

Economics of Demand-Side and Supply-Side Climate Policies

Ryan Kellogg, University of Chicago and NBER
September, 2026

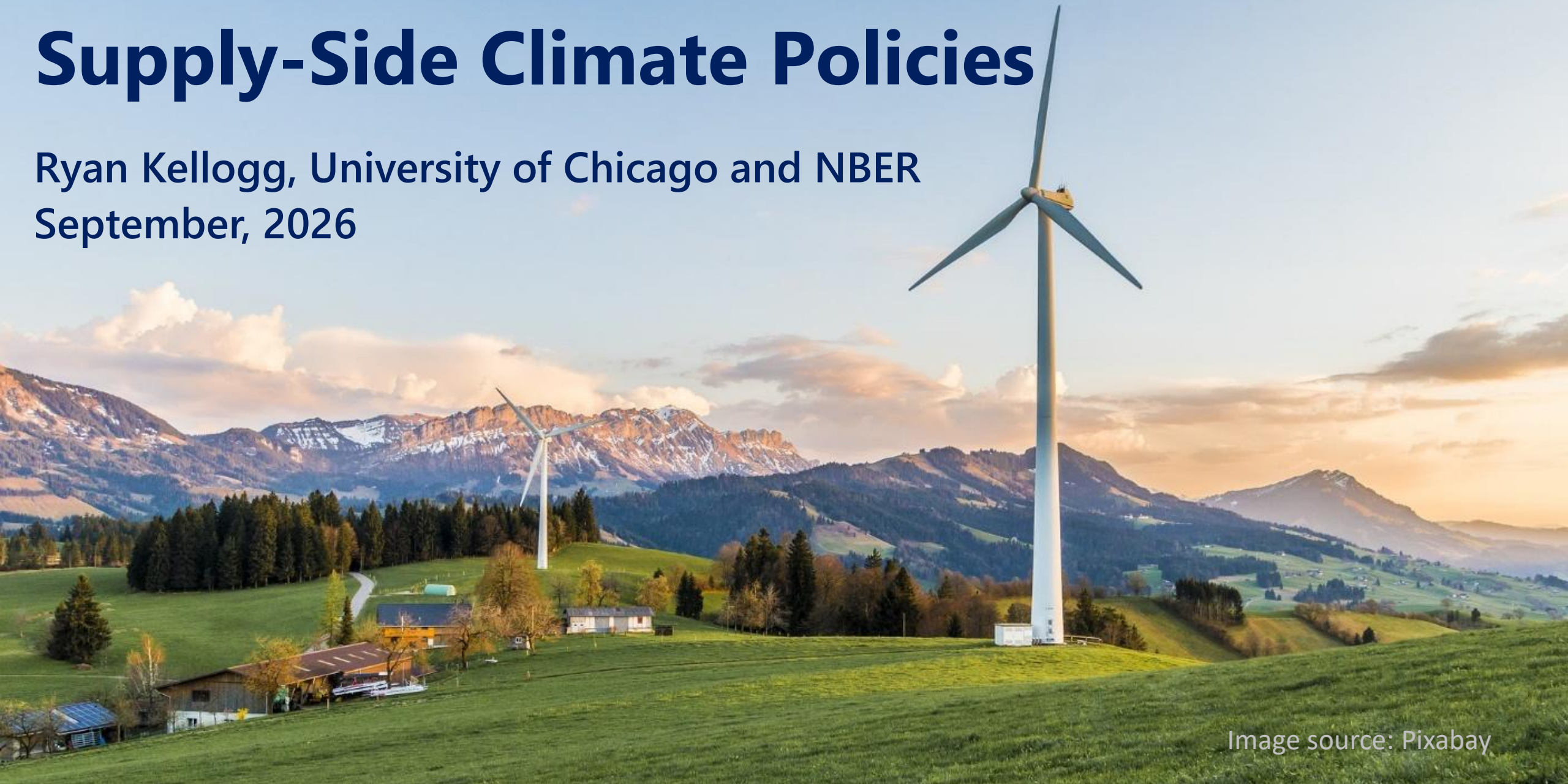


Image source: Pixabay

Global governments have made starkly different choices from the climate policy menu

Demand-side policies: target **consumption** of fossil fuels

- Pigouvian version: price carbon emissions
 - EU ETS most prominent



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 - US: Inflation Reduction Act
 - China: green industrial policy



A Victory for Biden, and a Bet on America's Future

Congress gave final approval to the Inflation Reduction Act, which will lower the cost of prescription drugs, extend health care subsidies and invest billions into climate and energy programs.

Source: New York Times: Aug 12, 2022

China's BYD Surpasses Tesla as World Leader in Electric Car Sales

As the largest maker of electric vehicles in the United States, Tesla suffered more than other carmakers from the elimination of federal incentives.

Source: New York Times: Jan 2, 2026

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Biden Administration Pauses Approvals of New Gas Export Terminals

The president said the government would analyze impacts on climate, the economy and national security before approving new projects.

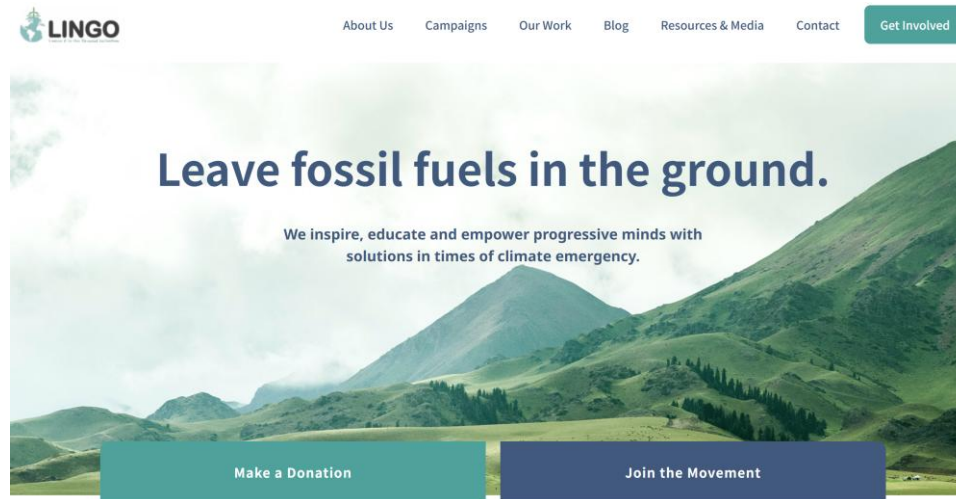
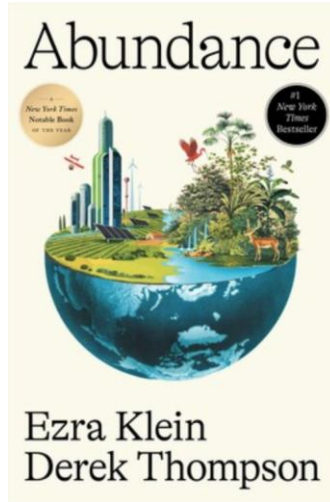
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Supply-side policies: target **extraction** of fossil fuels

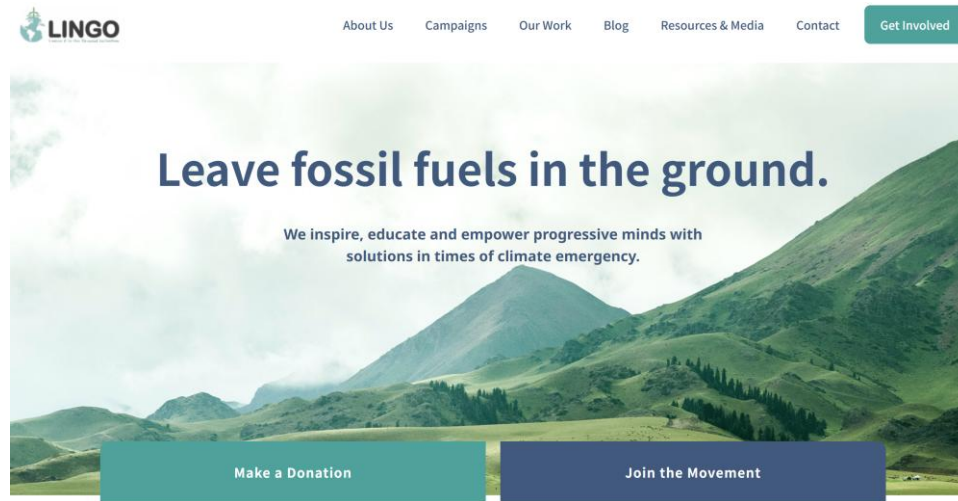
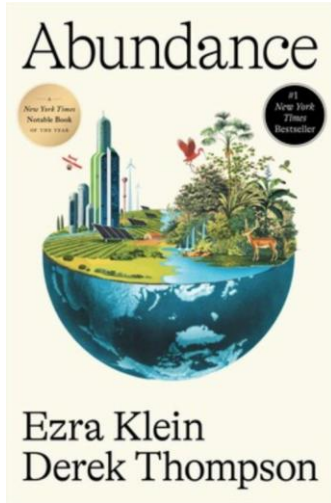
- Biden admin: block fossil fuel infrastructure, restrict extraction on federal lands



There is an active debate over demand vs. supply-side policy instruments. My goal: summarize economic tradeoffs.



