



Energy Policy in Ontario:

Government, The Electricity Sector and the New Paradigm for Conservation

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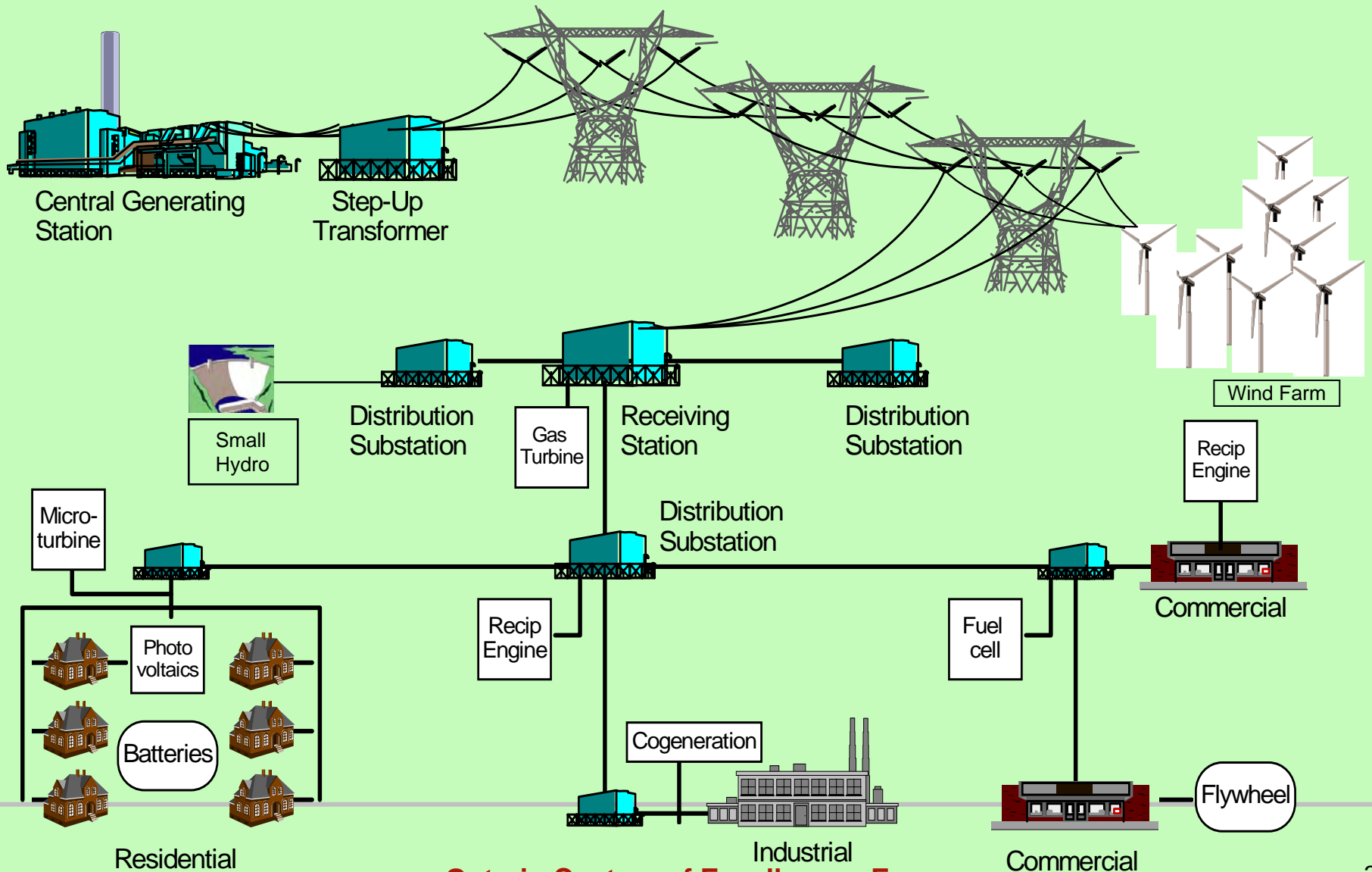
Ontario Centres of Excellence - Energy

Pulling yourself up by your bootstraps

- ◆ **Classic Electric Trolley in Astoria Oregon pulls its own diesel generator. Why is this ironic?**

