Only carbon taxation can stop climate change

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A transition to globally harmonized carbon taxes

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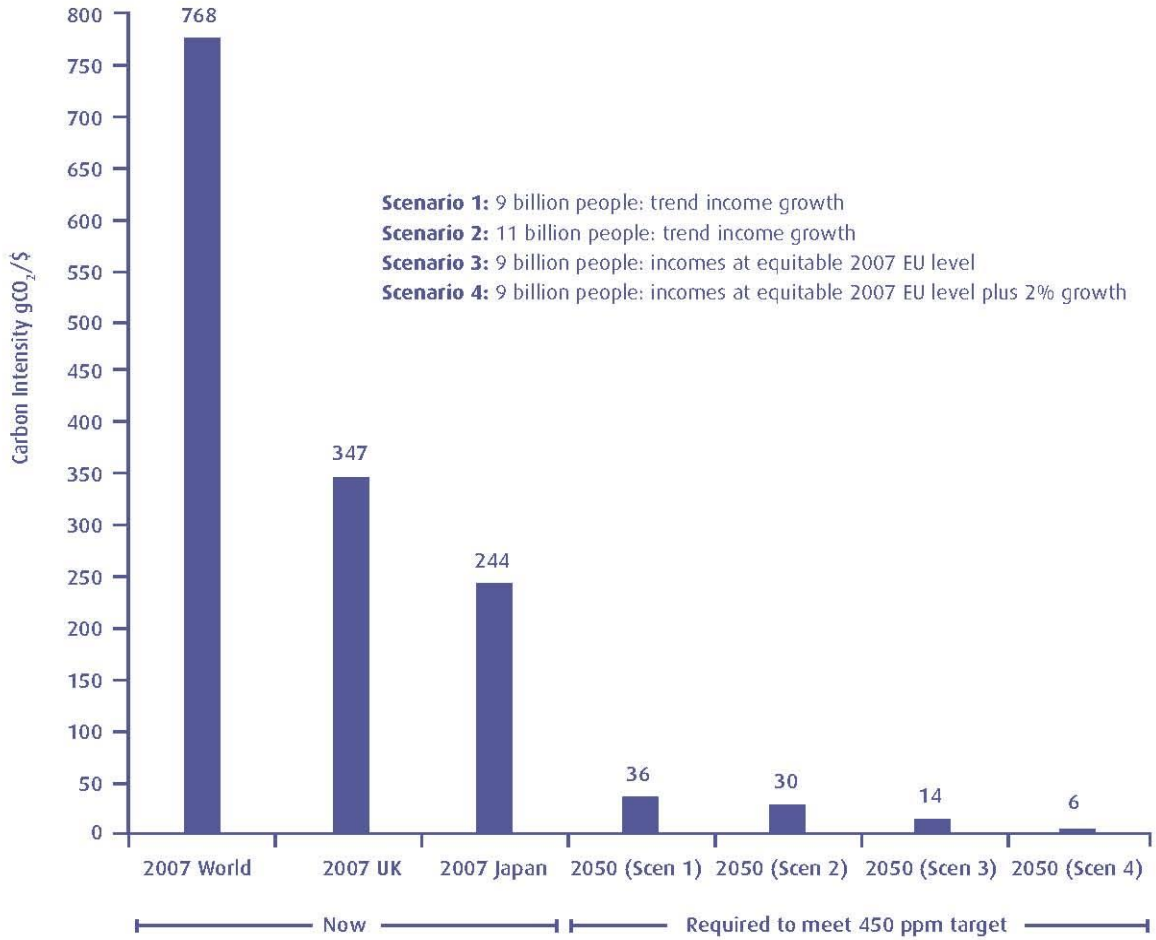
Decoupling requirement is tremendous

Factor 20-100 reduction in emission/energy intensity

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



Source: Jackson (2009)