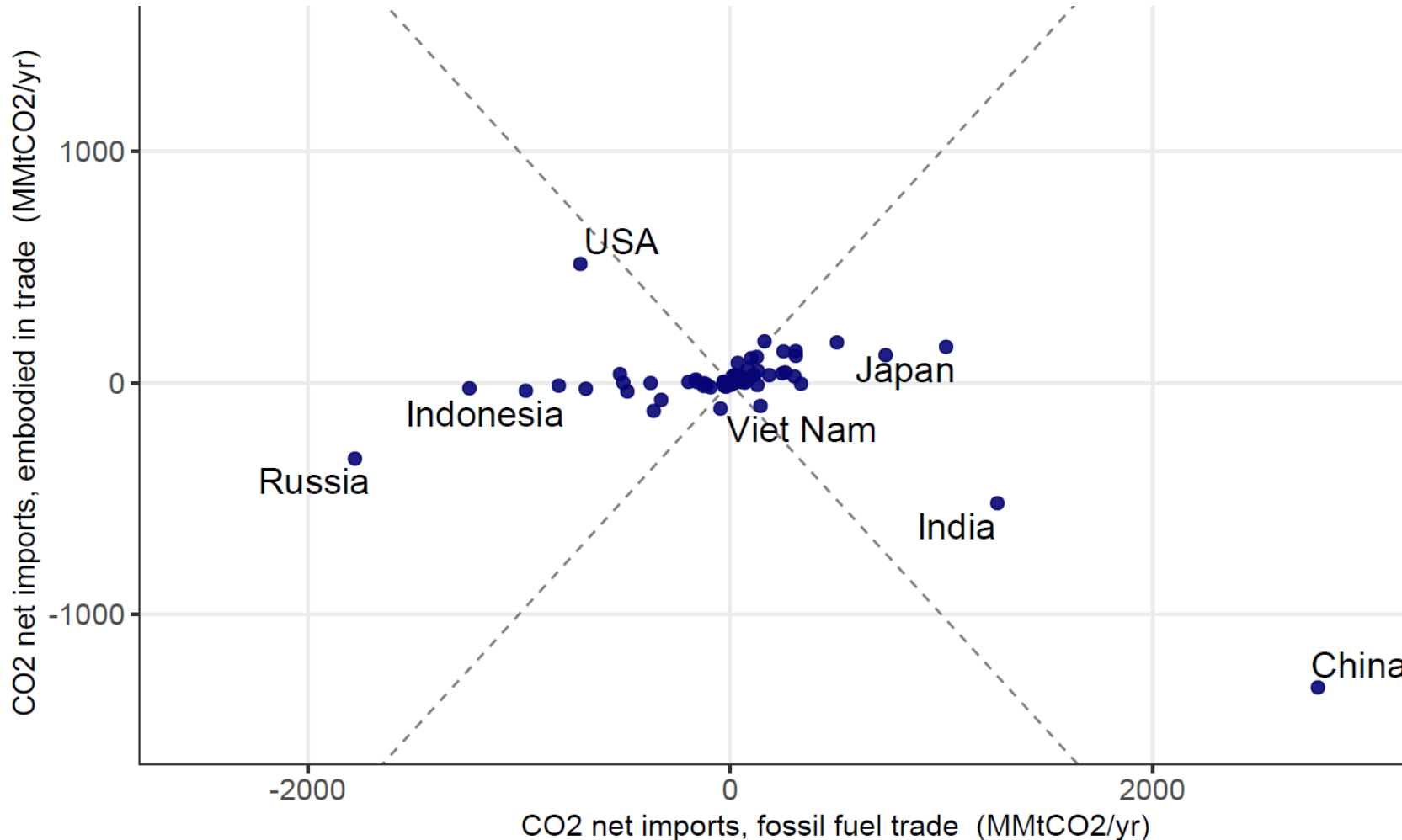
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- Upshot: value in a policy portfolio, rather than an either/or choice
- Portfolio value stems from:
 - Climate is a global problem, and local policies have global consequences
 - Real-world markets and policies are imperfect
 - Consideration of efficiency and distributional goals

Leakage: concern that emissions reductions from local climate policy will be offset by emissions increases elsewhere

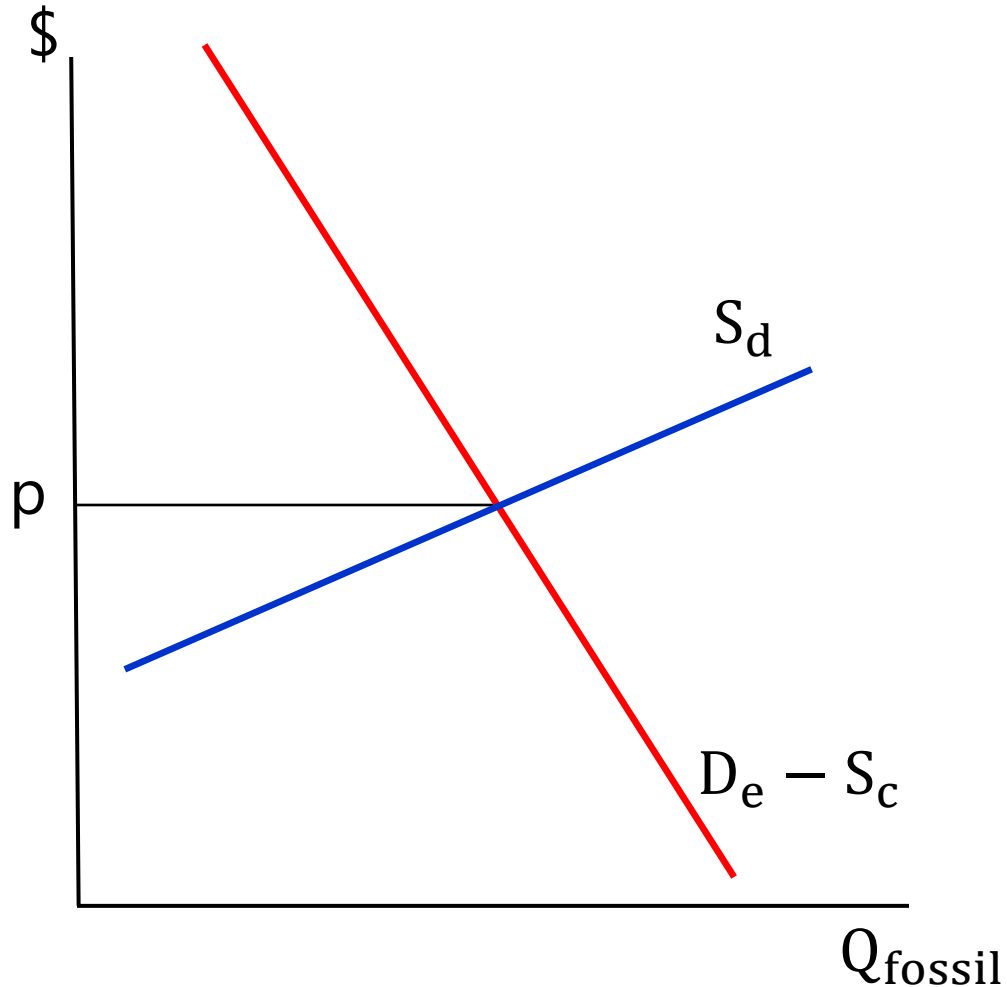
Leakage: a lot more carbon is traded directly via trade in fossil fuels than indirectly via trade in goods



- Data suggest importance of capturing leakage through trade in fossil fuels
- The model follows Weisbach et al. (2023), while also including a clean energy sector

