Lecture 22: What's Next?

Prof. Austin
Environmental Economics
Econ 475

What's Next?

Outline:

1) Bipartisan Infrastructure Law
2) West Virginia v. EPA
3) Inflation Reduction Act

Part 1: Bipartisan Infrastructure Law

Main Provisions of the Bipartisan Infrastructure Law

Massive $550b over 10 years. Environmentally-relevant portions of the BIL:

- $90b for newer buses, trains, and transit stops
- $66b for more and cleaner passenger rail
- $65b grid modernization and clean energy transmission
- $55b to eliminate lead pipes
- $50b flood, drought, wildfire, etc. preparedness
- $21b to clean Superfund and brownfield sites
- $7.5b for national network of 500,000 EV chargers
- $5b for 24,000 electric school buses

Electrification of Buses

Some benefits of electrifying school buses:

- Reduced visits to hospitals and clinics for children and adults (Beatty and Shimshack, 2011).
- Aerobic capacity and lung growth (Austin et al, 2019).
- Student test scores.

Figure: A Diesel Particulate Filter at the End of its Life

Aerobic Capacity (VO2 Max)

Natural experiment on school bus retrofits:

- 2,600 buses retrofitted in Georgia 2007-2015 (150,000 students).

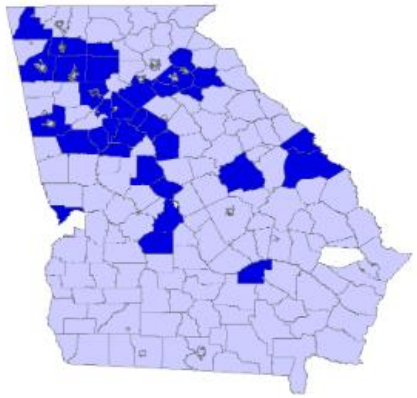


Figure: Retrofitting Districts (2007-2015)

	Δ Aerobic Capacity (1)	Δ BMI (2)
% Retrofit	1.740**	-0.274
	(0.80)	(0.35)
Bus Chars.	✓	✓
Demog.	✓	✓
R2	0.189	0.053
N	856	856
n	180	180
Dep. Var. mean	41.2	21.1
% Change	4.2	-1.3

Satellite-based PM 2.5

National version:

- 18,000 buses retrofitted nationally 2008-2016 ($170m)

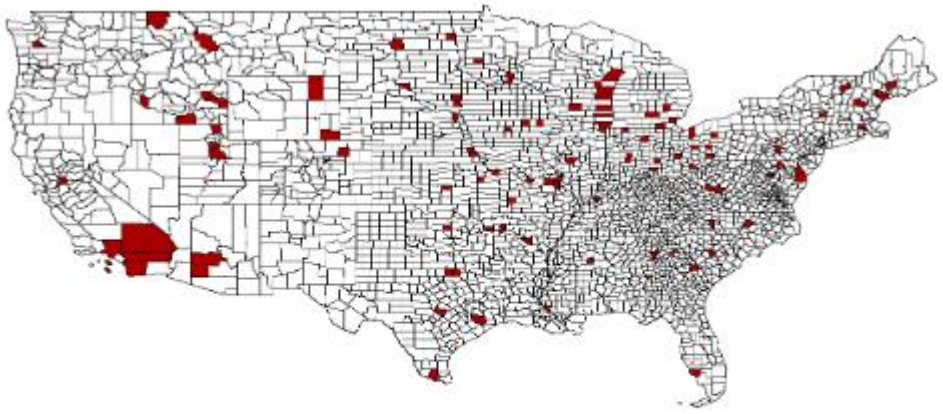


Figure: Retrofitting Counties (2008-2016)

	(1) Monthly Average PM	(2) Monthly Average PM
Buses Retrofitted in Year t	-0.00042**	
	(0.0002)	
Cumulative Buses Retrofitted		-0.00036***
		(0.0003)
Δ PM Concentration	0.0356	0.0619
% Change from Mean	0.39%	0.68%
County-Year-Months	636,072	636,072
Counties & County Equivalents	3,118	3,118

Test Scores

Also, sizeable impact on academic performance for both language arts and math test scores.

- PM 2.5 benefits would have been **$245m**.
- Test score benefits, where 1 percentile increase is $1,041 extra income after discounting implies **$4.5B** benefit.

	(1) ELA	(2) Math	(3) ELA	(4) Math
Proportion Retrofitted in Year t	0.0678*	0.0860**		
	(0.0361)	(0.0408)		
Cumulative Proportion of Fleet Retrofitted			0.0549**	0.0603**
			(0.0245)	(0.0246)
County-Year Observations	19,477	19,266	23,133	22,961
State-Year Observations	309	305	372	369

Abatement of Lead

The Drinking Water State Revolving Fund is how BIL funding will be distributed to remove lead pipes from homes, schools, daycare centers, and businesses.

- States receive these funds and then distribute them to "disadvantaged" community water systems, but each state has its own definition of this term.
- Small systems with more people of color are less likely to receive grants (Hansen, 2021).

