

# The Energy Transition and Climate Change

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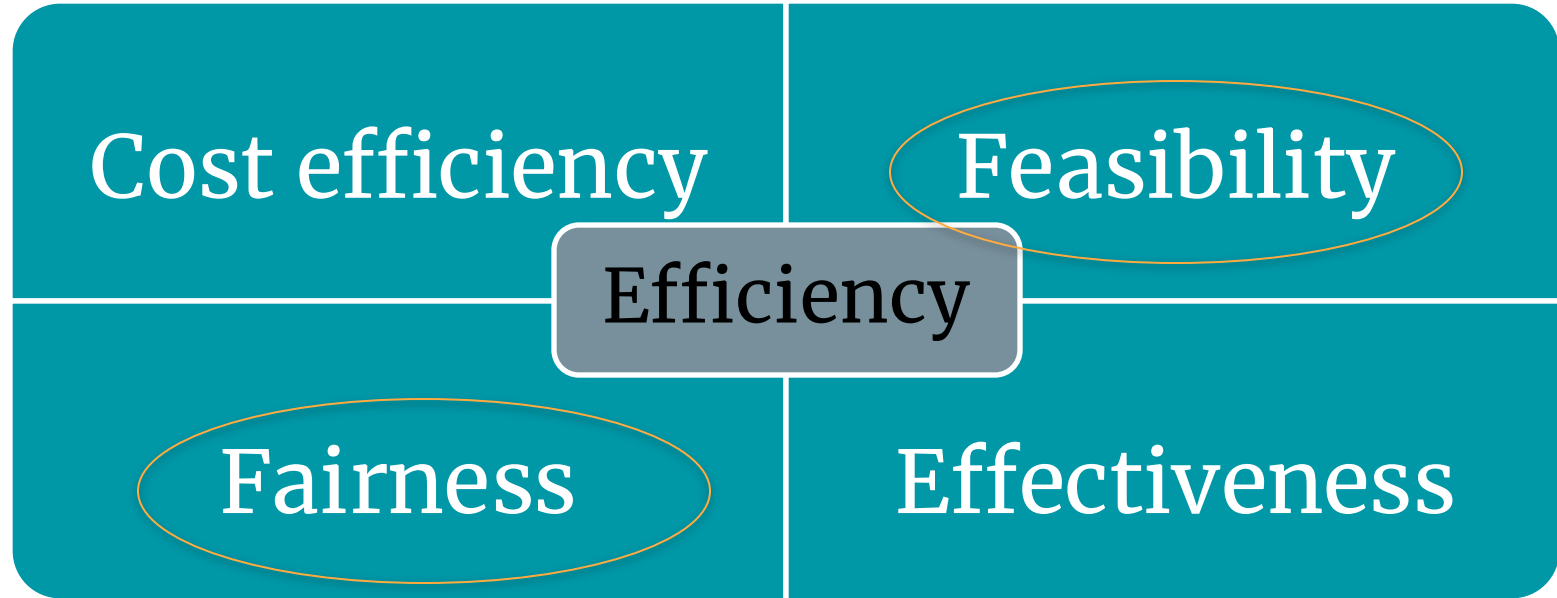
Jacint Enrich (BSE)

Economics of Energy, Climate Change, and Sustainability Program

# This week

- We will discuss what new research about **climate attitudes towards climate policies**.
  - Evidence on climate attitudes.
  - Evidence from voting behavior.
- We will have the group presentations in the next class. :)

# Reminder



# Inequality on the rise

- Growing concerns about equity impacts of climate policy and climate impacts.
- It is well-known that households are most affected by energy and carbon prices if they have low income (due to the relative burden of basic goods).
- Climate policies also benefit high-income households disproportionately.
- These growing concerns can often be used to affect perceptions of households.

**The feasibility of climate policies is not only limited by objective facts, but also by the subjective perceptions of voters.**

# Equity and efficiency

- Economists had traditionally not engaged with issues such as inequity, environmental justice, etc.
- However, it is increasingly obvious that inequitable policies are not feasible.
- This creates a **link between efficiency and equity**.
- For a policy to be effective, it needs to be socially implementable.

## Explainer

### Who are the gilets jaunes and what do they want?

What began as a fuel tax protest by French drivers now appeals to wider anti-government sentiment



# The beneficiaries of climate policies

These growing tensions are not helped by the fact that:\

- Emissions are concentrated among the highest income quintiles.
  - The data shows that the richest 10% of the global population emitted nearly 48% of global emissions in 2019, and the top 1% emitted 17% of the total (WID).
- The **transfers from climate policies** (energy efficiency, solar panels, EVs) are concentrated among the **highest income quintiles**.
  - Davis and Borenstein (2016) document that the Gini coefficient of climate policies is higher than for income.

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

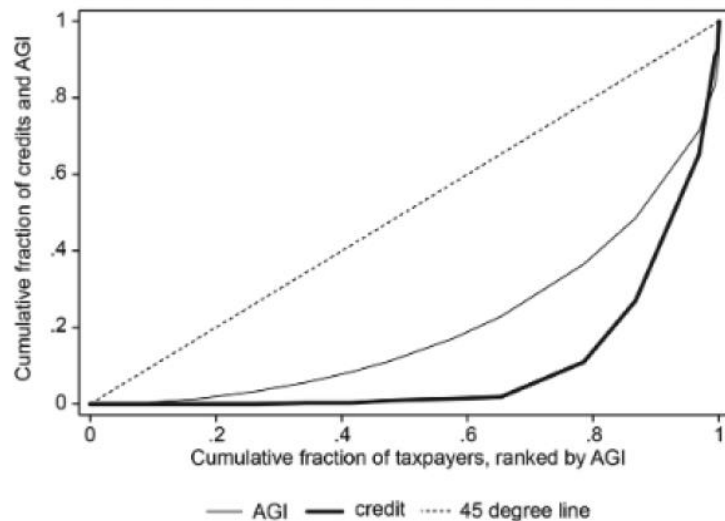
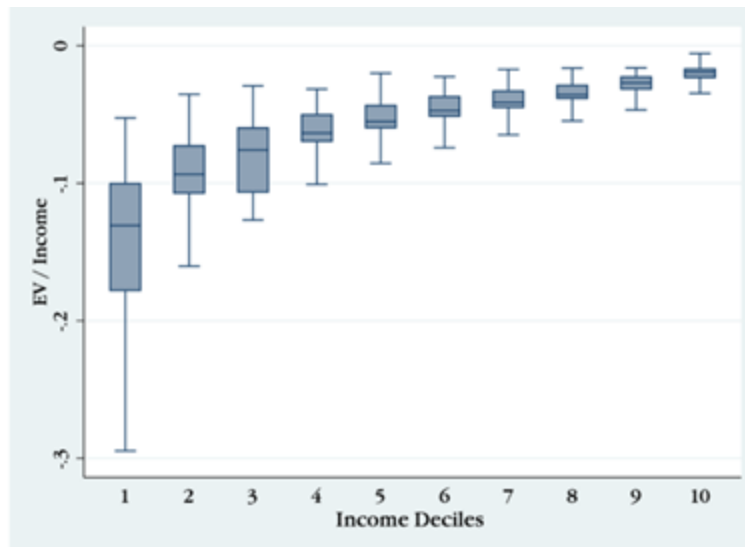


