Climate policy coordination: *Beyond Paris*

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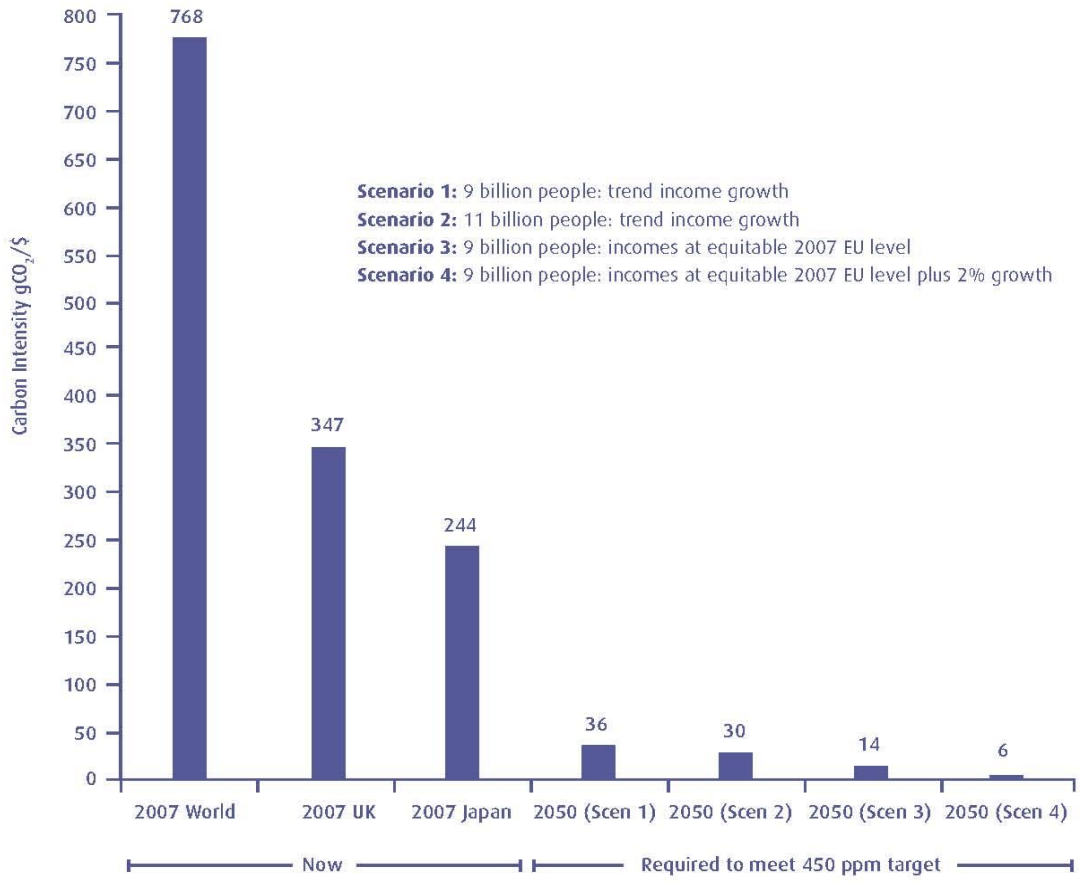
Decoupling requirement is astonishing

Factor 20-100 reduction in emission/energy intensity

Figure 17 **Carbon Intensities Now and Required to Meet 450 ppm Target**[25]

