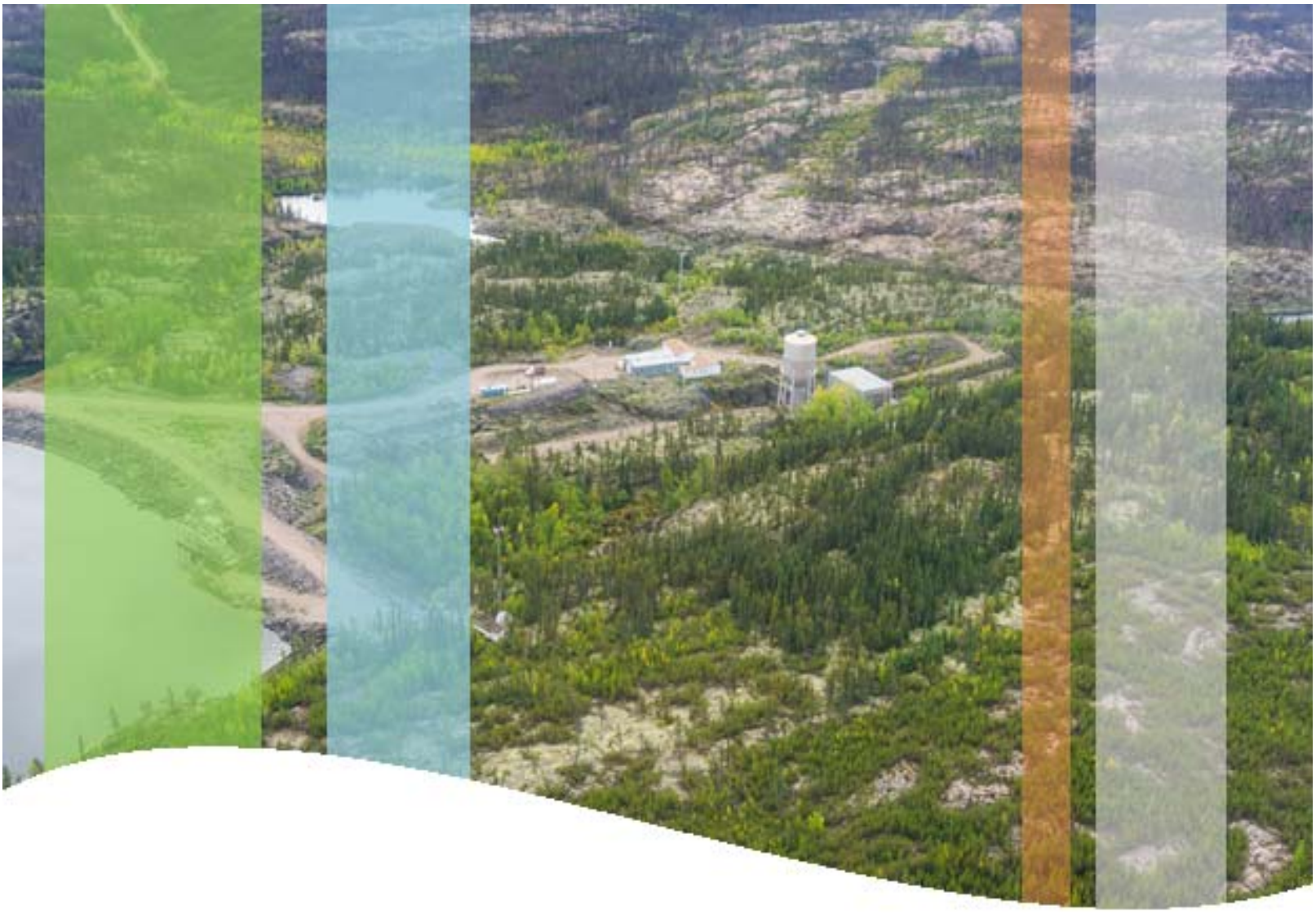


2016-17 Greenhouse Gas Report

NORTHWEST TERRITORIES POWER CORPORATION
Empowering Communities

TABLE OF CONTENTS

INTRODUCTION

Company Profile

The Northwest Territories Power Corporation is a Crown corporation wholly owned by the Government of the Northwest Territories. NTPC was created in 1988 when the Territorial Government purchased shares of the federally owned Northern Canada Power Commission. Today we are the primary power producer in the Northwest Territories (NWT). We distribute electricity to the end-use consumer in 25 communities and supply electricity on a wholesale basis to two distributing utilities. These utilities in turn retail electricity to customers in the Yellowknife and Hay River areas.

NTPC's facilities include hydroelectric, diesel, and natural gas generation plants, as well as transmission systems and numerous isolated electrical distribution systems. NTPC operates 31 power plants including the standby diesel generation facilities

within the Bluefish, Snare, and Taltson hydro systems and the Inuvik and Norman Wells natural gas systems. NTPC purchases and distributes natural gas generated power in Norman Wells. We also own and operate alternative energy assets used for the supply of residual heat, solar power, and cogeneration in several communities. Figure 1 shows the NWT and the locations of communities served by NTPC.

NTPC serves a population of approximately 42,700 people located in an area of 1.3 million square kilometers. Approximately 69% of the population lives in the North and South Slave regions, while the rest of the population resides in small communities widely dispersed throughout the NWT. The total electrical load for the NWT is approximately 73 MW, with isolated power systems having generating capacities ranging from 230 kW at Jean Marie River to 62 MW at Snare/Yellowknife (including Bluefish Hydro). As these systems are isolated and unconnected, each must be planned for and operated independently.

NTPC exists in a unique operating environment that has a profound impact on operations throughout its service area. Extremely low customer densities, a harsh climate, a mix of hydro/diesel/natural gas generation, and the lack of an integrated transmission system present logistical challenges that set NTPC apart from most utilities.

Figure 1: NTPC Service Area

Commitment to Reducing GHG Emissions

NTPC's long term vision includes a commitment to the environment. Each year the Senior Leadership Team and the Board of Directors approve strategies to achieve specific goals with respect to environmental performance, including GHG reduction. In addition, NTPC has environmental and capital plans that are approved annually by the Board and reviewed quarterly. These plans include actions to reduce GHG such as alternative energy projects, streetlight conversions, and engine replacements.

NTPC employs an ISO 14001 compliant Environmental Management System (EMS). The EMS includes a review of current climate change practices implemented by NTPC, which helps develop and monitor new targets.

Management System

Our GHG emissions are monitored at the most senior levels of NTPC by the Board of Directors and the President and CEO. Senior Leadership not only review and approve NTPC's Strategic Plan, but review and approve any GHG initiatives through the annual capital and financial planning process. The Minister responsible for NTPC is also advised of all major issues regarding NTPC including our GHG reduction programs.

Through our annual GHG report we analyze and monitor NTPC's success in reducing GHG emissions. NTPC data from the Environmental, Financial, and Engineering departments is compiled, analyzed and reviewed at a management level to generate the GHG report.

External Verification

The Auditor General of Canada annually carries out external verification of NTPC data, including fuel consumption and generation statistics.

In accordance with the Public Utilities Board (PUB) process for setting power rates all aspects of our operations, including our GHG initiatives and their associated costs and benefits, are reviewed publicly and by the PUB.

In 2003 Environment Canada's National Pollutant Release Inventory (NPRI) introduced Criteria Air Contaminants (CACs) into their list of toxic substances to be reported annually. In 2008 the Canadian Electricity Association (CEA) created the Sustainable Electricity (SE) Program which requires reporting of environmental, social and economic indicators.

NTPC now reports emissions annually to the NPRI and CEA.

In 2012, Duerden & Keane Environmental Inc., an independent, qualified assessor, completed an on-site verification at NTPC's Head Office to determine NTPC's degree of adherence to the CEA's Policy on Sustainable Development, accuracy of the information submitted by NTPC for the SE report and conformance to the CEA's requirements for an ISO 14001 consistent EMS.

The verification confirmed NTPC's commitment to sustainable business practices and principles, as well as having a well documented and implemented EMS system.

BASE YEAR QUANTIFICATION

NTPC used the 1990-91 fiscal year to create a Baseline for emissions against which to compare subsequent years.

