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Smart Meters and TOU Pricing in Ontario: From Policy to Legislation to Province-Wide Implementation

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The 190-member Ontario Energy Association (OEA) is Ontario's premier energy trade organization. The OEA represents:

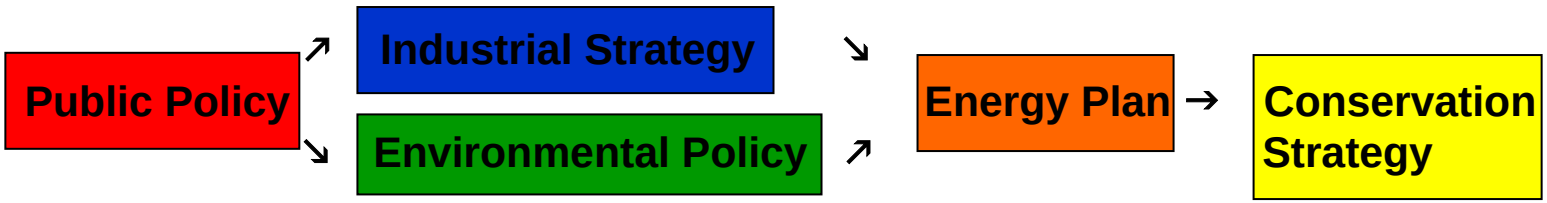
(1) firms involved in the generation, transmission, distribution and marketing of electricity; and

(2) firms involved in the transmission, distribution and marketing of natural gas.

OEA members together employ about 32,000 Ontarians and last year accounted for over $34 billion in market revenues.

Overview of Presentation

- Energy, the Economy and the Environment: Finding the Right Balance



- Issues and Challenges – Unique to Ontario? Similar to Other Jurisdictions?

- What is Ontario's strategy to transition from a *consumer culture* to a *culture of conservation*?

  - True-Cost Pricing
  - Consumer Awareness, Education and Empowerment
  - Conservation, Demand Management and Energy Efficiency Programming
  - Skills/Knowledge Capacity of Market Players
  - **Smart Meters and Time-of-Use (TOU) Pricing**
  - End Game: Market Transformation

Energy, the Economy and the Environment: Finding the Right Balance

Province of Ontario:

(1) Land mass of UK, France and Germany combined, with an environmentally-conscious population approaching 13 million.

(2) Currently, one of the most energy-intensive jurisdictions in the world (2007 generation output = 156.4 TWh), with 85 regulated Local Distribution Companies (LDCs) across the Province.

Toronto Population:
5,300,000 (CMA)
Note: Average Toronto homeowner uses about 900-1,000 kWh/month.

Global Energy Intensity Benchmarks

- Canada and the United States account for about 5% of the world's population, but together consume almost 25% of the world's primary energy supply.

- Both countries are among the most energy-intensive in the world:
  - relatively high levels of personal disposable income
  - relatively low prices (for some sources of energy supply) and affordability (for most)
  - energy-intensive capital stock/capital mix
  - industrial competitiveness pressures
  - geography
  - climate
  - strong consumer culture and mindset

International Comparisons of Energy Intensity – Total Primary Energy Supply (TPES)* and Electricity Consumption

	TPES/GDP (PPP) (toe/000 2000US$ PPP)	Electricity Consumption/ Population (kWh/capita)
	2004/05	2004/05
World	0.21	2,516
Australia	0.19	11,126
Canada	0.28	17,179
China	0.23	1,585
France	0.16	7,689
Germany	0.16	7,030
India	0.18	457
Japan	0.16	8,076
Sweden	0.21	15,420
United Kingdom	0.14	6,206
United States	0.22	13,338

*Includes coal, oil, natural gas, nuclear, hydro, combustible renewables and waste, geothermal, solar, wind, heat, etc.

Sources: International Energy Agency and Hydro-Québec, 2006.

Ontario's Electricity Supply/Demand Challenge – Where were we in 2003/2004?

