ONTARIO POWER AUTHORITY

Sept 22, 2008

Presentation to the Smart Grid Forum

Distributed Energy

September 22, 2008

Presentation Overview

- Ontario Government's commitment to renewable and clean energy
- Development of OPA programs for small scale and distributed energy generation
  - Renewable Energy Standard Offer Program (RESOP)
  - Clean Energy Standard Offer Program (CESOP)
- Lessons Learned

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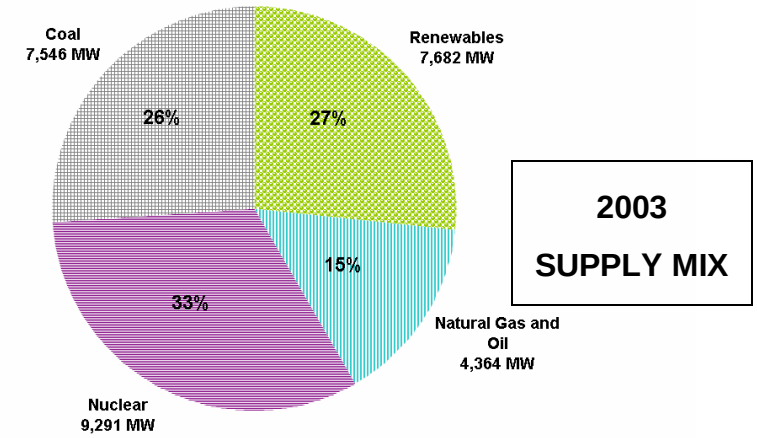
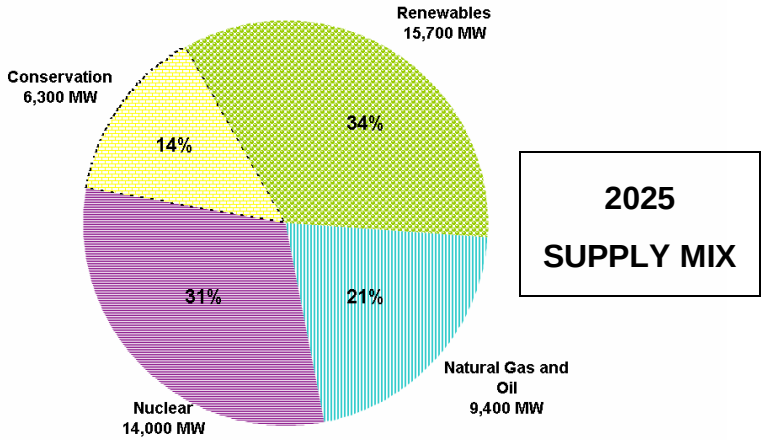
Supply Mix in Ontario

- Renewable Energy…
  - Involves electricity generation using environmentally-sustainable resources
  - Supports the replacement of coal-fired generation
  - Reduces Ontario's contributions to climate change and other air emissions
- Finding clean, affordable and sustainable sources of electricity is a top priority of the Ontario Government
- Through the Integrated Power System Plan (IPSP), the province is committed to doubling renewable energy capacity by 2025





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Renewable Energy Standard Offer Program

RESOP:

- Launched November 2006
- Program is designed to encourage smaller distribution connected renewable energy projects (< = to10MW)
- Balance renewable targets with value of electricity to ratepayers

Program Payments:

- Wind, Biomass and Waterpower @ $110 / MWh
- On-Peak performance incentive $35 / MWh
  - Available for biomass and waterpower only
- Payments for Solar PV @ $420 / MWh
  - Not eligible for inflation increases or on-peak performance
  - Price discovery, to incent 'early adopters'

