



**Alternative Energy, Demand Side Management
and Energy Efficiency**

Bi-Annual Report, December 2008

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1 **1.0 INTRODUCTION**

2 In Decision 13-2007 with respect to the Northwest Territories Power Corporation's ("NTPC")
3 2006/07 and 2007/08 Phase I General Rate Application, the Public Utilities Board ("PUB")
4 issued Directive 51 which stated:

5
6 The Board directs NTPC to provide the Board with biannual reports that discuss the
7 following:

- 8
- 9 1. The efforts and progress of NTPC and its affiliates in pursuing alternative energy,
10 demand side management and energy efficiency projects;
 - 11 2. Justification for any projects being pursued by NTPC's affiliates rather than NTPC;
 - 12 3. Funding programs that are, or will be, available and any efforts and progress by
13 NTPC and its affiliates in obtaining funding.

14
15 This report has been prepared to comply with Directive 51 from Decision 13-2007. This
16 report covers the period up to December 31, 2008. Subsequent reports will be prepared to
17 update this information and provide new information for future periods.

18 **1.1 OVERVIEW**

19 The Corporation undertakes numerous activities related to alternative energy, demand side
20 management and energy efficiency projects each year. In order to provide a comprehensive
21 response to the Board's directive, this report is organized according to the following
22 headings:

- 23
- 24 • **Alternative Energy Projects:** This section reviews all projects investigated or
25 undertaken by NTPC or its affiliates related to alternative methods of generation.

- 1 • **Demand Side Management/Energy Efficiency Projects:** This section reviews
2 all projects investigated by NTPC or its affiliates related to demand side
3 management (DSM) or improving energy efficiency.

4
5 The alternative energy, DSM or energy efficiency projects outlined within this report are
6 initiatives undertaken either solely by NTPC or its affiliates, or in partnership with other
7 organizations. The factors that are taken into consideration when determining which
8 business entity undertakes these projects include:

- 9
10 • If project risk is high and the potential for downside to regulated customers is
11 significant, then the project may be undertaken by an affiliate so as not to expose
12 the regulated customer to a liability or cost should the project be unsuccessful.
- 13 • Where a project will likely converge with operations that serve regulated
14 customers, then that project may be undertaken by NTPC.
- 15 • Where a project diverges from or is unrelated to the current service to regulated
16 customers, then such projects may be undertaken by an affiliate.
- 17 • Where NTPC does not have access to a particular business opportunity but an
18 affiliate does, then that project may be undertaken by the affiliate. An example of
19 this would be Federal Government funding for alternative energy projects where a
20 crown corporation is not eligible to participate.
- 21 • Where a project requires extensive third party equity, joint venture partners, or
22 other forms of financing such that NTPC is not in a majority position, then the
23 project may be undertaken by an affiliate.
- 24 • Legislative changes or executive order from the GNWT may also dictate which
25 entity undertakes the project.

26
27 NTPC frequently liaises with the GNWT who have staff dedicated to developing funding
28 programs targeted at alternative energy, DSM or energy efficiency projects. In addition to
29 these efforts, the GNWT is also aware of other funding programs that may be available
30 through other government agencies. In most cases, NTPC is not eligible for government

1 funding or the tax credits offered through these programs because it is a Crown Corporation.
2 Regardless, this report identifies on a project-by-project basis where NTPC or its affiliates
3 have applied for funding, received funding or assisted a third party in obtaining funding in
4 support of an alternative energy, DSM or energy efficiency project.

5 **2.0 ALTERNATIVE ENERGY PROJECTS**

6 The Corporation's primary goal in pursuing alternative energy projects is to continue
7 providing safe and reliable service at the least-cost to regulated customers over the long-
8 term. Many alternative energy applications are largely untested in the extreme operating
9 environment faced by NTPC. As a result, NTPC often pursues small scale demonstration
10 projects in order to test new technologies prior to implementing them on a larger scale. This
11 practice ensures these technologies can be adequately serviced and operated in our
12 environment without adverse affects to the Corporation's customers. NTPC's commitment
13 to alternative energy includes the following activities:

14

- 15 • The Corporation will stay knowledgeable of new technologies that may benefit its
16 core business. The Corporation will study these new technologies as they
17 emerge and analyze their suitability to the north including technical feasibility,
18 "green benefits", and economic costs and benefits.
- 19 • The Corporation will not act as a pure researcher of emerging technologies that
20 are not already on the market with proven technological and economic
21 performance. Rather, it will invest in demonstration projects to test how proven
22 technologies work in the northern environment.
- 23 • The Corporation will not undertake alternative energy projects that do not lower its
24 costs in the long term (as compared to the costs of diesel), unless it has
25 guarantees of operational subsidies that make up the cost differential or PUB
26 approval to recover these costs.

