Policy approaches to deep decarbonization in the United States

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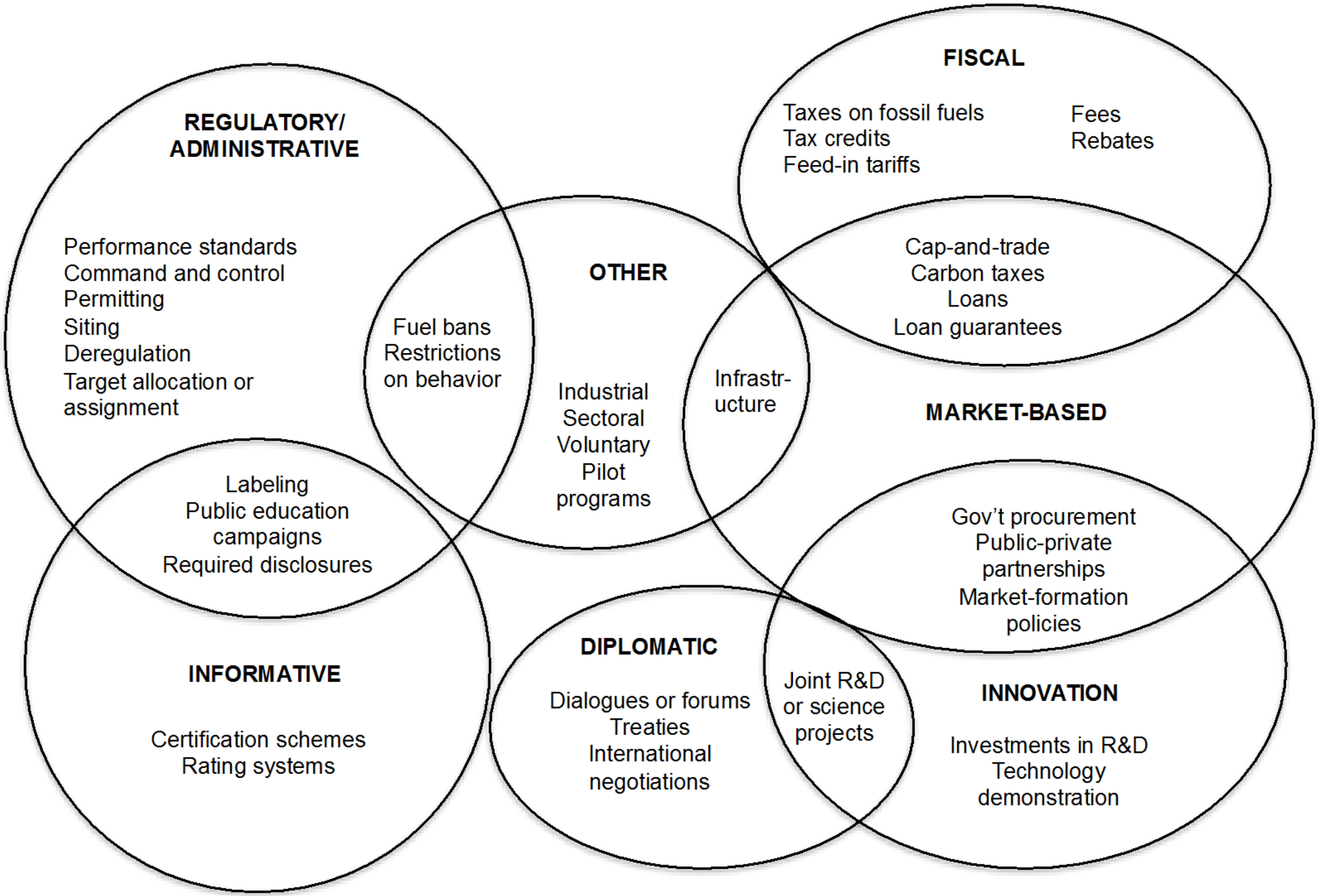
Outline

- Uncertainty and consequences of delay
- Sectoral versus economy-wide approaches
- Sequencing and growth
- Interaction of policies
  - Complementary versus undermining effects
  - Synergies between mitigation and adaptation

