2014–2023 SUPPLY PLAN
INTEGRATED SYSTEM

Table of contents

Note: the totals in the tables contained in exhibits HQD-1, document 1 and HQD-2, document 2 are calculated from non-rounded data.

The presentation of the 2014–2023 Supply Plan for the Integrated System (the "Plan") is composed of one main document and several appendices, these latter being grouped into three separate documents. The appendices relating to the context of the Plan are grouped into exhibit HQD-1, document 2.1. In particular, this exhibit contains Appendix 1A, a glossary of technical terms and a list of abbreviations used in the Plan, and Appendix 1B, which indicates the specific documents containing the information requested in the *Guide de dépôt d'Hydro-Québec dans ses activités de distribution*. The appendices relating to demand forecasting are grouped into exhibit HQD-1, document 2.2, while the appendices relating to supply are in exhibit HQD-1, document 2.3.

1. CONTEXT OF THE SUPPLY PLAN

1.1. Changes since the 2011–2020 Supply Plan

Since the filing of the 2011–2020 Supply Plan on 1 November 2010, energy requirements have sharply declined, as illustrated in Figure 1-1.

Over the 2014–2023 period, the cumulative decrease in energy requirements is 71.3 TWh. The recent decreases are mainly due to a decline in industrial activity, most notably in the aluminum sector. The decrease in requirements is particularly pronounced for the period from 2015 to 2018.

FIGURE 1-1
DISTRIBUTOR'S ENERGY REQUIREMENTS
DISCREPANCIES WITH RESPECT TO THE 2011–2020 SUPPLY PLAN (TWh)

[Legend:]
Requirements
Annual discrepancy
2011–2020 Supply Plan
2014–2023 Supply Plan
Discrepancies

Furthermore, and still in relation to the 2011–2020 Supply Plan, the Distributor's supply portfolio has grown with the integration of contracts deriving from the program to purchase electricity from cogeneration plants fired by residual forest biomass (300 MW) and further to the Government of Québec's announcement on 10 May 2013 of its intention to secure an additional 800 MW of wind energy through various projects. For 2014–2023, these new projects increase the Distributor's supply by about 32 TWh.

The combined effect of decreased requirements and increased supply is a larger energy surplus than anticipated three years ago. The surplus stands at 75.0 TWh for 2014–2023, even after application of the management methods, as indicated in Figure 1-2.

FIGURE 1-2
ENERGY SURPLUSES, 2014–2023

[Legend:]
Supply after management methods
Requirements covered by the Plan
Surplus after management methods

1.2. Review of the strategy presented in the 2011–2020 Supply Plan

At the time of filing of the 2011–2020 Supply Plan, the Distributor foresaw a period of energy surpluses, together with winter power requirements necessitating a variable energy contribution. The strategy devised at that time focused on the use of the methods already at its disposal. Thus, the Distributor planned to make prudent use the deferred energy agreements with the Generator to ensure that the balance of the deferred energy account could be used up by the expiration of the baseload and cycling contracts. To achieve this, energy covered by the cycling contract was no longer deferred out to the Plan horizon, and energy covered by the baseload contract was not deferred for the initial years of the plan. The non-deferred quantities were to be covered by sales transactions with the Generator. Recalls were planned for the entire period covered by the Plan so as to meet winter energy and power requirements.

Beyond the methods already at its disposal, the Distributor relied on the following additional methods: modulation of deliveries from the TransCanada Energy (TCE) station, implementation of a comprehensive modulation agreement, and

a risk management strategy in regard to the availability of the additional 400 MW relating to recalls under the deferred energy agreements. With the use of short-term markets, these new methods served to restore the energy balance and to satisfy the new power requirements up to winter 2014–2015, inclusive. For growth of the requirements beyond this horizon, the Distributor planned to put out a call for tenders for new capacity as required.

1.3. Follow-up on the strategy

Since the filing of the 2011–2020 Supply Plan, forecast demand has undergone a major downward revision, thus increasing the energy surpluses and postponing the need to purchase new power capacity.

Hence, the prudence observed in the treatment of the deferred energy agreements proved fully justified, since this increased surplus heightens the pressure on the balance in the deferred energy account, to the point where the Distributor is no longer in a position to defer energy.

In addition, apart from the Régie's rejection of the comprehensive modulation agreement, deliveries from the TCE station are no longer required over the Plan horizon, a call for tenders for long-term power purchases is no longer required before the filing of the next supply plan, and the availability of the additional 400 MW relating to recalls under the deferred energy agreements no longer necessitates the deployment of a specific strategy.

Moreover, within the framework of the 2012 Progress Report on the 2011–2020 Supply Plan (the "2012 Progress Report"), the Distributor filed an assessment of the technical/economic potential for power demand management. In this plan, the Distributor presents the measures to be taken to allow it to add resources to its power balance for the purpose of this type of intervention.

2. DEMAND FORECAST

The demand forecast relies on the most recent information available to the Distributor. The highlights of this forecast are discussed in this section. Appendices 2A to 2C present the details thereof, broken down by use, demand scenario (strong, average, or weak), as well as comparisons with the 2011–2020 Supply Plan and the 2012 Progress Report. Moreover, the historical demand data given in Appendix 2D and the changes occurred since the last supply plan, in terms of the methodology or parameters used to determine the demand forecast, are presented in Appendix 2E.

2.1. Context

The world economic context is characterized by low growth in the largest economies. While the financial crisis in the euro zone was forestalled in early 2013, unemployment is hitting record levels in certain European countries.

In Québec, although economic activity is quite sluggish, job creation has progressed since a year ago. However, nearly half the jobs created were part-time, so personal incomes have not significantly increased. After the rise in remittances to government (income tax and deductions) is factored in, real household disposable incomes in fact declined in 2011 and 2012.

Higher indebtedness and lower savings suggest that sluggish consumer spending could persist. Since that is the main component of GDP, the Distributor predicts weak economic growth in the short run, especially since the housing market, impacted by the tightening of mortgage rules, is in a downward phase.