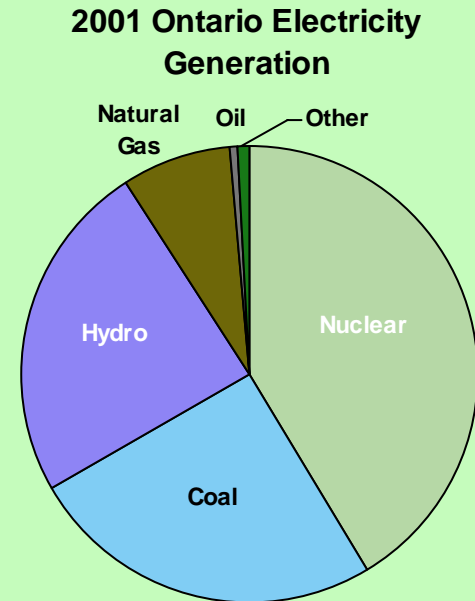


The Emerging Electricity Network



A majority of electricity in Ontario is produced from non-emitting or low-emitting generators, and this share is expected to increase

- ◆ **The Ontario electricity mix is currently approximately 48% nuclear and 25% hydro, with a small but growing component of wind and solar**
- ◆ **The Ontario government is still planning to phase out all coal generation, replaced by efficient combined cycle gas turbines, renewables and conservation.**
- ◆ **Most of the new renewable (or clean) capacity is likely to come from sources such as wind, small hydro, biomass, co-generation and solar. Contributions will also come from technology - based major conservation programs**



Total Generation = 152,739 GWh

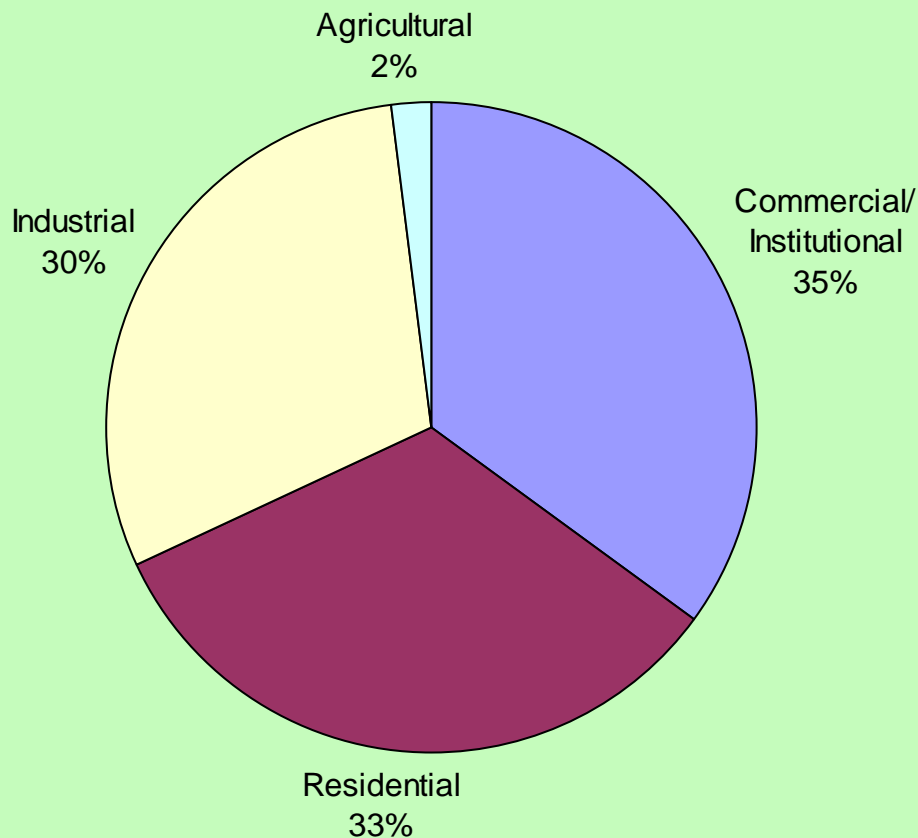


Generation Suppliers in Ontario

	%
◆ Ontario Power Gen	68.5
◆ Bruce Power	21.5
◆ Other Independents	6.1
◆ Self Generation	2.9
◆ Imports/Exports	1.0
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◆ TOTAL	100

