



Chaire Modélisation prospective
au service du développement durable



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Agence de l'Environnement
et de la Maîtrise de l'Energie



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The distributional effects of carbon taxation France

Its impact on equity

Outline

1/ Background on carbon taxation

2/ Model description

3/ Evaluation of the impacts on households of taxing carbon

Distributional effects / Behavioural responses / Energy poverty

Progressivity / Revenue recycling

4/ Conclusion

Carbon tax trajectory in France

Introduced with “Budget Law 2014”

- in line with the propositions made by the European Commission on the review of the European Directive on Energy
- rises over time to achieve the 2030 and 2050 GHG emission reduction targets
- all fossil fuels except electricity (already covered by the EU ETS)
- as a carbon base integrated within existing taxes on energy (TICPE / TICGN)

Year	<2013	2014	2015	2016	2017	2018	2019	2020	2030
		(LF 2014)	(LF 2014)	(LF 2014)	(LFR 2015)	(LFR 2015)	(LFR 2015)	(LTECV 2015)	(LTECV 2015)
Carbon tax level	0€/tCO ₂	7€/tCO ₂	14,5€/tCO ₂	22€/tCO ₂	30,5€/tCO ₂	39€/tCO ₂	47,5€/tCO ₂	56€/tCO ₂	100€/tCO ₂

Source: Budget laws and Law on energy transition

Impacts on households differ

- By type of energy consumed,
 - higher burden for households using **heating fuel** than those using natural gas. Electricity consumption are not affected.
 - higher burden for households driving with **diesel** than gasoline. Public transport are only indirectly affected, to a far lesser extent.
- By type of households,
 - higher burden for **low income** households: the impact is all the more important as income is low.
 - higher burden for households **constrained in their behaviours**: tenants of poorly insulated housing, no alternative to car, long daily distances to travel, etc.

Ultimately, it causes a **decline in purchasing power** and an **increase in energy vulnerability** of households.

Recycling revenues from the tax

- The carbon tax gives rise to large **tax revenues**
→ €0,4 billion in 2014, €2,5 billion in 2015 et €4 billion in 2016
- Today, revenues are mostly transferred **from households to businesses**
→ $\frac{3}{4}$ of the revenues contribute to financing tax credits for competitiveness and employment (CICE)
- There is **no consensus** on the use of carbon tax revenues
→ households bear $\frac{2}{3}$ of the carbon tax burden

The opportunity to compensate households

The revenue generated by the tax could be used to:
(€4 billion in 2016)

- aim at **budget neutrality** for households
→ lump-sum transfer: compensate every households
- respect **equity principles** between affected groups of population
→ targeted transfer: compensate some households, the most vulnerable

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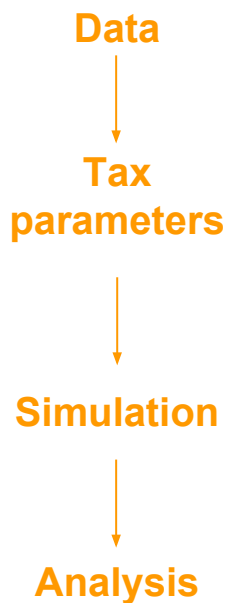
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The microsimulation model



Microsimulation model that simulates for a representative sample of the French population the taxes levied on energy consumption, as well as the benefits they receive.

This model allows analysing the distributional effects of rising energy prices and the vulnerability of households to carbon taxation.

This model simulates the French energy tax system for the years 2012 to 2016, and allows exploration of prospective scenarios.

Modeling households' energy spending

Electricity / Gas

Spending (including all taxes) = $\text{Subscription cost [type of contract]} \times (1 + \text{reduced VAT})$
+ $\text{Volume consumed} \times (\text{cost per kWh} + \text{TIC}^* + \text{carbon tax}) \times (1 + \text{normal VAT})$

Gasoline / Diesel / LPG / Heating fuel

Spending (including all taxes) = $\text{Volume consumed} \times (\text{cost per liter} + \text{TIC}^* + \text{carbon tax}) \times (1 + \text{normal VAT})$

*TIC = TICGN/TICPE/TCFE - carbon tax

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Phebus survey



- Where? metropolitan France
When? on 2012 consumption
Who? with **5405 representative households**
- energy consumption and spending
 - **transport** and **domestic** sectors

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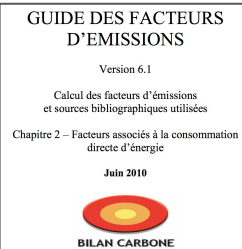
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	22€ / tCO ₂		100€ / tCO ₂	
	Carbon tax	% sale price (2012)	Carbon tax	% sale price (2012)
Heating fuel (1 ton)	77 €	7.8 %	348 €	36 %
Network gas (1 MWh)	5,2 €	5.8 %	24 €	26 %
Diesel (1 liter)	6,5 c€	4.7 %	30 c€	21 %
Gasoline (1 liter)	6,2 c€	4 %	28 c€	18 %
LPG (1 liter)	4,1 c€	4.7 %	19 c€	21 %

