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Dear Readers,

Gwich’in saw promise in the Arctic Council, when we applied for Permanent Participant status in 2002. As the most northerly First Nation in Canada, our communities are at the forefront of a changing climate. We also see the value of working across boundaries as our nation spans across artificial political borders, extending through the entire range of the Porcupine Caribou herd, from Alaska through Yukon and into the Northwest Territories. As we looked towards implementing our constitutional agreements of land claims and self-government and the decision-making responsibilities for the management of lands, waters, and wildlife, we knew we needed to be connected to the best science to augment the Indigenous Knowledge of our people to make these critical decisions. The Arctic Council provided this opportunity through its working groups and facilitated Gwich’in speaking directly on the international stage to the issues of vital importance to us.

This project is illustrative of the value that we saw in the Arctic Council. Gwich’in communities are powered by environmentally dirty and economically expensive diesel. There is a commitment of many of the Arctic states, as well as observers, to shift their power generation towards renewable sources. Gwich’in communities are aiming to do the same and in many instances, instead of being project partners, are acting as project proponents and are even owning the infrastructure and leasing it back to government or selling energy to the power corporation.

This Toolkit is an opportunity to bring together the best in circumpolar thinking on clean energy in a format that is easy-to-follow and accessible to Arctic residents, in that it facilitates deep thinking about clean energy in Arctic communities, but does not require Arctic residents to travel far from their communities to access training. The Toolkit is not prescriptive, but rather assists communities and clean energy champions across the Arctic, to have better discussions about their energy futures.

We are proud to have been able to see this project to fruition as it also marks an important milestone for GCI: it is the first project that we proposed and completed at the Arctic Council. We would like to thank our co-leads – the Government of Canada and the Kingdom of Denmark, for their generous support for this project.

Mahsi Cho,

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Co-Chair, Gwich’in Council International

Jordan Peterson
Deputy Grand Chief, Gwich’in Tribal Council

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Councillor, Vuntut Gwitchin First Nation
Arctic Council

The Arctic Council is the leading intergovernmental forum promoting cooperation, coordination and interaction among the Arctic States, Arctic communities and other Arctic inhabitants on common Arctic issues, in particular on issues of sustainable development and environmental protection in the Arctic.

The Ottawa Declaration lists the following countries as Members of the Arctic Council: Canada, the Kingdom of Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden and the United States.

In addition, six organizations representing Arctic peoples have status as Permanent Participants. The category of Permanent Participant was created to provide for active participation and full consultation with the Arctic peoples within the Council. They include: the Aleut International Association, the Arctic Athabaskan Council, Gwich’in Council International, the Inuit Circumpolar Council, Russian Association of Indigenous Peoples of the North and the Saami Council.

Observer status in the Arctic Council is open to non-Arctic states, along with inter-governmental, inter-parliamentary, global, regional and non-governmental organizations that the Council determines can contribute to its work. Arctic Council Observers primarily contribute through their engagement in the Council at the level of Working Groups.

The work of the Council is primarily carried out in six Working Groups.

- **The Arctic Contaminants Action Program (ACAP)** acts as a strengthening and supporting mechanism to encourage national actions to reduce emissions and other releases of pollutants.
- **The Arctic Monitoring and Assessment Programme (AMAP)** monitors the Arctic environment, ecosystems and human populations, and provides scientific advice to support governments as they tackle pollution and adverse effects of climate change.
- **The Conservation of Arctic Flora and Fauna Working Group (CAFF)** addresses the conservation of Arctic biodiversity, working to ensure the sustainability of the Arctic’s living resources.
- **The Emergency Prevention, Preparedness and Response Working Group (EPPR)** works to protect the Arctic environment from the threat or impact of an accidental release of pollutants or radionuclides.
- **The Protection of the Arctic Marine Environment (PAME)** Working Group is the focal point of the Arctic Council’s activities related to the protection and sustainable use of the Arctic marine environment.
- **The Sustainable Development Working Group (SDWG)** works to advance sustainable development in the Arctic and to improve the conditions of Arctic communities as a whole.
Sustainable Development Working Group

The SDWG plays the lead role in addressing the human dimensions of the Arctic within the Arctic Council. Maintaining a focus on the three pillars of sustainable Development – social equity, economic development, and environment protection – the working group encourages the generation and acquisition of new knowledge, capacity building, and innovative approaches to the unique challenges and opportunities in the Arctic.

Building self-sufficient, resilient, and healthy Arctic communities while protecting the environment, subsistence lifeways and cultural traditions is a primary goal of the working group.

Through undertaking cooperative, circumpolar-wide, projects and initiatives across a broad set of priority areas, the SDWG advances the sustainable development in the Arctic. The SDWG’s stakeholders are the Arctic communities, comprised of both Indigenous and non-Indigenous peoples.

Two subsidiary expert groups contribute to the work of the SDWG. The Arctic Human Health Expert Group pursues efforts to increase awareness and visibility of health concerns of circumpolar residents. The Social, Economic and Cultural Expert Group seeks to advance sustainable development across the arctic.

The SDWG seeks to meaningfully engage local communities and stakeholders in its work. The working group aims to provide decision-makers with knowledge-based information, derived from a combination of scientific data, Indigenous knowledge and local knowledge and to provide information through outreach and communication channel appropriate for its stakeholders. In this regard, the SDWG requires the integration of such knowledge into all of its projects and activities, as appropriate.

The SDWG strives to be a leading force for sustainable development in the Arctic. Through its regional leadership, it contributes to global sustainable development, efforts such as the UN Agenda 2030 Sustainable Development Goals (SDG) and to climate-change mitigation, and adaptation efforts such as the Paris agreement under the UN Framework Convention on Climate Change (2015). The adoption of Agenda 2030 in particular provides new momentum to enhance sustainable development activities relevant to the Arctic and resonates with the past, present and future work of the SDWG.
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INTRODUCTION

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Introduction

Each community in the Arctic is unique, with vast differences in geography, resources, and needs. However, maximizing the use of clean energy resources for affordable and reliable electricity, heating and transportation is consistently a priority across the Arctic.

High energy costs can be a big challenge for remote communities that are not connected by transmission or pipeline to a regional or national energy network. Electricity and fuel costs may take a large share of family income and may strain community or regional budgets. There are still many Arctic communities that rely almost exclusively on fossil fuels for electricity, heating and transportation. These fuels may come from local sources or may be shipped in by land, sea, or air – and those transportation methods bring more challenges and costs.

Effective integration of clean energy resources to achieve a locally attainable balance of affordability, energy security, environmental and public safety and economic viability continues to be a challenging problem.

Arctic communities cannot control many of the technical, economic and environmental challenges, nor can they control energy costs, such as the price of fuel and transportation. However, communities can explore ways to develop clean energy projects and lower their need for fossil fuels.

There is a growing need, desire, and opportunity for communities to develop clean energy projects in the Arctic. Renewable energy projects, energy efficiency and conservation initiatives can help reduce dependence on fossil fuels. For communities to successfully take on this type of work, they first need a solid plan – a Community Energy Plan (CEP) – to define their unique goals and priorities related to energy.

**TRANSMISSION**

Electrical transmission is the process of delivering electricity – usually over long distances – to local electricity grids in communities. Installing transmission lines to off-grid communities is often very costly and time intensive. For communities in difficult terrain or communities located far away from the national electricity grid, it is easier, more flexible and adaptable to local needs and conditions to provide a stand-alone off-grid electricity system.
The Arctic Community Energy Planning and Implementation (ACEPI) Toolkit was launched to support Arctic communities as they move through the community energy planning process. The goal is for Arctic communities to be able to carry out a CEP and create a path to a reliable and affordable energy future – with clean energy projects that align with community priorities, are technically sound, adhere to local energy regulations, and embrace local culture.

What is the Arctic Community Energy Planning and Implementation (ACEPI) Toolkit?

There is no substitute for local knowledge and capacity. External experts can offer valuable advice and support, but achieving benefits and creating social change from clean energy projects requires local leadership.

The goal of the Arctic Community Energy Planning and Implementation (ACEPI) Toolkit is to support Arctic communities, so that they feel confident and prepared to develop a Community Energy Plan and work on clean energy projects.

Using this Toolkit as a guide, your community will be able to create a vision and set achievable energy goals for the near and long-term. You will also acquire fundamental clean energy skills and knowledge; skills that will stay in the community and can continue to provide benefits.

This Toolkit is based on the experiences of communities across the Arctic. From their challenges and successes, we have identified best practices in community energy planning. The Toolkit includes activity guides, case studies, templates, worksheets, and strategies from these communities. It also includes resources for energy education and community capacity-building.

If you follow the Toolkit step-by-step and use the worksheets provided, you will have a Community Energy Plan by the end of the process. This CEP can be used as a roadmap to guide discussions and decisions related to energy and energy projects in your community.

If you have questions or comments about the Toolkit or need more information, please contact Grant Sullivan, Executive Director at Gwich’in Council International: gsullivan@gwichin.nt.ca or info@arcticenergytoolkit.com.
What is Community Energy Planning?

Community Energy Planning is a way to assess your community’s current energy situation and identify a path to reduce energy costs, reliance on fossil fuels, and greenhouse gas emissions. The path is based on your community’s needs and vision.

A Community Energy Plan (CEP) should be rooted in your community’s wants, but also grounded in the realities of the energy system. For example, after energy project options have been identified, it may become clear that the projects that would have the greatest impact are not affordable or are not supported by the community. A delicate balance must be struck between the needs and wants of individuals and groups in the community, and the realities of the energy system.

A CEP will help your community to:

- Understand their current energy use and costs
- Create strategies to increase energy efficiency and conservation
- Explore renewable energy opportunities
- Further reduce energy costs through programs and activities

To develop an implementable CEP, it is essential that your community be committed and willing to lead the CEP process. It is also important to have support from your local and regional governments, utilities and other partners. These partners can provide key resources, information, and support to develop and implement your CEP. Involving partners ensures that the goals of the CEP are realistic and in line with the resources available – funding, personnel, permits, regulations, etc.

Throughout the CEP process, you will also need to engage community members so that they can share their concerns and values about the community’s current and future energy state. This input and collaboration will guide the CEP process, creating a plan that truly reflects community values and priorities.

Every community is unique; therefore, each CEP will be distinct. There will be elements that are common to every plan, but your CEP will be tailored to your community’s priorities, knowledge, lifestyle, culture and landscape.
Benefits of Community Energy Planning

Think about the priorities that are most important to your community. Perhaps your list includes concerns like health, environment, education, housing, natural resources, food, water or employment. Your community may even have a strategic plan that addresses some of these priorities.

It is important that energy be a part of your community’s central or holistic planning efforts, as energy impacts so many different areas. A good energy plan not only makes electricity or fuel more affordable or clean; it also offers many other benefits. It can create jobs or businesses, reduce your community’s carbon emission footprint, help to build self-reliance, and save money for households and the whole community.

Whatever the community priorities are, the benefits of community energy planning may be too numerous to count! Many of the ways that energy planning intersects with community priorities are listed below.

**ECONOMIC DEVELOPMENT**
- Cost savings for community members
- Equity Partnerships
- Employment Opportunities
- Revenue Generation
- Business Development

**HEALTH & SAFETY**
- Healthy Homes
- Mental Health
- Clean Drinking Supply
- Energy Security
- Energy Independence

**EDUCATION & CAPACITY BUILDING**
- Project Readiness
- Capacity Retention
- Community Engagement and Sharing
- Transferable Skills
- Youth Education

**ENVIRONMENT & CLIMATE CHANGE**
- Clean Energy
- Smaller Carbon Footprint
- Responsible Stewardship
- Water Protection

**COMMUNITY INDEPENDENCE**
- Local influence over energy facilities
- Energy independence and security
- Community coordination and collaboration
- Chance to demonstrate leadership

*Figure 1. Benefits of Community Energy Planning*
A clear understanding of your community priorities provides valuable guidance when tough decisions need to be made or budgets need to be tightened. The CEP can also help the community judge if new opportunities fit with their priorities.

**What Resources are Required?**

Energy planning is important for communities of all types, sizes, financial resources, and capacity. The size and scope of the CEP will vary according to the community. Some plans are brief documents used to inform leadership; others are detailed plans with measurement and verification procedures and reporting protocols. Finances and resources are already stretched in many communities, so it is important to find a way to create a CEP without putting a heavy burden on the community.

The plan will lay the groundwork for clean energy projects for years to come, so a lot of thought needs to go into it before you even begin. Community Energy planning requires sustained effort by a [Community Energy Champion (CEC)](#) and an [Energy Team](#). They must be dedicated to the process.

**How Much Time is Required?**

Collecting information about the community’s energy landscape is the first step. This could take two to four months. The real work is during the community engagement period. If a lot of energy education, capacity-building, and discussion are needed, this stage could take six months to a year. Though it may seem long, the effort is worth it – community engagement brings a lot of value to the CEP.

Creating the community energy profile, evaluating the energy opportunities and writing the community energy plan will likely take between nine months to a year to complete.

Implementing a CEP may take longer. It will largely depend on the scope of the energy projects that have been prioritized. For example, building a hydro dam will take significantly longer than installing energy-efficient lights in the community centre.

It is best to find funding and other support before you launch the CEP process. This will make it easier for the community to dedicate time, effort and resources to the project. One person could be assigned to take on the job of writing grant applications for project funding and financing.
How do I use the Arctic Community Energy Planning and Implementation (ACEPI) Toolkit?

The Toolkit contains an array of resources and information, organized according to the ACEPI framework. This framework includes nine stages, from defining the local energy system, through to business planning and implementation. Take your time with each stage. The Toolkit provides worksheets, strategies and practical information for each one.

Your community may not need to follow all of the stages. The framework can be modified to meet individual community needs. Read the stages that are most relevant to you.

HERE ARE JUST A FEW WAYS THAT COMMUNITIES MAY CHOOSE TO USE THE ACEPI TOOLKIT:

1. As a comprehensive, end-to-end toolkit to steer a Community Energy Plan and Clean Energy Projects;
2. As a quick-start guide for specific planning and engagement activities associated with a CEP;
3. As a workbook for planning activities, capturing project data and analyzing results; and
4. As a reference following implementation of a Community Energy Plan, to evaluate the success of a project or process.
The ACEPI framework has two phases. Phase One (Stages 1-6) focuses on community energy planning, and Phase Two (Stages 7-9) focuses on the implementation of clean energy projects. These two phases are shown in different colours in the diagram below.

The framework is represented as a continuous cycle. This framework illustrates that once you have a complete plan, it is valuable to continue to revisit, revise and update it. Each stage has its own chapter in the Toolkit and is summarized below.

**STAGE 1**
Understanding Your Energy Landscape

**STAGE 2**
Choosing & Convening Your Energy Team

**STAGE 3**
Community Engagement and Energy Education

**STAGE 4**
Creating a Community Energy Vision

**STAGE 5**
Assessing Energy Needs & Resources

**STAGE 6**
Identifying Specific Energy Goals, Objectives & Projects

**STAGE 7**
Creating the Business Case

**STAGE 8**
Implementing Energy Project Plans

**STAGE 9**
Monitoring, Reviewing & Altering Plans

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**Figure 2.** Arctic Community Energy Planning & Implementation Framework
STAGE 1: Determining Your Energy Landscape
Before starting a CEP, it’s important to understand your energy system. This means researching the historical and current energy context, to ground the details of the Community Energy Plan in your local realities.

STAGE 2: Choosing & Convening Your Energy Team
A good Energy Team will include people with diverse skills and expertise who offer varied and valued knowledge. The core of your team should be drawn from among collaborators in the community, with support from local government and utilities, as well as partners and technical advisors.

STAGE 3: Community Engagement & Energy Education
This stage builds awareness of the opportunities for clean energy and the benefits they offer. Inspire members of the entire community – youth, elders, men, women, other partners – to get involved in clean energy by providing them with information, education, workshops and training, as well as opportunities for engagement.

STAGE 4: Creating a Community Energy Vision
Engage the community and the Energy Team to develop a long-term energy vision that is rooted in the community’s needs and wants. A common vision builds community support for the actions that follow.

STAGE 5: Assessing Energy Needs & Resources
Complete an assessment that details the community’s current and future energy needs and resources. The energy assessment will be guided by the community energy vision.
STAGE 6: Identifying Specific Energy Goals, Objectives & Projects

Based on the energy assessment and the vision, set energy goals (such as a target for reducing energy use) and identify possible clean energy projects. Projects may be ranked according to their alignment with the community vision, cost effectiveness, social acceptance and environmental impacts.

STAGE 7: Creating the Business Case

Once the community has decided on the priority projects, it is time to create business plans for each one. The business plans will assess the technical and economic feasibility of projects, ownership models, partnerships and their capacity for implementation.

STAGE 8: Implementing Energy Project Plans

This stage is focused on building the priority projects that are supported by a solid business case. In this stage, communities will finalize project agreements and proceed with construction, commissioning and operation.

STAGE 9: Monitoring, Reviewing & Altering Plans

The CEP should be treated as a “living document”. Sustained energy planning fosters community interest and understanding of the continuously changing energy landscape. It also offers the community the opportunity to adjust plans and timelines to accommodate changing situations and priorities.
READINESS CHECKLIST

Is your community ready to begin a Community Energy Plan? To find out, review the checklist below. These five things should be in place before you begin.

☐ There is someone in the community who has agreed to take on the role as the Community Energy Champion (CEC).

☐ The CEC has some funding to start the Community Energy Plan, and has a plan for how to get funding for the planning and implementation of ACEPI Stages 1-6.

☐ The CEC has time to commit to this project over 6-12 months, depending on the technical assessment timelines.

☐ Community leadership is supportive of a Community Energy Plan, and will participate where possible and beneficial to the project and community.

☐ The CEC is open to opportunities to collaborate with and learn from other Arctic communities that have done similar projects.
STAGE 1:
Understanding Your Energy Landscape

Image 1-1. ©Bill Williams
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The first step in creating a Community Energy Plan is to understand the energy systems or “landscape” around you. In Stage 1: Understanding Your Energy Landscape, we first cover the basics of energy systems, then look at the opportunities in your community. This means looking at energy programs and policies that will support community energy planning efforts in your region, and talking to people you may need to work with later in your energy planning process. The more accurate the information you gather, the better your plan will be.

The next step is to figure out what motivates your community to take action. Maybe they’re concerned about a clean environment or the cost of energy or its reliability, or healthy homes, or maybe all those things. You need to understand what’s most important to the people in your community, to bring people on board and get them interested in the energy work you will be doing.

Then, you can build on this knowledge about the energy systems and your community priorities, and plan how you will help the community understand the benefits of doing a Community Energy Plan (CEP).
Energy Systems Around You

Every day we interact with energy in many ways – whether it be turning on lights, heating our homes or fueling our vehicles. These are called energy services. These services bring significant benefits to our lives such as comfort, convenience, safety and general enjoyment. These benefits are called energy amenities. To satisfy our demand for energy services and amenities, we need energy systems that supply that energy to us.

An energy system begins with energy sources – diesel, wood, wind, solar, and more – and turns them into the energy services that help us do simple everyday tasks, like powering our computers and turning on hot water.

An energy system is a network of interconnected technology and infrastructure that converts energy sources into useable services in our homes and other buildings. The diagrams on the next page explain typical energy systems (electrical and heating) that people use every day.

Image 1-4. Distribution lines in Kodiak, Alaska, U.S. ©NREL

ENERGY SYSTEMS

An energy system is a network of interconnected technology and infrastructure that converts energy sources into useable services in our homes and other buildings. A remote community may have many energy systems running independently from each other. See Figures 3 and 4 for more information.
Energy Systems in Action

Here are some energy systems (electrical and heating) that people use every day:

**Figure 3.** Example of the energy system for electricity. Adapted from Primer on Energy Systems in Canada (Second Edition, 2016) to reflect Arctic community realities.

**Figure 4.** Overview of energy system for heating. Adapted from Primer on Energy Systems in Canada (Second Edition, 2016) to reflect Arctic community realities.
The energy we need to have amenities we love is known as the demand for energy. This demand is met by a series of services, commodities, and resources, known as the supply. Energy amenities are what we really want – comfort, convenience, access and enjoyment. We get those by using energy services such as heating and cooling, lighting, appliances and transportation. Energy commodities power the technologies that provide these services, and energy commodities are produced from energy sources.
Powering Energy Systems – The 3 Ps: Partners, Policies and Programs

In energy systems, different groups and organizations play different roles. These include setting energy policy, turning energy sources into energy commodities, selling energy services, and using energy (end-users). These different groups and organizations shape what energy infrastructure is built, how energy is sold, the cost of energy to consumers, and more.

Therefore, it is important that when creating an energy plan, all players are considered. Their work will influence your direction and decision-making, so you need to engage them in your energy planning process. When developing your energy plan, think about the 3 Ps of powering the energy systems: partners, policies, and programs.

The sections below explain the importance of the 3 Ps for the development of your community energy plan. The diagram on “Kodiak Regional Energy Plan – Community Profiles” on page 32 shows how these pieces fit together. On the next page you will find Worksheet 1-1, which you can use to identify who the different partners would be on your CEP and clean energy project(s).

**Partners**

As you begin, try to understand the roles, responsibilities and knowledge of various partners in the energy systems. For example:

**Local utility representatives** – The local utility will probably have information on energy use by customers and for community buildings. This will be very useful when you develop your CEP. Utilities also often know the opportunities in your energy systems, as well as the limitations.

**Government administrators with an energy focus** – Regional and national-level government administrators often have information about energy programs that can help you develop your CEP. They also likely have an energy strategy that looks at energy research, capacity-building, and deployment that may involve your region.

**Managers of Community facilities** – Building managers will have practical information about community infrastructure and energy practices in your community. They most likely have access to critical information such as utility bills, building square footage, and what measures the community has in place to save energy. These managers will be key to establishing programs to conserve energy and implement energy efficiency measures, once the energy plan is complete.

**Nearby communities** – Very likely there are nearby communities involved in energy initiatives or interested in getting involved. Reach out and learn from each other. If communities are close together, it may make sense to share resources and technical expertise or even do a joint regional energy plan.
### Examples of Partners

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<td>• Elected Officials and Policymakers</td>
<td>• Local Utility Representatives</td>
<td>• Community Members</td>
</tr>
<tr>
<td>• Community Leaders</td>
<td>• Local Facilities Managers</td>
<td>• Community Businesses and Industry, School</td>
</tr>
<tr>
<td>• Regional Energy Organizations</td>
<td>• Community Development and Land-Use Planners</td>
<td>Districts, Universities, and Other Large</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Institutions</td>
</tr>
</tbody>
</table>

**DIRECTIONS**

In each of the tables below, you can fill in the contacts for each of these categories, as well as adding your own rows for additional types of partners.

<table>
<thead>
<tr>
<th>STAKEHOLDER</th>
<th>NAME/TITLE</th>
<th>ORGANIZATION</th>
<th>CONTACT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LEADERSHIP</strong></td>
<td></td>
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<tr>
<td>Elected Officials and Policymakers</td>
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<tr>
<td>Community Leaders</td>
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<tr>
<td>Regional Energy Organizations</td>
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</tbody>
</table>
### WORKSHEET 1-1

<table>
<thead>
<tr>
<th>STAKEHOLDER</th>
<th>NAME/TITLE</th>
<th>ORGANIZATION</th>
<th>CONTACT INFORMATION</th>
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</thead>
<tbody>
<tr>
<td><strong>IMPLEMENTERS</strong></td>
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<tr>
<td>Local Utility Representatives</td>
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<tr>
<td>Local Facilities Managers</td>
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<td></td>
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<tr>
<td>Community Development and Land-Use Planners</td>
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<td></td>
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<tr>
<td><strong>END USERS</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Community Members</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Community Businesses and Industry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School Districts, Universities, and Other Large Institutions</td>
<td></td>
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</tbody>
</table>
Energy System Policies & Regulations

Energy regulations and policies provide guidelines and structure to energy systems. Governments set these policies to address issues such as energy production, distribution and consumption, as well as energy reliability, access and costs.

When framing your energy plan, you need to keep in mind the energy policies and regulations at the local, regional, and national level. It is often valuable to clearly describe how your CEP will meet government policy directives. Also, highlight how the plan will benefit others, even constituents and groups outside your community.
Having a favourable political environment in support of clean energy project development often makes much easier to gain support for creating and implementing a CEP. If it turns out there is not a favourable political environment, it often makes it quite difficult to implement projects and plans. For example, if your community is interested in becoming an independent power producer, but there is no policy in place in your region to help you do so, it makes developing projects that much more difficult. Be sure to read the specifics of each of these policies and regulations. Policies and regulations can be quite long, technical and daunting documents, so it often helps to get an outsider’s opinion or second review. Every country, state/territory/province has different policies and programs for clean energy project implementation. It is important to know which ones will impact your community projects and plans. Look for the policies and programs below to see if clean energy projects are supported in your region:

- **Renewable energy policies**
  Policies that require the increased production of power from renewable sources such as solar, wind, hydro, geothermal and biomass;

- **Net-metering policy**
  A policy that allows consumers to produce their own electricity and sell excess electricity to the local grid in exchange for a credit on their next bill;

- **Energy education programs**
  Programs to educate people of all ages about energy to help them use it wisely and understand their energy systems;

- **Energy conservation programs**
  Programs to help reduce energy use in homes and community buildings (including building retrofits);

- **Preference for local procurement**
  Puts a priority on local projects, suppliers, or companies, which creates and protects local jobs and the local economy;

- **Builds local skills and capacity**
  Support for local energy goals and for training local people to gain the knowledge and skills to help put community energy projects in place;

- **Carbon pricing policy**
  Puts a price on carbon dioxide emitted into the atmosphere and charges those who produce the emissions. Rewards those who reduce their greenhouse gas emissions; and

- **Independent Power Production (IPP) policy**
  Provides a way for utilities to purchase electricity from independent power producers.
CHECKPOINTS FOR A FAVOURABLE CLEAN ENERGY POLITICAL ENVIRONMENT

☐ There are renewable energy goals and policies.
☐ There is a net-metering policy.
☐ There are government, utility and/or community-run programs to support energy education.
☐ There are government, utility and/or community-run programs to support energy conservation.
☐ Some sort of carbon pricing policy is being considered or has been implemented.
☐ There is an Independent Power Production Policy.
Programs

Once you know the partners and policies in your energy systems, it’s time to look for the programs and financial resources to help you develop and implement your Community Energy Plan.

Think about the financial resources you need today to create your plan, but also look for programs that might support the projects your community may want to implement in the future. The most common reason Community Energy Plans fail is because they are created for the near-term without considering the long-term financial realities of implementing them.

Funding may come from utilities, regional or national government, local municipalities, not-for-profits or from the community itself. Talk to others to see if they know of energy programs and incentives available. Also look at your community budgets to see if they include funds for contractors and dedicated staff to oversee the development and implementation of the energy plan.

There is a table of clean energy funding programs that can be found in the digital resources which describe opportunities for funding in Alaska, USA, and northern Canada.

The next diagram shows how the main partners in a typical northern electricity energy systems interact. If each organization works effectively and delivers on the actions and policies noted in the boxes surrounding the diagram, you will have systems that can support real progress on clean energy. The interaction amongst partners may look slightly different in your region. It may be useful to draw out a diagram similar to this one showing how partners in your energy systems interact.
GOVERNMENTS

Set policy, regulations, and programs for:
- Clean energy development;
- Climate change action;
- Energy and infrastructure;
- Economic development; and
- Program and financial support.

ENERGY BOARDS/REGULATORS

Make decisions and set direction for:
- Electricity rates;
- Investments;
- Project contracts; and
- Project subsidies.

UTILITIES

Mandated by government and directed by the regulator to:
- Deliver electricity services;
- Ensure service reliability;
- Procure power; and
- Administer service contracts.

Figure 6. Regulatory, policy, and decision-making roles for energy systems under state/territorial/provincial jurisdiction.
Is Your Community Involved in Energy?

Energy is one of the biggest costs a community faces. It is central to community services including heat, electricity, and fuel delivery. Therefore, it’s very likely that your community is already engaged in energy initiatives of some kind. It is important to gain an appreciation and understanding of the community’s past and present experiences with energy. Research the community’s energy history and engage individuals who may have been involved, to garner early support for your planning efforts.

These documents may talk about energy in your community:

- Land-use plans;
- Comprehensive or official community plans;
- Community infrastructure development plans;
- Housing development plans;
- Sustainability plans;
- Natural resources plans;
- Waste management plans;
- Economic development strategies; and
- Specific clean energy project pre-feasibility or feasibility plans

If discussions on energy are scattered among too many documents, it can take away from the importance of energy planning in the community environment and often hinders implementation. By weaving energy into the official community plan, it prevents duplication in efforts across different community departments and allows for effective use of the resources available.

To see how these different plans might overlap and complement each other, look at the diagram on the next page.

The Teslin Tlingit Council and Village of Teslin in Yukon Territory, Canada, have done an excellent job at integrating energy into their official community development plans and working with the neighbouring municipality to do the work. Read more about their work in the case study on “Teslin Community Development Plan 2015–2025” on page 29.

In Stage 2: Convening Stakeholders and Creating an Energy Team, we will discuss how partners and groups in the community can be brought together to form your energy team and centralize community energy planning efforts.

A good energy plan will be woven into the official (or comprehensive) community plan. It will provide a roadmap for a sustainable future, with energy as a core component. If done correctly, this roadmap can work seamlessly with other planning efforts, but it’s important that it be central to community processes.
Possible Connections between a CEP and Other Community Plans

Figure 7. Connections between a CEP and other community plans.
THE DEVELOPMENT PLAN FOR THE VILLAGE OF TESLIN covers a wide range of priorities for the community, including projects relating to infrastructure, land use planning, economic diversification, recreation, and community & cultural development. Discussions around energy and sustainability can be found in many of these areas. Teslin has also done an excellent job integrating the concerns and values of the community into the planning process. They held a series of workshops to gather this input. These community ideas were then used to create the community values, which in turn helped in the entire planning process.

The plan highlights the sustainability principles that Teslin Tlingit Council and the Village of Teslin follow, as well as their goals and objectives for the plan. They announced their goals to eventually eliminate their unsustainable practices, reduce their dependence on fossil fuels, and make their energy system more diverse and sustainable.

A key way these goals are being addressed is by re-opening the sawmill and using the wood waste as fuel for a biomass-based community energy source. When they published the plan (2015), feasibility studies were just about to start for this project. As of 2018, the project is up and running and supplying heat to the community. Teslin is also reaching their goals through higher building standards, improved energy efficiency and promoting the integration of renewable energy.

The biomass project is a key component of their comprehensive community plan and capital works plan which they’ve had visually represented.
Understanding Community Energy Needs & Wants

The needs, wants and priorities of the community must be at the forefront of energy planning. It has been shown time and time again that processes that are driven “by the community, for the community” have a higher success rate. In Stage 3: Community Energy Education & Engagement, we will explore ways to engage and educate your community about energy, but for now begin by simply talking to people about their energy wants and needs.

Have conversations about energy with elders, youth, community leaders, neighbouring communities. Each group will offer a distinct perspective.

In this way, you will gain an understanding of the community’s thoughts and viewpoints on a clean energy future and what areas and problems they’d like to see addressed. You may also learn about people’s thoughts on the cost and affordability of energy, as well as the commercial and traditional relationship with the land, water, wildlife and plants. This information and these conversations will be an important part of gaining support from leadership and the general community around your community energy planning efforts. Through conversations, people can begin to understand the benefits of participating and how the process will address their needs and wants.
Developing A Community Energy Profile

Now that you have this background information, you can start to sketch out your community energy profile. This profile will be a picture of the energy landscape in your region. It will outline the partners that make up your energy systems; the policies and regulations that provide structure to the systems; the programs that support energy planning and implementation; your community’s past and present experiences with energy and your community’s energy needs and wants.

This profile will become more detailed as you continue the energy planning process. A full energy profile requires a deeper analysis of power and fuel bills, meters, community budgets and other technical components. This will be discussed in Stage 5. You may require external assistance from individuals with technical expertise. The final community energy plan will include items such as:

- **Housing Inventory**
  Occupied housing units (owned/rented), housing types, amount of homes, average home size, homes slated to be built in the future, energy efficiency and conservation initiatives in place;

- **Community energy consumption data**
  By energy source, household, and sector (buildings, transportation, industry);

- **Demographic profile**
  Population, percent change in population (over a specific time), average annual growth or decline;

- **Geographic profile**
  Longitude/latitude, elevation, land ownership, topography, environmental issues;

- **Lists of plans and reports about energy**
  Any plans that might be relevant to the success of the CEP;

- **Greenhouse gas emissions calculations**
  How much energy the community consumes that produces greenhouse gas emissions;

- **Economic and community capacity**
  Types of employment, unemployment levels, seasonal employment and skills and capacities of community members;

- **Recent energy-related developments in the community and broader region**
  Other developments or changes that might impact your CEP.

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**Image 1-14.** Eric Atagotaaluk, from Pituvik Landholding Corporation, talks about the Innavik Hydro Project — a medium-scale 7.5 megawatt hydro powered generation facility to be built on the Innavik River in Nunavik, Quebec, Canada. ©Lumos Energy
Kodiak Regional Energy Plan – Community Profiles

Alaska Energy Authority for the Kodiak Region, Alaska, U.S.

**THE KODIAK REGIONAL ENERGY PLAN** was part of a project led by the Alaska Energy Authority (AEA) to identify energy projects that would reduce the long-term cost of power and dependence on fossil fuels in Alaska. The process looked at the total mix of energy needs in the Kodiak region, including electricity, heating, and transportation. It also looked at all local and regional energy sources, including efficiency and conservation.

In Phase I of the project, the AEA worked with partners from community and regional organizations, residents, utilities, industry representatives, and other key stakeholders. They created **Resource Inventories** and **Community Profiles**. These helped them focus on the most technically feasible and economically realistic projects, given the region’s mix of energy resources and the current state of technology. This data was put into a visual representation of the community’s energy landscape, which gave a common base of information for all partners involved in the Project.

Samples of the Resource Inventory and Community Profile from Akhiok, a community in the Kodiak region. These documents display the community’s energy landscape in a very visual manner, including the utility fuel mix, asset management inventory, housing inventory, community energy consumption and demographics.
Organizing the Information

It’s good practice to develop a way to manage all your information, from the very start. You will need a way to organize and display information related to the plan, to allow the Energy Team to see the information clearly and to help you communicate data to a broad audience.

Adopt a standard way of reporting and keeping track of the CEP information. Establish practices that you and your community will feel most comfortable using. For a starting point, look at using an online database such as Google Drive, One Drive or Dropbox to allow you and the Energy Team to easily share information and collaborate. An energy activities and resources inventory (Worksheet 1-2) created by the US Department of Energy has been included as a reference. This inventory is a tool that communities can use to collect existing and potential government, community, and utility energy activities, including policies, projects and other relevant information.

Getting to ‘Yes’: Building the Value Proposition for Community Energy Planning

To get your community’s leadership onside with energy planning, you need to show how the plan will be of value to the community. Different values will speak to different people, so determine what is important to your community leadership and what motivates them to act. You can also include information you’ve collected from talking to community members about their specific energy wants and needs. Define and clearly articulate how the energy plan will reflect the community’s social, economic and environmental values, and how the CEP will likely contribute to other community priorities and goals. This is your “value proposition”.

Use clear language to help get your point across and give only the level of detail the leadership needs in order to say yes to proceeding with the project. Inundating them with pages and pages of information may be overwhelming and may not lead to the answer you want.
**WORKSHEET 1-2**

**Inventory of Energy Activities and Resources**

Use this input table to collect and record information for your inventory of existing and potential government, community, and utility energy activities, including policies, programs, and projects, and other relevant jurisdictional plans.

<table>
<thead>
<tr>
<th>Activity #</th>
<th>Activity Type</th>
<th>Activity Title</th>
<th>Who</th>
<th>What</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>Project</td>
<td>Implemented Energy-efficient Lighting Retrofits and Controls</td>
<td>Dept. of Public Works</td>
<td>Installed energy efficient lighting and motion sensor controls</td>
<td>2008</td>
</tr>
<tr>
<td>1</td>
<td></td>
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<td>10</td>
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<td></td>
</tr>
<tr>
<td>Where</td>
<td>Why</td>
<td>Costs</td>
<td>Savings/ Benefits</td>
<td>Next Steps</td>
<td></td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>---------</td>
<td>-------------------</td>
<td>------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Community Centre, TPAC, Adult Learning Centre, Community Office</td>
<td>Phase 1 of the community’s energy audit identified approximately $500,000 of cost-effective energy and water conservation measures, which were implemented between 2006 &amp; 2008.</td>
<td>$50,000</td>
<td>$20,000/ year</td>
<td>Continue to deploy efficient lighting in all community buildings, and conduct regular energy audits to identify more energy and cost saving projects.</td>
<td></td>
</tr>
</tbody>
</table>
The table below lists many benefits associated with energy planning and implementation. At the end of this stage, you will also find sample resources to help you build your value proposition to present to community leadership. These include a PowerPoint presentation, brochure, proposal template, timeline and budgeting resources, and a sample community energy planning resolution.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Summary of Benefits</th>
<th>What you Will Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>• Reduce GHG emissions</td>
<td>• Baseline energy and emissions inventory, including community-wide data on electricity and fuel consumption</td>
</tr>
<tr>
<td></td>
<td>• Reduce local pollution</td>
<td>• Summary of the largest contributing factors to GHG emissions</td>
</tr>
<tr>
<td></td>
<td>• Foster healthy ecosystems</td>
<td>• Projected local climate change impacts</td>
</tr>
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<td></td>
<td>• Increase efficient use of natural resources – sunlight, wind, water, wood.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Baseline energy and emissions inventory, including community-wide data on electricity and fuel consumption</td>
</tr>
<tr>
<td>Economic</td>
<td>• Reduce energy costs for homes and businesses</td>
<td>• Community-wide energy spending and spending projections</td>
</tr>
<tr>
<td></td>
<td>• Keep energy spending in the local economy</td>
<td>• Analysis of where energy spending goes (e.g., local businesses, local or regional government, federal government, or outside of country)</td>
</tr>
<tr>
<td></td>
<td>• Create high-quality, local green jobs</td>
<td>• Projected savings due to energy conservation measures</td>
</tr>
<tr>
<td></td>
<td>• Promote energy education and capacity-building in the community</td>
<td>• Spending on local distributed energy resources</td>
</tr>
<tr>
<td></td>
<td>• Attract and retain businesses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Capitalize on a growing clean technology market</td>
<td></td>
</tr>
<tr>
<td>Health &amp;</td>
<td>• Improve social connections</td>
<td>Baseline energy and emissions inventory, including community-wide data on electricity, natural gas and fuel consumption</td>
</tr>
<tr>
<td>Social</td>
<td>• Improve mental health</td>
<td>• Baseline studies on air and water quality</td>
</tr>
<tr>
<td></td>
<td>• Reduce heart disease and respiratory illnesses</td>
<td>• Records from medical officer of health</td>
</tr>
<tr>
<td></td>
<td>• Increase physical activity</td>
<td>• Avoided costs of diesel study</td>
</tr>
<tr>
<td></td>
<td>• Improve air quality (indoor and outdoor)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reduce healthcare costs</td>
<td></td>
</tr>
<tr>
<td>Resilience</td>
<td>• Improve access to reliable energy sources</td>
<td>Baseline energy and emissions inventory, including community-wide data on electricity, natural gas and fuel consumption</td>
</tr>
<tr>
<td></td>
<td>• Reduce exposure to energy price volatility</td>
<td>• Projected local climate change impacts</td>
</tr>
<tr>
<td></td>
<td>• Provide solutions for areas facing energy poverty</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Recognize local priorities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reduce the replacement cost of asset renewal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Promote northern resilience, self-sufficiency and independence</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Analyzing the widespread benefits of community energy planning. The Community Energy Implementation Framework, Getting to Implementation
If At First You Don’t Succeed...

If your proposal isn’t approved on the first try, there are still many steps you can take to advance clean energy in your community. First, you can rework your proposal after considering any suggestions from the community leadership. The most common reason for turning down the development of a CEP is that it appears to need a lot of capacity and money. While this may be true to some extent, there are many social, economic, and environmental benefits that make the time and investment to develop and implement a CEP worthwhile and the initial upfront investment can save the community money in the long run. Make sure these benefits are clearly articulated in your proposal.

If your CEP proposal is still not approved, there are still steps you can take. For starters, you can develop a short-term project plan which identifies current energy issues with buildings and other operations and what to do about them. You can identify areas to improve energy use with little cost, such as encouraging energy-saving behaviours. You can also run small energy education events in your community to provide community members with knowledge and information to conserve energy in their homes and offices. Once these smaller projects become a success, they will serve as proof that a larger plan will also bring substantive benefits.

You can also continue to promote energy initiatives, find allies in different organizations and look out for influential people in the community to engage with. The more people in the community that become invested and believe in the CEP, the greater the odds are that it will be approved in the future.

Tools & Resources

These additional resources are available on the USB stick included with the Toolkit, as well as on the ACEPI website:

- Community Energy Planning PowerPoint
- Community Energy Planning Brochure
<table>
<thead>
<tr>
<th>Summary &amp; Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have identified the partners and their roles in my energy systems;</td>
</tr>
<tr>
<td>I have at least an introductory understanding of government policies, regulations and programs for energy planning and implementation in my region;</td>
</tr>
<tr>
<td>I have assessed the political environment for clean energy planning and development and have identified any difficulties that may arise;</td>
</tr>
<tr>
<td>I have explored external funding and financing opportunities for near-term energy planning, and explored some of the long-term financial needs to implement the plan;</td>
</tr>
<tr>
<td>I have at least an introductory understanding of the community’s past and present experiences with energy;</td>
</tr>
<tr>
<td>I have started to have conversations with community members about their specific energy needs and wants;</td>
</tr>
<tr>
<td>I will encourage leadership to integrate energy planning into the official community plan;</td>
</tr>
<tr>
<td>I have created a value proposition to present to my community leadership;</td>
</tr>
<tr>
<td>I have created a system to manage the information for the energy planning process, that is suitable for my community.</td>
</tr>
</tbody>
</table>
Sample Project Proposal

Use the template below to start developing a project proposal for your own CEP. This template gives you a sense of the key features your proposal could include.

Project Proposal: Community Energy Plan

Background

Energy is a critical component of our community. With long winters and extreme cold, energy use can be very high compared to communities in the south. We cannot control some of these energy costs, such as the price of fuel and transportation. However, there are some things we can do to lower costs – especially by reducing the amount of fossil fuels needed for electricity and heat.

As you may be aware, energy costs currently account for approximately [X%] of our community budget. These are a significant expense for households and businesses in the community.

There is a growing need, desire, and opportunity for our community to develop clean energy projects. Renewable energy projects, energy efficiency and conservation can help reduce our dependence on fossil fuels. However, in order for our community to take on this type of work, we first need a solid plan – a Community Energy Plan (CEP) – to define our unique goals related to energy.

The purpose of developing a Community Energy Plan is to strategically assess our community’s current energy situation and identify a path to reduce energy costs and fossil fuel reliance, increase energy efficiency, and enable a shift to clean, local energy sources.

A good energy plan does not only make electricity and fuel more affordable or clean, it can also create jobs, help keep the environment clean, build community self-reliance, and save money for households and the community as a whole.

It is also important to realize that the benefits of community energy planning can be innumerable. A list of ways that energy planning intersects with many of our community priorities has been listed on the next page.
Objectives of the CEP
- Reduce our community’s reliance on fossil fuels;
- Reduce energy spending for households, businesses, and the community as a whole;
- Benefit from a growing clean technology market;
- Understand the current energy use and costs;
- Create strategies to increase energy efficiency and conservation;
- Explore renewable energy opportunities;
- Further reduce energy costs through other programs and activities;
- Address the needs and wants of the community;
- Reduce the community’s impact on the planet and local environment.

Scope of the Project
The Community Energy Plan can take many different approaches to improving the community’s energy landscape. The scope of work will be decided once the needs & wants of the community have been identified, and the energy resources have been assessed. Areas that will most likely be addressed include: housing efficiency, renewable energy projects, energy education, community involvement, energy conservation, and water use.
**Timeline**

*See Sample 1-2 for Sample Timeline*

**Project Budget**

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff time</td>
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</tr>
<tr>
<td>Experts/Consultants</td>
<td>$_______</td>
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<tr>
<td>Materials</td>
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<td>Community Engagement</td>
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<td>Feasibility Planning</td>
<td>$_______</td>
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<tr>
<td>Etc.</td>
<td>$_______</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>$_______</td>
</tr>
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**Key Stakeholders**

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Energy Champion</td>
<td>[name]</td>
</tr>
<tr>
<td>Energy Team Members</td>
<td>[name]</td>
</tr>
<tr>
<td>Utility/Organization Partner</td>
<td>[name]</td>
</tr>
</tbody>
</table>

**Monitoring and Evaluation**

There will be an Energy Team at the core of the planning of the Community Energy Plan, but the community will also be involved every step of the way. Government, organizations, utilities and technical advisors will be included during the development process. With all these stakeholders involved, the plan will be continuously monitored and evaluated to ensure it is on the right track. Once the plan has been created and is being implemented it will continue to be reviewed and updated.

**Approval Signatures**

[Name]
Community Energy Champion

[Name]
Leadership

[Name]
Leadership
Sample Community Energy Planning Resolution

Depending on your community, you may need a formal resolution passed by your community’s council/leadership to engage higher levels of government, apply for certain funding, and more. The template below is a very simple example of what this resolution might look like.

Community Energy Planning Resolution

Dated the __________________________ day of __________________________

Resolution No: __________________________________________________________________

Resolution of _______________________________________________ (Community’s name)

WHEREAS the Community Energy Plan is a strategic way to assess the community’s current energy situation and identify a path to reduce energy costs and fossil fuel reliance, increase energy efficiency and the conservation of energy, and enable a shift to clean, local energy sources;

WHEREAS the Community Energy Plan is a community-driven plan with the goal of benefiting the community in many regards;

WHEREAS the Community Energy Plan is developed to respect and uphold the rights of the community and the authority conferred or mandated to their representative bodies;

WHEREAS the Council hereby unanimously supports the proposal to create a Community Energy Plan;

THEREFORE BE IT RESOLVED that the _____________ community hereby accepts the development and implementation of the Community Energy Plan.

FURTHER IT BE RESOLVED that the Council designate ____________ as the Community Energy Champion to lead the planning process.

Date: __________________________________ Quorum: _______________________________

Mayor/Leader: __________________________________________________________________

Councillor: __________________________ Councillor: __________________________

Councillor: __________________________ Councillor: __________________________

Councillor: __________________________ Councillor: __________________________
The timing will vary greatly from community to community and project to project. The diagram below is an effective way to show the action timeline for your CEP process.

<table>
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<tr>
<th>Month</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month 1</td>
<td>Understanding Your Energy Landscape</td>
</tr>
<tr>
<td>Month 2</td>
<td>Community Energy Education</td>
</tr>
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<td>Month 3</td>
<td>Choosing Your Energy Team</td>
</tr>
<tr>
<td>Month 4</td>
<td>Engaging Stakeholders</td>
</tr>
<tr>
<td>Month 5</td>
<td>Implementing Energy Project Plans</td>
</tr>
<tr>
<td>Month 6</td>
<td>Creating the Business Plans</td>
</tr>
<tr>
<td>Month 7</td>
<td>Assessing Energy Needs &amp; Resources</td>
</tr>
<tr>
<td>Month 8</td>
<td>Developing Specific Community Energy Goals</td>
</tr>
<tr>
<td>Month 9</td>
<td>Engaging Stakeholders</td>
</tr>
<tr>
<td>Month 10</td>
<td>Creating the Business Plans</td>
</tr>
<tr>
<td>Month 11</td>
<td>Developing Specific Community Energy Goals</td>
</tr>
<tr>
<td>Month 12</td>
<td>Implementing Energy Project Plans</td>
</tr>
</tbody>
</table>

Sample Community Energy Planning Timeline
STAGE 2
Choosing & Convening
Your Energy Team
### STAGE 2 CONTENTS

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<td><strong>Activity Guide 2-4:</strong> Resource Assessment</td>
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<td><strong>Energy Team Agreement</strong></td>
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</tbody>
</table>
Choosing & Convening Your Energy Team

Now that you’ve completed your first steps, it’s time to bring people together to kick-start the community energy planning process. This stage will focus on who to involve, how to involve them, and their roles and responsibilities. In this stage, we also offer tips and resources to run your first community energy workshop, which may help you identify members of your Energy Team and other partners.

It is important to bring the key people together as early as possible. Engaging this core group at the beginning of your CEP will create a strong foundation to launch and sustain the planning efforts. It is equally important to have the backing of the community. To earn support, the Energy Team must have continuous dialogue and engagement with community members and provide them with resources, following the practices and culture of the community.

Key Roles on Your Energy Team

A good Energy Team will have people with diverse skills and expertise that offer varied and valued opinions. From the innovative thinkers to the people who turn ideas into action, they all must be dedicated to the energy vision (discussed in Stage 4). You may have already identified candidates for your Energy Team during the research you did in Stage 1.
There are several key roles on your Energy Team: a Community Energy Champion; an Energy Leadership Team; and Partners. You can also bring Technical support and Advisors into the process when you need them.

All of these roles do not need to be filled when you begin. Often, people will emerge to fill these roles during your first energy planning workshop and as the CEP process gets started. Creating a CEP takes dedication and collaboration and so it is important that members of the team be committed for the long-term.

Each community has different strengths and weaknesses. Understanding the capabilities of the community will help you be realistic about what you can expect from the community. This will help you determine what skill sets you need to bring in, to support the development of the plan.

The roles and responsibilities of each team member are described in the next section. On page 52, you can read about how a solid CEP team was a key piece of the success of the Nunatsiavut Energy Security Plan.

## Community Energy Champion

**Who:**

The Community Energy Champion (CEC) is a key role on the Energy Team. Finding someone or a few people to fill this position should be one of your first priorities. There should be at least one on-the-ground person to take on this role to drive the project on a daily basis. This person will be the point-person for a lot of the day-to-day work of the CEP. The CEC should be the link between the
community’s leadership, advisors, partners, and the community. The CEC role is often a part-time or full-time paid position. You may be able to find funding for this role through grants or community budgets.