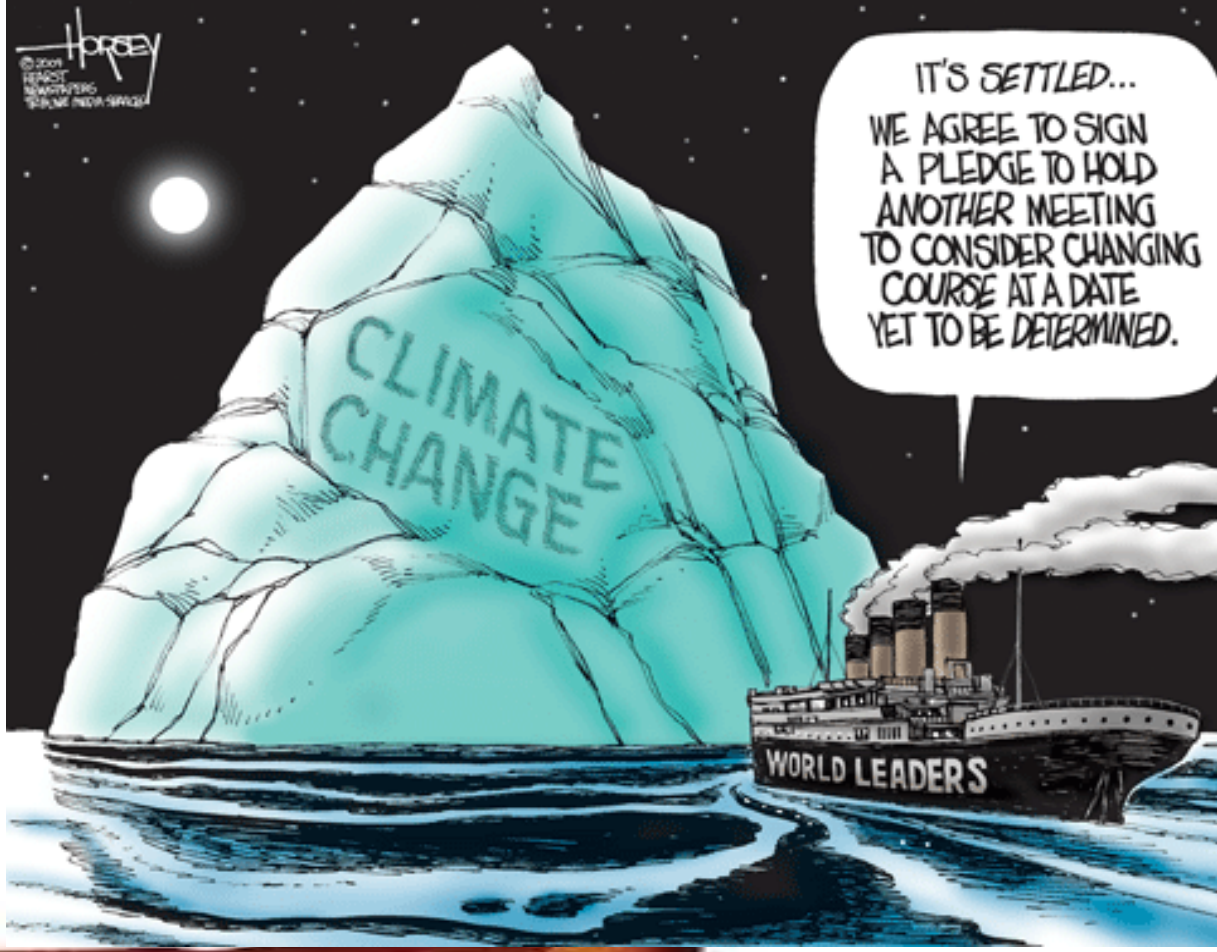


Source: Jackson (2009).

But now we have Paris climate agreement

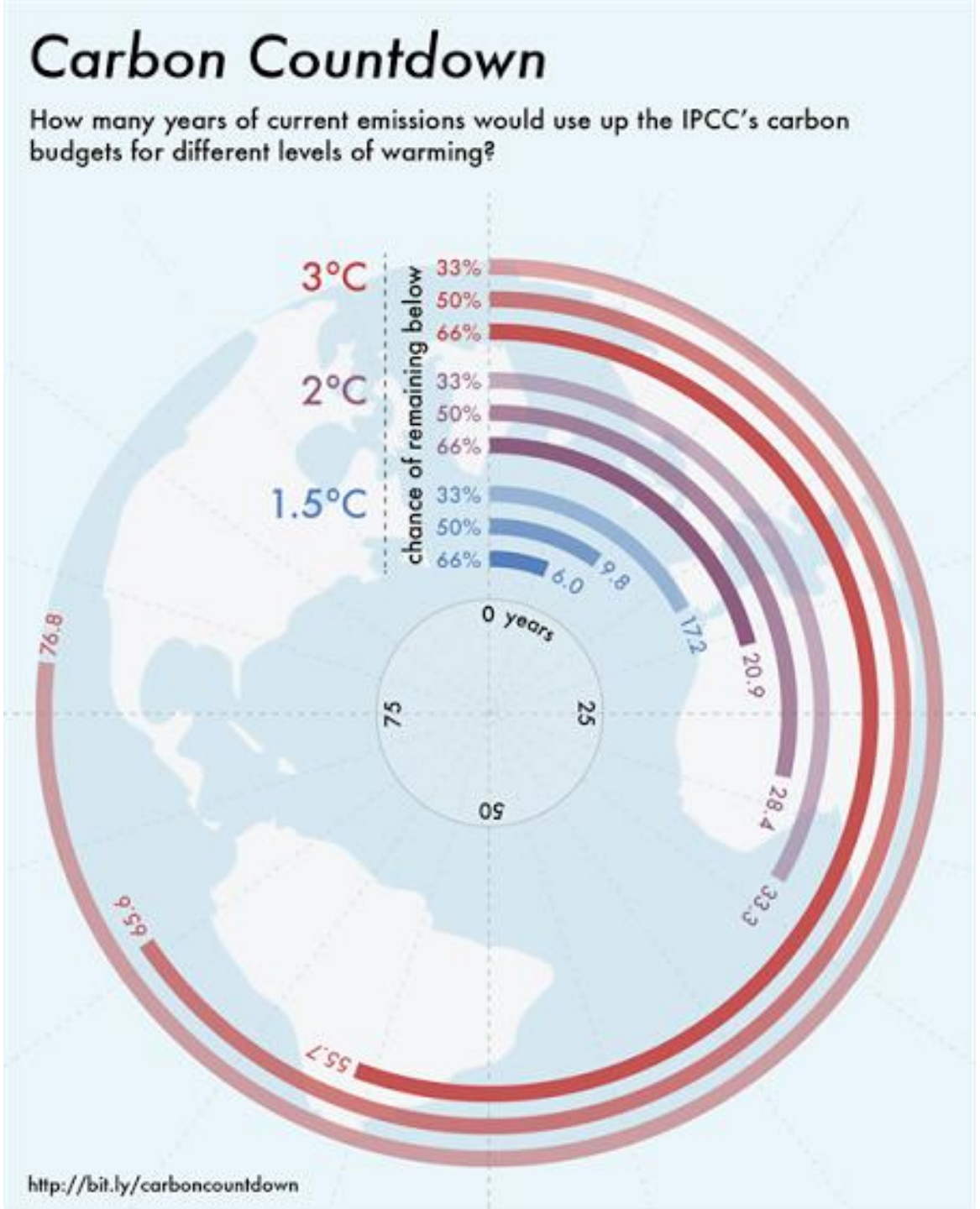
- **Pledges by countries**, or Intended Nationally Determined Contributions (INDCs), voluntarily revised each 5 years.
- Hoped to limit increase in global mean surface temperature to 2 or even 1.5°C but **expected increase is 2.5-3°C.**
- **Transparency mechanism** for monitoring and control.