Fig. 7. Concentration Curves

# Reminder: carbon taxes also regressive

Paoli and van der Ploeg (2021)



**Distributional implications of a carbon tax without recycling**

- Microsimulations of household behaviour from UK data to investigate the **equity impacts of carbon taxes and different ways of recycling** the carbon tax revenue
- **Without recycling, carbon pricing is regressive**, with carbon taxes representing almost 8% of weekly expenditures for the lowest income decile and around 5% for the richest households

\* Equivalent variations (EVs): how much households are willing to pay to avoid a policy change

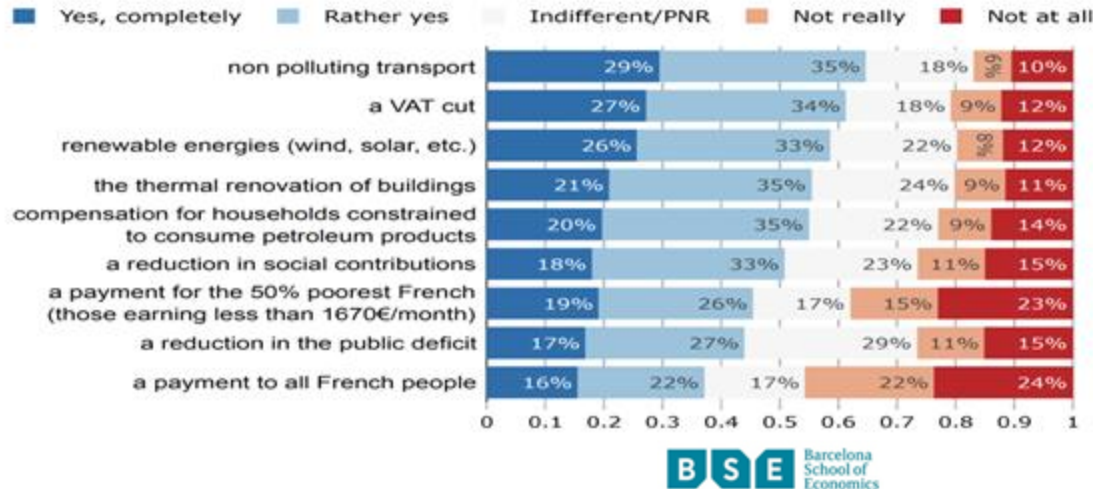
# Reminder: Perceived with caution even with dividends

Douenne T. and A. Fabre (2022)

- **Survey** among 3,000 French households during the yellow vest revolt
- **Proposal**: budget-neutral €50/tCO<sub>2</sub> carbon tax and dividend policy (+€0.11 per litre of gasoline and a €110/year per household transfer)

**Only 10% of the survey respondents approve, while 70% do not accept the proposal**

Figure 3 "Would you approve of an increase of the carbon tax if the revenues were used to...?"



"Even when people are expected to benefit from carbon taxation, **pessimistic beliefs about the effect of the policy** could lead them to oppose it"

People favour measures whose **costs are less salient**

- prefer norms or subsidies to taxes
- strongly support public investments



# Studies look at “feasible” strategies

- Examine people’s preferences via surveys or revealed voting patterns.
- Examine beliefs about the impacts of certain policies or perceptions about climate change.
- Today we will look at four examples:
  - Recent events in Canada (blogpost)
  - Washington State ballot initiatives for carbon taxes (Anderson et al.)
  - French perceptions and Yellow Vests movement (Douenne and Fabre)
  - Global perceptions (Dechezleprêtre et al)

# The political process of passing climate policies

- **Several questions** to examine:
  - What are the relevant dimensions of voter heterogeneity that affect support for a policy?
  - How to maximize the probability of approving a policy given voting patterns?
  - Are voters *informed*?
  - Are there possible policies to better inform them?
  - If a policy can pass, what are the re-election/durability prospects? Is it robust?
  - What to do if the feasible policy is no policy?
- Not too many answers, but today we will see a few of them.

# Oh, Canada (in-class discussion)

*by Meredith Fowlie and Patrick Baylis (2024)*

# Can Pigou at the Polls Stop Us Melting the Poles?

*based on Anderson, Marionescu, and Shor (2022)*

# Washington State carbon taxes

- Washington State had **two recent attempts at passing carbon taxes** into law.
- Two recent attempts (2016, 2018) in the form of ballot initiatives (referenda during an election).
  - **FAILED!!!**
- Finally **passed into law** with legislative process (non-ballot) **in 2021**.
- Now a functioning market, with 2023:
  - Price of \$56, quite high and higher than California.
  - 1 billion in revenue, much larger than expected.
  - Due to political pressure, attempts to contain the price from escalating further.

# What can we learn from failed policy proposals?

- Public economics and political economy literatures use results from ballots to infer preferences over policy outcomes.
- Paper exploits ballots related to carbon pricing to understand **voters' preferences towards climate policy**.

