RESPONSES BY HYDRO-QUÉBEC DISTRIBUTION
TO THE RÉGIE'S REQUEST FOR INFORMATION NO. 1

AUTONOMOUS GRIDS

REQUEST FOR INFORMATION NO. 1 BY THE RÉGIE DE L'ÉNERGIE (THE RÉGIE) ON THE 2014-2023 SUPPLY PLAN (THE PLAN) OF HYDRO-QUÉBEC IN ITS ROLE AS ELECTRICITY DISTRIBUTOR (THE DISTRIBUTOR)

SUPPLY PLAN FOR THE AUTONOMOUS GRIDS

14. References:
(i) Exhibit B-0010, p. 74;
(ii) Exhibit B-0010, p. 86.

Preamble:

(i)[1]

TABLEAU 3.2
COÛT DE REVIENT, PAR RÉSEAU
ANNÉE 2012

	Total (en ¢/kWh)	Entretien et exploitation (en ¢/kWh)
Îles-de-la-Madeleine	33,7	6,6
Nunavik		
Akulivik	109,7	35,1
Aupaluk	119,4	45,0
Inukjuak	77,7	10,8
Ivujivik	132,4	51,3
Kangiqsualujjuaq	78,8	14,0
Kangiqsujuaq	85,2	19,3
Kangirsuk	78,9	21,3
Kuujjuaq	86,0	5,3
Kuujjuarapik	70,4	7,7
Puvirnituq	66,2	9,3
Quaqtaq	95,4	32,4
Salluit	65,0	12,3
Tasiujaq	90,6	25,3
Umiujaq	95,9	33,7
Basse Côte-Nord		
La Romaine	41,9	8,6
Lac-Robertson	40,5	7,2
Port-Menier	74,3	15,3
Schefferville	35,1	18,7
Haute-Mauricie		
Opitciwan	49,2	4,9
Clova	61,7	18,3

(ii) Table 5.2 shows the different types of compensation and/or subsidies paid in the various territories of the autonomous grids in the context of the efficient energy use programs.

Requests:

14.1. Please provide explanations and comments on Table 3.2 to clarify, for each grid, what is comprised by the total cost of production per kWh and the costs of maintenance and operation.

[1] Legend: Table 3.2, Cost of production by grid, Year 2012
Total (in ¢/kWh); Maintenance and operation (in ¢/kWh)

Response:

As described in section 2.4 of exhibit HQD-13, document 1 (B-0058) in case R-3776-2011, the total cost of production includes the following:

- **fuel cost;**
- **operating and maintenance expenses;**
- **cost of transportation, distribution, customer service, administration, and support;**
- **commercial programs;**
- **depreciation and interest.**

The operating cost includes the expenses required to operate the power stations, while the maintenance cost includes the expenses required to maintain the stations.

14.2. Please itemize the total cost provided in Table 3.2 not only in terms of operating and maintenance costs but also by indicating in three additional columns the fuel costs of the power stations, the depreciation costs for the assets and, as applicable, the costs of the Efficient Energy Use Program for the Autonomous Grids.

Response:

The Distributor believes that the costs of production presented in Table 3.2 constitute information relevant to the study of the cost of service for the purposes of rate setting. The costs of production are accounting data that are based on past decisions. The Distributor reiterates that this information was submitted in certain rate cases and was found by the Régie to be relevant to the review of the cost of service.

However, the Distributor believes that the costs relevant to the analyses necessary to make the best energy choices for the future are the economic costs expressed as avoided cost of electricity supply. The avoided costs of supply represent the costs relevant to the analysis of the cost-effectiveness of the Comprehensive Energy Efficiency Program, for the determination of rate structures, and for the review of electricity generation options.

The Distributor presented the itemized 2013 avoided costs for each of the autonomous grids in rate case R-3854-2013 in Table 2 of exhibit HQD-3, document 4 (B-0017).

Consequently, the Distributor submits that the requested information exceeds the framework for the study of a supply plan submitted by the Distributor.

14.3. If the cost of the efficient energy use programs is not included in the cost of production per kWh of electricity for each grid, please provide it separately, indicating the number of litres of heating fuel concerned by the programs in each grid. Please elaborate on the concept of the avoided costs to the Distributor of measures in the technical/economic potential assessment targeting fuel heating savings and, as applicable, provide them for each grid.

Response:

The cost of the Efficient Energy Use Program is included in the cost of production.

Concerning those measures in the technical/economic potential assessment relating to heating oil savings, the avoided costs correspond to the forecast heating oil price determined for the heating requirements.

14.4. Please elaborate, in the cases of Kuujjuaq and Akulivik, on the impact of the commissioning of new thermal power stations on the costs of production presented in Table 3.2.

Response:

The commissioning of a new power station generally leads to improved genset efficiency (kWh/litre) and reduced maintenance costs.

For the Kuujjuaq station, efficiency improved by about 3% while maintenance costs decreased by about 5% between 2009 and 2012. For the Akulivik station, the Distributor anticipates a 6%-plus efficiency improvement between 2012 and 2016.

