

# Complementary Policies to Reduce GHG Emissions: Promise & Problems

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**Roundtable on Energy and Climate Change Policy**

*Harvard Environmental Economics Program – Enel Foundation*

*Brussels, Belgium*

*April 12-13, 2018*

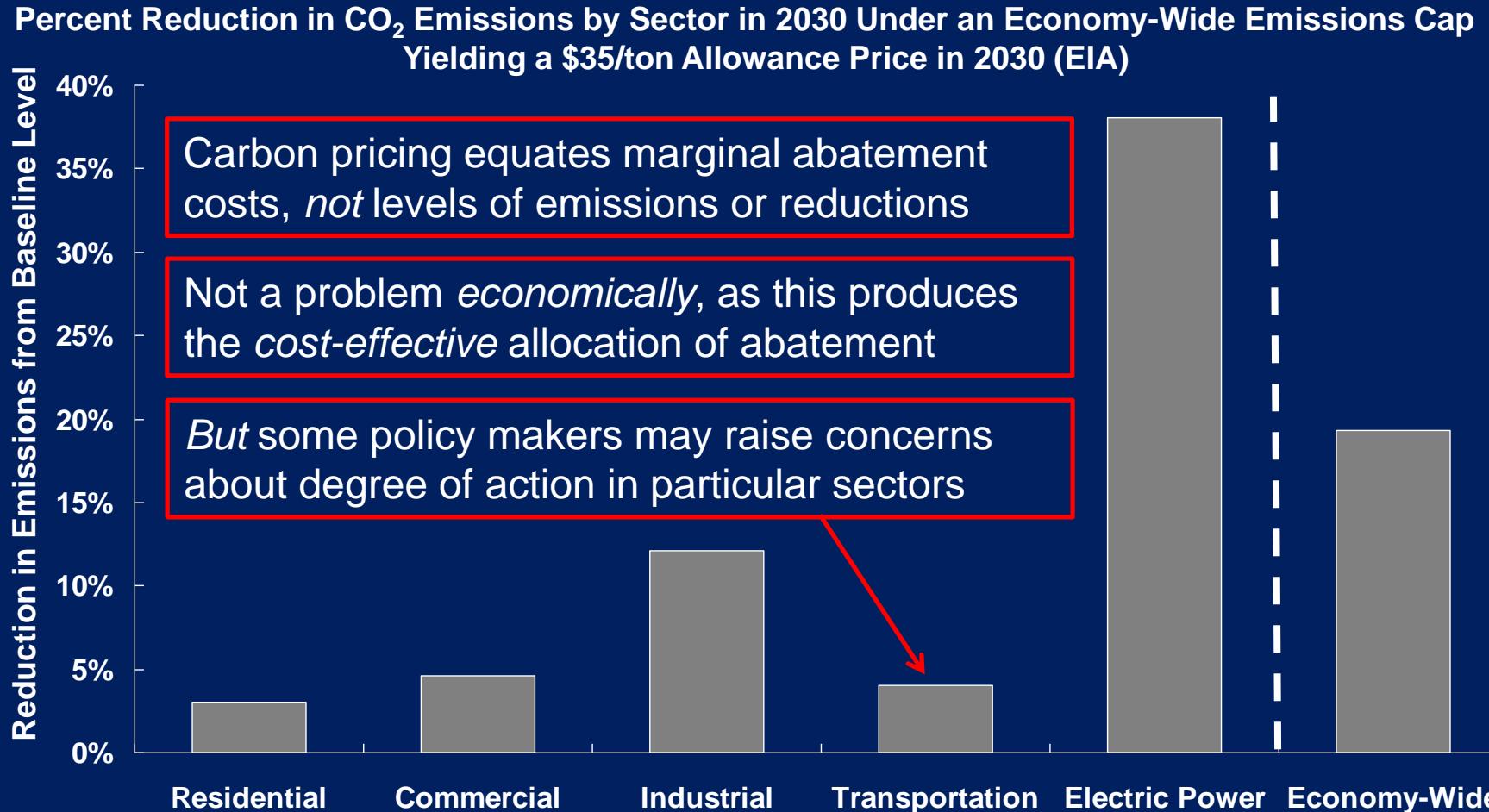
# A Major Issue arises with Cap-and-Trade Policies to Reduce CO<sub>2</sub> Emissions

- Is Cap-and-Trade (or other Carbon Pricing) Sufficient?
  - Or are *complementary policies* necessary – or at least helpful?
- Answers are available from 30 years of experience with cap-and-trade systems in Europe and North America

# **Seven Prominent (among a larger set of) Cap-and-Trade Systems**

- Leaded Gasoline Phasedown (1982 – 1987)
- Regional Clean Air Incentives Market (1993 – present)
- Sulfur Dioxide Allowance Trading (1994 – 2010)
- NO<sub>x</sub> Trading in the Eastern United States (1998 – 2009)
- European Union Emissions Trading System (2008 – present)
- Regional Greenhouse Gas Initiative (2009 – present)
- California's AB-32 Cap-and-Trade System (2013 – present)

# Motivation for Asking Whether Carbon-Pricing is Sufficient: Cost-Effective Economy-Wide Carbon Pricing Achieves Different Reduction Levels in Different Sectors