Paris agreement, December 2015

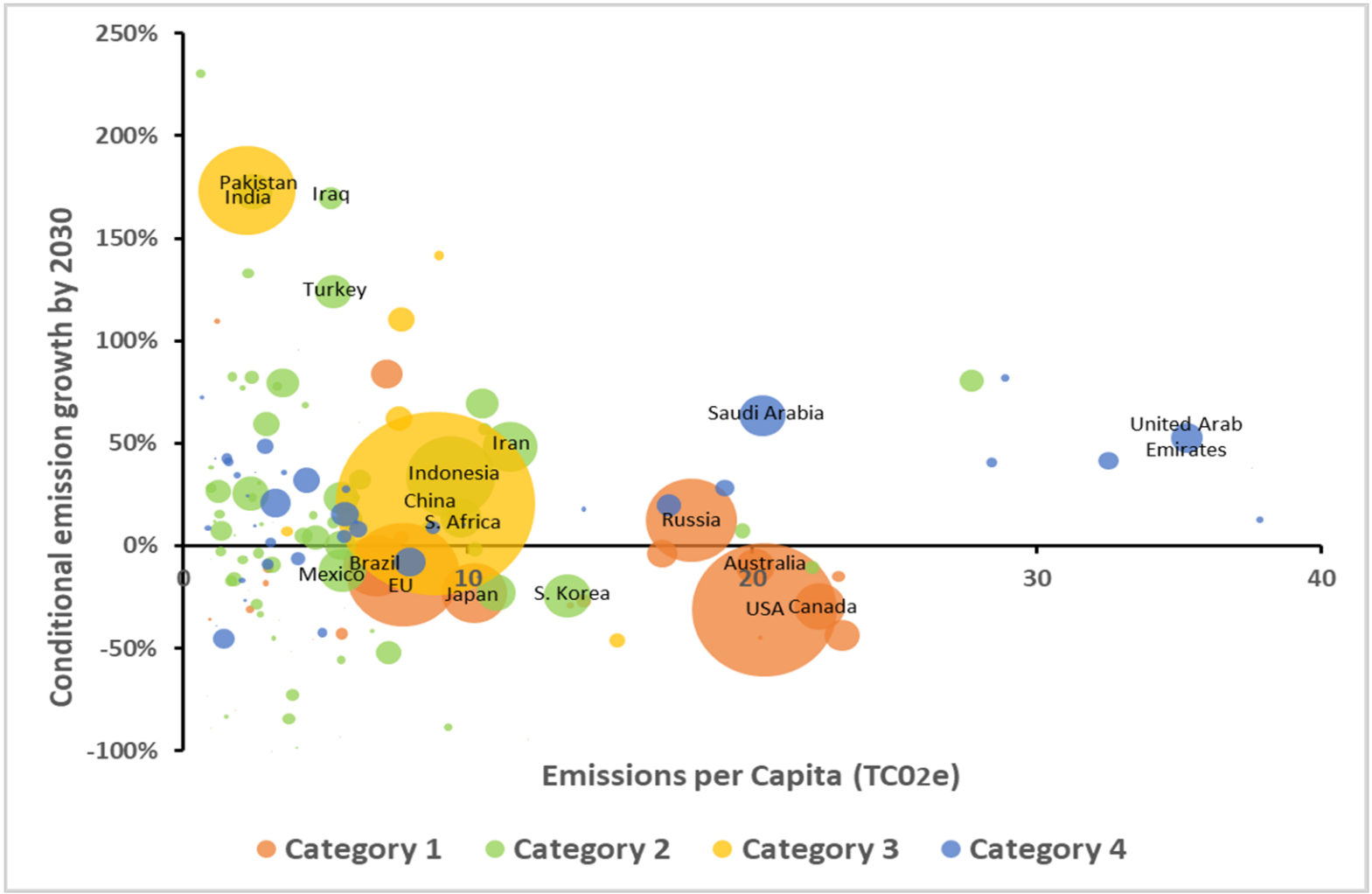
- Not a normal agreement: Voluntary country pledges or NDCs (Nationally Determined Contributions)

- Hoped to limit increase in global mean surface temperature to 2 or even 1.5°C but expected increase is 2.5-3°C (Rogelj et al., 2016 *Nature*; Schleussner et al., 2016 *Nature CC*).