The most important thing is that the individual is enthusiastic and passionate about the potential for a clean energy future in the community. It is important that this person live in the community — or at least nearby. They need to be very familiar with the community’s needs and culture before starting the CEP process. Having some sort of technical knowledge or expertise would be an asset but is not a necessity. A Community Energy Champion can come from a wide variety of educational backgrounds.

Roles & Responsibilities:
• Manage day-to-day tasks to complete the plan;
• Handle logistics and administration;
• Communicate with the Energy Team;
• Act as point-person between the community’s leadership, advisors, partners and community;
• Encourage others to get involved in the CEP process;
• Lead community engagement and energy education sessions;
• Plan meetings and key messaging documents;
• Keep the community informed about activities related to project planning, implementation and monitoring.

Energy Leadership Team

Who:
Almost all successful energy plans have a leadership team to drive and provide a clear top-down commitment to the project. When forming an Energy Leadership Team, try to find people who have the power to make important decisions, utilize funding, provide direction, and promote the project. The visibility of this leadership team is also very important, as they will be the public face of the project and help gain community buy-in and support. Without this leadership presence, it can be very difficult to implement recommendations from the plan.
When forming the Energy Leadership Team, it is important to find the right balance of people. Having people with political influence can be helpful, but they should not make up all of your Energy Leadership Team. Positions or organizations that could be part of the Energy Leadership Team may include local facilities managers, influential elders or leaders within the community, members of council, an economic development officer, housing authority representatives, energy-focused community administrator, commercial or residential energy users, etc.

Remember to consider the personalities of the Energy Leadership Team. For example, it is rarely helpful to have people on the team who are primarily interested in promoting their personal agenda. All team members must first be committed to the long-term energy goals of the community.

Roles & Responsibilities:
- Endorse the CEP process;
- Lend legitimacy, influence, and resources to the process;
- Offer support and input throughout the entire process;
- Promote community energy objectives;
- Serve as main decision-making group for the project.
Partners

Who:
Building relationships with a variety of partners will be imperative to the success of your plan. Partners can offer opinions, advice and services that may not be readily available otherwise.

There are four main ways partners can contribute to the CEP:
1. Influencing and promoting the plan’s goals;
2. Aiding in the planning process;
3. Informing and educating on a key topic area; and
4. Making a specific financial or content contribution to the plan.

Some of the most common partners include:
• Utilities
• Governments
• Universities or colleges
• Non-profit and community based-organizations
• Companies with expertise in Arctic energy

Whatever partners you choose, they must be willing to listen to and respond to the community’s needs, not the other way around. Their role is to offer guidance and suggestions, not to take over the entire process. You do not necessarily need a lot of partners. Assess where there are gaps in either your Energy Team or knowledge and determine where you need additional support.

Roles & Responsibilities:
• May provide funding to support development and implementation;
• Offer specific knowledge, resources, and expertise;
• Promote and use influence to advance community goals;
• Conduct research for the community energy plan or projects.

Technical Experts & Advisors

Who:
Throughout your CEP you will likely run into areas where you need technical expertise or outside advice that can’t be provided by your partners. Which experts you need will depend on your specific community and project-specific situation.

Start by identifying where your Energy Team and your partners have gaps and are missing certain skill sets. Then decide which technical experts or advisors you need to consult. You may need:
• Energy auditors to conduct energy assessments on buildings and homes;
• Legal advisors (to develop project agreements and financing mechanisms);
• A project financing firm (can be crucial to negotiating ownership of projects);
• Technical “on-the-ground” experts (to advise on a wide range of topics including hydrology, wind power assessment, fisheries, or environmental issues, a developer for a large renewable energy project).

Roles & Responsibilities:
• Provide a specific service related to the CEP
THE NUNATSIAVUT ENERGY SECURITY PLAN developed by the Nunatsiavut Government highlights the importance of having strong relationships and communication among all roles of your Energy Team. The plan adopted a sustainable development approach in addressing energy in the five communities of Nunatsiavut and covered all community infrastructure including housing and community facilities.

A key to the success of the plan was the Working Group that was established to develop and implement it. The purpose of this group was to ensure collaboration between the Nunatsiavut Government, the communities, provincial government, the federal government and the utility provider.

This group met on a quarterly basis to consider energy initiatives and policies for the region and determine the best ways to move forward to achieve the region’s energy goals. Another main responsibility of the group was to ensure the planning and implementation was on schedule and headed in the right direction. This working group was a great success because it allowed all key roles of Nunatsiavut’s Energy Team to come together and each share their own perspectives. Those who made up the working group brought varied and valued experience and offered expertise that ultimately enhanced the Energy Security Plan and grounded the plan in the provincial realities.

The working group for the Nunatsiavut Energy Security Plan included representatives from:

- Nunatsiavut Government (Leadership Team & Energy Champion)
- Lumos Energy (Advisor Group)
- Newfoundland & Labrador Hydro (Utility)
- Government of Newfoundland & Labrador (Provincial Government)
- Atlantic Canada Opportunities Agency (Funding Agency)
- Natural Resources Canada (Federal Government)
- Indigenous and Northern Affairs Canada (Federal Government)

Other contributors included representatives from the community leadership, local facilities managers, housing authority, and energy regulator.
When developing and implementing the CEP, you will run many kinds of meetings – strategy sessions, working group meetings, information-sharing, energy education sessions, relationship-building meetings, and so on.

A range of meeting structures and formats is needed to engage the community and other stakeholders and sustain their interest. In Stage 3: Community Engagement & Energy Education, we highlight some tools and techniques to create a great blueprint for every meeting. In this section, we focus on designing the first energy workshop and convening your Energy Team. It’s important that you choose a workshop approach that best fits your community. We offer a framework and suggested activities to help facilitate your first energy workshop. You can adapt them to fit your community’s unique situation.

**Collaboration Not Consultation**

Your goal is to create a space for people to truly collaborate and come up with ideas. If it seems that you already have a clear idea or plan and you simply want the community to accept it, you will probably not get the best result. Aim to create a CEP that is designed by the community, not for the community. Do your research before the first Energy Workshop but don’t get ahead and start on a plan. You want others to see that there is lots of room for their input and involvement.
Invite the Key People

The first energy workshop is not about engaging a lot of people, it’s about engaging the right people who will help kick-start your CEP. Invite a good balance of subject experts and community members. Choose people who bring a range of ideas, expertise and viewpoints. This diversity will help unlock important knowledge.

Acknowledge Accomplishments

It is very likely that your community has already engaged in energy initiatives over the years. Be sure to acknowledge these accomplishments during the first energy workshop. Invite people who have led energy initiatives in the community in the past to talk about their efforts.

Consider hiring a Facilitator to help run the energy workshop. Facilitators are impartial, non-biased and neutral third-party - they help make sure everyone has a chance to contribute, and they move the discussion along efficiently. They also drastically improve the likelihood of achieving your intended meeting goals.

Be Flexible

Energy workshops can take place in a single day or over several days, depending on your community’s needs and wants. Talk to others to see what formats and time allocations will work best for your community.

Image 2-9. Kugluktuk Beach in Nunavut, Canada, during the spring when snowmobile travel is possible on sea ice. ©Bill Williams
Energy Workshop Planning Timeline

Figure 10. Sample timeline for planning an Energy Workshop

Energy Workshop Objectives & Intended Outcomes

It is important to outline the objectives and intended outcomes at the beginning of the workshop planning efforts. If you have already started to form your Energy Team, ask them to provide direction to shape the workshop. If you have not formed your Energy Team, consider talking to others about the format and outline of the workshop.

The objectives of the workshop should be specific activities. These objectives should be grounded in the community’s energy landscape and the current capacity and needs of the community.

The intended outcomes are the measurement and evaluation of the activities. These intended outcomes are the expected result at the end of the workshop. The outcomes should make it possible for participants to walk away knowing what was accomplished, and also understand any next steps and follow-up mechanisms.

Sample Objectives & Intended Outcomes

Objectives:
1. Brainstorm key stakeholders, the relationship amongst stakeholders and who might become involved in the CEP efforts.
2. Gain an understanding of important community features (traditional hunting areas, community infrastructure, environmentally or culturally sensitive areas).
3. Generate ideas for clean energy solutions, projects, and planning efforts.
4. Discuss different ways to engage people of all ages within the community about energy.

Intended Outcomes:
1. Generate a map identifying most stakeholders in the community’s energy landscape and how they interact with one another.
2. Produce a visual representation of the community’s energy landscape.
3. Create a list of activities that the Energy Team is interested in pursuing as part of its CEP.
Sample Energy Workshop Agenda

Energy workshops require more than just experts and leaders in the room. There also needs to be a format to help promote information sharing and reflection and manage discussions. A good workshop will use a variety of methods to motivate and involve participants in different ways.

**Sample Workshop Agenda**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 min</td>
<td>Introductions &amp; Establishing Group Principles</td>
<td>Full Group</td>
</tr>
<tr>
<td>1 hour</td>
<td>Creating a Common Knowledge Base</td>
<td>Full Group</td>
</tr>
<tr>
<td>45 min</td>
<td>Stakeholder Mapping</td>
<td>Full Group</td>
</tr>
<tr>
<td>15 min</td>
<td>BREAK</td>
<td></td>
</tr>
<tr>
<td>1.5 hour</td>
<td>Community Energy Mapping</td>
<td>Small Groups</td>
</tr>
<tr>
<td>45 min</td>
<td>LUNCH</td>
<td></td>
</tr>
<tr>
<td>1 hour</td>
<td>Big Idea Generation</td>
<td>Full Group</td>
</tr>
<tr>
<td>15 min</td>
<td>BREAK</td>
<td></td>
</tr>
<tr>
<td>1.5 hour</td>
<td>Business Model Canvas</td>
<td>Small Groups + Full Group</td>
</tr>
<tr>
<td>1 hour</td>
<td>Resource Assessment</td>
<td>Full Group + Individual</td>
</tr>
<tr>
<td>30 min</td>
<td>Debrief &amp; Next Steps</td>
<td>Full Group</td>
</tr>
</tbody>
</table>
Introductions & Establishing Group Principles

Before you begin the workshop, consider setting up the room to display the agenda, the objectives and intended outcomes of the workshop. You may also choose to display these items along with group collaboration principles that are appropriate to your community’s cultural and political situation.

The following graphic shows a typical introduction sequence:

1. Introduce yourself
2. State the objectives and intended outcomes
3. Cover any administrative details
4. Review the Agenda
5. Create group collaboration principles
6. Explain the strategy to incorporate input
7. Facilitate group introductions

1. Start by introducing yourself and the Energy Leadership Team and explain the importance of the meeting. Thank everyone for coming.

2. Highlight the objectives and intended outcomes. Clearly outline what success will look like at the end of the workshop. Make sure these are written down somewhere where everyone can see them. It is important to give participants a clear understanding of what needs to be done.

3. Cover any administrative details particular to your meeting space or situation.

4. Review the agenda and explain the steps and how they will help achieve the intended outcome.

5. Share group collaboration principles, or have the group create their own. Make sure everyone agrees on how they will work together effectively, and that the principles are appropriate to your community. Here are some commonly used principles you can propose:
   a. Critique ideas, not people
   b. Be positive, non-judgmental and open to new ideas
   c. Be brief when voicing your opinion
   d. Everyone participates, no one dominates
   e. All ideas are valid

6. Explain how you will create a record of the input throughout the workshop. The people in the room will be your allies in the community energy planning process, so it is important that they see that their input is valued.

7. Rather than go around the room and have everyone say their name and their job title, it may be worth spending a bit more time on introductions that help people learn more about each other. Consider facilitating an introduction to help people feel comfortable.
Create a Common Knowledge Base

Some participants may understand the community’s energy landscape and have an idea of what a clean energy future could look like for the community. Others, however, may be getting involved in the energy conversation for the first time. Consider giving out some documents a couple of weeks before the workshop for participants to read. This should help create a common knowledge base, save time during the workshop, and keep discussions grounded in current energy landscape realities instead of blue-sky ideas.

After completing Stage 1: Understanding Your Energy Landscape, there is a good chance you have a lot of the reading materials already prepared. As an example, you could use the ‘Understanding your Energy System’ graphics on pages 17-18. Create a chart that displays the partners involved in the energy systems, the policies and regulations that provide structure to the systems and the programs that support energy planning and implementation on pages 19-25. Share the community’s past and present experiences with energy (page 25) and any information you’ve obtained for the Community Energy Profile Map including: utility fuel mix information, housing inventories, demographic profiles, etc. (page 31). Finally, share the value proposition you’ve created for the CEP (page 33).

Make sure this information is shared in a useable and digestible manner. Too much information can be overwhelming and discourage participants from reading any of the materials. Try to make documents very visual and avoid sending more than 10-15 pages of reading material in advance of the workshop. Also, try to use common language and be sure to define all unfamiliar terms.

Some examples of information that you can share and how this could be packaged is included in the digital resources.
Image 2-10. Traditional boat sits on the shore of Teslin Lake, Yukon Territory, Canada. ©Bill Williams
DURATION
45 minutes

OUTCOMES
By the end of the activity, you will have:

• Identified most stakeholders in your community’s energy landscape.
• Identified how stakeholders interact with one another in the energy systems in your community.

SUPPLIES
- Sticky notes
- Permanent Markers
- Pencils
- Chart Paper

ABOUT
Stakeholder engagement will be imperative throughout the entire development of your Community Energy Plan.

Make sure the right players are informed and involved from the very beginning of your CEP.

This brainstorming activity will help you determine project stakeholders, the relationships amongst stakeholders, and how stakeholders might be involved in your CEP.

DIRECTIONS
1. Using sticky notes, ask participants to identify all stakeholders who might be interested in energy planning. These stakeholders could be: participants at the workshop, elders, community organizations, government, utilities, council, youth, and many other groups or individuals.
2. For every stakeholder, add another sticky note describing how they are involved in the energy systems or could contribute to the CEP process.
3. Arrange the notes into any theme or patterns that you can identify.
4. Draw and label lines between the groups or individual stakeholders to represent existing relationships, influence, funding, etc.
STAGE 2
Choosing & Convening Your Energy Team

ACTIVITY GUIDE 2-1
STAKEHOLDER MAPPING

1. **STAKEHOLDER MAPPING**
   Step 1: Identify Interested Parties

2. **STAKEHOLDER MAPPING**
   Step 1: Identify Interested Parties

3. **STAKEHOLDER MAPPING**
   Step 3: Arrange Groups by Interest/Contribution

4. **STAKEHOLDER MAPPING**
   Step 3: Relationship, Influence, Funding, etc.
Community Energy Mapping

In Stage 1: Understanding Your Energy Landscape, we talked about the importance of understanding the energy systems in the community. Energy is central to community services including heat, electricity and fuel delivery, and therefore central to your community’s infrastructure, and its economic, social and environmental conditions.

Using maps is a good way to talk about the environment and community infrastructure. You may want to make digital maps using programs such as geographic information system (GIS) software or you may choose to use printed maps.

This mapping exercise will help you create a visual representation of the community’s energy landscape and will provide a common base of information for everyone attending the workshop. Through this exercise, everyone will gain a better understanding of the community’s asset management inventory, housing inventory, demographic profile, geographic profile (traditional relationship with land, water, wildlife, plants), economic and community-capacity information, recent energy-related development in the community and the broader region (see page 63 for further details).

If your community has already been involved in comprehensive community planning, land use planning or other planning related activities, then you may have most of the information you need to form your community energy map. Start by talking to people within your community’s administration office and see what plans and maps already exist. Depending on how recent the information is, you may still want to facilitate this type of activity to see if new information is brought forward.
COMMUNITY ENERGY MAPPING

ABOUT
The goal of this exercise is to give a visual overview of how energy plays a critical role in the community. This will be done by combining maps of the community and its surrounding area with aerial photos, information from the participants, and the research results from Stage 1.

DIRECTIONS
1. Spread topographic maps out with the tracing paper over top. Tape down the tracing paper to keep it in place over the map. An alternative to tracing paper is to write and draw directly on the maps.
2. Trace (or show additional map layers if using GIS) key features as a reference on the tracing paper (e.g. distribution lines, landmarks, buildings, home waterways, traditional hunting areas, environmentally or culturally sensitive areas, etc.).
3. Provide sticky notes to participants and invite them to provide additional information about the community and surrounding area directly on the map(s).
4. Add any relevant information from Stage 1 research.
5. The combination of all of these will form your Community Energy Map.

SUPPLIES
- Topographic Map(s)
- Aerial Photos
- Tracing Paper
- Sticky Notes
- Pencils
- Markers
- Tape

OUTCOMES
- Offer an overview of important features, landmarks, and points of interest in and surrounding your community.
- Facilitate knowledge-sharing throughout the community.

Having the right combination of people at the workshop is key so that all perspectives are shared during this exercise.

Image 2-12. Participants in the 20/20 Catalysts Program take part in a community energy mapping session. © 20/20 Catalysts Program
BIG IDEA GENERATION

DURATION
45 minutes – 1 hour

OUTCOMES
By the end of this activity, you will have:

• Identified many key components of your CEP.
• Identified many ideas that could be further explored in the CEP.
• Explored and validated ideas generated by people at the workshop.

SUPPLIES
☐ Sticky Notes
☐ Pens
☐ Pencils
☐ Chart Paper

ABOUT
This activity will encourage people to share all their ideas for clean energy solutions, projects, planning and collaborations. Everyone will have a chance to offer suggestions. These ideas will be discussed as a group and organized, and then the group will decide which ideas should move ahead for further study.

DIRECTIONS
1. Divide the group into small groups or pairs. Smaller groups ensure that everyone has a chance to express their ideas.
2. Using sticky notes, have them rapidly brainstorm possible ideas for the community’s clean energy future.
3. Continue to add more sticky notes which elaborate or explain the original idea in greater detail. Do this for all ideas offered. Try not to disregard ideas when they are first offered. Include them all. Once the group comes back together, all ideas can be discussed.
4. Reconvene the whole group and share what ideas have been discussed.
5. Organize similar ideas in clusters. Evaluate which ideas are important and feasible before diving into the details.
6. Use “Dotmocracy” – give participants 3–5 dots each and ask them to vote on their favourite ideas. Ideas with the most votes should be considered high priority for the Energy Team to explore further.
7. Use the Business Model Canvas to flesh out ideas further (see template on page 63).

Image 2-13. ARENA participants examining a map of the Yellowknife Power System, Northwest Territories, Canada. ©SDWG
Divide the group into small groups or pairs.

Reconvene the whole group and share what ideas have been discussed.
DURATION
40 minutes – 1 hour – this can also be done as an individual reflection.

OUTCOMES
By the end of this activity, you will have:

• A list of partners that have outlined their capabilities and their willingness to support an idea.

• The group will have identified any gaps in capacity or skill set in the community on the Energy Team. Technical Experts or Advisors may be needed to fill these gaps.

SUPPLIES
- Sticky Notes
- Pens
- Pencils
- Chart Paper
- Resource Assessment Sheets (Found in Tools & Resources)

ABOUT
In Activity 2-3, you will have developed many ideas to think about pursuing as part of the CEP. The next step will be to determine where and how the stakeholders can help with the creation of your energy plan.

For this activity, focus on the stakeholders that are present at the workshop. The goal is to involve the right people with the right skills to help with potential priority ACEPI projects.

The Resource Assessment sheet can also be sent to stakeholders who were not present at the workshop after they have been updated on all the discussions.

DIRECTIONS
1. On the Resource Assessment worksheet, write out all the ‘big ideas’ the group agreed upon in the previous exercise.
2. Ask the group to try and identify what capabilities or resources are needed to complete each ‘big idea’.
3. Hand out Resource Assessment sheets, and ask each participant to fill in what big ideas they’re willing to help with, what capabilities or skills they can provide, and what level of support or role they can see themselves in.
RESOURCE ASSESSMENT

BIG IDEAS
- Distributed Energy
- SMART GRID
- Protect Sacred Local Sites
- Community Driven Decisions
- Community Ownership
- Create Permanent Jobs

CAPABILITIES NEEDED
- Technical Research
- Funding Research & Application
- Elders to share traditional knowledge
- Community Engagement Leadership
- Financial Cost-Benefit in Project Planning

ROLES IDENTIFIED
- Technical Engineer
- Facilities Manager
- Community Energy Champion
- Elders Committee
- Community Engagement Officer
- Youth Council
- Community Council Leadership

Image 2-14. ARENA participants examining a map of the Yellowknife Power System, Northwest Territories, Canada. © SDWG
Debrief And Next Steps

Reviewing the meeting and discussing next steps are essential components of the energy workshop. Debrief discussions allow participants to draw connections among the topics that have been covered in the workshop. Debrief discussions also help people retain the information they’ve learned throughout the process.

During the debrief, leave time for participants to reflect on the workshop objectives and intended outcomes. Ask them: What has been accomplished throughout the day? What questions remain? What outcomes were not achieved, and who should be involved to help complete them?

Before closing the workshop, be sure to establish next steps. Discuss how follow-up materials will be circulated to participants, create guidelines and ongoing communications for the group, and make sure everyone has a clear understanding of what needs to be done next.

Tools and Resources

- Resource Assessment Template
- Business Model Canvas Template
- Examples of materials for creating a common knowledge base before your first Energy Workshop

SUMMARY & CHECKLIST

☐ I have chosen at least one on-the-ground person to take on the Community Energy Champion role to drive the project.

☐ I have found committed individuals to be part of my Energy Team, to provide direction and make important decisions regarding the project.

☐ I have spoken to potential partners who could assist my community in completing the Community Energy Plan.

☐ I considered workshop and convening approaches that were most suitable for my community.

☐ I have organized the first energy workshop and convened my Energy Team.
### Big Ideas: Business Model Canvas

<table>
<thead>
<tr>
<th>Key Partners</th>
<th>Key Activities</th>
<th>Key Propositions</th>
<th>Cost Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who are our Key Partners? What resources and input are we receiving from them? What activities do they perform?</td>
<td>What Key Activity does our Value Proposition require? What are the first priorities?</td>
<td>What value do we deliver to the community? What problems do we solve? What needs and wants are we satisfying?</td>
<td>What are the most important costs in our business model?</td>
</tr>
</tbody>
</table>

Adapted from IDEO - The Field Guide to Human Centred Design
<table>
<thead>
<tr>
<th>Roles I will take on</th>
<th>Capabilities Needed</th>
<th>“Big Ideas”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>
Sample Invitation to Participate at the First Energy Workshop

The invitation below can be used as a formal letter, email or newsletter depending on your community’s norms. The invitation could come from the Community Energy Champion or a member of the Energy Team. The template can be adapted accordingly for your needs and scope of work.

Dear [Name],

We would like to invite you to attend our upcoming energy workshop on [Date – day/month/year]. This is a by-invitation-only workshop to guide the development of our new important initiative called the [Community Name] Community Energy Plan. This workshop will provide strategic guidance and direction to our Energy Team to develop an energy plan for our community.

Energy is a critical component of our community. With long winters and extreme cold, energy use can be very high compared to communities in the south. We cannot control some of these energy costs, such as the price of fuel and transportation. However, there are some things we can do to lower costs – especially by reducing the amount of fossil fuels needed for electricity and heat.

As you may be aware, energy costs currently account for approximately [X%] of our community budget. These are a significant expense for households and businesses in the community. The purpose of developing a community energy plan, is to strategically assess our community’s current energy situation and identify a path to reduce energy costs and fossil fuel reliance, increase energy efficiency, and enable a shift to clean, local energy sources.

With this information, we invite you to attend our first energy workshop. We hope you can attend.

Thank you, in advance, for considering the invitation. [Community Energy Champion Name], [Title],[Entity] will call in a few days to discuss your attendance at the workshop.

With warm regards,

[Community Name] Energy Team
Energy Team Agreement

Consider drawing up and ratifying a team agreement for the Energy Team. Having a written agreement assures that the team understands what is expected of them and helps avoid confusion. Consider having members sign the Agreement as an assurance of their understanding and commitment to the process.

The following are suggested elements of an effective Energy Team Agreement:

1. **Date of Signing**
2. **Team Statement of Objective**
   - Consider stating objective in terms of deliverables, and services to be provided
3. **Team Members**
4. **Project Scope**
5. **Specific Roles and Responsibilities**
   - Include Community Energy Champion and Energy Team Members
   - These might include formal task assignments or more general skill categories
6. **Communication Plans**
   - Internal and external
   - Who, what, when, in what form
7. **Team Ground Rules**
   - May include commitments to participate in meetings, on-time commitment, internal meeting behaviours, etc., as determined by the group
8. **Decision-making Rules**
   - Process by which decisions/recommendations will be reached – consensus, majority, etc.
   - Who acts as arbiter in the case of disputes
9. **Empowerment Level** – a clear articulation of the role of the Team relative to final authorization of actions. For example:
   - Holds final authority to empower action without consulting others
   - Has authority to make final recommendations to others, but not empower action
10. **Process for Feedback on Team Effectiveness**
STAGE 3
Community Engagement and Energy Education
<table>
<thead>
<tr>
<th>Page</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
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<td><strong>Community Engagement and Energy Education</strong></td>
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<tr>
<td>77</td>
<td>Introduction to Community Engagement</td>
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<tr>
<td>80</td>
<td>Planning for Engagement Success!</td>
</tr>
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<td>80</td>
<td>Communicating Project Changes to the Community</td>
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<td>81</td>
<td>Community Engagement Planning</td>
</tr>
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<td>82</td>
<td>Identifying Community Groups</td>
</tr>
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<td>83</td>
<td><strong>Worksheet 3-1</strong>: Identifying all Community Groups</td>
</tr>
<tr>
<td>84</td>
<td>Prioritization of Community Group Relationships</td>
</tr>
<tr>
<td>86</td>
<td><strong>Worksheet 3-2</strong>: Identifying Community Group Priority for Community Engagement Planning</td>
</tr>
<tr>
<td>87</td>
<td>Creating a Community Engagement Strategy</td>
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<td>88</td>
<td><strong>Worksheet 3-3</strong>: Community Engagement Strategy Development</td>
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<td>Information for Community Engagement</td>
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<td>Selecting Community Engagement Methods</td>
</tr>
<tr>
<td>97</td>
<td>Community Engagement: Failing to Plan is Planning to Fail</td>
</tr>
<tr>
<td>99</td>
<td><strong>Case Study</strong>: Inukjuak Community Radio Segments</td>
</tr>
<tr>
<td>100</td>
<td><strong>Case Study</strong>: Dokis Community Energy Fair</td>
</tr>
<tr>
<td>101</td>
<td>Community Engagement Scheduling</td>
</tr>
<tr>
<td>102</td>
<td><strong>Worksheet 3-4</strong>: Assessing Feasibility and Impact of Engagement Tools</td>
</tr>
<tr>
<td>103</td>
<td><strong>Worksheet 3-5</strong>: Impact/Feasibility Matrix</td>
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<td>104</td>
<td><strong>Worksheet 3-6</strong>: Community Engagement Schedule</td>
</tr>
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<td>105</td>
<td>Feedback during Community Engagement</td>
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<td>107</td>
<td><strong>Sample 3-1</strong>: Community Engagement Feedback</td>
</tr>
<tr>
<td>108</td>
<td>Planning Checklists for Community Engagement Activities</td>
</tr>
<tr>
<td>109</td>
<td>Introduction to Community Energy Education</td>
</tr>
<tr>
<td>110</td>
<td>Community Energy Education Planning</td>
</tr>
<tr>
<td>110</td>
<td>Youth Energy Education</td>
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<td>112</td>
<td>Tools for Youth Energy Education</td>
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<td>----------------------------------</td>
</tr>
<tr>
<td>113</td>
<td><strong>Activity Guide 3-1:</strong> Pinwheels</td>
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<tr>
<td>114</td>
<td>Introduction to Renewable Energy: Wind, Solar Heat and Solar PV</td>
</tr>
<tr>
<td>117</td>
<td><strong>Activity Guide 3-2:</strong> Energy Collage</td>
</tr>
<tr>
<td>119</td>
<td>Which of these things use electricity? What other types of energy do they use?</td>
</tr>
<tr>
<td>120</td>
<td>Other Kits and Resources for Sale</td>
</tr>
<tr>
<td>121</td>
<td><strong>Activity Guide 3-3:</strong> Playing with Energy</td>
</tr>
<tr>
<td>124</td>
<td><strong>Activity Guide 3-4:</strong> Energy Investigation</td>
</tr>
<tr>
<td>124</td>
<td>Notes and Observations</td>
</tr>
<tr>
<td>126</td>
<td><strong>Activity Guide 3-5:</strong> Energy Conservation vs Energy Efficiency</td>
</tr>
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<td>127</td>
<td>Conservation vs. Efficiency</td>
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<td>128</td>
<td><strong>Activity Guide 3-6:</strong> Solar Oven</td>
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<tr>
<td>138</td>
<td><strong>Activity Guide 3-7:</strong> Energy Efficiency and Conservation Action Plan</td>
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<td>140</td>
<td>Adult Energy Education</td>
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<td>141</td>
<td><strong>Activity Guide 3-8:</strong> Clean Energy Passport</td>
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<td>142</td>
<td><strong>Activity Guide 3-9:</strong> Clean Energy Jeopardy</td>
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<td>144</td>
<td><strong>Activity Guide 3-10:</strong> Clean Energy Bingo</td>
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<td>147</td>
<td><strong>Activity Guide 3-11:</strong> Traditional Dwellings</td>
</tr>
<tr>
<td>150</td>
<td><strong>Activity Guide 3-12:</strong> Diesel and Gasoline – Energy Heavyweights</td>
</tr>
<tr>
<td>152</td>
<td><strong>Activity Guide 3-13:</strong> Filling the Cupboard and Freezer for the Winter – How Much Energy is Needed?</td>
</tr>
</tbody>
</table>
Community Engagement and Energy Education

Introduction to Community Engagement

In Stage 2, we focused on convening and educating your Energy Team; working with the influencers and people that will be involved with the development and implementation of the CEP project. Stage 3: Community Engagement and Energy Education, is focused on working with the broader community. All projects in your CEP will impact people in your community, of all ages and backgrounds. It is important that they have a clear understanding of the efforts that will take place.

Engagement early in the project development process, and often, will usually help prevent delays and challenges later. It is good practice for the Energy Team to come up with techniques and strategies to involve and educate the community from the very beginning. This stage will focus on these techniques and strategies and will provide examples of community engagement education activities that can be used in your community.
Putting Community Engagement into Action

The diagram below offers some tips for successful community engagement and advice on how to work these tips into your planning for each event or activity.

**CAREFUL PLANNING AND PREPARATION**
Ensure that the design, organization and implementation of the engagement activities serve both a clearly defined purpose and the needs of the participants.

**INCLUSION AND DEMOGRAPHIC DIVERSITY**
Ensure that people of all ages, backgrounds and experiences within the community are invited and encouraged to participate and share voices, ideas, and information, to lay the groundwork for quality outcomes and meaningful community projects.

**COLLABORATION AND SHARED PURPOSE**
Support and encourage participants, leadership, elders, businesses and others to work together to advance the CEP towards a clean energy future for the community.

**OPENNESS AND LEARNING**
Help all involved listen to each other, explore new ideas, and learn without the limits of predetermined outcomes. Allow people time to learn and apply information in ways that generate new options, and rigorously evaluate public engagement activities for effectiveness.

**TRANSPARENCY AND TRUST**
Be clear and open about the process, and provide a public record of the organizers, participants, outcomes, and range of views and ideas expressed.

**IMPACT AND ACTION**
Ensure each community member’s participation has real potential to make a difference, and that participants are aware of that potential.

**SUSTAINED ENGAGEMENT AND PARTICIPATORY CULTURE**
Promote a culture of participation with programs and institutions that support ongoing quality community engagement.

*Figure 11. Key factors of Successful Community Engagement*
Everyone has roles and responsibilities in a community engagement session. Whether it be the Energy Team running the event, or the community members attending, it is important for everyone to understand the importance of their participation. You can highlight these roles and responsibilities by creating space in the agenda to talk about them. Some examples are outlined below:

**Responsibilities of the Energy Team**
- Ensure that **MATERIALS ARE CLEARLY PRESENTED, BALANCED AND UNDERSTANDABLE** for the community
- Ensure that **COMMUNITY IN THIS PROCESS LEADS TO BETTER DECISIONS**
- Ensure that the processes in ACEPI are followed with **TRANSPARENCY AND OPENNESS WITH THE COMMUNITY**
- Ensure that Community **ENGAGEMENT ACTIVITIES ARE INCLUSIVE AND ACCESSIBLE**
- Ensure that **MATERIALS ARE CLEARLY PRESENTED, BALANCED AND UNDERSTANDABLE** for the community
- Ensure that **PARTICIPANTS ARE AWARE OF THEIR RESPONSIBILITIES IN THE ENGAGEMENT PROCESS** and support participants to fulfill those responsibilities
- Foster long-term **RELATIONSHIPS BASED ON MUTUAL TRUST AND RESPECT**
- Ensure that project **REPORTING ACCURATELY REFLECTS ALL THE FEEDBACK** received
- Ensure decisions and recommendations **ACKNOWLEDGE THE NEEDS, VALUES AND DESIRES OF THE COMMUNITY**

**Responsibilities of the Community**
- **PURSUE COMMUNITY ENGAGEMENT** with the belief that community involvement leads to better decisions
- **FOCUS ON THE DECISION** to be made or the question to be answered
- **RECOGNIZE THE NEEDS OF THE WHOLE COMMUNITY**
- **STRIVE TO REACH SUSTAINABLE SOLUTIONS**
- **LISTEN TO UNDERSTAND** the views of others
- **IDENTIFY CONCERNS** and issues early in the process
- **PARTICIPATE OPENLY, HONESTLY AND CONSTRUCTIVELY** offering ideas, suggestions, alternatives
- **WORK IN THE PROCESS IN A TRANSPARENT, RESPECTFUL AND COOPERATIVE MANNER**
- **ENCourage OTHERS to become engaged, and offer input to the project and engagement activities**
- **PROVIDE CONTACT INFORMATION** as requested, to receive updates about the community engagement process

*Figure 12. Responsibilities of the Energy Team and Community during Community Engagement*
Planning for Engagement Success!

It is disappointing to plan and host an event that people don’t attend! To attract participants and make sure the event runs smoothly, remember to keep in mind some of the practical reasons people might not participate. In Figure 13, you’ll see a list of some of these barriers to engagement, along with possible solutions.

Communicating Project Changes to the Community

Project plans can change at any point during the ACEPI process and for any number of reasons. These might include a change in funding, change of staff, sudden change of external partner, etc. It is important for the Energy Team to assess how such changes might impact the project and then tell the community about these changes and impacts. Depending on the nature of the change, only small updates may be required – e.g. a post in the newsletter or on the website. For big changes and impacts, you may need to organize dedicated community engagement sessions. This approach applies to both positive and negative changes because each one will impact the overall project.

Figure 13. Barriers and Solutions for Community Engagement. (right)
Community Engagement Planning

It is a good idea to work with your Energy Team to create a Community Engagement Plan for the community. Consider having a special planning workshop for the Energy Team, to develop your strategy. A sample workshop agenda with activity guides has been provided below.

Sample Agenda for Energy Team Workshop

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 min</td>
<td>Review of the Agenda and Overview of Topics</td>
<td>Full Group</td>
</tr>
<tr>
<td>1.5 hour</td>
<td>Identifying Community Groups</td>
<td>Full Group</td>
</tr>
<tr>
<td>15 min</td>
<td>BREAK</td>
<td></td>
</tr>
<tr>
<td>30 mins</td>
<td>Prioritization of Community Groups</td>
<td>Full Group</td>
</tr>
<tr>
<td>45 min</td>
<td>LUNCH</td>
<td></td>
</tr>
<tr>
<td>1.5 hour</td>
<td>Creating a Community Engagement Strategy</td>
<td>Full Group</td>
</tr>
<tr>
<td>1 hour</td>
<td>Selecting Community Engagement Methods</td>
<td>Full Group</td>
</tr>
<tr>
<td>1 hour</td>
<td>Community Engagement Scheduling</td>
<td>Full Group</td>
</tr>
<tr>
<td>15 min</td>
<td>BREAK</td>
<td></td>
</tr>
<tr>
<td>30 min</td>
<td>Debrief &amp; Next Steps</td>
<td>Full Group</td>
</tr>
</tbody>
</table>

Table 2. Sample Community Engagement Planning Workshop Agenda

Image 3-5. Eva Sheldon, participant in the 2017 ARENA program, presents Liz Cravalho from NANA Regional Corporation with a gift. © SDWG
Identifying Community Groups

The following worksheets will help your Energy Team identify different Community Groups and assess their level of knowledge about, and support for, the CEP and the clean energy projects to follow. These worksheets will also act as a guide to help you create a Community Energy Engagement Plan that considers the needs of each of these Community Groups. For this exercise, it is okay if there are groups with similar engagement needs; you should list every group to start, to make sure everyone is included. Many of these groups will be Stakeholders you identified during your first Energy Workshop in Stage 2 during Activity 2-1. The goal of this exercise is to break these down into more specific groups that, together, represent all people in the community, not just stakeholders involved in the energy system or that could contribute to the ACEPI project.

It is also important to consider, for all Community Groups, their level of influence in the community and their interest in the ACEPI project. Understanding these two points will help you to design a specific engagement strategy for each group, to meet their needs. If you find varying levels of support or interest within a group, it would be worth listing different subgroups in each group. Here are some examples:

- Local Leadership members who support renewable energy development
- Local Leadership members who do not see the benefits of renewable energy
- Residents in comfortable housing situations (e.g. with less crowding, good heating, etc.)
- Residents in uncomfortable housing situations (e.g. mold issues, crowding, heating problems, etc.)

The worksheet that follows, Worksheet 3-1: Identifying all Community Groups, provides a place to identify different groups based on age, occupation, activity, etc. Some examples are provided to help you get started.
## Identifying all Community Groups

<table>
<thead>
<tr>
<th>Groups of People</th>
<th>Description</th>
<th>Level of Impact/Influence</th>
<th>Level of Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children attending secondary school</td>
<td>Youth</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Retail Store Owners</td>
<td>Businesses</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Mining Companies</td>
<td>Businesses</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Councillors</td>
<td>Local Leadership</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Regional Government Agencies that could be potential funding providers</td>
<td>Agencies</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

Developed by Lumos Clean Energy Advisors
Prioritization of Community Group Relationships

Now that you have identified the Community Groups and determined their level of interest and influence on the project, you can start to prioritize your engagement work. This worksheet will help you identify which groups will need the most attention during your engagement work. The Worksheet examples give you an idea of where you might place certain groups on the chart. Following the example, there is a blank Worksheet (3-2) for your Energy Team to use.

The examples that are listed show what possible groups might exist and where they could be placed in the table. Each community is different, and your table should be mapped according to your local groups and their level of interest and influence. If there are members of a group who do not hold the same view as the majority, then list them separately. You will see this as an example in the table below, where Mining Companies are listed as supporters, except for Mining Company XYZ.
In this table, the community groups are given levels of priority, from 1 to 4. These priority levels reflect the level of interest the group has in the CEP and the level of potential impact on the project. For example, High Interest and High Impact puts a group in the Priority 1 category.

The priority level will determine the amount of resources which may be required to satisfy their community engagement needs. Priority 1 groups would be considered some of the most important people to engage with and will likely be the most active in playing a part in the outcome of the projects. Priority 2 groups may have an interest in learning about opportunities, safety measures, permitting, jobs and training etc. Their interests need to be addressed. Priority 3 groups have a direct impact on the project but for whatever reason do not have a high level of interest. The Energy Team will need to plan ways to reach out to them and invite engagement. Those groups considered to be Priority 4 need only to be kept informed to satisfy their needs and interests.

### Table 3. Example of how to complete Worksheet 3-2

<table>
<thead>
<tr>
<th>Level of Interest</th>
<th>Meet their Needs (Priority 2)</th>
<th>Key Players (Priority 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supporters</strong></td>
<td></td>
<td><strong>Supporters</strong></td>
</tr>
<tr>
<td>• Children attending secondary school</td>
<td>• Mining Companies</td>
<td>• Mining Company XYZ which has a view different than others about distributed energy deployment</td>
</tr>
<tr>
<td>• Engine Mechanics</td>
<td>• Local Community Leadership</td>
<td></td>
</tr>
<tr>
<td>• Most residents in the community</td>
<td>• Government Agencies that could be potential funders</td>
<td></td>
</tr>
<tr>
<td><strong>Opponents</strong></td>
<td></td>
<td><strong>Opponents</strong></td>
</tr>
<tr>
<td>• Mining Company XYZ which has a view different than others about distributed energy deployment</td>
<td>• Community Elders</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of Impact</th>
<th>Keep Informed (Priority 4)</th>
<th>Develop Engagement (Priority 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supporters</strong></td>
<td>• Retail Store Owners</td>
<td>• Councillor ABC, who doesn’t want to be involved in renewable energy development</td>
</tr>
<tr>
<td><strong>Opponents</strong></td>
<td>• Mining Company XYZ which has a view different than others about distributed energy deployment</td>
<td></td>
</tr>
<tr>
<td>• Local Community Leadership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Government Agencies that could be potential funders</td>
<td></td>
<td></td>
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</tbody>
</table>

| **Supporters**  | • Mining Companies |
| **Opponents**   | • Community Elders |
| • Mining Company XYZ which has a view different than others about distributed energy deployment |
| • Local Community Leadership |
| • Government Agencies that could be potential funders |

<p>| <strong>Supporters</strong>  | • Mining Companies |
| <strong>Opponents</strong>   | • Community Elders |
| • Mining Company XYZ which has a view different than others about distributed energy deployment |
| • Local Community Leadership |
| • Government Agencies that could be potential funders |</p>
<table>
<thead>
<tr>
<th>Level of Impact</th>
<th>Level of Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meet Their Needs (Priority 2)</td>
<td>Key Players (Priority 1)</td>
</tr>
<tr>
<td>Keep Informed (Priority 4)</td>
<td>Develop Engagement (Priority 3)</td>
</tr>
<tr>
<td>Opponents</td>
<td>Supporters</td>
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<tr>
<td>Supporters</td>
<td>Opponents</td>
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<td>Opponents</td>
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</tbody>
</table>
## Creating a Community Engagement Strategy

The information for each of the Community Groups can be collected from the earlier worksheets and combined to form a community engagement strategy for each group. Below is an example of a Community Engagement Strategy chart, which includes the goals and motivations, as well as an engagement strategy for each of the Community Groups.

<table>
<thead>
<tr>
<th>Name of Community Group</th>
<th>Goals and/or Motivations</th>
<th>Influence (in the community) Level: High, Medium, Low</th>
<th>Impact/Influence (on the project) Level: High, Medium, Low</th>
<th>Priority 1 - Key Players 2 - Meet Requirements 3 - Develop Engagement 4 - Keep Informed</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Centre Building Staff</td>
<td>The Community Centre provides a convenient place for people to be physically active, provides valuable community information, offers community-led services, workshops, and activities.</td>
<td>Medium</td>
<td>Medium</td>
<td>2</td>
<td>The staff may be interested in solar integration, as well as energy efficiency and conservation measures for their buildings. Make sure they know about energy assessment and building retrofit opportunities. Look at having their facilities manager participate in a building operator training program. May want to host community engagement sessions here.</td>
</tr>
<tr>
<td>Residents who are not interested in the project</td>
<td>They do not want to invest time or effort into a cause they are not interested in.</td>
<td>Low</td>
<td>Low</td>
<td>4</td>
<td>Make sure they receive all updates and event invitations. Ask if they want to be a home energy assessment participant.</td>
</tr>
<tr>
<td>Local Economic Development Officer or Senior Administrative Officers</td>
<td>They look for economic development opportunities for the community; will most likely support actions that result in local investment and earnings.</td>
<td>High</td>
<td>High</td>
<td>1</td>
<td>Collaborate to develop plans which can inform and guide the community’s clean energy development projects. May be able to seek out funding to support initiatives.</td>
</tr>
<tr>
<td>Community Youth Group</td>
<td>Ensures youth are involved in and aware of different community initiatives.</td>
<td>Medium</td>
<td>Low</td>
<td>3</td>
<td>Start a youth Climate Champions Club focused on engaging youth on climate change and energy-related issues. Ask the group to help lead energy education initiatives with their peers.</td>
</tr>
</tbody>
</table>

Table 4. Worksheet 3-3 Example: Community Engagement Strategy Development.
**WORKSHEET 3-3**

Community Engagement Strategy Development

<table>
<thead>
<tr>
<th>Name of Community Group</th>
<th>Goals and/or Motivations</th>
<th>Influence (in the community) Level: High, Medium, Low</th>
<th>Impact/Influence (on the project) Level: High, Medium, Low</th>
<th>Priority 1 - Key Players 2 - Meet Requirements 3 - Develop Engagement 4 - Keep Informed</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
Before finalizing how you want to engage your community to advance your CEP, consider what content and information is important for your community to have. When choosing content, consider three key factors:

**Is the information pertinent?**

Ask yourself which facts are directly related to what you are communicating or the decision your community is facing. For example, in a newsletter focused on a critical decision the community needs to make about their upcoming solar project, discussing wind energy potential is probably not helpful. The information isn't pertinent to the topic or the decision, and may distract people from the important information you are providing.

**Is the information reliable?**

Not all information is good information. To evaluate whether information is reliable, check to see if the information is current, objective and based on facts, evidence or research. Here are some clues to ensure that an information source is reliable:

- The information was written by an author with proven experience in the field of which they are writing.
- The information is published by a trusted organization, such as a government agency.
- The information is not associated with an opinion or a business, but may draw conclusions or recommendations.
- The information is peer-reviewed in some manner.
- The information is supported by citations of the author’s sources.

**Is the information unbiased?**

Some information is designed to generate sales, persuade the reader, or entertain the audience, but it may be structured and presented as factual. The incredible volume of information published on the internet includes a lot of biased work. If you are looking for quality information to present to your community, you must make sure that the information was designed for the sole purpose of informing people about the facts.

If after considering these questions, you can answer yes to all three, then go forward and incorporate the information into your community engagement efforts. If you aren’t confident that the information is correct or truthful, consider reaching out to a trusted partner or advisor.
Selecting Community Engagement Methods

Now that you have mapped out the Community Groups and have a sense of their needs and priorities, you can start to map out different methods to engage them. No one knows your community quite the way you and your Energy Team do, so choose engagement methods that work best for your community. Depending on the community, the level of engagement will vary. Some communities may only require a bit of information through an open house, or a newsletter, while others will require more hands-on engagement – one-on-one meetings, webinars, workshops, and tools – to make informed decisions. Community Engagement methods can take many forms, such as the following:

Figure 14. Community Engagement Methods
Think about your audience. It is important to consider how your local culture should influence your engagement methods. Some of these participation tools will be more successful than others for each Community Group and may or may not be suitable for your community.