- Reactions initially positive though later many have **questioned compliance**:
  - *merely targets, no consistent policies*


HORSEY
IT'S SETTLED...
WE AGREE TO SIGN A PLEDGE TO HOLD ANOTHER MEETING TO CONSIDER CHANGING COURSE AT A DATE YET TO BE DETERMINED.
CLIMATE CHANGE
WORLD LEADERS


Paris Agreement
We hereby commit to being uncommitted, but promise to be very good, to help each other and to meet every year, forever.

Time window for action closing quickly



Effective climate policy: *Adopt systems view*

➔ *Systemic effects* of well-intended strategies & policies

➔ Likely to happen under *Paris climate agreement* even if countries try to comply with their pledges.

1. **Carbon leakage** due to distinct stringencies of national (or regional/urban) policies
2. **Oil market responses** (*green paradox*) if only market subsidies for renewable energy
3. **Rebound** of weak policies stimulating energy conservation & efficiency improvements
4. **Environmental problem shifting** of non-systemic policies, part of which involves additional GHG emissions.

Paris: *voluntary pledges, no policy coordination*

- Reactions to Paris agreement ignore 4 systemic effects – no systems view but partial solutions (voluntary action, role cities).
- National policies likely weak out of fear to loose international competitive position => ***rebound***
- National policies likely distinct, as pledges differ (per unit of current emissions or average income) => ***carbon leakage***
- Deployment/diffusion subsidies likely, as polluters prefer these and as many see innovation as main ingredient to low-carbon transition => ***green paradox***

Diversity of pledges / INDCs

Countries given much freedom. Result: pledges in terms of emissions, carbon intensity, single/multiple year targets, etc. Creates headaches for carbon accountants & markets.

Source: http://switchboard.nrdc.org/blogs/hchen/country_report_cards_climate_pledge_COP21_paris.html

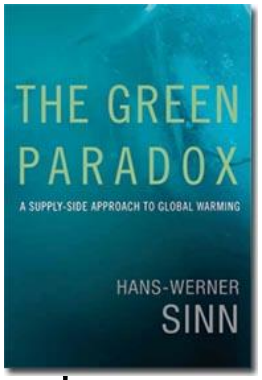
So are they overly excited and optimistic?

Carbon leakage

- **Relocation** of dirty industries and **increase in dirty imports** (shifts in international trade). Much empirical (econometric) evidence
- Sectors with relatively **high energy costs sensitive**: aluminium, cement and paper industries (ETS)
- Telling: rising imports of energy-inefficiently produced products from emerging economies with high carbon intensity (China)

- **Solutions:**
  - International coordination of policies – similar stringency
  - Border tax adjustments accounting for the carbon content of products (uncertain indirect effects, anti-GATT/WTO spirit – but may put pressure on climate treaty negotiations).

Green paradox



- **Climate policies will affect oil/fossil fuel markets**
- Anticipated by oil owners: If market subsidies for renewable energy threaten fossil fuels, their **reserves less valuable over time**. Stimulates rapid extraction.
- Oil price then drops and demand increases. **Result is increase CO_2 in emissions.** Uncertain, no experience, no data, but possible.
- Holds for *direct & indirect (off-budget, hidden) subsidies:* financial grants, tax deductions, renew. energy certificates & price guarantees (feed-in tariffs).
- **Intuitive explanation:** energy cheaper (subsidies), energy demand ↑.

