

Feature webinar: **Simon Sharpe**, author of *Five Times Faster*
and Managing Director of S-Curve Economics

Rethinking the economics and diplomacy of the energy transition

September 26th, 2025

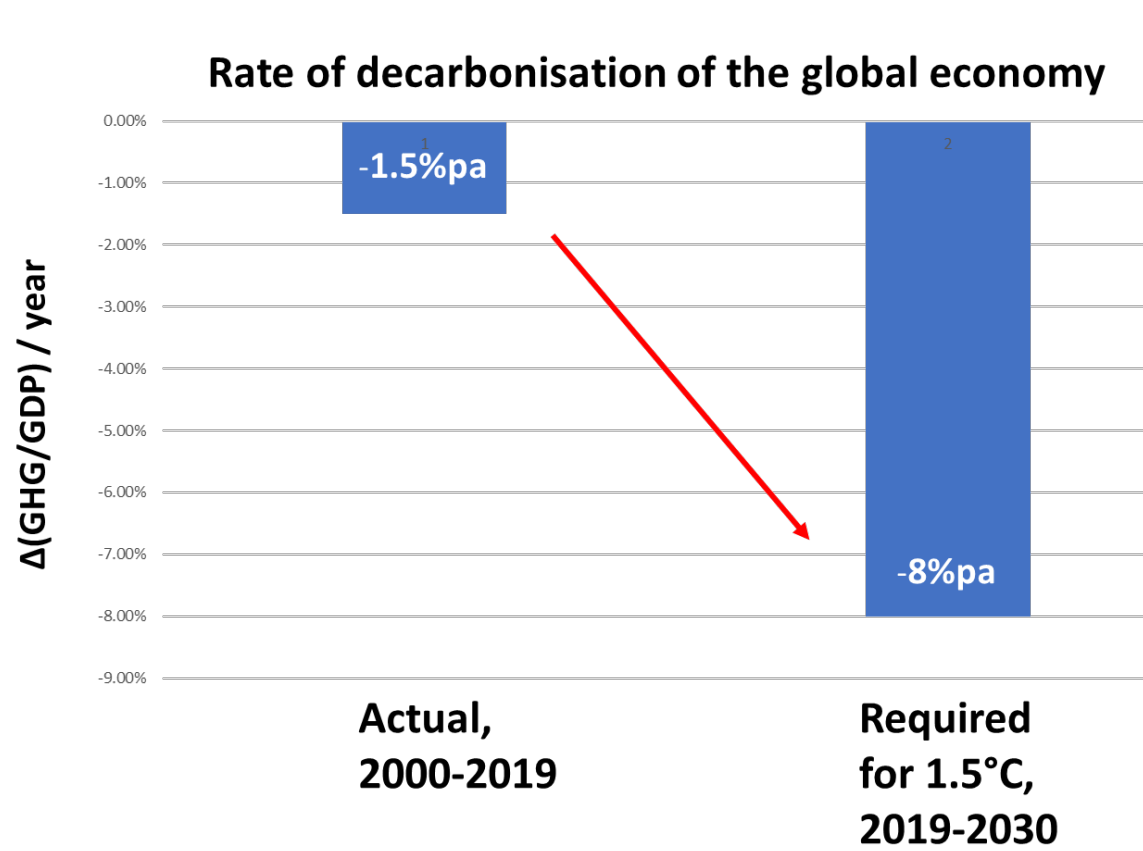
12 pm



12th annual Trottier Symposium on Sustainable
Engineering, Energy and Design

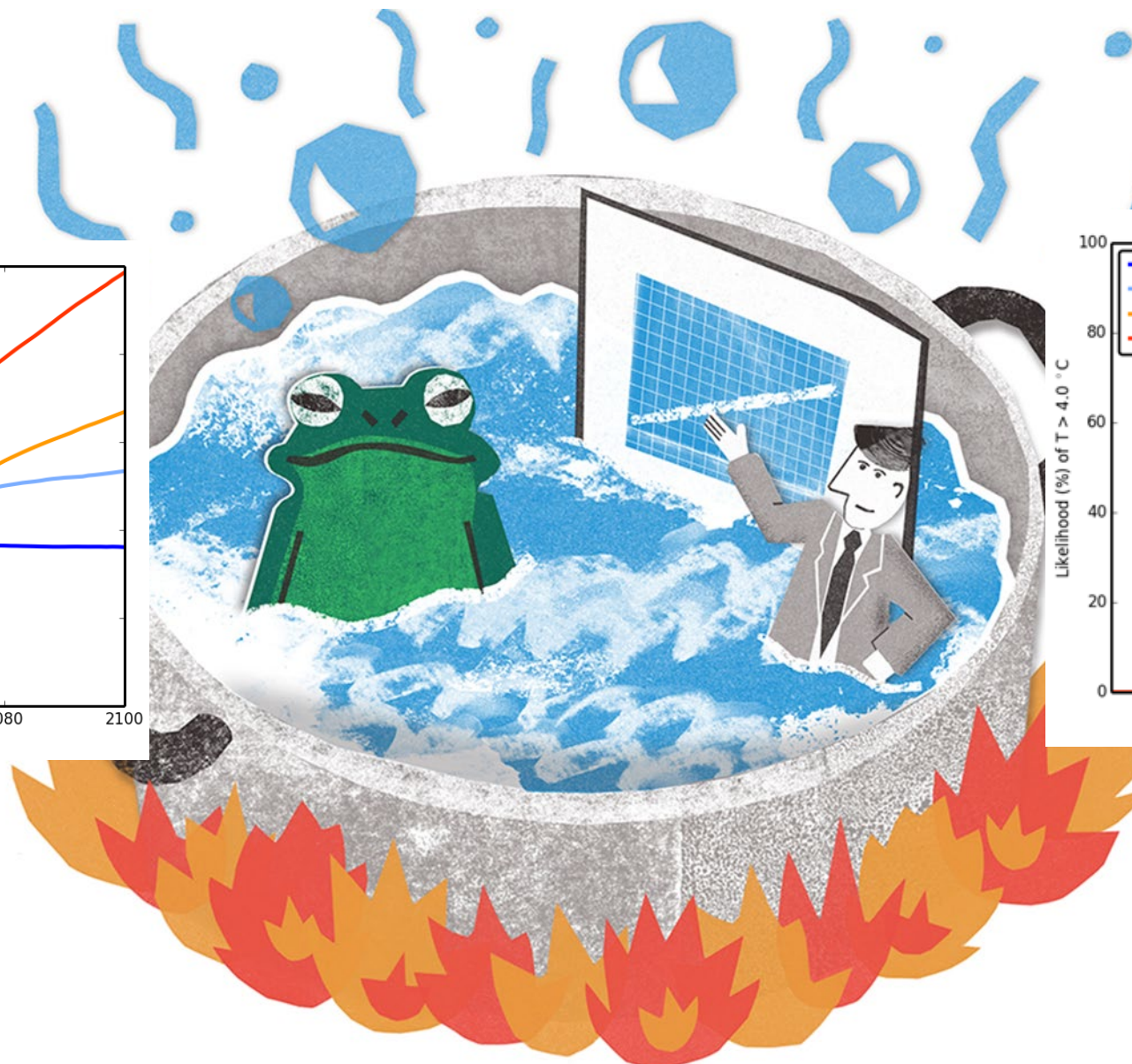
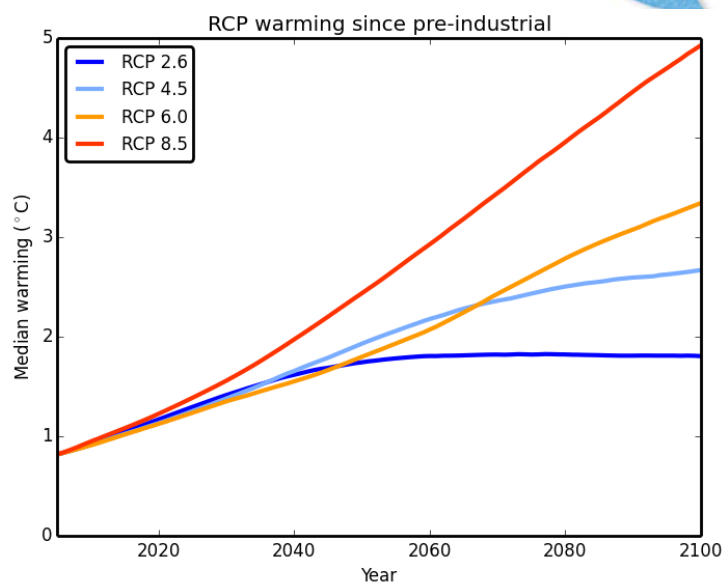
IET INSTITUT
DE L'ÉNERGIE
TROTIER

TISED
Trotier Institute for Sustainability
in Engineering and Design

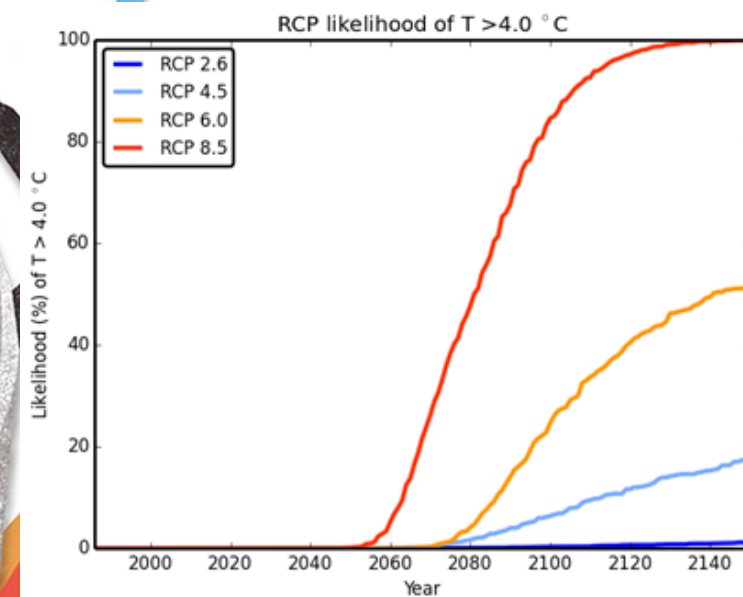


SCIENCE

Prediction

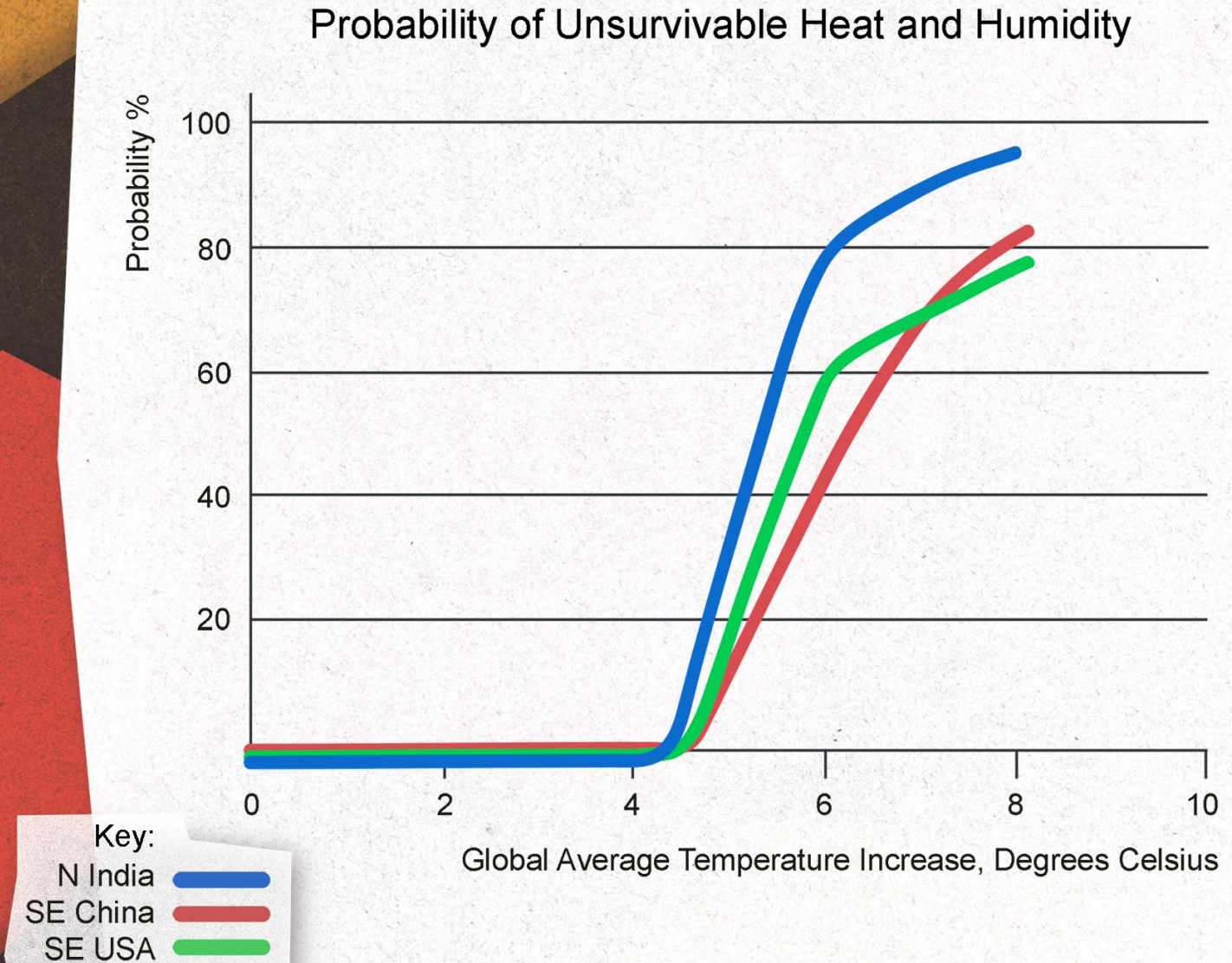


Risk assessment



“...the catastrophic norms of the future can be seen in the tail risks of today.”

Mark Carney, 2015



ECONOMICS

Equilibrium: *‘a situation in which nobody has any immediate reason to change their actions, so that the status quo can continue, at least temporarily’*

(Oxford dictionary of economics)

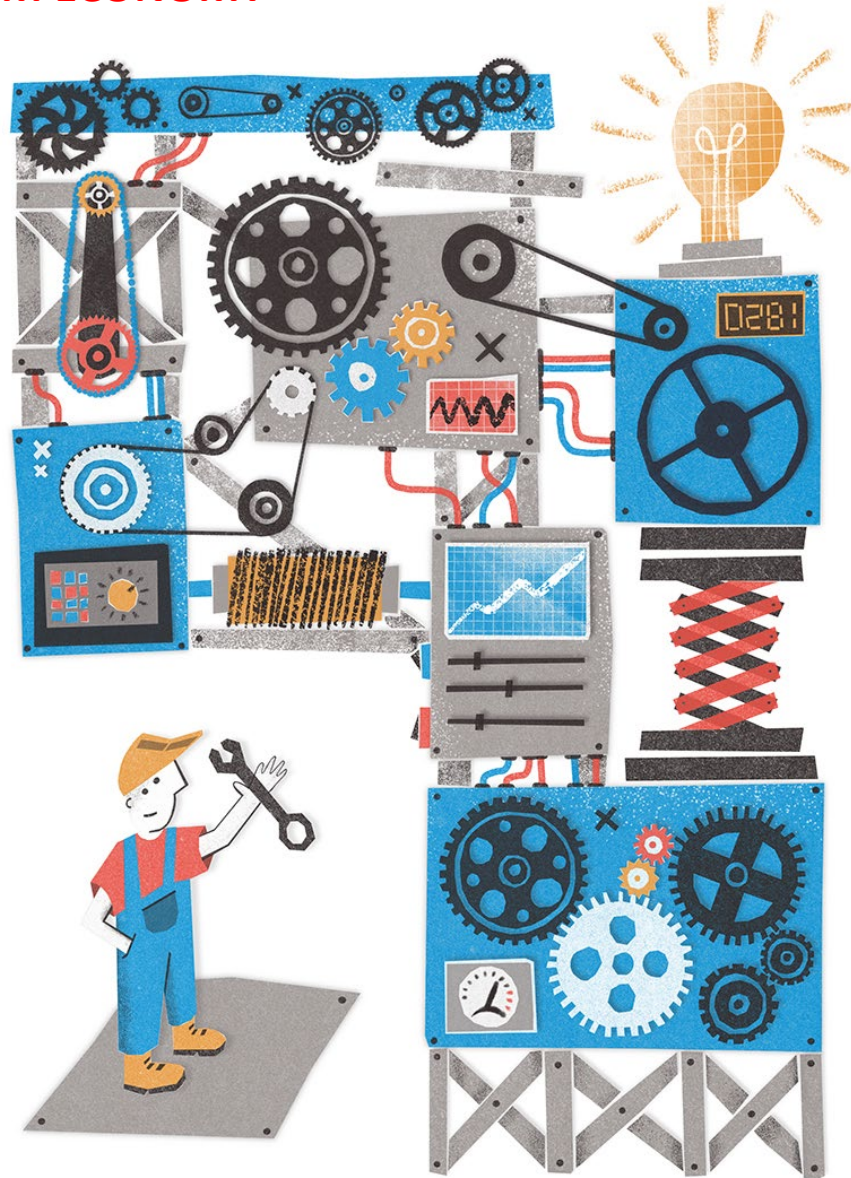
Meeting climate goals requires...

