THE CHALLENGE OF CLIMATE POLICY: NO TIME FOR WISHFUL THINKING

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Overview of main themes and ideas

- There is an urgency to addressing climate change, to stabilizing GHG concentrations
- The literature offers no encouragement on international environmental cooperation, such as international agreements. Indeed, there is little evidence of concrete progress in reducing CO_2 emission, or implementing effective incentives at the necessary scale.
- Overcoming these obstacles will require additional, novel approaches

A simple model to evaluate “expected” net benefits

- From: Zeckhauser, R. 1981. Preferred policies when there is a concern for probability of adoption. J. Environmental Economics and Management.

  -- “A theory of effective policy choice is developed that recognizes that the probability that a policy is adopted depends on who gains from it, who loses, and by how much…”

  1. Standard BCA does not incorporate the likelihood of success of options.

  2. The best option under BCA may have zero chance of adoption.

  3. Are there ways to alter the probability of success?

Let B_j be a vector of individual benefits (i) that policy j confers: $B_j = (b_{1j}, ..., b_{ij}, ...b_{nj})$.

- where some b_{ij} *'s* may be negative, and where we assume these to be CEs.

Let the total benefit of policy $_j$ be $T_j = \sum_i b_{ij}$

A naïve maximizer (standard benefit-cost analysis) chooses the policy that maximizes: T_j.

Or, to apply differential weights, λ_i (e.g., equity), we can maximizes $\lambda_j = \sum_i \lambda_i b_{ij}$

If the probability P_i of success or passage is uncertain, we can consider $P(B)$ where net benefits is weighted by the probability of success (e.g., passing legislation, successful implementation).

Assume: $\partial P / \partial b_i \geq 0$

Strategic Maximizing Behavior: maximize expected net benefits, R_j , which is:

$$R_j = P\left(B_j\right)T_j$$

"Assume that this is a one-time only proposal, and that if it is defeated the status quo, S, will persist."

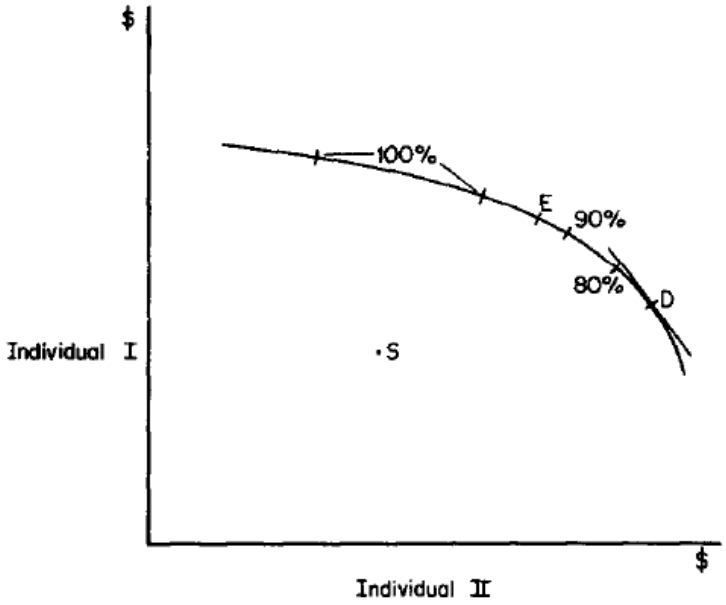


FIG. 2. Strategic maximization taking account of the probability of adoption.

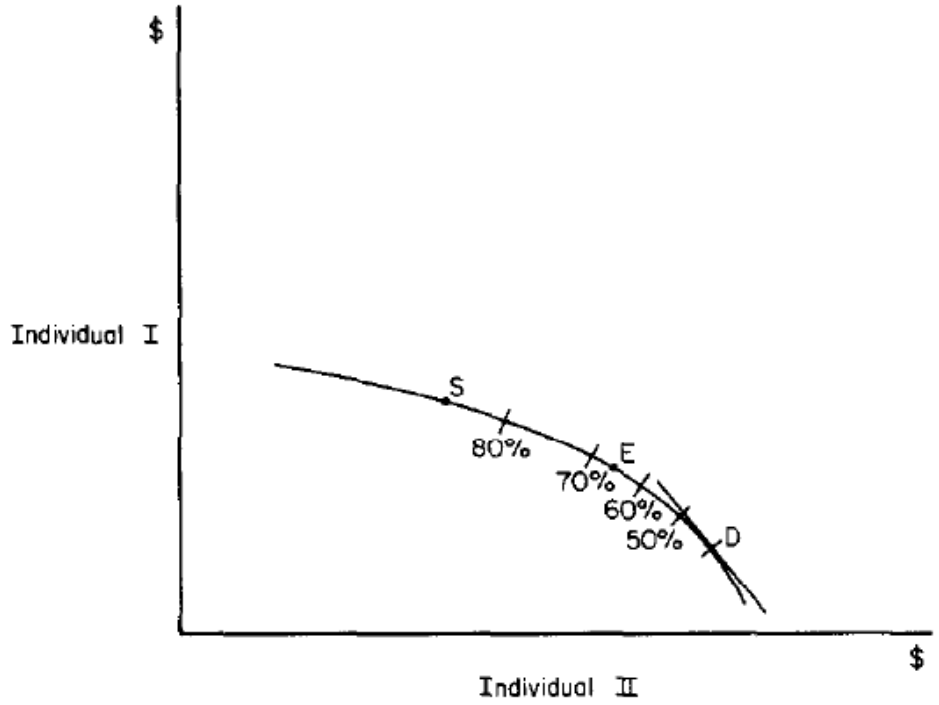
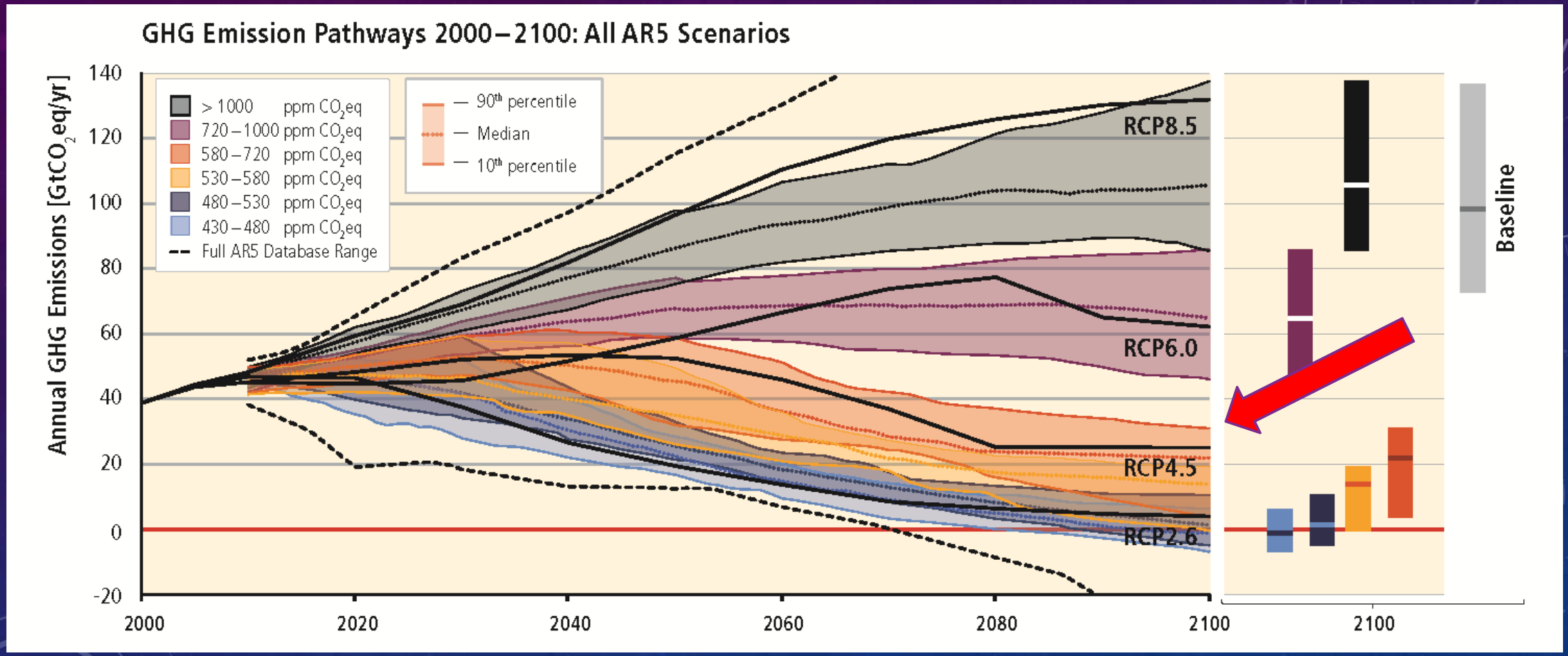


FIG. 3. Strategic maximization with non-Pareto improvements.

