Carbon Taxes: A tool for managing the greenhouse

Frank Muller
Adjunct Professor
Institute of Environmental Studies

Outline

- What is a carbon tax?
- What is the case for a carbon tax or similar economic instrument?
- What are the key issues in designing a carbon tax?
- What is the experience with carbon tax proposals?
- How does a carbon tax compare with emissions trading?

What is a carbon tax?

	Taxed Activity	Rate Based On
(Pure) Carbon	**Fossil Fuel Use**	**Carbon Content**
Carbon Dioxide	**Fossil Fuel Combustion**	**CO_2 emissions**
Greenhouse	**GHG-emitting activities**	**CO_2-equivalent emissions**
Energy	**Energy Use**	**Energy Content or related factor**
Hybrid Energy/Carbon	**Fossil Fuel/ Energy Use**	**A combination of above**

Carbon or Carbon Dioxide?

- CO_2 = 1 x C (12) + 2 x O (16)
- 1x12 + 2x16 = 44
- 1 tonne of CO_2 contains 0.27 tonnes of carbon (12 /44 = 0.27)
- To convert from \$/tonne CO_2 to \$/tonne C, multiply by 44/12 (or 3.67)
- \$20/tonne CO_2 = \$73/tonne C

Relative Impost on Different Fuels

- Per unit of energy content:
  - $1 on Coal
  - $0.84 on Oil
  - $0.57 on Natural Gas
- More efficient energy conversion/use → lower tax impost (eg, CCGT vs coal)
- Models used to more fully assess economic interactions

What Emissions Are Taxed?

	Emissions	Taxed
Stationary Energy	48.7%	48.4%
Transport Energy	14.5%	13.5%
Fugitive from Fuel	4.8%	
Industrial Processes	5.9%	
Agriculture	17.7%	
Land Use, etc	6.3%	
Waste	2.1%	
	100.0%	61.9%

Possible Carbon Tax Regimes

- Global or multilateral tax collected by international authority
- Harmonised national taxes established by multilateral agreement
- National taxes, possibly with multilateral agreement on competitiveness issues
- Sub-national (State/Province/Local) taxes

Types of Carbon/Energy Taxes

- Economist's Carbon Tax
  - goal is economic efficiency (optimal climate change)
  - singular instrument
  - pure carbon tax
- Environmentalist's Price Effect Tax
  - rate set to achieve emission reduction target
  - key element of climate policy package
  - possibly taxes nuclear, large-scale hydro, etc.
  - Possibly part of green tax shift

Types of Carbon/Energy Taxes (cont.)

- Environmentalist's Trust Fund Carbon Tax
  - revenues fund clean technologies, etc.
  - affects perceptions of future prices
- Real World Carbon Taxes
  - shaped by fiscal, economic, political, envt & social factors
  - integrate environmental goals into economic agenda
  - build coalition for broader policy package

Case for economic instrument

- Price signal/incentive for abatement
- Encourages lowest cost abatement across economy & allows flexible responses
- Signals future directions – encourages shift in long term investments
- Captures diffuse activities not amenable to regulation
- Reinforces other policies & actions

Case for Carbon Tax

- Administrative ease & familiarity
- Can be quickly implemented
- Energy is the core problem
- Price certainty (vs. abatement certainty)
- Revenues for transition costs and tax shift
- Mainstreams climate into economic policy

Why is a price signal important?

Multiple paths to a low-emission economy

- Cleaner primary energy sources
- More efficient generation & delivery of kWh
- Enhanced carbon storage in landscapes, etc.
- More efficient buildings, machines & appliances
- Lower emission vehicles & transport modes
- More greenhouse-friendly settlement patterns
- Shift to less carbon intensive materials & production
- Shift final consumption away from carbon intensive goods
- Shift from work & consumption to family, community & leisure time

Necessary – But Not Sufficient!