Source: EIA (2023) and Global Carbon Budget (2023), author's calculations

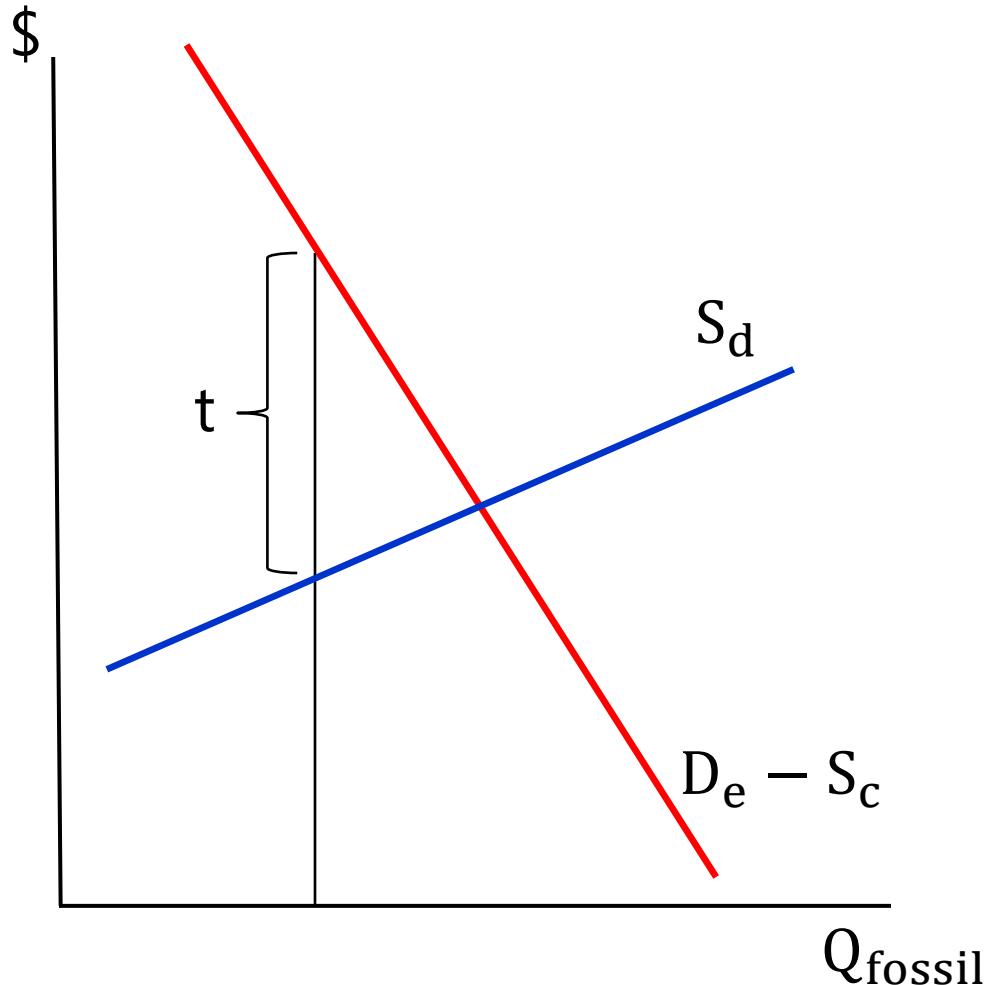
Starting point: demand and supply for fossil energy in a closed economy



- Fossil energy supply is given by S_d
- Fossil energy demand is the net of energy demand and the supply of clean energy
 - i.e., net demand is $D_e - S_c$
 - Assumes perfect substitutability between fossil and clean energy, for tractability

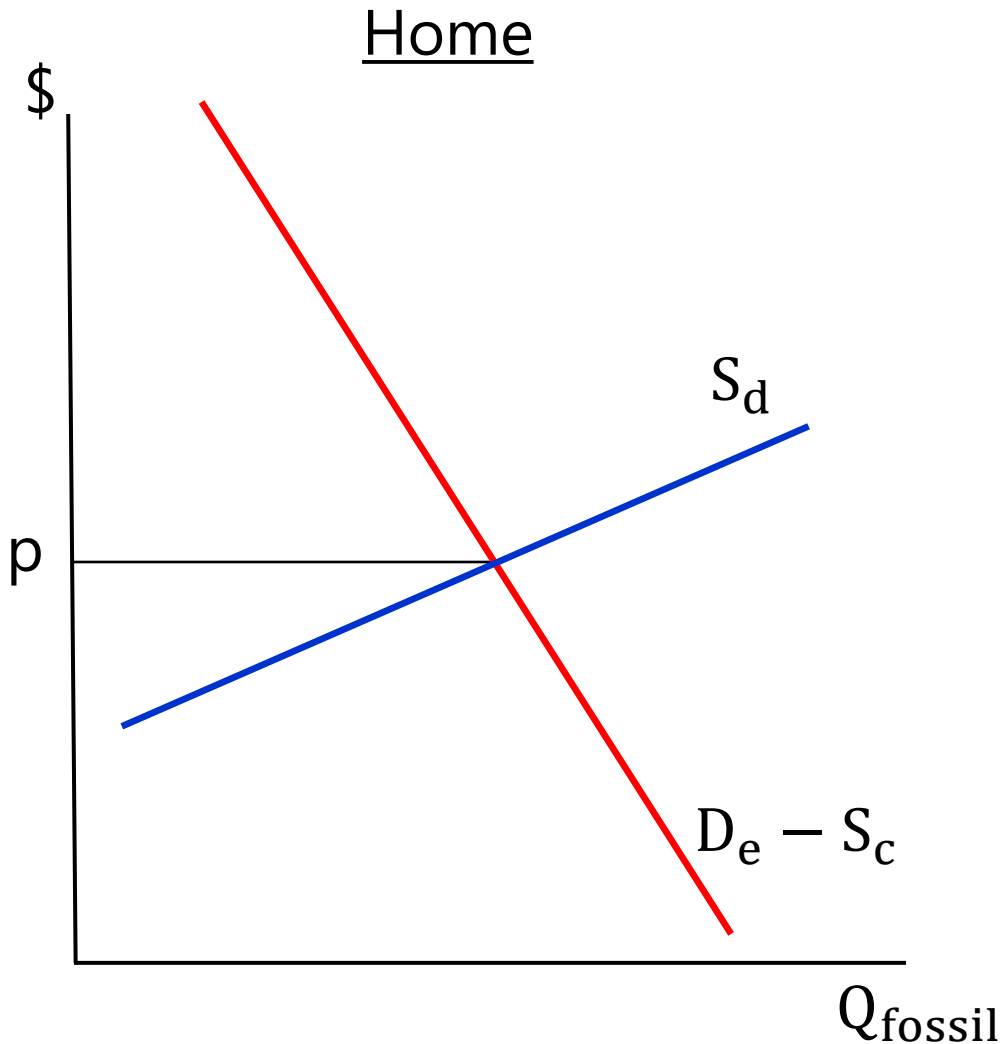
Punchline: Pigouvian carbon taxation is first-best.

Demand and supply-side taxes are equivalent.



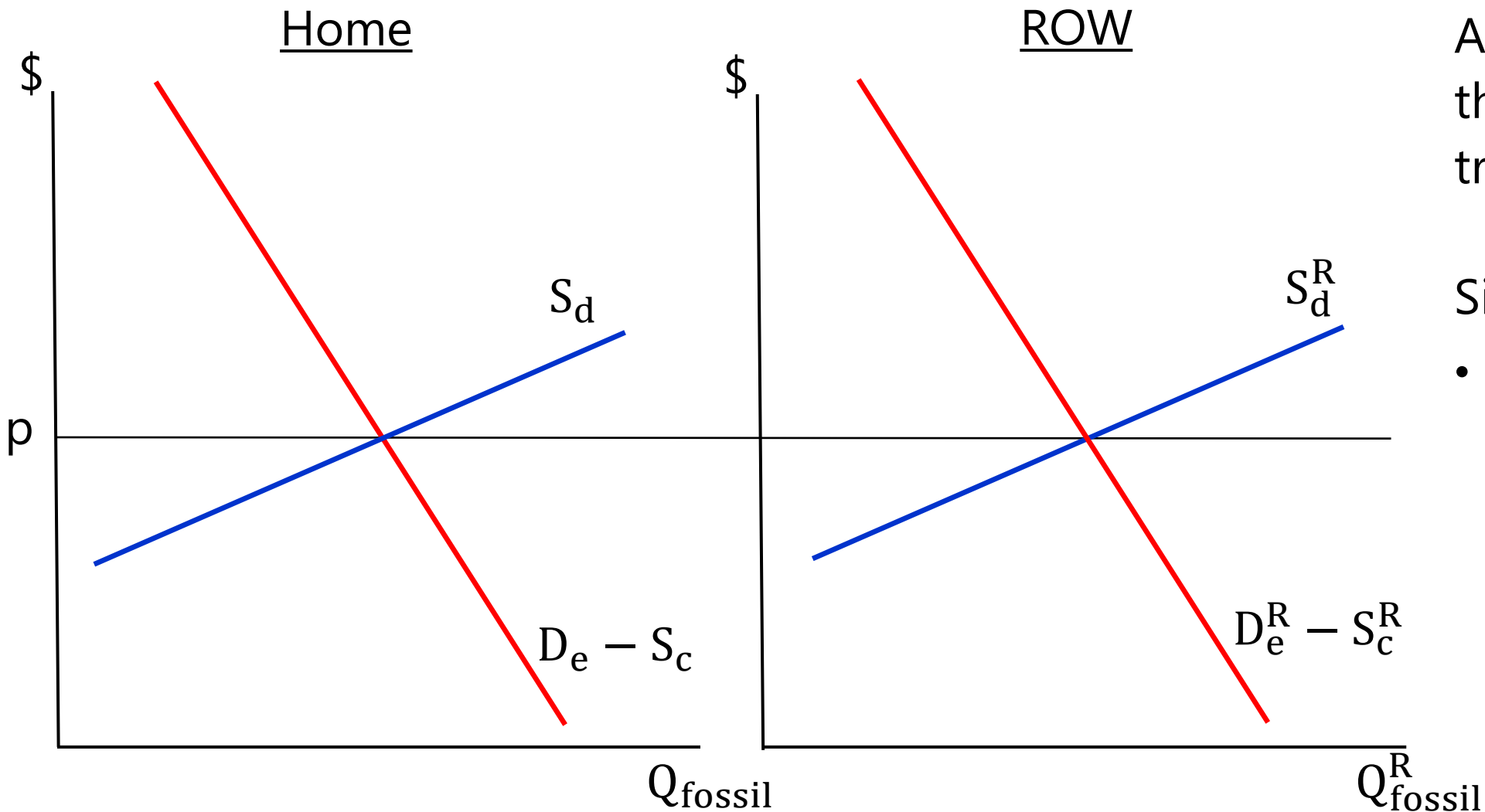
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- Standard result: in autarky, with no other distortions:
 - Economic incidence of a CO_2 use (emissions) tax versus extraction tax is the same
 - Clean energy subsidies are inefficient

Now consider a global economy in which fossil energy is traded.
No trade in clean energy.