- 1 • The Corporation will seek external funding (from all levels of government) for
2 testing, developing, implementing and maintaining ongoing operations for all
3 alternative energy projects.
- 4 • The Corporation's preference is to encourage private developers, manufacturers
5 or local interests to undertake and fund the projects and take the construction,
6 technological and operational risk. In cases where the Corporation undertakes
7 any projects directly it will seek approval from the PUB (i.e. a General Rate
8 Application or a Major Project Permit Application).
- 9 • In order to maintain a safe, reliable source of generation, the Corporation will
10 maintain existing or modified diesel plants as the main source of generation or as
11 back up to new technologies.

12
13 The following sections outline the alternative energy projects currently being investigated or
14 pursued by NTPC or its affiliates. It is important to note that not every alternative energy
15 project investigated by the Corporation will proceed to a capital investment. Where capital
16 projects are developed, these will be reviewed during future General Rate Applications or
17 Major Capital Project Permit Applications as appropriate.

18 **2.1 Snare Hydro Development**

19 The Snare/Yellowknife Hydro system comprises a series of four hydroelectric projects on the
20 Snare River system. The hydro facilities provide energy to the communities of Yellowknife,
21 Behchoko and Dettah. NTPC began studies into developing another potential hydroelectric
22 project, Site 7, in the mid-1990s. Since that time NTPC has continued to update the
23 business case for Site 7 as system loads, energy markets and construction costs have
24 changed over time.

25
26 At present, NTPC is forecasting the need for new generation resources on the Snare
27 Yellowknife system by approximately 2020. Potential industrial development or new electric
28 heat load in the region may improve the business case for Site 7 such that it could be

1 advanced prior to the 2020 in-service date when new generation resources are expected to
2 be required. Considering the requirements for aboriginal involvement, regulatory approvals,
3 financial and other requirements, development of Site 7 is expected to require a minimum of
4 eight years. NTPC has begun negotiations with the Tli Cho Investment Corporation (Tli Cho)
5 concerning future hydro development on Tli Cho land. NTPC is actively working with the Tli
6 Cho to develop an appropriate business case that benefits all stakeholders.

7

8 Funding for the feasibility studies was provided by NTPC. Further funding for regulatory
9 approval or development of this project has not yet been secured as it is unknown who will
10 undertake this development. Once this is determined, the proponent responsible for the
11 development of Site 7 will be responsible for securing funding either from government or on
12 its own merit.

13 **2.2 In-stream Hydro Generation**

14 An in-stream hydrokinetic power generation system is comprised of a turbine attached to a
15 floating pontoon boat that is anchored to the riverbed. It is similar to a vertical wind turbine
16 except that instead of wind, water flowing in the river turns the turbine. Currently the units
17 come in sizes ranging from 5 kW to 25 kW but they can also be connected in series. For
18 example, four 25 kW turbines can be stacked one after another to achieve a total output of
19 100 kW.

20

21 If this technology proves viable, potential site locations include communities along river
22 systems where the turbines can be connected to the electrical grid in a cost effective
23 manner. Such communities include but are not limited to Fort Simpson, Jean Marie River,
24 Tulita, Deline, Norman Wells, Wrigley, Fort Good Hope, Aklavik and Tsiigehtchic.

25

26 In October 2008, NTPC in conjunction with New Energy Corporation from Calgary, AB
27 conducted a hydrological assessment in Fort Simpson to determine the potential power
28 generation for a hydrokinetic project. This assessment could be the basis for a

1 demonstration project in Fort Simpson that would involve the purchase and installation of a
2 25 kW hydrokinetic turbine.

3

4 Fort Simpson is being proposed for this demonstration project because the Corporation has
5 been studying the potential for an in-stream hydro unit at this location for several years. As
6 a result, more technical information exists for this location. Also, the Corporation has
7 technical staff in Fort Simpson which will reduce costs and help ensure the success of the
8 project as it can be monitored and maintained more easily from this location. Finally, the
9 community strongly supports this technology.