Emissions abatement pathways – to stabilize GHG concentrations



From IPCC Summary for Policymakers, 2014.

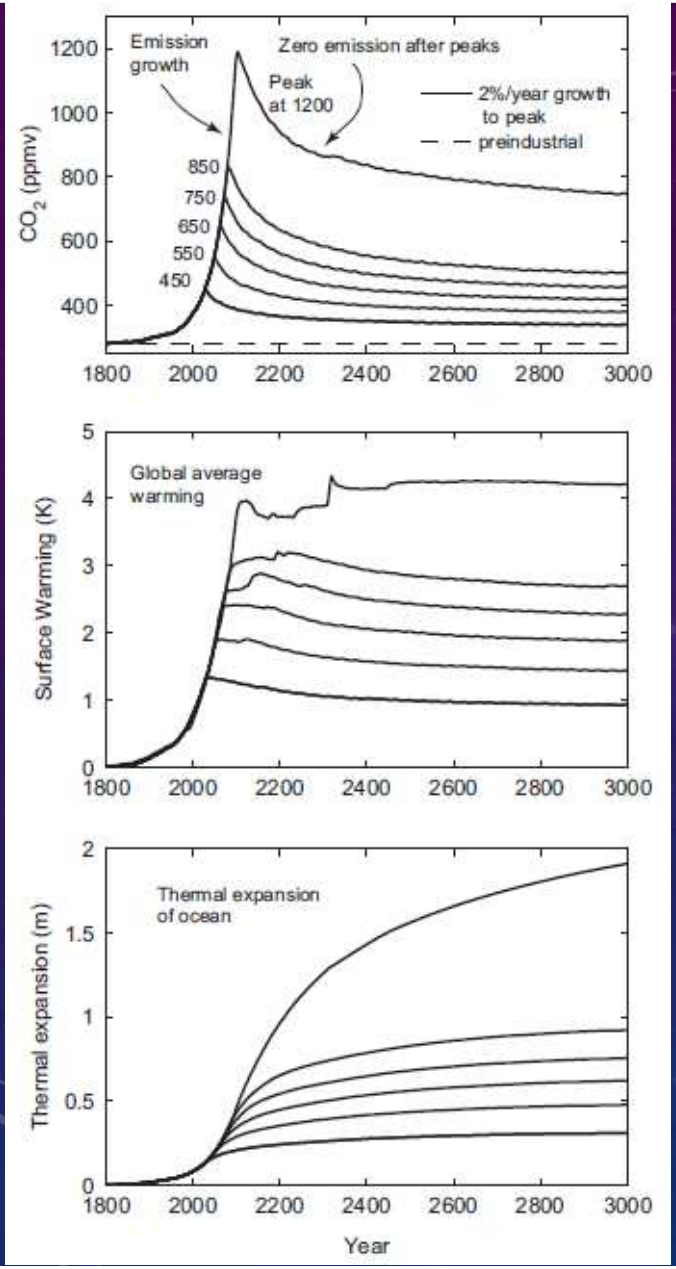


Fig. 1. Carbon dioxide and global mean climate system changes (relative to preindustrial conditions in 1765) from 1 illustrative model, the Bern 2.5CC EMIC.

Climate system responses are shown for a ramp of CO2 emissions at a rate of 2%/year to peak CO2 values of 450, 550, 650, 750, 850, and 1200 ppmv, followed by zero emissions.

(*Top*) Falloff of CO2 concentrations following zero emissions after peak.

(*Middle*) Globally averaged surface warming (degrees Celsius) for these cases (note that this model has an equilibrium climate sensitivity of 3.2 °C for carbon dioxide doubling). Warming over land is expected to be larger than these global averaged values, with the greatest warming expected in the Arctic.

(*Bottom*) Sea level rise (meters) from thermal expansion only (not including loss of glaciers, ice caps, or ice sheets).

From: Solomon, Susan, et al. "Irreversible climate change due to carbon dioxide emissions." *Proceedings of the national academy of sciences* (2009).

Literature on international environmental agreements: without "special features" the outcome for global public goods will be a non-cooperative, 'tragedy of the commons'

- E.g., Barrett, Scott. "Self-enforcing international environmental agreements." *Oxford Economic Papers* (1994): 878-894.

  International Environmental Agreements "can do little to improve on the non-cooperative outcome when the number of countries that share the resource is large."

- Pavlova, Yulia, and Aart De Zeeuw. "Asymmetries in international environmental agreements." *Environment and Development Economics* 18.01 (2013): 51-68.

  This paper considers self-enforcing international environmental agreements … "This confirms a persistent result in this literature that large stable coalitions usually go hand in hand with low gains of cooperation."

Lit. on common-pool resource management (e.g., Elinor Ostrom):

"When will the users of a resource invest time and energy to avert 'a tragedy of the commons'?" (Ostrom 2009)…

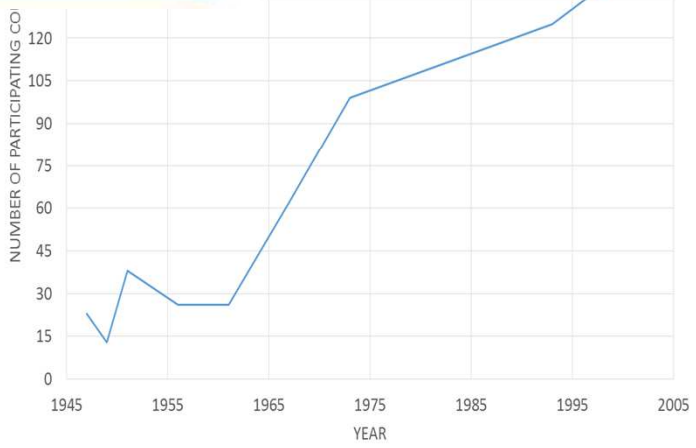
"…when expected benefits of managing a resource exceed the perceived costs of investing in better rules and norms for most users and their leaders, the probability of users' self-organizing is high"

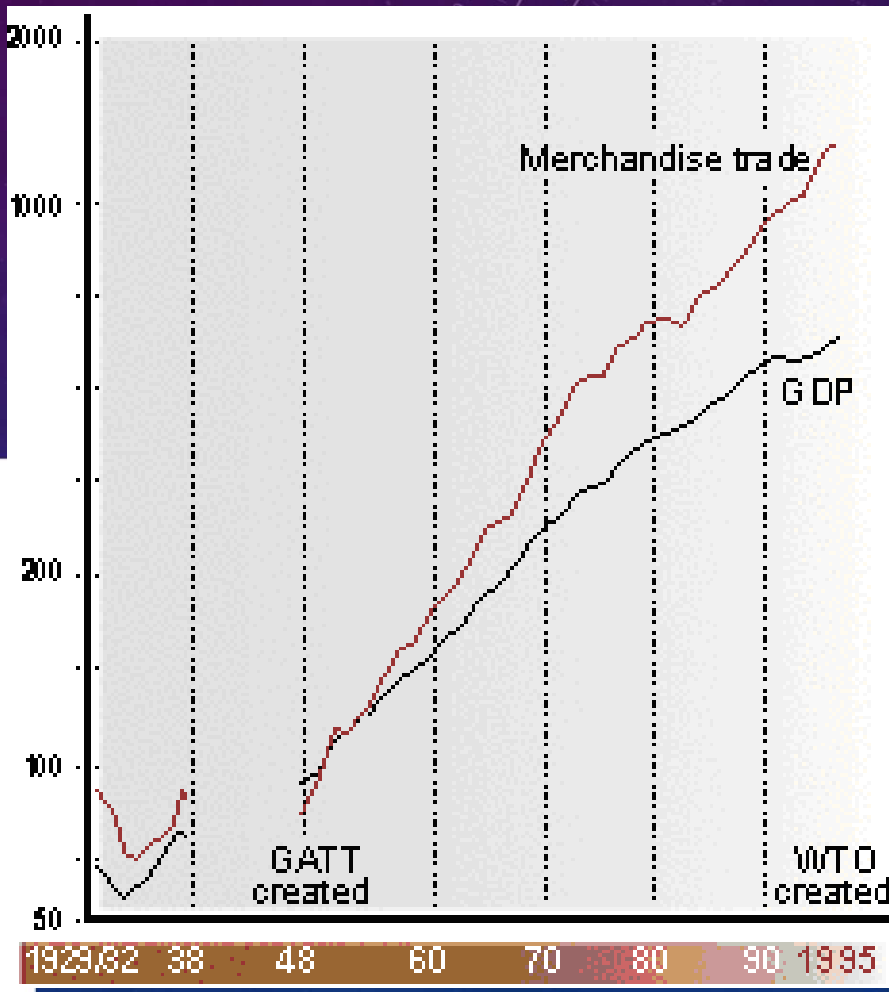
"… self-organizing to sustain a resource costs time – and effort can result in a loss of short-term economic gain. These costs, as well as the fear that some users will cheat on rules related to when, where, and how to [use a resource] can lead users to avoid costly changes"… in current practices.