- **Solution:** Guarantee *minimum price for fossil fuels.*

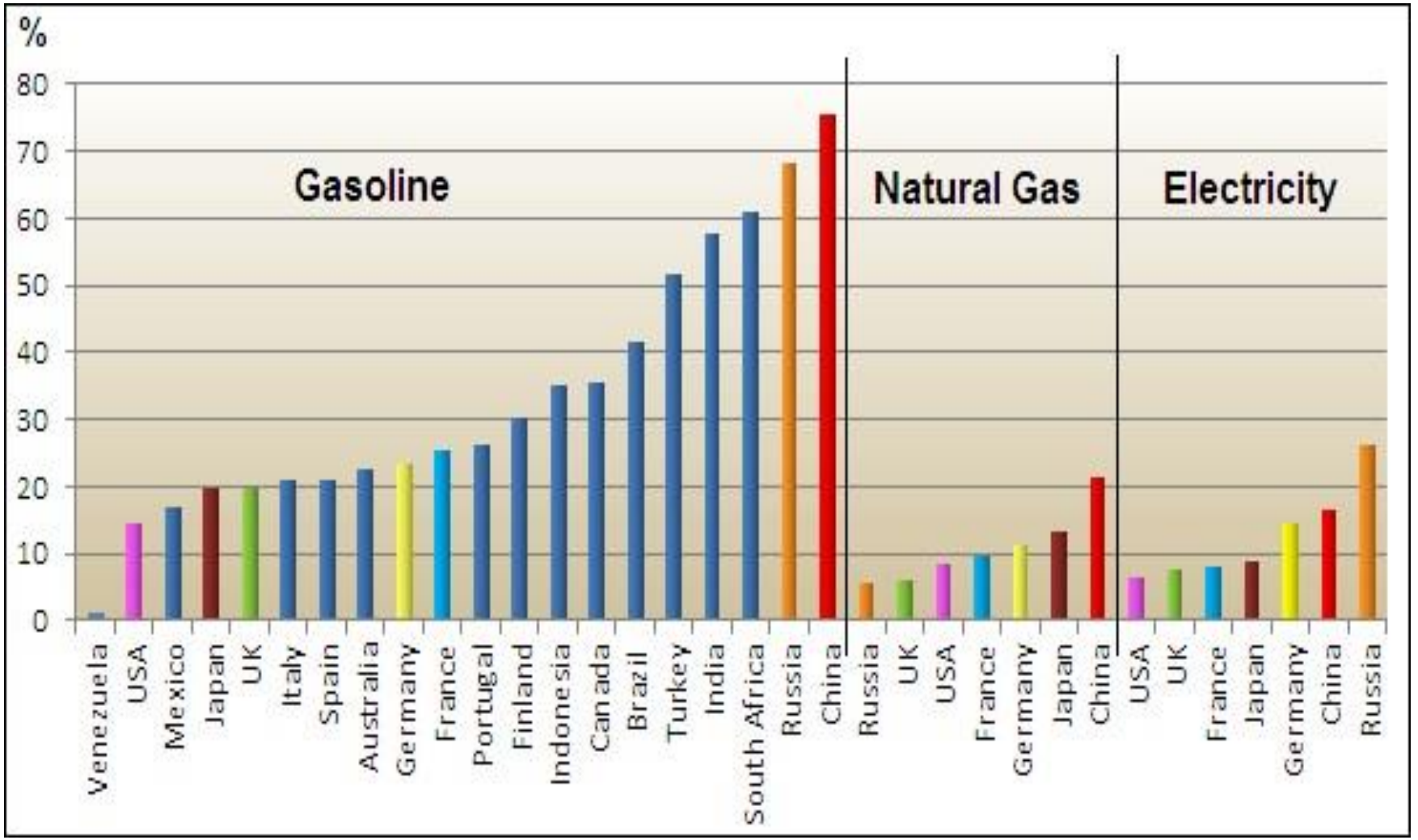
Energy/carbon rebound

- More intensive use of efficient energy-consuming equipment
- Purchase of larger units or units with more functions
- Re-spending financial savings due to conservation
- New, more energy-efficient devices embody much energy
- Price/market demand consequences
- Wide diffusion of more (energy-)efficient technologies … etcetera

  - Steam engine – Jevons paradox (> 100% rebound)
  - UK 2000: cost of lighting 1/3000 of that in 1800; income 15x. But much more light use now: relative spending on light down only 50%.
  - Energy intensity defined as energy input per monetary output has dropped by >30 % since the 1970s – but total energy use has risen.

