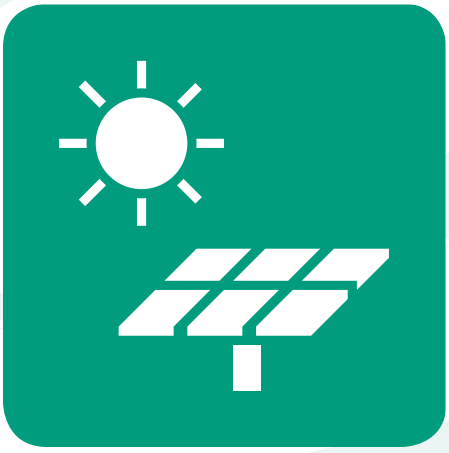


2017/18 Annual Report

ARCTIC ENERGY ALLIANCE

Contents

Table of abbreviations

AEA	Arctic Energy Alliance
EPA	Environmental Protection Agency
EEIP	Energy Efficiency Incentive Program
ERV	Energy recovery ventilator
GNWT	Government of the Northwest Territories
GTC	Gwich'in Tribal Council
HRV	Heat recovery ventilator
NRCan	Natural Resources Canada
NWT	Northwest Territories
REACHE	Responsible Energy Approach for Community Heat and Electricity
ERS	EnerGuide Rating System
WETT	Wood Energy Technology Transfer

Foreword

At the Arctic Energy Alliance—or AEA—we pride ourselves on leading the North in taking action on climate change. And we always enjoy seeing just how eager northerners are to follow that lead.

The AEA is a non-profit organization, and one of the primary services we offer is to provide rebates for northerners who adopt energy-efficient and renewable-energy technologies. From year to year our funding levels often stay very similar, meaning that the total value of the rebates we can give out remains relatively consistent. But we have been noticing a trend: more and more people are applying for our rebates earlier and earlier each year. This tells us that there is a demand; that people want to become more energy efficient and to use renewable energy. They want to save energy and money, and they want to use our services to do so.

And we're happy to oblige.

It's heartening to know that people are responding to the AEA's message more than ever, and I think it shows in the work that we do and that northerners do with us. The clients we worked with in 2017/18 will annually save nearly 2 million litres of oil and more electricity than is used by half the community of Ulukhaktok. And they have reduced their collective carbon footprint by more than 500 tonnes a year.

It has also been fantastic to continue to work with entire communities. For example, thanks to financial contributions from Natural Resources Canada and the Government of the Northwest Territories, we partnered with the Tthets'éhk'é Deli (Jean Marie River) First Nation to make energy-efficiency retrofits to most of the homes in the community. We also continued to partner with communities to install new, efficient, code-compliant wood stoves for residents. And we worked with Aklavik and Fort Providence to implement energy-efficiency measures from their updated community energy plans.

Just as our clients and partners have worked hard to implement their projects related to energy efficiency and renewable energy, so too have our staff. Without them, the programs and projects listed in this report couldn't have happened.

To all of you who continue to make responsible energy use a priority, thank you.

Craig J. Thomas
Interim Executive Director

A February 2017 workshop in Fort Providence to update the community's energy plan. In the 2017/18 fiscal year, we worked with Fort Providence, as well as Aklavik, to implement energy-efficiency measures from their updated plans.

2017/18 at a glance

Since the Arctic Energy Alliance was formed in 1997 our programs have seen plenty of firsts over the years. The 2017/18 fiscal year was no different. This year, for the first time ever, our rebate funding for the Energy Efficiency Incentive Program was fully distributed to successful applicants well before the end of the fiscal year. This resulted in a lengthy waiting list of applicants.

We had a similar situation with our Alternative Energy Technologies Program and our Commercial Energy Conservation and Efficiency Program—although it was not the first time these two programs have been fully subscribed early in the year. In both cases, budgeted rebate funds were fully allocated to pre-approved applicants within the first six months of the year, also resulting in waiting lists.

These results certainly support the fact that the AEA's rebate and incentive programs are becoming more popular, resulting in higher demands on existing budgets. Among our four incentive-based programs, the AEA provided 28 more rebates and $113,000 of incentives more than we did last year.

There was another first this year for the Energy Efficiency Incentive Program, as well as for the Energy Rating Services Support Program. For the first time under the Energy Rating Services Support Program, we gave a score of at least 85 under Natural Resources Canada's EnerGuide Rating System to a home without a renewable energy system. Then under the Energy Efficiency Incentive Program, the same homeowner earned our first rebate for a new or retrofitted home that earned a score of 85 or higher. This was a great achievement for the homeowner and an acknowledgment that energy efficiency in home building and retrofitting is growing and can be achieved in the North.

For the first time since 2015 the AEA operated on a base budget without the influences of supplemental funding from various funding sources. This reduced the number of "special projects" we could initiate and implement. A prime example of this was the absence of large-scale projects that resulted in significant impacts on reducing energy use in the North, such as the 2016/17 LED swap-out project.

The absence of these additional projects, however, doesn't detract from the significant accomplishments achieved this year. Far from it. It's clear that northerners are strongly interested in energy conservation, energy efficiency and renewable energy.

Aside from the firsts, if you look closely at this report, you may notice some other changes compared to our previous reporting structure. For one, the overall numbers below appear lower. Don't let that fool you. We've made some changes in how we present our numbers. And numbers don't always tell the whole story.

For example, we're only reporting seven core public programs this year instead of eight. That's because the Alternative Energy Technologies Program and Community Renewable Energy Program are essentially managed as two facets of the same program, so it makes sense to report on them as one.

Finally, we've changed how we present out incentive numbers in the overall results. Rather than counting funding distributed under special projects (which often is not an incentive, per se), we've decided to present solely the rebates distributed. It's a much simpler way to grasp how northerners are using our programs and services.

For a more in-depth understanding of those programs and services, be sure to read on.

Overall results

Programs and Projects		
Number of core programs		**7**
Number of special projects		**8**
Rebates		
Total rebates	Including Energy Efficiency Incentive Program (EEIP)	876
	Excluding EEIP	61
Total value of rebates	Including EEIP	$641,000
	Excluding EEIP	$414,000
Average rebate	Including EEIP	$700
	Excluding EEIP	$7,000
Payback*		
Total capital cost		$2,534,000
Estimated annual savings		$533,000
Simple payback	Before rebates	4.8 years
	After rebates	3.6 years
Energy Savings		
Estimated annual electricity savings		1,588 MWh
Equivalent to more than half the electricity used in Ulukhaktok every year		
Estimated power demand avoided/produced		544 kW
Equivalent to running ore than 450 dishwashers at the same time (at 1,200 W each)		
Estimated annual oil consumption avoided*		1,971,000 L
Equivalent to more than 12,000 barrels of oil		
Estimated annual gasoline consumption avoided		6,000 L
Equivalent to the amount of gasoline needed to drive 56,000 km in an average passenger vehicle[1]		
Estimated annual propane consumption avoided*		110,000 L
Equivalent to more than eight 13,200-L (3,499 U.S.-gallon) bobtail propane tanker trucks		
Greenhouse Gas Reduction		
Estimated annual greenhouse gases avoided		521 tonnes
Equivalent to taking 112 cars off the road[1]		

**Not counting fuel used for community-level electricity generation.*

[1] *https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator*

Highlights

The following are just a few of the highlights from our programs and projects over the past year.

Programs

Energy Efficiency Incentive Program

Provides rebates on energy-efficient appliances and other products.

- Highest uptake rate ever: for the first time, all allocated funding was distributed, or earmarked for distribution, well before the end of the fiscal year.
- Provided 815 rebates.
- Clients will save nearly 2 million litres of oil a year.

Energy Rating Service Support Program

Provides home energy evaluations.

- Sponsored and provided advice on a house built by Habitat for Humanity that is among the most energy-efficient homes in Yellowknife.
- Evaluated the first house in the NWT to receive a score of at least 85 out of 100 on the EnerGuide Rating System scale without using a renewable energy system; subsequently gave out the AEA's first Energy Efficiency Incentive Program rebate for a home scoring an 85 or above.

Commercial Energy Conservation and Efficiency Program

Provides building energy audits and rebates to NWT businesses to make upgrades to conserve energy and improve their energy efficiency.

- Provided 21 rebates (up 40 percent over last year).
- Annual electricity consumption avoided by all clients' projects combined is nearly equal to three times the annual electricity used in the community of Jean Marie River.
- All allocated funding was distributed or earmarked for distribution before the end of the fiscal year, speaking to the popularity of the program.

Community Government Building Energy Retrofit Program

Provides building energy audits, rebates and project coordination to help community governments across the NWT better manage their energy use.

- Distributed approximately $94,000 in rebates.
- Completed 22 "yardstick" building energy audits and 29 "targeted" building energy audits.
- Energy audits identified more than $400,000 in potential annual savings in five communities.

Alternative Energy Technologies Program

Provides incentives for NWT residents, businesses and community-based organizations to adopt renewable and alternative energy systems, such as solar, wind, wood and more.

- Provided 33 rebates (equal to last year).
- All allocated funding was distributed or earmarked for distribution before the end of the fiscal year, speaking to the popularity of the program.

Biomass Energy Program

Provides northerners with accessible technical advice on existing or potential biomass projects.

- Held Burn It Smart workshops in three communities.
- Supported biomass heating systems in Whati, Aklavik, Katlodeeche and Kakisa.

Regional Offices Program

Allows the AEA to keep a close connection to communities throughout the NWT.

- Regional offices are involved in every program and project the AEA undertakes, and attend trade shows, events and other community engagement activities in every NWT community.

Special projects

Domestic water heating testing

Conducted tests on various domestic water heaters to determine the approximate cost of operation, recovery times and standby losses.

Inuvialuktun terminology development

Designed and created illustrations and communications tools to share the results of an earlier workshop where the AEA had worked with elders and translators to develop new energy-related terminology in the Inuvialuktun language.

