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Environmental Taxation

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Outline

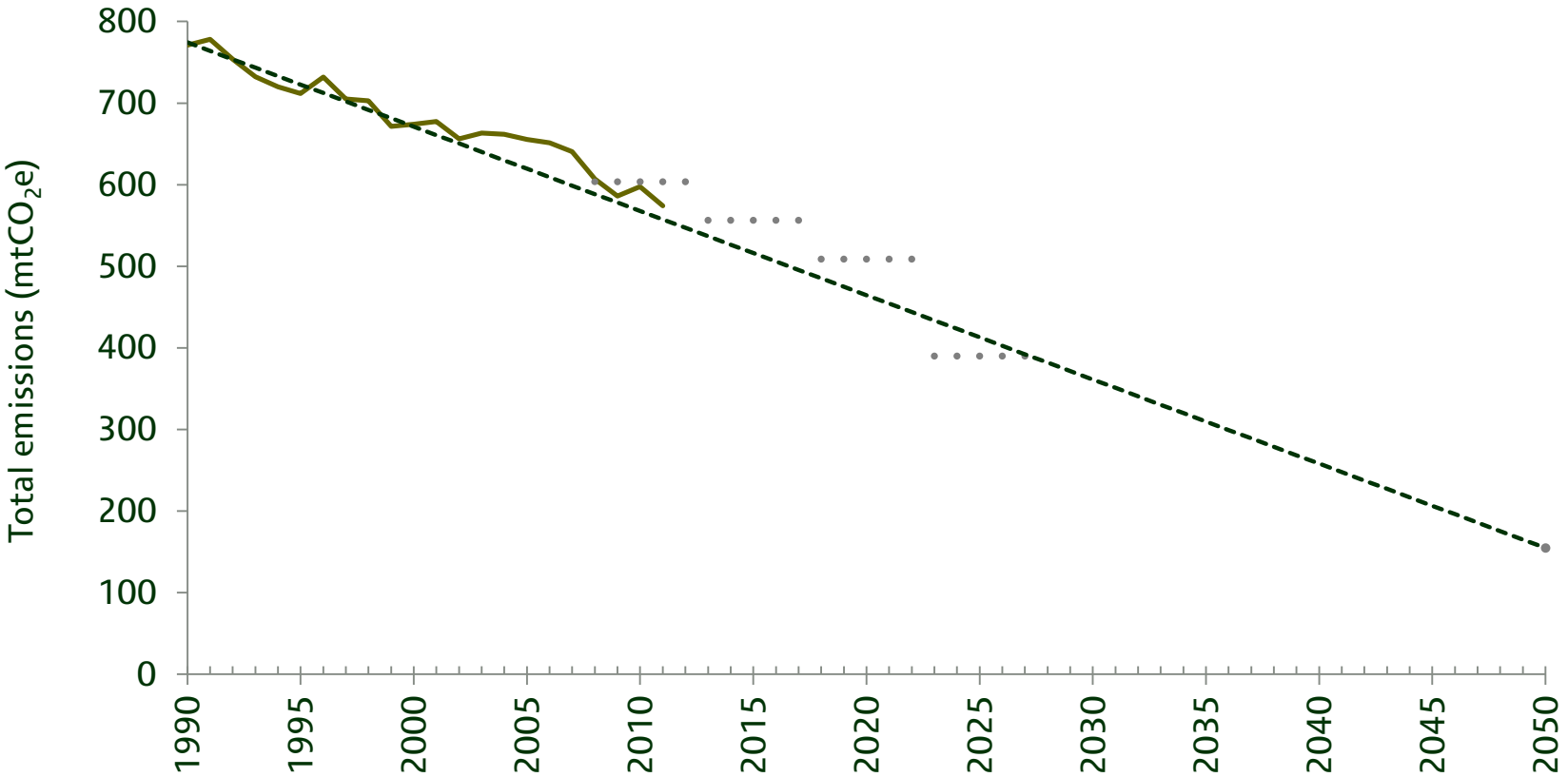
- Objectives for Policy.
- Theory.
- Current policy in the UK.
- An improving reform to household policy.
- Distributional effects.
- Potential compensation package.

Objectives for policy

Key objective for environmental taxation

- Reduce CO_2e emissions in line with our targets.
  - Target to reduce emissions by 80% relative to 1990 levels by 2050.

Getting to the 2050 target – UK carbon budgets



Source Advani et al. (2013a), Figure 2.1

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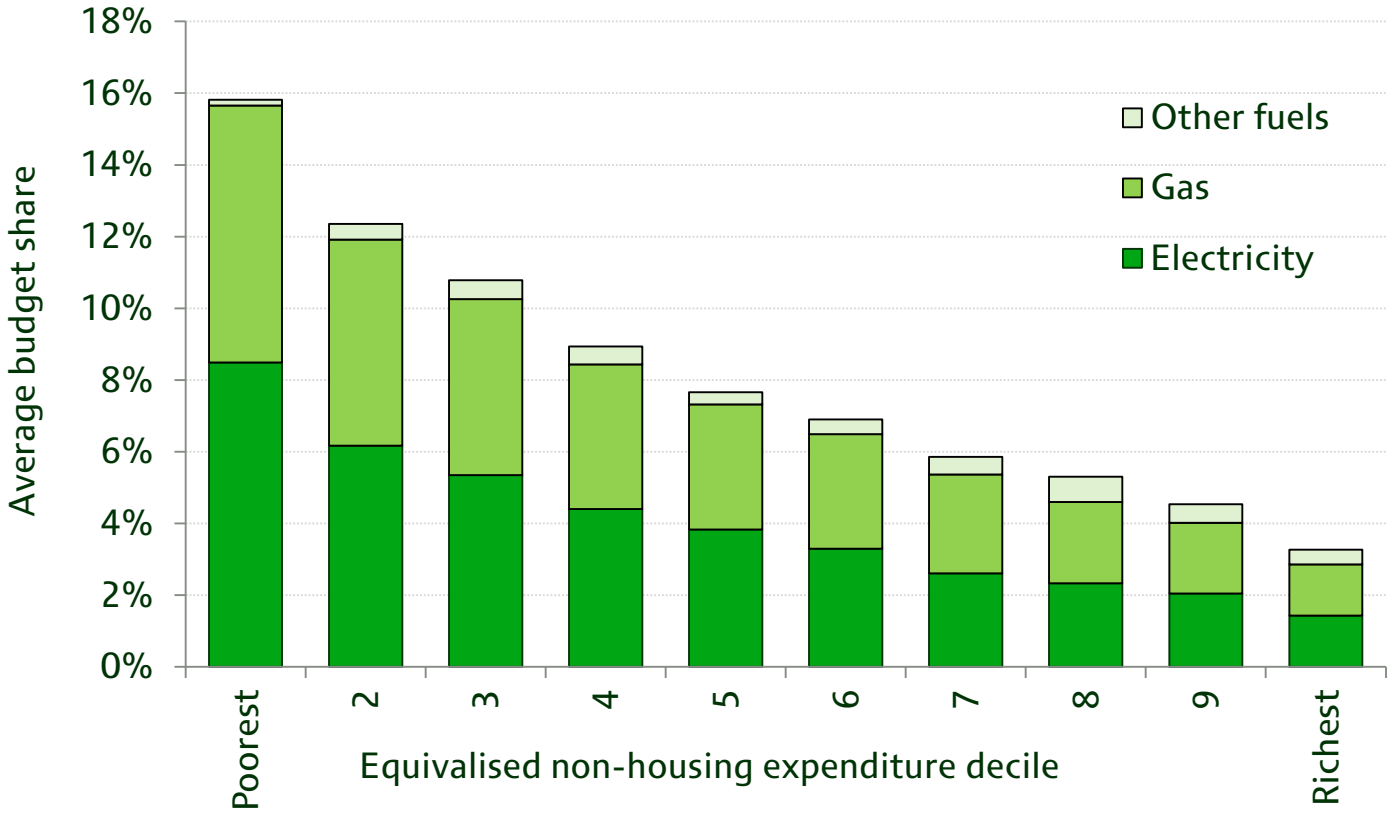
Key objective for environmental taxation

- Reduce CO_2e emissions in line with our targets.
  - Target to reduce emissions by 80% relative to 1990 levels by 2050.

- Want to achieve this whilst:
  - Maintaining energy security.
  - Avoiding negative distributional consequences.
  - Minimising “carbon leakage”.

Distribution of energy budget shares



Source Advani et al. (2013b), Figure 3.6

- Energy makes up 16% of spending for poorest 10%; 3% of spending for richest 10%.

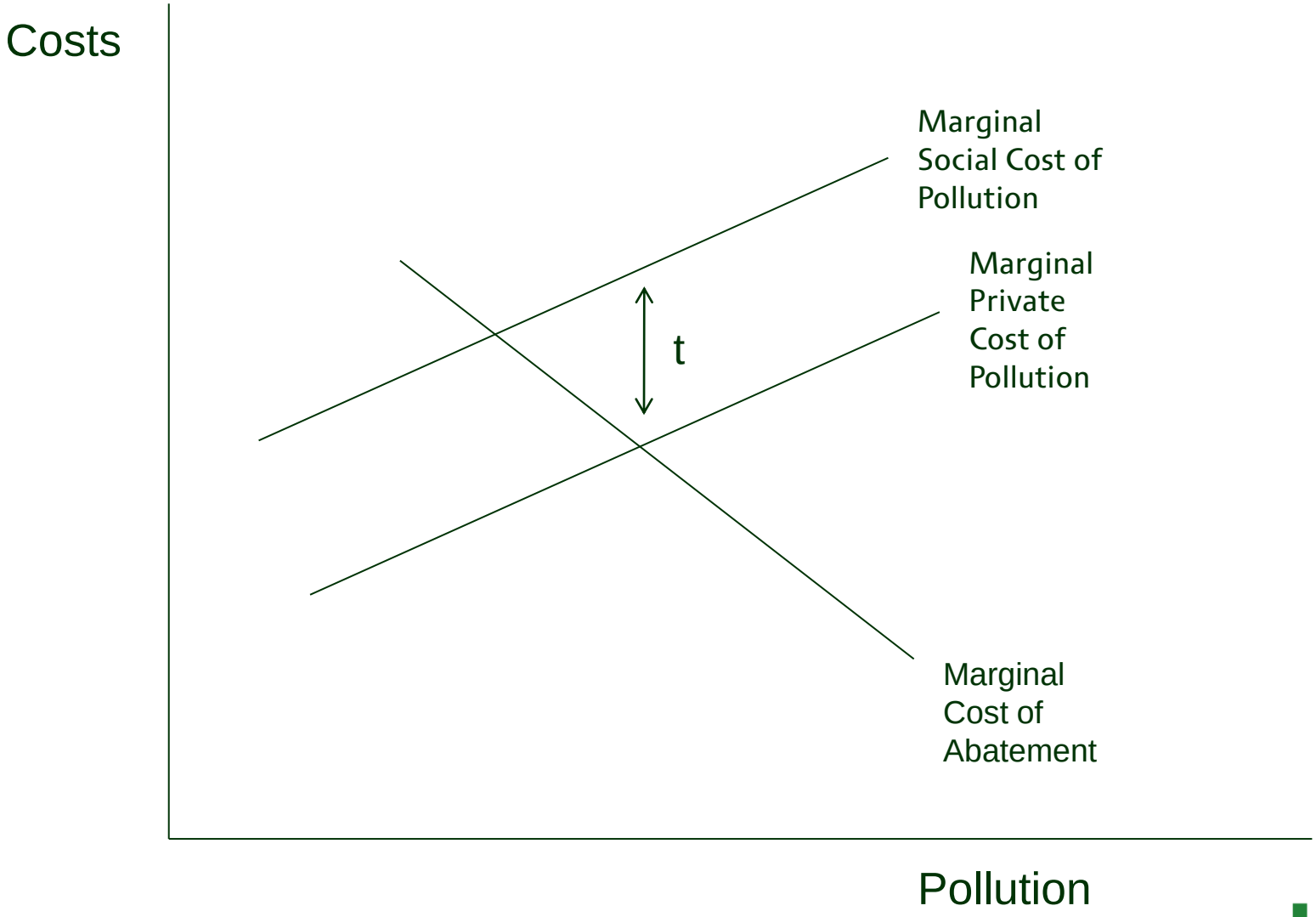
Theory

Correcting Externalities (1)

- Externalities.
  - Costs or benefits from an activity borne by third parties which are not reflected in prices.
  - Lead to misallocation of **resources** e.g. overconsumption of a ‘bad’.

