Renewable Portfolio Standards
A Solution In Search of Problem?

W. David Montgomery
Harvard Electricity Policy Group
Thirty-Ninth Plenary Session
May 20, 2005
An Economist’s View of the RPS

• There are some general economic principle for how to design efficient environmental policies
  – Deal with each externality explicitly
  – Control outputs (emissions) not inputs or processes
  – Equate marginal costs of control across all sources
  – Minimize administrative costs
  – Match geographic scope of regulation and externality

• RPS violates every one
  – Does not address externalities directly
  – Specifies a technology rather than emissions performance
  – Applies uniquely to one sector
  – Administratively complex trading rules (the subject here)
  – Mismatched geography
A Solution in Search of A Problem

• What are the externalities that renewables are claimed to address?
  – Criteria pollutants
  – Greenhouse gas emissions
  – Technology development
  – Other (energy security, resource use, production externalities)?

• Performance on criteria pollutants is required by law already
  – SOx trading
  – NOx trading
  – PM and regional haze
  – Hg regulations and trading
Consequences Of Layering A Technology Requirement On Top Of Existing Performance Requirements

• Utilities already have incentives to figure out how to meet existing emission standards and caps efficiently

• RPS creates zero improvement for any pollutant subject to a cap (100% leakage!)

• In general RPS either
  – substitutes for other (less costly) compliance measures or
  – leads to overcompliance without any cost-benefit test

• When a technology requirement changes choices, it increases the cost of meeting established emission targets but lowers the apparent price of permits
  – Example: NSPS, scrubber requirements and SOx trading
  – Application: RPS, wind power and greenhouse gas emissions
Other Issues Of How RPS Addresses Externalities

• **RPS unlikely to reduce the cost of power**
  – Utilities already have ample incentives to figure out least cost environmental compliance strategies
  – Competitive electricity markets and performance based regulation give an incentive for fuel diversity to minimize cost risks

• **Mandate for technology rather than performance brings unintended consequences**
  – Golden eagle mortality
  – Biomass pollution and sustainability issues

• **The one externality for which policy is still developing is climate change**
RPS Is The Opposite Of A Desirable Climate Policy

• Efficient climate policies are
  – Global
  – Include all sectors uniformly
  – Directed at emissions
  – Market based
  – Aimed at creating wholly new technologies

• RPS is at the other end of the scale
  – Local
  – Electric sector only
  – Technology mandate
  – Command and control
  – Mandates provide inadequate incentives for R&D
Command and Control in Climate Policy

• RPS is thinly disguised command and control
  – Instead of allowing emission trading to find the best technologies, RPS forces adoption of a specific technology
  – Technologies with far greater potential for climate purposes are excluded – in particular nuclear, carbon capture and sequestration, and conventional hydro

• Where wind is most economic choice, it will be chosen under a carbon tax or emissions cap and trade
  – If RPS forces more renewables than would be chosen based on economics of a carbon cap, it raises the cost of reducing greenhouse gas emissions unnecessarily
  – In general, the amount of renewables mandated by RPS is greater than would be chosen as cost-minimizing response to an emissions cap
Economic Choices Under A Carbon Constraint Add Less Than 10% Renewables

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Coal</th>
<th>Gas</th>
<th>Nuclear</th>
<th>Renewables</th>
<th>Other</th>
<th>Share</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Carbon Price</td>
<td>3,176,116</td>
<td>430,506</td>
<td>1,057,877</td>
<td>459,920</td>
<td>0</td>
<td>9.0%</td>
<td>5,124,419</td>
</tr>
<tr>
<td>Low Carbon Price</td>
<td>3,172,180</td>
<td>381,523</td>
<td>1,057,877</td>
<td>478,048</td>
<td>0</td>
<td>9.4%</td>
<td>5,089,628</td>
</tr>
<tr>
<td>Flat Carbon Price</td>
<td>3,176,549</td>
<td>316,828</td>
<td>1,057,877</td>
<td>476,650</td>
<td>0</td>
<td>9.5%</td>
<td>5,027,904</td>
</tr>
<tr>
<td>High Carbon Price</td>
<td>2,706,355</td>
<td>633,354</td>
<td>1,057,877</td>
<td>542,500</td>
<td>0</td>
<td>11.0%</td>
<td>4,940,086</td>
</tr>
</tbody>
</table>

Approximate Carbon Emissions in 2020 (Million Metric Tons)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Coal</th>
<th>Gas</th>
<th>Nuclear</th>
<th>Renewables</th>
<th>Oil</th>
<th>Total</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Carbon Price</td>
<td>767.9</td>
<td>40.8</td>
<td>0.0</td>
<td>0.0</td>
<td>10.8</td>
<td>819.5</td>
<td>0.0%</td>
</tr>
<tr>
<td>Low Carbon Price</td>
<td>767.2</td>
<td>36.0</td>
<td>0.0</td>
<td>0.0</td>
<td>10.3</td>
<td>813.6</td>
<td>-0.7%</td>
</tr>
<tr>
<td>Flat Carbon Price</td>
<td>767.6</td>
<td>29.4</td>
<td>0.0</td>
<td>0.0</td>
<td>10.0</td>
<td>807.1</td>
<td>-1.5%</td>
</tr>
<tr>
<td>High Carbon Price</td>
<td>663.2</td>
<td>62.5</td>
<td>0.0</td>
<td>0.0</td>
<td>10.3</td>
<td>736.0</td>
<td>-10.2%</td>
</tr>
</tbody>
</table>

Coal includes IGCC
Renewables includes Wind, Hydro and other Renewables

Mandating an additional 10% renewables share would reduce carbon emissions by about 6% assuming gas displacement
Trading Turns RPS Into A Regional Tax Because Wind Economics Is Highly Local

RPS won’t change generation, capacity, cost or air quality in the SE
Mandates for Current Technology Are A Questionable Approach To Technology Development

• **Criteria pollutants**
  – All technologies for reducing criteria pollutants can be improved incrementally
  – RPS won’t necessarily lead to renewables overtaking other options

• **Greenhouse gas emissions**
  – Future incentives, not current mandates, are required to motivate long term investments and technology
  – Completely new technologies are needed to achieve stabilization of emissions
  – Most promising options are not necessarily incremental improvements in current renewable technologies
Design Issues for RPS

• Many of the problems of designing RPS arise from failure to stick to the objective of minimizing the cost of achieving environmental goals
  – Ownership and use of SOx, NOx, Hg permits
    - Choice between overcompliance and driving out more cost-effective options
    - Inevitable consequence of layering technology requirement on trading
  – Local sourcing requirements and use as economic development tool
    - An irresistible temptation
    - Encourages rent-seeking behavior and bad economic studies
  – Definitions of “renewables” not tied to underlying externalities
Focus On Externalities Leads Logically From RPS to Emission Trading Programs for Specific Emissions

• Trading renewable certificates cures only one problem – non-uniform distribution of capability to use “renewables”
  – Vague connection to specific externalities fails to support the most cost effective choices
  – “Renewables” limitation does not allow superior technologies for specific problem to be chosen

• Trading is an efficient overall policy when it is
  – Applied directly to the source of the externality
  – Comprehensive
  – Unbiased as to technology or source

• Suppose we defined any action that reduces an externality of interest as “renewable”?
  – Solves the design problems all at once
  – Leads directly to cap and trade for criteria pollutants and direct support for R&D on climate-friendly technologies as a comprehensive approach