



Institute for
Fiscal Studies

Energy use policies and carbon pricing in the UK

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Outline of the talk

1. Economic principles for energy use policies
 - Objectives of policies
2. Efficient policy for reducing emissions
 - Efficient policy instruments
 - Uniform carbon prices
 - Why might we allow carbon prices to vary?
3. Current UK policy landscape
4. Carbon prices in the UK

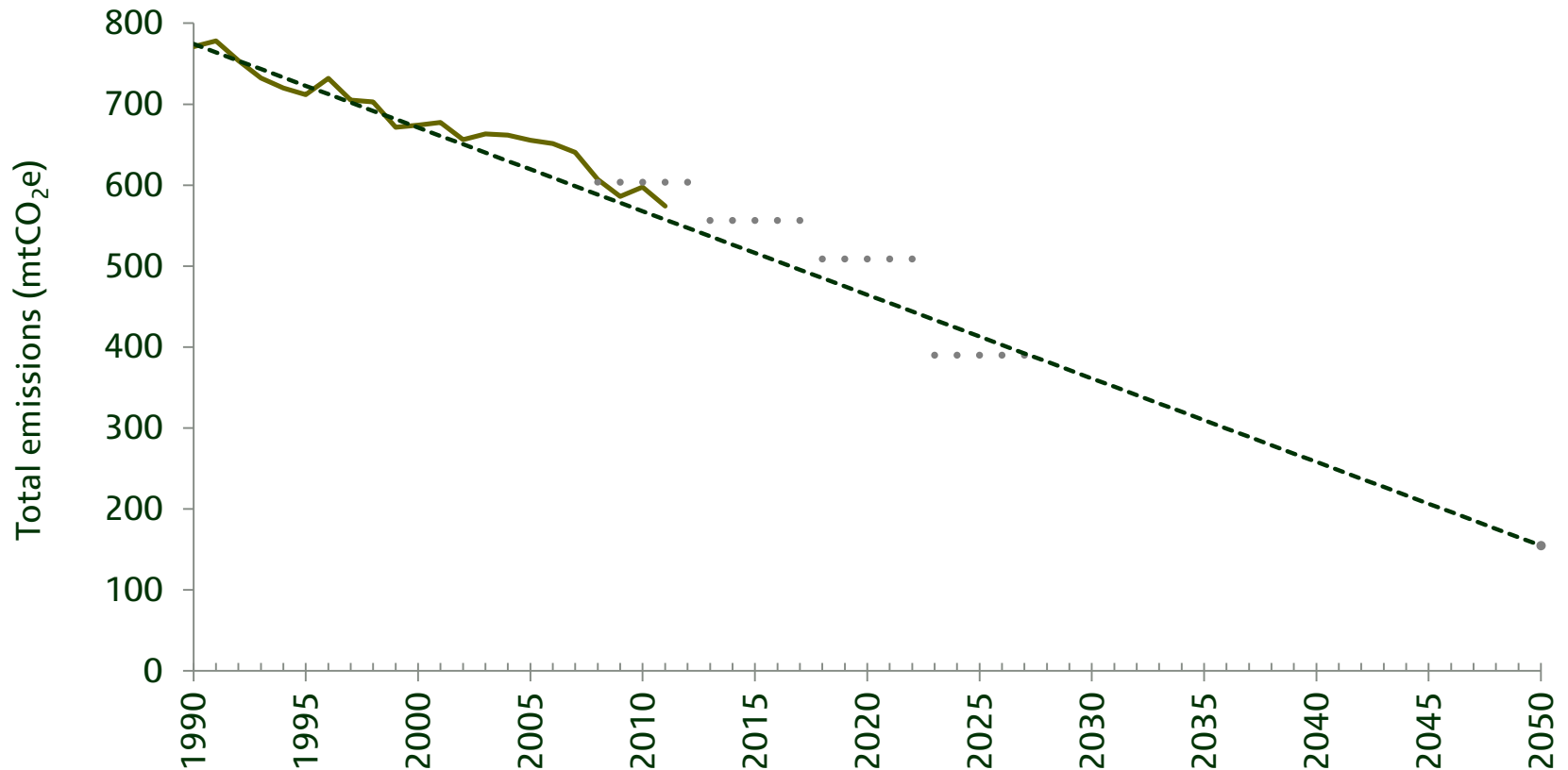
Objectives relating to energy use policies

- The government has three main objectives for energy policies:
 1. Reducing greenhouse gas emissions
 2. Ensuring energy security
 3. Maintaining ‘affordable’ energy prices
- Our presentations will illustrate ways in which the government can reduce greenhouse gases while being mindful of two key concerns:
 - Distributional consequences
 - The threat of carbon ‘leakage’

Targets relating to reducing greenhouse gas emissions

- The UK has a target to reduce emissions levels by 80% relative to 1990 levels by 2050.
 - We take this target as given
- This is achieved through legally-binding ‘carbon budgets’
 - Five-year emissions caps
 - Budgets become more stringent over time
- Proposed by the Committee for Climate Change and legislated by the Secretary for State

Getting to the 2050 target – UK carbon budgets



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

Why do we want to reduce emissions?

- Energy use often imposes an external cost on society due to harmful greenhouse gas emissions
- Prices do not reflect this environmental damage, leading to the over-consumption of energy
- We can impose a tax upon energy use to reflect this external cost in the price faced by users
- This is known as a ‘carbon price’

Uniform carbon prices

- A uniform carbon price is a central part of policy aimed at efficiently reducing emissions and should have three properties:
 1. Uniformity across users
 - The same level of emissions reduction can be achieved at lower cost by shifting abatement effort towards users facing low prices
 2. Uniformity across fuels
 - This avoids creating incentives to switch to lower-taxed emissions from alternative fuel sources
 3. Uniformity across locations
 - The location or the identity of the polluter do not change the external cost associated with carbon emissions
 - Optimal prices should therefore be global