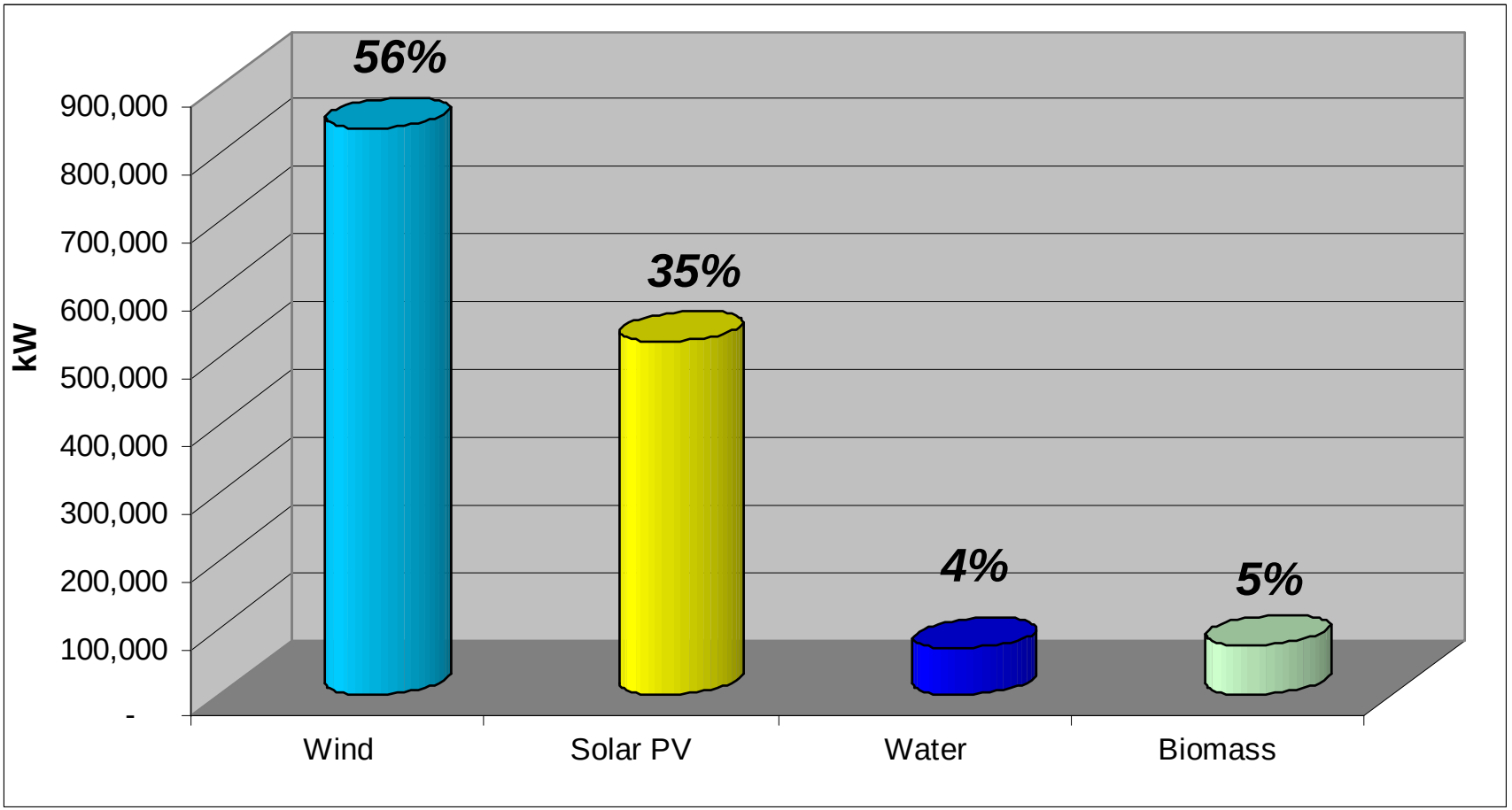
RESOP Background

- RESOP pricing was derived:
  - competitive RFP pricing results, plus
  - adder for lost economies of scale, and
  - Adder for assumed transmission loss reduction
  - For price discovery for PV projects at $420 / MWh

- Connection policies (OEB)
  - Generation can be connected up to minimum feeder load plus reverse flow up to 60% TS capacity
  - Connection queue rules are “first-come first-served”

RESOP Results To Date

- Total capacity of RESOP Contracts per fuel source (August 31, 2008)



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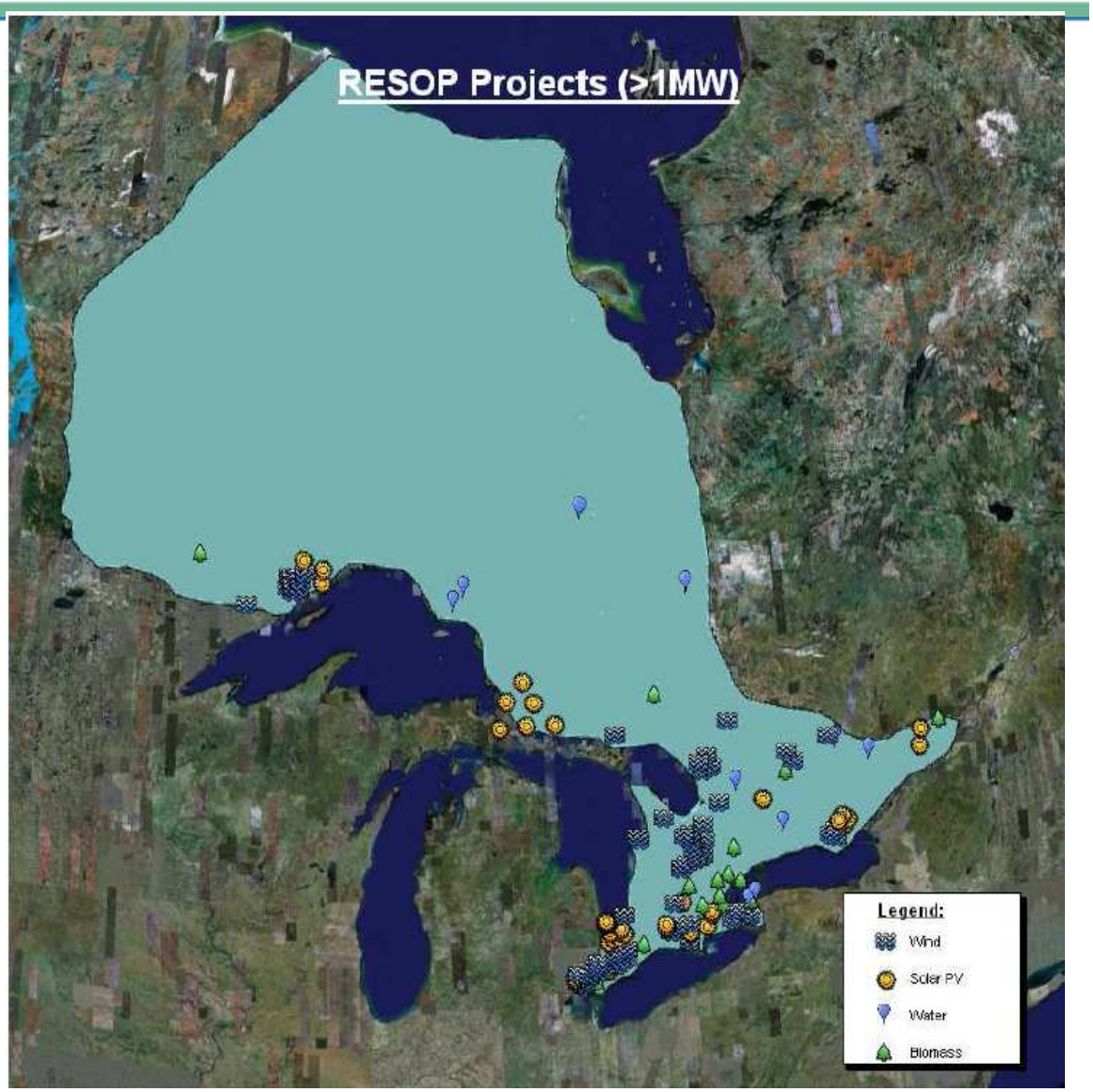
Location of RESOP Projects in Ontario