# Ballot initiatives

Two initiatives with quite different flavors:

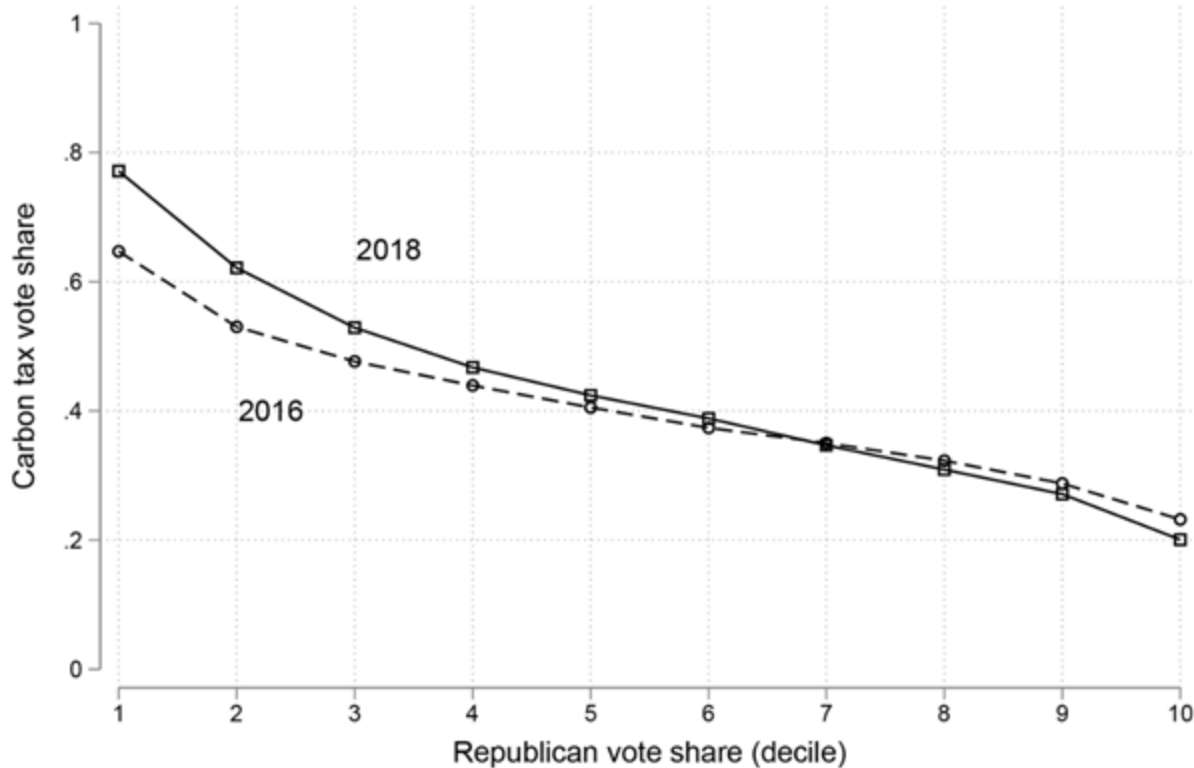
- **2016:** revenue-raising policy
- **2018:** revenue-neutral policy with an energy/environmental fund

Addition of revenue-neutral component as a response to backlash faced with 2016 ballot initiative (even Sierra Club!).

General finding in literature: *voters prefer green projects than rebates.*

	I-732	I-1631
Year	2016	2018
Provisions	<p>Revenue-neutral carbon tax swap \$15/tCO<sub>2</sub> in July 2017, \$25/tCO<sub>2</sub> in July 2018, then increase 3.5% per year to \$100/tCO<sub>2</sub></p> <p>Slower phase-in for farmers and public transportation Reduce state sales tax by 1% from 6.5% to 5.5%</p> <p>Reduce state business and occupation tax on manufacturing businesses to .001%</p> <p>Offer working families tax rebate (25% match on federal Earned Income Tax Credit)</p>	<p>Carbon emissions fee and spending \$15/tCO<sub>2</sub> in January 2020, then increase \$2/tCO<sub>2</sub> per year until state's emissions reduction goals met</p> <p>Levied on "large emitters" using and distributing fossil fuels Revenue to three funds: (1) 70% air quality and energy projects, (2) 25% water quality and forest projects, and (3) 5% for communities</p> <p>Establish public oversight board to determine spending from funds</p> <p>Create three panels to make spending recommendations to public oversight board</p>
Results	40.75% Yes, 59.25% No	43.44% Yes, 56.56% No
Spending for	\$3.2 million	\$16.4 million
Spending against	\$1.4 million	\$31.6 million
Top spenders for	Peter Kelly (\$125,000)	Nature Conservancy (\$3.4 million), League of Conservation Voters (\$1.4 million), Bill Gates and Michael Bloomberg (\$1 million each)
Top spenders against	Kaiser Aluminum (\$450,000)	BP America (\$13.15 million), Phillips 66 (\$7.2 million), Andeavor (\$6.1 million)

# “Recycling” increased support but not enough





# Econometric analysis of ballot data

- Voting on candidates and ballots at the precinct level.
  - Match to Census data to get demographic information.
- Use voting of main candidates to define “Republican share”.
- Use principal component analysis to create a measure of ideology based on ballot votes for a wide range of socioeconomic issues, defined as “Conservatism”.
  - The two variables are **highly correlated** but can both explain some of the voting patterns.

