

# DEMAND SIDE MANAGEMENT POTENTIAL IN CANADA: ENERGY EFFICIENCY STUDY BACKGROUND

## Introduction:

Canada faces several large and growing challenges on the energy front and there is an increasing recognition that governments must work together with industry and other stakeholders to address these challenges. While there has been significant focus on addressing supply issues, there are economic, social, health, environmental, and energy security benefits in achieving greater energy efficiency and energy demand management.

There has been uncertainty about the energy demand reduction that can be realized from energy efficiency, and Demand Side Management (DSM) measures. Research to date has looked at various aspects of the potential for demand reduction that can result from energy management efforts and most studies have focused on a single fuel in a single jurisdiction. As well experts have expressed differences in opinion concerning the energy efficiency potential for Canada.

The Demand Side Management Working Group (DSMWG) comprised of representatives from federal and provincial governments, the energy utility industry, major energy users and non-government organizations, commissioned a report on potential energy demand reductions to be realized from conservation and energy efficiency and demand side management. This study was commissioned to help provide a credible understanding of the potential to reduce energy demand through, efficiency and DSM in Canada. The results are estimated using a simulation model, and looked at all fuels and all jurisdictions in Canada and to identify short and long-term opportunities.

## Features:

The potential study is unique in many ways:

- It is a collaborative effort between the top two experts in the field, Marbek Resource Consultants Ltd. and M.K. Jaccard and Associates, Inc. who have differing perspectives on energy efficiency;
- It is national in scope, with regional and sectoral breakdowns;
- It is the first of its kind in Canada to look at comprehensive energy management for all fuels (oil, gas, and electricity), all economic sectors (residential, commercial, and industrial) excluding transportation;
- It allows for fuel switching.

## Approach:

The study models energy consumption over a 25 year period from 2000 to 2025 under three different scenarios based on a reference (baseline) case. In modeling the scenarios, energy management policy instruments like energy efficiency, fuel substitution, greater market penetration of energy technologies for on-site application and generation and market intervention were considered.

The Reference/Baseline Case is defined as projected energy use in the absence of any new energy efficiency measures. It includes the on-going contribution of pre-2000 DSM measures and “natural efficiency” that occurs due to incremental technology improvements, structural changes in the economy, and old energy-consuming assets being replaced with newer and more efficient technologies.

The fuel pricing forecast used in the reference case was the Techno-Vert scenario in the National Energy Board 2003, “Scenarios for Supply and Demand to 2025.” Adjustments were made for coal prices based on feedback from the provinces.

Achievable potential is defined as the energy demand reduction that might be achieved through intervention in the market by governments, utilities and the private sector. Two policy scenarios were modeled:

Achievable Scenario 1 (Status Quo) estimates the potential assuming energy efficiency financial incentives, voluntary actions, and information programs remain at their 2005 levels and types of spending over the study period.

Achievable Scenario 2 (Aggressive) The bundle of policy instruments modeled collectively in this scenario include marginal cost pricing, higher density land use policies, enhanced energy performance codes and standards, carbon liability, financial incentives for energy efficiency and greater market penetration of energy technologies for on-site generation.

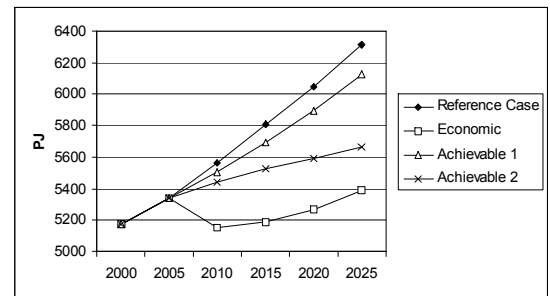
The Economic Potential scenario assumes total adoption of energy efficiency measures on purely economic considerations and assumes a carbon liability while ignoring the market barriers observed in the historical data. It should be viewed as a performance ceiling and as an important construct in assessing the remaining energy efficiency potential to be targeted within a given market boundary.

**Study Findings:**

➤ Across sectors, the potential reduction in demand achievable by 2025 through energy efficiency and energy management ranges from 182 PJ to 647 PJ. Figure 1 shows the total energy demand projections for the Reference Case and each of the three scenarios.

- *In the Reference Case*, energy demand grows by 1137 petajoules, from 5174 petajoules to 6311, over the study period. This represents a 22% increase in total energy demand from 2000 to 2025.
- *In the Achievable Scenario 1* (status quo) total energy demand growth is limited to 955 petajoules, resulting in energy demand reduction of 182 petajoules. This represents a 16% reduction in demand growth and 3% reduction in total energy demand compared to the Reference Case in 2025.
- *In the Achievable Scenario 2* (aggressive) total energy demand growth is limited to 490 petajoules, resulting in energy demand reduction of 647 petajoules. This represents a 56% reduction in demand growth and 10% reduction in total energy demand compared to the Reference Case in 2025.
- *The Economic Potential scenario*. In this scenario, total energy demand growth is limited to 213 petajoules, resulting in energy demand reduction of 924 petajoules. This represents an 81% reduction demand growth and a 15% reduction in total demand compared to the Reference Case in 2025.

**Total Energy Demand (excludes transportation)**



➤ A 3 to 10 percent reduction potential in total energy demand in 2025 as well as a 16 to 56 percent reduction in the growth of energy demand. This amounts to possible operating cost savings, in 2025, in the range of \$3.2 billion to \$15.7 billion.

**Comments/ Comparison to Existing Studies and Results Elsewhere:**

The results of the present study are in line with a 2005 U.S. government study investigating energy efficiency potential with a similar scope (national, all sectors, all fuels) which estimated savings range of 4% to 9%, also for two scenarios running to 2025.<sup>1</sup>

**Implications:**

Significant energy demand reductions can be realized through conservation, energy efficiency and DSM during the next 25 years. Achieving these savings will require expansion of existing programs and, to achieve the upper range of demand reduction, a range of new aggressive policy instruments would be required. Energy efficiency and DSM should be a component of future discussions on Canada’s sustainable energy future. Further, sustained and long term coordination of policy and program development is needed between governments, utilities, regulators, and other stakeholders to remove barriers which can impede achieving Canada’s energy efficiency potential.

<sup>1</sup> Energy Information Administration, Office of Integrated Analysis and Forecasting, **Assessment of Selected Energy Efficiency Policies**, May 2005 U.S. Department of Energy Washington, DC 20585.