TECHNICAL/ECONOMIC POTENTIAL OF ENERGY EFFICIENCY MEASURES IN THE AUTONOMOUS GRIDS

Technical/economic potential of energy efficiency measures in the autonomous grids

2012 Assessment

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1. Introduction

In paragraph 503 of decision D-2011-028, in file R-3740-2010, the Régie "ask[ed] the Distributor to perform a new analysis of the technical/economic potential of energy efficiency in the autonomous grids. It request[ed] that, before carrying out this analysis, the Distributor present its intended objectives and methodology to the Régie at an administrative meeting." This meeting was held on 6 September 2011, at which time the Régie requested that certain clarifications be made to the proposed methodological document. In response to the Régie's comments, an improved document was submitted on 28 October 2011.[1] This methodological approach was the basis of the Distributor's assessment of the technical/economic potential in the autonomous grids.

Moreover, in paragraph 338 of decision D-2011-162, in file R-3748-2010, "The Régie ask[ed] the Distributor specifically to review the demand-side management measures applicable to each system." In addition, in paragraph 23 of decision D-2012-119, in file R-3814-2012, the Régie "order[ed] the Distributor to update the technical/economic potential assessment for the autonomous grids and to submit comprehensive evidence on the subject in the 2014-2015 rate case."

In this document, the distributor presents the results of the technical/economic potential assessment of the electricity- and oil-related conservation measures, as well as the power demand management measures[2] directed at customers in the autonomous grids.

2. Context of the assessment

2.1 Definition

The technical/economic potential of energy efficiency reflects the energy savings and the reduction in the power demand that would be associated with the implementation of specifically determined measures, where technically possible, and where the unit cost of these measures is less than or equal to the distributor's avoided cost. **The potential presented in this document constitutes an upper limit since it does not yet take into account the commercial and financial constraints or the plausible rate of consumer adoption of these measures,** which are significant in the case of more involved measures such as those concerning the building envelope. It should therefore be stated that only some of the technical/economic potential can be commercially exploited.

[1] http://www.regie-energie.qc.ca/audiences/Suivis/SuiviD-2011-028_PTE_ReseauxAutonomes/HQD_PTE_RA_MethodologieProposee_28oct2011.pdf

[2] In order to ensure the uniformity of the terminology used, the Distributor proposes adopting the term "power demand management" instead of "consumption management" to define the Distributor's customer-directed measures aimed at reducing power requirements on the autonomous grids.

2.2 Methodological approach

The technical/economic potential assessment is performed for each of the five autonomous grids:

- Îles-de-la-Madeleine (IDLM);
- Basse-Côte-Nord (BCN);
- Nunavik;
- Schefferville;
- Haute-Mauricie.

2.2.1 Energy conservation potential

The basic methodology is a microanalytical approach whose mathematical implementation draws on that which is currently being used for the integrated system.[3] The parameters used, however – market composition, customer habits and demand levels, the climate prevailing on each grid, the applicable energy efficiency measures, the costs of the measures, and the avoided costs – are specific to each grid. These specificities are explained in the technical note filed with the Régie[4] in 2011. The better part of the market data comes from studies and surveys carried out on the autonomous grids. The avoided costs used are taken from file R-3814-2012.

The power impact of the energy conservation measures is used to estimate the impact of full implementation of the energy conservation potential on the peak demand of each grid. The electricity conservation measures are modeled using hourly simulations based on which the impact on the peak can be determined for each grid. These simulations also take into account cross- and cumulative effects, the impact of building thermal mass, and weather conditions in each region.

2.2.2 Potential of power demand management

Power demand management measures are intended to create a more even distribution of demand over time. They consist in reducing customers' energy consumption during peak hours or shifting load from peak periods to off-peak periods. This particularity distinguishes the methodological approach used in power demand management from the one used for the energy conservation measures.