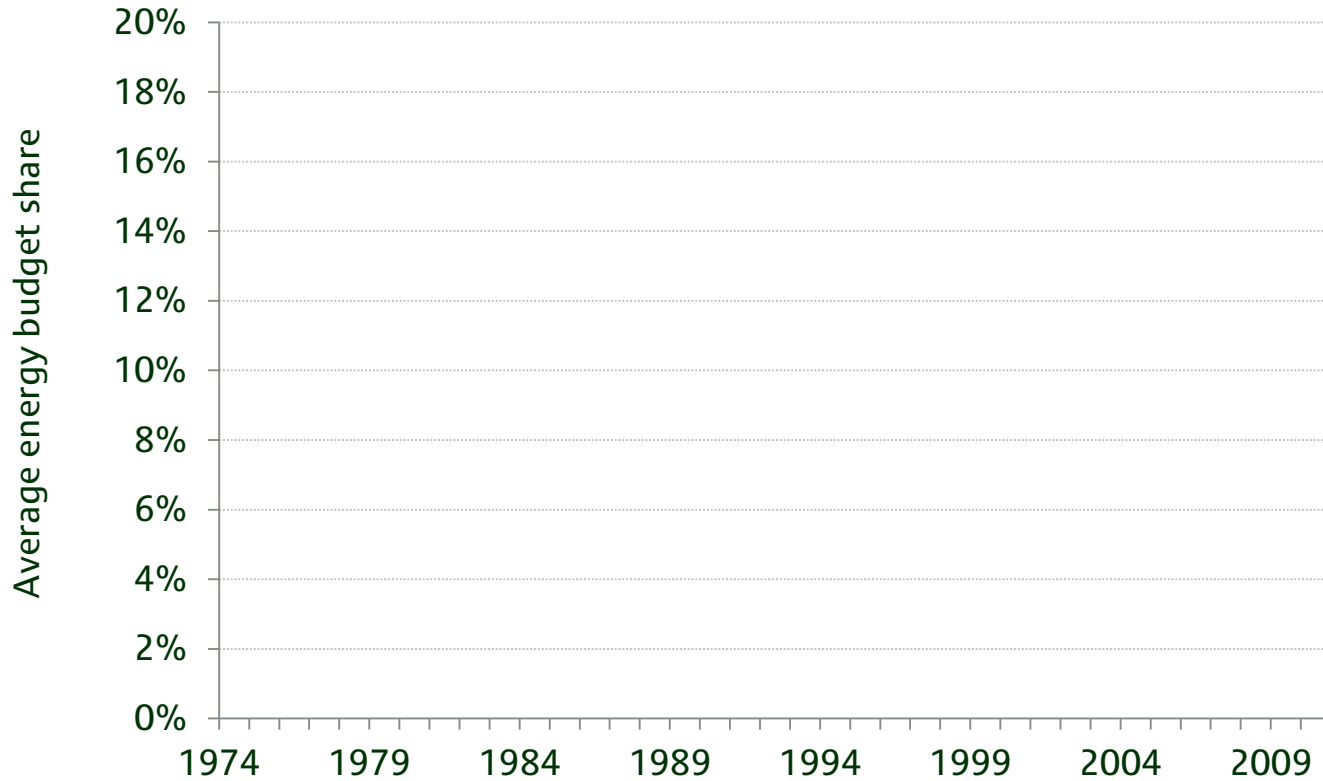
Setting the value of the carbon price

- We do not make a judgement on the value of the ‘correct’ carbon price in this presentation
- A trajectory of carbon prices can be set to reach a level of emissions reductions consistent with the 2050 target
- The Department of Energy and Climate Change (DECC) publish non-traded carbon prices which are consistent with this
- This non-traded price is taken as given throughout our analysis
 - £59/tCO₂e in 2013
 - £66/tCO₂e in 2020

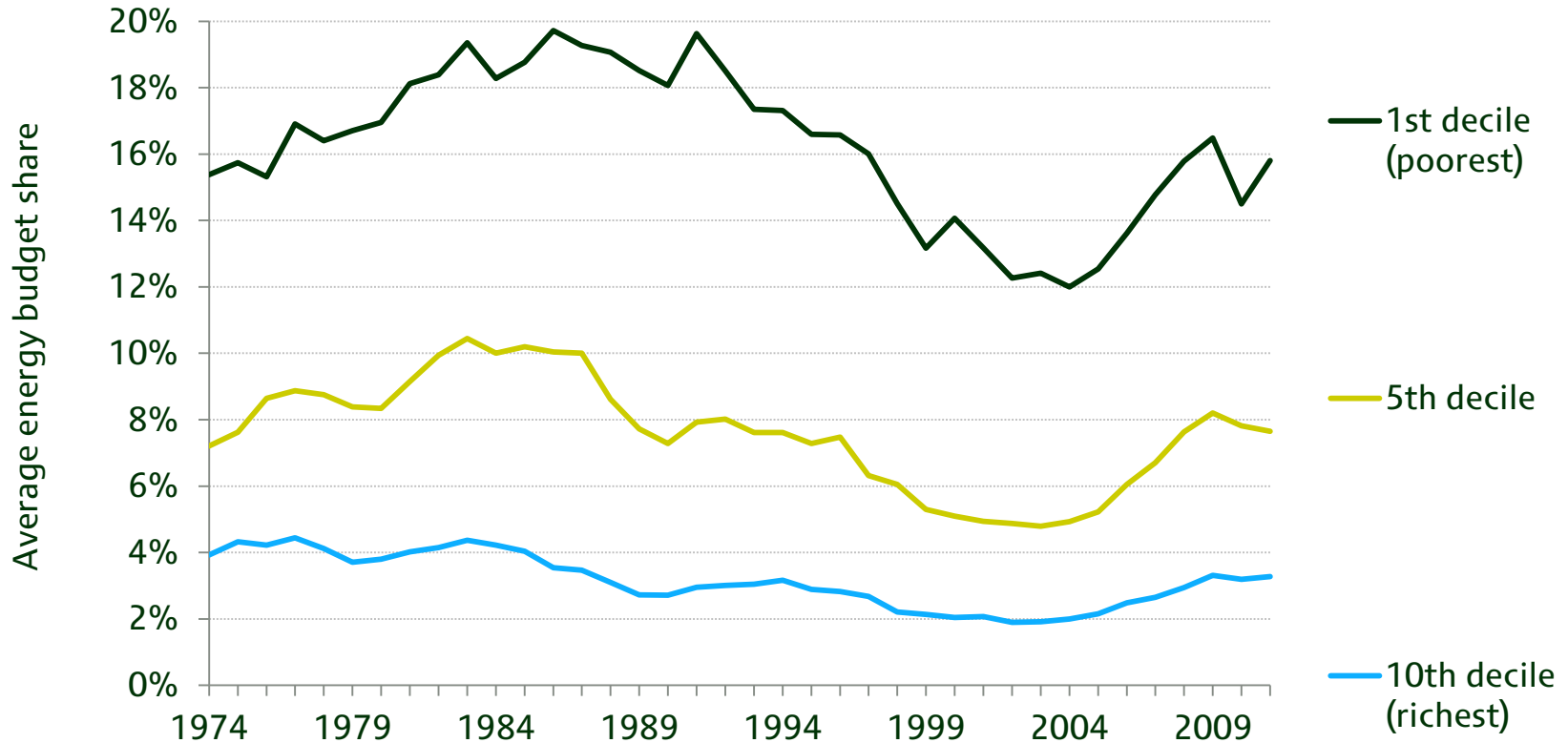
When might we want carbon prices to vary?

1. Equity concerns
2. Carbon 'leakage' concerns

Energy is an economic necessity



Energy is an economic necessity



Source Advani et al. (2013b), Figure 3.9

When might we want carbon prices to vary?

1. Equity concerns

- Increasing energy prices place the greatest burden on low-income households
- It may be possible to compensate these households in other ways
 - The existing tax and benefit system could be used to achieve this
- If compensation cannot be achieved, we might want low-income households to face lower carbon prices
- This is discussed in detail during the second presentation

When might we want carbon prices to vary?

2. Carbon 'leakage' concerns

- Relatively high carbon prices may result in firms moving to countries where carbon prices are lower
- Global level of emissions is important
 - Carbon emissions cause the same damage regardless of location
- Higher carbon prices may not reduce global carbon emissions
- There may be rationale to compensate firms that are more likely to leak through lower carbon prices

How are these concerns reflected in policy?

- Distributional concerns have resulted in households facing lower carbon prices relative to other users
- Energy-intensive firms have also been relatively sheltered as a result of leakage concerns
- Much of recent policy has been targeted directly towards raising the carbon prices faced by non-energy intensive firms
- This has resulted in a number of different policy regimes faced by different end users
 - We will explore the implications for carbon prices

Rationale for wider energy use policies

- There may also be a number of other reasons why wider energy use policies should be implemented
- Rationale for wider policy includes:
 - Energy security
 - Market failures
 - Responses to energy price signals
- It is important to realise that it is possible to address these through separate policy instruments
- Efforts should be made to avoid variation in the carbon price arising from policies targeting other objectives

Current UK policy

- This multitude of objectives have resulted in an array of energy use and climate change policies
- 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

Policies to price carbon

- EU Emissions Trading Scheme (EU ETS)
 - European cap-and-trade scheme to reduce emissions
- Carbon Price Floor
 - Imposes a minimum carbon price through the Carbon Price Support Rate
- Climate Change Levy
 - A levy on energy used by industries and the public sector
- Climate Change Agreement
 - Negotiated by specific industries
 - Provide discounted CCL rates in return for improved energy efficiency
- CRC Energy Efficiency Scheme
 - Applies to large firms that are not directly subject to the EU ETS

Policies to support renewables

- Renewables Obligation
 - Incentivises large-scale generation of energy from renewable sources
- Contract for Difference Feed-in Tariffs
 - Key component of the Electricity Market Reform (EMR)
 - Replaces RO for new entrants from 2018
- Small-scale Feed-in Tariffs
 - Payments to small-scale generators of renewable energy
- Renewable Heat Incentive
 - Payments to small-scale generators of renewable heat
 - Tax-funded

Policies to support energy efficiency improvements

- Energy Company Obligation (ECO)
 - Replaced existing supplier obligations in 2013
 - Obligates energy companies to improve the energy efficiency of the domestic building stock
- The Green Deal
 - Provides financing for the upfront costs associated with the installation of energy efficiency measures

Policies to support domestic energy bills

- Warm Home Discount
 - Provides rebates on electricity bills for vulnerable households
- Cold Weather Payment
 - Cash payments towards increased energy bills during periods of extreme cold weather
- Winter Fuel Payment
 - Universal payment to individuals above the Female State Pension Age
- Reduced rate of VAT

The VAT treatment of domestic energy use

- Domestic energy use is subject to a reduced rate of VAT.
 - 5% (as opposed to the full rate of 20%)
- There is a strong economic case for imposing a uniform rate of VAT on all goods and services
- Relative to the full VAT rate, the reduced-rate provides an implicit subsidy of 14.3% on electricity and gas prices
- This is equivalent to £179 off an average dual-fuel bill of £1,255 in 2013

What does policy mean for carbon prices?