10

11 The assessment was funded by the GNWT. The Corporation is in negotiations with the
12 GNWT to provide a capital contribution towards a demonstration in-stream hydrokinetic
13 power generation system at Fort Simpson to test this new technology in a northern operating
14 environment.

15 **2.3 Wind Energy Request for Proposal**

16 In February 2008 NTPC issued a request for proposals (RFP) for the purchase of power
17 from wind generation. This RFP is scheduled to close in January 2009. The lengthened
18 response time (approximately 11 months) was designed to give proponents enough time to
19 establish potential joint ventures and obtain government funding, which could strengthen
20 potential business cases. As of December 15, 2008, 23 parties have requested copies of
21 the RFP.

22

23 The wind energy RFP requested proposals to design, install, own and operate wind
24 generator(s) that will provide a portion of the required load to isolated communities presently
25 served by NTPC generation. NTPC would purchase the power from the successful
26 proponent and assist with interconnecting this project to the Corporation's distribution
27 system. This RFP is directed to proponents with a combined knowledge of wind energy
28 systems and northern and/or remote construction.

1
2 Although NTPC is not eligible for available Federal government funding for wind generation,
3 it is committed to working with the proponents to obtain this funding.

4 **2.4 Wind Energy Deployment**

5 In the past, the Corporation attempted to develop wind generating alternatives on four
6 different occasions (Sachs Harbour, Rankin Inlet, Kugluktuk and Cambridge Bay). In all
7 cases, the technology at that time was not sufficient to sustain a cost effective, generating
8 alternative for its customers. In efforts to re-visit this initiative and ensure current wind
9 generating technologies can operate in our unique environment, the GNWT is pursuing wind
10 energy deployment in the Inuvialuit Settlement Region at no risk to the regulated customer.
11 These efforts have advanced to the stage of a detailed business plan for installation of a
12 wind turbine in Tuktoyaktuk in 20010/11. Tuktoyaktuk will host the first project, possibly
13 followed by other installations in Sachs Harbour, Ulukhaktok and Paulatuk in future years.
14 The first installation in Tuktoyaktuk will consist of four 65 kW wind turbines. Other
15 communities will utilize the same model of turbine in smaller configurations to account for
16 electrical load requirements.

17
18 The Corporation's role in this initiative will be to purchase the electricity from the wind
19 generators, which will partially displace current thermal generation, to provide technical
20 assistance and to perform the necessary interconnection to the Corporation's distribution
21 system. NTPC will monitor the success of this project to determine if this technology offers
22 any benefits to customers.

23
24 Until other project partners are identified, the GNWT may need to finance the full cost of this
25 project.

1 **2.5 Residual Heat Recovery**

2 Diesel generators are approximately 35% efficient; that is they can only convert about one-
3 third of the energy they use into electricity. The remaining energy is lost as it is released
4 into the environment in the form of heat. Some of that heat can be recovered and used for
5 space and water heating locally and in nearby buildings. Installing a residual heat system
6 offers the potential to displace heating fuel, thereby saving operating costs and reducing
7 Greenhouse Gas (GHG) emissions. These systems might also reduce the amount of fuel
8 storage required in the community, possibly deferring future tank farm expansion costs.
9 Reduced heating oil consumption reduces transportation volumes, which also reduces
10 environmental risks associated with transportation of bulk fuel and further reduces GHG
11 emissions associated with transportation.

12
13 The Corporation has considerable experience with residual heat projects. Since taking over
14 the utility from the Federal Government, NTPC has incorporated residual heat recovery from
15 the majority of the Corporation's thermal plants to meet the needs of the Corporation's own
16 local facilities, including power plants and offices.

17
18 With respect to the use of residual heat outside of NTPC's facilities, Aadrii Limited (a joint
19 venture between NTEC and the Gwich'in Development Corporation) owns a district heating
20 system in Fort McPherson which began delivering supplemental heat to customers in 1997.
21 The current customers are the Water Treatment Plant, the Tent and Canvas Shop, and the
22 new Chief Julius School. Residual heat is provided at a reduced cost compared to
23 equivalent heating oil costs. Funding for this commercial operation was provided by the
24 owners.