*‘rapid and far-reaching **systems transitions...**
unprecedented in terms of scale’*

Intergovernmental Panel on Climate Change (2018)

What is the economy like?

EQUILIBRIUM ECONOMY



Static

Predictable

Limited possibilities

Role of policy: fix it when it fails

DISEQUILIBRIUM ECONOMY



Evolving

Uncertain

Unlimited possibilities

Role of policy: steer its evolution in desired direction

Carbon pricing “is the most cost-efficient solution” to achieve climate goals

"Meaningful carbon prices are a cornerstone of any effective policy framework".



**Kristalina
Georgieva,
Managing
Director, IMF**



**Ursula von der
Leyen, President,
European
Commission**



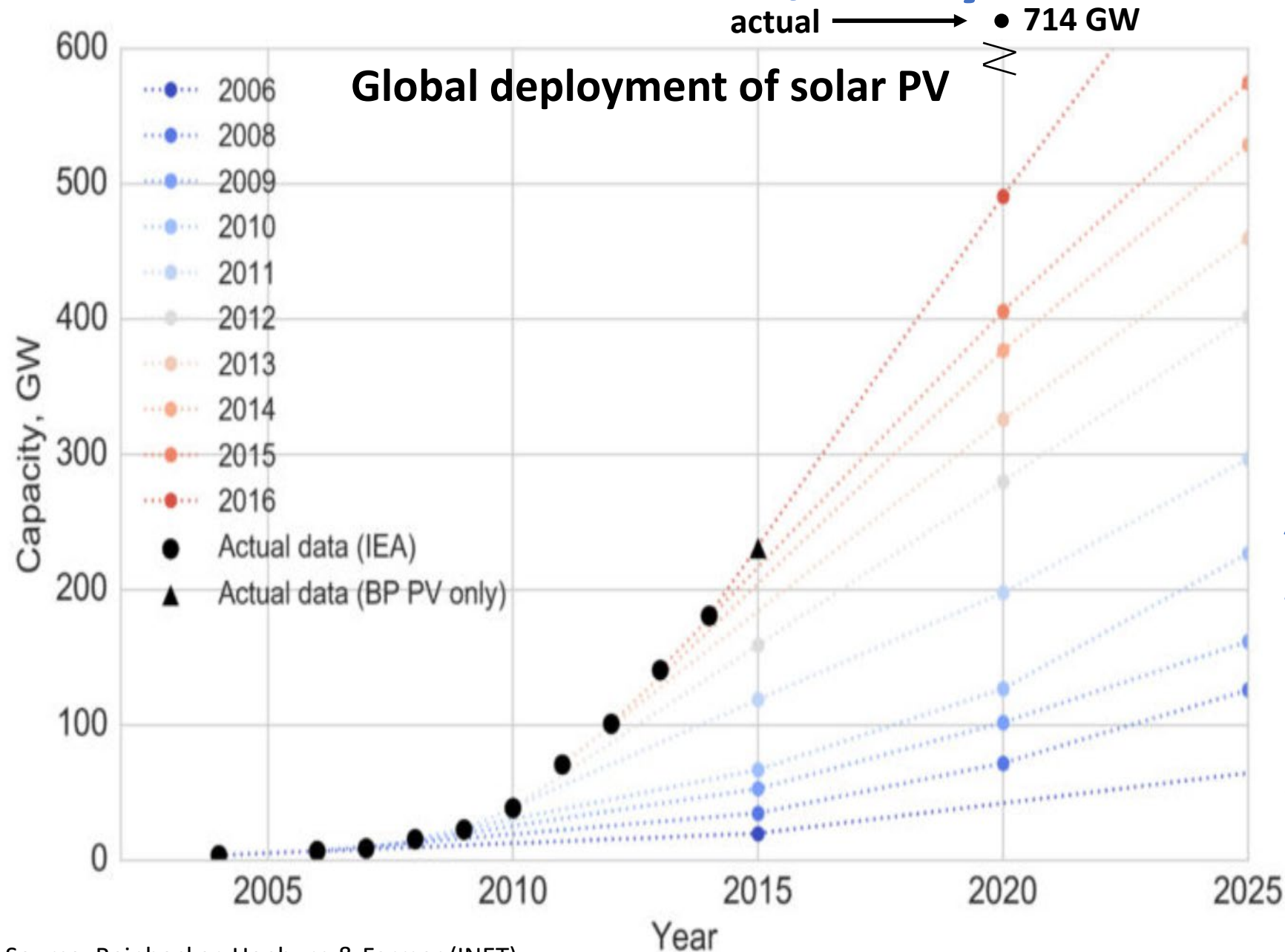
**Ngozi Okonjo-
Iweala, Director
General, World
Trade Organisation**



**Mark Carney,
UN Special Envoy
on Climate Action
and Finance (2021)**

Joint op-ed in Financial Times, 3 Dec 2023. 'No more business as usual: the case for carbon pricing.'

1. Investment beats tax, early in a transition



“Today, renewable energy is cheaper than coal in many places in the world, all major car manufacturers are working on several electric car models, and cities are starting to switch to electric buses.

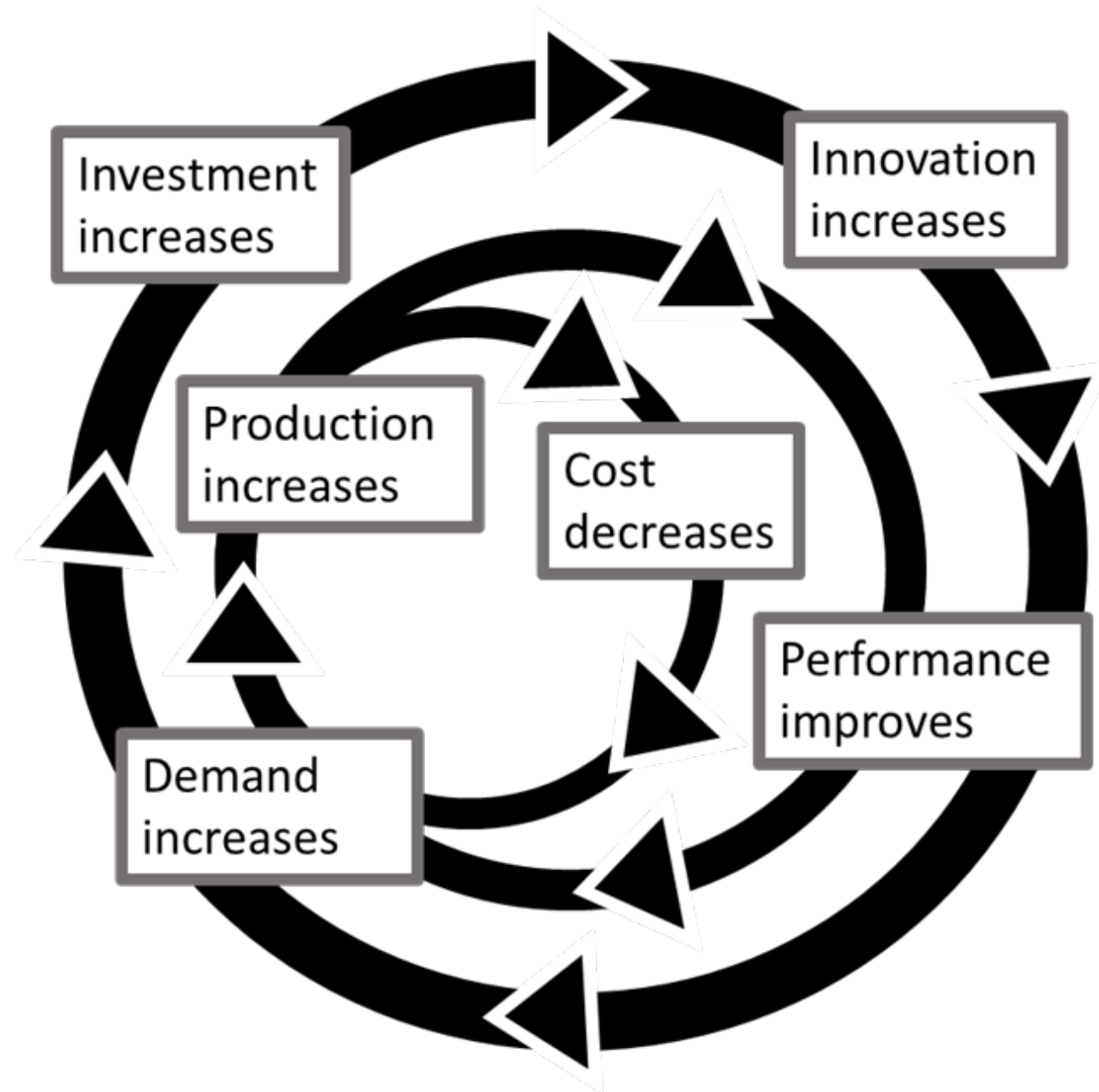
All of this was achieved with policies focussed on new investments, not with carbon taxes.”

Stephane Hallegatte & Julie Rozenberg

<https://blogs.worldbank.org/climatechange/all-hands-deck-mobilizing-all-available-instruments-reduce-emissions>

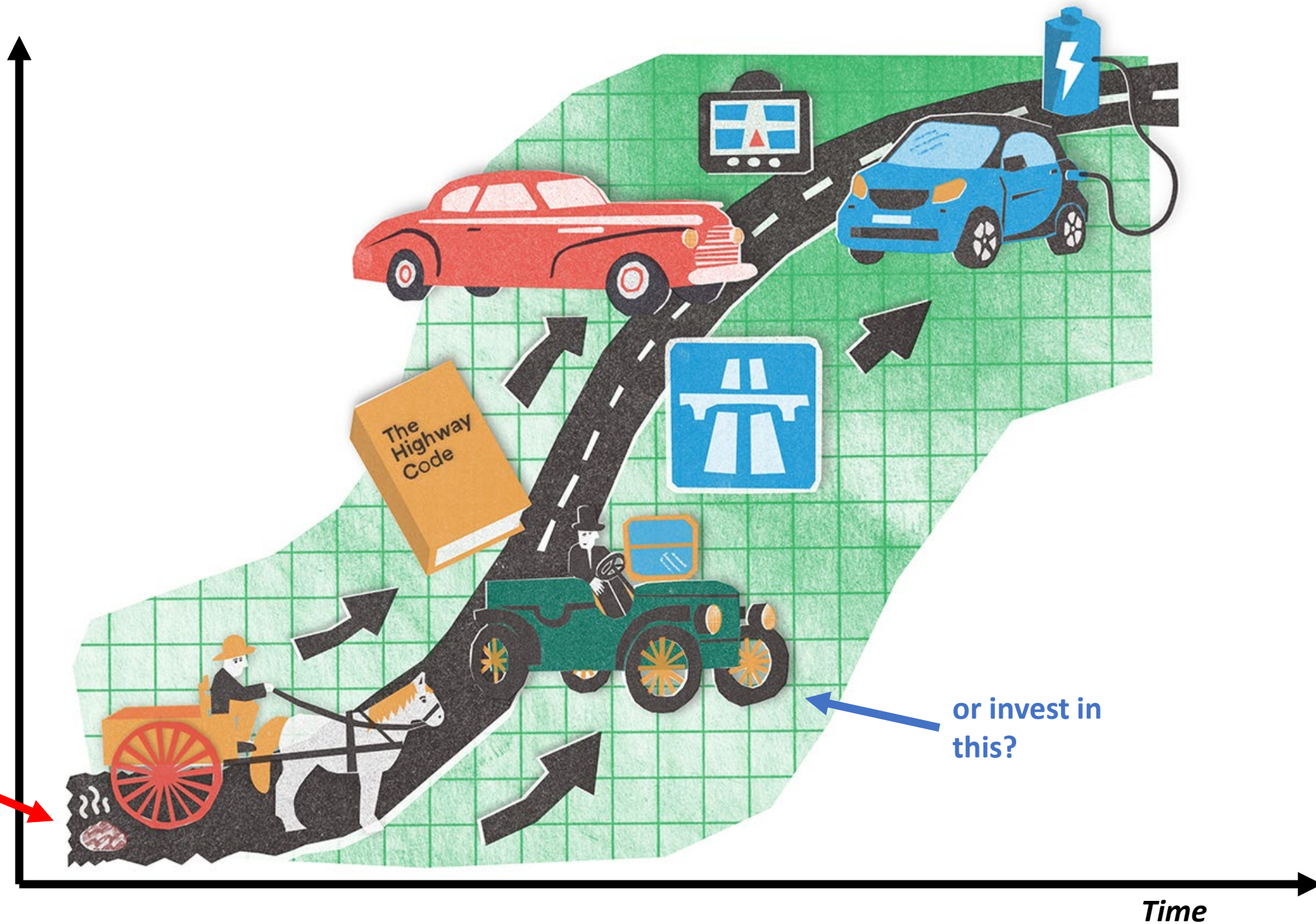
Reinforcing feedbacks:

- Learning by doing
- Economies of scale
- Emergence of complementary technologies
- Investment - innovation - increasing demand



Market
share of
new
technology

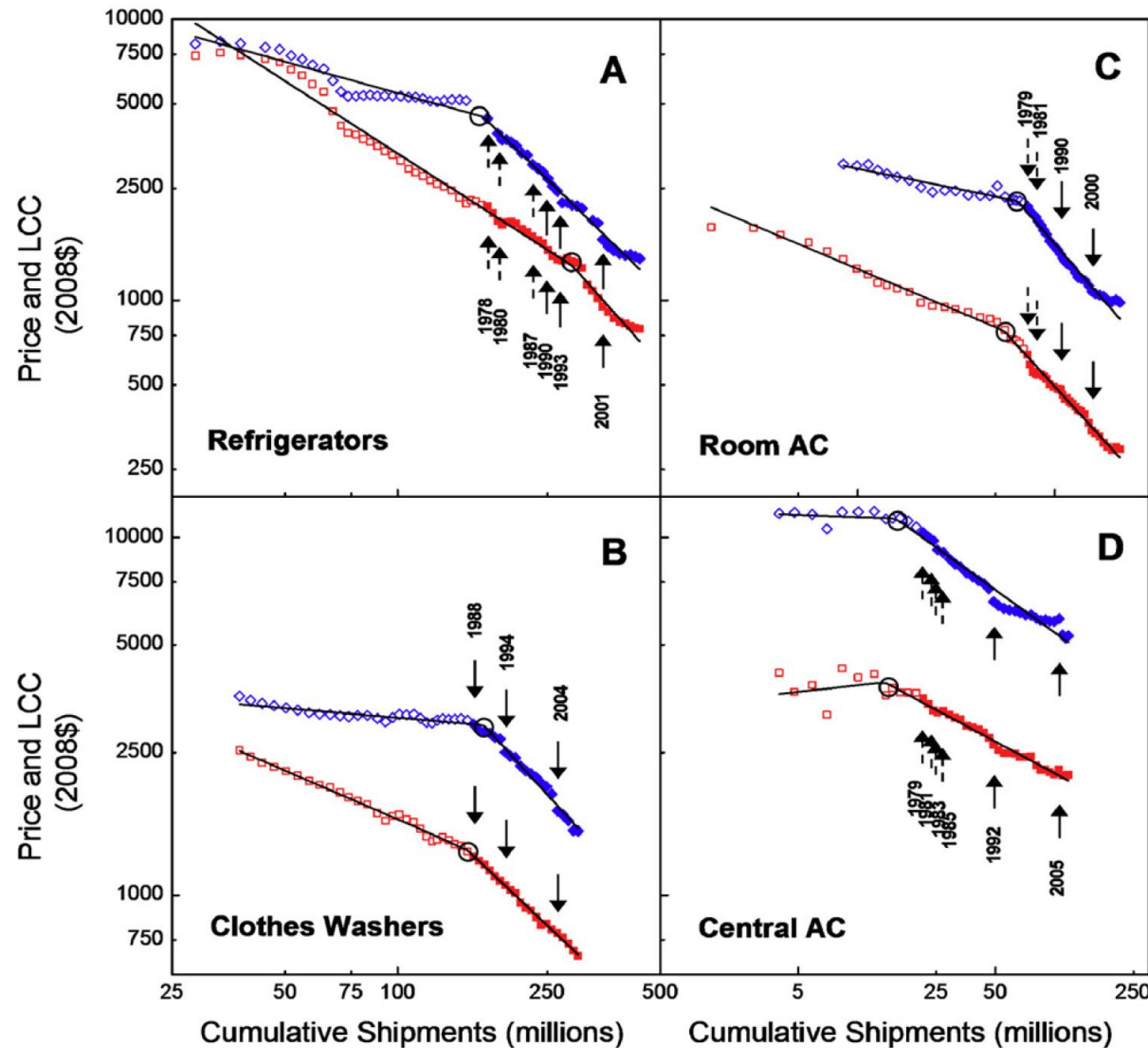
Tax this?



or invest in
this?