However, the investments sunk into the building of a power station necessarily lead to an increase in the costs associated with depreciation and financial expenses.

15. References:

(i) Case R-3748-2010, decision D-2011-162, p. 94;
(ii) Exhibit B-0009, HQD-2, document 1, p. 18;
(iii) Case R-3854-2013, exhibit B-0038, p. 5;
(iv) Case R-3776-2011, exhibit A-0039, p. 219;
(v) Case R-3414-2012, decision D-2013-037, p. 137;
(vi) Exhibit B-0009, HQD-2, document 1, p. 12.

Preamble:

(i) "[338] The Régie takes note that the Distributor, pursuant to decision D-2011-028, will, in the fall of 2011, undertake a reassessment of technical/economic potential for the autonomous grids. It asks the Distributor specifically to review the consumption management measures applicable to each grid in the context of this reassessment. The impact of each of the measures studied, whether or not selected for its technical/economic potential, must be distinguished and quantified. *Based on this assessment, the Régie asks the Distributor to quantify its consumption management objective for the autonomous grids.* The follow-up to these requests shall be submitted in the context of the 2014–2023 Supply Plan. [Our emphasis.]

(ii) "*In the longer-term,* the Distributor shall expend all efforts required to commercially exploit the energy saving measures identified in the assessment. In particular, it shall assess the feasibility and the achievable potential of building envelope measures as a complement to roof insulation. In addition, the Distributor shall validate the costs and performance of renewable energy technologies with reference to the context and climatic conditions of the autonomous grids. *If certain technologies prove technically promising and cost-efficient,* it shall prioritize their implementation in order to reduce requirements." [Our emphasis.]

(iii) "The technical/economic potential for energy efficiency measures consists of energy savings and reduced power demand *associated with the implementation of measures where this is technically possible* and where the unit cost is less than or equal to the Distributor's avoided cost." [Our emphasis.]

(iv) In regard to the utility of the avoided costs in the autonomous grids, the Distributor explains that "The level of the costs obtained is amply sufficient for us to implement any programs we want."

(v) "[551] Moreover, each autonomous grid may offer the opportunity to test technologies or measures at the scale of small-scale pilot projects. Under such circumstances, the financial risks related to the testing and evaluation of such measures are limited. In addition, the economic impact of the energy efficiency measures at the scale of these grids may be considerably higher than in the integrated system where the avoided costs are much lower. *The Régie encourages the Distributor to test and evaluate under real conditions the most promising measures identified in the technical/economic potential assessment on the autonomous grids.*

(vi) Table 3 presents the impact of the energy efficiency interventions.

Requests:

15.1. Please clarify which energy efficiency programs are included in the energy efficiency interventions for which Table 3 gives the impact [reference (vi)], particularly indicating the measures identified in the technical/economic potential assessment for the autonomous grids whose deployment is planned, and also indicating the year in which that deployment is to start.

Response:

The energy efficiency measures planned for the 2015 horizon are presented in Table 5.1 of exhibit HQD-2, document 2 (B-0010), Appendix 5. Beyond 2015, energy efficiency interventions will be specified as and when the achievable potential of the measures identified in the assessment is validated.

The budgets will be subject to approval in the context of the rate cases.

15.2. Considering the Distributor's remarks cited in references iii) and iv) and the decision excerpt in reference v), please explain the reasons that could prevent the Distributor from proceeding, without further delay, to conduct energy audits for each of the grids and to devise priority action plans or carry out pilot projects to validate and assess energy efficiency or peak demand management measures on the scale of an autonomous grid under actual conditions.

Response:

The Distributor has been conducting energy audits in the autonomous grids for several years. For example, it made energy audit visits to households in Îles-de-la-Madeleine and Basse-Côte-Nord from 2007 to 2010. These visits resulted in the implementation of energy efficiency measures specific to each household.

In particular, since 2009 the Distributor has been conducting energy audits of residential buildings and, in 2011, of commercial buildings on the Schefferville grid. These audits led the Distributor to implement a construction worker training program and a roof insulation pilot project. In 2013, energy audits were done for residential and commercial buildings in Opitciwan. The results of these audits will guide the Distributor's future actions on this grid.

16. References:
(i) Case R-3748-2010, decision D-2011-162, p. 97;
(ii) Case R-3814-2012, decision D-2013-037, p. 136;
(iii) Exhibit B-0009, pp. 20–2.

Preamble:

(i) "[354] the Régie notes, from the RNCREQ expert's report, that commercial wind-diesel systems have been in operation for over a decade. It recalls that the first wind-diesel project was to have been commissioned in Nunavik in 2008. The Régie asks the Distributor to update the wind-diesel expert report for Nunavik and Îles-de-la-Madeleine and to *file the update as part of the 2012 progress report on the Plan*. The updated cost-benefit analysis shall take account of various operational scenarios for the diesel gensets as well as the valuation of the surplus wind-generated electricity. The Distributor must also develop a concrete and rapid deployment plan for wind-diesel systems in the autonomous grids, for filing in the context of the 2014–2023 Supply Plan." [Our emphasis.]