	Contract Capacity
Wind	748 MW
Solar PV	420 MW
Biomass	67MW
Water	66MW

May 2008 Data



Source: http://www.powerauthority.on.ca/SOP/Storage/70/6543_RESOP_Background_May13_2008.pdf

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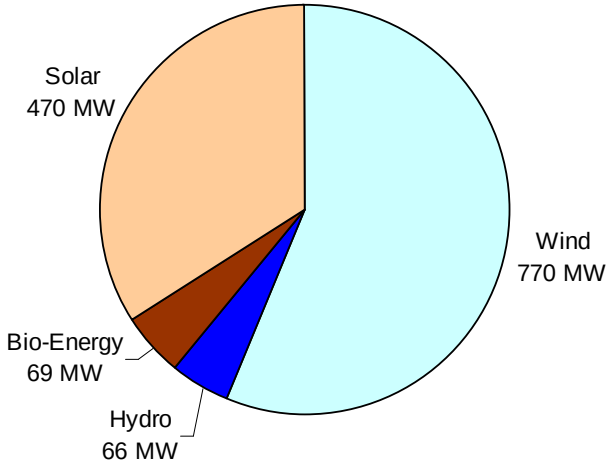
RESOP Challenges

- There is a high concentration of project ownership amongst developers
- Developers are breaking up larger projects to qualify for the program
- The distribution system (and in some cases the Tx) has limited capacity
  - first-come first served approach created race for the queue
- There is no requirement to move the project forward prior to 3-year in-service window

RESOP program overview
(10 regional zones in Ontario)