Assume initially that
there is also no
trade in goods

Now consider a global economy in which fossil energy is traded.
No trade in clean energy. World energy price is p .

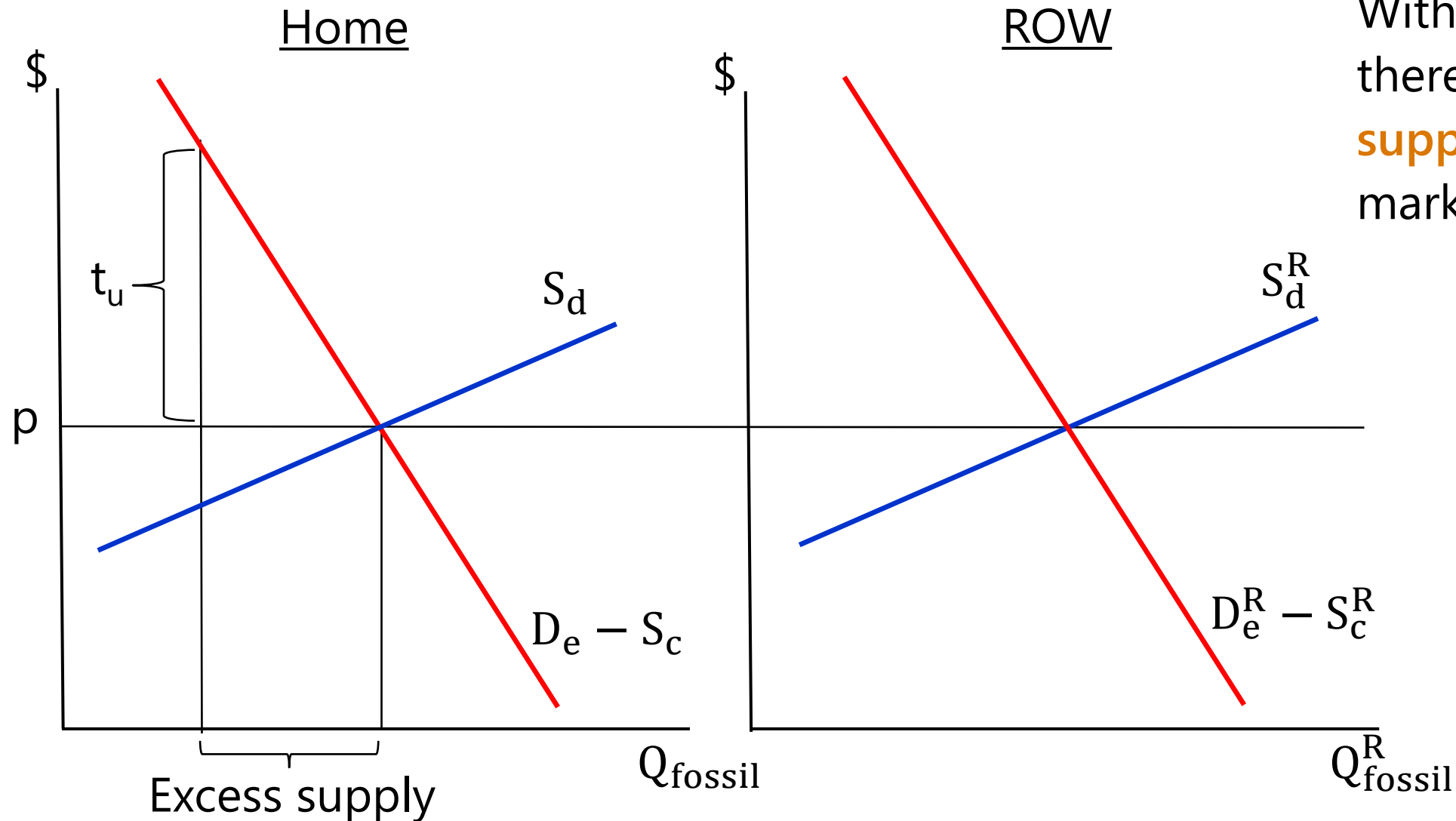


Assume initially that there is also no trade in goods

Simple model:

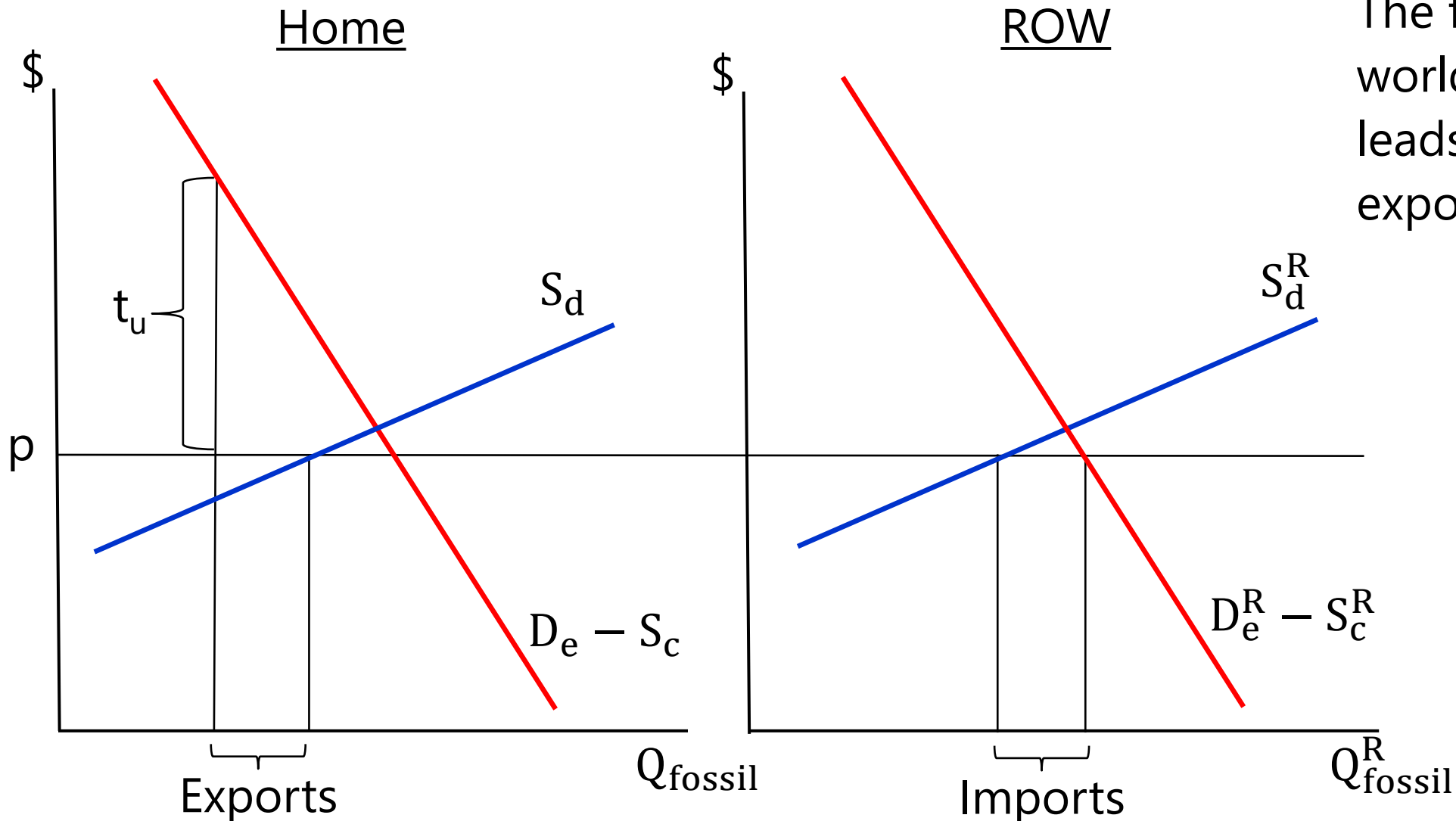
- Let ROW demand and supply be the same as Home, up to a scaling factor
 - So fuel trade is zero at baseline