On a different note, the US economic resurgence could benefit the Québec manufacturing sector in 2014–2015. This is especially true for the lumber sector, what with the renewed vigour in US residential construction. The combined impact of these trends should produce GDP growth for Québec of 1.0% in 2013 and 1.6% in 2014 and 2015.

What is more, Québec's population aged 15 and over is expected to grow by 445,700 in the ten-year period from 2013 to 2023, for an annual growth rate of 0.6%. This will result in 337,200 new residential customers by the 2023 horizon. The shrinkage of the 25–54 age group (the main labour market driver), consumer spending, and residential construction will have repercussions for the Québec economy. In the medium and long term, it will significantly dampen the prospects for GDP growth. In view of these facts, the forecast presented here assumes 1.4% GDP growth in Québec between 2016 and 2023.

Finally, the demand forecast takes account of the impact of energy efficiency interventions, which are described in section 3.

2.2. Forecast electricity sales by consumer sector

As presented in Table 2-1, electricity sales are predicted to rise to 182.2 TWh by 2023. This represents a 10.1-TWh increase over the 2013–2023 period, for a mean annual growth rate of 0.6% (1.0 TWh), greater than the growth observed during 2003–2013. In this last period, total normalized sales growth in Québec was 6.9 TWh, for a mean annual rate of 0.4%. Phenomena explaining the faster projected growth include a gradual resumption of growth in the industrial sector (both the large enterprises and the small and medium enterprises categories).

2.2.1. Residential and agricultural sector

Anticipated growth of the residential and agricultural sector (38% of Québec sales in 2013) for 2013–2023 is 5.0 TWh, for a mean annual growth rate of 0.7%. Growth in this sector derives essentially from an increase in the number of residential customers, and to a lesser extent from a rise in personal disposable incomes.

2.2.2. Commercial and institutional sector

In the commercial and institutional sector (21% of Québec sales in 2013), anticipated growth for 2013–2023 is 1.5 TWh, for a mean annual growth rate of 0.4%. Sales growth in this sector is essentially due to population, GDP, and service sector growth.

2.2.3. Small and medium-sized industrial customers

In regard to small and medium-sized industrial customers (5% of Québec sales in 2013), electricity sales for 2013–2023 will grow by 0.4 TWh (for mean annual growth of 0.4%). Sales growth in this sector is essentially due to GDP and manufacturing sector growth. However, businesses in this sector are strongly affected by the US dollar exchange rate and by competition from emerging countries.

2.2.4. Large industrial customers

As to large industrial customers (33% of Québec sales in 2013), forecast sales growth is 2.8 TWh for 2013–2023, which works out to mean annual growth of 0.5%. Most sales growth will be in the mining sector, which will continue to benefit from burgeoning world demand for raw materials. On a negative note, the economic context for the pulp and paper sector will lead to further downsizing and restructuring of the sector. As for the aluminum smelters, the Distributor does not foresee any significant sales growth at the 2023 horizon.

2.2.5. Other customers

The "other customers" category (3% of Québec sales in 2013) includes municipal distribution grids, street lighting, and public transportation. The municipal grids accounted for 4.5 TWh or 80% of the sector in 2013. Projected sales growth is 0.4 TWh between 2013 and 2023, or 0.7% per annum.

TABLE 2-1
FORECAST SALES AND ENERGY REQUIREMENTS (IN TWh)

[Legend:]
In TWh — Growth, 2013-23 Mean annual rate

Residential and agricultural
Commercial and institutional
Small and medium-sized industrial customers
Large industrial customers
Other customers
FIRM SALES IN QUÉBEC
Distribution and transmission losses and other items
REQUIREMENTS COVERED BY THE PLAN
Including the impact of climate conditions as at 31 July 2013

[1] Including published sales for January to July 2013, normalized for climate conditions.

2.3. Forecast energy and power requirements

2.3.1. Forecast energy requirements

The energy requirements covered by the Plan are essentially composed of electricity sales and distribution and transmission losses. A loss rate of 7.9% is assumed for the 2014–2023 period. Table 2-1 presents the forecast energy requirements. In 2023, these requirements will reach 196.6 TWh, an increase of 10.7 TWh over 2013.

2.3.2. Forecast power requirements

Forecast winter peak power requirements are determined from forecast energy requirements and include load reduction deriving from power demand management measures not under the Distributor's control (for example, residential dual energy). Table 2-2 shows that peak power requirements will reach 40,340 MW in winter 2022–2023, representing growth of 2,943 MW over winter 2012–2013. This growth will essentially come from the residential and agricultural sector.

TABLE 2-2
FORECAST WINTER PEAK POWER REQUIREMENTS (IN MW)

[Legend:]
In MW Growth, 2012-22
Mean annual rate
Distributor's firm requirements (requirements covered by the Plan)
[1]Peak normalized for climate conditions and other conditions of occurrence of the winter peak (date, day of the week, time of the day).

2.4. Comparison with the 2012 Progress Report

Forecast electricity sales in the present plan are lower than the forecast given in the 2012 Progress Report. In 2020, the difference is -5.4 TWh, while the cumulative decrease for 2013–2020 is -42 TWh. These negative differentials throughout the period are essentially due to the category of large industrial customers. The world economic outlook and the overall demand for ore and processed metals are leading to lower electricity sales in the aluminum, mining, metallurgy, casting, and refining sectors.

For 2013–2020, forecast energy requirements are lower than the figure given in the 2012 Progress Report. In 2020, the difference will be -5.7 TWh. As of winter 2013–2014, power requirements are also lower than the figure given in the 2012 Progress Report. The difference is maximal in winter 2017–2018, at -859 MW, and tails off to -531 MW in winter 2019–2020.

2.5. Demand variability

The forecast demand analysis presented in the preceding sections concerns the energy requirements arising from a sales forecast determined for normal climatic conditions. However, these requirements are subject to significant variability, which is divided into two types:
- climate variability;
- projected demand variability (under normal climatic conditions).