Modeling households' energy spending

Budget law
+
Energy tariffs

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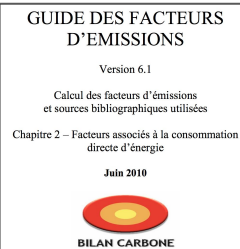
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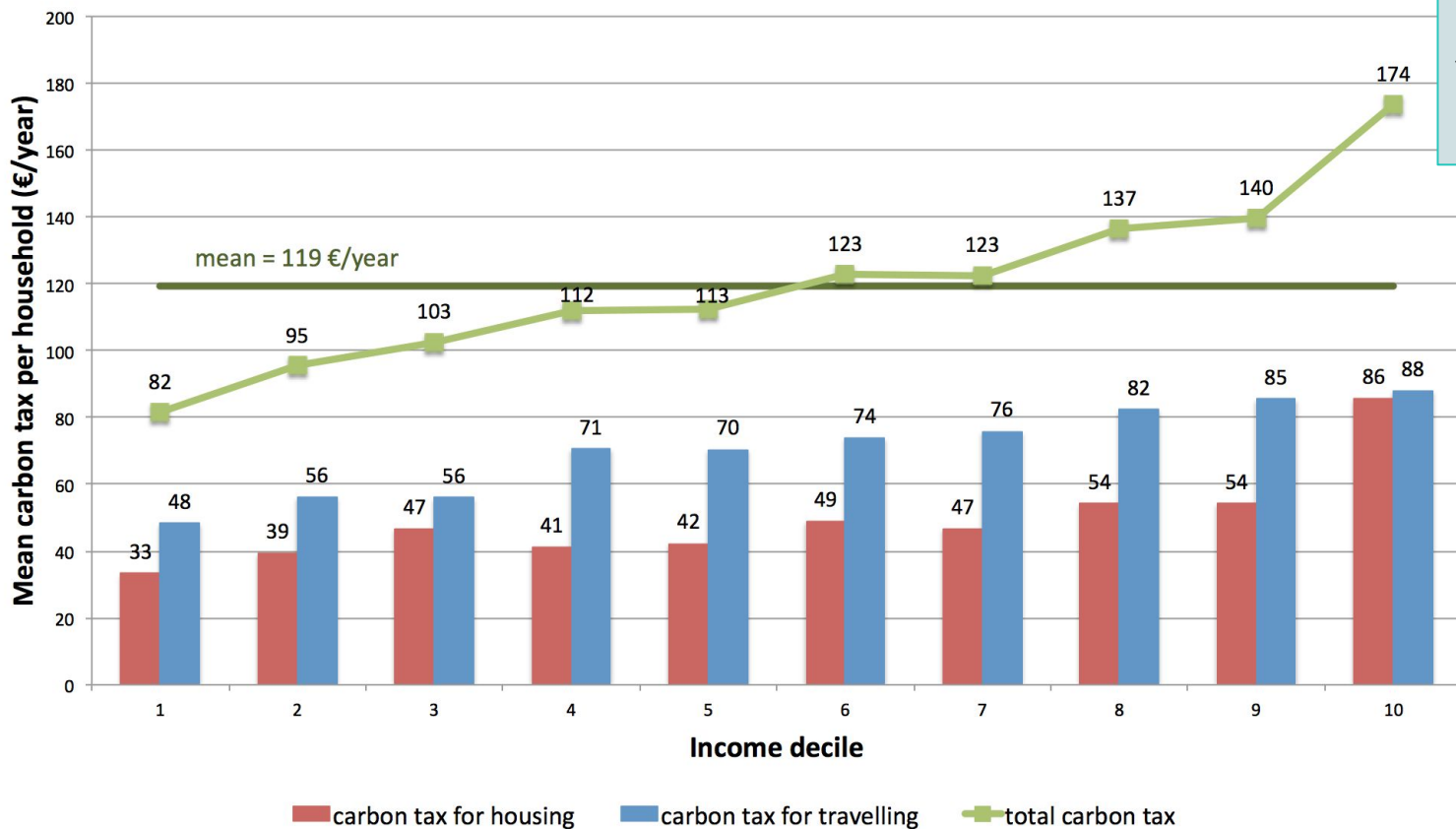
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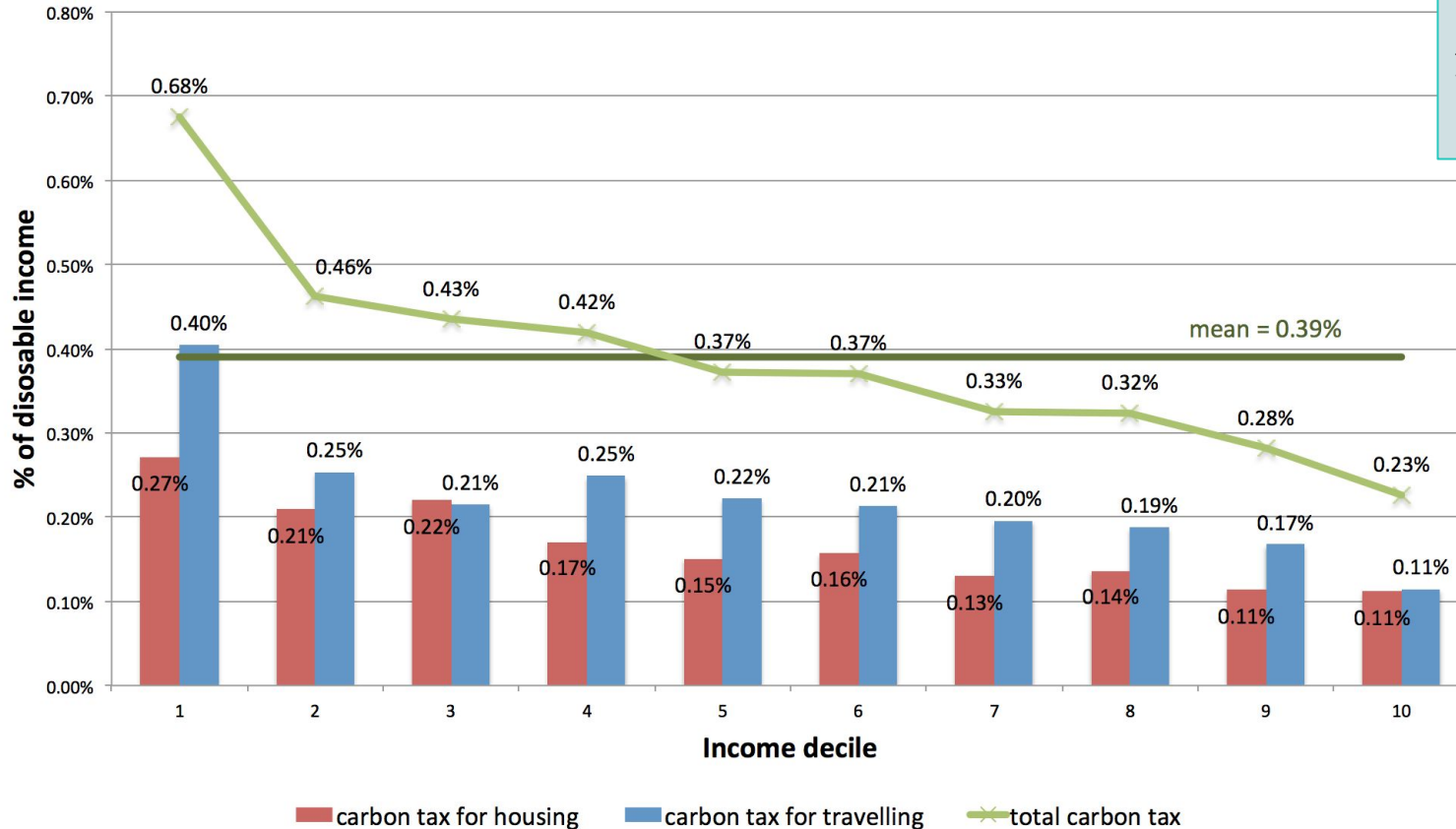
Distributional effects