Time

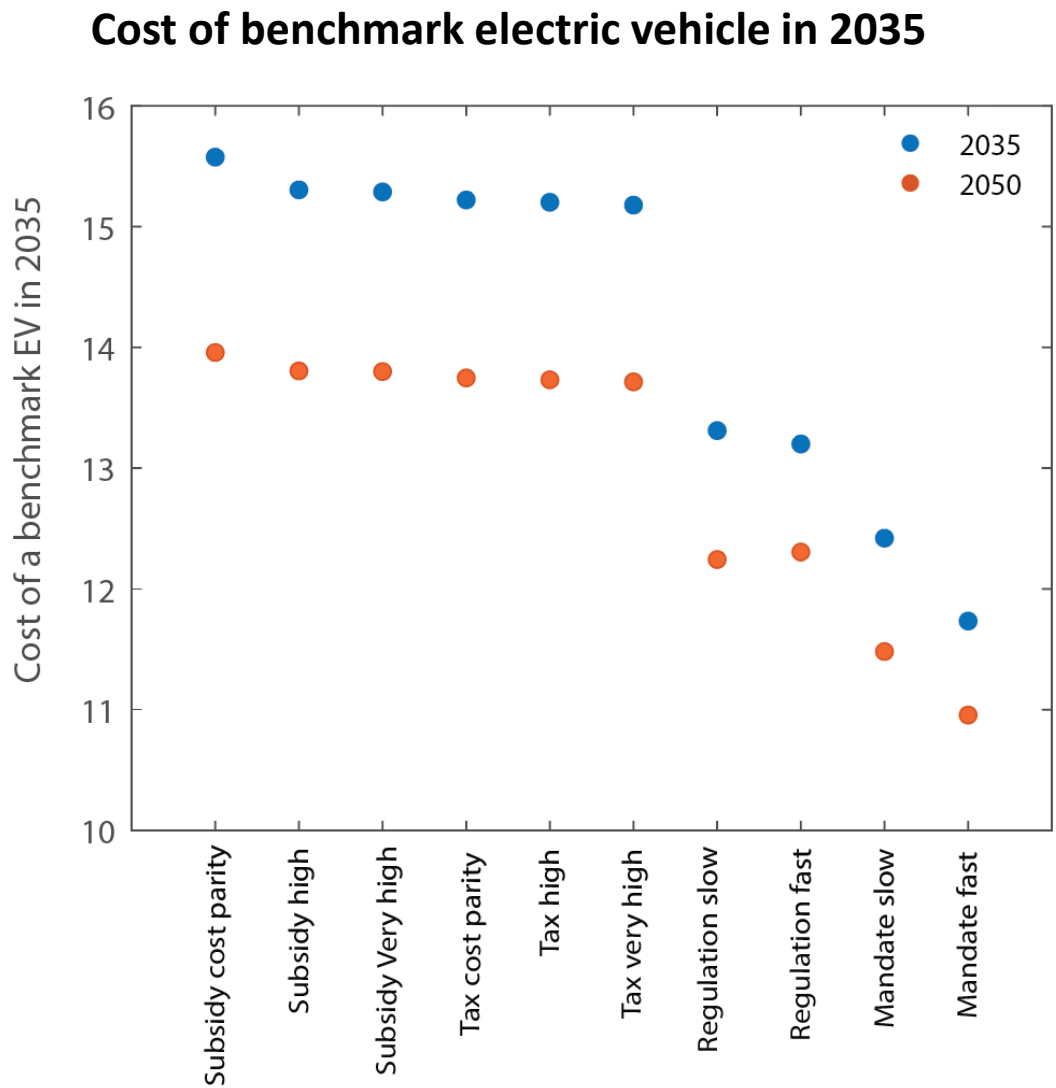
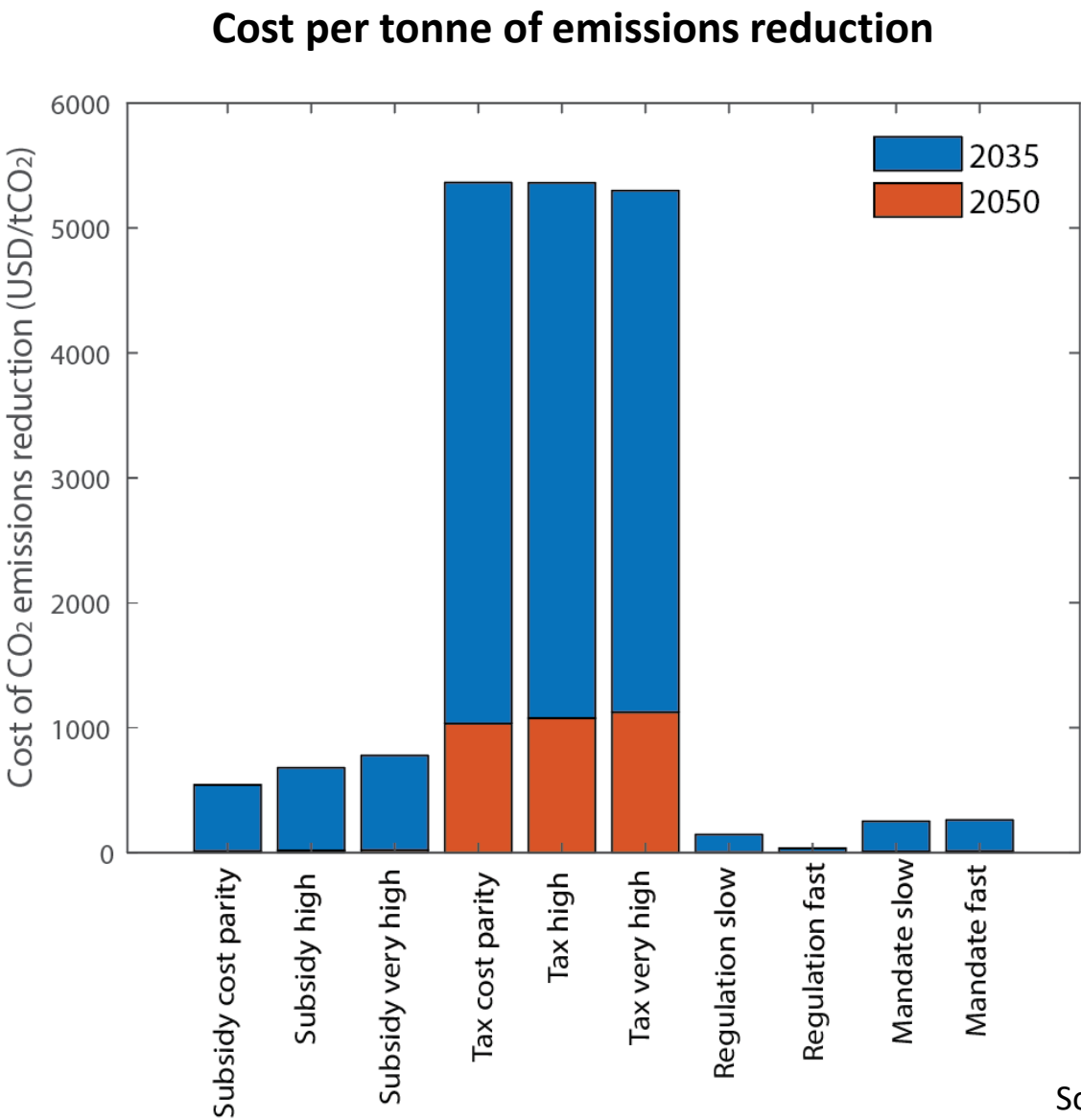
2. Regulation reallocates finance, and forces innovation



“In contrast to the classical picture of the impact of efficiency standards, the introduction and updating of appliance standards is not associated with a long-term increase in purchase price; rather, quality-adjusted prices undergo a continued or accelerated long-term decline.”

A retrospective investigation of energy efficiency standards: policies may have accelerated long term declines in appliance costs
R D Van Buskirk, C L S Kantner, B F Gerke and S Chu

ZEV mandates drive the fastest cost reduction in electric vehicles



Source: Lam & Mercure

Policy options to deploy electric vehicles in India

The social cost of carbon: economics, science, or philosophy?

*“Today we are issuing updated values for the Social Cost of Carbon (SCC), which are used to estimate the value to society of reducing carbon emissions... These technical corrections result in a **central estimated value of... \$37 per metric ton of CO₂** ... The estimate of the SCC has been developed over many years, using the best science available... Rigorous evaluation of costs and benefits ... The interagency group estimated the improved SCC values using the most widely cited climate economic impact models.”*

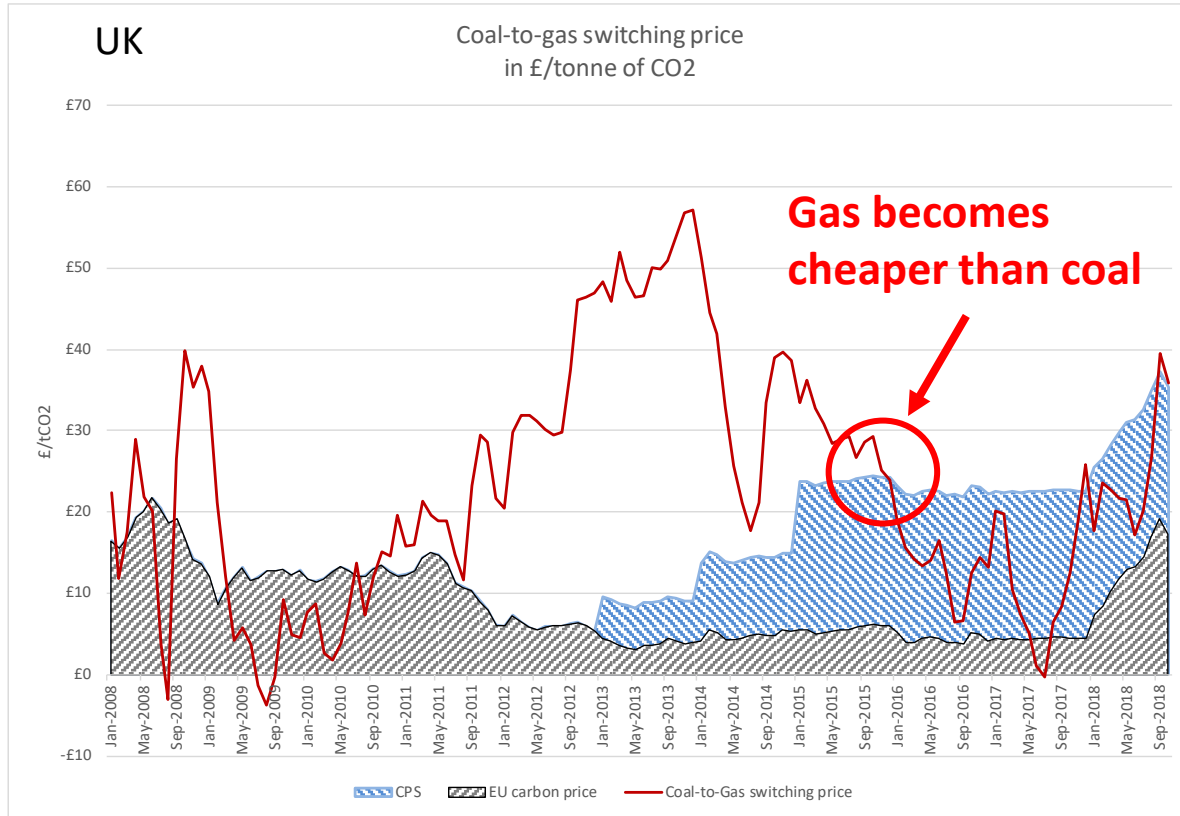
– US White House Council of Economic Advisers (November 2013)

*“A further source of uncertainty is whether and how the possibility of catastrophic damages is accounted for, which requires bounding potential losses with a parameter akin to the value of a statistical life (representing, essentially, willingness to pay to avoid human extinction). Without such a parameter, ‘social cost of carbon’ estimates incorporating risk aversion and potential catastrophic impacts **can be unboundedly high.**”*

- IPCC AR5 WGII Ch.19 early draft (November 2013)