(ii) "[549] On this subject, the Régie reiterates that the Distributor must develop a specific and rapid deployment plan for wind-diesel systems in the autonomous grids, to be filed in the context of the 2014–2023 Supply Plan."

(iii) In section 5.2.2, the Distributor presents the progress report on renewable energy projects. On the subject of wind-diesel, the Distributor states:

"The Distributor is continuing its study of two ongoing projects, one in Îles-de-la-Madeleine and the other in Nunavik (Kangiqsualujjuaq). *Results so far* from the technical assessment of the potential for integrating the Cap-aux-Meules and Kangiqsuallujjuaq stations into the grid *have been satisfactory*. The Distributor's assessment of the cost-effectiveness of these projects will continue. Once the studies are completed, the Distributor will update the expert report on the development of wind-diesel systems in Îles-de-la-Madeleine and Nunavik. Follow-up will be done in 2014 as part of the progress report on the Plan." [Our emphasis.]

Requests:

16.1. Please submit the results to date of the technical studies for the integration of the Cap-aux-Meules and Kangiqsuallujjuaq power stations into the grids.

Response:

The results of the technical studies show that it would be technically possible to do wind-diesel projects at Cap-aux-Meules and Kangiqsuallujjuaq.

Cap-aux-Meules power station

The wind turbine site is in the northeastern portion of the archipelago in the Dune-du-Nord area. Given the constraints under which Nav Canada (NavCan) is working, the site is more remote than the one initially chosen. A bylaw amending the zoning plan was passed accordingly.

The technical study was done with a concept comprising three wind turbines with nameplate capacity of 2.05 MW each, for a total of 6.15 MW.

To provide for the stability of the supply, impacts will be minimized by planned modifications to the grid that will be validated by means of simulation. A 1.5 MW-flywheel will be used for the purposes of load-frequency control.

Annual generation is estimated at about 22.5 GWh, corresponding to a load factor of 42%.

Kangiqsuallujjuaq power station

The wind turbine will be installed 1.2 km from the power station.

The technical study assumed a single wind turbine with a rated capacity of 800 kW, which will be designed to withstand Arctic climatic conditions.

The technical study served to define the operating modes and the systems to be implemented in order to provide for optimal operation of the grid; i.e., operation that minimizes the impacts for the customer even during disruptions. A 250-kW flywheel will support load-frequency control.

Annual generation is estimated at about 1.7 GWh, corresponding to a load factor of 24%.

16.2. Please indicate when the cost-efficiency analyses of the Cap-aux-Meules and Kangiqsuallujjuaq projects will be completed. If they cannot be completed before the beginning of May 2014, please detail the reasons why not.

Response:

The Distributor conducted preliminary economic analyses for each of the two projects. These analyses were performed on the basis of phase 1 of the pre-feasibility studies.

Assuming the costs determined in phase 1, the economic analyses show that the Kangiqsualluijuaq wind-diesel project would not be cost-efficient at this stage, while the Cap-aux-Meules project would have a slight economic advantage. Moreover, the implementation of wind-diesel in Îles-de-la-Madeleine will have to be analyzed in light of a possible scenario involving connection to the Percé substation.

Phase 2 of the pre-feasibility studies will allow the Distributor to clarify the operating mode to be implemented and to determine the costs of each project. It will take at least 12 months from the start of phase 2 of each pre-feasibility study to obtain results.

16.3. Please justify the two-year delay in filing the updated expert report on the development of wind-diesel systems for the autonomous grids, requested by the Régie in reference (i).

Response:

The Distributor reiterates that the expert report on the development of wind-diesel systems for the autonomous grids cannot be produced and filed as long as the studies of the Cap-aux-Meules and Kangiqsualluijuaq projects have not been completed.[2]

The Distributor reiterates that the rejection of the sites by NavCan forced it to identify new sites for the projects, which had a major impact on the timeline for the studies. The Distributor also had to retain an expert to review the sites identified in the expert report mentioned in reference (i).

16.4. Please comment on the feasibility of filing, by early May 2014, the updated expert report on the development of wind-diesel systems for Îles-de-la-Madeleine and

[2] See the response to question 2.1 of the Régie's request for information no. 1 in relation to the 2012 Progress Report on the 2011–2020 Supply Plan.

Nunavik as well as the specific and rapid deployment plan for wind-diesel requested by the Régie in reference (i). If it is impossible to do this, please detail the reasons why.

Response:

See the response to question 16.3.

17. References:

(i) Case R-3740-2010, decision D-2011-028, pp. 148–9;
(ii) Case R-3748-2010, decision D-2011-162, p. 101;
(iii) Case R-3776-2011, decision D-2012-024, p. 169;
(iv) Exhibit B-0009, pp. 16–19.

Preamble:

(i) For the year 2011, the Régie maintained the rate freeze in effect in Schefferville in 2008 *until such time as a specific energy efficiency plan tailored to that region could be initiated and put in place*.