Carbon tax per household (22 €/tCO₂eq)

Estimate of the mean amount of carbon tax born by households, per income decile

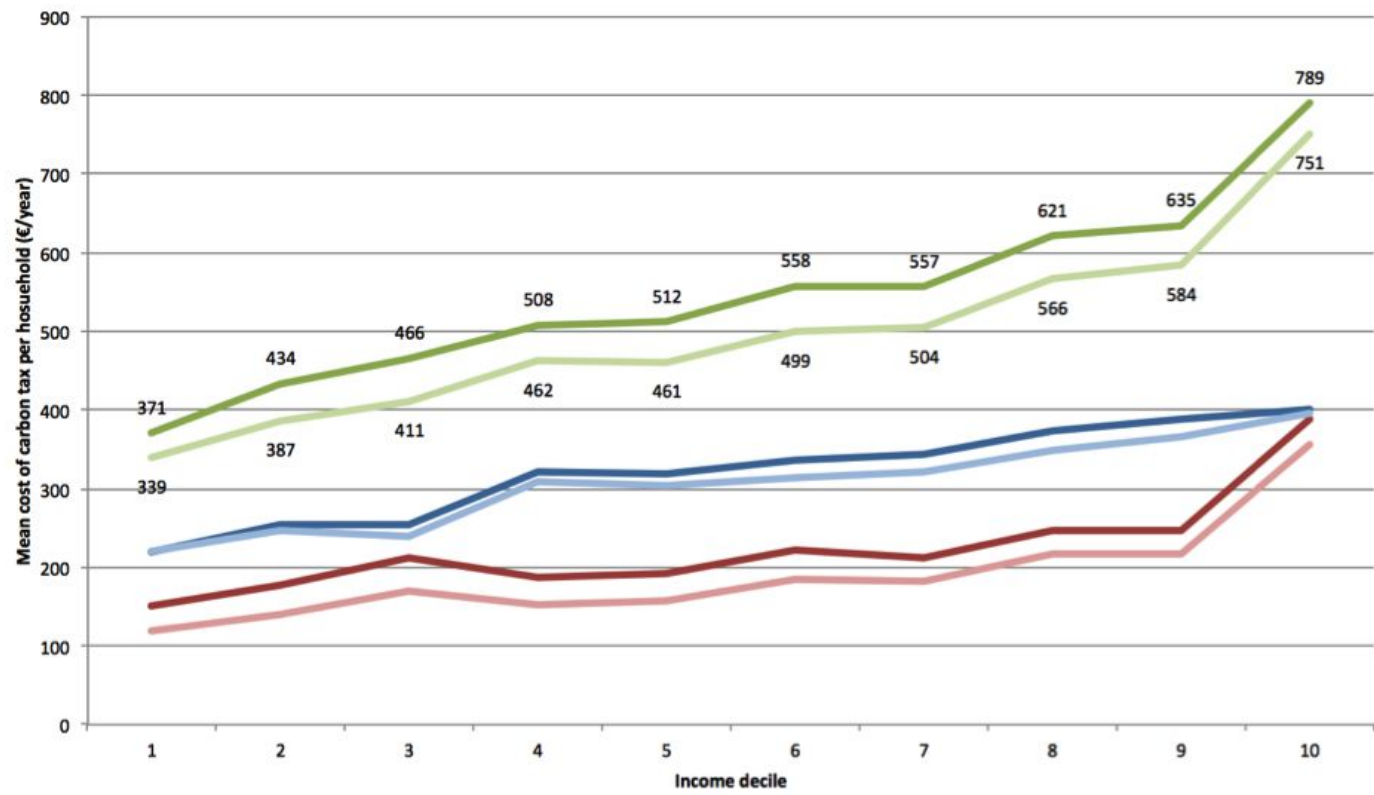
Carbon tax as a % of a household's disposable income (22 €/tCO₂eq)

Estimate of the mean budget share dedicated to the carbon tax, per income decile



Behavioural responses

Cost of the carbon tax in the domestic and transport sectors according to households' income decile in 2030 (100€/tCO2)



