

TRADUCTION

D-2011-028 – Révision du PTE d'efficacité énergétique en réseau intégré – Étude du potentiel d'économie d'énergie dans le secteur industriel (extraits : « Sommaire à la direction », pages 1 et 2 et « Conclusion », page 66).

EXECUTIVE SUMMARY

The purpose of this assessment was to determine the technical and economic potential of the Québec industrial sector at the 2015 and 2020 horizons.

The Québec industrial sector comprises some 12,450 establishments operating 23,000 factory buildings. In 2010, these establishments consumed an annual volume of 68.44 TWh supplied by Hydro-Québec.

The assessment considered the following sectors:

- **Large customers**, consisting of 176 customer connections at tariff L with power demand in excess of 5 MW. Annually, this segment was consuming 32.1 TWh in 2010.
- **Small and medium-sized customers (tariffs M and G)**, which consumed 8.8 TWh in 2010.
- Certain non-industrial sectors that use industrial equipment, such as **public utilities** performing wastewater treatment and natural gas distribution and **various other sectors** in the case of ports and airports, public transportation, waste treatment and disposal, and sanitation. These sectors consumed 836 GWh at tariff L and 891 GWh at tariffs M and G in 2010.

Some 1,080 groups of measures comprising several sub-measures were identified for the purposes of the assessment. Some groups are repetitive from sector to sector, but their costs and the savings they produce vary depending upon the characteristics of each sector.

The table below presents the aggregate technical/economic potential for the sectors in question at the 2015 horizon (five years) and the 2020 horizon (10 years).

Sector	Potential at 5-year horizon			Potential at 10-year horizon			2005 assessments: potential at 10-year horizon as % of demand
	Savings (GWh)	% of demand	Cost of measures (M\$)	Savings (GWh)	% of demand	Cost of measures (M\$)	
Large industrial (tariff L)	7716	21%	\$1137	7468	21%	\$1081	15%
Small and medium-sized industrial (tariffs M and G)	1710	21%	\$276	1841	23%	\$286	14%
Utilities et al. (tariff L)	107	8%	\$24	119	9%	\$27	Not available
Utilities et al. (tariffs M and G)	96	12%	\$23	100	12%	\$27	Not available

This assessment of technical/economic potential yields a higher result than the 2005 assessments. At that time, over the 10-year horizon, the assessed potential of large industrial customers (tariff L) was 15% of consumption while it now amounts to 21%. Similarly, the potential for small and medium-sized industrial customers rises from 14% in 2005 to 23% now.

Overall, this increase derives from:

- Growth in avoided costs, particularly as from 2023, with respect to 2005.
- A change in the 2010 assessment methodology with respect to that of 2005; the approach now includes interventions made during the useful life of assets at the end of the period rather than at the start of the period, as was the case in 2005.
- New market transformation measures in the areas of energy management and plant reconfiguration (LEAN & ENERGY).
- More accurate information about the uses of electricity and about energy efficiency opportunities.

The results of the current assessment are comparable to those of other such assessments recently conducted in North America.

The measures relating to energy management and plant reconfiguration (LEAN & ENERGY), respectively, account for a significant share of total potential:

- For large industrial customers (tariff L), 22% and 16% of total potential.
- For medium-sized industrial customers, 15% and 30%.
- For small industrial customers, 4% and 25%.

Interventions during useful life for large industrial customers (tariff L) and medium-sized industrial customers (tariff M) represent, respectively:

- 80% and 86% of savings resulting from all investment measures at the 2015 horizon;
- 66% and 68% of savings resulting from all investment measures at the 2020 horizon.

Measures involving replacement of equipment at the end of its useful life contribute marginally to total potential.

Measures drawing on renewable energy sources, such as solar collectors for water and space heating, geothermal energy, electricity generation by photovoltaic cells, and finally solar walls, make a very small contribution to total potential.

The costs of solar walls are lower than the avoided costs, but their use is limited by the large proportion of enterprises heating with fuel. For the other measures, the costs are either slightly higher than the avoided costs or, in the case of photovoltaic panels, much higher.

Savings directly related to processes represent:

- 25% at the 2015 horizon and 24% at the 2020 horizon for large industrial customers (tariff L);
- 9% in 2015 and 2020 for medium-sized industrial customers (tariff M).

Note that a large proportion of savings attributed to energy management and plant reconfiguration (LEAN & ENERGY), not accounted for in the previous data, directly concern processes. Auxiliary process systems such as compressed air, refrigeration, and cooling systems, building HVAC systems, and lighting account for about 25% of the savings of large industrial customers (tariff L). For medium-sized industrial customers, these auxiliary and building HVAC systems account for 52% of savings in 2015, a proportion which falls to 39% in 2020, when more of the savings are due to plant reconfiguration (L&E).

The winter peak power reductions generated by the potential energy savings are presented in the table below.

Industrial sector	2015 horizon		2020 horizon	
	MW	MW/GWh	MW	MW/GWh
Large industrial (tariff L)	1046.9	0.136	1009.9	0.135
Med. industrial (tariff M)	240.5	0.178	262.9	0.181
Small industrial (tariff G)	70.8	0.203	70.5	0.199
Total	1358.2	0.148	1343.3	0.147

8. CONCLUSION

The technical and economic potential was assessed for large industrial customers (tariff L), small and medium-sized industrial customers, and finally for public utilities and other customers using industrial-scale equipment.

The technical/economic potential at the 10-year horizon has increased with respect to the 2005 assessment, from 15% to 21.4% of consumption for large industrial customers (tariff L) and from 14.4% to 22.9% for small and medium-sized industrial customers.

The increase in the avoided costs and a modification of the methodology could explain this growth in potential.

On another note, the current potential assessment brings to light the important contribution of market transformation measures – energy management and plant reconfiguration – in the new LEAN & ENERGY approach, as well as measures implemented during the useful life of assets that affect systems and processes.

These measures make a very significant contribution to technical/economic potential. Replacement of equipment at the end of its useful life makes only a marginal contribution.

A measure identified as having technical potential but not retained for the purposes of the assessment could be cost effective when analyzed on a case-by-case basis in the context of a particular project.

Confidence level for validity of assessment

The validity of a technical/economic potential assessment relies in large part on the validity of the data concerning the activities of the establishments, their electricity uses, and the nature of the equipment consuming that electricity. A qualitative confidence level as to the precision of the assessment for each sector is presented in the next three paragraphs.

Sufficient information was available for the large industrial customers (tariff L). In addition, energy analyses and plant surveys were available. The industrial activities and the nature of the products are known. The confidence level as to the precision of the assessment is high for this sector.

The confidence level as to the precision of the assessment is moderate for the medium-sized industrial customers, since there are few energy efficiency case studies dealing with this sector.

The confidence level is lower for small industrial customers and for public utilities and similar consumers. While NAICS classifications and consumption-per-establishment figures are available for large- and medium-sized industrial customers, the coarseness of the NAICS classification and the division of consumption into a multitude of small contracts may affect the validity of the results.

Preparing for the next assessment

Ideally, technical/economic potential should be reassessed every five years.

With the exception of several surveys relating to energy conservation opportunities in industry conducted by Hydro-Québec's Technical Services for Large Industry, no systematic surveys have been conducted to support the assessment of potential since the late 1980s.

The potential determined in the current assessment represents the theoretical upper limit for what can actually be achieved. Any improvement in the quality and precision of the assessment of technical/economic potential for industrial customers will be contingent upon the taking of a much larger number of in-plant surveys and could prove to be a much more costly operation.