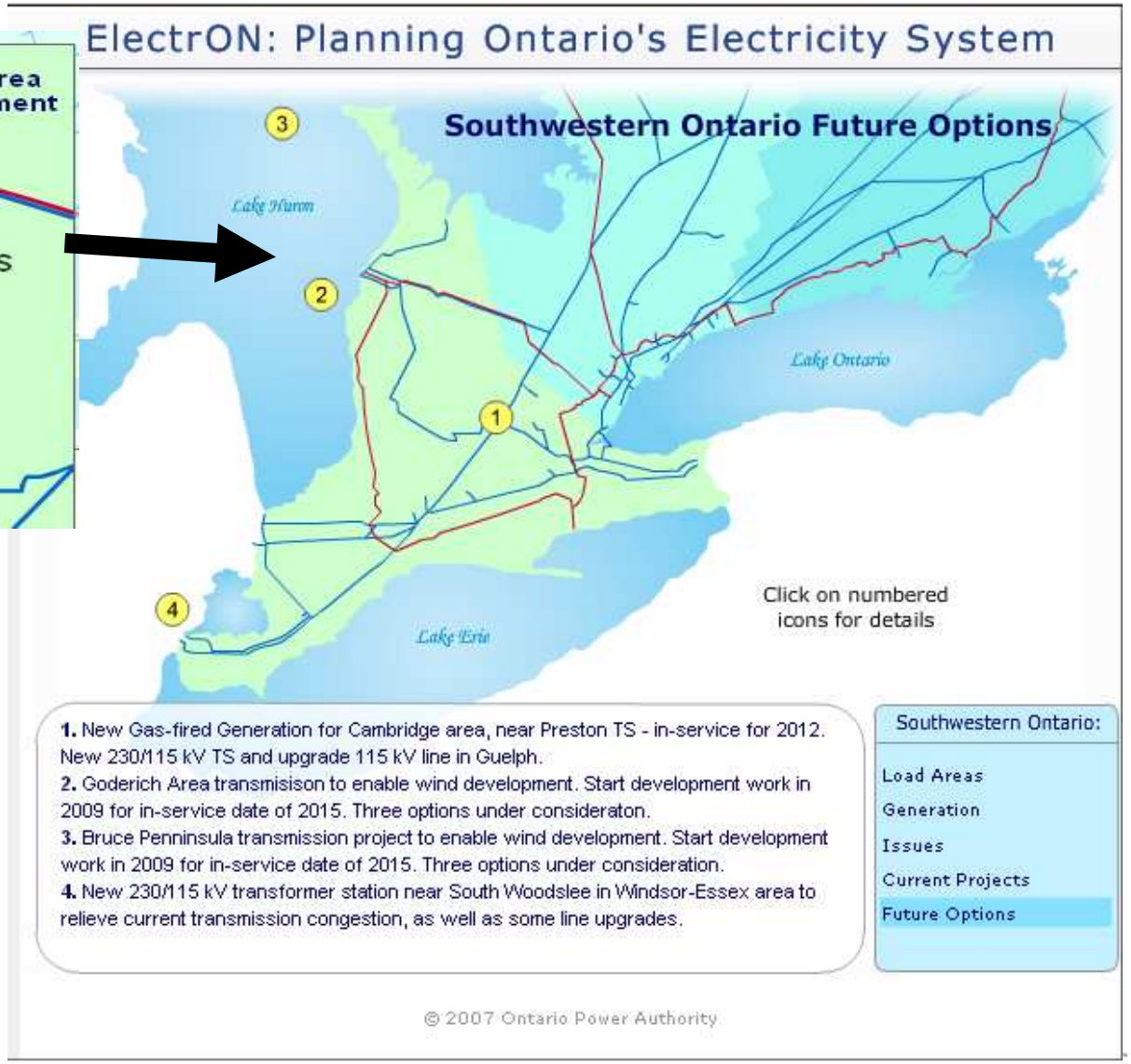
West →

Zone	MW	% of Total MW	# of Contracts	% of Total Contracts
Northwest	153	11%	21	6%
Northeast	94	7%	15	4%
West	581	42%	80	24%
Southwest	214	16%	54	16%
Bruce	38	3%	7	2%
Essa	89	6%	19	6%
Toronto	11	1%	73	22%
Niagara	47	3%	10	3%
East	147	11%	54	16%
Ottawa	1	0%	1	0%
Total	1,375	100%	334	100%

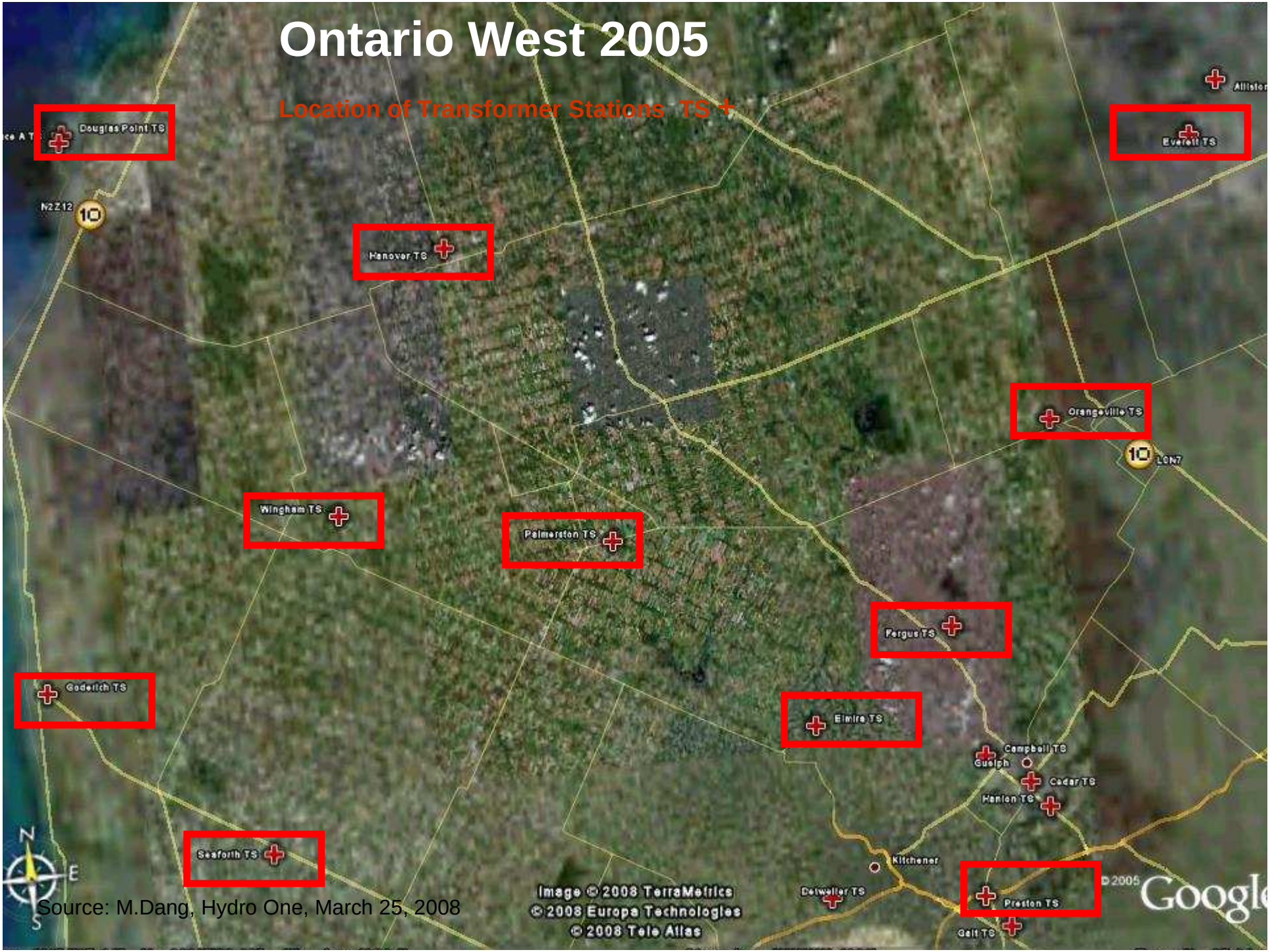
Source: http://www.powerauthority.on.ca/SOP/Storage/70/6543_RESOP_Background_May13_2008.pdf