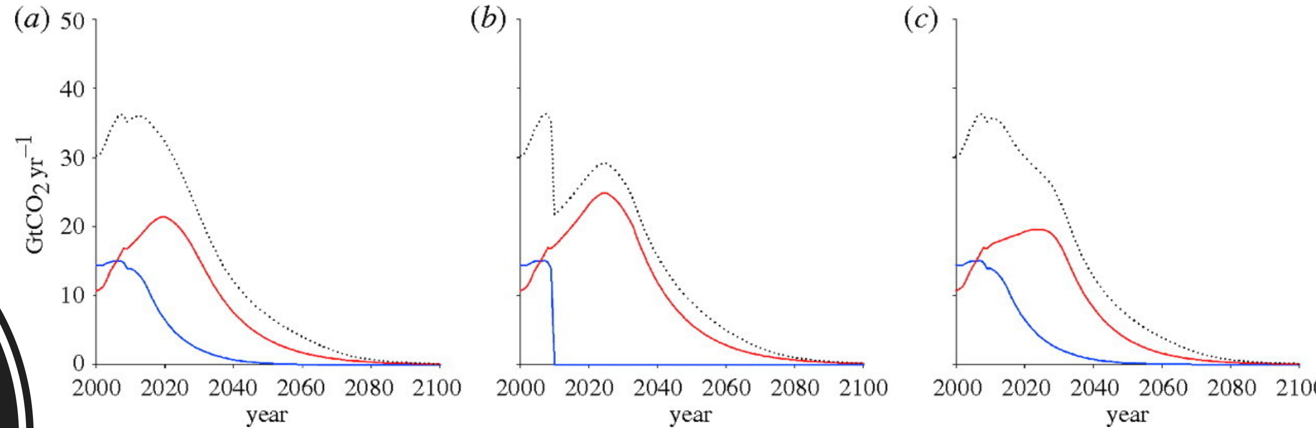
Typology of climate mitigation policies



Gallagher, K.S. and X. Xuan, 2018. Titans of the Climate, The MIT Press.

Consequences of delay

Emissions budgeting



Global CO_2 scenarios for approximately 50% chance of not exceeding 2°C

All scenario pathways ((a) C+4, (b) C+5, (c) C+6) are for the same cumulative twenty-first century CO_2 budget of 1578 GtCO2 (blue line, Annex 1; red line, non-Annex 1; dotted line, global including deforestation).

Kevin Anderson and Alice Bows 2011, "Beyond 'dangerous' climate change: emission scenarios for a new world" *The Royal Society*

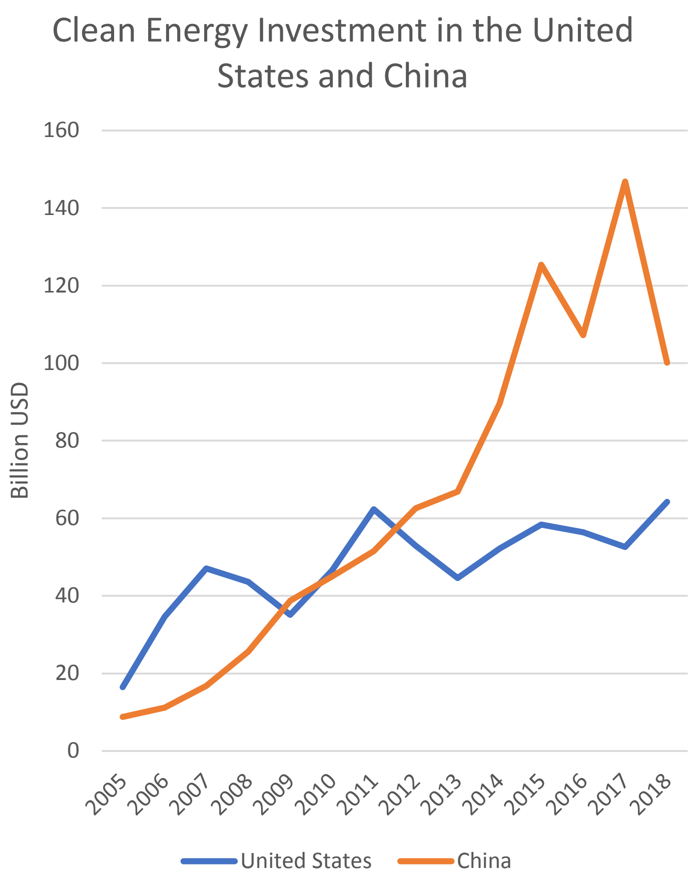
https://doi.org/10.1098/rsta.2010.0290

UK Carbon Budgets for 2008-2032

Budget	Carbon budget level	Reduction below 1990 levels
1st carbon budget (2008 to 2012)	3,018 MtCO2e	25%
2nd carbon budget (2013 to 2017)	2,782 MtCO2e	31%
3rd carbon budget (2018 to 2022)	2,544 MtCO2e	37% by 2020
4th carbon budget (2023 to 2027)	1,950 MtCO2e	51% by 2025
5th carbon budget (2028 to 2032)	1,725 MtCO2e	57% by 2030

https://www.theccc.org.uk/tackling-climate-change/reducing-carbon-emissions/carbon-budgets-and-targets/