(ii) "[367] Despite these explanations, the Régie remains concerned about the high unit consumption in Schefferville and asks the Distributor to file *a specific action plan for this grid* in the context of the 2014–2023 Supply Plan, including the measures taken and planned, *in terms of energy efficiency and consumption management,* with particular consideration to the rate and collection strategies considered in the context of other cases." [Our emphasis.]

(iii) "[663] The Régie asks the Distributor to design specific power demand management measures for Schefferville once the results of the ongoing technical/economic potential assessment for the autonomous grids are available."

(iv) Section 5.1 presents the energy efficiency interventions in the context of the Distributor's supply strategy for the autonomous grids. The only mentions of Schefferville are the following:

> "Drawing on the experience gained in 2013 in the Schefferville schools, the Distributor intends to pursue its student awareness-raising activities on all the grids. Furthermore, as announced in its 2014–2015 rate application, the Distributor has embarked on a roof insulation pilot project for Schefferville residential customers."
>
> "In order to exploit the power management measures identified in the technical/economic potential assessment, the Distributor will put an emphasis on the following:…
> Implement the mechanisms necessary to make appeals to the public in the autonomous grids. As of winter 2013–2014, the Distributor intends to prioritize the Schefferville and Îles-de-la-Madeleine grids."

Request:

17.1. Please present the Distributor's specific energy efficiency and power demand management action plan for the Schefferville grid, as requested by the Régie.

Response:

In terms of energy efficiency, the measures with the strongest technical/economic potential concern roof, wall, and floor insulation. The Distributor has begun a roof insulation pilot project for the three communities of Schefferville. This project will continue until 2015. The Distributor is continuing its work to identify the achievable potential of the other building envelope measures, to wit, wall and floor insulation, which generally require more extensive work. It will also continue its energy efficiency awareness-raising activities, particularly in the schools.

As to power demand management, in December 2013 the Distributor initiated its efforts to raise public awareness to winter peak demand. The Distributor is continuing to analyze the measures identified in the technical/economic potential assessment and will prioritize the development of new power demand management programs as and when the feasibility and cost-effectiveness of the interventions are demonstrated.

18. References:
(i) Case R-3748-2010, decision D-2011-162, p. 103;
(ii) Case R-3854-2013, exhibit A-0059, pp. 69–72;
(iii) Exhibit B-0010, HQD-2, document 2, p. 85;
(iv) Exhibit B-0009, HQD-2, document 1, p. 15;
(v) http://www.yukonenergy.ca/media/site_documents/1141_Conservation%20Potential%20_Review%20Final%20Report%202012%20-%20Residential%20Chapter1.pdf;
(vi) Case R-3854-2013, exhibit B-0088, p. 98.

Preamble:

(i) "[375] The Régie is of the view that the Distributor must consider the production, rate setting, and efficiency aspects for the autonomous grids simultaneously. To this end, it asks the Distributor to present, in the context of the next supply plan, a strategy over a 10-year horizon covering these aspects for each autonomous grid.

(ii) In response to UC's question about the reasons why there is no potential associated with space heating in Nunavik, the Distributor explains:

"Well, in Nunavik, obviously, space heating is with fuel oil, so it is not part of electricity potential.... backup heating is not a measure.... it is not part of the potential.... Backup heating is an observation we made based on certain information.... it's a question of pricing.... There are no measurement costs. The customer wouldn't consume, and it's a question of rates."

(iii) Table 5.1 presents the energy efficiency-related interventions on each grid.

(iv) Table 4 presents the power margins (deficits) for each grid at the 2023 horizon.

(v) On page vii of the Marbek study, it is stated that "Block-heaters – Car warmers" account for as much consumption as television sets in the Yukon. On page 99, it is stated that measures targeting this use of electricity could reduce it by 23% at the 2030 horizon, for a 3% share of the total savings identified, as much as or more than the measures targeting TV sets and electronic devices. On page 110 (exhibit 62) of the same study, it is stated that the management of this use of electricity offers the second-highest potential for peak load management.

(vi) "The Distributor limited its analysis of the technical/economic potential for power demand management to the winter months since the annual peak power requirements for all the grids always coincide with the winter months."

Requests:

18.1. Please explain the reasons why the annual peak on the autonomous grids north of the 53rd parallel occurs in winter.

Response:

The autonomous grids north of the 53rd parallel are characterized by a wide range of hours of sunlight, ranging from 6 hours at winter solstice to 18 hours at summer solstice. Thus, the analysis of demand curves as a function of hours of sunlight shows that lighting explains a good part of the additional winter peak load.

In addition, seasonal habits and backup heating also apparently contribute to the occurrence of the winter peak.

18.2. Please present the Distributor's strategy to reduce or eliminate the use of backup electric heating.

Response:

In rate case R-3854-2013, at the Régie's request, the Distributor presented an update on rates applicable north of the 53rd parallel. For domestic rates, it was proposed to gradually accentuate the price signal for the second energy block (average 8% increase in domestic rates) so that it ultimately reflects the avoided costs in the autonomous grids north of the 53rd parallel and induces consumers to use electricity efficiently, which in the case at hand largely translates into the use of fuel oil for heating.