25
26 Fort Simpson has been receiving heat from the power plant for their water intake facility.
27 The costs for upgrades to the residual heat recovery system were borne by the Village. The
28 Village receives the heat at no charge.

29

1 Inuvik also receives heat from the power plant for their water intake facility. The Town pays
2 a set annual fee for the heat under a contract which expires in 2014.

3
4 The GNWT's Department of Public Works designed and installed a residual heat recovery
5 system in Wha Ti for the school. All costs were borne by the GNWT. The school received
6 the heat from NTPC at no charge. The customer's facilities related to this project have been
7 inoperable in recent years and it is not certain if the customer has future intentions to repair
8 these facilities as the plant may become stand-by, which would remove the source of the
9 heat.

10
11 In 1994 the community of Ulukhaktok, with assistance from GNWT, built a system to provide
12 heat from the NTPC power plant to three community buildings adjacent to the plant. The
13 customer's facilities related to this project are now inoperable. NTPC is in negotiations with
14 the GNWT to fund an upgrade to this system.

15
16 Currently, the Corporation is undertaking an analysis of existing power generating
17 infrastructure and potential heat loads that could be served by a residual heating system in
18 the communities of Inuvik, Fort Liard and Fort Simpson and has requested funding to study
19 Ulukhaktok. The analysis will include cost estimates to upgrade infrastructure, both at the
20 plant and at the potential customers' facilities. NTPC received three Eco Trust Fund
21 contributions for the proposed residual heat studies totalling \$190,000. Funding will be split
22 equally between the sites for study purposes.

23
24 The Corporation is currently in negotiations with the GNWT to provide a capital contribution
25 towards the development and/or expansion of residual heat systems in these communities
26 as well as a contribution towards replacing the residual heat systems in Ulukhaktok.

1 **2.6 Converting Waste Heat to Electricity**

2 Converting waste heat to electricity is not a new concept but it is generally done from high-
3 grade heat sources such as gas turbines where the exhaust temperatures are higher than
4 500°C. This process uses a boiler to heat liquid into a vapour, which in turn spins a turbine
5 to create electricity. Diesel generators are low-grade heat sources around 200°C. A
6 company has recently filed a patent application for a technology that converts low-grade
7 heat to electricity. NTPC is currently monitoring any progress made in this area and may
8 pursue further if this technology is developed for the market.

9 **2.7 Wha Ti Transmission Line**

10 This project would involve the construction of a 65 km transmission line from the existing
11 Snare hydro facility to provide hydro power to the community of Wha Ti. The project would
12 have environmental benefits related to reduced greenhouse gas emissions from thermal
13 generation. The transmission line would be comprised of 650 wood poles, operate at 34.5
14 kV and include two substations, and a 30-foot right of way. The existing diesel plant would
15 be retained for back-up.

16
17 It would take approximately two years to gather the data needed for permitting and
18 environmental assessment and one year for a decision. Once permitted, construction of the
19 30 foot right of way, line and substations is estimated to take an additional year to complete.

20
21 In concert with this, the community of Wha Ti is also investigating the option of a mini-hydro
22 plant on the La Martre River. Community support currently favours the mini hydro option,
23 therefore support for the transmission line is limited. Regardless of which option is pursued,
24 community support is required in order to receive the appropriate regulatory approvals.
25 NTPC is in negotiations with the GNWT for a capital contribution for this project.

1 **2.8 Lutsel K'e Mini Hydro**

2 NTEC(03) is assisting the community to investigate the feasibility of a mini-hydro facility. The
3 hydro facility would be located on the Snowdrift River approximately 14 km from the
4 community. Water would be diverted via a 270 metre penstock to the powerhouse. The
5 transmission line would follow the road to Lutsel K'e. The initial turbine size would be 500
6 kW however the facility would be designed for expansion to 1 MW. If the mini-hydro project
7 proceeded, a stand-by diesel plant would be constructed in a new location at an estimated
8 cost of \$3 million. This would represent a cost savings of \$4 million compared to the
9 construction of a new diesel plant for the community (estimated at \$7 million).

10

11 It is anticipated that it would take approximately four years to complete the investigations
12 needed to obtain regulatory approvals for the project. Construction of the project is expected
13 to take three years following regulatory approvals.