Consider what happens if Home imposes a demand-side tax t_u on the **use** (emissions) of fossil energy



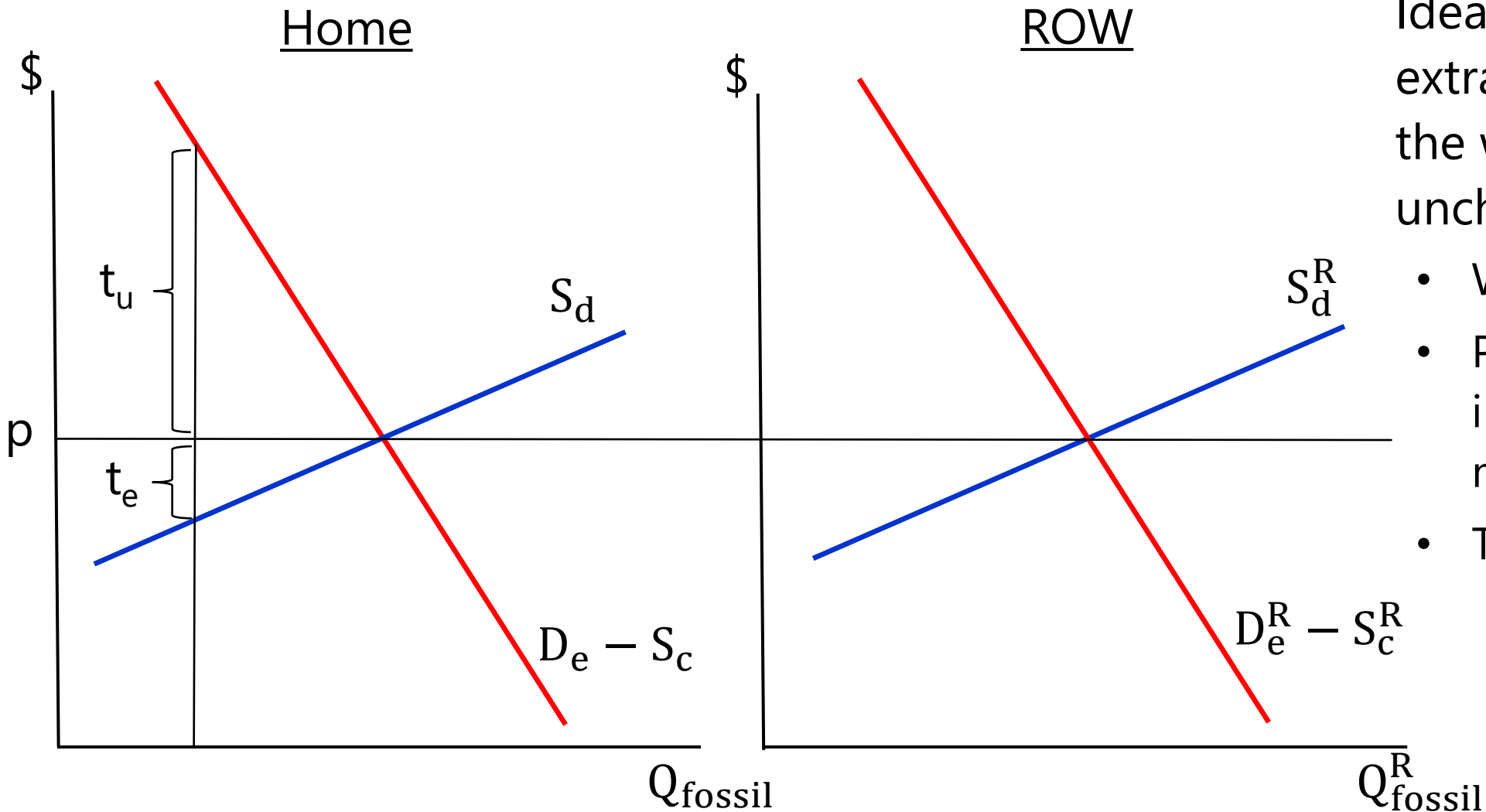
With no change in p , there would be **excess supply** in the U.S. market

A tax t_u on the **use** of fossil energy must **decrease** the world energy price p



The fall in the world energy price p leads to **leakage** via exports of energy

Combining a carbon use tax with a supply-side extraction tax **eliminates leakage** in the simple model



Idea: combine use and extraction taxes to hold the world price unchanged

- Weisbach et al (2023)
- Place higher tax on inelastic side of the market
- Taxes sum to the SCC

I calibrate the model for two versions of the “home” country: the U.S. and the EU

- US: produces 9% **more** energy than it directly consumes
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- Demand and supply elasticities (global):
 - Energy demand: -0.61
 - Fossil energy supply: +0.75
 - Clean energy supply: +0.75

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 - Energy demand: -0.61
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 - Clean energy supply: +0.75
- Model also allows for leakage from trade in energy-intensive goods
 - Efficiency justification for clean energy subsidies

In both the US and EU, the optimal tax combo puts most weight on the supply-side extraction tax

Surplus-maximizing carbon use tax t_u , extraction tax t_e , and clean subsidy s_c
Assumes SCC of \$50/tonne

	US as "Home"				EU as "Home"			
	t_u	t_e	s_c	ΔE	t_u	t_e	s_c	ΔE
All three instruments:	\$19	\$29	\$2	-0.88Gt	\$18	\$28	\$4	-0.24Gt

- The sum of surplus-maximizing taxes and subsidies equals the SCC of \$50/tonne
- Only a minor role for the clean energy subsidy
 - Border tax adjustment (BTA) does better

For the US, the extraction tax is the most important component.

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No extraction tax:	\$21		\$2	-0.35Gt				
No use tax:		\$30	\$20	-0.67Gt				

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For the EU, the use tax is most important.

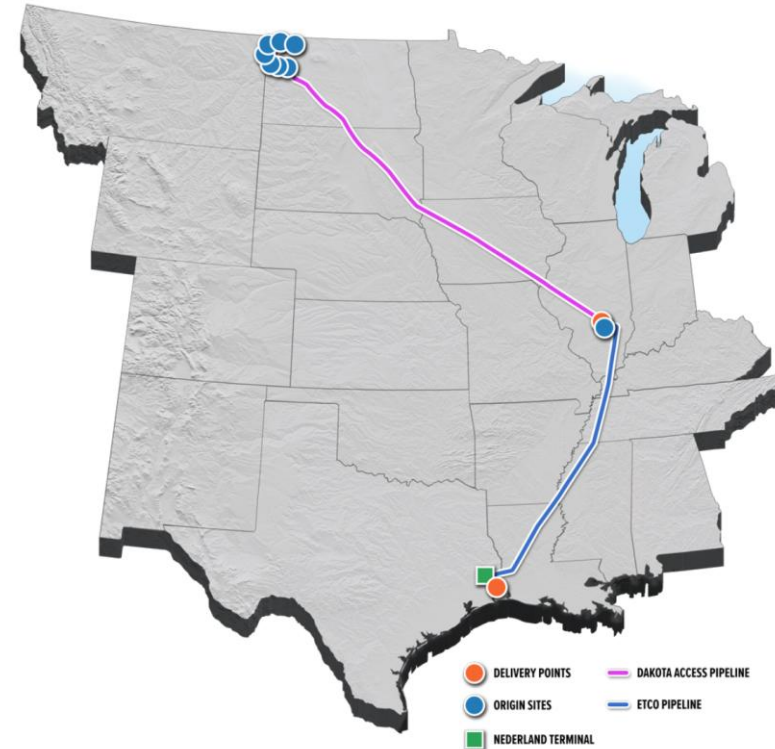
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No use tax:		\$30	\$20	-0.67Gt		\$28	\$22	-0.12Gt

- Difference reflects the fact that the US is a major fossil energy producer, and the EU is not

Supply-side policy in practice: policies target infrastructure rather than broadly tax extraction

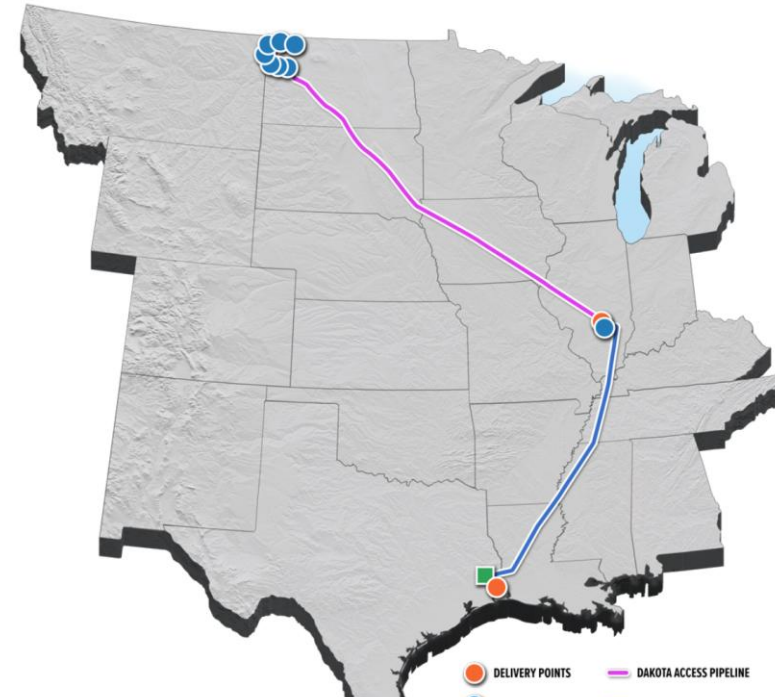
- Example from my own work (Covert and Kellogg 2026): the Dakota Access Pipeline
 - Moves ~500,000 bbl/day from North Dakota to the US Gulf Coast
 - Was stalled under Obama; completed in 2017
- What if DAPL had been blocked?