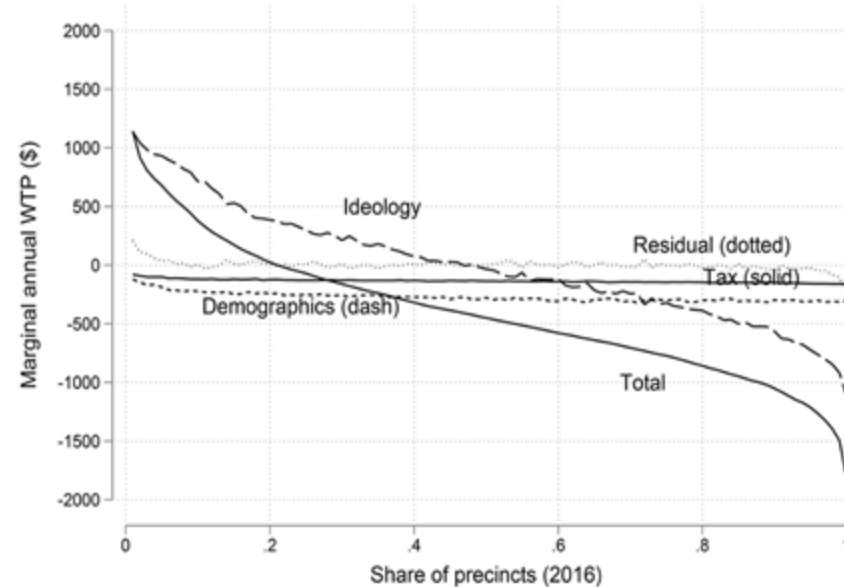
# Econometric analysis of ballot data

Table 3. Predicting the Carbon Tax Vote Share at the Precinct Level (pooled 2016 and 2018)

	Ideology (1)	Party (2)	+Census (3)	+Ideology (4)	+County FEs (5)	+Initiatives (6)
Conservatism	-.814*** (.013)			-.669*** (.019)	-.665*** (.018)	
Republican		-.730*** (.026)	-.635*** (.021)	-.124*** (.018)	-.139*** (.018)	-.046** (.016)
2018 Vote	.026 (.014)	.026 (.014)	.026 (.014)	.026 (.014)	.026 (.014)	.026 (.014)
Observations	12,438	12,438	12,438	12,438	12,438	12,438
R <sup>2</sup>	.913	.870	.906	.926	.929	.932

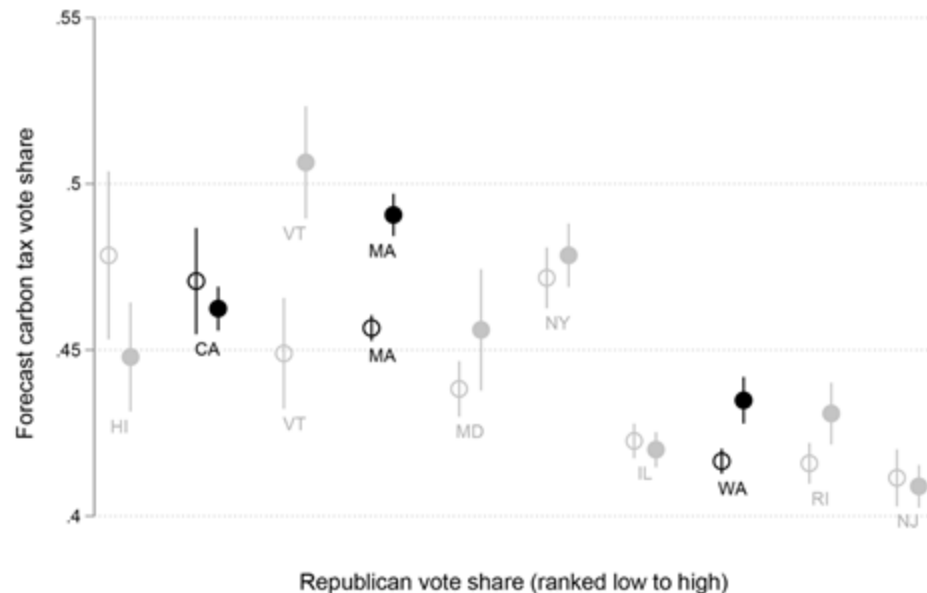
# Analysis is expanded with random-coefficient discrete choice model

- Models the decision of each individual, not just the precinct average.
- It predicts voter's vote (Yes or No) based on the tax impact (which can be adjusted for housing size, number of cars), ideology and demographics.
- They find that **ideology is the biggest determinant** of preferences for carbon taxes.



# Speculating beyond WA: a dismal result?

- Quite a stretch! Need a mix of precincts in WA to be able to replicate the mix in other states.
- But... fascinating!
- Results:
  - Almost none of the predictions are above 50%...
  - For VT only, but ballots not allowed in the state.



# Even the law passed in state is contested!

- WA initiative to kill the legislation passed by the state legislature.
- If brought to ballot, some of the dismal results could hit back.
- A very recent article suggests that the *status quo* matters, and voters might accept current legislation even with the option of taking it back.
- TBD...

Climate Lab | Local News | Local Politics | Northwest

## WA initiative to repeal carbon market loses ground in new poll

Oct. 20, 2024 at 6:00 am | Updated Oct. 20, 2024 at 6:00 am



Backers of Brian Heywood, founder of Let's Go Washington, hold signs in support of Initiative I-2117 during a press event at Jackson's Shell Station in Kent. A new poll results suggest trouble for the repeal effort just a... (Ellen M. Banner / The Seattle Times) [More](#)