The following table breaks down a list of participation tools into engagement categories:

- **Update**: these tools offer information updates to the community
- **Inform**: these tools will deliver and seek information from the community
- **Involve**: these tools generate conversation between the Energy Team and the community
- **Collaborate**: these tools bring community members into roles to advise and influence the project
- **Empower**: these tools bring community members into leadership roles to represent the interests of the community
<table>
<thead>
<tr>
<th>Participation Tool</th>
<th>Engagement Category</th>
<th>Examples and Notes</th>
<th>Why the Energy Team would want to use this tool</th>
<th>Example</th>
</tr>
</thead>
</table>
| Project Website    | Update              | A project website can provide:  
• project background information,  
• local climate information,  
• ways to engage in the planning process,  
• reports and project updates,  
• a schedule of events,  
• social media feeds, etc. | If the community uses the internet for browsing news and local announcements, then a Project Website could be a good choice to support other engagement methods. It can be updated throughout the planning process. | Innavik Hydro Project Website www.innavikhydro.com |
| Social Media       | Update/Inform       | Social media is excellent for:  
• Distribution of project information,  
• Project updates,  
• Invitations to community engagement activities. | If the community uses social media to share information, then a CEP project account could be a good method of engaging the community. | Lubicon Lake Band Solar Project – www.facebook.com/lubiconsolar/ |
| Radio              | Update/Involve      | Radio segments can notify the community about:  
• project updates,  
• upcoming events,  
• Q & A opportunities for community members to call in and ask questions,  
• brief pieces of project information trivia. | If the community has a radio station, it is a great way to update the community about upcoming events and project information. | Read Innavik Hydro Project case study on page 99. |
| Newsletters        | Update              | Distribution of:  
• project information,  
• updates,  
• invitations.  
These could be posted in public places or distributed to homes in the community and at community gatherings. | A good option if community members do not often use internet and radio to obtain community information. Some people in the community may prefer a printed copy even if other methods are available. | Kiashke Zaaging Anishinaabek (Gull Bay First Nation) Energy Newsletter, which can be found in the digital resources. |
<table>
<thead>
<tr>
<th>Participation Tool</th>
<th>Engagement Category</th>
<th>Examples and Notes</th>
<th>Why the Energy Team would want to use this tool</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handouts and Brochures</td>
<td>Update</td>
<td>Distribution of: • project information, • updates, • invitations, These could be posted in public places or distributed to homes in the community and at community gatherings.</td>
<td>A good option if community members do not often use internet and radio. Some people in the community may prefer a printed copy even if other methods are available.</td>
<td>Community Energy Planning Brochure in Stage 1 Digital Resources.</td>
</tr>
<tr>
<td>Open House</td>
<td>Update/Inform/Involve</td>
<td>The Open House format is casual and offers people in the community an opportunity to talk to the CEC and the Energy Team about energy issues and opportunities in the community.</td>
<td>This format is less structured than a typical public meeting and allows conversations to happen organically.</td>
<td>One excellent event for this type of engagement tool is an Energy Fair. There is a case study about Dokis First Nation’s Energy Fair on page 100.</td>
</tr>
<tr>
<td>Surveys and Polls</td>
<td>Inform</td>
<td>Surveys can collect many different types of useful information from the community, such as: • Electricity usage and costs, • Feedback about home comfort and heating use, • Feedback about the ACEPI project and engagement activities.</td>
<td>Surveys can both deliver and seek information. For example, in an electricity usage survey, households can learn about their energy use and discuss their energy issues by answering specific questions.</td>
<td>A Residential Energy Audit Sign-up Survey example can be found in Stage 5 Digital Resources.</td>
</tr>
<tr>
<td>Public Meetings</td>
<td>Update/Involve/Collaborate</td>
<td>• The CEC can give presentations and answer questions from the community. They may also provide handouts, newsletters or brochures.</td>
<td>Complex information is often best explained in person, rather than on a website or in print. This method also works well when the presentation contains videos or demonstrations.</td>
<td>Community Energy Planning Presentation in Stage 1 Digital Resources.</td>
</tr>
<tr>
<td>Participation Tool</td>
<td>Engagement Category</td>
<td>Examples and Notes</td>
<td>Why the Energy Team would want to use this tool</td>
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</tr>
<tr>
<td>Energy Centre</td>
<td>Update/Involvement/Collaboration</td>
<td>A (semi-) permanent display of information which is available for the community to visit for information, updates and plans about any clean energy activities.</td>
<td>To engage people who prefer to investigate the project information on their own, perhaps over several visits.</td>
<td>UNITE US for Climate focuses on Arctic climate and interweaves Indigenous and Western perspectives with the goal of instilling cultural pride, increasing climate literacy as a path to academic success and graduation for Interior Alaskan students grades 7 to 12. They host Community Energy Planning for students through their Stewardship Project. See more information in the digital resources.</td>
</tr>
<tr>
<td>Workshops</td>
<td>Involvement/Collaboration</td>
<td>People who attend workshops can work in groups to develop ideas, apply their knowledge and solve problems.</td>
<td>For problem solving and brainstorming new ideas.</td>
<td>Energy Workshop activities can be found in Stage 2, Stage 3 and Stage 4.</td>
</tr>
<tr>
<td>Focus Groups</td>
<td>Collaborate</td>
<td>People who attend Focus Groups are shown an idea or proposal and asked to provide feedback on that idea.</td>
<td>Use when you need very specific feedback without generating alternative ideas.</td>
<td>The Vuntut Gwitchin Government has engaged the community of Old Crow in northern Yukon many times for its solar project. See the video by following the link in the digital resources.</td>
</tr>
<tr>
<td>Home Visits</td>
<td>Update/Involvement</td>
<td>One or two people from the Energy Team can visit people in their homes to deliver information and involve them. This is aimed at people who are unable to attend events or are uncomfortable engaging in a public event.</td>
<td>Home visits take time and effort, but they provide a valuable opportunity to engage with people who would typically not be involved and who could make significant contributions to the project.</td>
<td>The Arctic Energy Alliance in Northwest Territories offers home energy evaluations to help residents increase energy efficiency in their homes and reduce energy consumption. A link to this program can be found in the Digital Resources.</td>
</tr>
<tr>
<td>Mapping Exercises</td>
<td>Involvement/Collaboration</td>
<td>Mapping exercises invite members of the community to see the physical areas of importance on a map, linking traditional knowledge, culture and planning ideas together in one place.</td>
<td>Provides ideas about what the community would like to see in the future, what exists today and opinions on the current situation.</td>
<td>A Community Energy Mapping exercise can be found in Stage 2.</td>
</tr>
<tr>
<td>Participation Tool</td>
<td>Engagement Category</td>
<td>Examples and Notes</td>
<td>Why the Energy Team would want to use this tool</td>
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<tr>
<td><strong>Energy Activity Week</strong></td>
<td>Inform/Involve</td>
<td>A week-long series of activities can be a focus for your communications and may be easier to coordinate than scattered small events. It might include displays and presentations as well as fun community activities, such as calls for artwork contributions, storytelling and community meals.</td>
<td>Generates interest in the ACEPI and delivers energy education to the community. It encourages people to have fun and be creative.</td>
<td>Renewable Energy Alaska Project (REAP) and the Alaska Energy Authority (AEA) host an annual energy challenge for middle school students leading up to Energy Awareness Month in October. See the links in the digital resources.</td>
</tr>
<tr>
<td><strong>Interactive Meetings</strong></td>
<td>Collaborate/Empower</td>
<td>Interactive meetings invite people in the community to share their knowledge. Community members take on the job of presenting and leading. They may present something new they have learned in the first stages of the ACEPI project and offer something from the community’s culture. E.g. An Elder might share an experience that shows connections between the scientific information from the Energy Team and the traditional knowledge and indigenous science of the community.</td>
<td>By welcoming the voices of people of the community, the Energy Team demonstrates that they want to promote involvement throughout the community and make sure the ACEPI process is respectful of, and aligned with, the traditional knowledge and teachings of the community.</td>
<td>Energy Efficiency and Alaska Native Dwellings AK EnergySmart Lesson can be found on page 147.</td>
</tr>
<tr>
<td><strong>Participatory Decision-Making Process</strong></td>
<td>Collaborate/Empower</td>
<td>The Energy Team can leave certain decisions and choices throughout the process up to the community. For example, where a solar project might be sited, or which buildings will be audited as part of the energy assessment.</td>
<td>Allows for a diverse network of individuals to work together to provide input into the ACEPI project.</td>
<td>Sustainable Southeast Partnership; see digital resources for a link.</td>
</tr>
<tr>
<td>Participation Tool</td>
<td>Engagement Category</td>
<td>Examples and Notes</td>
<td>Why the Energy Team would want to use this tool</td>
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<tr>
<td>Advisory Committee</td>
<td>Empower</td>
<td>A committee which represents the community and is entrusted to understand the needs and ambitions of the community. This type of committee could become informed on a more technical level to guide and enhance the community engagement plans. After the planning phase, the Advisory Committee would continue to represent the community during implementation of a project.</td>
<td>Streamlines the Community Engagement process. This Committee can help distribute project updates and help gather community feedback.</td>
<td>The city of Yellowknife in Northwest Territories has a Community Energy Planning Committee; see the digital resources for a link.</td>
</tr>
<tr>
<td>Small-scale Parallel Projects</td>
<td>Empower</td>
<td>A small grant program could be created for people who are ready to lead small-scale clean energy initiatives in the community. It could form part of an ACEPI capacity-building program or a Community Energy Education plan. For example, a community member might take a training course to learn how to seal air leaks around windows to reduce energy loss in a home. The grant would fund the cost of the course and the time needed to teach people how to do this in their own homes.</td>
<td>The community may see that benefits can come from both small and large projects. This may inspire them to consider their own role in community-level and individual projects. Funding could be provided through capacity-building government grants, community budgets for local skills development, or from the suppliers of the materials to be used for the projects.</td>
<td>The Alaska Energy Authority has a list of small-scale projects on their website; see the digital resources for a link.</td>
</tr>
</tbody>
</table>
Community Engagement: Failing to Plan is Planning to Fail

In the table below, we have mapped out where engagement activities may have the most impact during the ACEPI process. There are many engagement tools and they may not all be necessary or suitable for your community. Use this table as a starting point, and then as you decide what will work best for your community, you can also fill in the blank Worksheet on page 102 to develop your plan.

<table>
<thead>
<tr>
<th>Stage 1: Understanding Your Energy Landscape</th>
<th>Project Website</th>
<th>Social Media</th>
<th>Radio Segments</th>
<th>Open House</th>
<th>Surveys and Polls</th>
<th>Public Meetings</th>
<th>Energy Centre</th>
<th>Newsletters</th>
<th>Workshops</th>
<th>Focus Groups</th>
<th>Home Visits</th>
<th>Mapping Exercises</th>
<th>Energy Activity Week</th>
<th>Interactive Meetings</th>
<th>Participatory Decision-Making Process</th>
<th>Advisory Committee</th>
<th>Small-scale Parallel Projects</th>
<th>Community Decision Committee</th>
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<tbody>
<tr>
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<td>Stage 2: Convening Stakeholders &amp; Building Your Energy Team</td>
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<td>Stage 3: Community Engagement &amp; Energy Education</td>
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<td>Stage 5: Assessing Energy Needs &amp; Resources</td>
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<tr>
<td>Stage 6: Identifying Specific Energy Goals &amp; Projects</td>
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<tr>
<td>Stage 7: Creating the Business Case</td>
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<td>Stage 8: Implementing Energy Project Plans</td>
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<tr>
<td>Stage 9: Monitoring, Reviewing &amp; Altering Plans</td>
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</table>

*Table 5. Recommended Engagement Tools for Community Engagement throughout an ACEPI Project*
Each engagement tool requires a different level of effort and cost to organize and host. The amount of time and money you have for your CEP will influence your choice of engagement tools. The figure below gives an estimated level of effort and money required for each engagement tool:

<table>
<thead>
<tr>
<th>High Effort, Low $</th>
<th>High Effort, High $</th>
<th>Low Effort, Low $</th>
<th>Low Effort, High $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surveys and Polls</td>
<td>Open House</td>
<td>Social Media</td>
<td>Radio Segments</td>
</tr>
<tr>
<td>Public &amp; interactive Meetings</td>
<td>Energy Centre</td>
<td>Home Visits</td>
<td>Small-Scale</td>
</tr>
<tr>
<td>Newsletters</td>
<td>Energy Activity</td>
<td>Participatory</td>
<td>Parallel Projects</td>
</tr>
<tr>
<td>Workshops</td>
<td>Week</td>
<td>Decision-Making</td>
<td></td>
</tr>
<tr>
<td>Focus Groups</td>
<td>Project Website</td>
<td>Processes</td>
<td></td>
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<tr>
<td>Mapping Exercises</td>
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<tr>
<td>Advisory Committee</td>
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<tr>
<td>Participatory Budgeting Process</td>
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<tr>
<td>Public Decision Committees</td>
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</table>

**Figure 15. Comparing effort and cost of community engagement methods.**

Using the tables above as guides, your Energy Team can start to create a Community Engagement Plan. The team will need to decide which tools to use, and when, and estimate how much they will cost. Blank planning worksheets are provided in the next section for your team to use.
THE COMMUNITY OF INUKJUAK is a remote village on the northeast coast of Hudson Bay in Canada. The local energy system is powered by diesel generation, and local leadership is looking towards the development of a small-hydro facility on the Inukjuak River to provide a future of greater resilience and sustainability. As community engagement began, the importance of language became increasingly evident to the Energy Team. The native language is Inuktitut. Presenters and project partners from outside the community spoke English or French. The flow of information was challenging and slow, as information was translated back and forth between the three languages. Despite the language challenges, the community elders were able to share their wisdom with the Energy Team, and the community agreed to proceed to the feasibility stage.

Two years later, the feasibility study was completed and the community of Inukjuak needed to decide whether they wanted to see the project proceed to construction. The Inuit Pituvik Landholding Corporation (Pituvik), which would be leading the project, set a high bar for community approval. It required that at least 70% of eligible voters in the community participate in the vote, and that at least 75% of the votes be in favour of the project proceeding to construction. Based on this requirement, it was very important to make sure that the entire community had the information they needed to cast a vote, and that the community had access to the Energy Team to ask questions.

The Energy Team held dozens of community engagement events, largely supported by community radio segments. These radio segments ran almost every night for 3-4 hours and focused on questions and answers from the community. The callers and listeners all knew each other, and sometimes technical experts were available on the line to answer questions. By offering an open format for the community to engage and hear what the others in the community were asking, people gained knowledge and familiarity with the project.

By engaging with the community early and often, and by using methods that were relevant to the community, the Energy Team was able to identify what was important to the community and incorporate these factors into the project plans. As a result, 72% of the eligible voters in Inukjuak came out to vote on the construction of the project. This rate of participation far exceeds any Canadian federal or provincial election participation rate in the past 50 years. These outstanding results were reached because of the engagement strategy that developed a strong relationship between the community and the Energy Team. More than 83% of the votes were in favour of proceeding, which gave Pituvik a strong mandate to move forward with the project. The project was named Innavik, which means a pouch in which one would keep a stone flint and moss to start a fire.
Dokis Community Energy Fair

IN 2017, THE DOKIS NATION in Ontario, Canada, hosted their first Energy Fair as part of their community engagement strategy for their CEP project. The purpose of the fair was to engage and educate the community about energy conservation, efficiency and renewable energy opportunities. The event was approximately six hours in length and involved people of all ages.

Advertising started about six weeks in advance of the energy fair, and community members were invited to the event several times using different invitation methods to get the word out. The advertising strategy included: posting event notices around the community in public areas; sending the invitations in the monthly community mail-out; posting an invitation online and through social media channels; and sending out a reminder on the day of the event to households.

The Energy Fair started with activities geared more towards the youth and children. The community partnered with a not-for-profit organization to host several interactive stations for the participants to engage with hands-on energy education exercises.

For the evening portion of the Community Energy Fair, each attendee received an “Energy Passport” (see the image to the right, and Activity Guide 3-8: Clean Energy Passport, for instructions and samples). The passport invited participants to visit the different displays and gather energy-related information. The booths presented information about energy efficiency and conservation and renewable energy from sources such as utilities, contractors, not-for-profit organizations and product suppliers and the Energy Team. The passports also included questions, and participants could find the answers at the various booths.

The participants spent time going through the displays and completing their passports by answering the questions. When they finished filling them in, each person was given a ballot for a draw that offered numerous prizes, and a grand prize of NHL hockey tickets. Each participating household was asked to complete a survey, and this earned them a bonus ballot for the hockey tickets.

Once the participants had completed the Energy Passports and Household Surveys, the draws were held, and participants won energy-saving products such as items to reduce water usage, insulating items and different lighting products.

A community feast was served to all who attended.
Community Engagement Scheduling

In choosing your Community Engagement tools, consider two key questions: (1) how feasible are the tools to implement, given the level of funding and other resources you have (time, effort, skills, etc.) and (2) how important might the tools be to your community, or how impactful will they be? You want to consider: What will work well for your community and can the Energy Team implement it? For example, if nobody in the community listens to the radio, the effort and money involved in producing and running radio shows or advertisements would not be a good investment for the CEP project.

In Worksheet 3-4, fill in the table with your assessment of how feasible and how impactful each engagement tool would be in your community. This table will inform the matrix that follows in Worksheet 3-5. The matrix will highlight quality Community Engagement tools for your community. Which options you choose will depend greatly on your resources, but generally it is a good idea to focus on high-impact/high-feasibility tools.
## WORKSHEET 3-4  
Assessing Feasibility and Impact of Engagement Tools

<table>
<thead>
<tr>
<th>Community Engagement Tool</th>
<th>Level of Impact on the community</th>
<th>Level of Feasibility for the CEC and the Energy Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Website</td>
<td></td>
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<tr>
<td>Social Media</td>
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<td>Radio</td>
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<tr>
<td>Newsletters</td>
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<tr>
<td>Handouts and Brochures</td>
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<td>Open House</td>
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<tr>
<td>Surveys and Polls</td>
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<tr>
<td>Public Meetings</td>
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<td>Energy Centre</td>
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<tr>
<td>Workshops</td>
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<td>Focus Groups</td>
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<td>Home Visits</td>
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<tr>
<td>Mapping Exercises</td>
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<td>Energy Activity Week</td>
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<td>Interactive Meetings</td>
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<tr>
<td>Participatory Decision-Making Process</td>
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<td>Advisory Committee</td>
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<tr>
<td>Small-scale Parallel Projects</td>
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</tr>
</tbody>
</table>
Impact/Feasibility Matrix

WORKSHEET 3-5

High Impact - Low Feasibility

High Impact - High Feasibility

Low Impact - Low Feasibility

Low Impact - High Feasibility
Based on the engagement needs of the community, fill in the chart below to map out which events and activities will take place throughout the CEP process. Tools with a High Feasibility - High Impact (our top row) and Tools that would be a good fit for the community (our column on the left) will likely satisfy the community’s energy needs. First on this sheet is a suggested list of “high impact – high feasibility” tools. In the top row, stages of the CEP process that you plan to use those tools. An example can be found on page 97.

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**Community Engagement Schedule**

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**Arctic Community Energy Planning and Implementation Toolkit**
Feedback during Community Engagement

Feedback from the community during the engagement process is so important. Feedback helps reassure the Energy Team that they are doing a good job, and also informs them about ways they can improve. It also offers community members an opportunity to suggest future activities, and it may raise new questions and ideas. To get accurate and thorough feedback, try to collect input as soon as possible during or after an engagement activity, when the event is fresh in the minds of the participants.

You can choose from several different feedback tools. We have provided two options for collecting feedback below.

1. **Feedback Grid**
   a. On flipchart paper, draw a grid with four quadrants labelled: Things that Worked, Things to Change, New Ideas to Try and Questions We Still Have.
   b. Have sticky notes available and invite participants to write their comments on the sticky notes and place them in the appropriate quadrant. Ask them to be specific and give constructive criticism.
   c. Cluster similar ideas and look for patterns.
   d. This can be done on a wall with space for everyone to post their notes, or as a chart on a feedback form for participants to fill out on their own and submit.
2. **Feedback Form** (a sample Feedback Form follows that you can use or modify for your specific needs)

   a. Create some short questions for open-ended responses. Some examples include:
      i. What did you like about today’s activity?
      ii. What do you think we could have done better?
      iii. What should we change for next time?
      iv. What questions do you have about the activity or the CEP project?

   b. Add a checkbox which asks if the Energy Team can send them project updates and supply a space for their name and contact information.

   c. Provide a drop-off point at the event for people completing the forms at the event, and another place somewhere in the community for those who choose to complete the form at home.

   d. If there are participants who may face challenges in completing a form, have someone on the Energy Team offer to help those people by interviewing them and completing the form with them.

To reinforce the welcoming and supportive environment, remind people that feedback is an important and necessary part of the Community Engagement process and that the Energy Team relies on their feedback to continually improve their planning and offerings to the community.
Community Engagement Feedback

Activity Name: _______________________________ Date: ________________

Thank you for participating in this Arctic Community Energy Planning & Implementation (ACEPI) event. We really appreciate that you came out, and we would like to hear from you!

What did you like about today’s activity?
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

What do you think we could have done better?
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

What should we change for next time?
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

What questions do you have about the activity or the CEP project?
_______________________________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

Your ACEPI Energy Team would like to keep in touch to provide you with project updates and invitations to future events and activities. Please check one box below:

☐ Please add me to the mailing list!
Name: ___________________ Email or Mailing Address: _____________________________

☐ I do not wish to be added to the mailing list to get project updates or invitations to future events
Planning Checklists for Community Engagement Activities

Have you notified the community?
- Community elders
- Local government
- Business owners
- People working in the community
- Adults
- Young adults and children
- People who work outside of the community
- Youth
- Other:

Have you set an agenda?
- Have you chosen 2-3 areas to discuss in detail?
- Are these topics important and relatable to the people invited?
- Have you chosen the tools and facilitation techniques for the event?
- Do you think these tools and facilitation techniques will meet the engagements needs of the attendees?
- Is there a diversity of speakers at the event?
- Other:

Have you prepared the materials for the event?
- Presentations, handouts, newsletters, etc.
- Games and activities
- Logistics (paper, pens, projector, computer, photo release forms, etc.)
- Prizes or giveaways
- Question-and-Answer topics
- Snacks and beverages
- Other:

Have you organized presenters/speakers?
- Community elders
- Energy Team members
- Guest speakers from within the community
- Guest speakers from outside the community (usually bring a specific CEP expertise)
- A Translator
- Other:

Have you booked a venue and event services?
- School or community centre, Community building, or private home
- Child Care Services (if necessary)
- Catering Services
- Transportation
- Audio and/or Video system
- Have you arranged for photo or videos to be taken, if appropriate, to have a visual record of the event?
- Other:

Have you made a budget and considered the following?
- Presenter fees
- Travel and accommodation expenses
- Space rental
- Food and drink expenses
- Advertising expenses
- Supplies and Printing handouts
- Child Care expenses
- Other:

Have you planned for event advertising?
- Posters on community bulletin boards
- Invitations delivered to homes and offices
- Radio advertisement
- Newspaper announcements
- Announce at other events
- Social media
- Other:

Have you planned how you will evaluate the success of the event?
- How many people were contacted?
- How many ads were posted?
- How many people attended?
- How many materials were circulated?
- How did people respond to evaluation surveys?
- How many people signed up for follow-ups and mailing lists?
- Other:
Introduction to Community Energy Education

Education is key. It is one of the pathways to knowledge, ideas, and theories. It helps us to better understand the world around us. It is also a powerful tool for people to become informed and motivated to participate in conversations and planning and take on decision-making roles. Education can take many forms, whether it be in school or learning from our elders or our peers. This is why community energy education is so important. In order for your CEP to be truly community-driven, people first need to understand the basics of their energy landscape, community energy plans and clean energy opportunities.

In this stage, we describe a specific set of activities and tools to help people of all ages learn about energy systems, their energy consumption, energy efficiency and conservation, and renewable energy. The diagram below describes some key educational impacts and outcomes of engagement activities.

ACEPI STAGE, ACTIVITIES, TOOLS AND RESOURCES

IN STAGE 1, by participating in Community Energy Profile creation, supply and demand was mapped and measured using the Community Energy Profiling Tool.

People in the community will learn about their local energy systems and will be able to trace supply and demand flows.

IN STAGE 3, by participating in learning activities, reading CEP newsletters, and in conversations with the Energy Team about energy.

People will likely feel more confident speaking about energy and energy use in meaningful ways.

IN STAGE 3, by engaging in and learning through Community Energy Education and IN STAGE 4, the community energy vision will create a unified voice and set of goals and priorities.

People will be able to better assess actions plans for clean energy projects, like efficiency upgrades or renewable energy projects.

IN STAGE 5, the results of the Energy Resource Assessments will be shared throughout the community through engagement activities.

People will be able to make more informed energy use decisions based on an understanding of impacts and consequences.

Figure 16. Relating the ACEPI Framework to Impacts and Outcomes

Image 3-16. Participants in the 20/20 Catalysts Program taking part in youth energy education activities. © 20/20 Catalysts Program
Community Energy Education Planning

In planning your energy education activities, think about your community members, their various perspectives about energy and their levels of energy knowledge. The Energy Team will be responsible for ensuring that the plan is inclusive and that there are appropriate learning tools for different age groups, educational backgrounds, and interests.

Youth Energy Education

Engaging with youth in a community gives a powerful boost to any project. By engaging the youth in your community through energy education, you give them an opportunity to take part in the CEP process, giving them a way to express their needs and ideas. Youth can also be a good conduit to get information into the hands of adults!

Have a way to express their needs and ideas
Increase their confidence to participate in community activities and planning now and into the future
Gain knowledge about energy systems, clean energy opportunities, and decision-making processes

Figure 17. Benefits of Youth Energy Education
As youth become more aware of the community’s energy landscape and the various opportunities for a clean energy future, you can provide them with information about career and job opportunities in the sector. As the energy sector continues to grow and evolve, young people may decide to pursue occupations in many different related areas, such as:

<table>
<thead>
<tr>
<th>Automotive Engineer</th>
<th>Energy Manager</th>
<th>Environmental Officer or Consultant</th>
<th>LEED Consultant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biofuel / Bioenergy Researcher</td>
<td>Environmental Campaigner</td>
<td>Environmental Policy Analyst</td>
<td>Lighting Specialist</td>
</tr>
<tr>
<td>Communications Officer</td>
<td>Environmental Construction Project Manager</td>
<td>Green Business Development Manager</td>
<td>Master Electrician</td>
</tr>
<tr>
<td>Community Investment Manager</td>
<td>Energy Advisor</td>
<td>Green Loans Officer</td>
<td>Program Manager for a Non-Governmental Organization</td>
</tr>
<tr>
<td>Construction Worker</td>
<td>Utility Interconnection Engineer</td>
<td>Green Roof Installer</td>
<td>Renewable Energy Sales Representative</td>
</tr>
<tr>
<td>Development Coordinator</td>
<td>Environmental Educator</td>
<td>HVAC Technician (Heating, Ventilation and A/C)</td>
<td>Solar Panel Installer</td>
</tr>
<tr>
<td>Electrical Engineer</td>
<td>Environmental Impact Assessor</td>
<td>Housing Manager</td>
<td>Solar Service Technician</td>
</tr>
<tr>
<td>Energy Auditor</td>
<td>Environmental Lawyer</td>
<td>Industrial Design Engineer</td>
<td>Sustainability Manager</td>
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</table>

A great interactive website to explore the clean energy job sector is the U.S. Department of Energy’s Clean Energy Jobs and Planning page, which answers these types of questions:

What kind of careers exist in the U.S. clean energy sector? (note: these may reflect similar markets in other countries, so it is worth looking at even outside the U.S.)

What skills and experience are required to be qualified for a role?

What kind of career path follows an entry-level type of position once skills and experience have been gathered?

Figure 18. Credit: U.S. Dept. of Energy
Though a lot of Environmental and Clean Energy jobs can be very technical, not all require deep scientific or technical knowledge. Some jobs may be more community-based, others may have more of an environmental focus.

**Other Career Planning Resources:**

1. ECO Canada: Canadian Environmental Post Secondary Programs  
2. Green Collar Careers  
   [http://www.greencollarcareers.ca/](http://www.greencollarcareers.ca/)

**A green education should equip students with the following skills:**

- **Technical Skills:** A relevant set of mechanical skills (such as GIS mapping, ecological design, waste reduction, energy conservation, carbon offsetting, energy auditing).
- **Teamwork Skills:** An ability to work with multidisciplinary groups of people who may be scientifically knowledgeable, connected to business and government, or hold leadership positions.
- **Communication Skills:** An ability to relate complex or technical ideas to people who have little knowledge or interest in the information, but who share a need for that information.

**Figure 19. Skills Development from Clean Energy Education**

**Tools for Youth Energy Education**

Engagement with youth is much the same as engagement with adults, but there is an additional opportunity to partner with local educators and provide them with energy-related lesson plans and activities. The following activities offer good starting points and represent only a small sample of what is available on the internet.
ABOUT
This crafting activity is a great way to give young kids a hands-on demonstration of how wind can make things move and how more or less wind can affect that force. This activity is best for children aged 4-7.

DURATION
30 minutes

OUTCOMES
• Study the advantages and disadvantages of wind energy
• Discuss the difference between a windmill, which grinds or mills grain or pumps water, and a wind turbine, which is used to turn a generator that makes electricity.
• Explore how to use angles and which angles are best for wind turbines.

SUPPLIES
- Paper
- Pen or pencil
- Ruler
- Scissors
- Thumbtack or pin
- Wooden pencil with an eraser
- A small bead or washer

PINWHEELS ACTIVITY GUIDE 3-1
Introduction to Renewable Energy: Wind, Solar Heat and Solar PV

Adapted from EnerAction, by GreenLearning Canada Foundation

Many remote Arctic communities rely on fossil fuels for heat and electricity – sources that cannot renew or replenish in a short amount of time. Oil, coal and natural gas come from decayed matter from plants and animals that were alive millions of years ago. Buried deep underground, they take millions of years to form, and once they are used up, they are gone.

Renewable energy sources promise a way to power the future without using up the Earth’s natural resources. They also produce energy in ways that are much less harmful to the environment. Fossil fuels release greenhouse gas pollution into the atmosphere, especially carbon dioxide (CO2). Because oil, natural gas and coal must be mined, then processed in a plant and transported great distances, they may also disrupt many natural habitats. Renewable energy is becoming more popular not only because it uses sources that are renewable, but also because it is much cleaner.

This brief introduction looks at three kinds of renewable energy and their sources:

- **Wind Power**
  - Energy from the wind

- **Solar Heat**
  - Heat from the sun

- **Solar PV**
  - Light energy from the sun

Image 3-21. Three different solar thermal systems installed and operating at the Cold Climate Housing Research Centre in Fairbanks, Alaska, U.S. © SDWG
Wind Power

We have all felt and seen the power of the wind – from the gentle swaying of a tree to wild storms and hurricanes. Humans have used wind energy for thousands of years for tasks such as pumping water and sailing. About 120 years ago, people started to use the wind to generate electricity.

Today we harness the power of the wind using turbines. The blades of a turbine are like giant aircraft wings. The shaft of the turbine is connected to a generator that produces the electricity. The bigger the diameter of a wind turbine’s blades, the more power it can generate.

How does a wind turbine work?

- The wind causes the blades of the turbine to rotate.
- The spinning blades turn a gear box that is connected to a generator.
- The generator converts mechanical energy into electricity.
Solar Energy

Humans have marveled at the power of the sun since the beginning of human history. The sun is the source of all energy on Earth. It drives the water cycle and wind, and it provides us with our food supply. Every day, the sun sends out about 2000 times more energy than humans use. In one hour, the amount of solar energy falling on the Earth could power the whole planet for an entire year!

Solar energy can be collected in two ways – as heat, using glass-covered flat metal plates; or as electricity, using solar cells made from silicon or other materials. Heat energy is also called thermal energy. Solar heating uses the sun’s heat energy to provide heat for buildings, and homes. That can simply mean using the sun’s heat to warm a home through windows that face south.

Solar Heat

Solar heating can also involve the use of solar collectors that capture and store heat energy. A solar collector is a shallow box painted black on the inside, with a clear glass or plastic top. The sun’s heat energy enters the box through the clear top and is absorbed by the black paint. The result is a lot of heat, which is contained by the box. The heat is carried away by water that flows through metal tubes that line the box. The sun-heated water is then carried through insulated pipes to a tank.

Solar PV

Solar energy involves the use of photovoltaic (PV) cells which absorb light and produce electricity. The word photovoltaic comes from photo, meaning light, and voltaic, meaning electric. Fine wires are sandwiched between two wafers with different electrical properties. Sunlight causes electrons to travel between the layers and produce electricity.

The most common material used for PV cells is a special kind of silicon crystal. Photovoltaics are commonly used in calculators, rechargeable flashlights and radios, and they are mounted on racks or structures to generate electricity for buildings. Grouped together, PV cells are called a solar array. Solar arrays can be different sizes, providing small or large amounts of power. Sometimes reflective mirrors are used to produce even more electricity.

**Figure 21.** Solar Heating System Diagram

**Figure 22.** Solar PV System Diagram
ENERGY COLLAGE

From AK EnergySmart Lessons

ABOUT
This activity asks students to assess what they use that consumes energy and discuss how to conserve power. This is a great activity for children aged 4-8.

DIRECTIONS
1. Start with a brainstorm session: What items use and need energy?
2. Tell students that there are many types of energy, but every kind of energy makes change. Energy makes things happen. It makes things grow, move, light up, and get hot.
3. What are the types of energy that we use every day? Some forms of energy include electricity, food, gasoline, and heating fuel. How do students know if something has energy? Movement and heat are good indicators of energy. Lighting, heating, transportation, and cooking all require a source of energy.
4. Structure the brainstorming activity by asking students to go through their day chronologically and identify what type of energy is used for each daily activity (e.g. brush teeth, make breakfast, take bus, etc.)
5. Next, focus on electricity. Define electricity with the students. Electricity is an invisible force. It is one type of energy. It is the movement of electrons, usually through wires. Lightning is electricity. Many things we plug into the wall or put batteries into use electricity. When you turn on the lights, they use electricity.
6. Point to several objects in the classroom and have students decide whether or not they use electrical energy.
7. Ask students to think about what their life would be like if they didn’t have electricity (i.e. we couldn’t plug anything in or use batteries). Then ask them to think about going camping or to fishing camp: what wouldn’t they be able to do that they’re used to? What could they still do?
8. After brainstorming, supply students with the accompanying student worksheet. The pictures may have to be pre-cut for younger students. Another option is to use pictures and graphics from old magazines. Have students work in pairs to sort the pictures into two categories:
   a. Objects that use electricity to work or function
   b. Objects that DON’T use electricity to work or function

For younger students, the class can move through the activity together, and students can vote and discuss whether each object uses electrical energy.
9. Once students have finished sorting the pictures, hand out a piece of construction paper to each pair so they can glue or tape the three groups of pictures into an energy collage.

10. After students have sorted their pictures, facilitate a discussion among the class and encourage students to identify and share their observations on the different sources of energy (perhaps by having students present their collages to the class).

11. Explain that since we use energy every day, we often take it for granted and are not always aware of how much we consume. Then discuss how using less energy can save money and have less impact on the environment. Ask them how they can use energy wisely, and discuss the responses as a class.

<table>
<thead>
<tr>
<th>Electrical Energy</th>
<th>Other Types of Energy</th>
<th>No Energy</th>
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<tbody>
<tr>
<td>TV</td>
<td>float plane</td>
<td>chair</td>
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<tr>
<td>washing machine</td>
<td>4-wheeler</td>
<td>boots</td>
</tr>
<tr>
<td>vacuum</td>
<td>snowshoes</td>
<td>basketball hoop</td>
</tr>
<tr>
<td>video game</td>
<td>motor boat</td>
<td>coat and mittens</td>
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<tr>
<td>hair dryer</td>
<td>bicycle</td>
<td>drinking glass</td>
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<tr>
<td>computer</td>
<td>snow machine</td>
<td>teddy bear</td>
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<td>truck</td>
<td>book</td>
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</tbody>
</table>
WHICH OF THESE THINGS USE ELECTRICITY? WHAT OTHER TYPES OF ENERGY DO THEY USE?

AK EnergySmart: Energy Collage – Revised August, 2014
Other Kits and Resources for Sale

Sometimes it can be helpful to work with a kit of tools which is ready for learning, right out of the box. For those communities that want to shop for these kinds of kits, here are some helpful links to get started:

**K’NEX Education Renewable Energy Set**

This K’NEX set integrates concepts of: renewable energy; solar, wind, and hydro power; energy storage; energy generation; and clean energy into a format which encourages students to experiment and learn through active participation. K’NEX Education sets let students build replicas of real-world machines to gain an understanding of the principles that make them work. The set comes with lesson plans and experiment guides written by educators that feature hands-on, inquiry-based projects.

Find it online: [https://www.knex.com/knex-education-renewable-energy-set](https://www.knex.com/knex-education-renewable-energy-set)

**Wind Energy Science Kit**

With the Wind Energy Science Kit you can build a miniature power generation system that converts wind into electrical energy. Experiment with the pitch (angle setting) of turbine blades and find out the optimum number of blades for generating electricity.

ABOUT
Hands-on learning with a variety of different energy types can give students some basis for understanding the kinds of projects which could be planned for their community. There are three stations shown in this activity, but others could be included if your community is looking at other types of projects. This activity is best for youth aged 7 or older.

STATION 1 – WIND POWER

ABOUT
Students blow on a pinwheel, and it moves. A wind turbine would transform the spinning force of that axle into electricity through a generator.

DIRECTIONS
1. Hold the pinwheel in front of you and blow gently to see the pinwheel spin.
2. Try blowing with less and then more force and notice what happens to the pinwheel – does it spin at a different speed?
3. Try blowing on the pinwheel from different directions. Which direction works best? Why do you think that is?

STATION 1 SUPPLIES
- A pinwheel which can spin when blown on gently

You can find directions about how to make your own in Activity Guide 3-1 on page 113.
ABOUT
Shaking a Styrofoam cup full of sand allows students to sense the creation of heat energy. By placing a thermometer in the sand before and after shaking, students can observe the temperature rising.

The kinetic energy of the sand moving inside the cup is transformed into heat energy through friction between the sand particles.

DIRECTIONS
1. Fill one Styrofoam cup about 3/4 of the way up with sand.
2. Cover the first cup with the other cup and tape around the seam where the cups meet.
3. Insert a thermometer through the cup and into the sand, covering the hole with a small piece of tape to keep the sand in when it is shaken.
4. Record the temperature of the sand before starting the experiment.
5. Shake the cups and sand for one minute and record the temperature.
6. Compare the temperatures and discuss how the sand became warmer.

STATION 2 SUPPLIES
- Two Styrofoam cups
- Masking tape
- A digital thermometer
- Paper and pencil
- Sand
STATION 3 - SOLAR ENERGY

ABOUT
The sun gives off lots of light and heat. When the light and heat are used to power things, it is called solar energy. The black paper will absorb more of the sun’s energy (light and heat) than the glass dish, making the ice melt faster. The white paper will reflect most of the sun’s energy that hits it, keeping the dish and the ice in it cooler for longer so it will take longer to melt.

DIRECTIONS
1. Place the sheets of black and white paper on a flat surface in direct sunlight, or beneath a warm lightbulb.
2. Set a pie plate on top of each sheet of paper and put an ice cube in the middle of each pie plate.
3. After 5 minutes, check on the ice cubes to see which one has melted the most.
4. Which ice cube melted faster – the one on the white paper or the black paper? Feel the sheets of paper. Which one feels warmest?

STATION 3 SUPPLIES
- 2 clear glass pie plates or bowls
- 1 sheet of black construction paper
- 1 sheet of white construction paper
- 2 ice cubes
- A sunny spot near a window
ABOUT
Be an “energy detective!” Use this form to investigate energy use in a building in your community. The results of your investigation will give you helpful ways to reduce energy use and greenhouse gas emissions. Use the table on the next page and the notes area below to record your observations. This activity is best for kids aged 8 and older.

NOTES AND OBSERVATIONS
Location: _____________________________________________

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Location: _____________________________________________

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Location: _____________________________________________

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
ACTIVITY GUIDE 3-4
ENERGY INVESTIGATION

Be an “energy detective!” Use this form to investigate energy use in a building in your community. The results of your investigation will give you helpful ways to reduce energy use and greenhouse gas emissions.

<table>
<thead>
<tr>
<th>The Building I am investigating is:</th>
<th>Location in Building:</th>
<th>Location in Building:</th>
<th>Location in Building:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Are the lights on in the room?</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is anyone in the room?</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Is natural light being used when possible? (e.g. opening the blinds on a sunny day)</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Could any of the lights be turned off?</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Are any computers on and not being used?</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Are any of the computers on sleep mode?</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Are any windows open while the heat is on?</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
</tbody>
</table>

List all the items that use energy in the room.

List any items with Energy Star logo (these products use less energy)
ABOUT
This lesson plan is designed to help students learn the distinction between energy conservation and energy efficiency, both important ways of reducing overall energy use. This activity is best for children aged 8-11.

DIRECTIONS
1. Ask students to think about ways that they use energy during the day. After describing energy conservation and energy efficiency, ask students to brainstorm ways that they could apply these energy saving measures to their daily activities.

2. Hand out the Conservation vs. Efficiency student worksheet, and ask students to identify which activities listed on the first page are examples of conservation and which are examples of efficiency. Together as a class, go through the list, compare answers, and have students defend how they categorized the activities. Some activities may fit into both categories - conservation and efficiency.

3. Next, have students write three sentences describing how they can conserve energy and write three sentences about how they can use energy efficiently.

BONUS
Have students write a short paragraph explaining why it is beneficial to conserve energy and use it efficiently.
CONSERVATION VS. EFFICIENCY

Name: _____________________________________________________

Energy Conservation is a change in your behaviour to use less energy.

Energy Efficiency is using better technology to save energy.

Which of the following show a conservation of energy and which show an efficient use of energy? (Circle one of the answers. In a short sentence, explain why you chose your answer.)

1. Going for a ski instead of going for a snow-machine ride (or going for a hike instead of going 4-wheeling).
   Conservation  Efficiency

2. Insulating your dog house in the winter so it doesn’t need a heater.
   Conservation  Efficiency

3. Putting plastic film on your windows in the winter.
   Conservation  Efficiency

4. Installing a new timer thermostat so that it heats your house to a lower temperature when you’re not home or asleep.
   Conservation  Efficiency

5. Replacing regular incandescent light bulbs with CFLs or LED light bulbs.
   Conservation  Efficiency

6. Turning off the lights when you leave a room.
   Conservation  Efficiency

AK EnergySmart: Energy Conservation v. Energy Efficiency
SOLAR OVEN

From Build Your Own Solar Oven, by greenlearning.ca

ABOUT

Our sun is a constant source of energy. Each day, the sun bathes the Earth in unimaginable amounts of solar energy, most of which comes in the form of light. All over planet Earth, sunlight is by far the most important source of energy for all living things. Without it, Earth would be lifeless.

Sunlight can be a practical source of energy for such everyday jobs as cooking, heating water, or warming up homes. The challenge is to find ways to transform sunlight into concentrated heat. The most efficient way to capture heat from sunlight is to shine lots of sunlight onto a dark surface. Dark surfaces absorb most of the visible light that falls upon them, and reflect very little. Visible light that is absorbed this way usually causes the dark-coloured surface to warm up. Of all colours, black can absorb the most light and produce the most heat.

You are familiar with what happens to a dark-coloured surface when sunlight strikes it: it will get warm. But without a little help, there is usually not enough heat to cook foods. To produce enough heat for cooking, it is necessary to shine additional sunlight from a wider area onto the black surface. This is easy to do with mirrors or other reflective surfaces, or with glass or plastic lenses.

The solar oven you will be building with this plan uses aluminum foil to gather sunlight. The foil-covered panels of the oven reflect sunlight into the cooking chamber, which is painted black. Heat is produced when the concentrated sunlight is absorbed by the black surface of the cooking chamber. The heat is contained inside the chamber with the help of insulation, and a clear plastic oven bag. The result is a great solar cooker and yummy food!

This activity is best suited to children aged 9+ and should be supervised by an adult.
CAUTION!
• Use extreme caution when cutting cardboard with the utility knife. Extend the blade only as far as is needed to cut through the cardboard and lock it into place. Do your cutting on a cutting board or piece of scrap plywood or cardboard.
• Use sunglasses when working with shiny materials in sunlight.
• Solar ovens can get very hot! Use oven mitts or gloves to prevent burns.

DIRECTIONS
Organize your workspace. You will need a large tabletop to work on. It is very helpful to have a sink nearby for cleaning up. Arrange your materials and tools so you can get to them conveniently.

1. Prepare the reflective panels
   a. Using a metre stick and felt pen, draw the outlines of the reflector segments on your cardboard. Use the measurements on the blueprint template. You will need two of each panel size.
   
   b. Using the utility knife, carefully cut out the 4 cardboard segments. Use a ruler or straight-edge to help guide your cuts. CAUTION: Utility knives can be dangerous. Extend the blade only as far as necessary to cut through the cardboard. Use some scrap cardboard or wood under the material you are cutting to avoid damaging the tabletop.
   
   c. Remove the top from the white glue bottle and pour approximately 100 ml (about 1/3 cup) into the plastic container. Add 4 tablespoons of water to the glue and stir thoroughly. This will make the glue thinner and easier to spread evenly.
d. Carefully unroll enough aluminum foil to completely cover one section. Keep the foil as smooth and flat as possible. Wrinkles and creases in the foil will reduce the efficiency of the reflector. If the cardboard is wider than the foil, use two pieces of foil and plan to join them near the middle.

e. Using the paintbrush, apply a thin layer of white glue over the entire surface of one section of cardboard. Be sure to spread the glue right to the edge of the cardboard. Use the flat edge of a piece of scrap cardboard to spread out the glue evenly.

f. Before the glue dries, place the foil on the cardboard shiny side up, and smooth it down over the entire surface. Try to press out any wrinkles, bubbles, or creases in the foil. If your foil gets badly wrinkled during the gluing process, tear it off and try again with fresh glue.

g. Using the utility knife, trim the foil so that it is flush with the edge of the cardboard all around. Set the panel aside to dry.

h. Repeat with the remaining sections.

i. Rinse the paintbrush thoroughly under the tap to remove any glue. The glue-water mixture can be used again later, so put a lid on the container to keep the glue from drying out.

2. **Join the Panels**

   a. Cut 8 pieces of duct tape 60 cm long and set them aside (stick them to the edge of the table for easy retrieval).

   b. Arrange the segments foil side down, wide sections alternating with narrow ones. The narrow end of each should point toward you.

   c. Carefully position the first two panels, keeping a 2 mm space between them. Position one of your 60-cm strips of duct tape over the joint between the panels. Press it onto the joint, being sure it sticks securely to both panels over its full length.
d. Join the third and fourth panels to the first two in the same way until all four panels are attached.

e. Carefully flip the jointed panels over on the table. This may require two people. Reinforce the joint between each panel using another strip of duct tape on each joint.

f. Stand the reflector up, foil side in, with the larger edges down on the table. Have someone hold the reflector in position while you add duct tape to the last edges and connect the fourth panel. You will now have a flared tunnel with one end having a larger opening than the other.

g. Finish reinforcing the last joint by very carefully adding one last strip of tape to the inside of the last joint.

3. **Add the Insulated Box**

   a. Using duct tape, fasten the cardboard box securely to the bottom (smaller end) of the reflector by its flaps. Be sure the box is centered. Add a few strips of duct tape to the corners to make the whole thing more rigid.
b. Shred some newspaper by tearing it lengthwise into thin strips. You can also use paper from a paper shredder. Stuff shredded paper into the gaps between the box and the reflector. Leave a little of the shredded paper on the bottom of the box, as shown in the illustration.

4. **Prepare the Baking Chamber**
   a. In the plastic container, use your plastic spoon to mix 2 teaspoons of black tempera paint with one teaspoon of white glue, and two teaspoons of water (you can substitute glue and water from earlier if you had any left over).
   b. Using the brush, apply the black paint evenly over the inside of an aluminum foil loaf tin. Set this aside to dry. You may need to apply two coats of the paint to ensure full coverage of the aluminum.

5. **Test and Prepare the Solar Oven for Use**
   a. The solar oven is now ready to be tested. If the glue and paint are all dry and it is a sunny day, you can warm up your oven in preparation for its first cooking job.
   b. Place the oven thermometer inside the painted baking tin.
   c. Slip the baking tin into the transparent plastic oven bag. Arrange the bag so that the plastic forms a smooth, unwrinkled window over the loaf tin, which is your baking chamber.
   d. Press the baking chamber tightly into the bottom of the reflector.
   e. Outside, and with your sunglasses on, arrange your cooker so that the cooking chamber is fully illuminated by the sun. The diagram below shows you how to orient the reflector to get the most heat from the sun. You will need to prop the reflector up on some books, bricks, or other objects to keep it at the right angle.
   f. If the day is sunny, clear, and warm, the temperature inside the cooker should begin to reach 100 degrees C or more within 20 minutes or so. Allow the cooker to reach its maximum temperature (about 200 degrees C or higher) and maintain that for an hour or more. This will burn off any unwanted substances inside the baking chamber.
ACTIVITY GUIDE 3-6
SOLAR OVEN

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9 10
11 12
ACTIVITY GUIDE 3-6
SOLAR OVEN

19

20

21

22

23
6. **Warming and Cooking Food with the Sun**

- If your cooker reaches 100 degrees C, you can use it for heating foods. If it gets to temperatures of 175 degrees or higher, you can actually use it for baking.
- The plastic oven bag is extremely fragile and easily torn. Handle it carefully, especially when the cooking chamber is hot.
- For cooking and baking, you will need to find small baking tins that fit easily into your baking chamber. To improve the baking efficiency, paint the OUTSIDE of any small baking tins you want to use with the same paint and glue mixture you used to blacken the inside of the baking chamber. Be sure to heat your painted tins in the oven without food to burn off any impurities before cooking with them.
- You can use your oven to bake brownies, cookies, muffins, bread, and other foods. You can also use your oven to warm soups, stews, pizza, and pastries.
- You may need to support the pot or tin using small stones or metal jar lids to keep them level inside the baking chamber. Whatever you use in the baking chamber, make sure it is oven-safe and free from paints, solvents, plastics, and other substances that you do not want mixing with your food. If you are not sure whether something is oven-safe, ask a teacher, parent, or adult that you trust.

### Questions

1. **How could you increase the efficiency of this cooker?** Describe 2 or 3 design changes that would help this cooker get hotter faster and keep its heat better.
2. **What is the purpose of having insulation (shredded paper) around the baking chamber?**
3. **What would happen if you painted the inside of the baking chamber white instead of black?**

### Answer Guide for teachers:

1. Design changes could include making the solar cooker larger to collect more sunlight; replacing the paper insulation with something that insulates better, like the batting you see in houses; and using a more reflective foil like a mylar emergency blanket instead of tinfoil.
2. Insulating the baking chamber keeps the solar heat that is collected by the solar oven in the baking chamber and doesn’t let it escape out the back of the solar oven.
3. If the baking chamber were white instead of black, the solar heat that entered the baking chamber would partially reflect back out of the solar oven, meaning the cooking chamber would be much cooler.
ABOUT

Students will explore opportunities to conserve energy and be more energy efficient, brainstorm ways to engage their peers in these energy-saving practices, and delineate steps that can be taken at school and home to reduce energy. This activity is best suited to children 11 and older.

DIRECTIONS

1. Ask students to brainstorm ways to encourage, influence or motivate other students to conserve energy and use energy efficient technology.

2. Introduce to the students the idea of developing a class or school energy efficiency action plan, and discuss how they can improve their school and the surrounding community by educating their peers, teachers, and school administrators on energy conservation and efficiency.

3. Break students into groups of 3-5, and have them designate a note taker. Give them time to brainstorm ideas and sketch out an outline for an action plan that focuses on engaging their peers in energy conservation and efficiency practices. The action plan’s efforts will primarily be directed toward energy conservation and efficiency at school, but students can also incorporate ways to promote these issues at home and in their community. Have the students address the following points and have the note taker record their ideas:
   - Define the mission of your action plan.
   - List the goals for the action plan.

   (The mission is the overarching long-term objective of the action plan e.g. save energy, reduce energy costs, or raise awareness of energy efficiency and conservation; whereas the goals of the action plan are the individual completed action items that support the mission.)

   - Establish the basic parameters for the action plan: who is the audience (the class, the whole school)? What is the timeline...
(one week, one semester)? Will there be rewards for participation? or consequences for not participating?

- Students can begin by writing a Classroom Energy Policy which is a document that states what the classroom policy is for energy use and lists responsibilities of students to conserve energy.

- List and describe three activities to include in the action plan. Some examples include creating a teacher and/or student energy survey, conducting a classroom or a school energy audit, organizing a school energy fair, organizing a student bike/walk to school week, planning community service projects, and developing a school energy initiative.

- Discuss ways to promote your action plan and get students involved. Presenting data about how much energy is used in classrooms and how much energy can be saved can inspire students and teachers. Students can use Kill-A-Watt meters to demonstrate how much electricity is being wasted in the classroom as phantom loads.

Find it online:

BONUS:
Based on the individual group presentations, have the entire class synthesize the mission and goals to combine the ideas of all of the groups. Discuss ways that the students can turn this activity into a school club!