Source: dapipelinefacts.com

Substitution limits the efficacy of blocking hydrocarbon transportation infrastructure

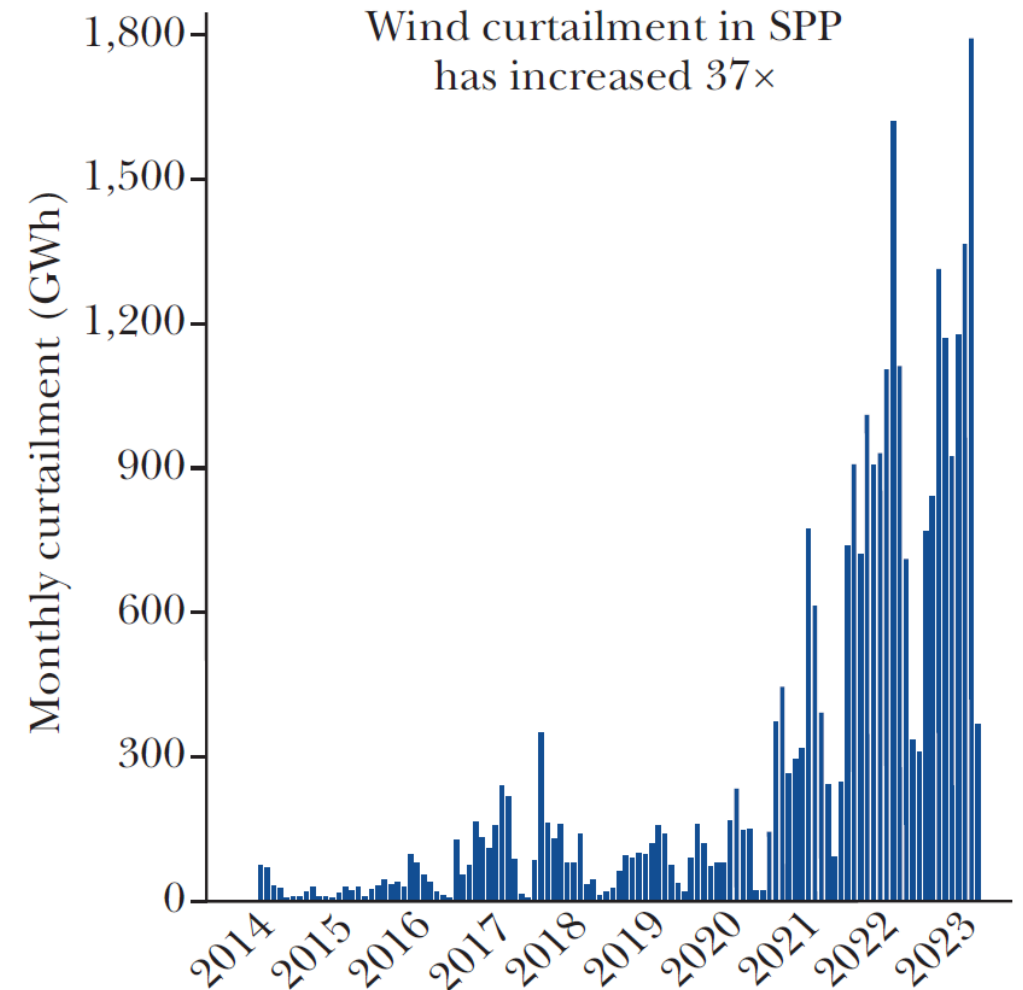
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 - Moves ~500,000 bbl/day from North Dakota to the US Gulf Coast
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- What if DAPL had been blocked?
 - 82% of its flows would move by rail instead
 - Increase in local air pollution from diesel locomotive traffic



Source: Flickr

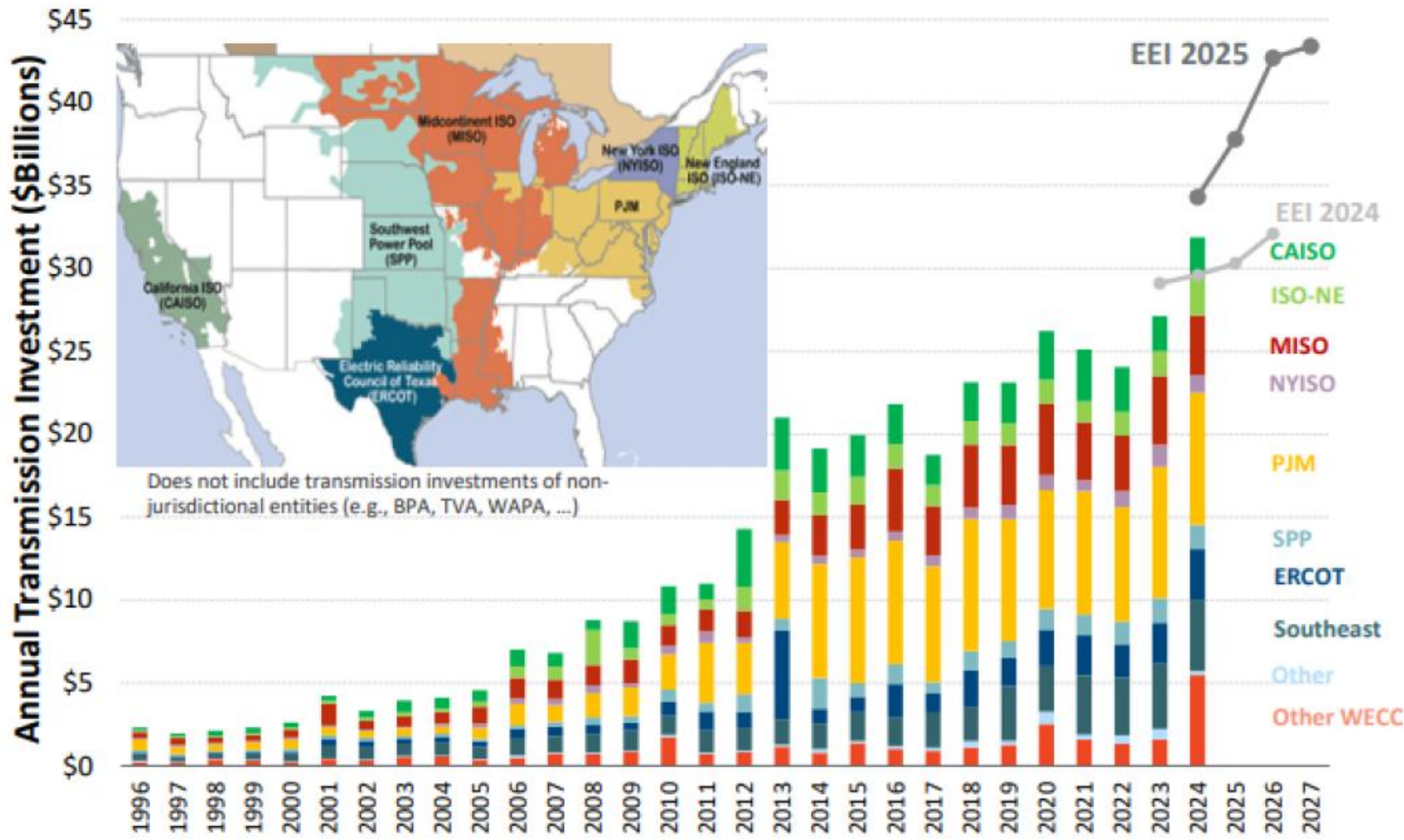
The ability of demand-side policies to decarbonize the grid is limited absent new transmission investment

- The best solar and wind resources are not where people live
 - Absent transmission, we are already seeing forced “curtailments” of wind resources
- Permitting challenges are a well-known problem but are not the only barrier



Source: Davis, Hausman, and Rose (2023)

The U.S. has actually massively increased transmission investment!