Consequences of policy uncertainty



- Continued investment in high carbon technology and infrastructure, which can contribute to carbon lock-in and/or stranded assets
- Higher interest rates for low-carbon investments because of perceived financial risk due to policy instability
- Loss of technological leadership, knowledge depreciation
- Loss of green manufacturing capacity and related jobs
- Higher costs if steep emissions reductions are later needed as a consequence of continued delay
- Higher costs due to ad hoc, redundant, contradictory, or fragmented policy approaches that arise due to policy vacuum

Percent change:

1990–2017

▲ 22.2%

▼ 5.2%

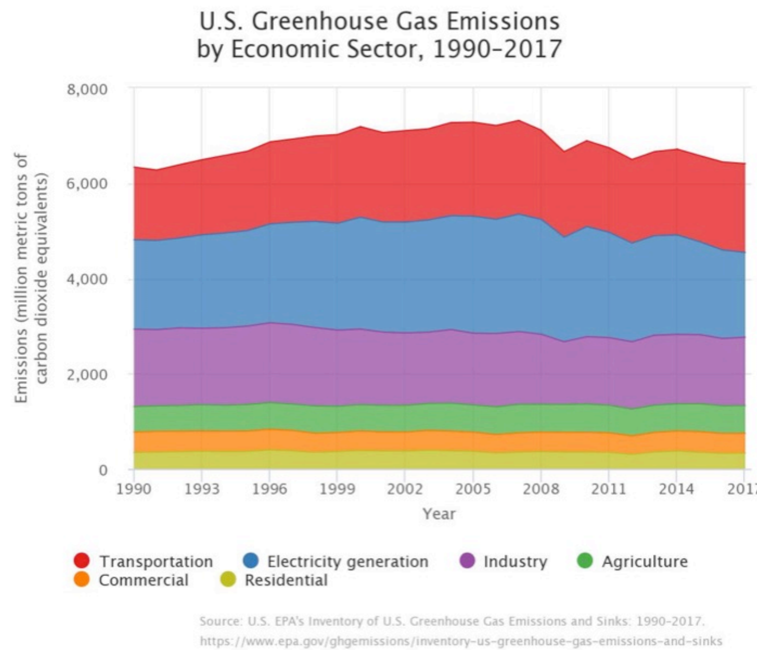
▼ 11.8%

▲ 8.8%

▼ 2.6%

▼ 4.0%

Total: ▲ 1.3%



Sectoral vs. economy-wide approaches

Fig. 1 | California and the EU have moved through three stages in developing low-carbon policies. First, they have adopted green innovation and industrial policies. Most of the world is currently at this stage. These initial policies have helped grow political support coalitions and reduce the cost of low-carbon technologies (green arrows indicate growth, red arrows indicate decline). Second, they have developed carbon-pricing policies. China, for example, is currently at this stage of low-carbon policy development. Third, California and the EU have reformed their pricing policies with an eye toward increasing their environmental effectiveness, responding to growing political support and continuing drops in the cost of low-carbon technologies. Regional Greenhouse Gas Initiative (RGGI) states have also gone through this third stage of ratcheting up.

Policy sequencing

Table 1 | Policy sequencing in power and transport sectors (numbers of jurisdictions)