Have the students create informational posters promoting energy conservation and efficiency practices that can be distributed throughout school or in the school newsletter.
Adult Energy Education

Adults have a lifetime of experiences which shape their view of the world and the way it works. They are the decision-makers in the community, the people who mentor the future leaders, and the people who generally contribute the most during times of change. Because of this, it is most important that your Community Energy Education succeed with the adult population.

Just like kids, adults like to be entertained. Therefore, it's important to provide a range of different energy education activities to adults – some that are more serious and others that are more fun. We encourage the Energy Team to find ways to engage the community with humour and playfulness and make the process more enjoyable for everyone. The Community Energy Education stage is a great time to tap into the community’s culture to have fun while learning. The following learning activities offer community activities which can be part of a more structured event, like a Clean Energy Community Meeting, or part of an event like a Council Meeting where people from the community are already gathered.

Image 3-25. 20/20 Catalysts Program participants examine solar panel equipment in New Brunswick, Canada. © 20/20 Catalysts Program
ABOUT
The goal of the clean energy passport is to learn about clean energy through a fact-seeking activity. This type of activity is often used during a community open house or public meeting. It can also be used as an activity during an energy education week in the community. This activity is best for teens and adults, but children could also team up with others to participate.

DIRECTIONS
1. Set up a couple of different energy information booths or presentations as part of an open house, public meeting, or another type of community event.
2. Leading up to the event, have each booth create a couple of key questions that can be added to an Energy Passport. These should be short questions that can be answered by the general public, based on information materials in the booth or presentation. The objective is to get participants looking for the answers and asking questions. For example, if you have a booth about energy efficiency, a page or two in the Energy Passport could look like the image below:

   Homes that install window film in the winter can save ____% on average from their heating costs.

   Answer: ______________________________________

   Source: ______________________________________

3. Hand out blank passports at the beginning of the event and challenge participants to fill in each page during the event. Participants can receive a stamp, sticker or signage verifying that they went to the booth or listened to the presentation. Once the energy passports have been filled in, enter all the participant names into a draw for a prize or multiple prizes.

A sample Energy Passport is digitally available on the ACEPI Toolkit website.
OUTCOMES
To learn some common clean energy terms and teach basic energy literacy while playing a fun game in the community.

DURATION
45-60 minutes

SUPPLIES
- Jeopardy game board (using online board or a physical board)
- Scoreboard

ABOUT
Using the terms and definitions from Activity 3-10, create a Jeopardy-style board for a team game of Clean Energy Jeopardy. This activity would be most enjoyed by teens and adults.

DIRECTIONS
1. A maximum of three teams can play in each game.
2. The clues must be revealed in order of easiest to hardest, or top to bottom in a category.
3. Points are deducted for incorrect responses.
4. Responses to questions should be given in the form of a question, otherwise the response will be considered incorrect and the clue’s value will be deducted from the team’s score.

Clue = “There are three of these and they spin”, Answer in the form of a Question = “What are wind turbine blades?” Clue = ”Energy Produced by falling water”, Answer in the form of a Question = “What is hydropower?”

5. Participants are not allowed to buzz in until the host finishes reading the clue. Buzzing in early should be considered as an incorrect response that leads to the clue value being deducted from the team’s score.

The game ends when all the clues have been revealed. The team with the most points is the winner.

Set up the board with categories in columns and with clues in each column becoming more difficult as you move down the board:

<table>
<thead>
<tr>
<th>Wind</th>
<th>Energy Efficiency</th>
<th>Solar Energy</th>
<th>Energy Terms</th>
<th>Conservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Easy</td>
<td>Very Easy</td>
<td>Very Easy</td>
<td>Very Easy</td>
<td>Very Easy</td>
</tr>
<tr>
<td>Easy</td>
<td>Easy</td>
<td>Easy</td>
<td>Easy</td>
<td>Easy</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Hard</td>
<td>Hard</td>
<td>Hard</td>
<td>Hard</td>
<td>Hard</td>
</tr>
</tbody>
</table>
ACTIVITY GUIDE 3-9
CLEAN ENERGY JEOPARDY

We set up an example game on jeopardylabs.com, which you can use: jeopardylabs.com/play/clean-energy-jeopardy but we also recommend that you try making your own board that is best suited to your community, which could include a version for youth, for example. Here is how a board could look if you wanted to put it together using sticky notes instead of running the online game board:
DIRECTIONS
This activity is based on the classic game of Bingo, but instead of having a combination of letters and numbers on the bingo card, the cards have clean energy terms on them. This activity would be most enjoyed by teens and adults.

The centre spot on the card is an empty space. The caller selects clean energy terms at random and calls them out to the players. When the caller calls a word or term, all the players mark it on their bingo cards using pens, markers or bingo dabbers. The winner is determined when one or several of the players complete the winning bingo pattern, which could be a line, an X, or a whole card or another shape. It may be useful to laminate the individual bingo cards if you plan to use them again.

On the following pages you will find a list of words and terms you could use. Please add more if you want, that are specific to your community!

A good way to make this activity educational is to read out the meaning when the term is called.

You can make a bonus square available to the first person who knows what the term is, making the game more competitive.

Refer to Figure 21 for an example of how a Bingo card would look.

Using a game card generator, you can make custom Bingo cards with the terms in the table below or your own terms. We made this sample card using the website: https://bingobaker.com/ and this site also offers card generators: https://myfreebingocards.com/bingo-card-generator

Whichever way you choose to set up your cards, make sure that when you call out a term, you also say what the term means or invite people to guess the meaning for an extra prize.
Here is a list of the words and phrases with their meaning:

**Air Filters:** Replacing these in your heating system will make it more efficient.

**Air Quality:** Will improve with less pollution caused by burning fossil fuels.

**Base Load:** The minimum average power that the community uses.

**Biomass Energy:** Renewable energy from living (or recently living) plants and animals; e.g. wood chippings, crops and manure.

**Blades:** Parts of a wind turbine that move when wind passes over their surface.

**Blower Door:** A home performance test conducted by a contractor (or energy auditor) to evaluate a home’s air-tightness.

**Carbon Footprint:** Total amount of greenhouse gases (such as carbon dioxide and methane) produced to support human activities directly or indirectly.

**Caulking:** A flexible sealing compound used to close up gaps where warm air escapes from a building.

**Community Energy Planning:** A comprehensive, long-term plan to improve energy efficiency, reduce greenhouse gas emissions and foster local clean energy solutions in a community.

**Conduction:** The movement of heat or electricity through a substance.

**Consumption:** Energy consumption is the act of using electricity or fuel.

**Convection:** The transfer of heat by the movement of warm air.

**Distribution System:** The portion of an electric system that delivers electricity to the end users (i.e. your homes).

**Energy Audit:** An assessment of a home’s energy use that includes a visual inspection, testing, analysis, and a list of proposed improvements.

**Energy Education:** Learning about energy and energy systems in order to effectively participate in energy planning.

**Energy Security:** The uninterrupted availability of energy sources at an affordable price.

**Fossil Fuels:** Coal, petroleum, and natural gas. These form in the Earth’s crust when the remains of plants and animals are exposed to heat and pressure, over hundreds of millions of years.

**Gear Box:** In a wind turbine, gears connect the blades to the generator to increase the rotational speed to the required speed of the generator.

**Generator:** A device that produces electricity from mechanical energy, such as from a rotating turbine.

**Geothermal Energy:** Energy from the internal heat of the Earth. The heat is found in rocks and fluids at various depths and can be extracted by drilling or pumping.

**Heat Pump:** A device that takes heat from the air, water or earth and moves it to where it is needed.

**HVAC:** An acronym for Heating, Ventilation and Air Conditioning.

**Hybrid System:** Combining two or more ways of generating power to supply reliable energy. A common hybrid system includes wind turbines and diesel generators.

**Hydroelectric Power:** Energy that is produced by turbine generators driven by falling or flowing water.
**Insulation:** Any material that slows heat transfer. Insulation acts as a barrier to heat flow and helps to keep your home warm in winter and cool in summer.

**Inverter:** A device that converts direct current (DC) electricity to alternating current (AC) either for standalone systems or to supply power to an electricity grid.

**Kilowatt-hour:** A standard of measurement for electricity. This is how your electricity use is measured on your electricity bill. One Kilowatt-hour (kWh) is equal to 1,000 watt-hours (Wh). A watt-hour is the amount of energy delivered at a rate of one watt (W) for a period of one hour. For example, a 100-watt light bulb in use for 10 hours uses 1 Kilowatt-hour (kWh) of electricity.

**LED Lights:** Light bulbs which contain Light Emitting Diodes to emit light. These bulbs are very long-lasting and use very little power.

**Load:** The energy demand of a community on the power supply.

**Lower Costs:** A benefit of Energy Efficiency and Conservation measures.

**Mounting Rack:** A metal frame to which solar arrays can be mounted on roofs, on poles in free standing arrays, or directly on the ground.

**Passive Consumption:** Energy consumed when appliances, televisions, computers and other devices stay plugged in to an outlet when they are not being used.

**Peak Energy Times:** The time of day when the most power is used.

**Peak Load:** The largest amount of electricity being used by everyone using electricity at any point during the day.

**Pitch:** The angle of a wind turbine’s blades. The pitch controls the speed of the turbine blades.

**Power Curve:** A graph that shows the power output of a wind turbine design at various wind speeds.

**Renewable Energy:** Electricity generated from sources such as solar, wind, and geothermal power rather than from fossil fuels. Renewable energy comes from naturally recurring sources.

**Retrofit:** Modifications to existing buildings that may improve energy efficiency or decrease energy demand.

**R-Value:** A rating of the insulation properties of building materials and insulation. The higher the R-value, the greater the level of insulation, delivering a more cost-efficient and comfortable building.

**Smart Grid:** An electricity network that uses technology to monitor and manage the transport of electricity from all sources to meet the varying electricity demands of the community.

**Solar-Hybrid System:** A solar electric or photovoltaic system that includes other sources of electricity generation, such as wind or diesel generators.

**Solar Photovoltaics (PV):** Pertaining to the direct conversion of light into electricity.

**Solar Thermal:** Method of harnessing solar energy for thermal energy (heat).

**Space Heating:** Heating of a single space, such as a room or an enclosed area of a building.

**Substation:** A facility that steps up or steps down the voltage in utility power lines.

**Tracking Array:** A photovoltaic (PV) array that follows the path of the sun to maximize the possible daily energy.

**Turbine:** A generator that produces electricity when a shaft is spun, converting mechanical power into electricity.

**Wasted Water:** By reducing the amount of hot water that is wasted in a home, you can conserve energy and lower water heating costs.

**Weather Stripping:** The process of sealing around openings such as doors and windows with specially made tape or seals. This reduces heat loss.

**Weatherization:** The activity of making a building more energy efficient by reducing air infiltration, improving insulation, and taking other actions to reduce the energy required to heat and/or cool the building.

**Wind Speed:** Determines how much energy can be generated from a wind turbine.

**Window Film:** A thin sheet of plastic which can be taped over a window to trap a layer of air and create insulation over the window.
TRADITIONAL DWELLINGS

From AK EnergySmart Lessons

ABOUT
Students will research how Indigenous people built their dwellings and how their designs minimized heat loss to keep occupants warm. This activity would be best for youth aged 12+.

DIRECTIONS
1. Gather research materials on traditional dwellings from their communities. This research could come from discussions with local elders, books or other resources that describe traditional dwellings.
2. Tell students that modern homes require the burning of huge amounts of expensive fuel to keep warm. How was it that ancestors were able to survive and thrive in such harsh, cold conditions without the resources we use today? Give them 5-10 minutes to jot down their response.

Additionally, they can write down what they already know about traditional building design from local knowledge.

Review with the students the three different ways that heat is transferred: conduction, convection, and radiation.

Conduction: Heat transfer by direct contact – such as from the foundation to the soils or through the wood framing in a wall.

Convection: Heat transfer via air flow. A typical example of heat loss through convection would be air leakage. Warm air is more buoyant than colder air and air leaking out of the top of a building can present a significant energy penalty.

Radiation: Heat transfer via electromagnetic radiation – such as the sun or a wood stove warming a surface. Unlike conduction and convection, radiant heat can be transferred through empty space. This method of heat loss is of least concern when it comes to cold climate construction. Heat losses attributed to conduction and convection make up the majority of heat losses with the exception of windows. Windows with reflective coatings are able to reflect specific wavelengths of energy either

DURATION
6 hours
(+ 30 minute set-up)

OUTCOMES
Students will build a model dwelling and then use the model to explain how the design efficiently used the energy available.

SUPPLIES
- Books and/or resources that describe traditional Indigenous dwellings
- Computer with Internet access
- Students may also interview local Elders or other community members who can share their knowledge
- Building materials to construct dwelling models
- Student worksheet-Traditional Indigenous Dwellings (on page 149)
back into the house or outwards, depending on what type of performance is desired.

3. Students may work individually or in groups of two or three for this project. Explain that the goal is for each student (or group) to research how their ancestors traditionally built their dwellings, and to use what they know about conduction, convection, and radiation to explain how the particular design helped keep occupants warm in their given environment. Let the students know that they will be building model dwellings, and they will then use their model to present their findings to the class.

**Day 1: Begin research**

- Distribute research guides to students
- Explain what resources are available for them to use.
- Give students time to work on their research.
- Encourage students to talk to elders within the community about the project. You may also want to consider bringing local elders into the classroom

**Day 2**

- Continue working on research.

**Day 3: Planning the model:**

- Have students sketch their model dwellings.
- Students can use graph paper to show their floor plan and profile.
- Consider setting a size limit on models, such as the base can have a surface area no larger than a pizza box.
- Students can then annotate their floor plan with the types of materials they will use and where they will procure them.
- Items may include cardboard, twigs, grass, popsicle sticks, pipe cleaners – anything that students may have access to at home or around town.
- Tell them to be creative! Give students a few days to gather materials.

**Day 4 & 5: Construct models**

- You may choose to have students construct their models at home, or have them bring their materials into school and construct them in class.

**Day 6: Present models**

- Have students present their research to the class while referring to their models.
- You may wish to have parents or community members visit to hear the presentations.

**ASSESSMENT**

Assess students’ models and presentations. Check for thorough research and application of the concepts of convection, conduction, and radiation.

**BONUS**

Have students research the clothing that their ancestors would have worn in the winter to stay warm. What type of materials did they use? How do these compare to modern day options? Why were these materials so effective in keeping people warm? What modern-day clothes designs mimic the technology used by their ancestors?
**TRADITIONAL INDIGENOUS DWELLINGS WORKSHEET**

Name: ________________________________ Period: ____________ Date: ____________

**GOAL**
Your job is to research how your ancestors were able to survive in a Northern climate without the use of modern energy resources and technology, by living in energy efficient dwellings tailored to their environment. This project is broken down into three tasks. 1. Consult books and reliable websites, and talk to Elders or community members to gather information. 2. After researching traditional building designs, construct a model of a traditional dwelling. 3. Create a presentation or poster to explain your model and your research findings to your teacher and fellow students.

**STEP 1: RESEARCH QUESTIONS**
Answer the following questions as thoroughly as possible:

<table>
<thead>
<tr>
<th>Describe the community geography:</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the climate like in this region?</td>
</tr>
<tr>
<td>What materials were used to build traditional houses? What were the walls made of?</td>
</tr>
<tr>
<td>What was the floor made of? How big was the house?</td>
</tr>
<tr>
<td>Was the house built above ground, below, or partially below? How was the house heated?</td>
</tr>
<tr>
<td>How was heat kept inside the house (make sure you answer in terms of convection, conduction, and/or radiation)? To answer this question, consider the building material, structure, and interior features that might add insulation.</td>
</tr>
</tbody>
</table>

**AK EnergySmart:** Energy Efficiency and Native Alaska Dwellings
DIESEL AND GASOLINE – ENERGY HEAVYWEIGHTS

From AK EnergySmart Lessons

ABOUT

Students will learn the units of energy and power, approximate how much energy is in litres or gallons of diesel and the amount of work that it can do, and how this energy compares to other sources of energy. This activity is best for youth aged 14 or older.

DIRECTIONS

1. Have students brainstorm the sources of energy that they depend on daily. What uses diesel? What uses gasoline? How would their lives be different if they no longer had access to diesel or gasoline?

2. Discuss the different definitions of energy and power with the students; while energy and power are often used interchangeably in layman’s terms, they are two different (though related) concepts when applied to physical science.

OPTIONAL GEAR UP EXTENSION ACTIVITY

Students can experience the physics of energy by doing physical work. Students can convert kinetic energy into potential energy by overcoming gravitation forces and carrying 5-gallon buckets of water or snow/ice up stairs (if 5-gallon buckets are not available, other heavy objects can be substituted, such as bag of kitty litter).

1. Divide the class into small groups and conduct a contest to see how much power each group can produce by having groups race against each other to move the 5-gallon (19-20 litre) buckets up the stairs or a hill outdoors.

2. Fill as many 5-gallon buckets of water as available (ideally around 10-20 buckets) and cover with lids to cut down on the amount of spilled water. Take turns timing each team as they carry the buckets up the staircase. If there isn’t an available staircase or hill, they can repeatedly lift the buckets onto tables and then place them back on the ground to simulate the height of a staircase. Record each team’s length of time to complete the task.

Use the following equation to calculate how much work was done (this calculation should be the same for all the groups):

\[
\text{work} = mgh
\]

whereas:
work = potential energy of the water (in joules, J)
m = mass (in kilograms, kg; 1 gallon of water = 3.8 kg)
g = gravity (9.8 m/s²)
h = height (in metres, m; this will need to be measured)
Use the following equation to calculate each group’s power:

\[
power = \frac{work}{time}
\]

whereas:
- power = watts (j/s)
- work = joules (J)
- time = total number of seconds (s) the team took to complete the task

If one gallon of gasoline contains 125,000 BTUs and one BTU is equivalent to 1055 joules, calculate how much gasoline would be needed to do the equivalent amount of work.

\[
gasoline\ equivalent\ (gallons) = \frac{work\ (J)}{125,000\ BTUs} \times \frac{1\ BTU}{1055\ J}
\]

If 1 joule = 2.8 x 10^{-7} kWh, calculate how many kWh of work the teams did. Using the local price for a kWh of electricity, how much money did each team earn for their work?

\[
earnings = (joules \times 2.8 \times 10^{-7}\ kWh) \times (\text{cost} / \text{kWh})
\]

<table>
<thead>
<tr>
<th>City</th>
<th>Cost/kWh*</th>
<th>Utility Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anchorage</td>
<td>$0.12</td>
<td>Anchorage ML&amp;P - Residential</td>
</tr>
<tr>
<td>Barrow</td>
<td>$0.11</td>
<td>Barrow Utilities &amp; Electric Co. - Residential</td>
</tr>
<tr>
<td>Bethel</td>
<td>$0.52</td>
<td>Bethel Utilities Corporation - Residential</td>
</tr>
<tr>
<td>Dillingham</td>
<td>$0.39</td>
<td>Nushagak Electric Cooperative - Residential</td>
</tr>
<tr>
<td>Fairbanks</td>
<td>$0.20</td>
<td>Golden Valley Electric Association - Residential</td>
</tr>
<tr>
<td>Juneau</td>
<td>$0.11</td>
<td>AEL&amp;P - Residential</td>
</tr>
<tr>
<td>Kotzebue</td>
<td>$0.58</td>
<td>Kotzebue Electric Association - Residential</td>
</tr>
<tr>
<td>Tanana</td>
<td>$0.69</td>
<td>Tanana Power Company, Inc. - Residential</td>
</tr>
</tbody>
</table>

*Values courtesy of Cold Climate Housing Research Center, US

**Extension:**

1. Students can investigate energy prices in their community. Standardizing their costs by price per BTU, what is the most affordable energy and what is the most costly? Why is electricity often one of the more expensive types of energy available? Where does electricity come from?
FILLING THE CUPBOARD AND FREEZER FOR THE WINTER – HOW MUCH ENERGY IS NEEDED?

From AK EnergySmart Lessons

ABOUT
Students will consider the different energy inputs needed for food preservation while creating a mini-cookbook on the different ways of processing and preserving food. Students will interview family or community members to conduct their research. This activity is for youth 14 or older.

DIRECTIONS
1. Ask students to come up with different food processing and preserving techniques, and write the list on the board. Next, have students brainstorm how these techniques use energy (electricity for freezer or stove, wood fuel, etc.).
2. Have students identify people they know who hunt, fish, garden, or harvest wild foods (such as berries) - are these people they could interview about how they process their game, fish, and other food? Potential interviewees may be elders in the community, family members, or family friends.
3. Tell students that they are all going to contribute recipes for processing and preserving food, for a mini-cookbook. Each student will contribute at least two entries for the cookbook, using interviews from family or community members,
4. Students should identify energy resources needed for the preservation methods as well as ongoing energy needs (electricity for freezer, etc.). Encourage students to be creative with this assignment. Have them draw pictures, take photos, and include stories in the cookbook.

When conducting interviews, have students identify members of their families or community that process and preserve food. These are usually people who have a vegetable garden in the summer or people who hunt, fish, or harvest wild berries. For safety reasons, students should only interview people that and their parents/guardians know and trust. Students can pair up to conduct interviews. Students can either record the interviews or take written notes.

The following are suggested questions for an interview:

1. Where did you learn to make this recipe?
2. What type of ingredients and supplies do you need for your recipe? Where do you get your ingredients and supplies?
3. What are the directions to make your recipe?
4. What type of energy is needed to make this recipe – a cook stove, firewood, refrigerator or freezer? Anything else? Students can practice interviewing each other in class.

Students (with permission of the interviewee) may also take pictures during the interview or draw pictures to illustrate the recipe.
# FILLING THE CUPBOARD AND FREEZER FOR THE WINTER WORKSHEET

Name: _______________________________________________
Recipe Name: _________________________________________
Source: ______________________________________________

<table>
<thead>
<tr>
<th>Materials Needed:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy Used During the Initial Processing of Food Preservation:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy Used Post-Processing:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Directions:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Notes/History of the Recipe/ Illustration:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**AK EnergySmart**: Filling the Cupboard and Freezer for the Winter – What Energy is Needed?
I have created a meeting or workshop for my Energy Team to start to develop a Community Engagement and Education Strategy.

With my Energy Team, I have identified all groups within my community and mapped their expected level of interest and impact on the CEP.

I understand some of the practical barriers to participation in community engagement and education activities and accounted for these factors in our Community Engagement and Education Strategy.

The Energy Team has selected community engagement and education methods that will be most suitable for our community, assessing the feasibility and impact of each engagement tool.

The Energy Team has contacted the local school to talk about energy education for the community youth.

I have worked with my Energy Team to finalize a broad community engagement and education strategy for the entire community.
STAGE 4
Creating a Community Energy Vision

Image 4-1. Kodiak Island, Alaska, U.S. © NREL
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<th>Section</th>
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<td>Elements of Visioning</td>
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<td>Identification of Issues</td>
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<td>Community Energy Goals</td>
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<td>Community Energy Priorities</td>
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<td>169</td>
<td>Develop Community Energy Vision Statement Elements</td>
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<td>Create a Community Energy Vision Statement</td>
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<td>Sharing the Vision and Remarks from Visioning Sessions</td>
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</tr>
<tr>
<td>178</td>
<td>Activity Guide 4-4: Vision Activities for Kids</td>
</tr>
</tbody>
</table>
Creating a Community Energy Vision

Introduction

Creating a Community Energy Vision is an essential part of community energy planning. This vision will reflect your community’s energy-related ambitions and goals and describe some of the benefits of implementing clean energy projects.

In this stage, we outline a method to create an energy vision that focuses on the strengths of a community, rather than its needs. This visioning process will help guide your community to look at energy opportunities that are based on shared values and goals.

In this section we use the terms Vision and Visioning, but if it fits better to discuss Community Energy Goals, Community Energy Futures or other terminology that makes sense for your community, then use those terms instead.

To see how community visioning fits in the ACEPI framework, consider what has been achieved in the earlier stages:

- In Stage 1, you defined the Community Energy Landscape and developed a proposal to demonstrate the needs and benefits of the ACEPI project.
- In Stage 2, the Energy Team was convened, and built a base of shared knowledge, and you hosted the first energy workshop for key stakeholders.
- In Stage 3, the Energy Team collaborated with the community and Partners to plan and host Community Engagement events and Energy Education activities. Community members learned about clean energy and were able to see how the CEP could benefit the community.

Later in the ACEPI framework, the Energy Team will work with technical partners to explore opportunities for clean energy projects. The results of these investigations, together with the Community Energy Vision, will inform the Energy Team’s discussions about which opportunities to explore further.
What is Community Energy Visioning?

Sometimes, important and pressing issues in a community can feel overwhelming and all-consuming. There isn’t always time or energy to focus on future planning when there are urgent things happening on the ground. The purpose of energy visioning is to set aside time to think about tomorrow, and the years ahead, to inspire and encourage positive change.

Through this process, you want the community to create goals to work on, trying not to get tangled up in the immediate challenges of day-to-day life. Visioning helps communities to:

- Focus on the future;
- Set goals for community change;
- Provide a framework for planning; and
- Decide on actionable steps.

Visioning is different from planning as it does not seek to produce a specific solution to address a certain challenge. Instead, visioning paints a picture of the future, with ideas about what the community wants to see. This vision can then be used as a motivator to inspire people to reach planning goals. The following figure presents the key differences between a vision and a plan.

<table>
<thead>
<tr>
<th>The vision</th>
<th>The plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS THE DREAM.</td>
<td>IS THE BLUEPRINT.</td>
</tr>
<tr>
<td>DESCRIBES.</td>
<td>ANALYZES.</td>
</tr>
<tr>
<td>IS ABOUT POSSIBILITIES.</td>
<td>IS ABOUT POLICIES.</td>
</tr>
<tr>
<td>DESCRIBES WHAT.</td>
<td>SHOWS HOW.</td>
</tr>
<tr>
<td>APPEALS TO IMAGINATION.</td>
<td>APPEALS TO REASON.</td>
</tr>
<tr>
<td>IS AN ASPIRATION.</td>
<td>IS IMPLEMENTED.</td>
</tr>
</tbody>
</table>

Figure 24. Vision versus Plan; Adapted from the Community Visioning Handbook by the Maine State Planning Office.
Creating a Community Energy Vision Statement

A great vision statement is very clear about what the community hopes to achieve. Clarity helps keep discussions focused on the issues that matter most to the community. A great vision statement will be:

- **Vivid** – it paints a picture of the desired future;
- **Inspirational and meaningful** – it connects people to the project;
- **Unique to the community** – it focuses on the strengths of the community and embraces its culture and values; and,
- **Simply stated and easy to understand** – it is developed by the community, for people of all ages and educational backgrounds.

Here are some other key ingredients for a good vision statement, as well as some examples of community energy vision statements:

![Image 4-4. © 20/20 Catalysts Program](Image 4-4. © 20/20 Catalysts Program)

**Figure 25. Ingredients of a Vision Statement**
Examples of Community Energy Vision Statements

“Develop the capacity to provide for current and future energy needs within the community and the Sahtu region.”
— BEHDZI AHDA FIRST NATION (COLVILLE LAKE), NORTHWEST TERRITORY, CANADA

“Respect the customs of our Alutiiq culture and empower our community with our rich traditions to sustain our village into the future.”
— KARLUK IRA COUNCIL, ALASKA, U.S.

“To make substantial reductions to the community’s energy consumption and investigate/promote alternate energy resources.”
— COMMUNITY OF NORMAN WELLS, NORTHWEST TERRITORY, CANADA

“Community Togetherness and spirit, education, environment, sustainable economy and community control.”
— COMMUNITY OF LARSEN BAY, ALASKA, U.S.
Each of these examples is based on general community beliefs and values, and they each promote the uniqueness of the community as a strength. It can be challenging sometimes to keep political debates or negative perspectives out of the process, and they can get in the way of forming a positive vision. However, when visioning includes people who may not be involved in regular decision-making, this wider group of participants may help build community spirit and a greater collective perspective for the community.

During the discussion leading to the vision statement, participants will express different motivations, perceptions and values. They should ask themselves which values are shared, and which are central to the community’s identity. Trade-offs may be necessary to preserve important values.

The vision statement should be broad enough to encompass different perspectives, but specific enough to provide direction in setting goals. Vision statements make people think about what matters most to the community and help them work towards a common goal.
Forming Community Energy Goals

One of the main purposes of community energy visioning is to clearly identify a community’s short-term, medium-term and long-term energy goals and priorities. Energy visions are made up of detailed statements which describe the priorities and goals of the community around energy. These goals guide a process, like the development of a clean energy project, but do not contain the details of implementing a plan.

The goals should be detailed enough that you know when you have achieved each one, and there should be a clear measurement of success. It is good practice to have a mix of larger-scale and smaller-scale goals. When some goals can be reached in the short term, the positive energy will give momentum and encourage the effort that is needed to reach the large-scale goals. The figure below shows how the short, medium and long-term goals can help inform a community energy vision statement, as well as the general timelines associated with each type of goal.

In the next section, the type of community engagement sessions used to create an Energy Vision are described, and some useful worksheets are provided for these sessions.

Figure 26. Goals with a Community Energy Vision
Introduction to Energy Visioning Sessions

An Energy Visioning Session is a type of Community Engagement activity which is like a workshop, but with a specific goal of creating a Community Energy Vision. The process offers participants a chance to be heard in a forum which values their opinions, and highlights the common priorities and goals of people from different demographics.

It may be beneficial to have a neutral and experienced facilitator help with the Energy Visioning Sessions, who can create a safe, welcoming environment for all participants. The facilitator does not need to have a technical background or be able to represent the project. What is important is that the facilitator be familiar with the concept and methods of Energy Visioning Sessions. It is best to have one facilitator or staff/assistant per 10-20 participants. The Energy Team can also run the Energy Visioning Session if they have strong skills and experience in guiding community discussions and brainstorming exercises.

The facilitator will:

- keep the activity focused on the topic;
- guide the discussions to be productive; and,
- create the setting for a positive experience.

During the Energy Visioning Session, the facilitator can take notes. However, it may be better to have someone who is not participating in the session to record notes, take a video, or record the session for later review by the Energy Team.
Who participates in a Visioning Session?

The Visioning Session should include participants from each Community Group, as identified in Stage 3. The Energy Team should open the invitation to anyone in the community, to offer an opportunity for each voice to be heard. There may be some groups or individuals in the community who are not able to participate in the larger community Visioning Session. For example:

- **Local Leadership**: it may be difficult for this group to participate for various reasons. They also may choose not to participate in a community-wide session because they don’t want their opinions to be too influential. The CEC can offer to lead a Visioning Session at one of their planned events or regular meetings instead.

- **Members of the community with barriers to participation**: There may be people who need home visits or other support. Be sure to check if they need these supports to participate in Community Energy Visioning.

It is fine to hold multiple Visioning sessions to get as many participants as possible. At each session, be sure to share the results of the previous sessions when it comes to identifying the Community Goals and Energy Priorities. The outcomes for each session may be different in terms of the final Energy Priorities, but that is fine. The CEC will be collecting these and the Energy Team will create the unified Community Energy Vision at the end of the process.
Visioning Session Planning

A Visioning Session is different from other Community Engagement activities. It involves careful consideration of the values of the community and requires specific input from the community on their desired outcomes of the CEP. Up to this point in the Engagement process, the Energy Team has shared information and presented the potential benefits of energy planning and clean energy projects. The Visioning Session is likely the first opportunity for the community to take what they have learned from community engagement and education sessions to make a meaningful impact on the direction and outcome of the CEP.

Below is a sample agenda with suggested timing and structure for a Visioning Session with 20-25 people. The time could be longer or shorter, depending on how many people are involved. Following the description of the activities, an Activity Guide is included to help run the session.

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 mins</td>
<td>Overview of Session Goals and Activities</td>
<td>Full Group</td>
</tr>
<tr>
<td>45 mins</td>
<td>Identification of Issues</td>
<td>Small Groups of 4-5</td>
</tr>
<tr>
<td>30 mins</td>
<td>Community Energy Goals</td>
<td>Small Groups of 4-5</td>
</tr>
<tr>
<td>1 hour</td>
<td>Community Energy Priorities</td>
<td>Whole Group</td>
</tr>
<tr>
<td>30 min</td>
<td>BREAK</td>
<td></td>
</tr>
<tr>
<td>1 hour</td>
<td>Develop Vision Statement Elements</td>
<td>Small Groups of 4-5</td>
</tr>
<tr>
<td>1 hour</td>
<td>Create Energy Vision Statement</td>
<td>Whole Group</td>
</tr>
</tbody>
</table>

Table 6. Sample Visioning Session Agenda
Elements of Visioning

There are key activities which take place during Visioning. These are shown below:

1. Create the Community Energy Vision
2. Vision Statement Elements
3. Community Energy Priorities
4. Community Energy Goals
5. Identification of Issues

**Figure 27. Steps to Creating a Community Energy Vision**

**Identification of Issues**

The “issues” are the energy-related needs or areas for improvement in the community. From the Community Energy Landscape created in Stage 1, many of these will likely have been identified, such as those shown in the figure below. This information should be reviewed with the Visioning Session participants and they should have the opportunity to add other ideas. Try not to get into long discussions on the issues, as the conversations can get sidetracked. This exercise should be limited to an hour.

Some examples of the issues in remote Arctic communities are:

- Poor air-sealing in homes which leads to issues of drafts and high heating fuel use
- High cost of fuel for power production and heating
- The local resources which could provide fuel are not being fully utilized
- There is a lack of training and funding for local tradespeople to improve energy efficiency
- Reliance on fossil fuels for energy and heating is contributing to climate change

**Figure 28. Examples of Energy-related Issues in Arctic Regions**
Community Energy Goals

Once needs and areas of improvement are identified, the participants can start to brainstorm Community Energy Goals. These goals identify the best-case outcomes if the community energy planning process and projects are successful and goes as planned. To turn issues into achievable goals, try to rephrase the issues in a positive way, so it can be stated as a goal. For some examples, see below.

<table>
<thead>
<tr>
<th>ISSUE</th>
<th>REFRAME IN THE POSITIVE</th>
<th>STATE AS AN ENERGY GOAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel is expensive, and we aren’t looking at any other ways to lower energy costs.</td>
<td>The community invests in reliable diesel fuel to power the community and is working through an developing a CEP to investigate opportunities that will result in lower energy costs.</td>
<td>REDUCE THE COST OF ENERGY FOR THE COMMUNITY.</td>
</tr>
<tr>
<td>Having technicians travel in to repair energy system equipment takes a long time and is expensive.</td>
<td>The community is committed to maintaining reliable, affordable energy services. This will be demonstrated by growing the local trades to do more of the maintenance on the energy systems in the community.</td>
<td>BUILD LOCAL SKILLS AND JOBS FOR ENERGY SYSTEM TECHNICIANS TO MAINTAIN INFRASTRUCTURE.</td>
</tr>
<tr>
<td>Burning diesel creates air pollution and contributes to global warming.</td>
<td>The community cares about the health of the environment and wants to reduce air pollution by implementing one or more clean energy projects.</td>
<td>REDUCE GHG EMISSIONS AND AIR POLLUTION AND IMPROVE THE HEALTH OF THE ENVIRONMENT AND THE PEOPLE BY IMPLEMENTING CLEAN ENERGY PROJECTS.</td>
</tr>
</tbody>
</table>

Figure 29. Turning Issues into Goals
Participants can write their Energy Goals on sticky notes while they are working in small groups and then again while they are working together in a large group. When the small groups have identified some ideas, then the whole group can reconvene, and the sticky notes can be reviewed. Sticky notes can be moved, and similar ideas can be grouped together, to keep the ideas organized.

If there is someone in the community who is interested, it can be really exciting for participants to see their vision illustrated with drawings, as they go through the Visioning process. A great example is the Teslin Tlingit Community Values Illustration which is shown in a Case Study in Stage 1.

Using “dotmocracy”, have your community vote on the priorities that they feel are the most important.

You can develop some clean energy priority ideas through community engagement.

Separate out the most popular community energy priorities.

For each set of goals, ask participants to identify their top goals. They could do this with an informal vote (you can use dotmocracy as a way to tally votes), a group discussion or friendly debate, depending on the participants and community. The important thing is to make sure that anyone who wishes to participate in the conversation has an opportunity to share their opinion.

The Energy Goals that are selected as the most important to the community can become part of the Energy Priorities which will be incorporated into the Community Energy Vision.

Participants can work together to organize the Energy Goals into short-term, medium-term and long-term goals. You can set up some labels on a wall and ask people to place the Energy Goal sticky notes under the appropriate heading: short-term, medium-term and long-term.
Develop Community Energy Vision Statement Elements

With the four to six most important Energy Priorities identified, the community can now generate ideas to bring these elements together to form a Community Energy Vision Statement. For each Energy Priority, try to come up with a statement which positions the community as the driver of the change with verbs like:

- Become
- Build
- Produce
- Generate
- Reduce
- Create
- Protect
- Lead
- Avoid
- Eliminate
- Develop
- Expand

For example, “Build local skills and jobs for energy system technicians to maintain infrastructure” or “Reduce GHG emissions through the development of a solar project.”

By turning the Energy Priorities into phrases, the group can confirm that the Energy Priority represents what the group discussed and that it is an ambitious, but achievable, goal. The final step is to combine these Energy Priority phrases into a Community Energy Vision Statement.
Create a Community Energy Vision Statement

This activity takes the elements from the previous step and weaves them into a single statement that is easily understood and represents the community. The statement can be very broad, or very specific, depending on the elements that have been created by the participants. It is important for the whole group to complete the task and create the final vision together.

After all the Visioning Sessions have been completed, the CEC can gather the information and summarize it into a draft Community Energy Vision. This draft should be shared with key stakeholders for feedback before a final version is developed by the CEC and approved by the Energy Team. When the final Community Energy Vision is complete, present it to the community in a highly visible way to create momentum for the rest of the CEP planning phase.

Sharing the Vision and Remarks from Visioning Sessions

By the end of the Visioning Sessions, you will have gathered a lot of input from the community. When you share the final Community Energy Vision, it is a good idea to share this community input too, as well as the process of how the vision came to be. This is a great way to demonstrate the importance of community participation. Here are some ideas for sharing this information:

- Give a presentation to a group at a regular meeting or activity;
- Host a drop-in at a community building, with the help of some volunteers, with the findings presented on posters, in a booklet or in a values poster (from the Value Cards activity explained on the following page);
- Write a story on the progress of the project and the results of the Visioning Sessions for the community newsletter or radio station.
VALUE CARDS

DIRECTIONS
1. Make the Value Cards:
   a. Make a set of Value Cards. You can use the terms in the Activity Guide or create your own. Be sure to leave at least 5-10 blank cards for participants to fill in with their own words or ideas.
   b. The values could include words such as: Reliable, Home Comfort, Co-operative, Lead by Example, Youth-focused, Community led, Support for Community Programs, Proven Technology, Sustainability, Safety, Easy, Innovative, Job Creation, Affordable, Respect for the Earth, Partnerships, Resilient, Local Skill Development, Efficient, Elder-focused, Healthy Community, Community-led, Autonomy, Change, Education, Family, Happiness, Independence, Leadership, Relationships, Security, Safety, Spirituality, Stability, New Business Opportunities, Reduced Costs, Long-term Revenue,

2. Set up the room with tables and chairs that you can move easily.

3. For each small group, provide a full set of cards and pens or markers for each participant. Consider assigning a notetaker to each group so that ideas, the values selected and quotes can be written down during the group discussion.

4. Break the participants into small groups to discuss the values on the cards. Ask them to study the cards for several minutes and try to express what each value means to them. Ask them to write these meanings down.

5. Once they have had some time to discuss the values, ask them to work together to identify the top three to five values that they feel represent the community. These cards should represent the “Core Values” of the community.
   a. It is important to give each group a couple of blank cards so they can add things they don’t feel are represented in the Value Cards handed out.
   b. Ask them to explain the meaning of the values they pick (e.g. What does “Energy Security” mean to them?). Write these descriptions on the cards – this way the CEC and Energy Team can use the community’s own words in any write-up.

DURATION
45-60 minutes

OUTCOMES
• Participants will identify values that are important to them
• Participants will be able to see the shared values in the community
• The values will help in forming a Community Energy Vision

SUPPLIES
- Scissors
- Paper
- Flip Chart
- Markers or pens
- Value Card cut outs for each group
6. Then ask the small groups to share their top values with the whole group. It is easiest if they can post the cards on a wall, so everyone can see them.
   a. It is important to have all groups share the meaning (to them) behind each value they chose. This way, themes can be clustered (e.g. if one group picked Protect the Earth and another picked Sustainability, but they wrote similar meanings, then they can be clustered together).
   b. Cluster the Value Cards together as they go. You might even note some ranking of what’s most important or the community might decide that they are all important and shouldn’t be ranked.
7. Identify where there is a lot of agreement amongst the small groups. For example, if three of the five groups say that Education is a top value to the community, then it should be marked in some way in the session notes.
8. Have the group look at the compiled list of values and share reflections and observations (e.g. areas of overlap, values that are missing, values that should be added). Ask if there are any conclusions that can be drawn about the group’s shared values and record those words on a separate flip chart.
**Sample Value Cards:**
(Note: this sample is a single page from a multi-page template)

<table>
<thead>
<tr>
<th>Self-Reliance</th>
<th>Job Creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Business Opportunities</td>
<td>Affordable</td>
</tr>
<tr>
<td>Reliable</td>
<td>Respect for the Earth</td>
</tr>
<tr>
<td>Home Comfort</td>
<td></td>
</tr>
<tr>
<td>Co-operative</td>
<td></td>
</tr>
</tbody>
</table>
VISIONING EXERCISE

ABOUT
This Visioning Exercise is similar to the process described earlier in Stage 4 and could be done with anyone from age 5+. The brief exercise could be completed in about 90 minutes.

DIRECTIONS
Set up the room with tables and chairs for participants to work in groups of 6–10 people, with each group led by a member of the Energy Team.

1. Ask participants to consider a time in the future (usually about five to ten years ahead) and imagine what they think their community could look like. Encourage them to use their imaginations to create scenarios that capture their positive visions for the future through drawings or written comments.

2. Participants can work on one or a few group scenarios or individual scenarios and then come together to discuss and present individual scenarios to one another. The strategy you use may depend on who is in the group and whether the group members will likely be in general agreement with each other. If you think there will be significant differences amongst participants, then they should work individually first. Here are some possible questions to prompt participants when developing their scenarios. You may want to consider writing these prompts on flipchart paper for easy reference:
   a. What features (physical, social, cultural) do residents use to identify their community?
   b. What are the community’s principle values?
   c. What defines a “good” quality of life in the community?
   d. What are the community’s energy opportunities?
   e. What things in the community should be preserved? What things should be changed?
   f. When it comes to energy issues, what five things would really improve the community?
   g. How fast should changes occur?

SUPPLIES
- Flip charts or wide roll of poster paper
- Markers
- Sticky notes
3. Once the inventory is completed and the probable scenarios are developed, ask participants to select one scenario from the group and further define it. They should review and discuss the information and select the scenario they believe best reflects their community’s desires for the future. They should also be encouraged to change or modify all scenarios.

4. Afterwards, participants will spend the rest of the community workshop developing a simple two-to-three paragraph statement that captures the chosen scenario. This statement will then become the core of the Community Energy Vision statement.

5. The Energy Team should explain that the wording will be adjusted later, so choosing exactly the right word is less important than capturing the key concepts or ideas. Each table will then present their vision statement to the other groups. Key phrases or statements that are reflected in more than one group should be highlighted. Explain to the group that the CEC and the Energy Team will consult with others to further refine the vision statement and then bring it back to larger group for review.
## ACTIVITY GUIDE 4-3

### GRAPHIC FACILITATION

**DURATION**
45-60 minutes

**OUTCOMES**
- Identify key energy values through artistic expression
- Illustrate important community values and practices

**SUPPLIES**
- [ ] Large roll of paper
- [ ] Markers
- [ ] Tape or thumbtacks

**ABOUT**
Community members may learn more or be more creative when they can see ideas in a visual way. Graphic facilitation helps translate thoughts, dialogue, and ideas into something people can see. This promotes a different way of imagining the answer to a question. In Visioning Sessions, graphic facilitation records the results and shows connections between ideas and conversations – which is not always easy to do with written notes. Graphic facilitation is also extremely accessible and inclusive for people of all ages and all reading levels. Each of the activities below can be a great addition to other Community Engagement Activities, but they are especially useful for Visioning. Choose one or several. Some may be a better fit for your community than others.

Remind participants that they do not need special drawing skills. Some people may prefer to sketch smaller images on pieces of paper rather than drawing directly on the larger image. The small images can be added to the collective image during breaks.

Graphic facilitation is not purely about drawing; it is equally important to ask the right questions, to listen and to record accurately what is being said. The group should feel ownership over the image and should see their own words, images and ideas presented in the emerging wall chart. You can invite feedback by asking participants to write comments on sticky notes and adding these to the chart during breaks.

**DIRECTIONS**

**Preparation:**

1. Clear an area of wall space 2 – 3 metres (6-10 feet) wide so that a wide panel of paper can be posted.
   a. Set up a long table so that the paper can be laid across it for multiple participants to draw upon.
   b. Put markers in containers on the table and by the wall so they don’t roll on to the floor.
2. **Mind maps** are a well-known tool for individuals to use in organizing their thoughts. They can also be used in groups. The key question or issue is written in the centre of the sheet of paper. Each main trend/factor etc. is represented by a line coming out from the key question or issue, with the trend/factor written along the line. A different colour is used for each line.

When the map is complete, issues can be grouped and given a name. Related issues may by now be on different parts of the map. Participants can be given coloured dots to use to vote for trends that they think most important. If the participants come from different community groups, using different coloured dots for each group will give a visual sense of how the priorities of each group compare.

3. **Clusters** are the next step from lists in brainstorming and generate insights through comparisons. Diagrams link elements so that they show organization and structure.

4. **Charts** from the meeting can be treated as the first draft for a report. The original drawing can be reduced to a manageable size by a copy company using a planning copier, or photographed with a camera that has a wide-angle lens. The accuracy of any re-drawn charts should ideally be checked with the work group. Remember to number each re-draft.
VISION ACTIVITIES FOR KIDS

ABOUT
Visioning is a fun exercise to do with children and youth because they like to dream big! We suggest running this event in the local school, at the community centre, or another gathering place for youth.

DIRECTIONS
This activity can be done with the paper posted on the wall or laid out on the table. Spread out markers on the tables so that participants are encouraged to come up and add their ideas on the lists.

1. Ask them to draw a picture of their vision of a healthy, happy future for their community.
2. Reassure them that there is no wrong way to do it – and that whatever they see in their minds is exactly right.
3. It is important to have talked about community sustainability before doing this activity, so the children or youth have this understanding in their minds when they are dreaming up their future.

SUPPLIES

- Paper
- Markers, pencil crayons or crayons
SUMMARY & CHECKLIST

☐ We have developed a Community Energy Vision through engagement with the community.

☐ Our Vision contains positive, present-tense language.

☐ Our Vision contains elements of our community’s uniqueness.

☐ Our Vision focuses on our people and quality of life.

☐ Our Vision contains short-term, medium-term, and long-term goals for our community.
STAGE 5
Assessing Energy Needs and Resources
### Assessing Energy Needs and Resources

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187  Define the Boundaries

188  Assemble Information from Community Sources

188  Sample letter to energy supplier

188  Sample letter — Survey household energy use

192  Create a Commercial Buildings Inventory

192  Create a Residential Buildings Inventory

195  Hiring Consultants through a “Request for Proposal” (RFP)

197  Types of Building Energy Audits

198  Analyze Energy Generation and Utility Consumption Data

200  Analyze Energy Cost Information

200  Calculate GHG Emissions

201  Benchmark Community Facilities

202  Project Future Energy Use

203  **Activity Guide 5-1:** Community Energy Profiling Engagement Activity

204  Clean Energy Opportunities & Recommendations

205  Overview of Project Types

207  The Energy Pyramid

208  Energy Measurement Glossary

208  Energy Unit Conversion Tables

209  Tools & Resources

210  Summary & Checklist
Assessing Energy Needs and Resources

Introduction

Building on Stage 1: Understanding your Energy Landscape, this stage involves taking a much closer look at the community’s energy needs and resources. The goal is to understand where and how energy is being used, and the impacts of energy use in terms of emissions, energy costs, or other community concerns. From there, you can then project future energy use along two possible pathways: continuing with “business as usual” (that is, making no changes to current energy systems), or setting goals and making changes to achieve your ideal energy vision as outlined in Stage 4. This detailed assessment in Stage 5 will help you define the strategic direction for your community’s energy needs and resources.

Creating your Community Energy Profile

Creating an energy profile is an important starting point in your community’s energy needs assessment. A Community Energy Profile is a snapshot of how a community uses energy across a certain time period. It gives the “before” picture of total energy use before making any changes or improvements in your energy systems. This is the community’s ‘energy baseline’. Your community’s energy profile data should describe:

- **ELECTRICAL GENERATION FUELS:** The type of fuel the community uses to produce energy (electrical generation) and how much GHG emissions each fuel generates;
- **ELECTRICAL CONSUMPTION:** According to how much electricity is used by the end-use sector (e.g. residential, commercial buildings, transportation, industrial-use, electricity generation, heating, waste, and water);
- **COMMUNITY LOAD:** A measure of the power consumed by the community over a specific time period. Measurements should show the average and the highest amount (the peak) of the electricity used;
- **ENERGY LOAD PROFILES:** For residential and commercial buildings, and other major energy users in the community;
- **ANNUAL FUEL USE AND COST:** The amount and cost of energy used to generate electricity, provide heating to buildings and power vehicles.

Image 5-2. The Gull Bay Solar Microgrid Project ©Gull Bay First Nation
It is also important to get a clear picture of the energy consumption by specific sectors or for specific uses (e.g. households, commercial buildings, energy generation, industrial, transportation, heating, water, etc.) Include all relevant sectors so you can identify the largest energy users.

Sample energy use profiles are shown below to illustrate the type of information that may be included in your community energy profile. A Community Energy Profiling Tool with instructions is provided on the ACEPI Toolkit Website at the end of this stage.