3. Tax should target tipping points

World's fastest power sector decarbonization

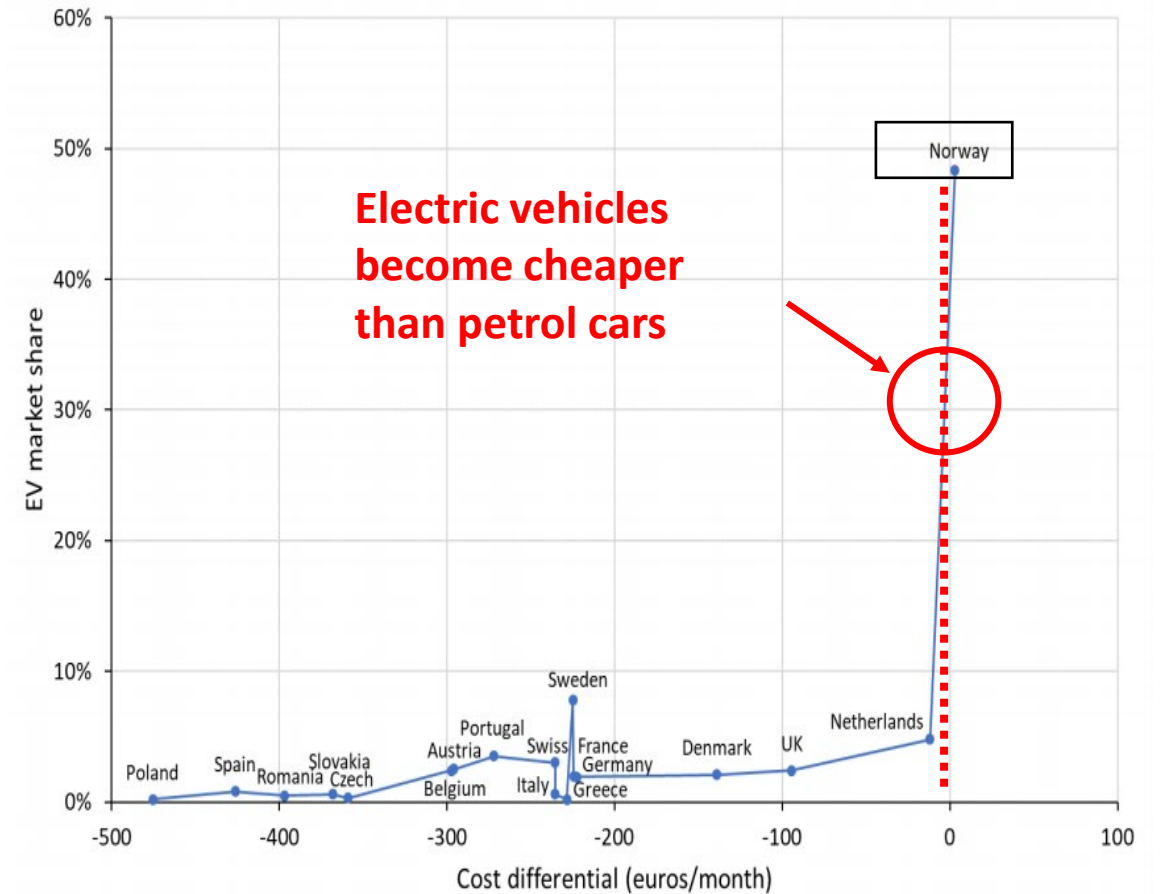


Grey shading: EU emissions trading carbon price

Blue shading: UK carbon price floor

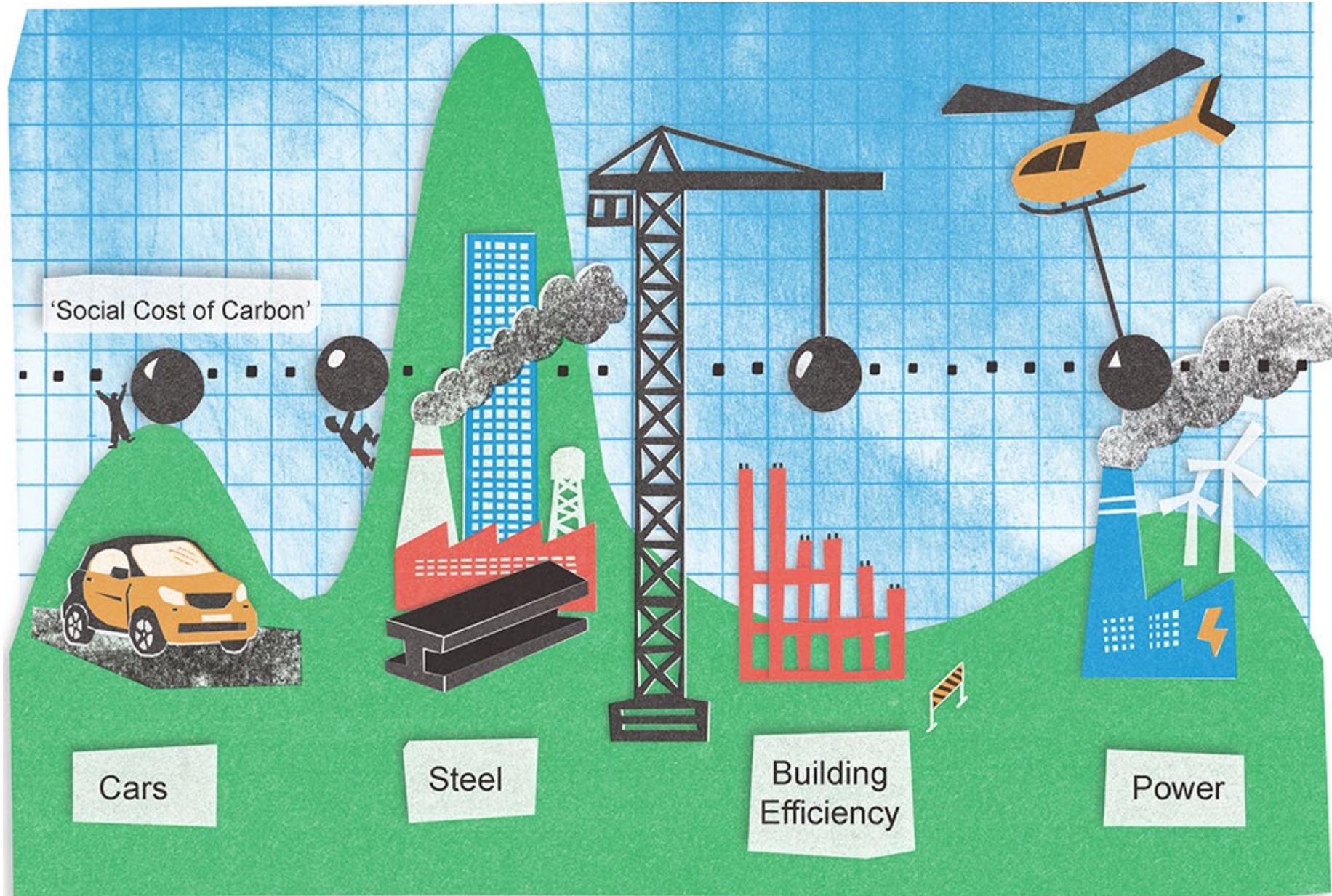
Red line: coal-to-gas switching price

World's fastest transition to electric vehicles



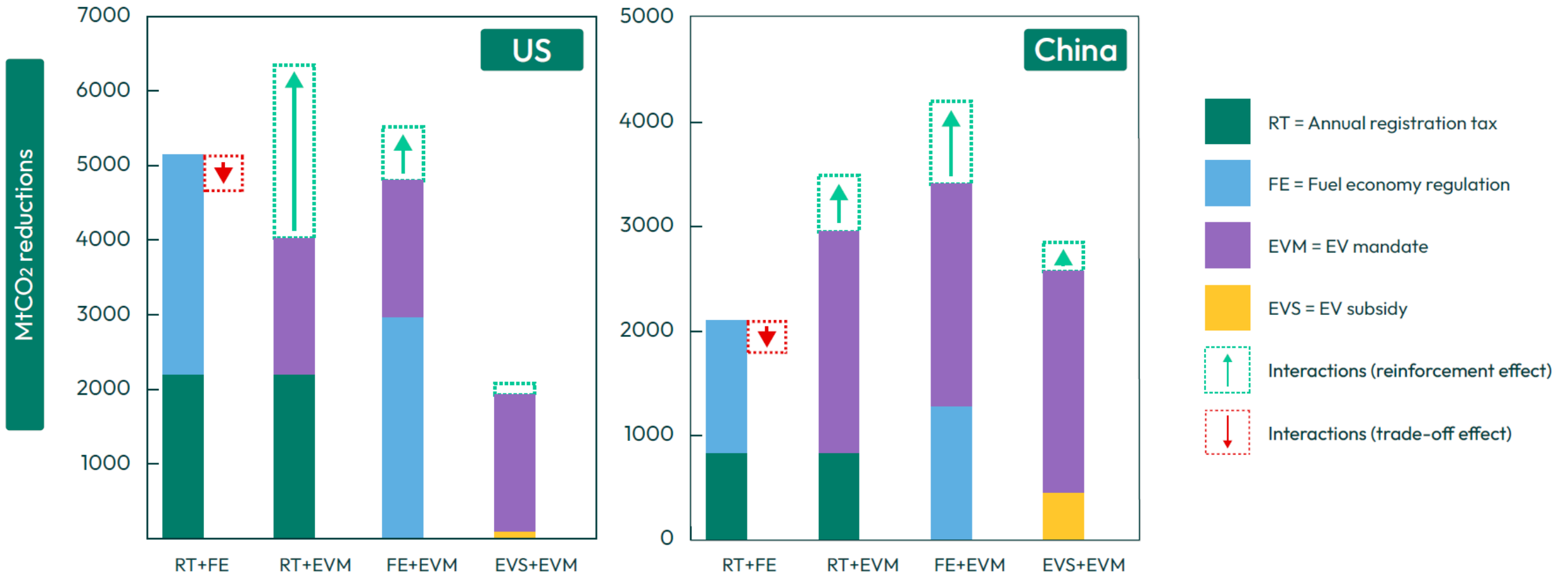
Sharpe & Lenton: Upward-scaling tipping cascades to meet climate goals: plausible grounds for hope

An equal carbon price across the whole economy is dynamically inefficient



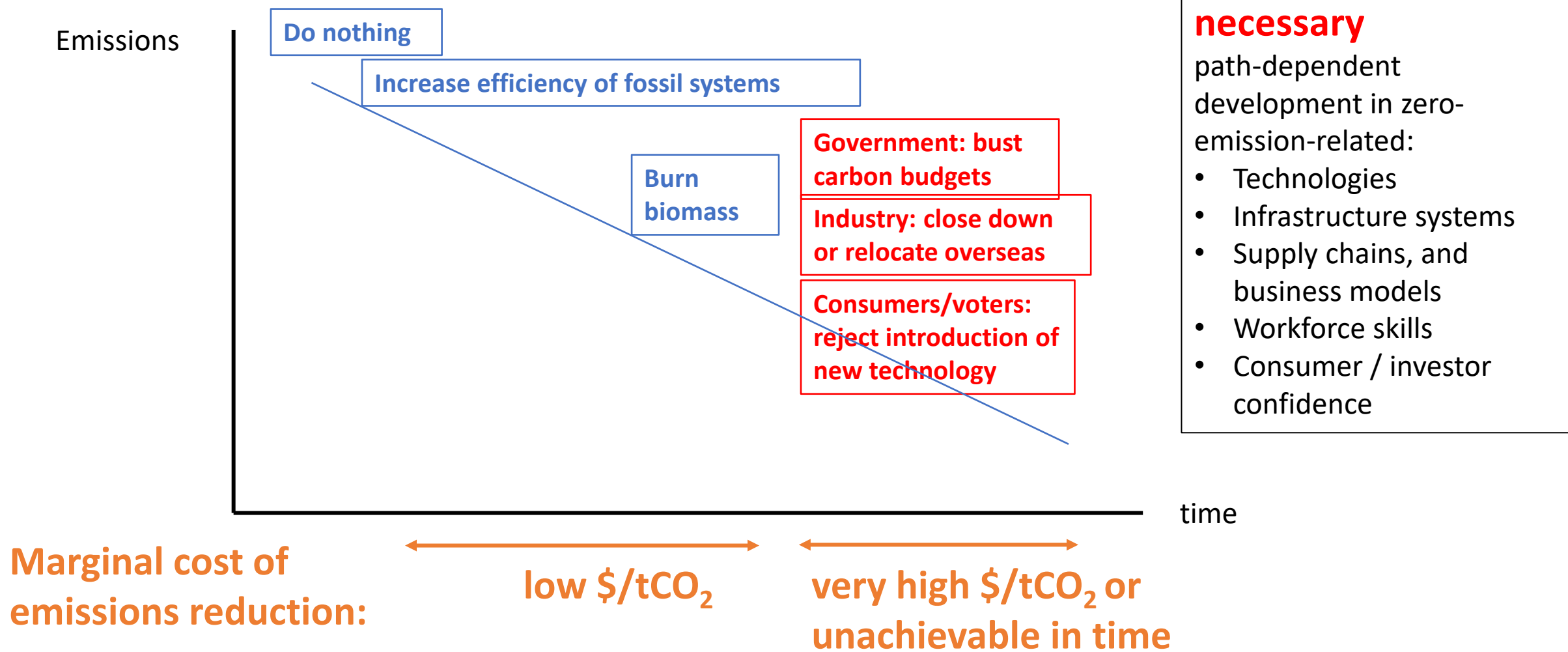
The right policy combinations can achieve more than the sum of their parts

Emissions reductions from policy combinations in road transport (using the FTT model)



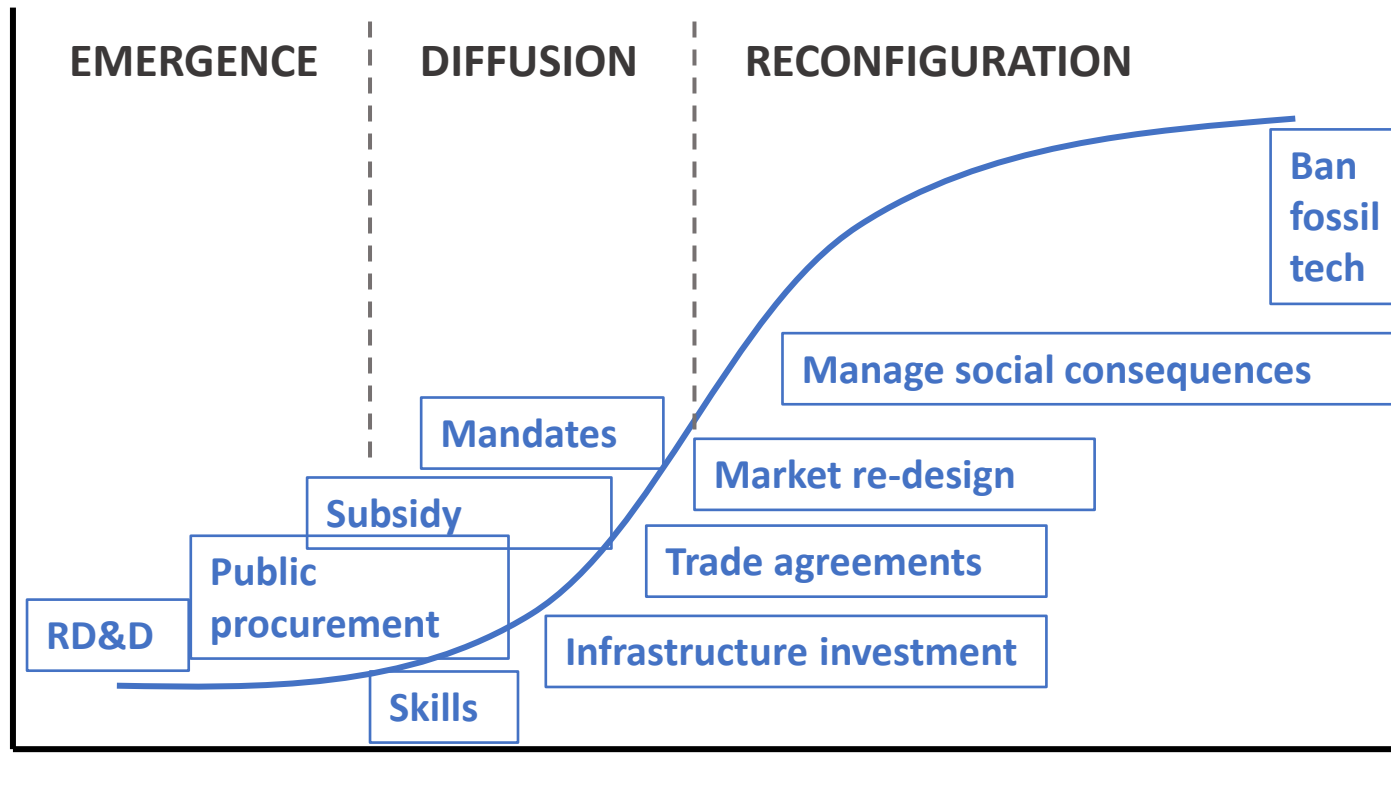
Source: Lam & Mercure, using the FTT model

4. A strategy focused on short-term emissions reductions stores up problems for the future



Focus instead on deployment of zero-emission solutions

Zero emission solution market share



Each step enables the next

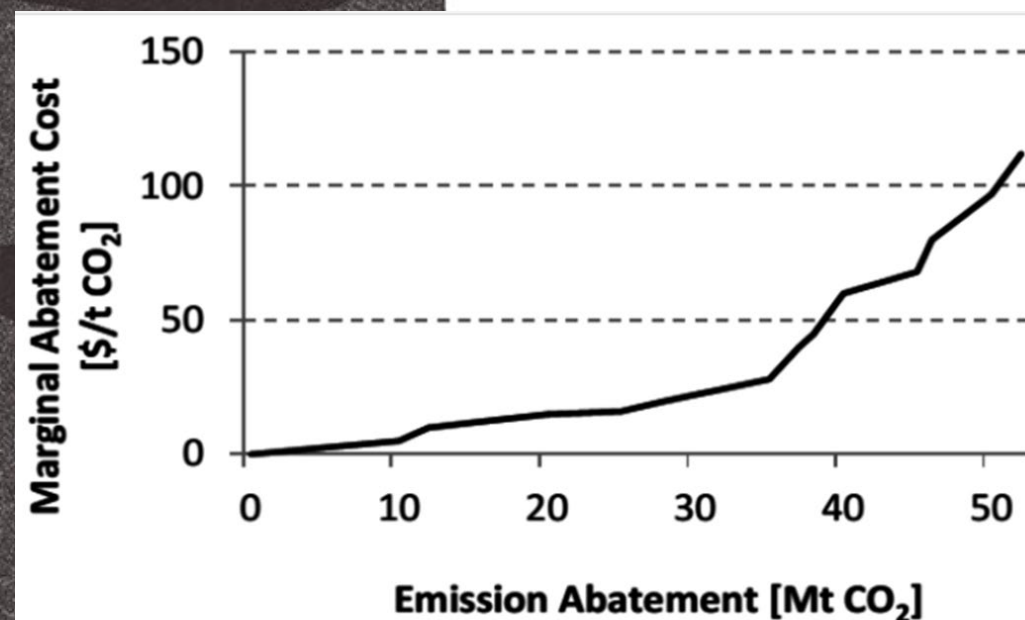
time

Marginal cost of emissions reduction:



DIPLOMACY

Does
decarbonisation
only ever get
more difficult?