14

15 NTEC (03) received \$350,000 from the GNWT and Federal Government towards the
16 studies. NTEC (03) has undertaken this work as they with their partners, the Metis Energy
17 Company Ltd. and Akaitcho Energy Corporation are in ongoing discussions with Lutsel K'e
18 with respect to hydro. It is possible that a capital contribution may be available from the
19 Taltson Expansion Project towards this project. NTPC is also in negotiations with the
20 GNWT for a capital contribution towards this project.

21 **2.9 Natural Gas Conversion**

22 Construction of the Mackenzie Gas Project would potentially result in access to natural gas
23 for communities and industries throughout the Mackenzie Delta and Valley. This offers the
24 NWT an opportunity to convert the power generation in some of these communities to this
25 clean, and potentially less costly fuel supply.

26

1 The GNWT is proposing conversion of communities to natural gas for heat and electricity
2 generation in relation to construction of the Mackenzie Gas Project. To date, desktop
3 studies have indicated that there could be a cost reduction to individuals in certain
4 communities if conversion took place. NTPC is working with the GNWT, who are funding
5 the studies on this analysis. There is a requirement to complete additional on-the-ground
6 technical evaluations in order to further refine the potential for conversion. In addition,
7 several questions remain unanswered in regards to possible small scale liquefied natural
8 gas supply to larger, off-corridor communities and businesses, and other communities
9 should be examined in greater detail through modeling, given the changing energy
10 demands, supply, and costs.

11
12 The overall objective of this initiative is to fully explore the potential for natural gas
13 conversion in the NWT and provide the technical basis for a policy decision by the GNWT on
14 the appropriate next steps in the initiative.

15 **2.10 Deep Geothermal Electricity Generation**

16 The GNWT is proposing to investigate the potential for geothermal electricity generation in
17 the Liard Valley. Deep geothermal energy is extracted from the earth from depths of 5 to 7
18 kilometres as super-heated water at temperatures of over 150°C. The Liard Valley is well
19 suited for this technology because earlier gas well exploration has confirmed that high grade
20 heat can be accessed at shallower depths.

21
22 NTPC will continue to monitor this technology and support the GNWT in its efforts to study
23 this potential.

24 **2.11 Micro-Turbines in Inuvik**

25 NTPC has worked with the Town of Inuvik since 2002 on the installation and operation of
26 two natural gas fired micro-turbine units to supply combined electricity and residual heat to

1 the Town's recreation complex. This technology is only available for communities with
2 natural gas and is NTPC's first venture involving micro-turbines. NTPC is monitoring the
3 development of this technology in a diesel format but so far it is not available.

4

5 To date, the performance of these units has not met the manufacturer's specifications.
6 NTPC will continue to monitor the performance of the micro turbines and work to improve
7 their performance.

8 **2.12 Taltson Hydro Expansion Project**

9 The proposed Taltson Hydro Expansion Project (THP) is a new 36 MW hydro plant located
10 at Twin Gorges on the Taltson River. This project is being pursued by Dezé Energy
11 Corporation, which is comprised of the NWT Energy Corporation (03) (NTEC(03)), the
12 Akaitcho Energy Corporation, and the Métis Energy Company Limited.

13

14 The expanded capacity would provide hydroelectric power to the diamond mines located
15 northeast of Great Slave Lake: Snap Lake, Ekati Diamond Mine, Diavik Diamond Mine, and
16 Gahcho Kué Mine (currently in Environmental Assessment). NTPC and NTEC (03) has
17 been working with Aboriginal organizations since 2002 to expand the Taltson site to supply
18 hydro to the diamond mines. The length of the development period, coupled with the
19 technical nature of the predevelopment work, means that significant expenditures must be
20 incurred before the viability of the Taltson Hydro Expansion can be assessed to an
21 acceptable degree of confidence. To date, approximately \$10 million (provided by the
22 Federal government, Territorial government, and the project proponents) has been
23 expended to bring the project to this relatively advanced stage of development. All work
24 completed thus far points to the project being viable and having the potential for long-term
25 positive economical impacts for the NWT.

