

MANITOBA HYDRO

2012/13 & 2013/14 ELECTRIC GENERAL RATE APPLICATION

UNDERTAKING PROVIDED BY: T. MILES

Manitoba Hydro Undertaking #75

Manitoba Hydro to provide a breakdown of the components of its GHG estimate.

Response:

Manitoba Hydro currently assumes an export GHG displacement factor of 0.75 kg CO₂e/kWh, which reflects a mixture of fossil-fuel resources and a variety of generation technologies and efficiencies. While not the basis of this factor, for illustrative purposes, this is roughly equivalent to a blend of about 50% coal fired generation and about 50% gas fired generation. As can be seen in comparison with the recent marginal unit types within the MISO market footprint data provided in the table below, this assumption is conservative relative to the proportion of coal emissions displaced by exports.

The *Comparison of Natural Gas vs Coal as the Marginal Fuel in MISO* table provides a recent analysis of the marginal generation unit in the MISO market footprint, showing the portion of time both coal and natural gas are the marginal fuels in both the on and off peak periods. Despite generally low gas prices in early 2012, the average annual marginal generation distribution in MISO has remained relatively consistent since 2010.

Comparison of Natural Gas vs Coal as the Marginal Fuel In MISO

| | | Avg Annual % on Margin | | |
|-----------------|-------------|------------------------|------|------|
| | | Year | 2010 | 2011 |
| On-Peak | Coal | 87% | 92% | 89% |
| | Gas | 20% | 16% | 24% |
| Off-Peak | Coal | 95% | 94% | 91% |
| | Gas | 5% | 4% | 8% |

Note 1: All information extracted from MISO's Monthly Market Assessment Report

Note 2: Binding transmission constraints can produce instances where more than one unit is marginal in the system, consequently, the percentage may sum to more than 100%.

Note 3: Other generation technologies are included in MISO's monthly report but weren't included for this analysis.

An article in the January 5, 2013 issue of the Economist entitled The Mixed Fortunes of a Fuel stated:

“At its peak, in 1988, coal provided 60% of America’s electricity. Even in 2010, when the shale-gas boom was well under way, it still accounted for 42%. By the middle of 2012, though, gas and coal were roughly neck-and-neck, each with around a third of power generation.”

The portion of energy from coal fired generation quoted in the article is for the United States as a whole. Regional power systems have substantially different generation mixes than for the United States as a whole, and the MISO market is much more coal intensive than the US as a whole. According to the “2011 State of the Market Report for the MISO Electricity Markets” (page A-6 and A-4 respectively; page A-5 of this report appears as Page 119 of the Board Counsel’s Book of Documents):

“Coal-fired resources set the energy price in 93 percent of intervals, including virtually all of the off-peak intervals. Frequently congestion causes both natural gas and coal to be on the margin in the same interval in different areas.”

“Since approximately half of MISO’s generation mix—and the large majority of its baseload capacity—is coal-fired, coal units tend to set price in a large majority of intervals. Natural gas and oil resources typically only set prices during the highest-load and ramp-up hours. Hence, these fuel prices have a greater impact on load-weighted average prices than the percentages suggest.”

Manitoba Hydro expects the role of coal in the MISO market region to diminish gradually. Emerging U.S. federal regulations related to mercury, SO₂, NO_x and particulates are expected to result in some coal retirements (likely smaller and older units). Further, federal U.S. GHG emission standards for new generation (if they are upheld), coupled with additional state level constraints and lower (and less volatile) gas prices are expected to constrain the development of new coal facilities. While additional and more significant greenhouse policies are ultimately expected, the resulting reduction of fossil fuelled generation will likely take place over decades and Manitoba Hydro’s exports will have a role along with other renewables in contributing to that reduction.