- A number of these policies have explicit carbon prices
- Other policies have implicit carbon prices
 - They have impacts on marginal energy prices
- We combine these implicit and explicit effects and compare the effective carbon prices faced by different users and across fuels
- We also examine how these compare to the 2013 non-traded carbon price of £59/tCO₂e

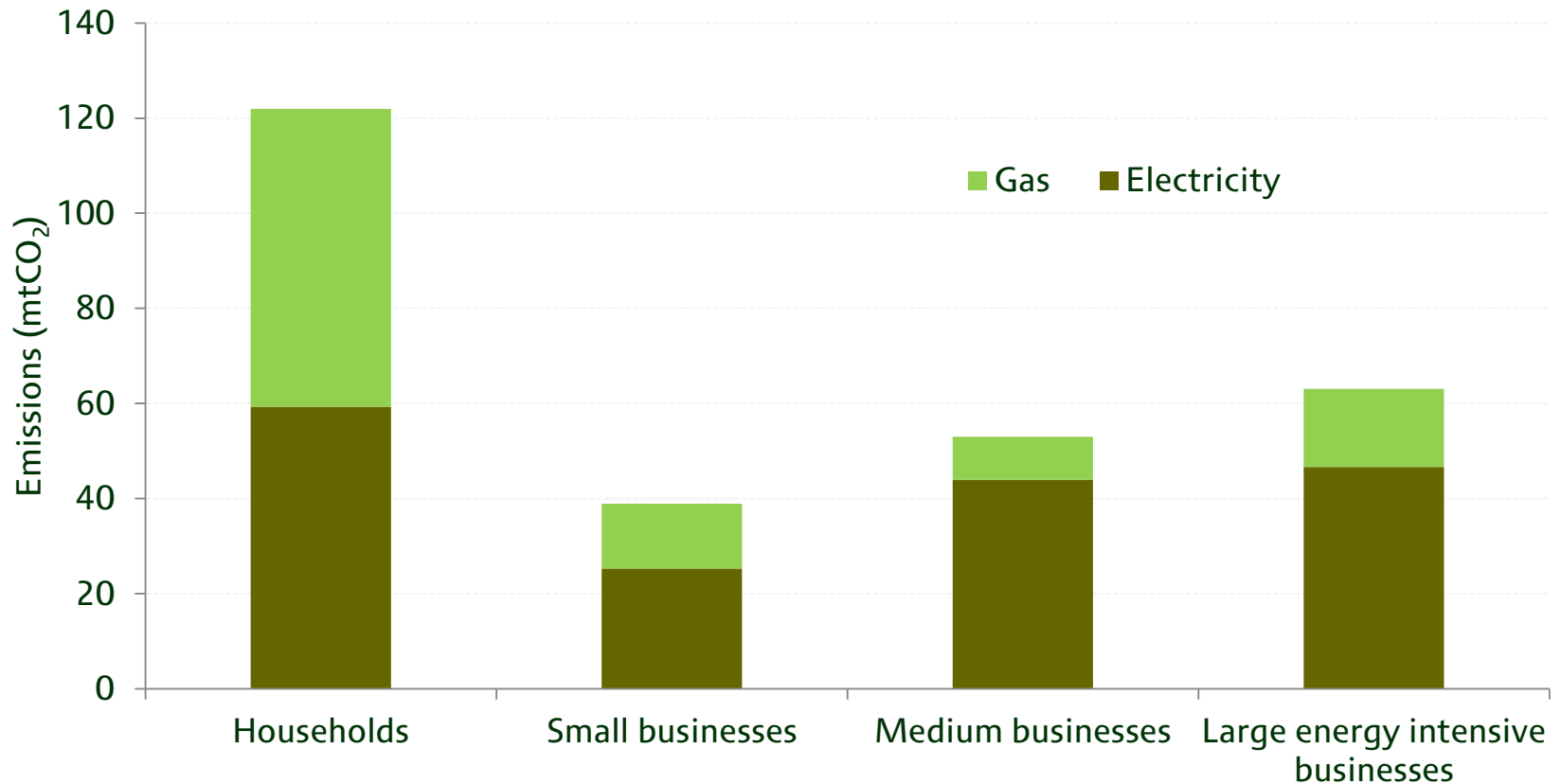
Calculating carbon prices

- 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

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

Which policies affect different end-users?

	Households	Small business	Medium business	Large energy-intensive business
Electricity	EU ETS CPSR	EU ETS CPSR	EU ETS CPSR	EU ETS CPSR
Gas				

Which policies affect different end-users?

	Households	Small business	Medium business	Large energy-intensive business
Electricity	EU ETS CPSR RO FITs	EU ETS CPSR RO FITs	EU ETS CPSR RO FITs	EU ETS CPSR RO FITs
Gas				

Which policies affect different end-users?

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

Which policies affect different end-users?

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

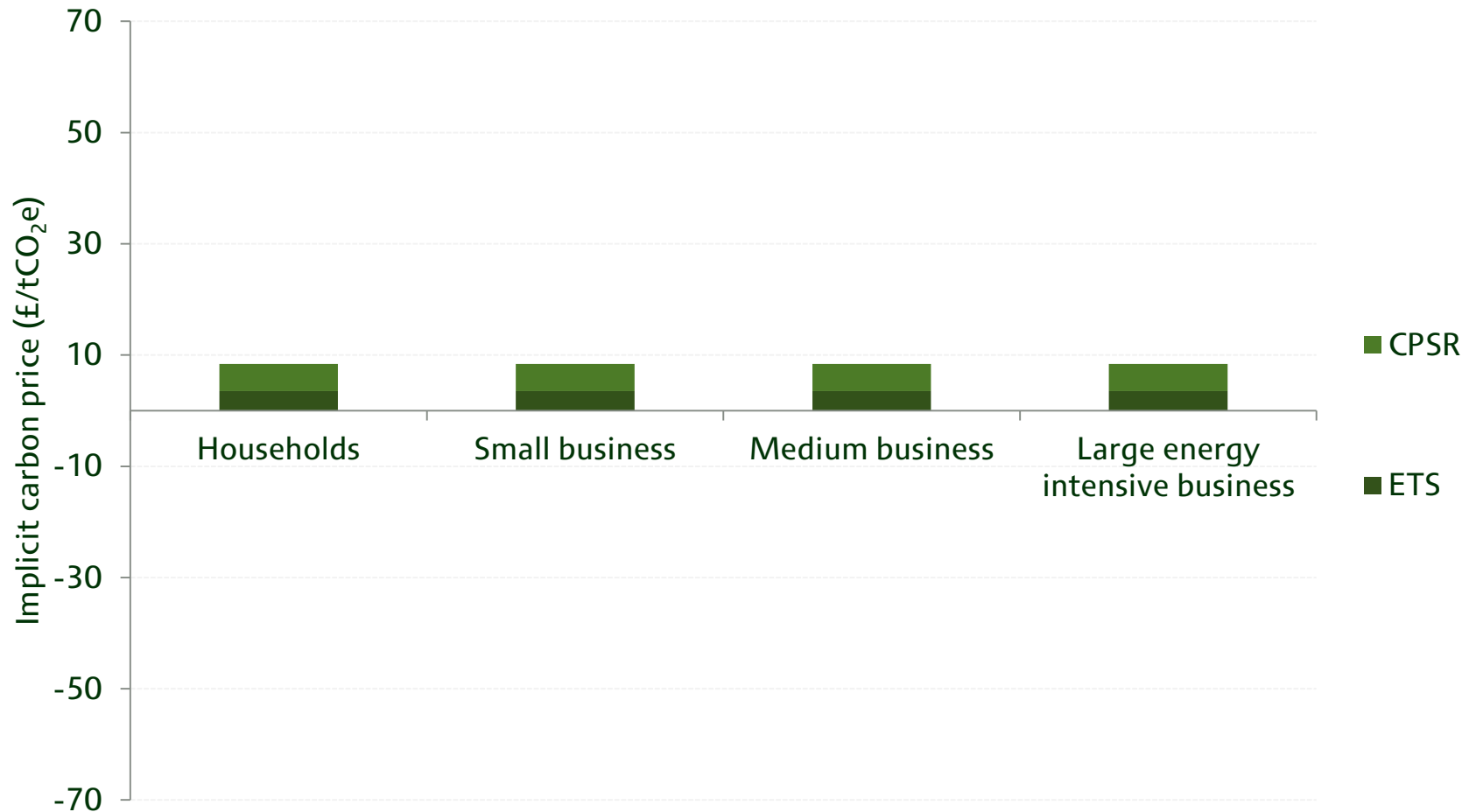
Which policies affect different end-users?