GATT Negotiating Rounds

Negotiating Round and Coverage	Dates	Number of Participants	Tariff Cut Achieved (percent)
Addressed tariffs			
Geneva	1947	23	21
Annecy	1949	13	2
Torquay	1951	38	3
Geneva	1956	26	4
Dillon Round	1960–1961	26	2
Kennedy Round	1964–1967	62	35
Addressed tariff and nontariff barriers			
Tokyo Round	1973–79	99	33
Uruguay Round	1986–93	125	34
Doha Round	2002–	149	—

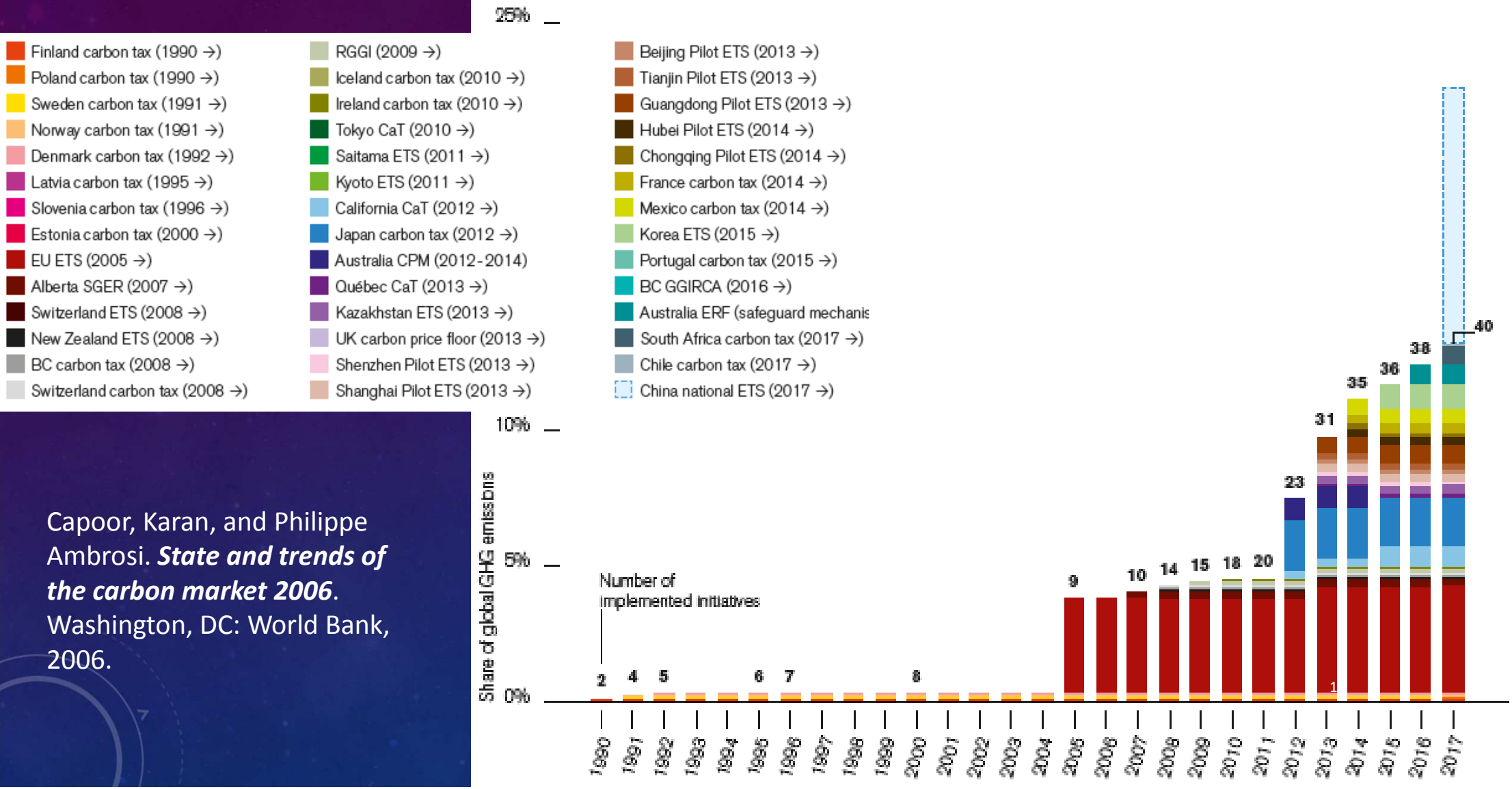
-- PARTICIPATION TREND



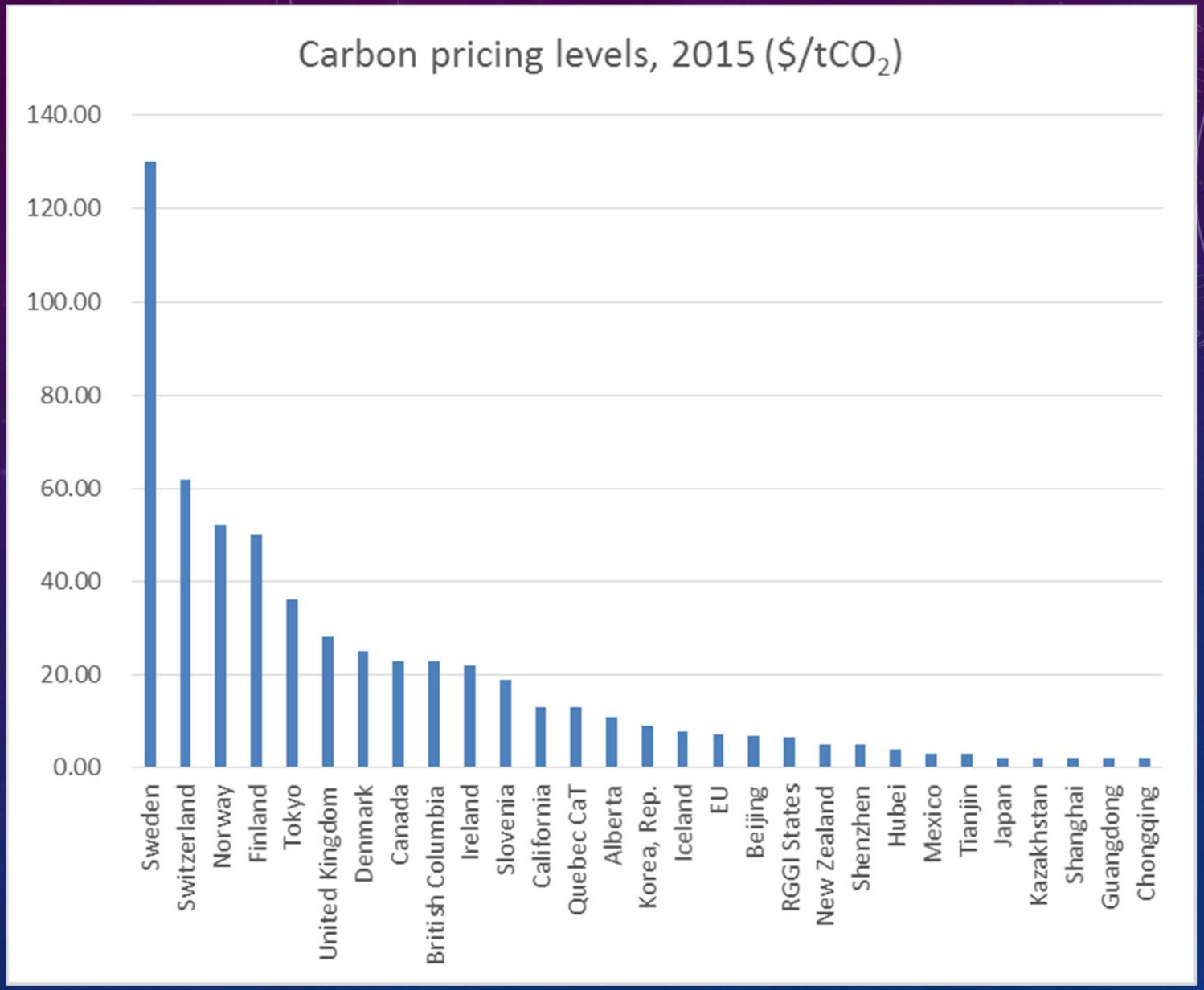


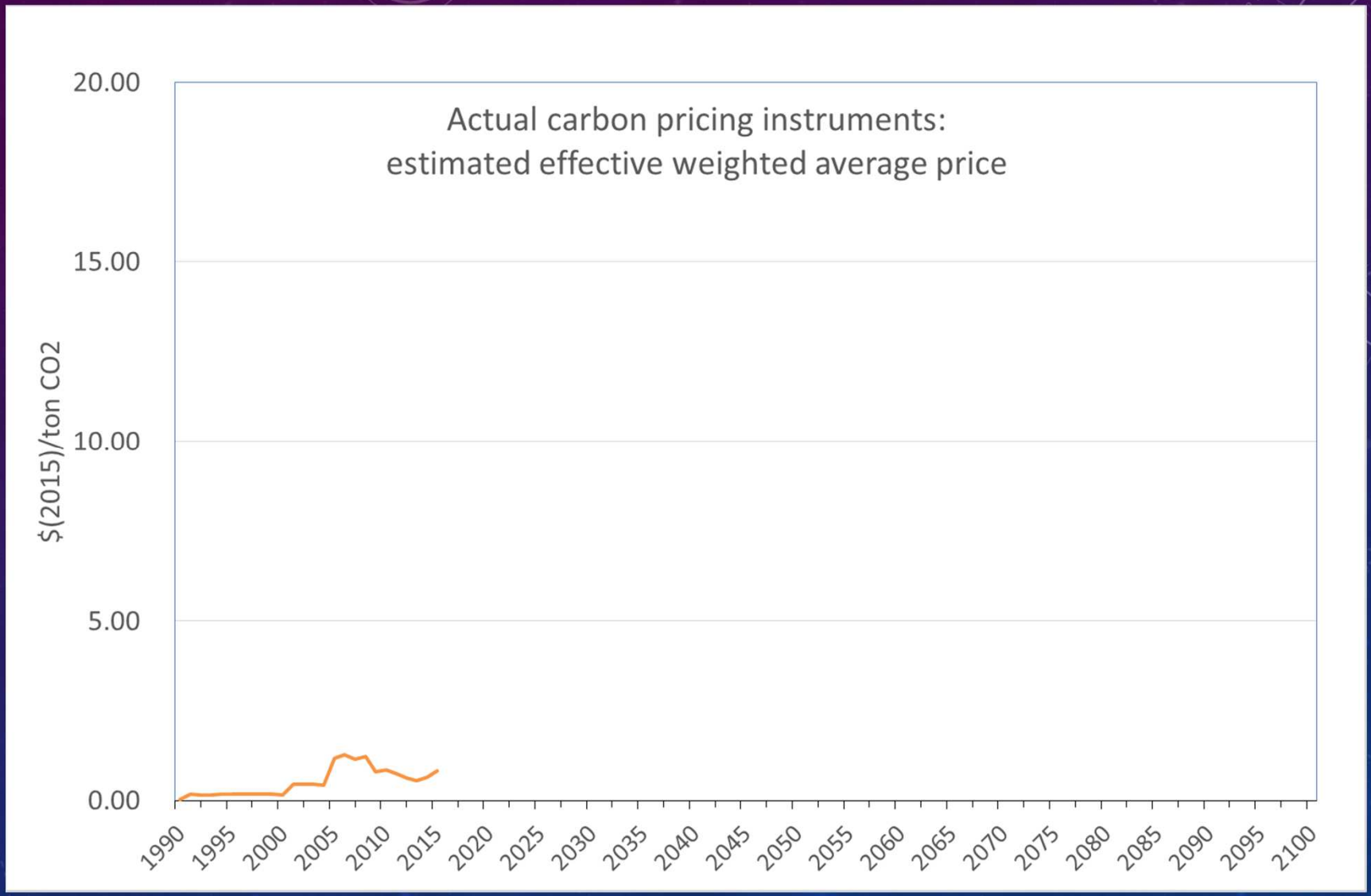
(1950 = 100)

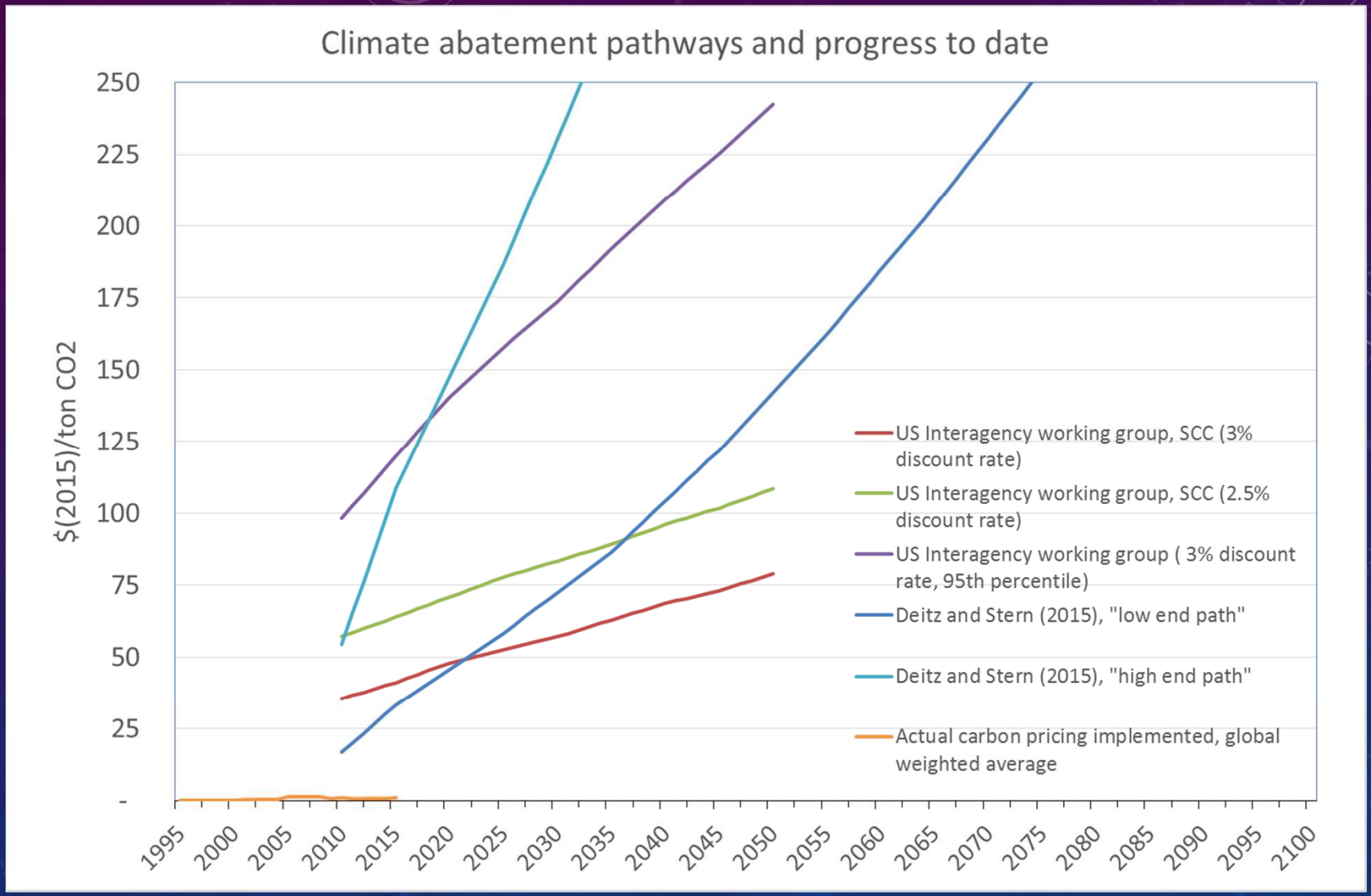
Figure 2. Regional, national and subnational carbon pricing initiatives: share of global emissions covered

