

# Evaluating the CHPE interconnection project: Does strategic interactions matters?

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## Abstract

Interconnection of different power systems is usually motivated by the increased efficiency which results from their complementarity. More precisely, it brings several benefits: reduction of the need to invest in power plants, more competition between producers, improved reliability, etc. However, such benefits assume perfect price arbitrage between systems, and they might be dampened if it's not the case. Imperfect arbitrage may exist through price making behaviour of large firms or of merchant interconnectors' private managers, or through local market rules that creates inappropriate incentives for producers to withhold capacity in their local markets.

The CHPE interconnection project is a plan to build underground 1 GW High Voltage Direct Current (HVDC) interconnection linking directly New York City to Québec. It would permit to deliver costless hydro-power to a load pocket where prices are high. Indeed, even if Québec is already interconnected to the North of New York State, the amount of hydro-power that can flow down to New York City is very limited, due to network congestion [5]. Hence, such an interconnection would permit Hydro-Québec to capture substantial value. However, such project is costly, around G\$2,2. On top of this, regulatory issues about shale gas exploitation raise concerns about the future price of natural gas, which is primarily important in setting the marginal cost of a thermal system.<sup>1</sup> A preliminary assessment [3] evaluates that such project would reduce the cost of operation of the system by M\$ 650 per year. However, this figure is obtained after assuming that the utilisation rate of the interconnection would be 90 % over the year. Considering the seasonality of demand, and the fact that HVDC interconnector are usually underused [6, 7, 1], this seems far from reality. Such inefficiency is mainly explained by the different rules that structure those jurisdictions management.

In this article we proceed to a cost benefit analysis of the CHPE interconnection, taking into account strategic interactions, network constraints and neighbour areas. Strategy consists here

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1. see the website <http://www.chpexpress.com/> for more details

in withholding the Physical Transmission Rights (PTR) which permit to access to the HVDC interconnection [4]. We analyse import and export strategies of generators as a mean to gain extra-profit, given that local regulation does not permit them to earn extra-profits on their local market. However, the extent to which generators could exert market power is limited by the rights they do not own. These remaining rights are de facto owned by a competitive fringe of traders that perfectly arbitrage the price differential, taking away any profit opportunity. Thus, the lesser rights this competitive fringe owns, the lower there ability to arbitrage price differences. The New York State network is approximated in order to retain its main characteristics: a central place of exchange between Ontario, Québec, New England and PJM, but a very congested network from North of the state to the south-east, NYC and Long Island.

Applying the model developed in [2], we define allocations of rights over CHPE that would maximise social welfare. Also we assess the welfare gain due to such interconnection.

## References

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