Climate variability represents the impact of climate conditions on electricity requirements with respect to the scenario determined for normal climate conditions. For 2018, the impact of climate variability on energy will have a standard deviation of 2.3 TWh. As regards power, the impact of climate conditions on winter peak requirements in 2016–2017 yields a standard deviation of 1,510 MW. The results are approximately the same for each year of the Plan.

As to forecast demand variability, it has to do with the impossibility of accurately predicting trends in economic, demographic, and energy-related variables as well as errors intrinsic to the modeling of the impact of these variables on forecast electricity demand. For 2018, the variability of the forecast energy demand has a standard deviation of 4.6 TWh. As regards power, the standard deviation for winter peak requirements in 2016–2017 is 1,050 MW.

Total variability is defined as the combination of climate variability and forecast demand variability taken independently.

The variability in energy requirements is illustrated up to 2018 in Table 2-3, while the variability in power requirements is presented up to winter 2016–2017 in Table 2-4. The detailed results of the variability analysis are presented in section 1 of Appendix 2B.

TABLE 2-3
VARIABILITY IN ENERGY REQUIREMENTS
STANDARD DEVIATION (IN TWh)

[Legend:]
In TWh
Climate variability
Forecast demand variability
Total variability

TABLE 2-4
VARIABILITY IN WINTER PEAK POWER REQUIREMENTS
STANDARD DEVIATION (IN MW)

[Legend:]
In MW
Climate variability
Forecast demand variability
Total variability

In comparison to the 2012 Progress Report, the standard deviation of total variability in energy requirements initially increases by 0.2 TWh and is 0.4 TWh higher at the three-year horizon. This increase is due to the upward revision of the variability associated with major energy consumers, especially given uncertainty in the aluminum market. Following this, the postponement of aluminum-sector projects beyond the five-year horizon causes a 0.9 TWh decrease in total variability.

Furthermore, total variability in power requirements under the Plan is greater than the figure given in the 2012 Progress Report. The increase in the standard deviation of total variability ranges from 20 MW to 50 MW and results, in particular, from the upward revision of forecast demand variability.

The standard deviations of the climate variability remain roughly the same as those given in the 2012 Progress Report.

3. ENERGY EFFICIENCY INTERVENTIONS

For many years, the Distributor has been working to promote a culture of energy efficiency in Québec. The longevity and breadth of the programs and activities carried out in this field have durably influenced consumer behaviour in several markets.

The Distributor's interventions in energy efficiency are essentially designed to achieve energy savings and facilitate power demand management. They may take a variety of different forms:
• **Commercial programs** designed to induce customers to reduce or shift their energy consumption;
• **Rates or rate options** that use price signals to induce customers to reduce their consumption or shift it to off-peak times;
• **Third-party financing or calls for tender** to involve third parties in delivering programs or activities;[1]
• **Other upstream structuring activities**: research and development (R&D), technological innovation, support for standardization and regulation.

The flexibility of these interventions, as compared with other means of preserving the supply-demand balance, represents an asset on which the Distributor will continue to rely for planning purposes.

3.1. Interventions in energy savings

Launched in 2003, the Comprehensive Energy Efficiency Plan (*Plan global en efficacité énergétique*—PGEÉ) had resulted in cumulative energy savings of nearly 7 TWh by the end of 2012. With the investments planned for 2013–2015, the Distributor is bolstering its capacity to reach the target of 8 TWh. Together with the CaTVaR project and the activities of the Bureau de l'efficacité et de l'innovation énergétique (BEIÉ),

[1] The financing of a portion of the energy saving activities and programs of the Bureau de l'efficacité et de l'innovation énergétique (BEIÉ) constitutes an example of this approach.

approximately 10 TWh of energy savings will have been implemented by the 2015 horizon.

As of 2016, so as to take account of the evolving context for the supply-demand balance, the Distributor proposes to fulfill one-third of its sales growth with energy savings interventions. Based on the current sales forecast, this represents annual realized savings of 0.6–1.0 TWh over the Plan horizon. Such a modulation of energy savings interventions offers flexibility to the Distributor but also requires sustained planning so as to be able to react rapidly to the market to capture the maximum number of lower-cost opportunities.

To achieve these energy savings, the Distributor will initially rely on its accomplishments to date by seeking to improve its existing portfolio. In the short run, it will put the emphasis on new strategic orientations giving pride of place to awareness-raising approaches while helping customers better understand and manage their electricity consumption with the help of appropriate tools and advice. In the business market, the Distributor will augment its offering of advisory and consulting services and will develop a portfolio of interventions targeting this sector. The priority will be on interventions designed to enhance the competitiveness of Québec companies. The Distributor's approach is thus part and parcel of its overall thrust to modernize its energy efficiency offering even as it pursues its R&D work.

In the longer run, the Distributor will rely on strategies aiming to elicit durable behavioural change and market transformation. To achieve this, the Distributor will expand its range of interventions and work together with its partners. For example, the Distributor's expertise in the development of energy efficiency standards, codes, and regulations and its influence over such processes should help to guarantee the durability of gains made in certain markets that have reached maturity.

Furthermore, in view of expected trends in the energy and power balances, the Distributor will prioritize those energy savings interventions having a significant impact on the lessening of power requirements.

3.2. Interventions in power demand management

A range of interventions will be used to reduce peak system requirements. Interventions for which power reduction is not under the Distributor's control (e.g., residential dual energy, three-element water heaters) are incorporated into the requirements forecast, while those for which power reduction is under the Distributor's control (e.g., interruptible electricity) are considered as methods that can be used for power balancing.

The Distributor remains firm in its intention to increase the contribution of demand management methods as a means of responding to new power requirements. In the coming years, as it proceeds to develop these methods, the Distributor will remain mindful of its business context and of the rapid development of new technological tools.

The strategy for the rollout of power demand management methods is divided into two phases according to the planning horizon for the work. In the short and medium run, the Distributor will capitalize on the following approaches:

- ***Maximize the use of existing methods***

For residential dual energy, the Distributor will continue with its awareness-raising activities with an eye to solidifying customer loyalty to the DT tariff. This rate option provides for a 640-MW decrease in peak power requirements. In addition, further to decision D-2013-177, agricultural operations are eligible for the DT tariff as of 31 October 2013.

