Overview of the Role of Demand Response in Canadian Electricity Markets

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TOPICS

- Role of Demand Response
- Overview of Canadian Demand Response Programs
- Developing Cost-effective Demand Response for Canadian Electric Systems

ROLE OF DEMAND RESPONSE

The fundamental rationale for demand response programs is to avoid constructing/committing expensive electric generation capacity whose cost exceeds the value of its output to electric industry consumers.

- This process happens as a matter of course in most non-electricity markets as consumers will not purchase commodities or services whose price exceeds their value.

- Special demand response programs are necessary to achieve this goal in electricity markets because retail customers often do not pay spot prices even at the margin, and spot electricity energy prices typically do not reflect the full cost of meeting incremental electric load.

ROLE OF DEMAND RESPONSE

Demand response can avoid several distinct kinds of generation costs:

- The cost of building generation capacity to meet uncertain peak load levels that may be reached for only a few hours during the year.
- The cost of building generation capacity or transmission to meet uncertain peak loads within transmission constrained load pockets that may be reached for only a few hours a year.

ROLE OF DEMAND RESPONSE

- The cost of building thermal generation capacity to meet electric load on energy limited hydro systems during low hydro years.

- The cost of committing extra generation to provide reserves to cover generation or transmission outages or the output variations of intermittent generation.

ROLE OF DEMAND RESPONSE

The appropriate role of demand response in Canadian markets is not to attempt to depress clearing prices but to reduce the cost of meeting load and maximize social welfare by ensuring that Canadian electric systems do not incur greater costs in meeting incremental load than the value of that power to consumers.

- This is obvious in the traditional regulated utility systems in Manitoba, Quebec, Saskatchewan or British Columbia where it clearly makes no economic sense to replace generation with demand response costing more than the generation it replaces.

ROLE OF DEMAND RESPONSE

- This is also true in the market systems in Alberta or Ontario.
  - Marginal market-based generation will not be built if demand response would make it uneconomic, so any impact of uneconomic demand response will be short-term while the excess costs will continue to be incurred.
  - Non-market based generation supported by OPA contracts or TMR contracts will simply receive larger non-market payments if clearing prices are depressed.

CANADIAN DEMAND RESPONSE PROGRAMS

Alberta

- Price responsive load – voluntarily reducing load in response to spot prices
- Supplemental Reserves (10 minute reserves) (SUPL)
- Load Shed Service (LSS) and Import Load Remedial Action Scheme (ILRAS – Fortis Alberta)
- Demand Opportunity Service (1 hour to seven minute or less curtailments)
- Voluntary Load Curtailment Program (VLCP) used in the event of supply shortfalls
- Under Frequency Load Shedding Scheme (UFLS) used in the event of very large loss of generation

CANADIAN DEMAND RESPONSE PROGRAMS

BC Hydro

- Winter load curtailment program

Hydro Quebec

- Interruptible load programs for large and medium power customers, projected to rise to 1000 megawatts in 2010 to 2011 Winter.

Manitoba Hydro

- Curtailable service program, industrial customers with 5 megawatts or more load

New Brunswick System Operator

- Interruptible load, one hour notice during supply shortages
- Interruptible load does not have capacity obligation

CANADIAN DEMAND RESPONSE PROGRAMS

Ontario

Capacity

- OPA DR3
- OPA DR1(Voluntary)

Reserves/Ancillary Services

- IESO Dispatchable loads
- IESO EDRP

CANADIAN DEMAND RESPONSE PROGRAMS

SaskPower

- Interruptible irrigation pumps
- Demand response for large industrial customers (5 MVA or larger)

DEVELOPING EFFECTIVE DEMAND RESPONSE

BC Hydro, Hydro Quebec, Manitoba Hydro, SaskPower –

- The key difficulty is providing efficient incentives for demand response within the framework of a regulated utility with regulated average cost rates.

Ontario

- Key difficulties are that generation investment is supported by OPA contracts, not spot energy prices, and non-locational pricing.
- Not all load is exposed to real-time pricing.
- Lack of reserve shortage pricing and use of "unconstrained prices" may eliminate the price signal needed to elicit load reductions (e.g. HOEP does not get high enough).

DEVELOPING EFFECTIVE DEMAND RESPONSE

Alberta

- Alberta's energy-only market design generally provides efficient incentives for demand response outside transmission constrained regions.

- The key difficulty is providing efficient incentives for demand response relative to generation within constrained regions that are supported by non-market contracts (e.g. IBOC/LBCSO), or out-of-market transmission investments (e.g. Edmonton Calgary Transmission Reinforcement Projects).

DEVELOPING EFFECTIVE DEMAND RESPONSE

Alberta

- Lack of reserve shortage pricing that would cause the pool price to rise above $1,000 during appropriate system conditions and non-market actions taken to address supply shortages may preclude the price signal needed to elicit load reductions (e.g. the pool price does not get high enough).

- Not all load is exposed to real-time price.

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