**Figure 30.** An Example of a Community Energy Profile

<table>
<thead>
<tr>
<th>2019 EMISSIONS</th>
<th>PRIMARY FUELS</th>
<th>RENEWABLES</th>
<th>NATURAL GAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>70% DIESEL</td>
<td>DIESEL (64%)</td>
<td>(9%) PROPA (8%)</td>
<td>(9%)</td>
</tr>
<tr>
<td>10% NAT. GAS</td>
<td>BUILDINGS (53%)</td>
<td>INDUSTRIAL PROCESS</td>
<td></td>
</tr>
<tr>
<td>20% PROPANE</td>
<td>RESIDENTIAL (26%)</td>
<td>COMMERCIAL (27%)</td>
<td>TRANSPORTATION (36%)</td>
</tr>
</tbody>
</table>

**Figure 31.** An Example of a Community Energy Map

**GHG EMISSIONS:** 4506 t CO$_2$eq/yr

**INPUT ENERGY:** 21,958 MWh/yr

**ENERGY USE:** 21,958 MWh/yr

**COMMUNITY ENERGY MAP**

- TRANSPORTATION: 36%
- RESIDENTIAL: 38%
- NON-RESIDENTIAL: 26%

**COST:** $2,613,000/yr
The process of creating a Community Energy Profile involves several steps. Some of these the CEC and the Energy Team will lead (likely Steps 1-5), and others, you may want to work with an Energy Assessment Consultant to help complete the work (likely Steps 6-11). Here are the steps in process:

**Community Energy Profile Process**

1. **Define the Scope of the Profile**
   Decide if your Community Energy Plan needs to be comprehensive, focused on specific issues or integrated with other resource planning. Figure out the time scale for the project.

2. **Define the Boundaries**
   Specify the geographical boundaries and time boundaries.

3. **Assemble Information from Community Sources**
   Gather information from the community to create your energy profile.

4. **Building Inventory**
   Create an inventory of all the community infrastructure.

5. **Residential Inventory**
   Create an inventory of all the houses in the community.

6. **Analyze Energy Generation and Utility Consumption Data**
   Detail how much energy is being generated in the community and from which sources.

7. **Analyze Energy Cost Information**
   Collect data on the costs of all energy sources used in your community.

8. **Calculate GHG Emissions**
   Estimate what sectors and fuel types contribute to your community’s greenhouse gas emissions.

9. **Benchmark Community Facilities**
   Compare buildings and homes against similar buildings and homes.

10. **Project Future Energy Use**
    Forecast community energy use in 2, 5, and 10 years, based on projections.

11. **Clean Energy Opportunities & Recommendations**
    Find clean and renewable energy options and make recommendations for implementation.
Define the Scope of the Profile

Before you begin collecting data for your energy profile, consider what kind of Community Energy Profile and Plan your community needs. What information is most important? What amount of data do you need to give you enough information? What time period should the data cover? Will you need to consult an expert to analyze the data? Some communities may decide that they only need a brief, high-level assessment, while others may require deeper analysis. Different approaches for developing a CEP are listed below in Table 7. Some examples are provided to help you decide what kind of CEP is best for your community.

Some CEPs may focus on specific aspects of energy generation or consumption in the community. Other CEPs may be more comprehensive, looking at all aspects of energy use, or may integrate energy issues into a broader sustainable development plan for the community.

<table>
<thead>
<tr>
<th>CEP Approach</th>
<th>Objective/Scope</th>
<th>Document Example</th>
</tr>
</thead>
</table>
| Comprehensive | • Comprehensive energy and emission planning targeting all aspects of energy production and consumption in a community  
• Detailed analyses of technical and economic aspects of energy production and consumption in a community  
• Commonly adopted approach for energy planning among local governments and municipalities  
• Biggest investment of time and resources | The Deline CEP includes a comprehensive community profile and goals towards improving the sustainability of energy production and consumption through energy efficiency and renewable energy production. A link to this example can be found in the digital resources. |
| Specific Issues | • Targeted at a few specific aspects of energy production and energy use in a community  
• Often adopted in renewable energy planning or in implementing specific energy efficiency measures  
• May be adopted when a community has specific projects in mind or previously evaluated | The Kakisa CEP includes an energy profile and focuses on energy efficiency in homes and buildings as the primary area of improvement in the community. A link to this example can be found in the digital resources. |
| Integrated | • Energy considerations are integrated into a much broader sustainability plan  
• Energy planning is not the core focus of the plan  
• Implementation strategies are not strictly focused on community-wide actions to reduce energy consumption and emissions | The Inuvik 2010 CEP contains not only a comprehensive CEP, but also relates to the community’s Integrated Community Sustainability Plan. A link to this example can be found in the digital resources. |

Table 7. Approaches to Developing a CEP

If there is little or no prior knowledge of your community’s energy landscape, it might be useful to consider CEP approaches adopted by other communities with similar characteristics and within similar geographic settings. In some cases, this can help you to make quick estimates of your own community’s energy use and the cost and time needed for a CEP.
An energy plan may cover many or just a few of the following areas:

- Community design and zoning and how it affects energy use;
- The amount of energy produced in the community vs. the amount of energy that is imported;
- The amount of energy used to support community services and infrastructure such as streetlights, sewers, water, etc;
- Community building use of energy for space and hot water heating;
- Community building use of energy for electricity;
- Transportation within and outside of the community;
- Industrial use of energy to operate industries such as mines, fish plants, saw mills, etc.

Define the Boundaries

You will need to define the physical boundary for your assessment and decide on the baseline year of study. It is important to be clear about the areas of focus, timeline and the facilities you will include.

For example, does your assessment stay within the geographical boundaries of where your community is currently situated? Or does it go beyond that immediate region to cover a wider physical area or traditional territory? Does it include all elements (i.e. all local energy systems, all buildings etc.) or only a portion of them?

The baseline year is used to establish a benchmark or starting point. This is part of the “before” picture of your community’s energy use and needs. As time goes on, you can compare your baseline to your yearly energy use and track your progress. Establishing the baseline allows you to communicate to stakeholders and community members about where and how energy is being used in your community and the progress your community is making. It will help you explain the opportunities to use energy more efficiently, reduce emissions, increase the use of renewables and decrease your reliance on a single energy source.

There may already be a baseline year established for your community’s energy use. If not, make it the most recent year for which you have complete and reliable energy consumption data. It might be useful to collate a few years of recent data and not just a single year.

Figure 32. Example of an Energy Baseline
Assemble Information from Community Sources

To create an energy baseline, you will need information on local energy systems, historical energy consumption, and projected energy demand. You can gather useful information from energy use records, from interviews with people involved in community infrastructure operations (e.g. building operators), or through more detailed analysis with technical experts. You can collect energy consumption data (i.e. electricity, heating, and other fuel consumption) from relevant utilities and suppliers. You will want to identify all of the individuals, agencies and businesses that supply fuel to the community to get a historical look at energy use and supply hold accurate information on historical energy use in a community. Information about fuel supply may come from your public utilities board, your local utility, gas stations, heating fuel suppliers, or others. A letter, similar to Arctic Energy Alliance’s letter in Figure 33, can be written to each fuel provider explaining your information needs. Letter templates can be found in the digital resources found on the ACEPI website.

Sample letter to energy supplier

Energy supplier’s name and address

Your name and address, unless you use letterhead

November 14, 2019

Dear Sir or Madam,

Our community is working to create a community energy plan and we need your help. A community energy plan shows what action we plan to take in the future to use energy more wisely. To develop a plan that best suits the needs of our community, we first need to understand how we use energy right now — we need to create an energy profile.

To gather data for the energy profile, we’re asking each energy supplier in our community to fill out a form, to tell us how much fuel our community used in a year and how much it cost. Our study is for the year [insert dates here].

Please fill out the attached form and return it to us by [insert dates here]. If you have questions, please call us at 867-123-4567.

Thanks for taking the time to participate in this important work. We believe our whole community will benefit from a community energy plan.

Sample letter — Survey household energy use

Community Energy Planning Team

Community name

November 14, 2019

To all the homes in our community,

Our community is working to create a community energy plan and we need your help. A community energy plan shows what action we plan to take in the future to use energy more wisely. To create an energy plan that best suits the needs of our community, we need to understand how we use energy right now. We need to create an energy profile.

To create the profile we’re asking each home to fill out a confidential survey about your energy use. We’ll add up the information from all the surveys to find out how much fuel our community used in a year and how much it costs. Our study is for the year [insert dates here].

Please fill out the attached form and return it to us by [insert dates here]. If you have questions about the form or about energy planning in our community, please call us at 867-123-4567.

Thanks for sharing information and your ideas. Our community energy plan will help us use less energy and save money, and our whole community will benefit.

Figure 33. Example of a utility providers letter (Source: Community Energy Planning Toolkit, Arctic Energy Alliance 2006).
Door-to-door surveys can be conducted to collect more information on where and how community members use energy, particularly for electricity and heating. Again, letters (see Figure 33) can be sent to community members explaining the type of information required and why it is needed. While this approach may be time consuming, it can provide you with additional information on energy use trends and preferences. A sample household energy use survey can be found in the digital resources section of the ACEPI Toolkit website.

To engage community members, consider hiring a team of older students or maybe some elders in the community to go door-to-door and encourage people to complete the survey. Other sources of information for your community energy profile include:

- Population Census Data or Population Projections
- Utility Energy Use Records
- Land-Use Plans
- Official Community Plans
- Housing Development Plans
- Community Infrastructure Development Plans
- Sustainability Plans
- Economic Development Strategies
- Specific Clean Energy Project Pre-Feasibility or Feasibility Plans
- Natural Resource Plans
Up-to-date energy and climate data can often be found in a government database which may be available online, e.g. Statistics Canada and the Canadian Department of Environment and Climate Change. You may find data on your region’s energy use trends, GHG emissions and projected energy demand as well as important climate information (e.g. heating and cooling degree days), and data on your community’s renewable energy potential (e.g. wind speed).

If you already started to gather information for your Energy Profile as suggested in Stage 1, you may already have most of the data you need for your energy baseline assessment. Review the information from Stage 1 below and keep your records up-to-date in a common database:

- **The utility fuel mix** – From your local utility’s integrated resource plan;
- **Asset Management Inventory (for community-owned facilities)** – Number of buildings, year built, square footage, buildings slated to be built in the future, energy efficiency, and conservation initiatives that have been implemented;
- **Housing Inventory** – Occupied housing units (owned and rented), housing types, number of homes, average home size, homes slated to be built in the future, energy efficiency and conservation initiatives that have been implemented;
- **Energy consumption data** – By energy source, household, and sector (buildings, transportation, industry);
- **Lists of available plans and reports** about energy that might be relevant to the CEP;
- **Greenhouse gas emissions calculations**

It’s worth keeping a list of critical data points to keep track of progress over time. Some of the most relevant data points include:

- Buildings energy use profile
- Energy generation (electricity, heating, and other fuel types) and Utility consumption data
- Energy Cost Data
- Greenhouse gas emissions (GHGs) reductions

Where possible, these data points should be updated on a regular basis (e.g. quarterly or annually) to track the community’s progress. An energy reporting tool and user-friendly application such as a Microsoft Excel Spreadsheet can be used to record annual energy consumption and create easy-to-read graphs to show how your community performs in each period. An example is provided in Figure 34.
Using the 12 month period August 2018-July 2019 to a global organization baseline period of January-December 2017

<table>
<thead>
<tr>
<th></th>
<th>kBTU per SF per Year</th>
<th>Dollars per SF per Year</th>
<th>CO2 lbs per SF per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual</td>
<td>Baseline</td>
<td>Change from Baseline</td>
</tr>
<tr>
<td>Diesel</td>
<td>45.09</td>
<td>46.51</td>
<td>-1.42</td>
</tr>
<tr>
<td>Renewables</td>
<td>0.24</td>
<td>0.00</td>
<td>0.24</td>
</tr>
<tr>
<td>TOTAL</td>
<td>45.33</td>
<td>46.51</td>
<td>-1.18</td>
</tr>
</tbody>
</table>

% Change from Baseline

- Diesel: -18.68%
- Renewables: 1.27%
- TOTAL: -9.76%

**Figure 34.** Benchmarking Framework example. (Source: B3 Benchmarking Framework, Minnesota Department of Commerce 2004)
Create a Commercial Buildings Inventory

The next step is to complete a detailed inventory of community-owned, government-owned, commercial, institutional or other buildings. Gather statistics on all buildings owned and operated by municipal, community, and non-profit organizations including offices, community halls, health facilities, schools, and churches and any others you would like to include in the CEP Building Inventory. For some examples of the kinds of questions to ask when putting together this inventory, see the checklist on the right hand side of this page.

Where there have been previous energy audits completed, do a complete inventory of the reports. This will give you key information about potential areas for improving energy efficiency and reducing energy use. It may also provide a list of strategies that weren’t implemented, and reasons why. It should also provide a baseline for future reporting, projections and energy use comparisons. When you evaluate the energy performance of these buildings you can identify areas for improvement (e.g. better insulation). Consider talking to partners or members of your Energy Team with community infrastructure expertise to determine if a higher level of building energy efficiency analysis is needed. The buildings inventory should be updated regularly (e.g. every 2-3 years) to monitor the impact of changes in building use, efficiency, remodelling or renovations.

Create a Residential Buildings Inventory

Residential buildings are a significant source of energy use in a community. Gather information about the current housing stock and planned housing projects in your community. The housing inventory should include information on occupied housing units (owned and rented), housing types, energy cost as a percentage of household income, amount and average size of homes, previous home energy audits, and energy efficiency improvements that have been implemented.

Information on energy use in residential buildings can be obtained directly from community members using door-to-door surveys as shown in the Digital Resources. Where possible, gather information on the size of the home (i.e. floor area measured in square metres – m²), number of residents, electricity, heating, and other fuel bills for the past 12 months. Such data can be used to work out annual fuel consumption and costs as well as the energy performance of each home. Figure 35 provides a
summary of the basic steps in conducting a quick assessment of energy use in a residential building.

Energy performance of a home is simply the amount of energy consumed or the estimated level of energy necessary to meet the needs associated with the basic use of the building including heating, cooling, lighting, refrigeration. This information is useful when deciding on energy efficiency improvements and when projecting future energy demand of the community’s residential sector.

With information gathered from your community in Community Energy Profiling Steps 1-5, you may choose to engage with an Energy Assessment Consultant who can help you analyze the data you have collected, identify opportunities for improvement, and make recommendations about the clean energy project opportunities.

A high-level overview and key points about Steps 6-11 have been provided in the sections to follow. If you would like to complete Steps 6-11 on your own, we suggest using Arctic Energy Alliance’s (AEA) CEP Toolkit and worksheets to do these calculations. The main calculations covered in the AEA Toolkit include the following:

- Convert different fuel measurements to MJ and calculate total MJ.
- Calculate % of total MJ for categories of fuel and end use.
- Calculate fuel costs and % of total costs.
- Calculate greenhouse gas emissions and % of greenhouse gas emissions.
- Calculate % of electricity and % of waste heat from diesel-electricity power plants.

The AEA Toolkit worksheets and instruction manual have been included on the ACEPI Toolkit website in the digital resources section.

You have also been provided with information to consider when selecting an Energy Assessment Consultant to work with in the section to follow.
DEFINE THE SCOPE OF THE PROFILE
Decide if your Community Energy Plan needs to be comprehensive, focused on specific issues or integrated with other resource planning. Figure out the time scale for the project.

DEFINE THE BOUNDARIES
Specify the geographical boundaries and time boundaries.

ASSEMBLE INFORMATION FROM COMMUNITY SOURCES
Gather information from the community to create your energy profile.

BUILDING INVENTORY
Create an inventory of all the community infrastructure.

ANALYZE ENERGY GENERATION AND UTILITY CONSUMPTION DATA
Detail how much energy is being generated in the community and from which sources.

CALCULATE GHG EMISSIONS
Estimate what sectors and fuel types contribute to your community’s greenhouse gas emissions.

PROJECT FUTURE ENERGY USE
Forecast community energy use in 2, 5, and 10 years, based on projections.

CLEAN ENERGY OPPORTUNITIES & RECOMMENDATIONS

Community Energy Profile Process Leadership

CEC AND THE ENERGY TEAM
ENERGY ASSESSMENT CONSULTANT
Hiring Consultants through a “Request for Proposal” (RFP)

When you assess your community’s energy needs and resources you need to look at the level of expertise in your community to carry out the technical, financial, and administrative aspects of the CEP. If there are people within your community with some technical expertise, their involvement can be hugely beneficial because they are familiar with how your community operates, and you don’t have to pay travel or accommodation costs for them.

However, it is often likely that you will need an outside consultant or contractor to do at least some of the technical analysis. When choosing a consultant, you will want to hire an individual that is well suited to your community’s needs.

It is highly suggested that you prepare a Request for Proposal (RFP) to seek the services of the right consultant/contractor/organization. The first consultant to knock on your community’s door, or the first organization (consulting firm, academic institution, not-for-profit, government entity, etc.) to be readily available to assist you, may not be the best fit for your community.

Through the RFP, consultants who are interested in working on your project will bid for the contract and submit information on their organization, their experience in the sector, certifications and past projects. Your RFP should be tailor-made to the

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1. Request for Proposals (RFP)
This is the document that you will send to potential Energy Assessment Consultants who can analyze the information that you have gathered.

2. Contract Award for Energy Assessment Consultant
This contract identifies how the consultant will do their energy assessment for the community.

3. Energy Assessment & Pre-Feasibility
The Energy Assessment, conducted by the Energy Assessment Consultant, outlines the specific energy needs in the community, and the Pre-Feasibility work will identify opportunities that could be considered for future project options.

4. Recommendations
These are the opportunities which the consultant has identified as the most beneficial for the community to consider, primarily from a technical perspective.
specific services and tasks to be carried out by the consultant.

Some suggestions for developing an RFP include:

- Identify specific areas where you need expert assessment and highlight the questions you need answered.
- Clearly communicate what you expect them to produce and how you want that product to appear, and how you intend to use it.
- Be specific about the scope of the project and current level of support in your community.
- Provide all the energy data you have already collected.
- If training, mentorship or job shadowing are important to your community, be sure to include that within the scope of the RFP.
- Be clear about the issues to be tackled as well as the type of analysis you would like.
- Provide a clear plan and schedule for the work, stating what your community expects, and when.
- Request references and a showcase of specific work examples from previous jobs. For example, ask them about their experience working in Arctic conditions or small communities. Also be sure to check in with references!
- Be clear about your community’s energy goals. Make sure the RFP is clear about the next steps for your CEP, and how the work connects to your community energy vision and goals.
- Don’t be afraid to ask questions or make changes to the proposed methodologies. You can also ask to meet regularly with potential consultants to ensure they would be a good fit for your community.

Finally, if the organization cannot follow the instructions outlined in your RFP, think twice before hiring them. If they are unable to listen to your needs in the proposal, you may not get the product your community wants and needs.

A sample RFP for an energy assessment contract has been provided in the digital resources section of the ACEPI Toolkit website.

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Examining project ideas in an energy assessment

As part of your energy assessment, you may want to hire a consultant to do a pre-feasibility study of one or more clean energy project ideas. It is important to always do a pre-feasibility study or a desktop study to learn more about a potential project before investing time, money and effort into a feasibility study. Detailed feasibility studies provided a much closer look at a project’s potential, and if it is technically, environmentally and financially feasible. Detailed feasibility studies and business planning will be discussed in Stage 7.

A pre-feasibility study provide you will general information about a project potential. If the pre-feasibility study determines that there is little potential for a clean energy option, you may decide not to include the option in your energy plan. If the pre-feasibility study finds that a project has good potential, then the project should go into the recommendations section of the energy assessment and be evaluated by the community in Stage 6.

Below is a list of projects that will likely require further study.

<table>
<thead>
<tr>
<th>Project</th>
<th>Study Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable energy options</td>
<td>Desk top pre-feasibility study to show potential for renewable energy source</td>
</tr>
<tr>
<td>Retrofit community buildings</td>
<td>Energy audits</td>
</tr>
<tr>
<td>Retrofit homes</td>
<td>EnerGuide for house evaluations (discussed later in Stage 5)</td>
</tr>
<tr>
<td>Community Energy Engagement &amp; Education</td>
<td>Community Engagement Strategy (look to Stage 3)</td>
</tr>
</tbody>
</table>
Conducting an Energy Audit

An energy audit is a method to assess energy use in a building, home or facility, to identify opportunities to reduce energy consumption and improve efficiency. The goal is to learn where, when, why and how energy is being used and to establish a clear energy consumption baseline.

Typically, an energy audit is done with the help of an audit expert. You may have an expert in your community or you may need to bring somebody in. You can also explore other options with community members who have some expertise or who can be trained in some of the steps in the audit process.

The audit process begins with a review of the historical and current energy consumption data for the building, followed by benchmarking the building’s energy-use baseline against similar facilities. The results are usually captured in a formal report detailing key problems, a list of recommended energy efficiency measures (EEMs), and strategies for saving energy.

The auditor can also provide information on the costs and benefits of potential energy efficiency improvements. With the help of the auditor, the Energy Team can decide if the proposed costs are a good financial investment for your community.

Types of Building Energy Audits

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) sets out three levels of audits, from basic to highly detailed. An energy auditor will work with you to understand your community’s energy goals and budget and help you decide which level of audit you need. For smaller facilities where there may not be a major capital improvement plan or budget, a basic audit may yield results that make the cost of the audit worthwhile.

Facility Walk-Through: This audit is usually a basic tour of the entire building to identify the most obvious opportunities. There is also an analysis of the building’s utility billing information, the main equipment and appliances that consume energy, and the building operating data.

Energy Survey Analysis: This audit looks at specific systems or areas in the facility in greater detail (e.g. lighting or heating, ventilation and air conditioning). Energy surveys and engineering analyses are carried out by experts, to identify the building’s energy-use and energy performance, and opportunities. Such targeted audits are useful if your community is already interested in some specific energy efficiency projects and/or there is limited budget for improvements.
The next step is to look at energy generation sources and consumption data for your community. Again, utility providers and energy suppliers can be excellent sources of information for historical energy generation and consumption trends. The following information will be useful in compiling your community’s energy generation and consumption data:

- Inventory of the existing grid-mix by generation type (e.g. diesel, propane, natural gas, biomass, hydro, wind, solar, etc.)
- Utility information (publicly-owned vs. privately-owned utility)
- Utility consumption data for all fuel types

A survey (see example in Figure 34) can be used to gather information from utility suppliers about how much fuel your community consumes on an annual basis.
You can also organize the data according to the energy consumption trend for a specific building unit. Collect monthly, quarterly, or yearly energy consumption data for all measurable sectors including electricity, heating/cooling, waste, water, and transport. Table 9 provides an example of how to collate and analyze electricity consumption data.

### Table 9. Utility Consumption Example

<table>
<thead>
<tr>
<th>Date →</th>
<th>Jan-10 2012</th>
<th>Month-DD YYYY</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Days →</td>
<td>31</td>
<td>--</td>
</tr>
<tr>
<td>Bill ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly Electric Demand (kVA)</td>
<td>1,017.6 kVA</td>
<td>--</td>
</tr>
<tr>
<td>Monthly Electric Demand (kW)</td>
<td>915.8 kW</td>
<td>--</td>
</tr>
<tr>
<td>Electric Demand Cost ($)</td>
<td>$12,256.68</td>
<td>--</td>
</tr>
<tr>
<td>Electric Use (kWh)</td>
<td>7,593.6 kWh</td>
<td>--</td>
</tr>
<tr>
<td>Electric Use (kWh/day)</td>
<td>24,495.5 kWh/day</td>
<td>--</td>
</tr>
<tr>
<td>Electric Use Cost ($)</td>
<td>$65,277.77</td>
<td>--</td>
</tr>
<tr>
<td>Electric Use Unit Cost ($/kWh)</td>
<td>$0.085</td>
<td>--</td>
</tr>
<tr>
<td>Total Electric Cost ($)</td>
<td>$84,127.00</td>
<td>--</td>
</tr>
<tr>
<td>Consumption (kBtu)</td>
<td>2,591,044.1 kBtu</td>
<td>--</td>
</tr>
<tr>
<td>% of Bill is Demand Charges</td>
<td>15%</td>
<td>--</td>
</tr>
<tr>
<td>Load Factor (%)</td>
<td>111%</td>
<td>--</td>
</tr>
<tr>
<td>Tax ($)</td>
<td>$6,550.50</td>
<td>--</td>
</tr>
<tr>
<td>Service Charge ($)</td>
<td>$42.15</td>
<td>--</td>
</tr>
<tr>
<td>Total Charges ($)</td>
<td>$6592.65</td>
<td>--</td>
</tr>
</tbody>
</table>

To the electric utility: Please give a breakdown of how many kilowatt hours (kWh) produced for residential, general, and streetlights, and the cost for each one.

<table>
<thead>
<tr>
<th>Yearly Cost</th>
<th>Kilowatt hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential $</td>
<td>kWh</td>
</tr>
<tr>
<td>General $</td>
<td>kWh</td>
</tr>
<tr>
<td>Streetlights $</td>
<td>kWh</td>
</tr>
<tr>
<td>Total $</td>
<td>kWh</td>
</tr>
</tbody>
</table>

Total Yearly cost + Total kWh = Average cost per kWh

$ + kWh = $
Calculate GHG Emissions

When fuels such as diesel, natural gas and wood chips are burned to generate electricity or provide heat to buildings, harmful greenhouse gases are released into the atmosphere. It is essential to understand which sectors and fuel types contribute the most to your community’s greenhouse gas (GHG) emissions. Then you can focus on the changes that will lead to the greatest reductions.

Estimate total GHG emissions. Estimate total GHG emissions by following the process in the AEA CEP Toolkit and using simple calculations based on the amount of each fuel used in your community.

Analyse Energy Cost Information

Next, collect data on the average electricity rates in your community for residential, commercial, and industrial use. Also collect data on the costs of other fuel/energy sources used in your community. Record the rates in $/kWh or $/litre and estimate the average annual per capita costs for each type of fuel. Then you can calculate energy consumption costs by sector, by source, or even for each resident per year.

You will need the following information to analyze your community’s energy use costs:

• Average electricity cost recorded in $/kWh. Data can be obtained from monthly utility bills
• Average heating cost recorded in $/litres or $/gallon as applicable
• Utility tariff structure
• Current policies and rates applicable to renewable energy or distributed energy resources (e.g. net energy metering, local tax incentives)

Analyzing the utility’s rate structure is important to understand how these rates have changed over time. The utility rate is the price paid per unit of energy supplied in a given period. Energy cost information helps you to:

• Assess impacts of energy spending across the community;
• Identify opportunities for possible cost-savings;
• Make comparisons of current costs against future projections; and
• Project possible cost changes from new energy generation sources (e.g. from fossil-based generation to renewable energy).

Utility Tariff Structure

The electric rate is the price you pay per unit of electricity to your energy utility or retailer. The electricity tariff (or rate) structure is the combination of rates, additional charges, and other rules that determine how your electricity bill is calculated.
Benchmark Community Facilities

To better understand and keep track of the energy performance of individual facilities in your community, it is helpful to look at the performance of similar facilities in communities with similar geography and weather conditions. One resource for benchmarking energy performance for commercial buildings is the EPA Energy Star Portfolio Manager. The tool provides a standardized way to look at the energy performance of a whole building and it provides benchmark scores for many types of facilities. You can look at the energy performance of facilities in your community and compare them to similar facilities listed in the database. You can also use the EPA Energy Star Portfolio Manager to compare your facilities' current energy performance to its past performance and to track long-term trends in a facility's energy consumption and cost.

Project Future Energy Use

Projecting future energy use and potential clean energy opportunities is crucial in assessing your community’s energy needs and resources. See the checklist called Questions for Assessing Your Community’s Future Energy Use, to start your investigation.

Be realistic when you consider potential future energy scenarios. In your analysis, include the factors that will affect your community’s ability to reach its energy goals (e.g. economic, regulatory, political as outlined in Stage 1.). Looking to the future requires long-term forecasting for demand and long-term strategic planning for generation capacity. Local utilities, third-party consultants, and other stakeholders who may have experience in conducting such analysis should be involved alongside the Energy Team.

If you choose to create different scenarios for future energy use on your own, consider using Arctic Energy Alliance’s (AEA) CEP Toolkit. This toolkit includes an Excel spreadsheet and an instruction manual to create and compare total energy costs and greenhouse gas emissions for the following scenarios: scenarios where the community does no-energy savings projects (“business as usual”) or situations where the community invests in energy efficiency, energy conservation or renewable energy projects, or some combination of projects together.

The spreadsheet has different scenarios for four time periods: 5, 10, 15 and 20 years into the future. This spreadsheet and instructional guide can be found in the digital resources section on the ACEPI Toolkit website. There are also several other programs that provide different future energy use situation projections.

Once you have the data and technical details of your energy assessment, you will need to determine how you can communicate the information to stakeholders. You may want to share information visually using charts, graphs, or other compelling images. A community energy profiling engagement activity guide has been provided in the section to follow that highlights an interactive way to share an energy profile with the community.

QUESTIONS FOR ASSESSING YOUR COMMUNITY’S FUTURE ENERGY USE

- How does the community’s past energy consumption compare to the present?
- What trends do you see with respect to future demand?
- Have there been any recent changes in the community’s population?
- Are there possible economic development activities that could impact future demand for energy?
- What will future energy use look like if you continue with business-as-usual?
- Can the community explore potential sources of alternative energy generation?
- Is there potential for major new community infrastructure to be built in the next ten years?
- What is the anticipated increase or decrease in housing in the next ten years?
COMMUNITY ENERGY PROFILING ENGAGEMENT ACTIVITY

From the Arctic Energy Alliance Community Energy Planning Toolkit

ABOUT
This activity is a great exercise to introduce the Community Energy Profile and Report. The interactive format allows the CEC and the Energy Team an opportunity to present the Profile and gives community members plenty of time to ask questions. This activity is most suitable and enjoyed by teens and adults.

DIRECTIONS
1. Introduce the Community Energy Profile and hand out copies of the report.
2. Make a giant size version of the energy profile and cut it into pieces.
3. Start with a photo of the community and talk about the community (the people, the history, the location, etc).
4. Next, add the pieces that show each supply of energy – talk about energy costs to the community, sources of energy, etc.
5. Add the power plants – talk about how big they are, how old they are, if the power plants can integrate with renewables, how much heat energy they waste, etc.
6. Cut out or draw arrows to show how energy flows in and out of the community.
7. Draw or show pictures of fuel sources and the places where people in the community use energy the most.
8. Use pictures to show climate change impacts – talk about the greenhouse gas emissions the community currently generates.
9. Add pictures or diagrams to show the housing stock, buildings and transportation in the community.
10. Finally, talk about the top five ways to use less energy and top five clean energy sources possible for the community. This information can be found in your Community Energy Profile report.
11. Ask the group to put the pieces together and have the CEC or members of the Energy Team fill in any of the gaps about the Community energy story.

DURATION
45 minutes – 1 hour

OUTCOMES
Community members will have a clearer understanding of how the community currently uses energy, before they look at ways to use energy more wisely and generate clean energy.

SUPPLIES
- Markers, crayons, pencils
- 5-10 Copies of the Community Energy Profile Report
- Giant Size Version of the Community Energy Profile (3 ft x 5 ft)
- Scissors
- 5-10 Pictures of the Community – community infrastructure, sacred lands, homes, transportation methods
- Pictures of Community Power Plants
- Arrow Cut outs
- Photos of Community Fuel Sources
Clean Energy Opportunities & Recommendations

The clean energy projects selected should be those which satisfy the community’s Energy Vision and Energy Goals, and which show a strong potential for energy production or energy savings. There may be many project options or just a few. Most project ideas will fall into one of seven main categories:

- BioEnergy
- Energy Efficient Buildings and Communities
- Renewables
- Smart-grid and storage
- Clean Transportation
- Technology and Innovation
- Sustainable Communities
Overview of Project Types

Next, take your Project Ideas to the next level by adding in details and context before presenting the information to the community. Provide enough information so that people can understand the impacts and outcomes of each Project Idea and can offer an informed opinion on which projects to implement.

In this section, different project types have been separated into specific categories, with information about the technology, common impacts and outcomes, cost and timeline. These overviews were developed to help community members compare projects and envision the projects being built. Including details about your specific community or region is often helpful. The main categories are:

**ENERGY CONSERVATION INITIATIVES**
Low-cost initiatives to reduce energy use in the home or in community buildings. These projects focus on actions by community members to create change without the use of new technology. The projects may require some community education, materials to create reminders, and monitoring of energy consumption to demonstrate savings. Examples: lowering water tank temperatures, turning off lights when leaving a room, heating only rooms which are in use.

**OPERATIONS & MAINTENANCE**
Projects that can be done locally by someone with knowledge of the current power and heating equipment. The community would either have the supplies or be able to get them easily. These projects may have some small costs. Examples: Cleaning of the heating systems, replacement of worn out weather stripping on doors and windows.

**ENERGY EFFICIENCY UPGRADES AND RETROFITS**
Projects that can employ local tradespeople to use their skills and capabilities with little or no additional training. These projects often require supplies that may not be readily available. Examples: Installing new thermostats, lightbulbs, etc.; retrofitting homes with new attic insulation or windows.

**MINOR CAPITAL PROJECTS**
Small-scale projects, which would likely need outside expertise and potentially financial support. Some local employment is often possible. Examples: rooftop solar installation, retrofitting homes with significant upgrades.

**MAJOR CAPITAL PROJECTS**
Large-scale projects which require significant outside assistance to work with the CEC and the Energy Team to implement. These projects require very significant funding or financing and can take many years to complete. Examples: community-scale renewable energy projects, smart grid systems, district energy system, waste heat recovery.
Below is a list of project examples that fit into the categories listed above. This list does not include all possible project types, but gives some examples to showcase what could be identified in your energy assessment.

**ENERGY CONSERVATION INITIATIVES**
- Community Engagement on Energy Conservation
- Lower Hot Water Tank Temperature
- Lighting and Heating reductions in unused rooms
- Promote the use of energy efficient transportation

**OPERATIONS AND MAINTENANCE**
- Create a building operations and maintenance program
- Energy Tracking Program
- Tune-ups for generators and energy system components

**ENERGY EFFICIENCY UPGRADES AND RETROFITS**
- New thermostats and high-efficiency lighting
- Appliance Retrofits
- Weatherization and Insulation

**MINOR CAPITAL PROJECTS**
- HVAC Installation and Upgrades
- Roof-top solar project
- Structural building changes
- Major Renovations
- Installation of energy efficient wood heating

**MAJOR CAPITAL PROJECTS**
- Wind energy
- Community-scale Solar Photovoltaic (PV) energy
- Bioenergy project
- Building new buildings and homes that are highly energy efficient
- Run-of-river hydro
- Cogeneration projects
The Energy Pyramid

The most impactful initiatives to transition to a clean energy future are energy conservation, consistent operations and maintenance, and energy efficiency projects. Compared to other kinds of projects, such as renewables, these require the fewest studies and the least amount of technical work, time and capital investment. The Energy Pyramid shown below illustrates this basic principle, applied to a broad array of clean energy projects.

Energy Conservation Initiatives form the base of the energy pyramid, meaning they are some of the easiest and most cost-effective ways to start to move a community into a clean energy future. Conservation projects can also be good stepping stones to gain support for a larger project.

Figure 38. The Energy Pyramid
Energy Measurement Glossary

**Base Load** - The energy requirements of a facility that are unaffected by weather. It is also the minimum amount of electricity or natural gas delivered or required over a given period of time at a steady rate.

**Btu/h** – British Thermal Units per hour.

**J** – Joules

**KJ** – Kilo joule

**MJ** – Mega joule

**CO₂** – Carbon-dioxide

**Cooling Degree Days (CDD)** – The number of degrees by which the average daily temperature is higher than 18°C.

**Heating Degree Days (HDD)** – The number of degrees by which the average daily temperature is lower than 18°C.

**Demand** - The rate of electricity usage over a specified period of time.

**ft²** – Square foot

**GHG** – Greenhouse Gases

**kVA** – Kilo-volt amperes. A unit used to express reactive power.

**kW** – Kilowatt

**kWh** – Kilowatt hour

**W** – Watt

**Load Factor** – The percentage of electricity consumed relative to the maximum electricity that could have been consumed if the maximum demand had been constantly maintained throughout the billing period.

**m²** – square meters

**m³** – cubic meters

**Peak Demand** – The maximum level of electric demand in a specified time period.

**EUI** – Energy Utilisation Index (EUI) is a measure of the total annual energy consumption of a building divided by its gross square footage or metre square area.

Energy Unit Conversion Tables

**Fuel Measurements Conversions to kW (kilo-Watt) or kWh (kilo-Watt hour)**

<table>
<thead>
<tr>
<th>1 horsepower</th>
<th>0.7457 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.412 kBtu</td>
<td>1 kWh</td>
</tr>
<tr>
<td>3412 kBtu</td>
<td>1 MWh</td>
</tr>
<tr>
<td>1 cubic metre - Natural Gas</td>
<td>10.557 kWh</td>
</tr>
<tr>
<td>1 Litre - Propane</td>
<td>6.96 kWh</td>
</tr>
<tr>
<td>0.00086 metric tons</td>
<td>1 kWh</td>
</tr>
</tbody>
</table>

**Fuel Measurements Conversions to Joules (J)**
Tools & Resources

Here are some tools and resources that might be useful in your community’s energy needs assessment and planning. You can find links to these tools and resources in the digital resources.

Energy Star Portfolio Manager
- Building portfolio level energy assessment tool
- Benchmark energy performance for commercial buildings, industrial plants, and commercial building design
- Creates energy benchmark scores for several types of facilities based on operational characteristics
- Free resource, user friendly

ASHRAE – The American Society of Heating, Refrigerating and Air-Conditioning Engineers
- Provides standards and guidelines for building energy audits
- Step-by-step guide on the different levels of energy audit requirements
- Free resource, user friendly

CREST – Cost of Renewable Energy Spreadsheet Tool
- An Excel-based model to provide rough cost estimates for wind, solar, geothermal, biomass, and fuel cell projects
- Assists in the design of cost-based incentives to support renewable energy development at community level
- Free resource, user friendly

RETScreen Clean Energy Management Software
- User friendly software to determine the financial and technical viability of potential clean energy projects
- Engage in ongoing energy performance analysis
- Developed by the Government of Canada with the support of key partners such as REEEP, IESO, NASA, UNEP, and the World Bank
- Free resource (Viewer mode); Professional mode available via annual subscription

ACEPI Community Energy Profiling Tool
- A tool developed for the ACEPI toolkit for Arctic communities to lead the development of the Community Energy Profile.
- A sample of the report can be found starting on the next page, and the tool, with supporting documentation, can be found in the digital resources
- Free resource, user friendly
SUMMARY & CHECKLIST

☐ We have defined the scope and approach of the community energy profile based on our objectives, timelines, capacity and budget.

☐ We have determined the geographical and time boundary of our CEP.

☐ We have assembled energy baseline information from local energy sources, historical energy consumption, and projected demand through different methods.

☐ We have created a commercial and residential buildings inventory.

☐ We have created an RFP for, and then hired, an energy auditor.

☐ We have chosen an energy auditing plan that is suitable for our community’s energy goals and budget.

☐ The Energy Team and the auditor have analyzed energy generation and utility consumption data, as well as, all energy cost information.

☐ We have benchmarked our community facilities against similar facilities in communities with similar geography and weather conditions.

☐ The Energy Team and the auditor have project future energy use and potential clean energy opportunities for the community to consider.

☐ The CEP report includes a detailed recommendations list with tangible actions and realistic costs for the community to pursue.
STAGE 6
Identifying Specific Energy Goals, Objectives and Projects
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<th>Section</th>
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<td>Communicating the Project Priorities to the Community</td>
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<td>Worksheet 6-7: Goals, Objectives and Projects</td>
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<td>239</td>
<td>Case Study: Old Crow Solar</td>
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<tr>
<td>240</td>
<td>Summary and Checklist</td>
</tr>
</tbody>
</table>
Identifying Specific Energy Goals, Objectives and Projects

Introduction

Creating a business plan for a clean energy project can be an expensive and time-consuming endeavour. Before delving into the business planning and spending a lot of time, money and resources, it’s important to know that your project idea aligns with the community’s energy vision (Stage 4) and that you have community support. In Stage 5, we assessed the current and future community resources and energy demands to obtain a realistic look at the possible energy opportunities in the community. In Stage 6, we focus on creating strategic and realistic energy goals to help select key projects to achieve your community’s energy vision.

Creating Community Energy Goals

Community Energy Goals provide a practical guide for assessing which projects to pursue. Goals should include long-term aspirational goals as well as short-term strategies to act as first steps in the project. It is important that goals be Specific, Measurable, Actionable, Realistic, and Time-bound. These are often referred to as SMART Goals.
S  MEASUREABLE – There needs to be a clear way to assess that the outcome shows a change from baseline conditions. If goals are not measured, it is difficult to determine if you are making progress towards successful completion.

M  ACTIONABLE – Goals should be realistic and attainable by the community. The best goals require the team to stretch a bit to achieve them, but are not unattainable.

A  REALISTIC – The goal should be clearly achievable within the timeframe, with the current personnel, and with other resources available.

R  TIME-BOUND – Be sure to set a clear time frame for goal completion or map out a path to reach milestones towards the goal.

T  SPECIFIC – Be sure goals are clear and have enough details. When goals are specific, they are clear about exactly what is expected, why the goal is important, who is involved, where it is going to happen, and which attributes are important.

Using SMART Goals ensures that there are concrete ways to measure success. Here are some examples of SMART energy goals:

- “By the end of 2020, we want to reduce our fossil fuel consumption by 20% through energy efficiency and appliance upgrades.”
- “Before the end of 2021, we will implement a clean energy project to reduce our annual operating costs by at least 15% and GHG emissions by 35%.”

Developing community goals might involve a thorough community engagement process (such as the one used to create the Energy Vision) but it is often a much quicker process, with decisions made by the Energy Team or community leadership. To help define your goals, follow the exercise in Worksheet 6-1: Creating Community Energy Goals.
## Creating Community Energy Goals

This worksheet can be used by the CEC, the Energy Team, or as a tool for public or leadership engagement. Several copies may be needed for each participant as they work through their ideas and identify different goals.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the Community’s Energy Vision?</td>
<td></td>
</tr>
<tr>
<td>What are the energy needs identified by the community, building audits, and resource assessments? (e.g. homes in the community are cold and drafty and need to be more comfortable)</td>
<td></td>
</tr>
<tr>
<td>What are the current baselines for these needs? (e.g. heating costs, temperature)</td>
<td></td>
</tr>
<tr>
<td>Give each need a numerical goal (e.g. reduce heating costs by 18% and maintain an average indoor temperature of 19°C). These goals should be mapped out in your energy assessment recommendations.</td>
<td></td>
</tr>
<tr>
<td>When does the community need to achieve the goal based on urgency, community readiness and costs of current conditions? (e.g. is the cost of delaying a re-insulation project greater than investing the resources now?)</td>
<td></td>
</tr>
<tr>
<td>What are the challenges faced by the community which have prevented this need from being addressed? (e.g. cost for implementation has been too high, there were more pressing housing priorities)</td>
<td></td>
</tr>
<tr>
<td>Draft an Energy Goal that incorporates the information above in a Specific, Measurable, Actionable, Realistic, and Time-bound (SMART) way.</td>
<td></td>
</tr>
</tbody>
</table>
Defining Community Energy Objectives

With the community’s energy goals in hand, the next step is to understand the pathway to meet those goals. To move from the Community Energy Vision towards achieving the Community Energy Goals, certain actions need to be taken. These actions are called the Community Energy Objectives. Below is a diagram which illustrates the relationship between Visions, Goals and Objectives:

Figure 39. Vision vs. Goals vs. Objectives
Creating Community Energy Objectives

**Directions**

Fill in the table below following the examples to indicate ways to meet each goal. Keep in mind that there could be multiple objectives for each goal. These objectives will come from the recommendations in your Energy Assessment from Stage 5.

<table>
<thead>
<tr>
<th>Community Energy Goal</th>
<th>What is measurable change?</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.g. Reduce the fossil fuel consumption in the community by at least 30%</td>
<td>The volume of fuel, in litres or in gallons.</td>
<td>Implement a renewable energy generating project to offset 20% of fuel consumption.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upgrade insulation and sealing on homes in the community to reduce heating fuel consumption by 20% or more.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace all incandescent lightbulbs with LED bulbs to reduce electricity use by 15% and use less fossil fuel at the diesel power generators.</td>
</tr>
</tbody>
</table>
Choosing Clean Energy Project Options

The Energy Assessments completed during Stage 5 should provide a wide variety of clean energy recommendations and opportunities to explore. The CEC and the Energy Team should play a key role in selecting the best and most viable opportunities to present to the community. The CEC and the Energy Team can start by doing a quick high-level assessment, using a few simple questions:

1. **Does the project idea support the Community Energy Vision?**
2. **Does the idea look feasible from a technical and financial perspective?**
3. **Will the idea bring value to the community?**
4. **Does the community currently have the capacity to take on the idea? If not, could the community have the capacity with the right training?**
5. **Does the idea meet our defined set of project criteria (if you have created one)?**
6. **Did the community mention this idea during engagement or visioning sessions?**
7. **What value will this idea bring to the community?**

If the answer to most of the questions is yes, then the project can be presented to the community as a project idea to be considered for implementation. Worksheet 6-3: Filtering Project Ideas for Community Prioritization, will help guide this activity and inform what ideas should move forward to community-level discussions.
Filtering Project Ideas for Community Prioritization

<table>
<thead>
<tr>
<th>Recommendation or Opportunity from the Resource Assessment (the “idea”)</th>
<th>Does the idea support the Community Energy Vision? (Y/N)</th>
<th>Is the idea feasible from a technical and financial perspective? (Y/N)</th>
<th>Will implementing the idea bring value to the community? (Y/N)</th>
<th>Does the community have the current capacity to take on the idea? (Y/N)</th>
<th>Does the idea meet our defined set of criteria (if we have created one)? (Y/N)</th>
<th>What value will this idea bring to the community? (Y/N)</th>
<th>Did the community mention this idea during engagement or visioning sessions? (Y/N)</th>
<th>Decision: Will the idea advance to the community decision-making process?</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>
With goals defined, the CEC and the Energy Team may find it beneficial to weigh project ideas against a defined set of criteria to ensure that the most suitable projects are selected. Assessment criteria might include:

- Will the project contribute to achieving community energy goals (e.g. if a goal is to reduce emissions by 20%, how many GHGs does the project reduce?)
- Is the project cost-effective? Does its contribution to achieving the goals come at a relatively lower cost than another project?
- How risky is this project? Is the approach/technology proven or will this be a demonstration project?
- Are there other funds that could support the implementation of the project?
- How many local jobs will the project create? Contract jobs? Permanent?
- What level of community support is there for a project like this?
- Other Considerations:
  - 
  - 
  - 
  - 
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  - 
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  - 
  - 
  - 
  - 
  - 
  -
Comparing Projects to Help in Selection

A sample Project Idea One-Pager can be found on page 222-223. This example can be used during community engagement sessions. The template for the one-pager is available in the digital resources included with the print publication and online.

Each example in the figure below has been considered in the context of remote Arctic communities. Because the physical, cultural and political realities are different from community to community, the CEC should use specific information from your own energy assessment to create their own Project Idea One-Pagers.

In the sample, the project has been assessed in various ways and has been given a series of scores, to help in comparing the projects. The scores are from 1 to 5 and give a relative comparison among the options, rather than precise estimates.

**The categories are:**

1. **Potential cost (Cost)**
The financial cost to develop and implement the project – support may come from outside sources, so this cost may not be carried by the community, especially with major projects.

2. **Time required to implement (Time)**
Would this project require days, weeks, months or years to implement?

3. **Complexity to carry out (Complexity)**
How complex would the project be to carry out due to the number of steps, people engaged, etc.?

4. **Environmental Impact**
How much impact will there be on the lands, waterways, etc. in the community to implement this project?

5. **Carbon Offset**
How much GHG offset will occur from this project?

6. **Capacity building opportunities (Capacity)**
Can community knowledge grow, and can the project provide skills to the people working on it?

7. **Employment Opportunities (Jobs)**
How many jobs will become available to the community through project development and implementation?

8. **Level of risk (Risk)**
What is the potential that the process might not result in projects moving forward (due to turnover in key positions, community support, etc.)?
SAMPLE PROJECT IDEA ONE-PAGER

Project Overview

Project Idea:
Project A, a 3.8MW wind energy project

Project Rationale

Based on the Community Energy Vision, building a wind energy project in our community would help our community achieve a goal of 25% reduction in diesel fuel consumption. This is one of our Community Energy Objectives (Actions). This would be a major project for the community, that would require a lot of effort and coordination from our Energy Team to complete the project. In the summary below, you will see that there are some images circled. More images circled means more of that factor is involved. E.g.: five images circled in the Cost row mean that the project will cost a lot, but if only one were circled, it would mean that the cost is low. Each row also has some comments about this aspect of the project.

How does the project help the energy picture?

☐ Direct energy savings
☐ Make it easier to save energy
☒ Replace fossil fuels with renewables

Project Summary:

<table>
<thead>
<tr>
<th>Cost</th>
<th>This project will cost approximately $30 Million to implement. The costs will be shared through grants and loans. Detailed financial models that show exact costs will be completed if we decide to proceed with this project idea.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>The project will take approximately 3.5 years to implement, from permitting through to construction. The exact schedule will be based on the timing of the funding, permitting and transportation schedules.</td>
</tr>
<tr>
<td>Complexity</td>
<td>Development and construction will be a complex task involving specialists and equipment that will be transported in for project installation. The details of this plan will be available for the community to see once the business case has been put together.</td>
</tr>
<tr>
<td>Environmental Impact</td>
<td>The footprint of the project is relatively small, and there is very low risk to health, land and wildlife. The detailed impact assessment will be part of the permitting process that happens after the project business plan is complete. The final project design will minimize any impacts as much as possible.</td>
</tr>
</tbody>
</table>
### When will the community see results from this project?

- [ ] Less than one year
- [ ] Two or three years
- [x] Four or more years

### Carbon Offset

The wind project will supply our community with enough energy to offset approximately 25% of our annual fuel consumption. The detailed calculations will be done while preparing the business case when the feasibility studies will gather the exact amounts.