The Distributor will continue as well to attempt to interest large industrial customers in interruptible electricity. The Distributor maintains the hypothesis that this program will contribute 850 MW to the power balance. Added to this quantity is the interruptible block linked to the specific contract with Aluminerie Alouette. Aluminerie Alouette’s interruptible load is 150 MW for winter 2013–2014 and is expected to increase to 300 MW by winter 2016–2017, reaching 450 MW in winter 2019–2020.

• Improve awareness-raising in regard to the concept of peak and continue making appeals to the public

The Distributor will actively pursue its customer awareness raising efforts with the goal of inducing customers to consume electricity judiciously at peak times.

In addition, it will continue to make appeals to the public as necessary. The Distributor seeks to increase the public profile of this method and to analyze how the impact of appeals to the public evolves over several successive winters.

• Pursue innovation efforts with IREQ

The Distributor will pursue its R&D work on power demand management with IREQ, particularly the work related to remote load interruption over short periods. In the longer term, IREQ's work will also target power reduction methods of longer duration.

• Development of new interventions and continuation of strategic intelligence efforts

The Distributor will pursue the analysis of the commercially achievable potential of the power demand management measures identified in the technical/economic potential assessment. This analysis will serve to define the set of parameters needed to design new interventions.

The Distributor is also pursuing its strategic monitoring of market trends in new technologies enabling public utilities to deploy new power demand management methods.

In the longer term, over the Plan horizon, the Distributor is relying on the addition of 300 MW worth of new power demand management methods, at the rate of 50 MW per year starting in winter 2016–2017. This estimate will be revised to take account of the results of IREQ's work, the evolution of technological tools, and market conditions.

As presented in Table 3.1, the sum total of the Distributor's energy efficiency interventions will make it possible to decrease power requirements by nearly 3,000 MW – approximately 8% of requirements – as of winter 2013–2014, and by over 4,500 MW as of winter 2022–2023.

TABLE 3-1
CONTRIBUTION OF ENERGY EFFICIENCY INTERVENTIONS TO DECREASED POWER REQUIREMENTS (MW)

[Legend:]
Interruptible electricity
Residential dual energy and three-element water heaters
New power demand management interventions
Power impact of energy savings interventions
TOTAL

4. SUPPLY AND STRATEGIES

4.1. Characteristics of existing supply

The maximum contribution of heritage pool electricity to the energy balance is 178.9 TWh. The delivery of heritage pool electricity is characterized by a preset annual profile of ranked hourly power values, with the maximum value set at 34,342 MW. Since heritage electricity includes all the services necessary and generally recognized for the purpose of guaranteeing security and reliability,[2] the Generator sees fit to maintain a planning reserve of 3,100 MW, above and beyond the maximum value of the deliveries profile, which brings the power recorded in the balance to 37,442 MW.

The Distributor also has 58 long-term supply contracts in effect, representing over 4,600 MW of contract power. Since the filing of the 2012 Progress Report, five wind parks have been commissioned, providing 730.0 MW of power, along with six biomass-fired cogeneration plants providing 75.4 MW of power and a small hydroelectric generating station providing 25.0 MW. Moreover, the Government of Québec has announced the cancellation of six small hydroelectric generation projects that would have produced 82 MW when up and running. Table 4-1 presents a summary of the signed contracts; a detailed list is presented in Appendix 3C.

TABLE 4-1
SUMMARY OF LONG-TERM POST-HERITAGE SUPPLY CONTRACTS
[Legend:]

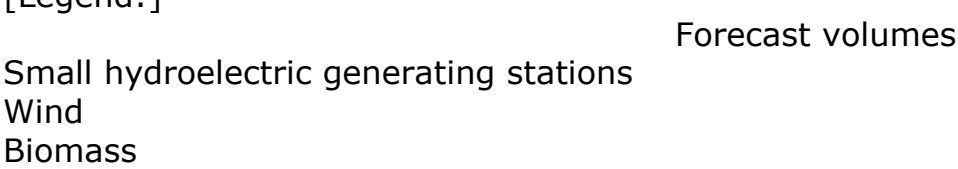
Number of contracts signed	Total contract power (MW)	Peak power[1] (MW)	Annual energy (TWh)
A/O2002-01-All energy sources	3	1107 + 40 at peak	
A/O2003-01-Biomass I	1	16–19 MW, depending on the month	
A/O2003-02-Wind I			
A/O2004-02-Cogeneration			
A/O2005-03-Wind II			
A/O2009-01-Biomass II			
PAE2009-01-Small hydro			
A/O2009-02-Wind III			
PAE2011-01-Biomass III			
TOTAL			

[1]Power recorded in power balance. In the case of wind energy, it is the contribution associated with the integration agreement, or the equivalent of 35% of contract power.

[2] In 2005, an agreement covering the services concerned was signed between the Distributor and the Generator; this agreement is presented in Appendix 3B.

The Distributor's post-heritage supply portfolio has greatly evolved since 2006. In particular, the energy associated with the blocks determined by the Government of Québec grew considerably and will continue to grow over the Plan horizon, as indicated in Figure 4-1. The energy associated with these sources of supply rose from 0.2 TWh in 2006 to nearly 3.0 TWh in 2012 and is expected to reach 15.1 TWh in 2023. Of these volumes, approximately 80% is from wind generation.

FIGURE 4-1
EVOLUTION OF POST-HERITAGE SUPPLY ENSUING FROM REGULATIONS ENACTED BY THE GOVERNMENT OF QUÉBEC, 2006–2023 (TWh)



Apart from long-term contracts, the Distributor has four agreements that it negotiated to increase the flexibility, security, and reliability of its supply portfolio:

- the Comprehensive Framework Agreement;
- the Wind Integration Agreement;
- the agreement to suspend deliveries from the TCE station;
- the deferred energy agreements.