	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				

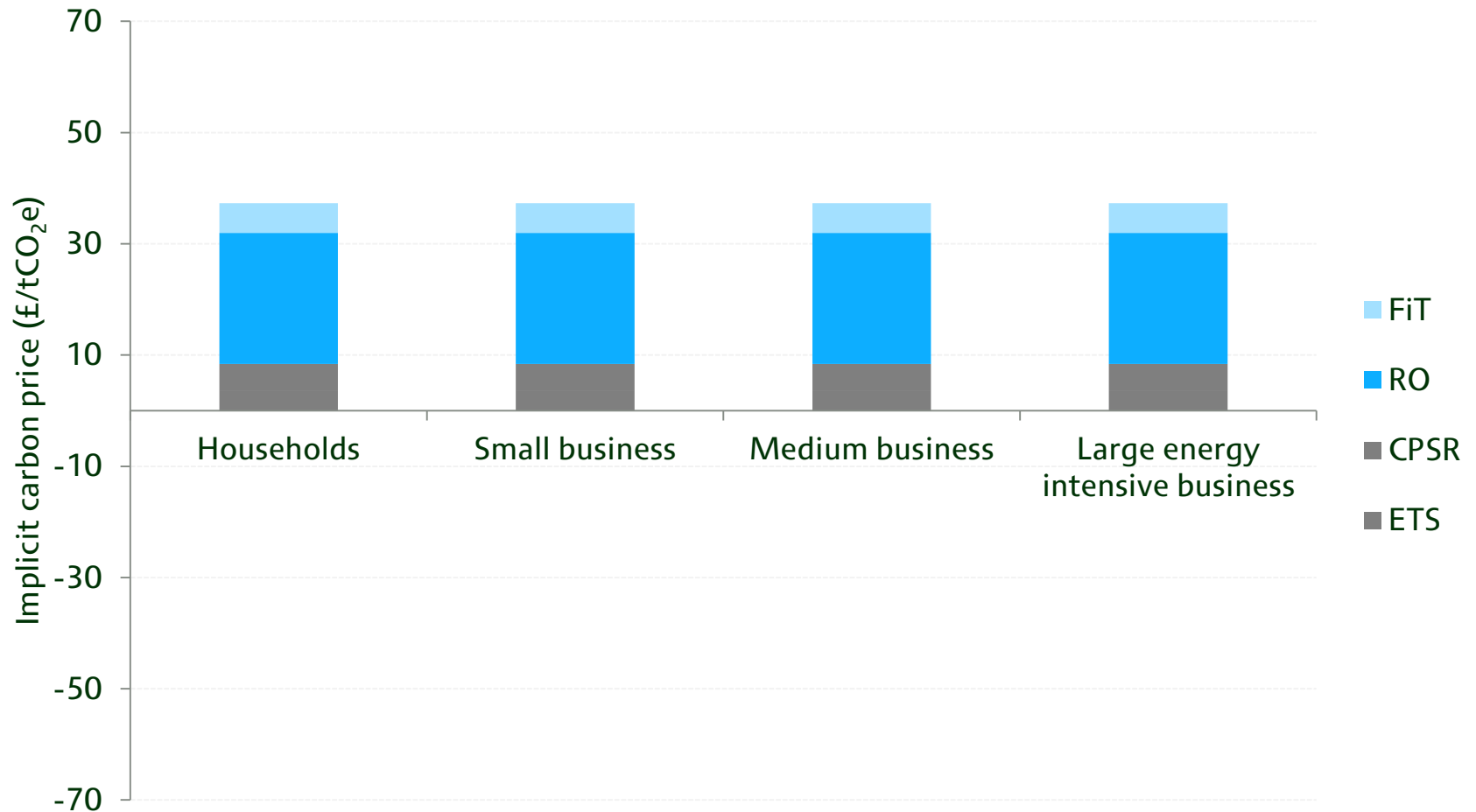
Which policies affect different end-users?

	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

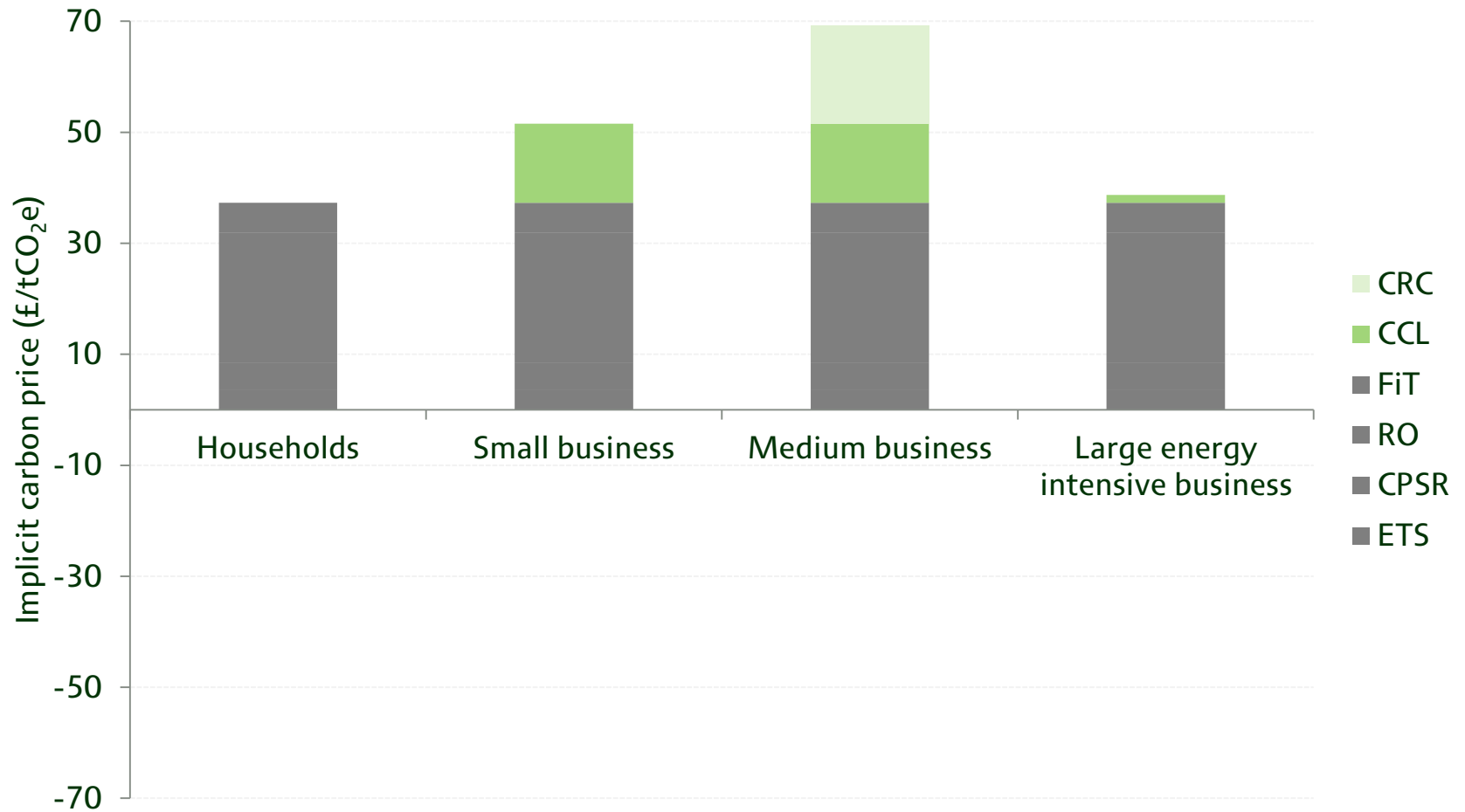
Implicit carbon prices for electricity, 2013



