Carbon dioxide sequestration: How much, when, and who should pay?

Report on ongoing work by

DAVID F. BRADFORD
Woodrow Wilson School of Public and International Affairs and
Department of Economics, Princeton University

KLAUS KELLER
Department of Geosciences
Pennsylvania State University

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Outline

Economic analysis of CO₂ management: Two example studies

• Optimal climate control using CO₂ abatement and CO₂ sequestration.

• A No Cap But Trade approach to greenhouse gas control
A simple model of economically optimal climate control
Carbon sequestration can change optimal policy and the atmospheric carbon budget dramatically.

**Important assumptions:**
- learning by doing
- phase in constraint
- neglecting uncertainty
- initial sequestration costs of 100 $ per t of carbon
- no exogenous CO₂ constraint
- reservoir half-life time of 200 a
Low cost carbon sequestration technologies lower the optimal CO$_2$ trajectory considerably.
Low cost carbon sequestration technology may have large economic benefits.
A No Cap But Trade (NCBT) Approach to Greenhouse Gas Control

• The NCBT approach is a possible alternative to cap and trade approaches to international policy as presently conceived.
  – The acronym is actually a misnomer. A more accurate but even more unwieldy name would be: the “non-binding cap and trade” approach.
  – As will be discussed, the idea is that every country has a cap but it is at least as high as its BAU level.

• It is somewhat analogous to the CDM, but applied to countries, not projects.
  – But it is also different in, for example, basing payment on performance, not projections.
Underlying Logic

• Control of the climate is a global public good.
• We analogize it to international peacekeeping or assembling resources to deflect an incoming asteroid.
  – In such cases it seems natural to distinguish the purchase of inputs by voluntary contract (e.g., hiring scientists and building rockets) and the financing of the effort, which might be by voluntary treaty but which would be politically determined as in the case of other global public goods.
• The “resources” needed to produce climate control consist in the reduction by countries from their business-as-usual emissions of greenhouse gases.
Domain of Application of the System

• We envisage applying the system to a country’s “imports” of carbon in fossil fuel (rather than to emissions directly).
  - Fossil fuel may be “imported” by extraction from below ground or by shipment across the border from another country; Hence the quotes on “imports.”
  - An export of fossil fuels to a participating country would be treated as a negative import.

• This is a practical point of emphasis, based on the possibility of monitoring and measurement, not essential to the approach.
  - Treatment of carbon sinks is straightforward conceptually, if not as a monitoring problem.
  - The system could be extended to other greenhouse gas emissions, but with both monitoring and aggregation problems.
Element 1.
The BAU Allowance Trajectories

• Critical step: Each participating country is assigned a BAU trajectory of fossil fuel carbon “imports,” which is expressed in terms of country-specific allowances.
  – Important point: For purposes of initial exposition, I assume all countries in the global system are “participating.” I return to this issue below.
• The BAU trajectory is *not* simply a fixed path. The idea is to express what the country would have “imported” but for the climate control regime.
  – So it would be contingent, for example, on the country’s population and economic growth and on the evolution of technology.
  – *Conceptually,* the country’s BAU level at any point in time is a (no doubt, difficult) technical matter, not a policy or normative matter.
Element 2. 
An Arrangement to Retire Allowances

• An agency would be designated with the sole function of buying *and retiring* allowances.
  – This constitutes the purchase of resources needed to produce the global public good of climate control.
  – A detail: Since there is likely to be some “slack” in the system, the extent of reduction from a true business-as-usual level will generally be less than the number of allowances retired. I return to this point below.

• To be concrete, I conceive of a new international agency that I call the International Bank for Emissions Allowance Acquisition (IBEAA) to serve this purchasing function.
  – The institutional detail is not important.
  – But does seem to me desirable that the agency not have any policy function; for example, it would not be empowered to monitor how a country achieves its import limits. It would be a passive executor.
  – The agency would, however, presumably have a monitoring function in determining performance justifying payment and it might have the capacity to borrow.
  – Basic rule: Payment is made for BAU less monitored “imports.” No reduction in “imports,” no money.
Element 3. Financing the Retirement of Allowances

• As in the case of the purchase of a conventional public good by a collective agency, the financing would be politically determined.

• An analogy would be the financing of international peacekeeping, the cost of which is shared according to a politically determined United Nations formula.

• Presumably, the sharing would take into account ability to pay, as reflected, for example, in per capita consumption or income levels in the various countries.
  – An income-based formula would play an obvious role in securing the participation of LDCs.
  – A country’s stake in climate change might well play a role.
The Main Conclusions

1) CO₂ sequestration (i) can decrease the near-term optimal carbon taxes, (ii) can reduce optimal CO₂ concentrations (and hence climatic change), and (iii) has potentially large economic benefits.

2) The NCBT approach to design of international cooperation in limiting CO₂ aides understanding of the logic of international collaboration on climate control, may assist in predicting policy, and has some practical promise in terms of compliance.