- Pricing the externality can internalise these costs.
  - Decentralised way to achieve the optimal allocation.
  - Can lead to a welfare gain.

Correcting Externalities (2)



Other imperfections

- Principle of Targeting.
  - If we have other objectives or constraints, where possible it is better to tackle them through well-targeted instruments.
  - If you use one instrument to target two objectives, may not achieve either...

- Lots of policy options for dealing with other objectives and constraints.
  - Taxes.
  - Permits.
  - Regulation.
  - Subsidising abatement or alternatives.

Current policy in the UK

Current UK policy

- These can be broadly defined in four categories:

1. Policies to price carbon.
2. Policies to support renewables.
3. Policies to support energy efficiency improvements.
4. Policies to support domestic energy bills.

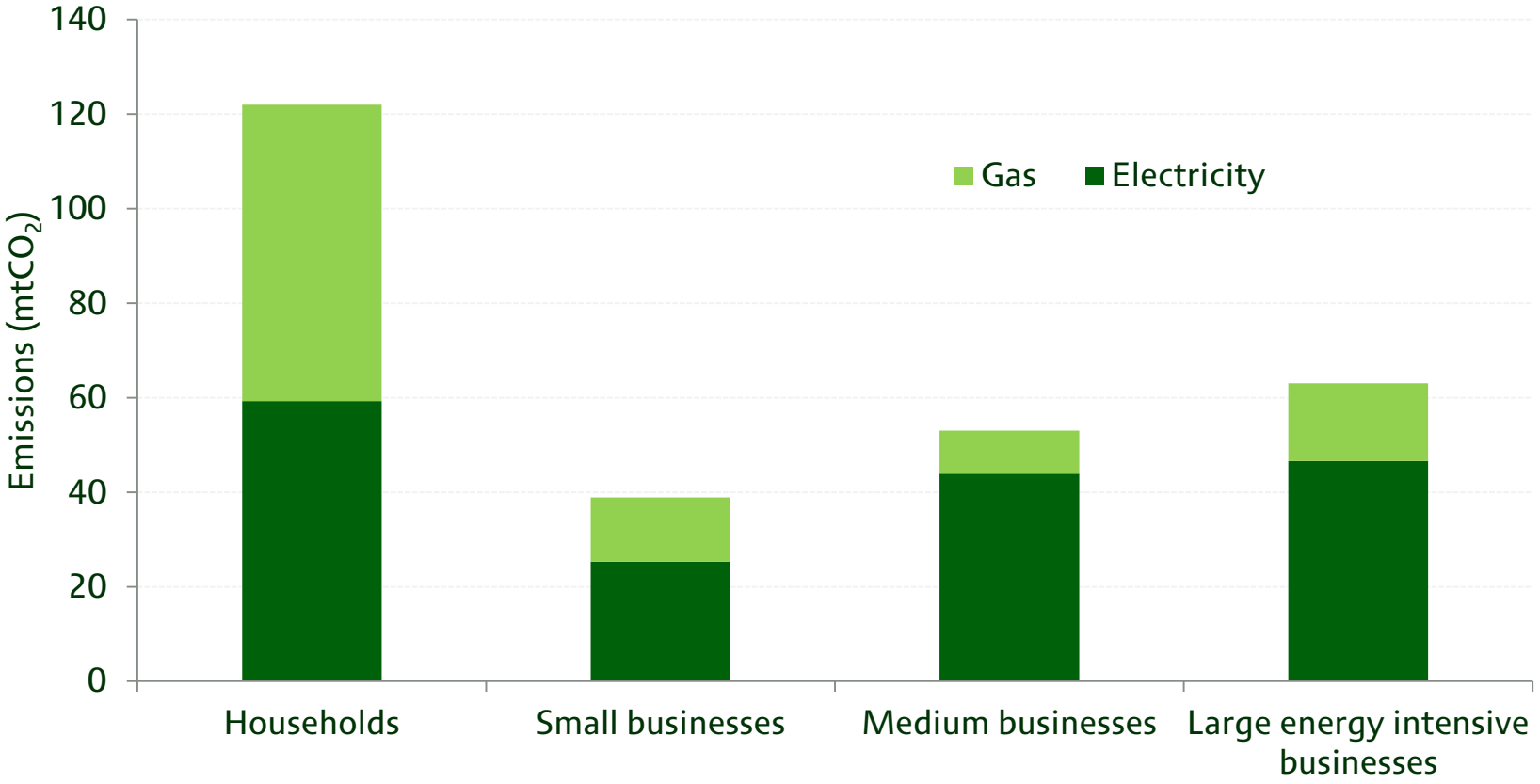
What do these policies mean for carbon prices?

- We calculate implicit carbon prices in 2013 and 2020.

- Two fuels:
  - Electricity.
  - Gas.

- Four end-users:
  - Households.
  - Small businesses.
  - Medium businesses.
  - Large energy-intensive businesses.

Emissions produced by each end-user in 2012



Source: Advani et al. (2013a), Figure 6.1

- For comparison, total UK emissions in 2012 were 572MtCO_2e.

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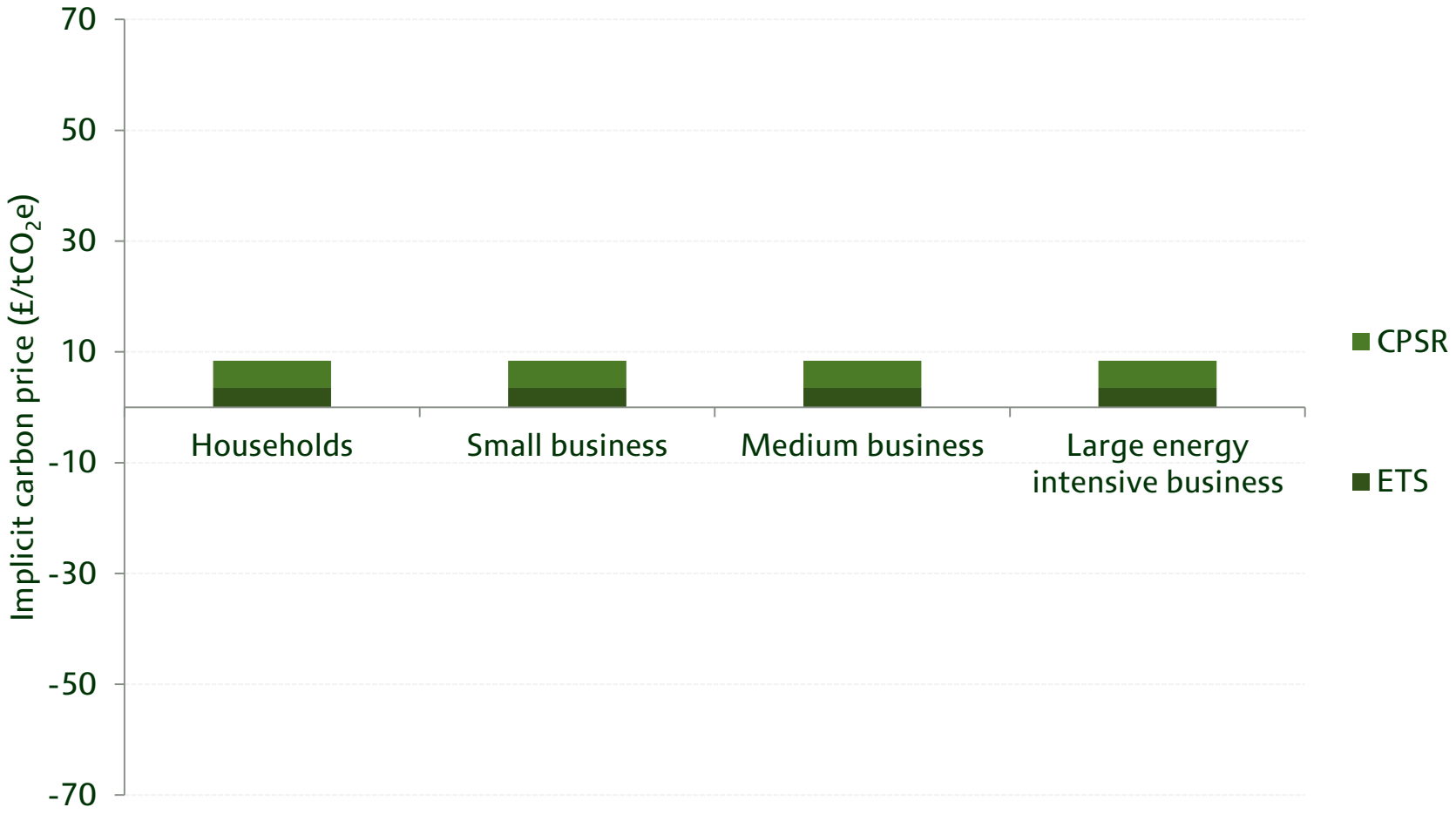
Which policies affect carbon price for different end-users?