Power gain of a measure

Power is, by its nature, an instantaneous value that varies over time. The power gain of a measure also varies with the period and moment when load reduction occurs. To reduce the power requirements on a grid, a measure must create a gain that coincides with peak demand. For this reason, for the purpose of

[3] http://www.regie-energie.qc.ca/audiences/Suivis/SuiviD-2011-028_PTE/HQD_PTE_Revision2010_SecteursR-CI-A_30juin2011.pdf

[4] Translator's note: The French version contains a footnote number "1" at this position but there is no corresponding footnote. It is probably a typo.

assessing the technical/economic potential of power demand management, the analysis is limited to the winter months and to two daily peaks, 6 to 9 a.m. and 4 to 8 p.m.

Load curve and load recovery

The majority of the power demand management measures involve shifting the load from peak hours to off-peak hours. This, however, often results in load recovery or resumed power demand at the end of the peak periods. The impact of load recovery should be considered when assessing technical/economic potential. In other words, the measures deployed must not create a new peak coinciding with load recovery, or else the original peak will merely have been shifted and not lowered. This particularity is specific to the residential and CI sectors, where load recovery due to most of the measures cannot be shifted forward more than two hours from the end of the peak. Therefore, the method for assessing the technical/economic potential of power demand management must take into account the load curve of each system, particularly for the annual peak day.

Maximum potential and non-additivity

Because of the phenomenon of load recovery, it is possible to determine a maximum power demand management potential for each measure. This maximum is often limited by the load curve of the grid rather than by the potential market or the avoided costs. In other words, due to the particular nature of each measure, its impact on the hourly curve, and the problems associated with load recovery, the potentials of the individual power demand management measures are not necessarily additive. This contrasts with the potential of energy conservation measures, which is simply the sum of the potentials of the individual measures.

Moreover, while certain load reduction measures (e.g., dual energy heating), are not associated with load recovery, they do alter the power curve of the grid and can therefore affect the potential of the other measures. It is likewise prudent not to consider the potential of this type of measure to be additive.

Since the measures are not necessarily additive, the power demand management potential of a grid must be established for a precise intervention scenario or scenarios, and only once the quantities, combination, and sequencing of measures from hour to hour is known.

3. Overview of technical/economic potential assessment

Tables 1 and 2 present a summary of the technical/economic potential of electricity and oil-related conservation measures, by use, for each of the territories.

For electricity conservation, the potential is 19% of overall consumption, the same percentage as for the integrated system. While the avoided costs are generally higher for the autonomous grids, the costs of the measures are also higher. Around 50% of the potential derives from space and water heating while 40% derives from lighting, appliances, and electronic devices. The latter percentage is explained by longer duration of use, which was noted in the surveys. Îles-de-la-Madeleine accounts for more than 50% of potential, due to a combination of avoided costs, less costly measures relative to the other grids, predominance of all-electric-heat buildings, and larger demand.

Table 1: Potential of energy conservation measures by use - 5-year horizon (in MWh)

Use	**% of potential**
Space heating	
Lighting	
Hot water	
Home appliances, electronics	
Industrial/motive power, other	
TOTAL	
as % of total potential	
as % of consumption	

The technical/economic potential of oil-related conservation measures is essentially due to space and water heating. Nearly 60% of the space heating potential is in Nunavik, due to the predominance of oil heating there.

Table 2: Potential of oil-related measures by use - 5-year horizon (in MWh equivalent)

Use	**% of potential**
Space heating	
Hot water	
Industrial/motive power, other	
TOTAL	
as % of potential	

The potential identified in Tables 1 and 2 includes numerous measures involving consumers' use of renewable energy sources. The potential of these measures is broken down in Tables 3 and 4 for electricity and oil use, respectively. It should be noted that a number of renewable energy sources have high potential but are in practice subject to major constraints associated with cost of installation and system performance under the climatic conditions prevailing on the autonomous grids. The costs assumed for these systems are those that would be obtained with bulk purchasing and are generally lower than the market prices currently available. In short, the commercially exploitable potential remains to be demonstrated.