4.1.1. Comprehensive Framework Agreement

Approved by the Régie in August 2009, the current five-year Comprehensive Framework Agreement ends 31 December 2013.

The Distributor and the Generator have reached agreement on the renewal of the agreement for a period of three years starting 1 January 2014. The application for approval of this agreement was filed with the Régie in September 2013[3] and is presently under consideration. The terms and conditions of the renewed agreement are essentially the same as those of the Comprehensive Framework Agreement currently in effect.

4.1.2. Wind Integration Agreement

The Wind Integration Agreement signed in 2005 was renewed until the Distributor obtains a new service.

In June 2013, the Distributor filed an application with the Régie for approval of the characteristics of the wind integration service and of the bid selection criteria with a view to acquiring this service.[4] The service defined by the Distributor has essentially the same characteristics as the service currently in effect, i.e., a wind energy balancing service coupled with backup power in winter. The service as defined meets the Distributor's requirements and is compliant with the Government of Québec's orders-in-council concerning the wind energy blocks.

The application is currently under consideration by the Régie.

4.1.3. Agreement to suspend deliveries from the TCE station

Under the terms of the current agreement to suspend deliveries from the TCE station, approved by the Régie in August 2009, the period during which deliveries are suspended can be extended from one year to the next, as per the Distributor's requirements. Generation by the TCE station has been suspended since 1 January 2008.

According to the current planning, deliveries from TCE are no longer required as baseload and would have contributed barely two months out of each winter as from 2022. Consequently,

[3] File R-3861–2013, Application for approval of Comprehensive Framework Agreement.
[4] File R-3848–2013, Application for approval of the characteristics of the wind integration service and selection criteria for the purchase of a wind integration service.

the Distributor has opened discussions with TCE to look for a longer-term solution. The Distributor will pursue these efforts and will notify the Régie of relevant developments in due course. Until then, the Distributor will exercise its annual suspension option, as applicable, and will file applications with the Régie for approval thereof.

4.1.4. Agreements to defer energy under baseload and cycling contracts with the Generator

The Distributor has agreements to defer deliveries under the 350 MW contract (baseload) and the 250 MW contract (cycling) with the Generator. The terms of these agreements would allow the Distributor to defer a portion of its energy surpluses and to meet energy and power requirements.

However, since the filing with the Régie of the application for approval of amendments to the deferred energy agreements,[5] the Distributor's energy requirements for 2013–2027 have decreased by 175 TWh. In addition, the Distributor's supply portfolio grew with the adoption of new renewable energy blocks by the Government of Québec, for a total of 51 TWh. The combined effect of shrinking requirements and expanding supply – 226 TWh – reduces the Distributor's capacity to recall the energy accrued in the deferred energy account.

Given this situation, the Distributor must first and foremost take steps to ensure that the volumes accrued in the deferred energy account can be used to meet the anticipated requirements of the Québec market. On this score, the Distributor must manage various risks relating to changes in requirements and supply options, in particular the possibility of a scenario in which demand is lower and new supply is added.

For example, in the reference demand scenario, if no additional volumes were deferred and no blocks of energy additional to those planned by the Distributor were added, the balance would be reduced to zero by 2024. However, in a weak demand scenario, the Distributor's requirements would justify the recall of only 2.7 TWh

[5] File R-3726–2010, Application for approval of the amendments to the deferred energy agreements.

by the end of the agreements and a balance of 1.9 TWh would remain. Figure 4-2 shows how the balance of the deferred energy account would change over time if no quantities were deferred by the end of the agreements, for both the reference and weak demand scenarios.[6]

FIGURE 4-2
MANAGEMENT OF DEFERRED ENERGY ACCOUNT
CHANGES IN BALANCE UNDER TWO DEMAND SCENARIOS
(IN TWh)

[Legend:]
Energy requirements
Balance of deferred energy account
Balance of deferred energy account - weak demand
Balance of deferred energy account - reference demand
Energy requirements - weak demand
Energy requirements - reference demand

Therefore, in the current context of the supply-demand balance, the Distributor is no longer planning to use the option to defer energy under the baseload contract from now until the end of the agreements. The point is that they can no longer be used for their intended purpose of deferring deliveries to meet future requirements while ensuring that the balance of the deferred energy account is brought to zero before the end of the agreements.

[6] The details of the quantities deferred and recalled under the reference demand and weak demand scenarios are presented in Appendix 4C.

4.1.5. Methods for meeting peak requirements

Beyond the power contribution of the long-term supplies, the Distributor is relying on the following methods to meet peak requirements:

- interruptible electricity, as discussed in section 3.2;
- a quantity of 250 MW related to voltage reduction (this calculation is validated each fall further to voltage reduction tests performed by the Transmission Provider, which assesses the persistence of the effect and its impact on power).

4.2. Projected supply

On 10 May 2013, the Government of Québec announced its intent to pursue the development of wind energy by allocating 800 MW for new wind generation projects in Québec. The principal aim of this 800 MW block is to provide for the development of projects initiated by local communities or cooperatives, in partnership with private developers.

The passage of Bill 16[7] in June 2013 dispenses the Distributor from having to put out calls for tender in order to sign contracts with the Aboriginal communities in relation to a wind energy block.

On 28 August 2013, the Government of Québec issued a draft regulation concerning a call for tenders to purchase a block of 450 MW, composed of 300 MW from projects developed in the Bas-Saint-Laurent or Gaspésie-Îles-de-la-Madeleine regions and 150 MW from projects developed anywhere in Québec.

4.3. Energy supply-demand balance and strategy

For the entire period covered by the Plan, contract energy will be greater than the projected requirements, with the energy surpluses totaling 75.0 TWh. The energy balance is presented in Table 4-2.

[7] *An Act respecting mainly the implementation of certain provisions of the Budget Speech of 20 November 2012,* ch. 1, section 5: http://www.assnat.qc.ca/en/travaux-parlementaires/projets-loi/projet-loi-25-40-1.html .