Gwich'in Wellness Camp energy assessment

Conducted energy audits on the buildings at the currently inactive camp and produced a detailed report with recommended measures for saving money and reducing greenhouse gas emissions when it reopens.

Community Wood Stove Project

Worked with two partner communities to install 29 safe, efficient wood stoves for residents and deliver 55 more stoves to five communities, to be installed next year.

NWT Smart Energy Communities Project

Worked with the communities of Aklavik and Fort Providence to implement projects stemming from their updated community energy plans.

Home Energy Efficiency Retrofit Project in Jean Marie River

Partnered with the Tthets'éhk'é Deli (Jean Marie River) First Nation to implement low-cost retrofits to participating residents' homes to reduce energy use, costs and greenhouse gas emissions.

Electric bike testing

Began testing and tracking energy usage data from an electric bicycle, and promoting e-bikes as an option for people who would like to commute by bicycle but want the convenience of a powered vehicle.

Studying northern homes for the Canada Mortgage and Housing Corporation

Completed five energy efficiency-related studies and evaluations of housing in Nunavut and Nunavik.

Residents of Jean Marie River sign up for EnerGuide home evaluations under the Home Energy Retrofit Project.

Budget

Source	Amount
Government of the Northwest Territories (GNWT) base/program funding	**$2,740,000**
Base funding for Regional Office Program, staff, offices, etc.	$1,600,000
Alternative Energy Technologies Program*	$300,000
Biomass Energy Program	$90,000
Commercial Energy Conservation and Efficiency Program	$200,000
Community Government Building Energy Retrofit Program	$200,000
Energy Efficiency Incentive Program	$200,000
Energy Rating Services Support Program	$150,000
GNWT supplementary project funding	**$210,000**
Community Wood Stove Project	$150,000
Home Energy Efficiency Project	$60,000
Natural Resources Canada project funding	**$202,200**
Home Energy Efficiency Retrofit Project	$100,000
NWT Smart Energy Communities Project	$102,200
Membership dues	**$277,500**
Government of the Northwest Territories	$150,000
Government of Nunavut	$50,000
GNWT – Crown Corporations	$67,500
Other	$10,000
Other source income	**$131,000**
TOTAL	**$3,560,700**

** Includes Community Renewable Energy Program*

Note that for incentive-based programs, the amount includes funding for both rebates and operations. Those programs are the Energy Efficiency Incentive Program, Commercial Energy Conservation and Efficiency Program, Community Government Building Energy Retrofit Program, and Alternative Energy Technologies Program.

Introduction

About the Arctic Energy Alliance

The Arctic Energy Alliance (AEA) is a not-for-profit society, based in the Northwest Territories (NWT), that helps northerners find ways to conserve energy, become more energy-efficient, and adopt alternative and renewable sources of energy. All of this leads toward reducing the North's carbon footprint, while saving our clients some money in the process.

The AEA was formed in 1997 to consolidate the activities of several organizations with an interest in energy. The intent was to eliminate duplication and overlap between the various departments and agencies, to provide a single point of contact for the public, and to allow for a more coordinated approach to public education and the delivery of energy conservation services.

Over the past 21 years, the scope of our work has grown substantially. Today, we help residents, businesses, non-profit organizations, community governments and Indigenous governments all across the North to lower energy costs, improve building efficiencies and comfort, reduce greenhouse gas emissions, and more. We have become the leading northern organization in bringing together communities, consumers, producers, regulators and policymakers to reduce the cost and environmental impacts of energy use in the NWT.

With our head office in Yellowknife, five regional offices across the Northwest Territories and 20 staff members, we touch every community in the NWT. Over the past several years, we've also expanded our reach into Nunavut, doing projects there at the request of the Government of Nunavut through their board membership.

Thanks to generous funding from the governments of the Northwest Territories, Canada and Nunavut, we offer a suite of core programs focused on energy efficiency and conservation, building evaluations, and alternative and renewable energy sources. We also conduct a suite of energy-related special projects, devised by AEA staff, which are typically more short-term in nature.

This report highlights our programs and projects from the 2017/18 fiscal year, including their results, so our readers can see the impact we have made.

AEA staff presenting to delegates at the Northwest Territories Association of Communities annual general meeting.

Charting our course

An overview of our strategic plan

The Arctic Energy Alliance's strategic plan shapes where we want to go and what we want to achieve as an organization. It defines everything we do. So understanding the core of our strategic plan—our vision, mission, goals, objectives and values—will provide context on the programs and projects we do and the results we achieve.

Our vision: *our ultimate goal*

NWT society will become a global leader in clean, efficient, sustainable energy practices.

Our mission: *why we exist*

To promote and facilitate the adoption of efficient and renewable energy practices by all members of NWT society.

Our goals: *what we will achieve*

1. Members of NWT society will know more about the costs and environmental impacts of their energy use.
2. Members of NWT society will want to reduce costs and environmental impacts of their energy use.
3. Members of NWT society will adopt efficient, renewable and carbon-neutral energy practices.
4. Members of NWT society will know the Arctic Energy Alliance as the best place to go when they want to adopt efficient, renewable and carbon-neutral energy practices.
5. Members of NWT society will achieve significant reductions in the costs and environmental impacts of their energy use.
6. Members of NWT society will be celebrated as leaders in efficient, renewable and carbon-neutral energy practices.

Our objectives: *how we will achieve our goals*

1. **Provide services that cover all energy sectors of NWT society:** To expand programs to ensure all sectors of NWT energy use are covered; ensure complete coverage outside of Yellowknife and expand coverage of industry and transportation.
2. **Learn continuously:** To increase Arctic Energy Alliance's own capacity as the "go-to place" for efficient, renewable and carbon-neutral energy practices in the NWT.
3. **Inform:** To provide top-quality information and advice on efficient, renewable and carbon-neutral energy practices accessible to all members of NWT society.
4. **Motivate and support an increasing number of clients to act:**
   a. *Identify and remove barriers*: To identify and work with our partners to remove barriers to the adoption of efficient, renewable and carbon-neutral energy practices.
   b. *Analyze costs and benefits*: To enable the delivery of top-quality energy audits and pre-feasibility studies to those who are contemplating taking action in NWT society.
   c. *Provide incentives*: To research, design and provide effective incentives (financial and other) that motivate NWT society to adopt efficient, renewable and carbon-neutral energy practices.
   d. *Advise on policies and regulations*: To research and advise our partners on effective policies and regulations that would motivate NWT society to adopt efficient, renewable and carbon-neutral energy practices.

e. *Prompt and follow-up with clients*: To encourage NWT society to adopt efficient, renewable and carbon-neutral energy practices.

f. *Champion and recognize success*: To work with and monitor specific clients as "case studies" to efficient, renewable and carbon-neutral energy practices.

5. **Integrate:** To transfer established efficient, renewable and carbon-neutral energy practices into the institutions of NWT society.

Our values: *how we operate*

Mutual respect

We show genuine concern for each other, our clients and others, treating them with understanding and appreciation through fairness, equality and healthy dialogue. We listen carefully to what people say, remain open to all suggestions and questions, and respect others' points of view.

Service and partnership

We believe that the most important way to achieve our vision is through partnerships. We view all our clients as potential partners and are dedicated to ensuring they get top-quality service.

Learning

We are committed to continuous improvement. We build on good ideas, learn from our experiences and challenge ourselves and the status quo.

Results

We have a clear vision of where we're going and how to get there. We focus our resources to achieve our objectives.

Honesty and integrity

We say what we believe and we lead by example.

Positive work environment

We take pride in our professional work ethic, our "can-do" attitude and our informal and flexible work environment. We recognize a job well done.

High-quality work

We are dedicated to detail. We strive to provide top-quality and unbiased advice, based on solid, science-based research. We review each other's work to make sure we get things right.

Conducting a mid-construction evaluation of Yellowknife's newest Habitat for Humanity house, which the AEA helped sponsor.

Core programs

A significant amount of the work we do is tied to seven core programs funded by the Government of the Northwest Territories (GNWT) Department of Infrastructure. These programs provide a range of services and support to residents, businesses, community governments, Indigenous governments and non-profit organizations throughout the NWT.

These seven programs can be grouped into three categories: energy efficiency and conservation, renewable and alternative energy, and regional offices.

Energy efficiency and conservation programs

Reducing energy use and using that energy efficiently are the easiest and most cost-effective ways to reduce greenhouse gas emissions and lower energy bills. This is why the AEA has four programs geared toward energy efficiency and conservation across the Northwest Territories.

Energy Efficiency Incentive Program

The Energy Efficiency Incentive Program provides rebates on the purchase of new, energy-efficient appliances and other products, with the goal of reducing energy costs and greenhouse gas emissions by conserving or reducing energy use.

