Key modeling issues and challenges facing domestic carbon tax design and implementation: UK Climate Change Levy

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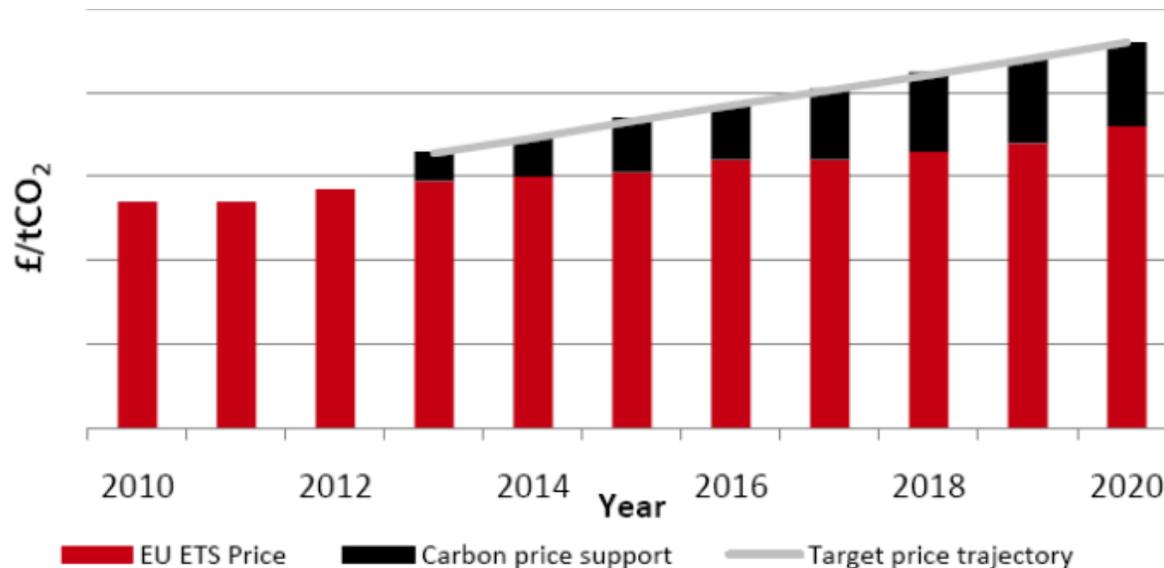
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1. Overview of UK Climate Change Levy (CCL)

i. **Main rate** – *energy tax* which applies to energy use by industry, commercial, agriculture and public services, collected via energy suppliers, introduced on 1 April 2001

- Excludes domestic, transport and charity sectors, as well as businesses that consume very small quantities of energy.
- Up to 90% exemption for industry sectors that agree to Climate Change Agreements.
- Long-standing exemption for electricity generated from RE and approved CHP schemes was removed from 1 August 2015 (raising £450m/year)

√ aims to incentivise energy efficiency

Commodity	Main rate (01/04/15-01/04/16)	Reduction for CCA holders
Electricity	0.554 pence/kWh	10%
Gas	0.193 pence/kWh	35%
LPG - any petroleum gas, or other gaseous hydrocarbon, supplied in a liquid state	1.240 pence/kg	35%
Any other taxable commodity	1.512 pence/kg	35%

Overview of UK Climate Change Levy (CCL)

ii. **Carbon Price Support rate** - *carbon tax* which applies to electricity generators and certain CHP operators (since 1 April 2014; excludes Northern Ireland)

- CPS provides a price floor for EUAs (starting at £16/tCO2 in 2013 and rising linearly to £30/tCO2 by 2020, and then up to £70/tCO2 by 2030).
- If the price of EUAs drops below the price floor, then UK power generators pay the difference between the EUA price and price floor to the UK Treasury (up to a maximum of £18/tCO2).
- Set two years in advance, with indicative rates published for a further two years.
- ✓ aims to provide an incentive to invest in low-carbon power generation by providing greater support and carbon price certainty in the UK (in light of low allowance prices in the EU ETS)

Legend: EU ETS Price, Carbon price support, Target price trajectory. Axes: £/tCO$_2$ (y-axis), Year (x-axis: 2010, 2012, 2014, 2016, 2018, 2020)

Overview of UK Climate Change Levy (CCL)

ii. **Carbon Price Support rate** – different rates apply to different fuel sources, based on the carbon content of fuels used in energy generation

Commodity	CPS rate (01/04/15-01/04/16)
Gas supplied by a gas utility	0.334 pence per kilowatt hour
LPG	5.307 pence per kilowatt hour
Coal and any other solid fossil fuels (petroleum coke, lignite, coke and semi-coke of coal or lignite)	156.86 pence per kilogram

CPS rate (£/kWh) = (target carbon price – market carbon price) x (fuel EF factor)

- Target carbon price for year X - determined by adjusting the target carbon price for year X in 2009 real prices for inflation.