By [Claire Withycombe](#)  
Seattle Times staff reporter

# Yellow Vests, Pessimistic Beliefs, and Carbon Tax Aversion

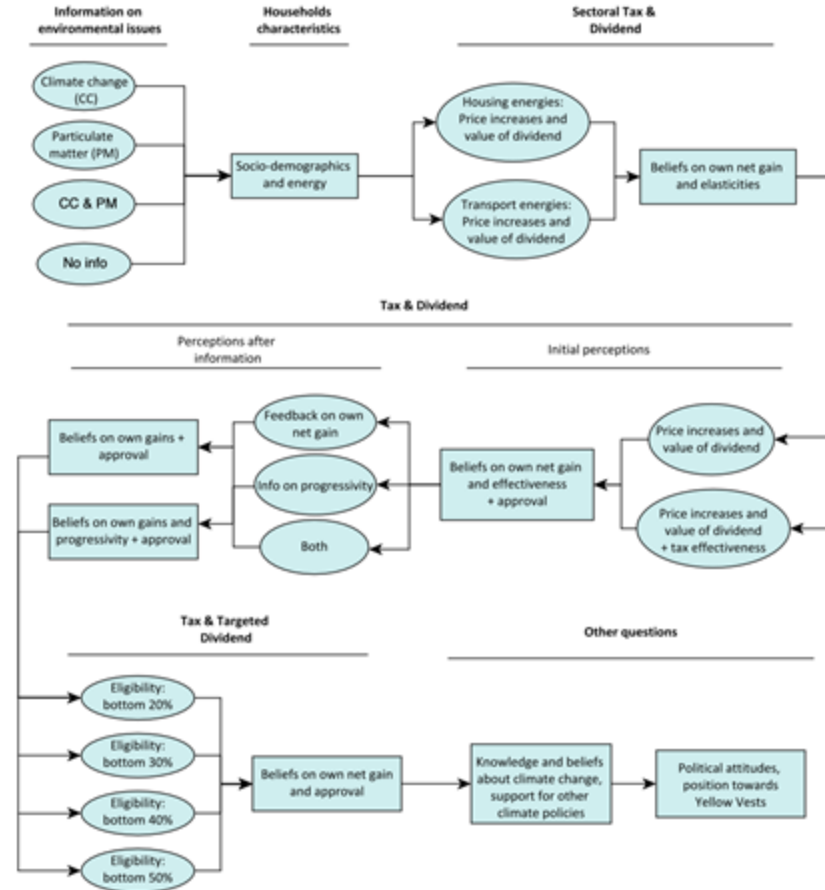
*based on Douenne and Fabre (2022)*

# This paper

- Understand **how** people perceive carbon taxes in France, and how that interacts with previous beliefs and attitudes (Yellow Vests)..
- Design and run a survey that allows researchers to estimate bias in perceptions.
- Main findings:
  - People's beliefs about negative effects of taxes are pessimistic.
  - Information can help but only marginally, beliefs are "strong."
  - Yellow Vests supporters have an even more negative perception.

# The Survey

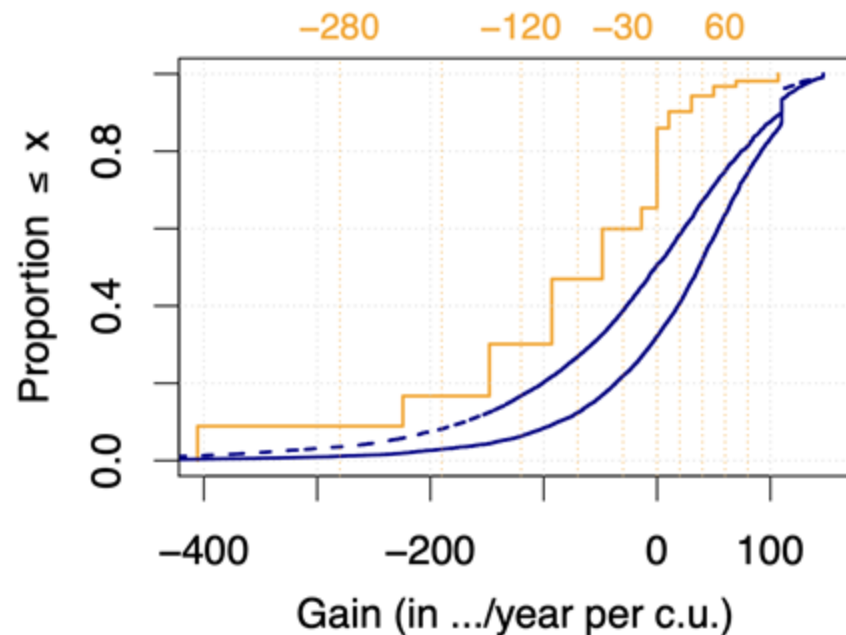
- 3000 individuals in France, collected to be representative of the population along several dimensions (gender, age, education, profession, rural/urban, region).
- Main goal is to **assess perceptions** on impacts of taxes, role of information, and role of carbon tax design (e.g., *progressivity*).
- Ask people about expected impact of policy (win/lose) and in Euros.





# Perceptions are biased

- Compute the expected net gain/loss based on housing-level survey questions (e.g., annual distance travelled, energy expenditures).
  - *What about inflation?*
- Add net transfer depending on progressivity of the design.
- In general, individuals are more pessimistic, expecting larger losses.
- *Very few people believe they will gain.*



(c) Both

# Fighting climate change: International attitudes towards

*based on Dechezleprêtre, Fabre, Kruse, Planterose, Sanchez,  
Stantcheva (2023)*

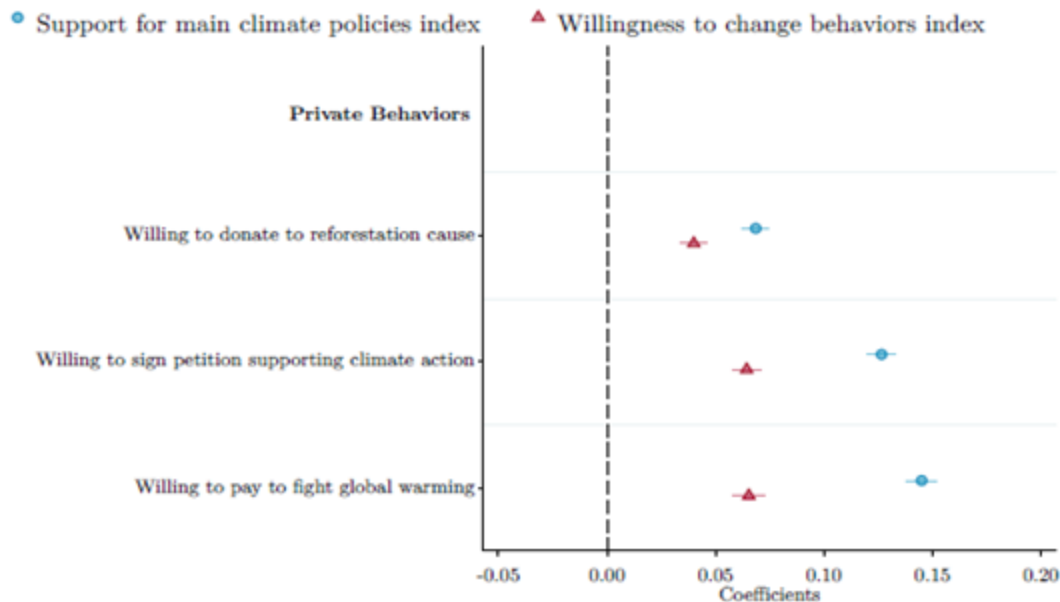
# This paper

- Understand **how** people perceive climate change and which factors determine their support to climate policies.
- Design and run a survey on more than 40,000 respondents in 20 countries.
- Support depends on three **fundamental beliefs**:
  - Effectiveness.
  - Distributional concerns.
  - Self-interest.
- Information on climate policies significantly increases their support.