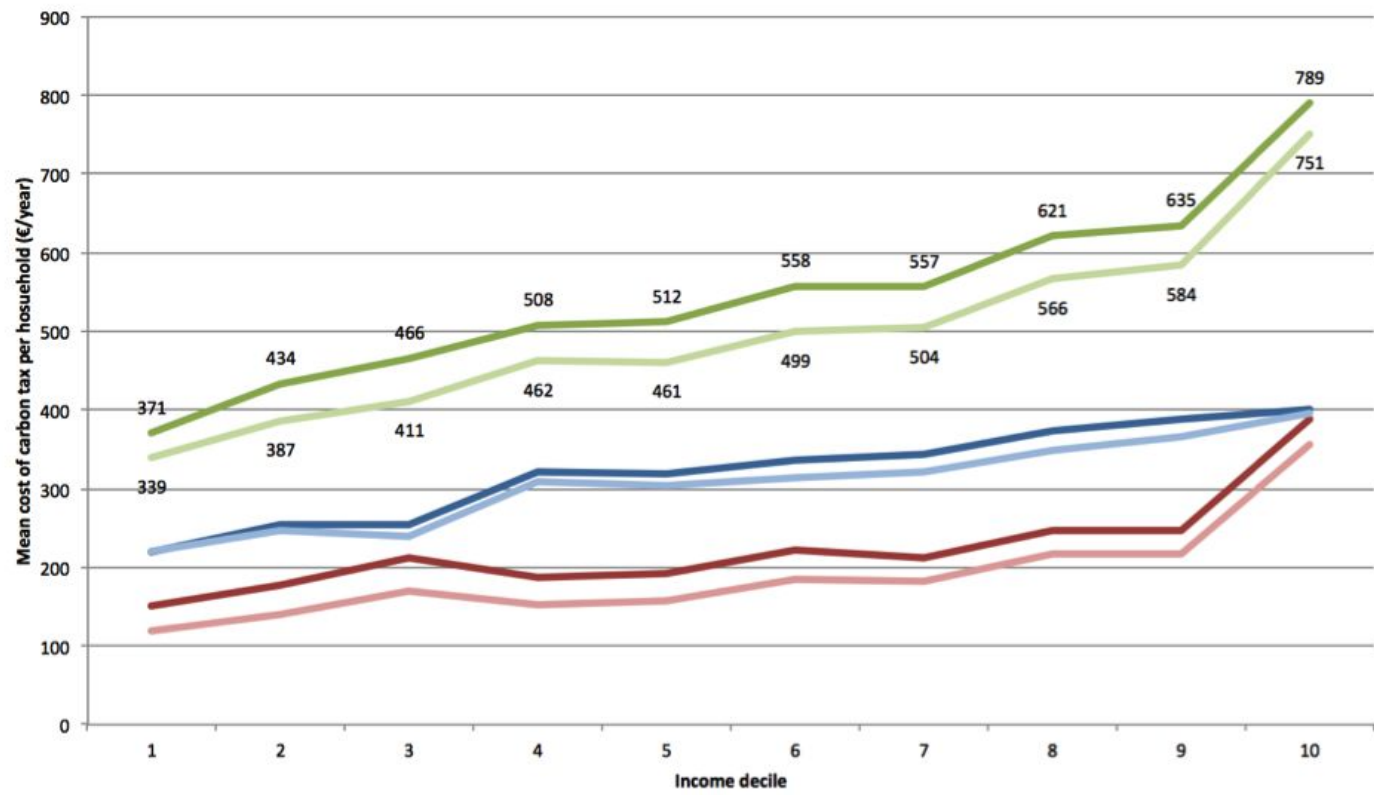
Carbon tax = 100 €/tCO₂

10,4 million tCO₂ saved

3,2 MtCO₂ → transport
7,2 MtCO₂ → residential

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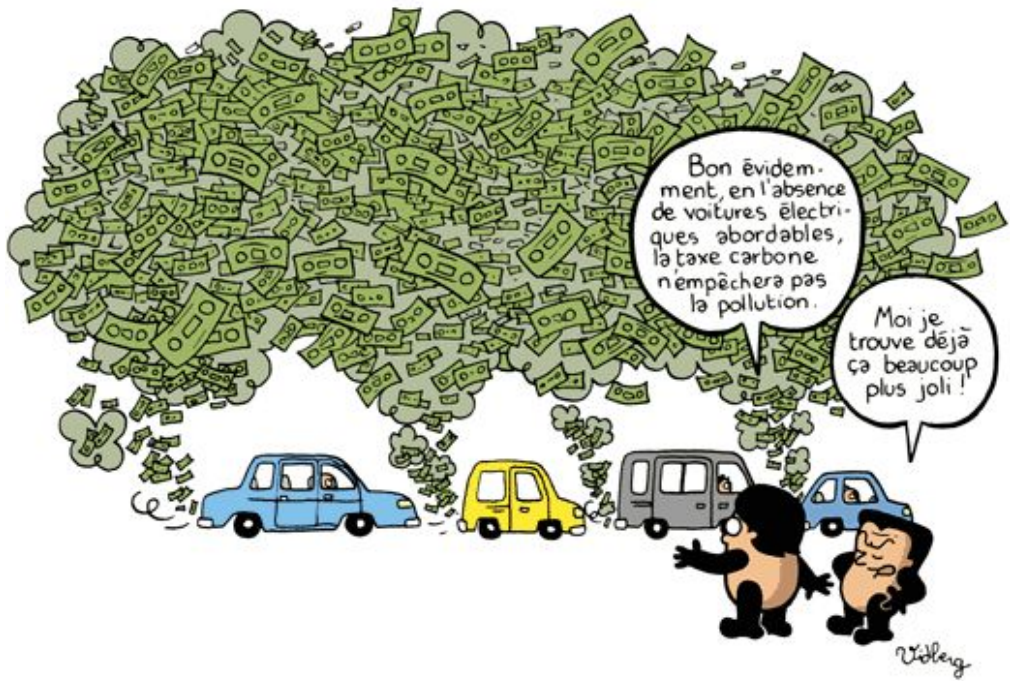
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Transport sector
2.3% decrease
 in carbon emissions