Table 3: Potential of electricity-related measures - Renewable energy measures - 5-year horizon (in MWh)

Residential and CI
Solar space heating
Pellet heating
Solar water heater
Photovoltaic
Geothermal energy
Micro-wind

Table 4: Potential of oil-related measures - Renewable energy measures - 5-year horizon (in MWh equivalent)

Residential and CI
Solar space heating
Pellet heating
Solar water heater
Geothermal energy

For power demand management measures, given the particularities explained in section 2.2.2, Table 5 gives an indicative value for maximum potential, corresponding to the potential of that measure which offers the highest potential in each consumer sector and on each grid. The potential is broken down for the different measures in section 4.3.

Table 5: Power demand management - Highest potential (in kW)

Sector
Residential
CI
Industrial

4. Principal results by grid

The principal results of the technical/economic potential assessment for each grid are explained in this section. Where pertinent, clarifications are provided to give a better idea of the achievable potential of these measures.

4.1 Energy conservation measures

The principal results of the energy conservation potential assessment, for electricity and oil, are presented in this section.

4.1.1 Îles-de-la-Madeleine

Îles-de-la-Madeleine is the largest of the autonomous grids, in terms of both consumption and number of customers. This grid is also the one most closely resembling the integrated system in terms of its climate and the characteristics of its CI and residential buildings. Tables 6 and 7 present the assessed potential of the main measures in Îles-de-la-Madeleine, for electricity and oil conservation, respectively.

For both electricity and oil, the most important measures concern space heating, and several of these concern the building envelope and changes to the heating system. Specific measures include renewal of building insulation, solar space heating, geothermal energy, and biomass heating. These measures are characterized by a long lifespan, which reduces their unit cost. In practice, the long-term viability of solar heating remains to be demonstrated under the climatic conditions (salt air) of the islands. For biomass heating, biomass was presumed to be available; however, this hypothesis will have to be validated when the commercial potential of this measure is assessed. As for solar water heaters, the assessment assumes that the market price will be lower than it is now. The viability of this equipment in the salt air of the islands as well as the cleaning requirements for the solar collectors are factors that can affect the achievable potential of this measure.

Table 6: Main electricity-related measures assessed - Îles-de-la-Madeleine

Main electricity-related measures
Improving basement wall insulation - Residential
Solar space heating - Residential
Geothermal heat pump - Residential
Improving roof insulation - Residential
Improving wall insulation - Residential
Pellet heating - Residential
Heat recovery from drainage water - Residential
Replacing T8 32W by T8 25W - CI
Elimination of recycling of second refrigerators - Residential
Lowering room temperature - Residential
Solar water heater - Residential
Recommissioning - CI

Table 7: Main oil-related measures assessed - Îles-de-la-Madeleine

Main oil-related measures
Improving roof insulation - Residential
Improving basement wall insulation - Residential
Improving wall insulation - Residential
Heat recovery from drainage water - Residential
Condensing boiler - Residential
Lowering room temperature - Residential
Installation of storm windows/plastic film - Residential
Heat recovery from exhaust air - CI
Control of outside air with CO2 sensor - CI
Lowering room temperature - CI
Solar water heater - Residential
Heat recovery from refrigeration - CI

4.1.2 Nunavik

Nunavik is the second largest territory, after Îles-de-la-Madeleine, in terms of both number of customers and energy consumption. Space and water heating in this territory are exclusively oil-based, so the electricity-related potential derives entirely from measures targeting lighting, appliance, and electronics use. Tables 8 and 9 present the main measures covered by technical/economic potential assessment for electricity and oil.

Among electricity-related measures, the elimination of incandescent light bulbs in the residential and CI sectors shows the greatest potential. Improvement of the energy efficiency of new CI building construction, identified as MNECB[5] (97) +40%, mainly deals with lighting. Turning off televisions when not in use also shows significant potential. The survey carried out in Nunavik revealed that many televisions stay on for extended periods of time, even when no one is home. A reduction in these periods of use would therefore yield considerable savings. This behavioural measure does, however, require significant changes in consumers' habits. This observation indicates that a basic energy awareness and education approach could make this potential achievable.