	Households	Small business	Medium business	Large energy-intensive business
Electricity	EU ETS CPSR RO FITs WHD ECO VAT subsidy	EU ETS CPSR RO FITs CCL	EU ETS CPSR RO FITs CCL CRC	EU ETS CPSR RO FITs CCA
Gas	WHD ECO VAT subsidy	CCL	CCL CRC	EU ETS CCA

Calculating carbon prices

- We take estimates for the impact of each policy on energy prices
- These impacts are converted into an implicit price for a tonne of carbon dioxide equivalent
- This varies across fuels due to differences in carbon content.
  - Gas is currently less carbon intensive than electricity
- For gas, we use the carbon content of domestic gas
- For electricity, we use the long run marginal emissions factor

Implicit carbon prices for electricity, 2013



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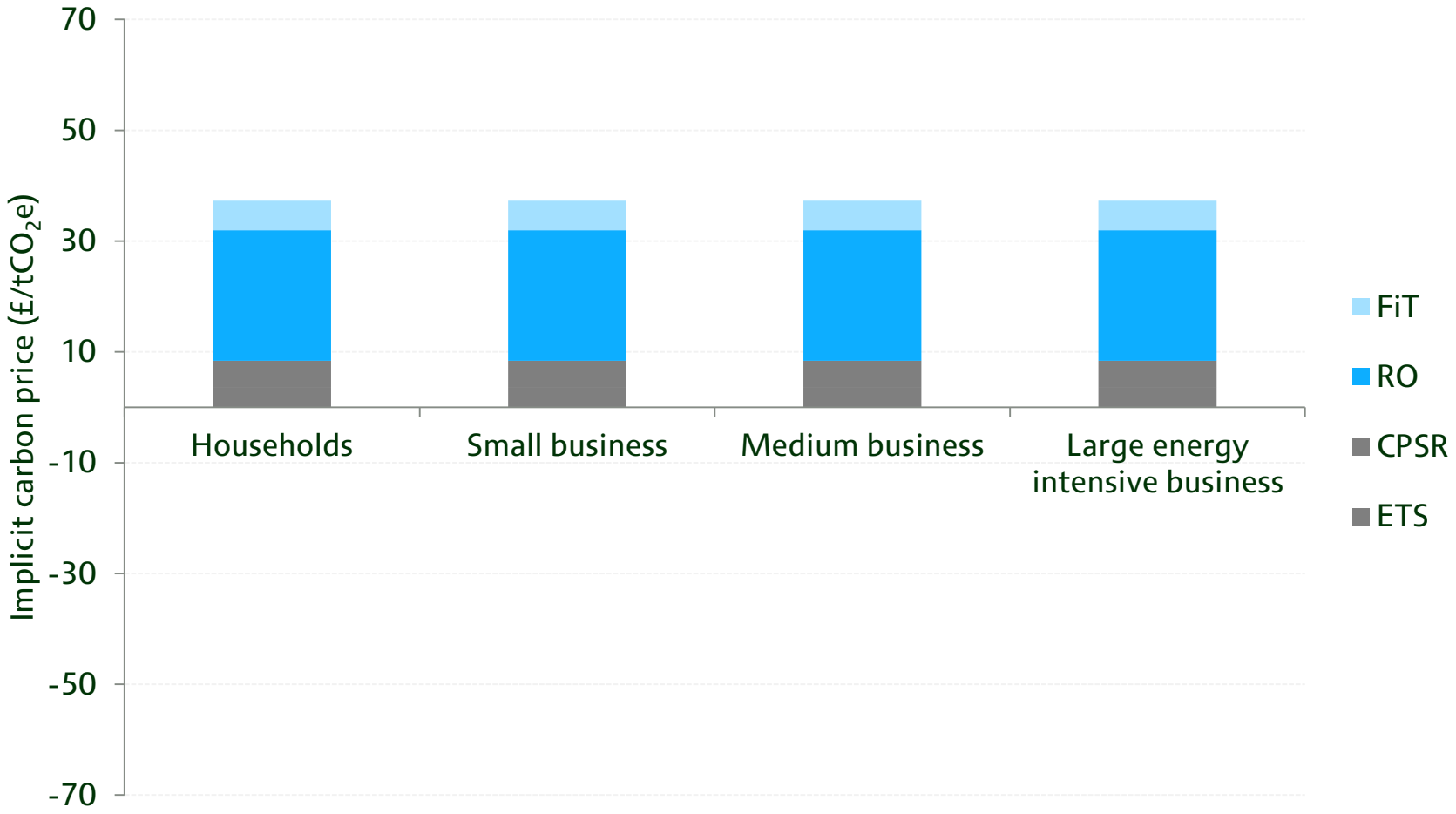
Implicit carbon prices for electricity, 2013



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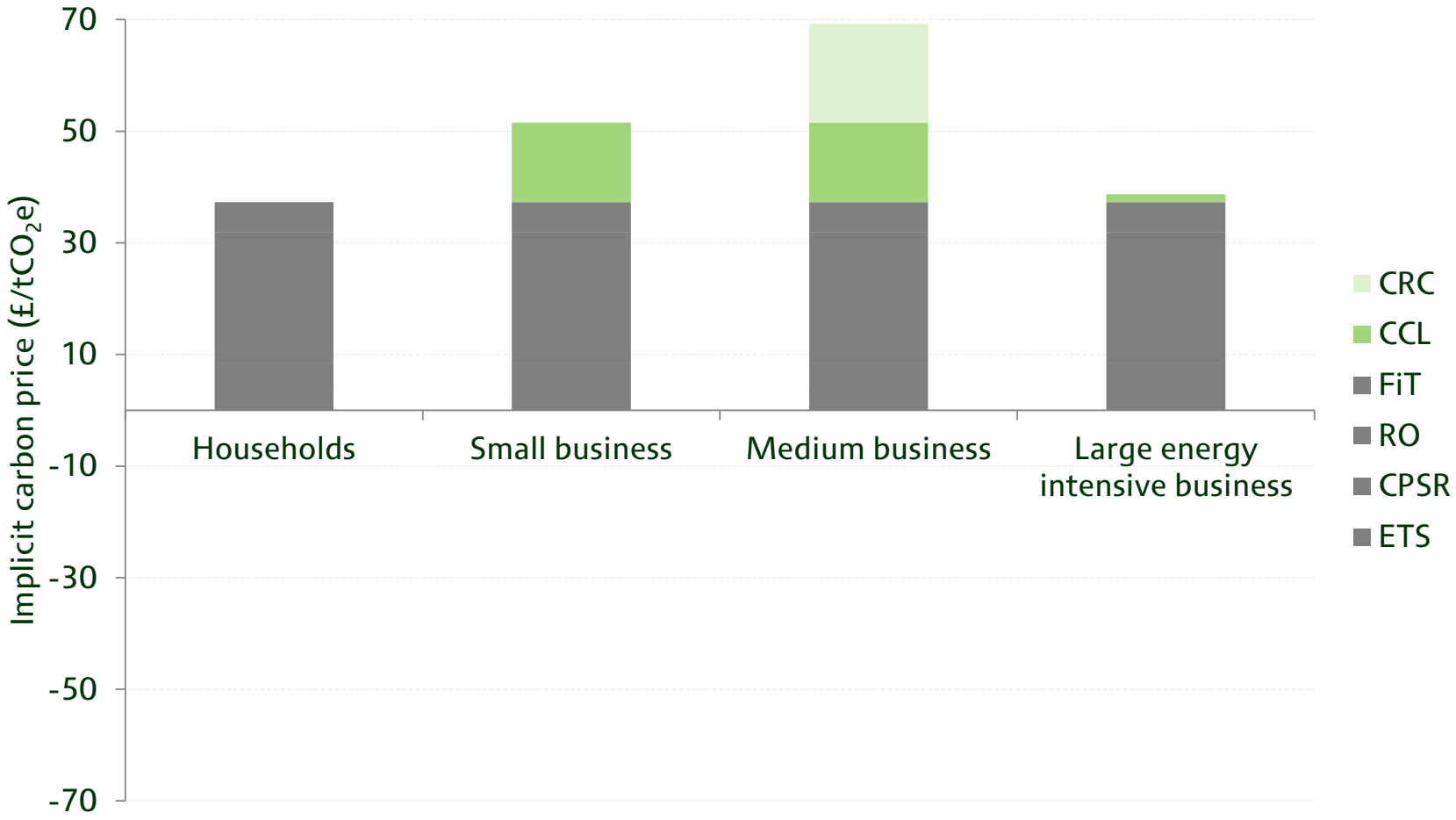
Implicit carbon prices for electricity, 2013



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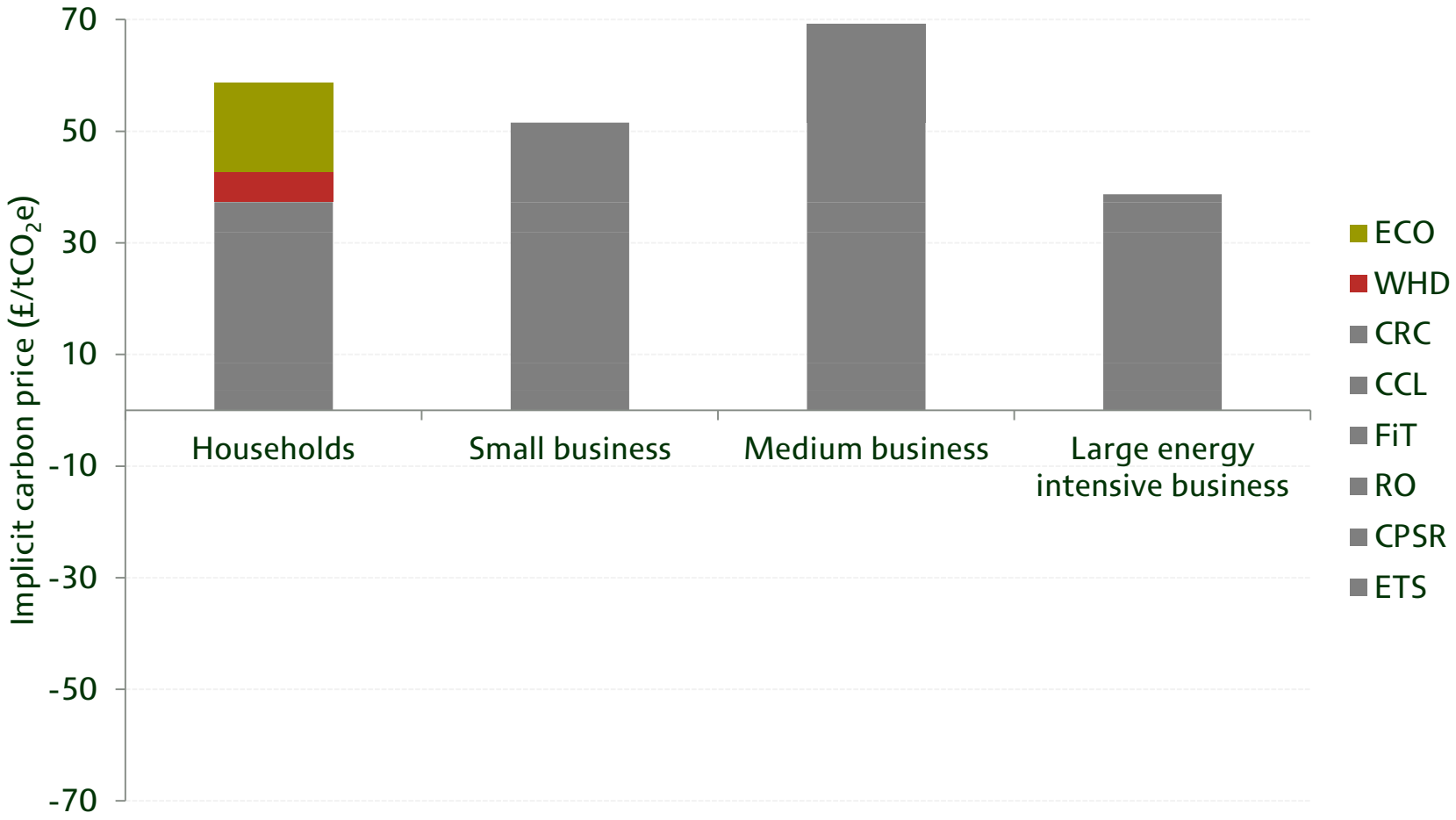
Implicit carbon prices for electricity, 2013