Example of a model-derived Marginal Abatement Cost curve

Balancing feedbacks dominate

Reinforcing feedbacks dominate



**Dirty
fossil
economy**

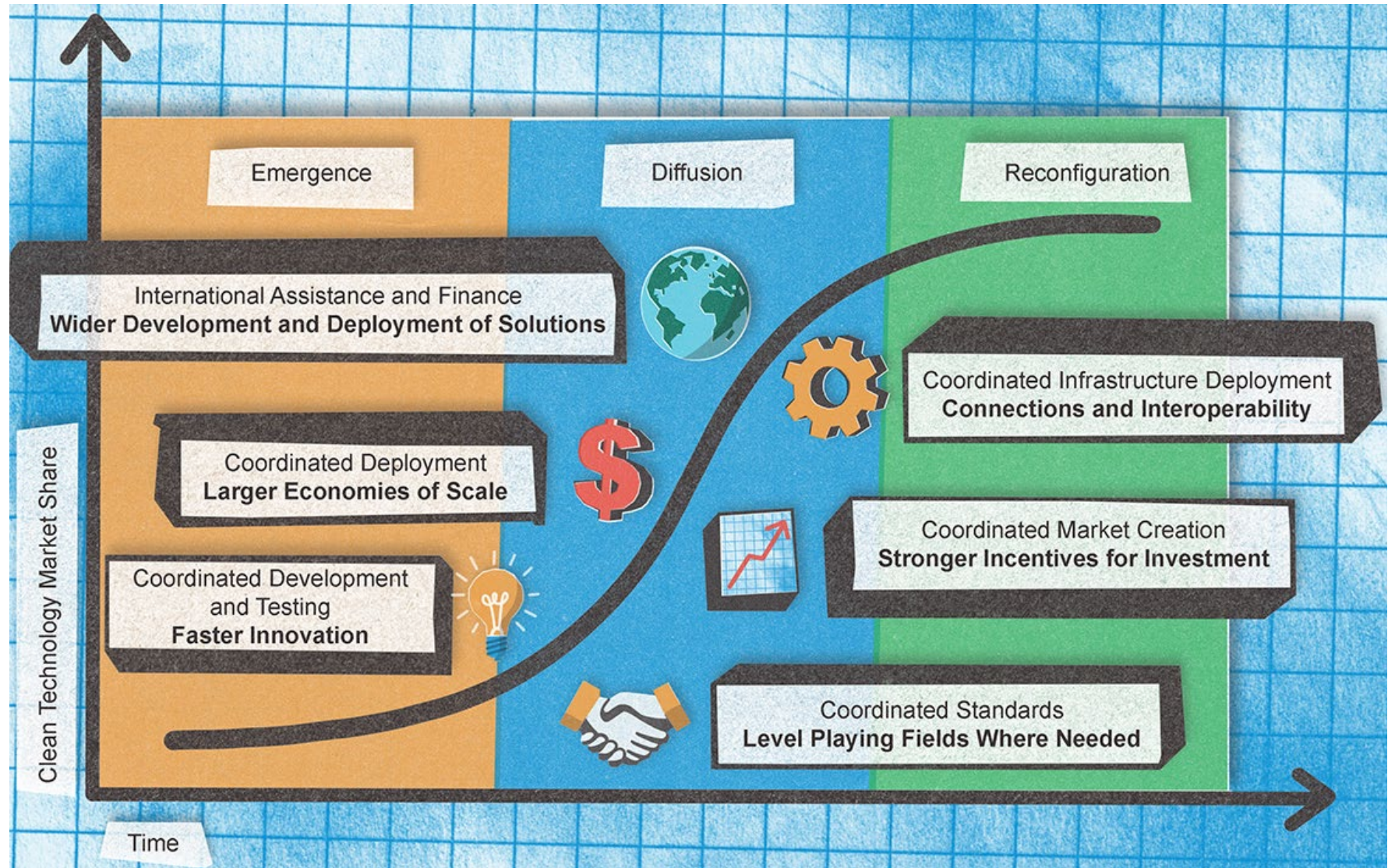
**Clean
economy
with \$12
trillion
savings**

Negative sum diplomacy in a static economy



How to divide up the global carbon pie

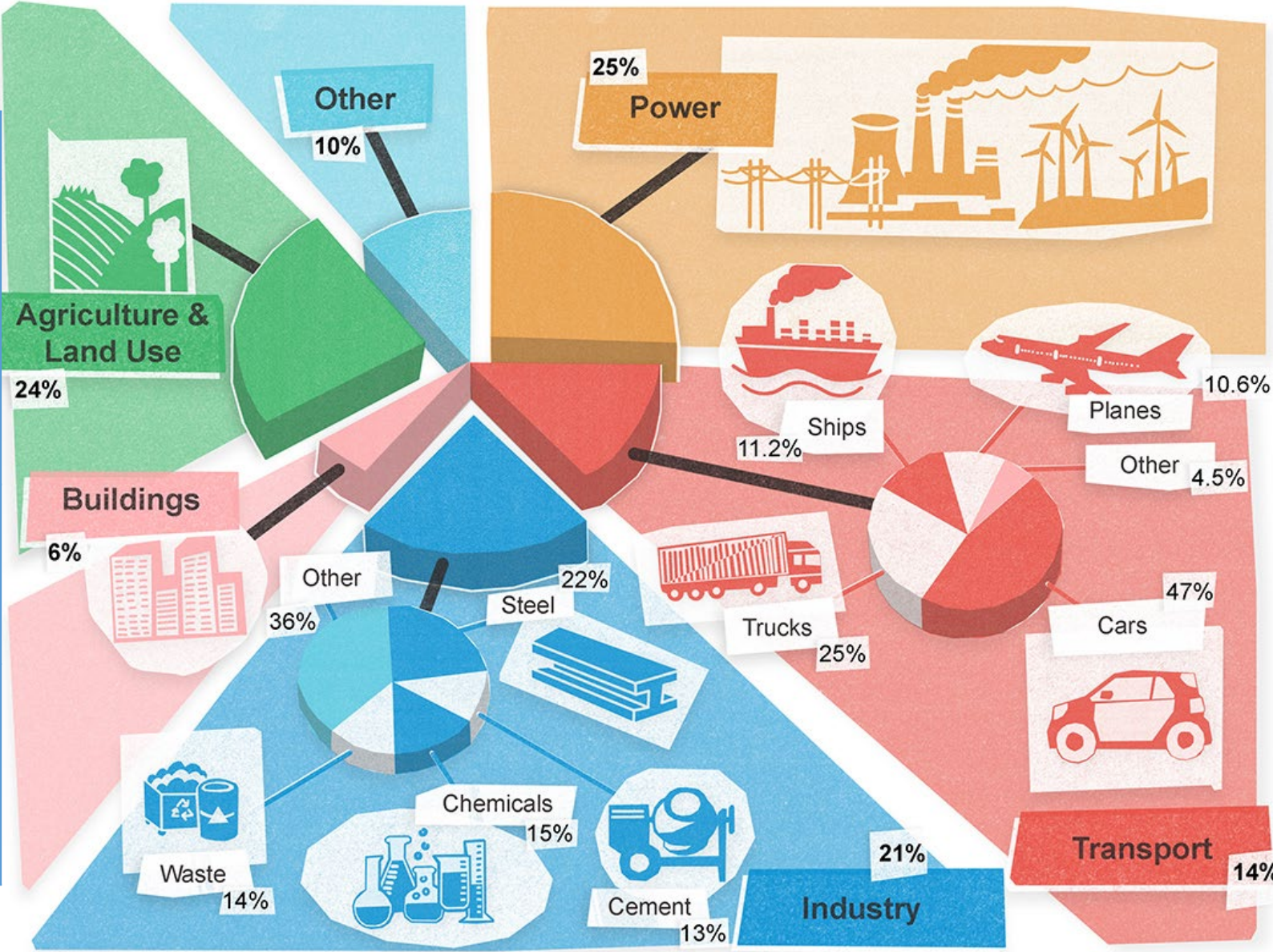
Positive sum diplomacy in a dynamic economy



Adapted from IEA, IRENA & Climate Champions, *The Breakthrough Agenda Report 2022* and Victor, Geels & Sharpe, *Accelerating the low carbon transition* (2019)

1. Scope: focus cooperation within sectors

LAND USE
Politics: food security, rural development, consumer preference
Technologies: sustainable agriculture practices
Problem: international trade flows incentivize deforestation
Influential countries: Indonesia, Malaysia, Brazil, Ghana, Cote d'Ivoire, EU, China, India, US, Argentina

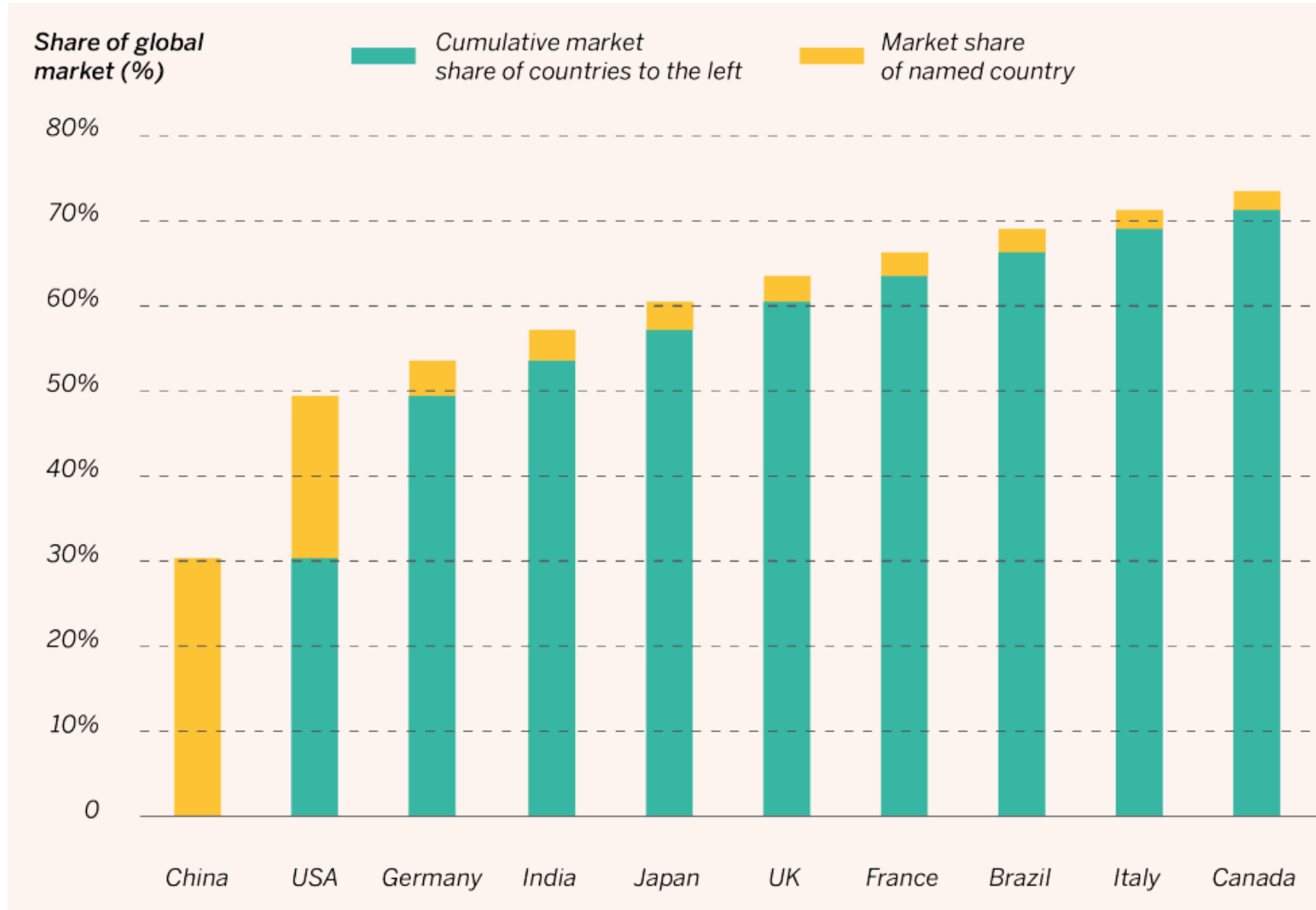


POWER
Politics: energy security, electricity costs, coal jobs
Technologies: wind and solar vs coal and gas
Problem: infrastructure and markets designed for old technologies
Influential countries: China, India, US, Japan, Germany, South Africa, Vietnam

ROAD TRANSPORT
Politics: costs, manufacturing jobs
Technologies: electric motors and batteries vs combustion engines
Problem: technology costs, infrastructure
Influential countries: EU, China, US / California

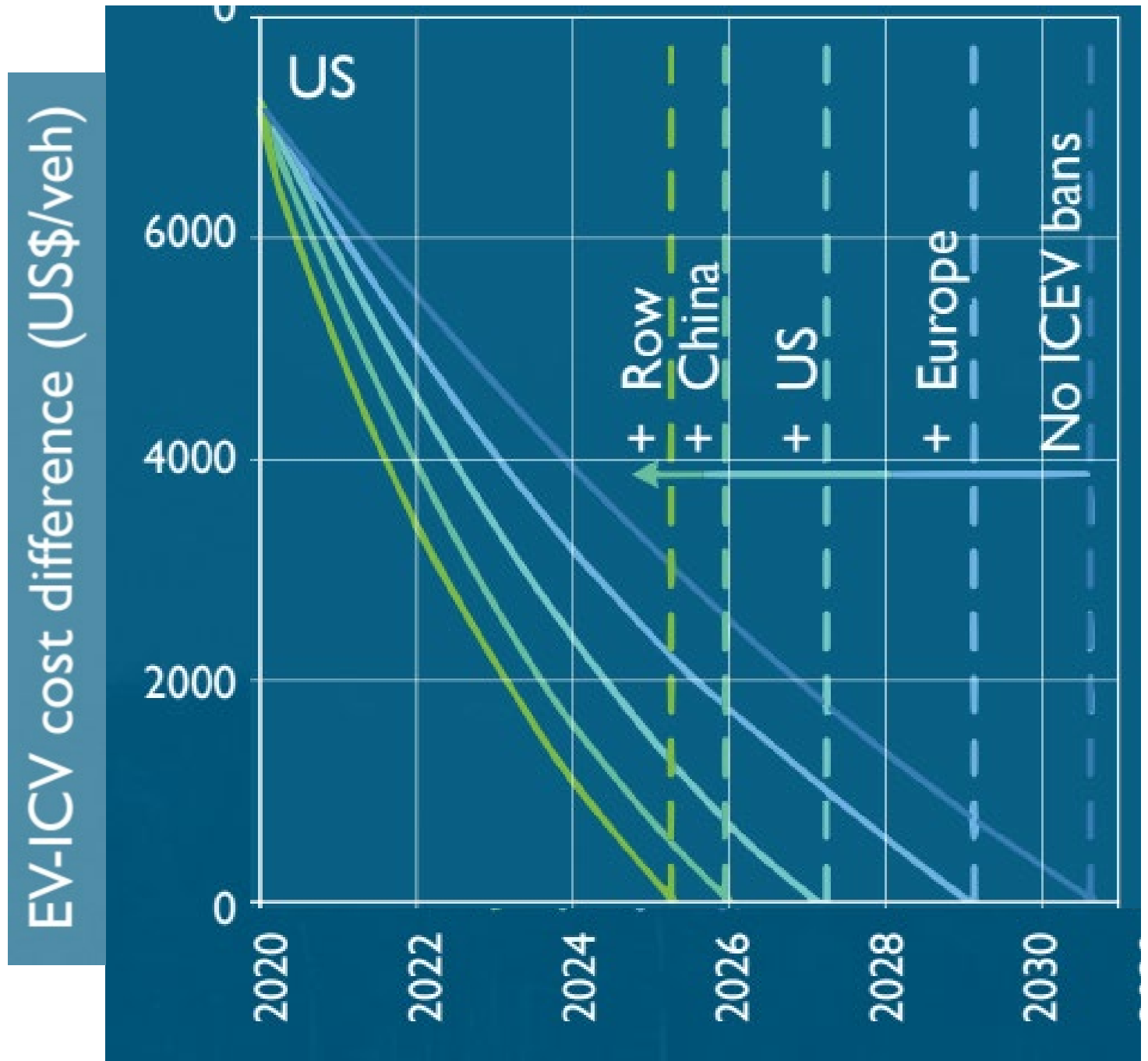
2. Participation: focus on a critical mass of actors