- Four categories of NDCs:
  1. Absolute emission reduction targets relative to (distinct) base year in the past
  2. Reduction relative to future emissions growth in BAU scenario
  3. Reduction of emission intensity of national income (carbon/GDP)
  4. Mere ‘projects’ without identifying implications for emissions

Normalizing 4 types of pledges/NDCs

(Base year 2015)



Source: King & van den Bergh (2019)

Paris comes with 2 systemic effects

Due to a lack of policy harmonization and wide variety of NDCs:

- *implicit carbon prices NDCs vary from 5 to 250 $ (Aldy et al., 2016)*

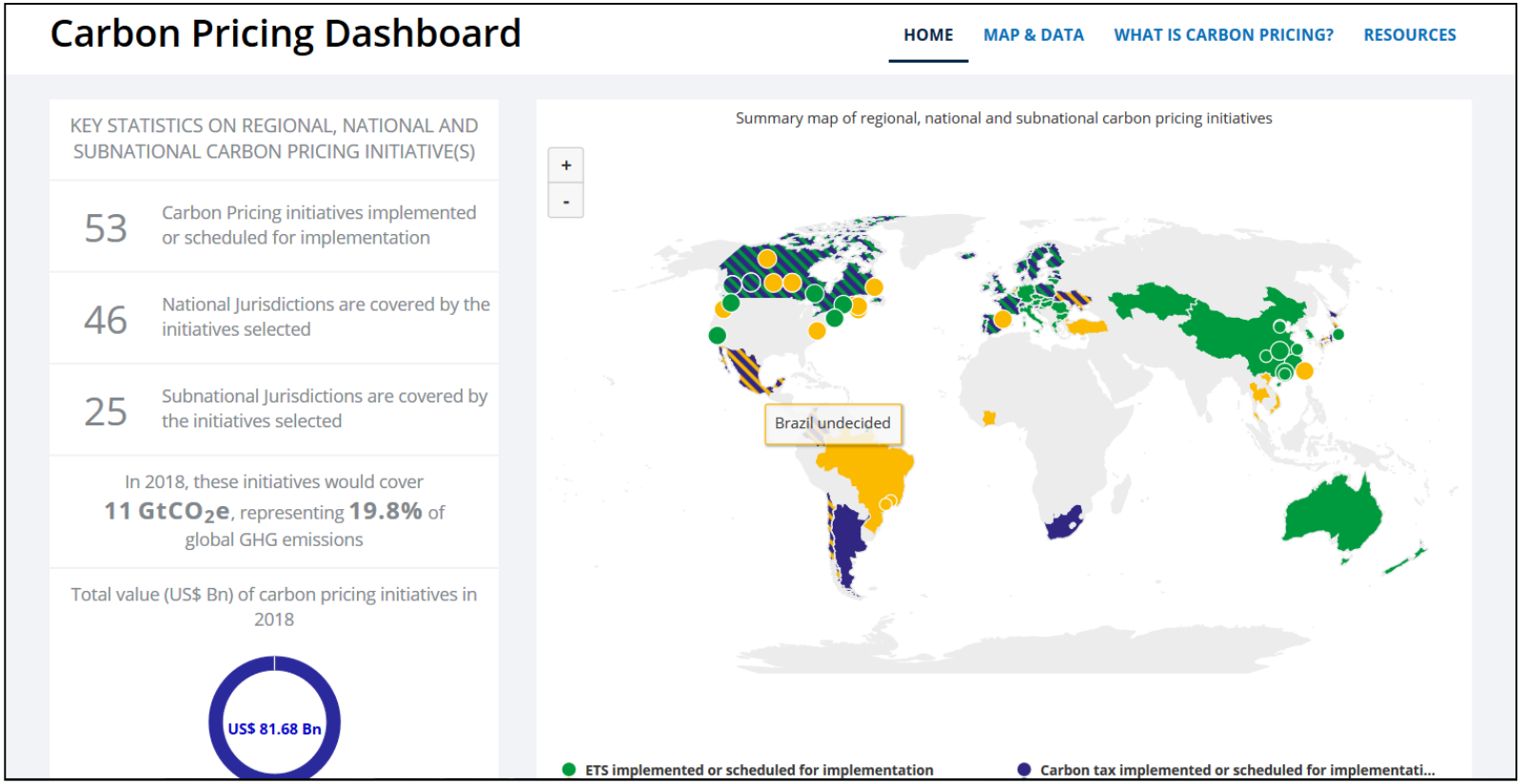
Implications:

1. Generally weak policies (subsidies, encouraging voluntary action) out of fear to harm *international competitive position (exports)* => **rebound**
2. Distinct policies (no harmonization) => *trade effects and industry relocation* => **carbon leakage**

Global mean surface temperature may then go beyond 3 or even 4°C

Explicit carbon pricing (CP) as a solution

- Already many unilateral initiatives indicating serious interest in CP *(carbon tax or emissions trading/cap-and-trade).*
- But low and inconsistent prices, and repeated public/political resistance motivated by concerns about international competitive position.
- Only upscaling to whole world can overcome these shortcoming.



Source: World Bank (2018)

Carbon pricing best instrument to upscale

- Carbon pricing easiest instrument to coordinate & make uniform among all countries

- Focus on uniform carbon price can overcome free riding in climate negotiations (Weitzman, 2014):
  - start with zero carbon price, and raise it; level playing field guaranteed,
  - technology performance standards instead invite for lobbying and country-specific interests and resistance (car industry).

Note: Carbon tax ≠ energy or fuel tax

Charge of price per unit of carbon: tax will then be proportional to carbon emissions factor.

Energy source	*EROI*	*Carbon emission factor[37] ($kgCO_2/TJ$)*	*EROC ($EJ/GtCO_2$)*
Coal	46:1	94.6	10.3
Oil	19:1	73.3	12.9
Oil shale	7:1	107.0	8.0
Tar sands	4:1	107.0	7.0
Natural gas	19:1	56.1	16.9

EROI = 'Energy return on energy investment'
EROC= 'Energy return on carbon' of combusting fossil fuels

Source: King & van den Bergh (2015)

Other main arguments for carbon pricing

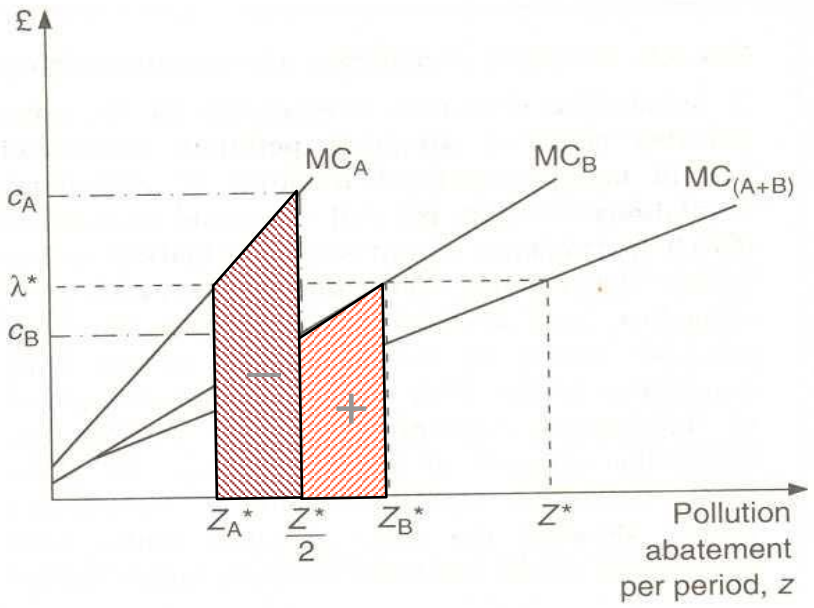
1. Pricing means ‘decentralisation of regulation’ => low information needs for regulator => no ‘dieselgate’.

2. Permanent incentive for adoption & innovation of low-carbon technology (innovation trajectories misguided if prices wrong).

3. Revenues can be used to compensate poor households and finance R&D

4. Carbon pricing cost-effective

Emissions reduction achieved against minimum cost, or maximum emissions reduction for a given cost.