26

27 The project is currently in the environmental assessment process. Signing of the Project
28 Development Agreement between Dezé partners is scheduled for spring of 2009 and the

1 Developer's Assessment Report will be filed with the Mackenzie Valley Environmental
2 Review Board in early 2009.

3 **2.13 Wha Ti Mini Hydro**

4 The Community of Wha Ti is investigating the construction of a mini hydro project on the La
5 Martre River. This project consists of installing a 1 MW hydro unit to serve the community
6 load and heating requirements. The project would also have environmental benefits related
7 to reduced GHG emissions from thermal generation. The existing diesel plant will continue
8 to be maintained as back up generation for the community.

9
10 This initiative is being studied in conjunction with another option to construct a transmission
11 line to the Corporation's existing Snare Hydro facility. The Corporation is participating and
12 supporting the community's efforts to complete this study. Until this study is completed, a
13 decision cannot be made on which project best meets the community's needs.

14
15 NTEC (03) received \$350,000 from the GNWT and Federal Government's Eco Trust Fund
16 Program to fund the studies. NTEC (03) received the funding as NTPC believes the
17 transmission line extension is the better project for customers.

18 **2.14 Bear River Feasibility Study**

19 This is a proposed study undertaken by Sahdae Energy Ltd to examine the feasibility of
20 hydro generation on the Bear River to provide power to the communities of Deline and
21 Tulita. The possible construction of a natural gas pipeline down the Mackenzie Valley has
22 given rise to the opportunity of generating and supplying hydroelectricity to the pipeline
23 operators. However the Bear River has hydro generation potential given the location of the
24 St. Charles rapids and the proximity of Deline and Tulita to that generation site. Sahdae
25 Energy Ltd. is currently in confidential discussions with the GNWT to secure financing.

1 **3.0 DEMAND SIDE MANAGEMENT AND ENERGY EFFICIENCY PROJECTS**

2 In addition to alternative energy projects, the Corporation investigates and pursues DSM
3 and energy efficiency projects where these projects provide economic or other benefits to
4 the Corporation and its customers. This section reviews those projects related to energy
5 efficiency and DSM currently being investigated or implemented by the Corporation.

6 **3.1 Streetlight Conversion**

7 In the spring of 2008, NTPC completed a streetlight conversion in the community of Wrigley.
8 This marks the completion of a corporate-wide initiative to complete streetlight change-outs
9 in all thermal communities serviced by NTPC from the less efficient mercury vapour
10 streetlight to a more efficient high pressure sodium (HPS) streetlight. This initiative
11 produces lower annual streetlight loads, lower streetlight expense for communities and lower
12 GHG emissions.

13
14 Funding to help offset the change-out costs is available to communities through the NWT
15 Energy Conservation Program from the GNWT's Department of Environment and Natural
16 Resources. NTPC played a key role in helping communities secure this funding including:
17 informing communities of the existence of the program; assisting with the completion of the
18 required documentation; and acting as liaison between the community and the GNWT.

19 **3.2 Light Emitting Diode (LED) Streetlights**

20 LED streetlights use less than half the power of a high pressure sodium light of the same
21 output and, although they cost about double the price, these lights may last up to 1 million
22 hours versus the typical 30,000 hours of a high pressure sodium light. The Corporation is
23 awaiting delivery of six LED streetlights that will be installed at three trial locations:
24 Yellowknife (Jackfish Plant), Inuvik, and Fort Simpson. Once installed, the Corporation will
25 monitor the performance of these new lights from an operational and economic standpoint.
26 If successful, more LED streetlights may be purchased in the future.

1 **3.3 Longer Life Batteries**

2 This is an energy storage device that has the ability to discharge large quantities of energy
3 quickly and has a longer charge-discharge life cycle than typical batteries. Using these
4 batteries in conjunction with a typical diesel generator may increase plant efficiency. During
5 higher load periods, a diesel generator can run at peak efficiency and the excess energy can
6 be stored in the battery. During lower load periods, a smaller generator can be used and the
7 battery can supply the extra energy or diesel generators can be turned off completely.
8 NTPC is currently working with Natural Resources Canada to provide load data and engine
9 configuration information so that a profile for the battery charging/discharging and a battery
10 rating can be developed. NTPC is currently monitoring any progress made in this area and
11 may pursue further if this technology is developed for the market.