Residential sector
7.3% decrease
 in carbon emissions

Taxe carbone



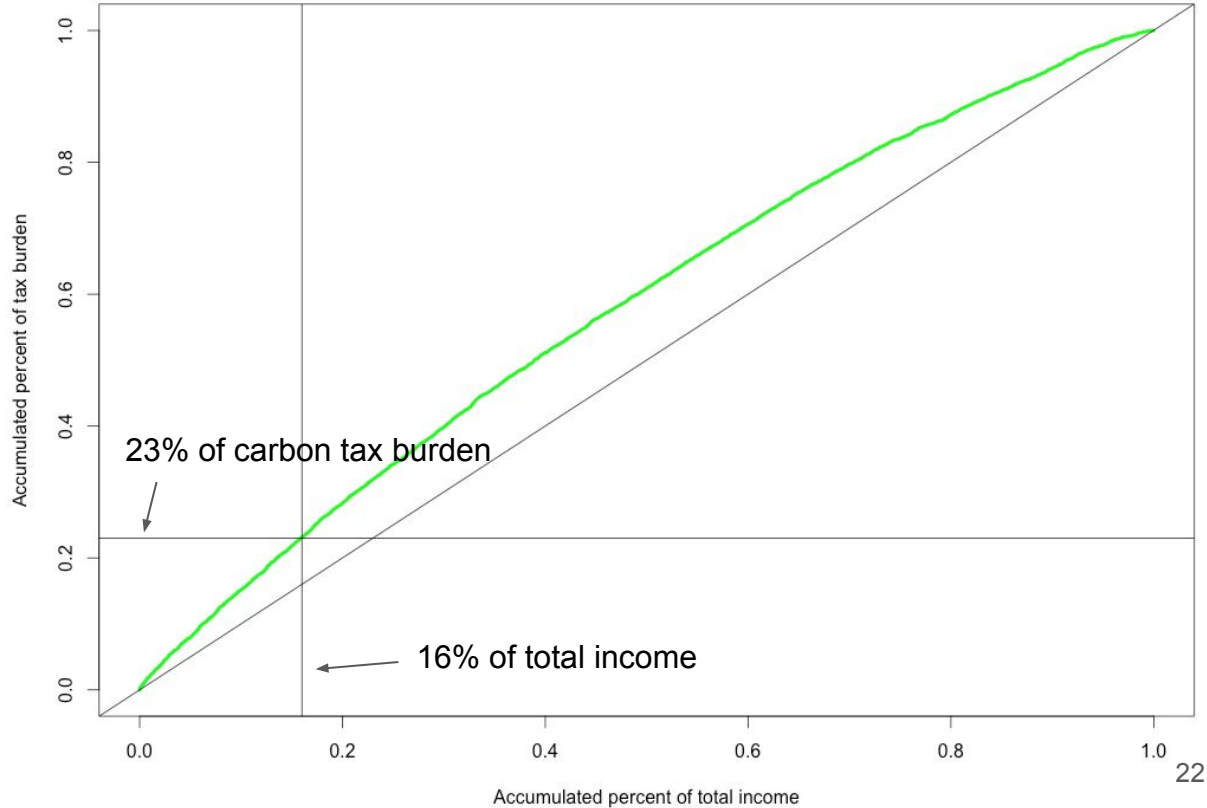
POLLUEZ MOINS = PRENEZ LE BUS !



Tax progressivity index

Share of total population	Share of total income	Share of total carbon tax
10%	4%	7%
20%	10%	15%
30%	16%	23%
40%	24%	33%
50%	32%	42%
60%	41%	52%
70%	52%	63%
80%	63%	74%
90%	78%	86%
100%	100%	100%

Reading:
 The **30% poorest households** receive **16% of total income** earned in France while they contribute to **23% of total carbon tax burden**.

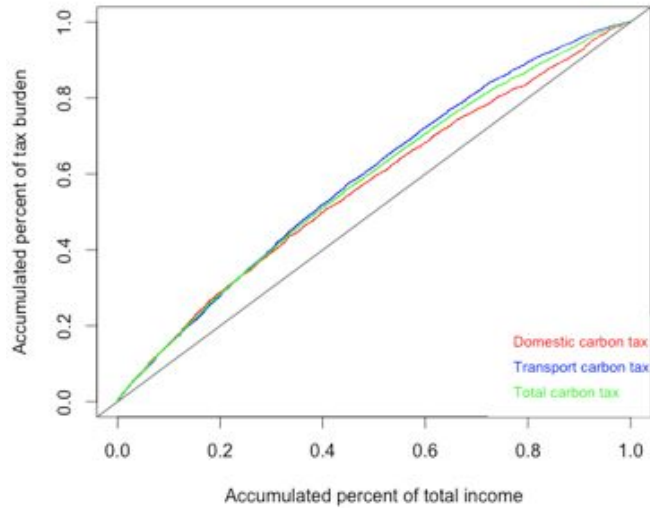


Suits Index of carbon tax

- total = -0.16
- transport = -0.18
- housing = -0.13

(negative value → regressivity)

The carbon tax is **more regressive on transport** than on housing.