Renewable Energy Integration – Southwestern Ontario

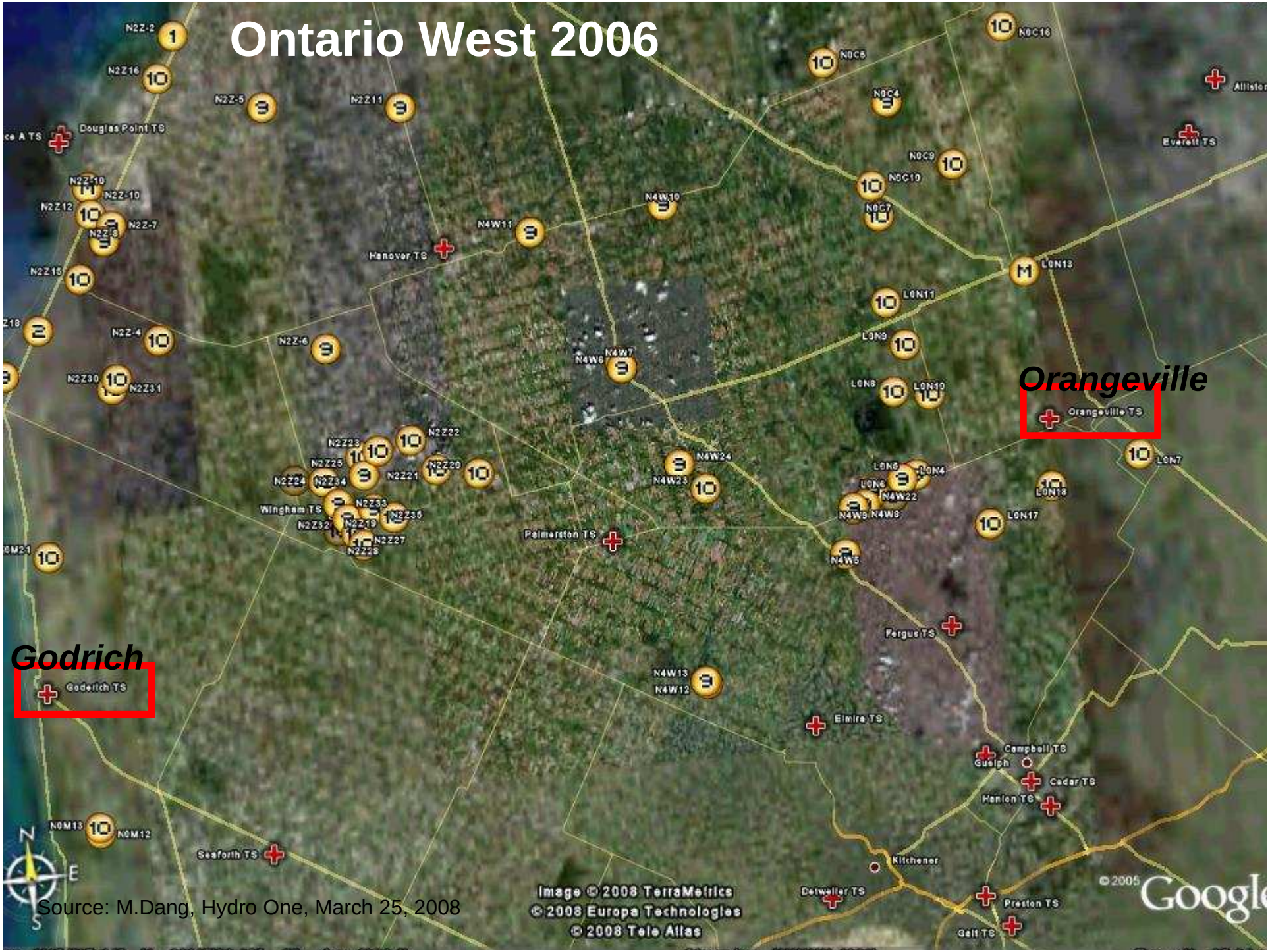
****Bruce Penninsula wind potential is 380 MW + Goderich area has wind potential of 429 MW. T&D infrastructure required.**