Baseline Quantification

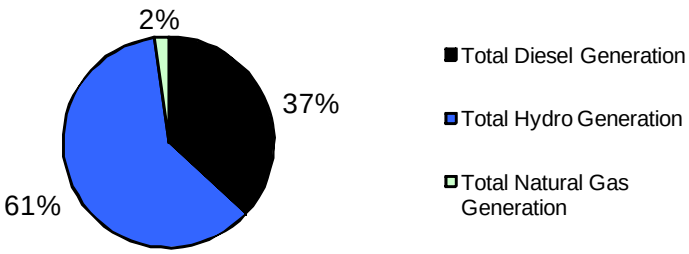
Emission factors from Environment Canada's GHG Inventory were used to calculate emissions. Table 1 illustrates our 1990-91 Baseline emissions according to GHG type.

Table 1: Baseline Emissions Estimates by Greenhouse Gas Type

	Tonnes			
Fiscal Year	CO_2	CH_4	N_2O	Total Emissions
1990-91	136,938	9.67	1.59	137,653

Hydro, diesel, and purchased natural gas generated power accounted for 61%, 37%, and 2% of total generation in 1990-91, respectively. Figure 2 illustrates 1990-91 percent generation according to source.

Figure 2: Power Generation by Source for 1990-91 (Baseline Year)



Direct and Indirect Emissions

NTPC's direct GHG emissions result from the combustion of fossil fuels to generate electricity in NTPC-owned diesel and natural gas facilities.

Indirect emissions are those created or saved by operations not directly controlled by NTPC, but affected by NTPC business decisions. These include emissions produced from purchased natural gas generated power and emissions saved as the result of residual heat projects providing heat to buildings not owned by NTPC.

In 1990-91 NTPC did not own any natural gas generating facilities. All natural gas generation emissions at that time were therefore indirect emissions resulting from the purchase of natural gas generated power in Norman Wells. Table 2 illustrates NTPC's emissions according to source for 1990-91.

Table 2: Baseline GHG Emissions by Source

	CO_2 Equivalent Tonnes		
Fiscal Year	Diesel Generation	Gas Generation	Total Emissions
1990-91	131,595	6,058	137,653

Emissions Calculations

Greenhouse gas emissions are calculated using actual fuel consumption data and emission factors. Emission factors are provided by Environment Canada's National Inventory Report (see Table 3).

Table 3: Emissions Factors by Gas Type

Source	CO_2	CH_4	N_2O
Natural Gas	2,466 m^3/L	0.490 m^3/L	0.049 m^3/L
Diesel	2,753 g/L	0.18 g/L	0.031 g/L

The following equivalency factors provided by the NIR were utilized to calculate GHG carbon dioxide equivalent (CO_2e) emissions:

Table 4: Carbon Dioxide Equivalency Factors

Greenhouse Gas Type	CO_2e Factor
CO_2	1
CH_4	25
N_2O	298

NTPC buildings heated by residual heat or electricity directly from NTPC power plants are included in emissions estimates, however emissions produced from oil-fired furnaces in NTPC owned housing, office buildings, etc. are not reported.

Due to the low number of NTPC owned vehicles (61 on average) and the limited distances driven annually, GHG emissions produced from vehicles are not included in this report.

Forecast Emissions

Forecast emissions are based on predicted future power generation values for 2017/18 to 2019/20, which are divided by three-year weighted averages for plant efficiencies to determine fuel consumption. This method of forecasting incorporates the previous year's improvements to fuel efficiencies, upgrades to streetlights and transmission lines, and reductions to station service.

Average hydro generation (assuming normal precipitation levels, as most water comes from runoff) is used to forecast the amount of diesel generation required for those communities where diesel generation supplements hydro generation.

2016-17 GHG EMISSIONS

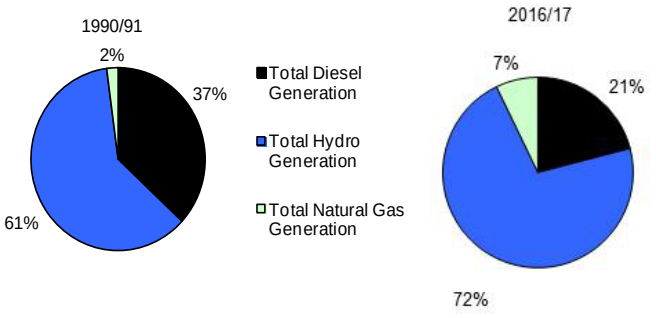
Diesel combustion for the production of power is our major source of GHG emissions. Since 1990 diesel generated emissions have accounted for an average of 80% of our total GHG emissions. The following section illustrates NTPC's production of GHG emissions and the efforts taken in the last year to reduce our reliance on diesel generated power.

Hydropower Generation

Hydropower generation is dependent on water levels and thus varies from year to year. In years of low hydropower generation, diesel generation is increased to meet hydro shortfalls. The majority of NTPC's GHG emissions result from diesel generation, so when hydro generation is low, GHG emissions increase. 2016-17 was a slightly below average water level year resulting in a less than average amount of hydro generation.

Hydropower is currently the cleanest power NTPC can provide to its customers. As diesel generation is utilized as backup power generation for the hydro systems, the more hydropower we are able to produce the more diesel generated power we displace. Figure 3 shows NTPC's average power generation by source for 1990-91 and 2016-17.

Figure 3: Average Power Generation by Source for 1990-91 and 2016-17



In 2016-17 the Bluefish, Snare, and Taltson hydro systems produced 28,122 MWh, 147,945 MWh, and 65,954 MWh of power respectively, totalling 72% of total generation. In the absence of hydropower, all this power would have been generated from diesel.

Diesel Generated Power

NTPC's consumption of diesel fuel for generation purposes, our major source of GHG emissions, has greatly decreased over the years. In 1990-91, 37% of total generation came from diesel generated power. In 2016-17, diesel generated power accounted for 21% of total power generation. Our decreased reliance on diesel generated power has allowed us to reduce our diesel generated CO_2 equivalent emissions from 132,231 tonnes in 1990/91 by 49% to 67,130 tonnes in 2016-17. Table 5 shows NTPC's CO_2 equivalent emissions from both direct and indirect generation sources.

Table 5: GHG Emissions Produced/Gen. Source

	Direct		Indirect	
	CO_2e Emissions (Tonnes)			
Fiscal Year	Diesel Generation	Natural Gas Generation	Natural Gas Generation	Total Emissions
1990-91	131,595	0	6,058	137,653
1991-92	125,336	0	6,128	131,464
1992-93	127,389	0	6,170	133,558
1993-94	130,951	0	6,501	137,452
1994-95	171,402	0	6,463	177,865
1995-96	171,890	0	5,758	177,648
1996-97	119,150	0	5,457	124,607
1997-98	100,855	0	6,089	106,944
1998-99	89,904	0	6,124	96,027
1999-00	50,966	9,608	5,733	66,307
2000-01	45,436	16,414	5,656	67,505
2001-02	43,693	18,720	5,651	68,063
2002-03	58,773	18,482	5,768	83,023
2003-04	65,754	19,136	6,645	91,535
2004-05	56,748	19,293	6,347	82,389
2005-06	38,508	18,718	6,121	63,348
2006-07	34,587	22,802	6,658	64,046
2007-08	46,658	23,460	6,738	76,855
2008-09	39,051	23,339	6,527	68,916
2009-10	35,838	23,487	6,416	65,741
2010-11	43,317	18,710	6,242	68,269
2011-12	43,329	18,223	7,012	68,564
2012-13	58,470	3,531	7,386	69,387
2013-14	58,480	1,786	7,734	67,999
2014-15	94,393	1,643	7,570	103,606
2015-16	111,208	2,594	7,011	120,813
2016-17	64,587	4,205	7,573	76,365

Natural Gas Generated Power

NTPC continues to look for opportunities to replace diesel generated power with less GHG intensive natural gas generated power. Due to a natural gas shortage in Inuvik NTPC began to investigate possible solutions to meet Inuvik's power needs. To counteract the negative economical and environmental effects of converting back to diesel generation NTPC completed the construction of a Liquefied Natural Gas (LNG) storage facility in 2014. LNG is projected to meet Inuvik's electricity needs for the next 20 years. Inuvik now relies on a mix of 60% LNG and 40% diesel.