Cumulative
share of
global car
sales

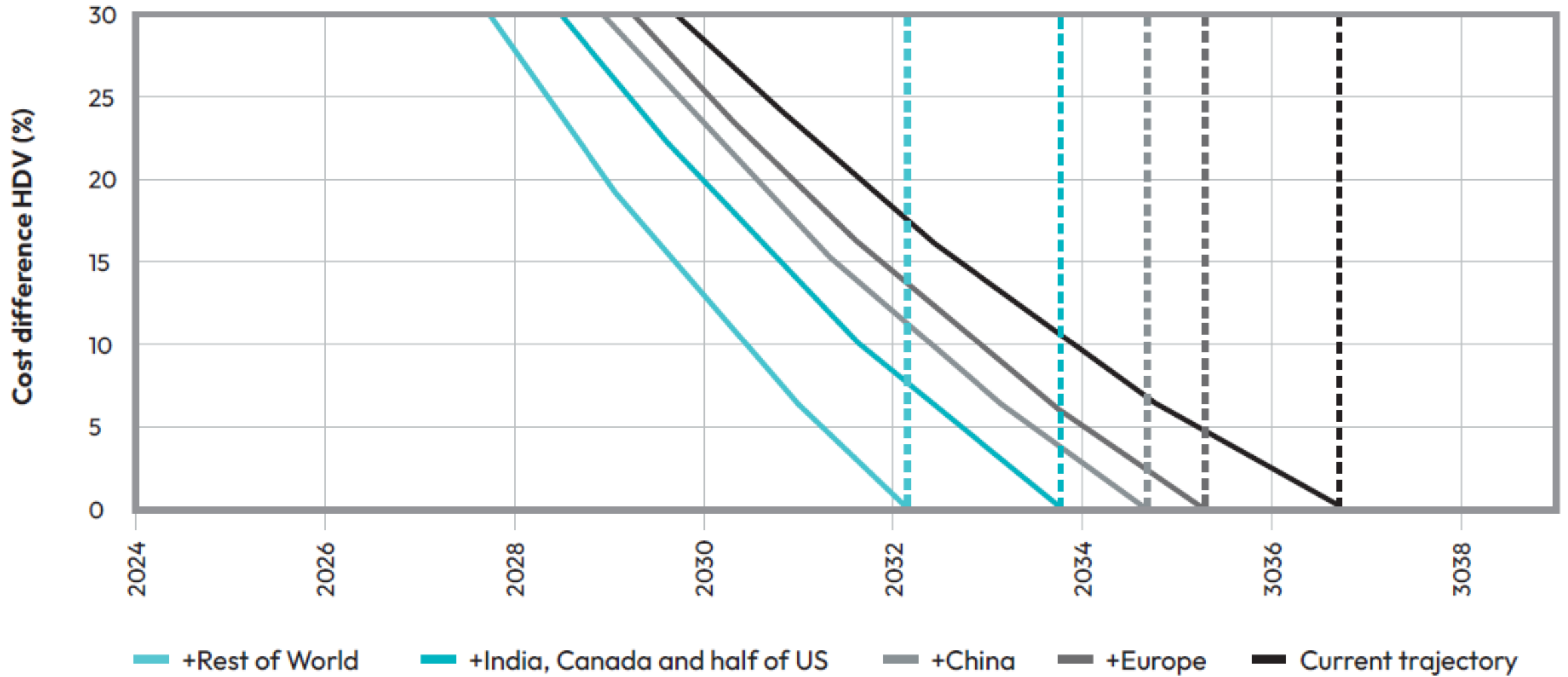


Three regulators can bring forward the electric vehicle tipping point by 5 years

Source: Lam & Mercure,
*'Evidence for a global electric
vehicle tipping point'* (2022)



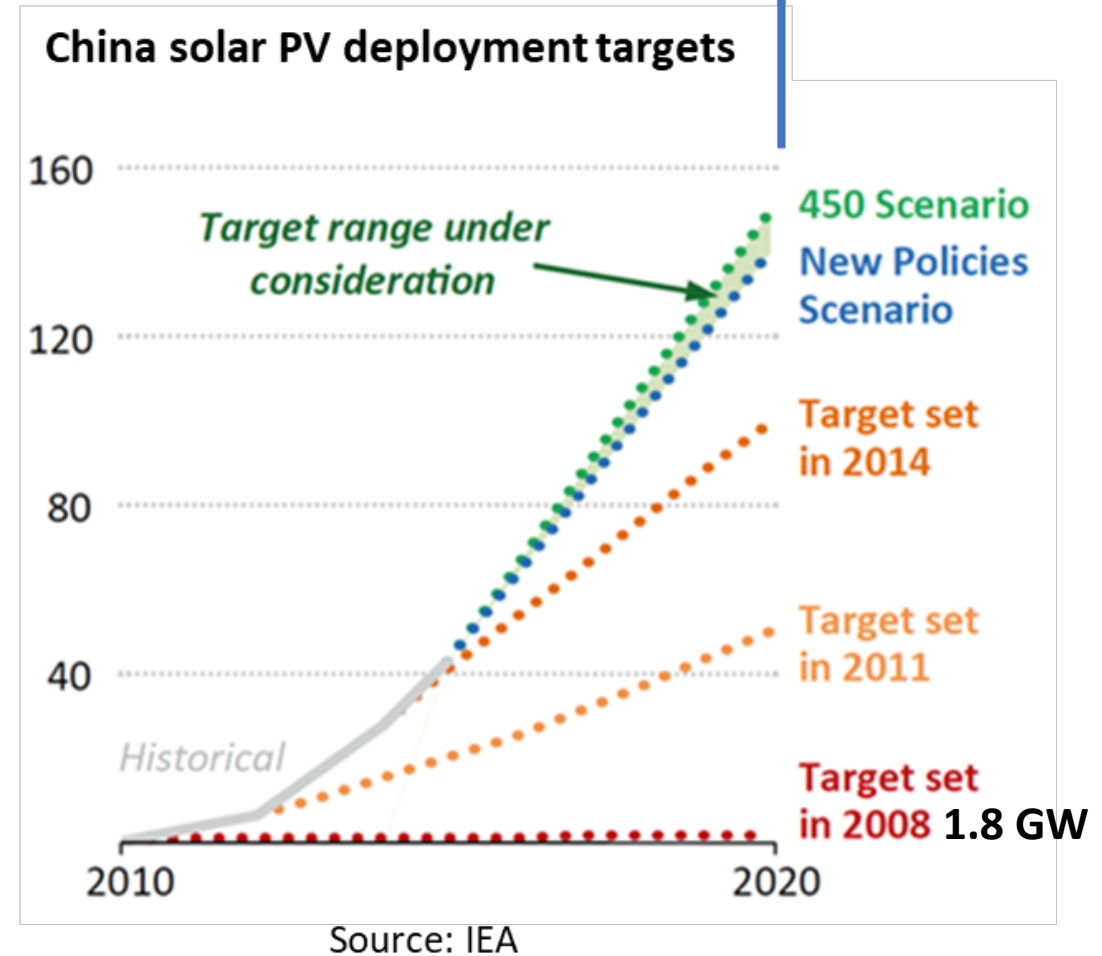
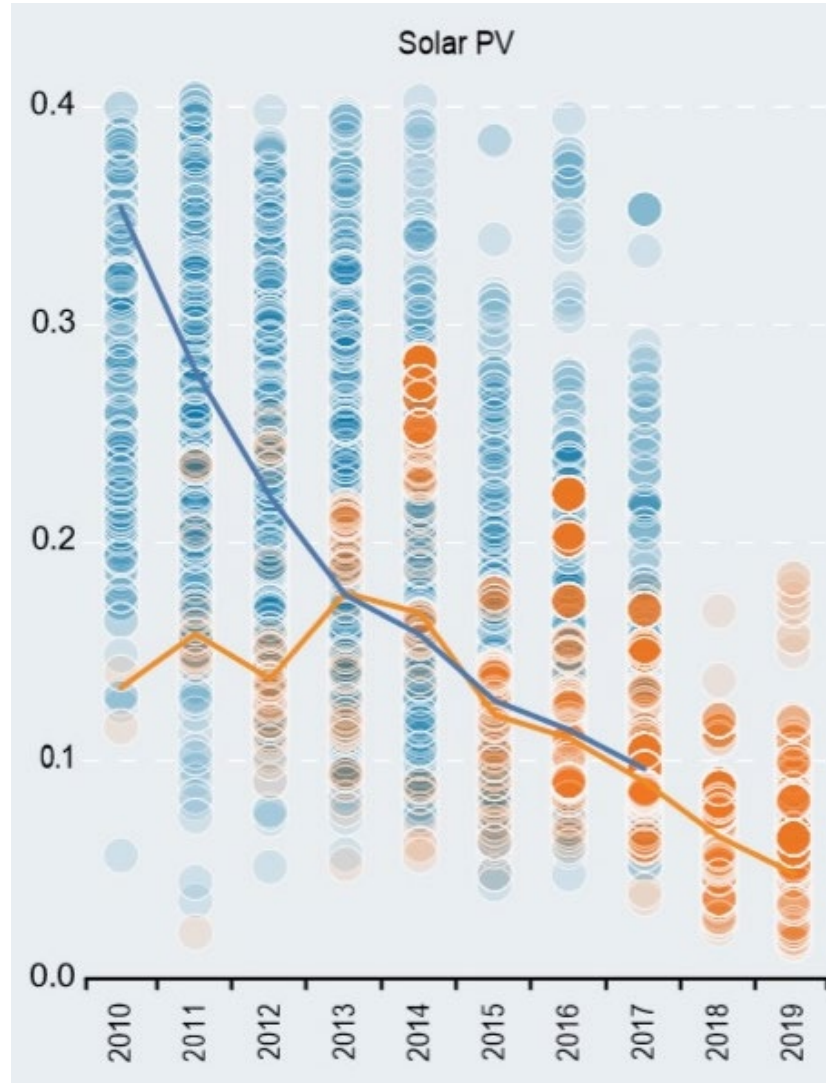
Five leading markets can bring forward the trucks tipping point by 3 years



The effect of international coordination on the purchase price difference between BEVs and diesel vehicles in China.

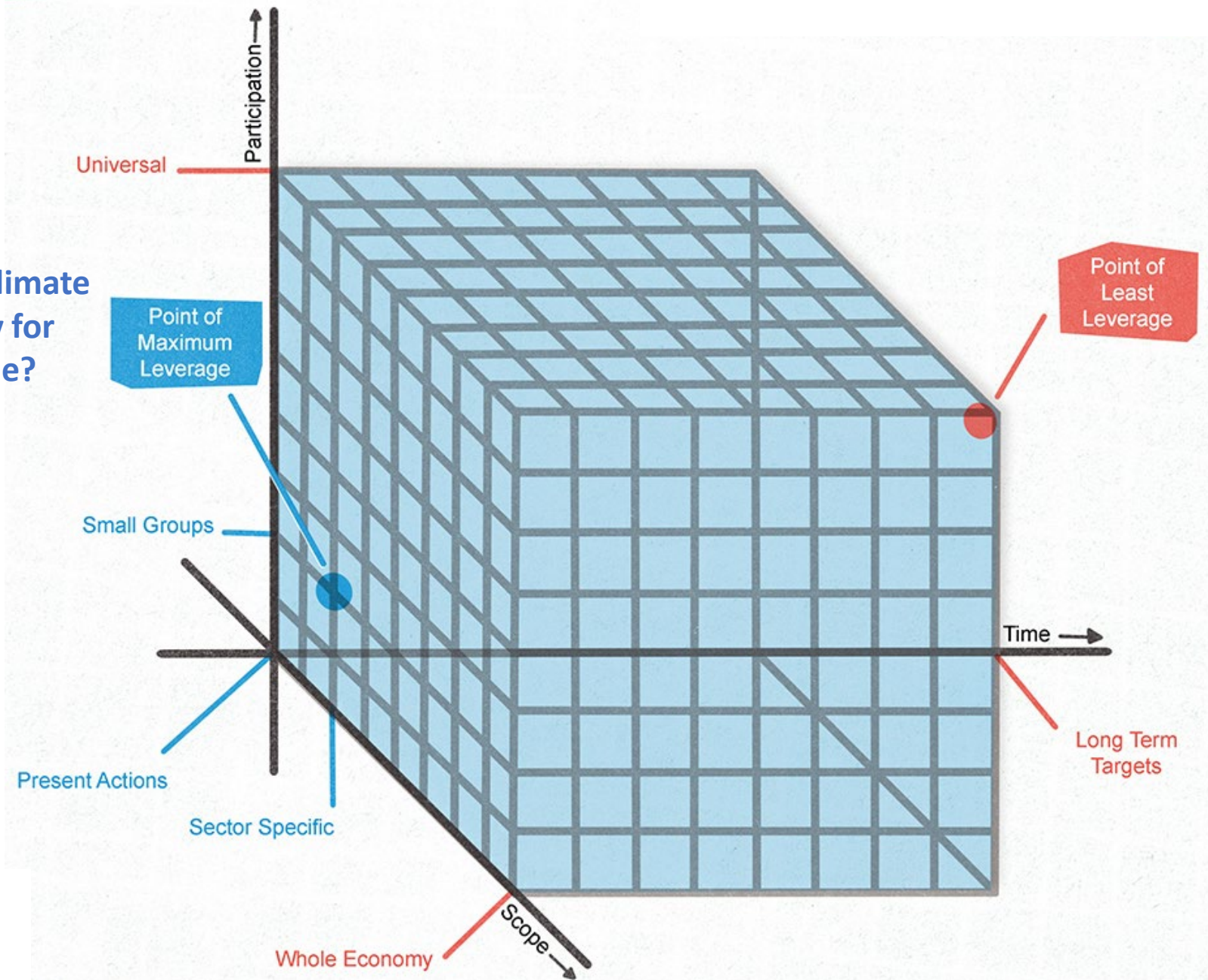
Source: Akther, A. *et al* (2025): [Driving the transition to zero emission trucks](#)

3. Timescale: focus on the present



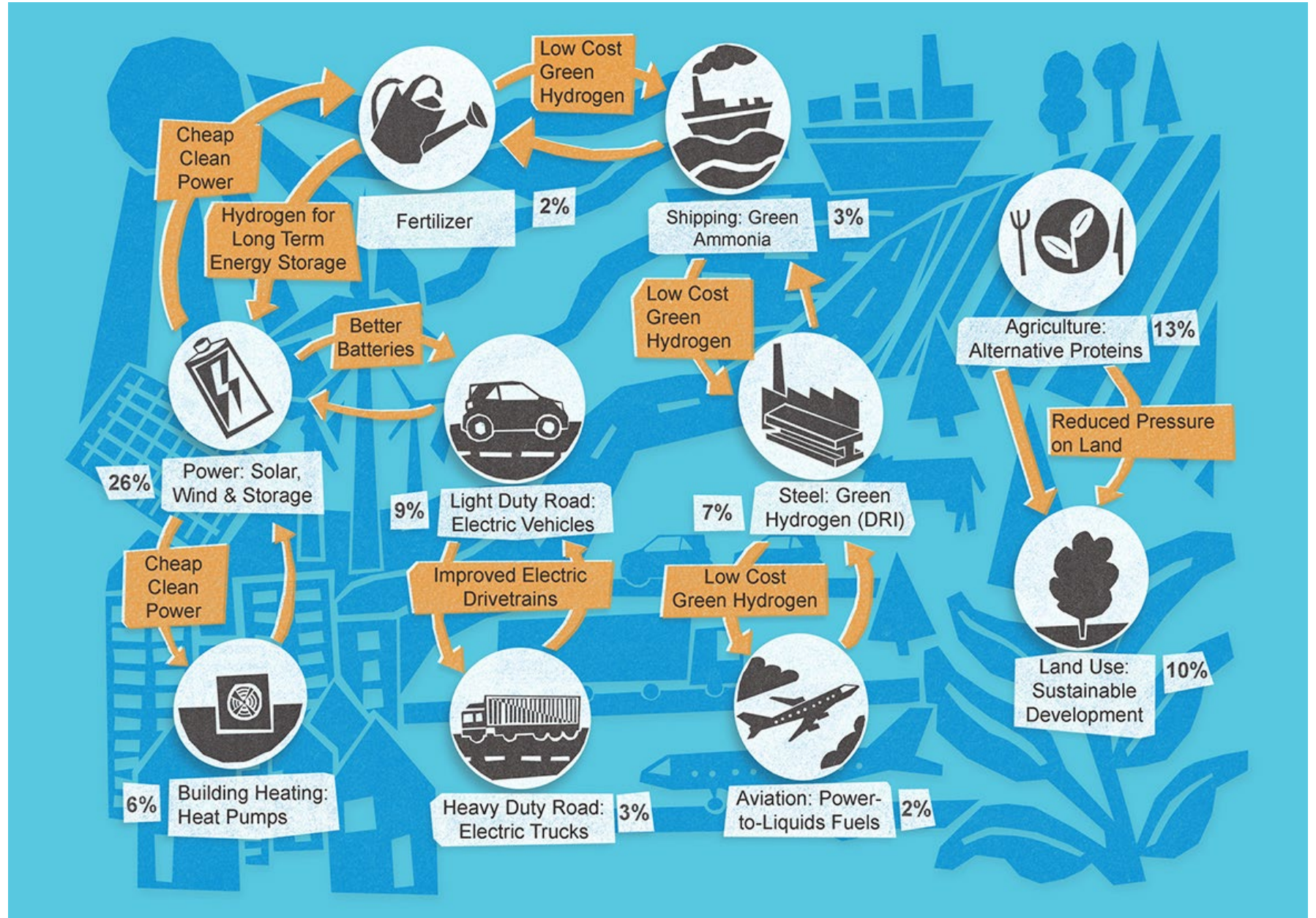
253 GW ★ 2020 actual

Focus of climate
diplomacy for
this decade?



