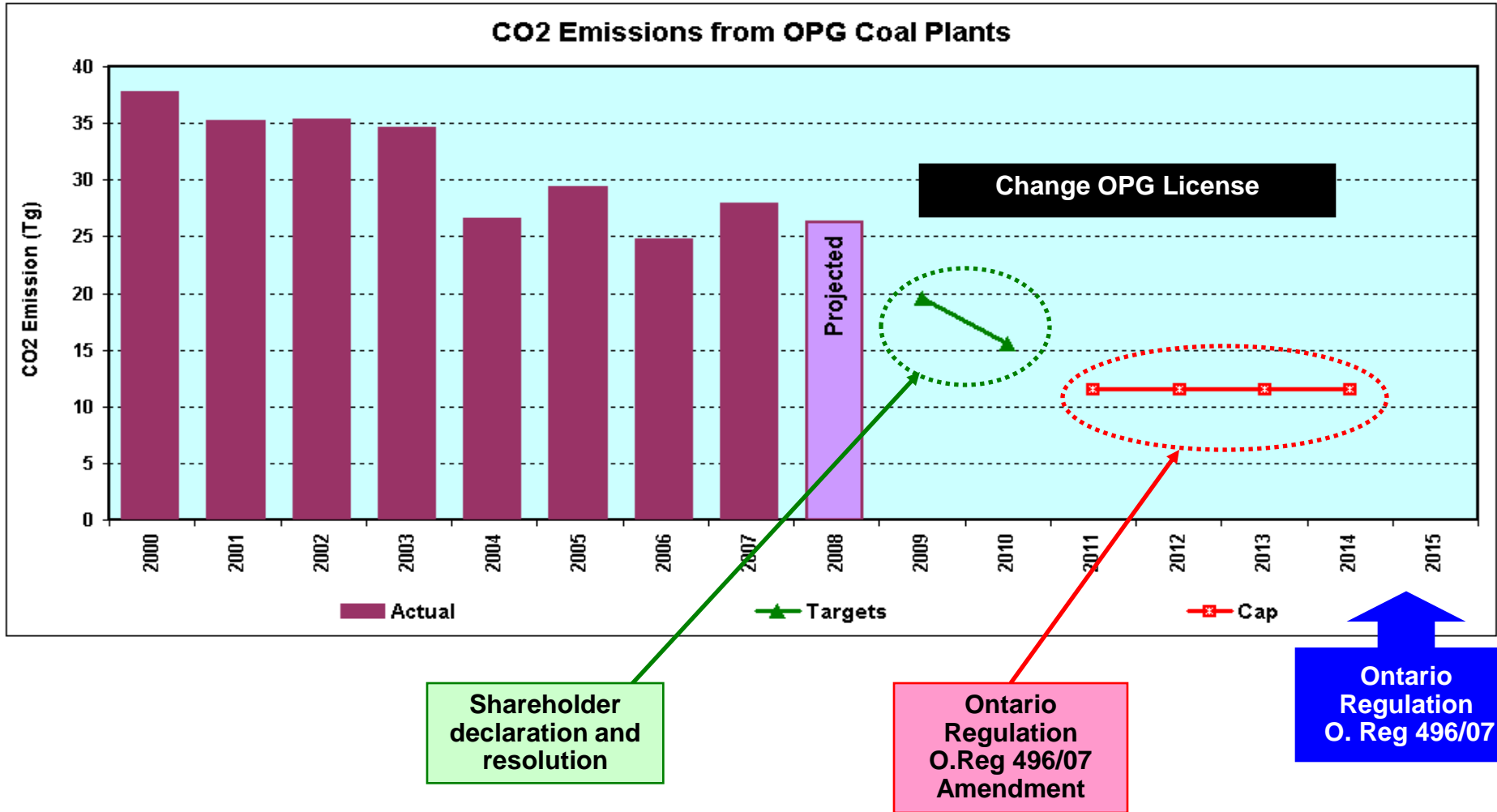


Implications of Phasing Out Coal for HOEP under Current Pricing Rules

Market Price Working Group
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Ontario Government CO2 Emission Targets for OPG Coal Plants