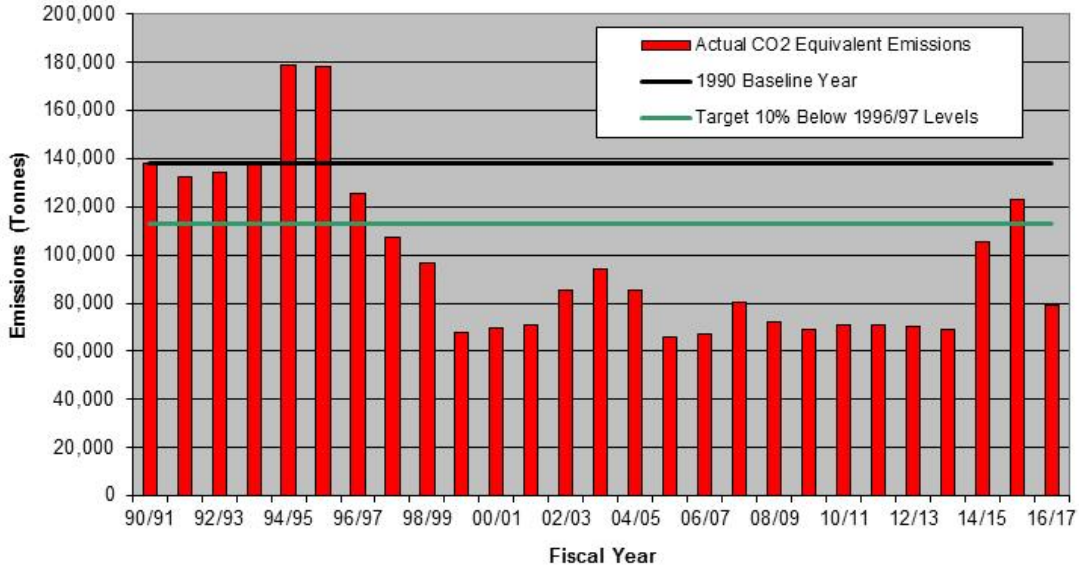
Actual Emissions for 2016-17

NTPC was able to produce fewer emissions per MWh than in 1990-91. This was accomplished by maximizing hydro and natural gas generated power over the more GHG intensive diesel generation. In 2016-17 NTPC produced 78,908 tonnes of CO_2 equivalent emissions, a decrease of 43% from 1990-91 levels. NTPC's GHG emissions remain well below both the 1990/91 Baseline levels. Figure 4 illustrates NTPC's GHG emissions from 1990-91 to 2016-17 while Table 6 illustrates our GHG emissions according to gas type and emissions intensity from 1990-91 to 2016-17.

Table 6: GHG Emissions by Gas Type

	Tonnes				
Fiscal Year	CO_2	CH_4	N_2O	Total CO2 Equivalent Emissions	Emission Intensity (Tonnes/ MWh)
1990-91	137,366	8.89	2.35	138,289	0.370
1991-92	131,213	8.49	2.29	132,108	0.349
1992-93	133,300	8.62	2.32	134,207	0.334
1993-94	137,196	8.87	2.41	138,135	0.333
1994-95	177,405	11.50	2.86	178,544	0.438
1995-96	177,143	11.50	2.76	178,253	0.418
1996-97	124,346	8.05	2.13	125,181	0.297
1997-98	106,812	6.89	2.01	107,584	0.261
1998-99	95,952	6.18	1.89	96,671	0.261
1999-00	66,983	4.15	2.79	67,918	0.176
2000-01	68,587	4.15	3.80	69,824	0.181
2001-02	70,535	4.16	4.11	70,624	0.179
2002-03	84,178	5.14	4.24	85,571	0.214
2003-04	92,770	5.68	4.47	94,244	0.240
2004-05	83,660	5.09	4.35	85,083	0.228
2005-06	64,661	3.86	4.03	65,957	0.193
2006-07	65,659	3.86	4.65	67,142	0.194
2007-08	78,453	4.68	4.89	80,028	0.225
2008-09	70,531	4.17	4.76	72,054	0.209
2009-10	67,374	3.96	4.73	68,883	0.204
2010-11	69,565	4.18	4.10	70,891	0.204
2011-12	69,877	4.20	4.14	71,216	0.207
2012-13	69,758	4.40	2.24	70,534	0.203
2013-14	68,285	4.32	2.03	68,999	0.197
2014-15	104,342	6.54	3.71	105,610	0.313
2015-16	121,611	7.64	4.20	123,055	0.375
2016-17	77,572	4.71	4.09	78,908	0.234

Figure 4: Total CO_2 Equivalent Emissions between 1990-91 and 2016-17



Emissions Intensity

Emissions intensity is a product of the CO_2 equivalent emissions produced in relation to total power generation from all sources (tonnes/MWh). As diesel generated power is our major source of GHG emissions, the lower our emissions intensity the more successful we are at meeting our power generation demands from other, cleaner sources.

NTPC's GHG emissions intensity for 2016-17 was 0.234 tonnes/MWh, well below the 0.370 tonnes/MWh from 1990-91.

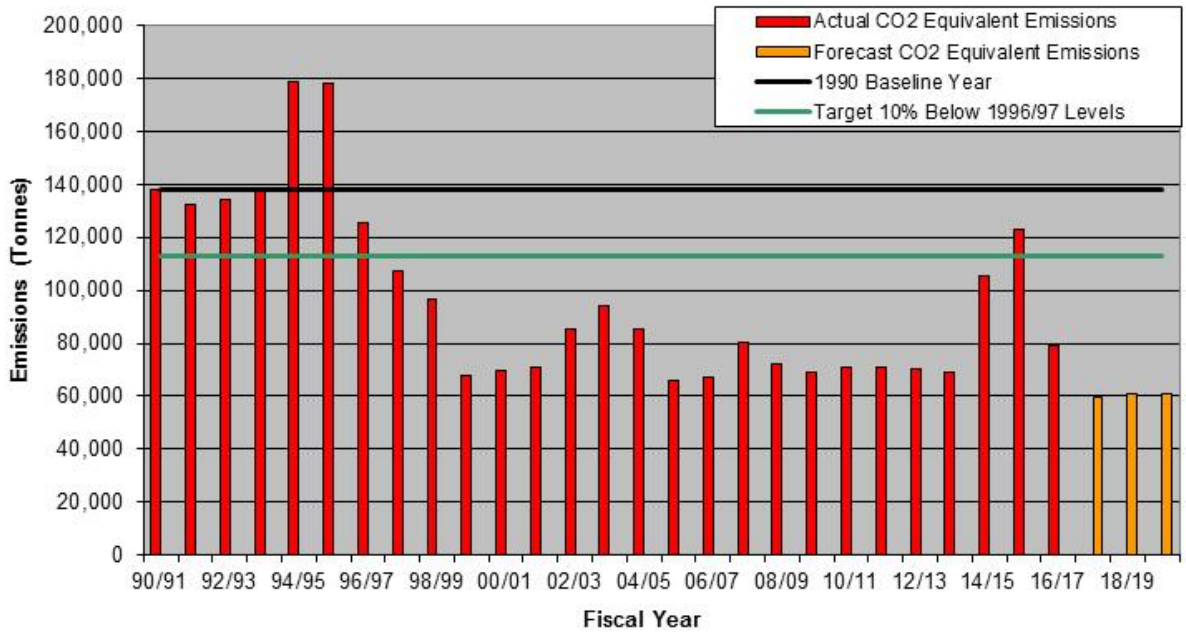
Forecast Emissions

NTPC's forecast GHG emissions for the period of 2016-17 to 2018-19 average 56% below the 1990-91 Baseline levels. Figure 5 illustrates actual CO_2 equivalent emissions and forecast emissions to 2019-20.

Forecast hydro generation is based on a long-term average water level forecast, and has a large influence on NTPC forecast emissions. With average water levels anticipated for 2017-18 total emissions are expected to be lower than in 2016-17.

In 2003 NTPC purchased the Bluefish Hydro facility from a decommissioned mine. Hydropower no longer required by the mine is now available to meet Yellowknife power demands, thereby reducing diesel fuel consumption. Between 2017-18 and 2019-20 we anticipate using an average of 1,298 kL of diesel fuel annually to meet Yellowknife demands. This will produce 3,378 tonnes of CO_2 equivalent emissions per year to service Yellowknife power demands, compared to the 54,529 tonnes produced in 1990-91. Figure 6 illustrates percent change in NTPC emissions relative to 1990/91 levels for actual and forecast years.