FOR

residents, businesses, non-profit organizations, Indigenous governments, community governments

AEA FUNDING

$200,000 (from GNWT Department of Infrastructure)

Results

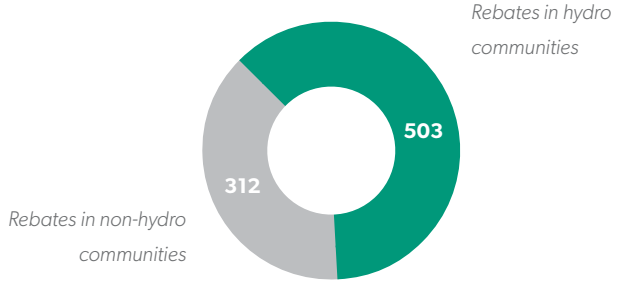
815 total rebates[2]

total value of rebates **$227,000**

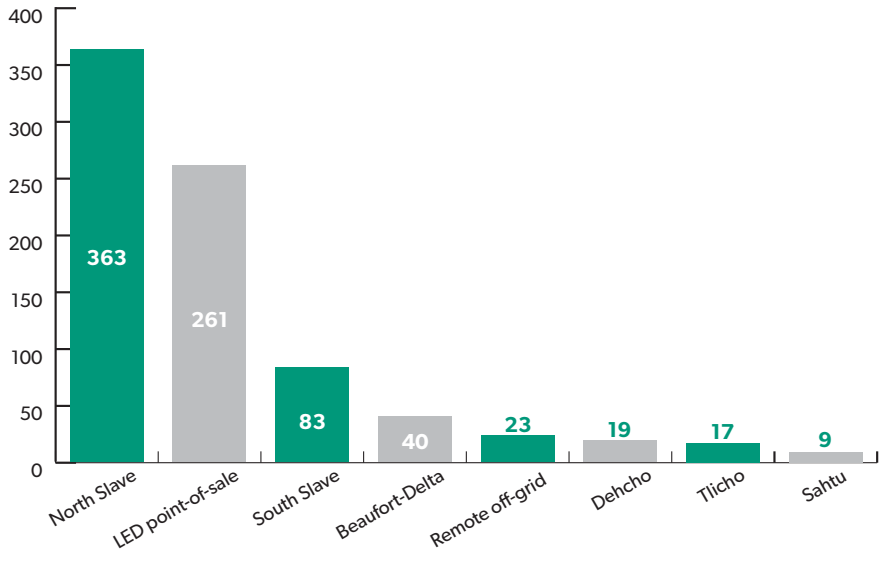
$300
average rebate

The 2017/18 fiscal year marked the program's highest uptake level ever: this was the first time that all allocated funding had been distributed, or earmarked for distribution, well before the end of the fiscal year.

Rebates by region[3]



[2] The LED point-of-sale rebate project is still in its pilot phase (see page 13), and the way these rebates are tracked changed over the course of the fiscal year. The number of rebate cheques issued by the AEA to North West Company stores may not accurately reflect the number of rebates issued by North West Company stores at the checkout. The 261 point-of-sale rebates issued by the AEA represent approximately 1,400 LED bulbs.



Rebates by type

362	LED light bulbs
175	Washers
69	Refrigerators
53	Wood stoves
50	On-demand water heaters
38	Propane furnaces
36	Pellet stoves
9	Programmable thermostats
8	Insulation
8	Propane boilers
3	Air sealing
2	ECM pumps
1	Drain water heat recovery
1	Energy-efficient new home

[3] Point-of sale rebates on LED light bulbs are included in the category for non-hydro communities, but are not broken down by region. See page 13 for more information on these rebates. (Continued next page.)

Payback

Capital cost (all products, before rebates):

$870,000

Estimated annual savings (all products):

$143,000

Simple payback (all products, after rebates):

4.5 years

Greenhouse gas reduction

Greenhouse gases avoided: **235** tonnes

(equivalent to recycling 74 tonnes of waste instead of putting it in a landfill)[4]

Energy savings

Annual electricity consumption avoided:

338,000 kWh

(equivalent to running 644 incandescent light bulbs—at 60 W each—24 hours a day for a year)

Power demand avoided (from LED bulbs only): **68** kW

(equivalent to running 85 toasters at the same time, at 800 W each)

Annual oil consumption avoided: **1,920,000** L

(equivalent to the volume of enough 2-L pop bottles, placed end-to-end, to stretch from Fort Providence to Fort Resolution)

Annual propane consumption avoided: **48,000** L

(equivalent to the volume of more than 900 blue plastic storage totes, at 53 L each)

Partnering to offer instant rebates

Near the end of the 2016/17 fiscal year, the AEA launched a pilot project with the North West Company to offer point-of-sale rebates on LED light bulbs in Northern and NorthMart stores in communities that do not use hydroelectricity. The partnership makes it easier for customers in these communities to purchase energy-saving LED bulbs at more attractive prices by offering instant rebates at the checkout till, rather than requiring them to send in rebate application forms. It also encourages stores to keep these bulbs in stock.

The partnership continued throughout the 2017/18 fiscal year, saving customers more than $3,000 on the cost of the bulbs alone (plus the energy savings from using them). The AEA is now in discussions with the North West Company to offer point-of-sale rebates on ENERGY STAR® certified refrigerators and washing machines as well.

Bill Cameron, from Hay River, who received a rebate for his new high-efficiency furnace.

[3 (cont'd)] Hydro communities are those communities that receive most of their electricity from hydroelectric generators. This includes Behchoko, Dettah, Fort Smith, Hay River, Katlodeeche, Ndilo and Yellowknife. All other communities in the NWT are "non-hydro," which receive most of their electricity from generators that burn fossil fuels.

[4] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Energy Rating Services Support Program

The Energy Rating Services Support Program provides homeowners across the NWT with access to affordable home energy evaluations.

The AEA's registered energy advisors evaluate new and existing homes under licence with Natural Resources Canada (NRCan). Using NRCan's EnerGuide Rating System for homes, the AEA can provide a measure of a home's performance according to a national standard. An evaluation also provides a homeowner with a detailed list of potential upgrades to use less energy.

In addition to conducting home evaluations, the AEA provides free, unbiased home energy efficiency advice to NWT homeowners, and develops working partnerships with contractors and builders to increase their knowledge of building ventilation and envelope air tightness.

Results

85 existing homes

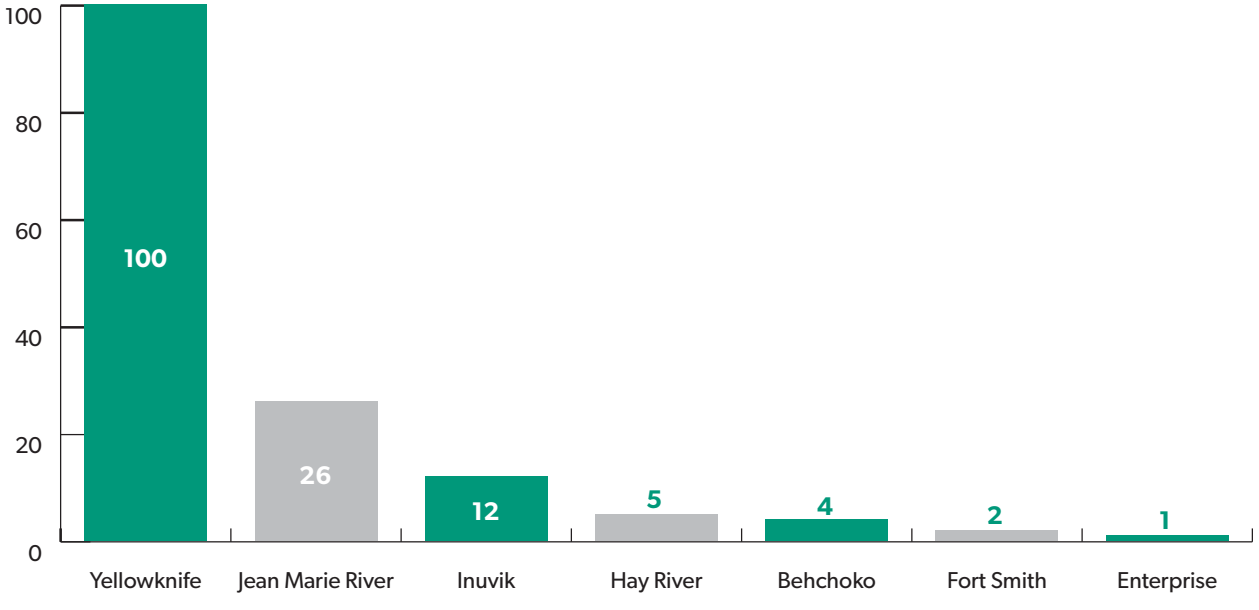
65 new homes

150 total

FOR
residents

AEA FUNDING
$150,000 (from GNWT Department of Infrastructure) + fee for service

Total evaluations by community



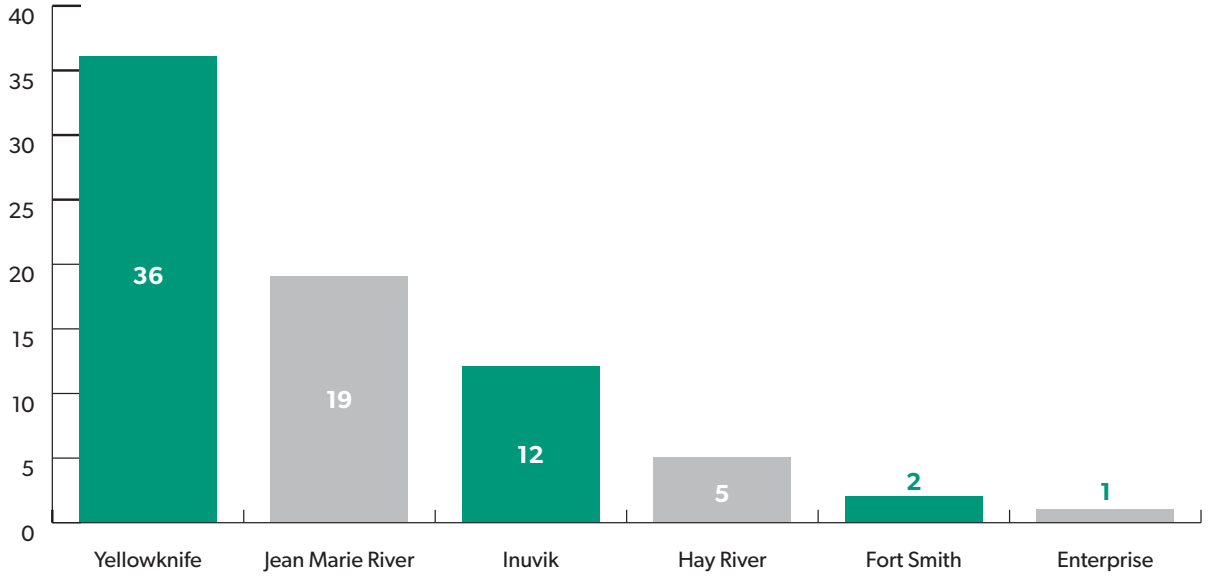
Existing homes

For existing homes, the Arctic Energy Alliance provides two types of evaluations:

- Pre-retrofit: conducted before implementing energy-saving upgrades
- Post-retrofit: conducted after a homeowner implements recommended upgrades

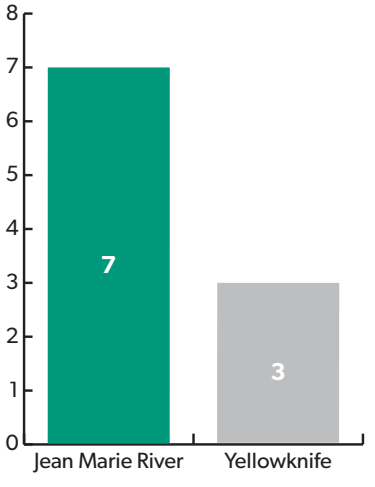
Pre-retrofit evaluations

total pre-retrofit evaluations: **75**



Post-retrofit evaluations

total post-retrofit evaluations: **10**



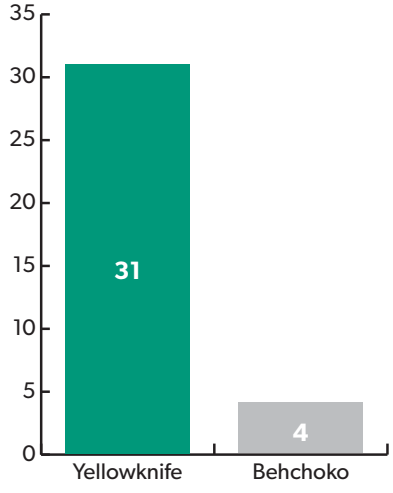
New homes

The AEA provides two types of evaluations for new home construction:

- Blueprint: conducted using building plans to calculate the expected energy use of a new home
- New home final: conducted when construction is complete

Blueprint evaluations

total blueprint evaluations: **35**



New home final evaluations

total new home final evaluations: **30**

All new home final evaluations were done in Yellowknife.

AEA firsts: evaluating and giving a rebate on a highly-efficient home

This year marked the first time the AEA gave an EnerGuide Rating System score of at least 85 out of 100 to a new home without a renewable energy system. The builder was also the first recipient of the AEA's Energy Efficiency Incentive Program rebate for homes that score 85 or above. It's great to see such energy-efficient homes in the NWT.

Sponsoring an energy-efficient Habitat for Humanity home

In December, Habitat for Humanity NWT handed over the keys to its newest home, located in Yellowknife. The AEA was one of the sponsors of the home, and provided energy-efficiency advice to PSAV Architects and Clark Builders, who worked to build it. We also conducted energy evaluations as the home was being built—to help improve its efficiency—and again once it was complete, to confirm its final energy efficiency rating.

In the end, the house scored 84 out of a possible 100 on the EnerGuide Rating System scale, putting it among the most energy-efficient homes in the city. For comparison, scoring above an 85 in the North is extremely difficult without using renewable energy systems like solar panels or a wind turbine.

Commercial Energy Conservation and Efficiency Program

The Commercial Energy Conservation and Efficiency Program provides rebates to NWT businesses that make upgrades to conserve energy and improve their energy efficiency. The program is open to businesses both on- and off-grid.

Rebates of up to $15,000 are available. The actual rebate amount paid to each business is the lesser of the following:

- One-third of the total eligible cost of the project
- Five times the annual estimated money saved in fuel, water and electricity

FOR
businesses

AEA FUNDING
$200,000 (from GNWT Department of Infrastructure)

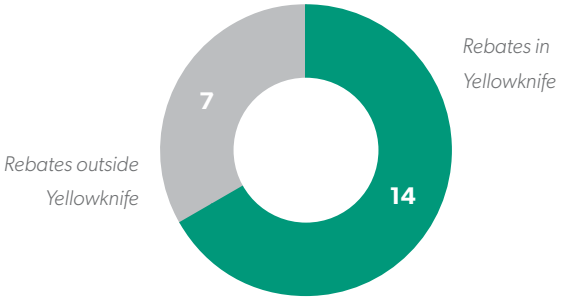
Results

21 total rebates

total value of rebates **$127,000**

$6,000
average rebate

Communities



Communities receiving rebates: **5**
plus 1 remote business

Payback

Capital cost (all projects, before rebates):
$553,000

Estimated annual savings (all projects):
$198,000

Simple payback (all projects, after rebates):
2.2 years

Greenhouse gas reduction

Greenhouse gases increased: **118** tonnes
(can be offset by the equivalent of running a 2-megawatt wind turbine for 11 days)[5]

Energy savings

Annual electricity consumption avoided:
1,025,000 kWh
(almost three times the annual electricity used in the community of Jean Marie River)

Power demand avoided: **189** kW
(the equivalent of running 126 1,500-watt kettles at the same time)

Annual oil consumption increase: **40,000** L
(equivalent to almost nine 4,550-L [1,000-gallon] commercial oil tanks)

Annual propane consumption increase: **44,000** L
(equivalent to 2,485 propane cylinders for home barbecue use)

Why did oil and propane consumption increase?

One of the AEA's goals is to help northerners reduce the costs associated with energy use. Sometimes this means using one form of energy in place of another. LED lighting retrofits were a common energy-efficiency project for businesses this fiscal year. LED lights use less electricity than other forms of lighting, but also produce less heat. This means that when the lighting in a building is converted to LEDs, the heating system will have to do a little more work to make up the difference.

The money saved by using less electricity for lighting is often greater than the extra spent on heating fuel. Sixteen of our clients completed lighting retrofits this year. On average, each of them will save an estimated $9,000 a year, even after taking additional heating fuel into account.

Most of these businesses are located in communities that use hydroelectricity, which does not produce greenhouse gases. Using less hydroelectricity and burning more heating fuel means that greenhouse gas emissions increase slightly. On the other hand, our clients in communities that produce electricity by burning fuel such as diesel, natural gas or propane are both saving money and reducing their overall greenhouse gas emissions.

[5] *https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator*

Community Government Building Energy Retrofit Program

Through the Community Government Building Energy Retrofit Program, the Arctic Energy Alliance supports community governments across the NWT to better manage their energy use and save money in the process.

FOR
community governments

AEA FUNDING
$200,000 (from GNWT Department of Infrastructure)

The first step is to conduct a "yardstick" energy audit of community government buildings, which looks at utility bill data. Next is a "targeted" energy audit, in which an AEA Energy Management Specialist will evaluate a building in person. Both of these audits are subsidized by the AEA. They identify ways to save electricity, heating fuel, water, greenhouse gas emissions and money. From there, we help the community government make the recommended changes, including providing rebates and offering project coordination services for a fee.

Results

Audits

Building energy audits completed:

22 yardstick audits *(in 4 communities)*

29 targeted audits *(in 5 communities)*

The targeted energy audits identified more than $400,000 in combined potential savings on energy bills.

Completed projects

7 total rebates

18 buildings retrofitted by clients

total value of rebates: **$94,000**

average rebate: **$13,000**

1 community requesting project coordination services

Payback

Capital cost: **$292,000**

Estimated annual savings: **$124,000**

Simple payback (after rebates): **2.4** years

Greenhouse gas reduction

Greenhouse gases avoided: **113** tonnes

(equivalent to the carbon sequestered by more than 2,900 tree seedlings growing for 10 years) [6]

Energy savings

Electricity consumption avoided: **113,000** kWh

(equivalent to running a 500-watt washing machine for 226,000 hours—nearly 26 years)

Power demand avoided: **32** kW

(equivalent to charging 356 iPads at the same time)

Annual oil consumption avoided: **4,000** L

(equivalent to more than three standard 1,135-L [250-gallon] residential oil tanks)

Annual propane consumption avoided: **18,000** L

(equivalent to nearly five 3,785-L [1,000 U.S.-gallon] commercial propane tanks filled to standard levels)

[6] *https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator*

An evolving program

All of the AEA's programs are based on creating cumulative success, but that is particularly evident when looking at the Community Government Building Energy Retrofit Program. To date, 19 community governments in the NWT have had targeted energy audits done on most, or all, of their buildings under this program. The AEA has also completed audits for another two community governments outside the scope of this program, bringing the total to 21 of the NWT's 33 communities with completed audits. Twelve of those community governments have accessed funding through this program to make some of the upgrades or changes recommended in their audit reports. And some have accessed AEA funding for more than one project in more than one fiscal year. In addition, eight community governments have used the AEA's project coordination services under this program to implement recommended changes.

The process from yardstick audit to completed retrofits can often take several years. In the past, a major focus of the program was to encourage community governments to complete energy audits on their buildings so they could know the steps to take to save energy and money. That will continue for now, but we are reaching the point where many of the community governments that are ready and able to address energy issues have already had audits completed. So the AEA is shifting its focus even more to supporting community governments to implement the recommendations in their audit reports.

As more and more community governments complete building energy audits and make upgrades, the program will continue to evolve. And we look forward to seeing more energy-efficient communities across the NWT.

Renewable and alternative energy programs

Replacing fossil fuels with renewable or alternative energy sources can greatly reduce greenhouse gas emissions. The Arctic Energy Alliance has two programs designed to help northerners adopt these technologies.