# Is Carbon Pricing Sufficient?

- **Carbon pricing is necessary**
  - Only *feasible* policy instruments that can affect millions of daily decisions
  - Produce *cost-effective* allocation of actions
  - Provide long-term price signals for *technological change*
- **But carbon pricing is *not* sufficient – because of *other* market failures**
  - Example: principal-agent problem in renter-occupied buildings
    - Insufficient incentive to adopt energy-efficient products (e.g., insulation)
    - So, regulate – for example – with building codes
  - Example: Public good nature of information
    - Spillover from Apple (iPhone) to Blackberry (Storm II)
      - Companies under-invest in research & development
      - So, government technology policies can encourage basic R&D
- **Thus, some specific non-pricing policies *can be* complementary.**

# Is Carbon Pricing Sufficient? (continued)

- But some “complementary policies” *conflict* rather than complement
  - Consequences of policy for sources *under the cap* of a cap-and-trade system
    - Achieves no incremental CO<sub>2</sub> emission reductions – relocates emissions (*unless* allowance price floor or ceiling is binding; then acts as a carbon tax)
    - Drives up abatement costs (marginal costs not equated)
    - Suppresses allowance price (by reducing overall demand for allowances)
- Some “complementary policies” produce perverse effects [for example, EU-ETS & renewable portfolio standards]
- Caveats:
  - Policy makers may want to keep down allowance price by having other policies do “heavy lifting” (perhaps because costs of other policies are less visible)
  - Complementary policies can be *additive* to cap-and-trade system if affected sources are *not* under the cap (geographically, source category, or pollutant)
  - Complementary policies can be *additive* if there is an *additional market failure*

# Interactions when a Jurisdiction within a Cap-and-Trade System Takes Additional Actions

- Examples:
  - EU ETS member state puts in place a more ambitious CO<sub>2</sub> policy
  - Province or state in a country with a national cap-and-trade system puts in place a more ambitious CO<sub>2</sub> policy
- Can yield same perverse outcome as with “complementary policies”
  - *Achieve no incremental CO<sub>2</sub> emission reductions* – relocates emissions to other jurisdictions
  - *Drive up abatement costs*
  - *Suppress allowance price*
- But, will these perverse outcomes necessarily arise?

# Will the Perverse Outcomes Arise?

- In presence of a national policy, ....
  - Will state/provincial efforts achieve their objectives?
  - Will state/provincial efforts be cost-effective?
- Answer: interactions can be *problematic*, *benign*, or *positive*, ...
  - *depending* on relative scope and stringency, and policy instruments used

# **Problematic Interactions**

- If national policy limits emissions *quantities* or uses nationwide *averaging* of performance, ...
- Then, emission *reductions* accomplished by “green” state/province (more stringent policy than national) reduce pressure on other states,
  - thereby freeriding – indeed, *encouraging* (such as through lower allowance price) – emission *increases* in other states
- Result: 100% leakage, and loss of cost-effectiveness nationally
- Potential examples
  - State limits on GHGs/mile *and* Federal CAFE standards
  - State renewable fuels standard *and* Federal RFS; or state renewable portfolio standard *and* Federal RPS
  - British CO<sub>2</sub> policies if under umbrella of EU ETS
- Partial solution: carve-out from broader policy (eliminates 100% leakage, but still not cost-effective!)

# *Benign* Interactions

- **Example #1: Regional Greenhouse Gas Initiative (RGGI)**
  - RGGI (state) policies are less stringent than assumed Federal policy
  - Result: state policies become non-binding and largely irrelevant
- **Example #2: Federal policy sets price (not quantity)**
  - A carbon tax, or a binding safety-valve/price collar in cap-and-trade
  - More stringent actions in green states *do not lead* to offsetting emissions in other states induced by a changing carbon price.
  - *However*, there will be *different* marginal abatement costs across states, and so aggregate reductions are *not* achieved *cost-effectively*.

# *Positive Interactions*

- **States can address market failures not addressed by a Federal “carbon-pricing” policy**
  - Example: principal-agent problem re. energy-efficiency investments in renter-occupied properties → state or local building codes
- **States can be “laboratories” for policy design**
  - Can provide useful information for development of national policy
  - But will state authorities allow their “laboratory” to be closed after the experiment has been completed and the information delivered?
- **States can create pressure for more stringent Federal policy**
  - Example: CA standards and subsequent change in Federal CAFE
  - Desirable if previous national policy is insufficiently stringent, ... but that is an empirical question

# Summary

- **Policy makers may push for “complementary policies” ...**
  - ... because carbon pricing equates marginal abatement costs, not magnitude of emissions or reductions (good news economically)
- **Carbon-pricing is necessary, but not sufficient**
- **Some complementary policies can be effective, but many others lead to perverse outcomes**
- **Interactions also occur when jurisdiction within cap-and-trade (or other quantity-averaging) system puts in place additional policy**
  - Interactions can be problematic, benign, or positive
- **The unintended consequences of a policy can be as important/more important than the intended consequences!**

# For More Information

Harvard Project on Climate Agreements

[www.belfercenter.org/climate](http://www.belfercenter.org/climate)

Harvard Environmental Economics Program

[www.hks.harvard.edu/m-rcbg/heep](http://www.hks.harvard.edu/m-rcbg/heep)

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