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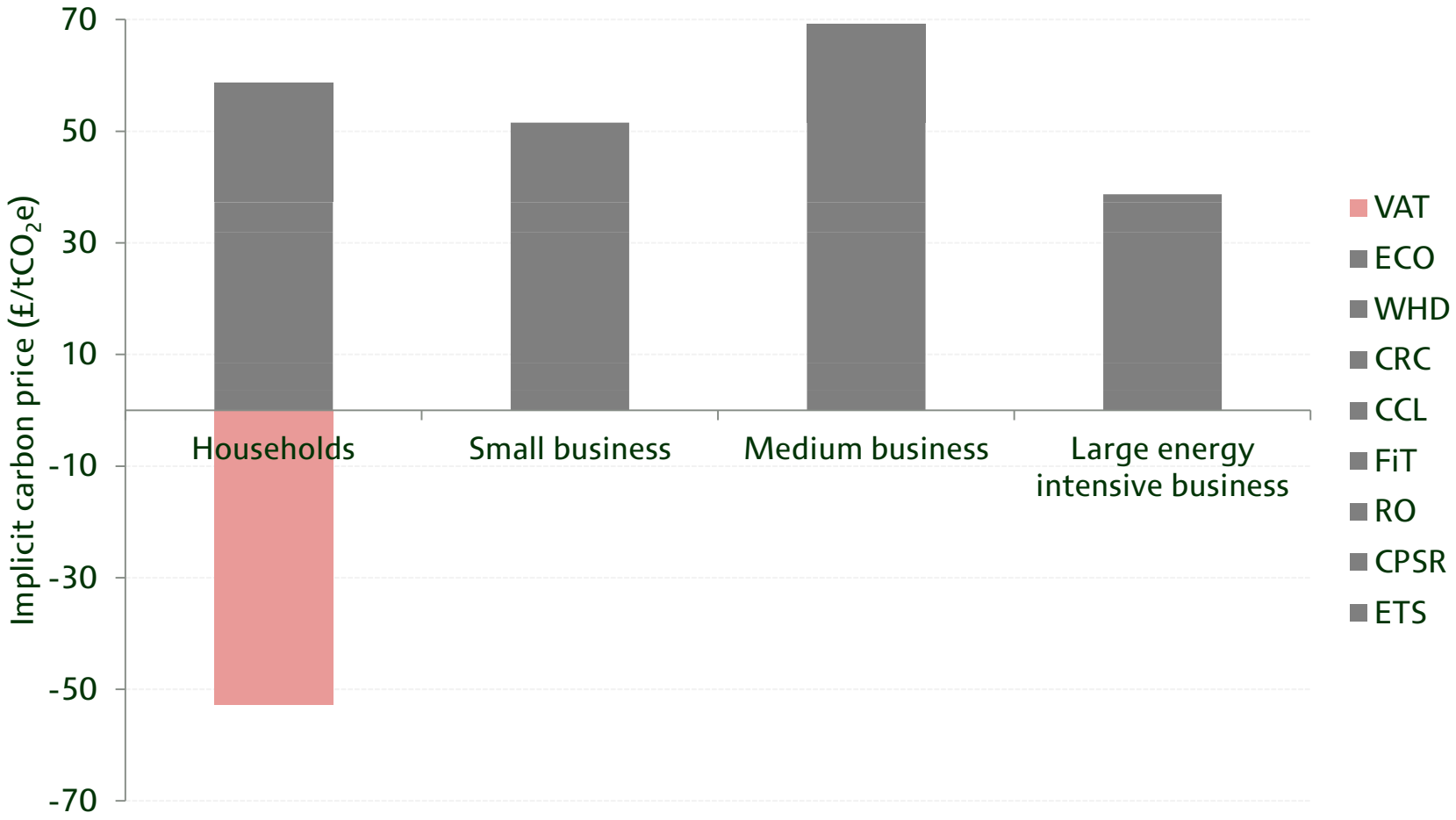
Implicit carbon prices for electricity, 2013



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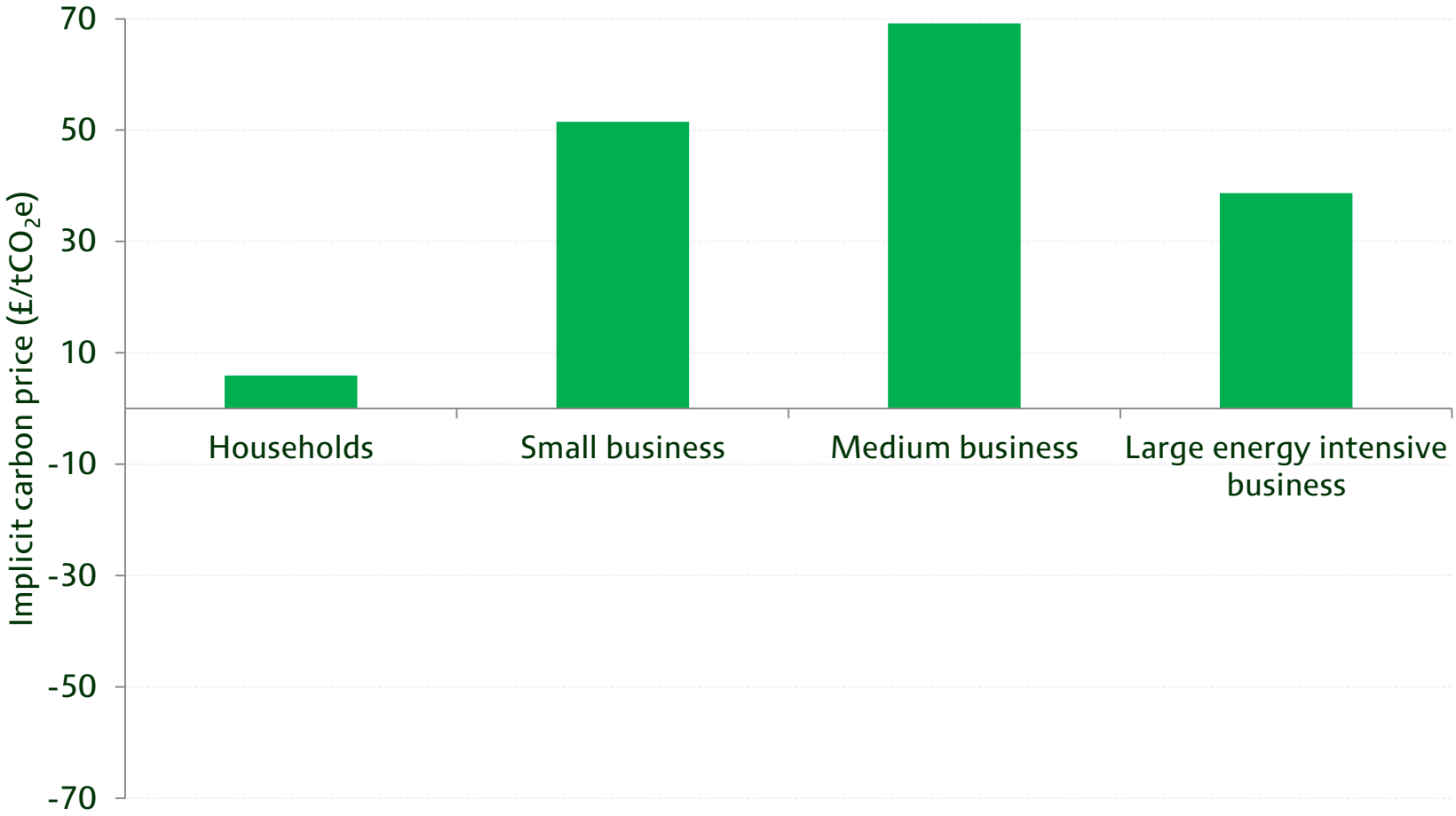
Implicit carbon prices for electricity, 2013



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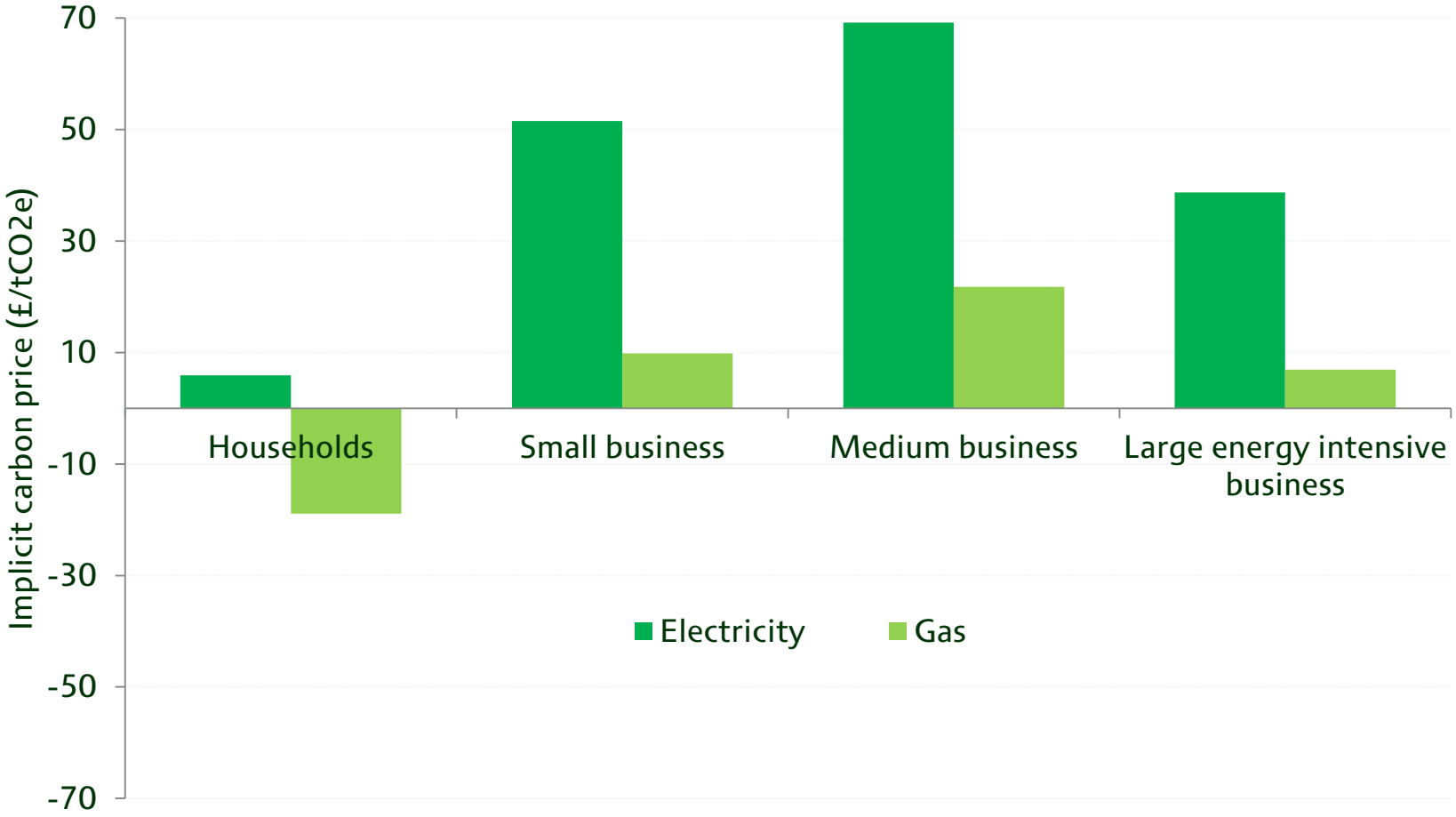
Implicit carbon prices for electricity and gas, 2013