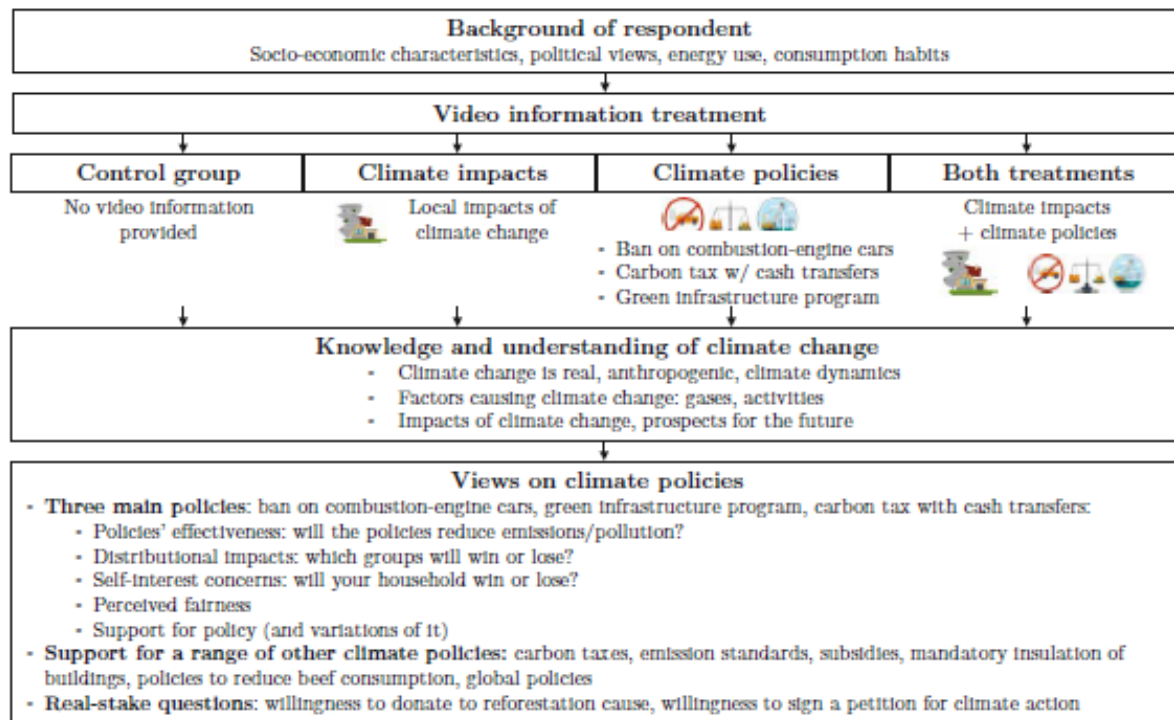
# The Survey

- Collected between March 2021 and March 2022.
- Complement it with **real-stake questions** to check whether survey responses reflect actual behavior.

Figure 3: Do Survey Responses Reflect Actual Behaviors? Correlation between self-reported support and actual behaviors



# The questionnaire



- Energy usage and lifestyle questions to assess how respondents are affected by policies.
- Policies are not **first-best instruments**: assess trade-off between **efficiency** and **social acceptability**.

