# Pricing Ontario Coal Emissions

Presentation to Coal's Future in Ontario:
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# Presentation Overview

- Regulatory Alternatives
- Past Experience
- Policy Objectives
- Ontario Facts
- Uncertainty and Policy
- Ontario Choices
- Conclusions

# Traditional Pollution Regulation

- Ministry chooses an environmental goal.
- Ministry sets emission standards for individual sources.
  - Activity based: 1 tonne per MWh generated.
- Sources complain that standard is too fast, too tough, too costly.
- Activity grows → more total pollution.
- Sources do not pay for remaining pollution. Pollution is free.

# Regulating Ontario Coal Plants

- Countdown Acid Rain 1994
  - OPG limit 175kt/year SO2
  - OPG limit 225 kt/year SO2 + NO
  - This is cap with internal trade.
- Closing coal plants
  - Phase out by 2007
  - Phase out by 2009
  - Phase out by 2014

# Regulating Coal (2)

- Advantages of ban:
  - Simple, politically attractive
  - Eliminates the coal pollution (or not)
  - Easy to monitor
- Disadvantages of ban:
  - Timing – when won't we need coal?
  - Cost depends on substitutes
    - Wind, gas are costly; nuclear is risky
  - Prevents use of "clean coal"
    - Why?

# Market-based Alternatives

- Cap and trade (allowances)
  - Cap limits total emissions
  - Distribute allowances to existing sources
  - Trading allowances reduces costs
- Emission reduction credit
  - Regulations/commitments limit individual sources
  - Unregulated sources reduce emissions and sell credits to regulated sources – reduce costs.
- Emission Charges
  - Sources must pay $x/kg of pollution discharged
  - Sources reduce emissions until MC = $x/kg.

# Emissions Trading

- Purpose of Emissions Trading – reduce costs
  - Lets the source that can reduce at lowest cost do most reduction
- ET can add flexibility to regulations.
  - Trading allowances, credits, or offsets.
- ET can be part of a stand-alone emission reduction program.
  - Cap-and-trade

# Example: 2 Sources

- Both discharge 1000 kg/day
- Different control costs
  - #1 control cost $1/kg
  - #2 control cost $2/kg
- MOE regulation requires each to reduce by 200 kg/day to 800 kg/day.
- Uniform regulation costs $600
  - 200x$1 + 200x$2 = $600

# Example: 2 sources (2)

- Allow emissions trading
- High cost source pays $1.50/kg for low cost source to reduce another 200 kg.
  - High cost source saves $0.50/kg, low cost source profits $0.50/kg.
- Total cost of reduction $400:
    - $1x400 + $2x0 = $400
- ET reduces cost of achieving goal
  - **Saved $200**
- ET may allow better environmental goal.
  - Lower cost facilitates cleaner standards.

# Why Use Market Mechanisms?

- CO2 control will be expensive
- Sources vary greatly in control costs
  - New/old; coal/gas.
- New technology may develop given the right incentives
  - Integrated coal gasification
  - Carbon sequestration
- ET or EC will reduce emissions faster at much less cost than any regulation.

# Credit Problem: “Anyway”

- A credit or offset reduces emissions only if the project that creates it would **not** have been undertaken without the offset/credit incentive.
- This is the problem of “anyway” credits
  - To be valid an credit/offset must **not** be recognised for something the creator would have done anyway.
- Another name: “additionality”
  - To be valid an credit/offset must be **additional** to what would have happened under business as usual.

# Past Experience

- Cap and trade has worked in US
  - 1990 CAAA Title IV SO2 – 10m ton/yr reduction, costs < forecast.
    - Smaller reduction if no trading.
  - California RECLAIM – reduced NOx, VOC in southern CA at reasonable cost.
    - But NOx price spikes during electricity crisis.
- ET has worked for Kyoto in Europe
  - International trading of allowances, credits.