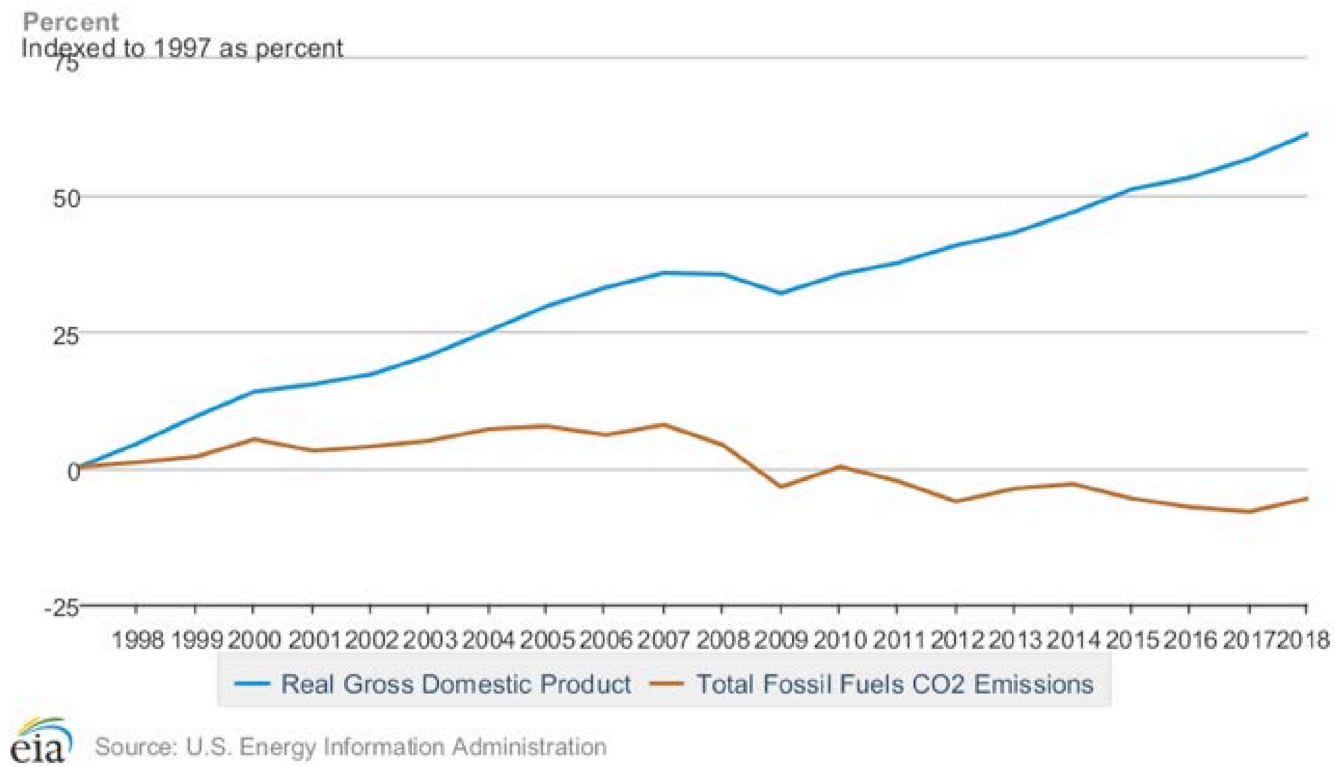
	Green industrial policy	Carbon pricing	Green industrial policy preceding carbon pricing[a]
Power	132	52	65–86%
Transport	99	12	58–95%

Green industrial policy: in the power sector, this includes renewable portfolio standards or feed-in tariffs; in the transport sector, this includes biofuel mandates or electric vehicle incentives. In terms of carbon pricing, this includes carbon tax or cap-and-trade systems. Data: authors own. [a]Lower bound of range calculates ratio based on existing carbon-pricing systems; upper bound accounts for potential of carbon pricing to appear in jurisdictions that currently have adopted green industrial policies.

Meckling, J, Sterner, T, and Gernot Wagner (2017) Policy sequencing toward decarbonization, *Nature Energy*, Vol. 2, 918–922

Green industrialization as policy opportunity:

US GDP versus energy-related CO_2 emissions



Approaches to ratcheting up climate policy over time

Market-based approaches and getting the prices right – but so far the politically-achievable carbon prices have had little impact on emissions.

Politically-achievable incremental progress? The hardest part is to start. A $1/ton carbon tax, for example.