Figure 5: Forecast CO_2 Equivalent Emissions as a Product of Total Generation



Liquefied Natural Gas

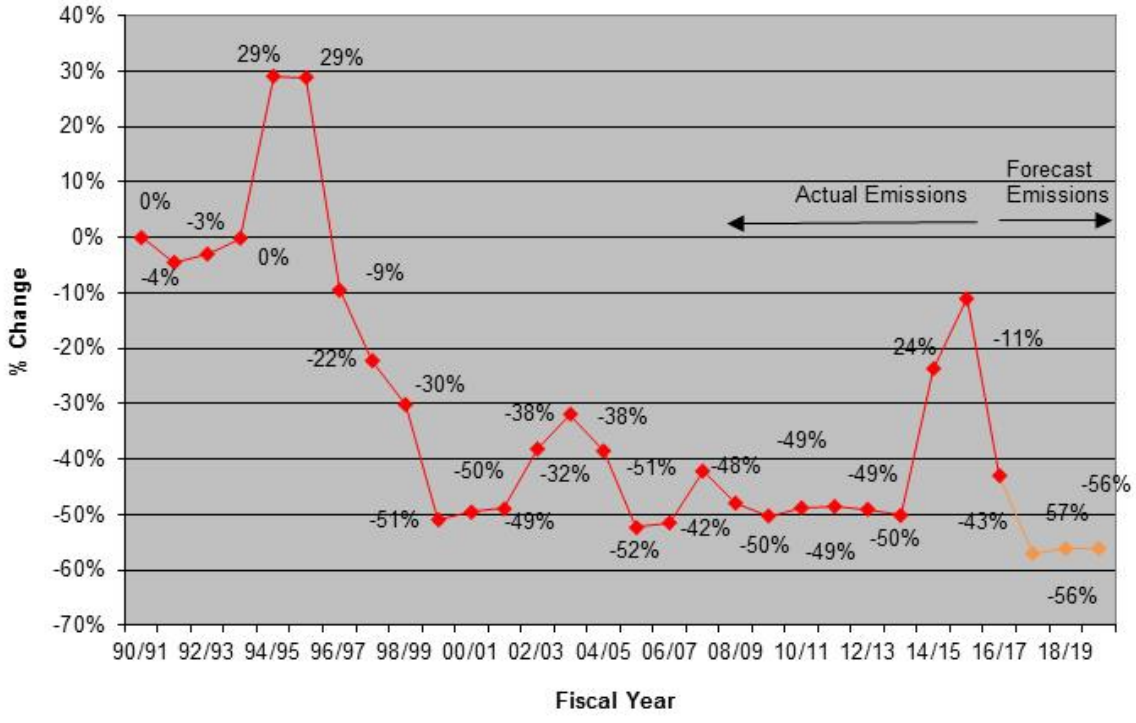
The Town of Inuvik is home to NTPC's first long haul Liquefied Natural Gas (LNG) storage facility. The installation allows roughly 60% of the town's electricity to be generated through LNG. LNG is more environmentally friendly, as LNG fired plants emit less GHG and criteria air contaminates than diesel plants.

The success of the project will also help NTPC determine if other northern communities with road access can also be powered by LNG. NTPC is currently investigating the potential for LNG in the community of Tuktoyaktuk and Fort Simpsons.

Business As Usual Forecasting

Past projects that have resulted in GHG reductions are reflected in our forecast emissions for the period between 2017-18 and 2019-20. The use of techniques such as three-year weighted averages for fuel efficiencies and using the most recent year's data to forecast future years helps to capture the trends that result in GHG reductions and to represent them in forecasts. This is how we develop our "Business As Usual" forecasts, which include existing efforts. This helps to improve our supply-side management through improved diesel engine efficiency programs, reduced station service, residual heat projects, upgraded streetlights, and reduced line losses from transmission and distribution systems.

Figure 6: GHG Emissions Percent Change Relative to Baseline Data



Emissions Reductions Targets

NTPC has successfully decreased emissions below the 1990 Baseline. NTPC will continue to strive to reduce GHG emissions through increases to energy efficiency, energy conservation programs and alternative energy projects. Any major changes to our operating infrastructure will be adopted if they represent an economic benefit as well as a savings in GHG emissions.

RESULTS ACHIEVED & MEASURES TO ACHIEVE RESULTS

NTPC has successfully reduced GHG emissions through a number of programs since 1990-91. The following section describes individual initiatives taken in 2016-17 that contributed to GHG reductions and/or their impacts on future reductions.

NTPC endeavours to improve overall efficiency. Improving operating efficiency reduces reliance on fossil fuels to generate and distribute energy to customers. The benefits of improving efficiency reach beyond NTPC's direct emissions.

The vast geographic area and remoteness of the region means that significant resources and energy must be expended in order to transport fuel to each of NTPC's sites. By reducing the volume of fuel required to generate power the overall energy required to transport fuel to generating sites (derived from fossil fuels) is also reduced.

Examples of individual projects undertaken by NTPC to reduce dependence on fossil fuels and production of GHG emissions during 2016-17 follow below. Table 7 summarizes the cumulative aggregate savings for all initiatives from 1990-91 to 2016-17. The table in Appendix A shows actual and forecast GHG emissions savings by gas type as well as total CO_2 equivalent emissions for all initiatives since 1990-91 forecast to 2019-20. Please note that data from 1991-92 to 1999-00 has been removed from the table to allow room for table expansion. Please see previous years' reports for this data.

Table 7: Cumulative Aggregate Emissions Savings (Tonnes) from All Initiatives since 1990-91

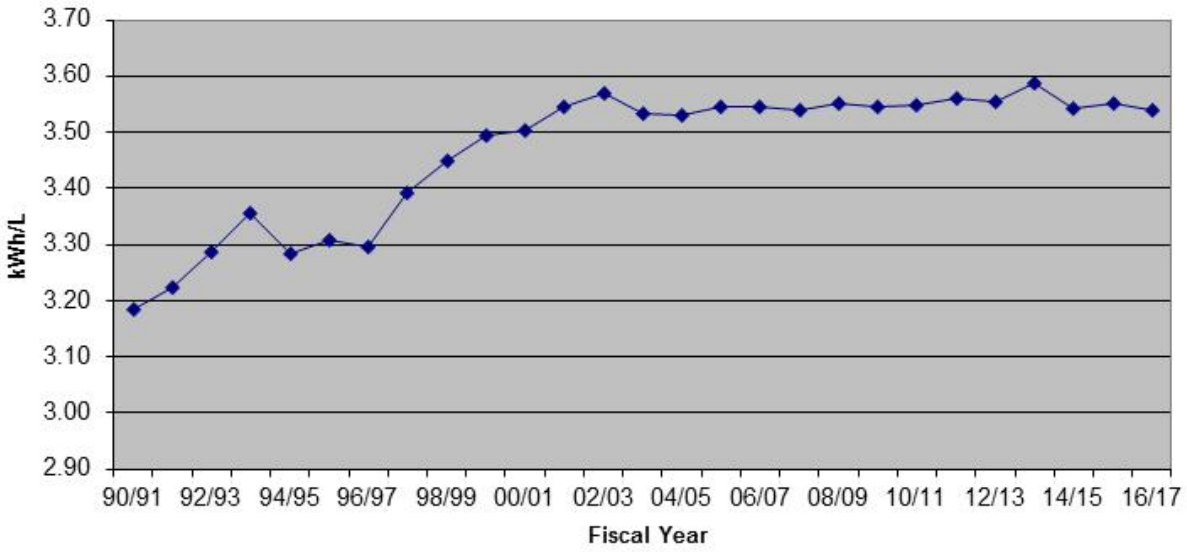
CO_2 Equivalent Reductions (Tonnes) 1990-91—2016-17				
Alternative Generation/ Fuels	**Station Service Reduction/ Residual Heat Projects**	**New Engine Upgrades/ PLCs**	**Streetlight Upgrades**	**Total**
1,072,440	13,273	104,258	381,199	1,571,170

Fuel Efficient Engine Upgrades

In recent years, diesel engine technology has aided in reducing the amount of emissions produced. Engine selection analysis is based primarily on life-cycle costs and the amount of emissions produced. The most significant of those life-cycle costs is fuel, which accounts for 85-90% of the capital and operating costs of a diesel engine over its life. Therefore it is extremely important to replace aging equipment with units that are fuel-efficient yet still produce the least amount of emissions possible. In 2016-17 NTPC installed seven new diesel engines in six NWT communities.

Figure 7 illustrates NTPC's efficiency trend. Yellowknife and Inuvik, two of our largest diesel generating plants, operate as backup diesel generators in the event that hydro or natural gas generation become unavailable. Due to the low frequency with which these plants now operate, their fuel efficiencies have decreased accordingly. Therefore the Yellowknife and Inuvik plants have been excluded from this graph as they skew the data.