# Past Experience (2)

- Effluent charge working in Sweden
  - Charge for NOx emissions, refunded to industry based on generation. Big emission reductions.
- Problems:
  - Caps generally set high, so allowance prices too low.
  - ET prices very volatile. Inelastic supply and demand.
  - EC looks like a tax, so terribly unpopular.
    - Cap and trade gives away the right to pollute – familiar.

# Ban on Products

- Ban has been successful for products where there are good substitutes.
  - Lead in gasoline → more refining.
  - Asbestos insulation → other fibres.
  - PCBs → other insulating oils.
  - CFCs → other refrigerants.
- Coal is a major fuel source.
  - Banning coal will raise the price of substitutes, render existing capital worthless. Costly.

# Policy Objectives

- Economic efficiency
  - Achieve the environmental goal at least cost.
  - Tends toward pricing, not ban.
- Predictable emissions
  - Tends toward regulation, C&T, not charge
- Predictable costs
  - Tends toward effluent charge NOT C&T
- Acceptable impact on sources, economy
  - Tends toward nuanced policies.

# Ontario Facts

- Coal plants: 1 big, 1 medium, 2 small
  - Poor basis for emission trading – thin market.
- Coal emission rate ≈ 1 tonne CO2/mWh.
- Suppose that we are willing to pay $10/tonne to control CO2.
  - EC = $10/tonne → $10/mWh for coal.
    - Big increase in the cost of coal power
  - ET - set cap so allowance price = $10/tonne.

# Choosing Uncertainty

- All tonnes of CO2 have the same effect, regardless of location or time.
- Ontario is a tiny source of global CO2.
- So, value of 1 tonne emission reduction is independent of our rate of emission.
- Therefore, effluent charge is best.
  - We pay a constant price regardless of degree of control.

# Choosing Uncertainty (2)

- Public may demand guarantees that emissions are falling.
  - Implies quantity is the goal.
  - Tends to support cap & trade.
- But demand for coal power is volatile.
  - With C&T, have allowance price volatility, blackouts.
- Maybe price for base amount/year, 50% premium for excess emissions.

# What Price Emissions?

- Studies suggest world benefits of CO2 reduction = $3 to 19/tonne.
  - US NCEP 2004, p. 23.
- Jaccard policy: $14 in 2015; $55 in 2045.
  - Jaccard, 2005, p. 294.
- Canada says meeting Kyoto requires a charge of $195/tonne.
  - EnvCan 2007 (Cost of Bill C-288) p. 14.

# Ontario's Choices

- Ban on coal, 2014
  - Simple, politically attractive, committed.
  - Co-benefits from PM, SO2, NOX, PTS.
  - Cost is highly uncertain.
  - Ignores "clean coal" options
  - May cause blackouts.
- Ontario effluent charge
  - Increase price of electricity.
  - Increase imports of dirty coal power?
  - Cause industrial bypass?
  - Where to recycle revenues?

# Ontario's Choices (2)

- Cap and trade for CO2
  - Not feasible for OPG alone
- Join RGGI
  - Many sources, so efficient market.
  - Modest goals: 10% reduction 2020
  - Aligns Ontario with some neighbours.
- Cap and Credit
  - Serious questions about the merits of credits.
- Encourage federal GHG policy
  - For people of faith.

# Market Policy Caution

- Pricing policies involve the creation of artificial markets.
- ET and electricity experience prove that careful design is essential:
  - Design for economic efficiency to min costs.
  - Design to handle **all** contingencies.
  - Design by anticipating political forces and forestall damaging intervention.

# Conclusions

- Ban on coal is brittle.  Easy to postpone.
- Ontario GHG policy must behave like an effluent charge.
  - Significant price for pollution discharge.
- Could be simple effluent charge on all major fossil fuel generators.
  - Low at first, growing over time.
  - Careful design of revenue recycling.
- Could join regional emissions trading.
  - Modest goals, unproven performance.