Focus of
climate
diplomacy
for the last
30 years

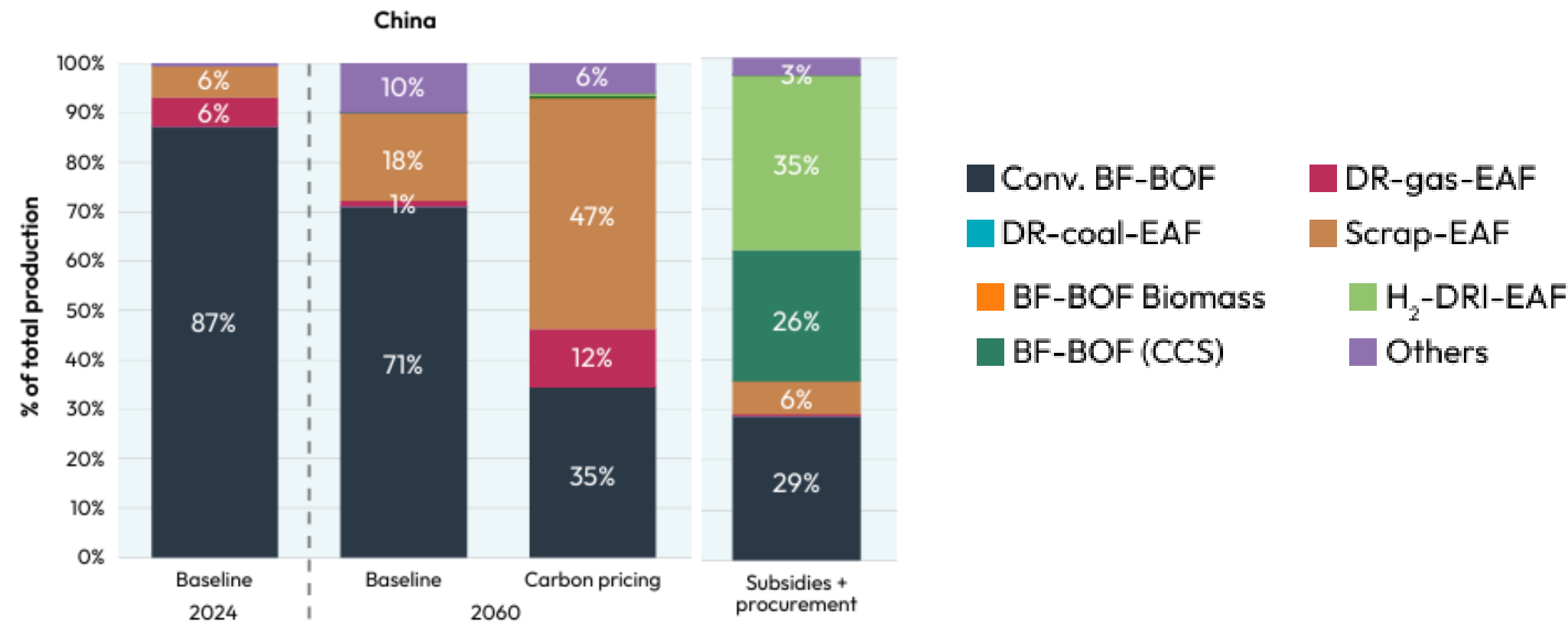
Each positive tipping point that is crossed increases the chances of crossing others



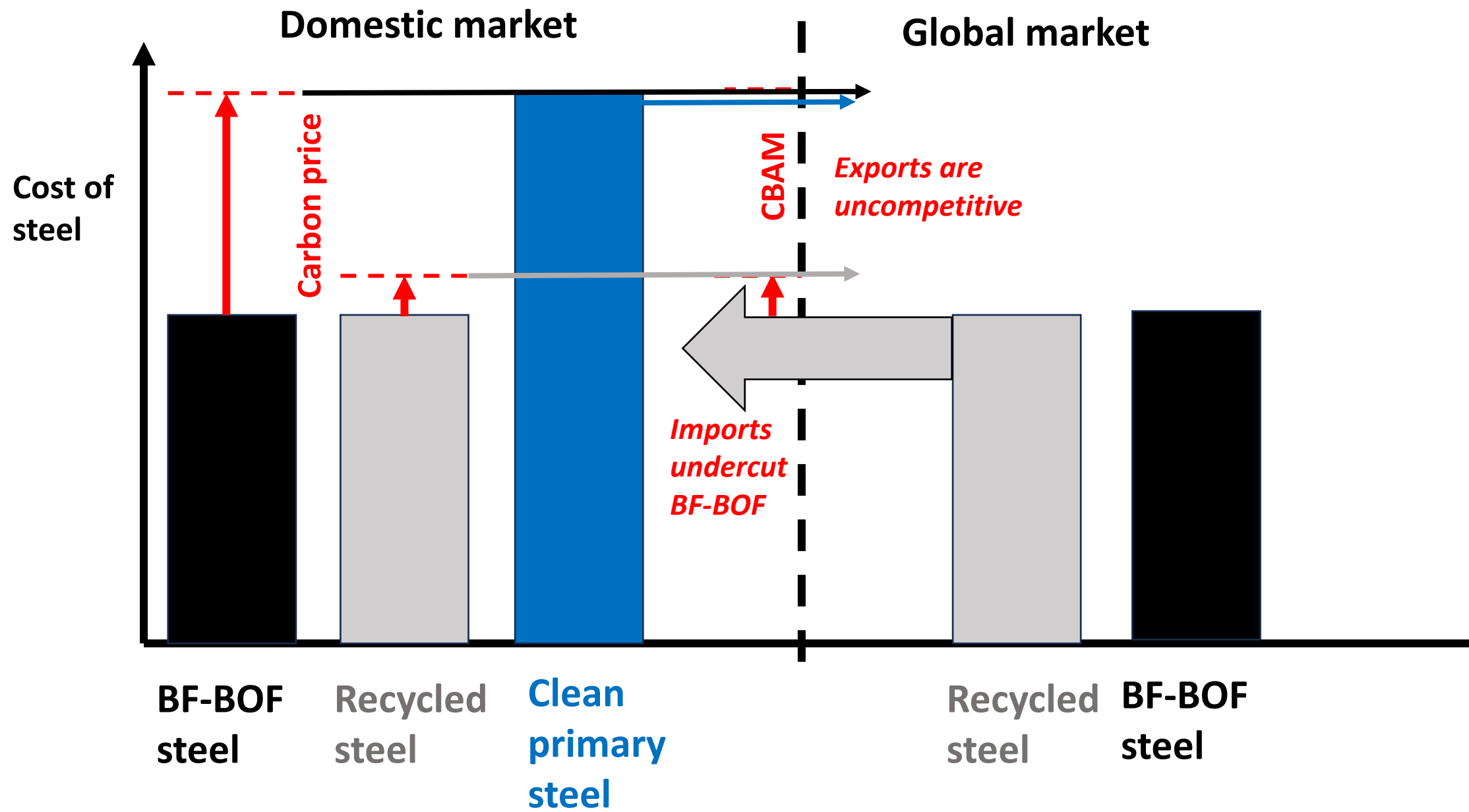
Adapted from Meldrum et al, *'The Breakthrough Effect'* (2023)

STEEL: a case study

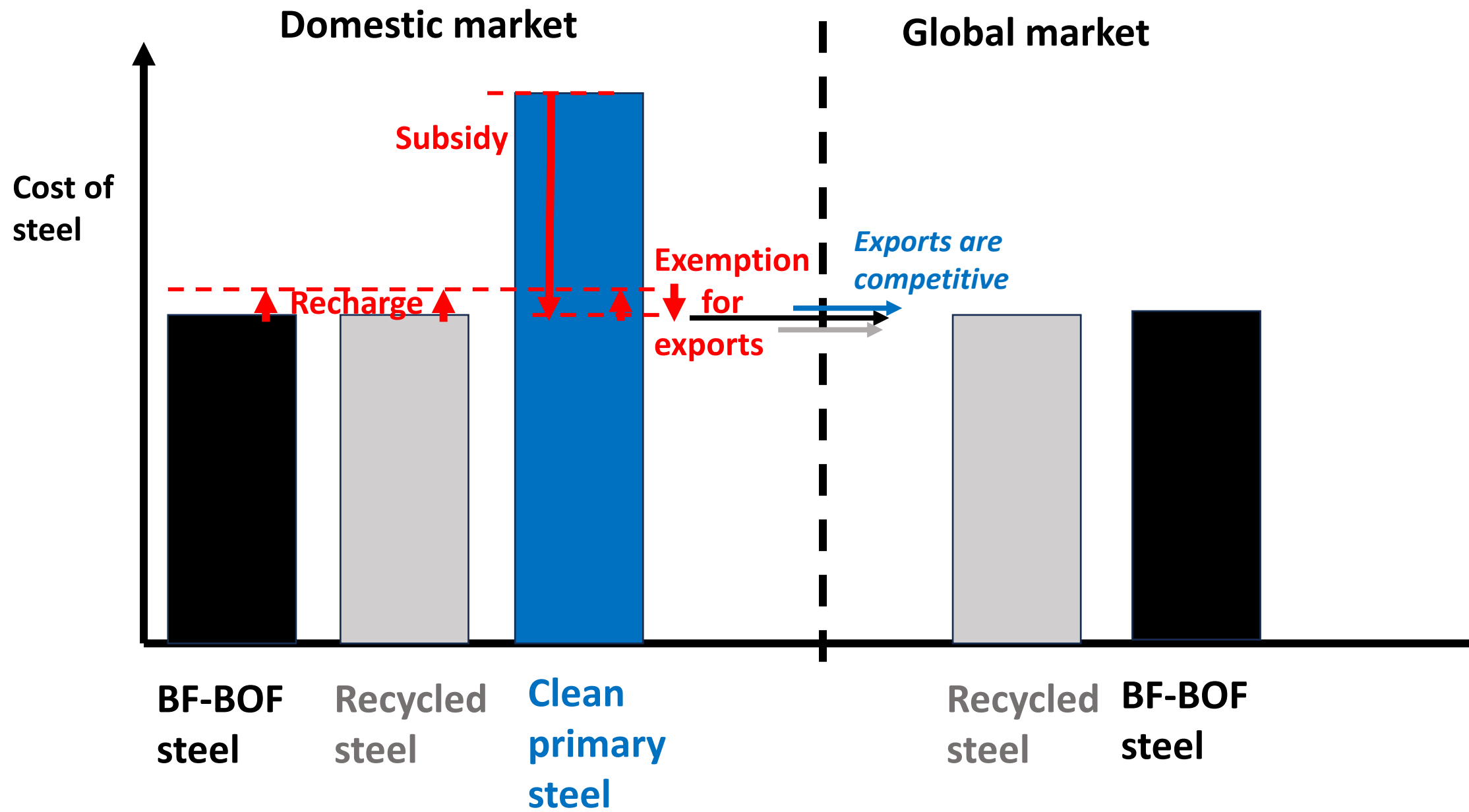
Carbon pricing drives a shift to recycling. Subsidies can deploy clean primary steel.



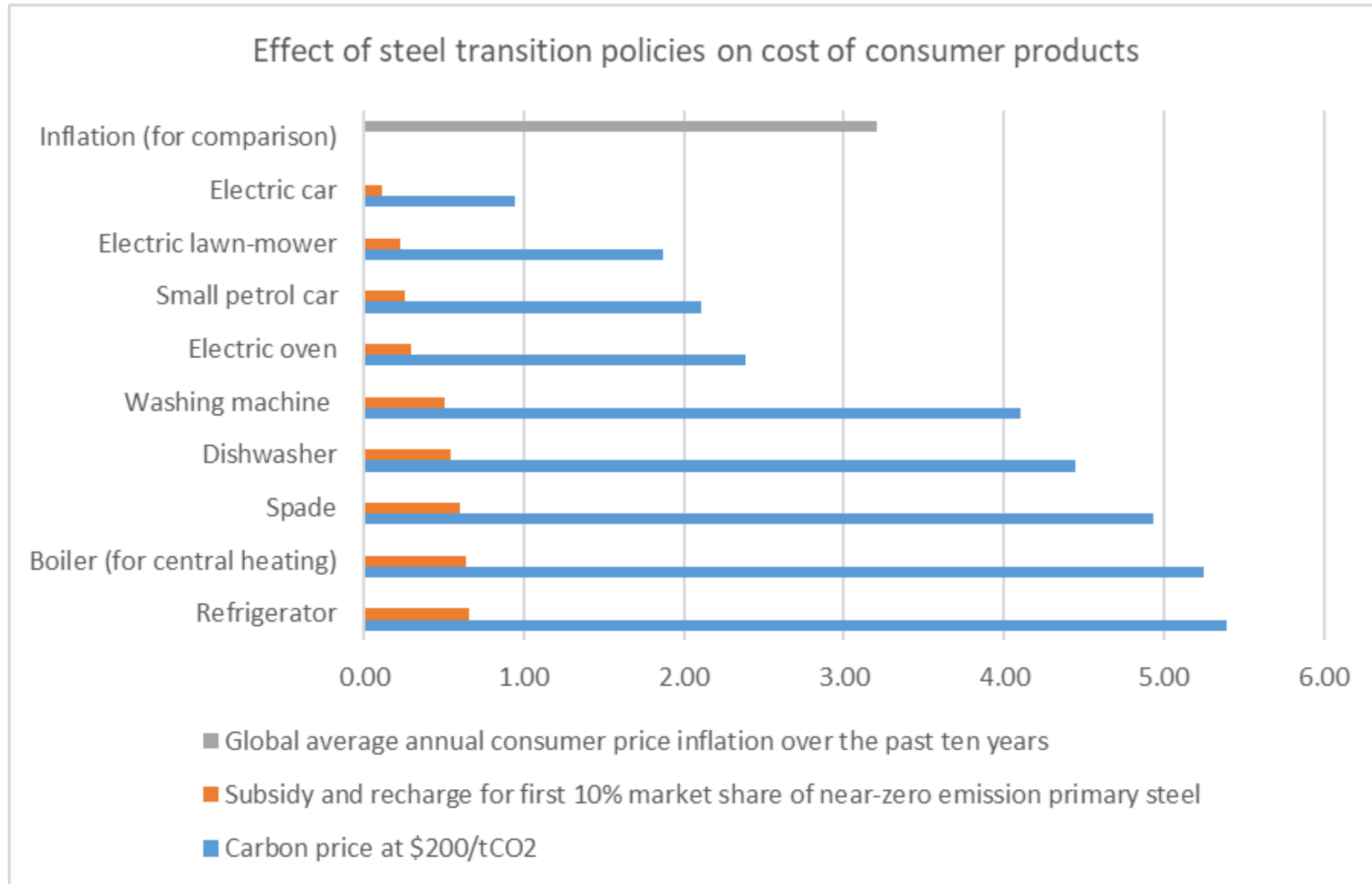
A carbon price creates competitiveness risks that a CBAM cannot solve