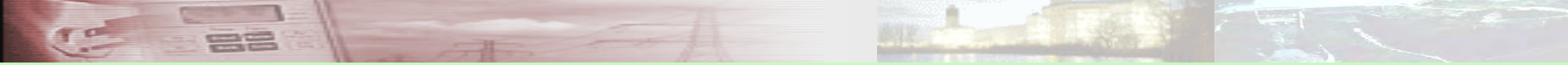
Electricity Use in Ontario

Electricity Use by Major Sector in Ontario



Characteristics of Ontario Electricity Use

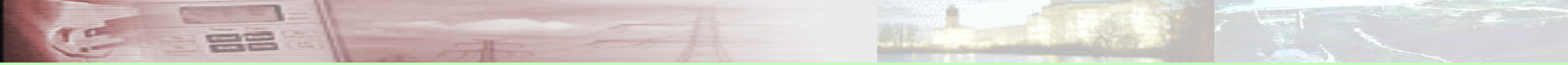
- ◆ Electricity demand is split roughly equally between Industrial, Commercial/Institutional and Residential Sectors.
- ◆ Biggest users include Offices, Retail, Pulp/Paper, Iron/Steel, and Transportation Equipment.
- ◆ Demand growth has been highest in rapidly growing sectors of the economy, notably office and retail space



Current Government Policy

Has focused on...

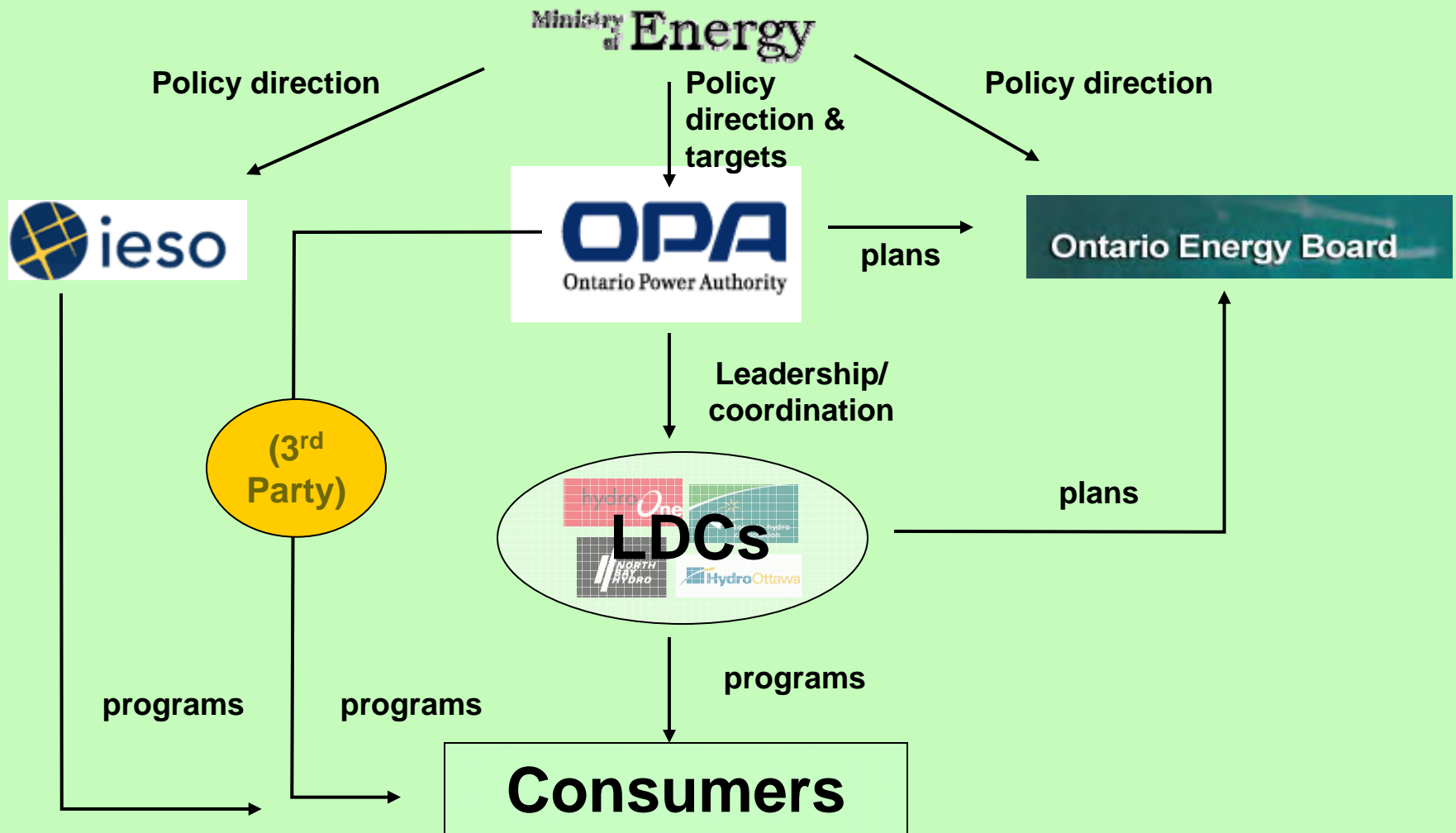
- **Providing government leadership:**
 - Strengthening system planning and establishing a new institutional framework
 - Setting conservation targets
- **Establishing true market price signals:**
 - Pricing that reflects the true cost of generation.
- **Setting up a robust institutional framework:**
 - Placing conservation and generation on equal footing.
 - Building a Conservation Culture