Alternative Energy Technologies Program

The Alternative Energy Technologies Program provides incentives for northerners to adopt alternative energy systems, such as solar, wind, wood and more. The program is divided into three streams:

- For residents
- For businesses (including off-grid businesses)
- For community-based organizations (including community governments, non-profit organizations and Indigenous governments)

FOR
residents, businesses, non-profit organizations, Indigenous governments, community governments

AEA FUNDING
$300,000 (from GNWT Department of Infrastructure)

Results

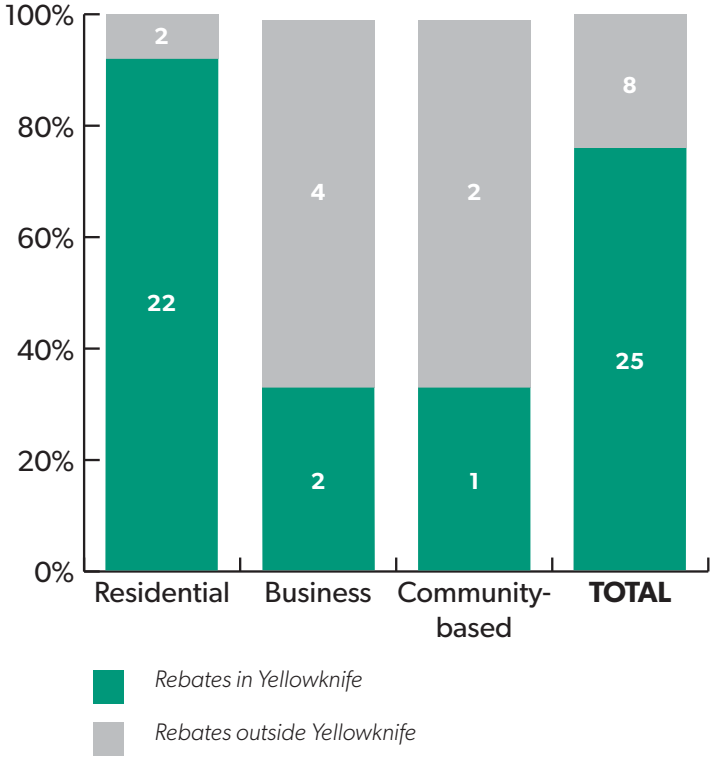
	Residential	Business	Community-based	TOTAL
Total rebates	24	6	3	33
Total value of rebates	$80,000	$55,000	$58,000	$193,000
Average rebate	$3,000	$9,000	$19,000	$ 6,000

Project types

	Residential	Business	Community-based	TOTAL
Solar photo-voltaic	22	3	3	28
Biomass	1	2	0	3
Wind	1	0	0	1
Other *(combination rebate for net zero building)*	0	1	0	1

Solar panels on one of the homes that received a rebate under the Alternative Energy Technologies Program.

Communities



Payback[7]

	Residential	Business	Community-based	TOTAL
Capital costs *(before rebates)*	$368,000	$79,000	$372,000	$819,000
Estimated annual savings	$26,000	$3,000	$39,000	$68,000
Simple payback *(after rebates)*	11.0 years	16.7 years	8.0 years	9.6 years

Energy savings

	Residential	Business	Community-based	TOTAL
Electricity avoided/ produced	68,000 kWh	7,000 kWh	37,000 kWh	112,000 kWh
Power demand avoided	97 kW	121 kW	37 kW	255 kW
Gasoline savings	6,000 L	-	-	6,000 L
Oil savings	7,000 L	-	-	7,000 L
Greenhouse gases avoided	34 tonnes	1 tonne	20 tonnes	55 tonnes

[7] *Energy-savings data was not available for the biomass systems installed by businesses, and information related to payback and energy savings from these systems has been excluded from this report.*

Biomass Energy Program

Through the Biomass Energy Program, the Arctic Energy Alliance provides northerners with accessible technical advice, project coordination, and education on existing or potential biomass projects. AEA staff also help clients by facilitating the development of partnerships with potential project funders.

There are several ways to use biomass energy, such as biomass heating (for example, a wood-pellet furnace or boiler), co-generation (heat and electricity from the same system) and district heating (using one heat source for several buildings).

In the 2017/18 fiscal year, we held Burn It Smart workshops in three communities, and supported biomass heating systems in Whati, Aklavik, Katlodeeche and Kakisa.

FOR

residents, businesses, community governments, Indigenous governments, non-profit organizations

AEA FUNDING

$90,000 (from GNWT Department of Infrastructure)

Burn It Smart workshops

The AEA held three Burn It Smart workshops over the course of the year—in Fort Good Hope, Colville Lake and Yellowknife. The Burn It Smart program focuses on familiarizing people with energy-efficient wood stoves and their operation, the importance of burning clean, seasoned firewood in these stoves, and essential safety and maintenance practices, such as chimney cleaning.

Firing up the district heating system in Whati

Since the 2015/16 fiscal year, the AEA has been helping the Community Government of Whati to plan and build a district heating system based around a biomass boiler. The boiler burns wood pellets to heat three community government buildings and the GNWT-owned health centre.

The AEA helped the community to secure funding, and acted as a coordinator between the community government and the contractor.

The boiler was fired up for the first time in March 2017. In the winter of 2017/18, the contractor conducted some small repairs and held training sessions for community government staff on operating and maintaining the boiler. The system is now fully operational and the community government expects to connect additional buildings in the future.

The system is expected to save the community 100 tonnes of greenhouse gases, 38,000 litres of diesel and $40,000 each year.

The container for the pellet boiler that powers Whati's district heating system, with the pellet silo in the background.

Building on Aklavik's community energy plan

In the 2016/17 fiscal year, the AEA worked with the Hamlet of Aklavik to create a new community energy plan (see page 29 for more information). One of the projects included in that plan is a biomass heating system for the community's recreation complex, using a boiler fueled by wood pellets or potentially by locally harvested wood chips. Such a boiler could even be connected to nearby buildings to create a district heating system. The AEA was part of a team that developed a pre-feasibility analysis. We also contributed information to a more in-depth study to determine the requirements for the system. The community is currently looking at options for moving into the next phase of the project.

Determining options for a district heating system in Katlodeeche

Like many communities, the Katlodeeche First Nation wants to enable community employment and reduce its dependence on fuel oil. One option it has been considering to help achieve both goals is to build a biomass district heating system to provide heat to several buildings in the community. The system would use a boiler that could be fueled by wood pellets or locally harvested wood chips.

The AEA conducted pre-feasibility analysis of three options for a system that could heat from three up to 11 buildings. We presented these options to the council so it can decide whether the information warrants pursuing funding opportunities and conducting a more detailed feasibility study.

Continuing to support the biomass district heating project in Kakisa

The Ka'a'gee Tu First Nation installed a biomass boiler in Kakisa in 2015, which can operate using either wood pellets or cord wood. The system heats two buildings owned by the First Nation. Since the project's inception, the AEA has been providing advice and guidance. That continued in 2017/18, as we conducted regular check-ups to ensure the boiler was working properly, and provided tips to community government staff on best practices for operating and maintaining the system.

When the system is operating at full capacity, it is expected to save the community 74 tonnes of greenhouse gases, 29,000 litres of diesel and $14,000 a year.

Regional Offices Program

The Arctic Energy Alliance has offices in six communities across the NWT: Fort Simpson, Hay River, Inuvik, Norman Wells, Whati and Yellowknife. Together, these offices allow the AEA to provide education and advice, and promote and coordinate our programs across the territory, and specifically within the Beaufort-Delta, Dehcho, Sahtu, South Slave and Tlicho regions, in addition to the Yellowknife area.

Our regional offices—those outside Yellowknife—allow us to keep a closer connection to the communities. Who better to understand the needs of a region than the people who live there?

FOR
residents, businesses, community governments, Indigenous governments, non-profit organizations

AEA FUNDING
allocated from $1,600,000 core funding (from GNWT Department of Infrastructure)

The AEA's regional offices are involved in every program and project that we undertake, but also engage in their own work, unique to each region. One of the main ways we get involved in our communities is through trade shows, events and other community engagement activities. We partner with organizations throughout the NWT to help educate northerners on our programs and the importance of responsible energy use.

The following are highlights from just a few of those activities.

Beaufort-Delta office (Inuvik)

Inuvik Fall Fair

The annual Fall Fair, held at the Inuvik Community Greenhouse in September is a great way for the AEA to connect with the community. The AEA sponsors a plot at the greenhouse, which supplies fresh potatoes to the Parish Hall Community Kitchen, and is part of the daily greenhouse tour. So it is a natural fit for us to take part in the fair and speak to people directly about energy conservation and efficiency.

Renewables in Remote Communities Conference (Whitehorse)

Sheena Adams, the AEA's Beaufort-Delta Regional Energy Project Coordinator, was one of the AEA's representatives at the Renewables in Remote Communities Conference, held in Whitehorse, Yukon, in October. The theme of the conference was advancing financial mechanisms and building Indigenous capacity for clean energy projects in Canadian Indigenous communities. Specifically, there was a focus on building financial and human capacity. Sheena gave a presentation on the recent work done to modernize the Inuvialuktun language by including renewable energy terms.

Top of the World Loppet (Inuvik)

This year marked the 50th anniversary of Top of the World Loppet, hosted by the Inuvik Ski Club. The Arctic Energy Alliance sponsored the event and was there to hand out AEA-branded sunglasses to youth and relay racers. The Ski Club has embraced energy efficiency and renewable energy, having previously installed solar-electric panels on its building, and taking part in a pilot project with the AEA to upgrade the building's lighting to more efficient LEDs.

Steering committee for Arctic Energy and Emerging Technologies Conference and Tradeshow (Inuvik)

The Arctic Energy and Emerging Technologies Conference and Tradeshow brings together people from government and industry to learn, network and promote various sources of energy and emerging technologies as they relate to the Arctic living environment. The AEA's Sheena Adams was on the steering committee for the 2018 conference, meeting with the rest of the committee six times over the course of the year to choose speakers, entertainers, keynote guests and catering.

Dehcho office (Fort Simpson)

Community Healthy Living Fairs in Jean Marie River, Nahanni Butte and Sambaa K'e

The Government of the Northwest Territories' Department of Health and Social Services sponsors a series of Community Healthy Living Fairs around the NWT. The fairs are a chance for the GNWT and other organizations to share information with community members about health and wellness. The AEA participated in several Community Healthy Living Fairs in 2017/18, including three in the Dehcho region—in Jean Marie River, Nahanni Butte and Sambaa K'e. It was a great chance to connect with people, help them learn how to save energy and money, and hear the success stories of people who have already made energy-efficiency changes.