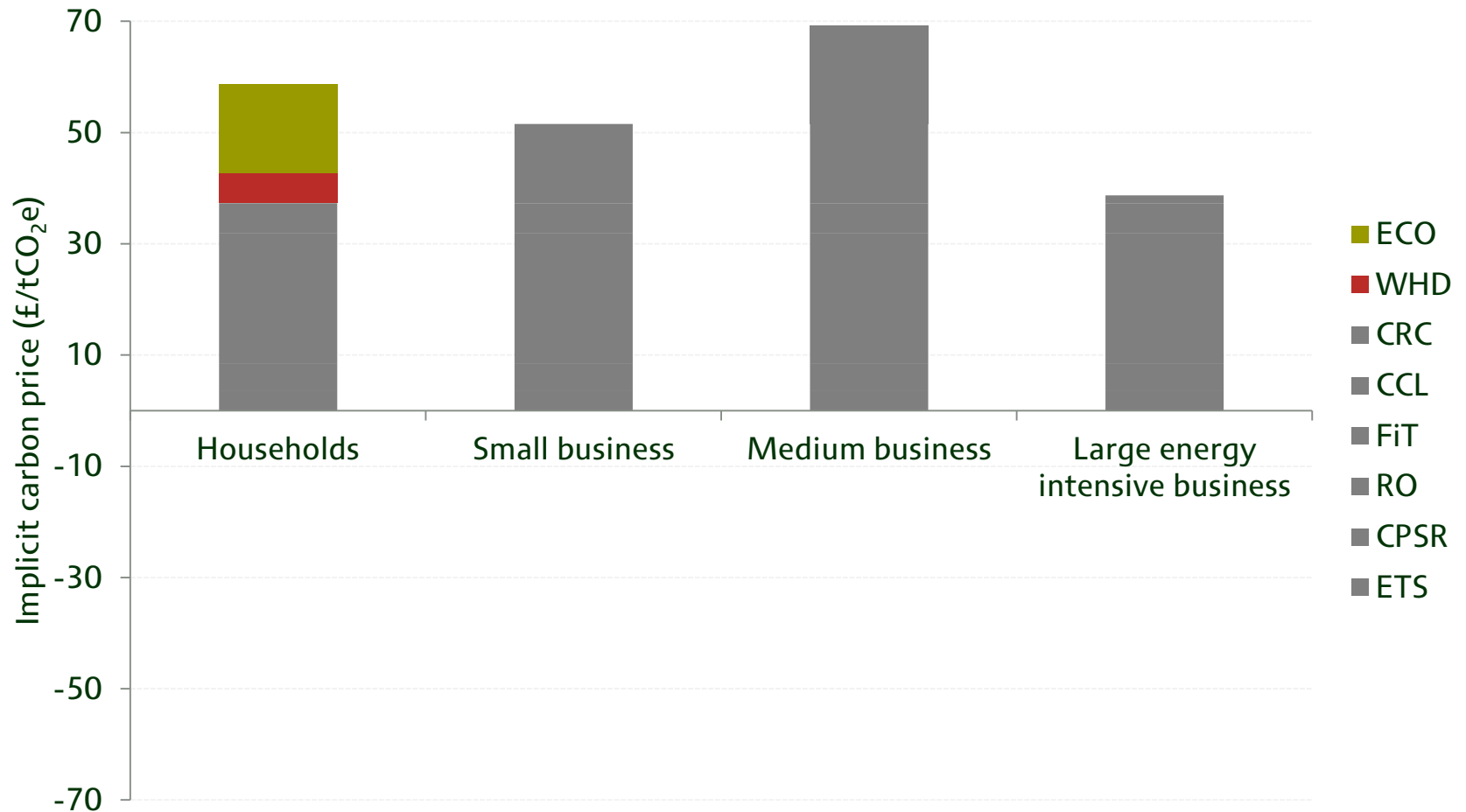
Implicit carbon prices for electricity, 2013



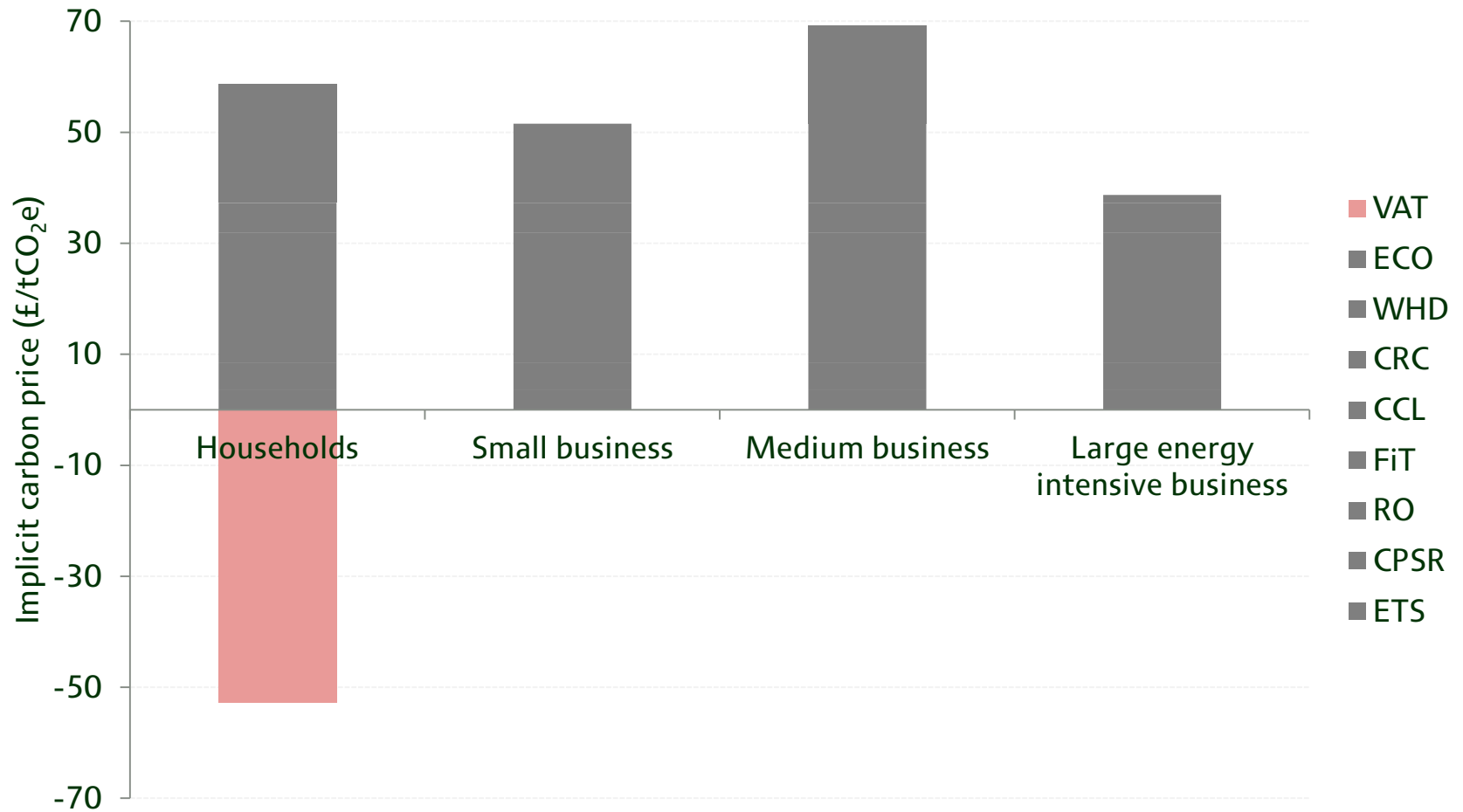
Implicit carbon prices for electricity, 2013