Moreover, the Distributor committed to stepping up its awareness-raising efforts with the agencies responsible for nearly all electricity bill collection in Nunavik. Starting in 2014, the Distributor intends to work in close collaboration with the local agencies to establish a complete diagnosis of the actual causes of second-block consumption and to quickly identify solutions that are likely to be implemented and accepted by the communities.[3]

18.3. Please specify those measures planned for deployment by the Distributor in Table 5.1 of reference (iii) that are specific to the autonomous grids and/or to the northernness of the grids north of the 53rd parallel, e.g., as regards management of engine block heaters, a specifically northern use of electricity.

Response:

The management of engine block heaters is not planned in Table 5.1 of reference (iii) for the Nunavik grids. As mentioned previously, the Distributor intends to work in close collaboration with the local agencies to establish a diagnosis of household electricity consumption in the grids north of the 53rd parallel. This diagnosis will allow the Distributor to explore new interventions, including management of engine block heaters, should

[3] As the Distributor testified in case R-3854-2013 (see the stenographer's notes of 12 December 2013, pp. 46–8).

this measure prove a promising means of reducing power requirements.

18.4. The Régie notes that, in presenting the requested strategy for each autonomous grid, the Distributor grouped the 14 villages of Nouveau-Québec under the heading "Nunavik." But Table 4 of reference (iv) shows that certain villages will need to add capacity sooner than others. Please present the Distributor's strategy for prioritizing measures in these grids that will enable it to forestall adding capacity to their thermal power stations, whether these be energy efficiency, power demand management, or decentralized electricity generation measures.

Response:

The Distributor's strategy for managing the power balance is the same for all the autonomous grids.

As a first priority, the Distributor aims to decrease power requirements by putting forward energy efficiency measures. Beyond the current methods (deterrent pricing, Efficient Energy Use Program, interruptible electricity), the Distributor will roll out any other power demand management measures that can serve to reduce peak demand. For the time being, it is premature to set specific power demand management targets. The power demand management target on each grid and the specific measures for attaining it cannot be set until the marketable technical/economic potential of each measure has been clearly established.

To reduce the short-term deficit of certain Nunavik power stations, the Distributor is continuing its interventions by proposing new programs (residential lighting efficiency program, LED public lighting program) and by carrying on its awareness-raising efforts (educational package for schools), which consist in targeting behavioural measures. The Distributor also has plans to extend its winter peak awareness campaign to all the villages of Nunavik.

As a second priority, if energy efficiency interventions prove insufficient to make up for the power deficit, the Distributor will act on supply by adding sufficient capacity at the right time – in particular by installing mobile generators – to guarantee the reliability of supply on each grid.

19. References:
(i) Exhibit B-0009, HQD-2, document 1, p. 5;
(ii) Exhibit B-0009, HQD-2, document 1, p. 7;
(iii) http://www.newswire.ca/fr/story/1264881/gaz-metro-gnl-lance-unappel-de-soumissions-sans-engagement-pour-du-gaz-naturel-liquefie;
(iv) http://affaires.lapresse.ca/economie/energie-et-ressources/201310/22/01-4702178-gaz-metro-un-client-a-1000-km-de-distance.php;
(v) http://www.yukonenergy.ca/media/site documents/LNG Life Cycle Assessment - Pembina Institute-Final Report;
(vi) http://www.yukonenergy.ca/media/site documents/1260 ICF%20Marbek%20Final%20Report LNG lifecycle july2013.pdf.

Preamble:

(i) "The Distributor is carrying out its basic mission in the autonomous grids, which is to meet the customers' requirements at the lowest cost, in both the short and the long term."

(ii) "The operating cost of the thermal power stations is very high because of fuel prices (see Appendix 3). In addition, most of the stations are obsolescent and will eventually require investments in order to keep them operating.... Apart from generation capacity issues, the Distributor will also have to deal with excess CO2 emissions from the Cap-aux-Meules power station. In 2012, the plant's emissions exceeded 125,000 CO2-equivalent tons, or five times higher than the authorized ceiling. In 2013, the Distributor will proceed to purchase the allowances necessary to cover the excess emissions on an annual basis."

(iii) and (iv) The press clippings cited in the reference show that liquefied natural gas (LNG) is becoming an option that could be given economic consideration for remote regions.

(v) A passage on page 28 of the report *LNG for Yukon Energy Power Generation: A Life Cycle Emissions Inventory* (The Pembina Institute, July 2013) reads: "The environmental performance of the LNG system modelled was better than the diesel pathway across all categories of environmental impact.... LNG performance is specific to Shell's Jumping Pound facility."