Dehcho First Nations Annual Assembly (Fort Providence)

In June, AEA staff from our South Slave and Dehcho offices attended the Dehcho First Nations Annual Assembly, hosted by the Deh Gah Got'ie First Nation. While there, we not only spoke with delegates and other attendees about energy conservation, energy efficiency and renewable energy, but also demonstrated some renewable energy technologies. Our solar-electric trailer was on full display, showing how solar electricity works. And we also brought out our solar oven, which we used to cook moose meat and bannock for attendees to sample.

School energy literacy sessions (Fort Liard, Fort Simpson, Jean Marie River and Sambaa K'e)

A great way to encourage future generations to use energy wisely is to build their energy literacy from a young age. Energy literacy includes concepts such as knowing where energy comes from, how we use it, the impacts and consequences of energy use, and how to make decisions about energy use.

Over the course of the year, Teresa Chilkowich, the AEA's Dehcho Regional Energy Project Coordinator, held classroom sessions in schools around the Dehcho region to talk to kids about energy literacy. Those schools included Bompas Elementary School in Fort Simpson, Charles Tetcho School in Sambaa K'e, Echo Dene School in Fort Liard, and Louie Norwegian School in Jean Marie River. Teresa shared information about energy literacy and demonstrated small-scale renewable energy technologies, such as solar-rechargeable lamps and phone chargers. In Jean Marie River, she also talked to students about the community's electricity monitoring project.

Energy Futures Lab leadership bootcamp (Calgary)

Energy Futures Lab's leadership bootcamp offers tools and connections for people to play a leading role in the transition to a new energy economy. Teresa attended the three-day conference in Calgary, and was invited to help facilitate the Newtonian Shift energy transition role-playing simulation, which allowed participants to experience decades of energy transition in one day.

The AEA's Teresa Chilkowich with students from Echo Dene School in Fort Liard.

Sahtu office (Norman Wells)

Drop-in sessions (Fort Good Hope and Deline)

In October, the AEA held public drop-in sessions in Fort Good Hope and Deline. Residents could stop by to ask questions on becoming more energy efficient, installing renewable energy sources, or virtually anything else energy-related. Questions about wood stoves and solar panels were particularly popular.

Coordinating wood stove installations and deliveries throughout the Sahtu

For the AEA's Sahtu office, a significant amount of work this year went into coordinating the Community Wood Stove Project in Sahtu communities (see page 27 for more information). Wayne Lennie, the AEA's Sahtu Regional Energy Project Coordinator, helped arrange for nine stoves to be installed and inspected in Fort Good Hope and 20 in Colville Lake. In Deline, the AEA arranged for 10 stoves to be delivered in March, which will be installed in the 2018/19 fiscal year. The community government has already identified the homeowners who will receive the new stoves and the AEA confirmed that a wood stove and chimney can be safely installed in each home.

Wayne Lennie at a drop-in session in Deline.

South Slave office (Hay River)

Gateway Jamboree (Enterprise)

The Arctic Energy Alliance's South Slave regional office was invited to set up a booth at the Gateway Jamboree music festival in Enterprise in August. Tom Gross, the AEA's South Slave Regional Energy Project Coordinator spoke with people about a range of topics including reducing electricity consumption and phantom power loads. He even reviewed power bills with festival attendees to help them find ways to save.

Tu Beta Ts'ena (Water is Life) Gathering (Fort Smith)

In August, the AEA was kindly invited to set up an educational booth at the 2017 Tu Beta Ts'ena (Water is Life) Gathering in Fort Smith. Organized by the Slave River Coalition, the Keepers of the Water and the Smith's Landing First Nation, the event was a celebration of the Mackenzie River watershed, focusing on understanding the threats and opportunities related to water in the area, and finding ways for people to protect, secure and restore the watershed.

We heard excellent discussions at the main gathering, and during breaks plenty of people stopped by the AEA booth to ask questions on everything from LED lighting, to drain water heat recovery, to solar panels and more.

Community Healthy Living Fairs in Kakisa, Katlodeeche and Fort Resolution

The AEA participated in Community Healthy Living Fairs in not only the Dehcho region, but in the South Slave communities as well. From October through February, the AEA travelled to Kakisa, Katlodeeche and Fort Resolution to take part in the fairs sponsored by the GNWT Department of Health and Social Services. It was great to share information about energy conservation and efficiency, and the highlight of each trip throughout the NWT was the "Strengthening Partnerships" day, where members from each community would offer cultural activities to the presenters, such as short trips out on the land or learning to make traditional arts and crafts.

Louise Schumann speaks with a participant at the Tu Beta Ts'ena (Water is Life) Gathering in Fort Smith about the benefits of LED light bulbs.

Tlicho office (Whati)

Working with community governments to plan energy-efficient building upgrades (Behchoko, Gameti, Wekweeti and Whati)

Under the AEA's Community Government Building Energy Retrofit Program, community governments can access building energy audits, project coordination services and rebates for energy-efficiency upgrades to their buildings. But, in many cases, it's our regional energy project coordinators who get the ball rolling by showing a community government how they can access funding and services under the program. Sonny Zoe, the AEA's Tlicho Regional Energy Project Coordinator, met with the community governments of Behchoko, Wekeeti, Whati and Gameti to review their building energy audit reports and determine whether they wanted to make any of the recommended upgrades to improve the energy efficiency of their buildings.

Sustainable living presentations (Behchoko, Gameti, Wekweeti and Whati)

Being Tlicho, Sonny is very tied to his culture. This is why he has developed sustainable living presentations, based on Indigenous culture, that he delivers in the Tlicho communities. The presentations are well-attended, and discuss not just ways to cut energy costs and reduce greenhouse gas emissions, but also the importance of traditional foods and cultural activities.

Meeting with community members throughout the Tlicho region

Speaking with people one-on-one is an invaluable part of engaging with communities throughout the NWT. The AEA does this in the Tlicho region by meeting with people both in public places such as community centres, and in their homes. Setting up a table in a public area allows us to meet with many people in a relatively short period of time. On the other hand, meeting with people in their homes allows for a more personal touch, where we are able to look at a person's specific energy needs in more detail. Through both approaches, Sonny was able to meet with more than half the community members in the Tlicho region this year, helping them learn how to save energy and save money in the process.

Sonny Zoe reviews Gameti's building energy audit report with SAO trainee Priscilla Bekale.

Special projects

In addition to our core programs, the Arctic Energy Alliance undertakes special projects as opportunities arise. These projects can support residents, businesses, community or Indigenous governments, or non-profit organizations in the NWT and Nunavut.

Over the 2017/18 fiscal year, the AEA conducted six projects, with funding provided by the Government of the Northwest Territories, Natural Resources Canada, and Indigenous and Northern Affairs Canada.

Domestic water heater testing

AEA staff visited the Aurora College campus in Fort Smith to conduct tests on various domestic water heaters to determine the approximate cost of operation, recovery times and standby losses. The college has a suitable facility for conducting such tests, and the exercise served as a teaching aid for students.

The collected data has not yet been finalized, but once complete it can be used by the public to determine the type of domestic water heater that would best serve a family's needs and budget while keeping efficiency and life-cycle costs in mind.

Inuvialuktun terminology development

In the 2016/17 fiscal year, the AEA partnered with the Inuvialuit Cultural Resource Centre to work with elders to develop energy-related terminology in Inuvialuktun. The goal was to help revitalize the language and share knowledge about the terms being developed.

In 2017/18, the AEA followed up on this project by designing and creating communications tools to share the results of the initial workshop. The new terms and corresponding illustrations were used on tools such as magnets, coffee cups, t-shirts and bags, which were distributed at community events in Ulukhaktok and Sachs Harbour. Events will be held in Paulatuk, Tuktoyaktuk, Aklavik and Inuvik in the 2018/19 fiscal year.

The project was presented at the 2017 Renewables in Remote Communities conference in Whitehorse and at the 2018 professional development conference for NWT teachers in Yellowknife.

Gwich'in Wellness Camp energy assessment

The AEA supported the Gwich'in Tribal Council (GTC) in securing multi-year federal funding for scoping out and implementing energy conservation, energy efficiency and renewable energy measures at its remote wellness camp. The camp, located near Inuvik on the Mackenzie River, has not been used in some time. But the GTC plans to re-open it, while increasing the camp's energy efficiency to reduce its operating costs and carbon footprint.

The AEA conducted an energy audit on the camp and produced a detailed report with recommended measures for saving money and reducing greenhouse gas emissions. The GTC plans to begin implementing these measures in the 2018/19 fiscal year.

Community Wood Stove Project

In 2017/18, the GNWT Department of Infrastructure and Indigenous and Northern Affairs Canada, through its Northern REACHE program, provided funding for the AEA to continue its community wood stove project. Under the project, the AEA typically forms a two-year partnership with each participating community, where each partner has designated roles and responsibilities and provides 50 percent of the funding for new stoves. In the first year, the stoves and related materials

are purchased and delivered to a community. The second year involves the code-compliant installation of the stoves and related materials in the homes of local residents.

The goals of the project are to:

- increase wood burning safety by supporting code-compliant installations
- reduce particulate emissions in smoke from wood stoves
- increase local capacity around wood harvesting and seasonal local employment
- increase wood burning efficiency by installing EPA-certified wood stoves

Over the course of the fiscal year, the AEA helped coordinate the installation of nine stoves in Fort Good Hope and 20 in Colville Lake. In March, a total of 55 stoves were delivered to Behchoko, Whati, Gameti, Wekweeti and Deline to be installed in the 2018/19 fiscal year.

The AEA also holds Burn It Smart sessions in each community that receives new stoves, to ensure that residents are aware of how to use their stoves efficiently and safely.