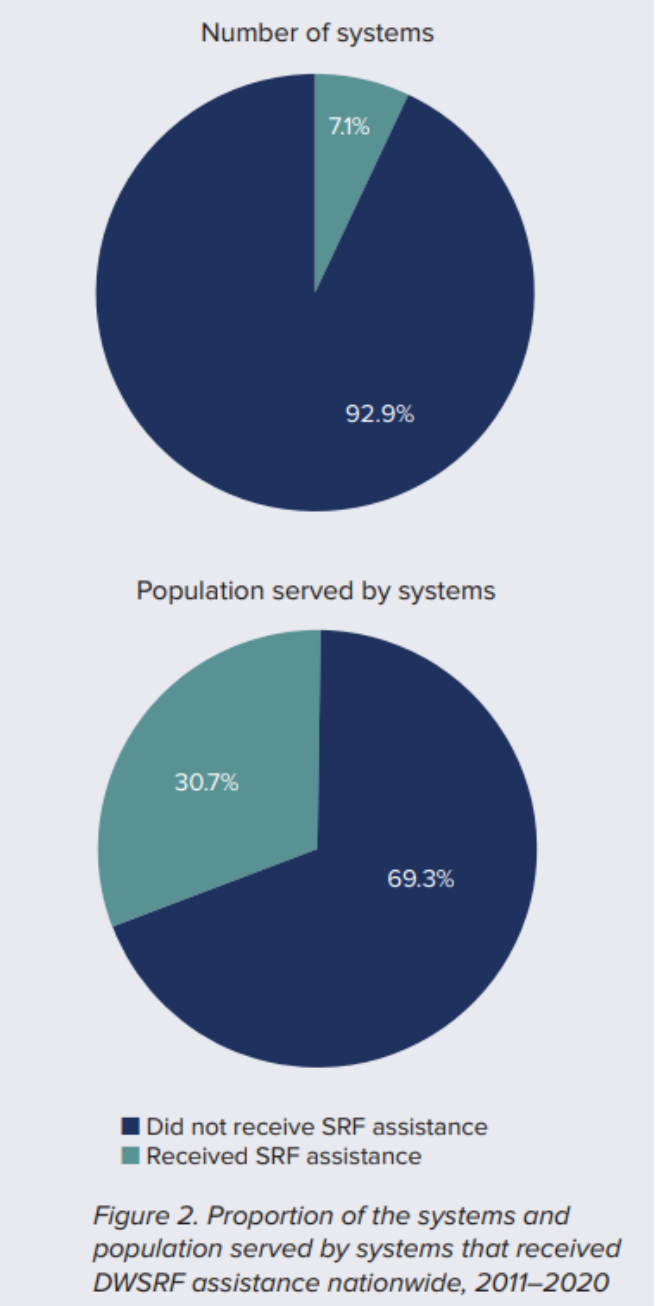


Figure 2. Proportion of the systems and population served by systems that received DWSRF assistance nationwide, 2011–2020

Source: Hansen, 2021.

Abatement of Lead

Many states use a formulaic definition of “disadvantaged” based on being below statewide median household income.

- Montana: disadvantaged if cost of water > 2.3% of the state’s MHI.

Median incomes can mask differences in poverty share.

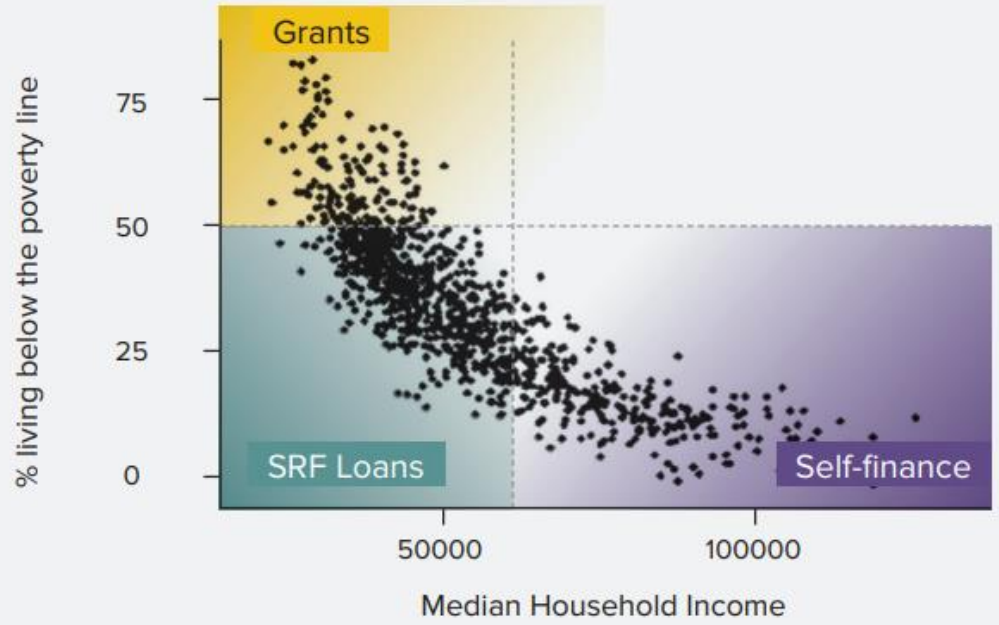


Figure 9. Recipients of DWSRF awards by MHI and proportion of the population living below twice the federal poverty line in 10 states, 2011-2020. We recommend using MHI and poverty to determine the type of assistance to provide communities.

Source: Hansen, 2021.

Part 2: West Virginia vs. EPA

Background of the Case

The 2015 Clean Power Plan would have reduced GHG emissions from existing power plants and shifted generation to cleaner sources. It gave states the authority to implement these standards and design a wide variety of programs, including allowance trading, to meet the GHG goals.

States and power companies sued EPA for over-reach, alleging that generation shifting was not a valid best technology that could be used to meet EPA's standards.

- Congress/CAA permits emission standards based on "best technologies" for regulation of new sources within the fenceline
- Emissions standards and generation shifting could apply to an entire state electricity sector, hence regulating "beyond the fenceline" of the air pollution source

Merits of Each Side

Shortcomings in the petitioner's argument:

- Clean Power Plan never implemented, so no standing to sue EPA.
- Invocation of major questions doctrine goes against judicial precedent in Chevron doctrine and Massachusetts vs. EPA.
  - **Chevron doctrine:** precedent of court *deference* to agency expertise where Congressional language is ambiguous.

Shortcomings in the EPA defense:

- CPP and generation shifting was cost-benefit justified ($22.6b net benefits), but this fact was not used to justify the selected standard (see Cecot, 2022).
  - Led to criticism that CPP was not science-based and EPA would set standards "wherever the Agency sees fit."

Long-Term Concerns

Many concerns with the ruling have been expressed, but a few big ones:

- Precedent to invoke major questions doctrine implies significant regulations will be over-turnable by courts, including past regulations
- Increased uncertainty around delegated powers weakens agency flexibility and ability to act quickly, pushes many actions back to Congress.
- Prohibiting regulation “beyond the fenceline” through the CAA limits the potential range of regulatory options for GHGs.
  - Generation shifting often much cheaper than other GHG abatement, so weakens reduction options set for new or existing plants.

RFF Session

Two questions uncertain:

1. How far-reaching is the ruling?
   - Holmstead: narrowly affects power generation shifting.
   - Heinzerling: potentially affects all future agency actions not limited to climate change.
2. Elected congress, unelected bureaucrats, or unelected judges?