Source Advani et al. (2013a), Figure 6.4

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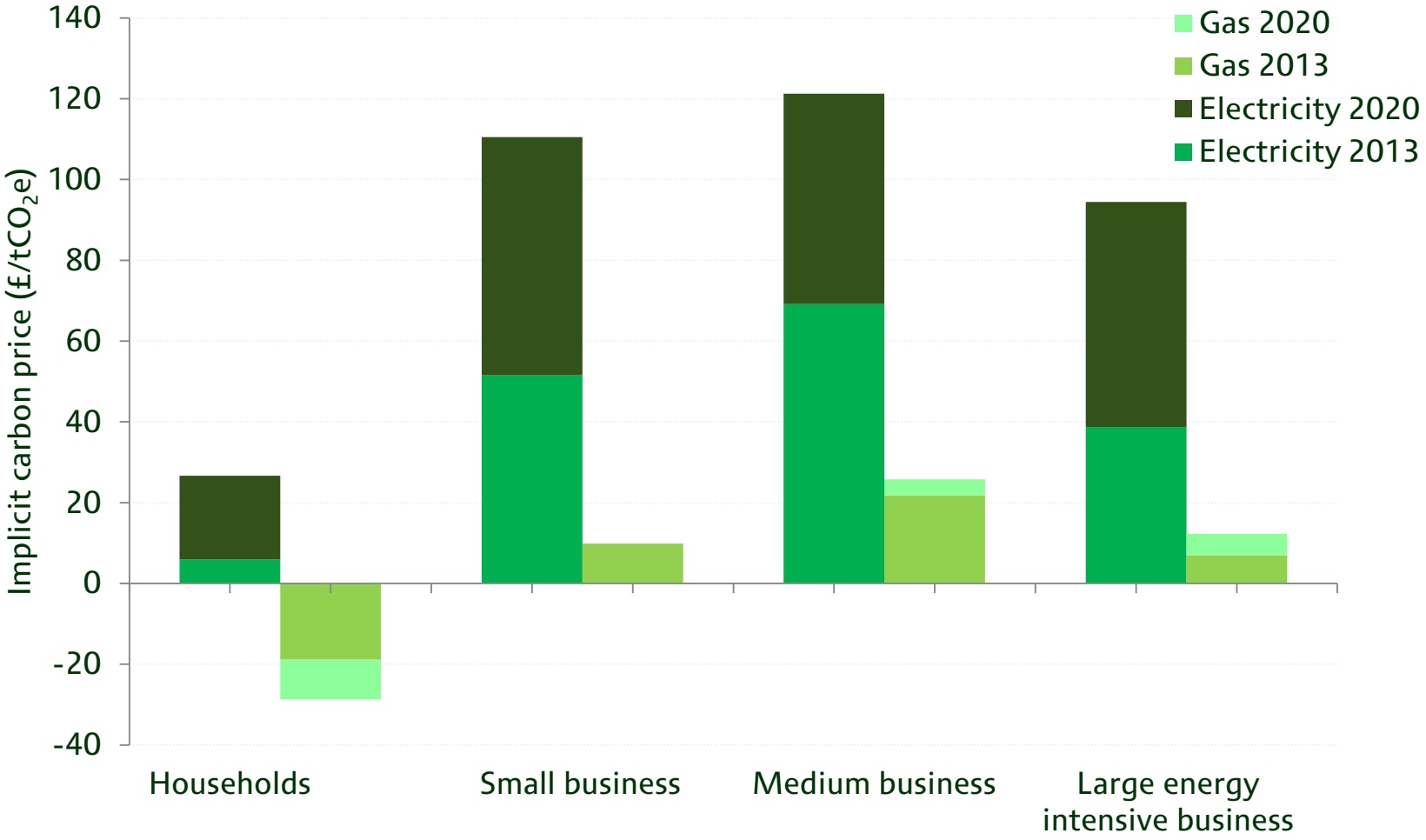
The size of the implicit VAT subsidy

- The carbon content of a fuel depends on the quantity burned
  - Prices on quantity of fuel used can be a reasonable proxy for a carbon price
- The size of the VAT discount doesn't vary with the *quantity* of fuel, but with the *price* of the fuel
- This makes it hard to predict the size of the subsidy in a given year, as this depends on the retail price of the fuel that year
  - If prices rise, the rise of the subsidy will also increase
- Hence the VAT subsidy adds significant complication and uncertainty to the carbon price, as well as making it uneven

Implicit carbon prices in 2013 and 2020



Source Advani et al. (2013a), Figure 6.5

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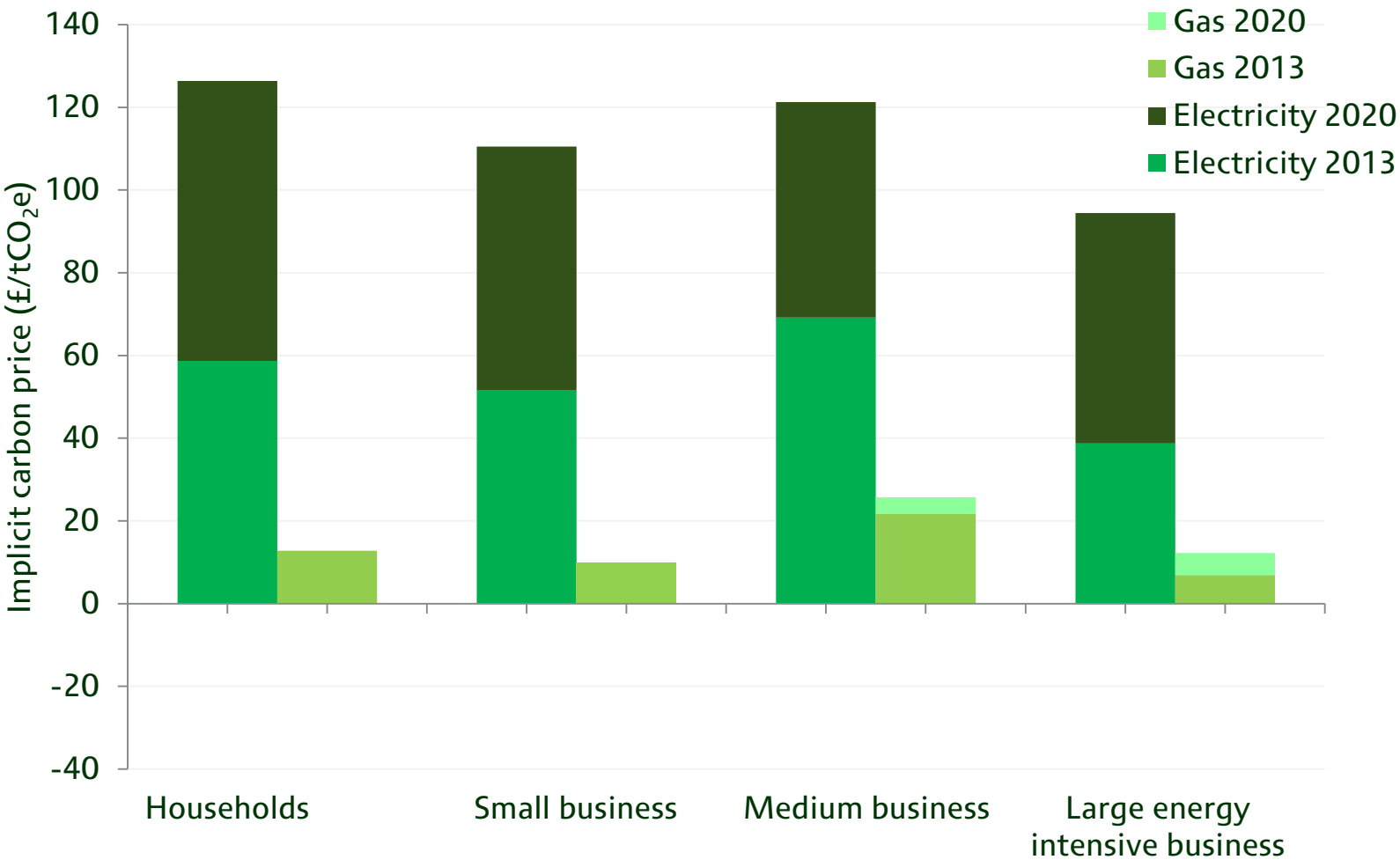
Implicit carbon prices in 2013 and 2020 (excluding the VAT subsidy)



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An improving reform to household policy

Potential reform to carbon prices

- DECC publish an estimated "non-traded carbon price" consistent with meeting the government's carbon emissions reduction targets.
  - For 2013 this "target price" is £59/tCO_2e.

- Potential reforms to bring household price close to target:
  - Introduce a gas tax of 0.8p/kWh (average retail price is 4.8p/kWh).
  - Introduce full rate VAT on both electricity and gas.

Implications - initial

- Price rises similar to those seen in recent years...
  - Electricity prices rose by 15% between August 2011 and May 2013.
  - Gas prices rose by 33% between November 2010 and May 2013.

- ...But, can use the revenue raised to provide compensation.

- If one assumes no change in energy demand, this raises £8.3 billion.
  - For comparison, the OBR estimates energy-related taxes raised £3.0 billion in 2012-13.
  - This is composed of CCL, EU ETS, CRC, RO, FITs, WHD.

Implications – short term

- Price rise reduces household demand.
  - Around 4% for electricity.
  - Around 10% for gas.
- Also raises average bills by £300.
- Expect to raise £7.5 billion accounting for this.
- Emissions to fall by eight million tonnes of CO_2e per year.
  - 1.4% of total annual UK emissions.