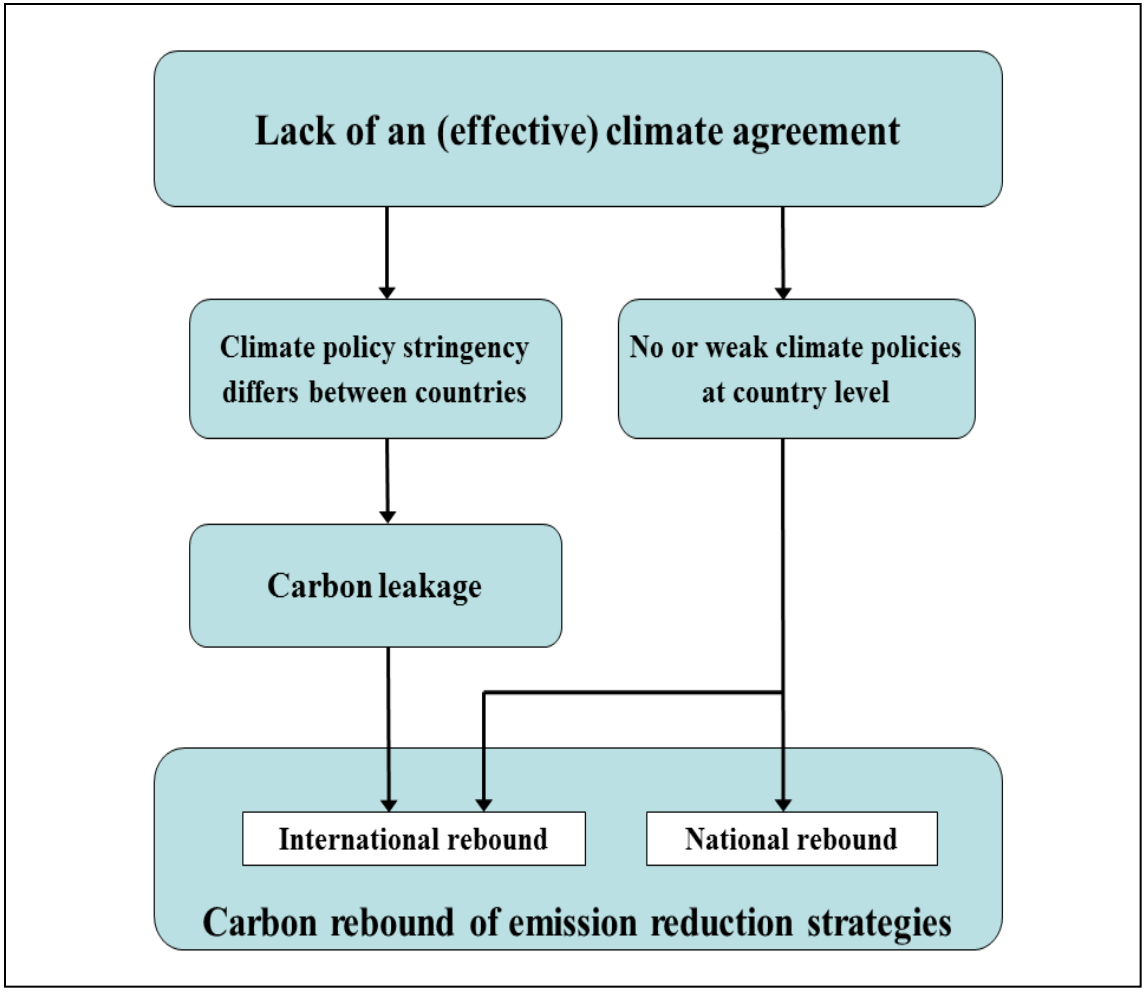
Re-spending rebound, for three energy carriers

National averages, 2009 – vary with national prices and carbon intensity



Source: Antal and van den Bergh (2014, *Energy Policy*)

Connection between *carbon rebound* and *carbon leakage*



Source: van den Bergh (2016)

