Pembina Institute Comments on IPSP - Discussion Paper #2 - Load Forecast

October 2, 2006
Prepared by:

Mark S. Winfield, Ph.D. Director, Environmental Governance.

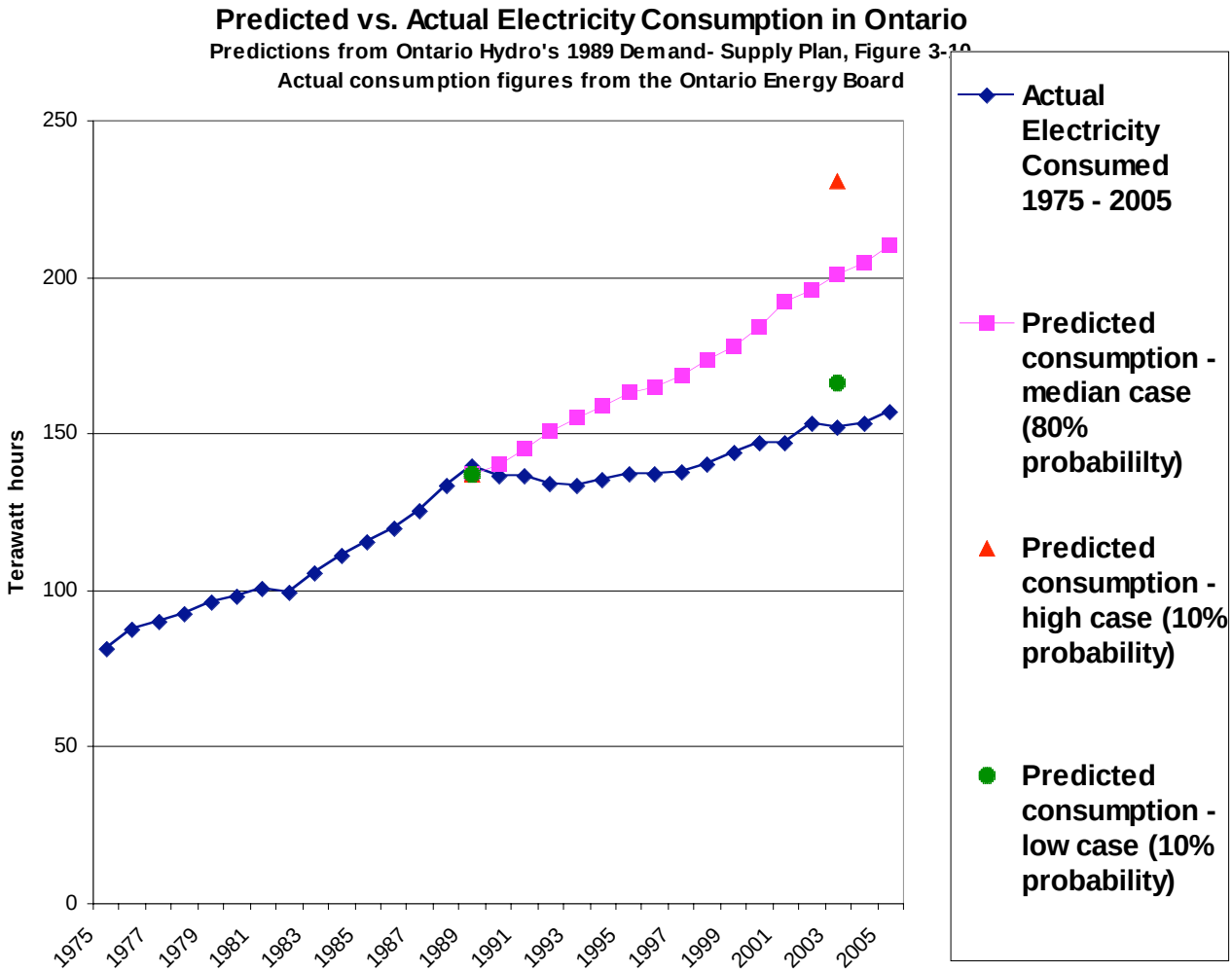
The Pembina Institute has reviewed the Ontario Power Authority's (OPA) Integrated Power System Plan (IPSP) Discussion Paper 2 – Load Forecast, and makes the following comments and observations.

In general, the Pembina Institute believes that the forecast likely overestimates future electricity demand in Ontario, and at best underestimates the risks associated with basing electricity system planning on long-term projections of future economic activity. The future direction of economic activity and socio-economic factors, such as population levels and distribution, that influence future electricity demand are subject to a wide range of independent variables. The variety of factors affecting these variables, and the complex manner in which they may interact, makes the generation of accurate projections of future conditions extremely difficult, especially over the long term.

Previous efforts to project future electricity demand in Ontario have significantly overestimated future demand. As shown in the figure below, in the case of the Ontario Hydro Demand Supply Plan, electricity demand over the 1989-2003 period ultimately turned out to less than the lowest case predicted demand in the Plan.

Toronto Office: C/O Centre for the Environment, 33 Willcocks St. Toronto, Ontario, M5S 3E8
Tel: 416-978-3486 - Fax: 416-978-3884 - www.pembina.org

(Figure Courtesy of the Ontario Energy Board via Keith Stewart, WWF-Canada)



The Pembina Institute identifies the following factors as examples of those shaping future electricity demand, and makes accompanying comments on the limitations to the ability of the models on which the OPA has relied for its load forecast to consider and incorporate these factors, and potential variability in them.