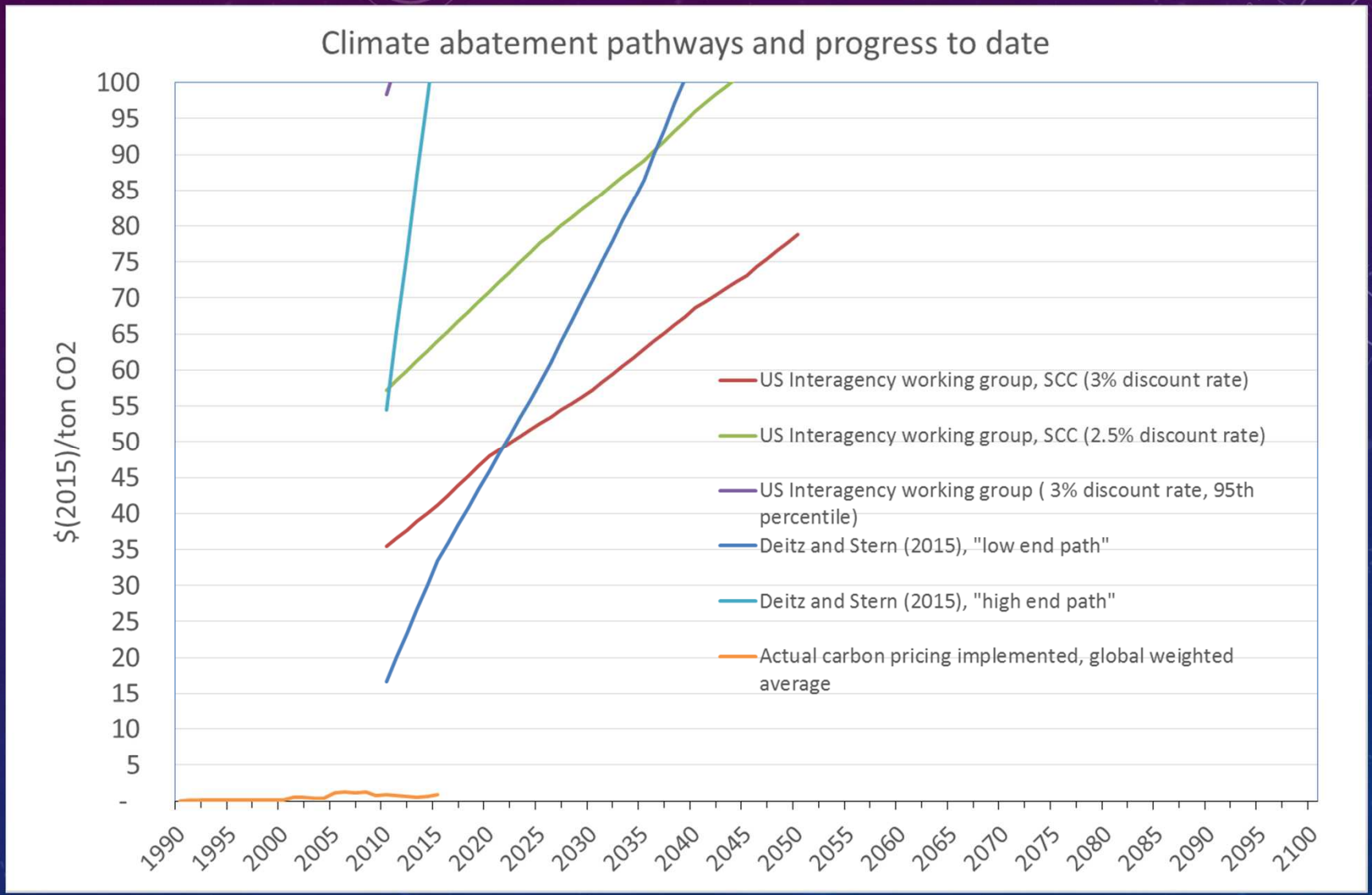


Capoor, Karan, and Philippe Ambrosi. ***State and trends of the carbon market 2006***. Washington, DC: World Bank, 2006.


Carbon pricing levels, 2015 ($/tCO2)
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Sweden
Switzerland
Norway
Finland
Tokyo
United Kingdom
Denmark
Canada
British Columbia
Ireland
Slovenia
California
Quebec CaT
Alberta
Korea, Rep.
Iceland
EU
Beijing
RGGI States
New Zealand
Shenzhen
Hubei
Mexico
Tianjin
Japan
Kazakhstan
Shanghai
Guangdong
Chongqing


Actual carbon pricing instruments:
estimated effective weighted average price
$(2015)/ton CO2
20.00
15.00
10.00
5.00
0.00
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
2095
2100


Climate abatement pathways and progress to date
$(2015)/ton CO2
250
225
200
175
150
125
100
75
50
25
-
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
2095
2100
US Interagency working group, SCC (3% discount rate)
US Interagency working group, SCC (2.5% discount rate)
US Interagency working group (3% discount rate, 95th percentile)
Deitz and Stern (2015), "low end path"
Deitz and Stern (2015), "high end path"
Actual carbon pricing implemented, global weighted average


Climate abatement pathways and progress to date
$(2015)/ton CO2
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
-
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
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2075
2080
2085
2090
2095
2100
US Interagency working group, SCC (3% discount rate)
US Interagency working group, SCC (2.5% discount rate)
US Interagency working group (3% discount rate, 95th percentile)
Deitz and Stern (2015), "low end path"
Deitz and Stern (2015), "high end path"
Actual carbon pricing implemented, global weighted average

The optimal policy for a two-individual world, where benefits can be transferred from individual 2 to individual 1, where $\partial P/\partial b_1 > \partial P/\partial b_2$. If transfer costs per dollar is $\$\beta$, optimality is achieved where

$$\left(\beta\frac{\partial P}{\partial b_1}-\frac{\partial P}{\partial b_2}\right)(b_1+b_2)=P(b_1,b_2)(1-\beta)$$

Where β and b_1 are implicit functions of b_2.

The left hand size represents the gain in expected net benefits due to an increase in probability; the right hand side gives the loss due to the lower level of total benefits.

Zeckhauser's examples of how to improve probability of successful implementation:

Mechanisms used in U.S. environmental policies "to spread costs and benefits"

a. **Coupling** with additional provisions or legislation:

- Compensating benefits
- Indemnities

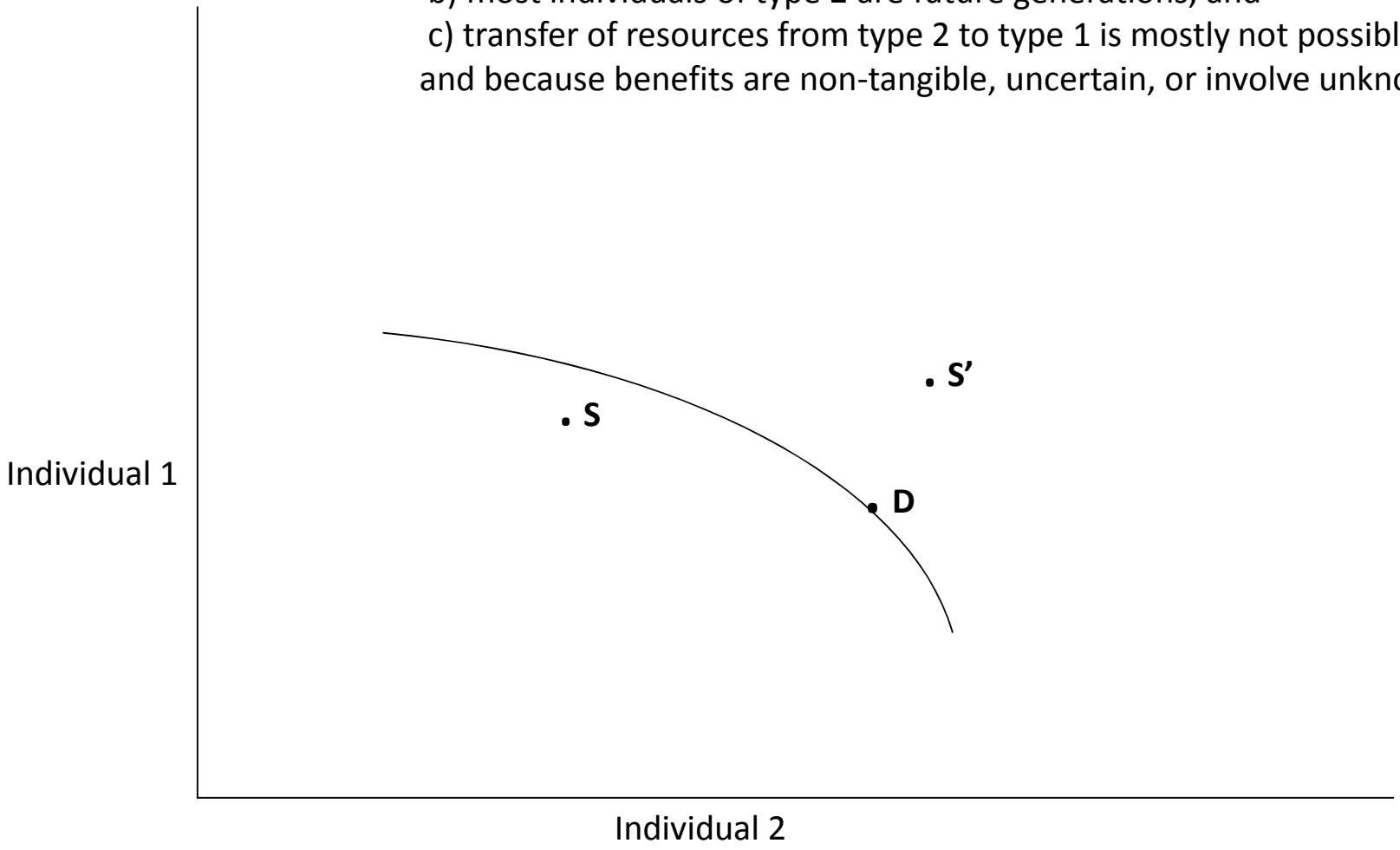
b. **Delayed or phased** implementation:

- Stepped introduction of fees, or implementation
- Flexible deadlines

c. **Manipulation of uncertainty**:

- clouding the identity of losers, leaving form of impositions in doubt.