Another benefit partially related to this project was that a resident of Fort Good Hope received his Wood Energy Technology Transfer (WETT) Canada certification.

Wood stoves ready for delivery to Behchoko. Photo courtesy of Taylor & Company.

The Sahtu's first certified wood stove installer

Getting certified to install code-compliant wood stoves is no easy feat. Just ask Curtis Manuel. In 2017, after nearly three years of education and work, he became the Sahtu region's first certified wood stove installer under Wood Energy Transfer Inc. (WETT), a non-profit training and education association that promotes the safe and effective use of wood-burning systems in Canada.

Curtis, a resident of Fort Good Hope, began his training in 2014 when he took a WETT wood stove installers course in Norman Wells that was sponsored in part by the AEA. After this initial session, he had to take several more courses and install 30 code-compliant wood stoves to get his certification. Luckily, the Yamoga Land Corporation was taking part in the AEA's Community Wood Stove Project and had 30 stoves to be installed in Fort Good Hope.

"The Land Corporation trusted my work," says Curtis. But he didn't do it alone: Henry Nagtegaal, a WETT technician and trainer from Winnipeg Chimney Service, provided guidance. "Henry helped technically with the installs and gave me good compliments," he says.

A carpenter by trade, Curtis now installs stoves as his main line of work. Since completing his course, he's installed roughly 100 stoves in Fort Good Hope and Colville Lake. He is also close to being certified to inspect stoves, needing to complete just four more inspections to get his certification.

"People feel more secure having a certified installer in their community," he says. "When I take down an old stove, people are very fortunate. I've seen flue pipes that were completely rusted out and a bump could knock it down. A fire could happen at any time."

He notes that the new stoves could help save lives in his community. "People are very thankful for their new wood stoves."

NWT Smart Energy Communities Project

This is a two-year project, funded by Natural Resources Canada (NRcan). In 2016/17, the Arctic Energy Alliance worked with the communities of Aklavik and Fort Providence to update their existing community energy plans. Each of the communities identified and prioritized projects that would increase its energy efficiency. In 2017/18, we worked with the communities to implement those projects.

In Aklavik, the AEA conducted energy audits on Hamlet-owned buildings and made specific recommendations for improving heating and lighting efficiency. We then worked with the Hamlet to develop requests for proposals to implement the upgrades, review contract proposals and confirm the work was completed according to the contracts. The AEA also worked with the community's energy coordinator to offer home winterization workshops and to winterize the homes of several elders and single mothers. And under the AEA's Biomass Energy Program, we prepared a pre-feasibility analysis for a biomass-fuelled district heating system for the community's recreation complex (see page 22 for more information). A feasibility study was subsequently completed through the Hamlet's contribution agreement.

In Fort Providence, the AEA analyzed energy audits that were conducted on Hamlet-owned buildings and then worked with the community to implement heating and lighting upgrades. This included developing requests for proposals to implement the upgrades, reviewing contract proposals and confirming the work was completed according to the contracts. The AEA also supported the Fort Providence Energy Committee start-up. The committee is tasked with the ongoing implementation of their community energy plan.

The AEA also held planning workshops with staff from both hamlets and NRCan at key points throughout the two-year project, as well as a final evaluation workshop in March 2018. Weekly phone meetings with the hamlet energy coordinators and monthly meetings with the senior administrative officers from both communities contributed to the success of the project.

The projects the two communities undertook this year are expected to save them a combined 130 tonnes of greenhouse gases, 24,000 litres of oil, 81,000 kWh of electricity and $106,000 a year.

Both Aklavik and Fort Providence expect to implement additional energy-related projects identified under their community energy plans.

Home Energy Efficiency Retrofit Project in Jean Marie River

This is a two-year pilot project, funded by Natural Resources Canada and the GNWT Department of Infrastructure. For 2017/18—the first year of the project—the AEA partnered with the Tthets'éhk'é Deli (Jean Marie River) First Nation to implement low-cost retrofits to participating residents' homes. These retrofits are designed to reduce energy use (fossil fuel use in particular), costs and greenhouse gas emissions.

Jean Marie River was selected through an expression-of-interest process. During 2017/18, the AEA conducted the following activities:

- Held an information and sign-up workshop
- Conducted initial home energy evaluations and walkthroughs with participating homeowners
- Identified the retrofit options with the best potential payback, according to available funding
- Reviewed the results of the home energy evaluations and walkthroughs with homeowners
- Confirmed the work to be completed and obtained permission from homeowners
- Obtained quotes and secured contractors to complete the work
- Confirmed the work was completed
- Conducted post-retrofit home energy evaluations to assess the level of improvement
- Held an evaluation and community celebration

Overall, the project is expected to save an equivalent of 1.12 tonnes of CO_2 per year, along with more than 100 kWh of electricity and roughly 400 litres of heating fuel.

In 2018/19, the AEA will select a second community from among applicants, where we will conduct similar activities.

Electric bike testing

In the 2017/18 fiscal year, the AEA purchased an electric bicycle, or e-bike. The bike has a battery-powered motor to assist the rider and fat tires to make it suitable for winter riding. The AEA is tracking the electricity that the bike consumes to determine the cost to operate it. We will also be displaying it at public events to promote e-bikes as an option for people who would like to commute by bicycle but want the convenience of a powered vehicle.

Studying northern homes for the Canada Mortgage and Housing Corporation

Over the past few years, the AEA has been studying northern housing for the Canada Mortgage and Housing Corporation (CHMC), which continued into 2017/18.

Analyzing the Northern Sustainable House in Arviat, Nunavut

The AEA revised two studies of a Northern Sustainable House in Arviat, which were originally done in 2014 and 2015. One study examined the design and construction of the house and the other was an evaluation of how the house has been performing. The revised versions contain updated analyses.

The studies found that the house did not meet its high energy-efficiency goal, but is still an energy-efficient house under standardized operating conditions. In practice, the house uses more energy than predicted; possibly because of factors such as the number of people living there and the ways they use energy. Although the house did not meet its initial design goal, it has raised several questions regarding conventional construction techniques and systems, and has demonstrated the importance of energy monitoring and closely examining bills.

Examining fuel usage in "Tuktu" structurally insulated panel houses throughout Nunavut

The AEA conducted a fuel-usage study on houses built in Nunavut using structurally insulated panels (SIPs)—known as Tuktu SIP houses. The study was done in the 2016/17 fiscal year, and the AEA submitted the final report in 2017/18. We compared data from 119 SIP houses and 60 stick-built homes in all 25 Nunavut communities. The study found that there was not a large difference in fuel usage between the two types of houses. This is probably because stick-built houses in Nunavut have been built to a high standard since the 1990s. However, the better building envelope of the SIP houses likely means that they have better internal air quality and are healthier to live in.

Studying the effectiveness of HRVs and ERVs in Nunavik

Modern, airtight houses need mechanical ventilation to maintain good indoor air quality. This typically means using a heat recovery ventilator (HRV) or an energy recover ventilator (ERV). An HRV recovers some of the heat from outgoing air. An ERV recovers both heat and moisture to keep indoor relative humidity levels constant.

The AEA examined the effectiveness of HRVs and ERVs in three communities in Nunavik (northern Quebec). We found that in the winter months, using an HRV or ERV will lower the indoor relative humidity level within a house to below the threshold recommended to prevent mold growth. The study did not find an apparent difference in the performance of HRVs and ERVs under these conditions.

Evaluating the energy efficiency of a "Tuktu" house in Arviat, Nunavut

In February 2017, the AEA conducted an EnerGuide Rating System evaluation of a SIP house in Arviat and found that it had a rating of 80 out of 100—certainly a high score for a home in Canada's Arctic. The report for this evaluation was finalized and submitted in the 2017/18 fiscal year.

Operations management

The Arctic Energy Alliance uses cash-based cost tracking, accrual accounting, and project resource-loading systems in our operations. Our cash-based project cost planning and tracking system, together with our accounting system, enables project- and ledger-level budgeting and expense tracking. These two systems are linked.

We use timesheet and billing software that includes project setup, budgets, resources assignment, timesheets, and advanced reporting tools. Using this software, each staff member is allocated time for each project and task to which they are assigned. This enables us to plan and report on staff activity at project and task levels.

The AEA has an established financial system including policies, procedures, budgeting and expenditure control. The system requires all expenditures at the project and ledger levels be planned and budgeted for. Once project and ledger-level budgets are loaded into our tracking and accounting software, purchase orders can only be issued if they are budgeted for, and only within prescribed spending thresholds. All purchase orders are electronically generated and are used to track planned, in-progress and actual expenditures against budgeted expenditures.

Salary time expenditures are tracked using our timesheet software and paid using our accounting system. Every two weeks, staff members submit their timesheets to the Executive Director for review and approval. This system restricts staff to only booking time against projects and tasks they are assigned. The approved timesheets are loaded into the accounting system and used to allocate staff costs to projects, and for payment purposes.

The AEA associates individual expenditures to vendors and projects. A single line item amount can be allocated to one or more projects, or the AEA can allocate entire transactions to one or more projects. This provides us the flexibility to provide detailed project-level expenditures such as those provided in our quarterly reporting.

The table on the next page summarizes the outcome of the AEA's work, and the subsequent chart reports the total staff hours dedicated to achieve that outcome.