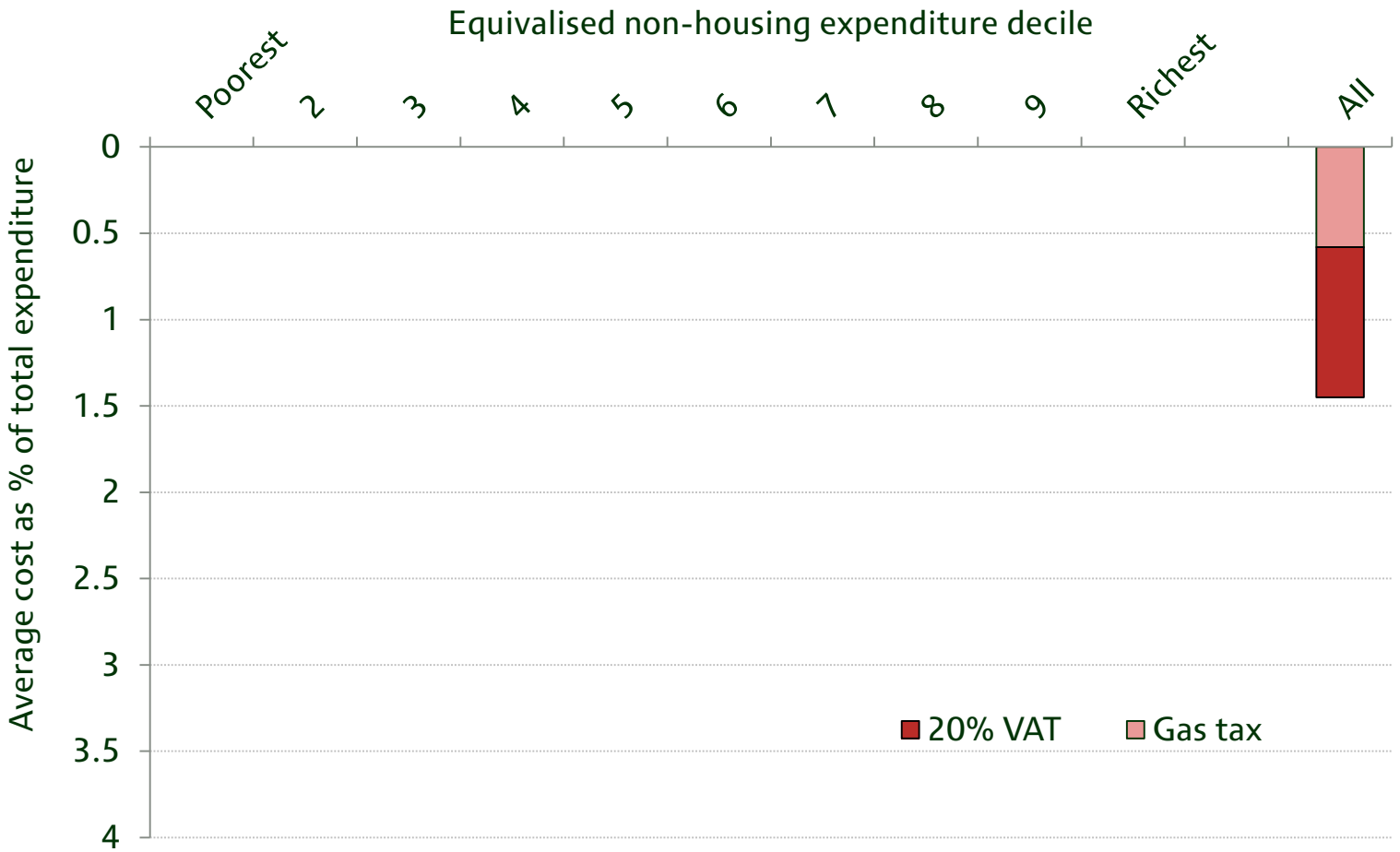
Implications – long term

- Over longer horizon people will replace boilers and other appliances.
  - Some replacement would happen anyway...
  - ...but higher energy prices encourage both production and take-up of more efficient models than without this.

- Expected saving of 22 million tonnes of CO_2e per year.
  - 4% of total annual UK emissions.
  - Worth around £1 billion a year.

Distributional effects

Average effects without compensation



- Policies add an additional 1.5% to average total expenditure.

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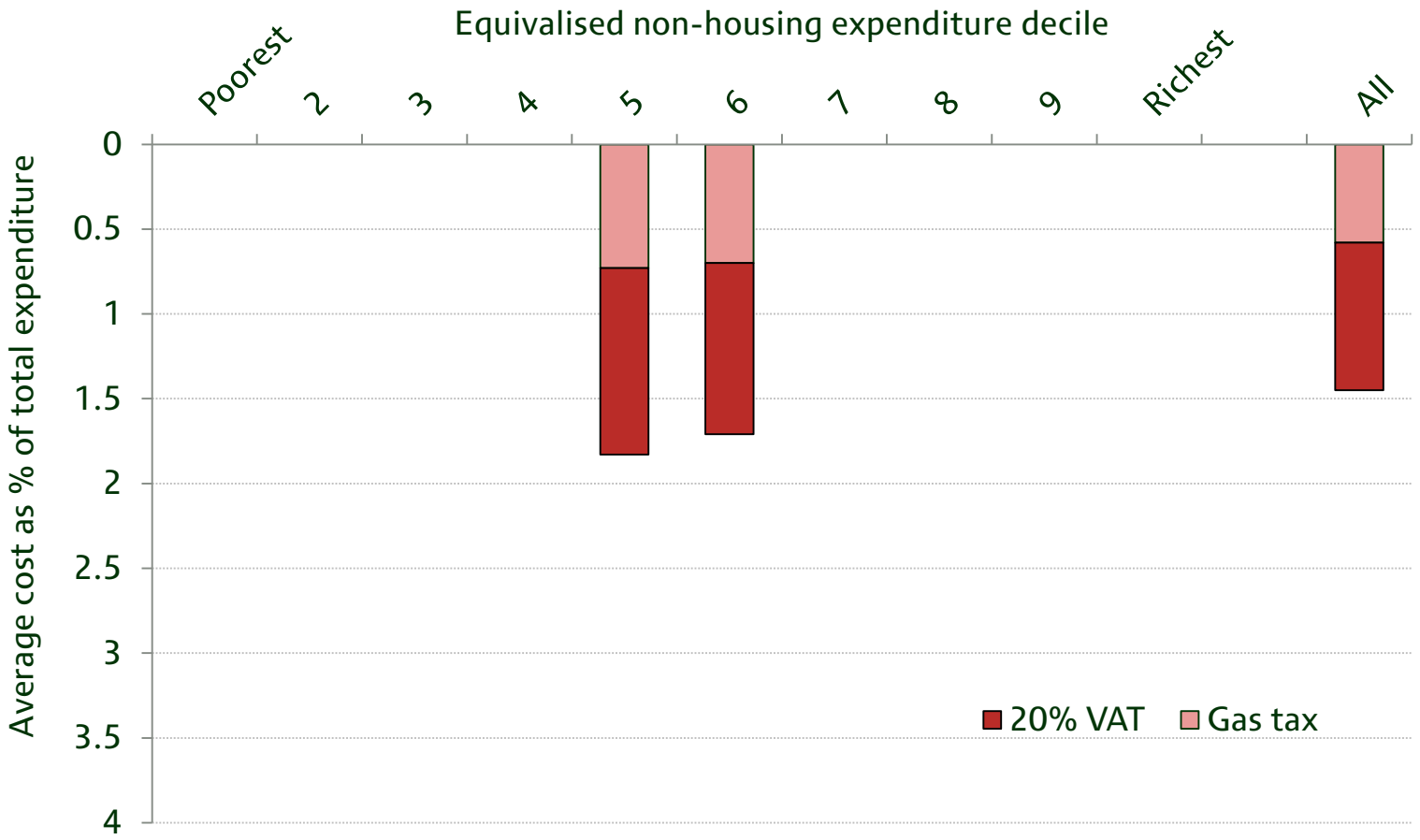
Distributional effects without compensation



- Combined reform adds around 1.8% to middle of distribution.

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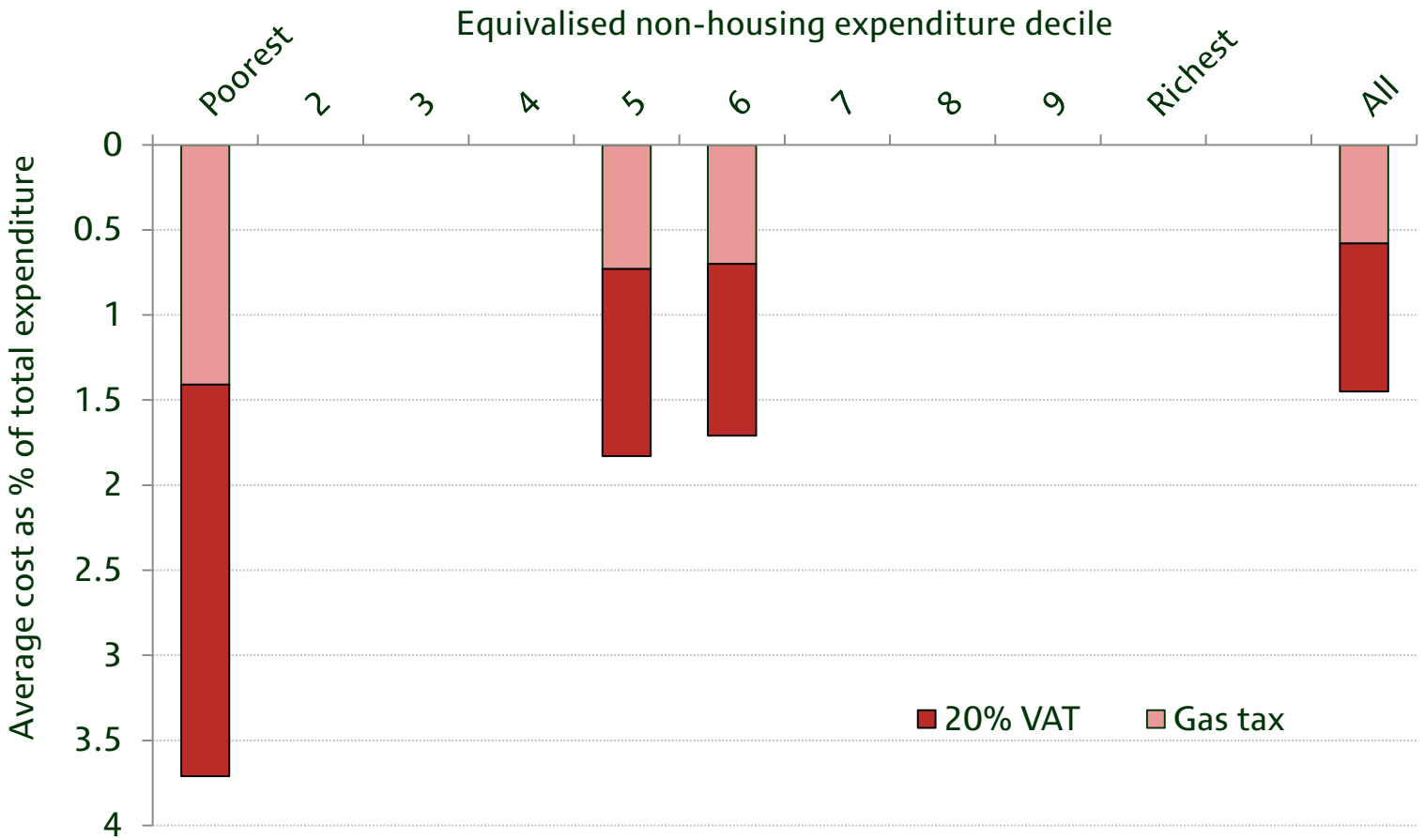
Distributional effects without compensation



- Combined reform adds around 3.7% to bottom 10% of households.
- Energy is large share of budget for these households.