Non-Pareto improvement situation: but where:
a) most individuals are like Individual 1,
b) most individuals of type 2 are future generations, and
c) transfer of resources from type 2 to type 1 is mostly not possible because of b) and because benefits are non-tangible, uncertain, or involve unknown future risks



Factors affecting likelihood of users' engaging in collective action to self-organize (Ostrom, 2009. Science)

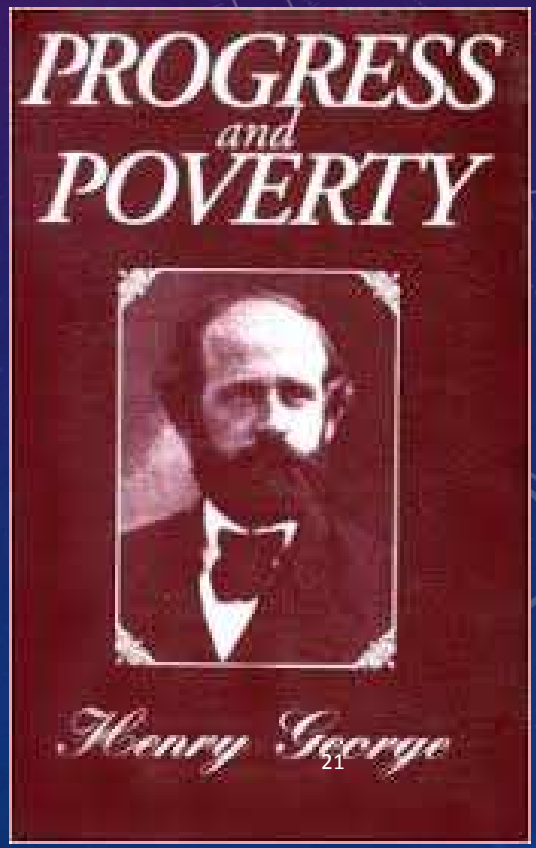
1. Small size of the resource system
2. Small number of users
3. Predictability of system dynamics
4. Resource is stationary and observable
5. Clear evidence of scarcity before users invest in self-organizing
6. Leadership – when some users of the resource have prior skill and credibility
7. Shared moral and ethical standards among users, norms of reciprocity, trust
8. Shared common knowledge about the complex social-ecological system
9. Importance of the resource
10. Ease of developing collective choice rules

Welfare losses from distortionary taxation have persisted, with no apparent ability or effort to eliminate them.

- "One of the most important but underappreciated ideas in economics is the Henry George principle of taxing the economic rent of land, and more generally, natural resources.“ – Joe Stiglitz 2013 [See Arnott and Stiglitz *Quarterly J. of Econ*. 1979]

- Adam Smith, The Wealth of Nations. “Ground-rents are a still more proper subject of taxation than the rent of houses.”

- Shifting to taxation of land rents would eliminate the excess burden of existing taxation, estimated for the U.S. to be $0.25-0.35/dollar of revenue.



International distribution of SCC, based on three IAMs (Kotchen, NBER 2016)

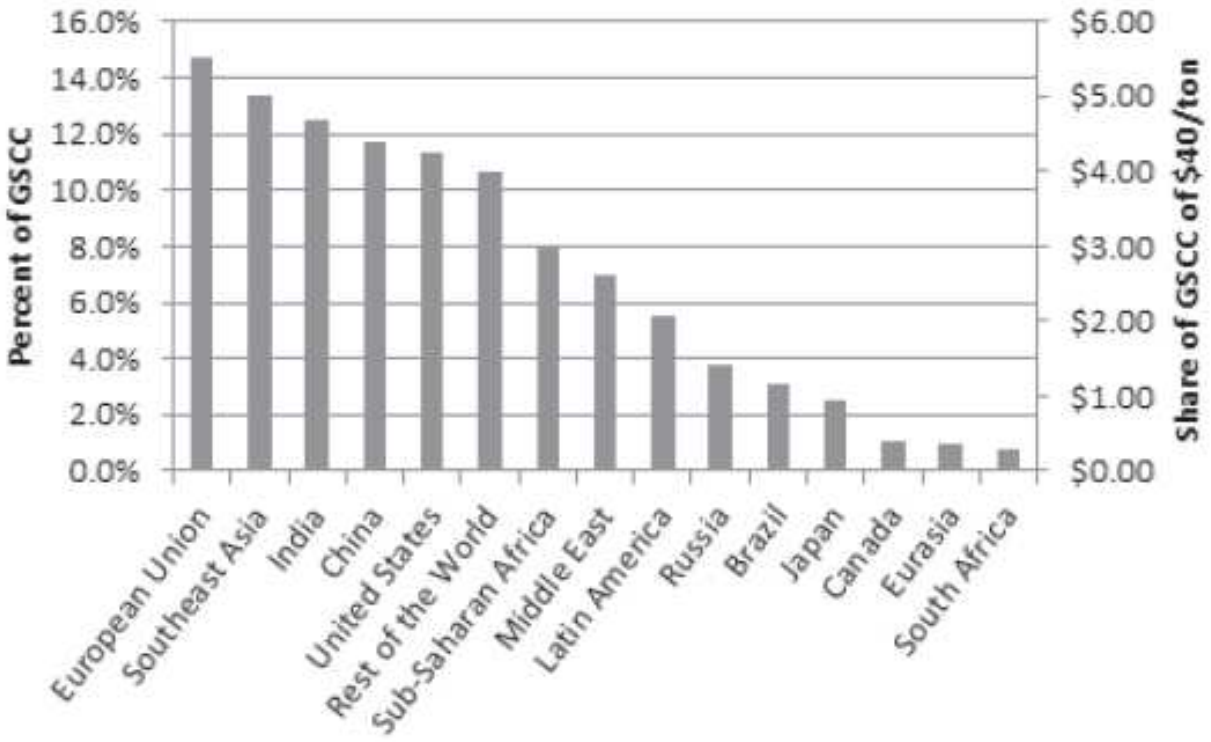


Figure 1: Heterogeneity in the distribution of the GSCC across countries or regions based on averaging across three IAMs

Distribution of climate policy WTP in U.S. (Kotchen, et al. 2013)

Table 2
Percentage distribution of willingness-to-pay responses by policy instrument and survey year.

Response	2010 Survey			2011 Survey		
	Cap-and-trade	Carbon tax	Unspecified policy	Cap-and-trade	Carbon tax	Unspecified policy
$0	34.1	31.4	29.6	25.8	30.5	26.2
$26	15.2	16.0	15.1	14.6	14.8	12.9
$60	10.3	12.5	12.1	16.3	15.4	16.4
$121	6.0	6.7	8.5	7.7	8.1	10.1
$157	4.0	2.3	4.2	2.6	1.7	2.8
$193	0.9	0.9	1.2	1.4	1.2	1.9
$250	3.2	4.9	6.0	4.0	4.4	3.8
$475 or more	3.4	2.3	1.8	2.9	2.6	2.8
Don't know	22.9	21.2	21.5	22.9	20.4	20.2
No answer	0.00	1.7	0.00	1.7	0.9	2.8
Observations	349	344	331	349	344	317

Notes: Columns may not sum to 100 due to rounding.

Obstacles to domestic support for climate policy:

1. Benefits (of policy) occur mostly in the future
2. Benefits are highly uncertain
3. Many benefits are intangible, non-market, ill-defined
4. Incidence of benefits is uncertain
5. Large proportion of benefits accrue to future generations

6. Costs (of policy) are more immediate
7. Costs are more certain
8. Most costs are easily understood in monetary terms
9. Incidence of the costs are more certain
10. Concentrated costs for owners of assets reflecting capitalized resource rents

What other tools, mechanisms, could improve the probability of actions to stabilize the climate before irreversible damages become large?

Three themes:

1. Alter the incentives among countries (negative b_j) that produce free riding and a "tragedy of the commons"

2. Improve probability of domestic policy approval $P(B)$ by altering the level and/or distribution of individuals' (low and varied) benefits ($b_i s$)

3. Promote changes in laws (property rights & liability) to leverage support

Theme #1:

Alter the incentives among countries (negative b_j) that produce free riding and a "tragedy of the commons"

Strategy: Use tariff threats on non-participants in "climate club"

Nordhaus, William. "Climate clubs: overcoming free-riding in international climate policy." *The American Economic Review* 105.4 (2015): 1339-1370.