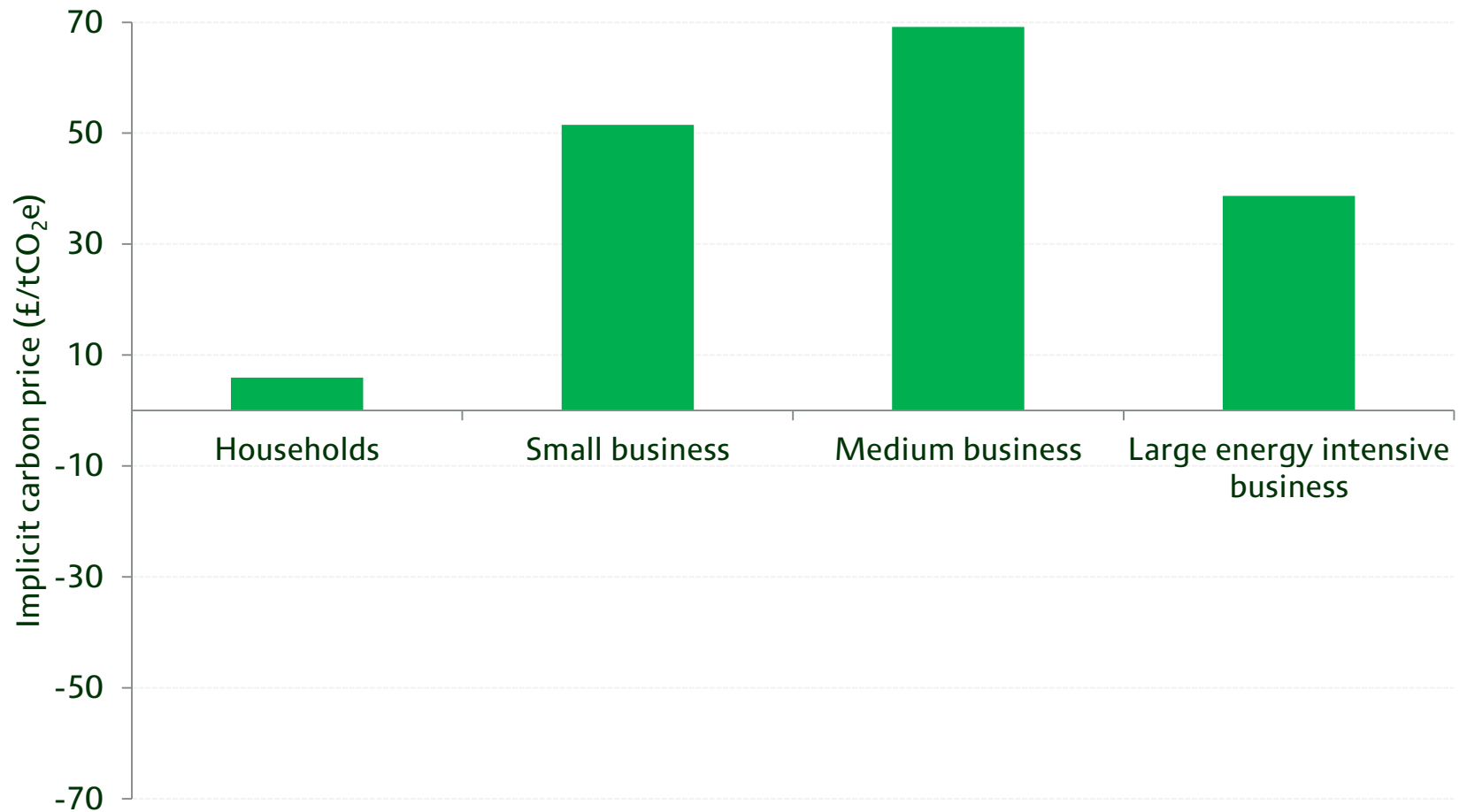
Implicit carbon prices for electricity, 2013



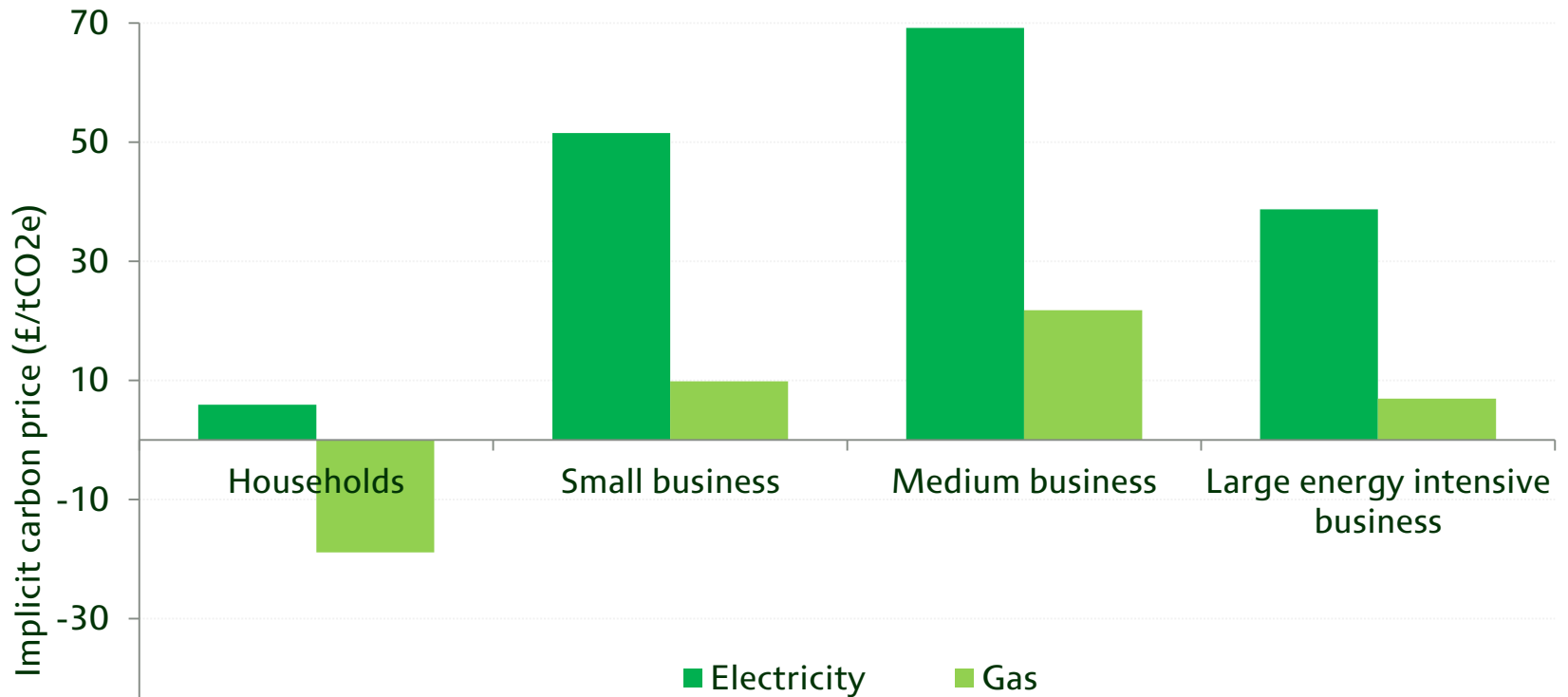
Implicit carbon prices for electricity, 2013