[5] Model National Energy Code for Buildings.

Table 8: Main electricity-related measures assessed - Nunavik

Main electricity-related measures
Compact fluorescent - Residential
Replacement of T8 32W by T8 25W - CI
MNECB (97) + 40% - CI
Reduction of hours - TVs - Residential
Replacement of incandescent bulbs with compact fluorescents - CI
Motion detectors for lighting- CI
Improvement of ventilation systems - CI
Energy Star TVs - Residential
LED instead of compact fluorescent - Residential
Recommissioning - CI
Shutting off ventilation when unoccupied - CI
LED instead of compact fluorescents - CI

As for the potential for oil-related measures, the main potential comes from ventilation systems in CI buildings and from insulation and drainage water heat recovery in the residential sector. For the measures having to do with insulation, the available information on the current level of home insulation is quite limited. Therefore, the assessment assumed an insulation level equal to that imposed by Quebec regulations; namely, an RSI value of 4.7. This value is considered relatively low given the climate. Consequently, the potential for improving building insulation would appear to be high, subject, however, to a verification of existing insulation levels. Concerning drainage water heat recovery units, the conventional models require the presence of a basement, which Nunavik homes lack. A literature search identified a product that can be installed in homes without basements. The performance of this product and its applicability in Nunavik's climate remain to be demonstrated.

Table 9: Main oil-related measures assessed - Nunavik

Main oil-related measures
Heat recovery from exhaust air - CI
Floor insulation - Residential
Heat recovery from drainage water - Residential
High-efficiency windows - Residential
Control of outside air by CO2 sensor - CI
Roof insulation - Residential
Lowering temperature at night - Residential
Lowering temperature when unoccupied - CI
MNECB (1997) + 40% - CI
High-efficiency water heater - Residential
Ultra-low flow aerator, 0.5 gpm - Residential
Condensing boiler - Residential

4.1.3 Basse-Côte-Nord

Basse-Côte-Nord comprises the customers served by the La Romaine, Port-Meunier and Lac-Robertson generating stations. This territory is characterized by predominant use of electric space and water heating. Oil heating is present only on Anticosti Island (Port-Meunier). Tables 10 and 11 present the main measures assessed for electricity and oil in Basse-Côte-Nord.

The most significant measures have to do with electric heating: increased insulation of floors and roofs, photovoltaic technology, and cold climate or geothermal heat pumps. Solar water heaters also show significant potential; nevertheless, the comments relating to the costs of such systems and the constraints associated with durability, maintenance, and equipment breakage will have to be considered. The use of condenser dryers also has high potential. However, the implementation of this measure has an impact on users' habits, since the drying cycle for this type of machine is much longer.

The technical/economic potential of oil-related measures represents only a small fraction of the total in this territory and is mainly concentrated on Anticosti Island. Basement insulation is the measure with the highest potential.

Table 10: Main electricity-related measures assessed - Basse-Côte-Nord

Main electricity-related measures
Floor insulation - Residential
Photovoltaic system 3 kW - Residential
Solar water heater - Residential
Cold climate heat pump - Residential
Roof insulation - Residential
Condenser dryers - Residential
Lowering room temperature - Residential
Geothermal heat pump - Residential
Heat recovery from drainage water - Residential
High-efficiency windows - Residential
Compact fluorescent - Residential
Pellet heating - Residential

Table 11: Main oil-related measures assessed - Basse-Côte-Nord

Main oil-related measures
Floor and basement insulation - Residential
Heat recovery from drainage water - Residential
Lowering temperature when unoccupied - CI
Use of thermal curtains - Residential
Lowering room temperature - Residential
New construction - ERS 80 - Residential
High-efficiency burner - Residential
Roof insulation - Residential
Covering water heater - Residential
Installation of vestibules - CI
High-efficiency furnace - CI
Control of outside air by CO2 sensor - CI

4.1.4 Schefferville

The Schefferville system is distinguished by its predominant use of electricity for heating, in both the residential and CI sectors, and by its low avoided cost relative to other systems. It stands to reason that the electricity-related potential is less significant and that the oil-related potential is negligible. Table 12 presents the main measures assessed.