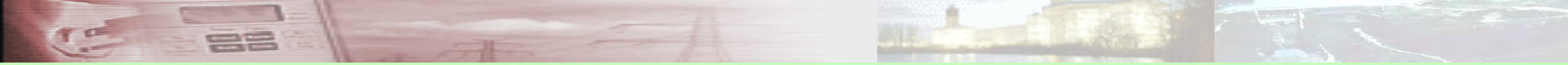


Key Elements of Electricity Sector Reform

- ◆ The creation of a new **Ontario Power Authority**, mandated to ensure an adequate, long-term supply of electricity
- ◆ The creation of a new **Conservation Bureau**, led by the province's first Chief Energy Conservation Officer
- ◆ Provisions that the **Ministry of Energy** will continue to set targets for conservation, renewable energy, and the overall supply mix of supply sources in the electricity sector
- ◆ A redefinition of the role played by the Independent Electricity Market Operator, which has been renamed the **Independent Electricity System Operator**.
- ◆ **Regulated prices** in parts of the electricity sector that will ensure price stability for consumers.

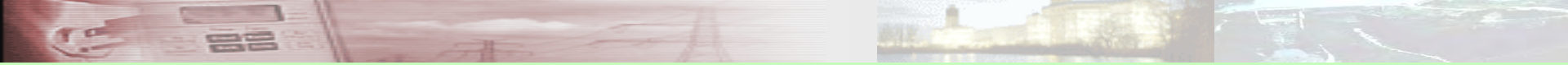
Institutional framework for conservation





Change in Sector Business Model

- ◆ **Business goal for generators will not be to match load but to maximize revenue.**
- ◆ **Formerly, emphasis was on improving generation and transmission technologies.**
- ◆ **This will shift to end-use, consumer based load shifting, clipping and smoothing technologies as well as self-generation.**
- ◆ **Continuous efficiency and performance improvements of existing capital assets will become essential to business strategies.**
- ◆ **The ability to dispatch unessential loads on demand will provide a revenue stream to large users**




Business Case for On-site Peak Shaving, Shifting and/or Cogeneration

- ◆ **With time-of-use rates LOAD PROFILE will become the most important determinant of electricity costs for larger users; industries or commercial users with significant ‘on peak’ loads will implement price risk management measures such as tailored supply contracts, conservation, DSM and co-gen.**
- ◆ **Formerly, emphasis was on improving efficiency of on-site energy use via local generation and subsequent ‘pay-back’ period.**
- ◆ **This will shift to a risk management decision where local generation will be one of the key tools in managing electricity price risk.**
- ◆ **The pay-back period will take a back seat to risk avoidance as the major driver, with the business option of selling back to the grid.**
- ◆ **The drivers of environmental compliance and emissions trading will also have increasing importance.**



Government Energy Targets and Commitments

- **Replace coal-fired electricity generation with cleaner generation and conservation**
- **Add 5 per cent (1,350 MW) new renewable capacity by 2007; 10 per cent by 2010**
- **Reduce energy consumption by government operations by 10 per cent by 2007**
- **Implement smart meters – 800,000 by 2007; all homes and small business by 2010**
- **Reduce projected peak electricity demand by 5 per cent by 2007**



Energy Minister's Directive Integrated Power System Plan (IPSP)

- Increase the goal for total peak demand reduction from conservation by 2025 is **6,300 MW** (an additional 3,600 MW).
- The plan should assume conservation includes continued use by the government of mechanisms such as energy efficiency standards under the *Energy Efficiency Act* and the Ontario Building Code.
- Additional load reduction from: geothermal, solar thermal, fuel-switching, small-scale customer generation.