Implicit carbon prices for electricity, 2013



Implicit carbon prices for electricity and gas, 2013

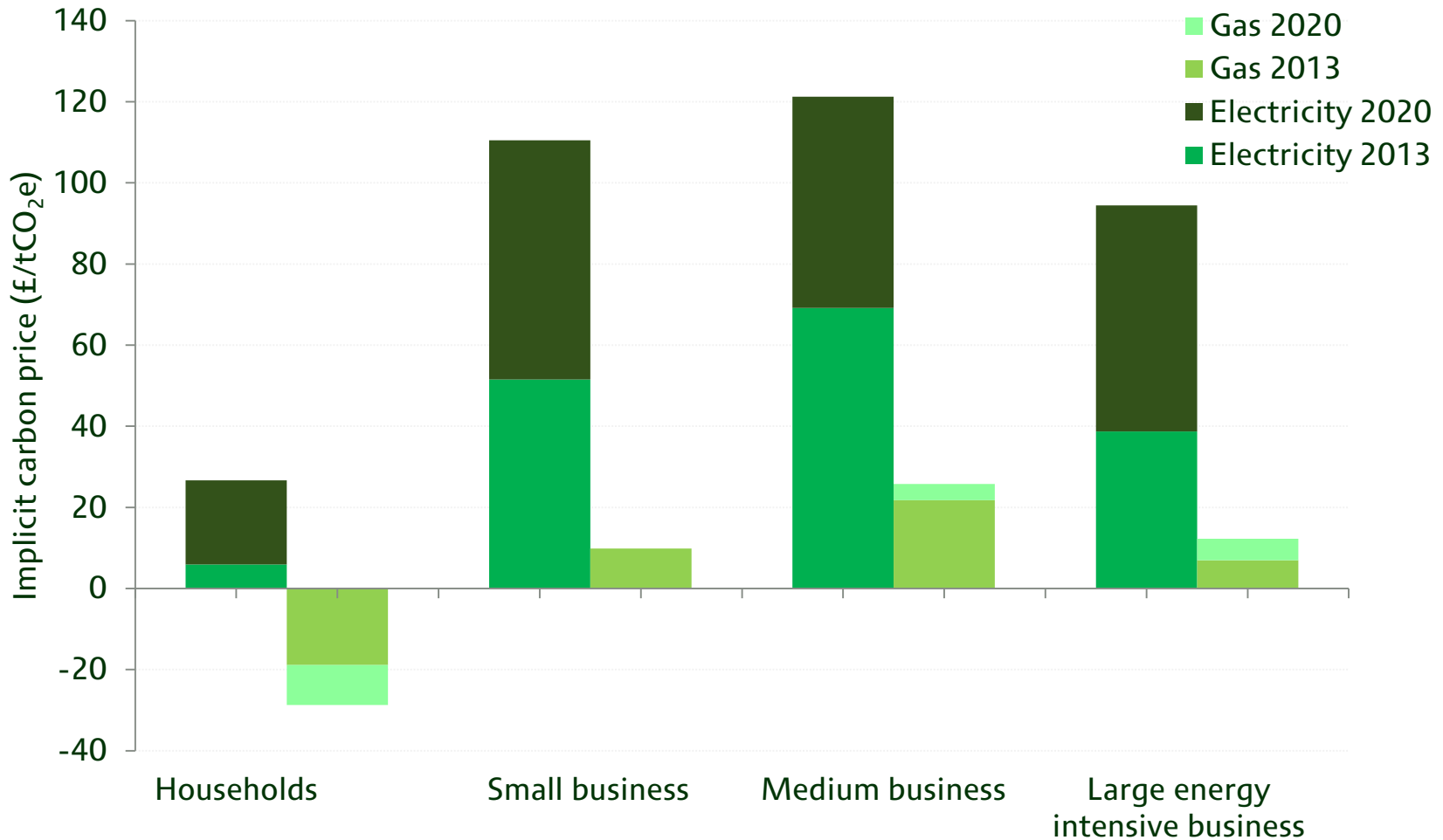


Source Advani et al. (2013a), Figure 6.4

Future carbon prices

- Variation across fuels is set to grow over time.
- This is driven by the expansion of policies aimed at supporting renewables.
 - Renewables Obligation.
 - Contract for Difference Feed-in Tariffs.
- Large increases for electricity.
- Minimal increases for gas.