Figure 7: NTPC Fuel Efficiencies Excluding Yellowknife and Inuvik



The overall fuel efficiency for NTPC in 2016-17 (excluding standby plants) has improved by 11% over the 1990-91 efficiency.

Our day-to-day operations, maintenance, and capital planning focus on maintaining or improving our fuel efficiency. Therefore our upward trend in fuel efficiencies is reflected in our forecasts for fuel consumption, and hence our forecast GHG emissions.

Programmable Logic Controllers (PLC)

Programmable Logic Controllers automate power plant diesel engines and help ensure that the appropriate engine is operating to most efficiently service fluctuating loads. This contributes to improved plant fuel efficiency. As it is impossible to separate PLC efficiency improvements and gains from upgrading to more fuel-efficient engines, the benefits of PLCs and new engines are calculated together in the Fuel Efficient Engine Upgrades section.

The only plant without some level of PLC automation is Fort Smith, a backup plant to the Taltson Hydro site.

Reduction in Station Service / Residual Heat Recovery

NTPC is continuously investigating ways to reduce its own consumption of power. Some of the equipment and design improvements utilized to reduce station service at our plants include:

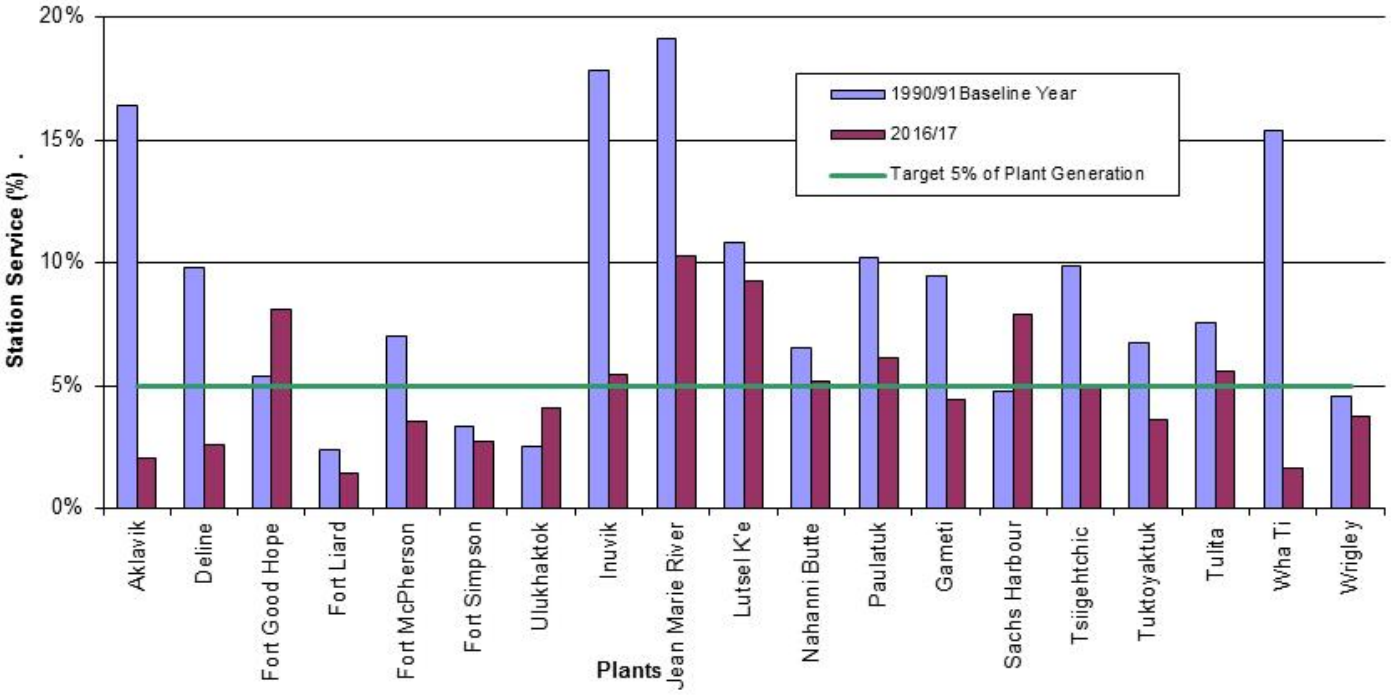
- replacement of in-plant electric space heating with residual heat from engine jacket water systems;
- replacement of engine electric block heaters with residual heat circuits that utilize jacket water heat from operating engines;
- replacement of inefficient lighting;
- installation of separate lighting circuits so that only specific lights are on at certain times;
- installation of variable frequency drives on radiators; and
- installation of photo sensors on outside lighting.

Station service reductions have also come through the education and resulting heightened awareness of plant personnel. Small measures are highlighted, such as turning off lights when plants are unattended, turning heaters down or off when not required, and ensuring that any pipes or other equip-

ment that require heat tracing during colder months are shut-off during warmer months.

Since 1990-91 NTPC has successfully reduced overall station service. Through frequent audits of operations and diligent efforts to implement station service reducing technologies and practices we will continue to reduce our station service in future years. Figure 8 illustrates station service for NTPC diesel generating facilities (except standby plants) for 1990-91 and 2016-17. Note: there is no generation for Colville Lake in 1990-91 as the plant was commissioned in 1992.

Figure 8: Station Service for Diesel Plants (excluding standby plants) for 1990-91 and 2016-17



By diligently monitoring facility statistics, NTPC is able to identify sites where station service requirements are in excess of acceptable levels. NTPC set a target for each facility to achieve and maintain a station service less than or equal to 5% of its total generation. NTPC will continue to monitor station service and work to reduce it at the seven plants still exceeding the 5% target while maintaining all other site station service percentages below the target.

Fort Smith Electric Heat Project

Breynat Hall and JBT Elementary School in Fort Smith were converted from diesel heating systems to electric heat. These electric heating systems are powered by excess generation from the Taltson Hydro facility. After proven success of the electric heat project the Department of Transportation parking and maintenance garage, was converted to electric heat, along with the Fort Smith Catholic Church .

Jackfish Electric Boiler Installation

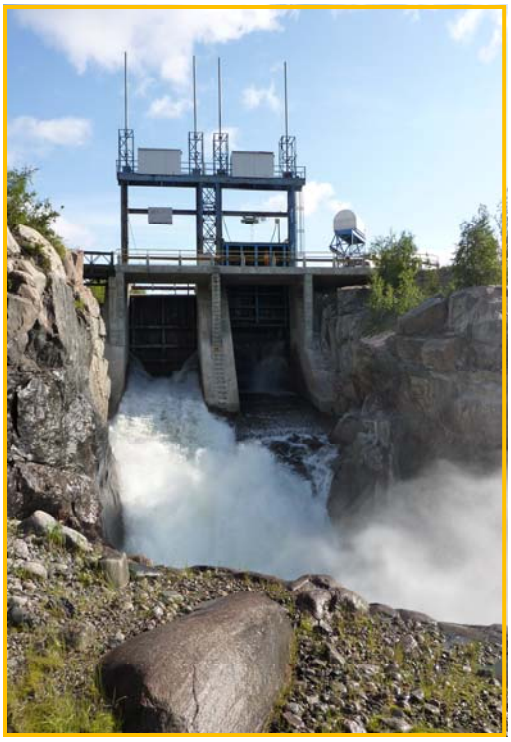
Electric boilers have been installed to heat the Yellowknife power plants, which are now used as backup to hydro generation, rather than using diesel fuel to heat the plants. This electricity is excess hydropower displacing approximately 84,000 L of diesel per year, which translates into a savings of 232 tonnes of CO_2e emissions. When the engines are running they are used to heat the facility.

Alternative Generation Fuels / Methods

In recent years NTPC has undertaken a number of initiatives to reduce GHG emissions by utilizing alternative methods or fuel sources to generate power. Some of these initiatives have involved major capital projects such as the Inuvik LNG Project, solar arrays in Fort Simpson and Colville Lake and major changes to hydro infrastructures. Some alternative generation methods are summarized below.

Bluefish Hydro Purchase

NTPC purchased the Bluefish hydro facility in the spring of 2003. The Bluefish hydro facility was used primarily to serve the energy requirements of a now decommissioned mine. Bluefish Hydro displace diesel generation with hydro generation to supply Yellowknife's electricity demands. Between 2017-18 and 2019-20 Bluefish hydropower will displace approximately 76,863 tonnes of CO_2e emissions.