12 **3.4 Diesel Fuel Catalysts**

13 A diesel fuel catalyst is a substance that, when mixed with low sulphur diesel fuel makes a
14 physical change to the way the diesel fuel is burned. As a result, fuel consumption, engine
15 wear, and emissions are reduced in older model engines currently in service. However, it is
16 not expected to materially improve engine efficiency for new engines equipped for the new
17 California emission standards. NTPC is investigating and speaking with other Canadian
18 companies that use these products.

19 **3.5 NWT Hydro Strategy**

20 The GNWT may fund NT Hydro to conduct ongoing baseline environmental, engineering
21 and economic work related to future development of the NWT hydroelectric resources. The
22 strategy will quantify the resources available, identify opportunities and challenges of
23 development, and create a long-term vision for sustainable hydroelectric development in the
24 NWT.

1 **3.6 Fort Smith Electric Heat**

2 The Corporation has partnered with the GNWT on this project. The GNWT has converted
3 the heating system in several of its buildings in Fort Smith to one that uses electric boilers.
4 This heating system avoids the use of heating oil and therefore reduces GHG emissions. All
5 costs associated with this conversion including all upgrades to the Corporation's distribution
6 system were funded by the GNWT. To support these efforts, NTPC is selling the electricity
7 used for heating purposes to the GNWT at an interruptible rate in accordance with PUB
8 Decision 19-2005.

9 **3.7 Station Service Initiatives**

10 The Corporation has undertaken a number of measures to reduce its reliance on diesel fuel,
11 and assist customers to conserve energy thereby reducing diesel generation:

12

- 13 • Programmable logic controllers (PLC) automate power plant diesel engines and help
14 ensure that the appropriate engines are operating to most efficiently service
15 fluctuating loads. The PLC's are being connected to NTPC's SCADA System so
16 plants can be monitored 24/7. This contributes to improved plant efficiency.
- 17 • The purchased power contract to buy power from Imperial Oil Ltd. in Norman Wells
18 has been renewed 3 times since originally signed. This power, produced by natural
19 gas, reduces the use of the diesel power plant.
- 20 • Two natural gas engines were installed in Inuvik in 1999 and a third was installed in
21 2006. These three engines will allow 95% of Inuvik's generation to be supplied from
22 natural gas.
- 23 • Yellowknife is now a standby diesel plant so a new heating source was needed (as
24 an operating plant it was heated using residual heat from the engines). The system
25 installed uses excess hydro to provide electric heating avoiding the need for a boiler
26 using heating fuel.

- 1 • lower station service and vehicle fuel expense by installing engine coolant heaters on
2 diesel vehicles. These heaters will be used to warm the engine and vehicle cab
3 instead of letting the vehicle idle or plugging in the vehicle's block heater.
- 4 • Utilizing jacket water heat from gensets to:
 - 5 ○ Provide block heating instead of traditional electric block heating;
 - 6 ○ Provide space/comfort heat within power plant and office facilities;
 - 7 ○ Provide space heating for transient quarters in certain locations.
- 8 • Replacement of inefficient lighting;
- 9 • Upgrades to distribution systems have been undertaken to lower line losses. Since
10 1998/99 line losses have been reduced by 4% in diesel and gas communities.
- 11 • Installation of separate lighting circuits so that only specific lights are on at certain
12 times;
- 13 • Installation of variable frequency drives on radiators and ventilation systems; and
- 14 • Installation of photo sensors on all outside lighting.

15 **3.8 Energy Audits**

16 Customer Research Surveys completed in 2000 and 2002 confirmed that customers would
17 like more information on how to make their homes more energy efficient. To meet their
18 needs, NTPC implemented a Residential Energy Efficiency Program in 2002/03 targeting
19 residential customers responsible for their own bills in the 13 remote northern communities
20 of the Delta-Sahtu region. Approximately 500 customers participated in the program. Each
21 participant received recommendations to lower their consumption as well as energy saving
22 light bulbs and an energy efficient showerhead. The energy efficiency assessments showed
23 that high power consumption was primarily caused by inefficient, outdated, or poorly
24 maintained electrical appliances. Due to the success of this program in the Delta-Sahtu
25 region, NTPC ran the program in the Deh Cho and North Slave regions in 2004/05 and in
26 the South Slave region in 2005/06. Funding for the Delta Sahtu assessments was received
27 from the Federal Government. When the Federal Government would not continue to fund

1 the program NTPC funded the 2004/05 program. Funding was obtained from the GNWT for
2 the 2005/06 program. The program included the following key objectives:

- 3
- 4 • To conduct comprehensive energy efficiency audits of residential homes;
- 5 • To provide customers with information pertaining to energy efficiency solutions and
6 how to obtain them;
- 7 • To provide customers with information pertaining to climate change and how energy
8 conservation can make a difference; and
- 9 • To discuss with customers any concerns regarding the service and electricity
10 currently supplied to them by NTPC.