Böhringer, Christoph, Jared C. Carbone, and Thomas F. Rutherford. "The strategic value of carbon tariffs." *American Economic Journal: Economic Policy* 8.1 (2016): 28-51.

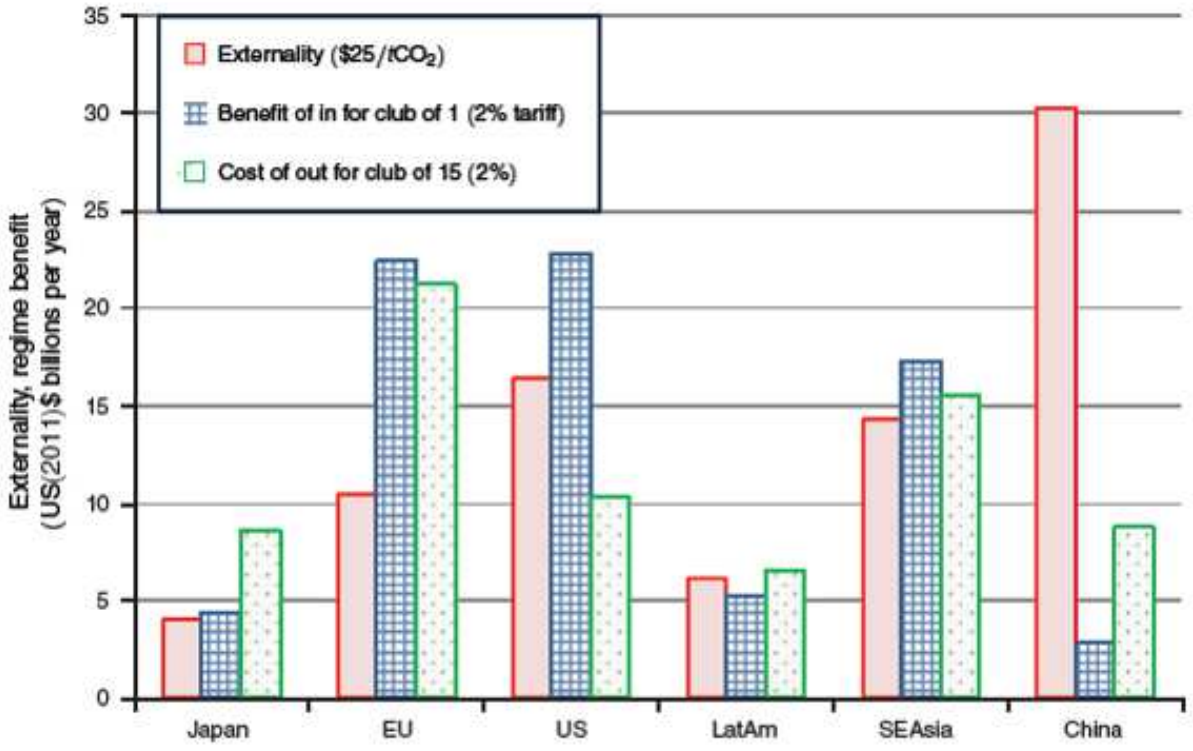


FIGURE 1. COMPARISON OF THE TRANSNATIONAL EXTERNALITY AND THE IMPACTS OF PENALTY TARIFFS BY REGION

Notes: The left-hand externality bar shows the transnational spillover for each region for a $25 per ton global social cost of carbon. The middle benefit bar shows the benefit of participating in a Climate Club with a penalty tariff of 2 percent for clubs of 1 (that is, the region is the only participant). The right-hand cost bar shows the cost of not participating in a Climate Club with a penalty tariff of 2 percent for clubs of 14 (that is, the region is the only nonparticipant).

From Nordhaus:

This study examines the club as a model for international climate policy. Based on economic theory and empirical modeling, it finds that without sanctions against non-participants there are no stable coalitions other than those with minimal abatement. By contrast, **a regime with small trade penalties on non-participants, a Climate Club, can induce a large stable coalition with high levels of abatement.**

Theme #2:

Improve probability of domestic policy approval *P(B)* by altering the level and/or distribution of individuals' (low and varied) benefits (b_is)

- Strategy: use revenues from a carbon tax to finance actions where a set of a) self-identified beneficiaries are currently b) least likely to support climate policy.

(Comes closest to a "Zeckhauser solution")

Options for using carbon tax revenue	Recent sponsors
Lump-sum rebates to individuals	Sens. Sanders and Boxer, 2013
Reduce federal budget deficit	Rep. Stark and Larson, 2011; Rep. McDermott 2012
Fund climate, energy, and adaptation R&D	Rep. McDermott 2012
Give revenue to states or other sub-federal entities	
Reduce (or prevent increase in) payroll or labor income taxes	
Give revenue to utilities to lower electricity rates	
Reduce captial gains taxes (corporate income tax or capital gains tax)	
Fund transportation, education and disadvantaged communities	Governor Jay Inslee, 2014
Finance Social Security funding gap	Rep. Inglis 2009
Pay for health insurance for 30 million uninsured	

Theme #3:
Promote modification of laws (property rights & liability) to leverage support

Some background – laws and institutional change:

1. Property rights and related institutions are public goods, created by society.
2. R. Posner and others posit that "common law is best explained as an effort, however inarticulate, to promote efficiency." (to max. social welfare)
3. Government policies can be an attempt to improve on "property rights only" failures (owing to high transactions costs).
4. But, status quo vested interests often work against welfare-improving changes in law or policy. They "lock-in" status quo institutions (D. North).

Theme #3 (Continued):

Promote modification of laws (property rights & liability) to leverage support

Background (part 2): specific to climate policy:

1. Firms in some industries are concerned about losing competitiveness with climate policy (Carbone and Rivers, draft)

2. Some industrial sectors would face large asset value losses with climate policies (Jenkins, J. 2014. Energy Policy), including oil companies.

3. These asset values represent capitalize resource rents from degradation of the atmosphere.

Strategy: Litigation. Bring law suits against governments and oil companies for damages

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HOME CLIMATE CASE PEOPLE'S CLIMATE MARCH REPORT 2030

THE URGENDA CLIMATE CASE AGAINST THE DUTCH GOVERNMENT

Together with 900 citizens the Urgenda Foundation filed the Climate Case against the Dutch Government. On 14 April 2015, the district court in The Hague heared the arguments of the parties. The verdict will be reached June 24th.

The Urgenda Foundation has filed a lawsuit against the Dutch Government for not taking sufficient measures to reduce greenhouse gas emissions that cause dangerous climate change. The Urgenda Climate Case is the first case in Europe in which citizens attempt to hold a state responsible for its potentially devastating inaction. It is also the first case in the world in which human rights are used as a legal basis to protect citizens against climate change.

The Climate Case was initiated in November 2012 with a letter to the government asking for action and a