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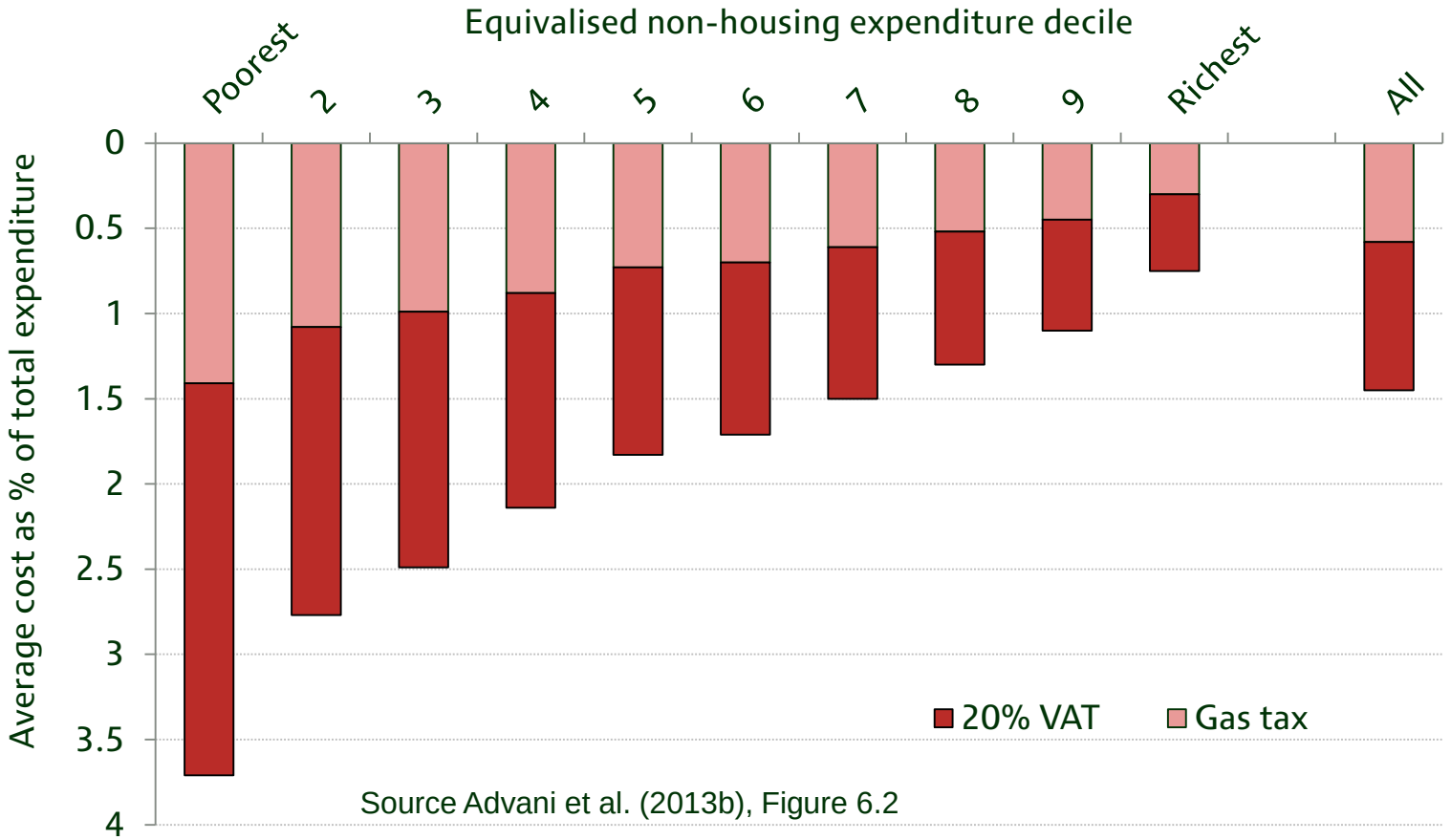
Distributional effects without compensation



Source Advani et al. (2013b), Figure 6.2

- In absence of compensation, reform is 'regressive' in the sense that poorer households pay more as a share of expenditure.

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Potential compensation package

Compensation for inflation

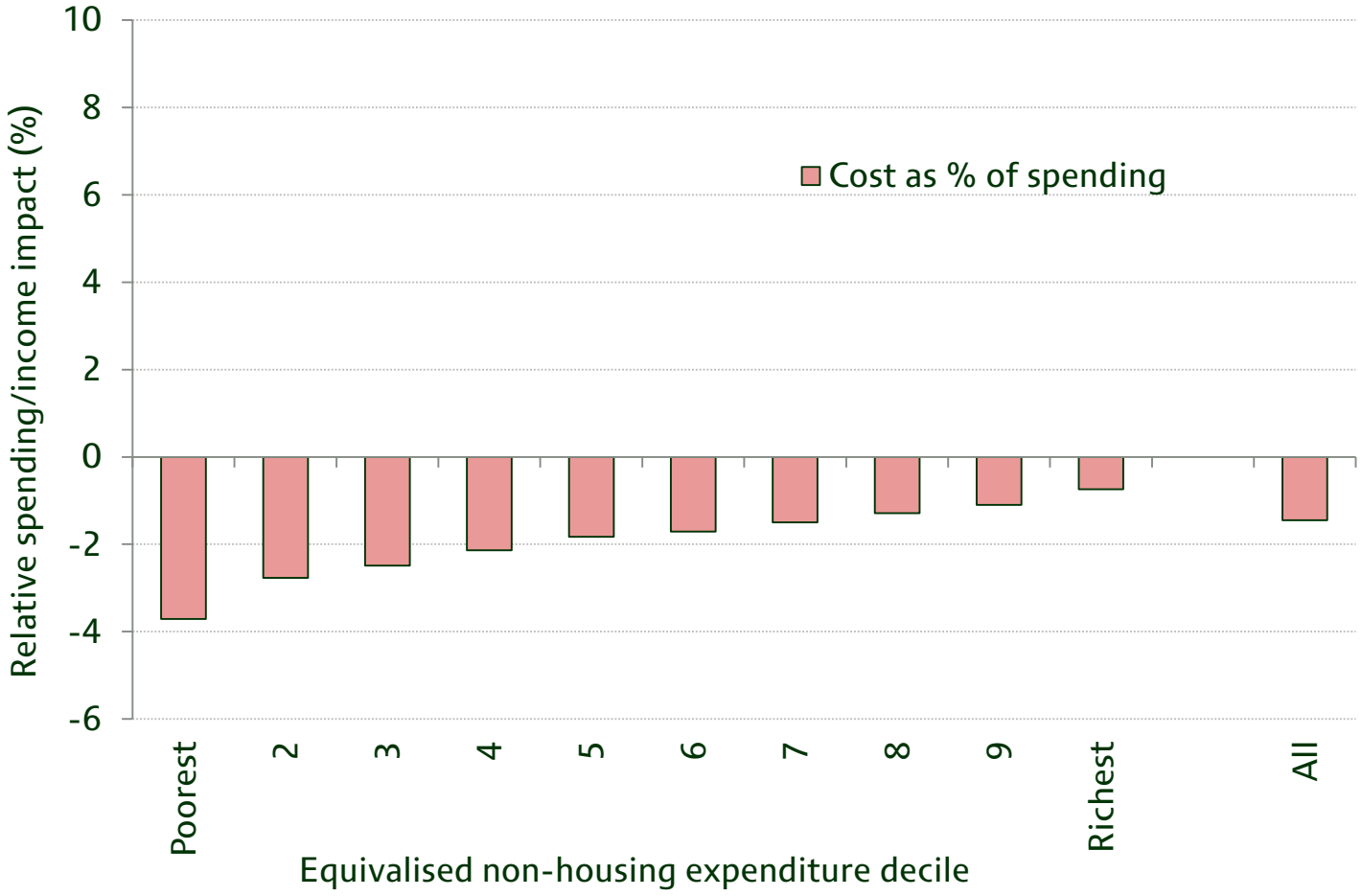
- These price increases therefore feed through noticeably to inflation (one-off effect).
  - CPI inflation rises by 1.2 percentage points.
- There is a degree of “automatic compensation” that comes from uprating of tax and benefit thresholds.
  - Estimated cost of this is £2.6 billion.
- Since energy makes up much larger share of budget for poorer households, even after this change they are most likely to be worse off.

Additional compensation for poorer households

- We increase the size of some means-tested benefits, to provide compensation.
  - This reform is illustrative and broadly revenue neutral (spend £7.2 bn).
  - Many alternatives are available depending on distributional priorities.
  - We consider a strongly progressive option, to see how well one could compensate poorer households if that were the aim of policy.

- Groups targeted:
  - Poor pensioners.
  - Unemployed.
  - Low-income employed.
  - Individuals receiving disability benefits.

Average effect by decile



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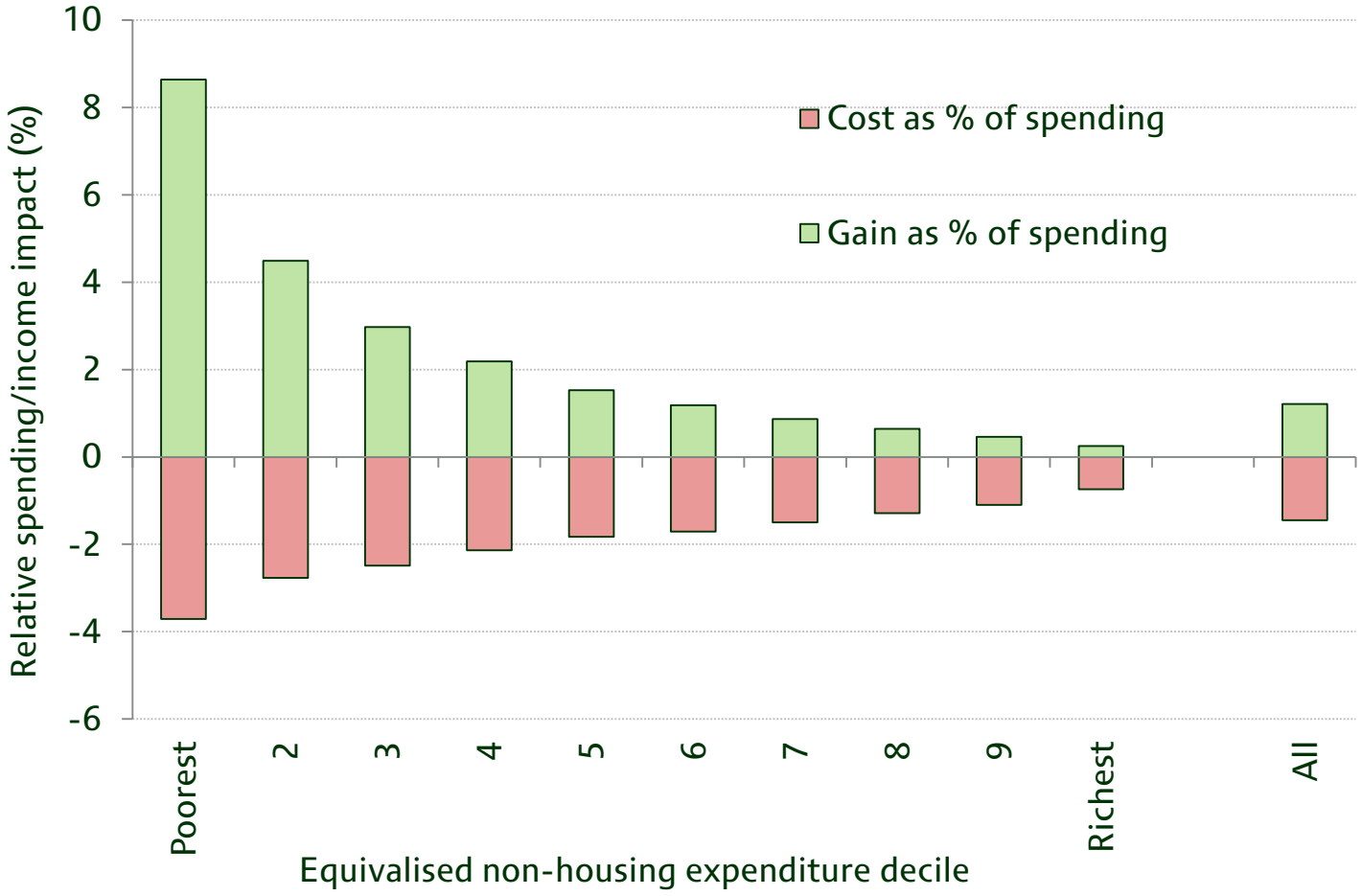
Average effect by decile