### Capacity

There could be opportunities for people from the community to become trained to be operational wind technicians. The power system management role could be filled by a utility, but there could also be an opportunity for that role to be developed through local training.

### Jobs

Engineers and designers will be needed for the projects and will be brought in for implementation, but qualified local workers can also bid on the work. Job opportunities exist mainly during construction in the civil works on the project site, potential labour jobs during equipment delivery, and construction of the project systems. During operation, the project may require groundskeeping and on-site operations management, which could be filled by someone from the community if they were trained and qualified.

### Risk

A wind project is considered a relatively high-risk project option because of the amount of money invested for implementation, the complexity of the project design, and the high investment of time for developing and building the project.

### Benefits

Insert specific community benefits here.
Hybrid System Design in Igaliku, Greenland

Igaliku, Greenland

GREENLAND’S PUBLIC POWER UTILITY, Nukissiorfiit, supplies electricity, heat and water to most of Greenland, serving 17 cities and 53 settlements. Nukissiorfiit’s energy supply is largely based on renewable energy sources, and it is its goal to use renewable energy wherever possible.

In 2017, the organization commissioned a pilot project to demonstrate the opportunity of a hybrid power generation system which could take advantage of more than one renewable energy resource and optimize and energy system; all in a remote community. The system design included wind and solar energy generators, energy storage, and a back-up diesel generator. The approach was to take advantage of more than one renewable energy resource so that the overall generation would be more consistent and there would be less time spent generating power using the backup generator.

In general terms, wind energy has higher production overnight, and solar energy has higher production during the day. In this pilot project, these two types of energy production were used to deliver energy to the community and excess power is stored in battery banks. The project infrastructure included 400 solar PV panels, with a combined capacity of 100kW, plus 64 small wind turbines with a combined capacity of 20kW. When the energy demand is in excess of what the generators and batteries can deliver, the backup generator is activated to maintain delivery.
Image 6-8. Kugluktuk Visitor Centre, Kugluktuk Nunavut © Bill Williams
Planning a Community-Driven Project Selection Event

When the CEC, Energy Team and perhaps community leadership arrive at a list of projects they want to pursue based on time, capacity, and budget, they should present the ideas back to the community or host a more focused workshop with specific stakeholders and partners. When you begin planning for a project selection event, consider these factors when choosing your community engagement methods:

1. How many people will want to participate?
2. How much information needs to be communicated?
3. What engagement and education initiatives were successful during the Stage 3 Energy Education activities?
4. What is the budget for staff and materials?

We have provided three event examples; one is an open house for the whole community, and the other is a more focused workshop for a smaller group of stakeholders and partners:

Example 1: Open House for the Whole Community

In this scenario, the Energy Team has done some preliminary analysis in Stage 5 which they will share along with the project ideas. During an open house, community members can talk to the Energy Team and CEC about project ideas, and submit their comments and feedback to the Energy Team.

Materials:
- Posters of each Project Idea. Be sure to include general information about the project, as well as context specific information.
- Posters or handouts proposing a ranking of the project ideas
- Feedback forms, Project Scoring Forms (found on page 231)

Method:
The participants can move around a space where the information posters are set up, for them to view and read. They have access to the Energy Team,
CEC and any partner or key information experts to ask questions and discuss the project ideas. When the community members feel they have enough information, they can cast their opinion on the Project Scoring Forms.

Following the meeting, the CEC can tabulate the feedback and project scorecards to find out if the community agrees with the recommendations from the Energy Team. If the results are aligned, the CEC can move forward with the proposed project ideas. If the community results are not aligned with the Energy Team’s proposal, consider doing some more community engagement to understand the differences in ideas and to reach closer alignment, before proceeding.

Example 2: Focused Workshop for Key Stakeholders and Partners

In this scenario, the participants will be presented with project ideas, then develop and analyze some scenarios and decide on priorities. This format works best for people who understand the community energy landscape, needs, politics and development history. This group is probably very similar to the initial Energy Workshop participants from Stage 2.

**Materials:**
- Presentation materials to give an overview of the project ideas
- Worksheets and scoring forms
- Chart paper, markers and pens

**Method:**

Present the project ideas to the whole group and then break participants into small groups to complete the worksheets. The group reconvenes to go through the findings of the small groups and discuss the priorities. Project Scoring Forms can be used for collecting specific feedback from participants.

Example 3: Community Energy Timeline

In this scenario, participants will be introduced to the community energy profile and report and examine their community’s energy use in the past, in the present and in the future. This format works best for people who prefer a visual format to understand information.

**Materials:**
- Post it notes or posters about Project Ideas from the Energy Assessment
- Post it notes or posters about community energy baseline information and past history from the Energy Assessment
- Chart paper, post it notes, markers and pens
- Headers: in the past, in the present, and in the future

**Method:**

Start by asking participants to write notes or draw pictures about their community’s energy use: in the past, in the present, and in the future. Have the Energy Team place the project ideas, community energy baseline information, and past energy history in the appropriate places on the timeline. Encourage participants to look at energy use related to home heating, travelling, cooking, lighting, etc for each time period. Create a timeline on the wall, using the headers: in the past, in the present, and in the future. Put up all the notes and pictures on the appropriate place on the timeline. Ask the participants to organize the ideas by type of energy use. Finally, look for patterns in the history and future of energy use in the community and have a discussion among participant.
Presentation Materials

There is a careful balance that needs to be struck for the effective presentation of the project ideas. On the one hand, most participants in the community engagement process will benefit most from a high-level overview of the project ideas and a broad comparison between the projects and the community benefits. On the other hand, some people in the community will appreciate access to more detailed information and will ask technical questions, so having that information available is also important, even if it is not part of your core presentation.

What you choose to present in your community will depend on what has worked well during the earlier community engagement activities.

Tools and Activities for the Event

SWOT Analysis of Project Ideas

This analysis looks at a project’s Strengths, Weaknesses, Opportunities and Threats. This tool is best suited to analyze and compare projects of the same type, as described earlier in this chapter (Energy Conservation Initiatives, Operations & Maintenance, Energy Efficiency Upgrades & Retrofits, Minor Capital Projects and Major Capital Projects).

A sample SWOT Analysis is included on the next page. Worksheet 6-4 can be completed with content specific to your community project ideas.
**SWOT Analysis Example for Project Ideas (in this case Energy Efficiency Upgrades & Retrofits)**

<table>
<thead>
<tr>
<th>Project Ideas</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Replacing old light bulbs with LED bulbs</strong></td>
<td>Installation can be done quickly by the community in homes and many buildings.</td>
<td>LED lights often have a higher upfront cost than cheaper incandescent light bulbs.</td>
<td>Watch for sales or do a bulk order to save on ordering costs.</td>
<td>People have reported issues with glare from LEDs and may not like the way they look, as the lighting quality is different.</td>
</tr>
<tr>
<td><strong>Installing programmable thermostats</strong></td>
<td>Keeps a consistent temperature in homes and buildings to save money on energy bills.</td>
<td>Programming needs to be aligned with how the space is used, so there is no one-size-fits-all solution.</td>
<td>New innovations in smart thermostats can control heat based on measured temperature, not just a programmed schedule, so less efficient homes will be as well heated as better insulated homes.</td>
<td>Installation in homes with unknown problems with the HVAC and electrical systems may lead to unpredictable costs for installation and repairs.</td>
</tr>
<tr>
<td><strong>Air-sealing and re-insulating attics</strong></td>
<td>Increases the heat-retention of the home and can re-use existing insulation instead of completely replacing old materials.</td>
<td>The work can only take place during warmer times of the year because the attic needs to be exposed to the elements. This is a limited timeframe in Northern homes.</td>
<td>Local tradespeople can be trained to install and maintain these upgrades, which will add to the local capacity and independence.</td>
<td>If the current attics are in poor condition and require repairs to the roof or structure before upgrades can take place, then this could result in unforeseen costs.</td>
</tr>
<tr>
<td><strong>Replacing old refrigerators with high-efficiency models</strong></td>
<td>Food storage costs will be lower, which directly benefits the community with no effort required from the residents.</td>
<td>Old units will need to be disposed of properly which is sometimes difficult to do in the North. Parts and servicing will require local training and adequate supplies.</td>
<td>Watch for sales or do a bulk order to save on ordering costs.</td>
<td>Unit sizing for newer models may be different than what was in place, so options may be limited without modifying the existing space.</td>
</tr>
</tbody>
</table>

Table 10.
<table>
<thead>
<tr>
<th>Project Ideas</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Project Scoring Forms

There are several ways to select project ideas. We recommend using a project scoring form to rate projects, and identify specific weaknesses, as well as ideas to increase the community benefits.

By adding aspects of evaluation to the scoring form that are specific to the community, the CEC and the Energy Team can gather much more information and gain a better sense of the community’s interest in the projects. The more detailed the project scoring form can be, the better.

The ACEPI project scoring form worksheet is found on the next page and digitally in the resources included with the book and on the website. There should be enough columns to accommodate all project ideas, and additional rows for specific evaluation criteria.

The example below shows a sample project scoring form for a Solar PV Project. It is important to remind everyone that their forms are anonymous, so they should record their honest opinions.

<table>
<thead>
<tr>
<th>Directions: mark your opinions for each project idea, according to the statements below:</th>
<th>Project Idea: Solar PV Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>Agree</td>
</tr>
<tr>
<td>I think that the project can be implemented successfully</td>
<td>1 2 3 4 5 Not Sure</td>
</tr>
<tr>
<td>The project will be cost effective</td>
<td>1 2 3 4 5 Not Sure</td>
</tr>
<tr>
<td>The project will help people in the community use less energy</td>
<td>1 2 3 4 5 Not Sure</td>
</tr>
<tr>
<td>The project will be fair in sharing the efforts and rewards across the community</td>
<td>1 2 3 4 5 Not Sure</td>
</tr>
<tr>
<td>The project has environmental impacts that the community can accept</td>
<td>1 2 3 4 5 Not Sure</td>
</tr>
<tr>
<td>The project will result in people paying less on their electricity bills</td>
<td>1 2 3 4 5 Not Sure</td>
</tr>
<tr>
<td>The project will benefit the local economy</td>
<td>1 2 3 4 5 Not Sure</td>
</tr>
<tr>
<td>Total of the numbers circled above</td>
<td>21</td>
</tr>
<tr>
<td>Do you think this project should be a priority project in the community?</td>
<td>Yes No Maybe</td>
</tr>
<tr>
<td>How could this project be made more beneficial to the community?</td>
<td>I would really like to be trained as a solar installer</td>
</tr>
</tbody>
</table>

Table 11. Sample Project Scoring Card
### Directions

Complete one column for each project idea, and staple additional pages if needed.

#### Directions: mark your opinions for each project idea, according to the statements below:

<table>
<thead>
<tr>
<th>Project Idea:</th>
<th>Disagree</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Not Sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>I think that the project can be implemented successfully</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>Not Sure</td>
</tr>
<tr>
<td>The project will be cost effective</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>Not Sure</td>
</tr>
<tr>
<td>The project will help people in the community use less energy</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>Not Sure</td>
</tr>
<tr>
<td>The project will be fair in sharing the efforts and rewards across the community</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>Not Sure</td>
</tr>
<tr>
<td>The project has environmental impacts that the community can accept</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>Not Sure</td>
</tr>
<tr>
<td>The project will result in people paying less on their electricity bills</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>Not Sure</td>
</tr>
<tr>
<td>The project will benefit the local economy</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>Not Sure</td>
</tr>
</tbody>
</table>

Total of the numbers circled above

Do you think this project should be a priority project in the community?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
</table>

How could this project be made more beneficial to the community?

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
After the Community-Driven Project Selection Event

With the SWOT Analysis and project scoring forms completed, it is time for the CEC to analyze the results of the polls and determine what the community thinks about the projects. Through this process, you want to know how each participant ranked the projects and which projects emerge as the preferred choices.

Here are the steps to determine the community’s priorities for the projects:

1. Gather up all the voting forms and write a unique identification code on each one. In our example, we wrote numbers, but you could also choose some simple combination of letters or numbers, or another method.

2. For each of the voting forms, tally up the scores for each project, which would be the total of each column.
   
   a. The project with the highest score gets 3 points;
   b. The project with the second highest score gets 2 points; and
   c. The project with the third highest score gets 1 point.

Here is an example of how you might tally up the scores of the top projects across all forms (and a blank worksheet follows for you to use):

<table>
<thead>
<tr>
<th>Form ID</th>
<th>Project A</th>
<th>Project B</th>
<th>Project C</th>
<th>Project D</th>
<th>Project E</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>3</td>
<td></td>
<td>2</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td>3</td>
<td>2</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>3</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>3</td>
<td></td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>3</td>
<td></td>
<td>2</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Totals</td>
<td>16</td>
<td>11</td>
<td>5</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 12. Example of Project Priority Voting Analysis
In the table below, mark down each voting form’s ID number and then give points to the projects in the same order that they were ranked on the voting forms (5 points for first choice, 2 points for second choice, and 1 point for third choice). When you have gone through all the voting forms, you can add up the totals in this worksheet to get a community-based project choice.

**Directions:**

**Voting Form Results**

<table>
<thead>
<tr>
<th>Form ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project</td>
</tr>
</tbody>
</table>

**Worksheet 6-6**
Analyzing the Project Scoring Forms

In the sample scoring sheet in Table 11, Project A received the highest scores and should be prioritized, along with Project B and Project D. You may want to make sure that the priority projects represent a spread of project sizes so that there are large, medium and small projects. You will also want to make sure the projects are dispersed between short-term, medium-term, and long-term implementation.

On the scoring forms, there is the sum of the points scored for each project, but beyond that, there are other things that should be considered that will inform the decision about project priorities. These scoring forms can also identify areas where people in the community have concerns.

Some questions to guide your analysis of the results:

1. **On the scoring forms, there is a total score in row 8. Were these total scores for each project idea close together across the community?** (e.g. were all the scores for the Solar PV project around 25, or were they more scattered?) If the scores were close together, it could indicate that the community has a somewhat unified perspective on the project.

2. **On each individual scoring form, were the scores between project ideas close together or far apart?** (e.g. did the person who completed Form ID#18 give project scores all in the 20s; or were some below 15 and others close to 30?) If individuals showed big differences in scores between project ideas, it could indicate that there were distinct issues with some projects and that the higher-scoring projects showed more distinct advantages. If the scores were similar, it could mean that they did not have a strong opinion or lacked enough information to cast a strong vote.

3. **Were there many “Not Sure” responses on the vote cards?** Was there any pattern to these responses? If there was an area where this answer came up often, it could indicate that the community did not receive enough information in this area to form an opinion. It would be a good idea to provide some additional information and education before finalizing the project decision.

There are many other ways to analyze the results of the project selection forms. It would be a good idea to spend some time answering the questions above, and considering what other conclusions can be drawn from the results. Most importantly, check to make sure the forms provide a clear response from the community about what projects should be prioritized.
Yukon First Nation Energy Capacity Modelling Tool

The Government of Yukon, Canada

IN 2019, THE TERRITORIAL GOVERNMENT of Yukon, Canada, launched a new modelling tool to evaluate a community’s capacity to take on a CEP and implement a clean energy project.

The project was developed as a result of findings within the territory that indicated that communities were struggling to keep pace with the complexity and costs of development, due to capacity issues. The government recognized that:

• There are many local priorities that must be taken into account;
• There can be a lack of policy or skills to interpret and respond to complex problems; and,
• There can be a lack of local personnel to implement projects.

The Yukon First Nation Energy Capacity Modelling Tool is being created to evaluate and measure different types of capacity within a community. The different types of capacity are referred to as streams of capital, as shown in this example:

The five capacity streams considered in this model are:

1. Human capital: e.g. educational backgrounds, job experience.
2. Institutional capital: e.g. Community Policy and planning.
3. Natural capital: e.g. water, forests.
4. Social capital: e.g. community groups, Elders councils.
5. Financial capital: e.g. community assets, funding streams, community savings.

In a perfect world, all five streams of capital would flow outward enabling a community to accomplish any development objective using local resources. It is a more likely scenario, however, that each community would have a unique combination of capital stream strengths and weaknesses. With this modelling tool, a community can assess its capacity before undertaking a clean energy project. This will help the community identify where it will require additional capacity building – which could involve policy changes, investment in local skills training, or investment in community social programming, infrastructure or finances.

As well, by assessing the community’s capacity before committing to a clean energy project, and taking steps to build capacity, the community can reduce the risk of encountering capacity limitations during implementation. These limitations can be weighed against the risk to the project before it starts instead of being mitigated after the community has made commitments for funding, procurement, etc. A modelling tool like this is often most valuable in comparing community project opportunities, because the capacity requirements may vary significantly between the different project ideas. For example, implementing energy efficiency retrofits requires a very different community capacity compared to the design and construction of a solar-diesel microgrid project.

For more information on this project, contact Ryan Hennessey via info@arcticenergytoolkit.com
Communicating the Project Priorities to the Community

With the scoring forms tabulated, the CEC and the Energy Team can now put everything together and present the findings to the community. A great way to do this is to circle back to the illustration at the beginning of this stage, on page 216. That pathway illustrated how the Community Energy Vision leads to the development of the Community Energy Objectives, to meet specific Community Energy Goals. Your community’s Vision, Goals, and Objectives can be summarized in the table below with some examples of projects and projected impacts, and in Worksheet 6-7: Goals, Objectives and Projects.

<table>
<thead>
<tr>
<th>Community Energy Vision</th>
<th>Community Energy Goals</th>
<th>Community Energy Objectives</th>
<th>Projects</th>
<th>Projected Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>To make substantial reductions to the community’s use of fossil fuels and energy consumption through alternate energy sources.</td>
<td>Before the end of 2021, we will implement a clean energy project to reduce our annual operating costs by at least 20% and GHG emissions by 40%.</td>
<td>Offset 50% of the GHG emissions made by using fossil fuels to power and heat buildings.</td>
<td>Project A: A 1MW Solar PV Project</td>
<td>Offsetting 1,850,000 kwh of GHG-producing power generation, or approx. 56% of diesel generation annually.</td>
</tr>
<tr>
<td></td>
<td>Reduce heating costs to reduce overall operational cost by 30%.</td>
<td>Project B: Heating System Upgrade/ Retrofit Project</td>
<td></td>
<td>The new heating units are approx. 20% more efficient, making the operating cost 20% less than we currently pay.</td>
</tr>
<tr>
<td></td>
<td>Reduce energy consumption to help achieve the goal of overall operational cost reduction of 30%.</td>
<td>Project D: Community Energy Conservation Campaign</td>
<td></td>
<td>Changes in behaviour and awareness of savings potential could lead to a 5-10% reduction in energy consumption.</td>
</tr>
<tr>
<td>Community Energy Vision</td>
<td>Community Energy Goals</td>
<td>Community Energy Objectives</td>
<td>Projected Impacts</td>
<td>Projects</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------</td>
<td>-----------------------------</td>
<td>------------------</td>
<td>---------</td>
</tr>
</tbody>
</table>

**WORKSHEET 6-7**

Goals, Objectives, and Projects
With the information gathered in Worksheet 6-7, the CEC should think about the next steps in communicating a comprehensive approach to the community and planning for implementation. In collaboration with the Energy Team, the CEC may decide to plan a community engagement event to present the detailed plans for the priority projects and the completed CEP.

The ACEPI Toolkit provides several sample Community Energy Plans for you to review and use as examples. You can also use the template provided in the digital resources section on the ACEPI Toolkit website to develop your own energy plan.

During this event, it would be an excellent opportunity to ask the community for ideas about how to make the projects provide unique benefits to the community. A great example of this comes from the community of Old Crow, home of the Vuntut Gwitchin, in the Yukon Territory, Canada.

In your community, consider inviting people to think about ways the project can become more integrated into the local culture. By asking the question, you may reveal some hidden opportunities that offer real benefits.

Any ideas that are collected will be integrated into the project planning documents and become part of the design process for the project ideas.

Old Crow Solar

An Example of Combining New Ideas and Cultural Practices

FOR THE OLD CROW SOLAR PROJECT, in Yukon Territory, Canada, community members suggested that the areas around the solar arrays would make excellent habitat for growing traditional plants which have significance to the community. The project team determined that this could be incorporated into the project to add value to the site, beyond power production.
SUMMARY & CHECKLIST

☐ We have created some Community Energy Goals that are SMART and reflect the needs and hopes of the community.

☐ Based on the community energy vision, we have defined Community Energy Objectives which will result in the community energy goals being achieved.

☐ Our community has been engaged and presented with a variety of clean energy recommendations and opportunities based on its needs and the pre-feasibility energy assessments in Stage 5.

☐ We have considered the project opportunities against a range of criteria to select projects that best fit the community and its needs.

☐ We have held a community engagement event where a vote was held to help prioritize project opportunities with community input.

☐ We have analyzed the community feedback and mapped the projected outcomes of the projects against the Community Energy Goals and Vision.

☐ We have assessed the capacity of the CEC, the Energy Team and the community to implement the clean energy project ideas and the community has taken steps to increase capacity, where needed.

☐ We have engaged with local leadership and the community on the proposed plan for implementation.

☐ We have community and leadership support to proceed to implementation of project ideas.
STAGE 7
Creating the Business Case

Image 7-1. St. Jude's Cathedral, Nunavut. © Bill Williams
## STAGE 7 CONTENTS

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<th>Section</th>
</tr>
</thead>
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<td>Introduction</td>
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<td>Partnerships</td>
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<td>Process Diagram for Major Project Feasibility and Planning</td>
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<td>272</td>
<td>Case Study: Alternative Energy in Yakutia, Russia</td>
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<tr>
<td>274</td>
<td>The Business Case</td>
</tr>
</tbody>
</table>
Creating the Business Case

Introduction

By this point in the ACEPI framework, you have likely completed several important steps. You have likely identified a broad range of clean energy project ideas in your community’s energy assessment in Stage 5. These opportunities would have been examined and prioritized by your community in Stage 6 and you would have completed your CEP. Now, in Stage 7, we want to examine the potential – both technical and financial – of these project options.

You may recall from the introduction section that the ACEPI Framework has two phases. Phase One (Stages 1–6) focuses on community energy planning, and Phase Two (Stages 7–9) provides an overview about the implementation of clean energy projects. The remainder of the Toolkit outlines Phase Two and offers guidance and resources to create business plans for your project options and to implement different clean energy projects.

The steps to move from business planning to project implementation are illustrated in Figure 40.

Figure 40. Project Implementation
This stage focuses on the pre-development work that is needed before a project can be implemented. This includes feasibility and business case planning for each of the following areas: energy conservation initiatives, operations and maintenance, energy efficiency initiatives, and renewable energy projects. There is a large volume of information available for each topic.

The goal of this stage is not to provide all the details, but to offer an overview of what is involved in project feasibility and business case planning. Since renewable energy projects require the most time, financial resources, and technical expertise, there will be a greater focus on renewable energy projects in this stage.

The activities in this stage include:

- Conducting feasibility studies
- Creating the Business Case
- Securing project financing & funding

Feasibility Studies are a detailed set of investigations to determine if a project concept is technically possible, environmentally responsible, and financially sound. Feasibility studies can involve collecting and measuring resources, calculating potential production, and factoring in many influences on the production estimate. Feasibility studies can be prepared with the assistance of Technical Advisors, however, the more you can engage the local community and leadership, the better the project feasibility study will be.

The Business Case takes the results of the feasibility studies and presents the information to potential funders, leadership, supporters and financers in a comprehensive manner. The business case aims to demonstrate that the project is a good investment and will “work” in the technical sense, within the regulatory framework, respecting the environment and local culture. Securing project financing and funding relies on a strong business case. It involves applications to public and possibly private financing or funding providers, due diligence, negotiations and committing to financing contracts. Once the financing and funding has been secured, the timeline for the project implementation can be established.

**PRODUCTION ESTIMATE**

A calculated forecast of the amount of energy that can be produced on a site using specific equipment over one year.

**DUE DILIGENCE**

Due diligence involves research and evaluation of a project or partner, in preparation for a business transaction, like project financing.
Image 7-3. Cabins on the Coppermine River, Canada. © Bill Williams
Partnerships

With the community’s support to move forward on specific clean energy projects, the next step is to align those project ideas with a team to help with project feasibility, business planning and project implementation. Key partners or collaborators for this stage will be:

1. Project Management (PM) Partners
2. Technical Advisors
3. Local Leadership Team

The partnerships with PMs and technical advisors are key relationships in the business planning and implementation process. These teams will likely lead and guide the technical schedules and budgets for the project. These partners should be well experienced in similar projects in Arctic conditions. As mentioned in Stage 1, these partners and technical advisors should be working for the needs and wants of the community, not the other way around.

Finding a great PM Partner for your project can be difficult. Approach other communities that have undertaken similar projects of size, type and scope for PM references. It can also be helpful to speak to technical firms and equipment suppliers who have worked with that PM on Arctic projects. Because of the importance of this partnership, make sure you invest the time needed to do a thorough due diligence or reference check on any prospective PM Partners and other technical advisors. Many PMs will be interested in working on projects in your region; it is up to you to choose the right one as your partner.

The other key area of partnership at this stage is with local leadership. You will need to bring local leaders on-side and create opportunities to work together as the project advances towards implementation. It’s helpful to update local leaders now and again, and provide learning opportunities, especially if they did not participate in the community engagement activities.
Some communities may require a formal approval or vote before proceeding to implementation and other major project milestones, so make sure you understand this process and plan for those actions to take place. Aim to have your project plans integrated into the Community Strategic Plans so that there will be alignment between the project and broader community goals.

The PM Partner will generally have a technical focus, though some provide more comprehensive project management services. Usually, the CEC and the Energy Team will provide overall project management. This includes coordinating feasibility studies and permitting; coordinating logistics and employment; integrating local capacity and economic resources; connecting with financing or funding agencies; and making sure the project remains on task and on time.

In the figure below, you can see how the process of forming a partnership progresses with key milestone activities and documents.

### Qualities of a Strong Partnership

1. **Respect**: Acknowledging and adhering to community culture and traditions
2. **Relationship of Equals**: Between equal partners even if a partner leads
3. **Clear Focus**: Targeted, business-oriented clean energy goal
4. **Early Stage Resourcing**: Partner funding commit to take the project forward
5. **Staged Development**: Defined feasibility to design to implementation plan
6. **Role Clarity**: Definition of Roles, Rights and Responsibilities
7. **Value & Benefits**: Definition and conditions of project benefits
8. **Financial Planning**: Willing to share budgeting/cash flow statement and financing structure
9. **Dispute Resolution**: Mechanisms for resolving differences

### Process of Engagement with Partners and Associated Documentation

- **Preliminary Discussions** (No Documents)
- **Collaborating Agreement** (MOU Type)
- **Partnership Terms/Roles** (Term Sheets)
- **Executing & Financing Agreements** (Capitalization & Construction)
- **Shareholders Agreement** (Corporation)

*Figure 41. Partnership Process Documents*
Business Models

In developing the economic feasibility assessment, the ownership model for the project will need to be established. This is specifically applicable for renewable energy and infrastructure projects, and less applicable to energy efficiency projects in a community. Before deciding on a particular ownership model, it would be wise to seek the advice of a business planner with experience in energy projects. In the table that follows, the most common ownership models are summarized, followed by notes and advice for owners of capital projects.

Project Ownership Model Examples

<table>
<thead>
<tr>
<th>Ownership Structure</th>
<th>Basic Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sole Proprietorship</td>
<td>Owner holds all control and liability of the project company.</td>
<td>Low administration costs, simple structure</td>
<td>Exposed to personal risk if the project company defaults on financial obligations.</td>
</tr>
<tr>
<td>Partnership</td>
<td>Two or more people who share the profits or losses.</td>
<td>The partnership does not bear the tax burden of profits.</td>
<td>Each partner is personally liable for the financial obligations of the business.</td>
</tr>
<tr>
<td>Public – Private Partnership</td>
<td>A contract between a private party and a public partner for the project.</td>
<td>Allocates the risks and tasks, suited to specific parties, and the public partner, which may be supported by providing subsidies or transfer of asset or land.</td>
<td>It can involve high cost transactions and if the risks are not handled properly can be expensive.</td>
</tr>
<tr>
<td>Corporation</td>
<td>A legal entity formed to conduct business.</td>
<td>The owners are free from personal liability that the corporation may face. Ownership is transferable.</td>
<td>High cost to form a corporation and a lot of record-keeping is required.</td>
</tr>
<tr>
<td>Limited Liability Company (LLC)</td>
<td>A simple business formation of two or more owners under an agreement, and a corporation, which has certain liability protections.</td>
<td>Profits and losses can be passed through to owners without taxation of the business itself while owners are shielded from personal liability.</td>
<td>Usually subject to self-employment taxes. If a member leaves the LLC, it ceases to exist.</td>
</tr>
<tr>
<td>Co-operative</td>
<td>A company which is owned and operated by its members.</td>
<td>Democratic control, limited liability and profit distribution.</td>
<td>Longer decision-making processes, extensive record keeping, participation of all members is needed.</td>
</tr>
</tbody>
</table>

Table 13.
Feasibility Studies

The scope and duration of a feasibility study will largely depend on the type of project you are pursuing. In this section, we discuss the different types of projects that require a detailed feasibility study, such as renewable energy projects. We also offer methods for assessing feasibility on community projects, such as energy efficiency upgrades and conservation initiatives. In the following sub-sections, the common types of projects for each category are described with the typical assessment practices.

Energy Conservation Initiatives

Energy Conservation is the process of reducing energy use through changes in behaviour. This is the first and most important means of reducing energy demands and costs in a community. Such changes are generally low cost, and save money for the household or the community. These initiatives rarely, if ever, require detailed feasibility studies. Usually the only limiting factor to implementing energy conservation initiatives is creativity, effort and time. In general, the best way to help individuals in the community save energy is by raising awareness.

When planning Energy Conservation initiatives, you should adopt an infrastructure perspective by examining the housing, facility and community systems that require energy, and assessing alternative practices and ways to conserve energy. Look to other communities that have undertaken similar initiatives, for models to inspire your community.

Operations & Maintenance

Operations & Maintenance projects require some investment, but generally do not usually require a comprehensive feasibility study. Most of the information you need may be found in your energy assessment report from Stage 5.

Some funding will likely be required for training, supplies or additional resources, so it may be helpful to add a simple feasibility study to a funding application.
Upgrades & Retrofits

For Upgrades & Retrofit projects, the feasibility study will look at the total cost of the project, with specific equipment, shipping, staff training, and installation, and explore whether the total costs will balance with long-term energy savings and other benefits. The feasibility study can also address economies of scale; that is, are there benefits to doing more buildings because of the reduction in unit costs, when supplies and services are ordered in greater volumes?

Minor Capital Projects

In the context of the ACEPI framework, a minor project is defined as several smaller clean energy projects or installations across a community. For example, these may be comprehensive energy efficiency upgrades to homes, or installation of rooftop solar panels on several community buildings.

Depending on the project, the feasibility assessment for Minor Capital Projects will involve the considerations described in the Upgrades & Retrofits section previously, and may also need more technical site and financial assessments to create accurate implementation cost estimates. These projects could involve more engineering assessments of the buildings.

There are many tools available for calculating feasibility and system optimization for minor and major clean energy projects. Several examples have been provided below:

- **RETScreen** – A Clean Energy Management Software system for energy efficiency, renewable energy and cogeneration project feasibility analysis as well as ongoing energy performance analysis.
- **HOMER** – Hybrid Optimization of Multiple Energy Resources (HOMER) is a platform for microgrid and distributed energy system design and feasibility assessment.
- **PV Watts** – Estimates the energy production and cost of energy of grid-connected PV energy systems.
- **Systems Advisor Model (SAM)** – A performance and financial model designed to facilitate decision-making in the renewable energy industry.
- **BioEnergy Atlas** – The atlas includes two interactive maps, BioPower and BioFuels. These maps allow you to compare and analyze biomass feedstocks, biopower, and biofuels data from the U.S. Department of Energy and the U.S. Department of Agriculture.

These tools provide a way to create scenarios for different facility configurations, financing and cash flow management. Though each tool is excellent and has a lot of capabilities, it is recommended you find an engineer who specializes in your type of project, to review some of the reports generated from these tools.
Major Capital Projects

The feasibility study requirements with a major capital project are largely driven by the kind of project you are working on. For renewable energy generation projects, the feasibility study involves collecting resource data and generating production models using specialized software. With this kind of analysis, the Energy Team can obtain the production and financial forecasts for a project based on a specific type of equipment or different conditions.

**How does the Energy Team complete all these activities before financial resources are secured for project construction?**

Much like the funding you obtained for the Planning Phase of the ACEPI project, (Stage 1-6) these feasibility studies and the development of the business case are considered soft costs. Funds for feasibility are often sought out separately from the financing needed for project implementation. However, many project financing deals will consolidate these costs into one financing agreement, so this is something to investigate when you are preparing the business case, financing and funding strategy, and considering partners to work with.

In the figure on the next page, the activities for Major Projects feasibility and business planning are shown in blue boxes. Activities which take place after Stage 7 are shown in white boxes, to illustrate how they fit into project development and implementation initiatives.

It is important to note that the results of any of the activities in light blue boxes – such as Environmental Assessment, Resource Evaluation, Project Design and Economic Feasibility – could bring the project to an end. If the project does not meet the requirements in any one of those areas, then it may not have a viable business case. A feasibility study determines if the project can proceed, or if it should stop before any more time or money is invested.
Figure 42. Development Activities for Major Projects
Feasibility Studies

Feasibility studies may reveal better or safer ways to implement the project, create healthier communities, save money and create a positive return, or they may show that the project is not feasible and would result in irreparable environmental damages or financial losses. For Major Projects, these studies are especially important. They provide a reliable forecast for how the project will perform and how safe the project is, and the rationale for undertaking any risks associated with the project.

The following sections discuss the technical feasibility of major capital projects, as well as the environmental impacts. The best project design is one that achieves the highest possible energy production with the least possible environmental impact.

There are some special considerations for Arctic projects compared to more southern projects. For example, because energy resource availability could be radically different during each season, the feasibility studies may need to take place over a longer period than better-studied southern regions with less variability in resource availability. A second consideration is that not all manufacturers and suppliers may warranty their products for the extreme weather conditions of the North, without current data on operating conditions. In order to gain the protection of these warranties, the Energy Team may need to examine risk factors that arise from Arctic and remote conditions, which may require a greater resource commitment and timeline.

Permitting Feasibility

During the collection of information for the Energy Assessment, the environmental impacts on the site need to be assessed as well. No matter how beneficial a project could be, there are barriers to projects when they could cause serious and irreparable damage to the environment. While permitting agencies rely on the methods and knowledge of western sciences to impact, your community’s traditional knowledge is extremely valuable. By involving people from the community to assess potential impacts, you can work to ensure that the plants, animals and ecology valued by your community are not greatly impacted by the project.

Permitting agencies will have different requirements in each region, and you will need to research the requirements in your region. There are generally assessments and permitting processes required for the natural heritage, archaeology and geology of the site.

By the end of the permitting feasibility process, you should have the following information:

1. Permitting requirements which apply to your region and project type.
2. Supporting assessments and studies that investigate potential impacts to the project lands.
3. An assessment of specific impacts based on the preliminary project design.
Technical Feasibility and Design

Before starting the technical feasibility and design activities, the Energy Team will need to select one or more test sites to examine. To secure the right to install the equipment, the Energy Team should consider creating a formal land use agreement. This is a Land Agreement, which is described in Stage 8, to define how the land will be used and to grant permission to contractors to enter the lands for data collection and site investigations. The equipment suppliers often require a Land Option Agreement for insurance for the equipment, so it is worth investigating in the planning of the feasibility study.

To understand the technical feasibility and design of a renewable energy project, we examine a specific example throughout Stage 7 – a wind energy project. Wind projects have a highly complex feasibility study, so understanding the general process and examples below will give context for other feasibility studies.

The example used throughout this stage shows the outline and content of a typical wind energy feasibility assessment, with sample data from a 2015 study for a Canadian remote community project (Project A). The typical steps in a study are illustrated in the adjacent figure.

Figure 43. Wind Energy Technical Feasibility Process
The Preliminary Site Selection for Project A was based on the following criteria:

- **Wind resource and energy estimates**: the team tried to identify and measure the best wind resources available at a couple potential project site options.
- **Icing potential**: if an area was known to accumulate ice, it could lead to issues on the Meteorological (Met) Tower and future wind project equipment. These areas were avoided.
- **Construction**: the cost of road and grid extensions was factored in to the site selection.
- **Environmental constraints**: the team sought to ensure that the ecological impacts were acceptable for the site selection. The Energy Team also sought feedback from the community to make sure the site didn’t have any traditional significance.
- **Land use**: the site needed to comply with all permitting and legal requirements for the proposed project.
- **Navigable air**: where there was air traffic in the area, the site selection factored in constraints that would affect the project design.

The **Meteorological (Met) Tower** Tower was installed and collected data for 18 months. The wind resource assessment required 12 months of high-quality data so, from 18 months of data collection, the best 12 consecutive months of data were selected for analysis. In the Project A assessment, the Met Tower was installed in October 2013 and the data set which was analyzed covered the period of December 2013 to November 2014. The data recovery level was 97%, which means that there were approximately 8 days in the 12-month period when data was not collected. This level of data recovery was acceptable for the assessment to proceed. The following table describes the data collected by the Met tower, which is used to determine wind resources for production forecasting. The table contains a fair amount of detail, though it does illustrate the amount of information that would be important to collect to validate the generating and technical potential of a wind project in the Arctic.

Though Project A used a Met Tower to collect their high-quality wind data, **LIDAR** remote sensing systems has also become popular in the wind industry as a supplement to the traditional Met Tower option.

---

**MET TOWER**

A metal tower which carries measuring instruments with meteorological instruments such as thermometers and instruments to measure windspeed.

**LIDAR**

An acronym standing for Light Detection and Ranging, these systems can provide remote wind measurements across ten user-defined heights from 10 m to 200 m. It is ideal for applications that require wind measurements at multiple heights, and for locations where the installation of a tall tower is difficult.
### 3. Collect Wind Resource Data

#### Wind Resource Data for Project A

<table>
<thead>
<tr>
<th>Measurement (unit)</th>
<th>Description of Measurement</th>
<th>Sample data from Project A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement Height (meters)</td>
<td>The height of the sensor on the Met tower. Some installations will have multiple sensors at different heights.</td>
<td>39 m</td>
</tr>
<tr>
<td>Average Wind Speed (meters/second)</td>
<td>The measurement of wind speed at a fixed height</td>
<td>6.7 m/s</td>
</tr>
<tr>
<td>Wind Direction (degrees)</td>
<td>This indicates the direction of the winds and the prevailing winds. The wind resource assessment may not measure this data unless there is a specific reason, because modern wind turbines can rotate 360 degrees to meet the wind and generate electricity.</td>
<td>n/a</td>
</tr>
<tr>
<td>Wind Shear (seconds to the negative 1)</td>
<td>Refers to the rapid change in wind direction over a short distance. This can affect the air pressure on a wind speed sensor. On a wind turbine, it can affect how much wind is passing over different parts of the turbine at a given time, applying uneven pressures on the components. This factor can allow analysts to calculate the extra wind speed during wind shear events.</td>
<td>.12 s⁻¹</td>
</tr>
<tr>
<td>Turbulence Intensity (%)</td>
<td>This is a value that shows how gusty a location is. Within the height of wind turbines, turbulence occurs on a daily cycle, so a measurement represents a consistent pattern.</td>
<td>14.6 %</td>
</tr>
<tr>
<td>Annual Average Air Density (kilogram/meter³)</td>
<td>The higher the air density, the more energy is received by the wind turbine.</td>
<td>1.25 kg/m³</td>
</tr>
<tr>
<td>Icing (%)</td>
<td>This represents the portion of time when the sensors detected ice accumulation on the equipment. Sometimes the accumulation may put the tower out of operation, as seen in Project A, with 8 days of no data collection. This could have been caused by freezing rain or by rime ice. Heated anemometers and wind vanes were installed to increase the data recovery rate during icing periods.</td>
<td>6 %</td>
</tr>
<tr>
<td>Temperature (degrees Celsius) in monthly averages, in a range from coldest to warmest month</td>
<td>This will inform the Energy Team about the requirements of the equipment, especially when some electronic systems cannot operate in extreme cold and some equipment may require heating to maintain reliable operation.</td>
<td>-19.6°C – 11.7°C</td>
</tr>
</tbody>
</table>
To calculate production forecasts, the team will collect data from the Met tower and combine it with historical wind data, by doing a correlation/adjustment process. Setting up, collecting and evaluating wind energy data is typically done by a specialist engineering firm with a vast amount of wind project experience, on-site capacity and software tools to assess all facets of the wind potential.

The wind flow and energy production are calculated with specialized software that requires the Met tower data, long-term data, and background maps with information on topography, elevation, roughness lengths and potential obstacles. This is also used in conjunction with the wind turbine characteristics to form the analysis.

While the wind resource assessment is underway, certain data from the Met tower can be used to start preliminary wind turbine selection. The criteria for choosing the wind turbine model are based on the following types of information (although other factors could exist for your community):

- Average wind speed and turbulence levels
- Extreme wind and weather conditions
- Energy demand in terms of base load requirements

The next step is to evaluate some equipment models to identify the correct type of wind turbine for the project. In the case of Project A, two turbine models were examined, which had proven technology for cold and icy environments and were suitable for wind-diesel generation in remote communities. Questions to consider when forming an evaluation could include:

- How many units will be needed to supply the community with the average base load power?
- Will excess power be produced?
- If choosing a configuration with fewer turbines, will an operational shut-down on one turbine for maintenance or repair have an impact that can be handled on the system? In a design that has a larger number of smaller units, one turbine being out of operation has a small impact on the energy supply, but the overall cost of maintaining more machines may outweigh the benefit.

For example, if the base load in a community is 4000 MWh/year and the annual production of a 3-turbine project is 5000 MWh/year, would the community want to invest in the over-production in the short term? What if the base load projections showed that the base load consumption was expected to rise to 4500 MWh/year within 10 years? These kinds of questions are important to consider in a remote isolated community because, when supplying your energy system, there is usually no overflow demand from other areas outside of your community to take unused power from the system.
The electrical systems and integration of a wind energy project - or any kind of generation project in remote communities - can be modelled and simulated using specialized hybrid systems modelling software. Hybrid modelling should be used in any project where an energy system will be optimized using a combination of renewable energy, diesel and any type of storage. One software system that is often used for pre-feasibility and feasibility work is called HOMER (Hybrid Optimization of Multiple Electric Renewables) which can investigate several configurations which integrate systems and give insights about how to minimize the Levelized Cost of Energy (LCOE) or the system’s fuel consumption. LCOE is an approach to project assessment generally accepted by utilities. A similar technique is to measure the value of reducing diesel requirements known as an Avoided Cost Analysis.

By the end of the technical feasibility activities on any kind of generation project, like renewables, you should have the following pieces of information:

- Site Identification and description of terrain and ecology
- Technical project feasibility based on the data that was collected
- Preliminary project design based on the resource data and calculations based on specific generating equipment
- Modeling of any applicable hybrid systems
- Detailed design that will satisfy the requirements of permitting and interconnection
- Technical Feasibility recommendations to move forward

**Image 7-9.** Kiashke Zaaging Anishnaabak’s remote solar/diesel/battery system, as seen from above in winter 2018 - Gull Bay First Nation is in northern Ontario, Canada. © Gull Bay First Nation

**LEVELIZED COST OF ENERGY**

The levelized cost of energy (LCOE) is a measure of a power source that allows comparison of different methods of electricity generation on a consistent basis.
Financial Assessment

A financial assessment will determine a project’s economic feasibility; that is, whether it can be built and operate over its projected lifetime without a financial loss. Projects are evaluated in part by considering scenarios of economic change that operate outside the community and which have an impact on financing. These scenarios would consider changes in interest rates, inflation, cost of fuel, and other factors.

The cost of energy production is the most important factor to determine the economic feasibility of an energy project. The Levelized Cost of Energy (LCOE) is a measure of a power source that allows comparison of different methods of electricity generation on a consistent basis. It also allows the comparison of different technologies of unequal project size, cost, risk, return and capacities. The economic analysis of a project should consider the risk between the current energy system and the proposed project.

The LCOE can be calculated using the following formula:

\[
\text{LCOE} = \frac{\text{Total Life Cycle Cost}}{\text{Total Lifetime Energy Production}}
\]

To calculate the LCOE:

\[
\sum_{t=1}^{n} \frac{I_t + M_t + F_t}{(1+r)^t}
\]

\[
\sum_{t=1}^{n} \frac{E_t}{(1+r)^t}
\]

- \(I_t\) = Investment expenditures in year \(t\) (including financing)
- \(M_t\) = Operations and maintenance expenditures in year \(t\)
- \(F_t\) = Fuel expenditures in year \(t\)
- \(E_t\) = Electricity generation in year \(t\)
- \(r\) = Discount rate
- \(n\) = Life of the system

In Figure 44, the relative costs of renewable energy technologies are compared in their respective LCOEs. Note the average costs of electricity for comparison.
The LCOE helps with measuring the cost made per unit of electricity. This includes the maintenance costs, initial capital, cost of fuel, discount rate as well as operational cost. It helps combine both the fixed as well as variable cost into a single measurement.

In order to compare energy alternatives, considering all costs and revenues (or cost avoidance) in constant dollars, you would calculate the Net Present Value of each option. You can think of this as an “apples to apples” comparison that considers when costs and revenues are incurred.

Calculating Net Present Value requires knowing the likely amount of time (t, usually in years) that cash will be invested in the project, the total length of time of the project (N, in the same unit of time as t), the interest rate (i), and the cash flow at that specific point in time (cash inflow—cash outflow, C).

\[
\text{NPV} = \sum_{t=0}^{N} \frac{C_t}{(1+i)^t}
\]

For example, consider a community that is considering changing their lighting from incandescent bulbs to fluorescents. The initial cost to change the lights themselves would be $40,000. After the initial investment, it is expected to cost $2,000 to power the lighting system but will also provide $15,000 in savings each year; so, there is a yearly cash flow of $13,000 every year after the initial investment. For simplicity, assume a discount rate of 10% and an assumption that the lighting
Here’s how this scenario would calculate Net Present Value:

\[
\begin{align*}
t = 0 & \quad \text{NPV} = \frac{-40,000}{(1 + .10)^0} = -40,000.00 \\
t = 1 & \quad \text{NPV} = \frac{13,000}{(1.10)} 1 = 11,818.18 \\
t = 2 & \quad \text{NPV} = \frac{13,000}{(1.10)^2} = 10,743.80 \\
t = 3 & \quad \text{NPV} = \frac{13,000}{(1.10)^3} = 9,767.09 \\
t = 4 & \quad \text{NPV} = \frac{13,000}{(1.10)^4} = 8,879.17 \\
t = 5 & \quad \text{NPV} = \frac{13,000}{(1.10)^5} = 8,071.98 
\end{align*}
\]

Based on the information above, the total net present value over the lifetime of the project would be $9,280.22.

Once the net present value is calculated, energy opportunities can be compared. Any proposal with an NPV < 0 should be dismissed because it means that a project will likely lose money or not create enough benefit. The clear choice is a project whose NPV > 0 or, if there are several options with positive NPVs, the choice would be the option with the higher NPV. Net present value provides one way to minimize foregone opportunities and identify the best possible options.

Another important component of the economic feasibility study will be the pro forma report. Business planning of a clean energy project often consists of creating a financial model or “pro forma” for the project. A pro forma is a useful tool to perform “what if” analyses by varying key inputs such as cost, operations and maintenance, energy production amounts, etc. This key information will help inform the Energy Team about where financial resources should be applied to improve the project’s financial outcome. The following table includes elements of a pro forma:

<table>
<thead>
<tr>
<th>Expense Inputs</th>
<th>Income Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much will it cost to build?</td>
<td>What will the project produce?</td>
</tr>
<tr>
<td>Operation and maintenance?</td>
<td>How much will it produce?</td>
</tr>
<tr>
<td>How long will it take to build?</td>
<td>When will it occur?</td>
</tr>
<tr>
<td>How much do we need to borrow?</td>
<td>At what price?</td>
</tr>
<tr>
<td>How much will it cost to borrow the money?</td>
<td>What subsidies are available?</td>
</tr>
<tr>
<td>Fees for others (e.g. local utility)?</td>
<td></td>
</tr>
<tr>
<td>Any taxes?</td>
<td></td>
</tr>
</tbody>
</table>

Project partners or developers will often use their own pro forma analysis software for assessment. This allows them to include their own risk tolerances and professional judgments on a project. Other activities that may be included are:

- Establishing that the site is available for development and transferability to a private entity;
- Producing a critical issues analysis;
- Inputting site-specific data (the 12 months of data that wind and solar projects often require);
- Details about potential off-takers or purchasers of the project.
- The pro forma report will provide a clear view of the project planning and operational outlooks. The data can answer several important questions, such as:
1. What are the Annual Fuel Savings of the project?

Project A example is shown below:

<table>
<thead>
<tr>
<th>Cost of Energy (on diesel gen. only)</th>
<th>Optimal System Design</th>
<th>Optimized System Cost of Energy</th>
<th>Fuel Savings</th>
<th>Annual Fuel Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.321/kWh</td>
<td>2 x 950kWh Turbines</td>
<td>$0.263/kWh</td>
<td>45.2%</td>
<td>$1,761,440</td>
</tr>
</tbody>
</table>

Table 15. Fuel Savings Summary Example

In the example above, the report from the hybrid systems modelling shows that adding two 950kWh wind turbines to the Project A power system will enable the community to consume 45.2% less fuel, for an annual savings of $1,761,440. This represents a reduction of 1,225,725 litres of diesel consumed in the community. This information will be used in calculating the approximate costs for construction, to establish preliminary economic feasibility (which is done in more detail in the business case).

2. What are the costs of implementation?

The table which follows provides examples of implementation costs. Sample data from Project A illustrates what these costs may be for a project of that size and scope. The PM Partner would create these estimates using industry-specific rates and knowledge from the preliminary design engineers as well as experience from other northern projects. It may be a good investment to have this estimate peer-reviewed by another PM or engineering firm to confirm its accuracy, for the business case.