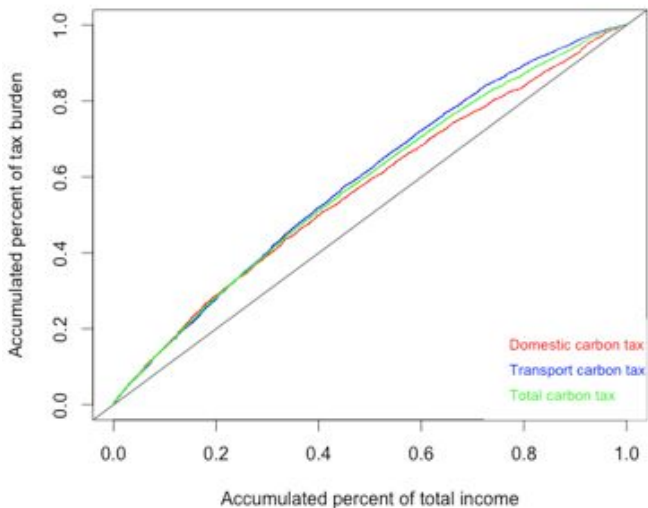


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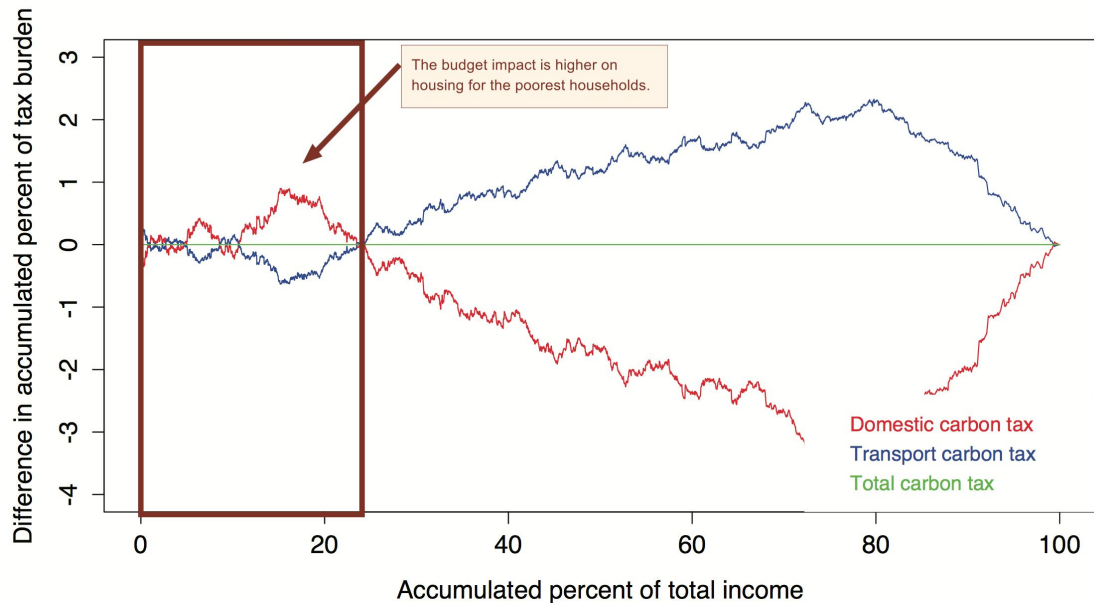
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Deviation from the mean regressivity of the carbon tax



The impact on fuel poverty

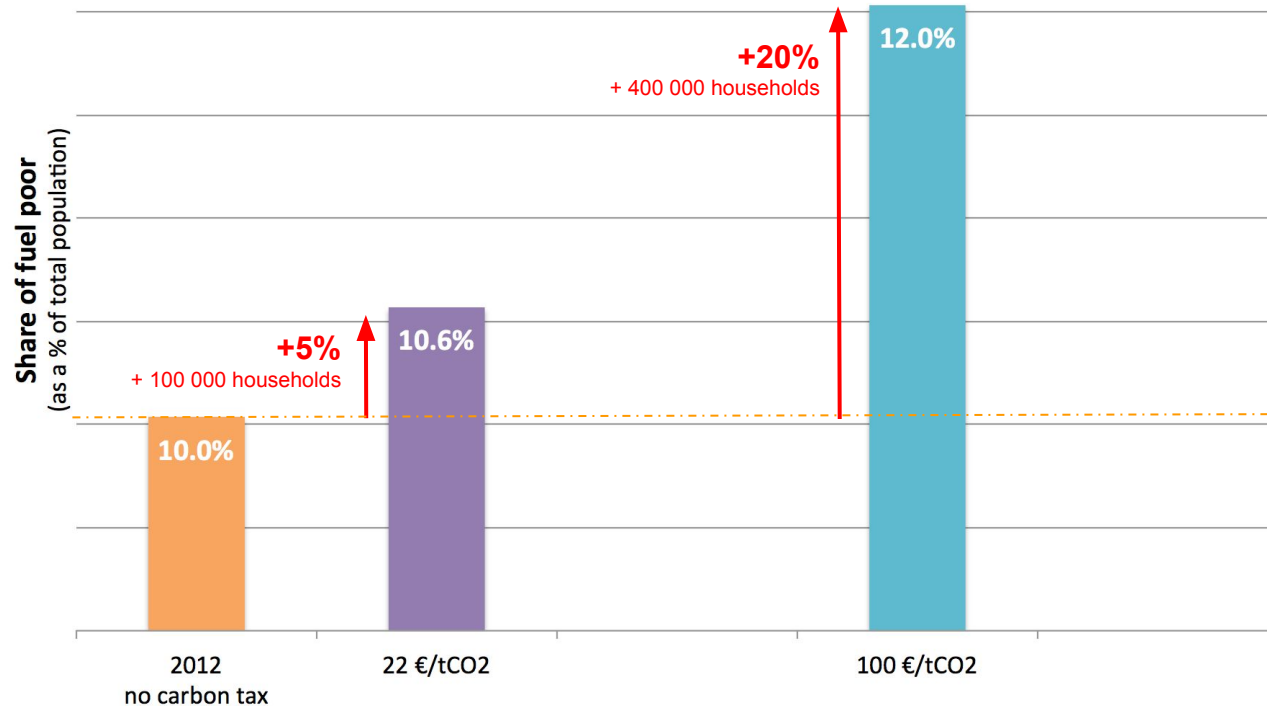
Three **indicators of fuel poverty** to reveal different situations of fuel poverty:

- Spending more than 10% of income on energy (among the 3 lowest income deciles)
- Cumulating a high energy spending (>1 442 €/UC/year) and a low income (<11 844 €/UC/year)
- Feeling cold (subjective)



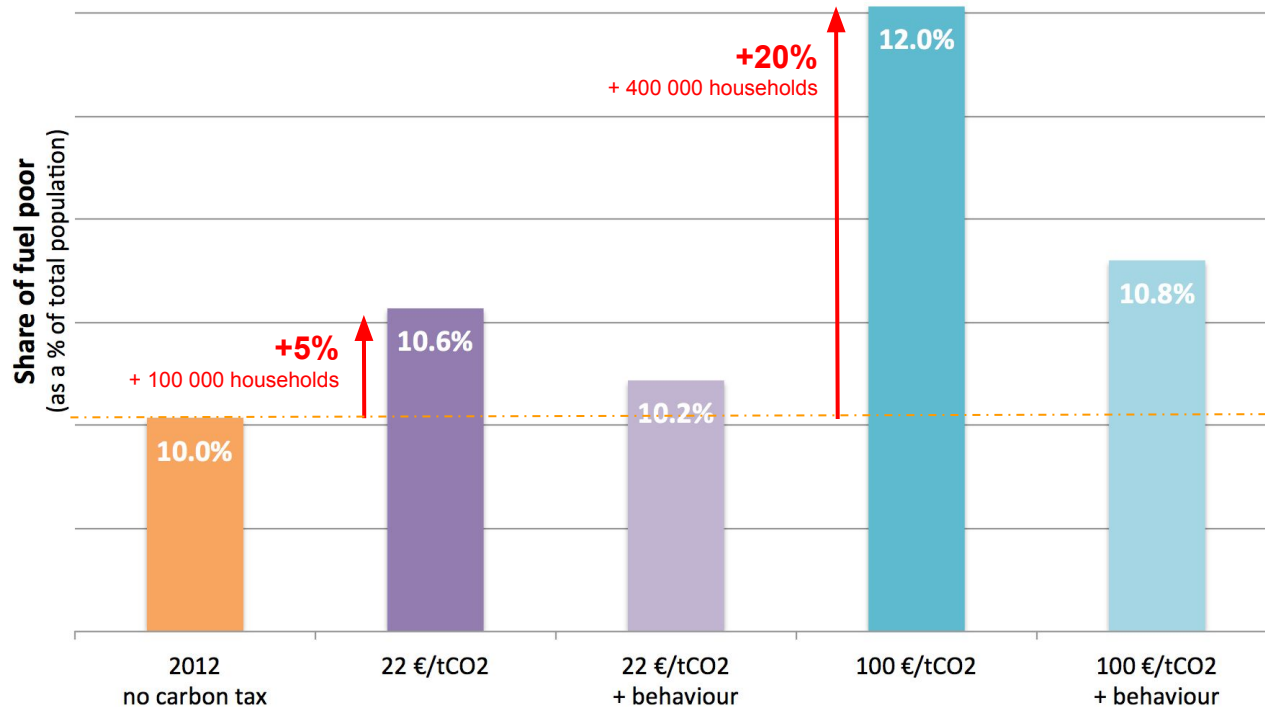
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Risk of restriction?

18% of households declared feeling cold in 2012

Revenue recycling

Different monetary compensations

- **flat recycling**: same amount transferred to every household
- **size-based recycling**: the amount transferred is adjusted to the household composition
- **targeted recycling (income poor)**: only households with an income below the poverty line are eligible

	% of tax revenue recycled	% of population eligible	mean cash transfer (eligible population)
no recycling	0.0%	0%	- €
flat recycling	59.2%	100%	71 €
size-based recycling	58.2%	100%	70 €
targeted recycling (income poor)	16.6%	12%	168 €

Conclusion

- Designing a fair ecological taxation requires **anticipating the distribution of the impacts** it introduces into society.
- The carbon tax increases the cost of fossil fuels, and some categories of households are more affected than others.
- It is possible to **correct its negative effects**, if the tax is part of a carbon package. Such package should include measures to **compensate for its regressivity** and to **support vulnerable households**.
- Otherwise, the tax may be perceived as unfair and cause difficulties to heat one's home and achieve one's travel needs.



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Thanks !

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