The highest potential in Schefferville is derived from building envelope measures for the residential sector – basement and roof insulation, Energy Star windows. It should be noted, however, that little information is available on the current level of insulation of Schefferville homes and that the technical/economic potential assessment is based on the minimum required by

Quebec regulations. Therefore, the commercial potential is contingent on a verification of the actual level of home insulation. Behavioural measures also show high potential.

Table 12: Main electricity-related measures assessed - Schefferville

Main electricity-related measures
Improving basement wall insulation - Residential
Improving roof insulation - Residential
Lowering room temperature - Residential
Lowering temperature when unoccupied - CI
Energy Star windows- Residential
Closing windows - Behavioural- Residential
Ventilator heat recovery - CI
Installation of vestibules - CI
Shutting off ventilation when unoccupied - CI
Ultra-low flow aerator, 0.5 gpm - Residential
Motion detector for lighting - CI
Heat recovery from refrigeration - CI

4.1.5 Haute-Mauricie

Haute-Mauricie is the smallest of the grids analyzed. Space heating is almost exclusively done with oil; however, the vast majority of water heaters are electric. Tables 13 and 14 show the potentials of electricity- and oil- related measures for this grid.

For electricity, the most significant potential comes from measures involving photovoltaic technology. This is due to a combination of high avoided costs on this grid and implementation cost relatively close to that of Îles-de-la-Madeleine. Measures with an impact on lighting also account for a high proportion of technical/economic potential. Concerning solar water heaters, the high avoided cost on this grid and the predominance of use make for a high technical/economic potential. Nevertheless, the long-term viability of this type of water heater, and that of photovoltaic technology, remain to be demonstrated; the achievable potential would be strongly influenced by a drop in present costs and by the possibility of maintaining system performance and avoiding breakdowns.

Where oil is concerned, building envelope-related measures top the list. As in the other territories, the commercial potential of these measures is subject to verification of actual home insulation levels.

Table 13: Main electricity-related measures assessed - Haute-Mauricie

Main electricity-related measures
Photovoltaic system, 3 kW - Residential
Compact fluorescent - Residential
Replacement of T8 32W by T8 25 W - CI
Solar water heater - Residential
Reduction of hours - TVs - Residential
Motion detector for lighting - CI
MNECB (97) + 40% - CI
Recommissioning - CI
Heat recovery from drainage water - Residential
Improved ventilation system efficiency - CI
TV Energy Star - Residential
LED instead of compact fluorescents - Residential

Table 14: Main oil-related measures assessed - Haute-Mauricie

Main oil-related measures
Roof insulation - CI
Wall insulation - CI
Lowering temperature at night - Residential
Lowering temperature when unoccupied - CI
Ultra-low flow aerator, 0.5 gpm - Residential
High-efficiency boiler - CI
Floor and basement insulation - Residential
Heat recovery from drainage water - Residential
Heat recovery from exhaust air - CI
Roof insulation - Residential
Triple-glazed windows - High-efficiency - Residential
High-efficiency furnace - CI

4.1.6 Industrial sector

The industrial sector accounts for only a small proportion of customers (0.2%) and consumption (6.3%) on the autonomous grids. The first- and second-largest customers are in Îles-de-la-Madeleine while the third largest is in Opticiwan on the Haute-Mauricie territory. The technical/economic potential of these three customers is based on specific energy analyses.

The industrial sector potential in the autonomous grids is presented in Table 15. Nearly all the potential lies in Îles-de-la-Madeleine.