Problem: the vast majority of investment is for within-region reliability projects

Not the cross-region transmission needed to unlock cheap renewables

Source: CBO (2026)

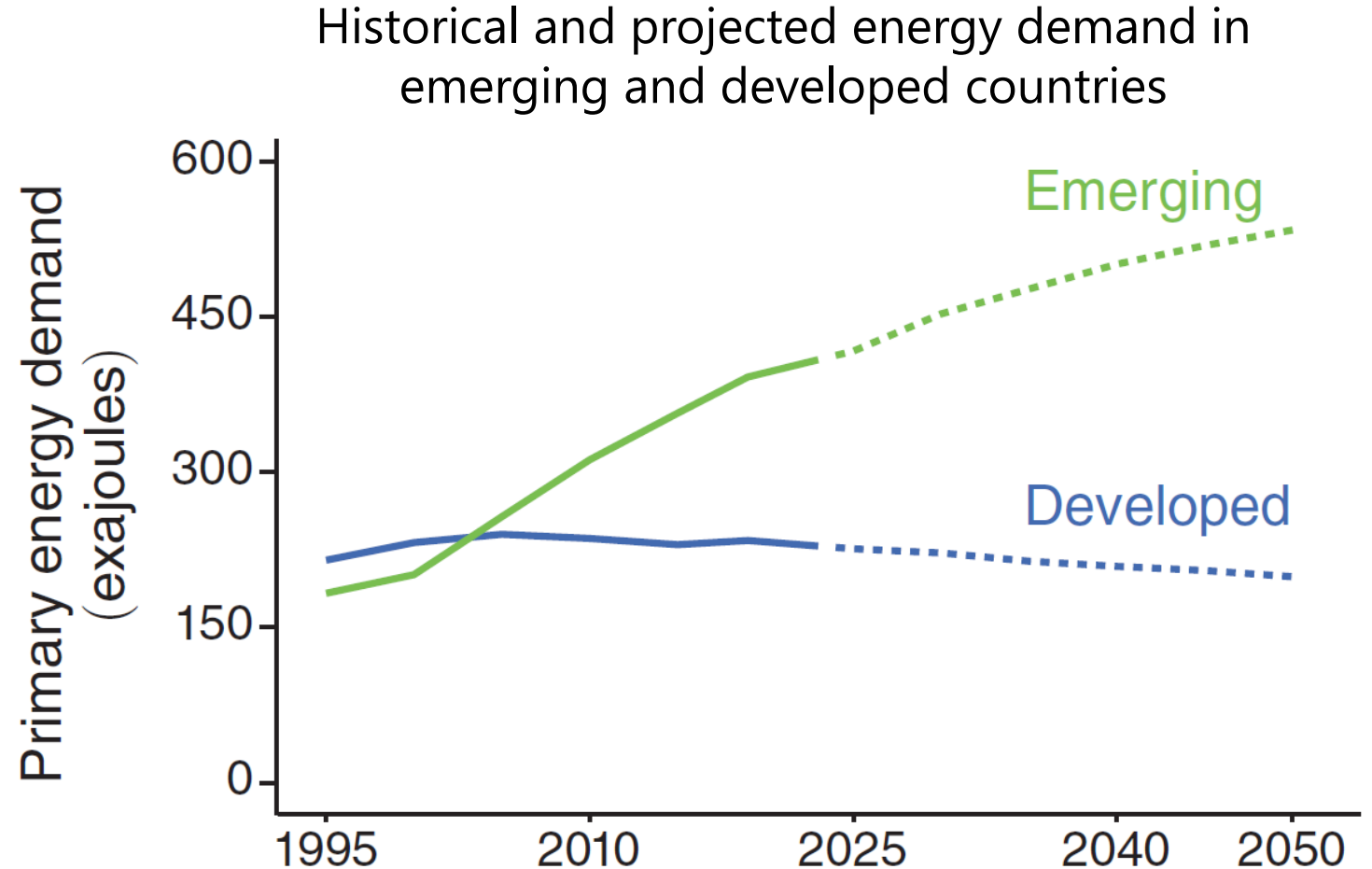
Solving the transmission problem requires reforms to transmission planning and governance

Major barrier to long-distance transmission: no inter-regional planning and mis-aligned incentives

- Hausman (2025) studies relieving congestion between the Midwest and OK-AR-LA
 - Saves \$2bn in annual costs
 - Reduces incumbents' revenues by \$1bn annually
- Kovvali and Macey (2023), Peskoe (2023): utilities are able to act on these incentives and block projects

Climate policy, economic growth, and global emissions reductions

Fact 1: Almost all forecast emissions growth will come from emerging economies



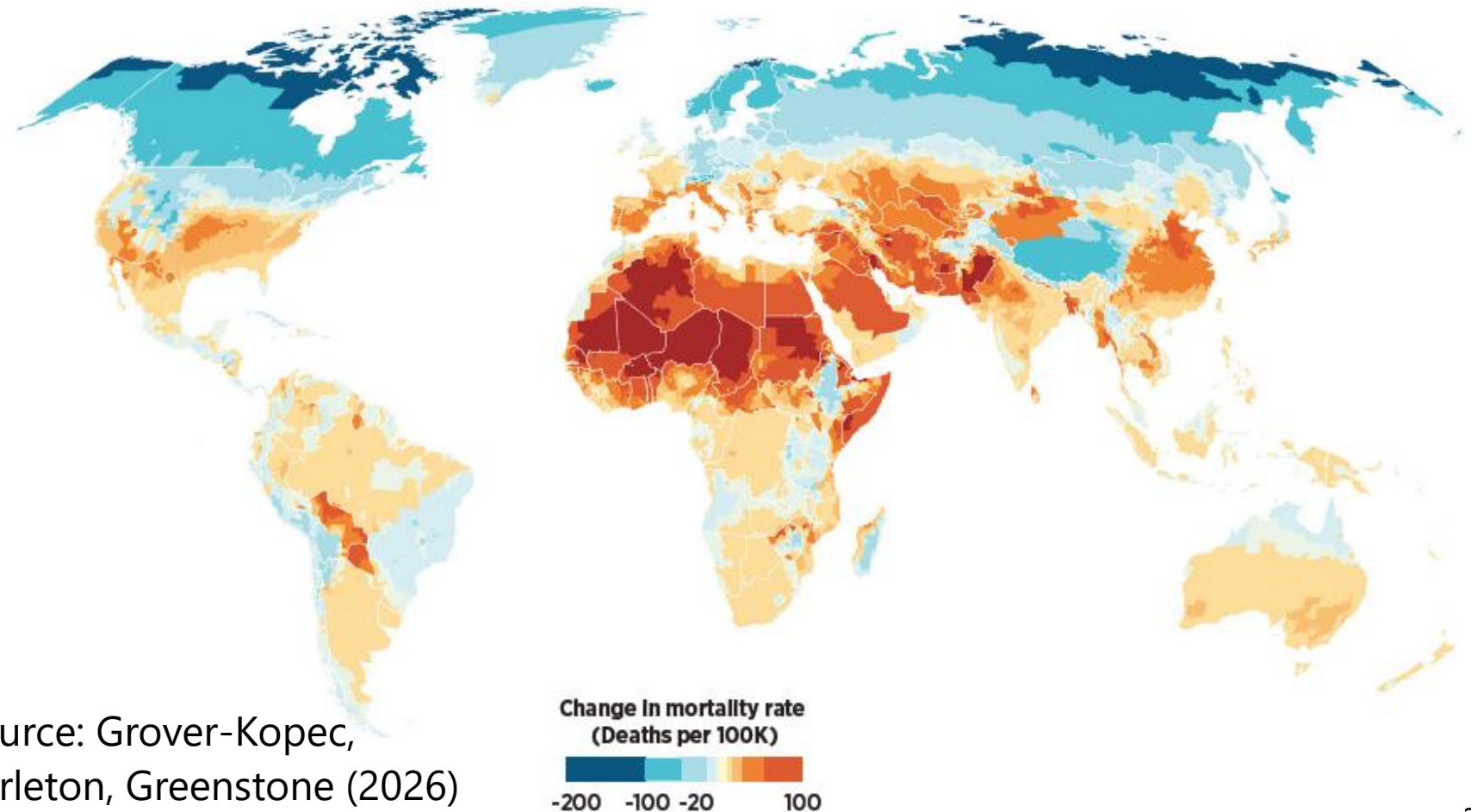
Source: Greenstone (2024), BP Statistical Review of World Energy (2023)

Climate policy, economic growth, and global emissions reductions

Fact 1: Almost all forecast emissions growth will come from emerging economies

Fact 2: Climate damages disproportionately fall on poor households in emerging economies

Figure 1. Change in region-level net mortality rates (deaths per 100,000 people) in 2050 compared to the 2001-2010 average due to climate change



Source: Grover-Kopec,
Carleton, Greenstone (2026)

The global problem points to demand-side climate policy that drives down the cost of clean energy technologies

- **Decarbonize the world:** public support for globally-deployable clean tech
 - Funding for R&D