Please note that the following example includes costs that are illustrative only, and several factors influence actual project costs, such as the nature of the existing energy system, site conditions, energy demand profile, logistics, geography and financing parameters.

<table>
<thead>
<tr>
<th>Cost Type</th>
<th>Description</th>
<th>Cost (Project A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Costs</td>
<td>Site investigations, engineering, permitting, etc.</td>
<td>$395,000</td>
</tr>
<tr>
<td>Turbine Costs</td>
<td>Two wind turbines, foundations, transformers, etc.</td>
<td>$4,730,000</td>
</tr>
<tr>
<td>Construction Costs</td>
<td>Balance of Plant, internal power lines, substation, disconnects, etc.</td>
<td>$3,585,000</td>
</tr>
<tr>
<td>Project Management</td>
<td>For PM partner, the CEC, the Energy Team and affiliated consultant fees</td>
<td>$825,950</td>
</tr>
<tr>
<td>Contingency</td>
<td>To protect the project from unforeseen cost overruns</td>
<td>$725,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$10,260,950</strong></td>
</tr>
</tbody>
</table>

Table 16. Project Cost Summary
3. What are the cost savings of the project annually and overall?

Cost Savings from lower LCOE per year:

\[
\text{Cost Savings} = (\text{Current Cost} - \text{Optimized Cost}) \times \text{Forecasted Energy Demand}
\]

Project A example: where forecasted energy demand for 2015 was 9,250MWh

\[
\text{Cost Savings} = (0.321 - 0.263) \times 9,250 \text{MWh} = 536,500
\]

Next, you could determine the Net Cost Savings over the Project Life from using less fossil fuel. The Project Lifetime typically refers to the length of a production contract with the energy distribution company (usually 20 years), not the equipment lifetime, which could exceed that length of time:

\[
\text{Net Savings} = \text{Yearly Fuel Savings} \times \text{Project Lifetime} - \text{Total Project Capital Expenditures}
\]

Project A example:

\[
1,761,440 \text{ (from Table 3) x 20 years} - 10,260,950 \text{ (from Table 4)} = 35,228,800 - 10,260,950 = 24,967,850 \text{ saved by the community over 20 years}
\]

This means that the net cost savings from the wind project for the community will be $24,867,850 saved over 20 years.
Another aspect of importance to remote communities is the reduction of GHG emissions with the installation of renewable energy technology. For Project A, the environmental consultant calculated 2.791 kg of CO₂ emissions for each litre of diesel burned in the generators the community operates. An illustration of this kind of calculation is included in the digital resources.

Based on this number, it is possible to calculate the amount of avoided GHG emissions:

\[
\text{Avoided Emissions} = \text{Fuel Volume Reduction} \times \text{CO₂ offset value}
\]

Project A example (using the Annual Fuel Savings figure from Step 1):

\[
1,225,725 \text{ litres} \times 2.791 \text{ kg/l} = 3,421,000 \text{ kg of CO₂} \\
= 3,421 \text{ tonnes of CO₂}
\]

This figure of GHG reduction is a strong point to communicate to the community, as it is a central focus in the Community Energy Profile.

The True Cost of Diesel in the North

When considering a clean energy project to replace certain fossil fuels, such as diesel, the social, environmental and financial costs of your current energy source should factor into the economic case for renewable energy projects. In 2017, Gwich’in Council International released a study called Diverging from Diesel, which examined the costs of diesel reliance in remote northern communities. The cost of diesel was described not only in terms of purchasing fuel and transporting it to remote communities, but also in terms of the ongoing and growing capital costs of maintaining aged equipment and the societal costs of fossil fuel reliance. A snapshot of the Diverging from Diesel infographic has been provided on the next page. The report examined communities in Canada’s Arctic, but the analysis could apply to many other Arctic regions.
Reducing diesel reliance in Canada's off-grid communities is well within reach. A key to getting there is a fair price for energy produced by projects that reduce fuel use. *Diverging from Diesel*, a report from Gwich’in Council International, establishes the full cost of using diesel to power communities, so that a discussion on fair price can begin. The findings are illustrated here.

**175**

fossil fuel reliant communities

Fuel is shipped in by...

- **Ice Road**: Which are increasingly unreliable due to climate change.
- **Airplane**: One of the most expensive ways to get fuel.
- **Boat**: Available to coastal communities.

Fuel is stored in large tanks in the community.

Generators turn the fuel into energy.

Electricity is distributed to the community.

Fuel systems are:

- **Expensive**: Shipping, storage, maintenance, machine replacement and more, make fuels so expensive that utilities or governments must subsidize the cost.
- **Polluting**: Emissions from generation and transportation, fuel spills, and machine noise have environmental and community health impacts.

**They need a fair price to make projects go.**

*From Diverging from Diesel*
Capital Costs

The communities in the report faced varying monetary costs of diesel fuel, but consistently had significant other costs that were nearly equal to or higher than the cost of the fuel itself. The following table is an excerpt from Gwich’in Council International’s *Diverging from Diesel* study:

<table>
<thead>
<tr>
<th>Territory</th>
<th>Community (diesel fueled unless noted)</th>
<th>Fossil Fuel Generation (MWh)</th>
<th>Current Utility Costs¹</th>
<th>Total Costs ($/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fuel ($/kWh)</td>
<td>Other Costs ($/kWh)</td>
</tr>
<tr>
<td>Northwest Territories (Canada)</td>
<td></td>
<td></td>
<td>0.33</td>
<td>0.31</td>
</tr>
<tr>
<td>Inuvik</td>
<td></td>
<td>16,996</td>
<td>0.33</td>
<td>0.31</td>
</tr>
<tr>
<td>Inuvik (Natural Gas)</td>
<td></td>
<td>11,330</td>
<td>0.27</td>
<td>0.31</td>
</tr>
<tr>
<td>Tuktoyaktuk</td>
<td></td>
<td>4,142</td>
<td>0.29</td>
<td>0.31</td>
</tr>
<tr>
<td>Fort MacPherson</td>
<td></td>
<td>3,424</td>
<td>0.34</td>
<td>0.31</td>
</tr>
<tr>
<td>Nunavut (Canada)</td>
<td></td>
<td></td>
<td>0.29</td>
<td>0.21</td>
</tr>
<tr>
<td>Iqaluit</td>
<td></td>
<td>60,741</td>
<td>0.29</td>
<td>0.21</td>
</tr>
<tr>
<td>Cambridge Bay</td>
<td></td>
<td>10,267</td>
<td>0.29</td>
<td>0.21</td>
</tr>
<tr>
<td>Rankin Inlet</td>
<td></td>
<td>17,625</td>
<td>0.28</td>
<td>0.21</td>
</tr>
<tr>
<td>Baker Lake</td>
<td></td>
<td>9,518</td>
<td>0.27</td>
<td>0.21</td>
</tr>
<tr>
<td>Yukon Territory (Canada)</td>
<td></td>
<td></td>
<td>0.54</td>
<td>0.76</td>
</tr>
<tr>
<td>Old Crow</td>
<td></td>
<td>2,246</td>
<td>0.54</td>
<td>0.76</td>
</tr>
<tr>
<td>Destruction Bay</td>
<td></td>
<td>1,789</td>
<td>0.19</td>
<td>0.41</td>
</tr>
</tbody>
</table>


The table reflects that, beyond the cost of fuel, there are significant other costs associated with fuel consumption. These include generation facility operations and financing costs. These rates do not necessarily reflect the cost of capital needed for upgrades and replacements anticipated in the near future. In addition, some nations are developing carbon tax policies which could add $0.05 to $0.10 per litre of fuel.
**Social Costs**

In addition to monetary costs for using and transporting fossil fuels, communities which are reliant on fossil fuel energy generation experience other direct impacts or indirect social costs. These may include direct impacts on health and well-being, impacts on plants and animals, and contribution to global issues like climate change. There are not many studies which put a price on these impacts, so direct comparisons to fuel costs are challenging. There are, however, a few studies which made preliminary estimates to evaluate the true social costs of fossil fuels:

- Air emission social impact costs were estimated to range from $0.032-0.192/kWh for oil thermal generation and $0.0025-0.13/kWh for natural gas thermal generation.
- The same studies indicate higher social costs for thermal power generation using coal, and diesel fuel for transportation.

This information is important to consider as part of the business case because, for your projects, part of what may motivate your community to take action is the desire to reduce these social costs and concerns.

**Operations Planning**

There are ongoing costs to consider when going through the economic feasibility exercise. Typical costs include things like insurance, land lease payments, pre-positioning or purchasing parts as part of the construction plan, debt payments and operations & maintenance (O&M). Strong design and planning of the O&M for a project can mean the difference between carrying a low-risk fixed cost for recommended O&M or facing a high risk of performance issues.

Planning of the Operations and Maintenance (O&M) on a project will inform the budget and help the team make decisions about equipment, as well as strategies for developing the skills needed to support O&M within the community. This plan will also form part of the documentation required for permitting. Reviewers of this plan will be looking for environmental protection measures planning during operations and O&M planning to ensure that the facility is maintained for performance and safety standards.

O&M Activities can be broadly separated into two categories:

- **Scheduled Maintenance**: activities planned and aimed at fault prevention and optimizing operations, and
- **Unscheduled Maintenance**: activities that take place in response to failures and malfunctions.

Many of the standard O&M activities are preventive (or scheduled) maintenance, which aim to maximize system output, prevent expensive failures, and maximize the life of the system. Preventive maintenance protocols depend on system size, design, complexity, and environment. The cost of preventive maintenance needs to be considered - how much will it cost to maintain the system and how much might be saved as a result? The goal is to manage the optimum balance between cost of scheduled maintenance, yield, and cash flow through the life of the system.

When there is an issue with a project that disrupts energy production, there are losses not only in service, but also potential revenue losses while the system is down or when output is reduced. Response time for service from outside technicians should be specified as part of the procurement contract.

**Risk Assessment**

Any project can face risks which could result in losses, delays or even closure. Most risks can be avoided by good planning and project management, but some risks may need to be
mitigated. The technical assessments allow the team to understand the types of risks your project may encounter. The following table contains an overview of some common risks. Other risks could be project-specific, so the Energy Team should create a comprehensive risk assessment, to make sure none are overlooked. A template of the following table can be found in the digital resources.

**Common Risks identified in a Technical Assessment**

<table>
<thead>
<tr>
<th>Risk Type</th>
<th>Description</th>
<th>Mitigation Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Risks</td>
<td>Involving fluctuation in interest rates, inflation and tariffs, and/or currency rate. Other financial risks could include changes in the price of supplies or equipment and shipping.</td>
<td>• Use hedging facilities in the financial package</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Manage projects with fixed interest rate rather than variable rate loans</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use fixed-price contracts to protect against budget creep</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Include a contingency fund for change in prices</td>
</tr>
<tr>
<td>Development Risks</td>
<td>Risks include unclear contract language, inflated or overly-conservative project budgets, change orders resulting in cost over-runs, changes to project design, policy and permitting changes mid-way through a project, staff turnover, technology changes, differing site conditions</td>
<td>• Establish firm budgets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Obtain independent cost estimates during the design process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Peer-review all project designs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Think about what project features are not essential, so that some can be removed in case of cost overruns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Review all design plans for construction feasibility before sending out to tender</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Obtain thorough geotechnical studies</td>
</tr>
<tr>
<td>Design Risks</td>
<td>Flawed design, poor detail and drafting</td>
<td>• Eliminate plan errors with peer reviews</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Research contractor history and references before contracting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Review construction activities regularly with the PM</td>
</tr>
<tr>
<td>Construction Risks</td>
<td>Deviations from plans and specifications, failure to follow manufacturer or industry guidelines, functional defects, poor workmanship, failure to meet performance criteria, building code violations, early wear on long-lived materials, defective materials, sudden failure</td>
<td>• Ongoing involvement of CEC/Energy Team and PM partner with on-site construction managers and foremen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Independent inspections of work before signing off on work completion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Early and frequent collaboration of inspectors in the planning and construction of the project to keep them informed and involved in project plans and on-site construction changes.</td>
</tr>
<tr>
<td>Scheduling Risks</td>
<td>Permitting delays, plan reviews find significant errors, conflicts in on-site access or activities, weather conditions which cause delays in equipment delivery and construction activities.</td>
<td>• Understand permitting process and act proactively in obtaining permits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Share risks with contractors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do not include “damages for delay” clause in contractor agreements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Review plans for errors and construction feasibility</td>
</tr>
</tbody>
</table>

Table 18.
Image 7-14. Koojesse Inlet, Nunavut. © Bill Williams
Negotiating Key Agreements

Electricity Purchase Agreements (EPAs)

Whether the project is a small rooftop solar panel or a large wind farm, the connection to the community’s energy system is regulated by an EPA. The electrical distributor purchases the generated power at a negotiated rate, and then sells that power to the consumers on the grid. This applies to small microgrids all the way to large continental grids. Having this agreement in place will almost certainly be a requirement for financing. These are also referred to as Power Purchase Agreements in some jurisdictions.

Interconnection

When a community energy system is connected to a new generating source, an interconnection agreement must be made between the project and the electricity distributor. This agreement outlines the technical and legal requirements for a physical connection to be made which can provide protection from electrical faults in either party’s system. This connection must also meet industry standards. Interconnection studies can be quite costly, and the expense is generally borne by a project developer or proponent.

Legal

To protect the interests of all parties, communities should seek legal counsel to confirm that the development process and the activities comply with the rules and regulations of the applicable agencies. This includes activities such as title certification, legal plans, land status reasearch, construction contracts and formation of business structures.

Insurance

The project team must be protected by various kinds of applicable insurance throughout the life of an energy project, starting during development and through to the end of operations.

Municipal and Regional Governments

In the development of a large capital project, local, municipal or regional leadership may wish to be consulted and may hold requirements for formal agreements. Research the possibility of these requirements early in the process, to ensure that implementation schedules are not impacted by an unexpected requirement. Local authorities often have key permitting controls and provisions that need to be understood. Upfront and regular communications with local authorities is highly advisable to reduce surprises and project delays.

Construction

Construction Agreements outline labour rates and unit prices (or lump sums) and contain the details which will ensure the community’s interests are protected.

Procurement

In the case of large capital projects, the procurement agreements may need to be in place before the financing can occur, with contingencies on financing included in the terms. When the financing is secured, then the procurement contracts are triggered, and the contract becomes valid.

Image 7-15. David Dupuis talks about Makivik’s renewable energy project potential in Nunavik, Canada, at the 20/20 Catalysts Program. © 20/20 Catalysts Program
Alternative Energy in Yakutia, Russia

Off-grid Renewable Energy

IN RUSSIA’S ARCTIC, remote communities face similar challenges as those in the North American Arctic regions in terms of reliance on fossil fuels. Utility companies in this region have identified that one of the continuing challenges for the region is that communities often do not have the human or fiscal resources to develop and manage new power systems.

In response, multi-community projects are being developed with adjacent communities to share resources and reduce the costs of the project with volume procurement strategies. This approach has been termed “energy clustering” and has been deployed through solar PV generation projects in the Betenkes and Stolby settlements of Verkhoyanskiy district in Russia. This type of development approach reduces the high cost of deliveries to the area for energy equipment and services, as well as the logistics for the construction of the projects.

The coordinated approach to development and construction provides each of the communities with the benefits of learnings from the other projects, which can drive efficiencies in the development process and save money on avoiding doubled efforts.

The projects were developed by Sakhaenergo JSC, a branch of the local utility corporation, and it reports that these projects will pay for themselves in 7-8 years, in addition to the savings that result from lower fossil fuel consumption. While the region is primarily focused on developing solar projects in Russia’s northern regions, future projects are also focused on bringing wind energy to the region, beginning with a project in Tiksi, in the Bulunsky district. It is planned that the project will be built in two stages and designed by Japanese specialists considering the climatic features of the region.
Image 7-16. Kugluktuk, Nunavut, Canada. © Bill Williams
The Business Case

What Is a Business Case and What Does It Do?

The Business Case contains an evaluation of your proposed project and an assessment of whether the project is feasible across several facets, including financial and environmental feasibility, community impacts/outcomes, and technical feasibility. The Business Case is supported with factual and financial documentation and is designed to present the project vision and plans to community leadership and potential lenders and partners.

Presenting the Business Case to the Community, Partners and Funders

The community, partners and any prospective funders or lenders need a well-crafted business case to agree to pursue a project. The Business Case should provide the community with all of the information they need to get behind the project. It will also give funders or lenders a level of confidence in project completion, confirms if the objectives are achievable, and if the expenditures and revenues are accurately projected.

Where funding is sought through grant programs, a strong business case with forecasted benefits and minimal risks will serve to demonstrate the merits of the project. Most grant programs will have an application form to gather your information, but adding a business case will bolster the application and demonstrate that the project is a good investment. Also, backing or support from the regional government and utility can show the support locally for the project.

Business Case Contents

Executive Summary

The Executive Summary should include the key points of the case for the project and should be prepared after the rest of the document is.
complete. The section should be interesting and informative, to engage the reader in the idea of the project before doing a deep analysis into the specific details of the project. Some best practices for executive summaries are shown below:

Tips for a great executive summary:

• Do some research on the organization that is going to be reviewing the business case and try to tailor the executive summary, to show how the project is aligned with the vision and goals of the organization. Try to use their language and explain how their principles apply to the project. The same is true when applying for grants, where the executive summary should show how your project helps the granting program achieve its vision and goals.

• Summarize the key facts from the business case and present these in the executive summary, making sure to stay focused on these points and not to expand on other subjects.

• Read the executive summaries of business cases for projects that succeeded in obtaining funding and have been built.

A sample newsletter that was circulated to the community of Inukjuak in Northern Quebec about the potential Innavik hydro project has been included as a reference for an executive summary for a business case.

**Community Profile and History**

This section of the business case explains why the project should be implemented, with an opportunity to describe the history and achievements of the community as well as the community’s experience with energy projects. Most, if not all, of this information can be found in your Community Energy Profile completed in Stage 5. This part of the business case may include:

• The name of the community;

• Location description, with a small map to help give context;

• A description of the lands and the features that define it, as well as a description of the parts of the landscape which are particularly important to the community;

• A description of the weather, including any significant trends in local impacts of climate change;
A brief history of the community and the population, with some facts about demographics;

A description of the governance (e.g. elected officials, Chief, Council Members, district, municipality), etc.;

Public and private services (e.g. heat, electricity, other services);

Economy (main economic activities, unemployment rate, types of job opportunities);

Present energy system description and generation source(s), including electricity and heating for buildings;

Present community demands in terms of total energy (electric power, transportation, heating);

A description of the main issues faced by the community (especially community issues that the project can directly address);

A summary of the findings of the Community Engagement process;

The Community Energy Vision and Goals;

Project selection criteria, community support documentation, and summary of anticipated benefits;

Project Objectives.

**Project Overview**

In this section, start to describe the details of the project. Each of the following points can be made into sub-sections of the business case. If there is a lot of information in any of these sections, it is a good idea to provide a summary before launching into lengthy descriptions.

**Project Timeline:** List the project activities from the beginning, including CEP development, engagement, project funding milestones, project development and design milestones.

**A description of the project in general terms**

*E.g.* The proposed project is a 1.9MW wind energy project consisting of two (2) 950kW wind turbines and ancillary equipment. The project will connect to the local transmission infrastructure which supplies power to buildings in the Hamlet on an existing microgrid.

**Project Infrastructure and Equipment:** Describe all equipment and materials that will be installed for operations. Include preliminary design documents, if possible, as well as summary reports showing impact assessments and site investigations.

**Procurement Process Due Diligence:** It is important to demonstrate that the Energy Team has a well-thought-out process in place for running project procurement and is prepared to undergo due diligence on the project by potential lenders.
Location, Site and Environmental description: This describes the geographic location of the project, the legal status of the lands and a description of current use, ecology and zoning. This could include references to the resource data for the area and specific resource study results. E.g. For the Innavik project, environmental impacts were considered right from the start of the pre-feasibility study and a detailed environmental impact assessment (EIA) was completed and filed with the Katavik, Quebec and other Canadian regulatory authorities. Fishing and fish habitat were tested on the Inukjuak River in the summer of 2008.

Policy and Regulatory Framework: Include a list of all policies, permits and regulations the project would be subject to, in order to be approved for operation by the respective regulators and agencies.

Feasibility Study Findings: A description of the environmental, technical and economic feasibility study results demonstrates that the project team has investigated the project in detail with real data. The information from calculations in the feasibility study will form part of the later calculations in the financial assessment portion of the business case.

Implementation Overview

- **Schedule:** Include a preface which describes how the risk factors that could impact the schedule have been taken into consideration. If there are risks which could affect the schedule, additional contingency schedules may be a good idea.
- **Activities:** List the implementation activities and describe them in terms of the following aspects:
  - Facility Design
  - Procurement
  - Site Preparation
  - Construction
  - Commissioning
- **Risks:** List any risks which may impact the project and mitigation measures available in case any risks should occur.

Management Team: This section describes the roles and experience on the Energy Team, and would typically include:

- The CEC
- The Energy Team
- The PM Partner
- Technical Partner(s)
- The Finance Partner

For each of these, describe the role the person plays on the team, relevant experience, and contact information.

Project Agreements: A list of all agreements pertaining to the project and a brief description of their scope, including:

- Service agreements with contractors and consultants
- Land rights agreements
- Utility/Interconnection agreements
- Power Purchase Agreement
- Equipment Supplier Agreements
- Funding Agreements

Jobs and Economic Development Measure: Economic development that comes in the form of skills development, contracted employment (full-time, contracts, apprenticeships, trainees, local sub-contractors), capacity building and other opportunities that arise.

Performance Measurement: Description of performance indicators on the project, targets and measurement dates to demonstrate that the project has been developed with a level of performance that forecasts a successful implementation. In addition, it will include performance indicators which will be measurable following the start of operations.

Following the Project Overview, the next section of the business case is the financial assessment, which presents the economic feasibility of the project, and outlines how the financial plans can be implemented to successfully launch and operate the project.
Financial Assessment

The commercial viability of a project is calculated through a financial analysis of costs, investment, and revenues. These include assumptions about the future operation of the project and potential future risks. Unlike grid-connected projects, remote community projects that are connecting to local microgrids are operating in a closed system, likely in a hybrid design with some kind of fossil fuel generation combined with renewables and storage. With this type of project, the typical business case that would be written for the market strength of the project is less important than the project’s ability to create long-term reductions in cost and fossil fuel consumption.

This section is an overview of the findings from the economic feasibility assessment. This would be supported by a pro forma statement, cashflow projections and balance sheets for the project. It would also include an overview of the business model and background about the participants in these structures. In these reports, there are some key terms to know:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nameplate Capacity</td>
<td>MW</td>
<td>The amount of power the facility is designed to produce at maximum capacity.</td>
</tr>
<tr>
<td>Capacity Factor</td>
<td>%</td>
<td>A ratio of actual power output over a period of time, to its potential output if it were possible for the facility to operate at full nameplate capacity indefinitely. For example, if a 1MW wind energy project produces power at an average of 500 kW, then its capacity factor is 50% (500/1000 = 0.50, i.e. 50%).</td>
</tr>
<tr>
<td>Estimated Average Annual Energy</td>
<td>MWh/yr</td>
<td>The total amount of electrical energy the project produces over a year, measured in megawatt hours.</td>
</tr>
<tr>
<td>Annual Efficiency Degradation Rate</td>
<td>Reduction % Per Year</td>
<td>The decline in output, that all power generation technology experiences over time. The rate will differ depending on the technology.</td>
</tr>
<tr>
<td>Energy Sell Rate (year 1)</td>
<td>$ / kWh</td>
<td>The negotiated rate that is paid to the project owners for the power that is produced.</td>
</tr>
<tr>
<td>Annual Revenue (year 1)</td>
<td>$ Per Year</td>
<td>Annual gross earnings from power production.</td>
</tr>
<tr>
<td>Capital Cost</td>
<td>$</td>
<td>The cost of constructing the facility, including soft costs for development.</td>
</tr>
<tr>
<td>Capital Cost / MW</td>
<td>$</td>
<td>The Capital Cost divided by the Nameplate Capacity.</td>
</tr>
<tr>
<td>Debt Service Reserve</td>
<td>$</td>
<td>A cash reserve that is used to pay for the interest and principal payments on certain types of debt used in project construction.</td>
</tr>
<tr>
<td>Owners Equity</td>
<td>$</td>
<td>Sometimes referred to as the book value of the company, it is equal to the reported asset amounts minus the reported liability amounts.</td>
</tr>
<tr>
<td>Owners Equity % of Capital Cost</td>
<td>%</td>
<td>The Owner’s Equity as a percentage of Capital Cost.</td>
</tr>
<tr>
<td>Senior Debt or Loan Amount</td>
<td>$</td>
<td>The amount of money borrowed in order to implement the project.</td>
</tr>
<tr>
<td>Loan Interest Rate</td>
<td>% Per Annum</td>
<td>The cost of borrowing money for the implementation of the project.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Units</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Loan Amortization</td>
<td>Years</td>
<td>The number of years that the loan will be active and also the number of years across which the payments will be divided.</td>
</tr>
<tr>
<td>Loan Type</td>
<td></td>
<td>Includes Grants, Equity, Debt, and others.</td>
</tr>
<tr>
<td>Revenue Reserve</td>
<td>$</td>
<td>The sum of money retained in the business, so as to meet future contingencies.</td>
</tr>
<tr>
<td>Revenue Escalation</td>
<td>% Per Annum</td>
<td>Growth in revenues over a year.</td>
</tr>
<tr>
<td>Expense Inflation</td>
<td>% Per Annum</td>
<td>Increases in operating expenses over a year.</td>
</tr>
<tr>
<td>Annual Operating Cost (Year 1)</td>
<td>$ Per Year</td>
<td>Total operating costs in the first year of the project.</td>
</tr>
<tr>
<td>Sustaining Capital Expenditures or Reserve (SCR)</td>
<td>$ Per Year</td>
<td>SCR refers to the process of periodically investing capital into the business to maintain the current level of operations.</td>
</tr>
<tr>
<td>Income Tax Rate</td>
<td>% of Taxable Income</td>
<td>Rate of tax that applies to the project earnings.</td>
</tr>
<tr>
<td>Capital Cost Allowance (CCA) Rate</td>
<td>% of Unappreciated Capital Cost (half year rule)</td>
<td>The Capital Cost Allowance (CCA) occurs when a business purchases a building, piece of equipment or some other long-term asset, and is not allowed to deduct the full cost of that asset on its income taxes. It is allowed to deduct the full cost only over a period of years.</td>
</tr>
<tr>
<td>Project Residual Value</td>
<td>$ (at end of analysis period)</td>
<td>In the case of an energy project, residual value reflects the cost or worth of the asset at the end of its useful life, or energy production contract, at which point the project can be re-energized on a new contract or decommissioned.</td>
</tr>
<tr>
<td>Return on Equity Invested After Tax (ROI)</td>
<td>% Per Annum</td>
<td>ROI is a financial ratio used to measure after-tax income earned by a company from its assets. After-tax ROA compares after-tax income to average total assets (ATA) and is expressed as a percentage.</td>
</tr>
<tr>
<td>Project Internal Rate of Return (IRR)</td>
<td>% Per Annum</td>
<td>Internal rate of return is a discount rate that makes the net present value (NPV) of all cash flows from a particular project equal to zero.</td>
</tr>
<tr>
<td>Simple Payback</td>
<td>Years</td>
<td>The payback period is the length of time required to recover the cost of the project. The payback period of a given project is an important determinant of whether to undertake the project, as longer payback periods are typically not desirable for investments.</td>
</tr>
<tr>
<td>Equity Investment Payback</td>
<td>Years</td>
<td>The length of time required to recover the cost of equity investments into a project.</td>
</tr>
<tr>
<td>Debt Service Coverage</td>
<td>NetOpCF / DebtSvc</td>
<td>In corporate finance, the Debt-Service Coverage Ratio (DSCR) is a measure of the cash flow available to pay current debt obligations.</td>
</tr>
<tr>
<td>Net Present Value</td>
<td>$</td>
<td>The difference between the present value of cash inflows and the present value of cash outflows over a period of time. NPV is used in capital budgeting and investment planning to analyze the profitability of a projected investment or project.</td>
</tr>
</tbody>
</table>
SUMMARY & CHECKLIST

☐ I have approached other communities undertaking similar projects, have spoken to technical and equipment suppliers, and done a thorough due diligence and reference check on any prospective PM partners.

☐ I have selected project and technical management partners (PM) that have experience working in Arctic conditions on similar project(s).

☐ The CEC and the Energy Team feel equipped to take on the general coordination of the feasibility studies and permitting process.

☐ I have completed all technical and economic feasibility studies for the clean energy project(s) my community hopes to pursue.

☐ I understand the permitting requirements that apply to my region for the project(s).

☐ I have calculated (or had someone calculate) the energy savings and carbon offsets from the proposed clean energy project(s).

☐ I have calculated (or had someone calculate) the true cost of diesel in my community.

☐ I have completed operation and maintenance planning for each of the clean energy projects my community hopes to pursue.

☐ I have completed risk assessments for each of the projects.

☐ I have created business cases for all projects.
STAGE 8
Implementing Energy Project Plans

Image 8-1. Iqaluit, Nunavut, Canada. © Bill Williams
<table>
<thead>
<tr>
<th>Stage 8 Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>283</strong> Implementing Energy Project Plans</td>
</tr>
<tr>
<td>284 Impact Projections for all Actions Proposed in your Business Case</td>
</tr>
<tr>
<td>286 Example: Impact and Benefit Projections</td>
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<td>288 Creating a Project Employment Plan</td>
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<td>297 <em>Worksheet 8-3</em>: Equipment &amp; Services SWOT Analysis</td>
</tr>
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<td>298 Equipment Procurement</td>
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<td>301 Scheduling Site Preparation and Installation</td>
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<td>302 Site Management</td>
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<td>303 Community Education and Training</td>
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<tr>
<td><strong>304</strong> Operations and Maintenance</td>
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<tr>
<td><strong>305</strong> New Infrastructure Project Implementation Process</td>
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<tr>
<td><strong>306</strong> Permitting and Consultation with Agencies</td>
</tr>
<tr>
<td><strong>310</strong> Funding Applications and Financial Information</td>
</tr>
<tr>
<td><strong>311</strong> Funding Outcomes</td>
</tr>
<tr>
<td><strong>311</strong> Funding Applications May Need to Be Resubmitted</td>
</tr>
<tr>
<td>311 Land Agreements</td>
</tr>
<tr>
<td><strong>313</strong> Land Leases</td>
</tr>
<tr>
<td><strong>313</strong> Procurement of Equipment and Construction Services</td>
</tr>
<tr>
<td><strong>316</strong> Building and Transportation Planning &amp; Permitting</td>
</tr>
<tr>
<td><strong>317</strong> Ongoing Community Engagement</td>
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<tr>
<td><strong>318</strong> Construction</td>
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<tr>
<td><strong>319</strong> Inspections and Commissioning</td>
</tr>
<tr>
<td><strong>320</strong> Operations &amp; Maintenance</td>
</tr>
</tbody>
</table>
Implementing Energy Project Plans

With the business case completed in Stage 7, you can take the results of the feasibility studies and start to work on the implementation of your project. At this point, you will have funding/lending proposals in progress so that project implementation activities can begin. There would generally be a project development agreement between the community and the Development Partner at this stage of project development. At this point, you will work with the Energy Team and your community to determine the detailed impacts and benefits that the project will have during installation and operation. You will also be determining your local employment and training plans.
Impact Projections for all Actions Proposed in your Business Case

The Energy Team and their PM Partner should take time to identify and try to quantify all potential impacts and benefits for each step of project implementation. This analysis considers a wide range of community impacts and benefits, including:

**Economic Development:**
- Employment and contracting opportunities
- Revenue generation or cost reduction opportunities
- Business development

**Health & Safety:**
- Affordable heat and comfortable homes
- Health & wellness of community members
- Potable water supply
- Energy security
- Energy independence

**Education & Capacity Building**
- Capacity-building & retention
- Community engagement
- Transferable skills
- Youth education

**Environment & Climate Change**
- Local habitats & species
- Noise pollution
- Water pollution
- Air and ground pollution

**Community Independence**
- Energy systems and system operators/regulators
- Supply chain budgets for fossil fuels

One role of the CEC will be to help identify any community-specific values that could be impacted or could benefit from the project implementation and operations. For example, some of the community values might relate to home comfort, preservation...
of certain traditional or culturally-significant lands, wildlife, plants, *viewsheds*, etc. The CEC’s knowledge of the community and of the project will help in identifying potential impacts and benefits on those aspects of the community which are highly valued.

Some of these impacts and benefits will be quantitative, such as revenue generation, and some are qualitative, such as people’s experiences of home comfort.

How you calculate these impacts and benefits will depend on what is potentially being affected. In Stage 9, these projections will be assessed when the project is in operation and many of the impacts can be measured. At this point, try your best to estimate the proposed impacts based on your community’s knowledge and the knowledge of your partners and other technical experts.

Worksheet 8-1: Project Impact and Benefit Projections lists examples of aspects of the community that may be positively or negatively impacted by the project, the metric that will be considered, the potential level of impact, and, if possible, the specific impact. When there is a potential negative impact you will need to discuss how to mitigate it – how to reduce the impact.

All United Nations Member States (both developed and developing countries), share a blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 shared Sustainable Development Goals (SDGs) with 169 associated targets, which are an urgent call for action to improve health and education, reduce inequality and spur economic growth – all while tackling climate change and working to preserve waters and forests.

For countries to meet their SDGs commitments, everyone has an active role to play in creating sustainability projects, initiatives, advocacy, knowledge-sharing and monitoring the results of those projects.

Thankfully communities like yours are making a difference on the ground through your ACEPI projects, and other community sustainability initiatives! Your project stories will be an important vehicle for mobilizing change in other parts of the world, so we highly recommend sharing pictures and stories about your clean energy projects with the Sustainable Development Working Group (SDWG) of the Arctic Council.

With the impact projections considered, you can proceed through the rest of the implementation planning. The following sections present the process for the development of Upgrade/Retrofit and New Infrastructure projects. Once you have reviewed these sections, it would be a good idea to circle back to Worksheet 8-1 and update any items that you were unsure about.

---

**Viewshed**

A viewshed is what you can see from a particular location. Some viewsheds can hold cultural significance and visual impact studies can help model these potential impacts during the development of a project.
Example: Impact and Benefit Projections

This worksheet illustrates how you can identify community impacts and benefits during project implementation and develop a plan to mitigate the negative impacts. The blank worksheet follows on the next page.

<table>
<thead>
<tr>
<th>Community Aspect</th>
<th>Metrics</th>
<th>Potential Mitigations</th>
<th>Impact Calculation</th>
<th>Level and Type of Impact</th>
<th>Activities Creating Impact</th>
<th>Impact Calculation</th>
<th>Potential Mitigations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment</td>
<td>Low</td>
<td>N/A</td>
<td>Medium</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Health</td>
<td>Low</td>
<td>N/A</td>
<td>Medium</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Environment</td>
<td>Low</td>
<td>N/A</td>
<td>Medium</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Opportunity</td>
<td>Low</td>
<td>N/A</td>
<td>Medium</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Example:

<table>
<thead>
<tr>
<th>Impact Aspect</th>
<th>Impact Calculation</th>
<th>Level and Type of Impact</th>
<th>Activities Creating Impact</th>
<th>Potential Mitigations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment</td>
<td>Projected cost savings per home from #</td>
<td>Medium</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Health</td>
<td>Projected cost savings per home from #</td>
<td>Medium</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Environment</td>
<td>Projected cost savings per home from #</td>
<td>Medium</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Opportunity</td>
<td>Projected cost savings per home from #</td>
<td>Medium</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Note: Similar projects and experiences in other communities should be considered when completing the same worksheet.
## WORKSHEET 8-1

### Impact and Benefit Projections

<table>
<thead>
<tr>
<th>Community Aspect</th>
<th>Metrics</th>
<th>Activities Creating Impact</th>
<th>Level and Type of Impact</th>
<th>Impact Calculation</th>
<th>Potential Mitigations</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
Creating a Project Employment Plan

In Stage 7, as part of the project preliminary design, a worksheet for potential staffing roles was created. Now that the design has been finalized and budgets established and the project approved, the staffing for implementation can begin. This Project Employment Plan considers each role involved in implementing the project and identifies:

1. What project and contracted positions are needed and what roles will these individuals play in the project?
2. What skills and experience are required? (Requirements may come from external sources such as contracting companies)
3. Which of these roles can be filled by local staff?
4. Who are the local candidates and what skills and experience do they bring?
5. Are these people available for the job?
6. Is there any training required for these people to be ready to work on the project?
7. What wages would need to go into the budget?
8. What plan is in place in case any local staff need to be replaced? (E.g. in case of sick leave, bereavement leave, termination, etc.)
These questions are included on Worksheet 8-2: Project Employment Plan. The worksheet can be used as a framework for employment planning discussions with the PM Partner and local leadership. If you’re not sure where to start, talk to your PM Partner and have them create a list of typical roles for your project. Your community may have someone who manages employment and training opportunities, such as a Community Employment Officer, Adult Trade School Lead or an Economic Development Officer. This person should be able to advise on how to support the project in hiring local staff, e.g., through contributions of a grant, provisions for training, or other supports which could be unique to the community.

While going through the equipment procurement process, the project team will learn more about the skills required to install the equipment for the project. Sometimes there needs to be specialized staff involved in the installation in order to maintain the equipment warranty. Other times, there will be opportunities to hire local staff to do the installation.

There may also be local, regional or national grant programs for hiring for roles in “green” jobs (i.e. jobs in sustainability and clean energy). These grants could offset some wage costs and provide an opportunity to offer higher wages to local candidates. Partners or advisors with experience in government-funded projects should be able to advise on such programs and help in applying for grants.
WORKSHEET 8-2

Project Employment Plan

Directions: for each project role that could potentially be filled with local staff, fill in a copy of this worksheet as the basis for planning discussions. A Job Fair can be an effective way to reach the community to explain what the project is about, the implementation plan, and the associated employment and contracting opportunities.

Role:  ____________________________________________

What skills, certifications and experience are required?  ________________________________

Who are the local candidates and what skills/experience do they bring?  ________________

Are these people available? (To find this information, one often has to canvass the community, and even create a human resources list of available and qualified community members and contractors.)

What training (if any) would they need, to be ready to work on the project? Are there apprenticeships and on-the-job training opportunities available?  ________________________________

What wage amount needs to go into the budget?  ________________________________

What plan is in place in case any local staff need to be replaced? (E.g. in case of sick leave, bereavement leave, termination, etc.)  ________________________________

Next steps:
1.  ____________________________________________
2.  ____________________________________________
3.  ____________________________________________
This Stage highlights two tracks of implementation projects. These two tracks encompass the same potential project directions that were described in Stage 6 (bioenergy, energy-efficient buildings and communities, renewables, smart-grid and storage, and clean transportation, technology and innovation). The tracks categorize the projects based on their scale. There are different requirements you need to consider in the planning and implementation of the two kinds of projects.

**NEW INFRASTRUCTURE PROJECTS**
Where new infrastructure is being built.
*E.g.: Solar PV project with ancillary equipment, new community buildings*

**UPGRADE AND RETROFIT PROJECTS**
Where improvements are made to existing infrastructure.
*E.g.: Home Exterior Insulation Upgrade Project for 50% of community homes, HVAC replacement in 50% of community homes.*

**New Infrastructure Projects** are projects built outside of current buildings, and are typically self-contained without relying on existing buildings for operation. The exception would be a rooftop solar project, which mounts solar PV equipment on the roof of a building to generate power.

**Upgrade and Retrofit** projects are custom-designed for the infrastructure that is already in the community. These building-scale projects may be distributed across an entire community or may be centered in one place.
There are some typical differences in the implementation of these kinds of projects:

<table>
<thead>
<tr>
<th>New Infrastructure Projects</th>
<th>Upgrade and Retrofit Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>May need to get land use agreements for the proposed project site.</td>
<td>May need to get building owner agreements to implement upgrades and retrofits.</td>
</tr>
<tr>
<td>Project costs are often larger: tens of thousands to tens of millions of dollars.</td>
<td>Project costs are often smaller than new infrastructure projects.</td>
</tr>
<tr>
<td>The project design is subject to permits and approvals by governments (of various levels), utilities and service agencies. The design and policy compliance of the equipment is managed by the supplier.</td>
<td>The project design is subject to building codes and project permitting, which could include approvals from local utilities. The design and policy compliance of the equipment is managed by the supplier.</td>
</tr>
<tr>
<td>Requires impact assessments which may include environmental assessments, heritage assessments, and technical studies.</td>
<td>Requires technical assessments of each retrofit/upgrade site to evaluate installation specifications.</td>
</tr>
<tr>
<td>Requires engineering, assessments and agreements with utilities to connect to the local power system.</td>
<td>May require inspections to confirm that upgrades and utilities retrofits are installed correctly and satisfy power agreements.</td>
</tr>
<tr>
<td>Procurement of equipment and infrastructure is typically for custom configurations of equipment and specialized services for installation.</td>
<td>Procurement is typically for standard equipment but could also include modified equipment and/or custom fabrication.</td>
</tr>
<tr>
<td>May require special arrangements for transportation of equipment; possible constraints could include timing of deliveries and modes of transportation for large industrial equipment, such as the machines required to construct and erect wind turbine towers.</td>
<td>Equipment for home or community building scale retrofits would probably not require oversized delivery vehicles, thus would be subject to the same transportation constraints that the community usually faces (e.g. use of winter roads, barge schedule).</td>
</tr>
<tr>
<td>Construction schedule could be affected by weather.</td>
<td>Installation of upgrades and retrofits could be affected by weather.</td>
</tr>
</tbody>
</table>

The processes for implementation of these two tracks of projects are laid out in this stage. These processes will be followed by representative schedule for common types of projects that could be implemented in Arctic communities. Before splitting into the project-specific streams we will first talk about Project Employment Opportunities.
Image 8-6. The Teslin Biomass Project uses 10 Hargassner wood-chip boilers. These boilers are CSA approved in Canada, which was important to the community. © 20/20 Catalysts Program
Upgrade & Retrofit Project Implementation Process

Building Owner Agreements

Based on the Energy Assessment in Stage 5, the community energy project priorities defined in Stage 6, and the business planning done in Stage 7, you have identified your upgrade or retrofit projects and shared them with the community.

Before the work can take place, formal agreements between the building owners and the project team need to be completed. The agreements will describe the work that is proposed, the possible impacts, the responsibilities of each party, the plan for operations and maintenance, and any warranties.

This agreement would probably be prepared by the PM Partner for the specific project in collaboration with the CEC, to make sure to include considerations which would add value to the agreement for the community.

Ongoing Community Engagement

As the project details become clearer and the project works begins, it is important that the community be engaged on a regular basis to stay informed and continue to have the opportunity to ask questions.
In many Arctic communities, not all homes are owned by the people living in them. While it might be efficient to work with just the community housing corporation or social housing agency to get the homes registered for the retrofit project, it is also important to inform the residents and make sure they have opportunities to engage with the CEC and members of the Energy Team about the project.

Some key milestones in the development process, when you might provide updates to the community, are:

- **Following the completion of Building Owner Agreements**, to inform the community of the potential project outcomes. Some preliminary illustrations of the finished upgrades and retrofits can help community members to visualize the project.

- **Before the site preparation begins**, to provide final details.

- **Following the completion of construction**, to provide the community with an opportunity to learn about the upgrades and to see them in action, if there are homes willing to provide a visit and tour. You can also provide a Home Energy Training Program.

To decide which engagement tools to use, consider which were the most successful for community energy engagement and education, then use those tested methods first before trying new strategies.
**Funding Applications and Financial Information**

Financial resources will be needed for the proposed upgrades. Depending on the scale and cost of the project, this funding could come from the community or household budgets, but very often the path to funding will be through grants and programs offered by regional or national departments that promote energy conservation and efficiency.

Your partners should be able to advise you and propose a strategy to secure financial resources for the project. The CEC will have a central role in the financing application process, with support from the Energy Team.

**Technical Audits and Inspections to Identify Equipment**

Before procurement, the equipment needs to be sourced. Equipment selection will be based on several factors:

- **PERFORMANCE**
- **DURABILITY AND RELIABILITY**
- **OPERATIONAL LIFESPAN**
- **APPROPRIATENESS FOR BUILDING TYPE** (e.g. unit size, noise level, etc.)
- **COST-EFFECTIVENESS**

Your home or building energy assessment should specify the work needed to prepare it for the upgrade, and the best equipment to use. There may be more than one option of equipment. If so, it would be helpful to do a SWOT analysis, like that shown in Worksheet 8-3: Equipment & Services SWOT Analysis, to determine the best equipment choice. You can also ask your technical consultant that completed your energy assessment to complete this SWOT analysis for the equipment as part of their recommendations.
<table>
<thead>
<tr>
<th>Equipment or Service Option</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
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Equipment Procurement

With the selection of equipment made, the next step for the project team is to enter into contracts for the goods and services needed to implement the projects.

A good project partner will be knowledgeable about procuring equipment specific to your project. Also, ask these partners if they get preferential rates from certain organizations. If your partner has preferred technology, it could be a negative or a positive for the community. On the one hand, you could get better rates on equipment; on the other, it’s important to know if your partners are getting kick-backs for recommending those products or services. You want to recommend what best serves the needs and interests of your community first and foremost.

A key area where the CEC can contribute local knowledge is on the question of transportation and storage of equipment. It’s important to pick the right mode of transportation that will be most cost effective for your community, given both timelines and resources required. Depending on seasonal constraints, there may need to be more than one delivery method. You may need equipment storage for both the installation phase and during operations, if there are to be any supply stocks kept locally.
Service Contracts & Local Job Recruitment

With an understanding from the equipment suppliers about the skills required for installation, the project team will be able to strategize about who will be involved in the installation of the upgrades. Using the Community Employment Plan (Worksheet 8-2) as a guide, the staffing list can be planned using Worksheet 8-4: Project Staffing, to identify the roles and approximate salary costs.

In Stage 7, Worksheet 7-1 was used to help assess the possible economic development impacts of the project, in a generalized way. Now in Worksheet 8-4: Project Staffing Overview, the final budget can be applied and more detailed information can be identified on a per-worker basis. Note that in the example provided, there is a cost to provide accommodations and food for a trained worker from outside the community. This leads to higher expenses, compared to the cost of training a local community member. This may not be true for all scenarios, but this kind of analysis will help the CEC and PM Partner decide what staffing strategy would be best for the community and for the project.
### Project Staffing Overview

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Project Role</th>
<th>Required Skills</th>
<th>Rooming and Food Cost (6 weeks)</th>
<th>Training Required?</th>
<th>Training Costs Total</th>
<th>Wages</th>
<th>Total Hours</th>
<th>Total Skills</th>
<th>Required Role</th>
<th>Scheduled Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.g. Site Foreman 1/2</td>
<td>Manage on-site activities</td>
<td>Management, know ledge of all trades on site</td>
<td>$42 x $50 = $2,100</td>
<td>No</td>
<td>$0</td>
<td>$45/hr</td>
<td>$10,800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.g. Site Foreman 2/2</td>
<td>Manage on-site activities</td>
<td>Management, knowledge of all trades on site</td>
<td>$240 (6 weeks)</td>
<td>No</td>
<td>$42 x $150 = $6,300</td>
<td>No</td>
<td>$45/hr</td>
<td>$10,800</td>
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</tr>
</tbody>
</table>

**Working Sheet 8-4**
Scheduling Site Preparation and Installation

For retrofit and upgrade projects, the installation schedule will depend largely on the type of project and the logistics of getting the staff and equipment on site. Most projects will share these installation phases:

- Site preparation
- Delivery of equipment and fabrication of custom parts/fittings
- Installation and testing
- Cleanup of construction mess/damage

The CEC should prepare and distribute notices of work and schedules to all buildings that will receive upgrades and retrofits. These notices should include a summary of activities; a short list of expected impacts, including any power, water or heat interruptions; and contact information for residents to get more information. It is very important that if there are any language barriers or challenges between anyone in the community and installers that there be someone to facilitate the exchange of information so that residents can access the information they need.

Image 8-5. © AJ Esquega
Site Management

The space inside and around a building during the installation process could be dangerous for people who are not part of the installation team, therefore there must be measures to maintain the safety and comfort of the community during installation. To avoid issues, try to communicate with the community about ongoing project work activities. These include, but may not be limited to:

- Identifying, marking and maintaining project work zones which should only be accessed by the project team.
- Controlling who enters the work sites to ensure that only trained staff are present;
- Monitoring and controlling vehicles entering and exiting the site to ensure that they are clear to enter or exit, but also to ensure that people around the site are stopped at a safe distance from these work vehicles;
- Coordinating and managing deliveries to the site and storage facilities in the community;
- Coordinating any questions or concerns to the CEC and PM Partner, as appropriate.

In a minor upgrade, this could be a single exterior wall and one interior room of a building. In a major upgrade, an entire home could be marked as a work zone and the people living there will need a place to stay during installation.

Markings should be visible and could include a physical barrier, like a fence, or a simple marker like signs or a tape line on a doorway or floor.

Project zones should have a sign posted near the entrance noting what personal safety equipment is required to work on site. This and other safety measures are important for worker safety but may also form part of local labour laws and insurance requirements. It is important to work with the PM Partner to ensure that these requirements are clear.
During projects where equipment is upgraded, there will be waste produced from several sources:

- Old equipment removed from the buildings;
- Building materials removed during site preparation;
- Packaging and shipping materials that are delivered with the new equipment and materials.

Before the old equipment and building materials are removed from the community, consider how they could be reused and recycled locally.

Any materials which cannot be used or recycled locally may be disposed of or shipped out, which is often an added cost to the project. These costs should be accounted for by the PM in their initial project budgeting.

**Community Education and Training**

As upgrade installations near completion, the CEC should plan to educate the people living and working in upgraded buildings about the new equipment.

For example, you could hold an open house at one of the upgraded buildings and invite people in the community to see what the new equipment looks like and how it operates. This would be a great opportunity for people to see how the upgrade works and to ask questions in a setting that fosters a common knowledge base.