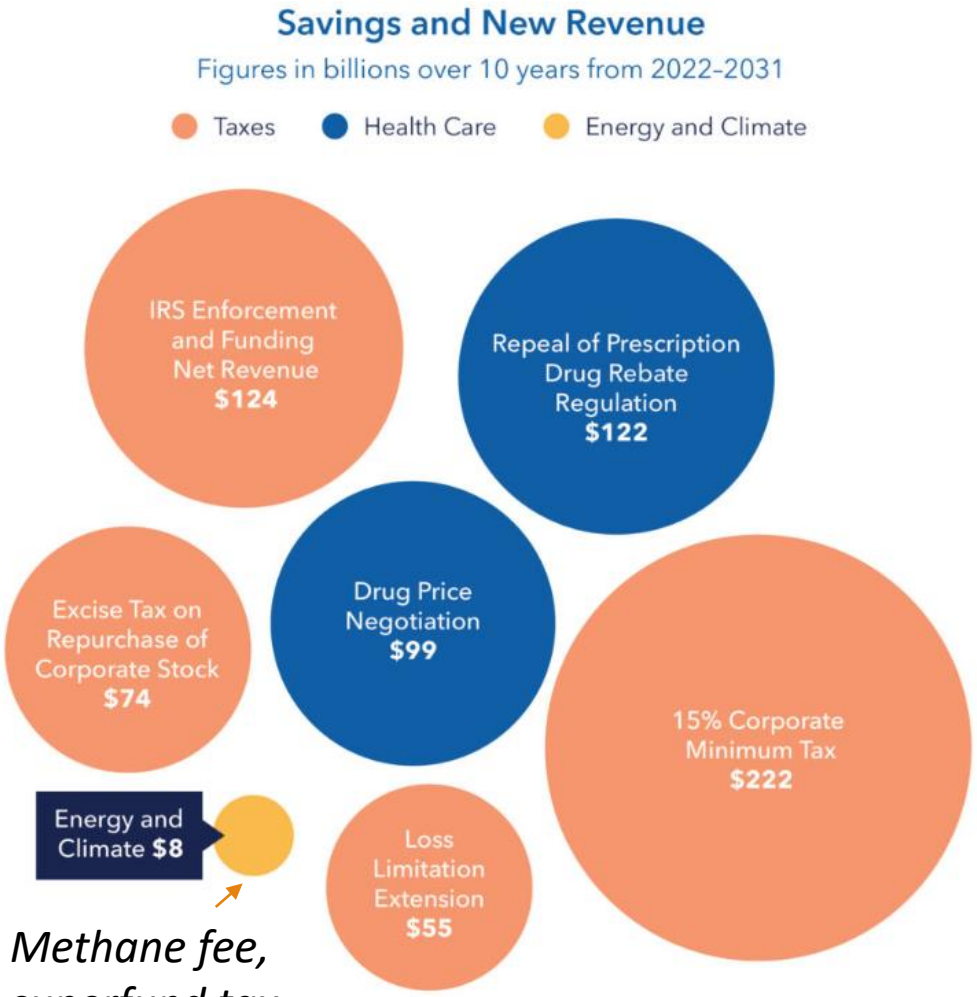
Link to RFF Event video.

Part 3: Inflation Reduction Act

Why is it called the Inflation Reduction Act?

The IRA is a budget reconciliation bill, which makes it easier to pass because no susceptibility to filibuster and only 50(+1 VP) votes needed.

- Reduces the deficit by $238 billion over a decade (CBO, 2022).
- General agreement that the bill has minimal effect on inflation.
  - Some uncertainty if increase or decrease (CBO, 2022).



Methane fee, superfund tax.

Main Provisions

Also:

- Methane fee
- Greenhouse Gas Reduction Fund
- New leasing of oil and gas fields but edits to pricing structure (12% → 16% royalty).

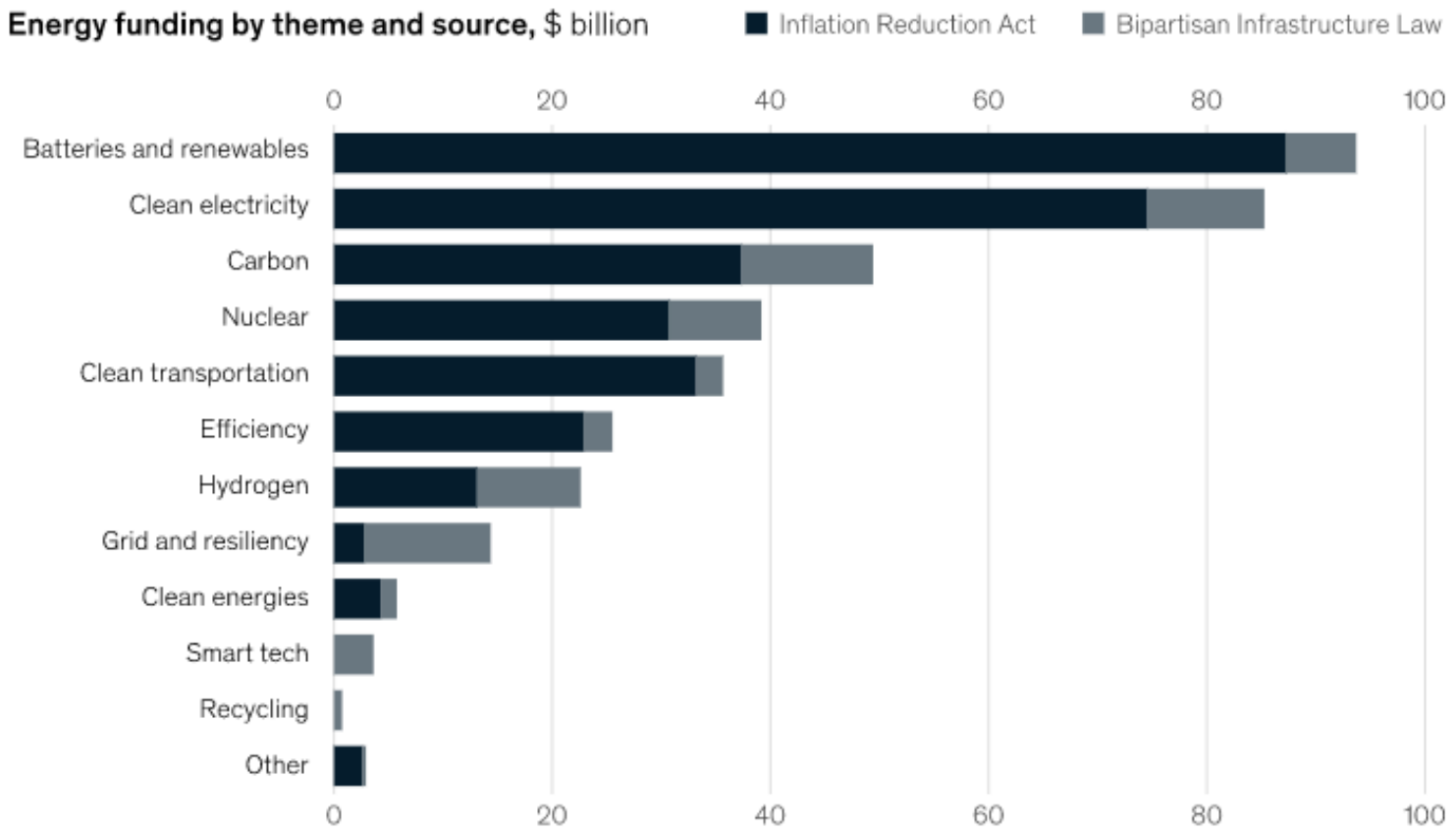
Inflation Reduction Act Summary

Policy	Cost (-)/Savings (2022-2031)
Energy and Climate	**-$386 billion**
Clean Electricity Tax Credits	-$161 billion
Air Pollution, Hazardous Materials, Transportation and Infrastructure	-$40 billion
Individual Clean Energy Incentives	-$37 billion
Clean Manufacturing Tax Credits	-$37 billion
Clean Fuel and Vehicle Tax Credits	-$36 billion
Conservation, Rural Development, Forestry	-$35 billion
Building Efficiency, Electrification, Transmission, Industrial, DOE Grants and Loans	-$27 billion
Other Energy and Climate Spending	-$14 billion

Figure source.