# Knowledge about climate change

## CC is real, human-made, & its dynamics

CC exists, is anthropogenic

Cutting emissions by half insufficient to stop global warming

## GHG emission ranking

GHG footprint of beef/meat is higher than chicken or pasta

GHG footprint of nuclear is lower than gas or coal

GHG footprint of plane is higher than car or train/bus

Total emissions of China are higher than other regions

Per capita emissions of the US are higher than other regions

## CC gases

CO<sub>2</sub> is a greenhouse gas

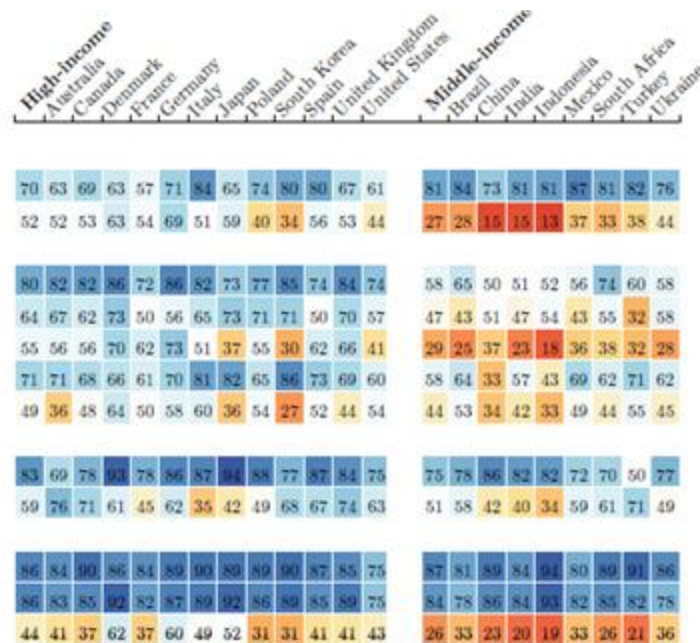
Methane is a greenhouse gas

## CC impacts if CC goes unabated

Severe droughts and heatwaves are likely

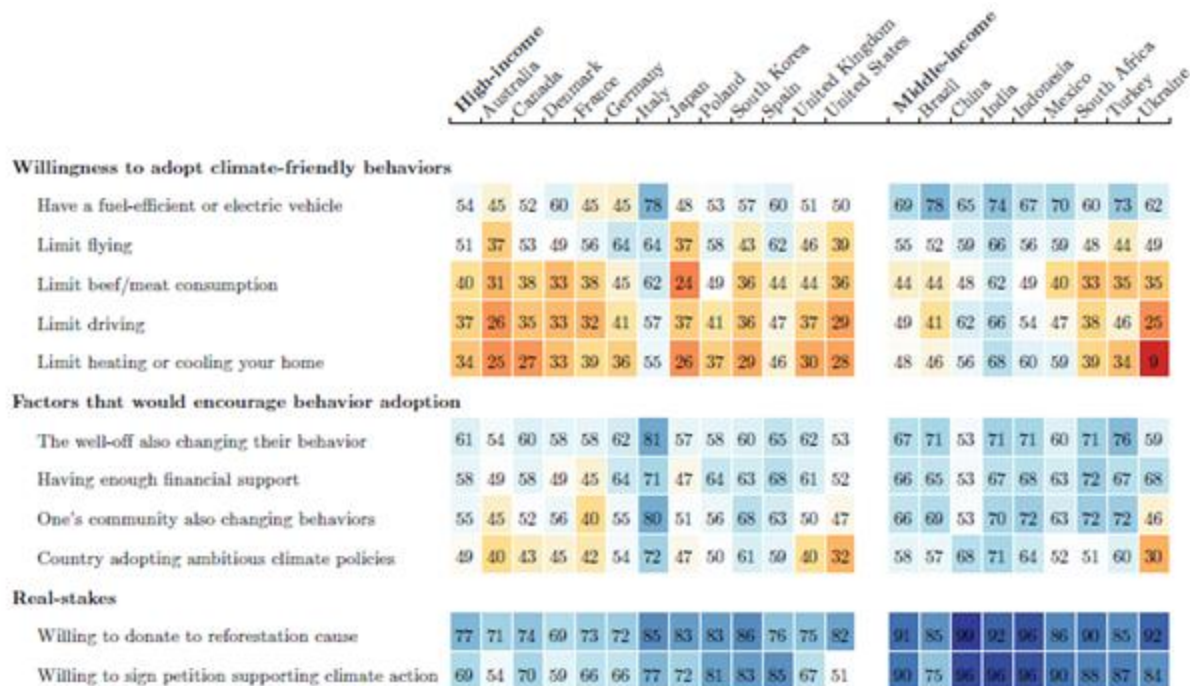
Sea-level rise is likely

More frequent volcanic eruptions are unlikely



- Respondents are **too optimistic** about the level of decarbonization required.
- College degree, income and left-leaning political views are associated with accurate perceptions.

# Willingness to adopt climate-friendly behaviors



Respondents are **unwilling to limit meat consumption.**

Financial support and the well-off changing their behavior as factors encouraging **climate-friendly behavior.**



# Support for climate action

## Main Policies Studied

Green infrastructure program  
Ban on combustion-engine cars  
Carbon tax with cash transfers

## Transportation Policies

Ban on polluting cars in city centers  
Ban on combustion-engine vehicles w. alternatives available  
Tax on flying (+20%)

## Energy Policies

Subsidies to low-carbon technologies  
Mandatory and subsidized insulation of buildings  
Funding clean energy in low-income countries  
Tax on fossil fuels (\$45/tCO<sub>2</sub>)

## Food Policies

Subsidies on organic and local vegetables  
Ban of intensive cattle farming  
Removal of subsidies for cattle farming  
A high tax on cattle products, doubling beef prices

## Support for Carbon Tax With:

Funding environmental infrastructures  
Subsidies to low-carbon tech.  
Reduction in personal income taxes  
Cash transfers to the poorest households  
Cash transfers to constrained households  
Tax rebates for the most affected firms  
Reduction in the public deficit  
Progressive transfers  
Equal cash transfers to all households  
Reduction in corporate income taxes

	High-income											Middle-income										
	Australia	Canada	Denmark	France	Germany	Italy	Japan	Poland	South Korea	Spain	United Kingdom	United States	Brazil	China	India	Indonesia	Mexico	South Africa	Turkey	Ukraine		
Green infrastructure program	57	49	56	53	57	42	78	48	58	68	71	54	50	78	77	82	80	80	84	73	76	69
Ban on combustion-engine cars	43	35	47	41	28	32	54	41	44	52	54	45	39	65	60	72	77	65	67	53	62	58
Carbon tax with cash transfers	37	34	41	30	29	28	47	35	36	53	44	34	33	59	47	80	71	67	55	52	55	39
Ban on polluting cars in city centers	60	53	60	66	57	50	76	64	61	52	64	65	49	71	65	73	74	85	72	66	60	67
Ban on combustion-engine vehicles w. alternatives available	48	38	47	42	42	41	58	51	48	58	57	52	44	68	60	78	77	72	66	62	64	63
Tax on flying (+20%)	45	35	44	60	46	53	41	47	44	42	44	46	33	52	39	61	64	68	51	43	45	36
Subsidies to low-carbon technologies	67	62	65	67	56	64	79	69	75	71	73	65	57	73	77	75	68	70	66	75	75	68
Mandatory and subsidized insulation of buildings	66	70	64	70	64	60	73	59	72	72	71	70	53	75	80					73	75	75
Funding clean energy in low-income countries	54	49	50	53	48	48	76	53	55	57	65	51	50	73	63	71	75	81	74	76	66	78
Tax on fossil fuels (\$45/tCO <sub>2</sub> )	36	36	40	43	31	31	38	35	27	42	39	38	34	48	35	58	64	58	41	38	52	28
Subsidies on organic and local vegetables	56	42	50	59	52	56	71	46	73	62	65	49	43	68	62	79		77	58	59	80	58
Ban of intensive cattle farming	42	32	41	31	55	49	64	17	44	44	43	50	36	39	38	50		45	46	28	32	25
Removal of subsidies for cattle farming	34	31	33	32	28	38	42	16	34	31	42	37	38	39	43	47		51	47	27	31	22
A high tax on cattle products, doubling beef prices	30	24	27	31	29	40	37	19	30	26	31	31	31	36	33	48		49	37	30	26	24
Funding environmental infrastructures	63	60	48	60	65	60	76	56	68	78	69	63	56	75	78	76	71	81	73	79	73	69
Subsidies to low-carbon tech.	63	58	49	52	57	66	76	68	71	70	69	59	53	73	74	79	68	79	71	78	66	65
Reduction in personal income taxes	57	52	48	38	62	54	72	64	69	62	67	52	49	69	69	74	68	74	69	68	66	64
Cash transfers to the poorest households	53	51	48	41	55	47	68	54	50	59	63	57	46	73	67	82	69	86	66	65	82	62
Cash transfers to constrained households	50	50	42	36	55	47	62	47	39	62	61	52	44	64	59	69	63	74	59	60	65	61
Tax rebates for the most affected firms	48	41	41	38	52	34	66	49	61	59	55	41	43	62	59	72	65	68	54	63	55	56
Reduction in the public deficit	48	40	39	34	49	39	66	50	56	48	62	44	48	63	62	72	65	70	61	62	57	52
Progressive transfers	47	40	54				45	66	56	40	44	40	43	58	64	84	67	61	44	45	51	49
Equal cash transfers to all households	38	37	38	27	45	31	42	43	37	42	44	33	38	61	45	70	64	76	62	57	59	53
Reduction in corporate income taxes	37	29	32	24	37	25	55	38	48	48	50	26	29	58	54	67	60	67	61	50	60	42