If the building users or residents need to take any steps to operate or maintain the equipment, a community open house will also offer a good time to start circulating information about Operations & Maintenance. You may want to consider planning one-on-one conversations with residents after each equipment installation, when the upgrades are ready to begin operating. Residential maintenance training programs are also highly encouraged.

After the equipment has been installed and operational for a while, it would be beneficial to do a follow-up with the occupants to make sure the upgrades are working as expected, to collect feedback and to answer any questions.
Operations and Maintenance

With each new installation, the building users and residents should get some form of instructions for maintenance. These instructions should be based on the manufacturer’s recommendations for the equipment and should also include any additional advice related to the environmental conditions in the community, such as extreme cold weather.

To create such a set of instructions, review the information from the manufacturer first, then solicit advice from sources such as: tradespeople who have experience with the equipment, particularly if they have northern experience; the supplier of the equipment, who may have received feedback from other customers; and the PM Partner, who should be familiar with the operation of such equipment in northern environments.

Try to create a set of instructions that are suitable for all audiences with varying educational backgrounds. Adding visuals and other diagramming will also help make the document more user friendly.

It is important to have some people in the community who can do minor repairs and provide support to people having issues with the equipment. Each community would benefit from having a local employee who has been trained in the specifics of the equipment and who can provide repairs, tune-ups and other servicing. In the long term, the performance of the equipment and its impact on the community energy system will depend on its care and operation.
In Stage 7, in developing the Business Case, you completed environmental and energy assessments, feasibility studies and preliminary project design for all new infrastructure priority projects. Those activities will have provided the information you need for the Stage 8 permitting applications, which will almost certainly be a condition of funding for a major project.

In parallel with submitting the permitting applications, you will need to negotiate conditional procurements and submit funding and financing applications. Once project funding has been confirmed, procurement and construction can begin.

These activities can be seen in the diagram below, which highlights the Stage 8 activities. In the sections that follow, these activities are discussed in more detail.

**Development Activities for Major Projects**

**Figure 46.**

![Diagram of Development Activities for Major Projects](image-url)
Permitting and Consultation with Agencies

New infrastructure projects typically require multiple permits from agencies which assess the impacts to traditional lands, environment, and any existing infrastructure. The permitting programs aim to ensure that project installations meet the required standards and do not cause permanent or irreversible harm to the natural environment or community. The agencies which govern the permitting process may differ from region to region; the Energy Team and the PM Partner need to understand the permitting process and initiate discussions with all relevant agencies.

It is recommended that you consult with agencies and utilities before submitting the applications for permitting, to develop an open dialogue between the Energy Team and each applicable agency. This collaboration may help you work through regulatory challenges, improve the project and gain more knowledge about the bigger context, be it regional or national. Each agency will specify the requirements of the permits you will need, in order to build the project.

Permitting applications require a lot of background information. Many regional or national agencies will have baseline information about the area proposed for the project. The Energy Team will also have the results of the community mapping exercise in Stage 2. For the agencies outside the community, the initial discussions may supply the project team with publicly available information such as:

- Public infrastructure maps (see Activity Guide 2-2)
- Maps of waterways and watersheds
- Maps of known traditional lands and protected lands
- Maps of known protected wildlife habitats
- Terrain and natural resource maps

While you would have identified much of this information through the earlier stages of the ACEPI, it is still a good idea to see if there is more information which could assist with the permitting process or if the information differs from what you currently have in your Community Energy Profile.
**Environmental Assessments**

The requirements for environmental assessments for project permitting vary from region to region, and for the type of project. Permitting regulations can be overseen by various government departments responsible for natural resources, the environment, heritage and water.

The purpose of the environmental assessment process is to:

- Study the current environment to identify natural and cultural features in the project location;
- Understand the project impacts;
- Analyze the project’s compliance with applicable regulations;
- Indicate opportunities to mitigate any potential impacts;
- Validate that the detailed project design can be implemented without serious and irreversible harm to the environment.

The first draft of any environmental study is prepared for the project team, to help understand how the project will potentially impact the project lands and inform the team whether the project, as proposed, complies with the regulations. When the project team receives the draft report, they will review the study in detail and refine the project designs to make it compliant with the regulations. A review of the updated designs is done by the environmental assessment consultants, and their report with the updated designs is prepared for submission.

There is typically more than one specialist involved with the environmental assessment permit, each analyzing a different aspect of environmental impact. The studies could include:

- **Subsistence & Cultural Impacts**
- **Water/Watershed Impact Studies**
- **Archaeological Studies**
- **Navigable Air Studies** (typically only applies to wind energy projects)
- **Natural Heritage Studies**
- **Sound Emission Studies**
- **Visual Impact Studies**
Establishing the layout for a new project using the studies from the environmental assessment process is like drawing a picture on a canvas, where each study result masks off part of the canvas. When each of the protected areas from each study are added one over the other, the project can only be built in those areas which have no masks over them.

It may not be possible to place the required infrastructure for a project outside of areas deemed significant by the environmental impact studies. If that is the case, then the project team will need to investigate, with their consultant, the possibility of a mitigation plan to remediate the impact of building on an area which is deemed significant. These measures are proposed in the permit application and must be approved by the permitting agency. Some proposed mitigation plans will not be approved, and some agencies will mandate standardized mitigation plans. Here are some examples of post-construction mitigation plans:

A solar energy project was planned on land which was habitat for a protected plant species. The permit specified that for every square metre of habitat affected, two metres of habitat would be created on non-developed parts of the project lands.

A wind energy development was planned in an area where migratory birds passed through during the day, over a six-week period each year. The permit specified that the project team must monitor bird deaths at the project site for the first two years of operation and, if the number of birds exceeded a set number, then the project would have to stop daytime operations during that six-week migratory period each year.

A ground-source heat pump project permit was issued for a project which demonstrated that the sound from the motors was above the level allowed within 50 metres of a house. The permit specified that the motor may not be operated between 11pm and 6am.

**MITIGATION PLAN**

A plan to reduce the impact of a negative consequence

**REMEDIATE**

Actions that fix or repair a negative impact.
These examples show why it is in the best interests of the project team to plan a project in the right location to minimize impacts. The mitigation measures may be worthwhile, but can be onerous and expensive, and may reduce the energy production.

Once the project design has been updated and the impact studies have also been updated to reflect the new design, the project application can be submitted to the permitting agency. The review of the application can take a long time. The project team should stay in contact with the permitting agency to follow the progress of the application and provide additional information as needed.

Some regions require a consultation report which demonstrates that the project team has consulted with municipalities, Indigenous communities and other residents of the area who could be impacted by the project. Keep this in mind as you consider how to keep a record of the engagement sessions you carried out in Stages 1-6.

**Interconnection and Energy Delivery**

In order for an electricity project to deliver power to a community, it needs to be connected to the local distribution infrastructure, or the grid. In a remote community, the grid refers to the connected buildings and equipment that share common sources of generation and are connected through distribution lines to a central control system.

To connect a generation source like a solar energy project to the grid, the utility company that operates it needs to assess the impact of the connection on the system. The utility needs to make sure that the equipment is adequate and that there are no upgrades required. You can think of the grid as a set of water pipes with one hose filling the pipes. If you add a new source of water to the pipes, the volume may be too great, and a pipe may burst under the pressure. In the same way, if the local power grid lacks capacity, it may not be able to take on extra power without some upgrades. Those upgrades may be in any part of the system, such as the power lines, transformers, switches, controls, etc.

It may be necessary to do an Interconnection Study which will identify any impacts that could cause safety or performance issues once the project is connected. If issues are identified, the distribution company and the Energy Team would need to negotiate to settle the costs of system upgrades.

The interaction between the operating energy project and the utility is based on an agreement to receive power based on the specifications for connection. This agreement will span the operational lifetime of the project. It ensures that the project will reserve capacity on the grid to deliver power for the full lifespan of the project at peak generation capacity.
Funding Applications and Financial Information

As the project plans become more defined and the specifications of the equipment are established, the engineering teams will be able to calculate projections of energy production/recovery. These figures will provide a way to validate the projections in the Business Case that was presented to lenders earlier in Stage 7.

Identifying funding and financing opportunities can be a major challenge, and even great projects can be put on hold when capital is not available. Investing time and resources in creating a funding and financing strategy for the project will be key. There are numerous funding guides available, with some examples below.

Note that these examples are for federal funding programs, but state/provincial/territorial and even local governments may also have funding available:

- Danish Ministry of Energy, Utilities and Climate https://en.efkm.dk/climate-and-weather/climate-financing/
- Business Finland https://www.businessfinland.fi/en/for-finnish-customers/services/funding/sme/energy-aid/

Some other international funding opportunities also exist:

- The Nordic Investment Bank finances projects in the Nordic and Baltic regions, targeting sustainable growth and clean technologies such as wind power. http://www.nib.int/
- The Nordic Environmental Finance Corporation funds environmental projects in northwest Russia, Belarus, Ukraine and the Baltic countries. http://www.nefco.org/
- Terra Viva Grants Directory http://terravivagrants.org/grant-makers/group-3-climate-change/

Private funding opportunities may also be possible. To gain access to those, a CEC would likely need to work with a lending firm that would match private lenders with projects. Private lending deals often have fewer rules of conduct and CECs should make sure that they work with an experienced business planner to represent their best interests in negotiations. If this is an avenue your community would like to explore, you could get more information from an investment firm that is known to broker financing for capital projects.

Consider talking to other communities that have installed renewable energy projects in your region, about how they have financed their projects. Be very thorough in assessing if a broker is the right fit with your project before committing to any service agreements.

As the project team completes the requirements of any financial lender’s due diligence, it will need to share project plans and documentation with the lender.
Funding Outcomes

The ACEPI toolkit has guided you through a thorough process of community-driven energy planning and project selection. In this Stage, you should have all the information you need in order to apply for project construction funding. Once the applications are submitted, you will go through the due diligence process if a financier is willing to invest or a grant program has selected your project for funding.

If your funding application is approved:
Congratulations! Now you can keep moving forward through implementation. If your application is not approved, the process is not over.

Funding Applications May Need to Be Resubmitted

If your application is not approved the first time, look back to your community for inspiration and a renewed sense of determination. Look back to the Community Vision Statement and see the forward-thinking views of the community, then seek to understand the weaknesses in your funding applications and improve it for a more successful attempt.

Engage the Energy Team to collaborate to improve the application and try to get feedback from the funding reviewers to understand why a project funding application was not approved.

While going through the steps in the funding process for major capital projects, try to organize smaller community projects focused on energy education and home energy efficiency. By getting your community involved and continuing the dialogue with your community around energy, you will be keeping them informed and motivated to support the larger projects that are in process but not yet started.

Land Agreements

When an energy project involves building new infrastructure, like a wind turbine or solar array, it will likely be planned on lands which are not already developed. These types of projects require land rights, which provide access and permission for the project team to build and operate a project. Because of the diversity of regulation, policy and practice across different regions, you will need to investigate what the requirements for land use agreements are necessary for your project. This section describes the process and documents which may apply to your process, in case they are a requirement in some form.

A Land Option Agreement describes a project, and the land to be used if the project progresses to construction and operations. It is created when the owner(s) of a project want to build on lands on which they do not have legal rights to build.

The Land Option Agreement will cover the period needed for assessing resources, getting the permits and designing the facility. If the Option is exercised, it commits the parties to land rights and payments. The Land Option Agreements are written by, or in collaboration with, a real estate lawyer to protect the rights of everyone involved. Options to lease are used to help the developer determine if the site
is viable before committing long-term. Indigenous traditional lands, title and treaties need to be reflected in any land agreement with due regard for Indigenous rights to land decisions. A fair and substantive agreement for the use of the land needs to be discussed with Indigenous communities.

The process and timing for obtaining Land Option Agreements is summarized below:

<table>
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<tr>
<th>Activity/Milestone</th>
<th>When to Complete</th>
<th>Responsible Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of proposed project lands</td>
<td>In Stage 5, when the energy assessments take place, and in Stage 6, when the proposed location is established based on preliminary project design.</td>
<td>The CEC and Community can propose lands for the energy assessment</td>
</tr>
<tr>
<td>Initial consultation with landowners</td>
<td>In Stage 6, as plans develop towards achieving Community Energy Goals, the landowners should be consulted early and often so that they are involved in the process and more likely to accept the terms of the Land Option Agreement.</td>
<td>PM Partner</td>
</tr>
<tr>
<td>Preparation of the Land Option Agreement</td>
<td>The draft Land Option Agreement can be created and opened for negotiation as soon as a clear project plan is defined in Stage 6.</td>
<td>Real Estate Lawyer</td>
</tr>
<tr>
<td>Legal description of the project</td>
<td>In Stage 7, with the creation of the detailed feasibility study and business case. A more concise, legal description may be created by the Real Estate Lawyer.</td>
<td>Real Estate Lawyer</td>
</tr>
<tr>
<td>Signed Land Option Agreement</td>
<td>The final Land Option Agreement, signed by landowners, will likely need to be in place before finalizing any financing agreements.</td>
<td>Project Manager and a community member with signing authority for the project.</td>
</tr>
</tbody>
</table>

Table 19. Process and Timing for Obtaining a Land Agreement
The CEC can collaborate in the following ways:

- Identify the legal land descriptions for the proposed project site. The project lands may cover multiple land parcels which could be held by different owners. A land registry office (or equivalent, outside of Canada) will have maps of the area and display identification numbers or codes for each land parcel. The ownership information for each land parcel can be found as well, which will be the named party on the Land Option Agreement. If possible, make copies of these documents to form part of the project file that will be used by the Real Estate Lawyer and the project planning team.

- In collaboration with the Project Manager, create:
  - A legal description of the project; and
  - A total duration for the land rights to exist, which would include, at a minimum: site preparation, construction, and operations.
  - A proposal/presentation to present the project, propose a Land Option Agreement and negotiate a cost to secure land rights for the project.

**Land Leases**

Once the project permits have been received, the lending agreements are finalized, and the project team has decided to move forward with construction, the next step is to exercise the Land Option and enter into a lease for the project lands.

The details of the lease may be updated to reflect the final location of the project in the Lease Agreement, but most of the details in the contract would have been in place when the Land Option Agreement was created earlier.

The Lease Agreement typically starts on the first day of construction of the project and will become a key document for building permits and insurance.

**Procurement of Equipment and Construction Services**

The PM Partner will be responsible for selecting the suppliers of services in the construction of the facility. The CEC can encourage local participation and employment during the implementation stage of the project by getting a full list of services required for the project construction phase and sharing this list with the community.

While it is advisable for the CEC to encourage local participation, the PM Partner should run a competitive process to ensure that the project stays on budget and that the services are provided by qualified individuals.
In addition to negotiating service contracts, the PM Partner will work collaboratively with the CEC to complete the procurement process for the project equipment.

**Engineering and Design**

While the environmental and interconnection permitting is underway and once the final equipment for the project has been finalized, the engineering process can begin for the installation of the equipment and infrastructure.

Typically, there are several streams of engineering design that run in parallel during development of a renewable energy project:

- **Civil Engineering** designs for the access roads, project site grading and installation areas of the project site.
- **Electrical Engineering** for the infrastructure (power lines, transformers, switches, etc.) connecting the power generators to the grid.
- **Structural Engineering** for the foundations of any large installation of wind turbines, for example.
| **CIVIL ENGINEERING** |
| Design of the access roads, staging areas and water crossings |
| • A survey of the current landscape at the project location |
| • Coordinates for the final placement of equipment |
| • Specifications of the equipment and information about how they will be transported to the project site |
| • A list of constraints and commitments made in the environmental permitting process (e.g. areas for protection beyond standard measures) |
| • The Electrical Engineering plans are required to ensure that the transportation of the equipment to the site is possible without impeding the delivery of oversized components. |

| **ELECTRICAL ENGINEERING** |
| Design of electrical infrastructure connecting the generators to the grid |
| • A survey of the current landscape at the project location |
| • Coordinates for the final placement of equipment |
| • A list of constraints and commitments made in the environmental permitting process (e.g. areas for protection beyond standard measures) |
| • Specifications for the equipment being installed |
| • Specifications for the connection equipment which will receive power to the grid |
| • Coordination with the Civil Engineering plans to avoid placing electrical infrastructure (e.g. overhead wires) in a way that will impede the delivery of oversized items to the project site. |

| **STRUCTURAL ENGINEERING** |
| Design of the foundations for the equipment |
| • A survey of the current landscape at the project location |
| • Coordinates for the final placement of equipment |
| • A list of constraints and commitments made in the environmental permitting process (e.g. areas for protection beyond standard measures) |
| • Specifications for the equipment being installed |

As this list demonstrates, the designs for the facility rely on common information and collaboration during the design process. The PM Partner is responsible for ensuring that the engineering teams collaborate to ensure that the permitting, construction and operation of the project proceeds with minimal delays.

In addition, the project team will act as a liaison between the engineering teams and the agencies which will be issuing permits for the construction of the infrastructure.
In order to provide equipment and supplies for the construction of a project, transportation issues must be considered. Equipment and materials may be sourced from the local area, or may be shipped across the world, depending on the design and procurement decisions for the specific project. In remote areas, all manner of transportation methods should be considered in the development of a transportation plan.

To analyze the feasibility of a route, it will need to be inspected to ensure that the dimensions and features of the route will allow the vehicles and their loads to pass through without damage to them on the route. The other factor is the cost of transportation, which is why multiple delivery scenarios should be considered.

Points to consider:

- **Turn radii** - when the project equipment is longer than usual, such as wind turbine components or large cranes.

- **Road conditions** - when the condition of the road means it may not be safe for the proposed loads to travel over them, without risking damage to the roads or the load.

- **Weather restrictions** - where there are seasonal travel restrictions, the planning schedule may or may not allow for these delays. The owner of the local roads (usually a municipality or community) may have load weight restrictions on the roads to avoid damage during spring thaws.

Some regions may require that oversized loads apply for permits for transportation.
Ongoing Community Engagement

Throughout the development process, the project details will be refined and the final specifications will emerge as the process moves forward. As these decisions are made and the project details become more defined, it is important to keep engaging with the community, so community members can stay informed and continue to have the opportunity to ask questions.

Consider some key milestones in the development process when you could provide updates to the community:

**Following the completion of Land Option Agreements**: to inform the community of the potential project location. Some preliminary illustrations of the finished project would be a strong tool to help the community visualize the project in place, with other landmarks visible to give context.

**Following the completion of the Environmental Impact Studies** which form part of the environmental permitting process. This will show the community that the project team understands the potential impacts, and will demonstrate how the project design will minimize harm to species, habitats, the community, and cultural heritage.

**Following the completion of the preliminary facility design**, to show the community the project plans in their final format, with the understanding that only minor changes will occur after that. The community should also be shown the high-level construction schedule. This would be the time to establish a person on the project team as a liaison between the community and the project team throughout construction and following the completion of the project.

**Following the completion of construction**, to provide the community with an opportunity to learn about the facility in operation mode and to visit the site, if appropriate. Including the community in important project events such as groundbreaking ceremonies, project launch, ribbon cutting and any other culturally significant events.

Transparency throughout the development process is an important factor in the success of any project. It is important for the CEC to maintain a strong relationship with the community by keeping the members informed and engaged throughout the development and implementation of the project.
Construction

The construction phase of the development cycle is the exciting part, when all the hard work and planning come together to become a physical reality.

The scheduling of construction activities comes after the of contractors is complete and the constraints on the delivery and installation of equipment and supplies have been identified. In many remote areas, there may be factors that will keep deliveries from taking place. These could include:

- Access roads which are only passable after the spring thaw and during the summer months for deliveries across land;
- Deliveries by boat may have limitations based on the availability of the boats and suitable weather;
- Pouring of concrete foundations for new installations can only be done at mild temperatures, without the costly use of heaters; or
- Installation of wind turbines cannot be done when the wind speed is high but must be done during times of the year known to experience lower wind speed.

The construction and installation of a new build project will follow different processes depending on the type and design of the project, but generally, most new build projects will follow these stages of construction:

<table>
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<th>Site preparation</th>
<th>Road/access construction</th>
<th>Construction of foundations, bases and supports for equipment</th>
<th>Delivery of equipment and installation</th>
</tr>
</thead>
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<tr>
<td>including earthworks, water crossing construction and environmental protection measures, such as silt fencing</td>
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<td></td>
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</table>

It is important to continue to engage with the community during construction. When members of the community begin to see construction activities, or perhaps become inconvenienced by them because of the noise or temporary traffic delays, their support for the project may waver. It is the CEC’s primary responsibility during construction to keep the community informed of construction updates and to reassure the community that the construction impacts are temporary. Many successful project teams will circulate newsletters, hold informal social gatherings and post updates on social media in order to remain transparent with the community during the construction process.
Inspections and Commissioning

Following the completion and testing of a project, the permitting authorities will inspect the project and operating data to ensure that the project was built to the specifications in the permit and that the project is operating as expected.

Each permitting agency will have its own criteria for inspections, which may be available for the project team to review in advance of the inspection.

Once a project has been inspected and approved for commissioning by all applicable agencies and parties, the commissioning plan can be started. This involves starting the project’s operation and flipping the interconnection switch.

Power generation projects will be equipped with various sensor systems to monitor the conditions and production of the project. This information can typically be monitored remotely and will be the “actuals” that the Business Plan will use to calculate the project’s revenue.

Typically, the commissioning of the project will be accompanied by a community gathering to celebrate the start of operations. This is an excellent opportunity to talk about the successes of the construction phase and show the community pictures from the construction and operations of the facility. Depending on the type of project and insurance restrictions, it may be possible to provide a community tour of the facility.

At the time of commissioning, a new set of activities will begin:

- Post-construction mitigation or studies that were conditions of the permitting process
- Operations & Maintenance activities
- Production data monitoring
Operations & Maintenance

The equipment for any project will have requirements for its safe operation and maintenance. These requirements will be identified by the manufacturer of the equipment and must be followed in order to maintain valid warranties.

Operations typically have scheduled maintenance periods, when servicing on multiple components is coordinated to limit the amount of time that a project is not generating energy. These scheduled maintenance activities are typically undertaken by a technician with specialized training, and they will arrive on site with the materials and equipment needed to perform the maintenance.

In remote areas, it is almost certain that the technicians that will perform the work will need accommodation in the community and will use local services. The project’s operating budget will be funding these costs, but the funds go back into the community, which is a positive point for the community to appreciate.

Other maintenance activities do not require the facility to be shut down, such as snow removal on the access roads of the project lands. There is an opportunity to contract local service providers to do these types of jobs.
STAGE 9
Monitoring, Reviewing and Altering Plans

Image 9-1. A pair of bowhead whale bones under the dancing aurora at the Apex Cemetery, in Iqaluit, Canada. © Bill Williams
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Monitoring, Reviewing and Altering Plans

Introduction

Once the community energy plan has been finalized and projects are being implemented, it’s important to continue to revisit your community energy plan and treat it as a “living document” by making updates and changes as necessary. Monitoring, reviewing and altering plans are important steps for the long-term success of your community energy plan and the projects within it. Without these activities, it’s hard to accurately assess if your community’s vision is being achieved, or to evaluate the project’s performance on social and economic benefits, fossil fuel offsets, GHG emissions reductions, and other key values that are important to your community.

Monitoring is a continuous process that looks at information from a project or process to determine how well it is working and to decide if changes are needed, to improve the project or plan.

Reviewing is a process to identify the current status of the project. Through calculations and comparisons with baseline data, you can determine if the project has met the goals set at the beginning or is on track to meet its long-term goals.

When your community has completed the implementation of a clean energy project, there is a valuable opportunity to finish the CEP by capturing not only the impacts and outcomes of the project, but also the rationale for choosing that specific project, and not the others that were considered.
There are two main paths that need to be considered for monitoring, reviewing and alteration:

1. The clean energy project(s) that your community has implemented; and,
2. The CEP that was created.

Here are some examples of situations that would warrant a review and possible revision to the CEP:

- The community’s energy vision or priorities change;
- The local energy landscape changes due to external factors, such as the cost of imports into the community;
- Different opportunities arise; for example, a new funding opportunity becomes available for a project that was not contemplated in the original CEP;
- A new technology comes to market which could make a less-feasible project opportunity more appealing;
- Community leadership, community programs, or local planning policies change and there is a change in the level of interest in clean energy projects and initiatives.

Many other situations like these could prompt a review and possible revision of the CEP. So how do you get the community engaged in the CEP once again? What are the desired outcomes of this effort? We discuss these and other questions in this stage, as well as strategies for updating a CEP to reflect new realities in the local energy landscape.

What if your community did not implement a clean energy project as part of the CEP? It could be that none of the recommendations were possible to implement when Stage 6 activities were assessed – due to a lack of local capacity, funding, human resources, etc. In this case, a revision of the CEP could be a valuable tool to revisit the realities of the findings with the community and identify opportunities better matched with the resources available.

For communities which have implemented a clean energy project, what if the monitoring and review show that the project is not achieving the results you had planned? Then it is time to alter plans. In the development of the project, plans were made using the information on hand at the time. Through the implementation of the project, the actual site conditions and equipment performance is tested. If the performance of the project is not within the expected ranges, then it is time to look at altering the plans. In this stage, we consider how this works and we provide some tools to evaluate the projects and the Community Engagement & Education Plan and decide upon changes.

Be transparent and share information with the community about the ongoing successes and challenges of your project. Information could be shared at Council meetings, community meetings, on posters or bulletin boards, in newsletters – any way that gets the word out in your community.

The following pages discuss Monitoring, Review and Altering of Plans for a clean energy project. This section is followed by the steps needed to do the same exercise for the CEP itself. If you did not implement a clean energy project, you can skip forward to page 339.
Monitoring, Reviewing and Altering Plans for Clean Energy Projects and Initiatives

Designing the Monitoring and Review Process

How do you know whether the project or initiative you implemented has had the intended impact? In Stages 4 and 5, the community identified some of the issues in the community related to energy, then investigated how these could be measured to determine a baseline. Now that the project is done, the Energy Team should collect the same kinds of data and compare the information to see if the project achieved the intended change. For example, if the project addressed home heating costs, then you would have records on the costs of home heating, and perhaps the average temperatures in the home.

The table on the following page provides some examples of the information you might have gathered during the ACEPI toolkit, and how the information supports each of the stages in the process.
<table>
<thead>
<tr>
<th>Information Gathered</th>
<th>Source</th>
<th>Examples</th>
<th>What happens with this information</th>
</tr>
</thead>
</table>
| Through Community engagement, the Energy Team determined the needs of the community and what needs should be focused on. | Stages 3 & 4: Feedback from the Community | • homes in the community are difficult to heat because they are drafty  
• people spend a lot of money heating their homes  
• the community relies entirely on diesel and this has negative cost and environmental impacts | These concerns and focus points inform the Energy Team about what is important to the community and what possible solutions to investigate in the pre-feasibility assessments in Stage 5. |
| Information about the pre-implementation state is collected and reported. | Stage 5: Community Energy Profile | • average room temperature in homes  
• energy costs  
• volume of fuel consumption | The Energy Team will have collected baseline data and conducted pre-feasibility assessments to offer the community a choice from among the best projects, in Stage 6. |
| Community Energy Goals | Stage 6: Community Energy Goals | • improve the heating in homes  
• reduce the amount of fuel used in the community | The Community Energy Goals will identify what should be improved by implementing the project. This informs the Energy Team about the Key Performance Indicators (KPIs) for the project. |
| Expected performance of projects, impacts and outcomes of implementation. | Stage 7: Feasibility and Production Forecasts | • Homes can be expected to be 3-4 degrees warmer in the winter with the installation of air sealing and insulation.  
• People in the community will save 10-15% on energy bills  
• The community is expected to consume 10% less fossil fuel | This information forms the basis of the Business Case and forecasts the operational values of the KPIs. This data is usually presented in comparison to the baseline data from Stage 5. |
| The results of project monitoring will be compared with the pre-implementation values and this will determine whether the project was performing as designed. | Stage 9: Project Data Review | The community implemented a Solar PV project, which resulted in a 12% reduction in fossil fuel consumption in the community. These findings validate the findings of the feasibility studies | In Stage 9, the actual performance of the project is measured. The results are compared to the baseline KPIs to determine how the project is performing. The results are also compared to the Feasibility KPIs to determine how accurate the Production Models were. |
Monitoring

How you monitor the project will depend on the kind of project. In earlier stages, you would have collected information to support project selection and the business case. This information will direct what should be monitored during operations. The following sub-sections give an overview of the information that could be collected for the different project types found in the Energy Project Pyramid. There are four types of measurements to be considered: Community Impacts, Environmental Impacts, Performance & Resources, and Economics.

Environmental Measurements

For a renewable energy project, there may have been environmental impacts to the lands during construction and operations of the project. This information must be gathered by a qualified person trained to conduct post-construction environmental monitoring. The regulations and permitting for the project will outline what needs to be monitored and measured.

The community may also take the lead in conducting its own environmental monitoring, based on traditional knowledge, and involving the community’s knowledge keepers for guidance.

If we consider the example of a wind energy project from the earlier stages, here is what the environmental monitoring might report:

There are 120m² of grasslands that are potential nesting habitat for migratory birds that were used for the construction of the project. The project’s biologists concluded that this change would not cause significant impact to the species, and the environmental permit was issued with a requirement to do a post-construction bird study to see if significant impact to the bird population was observed. The project team employed a biologist to do the observations and, based on the post-construction observations, they concluded that the populations were not affected in a significant way. In the permitting application, the project biologists identified some mitigation strategies that could be done if the post-construction surveys showed impact.
Performance and Resource Measurements

Renewable Energy

How much energy has your project produced? The project’s software monitoring system will provide this information. The data is recorded 24 hours a day and data points are recorded at regular intervals, e.g. a wind project’s resource monitoring system may record a measurement every 10 minutes. The production data is measured at the interconnection point where the power generated enters the local energy system. This will account for any energy losses through the equipment (such as line loss, which is the loss of current while it passes through power lines), and factor that into the readings.

Equipment monitoring systems on a project site should be connected to more than one power source. In a power generation project, they could be tied into the internal distribution lines to draw power from the project before it connects to the interconnection point, or they may run on an independent solar-powered system with storage batteries. No matter how the project’s monitoring systems are powered, it is important to have a source of back-up power available at all times so that, if there is a problem, the monitoring system can stay powered. A key feature of many equipment monitoring systems is an alert function that will notify the operators if there is a malfunction.

The information the monitoring systems provide will depend on the type of project and the kind of information you need. Information needs commonly include:

- Power generated: monthly, weekly, daily, and hourly
- Weather conditions, on an hourly basis
- System performance

For example, for a solar PV project, the information will be used to answer questions like these:

- How much direct sun was there at the project site over a specific period? Knowing this, what production could have been expected?
- What amount of power did the project actually generate?
- Did the production estimate and the actual measurement come close to each other?
- What possible causes could be impacting production (e.g. snow cover in the winter)?

The data can tell the project team a lot about the performance of the project and the way that site conditions and Operations & Maintenance affect performance.

The information gathered by the monitoring system can be stored at the project site within the system and can also be transmitted to project staff by telecommunication lines like DSL, cable, mobile phone networks, or satellite phone systems. The option you choose will depend on your project needs and any design requirements from the utility, safety regulators, and financiers, who may require a certain standard for system monitoring and communications.
Upgrades & Retrofits

For upgrade and retrofit projects, the Key Performance Indicators (KPIs) will focus on the energy efficiency of individual buildings. Beyond energy efficiency, there are also other benefits that can result when upgrades and retrofits are carried out. If these side benefits were part of the community energy goals, then they should also be measured at this stage. For example, in an air sealing project in a home, one of the main benefits is lower heating costs, and a side benefit of the work could also be that the air is less humid and mould is eliminated.

In these projects, energy consumption is the central KPI, where the energy consumption before and after the upgrade or retrofit is measured and compared. The monitoring equipment for this kind of analysis will vary depending on the kind of project but, as an example, power monitors can be installed on wall outlets to measure the power consumption of an appliance over a set period. Monitoring this data on old and new equipment can show you the difference in the amount of power saved as a result of the retrofit. This kind of monitoring can be more precise than looking at the entire household power bill, because there are a wide variety of power uses over a month and the source of any energy savings may not be obvious.

For heat energy upgrades, you may be monitoring the air temperature in the home, the consumption of power or fuel by the heating system and the utility bills for that period.

For building energy cost comparisons, the power bills for the upgraded buildings in the community should be examined for a set period at the same time of year the baseline data was collected.

Conservation and Education Initiatives

If your project involves conservation and energy efficiency education initiatives, then the KPIs for these can be measured before and after, and then compared. Here is an example of an initiative that involves the community taking on a challenge to conserve energy:

1. The community identified, in Stage 3&4, that many people don’t know very much about the effectiveness of conserving energy through simple home improvements like caulking around windows and doors to limit drafts, switching incandescent light bulbs to LED, and adding plastic film to windows during the winter.

2. The conservation initiative involved a Community Challenge to residents to make three small changes and see if their heating costs went down. Over four weeks, the CEC set up a booth at the arena with hands-on demonstrations about how to do some of the improvements, and gave people in the community a chance to try it out before doing it themselves at home.

3. The community members that took on the challenge and completed three improvements were congratulated in the community newsletter and became subject matter experts for other people in the community, so that friends and neighbours could see their homes and then learn how to do it for themselves.

In this example, some of the KPIs could include:

- A reduction in the cost of heating for the homes that were improved, which could be determined by comparing the utility bills for the household;
- A reduction in the amount of electricity consumed in the homes that were improved, which could be measured by comparing the utility bills for the household;
• The people in the community were engaged and chose to participate at the booth – this could be indicated by counting the number of people who visited the booth and inviting them to enter a raffle for a small prize, to keep track of their names;

• The message and ideas about energy conservation were shared around the community – this might be determined by surveying people who hadn’t visited the booth at the arena, to find out if they had heard about the challenge;

• There were at least five households that made the suggested improvements – after asking booth visitors if the CEC could follow up with them at a later date, the CEC could visit homes and find out what improvements they had done;

• The CEC was able to do some follow-up visits with the participants at their homes to see the work they had done.

The KPIs for your initiative could be similar or different, depending on what you are hoping to gain from the investment of time and resources.

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**Economic Measurements**

The economic measurements for the project will address the same questions you covered for the Economic Feasibility study in Stage 7, in developing the business case. The information required for those studies would depend on the project, so look back to your business case and collect the same set of information using actual operations data instead of projected data.

For renewable energy projects, the pro forma statement will be updated with actual figures and the economic projections will be adjusted based on the results. This information will likely be part of the reporting on the project, to maintain good standing in the contracts with regulators and lenders.
Reviewing

In the Reviewing activities, the calculations for determining the savings and effectiveness of the project are analyzed. With the information collected in the Monitoring activities, an analysis of the data will determine how successful the project has been in reaching the Community Energy Goals and supporting the Community Energy Vision.

The monitoring and review calculations will go into a report, to inform the community, the local leadership, the Energy Team, partners, and any project lenders about the project’s performance. It will also be used to decide if changes to the project should be considered.

Impact Evaluation

GHG offsets

A KPI for almost all clean energy projects should be the offset and reduction in fossil fuel consumption and GHG emissions. You would have likely collected the consumption data as part of the Community Energy Profile in Stage 5, so now you will collect the same figures for the current consumption, to calculate GHG emission reductions.

The formula for GHG reductions:

\[
\text{Avoided Emissions} = \text{Fuel Volume Reduction} \times \text{CO2 offset value}
\]

Project A feasibility study example:

\[
1,225,725 \text{ litres} \times 2.791 \text{ kg/l} = 3,421 \text{ tonnes of CO2}
\]

Project A project monitoring example:

\[
1,278,695 \text{ litres} \times 2.791 \text{ kg/l} = 3,569 \text{ tonnes of CO2}
\]

actually offset in project operations
Energy Savings

Energy savings and consumption are typically expressed over time (e.g. megawatt-hours of electricity consumed over a year). Energy savings can also be reported by time of use, which has several periods in a year coinciding with utility schedule.

When energy consumers use less over time, this is a reduction of energy demand. This is called demand savings in the context of energy calculations. The first step in determining demand savings is defining the metric of interest:

- **Annual average demand savings:** This is calculated by dividing total annual energy savings by the hours in a year (8,760). You can calculate the average daily demand or monthly demand in the same way. This is termed average is in MW.

- **Peak demand savings:** This involves determining the peak demand reduction during the peak period of time, which could be annually, seasonal, summer or winter days. The term must be clearly defined while reporting it as part of an evaluation.

Therefore, the calculation is:

\[
\text{Demand Savings} = \frac{\text{Energy Savings}}{\text{Time Period of Energy Savings}}
\]

Non-Energy Benefits

These are the identifiable, sometimes unquantified, non-energy impacts from participation or program implementation. These are sometimes referred to as co-benefits or non-energy impacts and may include productivity improvement, environmental benefits, and jobs created. The price stability, and power quality that comes with new energy systems are also often included in this category. Consider consulting a partner or advisor on how best to measure these benefits. They will vary from project to project, and each community will have different methods for measurement.

Other important benefits of clean energy projects are socio-economic benefits, like jobs for people in the community. Some jobs are created directly within the project implementation, but there can be broader impacts too. By looking at the workforce in the community before and after a project is implemented, you can draw some conclusions about job creation as a result of the project. The following worksheet will give you some ideas of how to account for the jobs in the community before and after a project is implemented.
WORKSHEET 9-1

Job Creation

**DIRECTIONS**
Use this worksheet to compare your community’s employment opportunities before and after the clean energy project was implemented. The Baseline Year would likely be just before the project was started, and the Year of Interest could be any year afterwards when you want to examine how many jobs have been gained as a result of the project. Extra lines are there so you can add in other kinds of jobs beyond the examples shown.

<table>
<thead>
<tr>
<th>OCCUPATION GROUP</th>
<th>FULL-TIME EQUIVALENT JOBS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline Year</td>
</tr>
<tr>
<td>Building Construction</td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
</tr>
<tr>
<td>Plumbing, Heating, and AC Contractors</td>
<td></td>
</tr>
<tr>
<td>Drywall and Insulation Contractors</td>
<td></td>
</tr>
<tr>
<td>Electrical Contractors</td>
<td></td>
</tr>
<tr>
<td>Advertising Services</td>
<td></td>
</tr>
<tr>
<td>Engineering Services, Architectural Services, etc.</td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td></td>
</tr>
<tr>
<td>Office Administrative Services</td>
<td></td>
</tr>
<tr>
<td>All Other Industries</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>
Cost-Effectiveness

Cost-effectiveness is one of the common metrics used to evaluate projects. During the activities in Stages 6 and 7, the Energy team would have developed various forecasts for the project’s performance, with estimates for best-case and worst-case scenarios. During actual operations, the cost-effectiveness of a project can be determined by asking: Has the project’s performance led to the expected cost-savings for the community?

To answer that question, the Energy Team needs to determine if the performance of the project has affected the energy costs of the community, then compare that to the pre-project costs. Essentially, they will be calculating a new Levelized Cost of Energy (LCOE) for the community, based on the new combination of energy sources.

The LCOE could be for a specific fuel type, but the Energy Team can determine a combined LCOE for the community taking into consideration the Community Energy Profile data.

The Community Energy Profile can now be updated as well to reflect the changes as a result of the project.

Cost-effectiveness asks whether something was “worth it”, in the simplest terms. It is possible to put numbers and measurements to the project, but in addition to the economics of a project, it is extremely important that you help your community embrace and celebrate the non-monetary benefits of a project, such as:

- Pride in the community’s accomplishment of completing a project;
- Improved energy independence and resilience;
- Growth of local knowledge about energy;
- Knowledge and confidence in making and managing decisions about energy;
- Cleaner air and water from less fossil fuel usage;
- ...and the list goes on.

It is the CEC’s role to guide the community through the calculations of the project performance, and through the recognition and celebration of other community benefits as well.
Reporting Evaluated Savings

The following is a sample report outline for an evaluated savings report:

- Executive Summary
- Introduction
  - Overview of the Project
  - Report Structure
  - Evaluation Objectives
- Study Methodology
  - Data Collection
  - Analysis Methods
  - Limitations and Assumptions
- Metrics and Key Evaluation Results
- Recommendations
- Summary and Conclusion
- Appendices – data which supports the calculations and evaluations

In the following outline for a Monitoring Plan, sample data is shown to illustrate how this process could be applied to projects.

Monitoring Plan Outline using an example for Window Upgrades

1. **Define the evaluation objectives, scale and time frame**
   
The basic objective of this evaluation is to measure the cost effectiveness and home comfort after installing better windows. Evaluation time period will be one year, to compare the benefit in different seasons.

2. **Decide what needs to be compared and how you can collect that data**
   
   Evaluation methods depend on program objectives. The baseline is a measurement of average energy use and demand without any efficiency program. Because energy savings cannot be directly measured, they must be calculated by comparing energy use and demand after efficiency program implementation with a baseline defined at the start of the program.

   - Electricity Cost
   - Heating Cost
   - Air conditioning usage
   - Ambient indoor temperature
   - Home Comfort
3. **Design and conduct data collection and analysis.**

Decide how you can collect data that will allow your analysis to follow best practices for experiments. The data should be consistent in collection duration and measurement methods and the analysis of results should follow industry standards. Below is a table with some examples of the KPI’s for upgrading windows, and how that data could be collected:

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity Cost ($)</td>
<td>Average electricity cost is recorded in $/kWh. Data can be obtained from monthly utility bills</td>
</tr>
<tr>
<td>Heating Cost ($)</td>
<td>Average heating cost is recorded in $/litres or $/gallon or $/kWh and consumption can be obtained from utility bills</td>
</tr>
<tr>
<td>Ambient indoor temperature (°C)</td>
<td>With a temperature monitor, measure the room temperature in the building.</td>
</tr>
<tr>
<td>Home Comfort (rating /10)</td>
<td>Participant questionnaire</td>
</tr>
</tbody>
</table>

*Table 20.* Example KPI’s for upgrading windows.
4. **Determine benefits.**
   Gross savings represent the changes in energy use and demand that result from program activities. Co-benefits may include:
   - avoided greenhouse gas emissions and other environmental benefits,
   - energy price effects,
   - economic impacts such as job creation and increases in income,
   - non-energy benefits to program participants.

For our window project example, we would compare the operational measurements with the data from the baseline year.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity Cost ($)</td>
<td>$4358</td>
<td>$4189</td>
<td>4% reduction</td>
</tr>
<tr>
<td>Heating Cost ($)</td>
<td>$1748</td>
<td>$1156</td>
<td>34% reduction</td>
</tr>
<tr>
<td>Ambient indoor temperature (°C)</td>
<td>17°C</td>
<td>18.5°C</td>
<td>1.5°C increase</td>
</tr>
<tr>
<td>Home Comfort (__/10)</td>
<td>6</td>
<td>8</td>
<td>20% improvement</td>
</tr>
</tbody>
</table>

*Table 21. Comparing project projections vs actuals*
Altering Plans

With the completion of the Reviewing steps, you will need to determine whether the project has met its goals, and whether or not you need to alter the project plans. It is not a failure of the project to alter plans during operation, but instead it demonstrates that the Energy Team is working to achieve the best project operation, for the benefit of the community.

Here are examples of findings in the data review which could lead to an alteration of project plans:

- The project’s impact on the environment is greater than the permitted impacts.
  E.g. A wind farm which had evidence of higher bird mortality than is within permit limits may need to alter its production schedule. It may need to operate less often during active bird migration periods.

- Higher-than-expected savings for upgrades and retrofitted heating appliance.
  E.g. A home which received air sealing, new insulation and an upgraded heating appliance has reduced consumption of heating fuel by more than anticipated. This is increasing the desire and motivation for faster expansion of the project within the community, before the end of the monitoring period.

- Operations & Maintenance Plan Alterations
  E.g. A solar PV project was found to have suffered from ice buildup around one of the components. The project’s O&M technician devised a plan to make a shield for the component, to block ice formation and enable the part to function. The plan was submitted to the manufacturer to check that using it would not affect warranty coverage, then the technician proceeded to install the shield.

- Unexpected consequences and impacts.

  For example:
  - The sound of the solar power inverters is impacting the people who work in the building next to the new generating equipment. This has led to recommendations to improve sound insulation in the building to mitigate the issue.
  - Energy conservation engagement with youth at the school has led to a decline in community-wide electricity consumption. The students have become energy savings ambassadors and teach their families energy conservation habits. The impact exceeded expectations and indicates that the investment in the program should be renewed in future.

Regardless of the findings of the Monitoring and Review of the project, the Energy Team should communicate the findings to the community to ensure that they are informed and have an opportunity to contribute their opinions to the future planning efforts.

The ACEPI framework will begin again, after a period of time, when the community is ready to re-assess its needs and examine further opportunities for clean energy.
Monitoring, Reviewing and Altering your Community Energy Plan (CEP)

In addition to monitoring and evaluating the individual projects and initiatives in the ACEPI framework, you will also want to monitor the CEP itself. Is the CEP moving the community towards its vision? Have the local impacts of climate change and resulting risks occurred as expected, or are they different somehow?

Once adopted, the CEP should be treated as a “living document”. It is important to:

- Establish how often the plan will be updated (e.g., every 1, 2, 3, or 5 years)

<table>
<thead>
<tr>
<th>Update the plan when:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Energy projects listed in the original energy plan have been completed;</td>
</tr>
<tr>
<td>• The community’s population grows or shrinks;</td>
</tr>
<tr>
<td>• Overall energy demand and supply shifts.</td>
</tr>
</tbody>
</table>

Refer to the plan when selecting an energy project or program and measuring success

Use the plan to reflect and verify that projects are moving the community closer to its stated vision and goals.

Once every six or seven years, it is important to go through the CEP process all over again. This doesn’t necessarily mean going all the way back to re-doing the vision, because this vision was created with many different community members and represents people’s long-term hopes and dreams for the community. Reflect on the community values and vision and bring these back to the community’s attention as you engage in the planning process again, so that it remains a focus.

As you re-do the CEP you can re-visit many of the activities in Stages 1 to 6. Look at the impacts of changes in your community, whether those changes are environmental, political, social or economic. Re-convene the Energy Team, which may change in membership. Challenge the Energy Team and the community to see if any local impacts and associated community vulnerabilities or weak points are new, have changed, or are different than was expected. This information will affect the CEP process, as it did during the first phase of planning, by pointing you towards solutions that address many areas of sustainability.

Sustained community energy planning fosters community interest and understanding of the energy landscape. It can help identify how a community relates to the energy landscape and, more importantly, can work to prioritize projects that move the community toward its sustainable energy vision and goals.
APPENDIX

References, Resource Credits, Figures & Tables
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21. Colville Lake Solar-Hybrid Project


26. Comprehensive Community Planning (CCP)
   Website http://www.comprehensivecommunityplanning.org


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82. Wind Energy Foundation Glossary http://windenergyfoundation.org/about-wind-energy/glossary/


Resource Credits

* Please note that any collateral not listed below was developed by Lumos Energy for the ACEPI Toolkit

1. Key Factors of Successful Community Engagement  
   Stage 3  
   Alberta Energy Regulator Stakeholder Engagement Framework, Page 12  

2. Responsibilities of the Energy Team and Community during Community Engagement  
   Stage 3  
   Guiding Principles for Community Engagement; City of Guelph  
   https://guelph.ca/city-hall/communicate/community-engagement/

3. Barriers and Solutions for Community Engagement  
   Stage 3  

4. Sample Community Engagement Planning Workshop Agenda  
   Stage 3  
   20/20 Catalyst Program  
   www.2020catalystprogram.com

5. Worksheet 3-2: Identifying Community Group Priority for Community Engagement Planning  
   Stage 3  
   District Energy Stakeholder Engagement Guide; Page 31  

6. Worksheet 3-3: Community Engagement Strategy Development  
   Stage 3  
   District Energy Stakeholder Engagement Guide; Page 34  

7. Community Engagement Tools by Category  
   Stage 3  
   Based on content in part from: Economic Development Through Transformative Community Energy Planning Table 1 starting on Pg.11  

8. Worksheet 3-4: Impact/Feasibility Matrix  
   Stage 3  
   District Energy Stakeholder Engagement Guide; Page 33  

9. Community Feedback Grid  
   Stage 3  
   IBM Design Thinking Field Guide Feedback Grid; Pages 44 & 45  

10. Questions about Clean Energy Careers  
    Stage 3  
    https://www.energy.gov/eere/education/clean-energy-jobs-and-planning

11. Activity Guide 3-1: Playing with Energy  
    Stage 3  
    EnerAction Lesson #1, by GreenLearning Canada Foundation  

    Stage 3  
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16. Turning Issues into Goals  
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17. Activity Guide 4-1: Value Cards  
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Stage 4  
Centre for Community Visions Resource Pack  

20. Activity Guide 4-4: Vision Activities for Kids  
Stage 4  
CIER Guidebook 3: Vulnerability and Community Sustainability, page 10  

21. Worksheet 6-4: SWOT Analysis  
Stage 6  

22. Worksheet 6-5: Project Scoring Forms  
Stage 6  
DOE Guide to Community Energy Strategic Planning; Tool 6.1: Sample Scoring Form for Prioritizing Actions  
https://www.energy.gov/sites/prod/files/2014/05/f16/cesp_tool_6-1_sample_scoring_form_prioritizing_actions.docx

23. Worksheet 6-6: Goals, Objectives and Projects  
Stage 6  

24. Worksheet 7-1: Economic Development Assessment  
Stage 7  
Figures & Tables

Figures

6  Figure 1. Benefits of Community Energy Planning

9  Figure 2. Arctic Community Energy Planning & Implementation Framework

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If you have any questions about the Arctic Community Energy Planning & Implementation Toolkit, please contact us at info@arcticenergytoolkit.com

www.arcticenergytoolkit.com
Clean energy projects create opportunities to improve quality of life for members of off-grid diesel communities, not only by reducing greenhouse gases, but by creating new economic opportunities that offset energy costs, allowing communities to invest in health, wellness, and recreation initiatives.

— Bill Williams, Executive Director of the Nunavut Economic Developers Association

Our community energy plan has helped provide a clear understanding of the challenges associated with diesel electricity generation, heating, housing and more. The energy plan has then helped to provide a vision that can be shared with all. This has been particularly helpful for working with all levels of government and the electricity provider.

— Neil Hawkes, Sustainable Energy Coordinator Nunatsiavut Government

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