Proposed Hydro Developments

NTPC continues to evaluate the feasibility of building a transmission line to connect Whati to the Snare transmission line. This would take the community off diesel generation and establish a corridor upon which future transmission could be built. If constructed, the Whati transmission line would be owned, operated and maintained by NTPC

NTPC's second proposed new hydro initiative is the Taltson Hydro Expansion Project. This would involve the expansion of the existing Taltson hydro site to power the Gahcho Kue mine site, which is currently in construction and the three operating diamond mines (Ekati, Diavik, and Snap Lake).

NTPC has worked closely with local aboriginal partners regarding power generation for each of the proposed projects. Life-cycle analyses of the mines were carried out to determine both GHG and dollar savings when replacing natural gas and diesel generated electricity with hydroelectricity.

Solar Energy

NTPC owns and operates the two largest solar energy project in the Northwest Territories. In 2012 a 60.6 kW solar photovoltaic (PV) system was installed in the Village of Fort Simpson. In 2013 NTPC expanded the project by 43.6 kW. The solar panels can now power up to 15% of Fort Simpson's energy requirements. In 2016-17 the solar panels displaced 138 tonnes of carbon monoxide equivalents (CO2e).

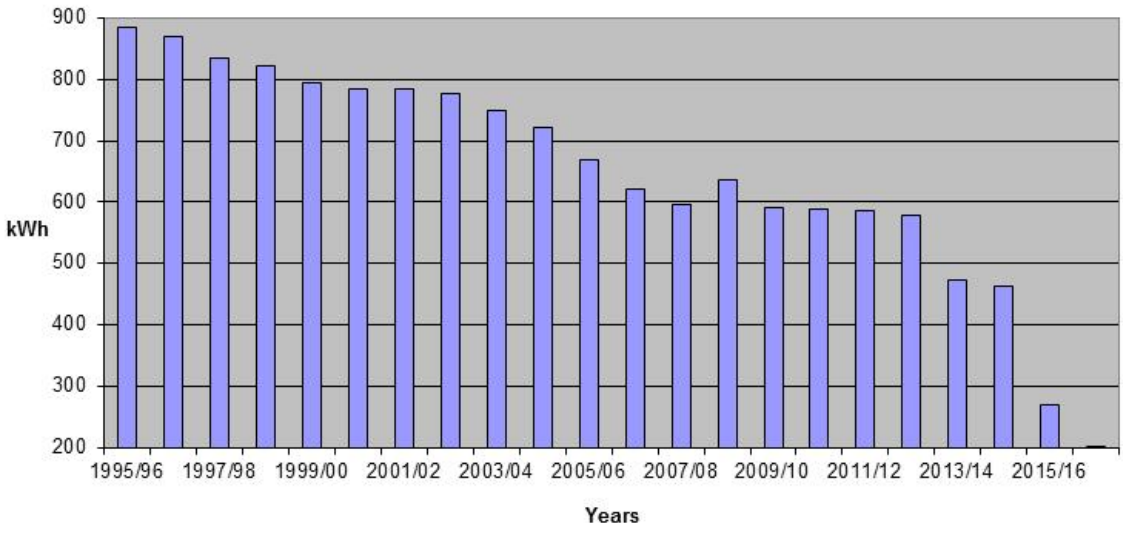
In 2015-16 NTPC completed the installation of a new power plant in the community of Colville Lake. The plant consists of new diesel generators, 136.5 kW of PV solar and 200 kWh of battery storage. Diesel fuel consumption has been reduced by 35,000 L annually. In 2016-17 96 tonnes of CO2e were displaced thanks to the solar/battery hybrid system.

In 2016 a 39 kW solar PV array was successfully built and connected to the power plant in Fort Lard. In 2016-17 the PV system displaced approximately 9,500 L of diesel fuel resulting in a reduction of 26 tonnes of CO2e. A 10 kW solar PV array was also installed in Wrigley. The system saved roughly 2,000 L of diesel fuel in 2016-17.

Streetlight Replacement

Light Emitting Diode (LED) lights use less than half the power of High-Pressure Sodium (HPS) lights and have an expected life of 25-30 years. LED streetlight replacement projects have been completed in twenty-two communities, replacing all HPS streetlights with LED lights. Figure 9 illustrates the average amount of energy required per streetlight in NTPC serviced communities. As more LED lights are installed, the average kWh required per streetlight decreases. GHG savings from our continuing streetlight replacement program are shown in Table 7.

Figure 9: kWh per Streetlight per Year



Transmission and Distribution Lines

Line losses increase generation requirements, which increase greenhouse gas emissions. As required, transmission and distribution systems will be upgraded with more efficient conductors and transformers in order to reduce line losses.

Residential/ Commercial Energy Efficiency Program

Customer Research Surveys completed in 2000 and 2002 confirmed that customers would like more information on how to make their homes more energy efficient. To meet their needs, NTPC implemented a Residential Energy Efficiency Program in 13 remote northern communities of the Delta-Sahtu region. This program proved highly successful with nearly 500 customers participating in the program. Each participant received valuable energy efficiency tips as well as energy saving light bulbs and an energy-efficient showerhead. The energy efficiency assessments showed that high power consumption was primarily caused by inefficient, outdated, or poorly maintained electrical appliances. Due to the success of this program in the Delta-Sahtu region, and in 2006-07 to several of our largest commercial customers. The program includes the following key objectives:

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

In 2013-14 NTPC launched its PowerWise energy conservation campaign. The campaign includes a website, posters, bill stuffers and pamphlets which present power-saving tips and suggestions for NTPC's customers.

Results in Comparison to Targets

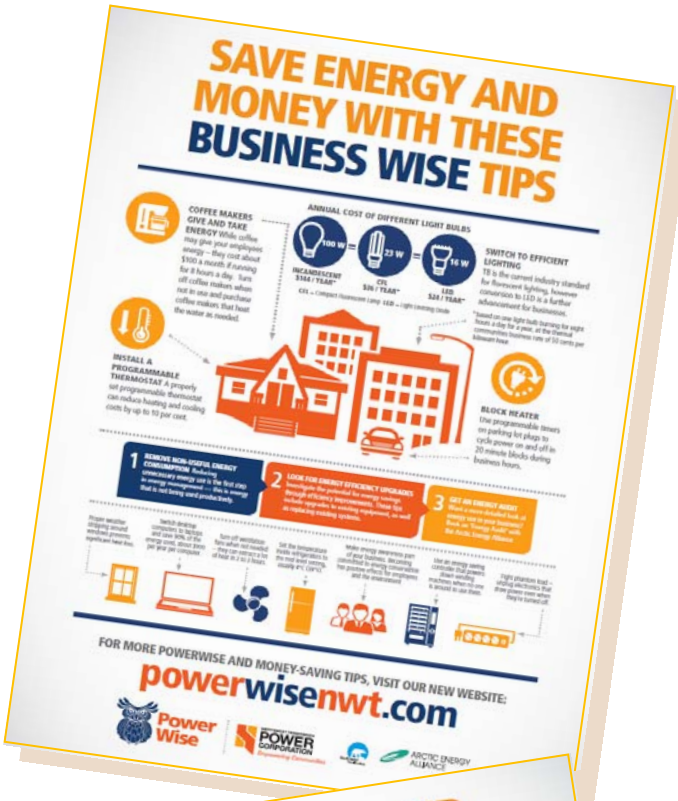
GHG Emissions

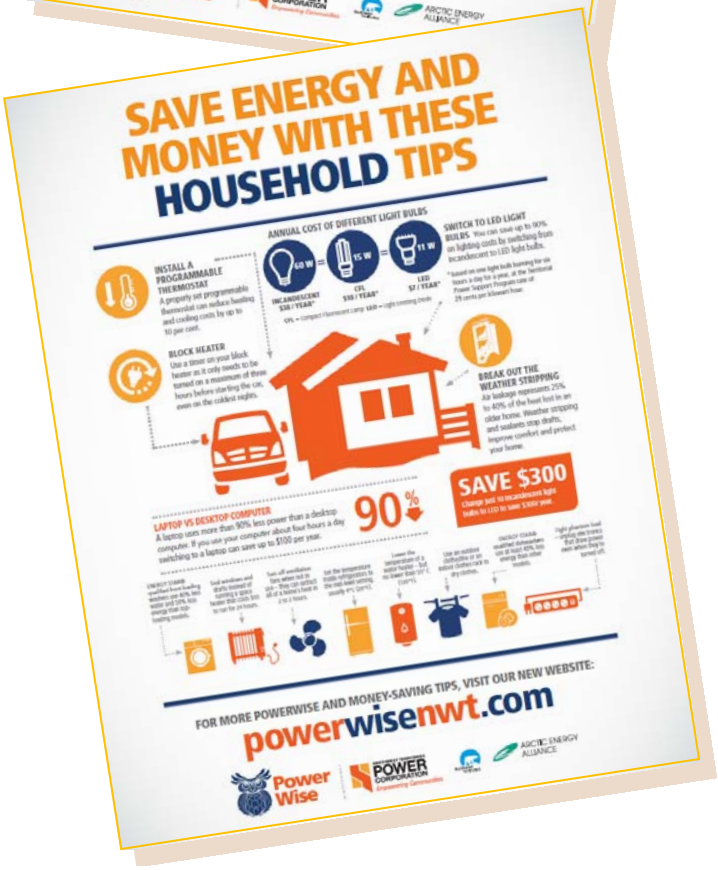
To date, we have reduced our cumulative CO_2 equivalent emissions by 1,571,170 tonnes and achieved a 43% decrease in 2016-17 from 1990-91 levels.