Table 15: Potential of energy conservation in the industrial sector (in MWh)

Industrial sectors
Sawmills
Food processing, ice plant
Mines
Other
potential of electricity-related measures
potential of oil-related measures

4.2 Power impact of energy conservation measures

The power impact of the measures making up the electricity conservation potential was assessed. This assessment estimates the impact of the full implementation of the technical/economic potential on peak demand of each grid. The peak is considered to occur from 6 to 9 a.m. and from 4 to 8 p.m. in winter.

The results by use and by grid are presented in Table 16.

Table 16: Potential power impact of electricity conservation measures (in kW)

Electricity - Use
Heating
Hot water
Household appliances, other
Lighting

4.3 Power demand management measures

As discussed in section 2.2.2, it is important to remember that because of the load recovery phenomenon, the potentials of individual power demand management measures are not additive. Nor can the potential of power demand management measures be added to the power impact of electricity conservation measures as a simple summation of the impacts of the measures identified.

Tables 17–21 present the technical/economic potential assessment of measures for the residential and CI sectors in each of the five autonomous grids. The results indicate considerable differences in potential from one territory to the next, due largely to the very different avoided power costs from one grid to the next.

4.3.1 Residential sector

For the residential sector on all the territories, those behavioural measures whose cost is considered nil all show potential. On the grids where electricity is the main energy source, the potential is much higher due to the possibility of managing space and water heating demand. In addition, dual energy and heat storage both offer significant potential. The achievable potential of these two measures remains, however, to be demonstrated, given the specificities and the energy realities of each grid.

On those grids where there is no all-electric heating, the power demand management potential is much more limited since it can only target lighting, household appliances, and electronics.

It should be noted that for all the measures concerning remote control of appliances or temperature setpoints, the additional costs of telecommunication between the Distributor and the customers have not yet been taken into consideration.

4.3.2 Commercial and institutional (CI) sector

The CI sector measures are generally similar to those considered to have potential in the residential sector. On those grids where there is no all-electric heating, uses are limited to ventilation, pumping, lighting, and plug loads. For electric heating, heat storage and dual energy offer the greatest potential. However, it remains to evaluate the acceptability of these measures in the context of each grid concerned.

Table 17: Potential of power demand management - Îles-de-la-Madeleine (in kW)

Residential measures	**Avg. cost ($/kW-yr)**	**Potential (kW)**
Manual setpoint management		
Dryer – behavioural		
Washing machine – behavioural		
Dishwasher – behavioural		
Lighting management – behavioural		
Water heater with timer control		
Water heater - Distributor control		
High-storage water heater - Distributor control		
Three-element water heater		
Setpoint management		
CI measures	**Avg. cost ($/kW-yr)**	**Potential (kW)**
Reduction of fresh air flow (with EMS)		
Optimal setpoint management (with EMS)		
Interruption of humidifiers (with EMS)		
Reduction of ventilation rate (with EMS)		
Dual energy (oil/propane) water heater		
Optimization of start times (with EMS)		
Control of high-storage water heater (without EMS)		
Control of water heater (with EMS)		
Heat storage with control		
Control of water heater (without EMS)		
Dual energy (oil/propane) heating		
Adjustment of heat pump flow rate (with EMS)		
Reduction of fresh air flow (without EMS)		
Adjustment of heat pump flow rate (without EMS)		
Reduction of ventilation rate (without EMS)		
Control of high-storage water heater (with EMS)		
Interruption of humidifiers (without EMS)		
Partial shutoff of lighting (with EMS)		
Optimal setpoint management (without EMS)		
Optimization of start times (without EMS)		

Table 18: Potential of power demand management - Nunavik (in kW)

Residential measures	Avg. cost ($/kW)
Dryer - behavioural	
Washing machine - behavioural	
Lighting control - behavioural	
Dryer - Distributor control	
CI measures	**Avg. cost ($/kW)**
Ballast with modulation	
Partial shutoff of lighting	
Reduction of ventilation rate	

Table 19: Potential of power demand management - Basse-Côte-Nord (in kW)