Impact of AEA programs and projects

Metric	Energy Efficiency Incentive Program	Energy Rating Services Support Program	Commercial Energy Conservation and Efficiency Program	Community Government Building Energy Retrofit Program	Alternative Energy Technologies Program – Residential	Alternative Energy Technologies Program – Commercial	Alternative Energy Technologies Program – Community-based	Biomass Energy Program	Total	Percentage of total
Total no. of rebates	815	-	21	7	24	6	3	-	876	100%
No. of rebates in Yellowknife	363	-	14	-	22	2	1	-	402	46%
No. of rebates outside Yellowknife	452	-	7	7	2	4	2	-	474	54%
Total value of rebates	$227,000	-	$127,000	$94,000	$80,000	$55,000	$58,000	-	$641,000	-
Average rebate	$300	-	$6,000	$13,000	$3,000	$9,000	$19,000	-	$700	-
Total capital cost	$870,000	-	$553,000	$292,000	$368,000	$79,000	$372,000	-	$2,534,000	-
Est. annual savings	$143,000	-	$198,000	$124,000	$26,000	$3,000	$39,000	-	$533,000	-
Est. annual electricity savings (MWh)	338	-	1,025	113	68	7	37	-	1,588	-
Estimated power demand avoided/produced (kW)	68	-	189	32	97	121	37	-	544	-
Est. annual oil savings (litres)	1,920,000	-	40,000	4,000	7,000	-	-	-	1,971,000	-
Est. annual gasoline savings (litres)	-	-	-	-	6,000	-	-	-	6,000	-
Est. annual propane savings (litres)	48,000	-	44,000	18,000	-	-	-	-	110,000	-
Est. annual greenhouse gases avoided (tonnes)	235	-	118	113	34	1	20	-	521	-
Total no. of desktop energy evaluations (blueprint and yardstick evaluations)	-	35	-	22	-	-	-	2	59	100%
No. of desktop energy evaluations in Yellowknife	-	31	-	-	-	-	-	-	31	53%
No. of desktop energy evaluations outside Yellowknife	-	4	-	22	-	-	-	2	28	47%
Total no. of on-site energy evaluations	-	115	-	29	-	-	-	-	144	100%
No. of on-site energy evaluations in Yellowknife	-	69	-	-	-	-	-	-	69	48%
No. of on-site energy evaluations outside Yellowknife	-	46	-	29	-	-	-	-	75	52%

Staff hours by program/project

8,050	Regional Offices Program
4,940	Administration
1,870	Energy Rating Services Support Program
1,140	Community Government Building Energy Retrofit Program
880	NWT Smart Energy Communities Project
850	Communications
750	EnerGuide Rating System for New Homes service*
670	Home Energy Efficiency Retrofit Project
580	Community Wood Stove Project
540	Commercial Energy Conservation and Efficiency Program
490	Alternative Energy Technologies Program**
440	Energy Efficiency and Incentive Program
340	Biomass Energy Program
320	Gwich'in Wellness Camp energy assessment
300	General education and advice
250	Canada Mortgage and Housing Corporation
120	Inuvialuktun terminology development
110	Domestic water heater testing
22,640	TOTAL

** The EnerGuide Rating System for New Homes service is managed under the Energy Rating Services Support Program. Staff hours have been separated in this table for the purposes of reporting hours by funding source. The Energy Rating Services Support Program is fully funded by the GNWT and the EnerGuide Rating System for New Homes service is provided on a fee-for-service basis.*

*** Includes Community Renewable Energy Program.*

Financial management

Highlights

Results of operations for the year ending March 31, 2018

- Overall revenues totalled $3.6 million and overall expenses totalled $3.5 million.
- The AEA budgeted for an overall deficit of $300 this year, but ended the year with an overall surplus of $91,000, representing 3% of total revenues. This is an 800% increase over the previous year's deficit of $13,000, which represented less than 1% of total revenues.
- Net financial assets increased $121,000 over the course of the year, compared to a $176,000 increase the previous year.

Key Revenues	Value	Increase/ Decrease from 2016/17	Comparison to budget
GNWT contributions	$3,000,000	↓ 21%	105%
Other source income	$112,000	↓ 25%	89%
Consulting fees	$94,000	↓ 44%	128%

Key Expenses	Value	Increase/ decrease from 2016/17	Comparison to budget
Office and general expenses/ project materials	$218,000	↓ 61%	138%
Rebates distributed[8]	$651,000	↓ 8%	120%
Travel and accommodations	$200,000	↓ 31%	94%

Financial position at March 31, 2018

Key Assets	Value	Increase/ Decrease from 2016/17	Primary reasons
Total assets	$1,328,000	↓ 23%	Decrease in short-term investments
Cash and short-term investments	$627,000	↓ 44%	
Accounts receivable	$652,000	↑ 25%	Accounts receivable for membership fees
Prepaid expenses	$10,000	↓ 23%	

Key Liabilities	Value	Increase/ Decrease from 2016/17	Primary reasons
Total liabilities	$431,000	↓ 53%	Decreases in bank indebtedness, wages and benefits payable, trade payables and accruals, and deferred revenue
Accounts payable and accrued liabilities	$407,000	↓ 45%	
Deferred revenues	$24,000	↓ 86%	Deferred revenue from 2016/17 paid in 2017/18

[8] *Clients of the Energy Efficiency Incentive Program can claim rebates up to three months after the purchase of an eligible product. The financial statement was prepared at the end of the fiscal year, and the value of rebates distributed includes accrued funds to account for additional rebate applications under this program, up to three months after the end of the fiscal year (up to June 30). In actuality, the AEA did not use all of these accrued funds and distributed $641,000 in rebates by June 30.*

Key Net Assets	Value	Increase/ Decrease from 2016/17	Notes
Total net assets	$896,000	↑ 11%	
Internally restricted reserves	$841,000	↑ 15%	
Unrestricted accumulated surplus	$39,000	↑ 26%	Represents accumulated unspent core funding and consulting projects

Cash flow for the year ending March 31, 2018

- Gross cash from operations showed a surplus of $97,000, compared to a deficit of $5,000 the previous year. This is largely due to a variety of unexpected reasons, including decreased expenses for consulting fees, project materials , and staff wages, and approximately $90,000 of canceled pre-approved rebates applications in the later portion of the fourth quarter of the year.
- There was a net cash flow decrease of $279,000, down 38% over the previous year, largely due to reduced cash receipts.

Key Cash Receipts	Value	Increase/ Decrease from 2016/17
GNWT contributions	$2,983,000	↓ 17%
Other sources	$164,000	↑ 19%

Management discussion and analysis

The Arctic Energy Alliance prudently manages its people and money to deliver quantifiable results in line with the organization's strategic plan. The organization is financially sound, has a three-month operating reserve and can respond to changes in our financial or operating environment quickly and effectively.

As evidenced in this annual report, the Arctic Energy Alliance delivered an outstanding variety and number of public services this year, and was able to do so effectively with the right balance of management and financial controls, thus ensuring an effective and prudent use of public money.

The financial future of the organization is positive because of two principal factors: the cost of heating and electric energy in the Northwest Territories, and the Government of Canada's commitment to addressing the factors underlying climate change. Therefore, demand for the services the organization delivers is expected to remain stable or grow. Combined with the confidence governments have in funding a fiscally and operationally sound organization like the Arctic Energy Alliance, it is reasonable to expect funding stability over the next three to four years. In fact, the AEA is anticipating an increase in funding beginning as soon as the 2018/19 fiscal year, due to additional funding streams becoming available, although this has not yet been confirmed. Should this additional funding come through, the AEA will have a need to hire additional staff to manage the increased workload. Some time would be needed to hire and train these new staff members until the AEA can begin operating at its full capacity with this increased funding.

Membership and governance

Board of directors

- John Vandenberg, President, Arctic Energy Alliance
- Scott Reid, Vice-President, Arctic Energy Alliance
- Gordon Van Tighem, Treasurer, Arctic Energy Alliance
- Craig Thomas, Secretary and Interim Executive Director, Arctic Energy Alliance
- Robert Jenkins, Assistant Deputy Minister, Corporate and Strategic Planning, GNWT Department of Environment and Natural Resources
- Grace Lau-a, Director, Community Operations, GNWT Department of Municipal and Community Affairs
- Myra Berrub, Manager, Energy Services, Northwest Territories Power Corporation
- Sara Brown, Chief Executive Officer, NWT Association of Communities
- Derek McHugh, Northland Utilities (Yellowknife) Ltd.
- Matthew Parent, Climate Change Mitigation Manager, Government of Nunavut

General members

- GNWT Department of Infrastructure
- GNWT Department of Environment and Natural Resources
- GNWT Department of Municipal and Community Affairs
- Government of Nunavut
- NWT Association of Communities
- NWT Housing Corporation
- NWT Public Utilities Board

Sustaining members

- Northland Utilities (Yellowknife) Ltd.
- Northwest Territories Power Corporation

Staff

- Sheena Adams, Regional Energy Project Coordinator, Beaufort-Delta
- Ken Baigent, Senior Energy Management Specialist
- John W. Carr, Senior Technical Specialist
- Teresa Chilkowich, Regional Energy Project Coordinator, Dehcho
- Kevin Cull, Communications Coordinator
- Alexandra Giroux, Energy Management Specialist
- Mike Goodwin, Energy Management Specialist
- Tom Gross, Regional Energy Project Coordinator, South Slave
- Barbara Guay, Program Assistant
- Wayne Lennie, Regional Energy Project Coordinator, Sahtu
- Faye MacDonald, Office Manager
- Margaret Mahon, Senior Energy Management Specialist
- Steve Outlet, Program Coordinator
- Leanne Robinson, Energy Management Specialist
- Louise Schumann, Program Assistant, South Slave
- Craig Thomas, Interim Executive Director
- Linda Todd, Program Coordinator
- Nick Walker, Energy Management Specialist
- Jennifer Wicks, Human Resources and Program Assistant
- Sonny Zoe, Regional Energy Project Coordinator, Tlicho

"I Craig Thomas, Interim Executive Director of the Arctic Energy Alliance, duly authorized on behalf of the board of directors of the Arctic Energy Alliance, represent and warrant that this annual report is true and accurate."

Craig J. Thomas,
Interim Executive Director
July 16, 2018

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The Arctic Energy Alliance is a non-profit, non-government agency whose vision is that "NWT Society will become a global leader in clean, efficient, sustainable energy practices." The Arctic Energy Alliance's mission is to promote and facilitate the adoption of efficient and renewable and energy practices by all members of NWT society.

ARCTIC ENERGY ALLIANCE