CO_2e Station Service Target

To date NTPC has successfully reduced station service at all but seven facilities to less than 5% of their total generations. NTPC will continue to monitor station service and, where feasible, implement training and technologies to reduce station service at the remaining eight diesel-generating facilities to meet the 5% target.

CLIMATE CHANGE AWARENESS





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

The simple addition of a bicycle rack outside of our head office has provided an incentive for emissions reduction by employees, both inside and outside of work. As well, a number of employees across NTPC make a point of walking to and from work. This is not only healthy for the individual and an environmentally friendly alternative to driving, but sets a good example for other members of their respective communities.

This report, along with all previous GHG reports, are made available on both our internal and external websites.

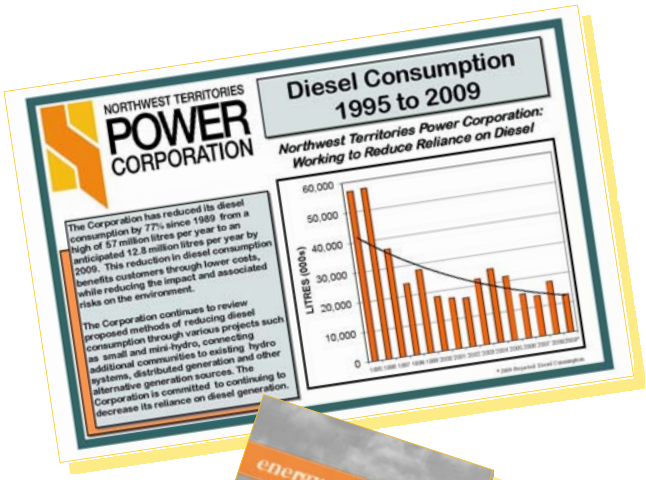
NTPC was a founding member of the Arctic Energy Alliance (AEA) and is a sustaining member today. The AEA is a not-for-profit organization established in 1997. The AEA's mandate is to help reduce the financial costs and environmental impacts associated with energy and utility services in the NWT, including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

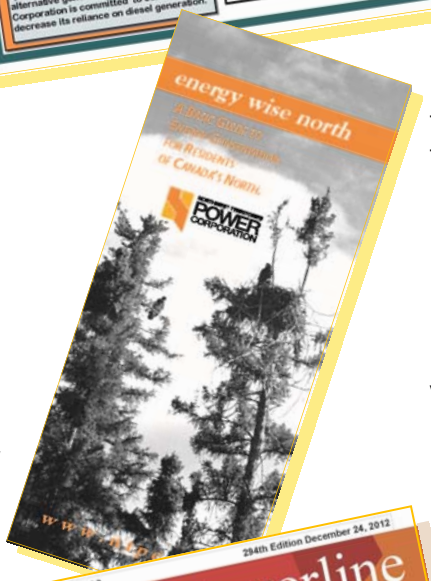
On the Supply-side Management end, NTPC purchases fuel oil that is low in sulphur content (0.05%), as specified by the Canadian General Standards Board.

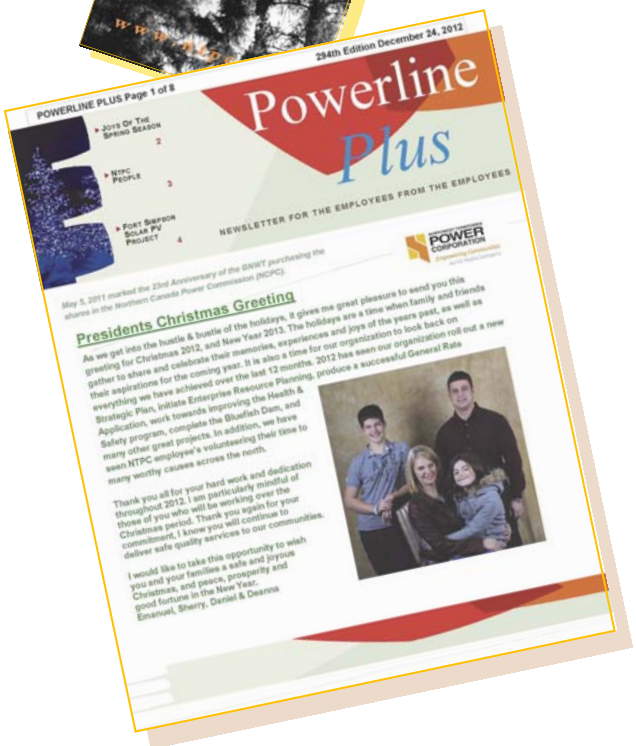
In 2001 NTPC ran a series of workshops for commercial customers to explain Demand-side Management. It was communicated that if customers could better manage their power usage to minimize peaking, they would save both money and power, at the same time reducing the production of greenhouse gases. In 2002, inspired by positive feedback from the workshops, NTPC began developing a fact sheet on demand-side management to be distributed to commercial customers.

These fact sheets, with such titles as *Understanding Demand Charges, Understanding your Power Bill*, and *Understanding Costs of Running Electrical Appliances* are distributed to both commercial and residential customers across the NWT. These brochures are produced to encourage customers to reduce their power consumption and to help understand how much electricity their electrical appliances really use.

Good News Posters are available to our employees and customers graphing such information as streetlight conversions, GHG emissions, and fuel usage.







All of our publications are available on our website at www.ntpc.com. The site also promotes NTPC's objective of reducing GHG emissions through reductions in customers' household energy usage.

NTPC has also launched PowerWiseNWT.com, a website aimed a providing tips regarding energy usage and ways our customers can save energy and money. Tools on the website include energy saving tips for various household appliances, as well as an energy calculator to help customers add up the cost of their energy usage per room.

Internal Communications

News articles including updates regarding NTPC's GHG emissions status and various ways to conserve energy are posted on NTPC's internal website's news feed. Employee updates are provided periodically by email and through regular meetings which provide information on proposed hydro developments and alternative energy generation.

NTPC annually provides environmental awareness training for employees covering topics such as minimizing station service, the importance of spill prevention, and an update on our greenhouse gas emissions.

CONCLUSION

The Northwest Territories Power Corporation has undertaken many successful initiatives towards reducing greenhouse gases. Our GHG reports demonstrate our commitment to combating climate change, as we believe that environmental issues should be at the forefront of all business. NTPC is committed to further reducing GHG emissions wherever feasible. We will continue to implement new ideas and strategies to conserve fuel usage and subsequent emissions while openly reporting our progress and initiatives.

