

Grid and Flexibility Services: An Overview of Hydro Québec

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Hydro Québec: Context

- 3 divisions: generation (HQP), distribution (HQD) and transmission (HQT)
- HQD needs: about 190 TWh/39000 MW (+3700 MW reserve)¹
- Most of the needs are fulfilled by HQP through the «*Heritage contract*» (180TWh/34000 MW)
- Rest (energy and capacity) comes through calls for tenders for example:
 - Independant power producers provide about 3700 MW of wind generation
 - HQP also provides:
 - base & cyclable contract (up to 1000 MW)
 - 500 MW contract
 - wind integration
- HQP also sells outside Québec but this presentation is about Québec only

(1) See section 3.1, http://publicsde.regie-energie.qc.ca/projets/529/DocPrj/R-4110-2019-B-0009-Demande-Piece-2019_11_01.pdf

Heritage pool¹

- Law and then Decree (2001): HQP must deliver to HQD:
 - 165 TWh of energy
 - Hourly « sticks » of capacity, between 11420 MW and 34342 MW
 - This supply **must include all services necessary and generally considered as essential to make this supply safe and reliable**²
 - Initial blended price (2000), about 3¢CAD/kWh



EN MÉGAWATTS

Hre	MW	Hre	MW	Hre	MW	Hre	MW	Hre	MW	Hre	MW
1	34 342	71	31 327	141	30 271	211	29 674	281	29 210	351	28 732
2	34 018	72	31 290	142	30 255	212	29 656	282	29 205	352	28 731
3	33 780	73	31 214	143	30 234	213	29 655	283	29 204	353	28 728
4	33 774	74	31 213	144	30 234	214	29 650	284	29 203	354	28 727
5	33 517	75	31 188	145	30 227	215	29 646	285	29 190	355	28 719
6	33 431	76	31 185	146	30 213	216	29 642	286	29 188	356	28 715

(1) Translation: <http://www.thesaurus.gouv.qc.ca/tag/terme.do?id=16953>

(2) <http://www.assnat.qc.ca/fr/travaux-parlementaires/projets-loi/projet-loi-116-36-1.html?appelant=MC>

(3) Cet approvisionnement doit inclure tous les services nécessaires et généralement reconnus pour en assurer la sécurité et la fiabilité.

What are the “services necessary and generally considered” ?

- Agreement on additional services (as part of the heritage contract); 2005

Short-term			Medium term	Long-term	
Sub-seconds to seconds	Seconds to minutes	Minutes to hours	Hours to days	Days to months	Months to years
250 MW of spinning reserve + reactive power + voltage control	Frequency responsive services (called RFP in Québec) between 500 MW and 1500 MW - 1500 MW of 30-minutes reserve, including 1000 MW of 10-minutes reserve	Provision for load forecasting errors up to 500 MW for the next 6 hours	Provision for load forecasting errors up to 1500 MW (day-ahead)	HQP has to provide 178,86 TWh (including losses) of energy to HQD. Large reservoirs belonging to HQP allow to store spring and autumn inflows for the next winter, and to hedge against dry years.	

Other contracts including flexibility: examples

Wind integration contract (2016-2019)¹

- Integration of about 3700 MW of wind generation owned by IPPs
- HQP
 - absorbs wind generation in real-time
 - guarantees 40% of installed wind capacity in winter
 - absorbs energy above 40%
- Covers intra-hourly, hourly and annual variations^{1, 2}

(1) http://publicsde.regie-energie.qc.ca/projets/367/DocPrj/R-3965-2016-A-0006-Dec-Dec-2016_06_20.pdf

(2) http://publicsde.regie-energie.qc.ca/projets/367/DocPrj/R-3965-2016-B-0007-Demande-Piece-2016_03_14.pdf

500 MW contract (2018-2038)

- 500 MW (100+200+200) firm capacity contract- includes 175,5 GWh of energy (35,1+70,2+70,2)
- Called up to 4 hours in advance
- 20 years
- 106,04 \$/kW/year²

(1) http://publicsde.regie-energie.qc.ca/projets/323/DocPrj/R-3939-2015-B-0009-Demande-Piece-2015_08_28.pdf

(2) http://publicsde.regie-energie.qc.ca/projets/323/DocPrj/R-3939-2015-A-0010-Dec-Dec-2015_12_11.pdf

Summary for Hydro Québec

- Hydropower provides the majority of services to the Québec power grid.
- Most flexibility products are provided through the “*Heritage contract*” between HQP (generation) and HQD (distribution).
- There is therefore no specific market or call for tender for flexibility services, except the wind integration contract.