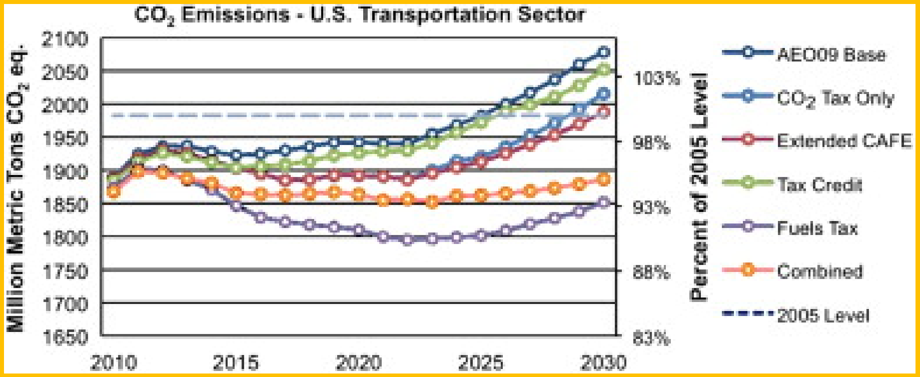
Hidden prices (e.g. regulatory approaches)? The main approach used federally in the United States despite stated preference for market-based approaches.

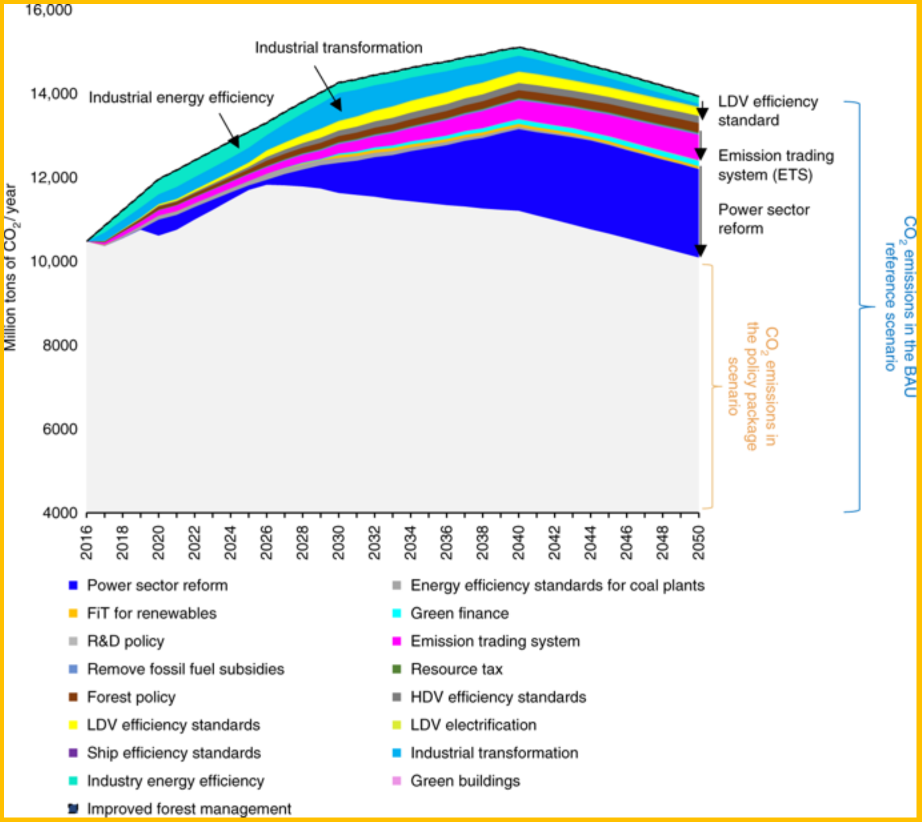
Fiscal approaches? Very effective at mobilizing finance and technology deployment (feed-in tariffs, auctions)

Green industrial and innovation policies? Good at cost reduction and political buy-in but more effective when matched with market-formation policies.

Pahle, M. et al 2018 “Sequencing to ratchet up climate policy stringency” *Nature Climate Change*.
Narassimhan, E. et al 2018, “Carbon pricing in practice,” *Climate Policy.*

Interaction of policies: complementary versus undermining approaches





(top) Morrow et al 2010, “Analysis of policies to reduce oil consumption and greenhouse-gas emissions from the US transportation sector,” *Energy Policy*.

(bottom) Gallagher et al 2019, “Assessing the policy gaps for achieving China’s climate targets in the Paris Agreement,” *Nature Communications.*

Synergies among mitigation, adaptation, and economic growth

Sources:
https://www.solarnovus.com/hurricane-sandy-puts-solar-installation-to-the-test_N6467.html;
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https://inhabitat.com/lucasfilms-new-singapore-headquarters-is-a-giant-glass-sandcrawler/#ixzz3AOvRtaY3&i

Thanks

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