- The combination of generation retirements and continued demand growth pointed to a notional or planning supply gap of roughly 24,000 MW by 2025. This represented almost 80% of Ontario's current installed generating capacity, and included:

  - the replacement of all coal-fired plants
  - the potential retirement of nuclear plants
  - load growth (annual growth of about 1.0%; peak at 1.3%)

- Three fundamental challenges facing the Province:

  1) 24,000 MW / $60-$70 billion in total investment*

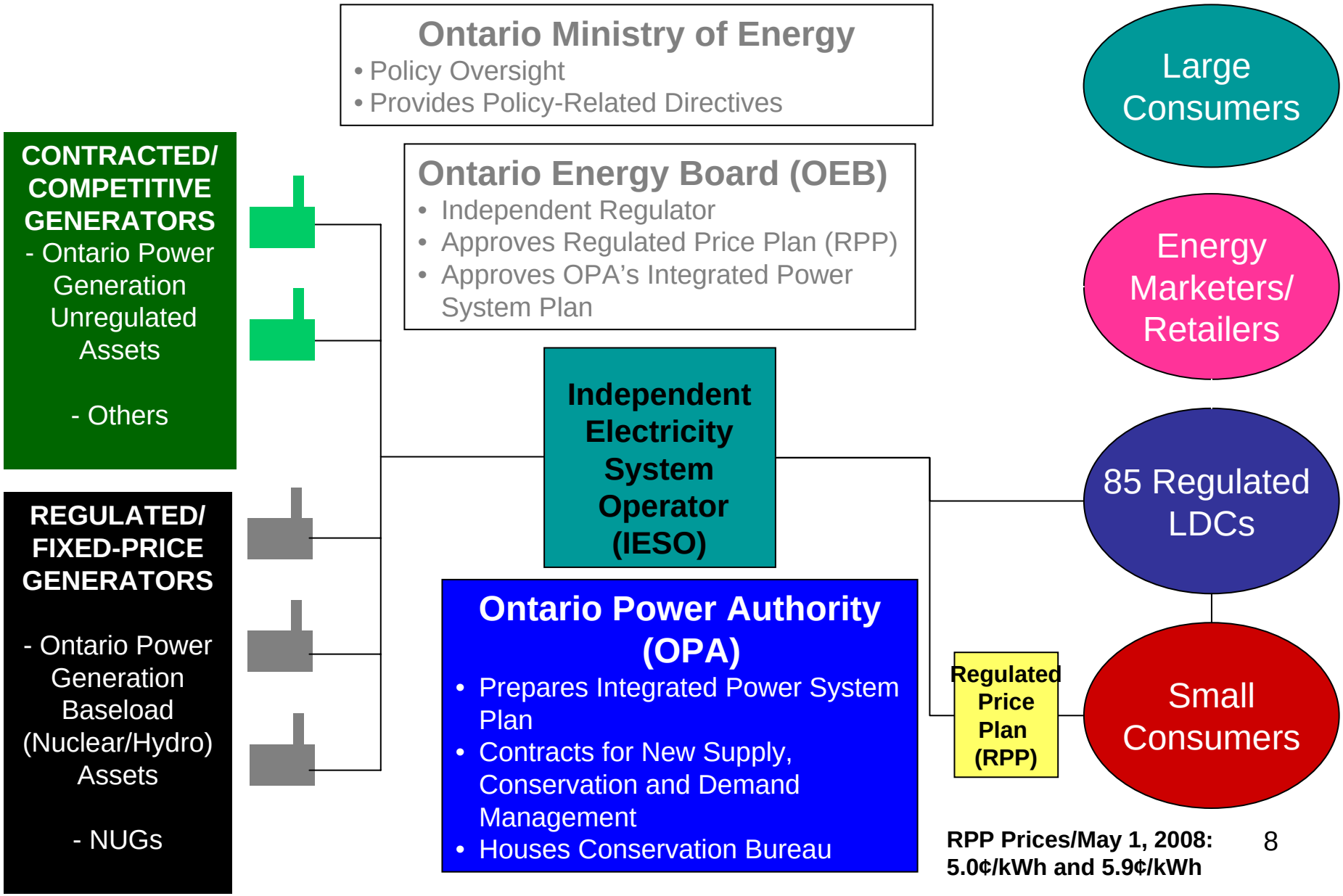
  *Ontario Power Authority forecast, 2005.