(vi) A passage on page (iii) of the final report *Yukon Plant Fuel Life Cycle Analysis* (ICF International, 2 July 2013) reads:

"Yukon Energy Corporation (YEC) wants to understand direct and indirect environmental consequences associated with the use of liquefied natural gas (LNG) for power generation at an electricity generating facility (planned project) versus an equivalently sized diesel-fueled facility in the city of Whitehorse.... The full lifecycle, from drilling through full production and processing, transportation of fuel to Whitehorse and combustion to generate electricity has been considered for each alternative studied, which constitutes three pathways from wellhead to transmission line. The study pathways are:

1. Conventional natural gas extraction and processing in the Foothills of Alberta to produce LNG for transportation to Whitehorse and subsequent electricity generation using a natural gas fired engine;
2. Shale (unconventional) gas extraction using hydraulic fracturing in northeastern British Columbia to produce LNG for transportation to Whitehorse and subsequent electricity generation using a natural gas fired engine; and
3. Crude extraction on the North Slope of Alaska, transportation of the crude to a refinery in northwestern Washington to produce diesel fuel, followed by transportation of the diesel to Whitehorse and subsequent electricity generation using a diesel fired engine.

		GHG kg CO_2e/MWh	NOx kg NO_x/MWh	SO_2 kg SO_2/MWh	CO kg CO/MWh	PM kg PM/MWh	Water L/MWh
Shale Gas	Base Case	594.3	2.1	0.2	1.2	0.2	178.2
Conventional Natural Gas	Base Case	679.5	2.3	2.2	1.7	0.7	5.6
Diesel	Base Case	694.8	17.8	1.2	1.2	1.1	52.9

Requests:

19.1. Please elaborate on the Distributor's position on LNG and its intent to analyze the economic and environmental feasibility of using LNG as a replacement option for diesel in the autonomous grids.

Response:

As with renewable energy projects, alternative fuels have to be shown to be technically feasible, cost-effective, environmentally acceptable, and favourably received by the communities concerned.

In the Distributor's view, there are major constraints on the use of LNG in the autonomous grids, particularly as regards generation and storage infrastructure as well as LNG transportation methods.

- **the thermal power plants currently in service in the autonomous grids cannot be converted to LNG. In fact, if conversion to LNG were under consideration, the Distributor believes that it would be preferable to install new generating units running exclusively on LNG or in "dual fuel" mode, rather than converting the existing generating units.**

- **The existing fuel oil storage infrastructure does not allow for storage of LNG, which has to be kept at -160 ºC in order to remain liquid.**

- **With the exception of Clova and Opitciwan, fuel transportation in the autonomous grids is by boat, which travels twice a year in Nunavik. In certain cases, transshipment has to be completed using barges. None of the autonomous grids has LNG transshipment facilities. Such facilities are particularly imposing and likely to be opposed by the communities concerned.**

- **Due to the low frequency of boat passage, LNG storage infrastructure in Nunavik would have to have sufficient capacity to provide for a full year's power.**

- **Clova and Opitciwan are the only road-accessible autonomous grids. In the case of Clova, the rating of the LNG-powered gensets available on the market exceeds the community's requirements. For Opitciwan, the Distributor notes that a biomass-based project is under study by the community.**

Therefore, there are no projects that currently meet the criteria of being technically feasible, cost-effective, environmentally acceptable, and favourably received by the communities concerned.

19.2. Please explain the process whereby the Distributor obtained greenhouse gas emission allowances corresponding to only 20% of the emissions from the Cap-aux-Meules power station.

Response:

The Distributor has to purchase all the emission allowances necessary to cover the entirety of the emissions from Cap-aux-Meules.

19.3. Please explain how the cap-and-trade system has or will have a direct or indirect influence on the operating costs of the other thermal power stations in the autonomous grids.

Response:

The Cap-aux-Meules thermal power station is the only such station in any autonomous grid that is emitting more than 25,000 CO2-equivalent tons per year over the period covered by the Plan (see exhibit HQD-2, document 1 (B-0009), page 7, note 3).

20. References:

(i) Exhibit B-0010, p. 45;
(ii) Exhibit B-0010, p. 34;
(iii) http://www.desjardins.com/fr/a propos/etudeseconomiques/conjoncture quebec/etudesregionales/eegasmad.pdf.

Preamble:

(i) At the Plan horizon, the Distributor forecasts average annual growth of 0.8% in the number of residential customers, 1.1% in energy sales, and 1.0% in peak power requirements.