- Tax or cap to achieve 60%+ emissions cut is a long way off
- Need to build capacity for long term cuts
- Policy/institutional/market barriers
- Govt role in shaping institutions & advancing technology
- Sectors not covered/not price responsive
- State/local policy innovation/learning

Climate Change Policy Toolkit

- carbon/energy taxes
- emissions trading
- other fiscal incentives (e.g. tax credits)
- institutional/market reform (e.g., electricity)
- market transformation strategies
- voluntary agreements
- government purchasing

Climate Change Policy Toolkit (cont.)

- minimum standards
- infrastructure investment
- land use planning
- labelling & information
- research & development

Key Design Issues

- Type of tax (carbon, energy, hybrid, etc)
- Tax rate
- Coverage of fuels/sectors
- Collection point in fuel chain
- Phased introduction – rate/coverage
- Relationship to existing taxes
- Revenue recycling/fiscal package
- Treatment of equity impacts
- Treatment of energy intensive industry

Carbon Tax Experience
The role of economic models

- What kind of model? (CGE, macro, etc)
- Efficient responses to price changes (product/fuel substitution, etc)?
- Backstop technologies & innovation?
- Efficient revenue recycling?
- Tax alone or policy mix?
- Kyoto mechanisms?
- Climate/air pollution damages?
- Relevance of historical data?
- What do the results mean?
- Beware of jobs numbers!

Carbon/Energy Tax Successes

	Tax Rate (US$/t C)	Industry Exemptions	Domestic Fuel Prodn.	Coal % of Electricity
Denmark	$27-$55	lower rate & refunds	oil, gas	76%
Finland	$18-$22		none	23%
Netherlands	$16-22		oil, gas	38%
Norway	$55-$172	coal used in industry	oil, gas	0.2%
Sweden	$38-$148	lower rate & total tax cap	none	2%

Carbon/Energy Tax Failures

	Tax Rate (US$/t C)	Industry Exemptions	Domestic Fuel Prodn.	Coal % of Electricity
U.S.A: Clinton Btu/Oil Tax	$9-$29	breaks for specific industries	coal, oil & gas	51%
Australia: Greenhouse Levy	$3	petroleum fuels	coal, oil & gas	80%
Europe: CO2/en. tax	$63-$90	breaks for energy-intensive industry	varies	varies

EU Carbon/Energy Tax: Barriers

- UK sovereignty concerns
- North-south burden sharing issues
- Industry competitiveness concerns
- No action by other OECD countries

US Btu Tax: Barriers

- Strong Opposition of Fuel Producing States
- Vigorous Campaign by Manufacturing Industry
  - cheap energy equals US comparative advantage
- General job insecurity
  - Btu equals big time unemployment
- Anti-tax/anti-government politics
- Poor political strategy & management
- No mobilization of environmentalists or business winners

Btu Tax Impact on Energy-Intensive Industry

Industry	% Value of Shipments
Primary Aluminium	2.14%
Nitrogenous Fertilizers	1.55%
Blast Furnaces & Steel Mills	1.14%
Ind. Inorganic Chemicals	0.94%

Australian Levy: Barriers

- Small tax is “thin edge of the wedge”
- Favors resource exports over processing
- “Free-trade” objections to border adjustments
- Political/economic power of transnationals
- Unemployment/job insecurity
- Government never argued for it

Tax vs Emissions Trading Assessment Criteria

- **Environmental effectiveness**
- **International compatibility**
- **Economy-wide cost**
- **Administrative cost/transparency**
- **Social equity**
- **Industry fairness issues (early action, new entrants)**
- **Investment certainty**
- **Capacity to address competitiveness impacts**
- **Political acceptability**
- **Match with jurisdictional responsibilities**

Tax vs Emissions Trading Key Questions

- Is the choice tax vs ETS or tax/auction vs grandfathering/baseline & credit?
- Does emissions trading inevitably lead to grandfathering?
- Do we have to choose? Can/should a carbon tax and emissions trading work together?
- What stakeholders are needed to reach a deal and how will they shape it?