CONTACT


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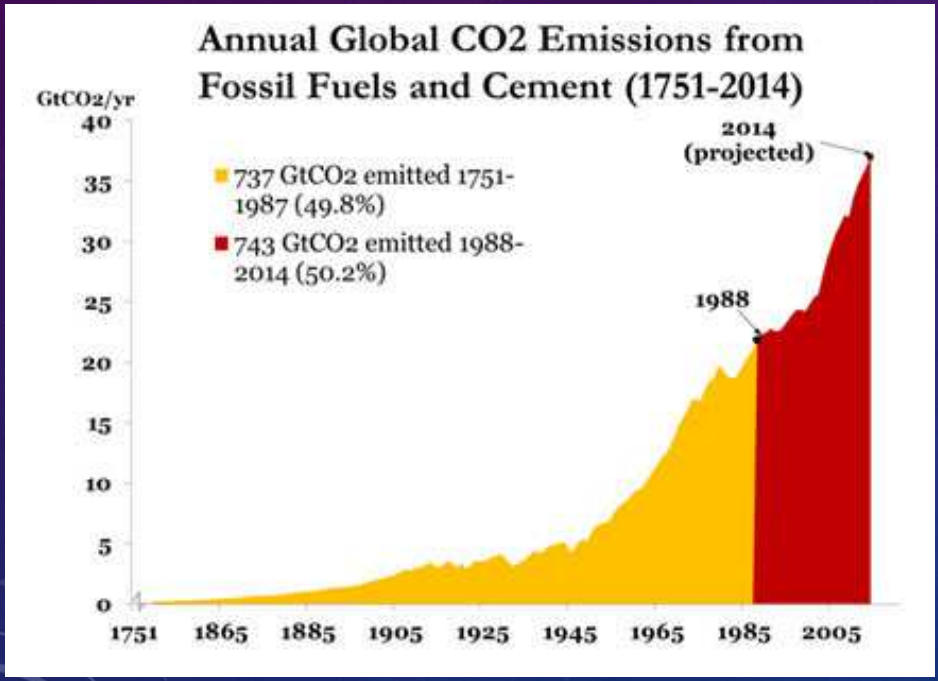
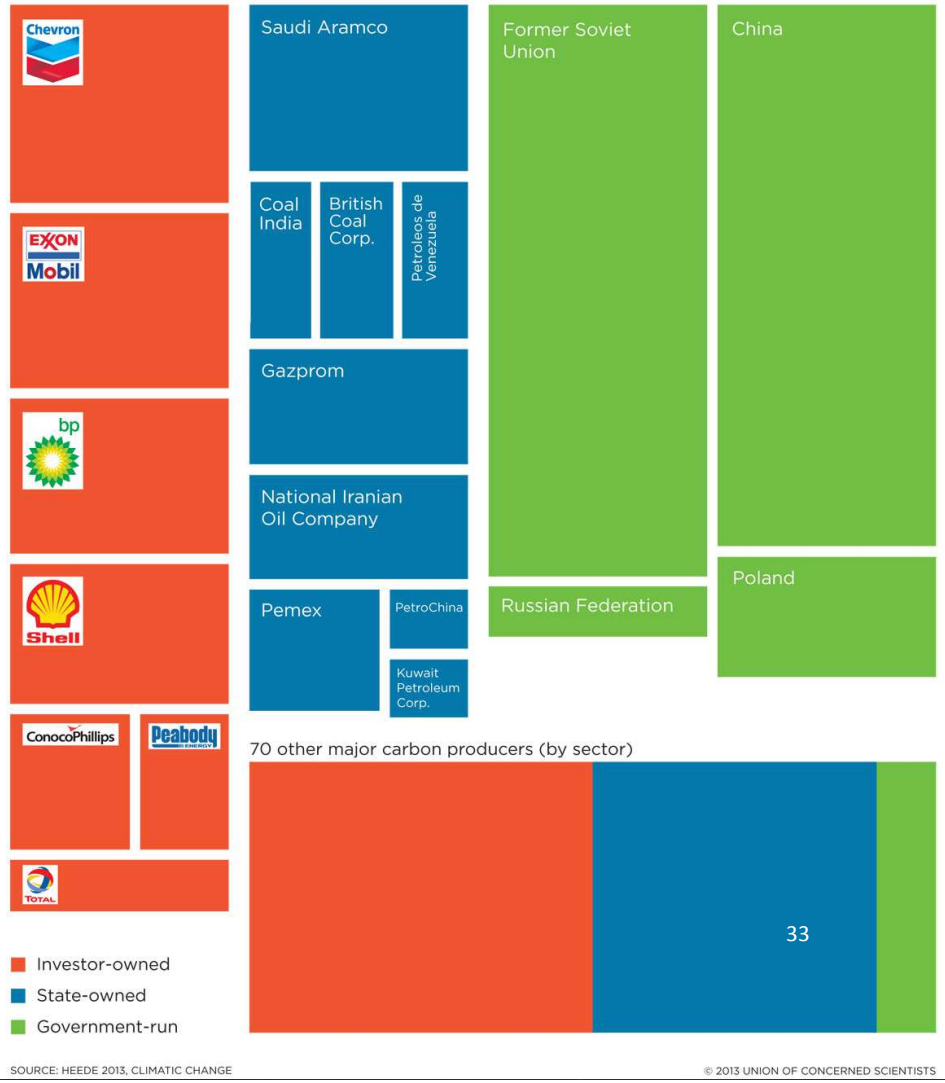
Union of Concerned Scientists

Science for a healthy planet and safer world



Major Industrial Carbon Producers

Nearly two-thirds, 63 percent, of industrial carbon dioxide and methane released into the atmosphere from 1854–2010 can be traced to fossil fuel and cement production by just 90 entities. The top 20 entities, shown here, produced 48 percent of all industrial carbon pollution, with 15 percent produced by another 70 entities.



Climate change

Peruvian farmer demands climate compensation from German company

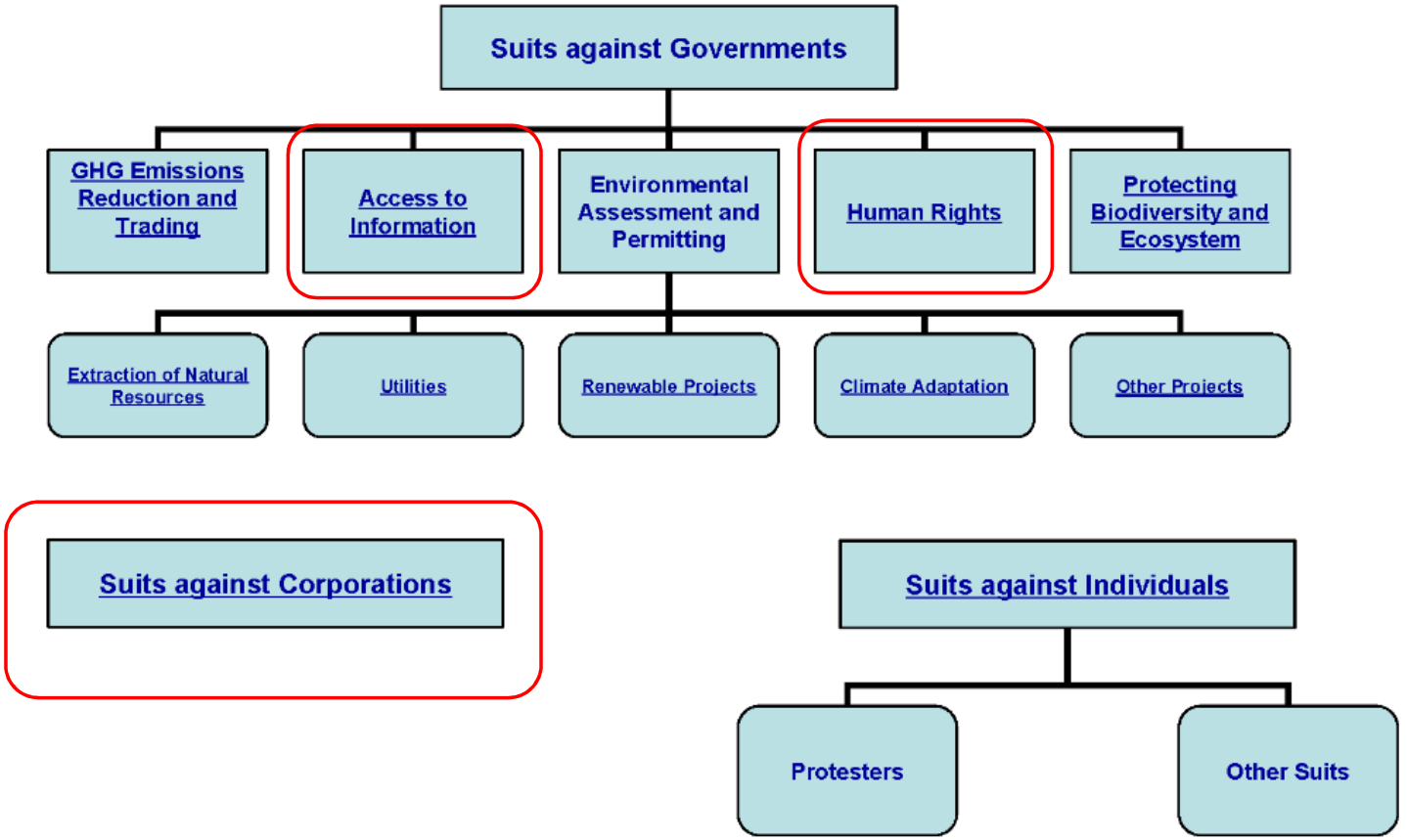
RWE asked to pay for costs of protecting home lying in the floodpath of a glacial lake as its historical emissions are linked to glacial retreat in the Andes

COLUMBIA LAW SCHOOL
CENTER FOR CLIMATE CHANGE LAW

http://www.law.columbia.edu/centers/climatechange

Non U.S. Climate Change Litigation Chart

Click here for Climate Change Litigation in the U.S.



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CLIMATE LITIGATION GOALS:

One legal argument:

- Is environment covered under “human rights”?
- Is climate covered under “environment”?
- If so, then oil companies, or governments, could be liable for violating human rights

Potential impact on firm’s behavior:

- Process will raise public awareness
- Information will be obtained through “discovery”
- Evidence that companies have suppressed information or disseminated misinformation could be explosive, and raise liability issues to a new level (this has already happened)
- Public opinion could shift, companies might eventually seek protection from liability in exchange for supporting climate policies.

Some final thoughts:

1. Past and ongoing work by economists, governments, individuals on climate change issues are necessary, but not sufficient, to achieve timely success.

2. The “no time for wishful thinking” view is not new, but needs to be taken more seriously by more people.

3. Looking beyond standard approaches, I’m suggesting there may be mechanisms that complement and leverage ongoing efforts