11

12 The Commercial Energy Efficiency Audit Program includes site visits to educate and provide
13 feedback to NTPC's commercial customers regarding their energy consumption, energy
14 shortfalls, energy tips and cost saving energy solutions. The program's objectives are:

- 15
- 16 • Target large commercial customers and evaluate their electrical consumption;
- 17 • Conduct energy efficiency audit of the customer's building envelope inside and
18 outside, heating and cooling system and lighting system;
- 19 • Educate customers with information pertaining to climate change and how energy
20 conservation can make a difference and lower their energy consumption; and
- 21 • Discuss with customers any concerns that they may have regarding the service and
22 electricity currently supplied to them by NTPC.

23

24 NTPC began this program in 2005/06 with four large commercial customers and one major
25 recreational facility. After conducting the energy audits, each customer was provided with a
26 written report on their present energy consumption and provided with recommendations on
27 the means required to not only reduce that consumption but also the cost savings that could
28 potentially occur if the customer put the recommendations in place. This program is currently
29 underway in the community of Fort Simpson. There are approximately two dozen
30 commercial customers that will receive energy audits in the Deh Cho region and the service

1 will be expanded to other regions upon completion of this stage. NTPC is currently funding
2 this program

3 **3.9 Energy Conservation Education**

4 NTPC is committed to both employee and customer education regarding energy awareness.
5 We hope to create an awareness of energy efficient practices and measures that can be
6 implemented by all to ensure that the maximum benefit is derived from the electricity
7 produced. Climate change issues are discussed in conjunction with many of our programs to
8 promote energy awareness and conservation. The communication avenues discussed
9 below are utilized to inform employees and the public of the many ways in which they can
10 contribute to reductions in GHG production.

11
12 In the past, NTPC issued a customer newsletter, Energy @ Work, which provided energy-
13 saving information that could be utilized within homes and communities to reduce energy
14 demands. Currently, brief energy saving tips are printed on power bills and slips of paper
15 containing additional tips are included in the envelopes with each monthly power bill.
16 Conservation messages appear as well in local community newspapers. NTPC also does
17 presentations in schools providing energy information to students in grades 5 and 6.

18
19 NTPC was a founding member of the Arctic Energy Alliance (AEA) and is a sustaining
20 member today. The AEA is a not-for-profit organization established in 1997. The AEA's
21 mandate is to help reduce the financial costs and environmental impacts associated with
22 energy and utility services in the NWT.

23
24 In 2001 NTPC ran a series of workshops for commercial customers to explain demand-side
25 management. It was communicated that if customers could better manage their power
26 usage to minimize peaking, they would save both money and power. In 2002, NTPC
27 developed fact sheets pertaining to demand-side management to be distributed to
28 commercial customers. These fact sheets, with such titles as Understanding Demand

1 Charges, Understanding your Power Bill, and Understanding Costs of Running Electrical
2 Appliances are distributed to both commercial and residential customers across the NWT.
3 These brochures were produced to encourage customers to reduce their power
4 consumption and to help understand how much electricity they use.

5
6 The Corporation also has a memorandum of understanding with the Native Communications
7 Society of Northwest Territories. This society runs radio programming in virtually every
8 community in the Northwest Territories. This has provided another medium for the
9 Corporation to run energy conservation messages to its customers.

10
11 Finally, NTPC maintains a corporate website, www.ntpc.com, where customers can access
12 all of its publications as well as numerous energy conservation education tools. This site is
13 currently being upgraded to provide more energy conservation tools for the Corporation's
14 customers to utilize.

15 **4.0 CONCLUSION**

16 This report has been prepared in compliance with Directive 51 from Decision 13-2007. This
17 report covers the period up to December 31, 2008. Subsequent reports will be prepared to
18 update this information and provide new information to be filed with the PUB on a bi-annual
19 basis.