TABLE 4-2
ENERGY BALANCE

[Legend:]
Requirements covered by the Plan
– Volume of heritage pool electricity
– Non-heritage supply
    TransCanada Energy
    HQP - Baseload and cycling
    Other long-term contracts
        Biomass
        Wind
        Small hydro
    Short-term purchases
= Additional required supply (surplus)

With the exception of deliveries under the cycling contract, the Distributor's long-term commitments to purchase are firm ("take-or-pay" contracts) and the deliveries cannot be reduced. In order to minimize the costs to its customers, the Distributor relies primarily on the flexibility of heritage pool electricity deliveries as a means of disposing of energy surpluses. No other long-term supply contract offers this flexibility. In addition, there is no cost to the Distributor for the reduction of heritage pool electricity deliveries; in fact, this will serve to avoid costs that are set to rise in the coming years due to the indexing of the price of heritage electricity.

4.4. Power supply-demand balance and strategy

The Distributor's power balance is presented in Table 4-3. It takes account of the reserve required to meet the reliability criterion, which is presented in section 6.

TABLE 4-3
POWER BALANCE

[Legend:]
In MW
Peak requirements covered by the Plan
+ Reserve to meet reliability criterion
– Heritage pool electricity
– Non-heritage supply
    TransCanada Energy
    HQP - Base and cycling
    Other long-term contracts[1]
        Biomass (including Tembec)
        Wind: 4000 MW[1]
        Small hydro: 150 MW
    Power demand management
        Interruptible electricity
        Interruptible contracts with Alouette
        Other power demand management interventions
    Voltage reduction
= Additional required power
    Contribution of short-term markets
= Additional required power
(Requirements rounded to nearest 10 MW)
Note (1): The power associated with wind-generated supply takes account of the firming associated with the integration service, which determines a total firm contribution equivalent to 35% of contract power.

The methods at the Distributor's disposal, together with the contribution of short-term markets, suffice to cover the power requirements for the initial years of the Plan. In the longer term, the Distributor’s power strategy is based primarily on power demand management, and secondarily on the contribution of short-term markets.

Power demand management

The core of the Distributor’s power supply strategy consists of load reduction and shifting of load to off-peak hours. For this purpose, the approach presented in section 3.2 is aimed at maximizing the use of the existing methods and at developing new interventions for power demand management.

Contribution of short-term markets

The Distributor’s strategy includes the purchase of power products on the short-term markets, which are needed in order to meet the reliability criterion. These purchases ensure that resources are available to meet peak requirements. With no

contractual undertaking on the Distributor's part, these quantities could alternatively be procured on other markets or could become unavailable if, for example, fuel supplies were inadequate.

The assessment of the contribution of short-term markets takes into consideration the flexibility at the disposal of the Québec balancing area, as well as the potential volumes available in neighbouring markets.[8] The Distributor is of the view that, taken together, the resources of the suppliers located in the Transmission Provider's balancing area are able to provide a portion of its short-term power supply requirements. In addition, apart from the potential of 1,100 MW identified on the New York market, the Distributor's view is that the other markets in combination now constitute a potential supply pool exhibiting the characteristics of a competitive market available to it.

Therefore, the Distributor is adding a short-term market contribution of 400 MW to the power balance, bringing the potential to 1,500 MW.

Power purchases on short-term markets have the advantage of being flexible and available on short notice before the start of winter, reducing the risk of buying too much. The Distributor will nonetheless make sure to make its short-term market purchases with a sufficiently long lead time (one to three years) to allow the market to guarantee the availability of the required resources, particularly where additional power requirements reach relatively high levels. In this regard, the Distributor will assess the possibility of putting out a call for tenders in 2014 to cover a portion of the winter 2016–2017 power requirements.

Moreover, to ensure that purchases on the short-term markets remain affordable, the Distributor will step up its efforts to increase the number of potential power suppliers that are likely to possess sufficient resources to fulfil the Distributor's requirements.

[8] Resource availability and interconnection capacity were reviewed to determine the power contribution from short-term markets that may be recorded in the Distributor's power balance. The details of this analysis are presented in Appendix 4D.

4.5. New market development

On 7 October 2013, the Government of Québec announced the launch of its "Priorité Emploi" economic policy. Among the measures put forward in this policy is the use of the Distributor's energy surpluses over the next ten years to stimulate job creation and investment in Québec in certain specific niches. This measure represents a promising opportunity to sell a significant portion of the surplus over the period and, in so doing, to maximize the use of heritage pool electricity. To illustrate the impact of this initiative on energy surpluses, the Distributor, in Table 4-4, presents several scenarios for the period covered by the Plan.

TABLE 4-4
IMPACTS OF QUÉBEC'S ECONOMIC POLICY ON DISTRIBUTOR'S ENERGY SURPLUSES (TWh)

[Legend:]
Distributor's energy surpluses (see Table 4-2)
Accelerated scenario
Mid-range scenario
Moderate scenario

Thus, in all but the accelerated scenario, the Distributor would possess sufficient energy surpluses to meet the new requirements over the Plan horizon. Depending on the degree to which the goals of "Priorité Emploi" are attained, the Distributor will progressively incorporate those projects receiving the required approvals into its planning processes.

5. RISK MANAGEMENT

The following are the main risks specific to the supply activities:

- risks related to demand fluctuations;
- risks related to fluctuations in the price of electricity;
- risks related to default by suppliers on contractually specified quantities;
- risks related to counterparty default.

5.1. Risks related to demand fluctuations

The Distributor's supply portfolio must offer the flexibility necessary for it to adapt to changes in demand, whether these be related to economic factors or climate conditions.

5.1.1. Management of weaker demand scenarios

In the current context of supply-demand balance, decreased requirements translate into increased surpluses. Moreover, the prospect of weaker demand scenarios being materialized leads the Distributor to manage the deferred energy account prudently, as per the explanations given in section 4.1.4. Since a large proportion of supply cannot be reduced, the Distributor is relying primarily on the flexibility of heritage pool electricity deliveries to manage weaker demand scenarios.