IRA vs. BIL for Climate

Energy funding from the Bipartisan Infrastructure Law and the Inflation Reduction Act spans major funding themes, totaling $370 billion.



Source: McKinsey and Company, 2022.

Long-term Impact?

Some high-level impacts:

- ↓ retail electricity prices
- ↑ GDP from government spending, capital investment, and reduced fuel expenditures by households.
- ↓↓ GHGs from 2005 levels by 2030.
  - Mostly electricity and transportation sectors.
  - Closer to meeting Paris Climate Goals, but not there yet.

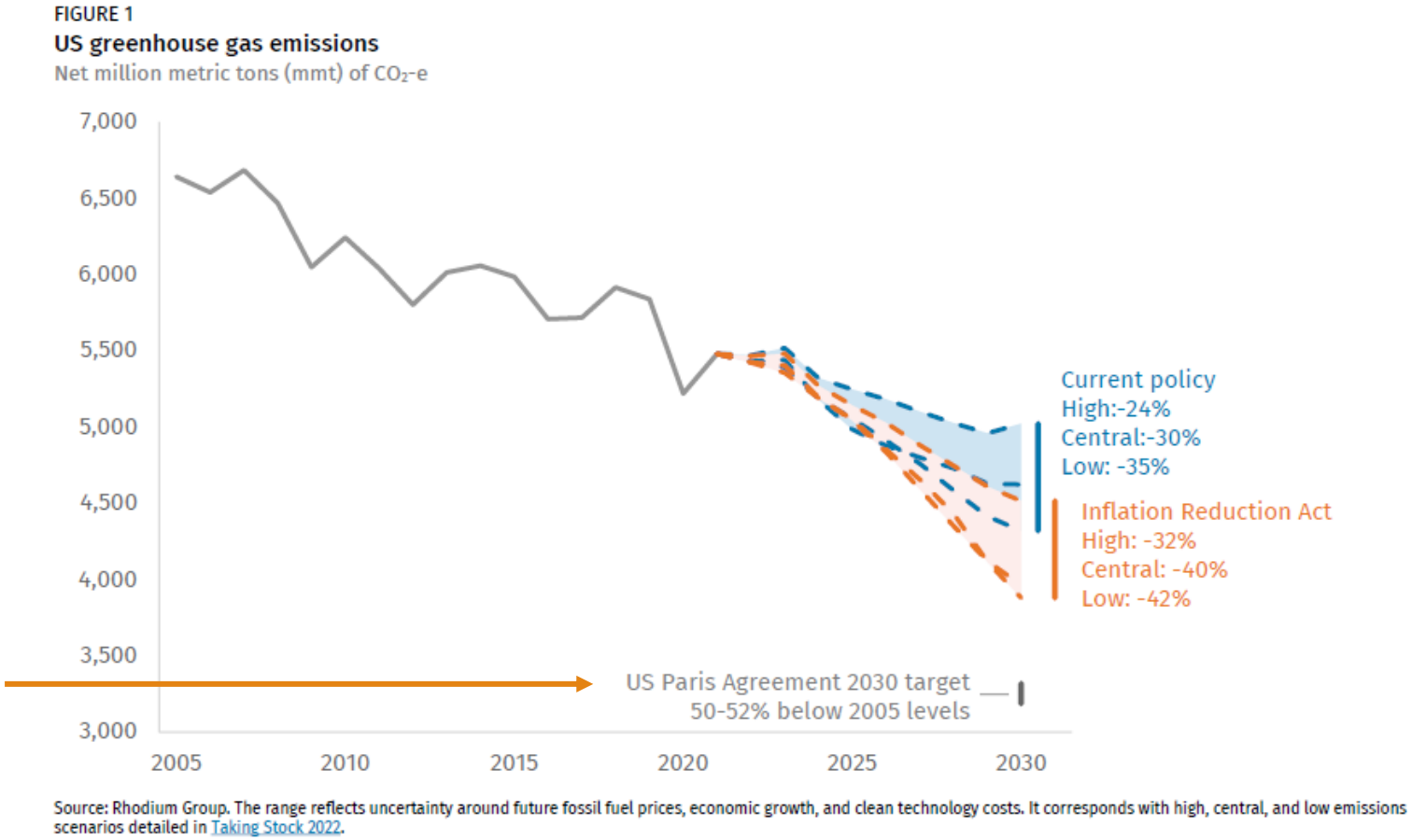


Figure source.

Clean Energy Tax Credits

Extension of clean energy tax credits to 2025, then technology neutral renewables credits after.

- Production tax credit ($5/MWh)
- Investment tax credit (6% on investment)

Other major tax credits:

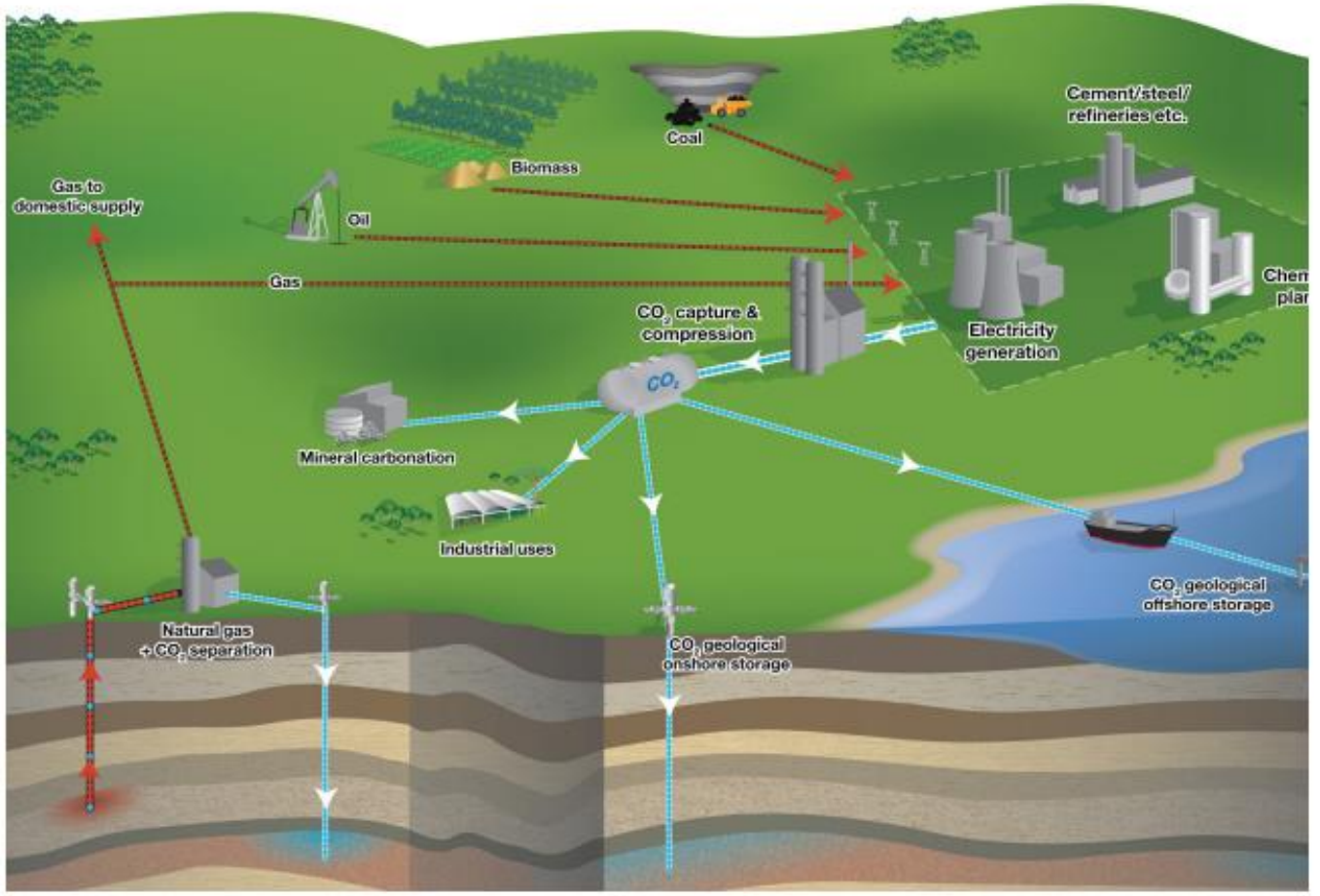
- $85 per ton tax credit for carbon capture.
- Hydrogen and nuclear tax credits.

Figure: Newest Siemens Gamesa windmills have a propeller spread of 240 meters and costs $13-20 million (Image source).

Carbon Capture and Sequestration

CCS dramatically lowers GHGs emissions overall, but also increases burning of fossil fuels to power CCS tech itself and continues operation. Mixed effects:

- Some GHGs from transporting additional fossil fuels unless clean transport
- More PM, NOx
- Threefold increase in local ammonia due to solvents that capture CO2.

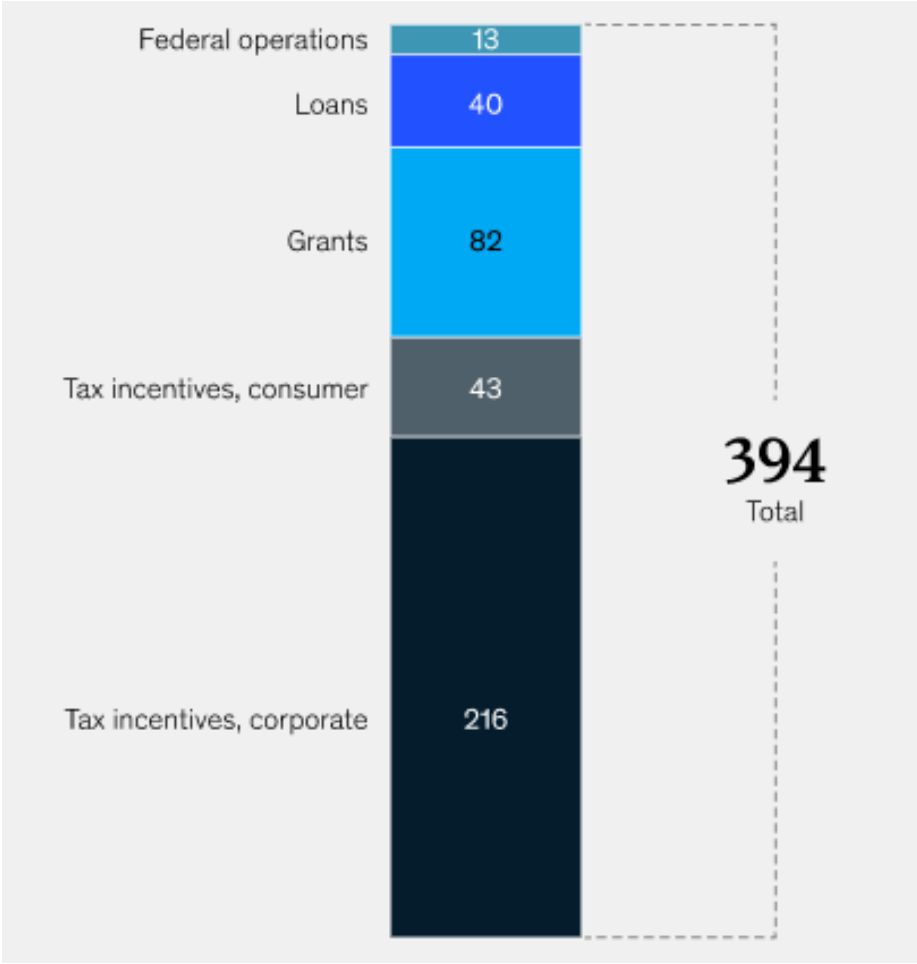


Source: European Environment Agency, 2011

Consumer Tax Credits

Roughly $43 billion in tax credits directly to consumers:

- Heat pumps and electric water heaters (capped at $2000)
- Rooftop solar (up to 30% of cost, capped at $1200 total)
- Electric vehicles ($7500 for new and $4000 for used EVs)



Source: McKinsey and Company, 2022.

