

Green Action Centre Evidence on Fuel Switching and DSM

Presentation to the
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End-Use Fuel Choice

- **Electricity versus Gas**
- **Switching Existing Loads**
 - from Gas to Electricity
 - from Electricity to Gas
- **Choosing Fuel for New Buildings**

Appropriate DSM Targets

- **Inter-Jurisdictional Comparisons**
- **Recommendation for Manitoba Hydro**
- **Effect on Need**

End-Use Fuel Choice

- **Which Fuel Should Manitoba Hydro Prefer?**
- **Manitoba Hydro Projections of Future Fuel-Switching**
- **Drivers of Uneconomic Fuel Choices**
- **Responses to Fuel-Choice Market Failures**

Which Fuel Is Preferable?

- **Gas Reduces Costs**
- **Gas Reduces Emissions**
- **Gas Improves Cash Flow**
- **Gas-Use Efficiency Greater at End Use**
 - > 90% versus 25%–50% for electricity**
- **Gas Is Preferable by Every Measure**

Results from Hydro Study

		Switching from Standard Gas Equipment to Electric			
		Furnace	Geothermal (SCOP 2.5)	Geothermal (SCOP 3.5)	Water Heat
NPV Utility Perspective					
Electric		\$3,223	\$1,563	\$1,117	\$10
Natural Gas		\$4,107	\$4,107	\$4,107	\$317
NPV Customer Perspective					
Retaining Some Natural Gas Service		\$9,146	\$12,685	\$10,806	\$727
Eliminating Natural Gas Service		\$7,737	\$11,276	\$9,397	
NPV TRC Perspective		\$15,067	\$16,946	\$14,621	\$1,054
NPV Change in Provincial Cash Flow Out (In)					
Low Equipment Cost		\$6,271	\$939	(\$489)	\$297
High Equipment Cost			\$1,939	\$511	
Net Annual Global CO₂e Emissions (kg)		8,919	1,543	139	1,684

Could the Gas Advantage Reverse Over Time?

- Higher Gas Prices? *Not likely*
- Lower Renewable Costs? *Possible*
- Pricing CO₂ in US-MISO? *Mixed Effects*

Effect of Higher Gas Prices

- **Increase electric market prices**
- **Improve gas end-use economics**

Effect of Lower Renewable Costs

- **Wind and solar costs likely to decline**
- **Hydro project costs tend to rise over time**
- **More renewables could**
 - **gradually push out MISO coal and peakers, or**
 - **back out gas, leaving more coal at margin**
- **Large price decline necessary to reverse cost benefit of end-use gas**

Effects of Pricing CO₂ in MISO

- **Would increase cost of coal, compared to gas CTs and CCs, which could lead to:**
 - retirement of more coal, lower marginal emissions, or
 - pushing coal to the margin, increasing marginal emissions.
- **Would raise export prices, increasing benefit of exporting power.**

Brattle Study of CO₂ Displacement (CAC/MH II-133)

- **Range of Estimates:**
 - Early period mostly avoids coal
 - ~0.7–0.9 tons/MWh
 - Later avoids more gas
 - ~0.5 tons/MWh
 - Perhaps down to gas rate of ~0.4 tons/MWh

Breakeven Avoided Emission Rate

<u>Electric Use</u>	<u>Breakeven Emission Rate (T/MWh)</u>
GSHP @ 3.5 SCOP	0.82
GSHP @ 2.5 SCOP	0.58
Water Heater	0.30
Furnace	0.23

*Assumes FUEL-SWITCHING Report used
0.85 T/MWh emission rate*

Relative CO₂ Emission Rates

- Compared to gas:
 - High-efficiency GSHP are a wash now, but expensive.
 - Low-efficiency GSHP may fall beat gas after 2030, also pricey.
 - Resistance space- and water-heating are likely be worse than gas for several decades.

GHG Policy Implications

- Encourage gas now for space and water heating.
- Monitor MISO marginal emissions.
- If emission rate falls, assess whether high-efficiency GSHPs would beat gas, and whether the CO₂ reductions are cost-effective.
- If emission rate falls substantially, re-evaluate standard GSHPs.
- Gas is likely to be preferable for other applications for many decades.

Manitoba Hydro Projects

Conversion *to* Electricity

- Fuel-Switching Report and 2012 Load Forecast
 - Electric dominance in new construction
 - Many conversions to electricity
- 2013 Load Forecast
 - Slower but important trend to electricity
 - Increases load by hundreds of GWh
 - Assumed effectiveness of vague “initiative”

Drivers of Uneconomic Fuel Choices

- Developers choose fuel source**
- Contractors prefer electric water heaters**
- Customers may have short horizon.**
- “Customers do not consider total cost of ownership.”**
- Customers assume that electricity is environmentally benign**

Developers Choose Fuel Source

- **Electric equipment is less expensive**
- **Developers avoid coordinating additional gas work crews**
- **Developers can get same price for gas- and electric-heated homes**

Contractors Prefer Electric DWH

- **Replacing gas with gas may require checking chimney condition**

Customers May...

- **Expect to sell before the investment to pays off**
- **Not consider total cost of ownership**
- **Assume that electricity is environmentally benign**

Responses to Fuel-Choice Market Failures

- **Manitoba Hydro Initiative**
 - Limited, Unclear
- **More-Robust Alternatives are Available**

Manitoba Hydro Initiative

- **Start date unclear**
 - Exhibit Manitoba Hydro-87 (p. 78) indicates 2010/11 start
 - Appendix D (p. 20) indicates that the initiative were not reflected in the 2012 forecast
- **Mostly or entirely information-based**
- **Considering “going beyond the education approach,” but has not decided (Tr. 923–924)**

More-Robust Alternatives

- Incentives, like any other DSM opportunity
- Inclining-block rates for residential and small commercial
- Lower demand charges, higher TOU energy charges for large customers
- Hydro: Increase first cost for electric heat
- Centra: Decrease first cost for gas heat

DSM Targets

- **Inter-jurisdictional Comparisons**
- **Recommendation for Manitoba Hydro**
- **Effect on Need**

Inter-Jurisdictional Comparisons

- **Manitoba Hydro DSM Plans Are Modest**
 - Only about 5% of output over 15 yrs,
~0.3%/year
- **Other Jurisdictions Have Achieved Much Greater Savings**
 - Several examples of >1.3%/year
 - Some are projecting over 2%/year

Reasonable Goals for Manitoba Hydro

	Annual Savings as % Energy	Cumulative GWh Savings
2014/15	0.60%	269
2015/16	0.90%	487
2016/17	1.10%	761
2017/18	1.30%	1,089
2018/19	1.50%	1,472
Annually post-2018/19	1.50%	+~385/yr

Effect on Need

- **Manitoba Net Load Would Decline Slightly Over Time**
- **Existing Resources Would Meet:**
 - all Manitoba load
 - all contracted exports
 - proposed exports through WPS 308 MW sale (<70 MW shortage in 2030/31 to 2034/35)
- **Additional Resources May Be Justified by Benefits of Exports**