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Appendix A: NTPC Greenhouse Gas Emissions Savings 1990-91 to 2019-20

	1990/91	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	Actual 2016/17	Forecast 2017/18	2018/19	2019/20	
Alternative Generation/ Fuels																						
Snare Cascades																						
CO_2		20,659	18,331	19,773	19,418	19,418	21,699	12,519	18,371	17,336	14,735	15,735	15,012	15,382	20,368	14,850	26,987	16,542	15,572	14,522	13,885	
CH_4		1.35	1.20	1.29	1.27	1.27	1.42	0.82	1.20	1.13	0.96	1.03	0.98	1.01	1.33	0.97	1.76	1.08	1.02	0.95	0.91	
N_2O		0.23	0.21	0.22	0.22	0.22	0.24	0.14	0.21	0.20	0.17	0.18	0.17	0.17	0.23	0.17	0.30	0.19	0.18	0.16	0.16	
CO_2 Equiv.		20,762	18,423	19,871	19,515	19,515	21,807	12,582	18,463	17,422	14,808	15,814	15,087	15,459	20,469	14,924	27,121	16,625	15,650	14,594	13,954	
Snare Rapids G2[1]																						
CO_2		2,572	2,430	874	193	117	117	1,061	817	1,348	2,082	2,234	2,142	1,123	1,534	552	785	336	-	-	-	
CH_4		0.17	0.16	0.06	0.01	0.01	0.01	0.07	0.05	0.09	0.14	0.15	0.14	0.07	0.10	0.04	0.05	0.02	-	-	-	
N_2O		0.03	0.03	0.01	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.02	0.01	0.02	0.01	0.01	0.00	-	-	-	
CO_2 Equiv.		2,585	2,442	879	194	117	117	1,067	821	1,355	2,092	2,245	2,152	1,128	1,542	555	789	338	-	-	-	
Norman Wells Purchased Power																						
CO_2	466	435	435	444	511	488	471	512	518	502	608	480	539	568	595	582	539	1,120	528	576	573	
CH_4	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.06	0.03	0.03	0.03	
N_2O	0.07	0.07	0.07	0.07	0.08	0.07	0.07	0.08	0.08	0.08	0.09	0.07	0.08	0.09	0.09	0.09	0.08	0.17	0.08	0.09	0.09	
CO_2 Equiv.	488	455	455	464	535	511	493	536	542	525	636	502	564	594	622	609	564	1,172	552	603	599	
Inuvik Gas Project																						
CO_2			-690	-955	-1,776	-2,031	-2,040	-1,893	-3,080	-3,178	-2,826	-2,925	-2,100	-2,634	-1,365	-679	-4,753	-5,640	-5,919	-13,571	-13,416	-13,542
CH_4			-0.06	-0.08	-0.11	-0.13	-0.13	-0.12	-0.18	-0.19	-0.17	-0.18	-0.13	-0.16	-0.07	-0.04	-0.25	-0.29	-0.31	-0.68	-0.67	-0.68
N_2O			-2.19	-2.50	-2.48	-2.56	-2.59	-2.51	-3.06	-3.15	-3.13	-3.15	-2.51	-2.45	-0.48	-0.24	-1.58	-1.97	-2.28	-2.04	-2.02	-2.03
CO_2 Equiv.			-1,343	-1,701	-2,516	-2,799	-2,814	-2,643	-3,998	-4,122	-3,763	-3,869	-2,851	-3,368	-1,511	-753	-5,230	-6,234	-6,604	-14,195	-14,033	-14,165
Bluefish Power																						
CO_2		38,756	40,028	37,152	35,933	25,184	32,078	28,775	16,344	28,242	39,434	25,310	25,349	35,139	24,681	23,211	13,199	21,038	27,092	25,265	24,157	
CH_4		1.87	1.93	1.79	1.74	1.22	1.55	1.39	0.79	1.36	1.91	1.22	1.22	1.70	1.19	1.12	0.64	1.02	1.31	1.22	1.17	
N_2O		0.44	0.45	0.42	0.40	0.28	0.36	0.32	0.18	0.32	0.44	0.28	0.29	0.40	0.28	0.26	0.15	0.24	0.31	0.28	0.27	
CO_2 Equiv.		38,933	40,211	37,322	36,097	25,299	32,225	28,906	16,419	28,371	39,614	25,425	25,465	35,299	24,794	23,317	13,259	21,134	27,216	25,380	24,267	

[1] Snare Rapids G2 unit does not operate during average to low water years. As forecasting for the hydro system assumes average water levels, zero G2 generation is also forecast. However, on average, the G2 unit has accounted for approximately 0.02% of the total Snare hydro generation since installation, so some generation is anticipated even if not forecast.

Note: 1991/92, 1992/93, 1993/94, 1994/95, 1995/96, 1996/97, 1997/98,1998/99 and 1999/00 data has been removed from the table to allow room for table expansion. Please see previous years' reports for this data.

Appendix A: NTPC Greenhouse Gas Emissions Savings 1990-91 to 2019-20

	1990/91	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	Actual 2016/17	Forecast 2017/18	2018/19	2019/20
Station Service Reduction/Residual Heat Projects																					
Station Service/Residual Heat Savings																					
CO_2		162	173	175	157	201	171	193	228	163	112	166	169	170	174	217	200	199	199	199	201
CH_4		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
N_2O		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO_2 Equiv.		163	174	175	157	202	172	194	229	164	113	167	170	170	175	218	201	200	200	200	202
Fort McPherson Residual Heat																					
CO_2		454	483	443	157	0	0	432	497	497	648	469	594	591	417	513	0	205	387	373	366
CH_4		0.02	0.02	0.02	0.01	0.00	0.00	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.02	0.02	0.00	0.01	0.02	0.02	0.02
N_2O		0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
CO_2 Equiv.		456	485	445	158	0	0	434	500	500	651	471	596	593	419	516	0	206	389	374	368
New Engine Upgrades/PLCs																					
Improved Fuel Efficiency Savings																					
CO_2		3,602	4,008	4,386	4,206	4,175	4,030	4,181	4,184	4,213	4,327	4,555	4,732	4,031	4,065	5,308	4,515	4,839	4,443	4,484	4,472
CH_4		0.17	0.19	0.21	0.20	0.20	0.19	0.20	0.20	0.20	0.21	0.22	0.23	0.19	0.20	0.26	0.22	0.23	0.21	0.22	0.22
N_2O		0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05
CO_2 Equiv.		3,618	4,027	4,406	4,225	4,194	4,048	4,200	4,203	4,232	4,347	4,576	4,753	4,049	4,084	5,332	4,535	4,862	4,463	4,504	4,492
Streetlight Upgrades																					
Streetlight Savings																					
CO_2		157	153	-1,313	1,057	1,142	29,994	29,486	24,297	24,043	25,364	25,691	25,675	25,771	25,951	26,121	57,894	59,332	59,332	59,332	59,332
CH_4		0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.08	0.09	0.09	0.09	0.09
N_2O		0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
CO_2 Equiv.		158	153	-1,312	1,059	1,143	29,996	29,488	24,299	24,045	25,367	25,693	25,677	25,774	25,955	26,125	57,900	59,338	59,338	59,338	59,338
Annual Totals																					
CO_2	466	66,107	65,087	60,158	59,599	48,684	86,668	74,079	62,079	73,519	84,385	72,540	71,578	81,410	77,107	66,602	98,478	97,694	93,982	91,334	89,443
CH_4	0.02	3.57	3.47	3.31	3.15	2.62	3.11	2.38	2.15	2.70	3.14	2.58	2.52	3.00	2.89	2.25	2.49	2.21	2.01	1.86	1.76
N_2O	0.07	-1.38	-1.69	-1.70	-1.81	-1.96	-1.78	-2.45	-2.61	-2.47	-2.36	-1.89	-1.82	0.24	0.43	-0.98	-1.36	-1.61	-1.41	-1.41	-1.45
CO_2 Equiv.	488	65,787	64,669	59,735	59,139	48,166	86,215	73,408	61,354	72,851	83,759	72,042	71,098	81,557	77,307	66,366	98,136	97,271	93,613	90,961	89,056
Cumulative Totals Since 1990/91																					
CO_2	466	397,059	462,146	522,304	581,904	630,121	714,484	768,058	807,380	861,112	916,018	1,083,857	1,154,969	1,234,074	1,290,675	1,334,521	1,413,212	1,481,426	1,670,708	1,762,042	1,851,486
CH_4	0.02	20.99	24.46	27.76	30.91	33.51	36.50	37.90	38.95	40.69	42.40	49.59	52.08	54.97	56.88	58.03	59.56	60.34	66.96	68.82	70.58
N_2O	0.07	1.72	0.03	-1.67	-3.48	-5.51	-7.38	-10.12	-13.06	-15.82	-18.58	-19.00	-20.89	-20.74	-20.61	-21.91	-23.56	-25.56	-25.50	-26.91	-28.36
CO_2 Equiv.	488	398,097	462,766	522,500	581,639	629,806	716,021	788,942	847,961	900,193	961,070	1,079,435	1,150,045	1,229,268	1,285,957	1,329,441	1,407,679	1,475,317	1,664,783	1,755,744	1,844,800

The Northwest Territories Power Corporation would like to thank the following people for their contributions to the 2016-17 Greenhouse Gas Report:

Eddie Smith
Eileen Hendry
Erin Ladouceur
Ian Flood
Jean Ramsay
Joshua Clark
Lillian Cao
Matt Miller
Sam Mugford