Rebound ignored by *IPCC* & *COPs*

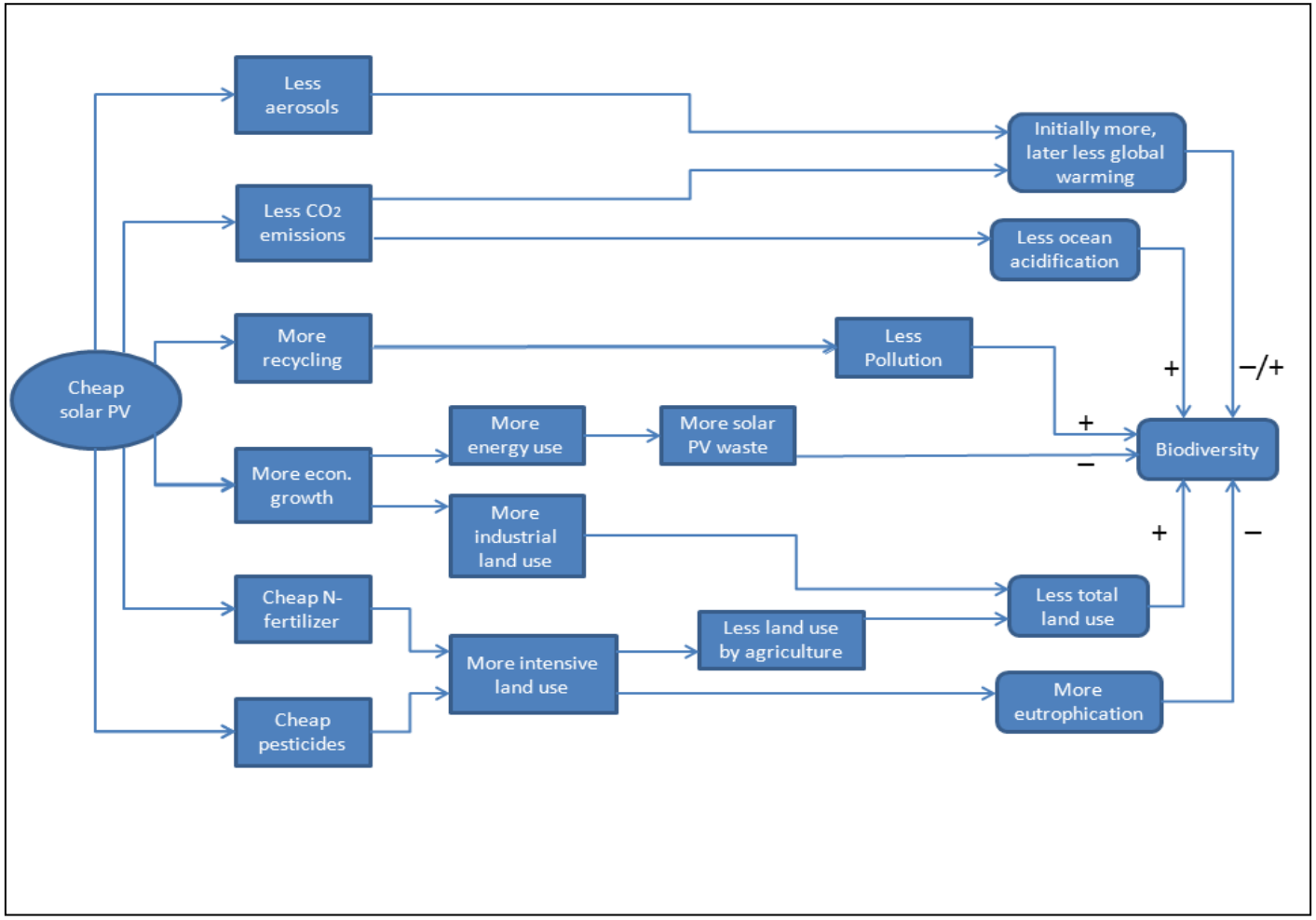
- Rebound not mentioned in *IPCC*'s 40-page Fifth Assessment Synthesis Report; in 31-page summary of Working Group III (Climate Change 2014) only 1 sentence devoted to rebound – which moreover reflects narrow interpretation & fails to stimulate policymakers to *connect climate agreement to rebound*.

- This *connection* has neither received any attention in *academic literature*. To illustrate, the extremely valuable report of "Harvard Project on International Climate Agreements", volume of almost 1000 pages, does not offer any serious discussion of rebound.

- Missed opportunity to motivate ***strict climate policy*** and ***international policy coordination.***

Environmental problem shifting

- Not just biofuels, also renewables, through biophysical and socio-economic channels.
- Very difficult to assess. Illustrated for potential shifting of *cheap solar PV:*



Source: van den Bergh et al. (2015, *COSUST*)

Guestimating systemic effects of Paris

- **Systemic effects likely to be considerable:** carbon leakage 10-20%, rebound 20-70%, green paradox 5-10%, so total 35-100%.
- If total systemic effects imply just 50% lower emission reductions, **global average temperature** up to ±3.7°C.
- Moreover, **unit abatement costs** (= costs of efforts to reduce GHG emissions) will double.

- Back-of-the envelope calculation: more careful analysis needed.