Ontario Energy Supply Capacity Mix

SUPPLY MIX 2005

- Nuclear 14,000 Mwe
- Renewables 7,885 MWe
- **Coal 6,434 MWe**
- Natural Gas and CoGen 4,976 MWe
- **Conservation 675 MWe**

SUPPLY MIX 2025

- Nuclear 14,000 Mwe
- Renewables 15,700 MWe
- Natural Gas and CoGen 9,400
- **Conservation 6,300 MWe**



Where will the power come from ?

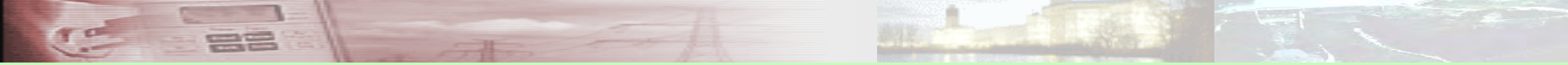
- ◆ Base load hydro and nuclear will remain the 'legacy' foundation of the Ontario supply (approx 75%) in the near term.
- ◆ New generation will come from many sources via the existing wholesale market and from various OPA long-term supply agreements (through RFPs)
- ◆ Most of the new supply in the near-term will be from gas-fired combined cycle, refurbished nuclear and from major DR/DSM
- ◆ Longer term supply will be from new nuclear and renewables (or clean energy) such as significant inclusion of wind, new hydro, biomass, solar and Distributed Generation at the industrial, commercial and residential levels.
- ◆ Target is 10% of supply from DSM/EE by 2010
- ◆ Renewable energy (wind) also 10% by 2010
- ◆ NO MORE COAL (?) after 2011.



Directives to the Conservation Bureau

- **500 MW DSM and DR across Ontario**
- **100 MW DSM - low income/social housing**
- **100 MW DSM – appliance exchange & efficient lighting**
- **300 MW DSM – Toronto specific (and GTA)**
- **150 MW DSM - MUSH sector**
- **150 MW DSM - Residential Sector**

1,300 MW of Targeted Demand Reductions have been issued - prior to the development of the IPSP – plus an additional 1,000 MWe directive for cogeneration projects.



Conservation: The Old Paradigm

- **Depended heavily on changes in human behaviour and good intentions. Sometimes worked but not for long.**
- **Was very difficult to quantify real savings and determine the cost; often cost was minimal but also not always economic.**
- **Often confused with actual energy constraints (which led to deprivation, discomfort & lower productivity)**
- **Often applied during times of system duress, then discontinued when constraints no longer challenging.**
- **Generally not taken seriously by system planners as part of the future supply mix.**



Conservation: the NEW paradigm

- **No longer linked to human behaviour, although voluntary measures still important at the residential level**
- **Depends heavily on ‘hard wired’ technology solutions such as advanced cooling/heating, advanced lighting systems, improved industrial processes, high efficiency motors, advanced building controls, self-generation etc.**
- **Has become an integral part of planning for future energy supply, where the cost is demonstrably less than cost of new generation.**
- **Will no longer be a reaction to constraint, but rather a cultural shift reflecting the rising cost of electricity production**
- **Is taken very seriously by industry, the commercial sector and the public at large.**

Typical Conservation Programs: Effectiveness and Timing

Program	Short Term	Long Term	Cost Effectiveness
Peak Reduction (Peak Saver)	Yes	Yes	High
Rebate for Reduction (10/10)	Yes	No	Medium
Beer Fridge Buy Back	Yes	Yes	Medium
New Appliance Rebates	Yes	Yes	Medium
Re-Lamping Programs & Retrofits	Yes	Yes	High
AC and chiller replacements	Yes	Yes	High
Home Audits and Rebates	No	Yes	Low
Building Audits and Rebates	No	Yes	High
Industrial Process Improvements	Yes	Yes/no	High
Door to Door Campaigns	Yes	Yes	Low
Codes and Standards	No	Yes	High



What Constitutes Conservation?