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

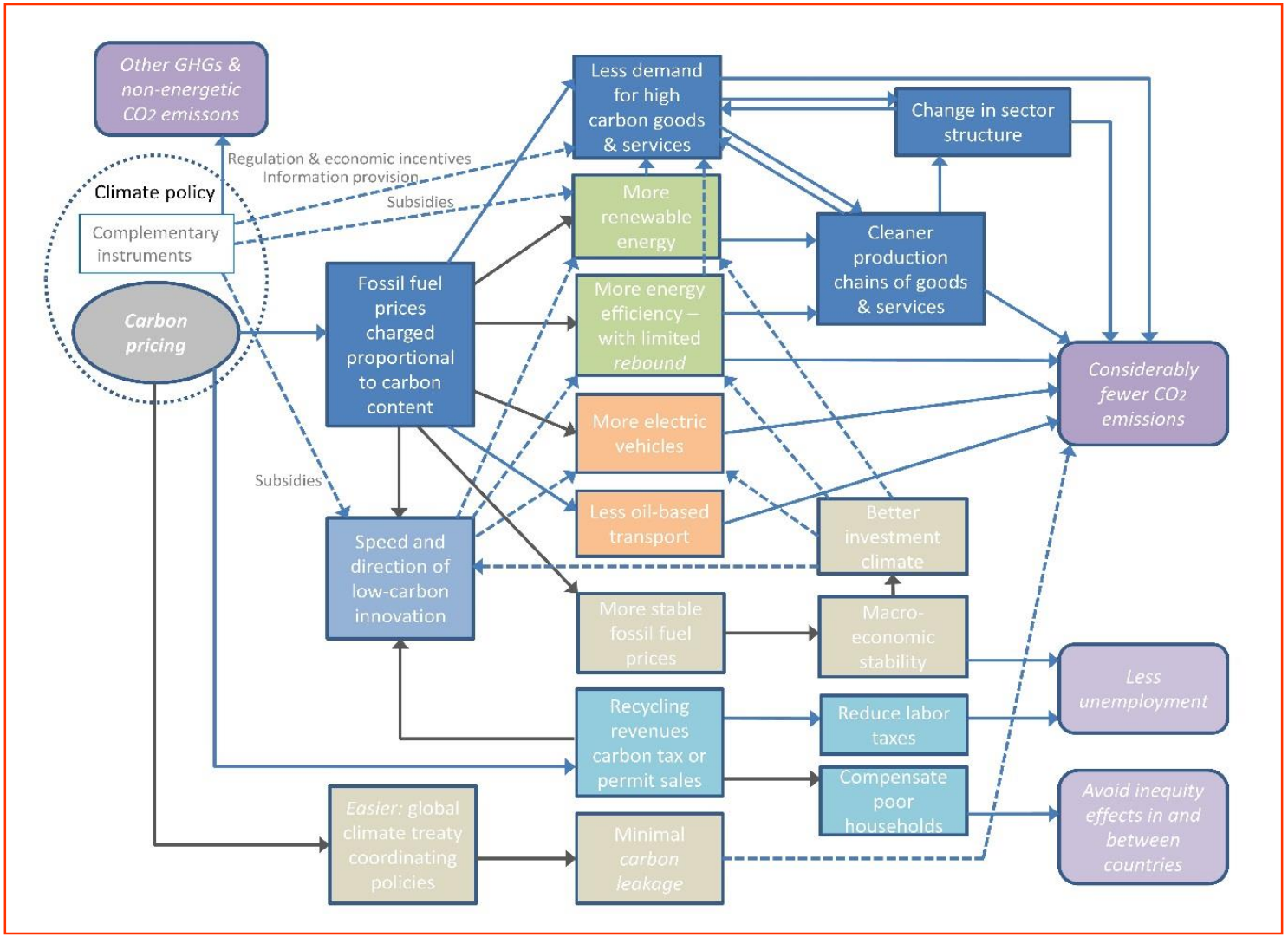
$$Z_A^* + Z_B^* = Z^*$$

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

Source: Perman et al. (2003)