- Preference for **bans** and regulation over **price mechanisms**, which people may deem unfair, as the richest can pay their **way out of it**.
- The use of **tax revenue** matters, e.g., to fund infrastructures and low-carbon technologies.



# Perceived characteristics of the main policies

Green Infrastructure Program			Carbon Tax w. Cash Transfers			Ban on Combustion-Engine Cars		
High Income	Indonesia India China	Other Middle Income	High Income	Indonesia India China	Other Middle Income	High Income	Indonesia India China	Other Middle Income

## Effectiveness of Main Climate Policies

Reduce air pollution  
 Reduce GHG emissions/Reduce CO<sub>2</sub> emissions from cars  
 Make electricity production greener  
 Encourage insulation of buildings  
 Increase the use of public transport/Encourage less driving  
 Positive effect on economy and employment  
 Costless way to fight climate change

76	84	82	68	84	77	79	85	83
			64	80	71	73	80	77
70	80	77						
			64	72	67			
60	77	67	51	75	64			
37	45	45	31	41	41	35	41	39
30	39	38	27	37	34	39	38	37

## Distributional Impacts of Main Climate Policies

*Believes the following groups would gain*

Those living in rural areas  
 Low-income earners  
 The middle class  
 High-income earners

25	62	41	21	58	32	16	51	24
21	57	40	22	57	31	12	51	24
22	54	43	21	51	31	15	47	26
39	52	50	33	45	37	40	50	47

## Self-Interest

Believes own household would gain

23	62	40	20	58	28	15	51	24
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## Perceived Fairness and Support

Support main climate policies  
 Main climate policies are fair

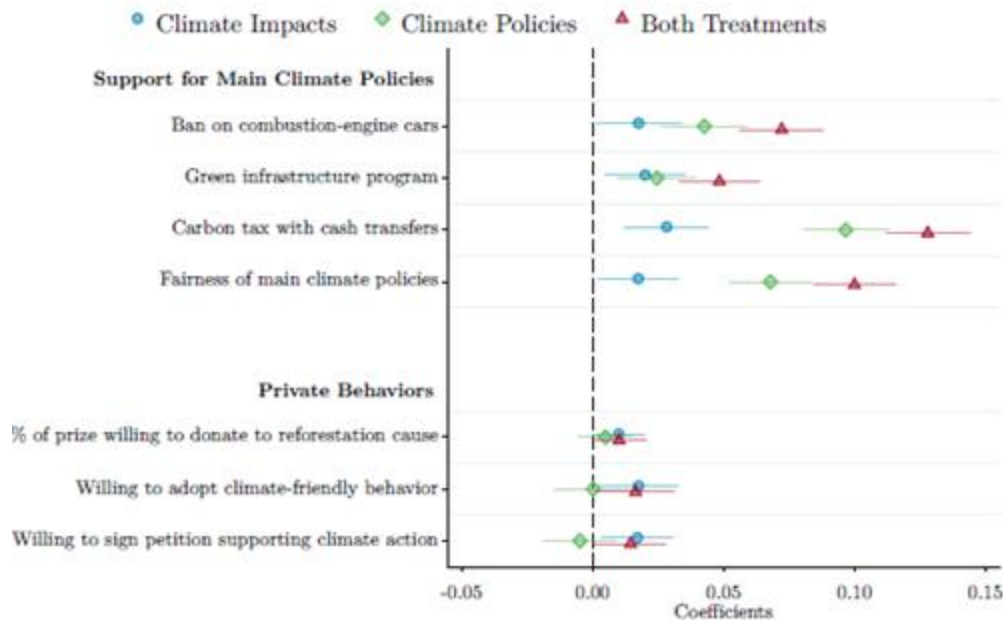
57	81	76	37	73	50	43	72	60
51	77	67	35	67	47	39	68	53

Policies are considered to be **regressive**.

Lifestyle and energy usage (having public transportation available, being a frequent flyer, not being car-dependent) are strongly correlated with a more positive outlook on the policies' effectiveness.

# Experimental results: the causal effects of information

- Control group with no video.
- *Climate impacts* video, explaining that climate change is **anthropogenic** and is likely to have adverse impacts on the respondent's country.
- *Climate Policies* video, describing its advantages and drawbacks (costs and benefits).



# What to take away from these surveys?

- Messaging around climate policies seems important across countries.
- Ranking of countries also appears to be systematic, although voting norms across countries could be different and confound the analysis.
- The surveys can be used as support to economic analysis when proposing a particular policy, e.g., why carbon pricing needs to go with revenue recycling that might not be the most efficient.

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