TABLEAU 2C-2
PRÉVISION DE LA DEMANDE - ÎLES-DE-LA-MADELEINE

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Crois. annuelle moy. 2013-2023
Abonnements résidentiels et agricoles	6 661	6 725	6 799	6 870	6 930	6 982	7 034	7 086	7 131	7 170	7 199	0,8%
Ventes (GWh)	172,4	175,2	177,5	180,4	181,7	183,6	185,5	188,0	189,0	190,6	192,1	1,1%
dont résidentiel et agricole (GWh)	*96,7*	*98,3*	*99,8*	*101,6*	*102,5*	*103,7*	*104,8*	*106,4*	*107,1*	*108,1*	*108,9*	*1,2%*
Pertes, consommation des centrales et usage interne (GWh)	22,1	22,4	22,7	23,1	23,3	23,5	23,7	24,1	24,2	24,4	24,6	1,1%
Besoins en énergie (GWh)	194,4	197,6	200,2	203,5	205,0	207,1	209,2	212,0	213,2	215,0	216,7	1,1%
Besoins en puissance à la pointe (MW) [1]	41,73	42,22	42,62	42,95	43,41	43,87	44,33	44,75	45,15	45,51		1,0%
Interventions en efficacité énergétique	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	
Économies d'énergie												
Ventes (GWh)	9,2	9,6	10,6	11,5	12,5	13,4	14,4	15,3	16,3	17,2	18,2	
Besoins en puissance à la pointe (MW) [1]	2,27	2,44	2,67	2,90	3,12	3,35	3,58	3,81	4,03	4,26		
Utilisation efficace de l'énergie												
Ventes (GWh)	43,8	44,5	45,2	46,0	46,4	46,9	47,4	48,1	48,4	48,9	49,3	
Besoins en puissance à la pointe (MW) [1]	15,38	15,64	15,86	16,14	16,28	16,46	16,64	16,89	17,00	17,16		

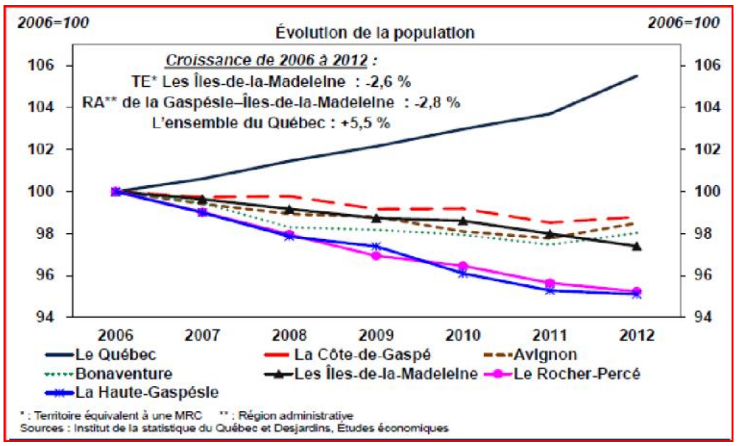
[1] Pour l'hiver commençant en décembre de l'année indiquée.

(ii) Table 2B-2 shows that the total number of customers increased by 423 in 2012 with respect to the 7100 customers of 2006. There are 441 additional residential customers in 2012 with respect to the 6152 in 2006, for a 7.2% increase in the number of residential customers. Thus, the numbers of other types of customers decreased. Energy requirements rose from 179.2 GWh in 2006 to 187.7 GWh in 2012, for an increase of 4.7%. Over the same period, peak power requirements rose from 35 to 42 MW, for an increase of 20%.

TABLEAU 2B-2
HISTORIQUE DE LA DEMANDE - ÎLES-DE-LA-MADELEINE

En GWh	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nombre d'abonnements	6 708	6 768	6 832	6 941	6 998	7 101	7 181	7 278	7 371	7 434	7 484	7 524
dont résidentiel et agricole	5 797	5 810	5 874	5 984	6 053	6 152	6 236	6 338	6 432	6 499	6 549	6 593
Ventes	140,8	153,0	155,1	159,9	155,7	155,5	161,8	162,2	167,0	158,9	167,1	166,3
dont résidentiel et agricole	73,7	80,8	82,9	84,9	83,6	82,5	89,2	89,5	93,6	88,2	92,9	93,1
Pertes, consommation des centrales et usage interne	24,2	20,5	22,4	21,0	24,5	23,7	22,9	20,8	18,7	20,0	22,9	21,4
Besoins en énergie	165,0	173,6	177,6	180,9	180,2	179,2	184,7	183,0	185,7	178,9	189,9	187,7
En MW	**2001/02**	**2002/03**	**2003/04**	**2004/05**	**2005/06**	**2006/07**	**2007/08**	**2008/09**	**2009/10**	**2010/11**	**2011/12**	**2012/13**
Besoins en puissance à la pointe	33,55	36,28	36,55	37,46	35,04	37,75	39,23	40,20	39,21	39,76	38,88	42,06
Puissance installée	68,23	68,23	68,23	68,23	68,23	68,23	68,23	68,23	68,15	68,15	68,15	68,19

(iii) [4]Population growth in Îles-de-la-Madeleine was -2.6% between 2006 and 2012.



Requests:

20.1. Please explain the average annual growth in the number of residential and agricultural customers in Îles-de-la-Madeleine, given the demographic trends prevailing on this territory [reference (iii)].

Response:

The Distributor wishes to clarify that total population growth is not an adequate indicator of growth in the residential and agricultural customer base. The reason is that not all age groups have the same impact on the customer base. For example, changes in the population aged 15 and under have no impact on the customer base. As an illustration, in Îles-de-la-Madeleine for the period 2006–2012, while total population decreased, the populations aged 15 and over, aged 20 and over, and aged 35 and over grew by 1.1%, 1.6%, and 2,6%, respectively.