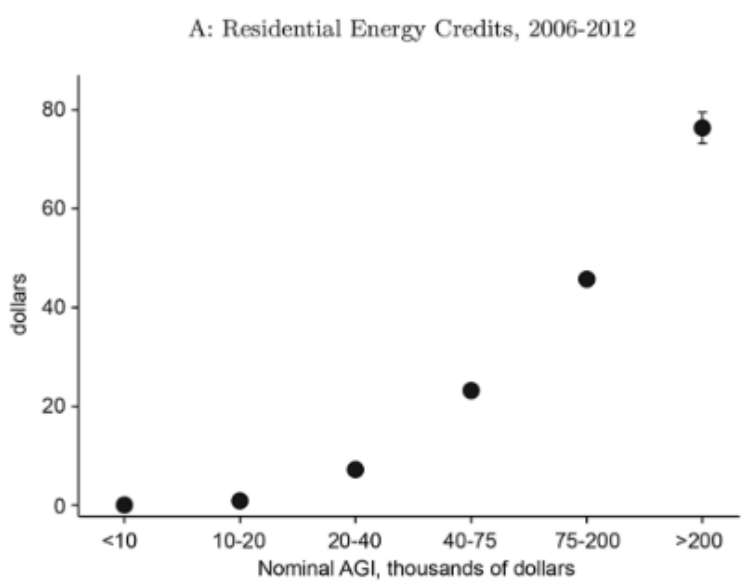
Who Benefits from Clean Energy Tax Credits?

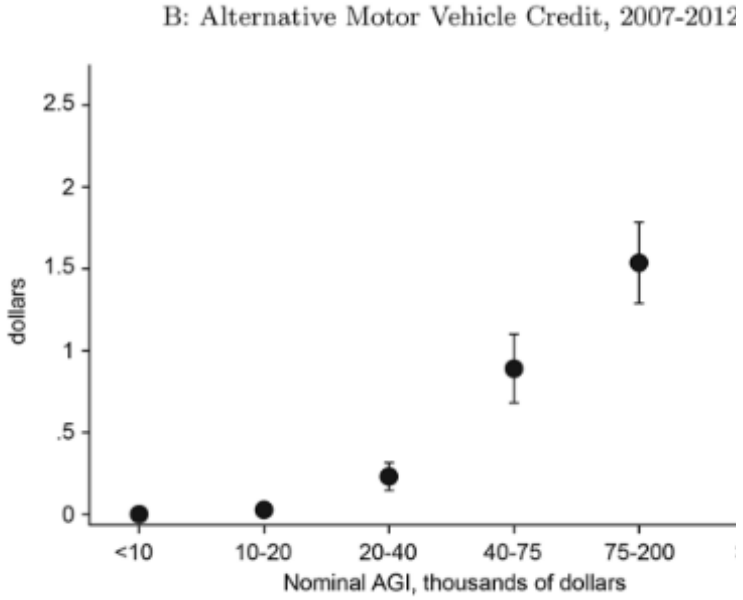
Consumer tax credits benefit wealthiest income quintiles (Borenstein and Davis, 2016).

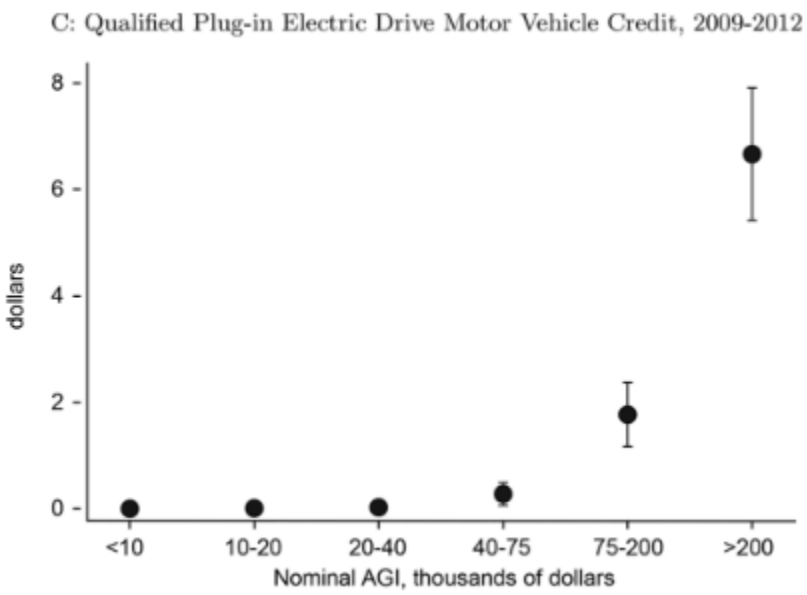
Using tax return data on home weatherization, hybrid/electric vehicles and solar panel credits:

- Top quintile received 60% of benefits, bottom three 10%.
- Top quintile received 90% of all credits for electric vehicles.

Who Benefits from Clean Energy Tax Credits?





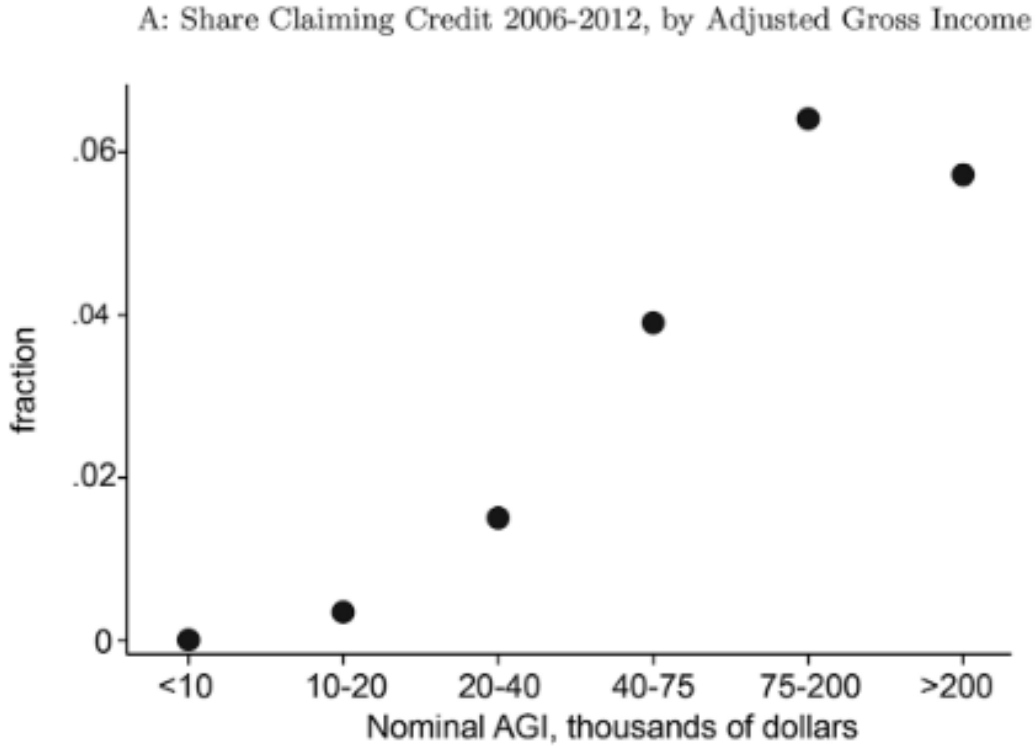


Who Benefits from Clean Energy Tax Credits?