Ontario West 2005



Source: M.Dang, Hydro One, March 25, 2008


Ontario West 2006
Orangeville
Godrich
Source: M.Dang, Hydro One, March 25, 2008
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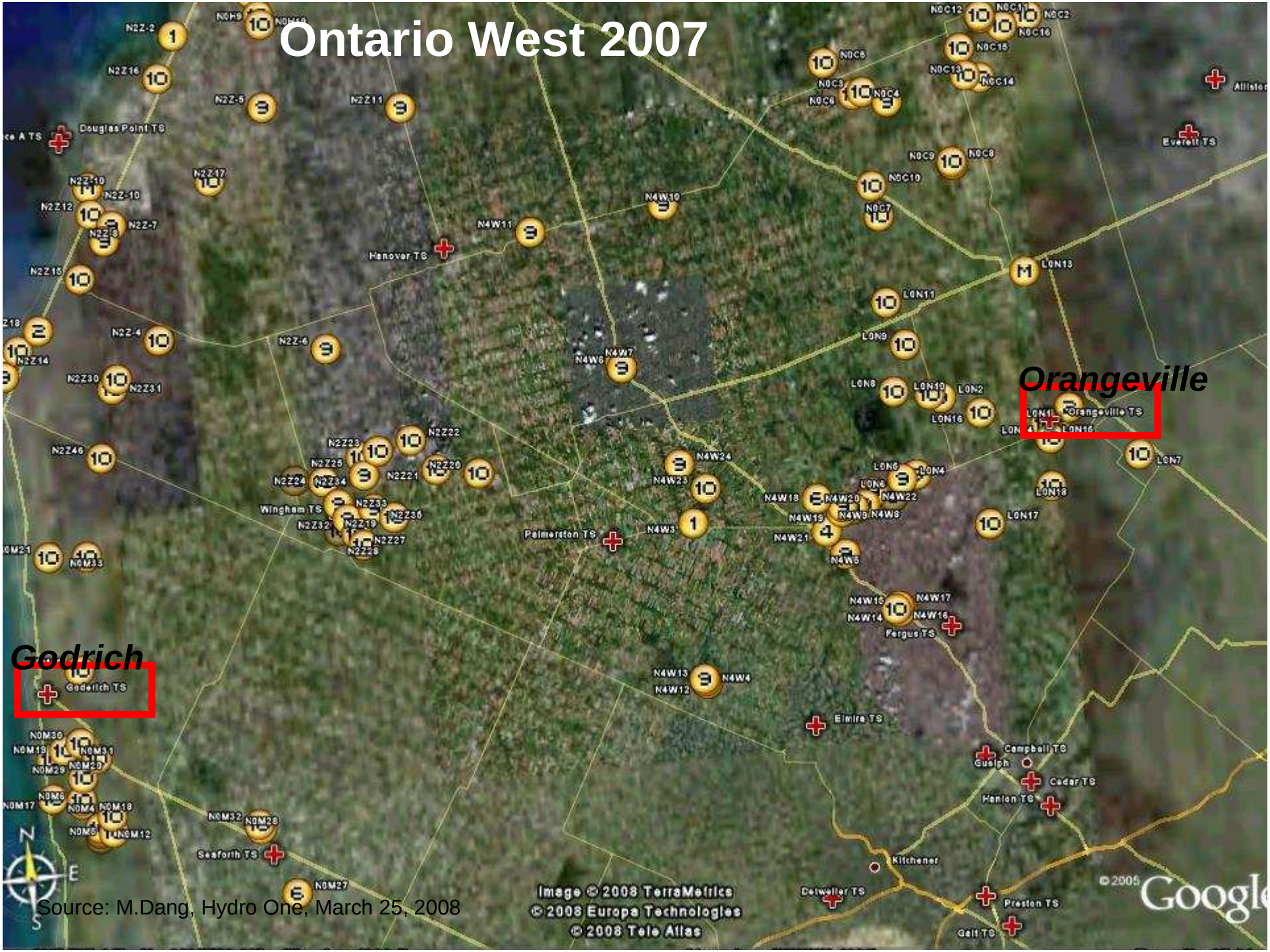
Ontario West 2007
Orangeville
Godrich
Source: M.Dang, Hydro One, March 25, 2008
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Orangeville TS - Hydro One red line (approx. 80MW RESOP contracts and queue of approx. 150MW)

Orangeville TS DESN 2				
Acceptable Generation = 80.8 MW				
Station Queue Position	**M4 - (A)**	**M2 - (A)**	**M3**	**M1**
1	153a (9 MW)			
2	153b (9 MW)			
3		154 (10 MW)		
4	6b (9 MW)			
5		36 (9 MW)		
6		51 (9.9 MW)		
CIA pending		116 (3.5 MW)		
CIA pending		117 (9.9 MW)		
CIA pending		118 (9.9 MW)		
CIA pending		119 (9.9 MW)		
CIA pending		257 (9 MW)		
CIA pending		258 (9 MW)		
CIA pending		158 (9.9 MW)		
CIA pending		459 (10 MW)		
CIA pending		460 (10 MW)		
CIA pending		461 (10 MW)		
CIA pending		226 (9.9 MW)		
CIA pending		227 (9.9 MW)		
CIA pending		525 (10 MW)		
CIA pending		673 (9.9 MW)		
CIA pending			894(10 MW)	
CIA pending				1717 (10 MW)

Source: Hydro One Distribution Generation Connections Application List, June 2008