5. CP = complete and consistent control

(effective emissions reduction, rebound limited)



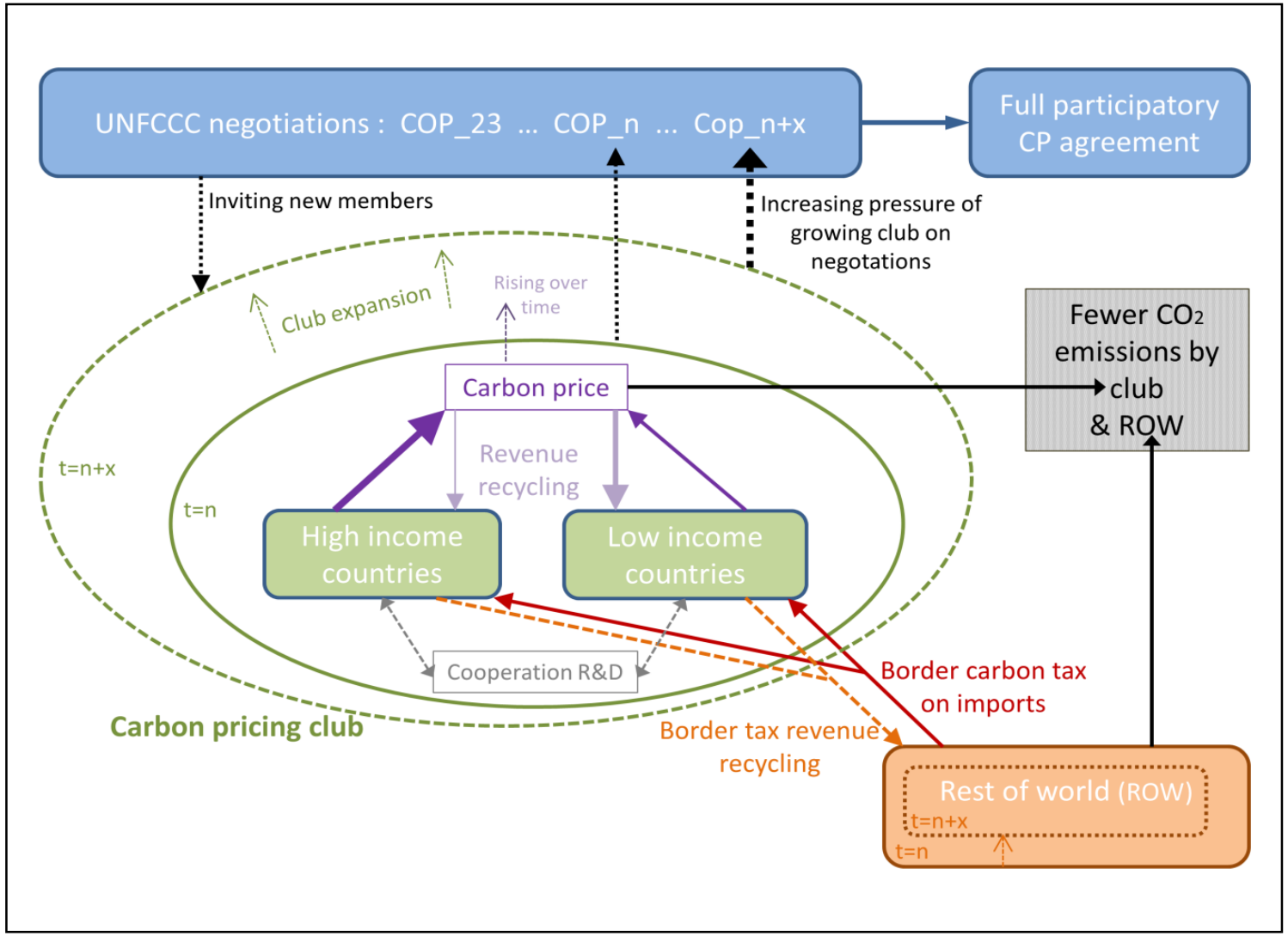
Source: van den Bergh et al. (2018)