Situations involving weaker demand can also result from warmer-than-normal winters. Where such winters occur, the Distributor's first steps in adjusting to the situation will be to rely to a lesser degree on short-term purchases and the use of the 250 MW cycling contract with the Generator.

5.1.2. Management of stronger demand scenarios

In a stronger demand scenario, energy surpluses would be used up more quickly. To respond to the accelerated rise in power requirements, the Distributor would continue to put a priority on power demand management and on power purchases on short-term markets. If the potential of these two

sources of supply is used up, the Distributor could then put out a long-term call for tenders to purchase firm power.

If power requirements turned out to be higher in a subsequent cold winter, the Distributor would then make more intensive use of the cycling contract, buy more energy on short-term markets, and draw more frequently on the energy associated with the power contracts.

5.2. Risks related to fluctuations in the price of electricity

The price of electricity in northeastern US markets is characterized by high volatility. However, compared to the other electricity distributors in these markets, the Distributor has a lower proportion of its portfolio subject to such volatility. On the one hand, most of its supply comes from heritage pool electricity, and on the other, its long-term post-heritage supply portfolio is largely independent of indicators linked to gas or electricity prices. In the coming years, only the Distributor's short-term procurement will be subject to the risk of electricity market price fluctuations.

5.3. Risks related to supplier default on quantities specified under long-term contracts

The Distributor must ensure that its suppliers deliver the quantities specified in their contracts. Even in an energy surplus situation, the Distributor must make sure that it can, at all times, make a sufficient quantity of resources available to the Transmission Provider, so that the latter can manage the system reliably and safely in real time.

Thus, the long-term contracts stipulate firm delivery start dates, minimum quantities of energy to be delivered, and payment of penalties or damages in the event of default or contract termination. The Distributor makes sure that it will always be able to obtain these amounts by requiring those of its suppliers bound by long-term contracts to post bonds guaranteeing the start of deliveries and the ability to operate without interruption. For suppliers rated by a recognized rating agency, the amount of the bonds is decreased as a function of the supplier's credit rating.

5.4. Risks related to supplier default on quantities specified under short-term contracts

The Distributor and the suppliers with which it does business on short-term markets reach prior agreement on transaction terms corresponding to industry standards. In the event of failure to deliver, such agreements generally provide that the penalties borne by the supplier shall correspond to the cost of replacing the energy on the open market. The Distributor ensures that it will be able to collect these penalties through suitable management of counterparty risk.

5.5. Risks related to counterparty default

The Distributor continually assesses the risk relating to default by the counterparties with which it does business. In the event of such default, the Distributor's risk exposure corresponds to the difference between the price of the contract electricity and its replacement market value.

In order to ensure that short-term transactions are carried out as planned and to grant terms of payment consistent with industry practice, each counterparty with which the Distributor conducts regular transactions is subject to maximum credit limits. The credit limit granted is periodically determined for each counterparty as a function of anticipated transaction volumes and credit ratings as issued by recognized rating agencies.

6. RELIABILITY OF SUPPLY

6.1. Distributor's power reliability criterion

To guarantee the reliability of the power supply to the Distributor's customers, a sufficient reserve is necessary to compensate for demand variability and the risk of resource unavailability. This reserve is recorded in the power balance presented in Table 4-3 of section 4.4. It is determined in such a way as to comply with the NPCC power reliability criterion, which requires that the load shedding risk in a balancing area not exceed 2.4 hours per year.[9]

The reserve needed to ensure that the reliability criterion is met varies according to the level of the requirements to be met, demand variability, and the characteristics of the resources deployed by the Distributor.

The required reserve rate corresponds to the ratio between the reserve needed to meet the power reliability criterion and the peak requirements. Table 6-1 presents the variations in the reserve rate since the filing of the 2011–2020 Supply Plan.

TABLE 6-1
VARIATIONS IN THE RESERVE RATE REQUIRED TO MEET THE POWER RELIABILITY CRITERION

[Legend:]
Current year +1 year +2 years +3 years
2011–2020 Supply Plan
2011 Progress Report
2012 Progress Report
2014–2023 Supply Plan

The method for determining the required reserve is the same as the one used in the previous supply plan. However, the higher total variability of power requirements, as discussed in section 2.5, led to an increase in the reserve rate at the three-year horizon. Certain modifications made to the Distributor's supply portfolio

[9] Source: NPCC "Directories#1 Design and Operation of the BPS" http://www.npcc.org/documents/regStandards/Directories.aspx

since the 2012 Progress Report also contribute to the increase in the reserve rate; this is particularly true for an additional 150-MW block of interruptible electricity to be made available by Aluminerie Alouette as of winter 2016–2017.

6.2. Power reliability of Generator's supply

The Generator reports on the power reliability of its supply at the start of each winter. An attestation to this effect is filed with the Régie in the context of follow-ups to the Supply Plan.

Furthermore, in decision D–2011-162 on the Supply Plan for 2011-2020, the Régie asked the Distributor to file an update of the assessment establishing the planning reserve associated with the heritage pool electricity. This reassessment was performed with consideration of the new facilities commissioned as well as the stations recently withdrawn from the Generator's portfolio of generation facilities. The outage rates used for the 2006–2010 period are the same as those of the 2011 triennial review of resource adequacy submitted to the NPCC.[10] The results obtained confirm the level of the planning reserve associated with the heritage pool electricity as 3,100 MW, set according to the parameters of the agreement between the Distributor and the Generator concerning the services necessary and generally recognized for the purpose of guaranteeing the security and reliability of the heritage supply.[11]

6.3. Distributor's energy reliability criterion

The Distributor's energy reliability criterion, as accepted by the Régie,[12] is worded as follows:

"To meet a requirements scenario situated one standard deviation above the average scenario on five years' notice (including demand variability and climate variability), without incurring a dependency greater than 5 TWh per year vis-à-vis short-term markets outside Québec."