RESOP Challenges

- Demand for RESOP far exceeds opportunities to connect on distribution systems
- The current approach to distribution system policies and distribution system management never anticipated significant generation
- Need to reassess whether we want significant amounts of generation on distribution, and what type or mix of generation

Renewable Energy Standard Offer Program

- RESOP is fundamentally a scaled down Feed-in-Tariff procurement approach, with no limits and no policy preference for generation type, based on:
  - Customer-based or retail generator
  - Production profile
  - Other government policy priorities

- RESOP is not a DG / DE program, however DG / DE is “coincidentally” eligible

Clean Energy Standard Offer Program

- OPA directed to develop CESOP for small clean generators connected to distribution
- Same eligibility principles as RESOP

- Eligible fuel types:
  - Natural gas fired combined heat & power (CHP)
  - By-product fuel-fired generation
    - Industrial or manufacturing by-products
  - Under-utilized energy generation project (including waste thermal or mechanical energy)

CESOP – Payments

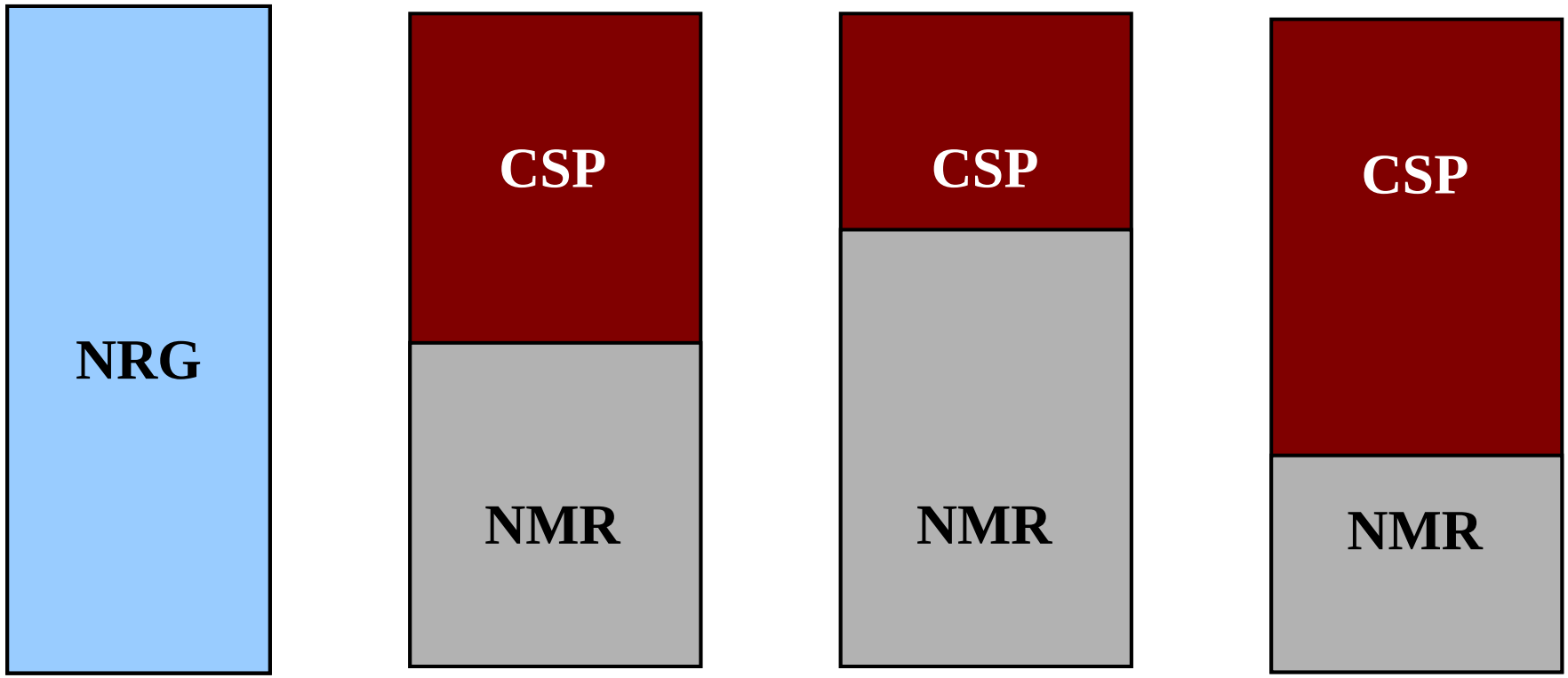
- **Current recommendation**: capacity payment derived from capacity value of CCGT

- CHP value seen as combination of
  - avoided cost of the ***marginal capacity*** it replaces/displaces (i.e. CCGT), *plus*
  - adjustments for differences in attributes between CESOP and larger scale CCGT generation

CESOP

- For natural gas fire CHP settlement, OPA uses deemed dispatch approach to promote economic efficiency of dispatch:
  - hours between 7 am and 11 pm weekdays (5x16) are considered for deemed operation
  - each month the deemed operation of the reference facility will be calculated
  - Generator payment will be total capacity payment minus assumed operation and gas/electric spark spread market revenue of reference facility

CSP to Gx = NRG (fixed) minus NMR (deemed)



CSP (paid from OPA to actual physical generators) = [NRG (fixed capacity payment)] – [NMR (revenues that OPA deems would have been earned by the reference facility]