Tax credits benefit wealthiest income quintiles (Borenstein and Davis, 2016).

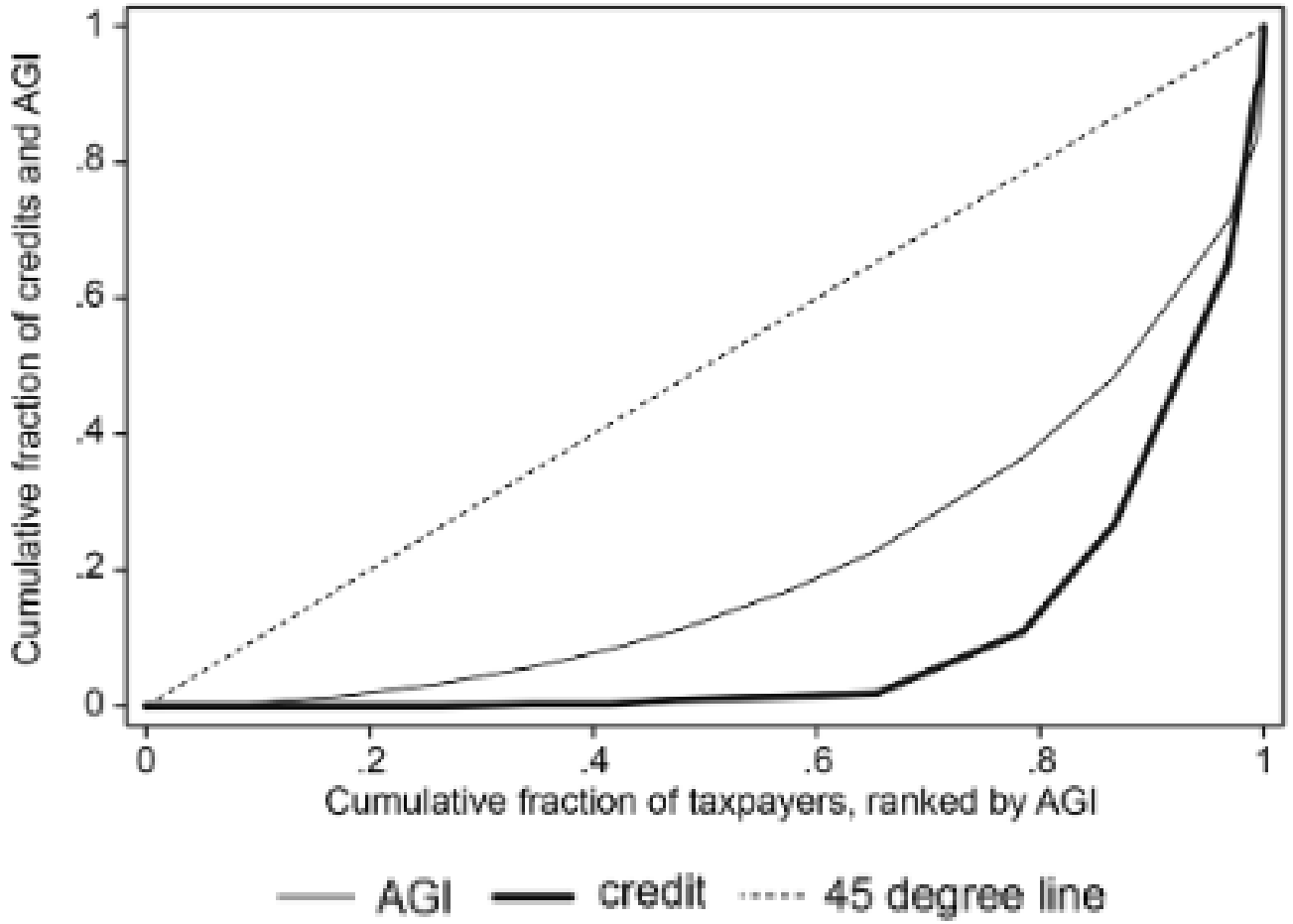
Explanation of findings:

- Renters not eligible
- Share of tax filers claiming credits
- Larger amounts for highest incomes