  Note: Total of all electricity bills in Ontario is $12.5 billion/year.

  2) industrial competitiveness, economic growth and jobs

  3) innovation challenge – conservation, energy efficiency, load management and minimizing the "environmental footprint"

Ontario's Hybrid Electricity Market in 2008



RPP Prices/May 1, 2008: 5.0¢/kWh and 5.9¢/kWh

Ontario's Conservation Strategy

- Transition to True-Cost Pricing
- Empower Consumers to Better Manage Their Energy Bills/ Underlying Principle of "Consumer Choice"
- Environmental, Political and Economic Context
  - Recent polls have shown that climate change, air quality and pollution are now among the top-ranked issues/concerns for most Canadians.
  - This fundamental shift in how the public views the environment (and environmental concerns) is unprecedented in terms of its potential to drive public policy and, in turn, the conservation and energy efficiency agenda.

Highlight:

- The Ontario Government set targets for the installation of 800,000 smart electricity meters on homes and small businesses by the end of 2007, and throughout the Province by December 31, 2010 (4,000,000 meters in total).

Ontario's Conservation Strategy

- Smart meters represent a key building block in Ontario's approach to repositioning itself within the new, higher-cost energy price environment.

- Together with Time-of-Use (TOU) pricing, increased consumer education and awareness of conservation and load-shifting options/strategies, all consumers will be "empowered" to act individually to better manage their electricity bills.

- Empowerment is the operative word, as those customers who conserve or load shift will be better off and those who continue their current consumption patterns will pay the true costs for peak-time consumption and volumes.

Ontario's Conservation Strategy

- Additional System-Wide Benefits and Efficiencies Available
  - Avoided capital costs of new generation, transmission and/or distribution infrastructure.
  - Innovation drives a new competitive advantage – Ontario's ability to adapt and adjust to higher energy prices better than our regional/global competitors.

Highlight:

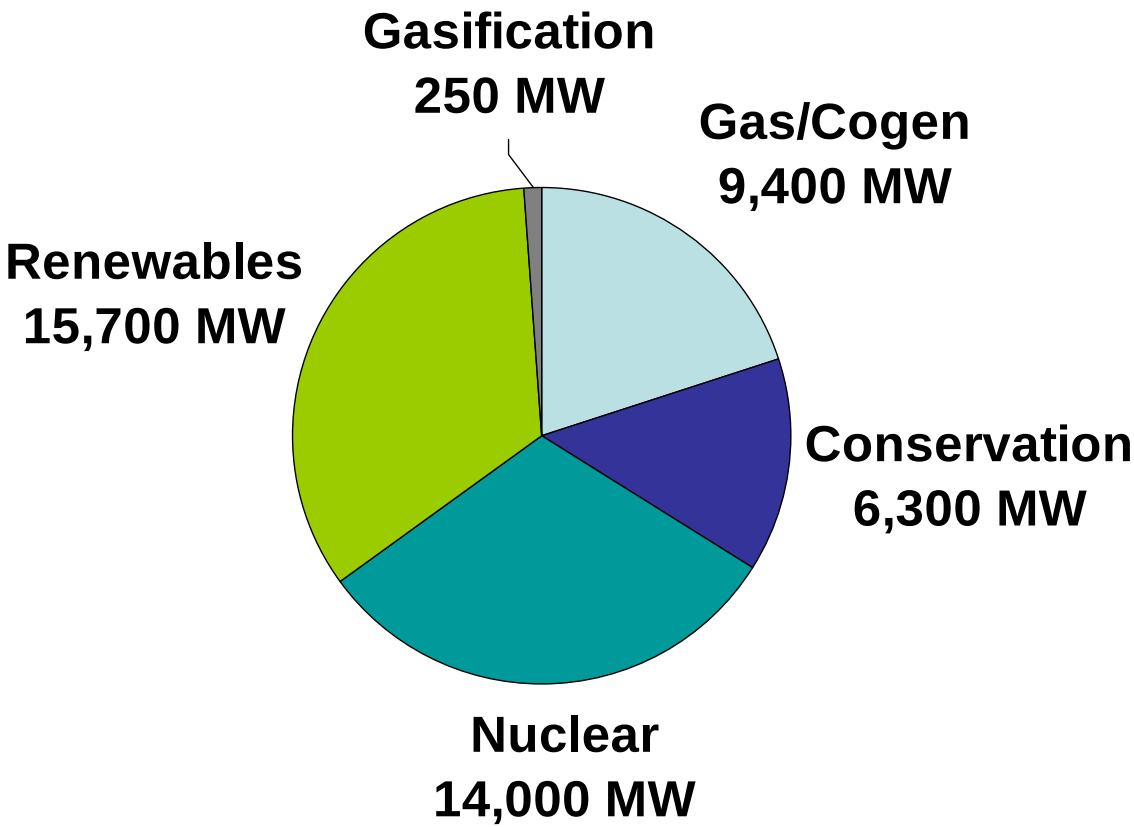
- By the end of 2007, close to 1,000,000 smart meters had been installed by 13 LDCs.