[10] These analyses take account of hydraulic and equipment-related restrictions of nearly 1,400 MW.
[11] This agreement is presented in Appendix 3B.
[12] Decision D-2011-162, paragraph 49.

Total variability reaches 5.2 TWh at the five-year horizon, as presented in section 2.5. Table 6-2 presents the impact on additional required supply of the addition of one standard deviation to the reference demand scenario.

TABLE 6-2
DISTRIBUTOR'S ENERGY RELIABILITY CRITERION (IN TWh)

[Legend:]
Additional required supply (see Table 4-2)
+ One standard deviation of variability (see Table 2-3)
Additional required supply + 1 standard deviation

The size of the surplus over the period analyzed means that the addition of one standard deviation of demand variability translates only into a reduction in surpluses, with no need to seek new supplies. Therefore, the Distributor has sufficient resources to meet the energy reliability criterion.

6.4. Generator's energy reliability criterion

The bulk of the Distributor's supply comes from the heritage pool electricity provided by the Generator, whose generation facilities are primarily hydroelectric. The Distributor must therefore ensure that its principal supplier is in a position to meet its obligations while also meeting the reliability standards accepted by the Régie.

In decision D–2011-162 on the 2011–2020 Supply Plan, the Régie renewed the energy reliability criterion applicable to the volume of electricity provided by the Generator; that is, the maintenance of a sufficient energy reserve to make up for a hydraulic inflow deficit of 64 TWh over two consecutive years and 98 TWh over four consecutive years.

Three times a year, the Distributor verifies with its supplier that this criterion is being observed. An attestation to this effect is filed and made public in May, August, and November of each year.[13]

Pursuant to decision D–2011-162, the Distributor is filing, in Appendix 5B, the reservoir level data for January 2013, the change in levels since January 2010, an updated estimate of the cumulative deficits corresponding to a 2% probability of supply underage, and the history of variations in energy inflows from the hydroelectric generating stations over the period 1943–2012.

6.5. Transmission system design criterion

The transmission system is designed to be capable of carrying the required power contemplated in the reference demand scenario plus 4,000 MW. Changes in the situation since the filing of the last supply plan do not require a change with respect to this criterion.

6.6. Ancillary services

6.6.1. Analysis of all ancillary services

The ancillary services currently provided by the Distributor to the Transmission Provider are provided under two agreements with the Generator: the Agreement concerning the Necessary and Generally Recognized Services to Ensure the Security and Reliability of the Heritage Supply[14] (the "Ancillary Services Agreement") and the Wind Integration Agreement.

The ancillary services related to the heritage pool are governed by the Ancillary Services Agreement, pursuant to the order-in-council concerning the heritage pool, and the sum total of the impacts of wind generation on the ancillary services are covered by the current Wind Integration Agreement and will continue to be so when the new wind integration service is put in place at some future time.

[13] The public documents sent to the Régie are available at http://www.regie-energie.qc.ca/audiences/Suivis/Suivi_HQD_D-2011-162_CriteresFiabilite.html .
[14] This agreement is presented in Appendix 3B.

Moreover, post-heritage resources other than wind generation do not cause any significant impact on the requirements for ancillary services. Therefore, the Distributor is of the view that the assessment of requirements for ancillary services peripheral to the Ancillary Services Agreement is sufficient to circumscribe the additional requirements for ancillary services with respect to the growth or modification of the native load profile. The Distributor is therefore of the view that it would not be desirable to implement the systems necessary to conduct an exhaustive analysis of all the ancillary services, as described in the context of file R-3799–2012.[15]

6.6.2. Exceedance of limits on ancillary services

A certain number of the services grouped under the Ancillary Services Agreement are subject to limits whose exceedance may be related to changes in the Distributor's load. However, it is worth mentioning that no compensation mechanism has been implemented in the Ancillary Services Agreement in the event these limits are exceeded.

As specified in files R-3799–2012[16] and R-3748–2010,[17] the Distributor has identified, in the historical data, the exceedance of certain ancillary services provided under the Ancillary Services Agreement, i.e., load following and provision for variability.

Given that the Generator is the service provider under the Ancillary Services Agreement, the Distributor must, in conjunction with the Generator, devise a methodology acceptable to both parties for assessing the magnitude and frequency of the exceedances of the identified services and the associated costs. Therefore, the Distributor is unable to file preliminary results for the time being.

[15] Response to question 4.3 of the further response to the Régie's request for information no. 1, exhibit HQD-2, document 1.1, file R-3799–2012.
[16] Response to question 4.3 of the further response to the Régie's request for information no. 1, exhibit HQD-2, document 1.1 (B-0023), file R-3799–2012.
[17] Response to question 9.1 of the Régie's request for information no. 2, exhibit HQD-4, document 1 (B-0023), file R-3748–2010.

7. ENVIRONMENTAL ATTRIBUTES

At the time of filing of the 2011–2020 Supply Plan, the Distributor mentioned that the sale of environmental attributes on the US regulatory markets did not constitute a realistic or promising option. The Distributor maintains this position and will not participate in these markets. On the one hand, as specified in the 2011–2020 Supply Plan, these markets are mostly concerned with local development of new renewable energy projects. On the other, to sell renewable energy certificates, energy deliveries have to be made into the markets in question, particularly those of New England. The Distributor has no plans to resell energy on neighbouring markets in the coming years.

Nevertheless, the Distributor holds the view that voluntary markets for renewable energy certificates (REC) constitute one possible avenue for marketing the environmental attributes of its wind parks. These markets let companies, governments, and consumers support renewable energy generation on a voluntary basis by purchasing RECs for the entirety or a portion of their electricity consumption. In Canada, for example, the Ecologo program certifies various products, including generating stations. The energy produced by these stations and delivered to a transmission grid gives rise to the sale of renewable energy certificates on this same grid.

The Distributor will take steps to participate in voluntary markets, particularly focusing on the certification of its wind parks by the Ecologo program. Québec's voluntary markets are accessible to the Distributor and could be a means of valuing the environmental attributes of the wind parks, without however involving new transactions on the markets.