Implicit carbon prices in 2013 and 2020

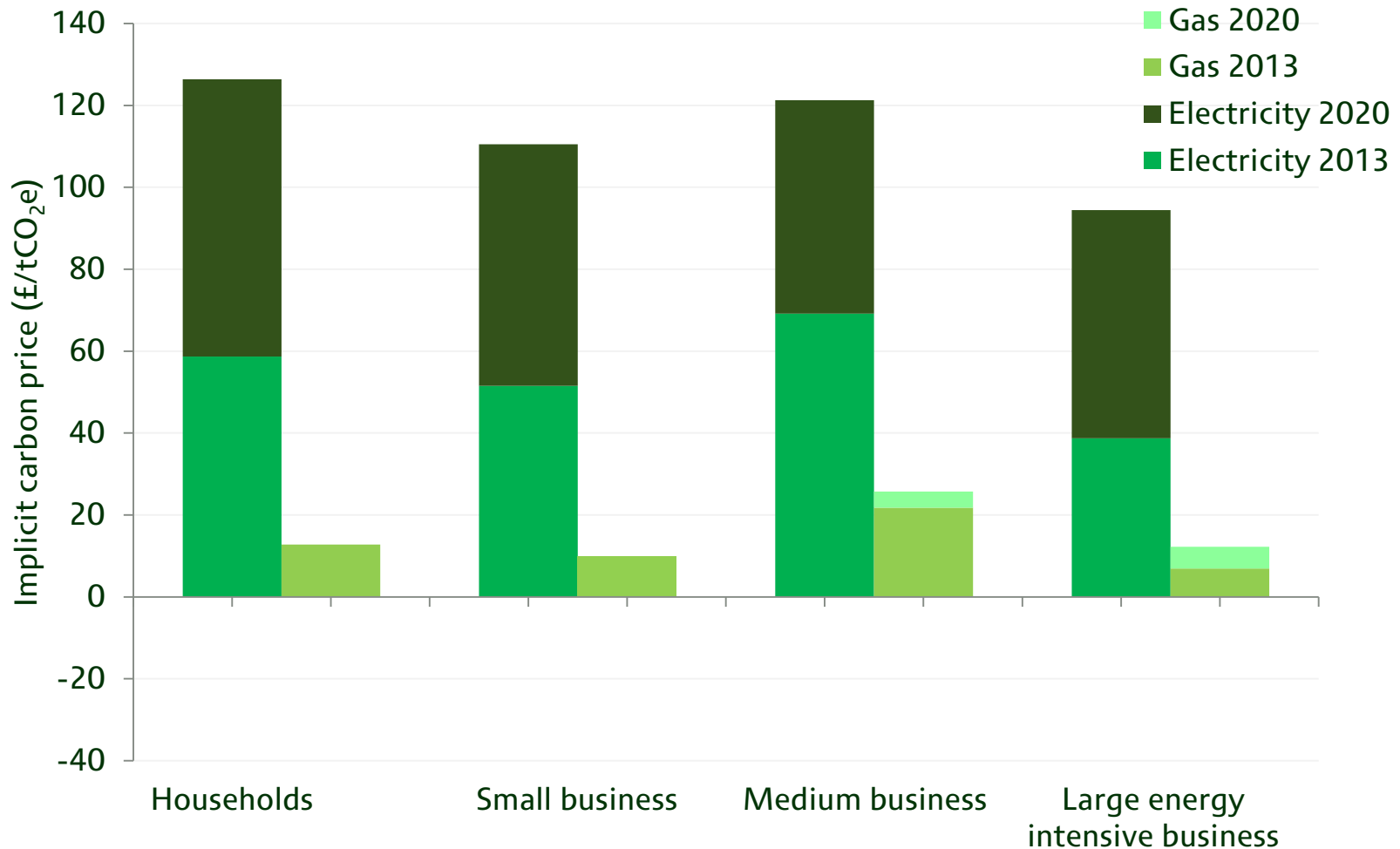


Source Advani et al. (2013a), Figure 6.5

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

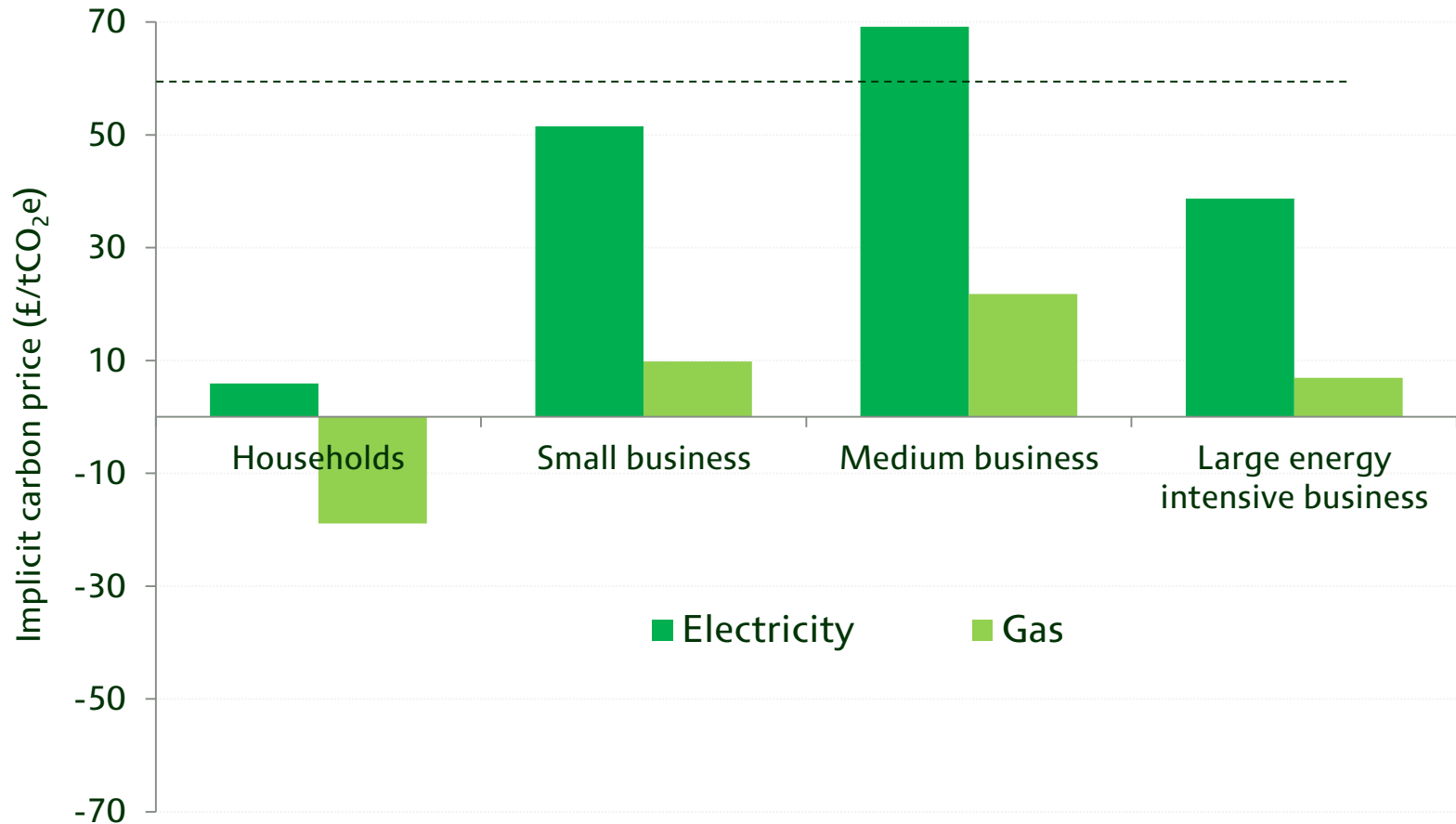
Implicit carbon prices in 2013 and 2020 (excluding the VAT subsidy)



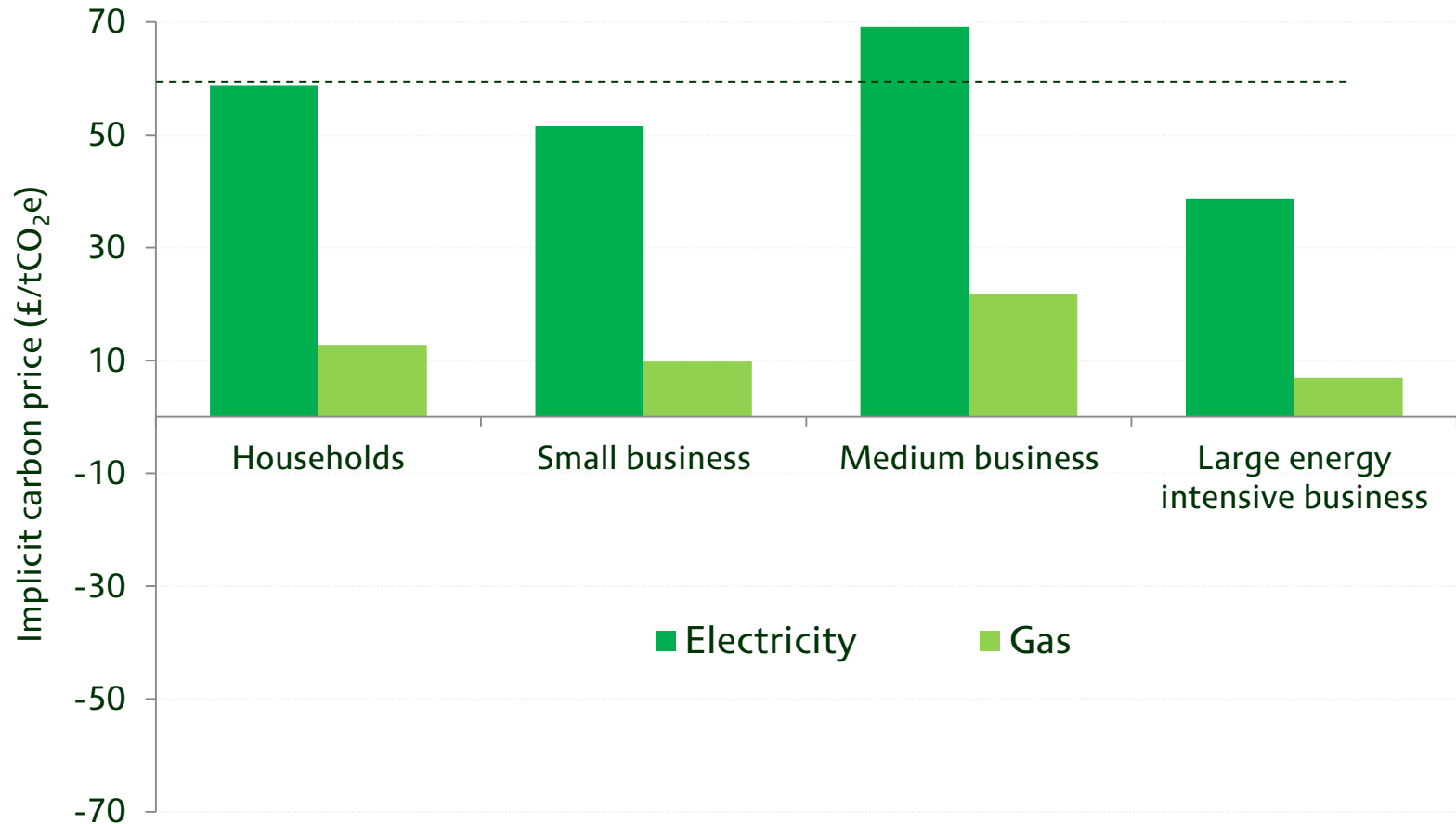
How close is the current price to the 2013 non-traded carbon price?

- We have discussed the variation in the carbon price across:
 - Users
 - Fuels
- How close are we to the non-traded carbon price for each of these users?
- The 2013 non-traded carbon price is £59/tCO₂e

How far away from the target carbon price are we in 2013?



How far away are we from the target carbon price in 2013 once we exclude the VAT subsidy?



Conclusions

- A number of objectives have resulted in a complex multitude of policies
- Distributional and leakage concerns have resulted in deviation away from a uniform carbon price
 - Households and large energy-intensive firms face lower carbon prices than other users
- Under current policy plans this variation is set to worsen
- The following presentations will illustrate ways in which policy could be reformed to reduce variation while addressing other concerns