CAN BE ALL OF THE FOLLOWING:

- ◆ **Load Reduction**
- ◆ **Peak Shifting and Reduction**
- ◆ **Demand Response**
- ◆ **Energy Efficiency Improvements**

CAN ALSO INCLUDE THE FOLLOWING

- ◆ **Behind the Meter Self-Generation**
 - ◆ **Ground Source Heat Pumps**
 - ◆ **Solar (thermal and photovoltaic)**
 - ◆ **Wind, micro hydro or Biomass**
 - ◆ **Clean micro CHP**

Distributed Energy Technologies

- ◆ Wind Turbines
- ◆ Micro-turbines
- ◆ Recip. Engines
- ◆ Gas Turbines
- ◆ ORC Devices
- ◆ Mini-Hydro
- ◆ Fuel Cells
- ◆ PV-Solar
- ◆ Biomass Conversion
- ◆ On-site Energy Storage

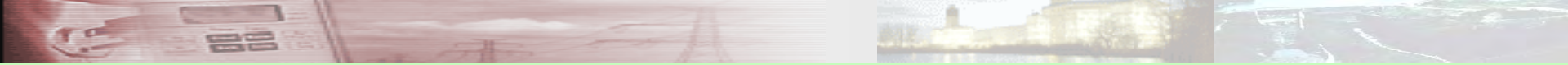




What is Distributed Generation ?

- ◆ **Distributed Generation (DG) - small-scale, modular, power generation units located close to where the energy is used.**

- ◆ **Drivers:**
 - ↙ **Electricity Price Volatility and Risk**
 - ↙ **Environmental Concerns**
 - ↙ **New Power Market Entrants**
 - ↙ **Higher Efficiency / Cogeneration**
 - ↙ **Power Quality & Reliability**
 - ↙ **Technology Development**



Building a Conservation Culture: Business Opportunity

- Last year \$400M (over 3 years) was directed to CDM activities by LDCs and to be coordinated by the OPA.
- Directives to the OPA for 1,300 MW of new conservation initiatives, and authorizing spending of up to \$1.5 billion
- Energy Conservation Responsibility Act to encourage conservation leadership by the public sector and to enable implementation of smart meters in Ontario.
- Net metering Regulation in place to enable customers who generate their own renewable electricity to receive credit for power sent to the grid.
- Standard offer for Renewable Energy (42 cents solar, 11 cents other) followed by Clean Co-Gen Standard Offer
- An approved IPSP releases even more funding to meet 3,600 MWe conservation target and new renewables supply.

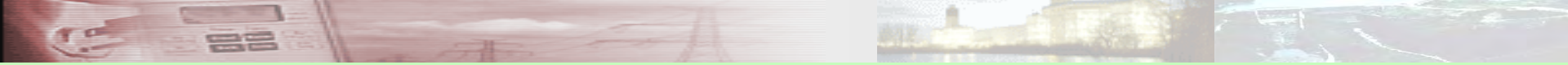


Ontario Community Conservation Initiative

- The purpose of the fund is to support grass-roots based conservation outreach, education and incubation projects, including small-scale renewable energy projects.
- Recipients are typically non-governmental organizations, community groups, school groups, small municipalities
- The funding limit per project is \$50,000

STATUS

- This is the second year for the fund and the budget was increased to \$1,500,000 from \$750,000 last year.
- 31 projects were selected for funding. All have a completion date of March 31, 2008
 - 13 Residential Outreach
 - 10 Schools/Education
 - 4 Renewables
 - 4 Small Business

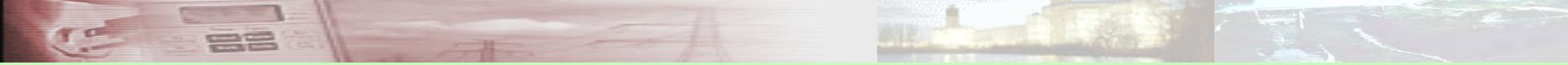


Home Energy Audit and Retrofit Programs

- Financial grants are offered to homeowners to assist with the cost of completing an energy audit of their home. Grants are also offered to assist with the cost of undertaking conservation retrofit measures recommended as a result of the audit.
- The audit program (a four-year \$24 million program ending March 31, 2011) was announced on March 22nd in Budget 2007. The Premier announced the retrofit program (a five-year \$88 million program ending March 31, 2012) on June 20, 2007. The programs are closely aligned to a similar federal program called ecoENERGY – Home Retrofit.
- One-half (to a maximum of \$150) of the cost of the pre-retrofit audit is paid. Ontario provides no assistance for the post-retrofit audit. Detached, attached and low-rise (3 storeys or less) residential properties are eligible. Grants for conservation measures vary in amount. The federal government matches Ontario's grant amounts. On average, retrofitted homes lower their energy consumption by 30 per cent and reduce household greenhouse gas emissions by 2-4 tonnes annually.