Ontario's Conservation Goals are Ambitious and Aggressive

- Ontario's overall conservation goals call for a reduction in peak demand of 6,300 MW by 2025. This is almost equal to the supply capacity of Ontario's existing coal-fired generation plants, which the government has committed to shutting down and replacing by the end of 2014.

- Short term conservation goals included a reduction in Ontario's peak demand of 1,350 MW by the end of 2007, another 1,350 MW by 2010, as well as a 10% reduction in the electricity consumption of Ontario Government buildings.

Ontario Government Directive for 2025 Supply Mix



Smart Meters:
A Government-Mandated Initiative

- The Energy Conservation Responsibility Act establishes the legislative framework for the installation of smart meters in Ontario homes and small businesses.

  "With smart meters, consumers will be able to make informed choices about their energy use. They will be able to control their energy costs by moving usage to off-peak periods. From a climate change perspective, shifting consumption to off-peak hours will help minimize our environmental impact."

  Hon. Dwight Duncan, Ontario Minister of Energy, February 2007.

Smart Metering Technology Platform

- Ontario's smart metering technology platform includes both Advanced Metering Infrastructure (AMI) and Meter Data Management/Meter Data Repository (MDM/R) functions. AMI is the infrastructure within which meter reads are to be remotely collected and, in due course, subsequently transmitted to a centralized MDM/R.

- Local Distribution Companies (LDCs) will be responsible for purchasing, owning, installing, operating and maintaining smart meters. Cost recovery will be through LDC distribution rates approved by the Ontario Energy Board.

- LDCs will be responsible for ensuring that all AMI functions (as specified) are provided to the centralized MDM/R which, in turn, will provide consumption data for each meter back to the LDC or its billing agent.

- The Independent Electricity System Operator (IESO), working with the selected technology/service providers of the MDM/R system, continues to coordinate and project manage MDM/R implementation activities.