Residential measures	Avg. cost ($/kW-yr)	Potential (kW)
Manual setpoint management		
Dryer - behavioural		
Washing machine - behavioural		
Dishwasher - behavioural		
Lighting management - behavioural		
Water heater with timer control		
Water heater - Distributor control		
Setpoint management		
High-storage water heater - Distributor control		
Three-element water heater		
Dual energy		
Heat storage - Distributor control		
Dryer - Distributor control		
High-storage water heater		
CI measures	**Avg. cost ($/kW-yr)**	**Potential (kW)**
Dual energy (oil/propane) heating		
Heat storage - Distributor control		
Reduction of fresh air flow		
Reduction of ventilation rate		
Control of high-storage water heater		
Adjustment of heat pump flow rate		
Optimal setpoint management		
Optimization of start times		
Dual energy (oil/propane) water heater		
Ballast with modulation		
Partial shutoff of lighting		

Table 20: Potential of power demand management - Schefferville (in kW)

Residential measures	Avg. cost ($/kW-yr)	Potential (kW)
Manual setpoint management		
Dryer - behavioural		
Washing machine - behavioural		
Dishwasher - behavioural		
Lighting management - behavioural		
Water heater with timer control		
Setpoint management		
Water heater - Distributor control		
Dual energy		
Heat storage - Distributor control		
High-storage water heater - Distributor control		
CI measures	**Avg. cost ($/kW-yr)**	**Potential (kW)**
Partial shutoff of lighting		
Ballast with modulation		
Heat storage - Distributor control		
Reduction of fresh air flow		
Reduction of ventilation rate		
Dual energy (oil/propane) heating		
Adjustment of heat pump flow rate		
Control of high-storage water heater		

Table 21: Potential of power demand management - Haute-Mauricie (in kW)

Residential measures	Avg. cost ($/kW-yr)	Potential (kW)
Manual setpoint management		
Dryer - behavioural		
Washing machine - behavioural		
Dishwasher - behavioural		
Lighting management - behavioural		
Water heater with timer control		
Water heater - Distributor control		
High-storage water heater - Distributor control		
Three-element water heater		
Dual energy		
Heat storage - Distributor control		
Dryer - Distributor control		
High-storage water heater		
CI measures	**Avg. cost ($/kW-yr)**	**Potential (kW)**
Heat storage - Distributor control		
Dual energy (oil/propane) heating		
Reduction of fresh air flow		
Control of high-storage water heater		
Optimal setpoint management		
Reduction of ventilation rate		
Dual energy (oil/propane) water heater		
Optimization of start times		
Ballast with modulation		
Partial shutoff of lights		

4.3.3 Industrial sector

For the industrial sector, the potential of power demand management is limited to Îles-de-la-Madeleine and Opitciwan, where almost all the industrial demand is located. Table 22 presents this technical/economic potential. It is composed of two main measures: the use of standby generators in Îles-de-la-Madeleine and the shifting of production to off-peak hours in Opticiwan. This potential can be exploited by using the Distributor's interruptible electricity option on the autonomous grids. For the other industrial customers in Îles-de-la-Madeleine, the potential is limited due to low demand by the plants during peak periods.

Table 22: Potential of power demand management - Industrial (in kW)

Industrial measures	**Potential (kW)**
Standby generators - IDLM	
Other industrial customers - IDLM	
Shifting of production to off-peak hours - Opitciwan	

5. Conclusion

The Distributor has assessed the technical/economic potential of energy efficiency measures on the territories covered by each of the autonomous grids. This assessment includes the avoided costs and the specificities of each autonomous grid, including consideration of lower oil consumption. The assessment also covers power demand management measures. Further to the technical/economic potential assessment of energy efficiency measures, the next step is to analyze the achievable potential of the most promising opportunities. These opportunities include the renewable energy technologies identified in the technical/economic potential assessment. Once the achievable potentials have been identified, the Distributor will be able to design programs targeting both energy conservation and power demand management measures.