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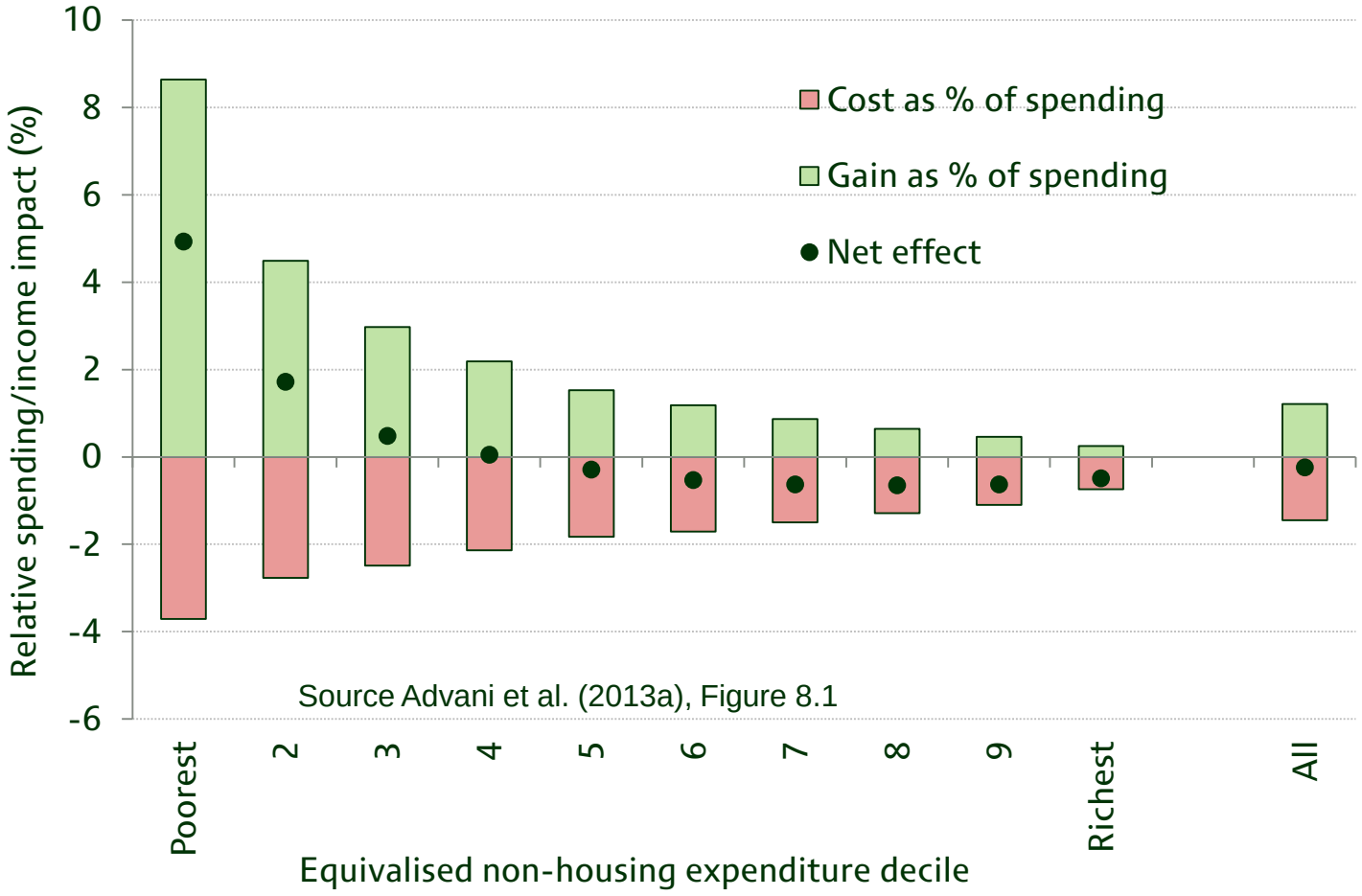
Average effect by decile



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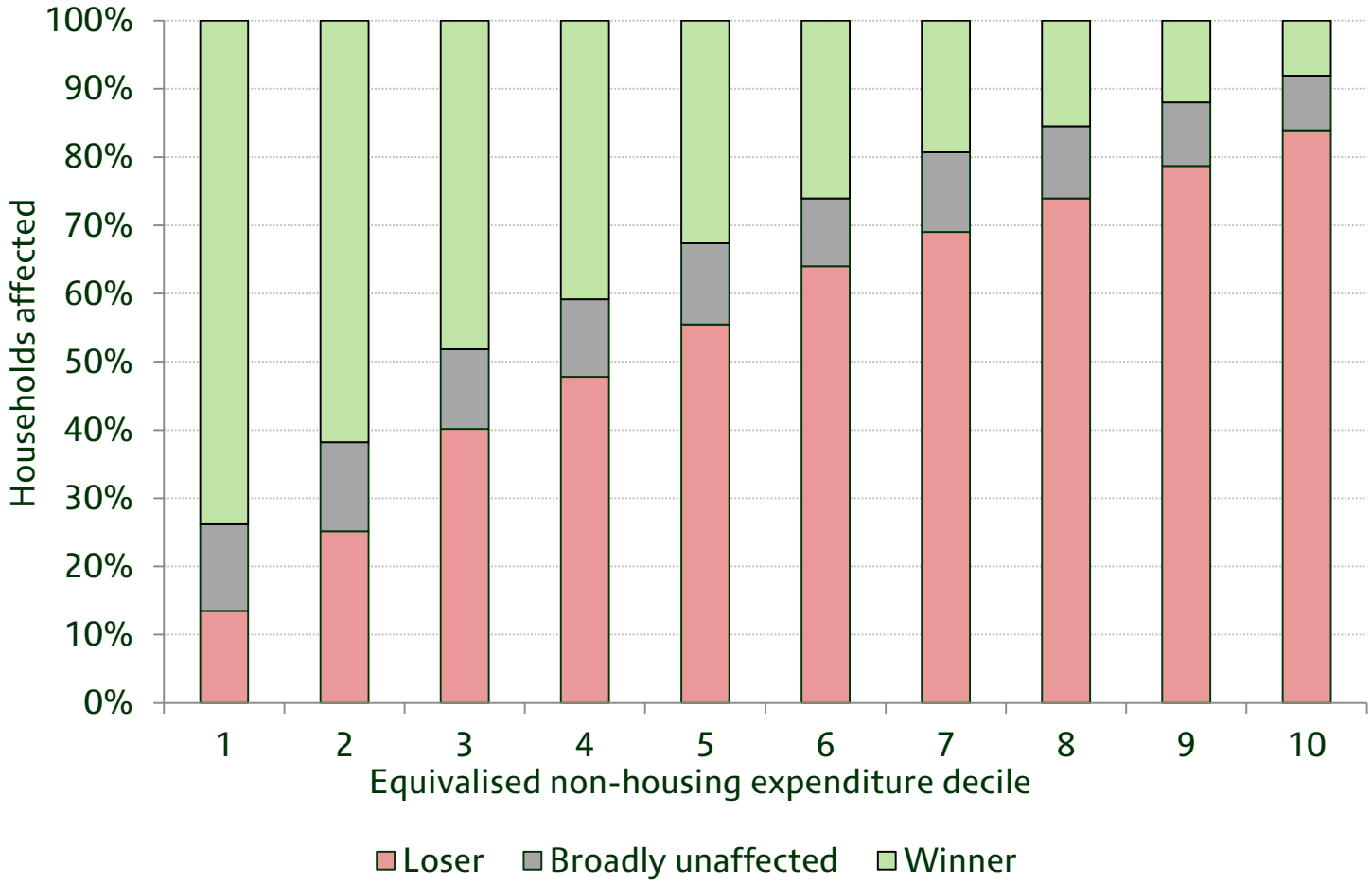
Within-decile variation



Source: Figure 8.2 of "**Energy use policies and carbon pricing in the UK**"

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Potential compensation - conclusions

- It is possible to harmonise household carbon prices whilst compensating poorer households *on average*.

- Within poor households there is significant variation.
  - Those who consume relatively large amounts of energy will still be worse off.

- Reform shown is illustrative.
  - Precise implementation depends on a government's distributional preferences.
  - We target poorer households particularly.
  - Also need to consider the interaction with work incentives.

Conclusion

Conclusion

- Energy use policy is currently incoherent, inefficient *and unstable*.
  - This comes from having multiple conflicting objectives.
  - However, not clear we are tackling these in the best way.

- Have shown it is possible to introduce reforms which rationalise the price and compensate most of those with low incomes.
  - Whilst reforms can be progressive on average, can't ensure *every* low income household is compensated.

- This would reduce emissions substantially at no additional economic cost.

Further Reading

- Advani, A., Bassi, S., Bowen, A., Fankhauser, S., Johnson, P., Leicester, A., and Stoye, G. (2013a) *Energy use policies and carbon pricing in the UK*, IFS Report R84 *http://www.ifs.org.uk/publications/6915*
- Advani, A., Johnson, P., Leicester, A., and Stoye, G. (2013b) *Household energy in Britain: A distributional analysis*, IFS Report R85 *http://www.ifs.org.uk/publications/6916*
- Stern, N., (2006), *The Economics of Climate Change: The Stern Review*, Chapter 2
- Fullerton, D., Leicester, A., and Smith S., (2010), *Mirlees Review: Dimensions of Tax Design,* Chapter 5 Environmental Taxes
- McKay, D., *Sustainable Energy - Without the Hot Air,* 2009 *http://www.withouthotair.com/*