OEB's Smart Price Plan

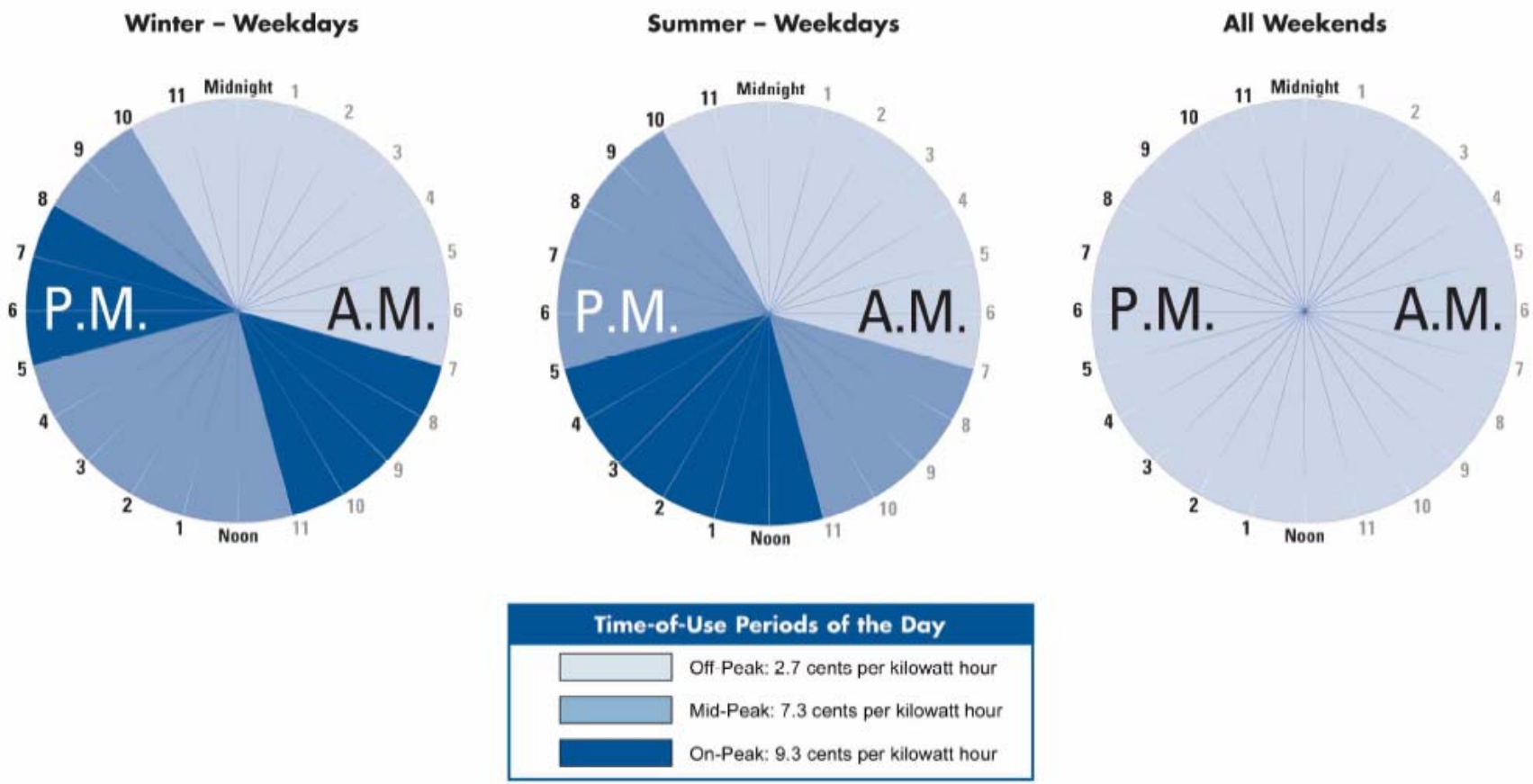
- The OEB's Time-of-Use (TOU) pricing for consumers with smart meters takes into account when, as well as how much, electricity is used by each consumer. These prices are developed as part of the Regulated Price Plan (RPP) and can change twice a year at set dates in the Spring and in the Fall, taking into account a number of factors.

- The TOU price structure has different price levels depending on season, day of the week (i.e., weekday, weekends or holidays), and the specific period of the day when electricity is used:

  - **Off-Peak** (when demand for electricity is lowest)
  - **Mid-Peak** (when demand for electricity is moderate)
  - **On-Peak** (when demand for electricity is highest)

OEB's Smart Price Plan

May 1, 2008



The Ontario Business Case for Smart Meters and TOU Pricing

Business Case ➔ Public Policy ➔ Cost-Benefit Analysis/ROI Includes “Externalities”