Classical arguments for regulation of (GHG) emissions through carbon prices

1. Can deal with *heterogeneous polluters:* equalizes marginal abatement costs among polluters => *cost-effective*

   - contributes to *political acceptability*

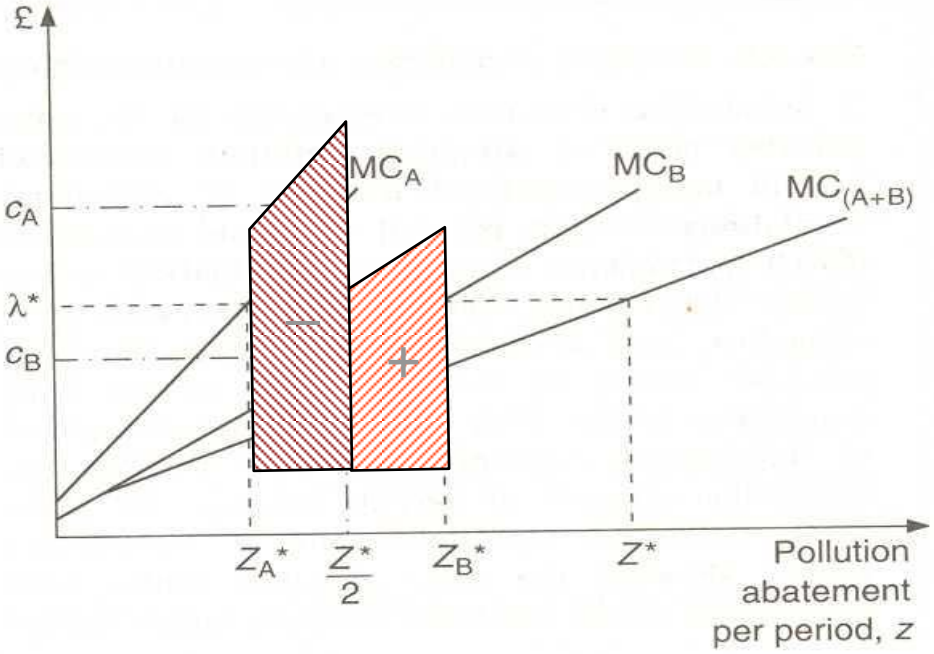
2. Pricing means "decentralisation" of regulation
   => *low information needs.*

3. Permanent incentive for both *technology adoption & innovation*

   - moreover, environmental innovation trajectories misguided if prices wrong.

First argument main finding of environmental economics:

Carbon pricing cheaper than standards



MC_A = Marginal cost of abatement of firm A
MC_B = Marginal cost of abatement of firm B
MC_{A+B} = Combined marginal cost of abatement for industry, A + B

$$Z_A^* + Z_B^* = Z^*$$

$$2\left(\frac{Z^*}{2}\right) = Z^*$$

Carbon pricing : *additional arguments*

1. Subtle, **complete control**: all goods/services have price correction proportional to pollution generated over life-cycle – ***less rebound***
2. Most emissions due to **market decisions**. Price intervention logical
3. No **separate LCA** needed, integrate in **financial accounting firms**
4. Pricing generates **revenues** for correcting undesirable distribution effects (or for innovation subsidies, or climate finance for poor countries)
5. Pricing said to be politically unattractive, but **international coordination** of policy arguably easiest through pricing – ***less carbon leakage***
6. Guarantees **minimal oil price – *green paradox avoided***
7. Shifts **revenues from OPEC to oil importers**

Rebound important reason for carbon price

- **Technical standards not effective**: cover only small subset of products
  - E.g., when European Union began phasing out incandescent light bulbs in 2009, light-emitting diodes became so widespread that any energy savings were reduced.
  - Impossible to control all emissions with standards: millions of technologies and products; moreover, need *continuous updating* in response to technical change.
- Carbon pricing assures rebound will be **optimal from social welfare angle**
- Most effective way to discourage rebound is through **carbon pricing** as it **affects all potential energy-savings decisions**.
  - *Cap-and-trade:* any rebound tendency would elicit a higher carbon price.
  - *Carbon tax:* requires adjustment if rebound means not reaching emissions reduction goals. This is difficult politically, certainly with a global carbon tax.

Nothing new under the sun

But not only carbon prices: *Policy package*

➔**Only carbon pricing** – *early lock-in of non-optimal solutions*:

- Reinforces early lock-in of currently cost-effective technologies
- Learning potential of alternatives is neglected
- Incremental innovation more attractive than radical innovation

=> Also technology-specific policies to keep options open.

➔**Only technology support** (subsidies) – risk of *green paradox*

➔**Information provision** – not just on *climate change*, also urgency of *international policy coordination*, and need for *carbon pricing*

Paris climate agreement is not enough

- **Amendment to Paris agreement:** coordination for similar, strict national policies. Controls systemic effects
- **Carbon price** ideal instrument for coordination: Compare harmonizing millions of technology standards.
- Decisions on **initial carbon price** (e.g. 50 US$) and **annual increase** (e.g., 5 US$); final price based on global emissions response.
- Then all producers and investors have **clarity/certainty about future** and can anticipate it: **minimizes economic costs and risks.**
- National **carbon tax revenue collection** or internationally (UN), redistributing among countries.

Transition to carbon pricing - how?

➔Small group of countries undertaking ambitious unilateral policies: ***climate club + penalties*** (Nordhaus, *AER* 2015)

➔**Carbon equalization tariffs** (=countervailing duties) on carbon-intensive imports from non-member countries

➔Add **"tariff revenue offsets"**: i.e. return associated revenues to countries from where products subject to the tariff originate

- Shows goodwill and signals tariffs not meant for protectionism or revenues.
- Combination would function as **carrot-and-stick**, not only penalty.
- Effectively, club would levy carbon tax revenues on behalf of non-members.