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- **Decarbonize the world:** public support for globally-deployable clean tech
 - Funding for R&D
- Green industrial policy?
 - China has become the global leader in producing and exporting PV, batteries, and EVs
 - Emerging research points to policy that has targeted barriers to innovation in supply chains
 - Aghion *et al.* (2025), Barwick *et al.* (2025), Banares-Sanchez *et al.* (2026)

China Exports More EVs Than Traditional Cars for First Time in April

China exported 769,000 automobiles in April, with new-energy vehicles accounting for 52.7% of total exports

By Jiahui Huang

May 10, 2026 11:47 pm ET



Aa



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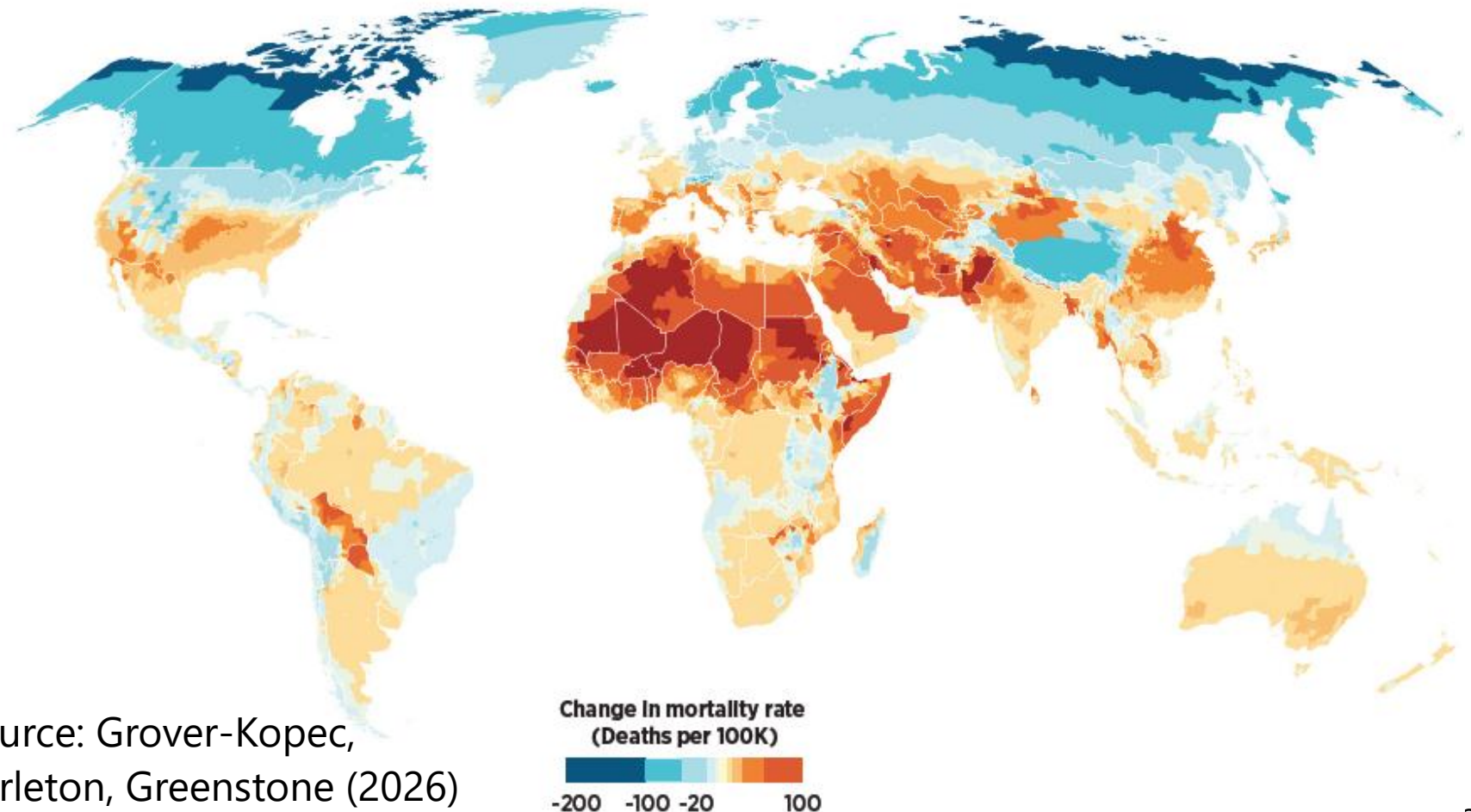
What are the distributional consequences of supply-side vs. demand-side carbon taxes?

Climate damages disproportionately fall on the global poor

Taxing carbon extraction will harm net fossil fuel importers.

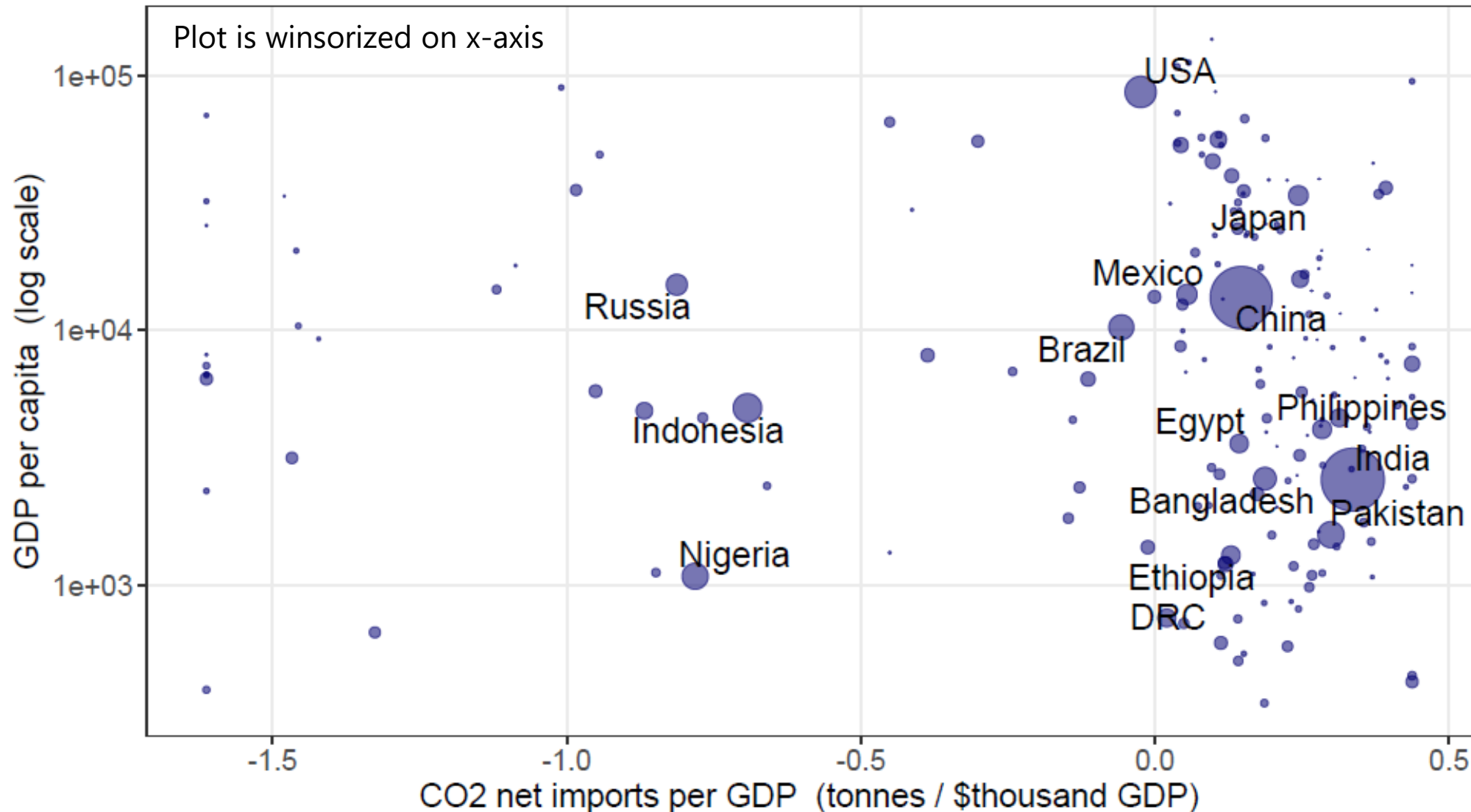
Do net importers tend to be rich or poor?

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Source: Grover-Kopec,
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The relationship between net fossil fuel imports and per-capita GDP is essentially flat. Correlation = -0.03



Demand-side and supply-side policies both have roles to play in driving global emissions reductions

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- **Policy and markets in practice call for richer set of instruments**
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 - Externalities in clean tech innovation and deployment argue for publicly-funded R&D and potentially green industrial policy
- **Distributional considerations:**
 - Domestic: supply-side carbon pricing burdens extractors and local communities
 - Global: supply-side carbon pricing burdens energy net importers, which include both high-income and low-income countries