- Market carbon price – average annual ICE-EXC benchmark end of day futures contracts for carbon for delivery in year X is used. (ICE-ECX has the largest market share of the European futures market).

- This rate (£/tCO2), when multiplied by the standard emission factors of individual fuels (tCO2/KWh, tCO2/kg) are used to derive CPS rates expressed as £/KWh or £/kg.

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2. Key modelling/analytical considerations: CCL's main rate (energy tax)

◆ Best efforts were made to anticipate the likely price impact of the CCL via economic modelling and stakeholder consultation.

- Economic modelling was used to consider the anticipated price impact at different CCL levels. Key modelling parameters were:

  o changing energy prices (gas prices were rising, electricity falling and coal prices stable)

  o the cost of the energy efficiency measures to be incentivised across different sectors of the economy

  o anticipated economic growth sector-by-sector.

- Data was good for some sectors (e.g. heavy industry), but limited data for other sectors (e.g. secondary manufacturing).

◆ However, in the UK, other factors became important - non-price impacts helped drive behaviour change; and the (moderate) price-impacts of the CCL could be leveraged using other policy instruments.

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Key modelling/analytical considerations: CCL's main rate (energy tax)

◆ Stakeholder feedback during the consultation process introduced the need for a cost-neutral package (i.e. no overall price impact), particularly for SMEs.

  - This was done by reducing the level of another tax (national insurance contributions. The CCL was proposed to be ~ 0.5% decrease in NIC, but reduced to 0.3%.
  - By 2005/06, the cost to government of reducing NIC exceeded its income from CCL; CCL increased in line with inflation from April 2006.

◆ The introduction of the CCL was high profile and controversial. The 'announcement effect' prior to the CCL being introduced is considered to have had an immediate and ongoing impact esp with large non-energy intensive business (increased energy management and monitoring).

◆ However, for some sectors (heavy industry), the price impact was considerable -those industries came to government to request relief, providing leverage for introduction of the Climate Change Agreements.

3. Key modelling/analytical considerations: Exemption from the CCL's main rate - CCAs

In a nutshell: UK Climate Change Agreements (CCAs)

- **Voluntary** agreements between energy-intensive industry and government - cover 54 sectors and 9,000 sites ~ 60% of UK industrial-delivered energy use
- If participants meet the targets included in their CCA, they receive a **substantial discount on CCL's main rate** (90% off electricity use, 65% off for fuel use).
- If targets are not met, penalty of £12/tCO2 applies to each tCO2 by which the target was missed. Penalties also apply to misreporting or failing to report.
- Targets are mostly intensity- based (allows for growth); absolute targets are also used.
- For much of heavy industry, partial exemption from the main rate > cost of meeting CCA targets
- CCAs **reduced emissions by 20%** in participating sectors over the first ten years of the CCAs.

◆ Targets are tailored to the sub-sector level to reflect the energy/carbon reductions possible per sub-sector, and determined based on a combination of modelling and negotiation with each industry sub-sector.

Key modelling/analytical considerations: Exemption from the CCL's main rate - CCAs

◆ **ENUSIM was used as the analytical basis for the targets proposed to each sub-sector.**

- ENUSIM is a bottom-up, MACC-based model includes: energy usage and fuel mix in different processes per sub-sector, specific measures that could be implemented per sub-sector/process; each sub-sector's uptake of measures.
- Research is undertaken to identify new technologies and R&D per sector, as well as best available technology in the UK and internationally.

◆ **CCA targets were set via an intensive negotiation process, comprising multiple meetings between government and each sub-sector's business association.**

- Meetings included much debate on the technical and financial feasibility of specific measures, and timeframe for their implementation
- The resulting set of targets were a compromise on both sides.

◆ **CCAs include a transparent MRV process which provided feedback every two years on industry performance against CCA targets.**

- This showed over-compliance against the targets at pre-set review points (2004, 2008). CCA targets were tightened at both of the review points.

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Key modelling/analytical considerations: Exemption from the CCL's main rate - CCAs

◆ The last set of CCA targets were agreed through a slightly different process – industry was asked to complete spreadsheets listing emission reduction technologies and indicate which technologies were realistic for them to implement and when – and then government vetted the lists, adding technologies if needed.

Thank You

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