Key Documents

1. Ontario Regulation 496/07 (O. Reg 496/07)
 - O.Reg. 496/07 requires the owner and operator of the Atikokan, Lambton, Nanticoke and Thunder Bay generating stations to cease using coal as of December 31, 2014.
2. Ontario Government's Shareholder Declaration (dated May 15, 2008) and Resolution dated (May 16, 2008)
 - CO2 emissions arising from the use of coal at coal-fired generation stations will be constrained
 - Target on forecast basis for 2009 19.6 megatonnes of CO2
 - Target on forecast basis for 2010 15.6 megatonnes of CO2
3. Amendment to O. Reg 496/07 (proposed)
 - specifying that as of January 1, 2011, the four generating stations subject to the regulation shall ensure that the generating stations do not collectively emit more than 11.5 megatonnes of carbon dioxide from the use of coal in any calendar year (i.e. hard cap)
4. Directive to OEB to change OPG License conditions
 - allows OPG to offer less than maximum available amount of any category of operating reserve (i.e. not required to offer all available capacity)

Major Supply Trends in Ontario: 2009-2015

- Baseload energy supply is increasing faster than off-peak demand in Ontario.
 - Wind, Niagara Tunnel, return of 2 Bruce A units.
- Gas-fired capacity is building up to replace coal.
- Ontario Government resolutions and regulations lead to the phase out of coal-fired energy by 2015. To meet the emission targets from 2009-2014, part of OPG's strategy is to apply CO₂ emission adders to its coal-fired offers.
 - Reduces exports from Ontario (mainly off-peak).
 - Raises imports to Ontario (increasingly off-peak).
- Participation in WCI from 2012 onwards would also involve emission adders.
 - As WCI covers all GHGs produced in the electric sector, natural gas-fired generation would also require allowances.
- If the US Midwest is not subject to similar GHG emission targets, its coal-fired generation will become increasingly competitive in the Ontario market.
 - Under these conditions, there will be pressure to apply carbon costs to imports to address leakage issues.

Relationship between the Intertie Pricing Issue and CO₂ Emission Limits

- The IESO pricing diagrams illustrate the significant discontinuity between baseload offers and the next lamination up in the Ontario stack as emission adders are applied.
 - In 2009, the next lamination above baseload is coal plus an adder. By 2015, it is natural gas-fired generation plus an adder.
 - The absence of imports in the real-time offer curve removes any elasticity in this neighbourhood of the supply curve.
- The major implications are increased volatility in price-setting in real-time and the likelihood that the 5-minute market will on average clear well below the value of imports.
 - If exporters have the opportunity to buy power out of Ontario at near baseload offers in real-time, and that power was sourced out of imports that receive an IOG based on up to predispatch prices, this creates a large inefficiency in the Ontario electricity sector.
- As coal is phased out, OPG expects the frequency of hours where price is set with baseload at the margin in Ontario to increase significantly.
 - Currently, baseload sets price rarely (though it has noticeably increased this year).
 - When coal is no longer used as a fuel in Ontario, OPG modeling suggests baseload offers will be at the margin in real-time over half of the hours of the year, mostly off-peak. Ontario is expected to be a net importer in about half of those hours.
- As emission limits increasingly restrict coal generation in Ontario, the ‘imports don’t set price’ issue will grow from being relatively inconsequential to a major distortion of HOEP.

A Hypothetical Example: No Coal in Ontario

	Imports Don't Set Price				
	Off-Peak % at the Margin	Offer Price \$/MWh	On-Peak % at the Margin	Offer Price \$/MWh	Annual Average HOEP \$/MWh
Baseload (hydro)	90%	15	30%	15	
Imports					
Natural Gas	10%	70	70%	70	
Total	100%	21	100%	54	38

	Imports Set Price				
	Off-Peak % at the Margin	Offer Price \$/MWh	On-Peak % at the Margin	Offer Price \$/MWh	Annual Average HOEP
Baseload (hydro)	60%	15	20%	15	
Imports	30%	60	10%	65	
Natural Gas	10%	70	70%	70	
Total	100%	34	100%	59	46

- This example is conservative in that Ontario gas offers do not have an emission adder, baseload offers are usually lower than \$15/MWh and Ontario is net importing one-third of the hours that baseload is at the margin in real-time.
- If baseload is at the margin 90% of the time off-peak, under current market rules, the example shows, relative to the 'Imports Set Price' case, about a 40% reduction in off-peak price and a 20% reduction in annual average HOEP.

Implications

- Lower HOEP leads to higher Global Adjustment - marginal price signals replaced by average prices.
- Demand-side response is distorted. Customers overly encouraged to shift loads from on-peak to off-peak, or to increase off-peak loads.
- If there are import tariffs in future to mitigate emission leakage, they should be reflected in real-time prices.