- ✓ Local Distribution Companies (LDCs) responsible for purchasing, owning, installing, operating and maintaining smart meters. Cost recovery through LDC distribution rates approved by the Ontario Energy Board.
- ✓ System-Wide Business Case: Promotes Demand Response and Conservation – Load Shifting and/or Load Reduction
- ✓ Eases Pressure on Demands for New Electricity System Infrastructure – Avoided Capital Costs
- ✓ Time-Lagged True-Cost Pricing – Provides for More Stable and Predictable Electricity Pricing
- ✓ Centralized MDM/R Infrastructure Provides Potential for More Effective System-Wide Planning and Other Customer-Based Benefits and Efficiencies

The Current State of Play – Progress, Issues and Challenges

Over 1,000,000 smart meters now installed, but the timing of Province-wide mandatory TOU pricing has not yet been determined.

- ✓ Basic functionality requirements established for initial technology/equipment RFPs included:
  - Two-way communications.
  - Hourly reads with differential rates.
  - Ability to store some data at the meter level.
  - In other words, a basic technology platform that was “affordable,” not quickly become “yesterday’s technology” and which could accommodate future platform additions/enhancements.

- ✓ At the end of 2007, Chatham-Kent/Middlesex Hydro, Milton Hydro and Newmarket Hydro were the only utilities in Ontario that were charging TOU prices to some of their residential and small business customers.

The Current State of Play – Progress, Issues and Challenges

- ✓ Toronto Hydro has installed over 450,000 meters, making Toronto one of the most densely smart-metered locations in the world.
  - Using Elster meters combined with a wireless mesh network.
  - Per-unit installation costs ranging from $175-$250, depending on the neighbourhoods involved.
  - In-house installation rate of between 250-1,000 per day, once again depending on the individual neighbourhoods.
  - Remote readings currently being done on over 225,000 meters to a 99% level of accuracy.

- ✓ Smart meter pilots have proven particularly insightful.
  - Hydro Ottawa (TOU prices/Critical Peak Pricing/Critical Peak Rebates)
  - Newmarket Hydro (TOU prices/Critical Peak Rebates/smart thermostats)
  - Hydro One (TOU prices/real-time monitors)
  - Oakville Hydro (TOU prices/sub-metered condominiums)
  - Veridian Connections (TOU prices/large business consumers)

The Current State of Play – Progress, Issues and Challenges

- ✓ Key Consideration: Price Elasticity of Demand – Own Price Elasticity, Elasticity of Substitution and Technology-Enabled Elasticities?
  - Demand response (or shifting of electricity consumption away from on-peak hours)
  - Conservation effects (or reduction in electricity consumption, regardless of when used)
  - What did the smart meter pilots tell us? What can we expect in terms of overall Province-wide impacts?

- ✓ The overall ROI from Ontario's smart metering initiative will ultimately have to be "nurtured" through complementary initiatives and activities.

The Current State of Play – Progress, Issues and Challenges

- ✓ What other initiatives/programs may be required to help build and nurture a culture of conservation in Ontario?
  - "smarter" prices – the commitment to true-cost pricing must not evolve into one of rhetoric rather than substance
  - incentives to encourage increased utilization of passive load-control devices
  - additional awareness/education initiatives
  - "call to action" bill presentment/smart meters web interface presentment
  - new energy efficiency and/or fuel switching initiatives
  - addressing the conservation and energy efficiency challenges often associated with older multi-residential rental units
  - realizing the opportunities from increased urban intensification (over 170 high-rise condominium projects are currently under construction or have just been recently completed in Toronto), future energy-related revisions to the Building Code, etc.

The Current State of Play – Progress, Issues and Challenges

- ✓ For LDCs, customer service is now much more than just simply the delivery of safe and reliable electricity to homes and businesses within their respective service territories.

- ✓ With the transition to true-cost pricing and the introduction of smart meters and differential TOU prices, it will increasingly be all about "customer-empowered, customer-centered service" and implementation of best practices in:
    - metering/billing;
    - customer relationship management (CRM) systems and processes; and
    - consumer awareness, education and empowerment.

- ✓ There is no doubt that the expertise, experience and direct interface LDCs have with customers will be critical to the success of Ontario's conservation strategy. These are clear advantages that must not be overlooked going forward.