➔Avoids retaliation, so implementation border tariffs politically easier

Potential use of *carbon tariff revenues*

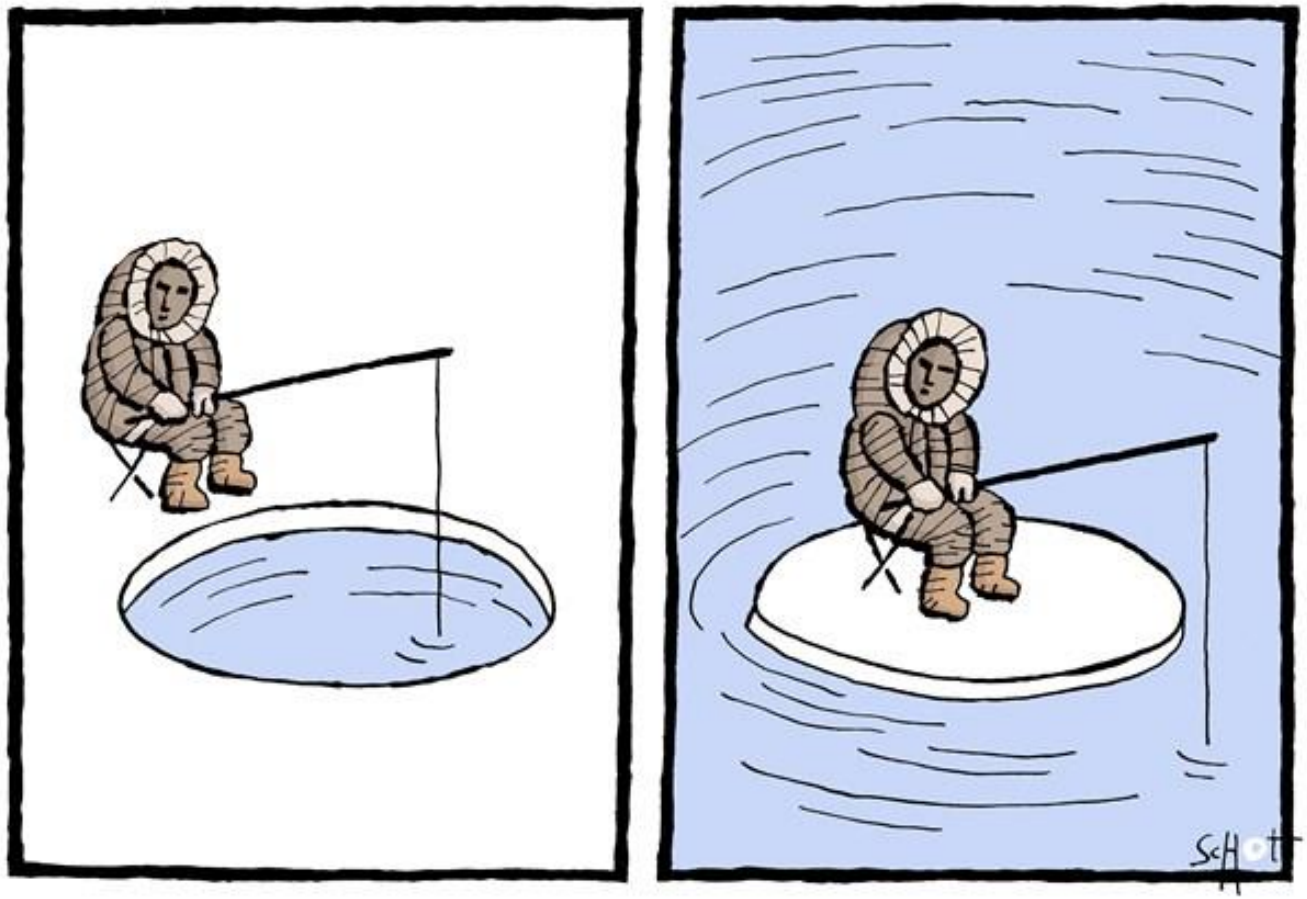
Exporting countries could use the *received tariff revenues* in a number of ways:

- Assist affected industries in adapting to globally emerging climate regulations
- Finance national GHG emission reduction strategies
- Create broader public support for a climate agreement (and climate club membership) among their citizens/voters.

➔ *Carbon tariff revenue offsets* can thus make non-member countries **rethink membership of club**, and so enhance transition to global carbon pricing

Conclusions and recommendations

1. *Systemic effects* neglected by IPCC and climate summits. Result: *voluntary pledge approach* of Paris
2. Motivation for international policy coordination strengthened by systemic concerns => *Amendment to Paris agreement*
3. Many arguments in favor of global carbon pricing: *effectiveness* more important than *efficiency*
4. Cap-and-trade advantage for rebound, but other policy criteria relevant too; e.g., carbon tax revenues – redistribution (inter)nationally
5. *Complementary instruments*: technology support, information provision
6. *Transition period*: *climate club* with carbon border tariffs to pressure unwilling countries. *Revenue offsets* to enhance its *political feasibility*



Relevant readings

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