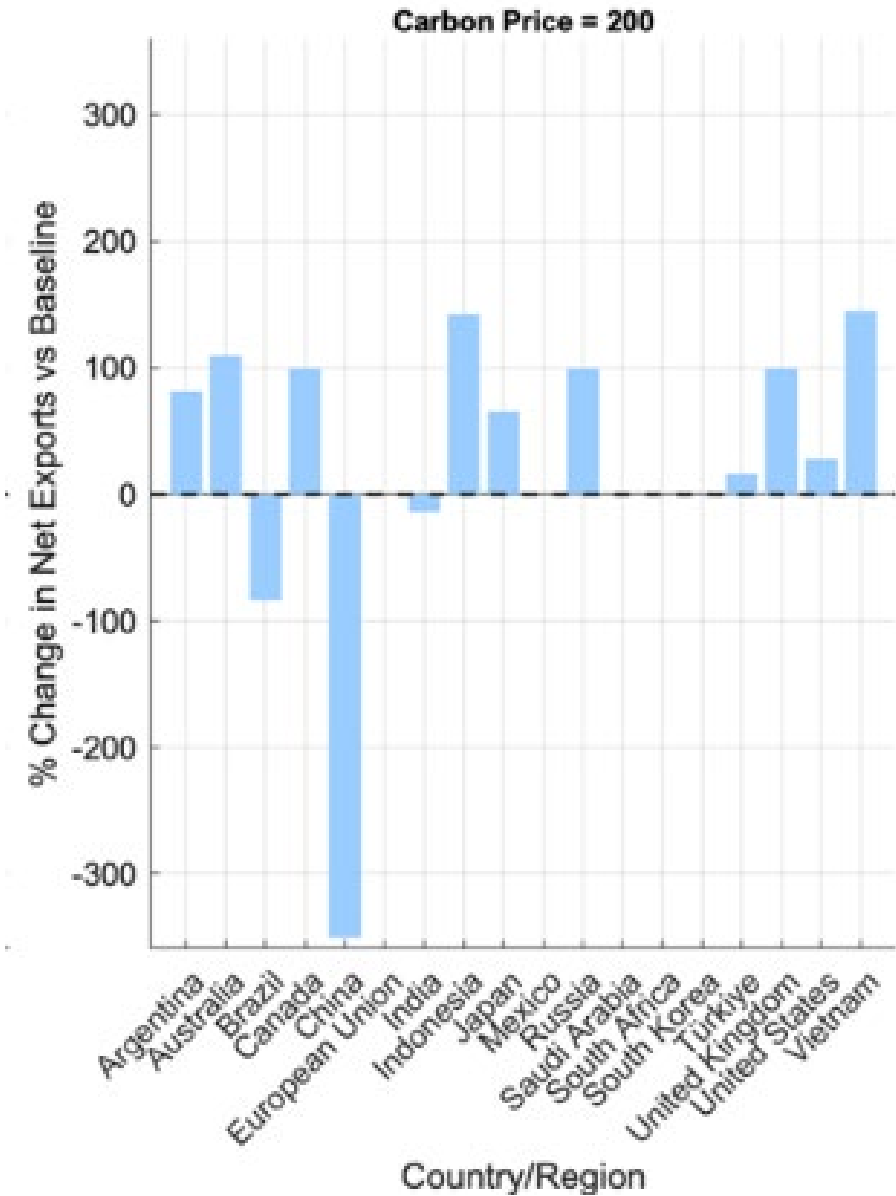
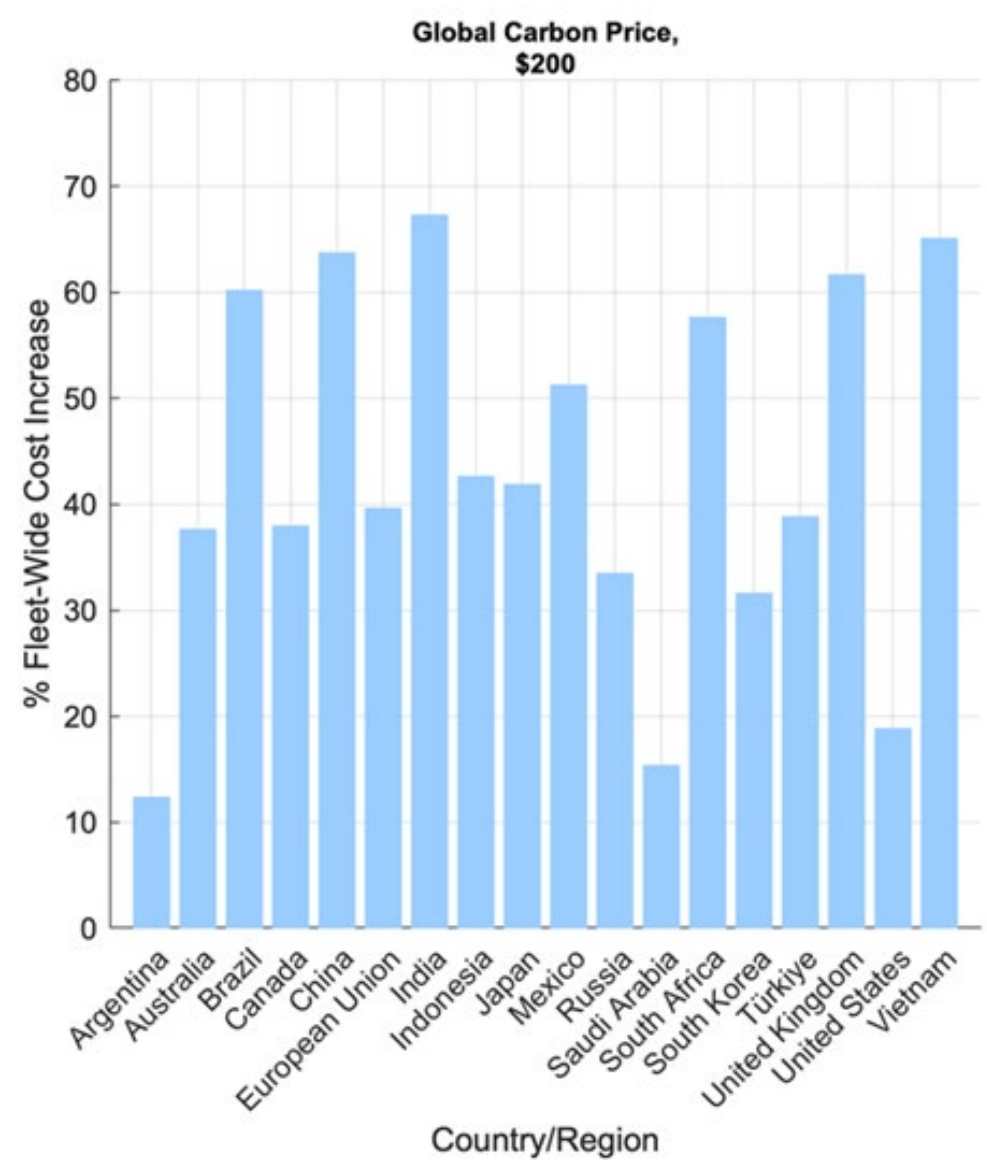
A subsidy-and-recharge creates no competitiveness risks



The cost to consumers is trivial, early in the transition

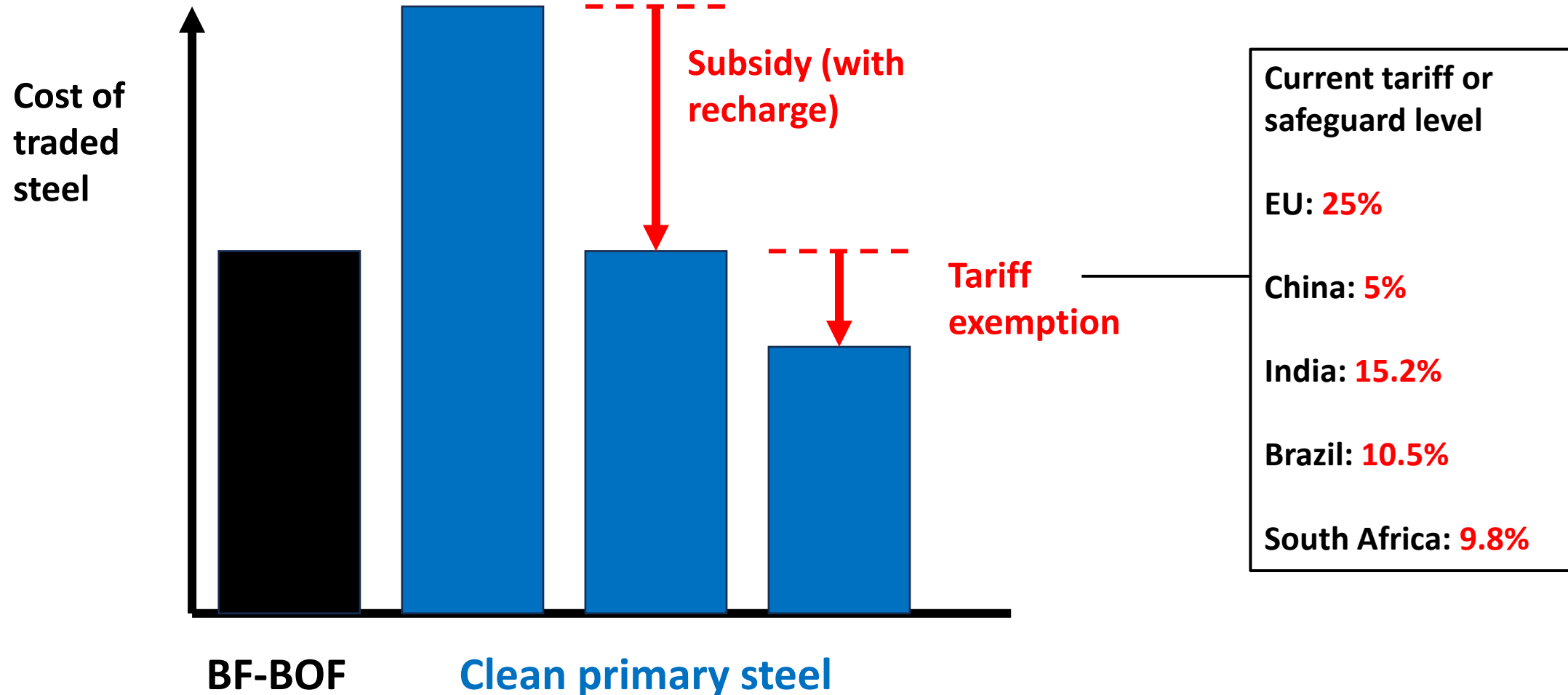


Internationally coordinated carbon pricing is unlikely to be possible

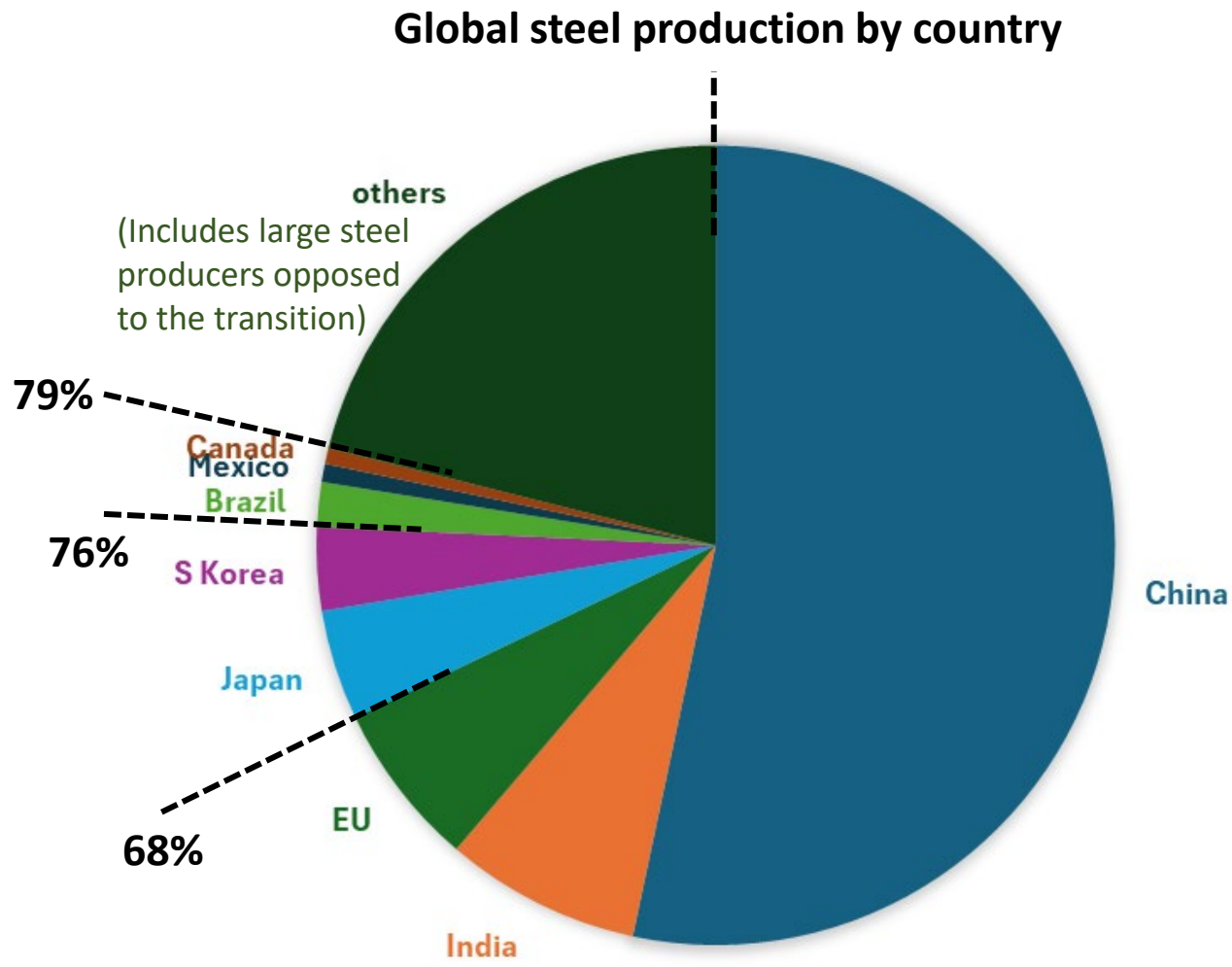


Modelling by Chris Bataille and Francis Li, for the Breakthrough Agenda Policy Network. Forthcoming report: 'Making clean steel competitive in international trade.'

A plurilateral clean steel tariff exemption could give near-zero emission steel the advantage in the global market



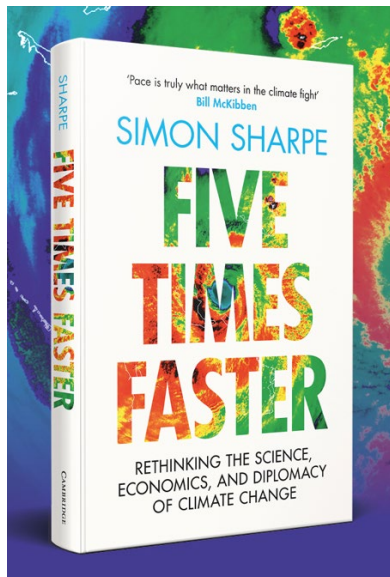
A small number of countries could move the global market



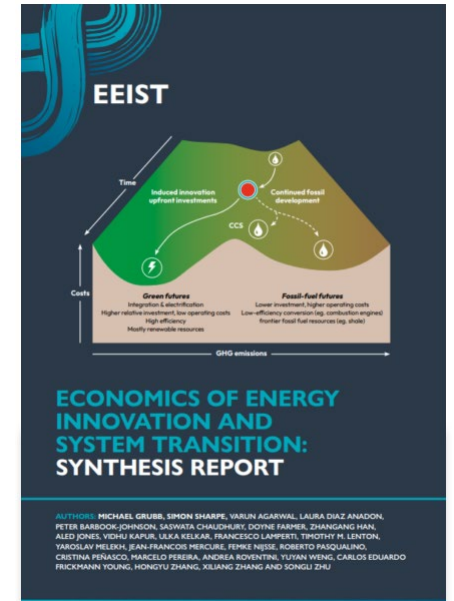
Thank you! More info available at...

A clearer view of the clean energy transition

Projects and publications
scurveeconomics.org



Sources and other info:
fivetimesfaster.org



More reports
eeist.co.uk