As to the forecast numbers of residential and agricultural customers in Îles-de-la-Madeleine, these are based on the demographic growth

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[4] Legend: Population trends Growth from 2006 to 2012; TE: Îles-de-la-Madeleine; Grid: Gaspésie- Iles-de-la-Madeleine; Quebec as a whole:
TE = territory equivalent to an MRC and ** = administrative region
Sources: Institut de la statistique du Québec and Desjardins, Études économiques

outlook for the different age groups in this region. Based on this demographic data, average annual growth in the residential and agricultural customer base over the period 2013–2023 is estimated at 0.8%, while it was 1.2% for 2006–2012.

20.2. Please elaborate on the assumptions enabling the Distributor to forecast average energy sales growth of 1.1% and average power demand growth of 1.0% at the Plan horizon, in particular explaining how the demographic data are taken into account and which energy efficiency and demand management measures are included in this forecast.

Response:

As described in the response to question 20.1, the demographic data specific to Îles-de-la-Madeleine are taken into account when forecasting the size of the customer base. Over the period covered by the Plan, the growth in the number of residential and agricultural customers is 0.8%, which is comparable to the forecast growth in energy demand. In addition, the demand forecast takes account of the evolution of unit consumption observed in recent years and of all the energy efficiency measures planned by the Distributor. These measures are presented in Table 3 of exhibit HQD-2, document 1 (B-0009).

As for the growth in the peak power forecast, it flows from the growth in energy demand.

20.3. Considering the 4.7% growth in energy sales and the 20% growth in peak power demand between 2006 and 2012, please elaborate on the performance of the Comprehensive Energy Efficiency Program and the Efficient Energy Use Program for the Autonomous Grids in Îles-de-la Madeleine from 2006 to 2012, particularly given the 2.6% population decline observed over this period.

Response:

The Distributor refers to the response to question 20.1 concerning the population decline over the period 2006–2012.

Moreover, the growth in real peak power requirements over the period 2006–2012 is 11.4% (42.06 MW in winter 2012–2013 as compared with 37.75 MW in winter 2006–2007) rather than 20% (42.06 MW in winter 2012–2013 as compared with 35.04 MW in winter 2005–2006), which takes account of an additional year.

In addition, in order to properly assess demand growth, the comparative analysis of growth must be based on normalized values for climatic conditions instead of the real values given in reference (ii). The table below presents the cumulative growth in energy and peak power requirements over six years, as normalized for climatic conditions. Thus, normalized energy requirements grew by 4.4% over 2006–2012 while normalized peak power requirements grew by 7.2% over the same period. Without the efforts under the Comprehensive Energy Efficiency Program during the period 2006–2012, growth in energy and peak power requirements would have been 9.4% and 12.4%, respectively. Thus, the energy efficiency programs cut the additional energy and power requirements by approximately half.

TABLE R-20.3
DEMAND GROWTH IN ÎLES-DE-LA-MADELEINE

	Year		Growth - 6 years	
	2006	2012	(in number)	(in %)
Total customers	7101	7524	423	6.0%
residential and agricultural customers	6152	6593	441	7.2%
	Year		Growth - 6 years	
Requirements (in GWh)	2006	2012	(in GWh)	(in %)
Real energy requirements	179.2	187.7	8.5	4.8%
Normalization for climatic conditions	3.4	2.8		
Normalized energy requirements	182.5	190.6	8.0	4.4%
Normalized energy requirements (before Comprehensive Energy Efficiency Program)	182.5	199.7	17.2	9.4%
	Winter		Growth - 6 years	
Peak power requirements (in MW)	2006-07	2012-13	(in MW)	(in %)
Real peak power requirements	37.75	42.06		11.4%
Normalization for climatic conditions	0.88	-0.66		
Normalized peak power requirements	38.63	41.40	2.8	7.2%
Normalized peak power requirements (before Comprehensive Energy Efficiency Program)	38.68	43.49	4.8	12.4%

As to the Efficient Energy Use Program for Îles-de-la-Madeleine, nearly 2,900 customers participated in this program in 2013, giving rise to annual reductions in energy and peak power requirements of approximately 50 GWh and 15 MW, respectively.

20.4. Considering the 4.7% growth in energy sales and the 20% growth in peak power demand in the period 2006–2012, please elaborate on what leads the Distributor to believe that peak power demand growth will be approximately equal to energy demand growth at the Plan horizon.

Response:

See the responses to questions 20.2 and 20.3.

Whereas Table R-20.3 indicates that growth in normalized energy requirements differs slightly from that of normalized power requirements, the Distributor wishes to specify that this type of comparative analysis calls for caution; it is contingent on the arbitrary choice of the start and end of the period analyzed. Thus, over a longer period, growth in normalized energy requirements is about equal to growth in normalized peak power requirements.