Energy Prices

Future electricity demand will not only be a function of future electricity prices, but also prices for potential substitute energy sources, such as natural gas for space and water heating, or solar water heating. These prices are themselves functions of wide range of factors that are difficult to predict, particularly over the longer term. These factors range from the costs of basic fuels (e.g. uranium, gas, coal), the particular electricity generating technologies used and their costs and performance, changes in economic conditions or structure that may reduce or increase energy demand, and policy interventions by governments.

The Pembina Institute notes that the OPA's load forecast is based on prediction that electricity prices will fall from 10.3 cents/kWh today to 9.9 cents / kWh in 2025 (both stated in 2005 dollars), with prices falling in particular in the post-2010 period. These projections contradict other projections, including those normally incorporated into the CIMS model, that Ontario electricity prices will rise steadily over the 2005-2020 period.[1] At the same time, the natural gas prices employed in the modeling are substantially higher than those incorporated into the model previously,[2] and predicted by other sources. These price assumptions may significantly affect future electricity demand and the relative roles of electricity and natural gas in meeting Ontario's electricity needs.

Structural Economic Change

Economic models, even those as sophisticated as the CIMs model on which the IPSP model is based, have considerable difficulty in dealing with structural change in the economy (e.g. a decline of energy intensive heavy industries and rise of the less energy intensive service and knowledge sectors). Models have to rely on forward projections of recent trends, therefore cannot anticipate rapid structural change, as happened in Ontario the early 1990s, and which resulted in a major decline in electricity demand in the province.

Technological Change

The CIMS model on which the IPSP model is based is very conservative in its approach to the emergence of new technologies. The model effectively assumes that no innovation or improvement in the energy efficiency of energy consuming technologies beyond what is commercially available now. The model also does not include a range of potentially

[1] See M.Winfield, et.al.*Power for the Future,* (Toronto: Pembina Institute and CELA, 2004), table 3.1.
[2] See Winfield *Power for the Future*, table 3.2.

important demand displacement technologies, such as residential applications of solar hot water or ground source heat pumps.

Consumer Behaviour

The CIMS model incorporates very conservative assumptions about how consumers will respond to the availability of energy efficient products in the marketplace. In particular, CIMS assumes an inertia towards conventional products even when more efficient versions of product are economically rational choices. This is reflected in the high discount rates incorporated into the model in relation to the adoption of new energy consuming technologies, indicating a desire on the part of consumers for very short payback periods, and number of assumed attitudinal and structural barriers to the adoption of new technologies.

Economic Cycles

CIMS and similar models have difficulty dealing with cyclical changes in the economy - economic upturns and downturns that may be driven by a variety of exogenous factors. These cycles are another crucial factor informing future electricity demand. The impact on electricity demand in Ontario of the economic downturn of the early 1990s, for example, accounts for much of the disagreements that have emerged about historical growth levels of growth in electricity consumption in Ontario. Assessments that take into account the impact of the downturn arrive at lower average levels of growth in consumption (e.g. 0.5%), while projections relying on a later base years arrive at the higher figures. In the context of the IPSP exercise, a key question is whether it is realistic to assume that the current extended period of economic growth will continue uninterrupted for another 20 years.

Population Growth

Projections of future electricity demand also incorporate assumptions about future population growth. These assumptions are again typically extrapolations of recent trends. As with the extrapolation of economic trends from recent experience, this approach to population projections can also entail significant risks. It has been pointed out, for example, that the population and economic projections that have informed the province's growth plan for the Greater Golden Horseshoe, are based on the relatively high economic and population growth in the region that has occurred over the past decade, with the risk that

projections into the future based on these trends may result in unrealistically high forecasts of population growth and economic activity. [3]

The implications of load uncertainty for the IPSP.

The foregoing points are not intended to be an exhaustive examination of the factors that may potentially affect future electricity demand in Ontario and their potential variability. Rather they are intended to highlight the complexity of the factors that inform such projections and the range of uncertainties that may be involved, with the implication that the reliability of such projections is open to serious challenge, particularly as they move further out in time. As noted above, previous efforts to develop long-term projections of future electricity demand in Ontario have produced serious overestimates, with the risk of over commitment to new electricity generating capacity. Such an outcomes in the past have imposed large and unnecessary costs on electricity consumers and provincial taxpayers.

The policy implication of these uncertainties, and of past experience in Ontario, is that the establishment of commitments to large-scale supply projects with very long planning and construction times on the basis of long-term projections of future demand entails significant risks. The primary risk is that of overbuilding capacity, as demand may not materialized as projected when facilities are completed, as happened with the Darlington facility. This may lead to serious challenges in addressing debts and obligations incurred in the construction of facilities for whose output there is no demand.

The challenges associated with the development of long-term projections of electricity demand argue for a more incremental and iterative approach to planning. In particular, as the uncertainties associated with future projections are reduced over shorter time frames, firm commitments to new supply should be targeted at meeting demand over shorter time periods, and focused on generating technologies and other options that can be brought into service within these time frames. A focus on smaller individual facilities would also increase flexibility and reduce the risk of over-commitment.

For more information contact:

Mark S. Winfield, Ph.D., Director Environmental Governance
Tel: 416-978-3486
Fax: 416-978-3884
e-mail: markw@pembina.org
www.pembina.org

[3] See Will Dunning Inc., *Economic Influences on Population Growth and Housing Demand in the Greater Golden Horseshoe* (Toronto: Neptis Foundation, January 2006).