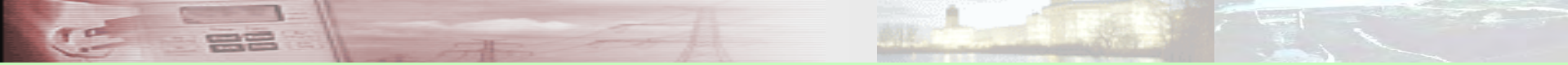
STATUS

- FAQs and instructions on how to participate in the programs are posted on the Ministry's web site. Training and information materials have been provided to INFO hotline the Ministry's call centre. In October, there were 1,000 calls on the program (70 per cent of the monthly volume of calls handled by the centre).



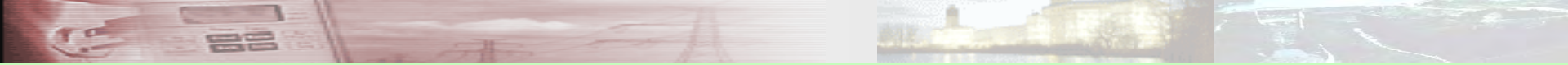
Ontario Solar Thermal Heating Incentive – Industrial, Commercial and Institutional (ICI)

- On June 20, 2007, the Premier announced several initiatives intended to encourage Ontarians to adopt solar technologies and other renewable and energy efficient products. The key ICI initiative is the Ontario Solar Thermal Heating Incentive (OSTHI).
- OSTHI is a proposed program (over four years), to encourage the ICI sector to convert to solar thermal heating. Ontario businesses, industries, schools, universities, municipalities and hospitals would receive 25 per cent of the cost of the installation of a solar thermal heating system (i.e. water or air) up to a maximum of \$80,000. The program is linked to the federal government's ecoENERGY Renewable Heat Program (managed by NRCan), which also provides a contribution of 25 per cent to a maximum of \$80,000.
- To avoid duplication of administration, Ontario directs applicants in the province to follow the NRCan eligibility process and program guidelines. Qualifying applicants will be eligible for the Ontario incentive if they contracted with NRCan after June 20, 2007.



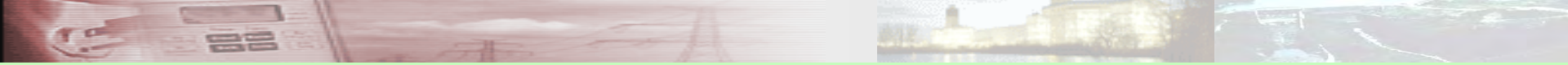
Proposed Municipal Eco Challenge Fund

- On June 13, 2007, the Ontario government announced it would provide \$200 million in loans and \$20 million in grants to help municipalities reduce greenhouse gas emissions
- The public sector must be seen as leaders in environmental stewardship. This new \$20-million proposed grant program provides an opportunity for the province to collaborate directly with municipalities to make significant reductions in greenhouse gas emissions and energy consumption
- Infrastructure Ontario would also provide \$200 million worth of affordable loans for municipal capital projects that reduce greenhouse gas emissions through the province's low-cost OSIFA Loan Program



Proposed Credit for Consumers of 100% Renewable Energy Retailers

- On May 20, 2007 the Premier announced that the government would be developing a program with Ontario's green energy retailers that helps Ontarians purchase 100 per cent green power.
- Green energy retailers would receive funds in the form of grants based on meeting certain eligibility criteria that would screen for newer renewable electricity that is sold to residential customers.
- The proposed program would allow the province to demonstrate its commitment to the retail residential green electricity market, provide a secondary method to increasing renewables in the province, and signal government support to customers that purchase green electricity.



The Proposed PowerHouse Renewable Energy Technologies Funding Program

- The Program was announced by the Premier on June 20, 2007, as a “Pilot Financing for Residential Renewable Energy” program.
- The Ministry of Energy, through its partners Hydro One Networks and Enersource Hydro Mississauga (the LDCs) would facilitate the financing of residential renewable technologies (solar dhw, pv, wind, geothermal), by “buying down” the interest portion of a customer’s monthly financing payments to 0%.
- This is a two year proposed pilot project that would end March 31, 2009.

CONCLUSION: Conservation & Demand Management success depends on applications of New Technology



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