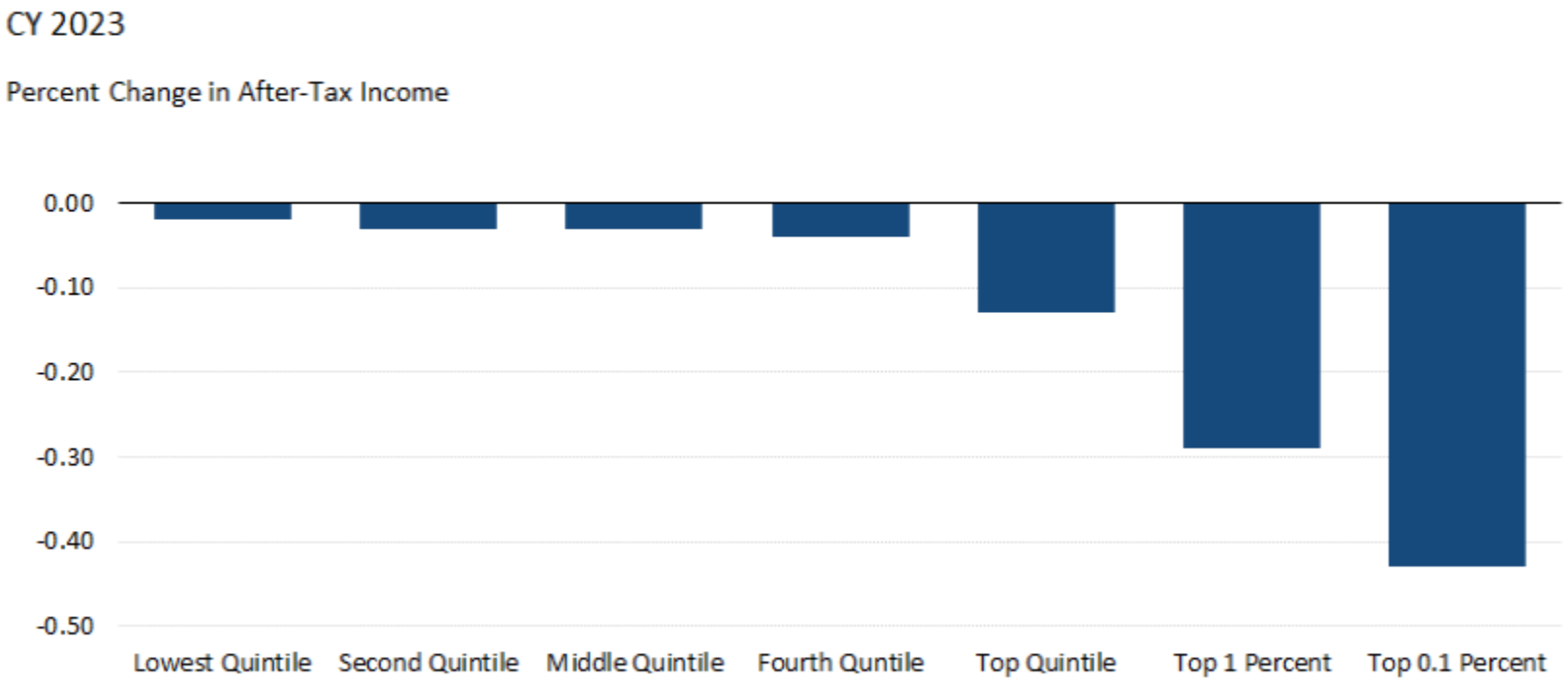
Concentration Curve for EVs

C: Qualified Plug-in Electric Drive Motor Vehicle Credit, 2009-2012



Who Pays?

Distributional Effects of the Inflation Reduction Act of 2022* as Passed by the Senate on August 7, 2022



Source: Urban-Brookings Tax Policy Center Microsimulation Model (version 0722-1). **Note:** *Excludes Premium Tax Credit

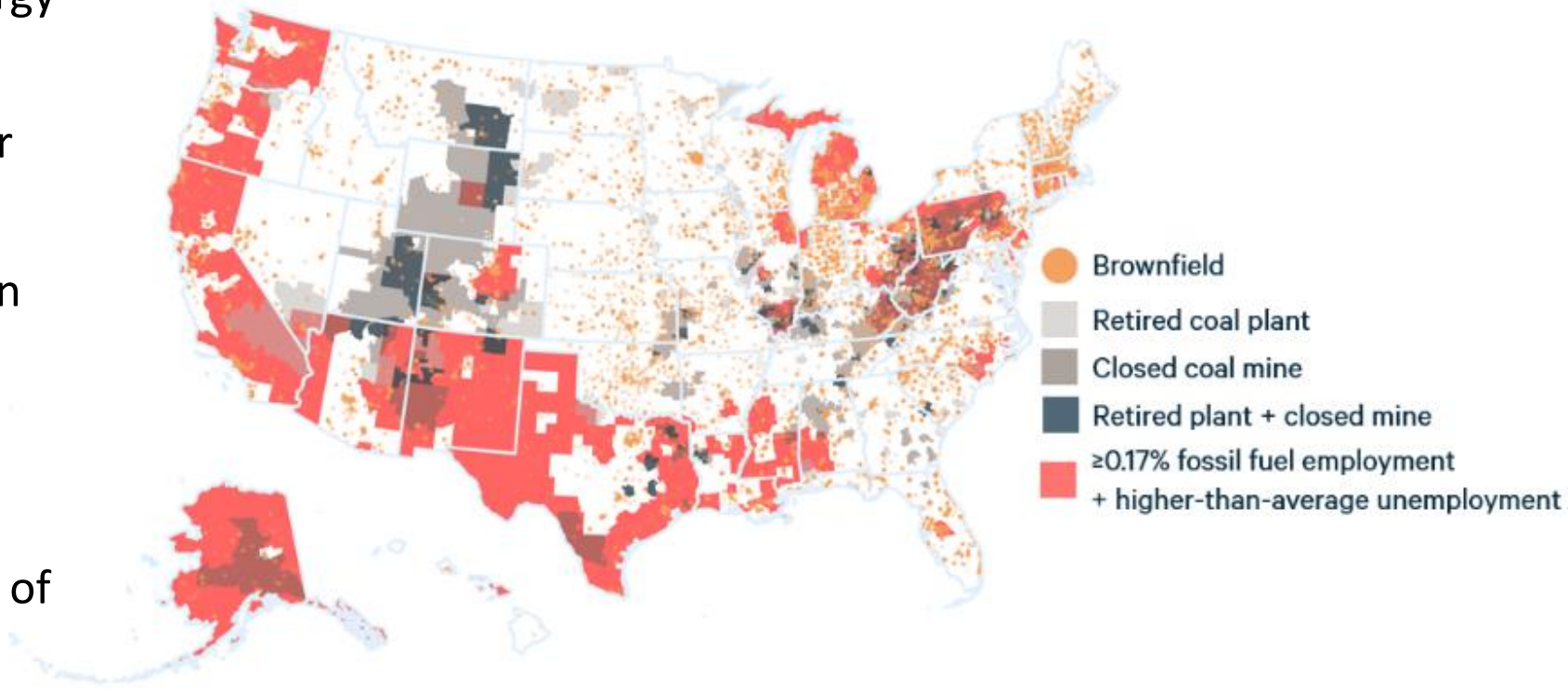
Link.

Energy Communities

Special consideration given to “energy communities.”

- Bonus tax credits ($0.50) for electricity production
- Bonus tax credits 6 – 16% on investments in electricity production

Increased political support, notions of fairness, and also extent of subsidy.



Greenhouse Gas Reduction Fund

The IRA created a new Greenhouse Gas Reduction Fund **($27B)** to provide competitive grants for clean energy and climate-related projects that reduce GHGs.

- $7b for distributed zero-emission electricity production to low-income communities such as solar rooftop grants
- $20b in financial assistance in competitive grants for projects that reduce GHGs ($8b specifically for low-income communities).
- Comments on the fund are open to the public but will close on December 5th, 2022.
  - Only 15 comments so far.

Next class

Wednesday's class will review Modules 1 and 2. Professor Parthum will also discuss recent developments with the social cost of greenhouse gases.

Please complete your **final case study** by December 5th.

Last note: **the final is not mandatory** if you are happy with your current grade.

Grading will be three part:

1)	Reflection Posts and Case Studies	25%
2)	Midterms (two)	25% each (50% total)
3)	Final Exam	25%

Your final grade will be the maximum of the averages of:

(1) + (2) *or* (1) + (3) *or* (1) + (2) + (3)