Other instruments perform less well than carbon tax

Instrument	*Performance criteria*				*Other issues*
	Effectiveness emissions reduction	*Distributional equity*	*Economic cost per unit of emission avoided*	*Global upscaling*	
Carbon tax	High	High *- if revenues partly recycled to poor households*	Low / minimal	Feasible	Tax aversion by citizens & firms; use terms “charge”, “dividend” or “ETR”
Technical standards	Medium *- not select cheap options, incompliance (‘dieselgate’)*	Medium *- no revenues raised to compensate poor households*	Medium to high	Difficult as there are many standards and distinct national interests	Monitoring problems, sector specific lobbying
Adoption subsidy	Medium	Low *- poor housholds do not buy solar PV or electric cars*	High *- not select cheap options, people don’t resist subsidies*	Difficult as it weighs heavily on national budgets	Weighs on general government budget
Information provision & nudges	Low	High	Low	Limited by cultural habits and norms	Interaction with other policy instruments not yet very clear

Transition to uniform global carbon price

Two interactive tracks: coalition (club) and UNFCCC-COPs



Multiple phases in a transition to global CP

Phase	Track 1: coalition	Track 2: UNFCCC negotiations	Interaction between tracks
1	Climate coalition initiated by ambitious countries with low uniform carbon price and border tariff	Raising awareness in UNFCCC-COPs for relevance of coordinating national policies and potential role of carbon price	Coalition speaks with one voice at UNFCCC-COP meetings
2	Expansion of coalition; moral and economic pressure on countries outside the coalition	Frequent discussions and initial negotiations about carbon price among majority of UNFCCC countries	Coalition strongly lobbies for focus on carbon price during COP meetings
3	Higher carbon price and border tariff; further expansion	Negotiation of heterogeneous carbon prices adapted to income levels in UNFCCC countries with joint carbon price floor	Lessons learned in coalition about design and coordination of carbon price transferred to UNFCCC negotiations
4	Large coalition which includes major emitting countries	Converging carbon price in majority of UNFCCC countries; complemented by financial transfers from rich to poor countries	Large coalition creates critical mass in UNFCCC process
5	Remaining countries (notably fossil-fuel suppliers) come on board under large political and economic (trade) pressures; results in all countries having consistent, economy-wide and strong climate policy. After harmonization, gradual rise in carbon price; frequently revised in response to extent of global emissions reduction achieved and advances in climate sciences on required reduction.		Carbon pricing coalition and UNFCCC climate agreement integrate

Suitable countries (large emitters) to start club

Analysis based on data from opinion surveys, NDCs & participation in relevant coalitions

Nation	Effectiveness		Likelihood of involvement	
	% of total global CO_2 emissions	% of total global GDP	Net likelihood score	Net likelihood ranking
Australia	1.1	1.8	0.758	1
Brazil	1.6	2.4	0.746	2
Canada	1.6	2.1	0.721	3
South Korea	1.7	1.9	0.711	4
Mexico	1.4	1.6	0.661	5
Japan	3.6	5.9	0.585	6
EU	9.6	21.9	0.571	7
India	6.6	2.9	0.517	8
South Africa	1.4	0.4	0.515	9
Indonesia	1.4	1.2	0.438	10
US	15.5	24.5	0.383	11
China	30.4	15.0	0.366	12
Iran	1.9	0.5	0.326	13
Russia	5.0	1.9	0.284	14
Saudi Arabia	1.8	0.9	0.227	15

Source: Martin and van den Bergh (2018)

Spain urgently needs to implement a carbon tax

- Otherwise:
  - emissions reduction will be difficult: due to ineffective policies (rebound) and sectoral instruments (lobbying by firms)
  - Economic costs of emissions reduction will be very high.

- Spain can learn about best carbon-tax design from experiences of other countries & the field of environmental economics:
  - economy-wide carbon tax + revenue recycling (energy poor, low-carbon R&D).

- Spain can subsequently:
  - harmonize its carbon tax with important trade partners to avoid negative effects on exports
  - become a member of future carbon-pricing coalition to foster global policy harmonization and stringency.

- *Time ripe:* Spanish government preparing climate-change law

More information

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