CESOP – Payments

- Market prices are inadequate to attract investment
- CESOP payment comprise four components

	Post 2005 Facilities	New Facilities	
Value Element	2009 $/MW-year	2009 $/MW-year	Percent Change
Capacity Value	$106,805	$138,091	29%
Net Market Revenue	$62,373	$49,395	-21%
Avoided Transmission Losses	$17,035	$14,134	-17%
Avoided Transmission Investment	$5,423	$5,423	0%
Total Value	$191,637	$207,044	8%

CESOP Pricing Derivation

- Note in previous table of assumed value from:
  - Avoided transmission losses
  - Avoided transmission investment
- Levels of assumed value derived with Navigant Consulting Inc. and their analysis on quantifying DG benefits
- CESOP CHP has requirement that projects maintain electric and thermal host energy utilization
- Provides greater assurance that CESOP will encourage true DG projects

Other CESOP Projects

- **By-Product Fuel-Fired/Under-utilized Energy Projects**
  - By-products of industrial or manufacturing processes used as fuels
  - otherwise wasted thermal or mechanical energy\
  - Will be offered fixed price contracts:
    - don't have NG fuel price risk;
    - costs largely fixed once built
  - Higher incentive during weekday days (7 am to 11 pm)

CESOP - Power Purchase Agreements

- Similar valuation exercise for PPA projects, based on different representative facility assumptions.

- Converted from capacity payment into energy payment
  - Average energy value ($2009) = $81 / MWh

- To promote generation during peak times (5 X 16)
  - On-peak $117 / MWh
  - Off-peak rates $51 / MWh

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RESOP Path Forward

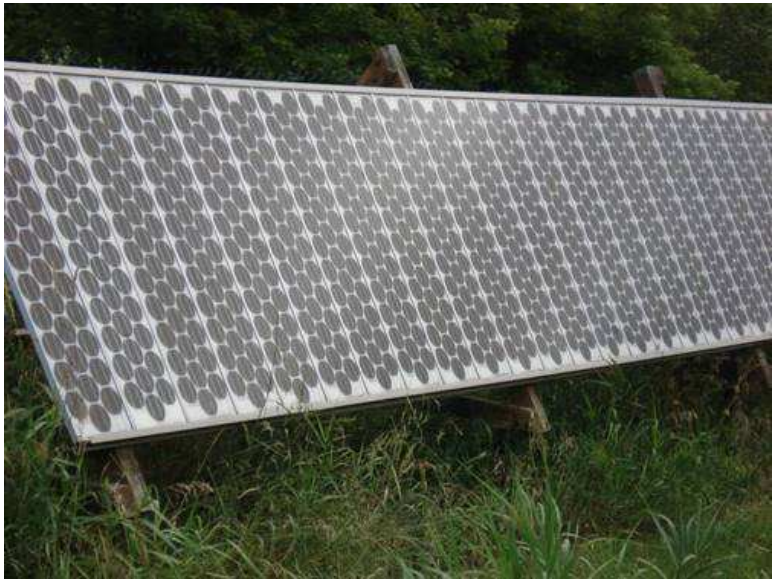
- Two–year review commenced in 2008, as per program design
  - Significant input was received from stakeholders through technical sessions

- Stakeholder comments included:
  - The need for a long-term Provincial solar PV strategy
  - The need to recognize the inherent delays in waterpower projects
  - There has been a limited response from biomass
  - Consider grandfathering mature projects under old rules

RESOP Next Steps

- The draft rules for the re-launch of the RESOP will be shared in Fall 2008

- Proposed changes should be aligned with the Government's policy priorities for renewable energy in Ontario.



CESOP Next Steps

- Continued stakeholders engagement
- Development of gas price risk mitigation approach
- Fall 2008, rules will be available for comment
- Program is expected to be launched later this Fall 2008
- We anticipate a positive industry response

Demand Response Programs

Demand Response 1 – a voluntary demand response program targeting high-value hours for load curtailment. This program is triggered on IESO 3 hour pre-dispatch prices

Demand Response 2 – a load shifting program with contractual obligations to shift load into the off-peak on a predefined schedule

Demand Response 3 – a demand response program with contractual obligations to reduce load during certain periods of the year. The program contracts for availability and dispatches 100 or 200 hours annually based on supply cushion targets.

peaksaver® - a residential and small commercial (< 50 kW) program targeting air conditioning at peak times.

Industrial Energy Efficiency Program

Customized, holistic approach unique to each organization

- Not limited to a single system -- a broader approach captures more savings.

Financial incentive available for energy reductions

- Five cent per kilowatt-hour incentive available for energy reductions, to a maximum of 50% of project costs.

Monitoring and targeting to help find savings

- Up to $75,000 is available to monitor electricity consumption

Support for an energy manager

- Will provide up to 80% of the cost for an energy manager up to $100,000 per year for one, two or three years

Support for energy assessment and feasibility studies

- Up to $10,000 is available for an energy assessment to uncover opportunities, up to $50,000 for a more detailed feasibility study

For Additional Information

- OPA Standard Offer Program Website: **www.powerauthority.on.ca/sop**
- OEB Website: **http://www.oeb.gov.on.ca** for more information on connections and queuing
- Questions?