Delivering Excellence Through Innovation & Technology

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Provision of carbon target setting and future scenario modelling

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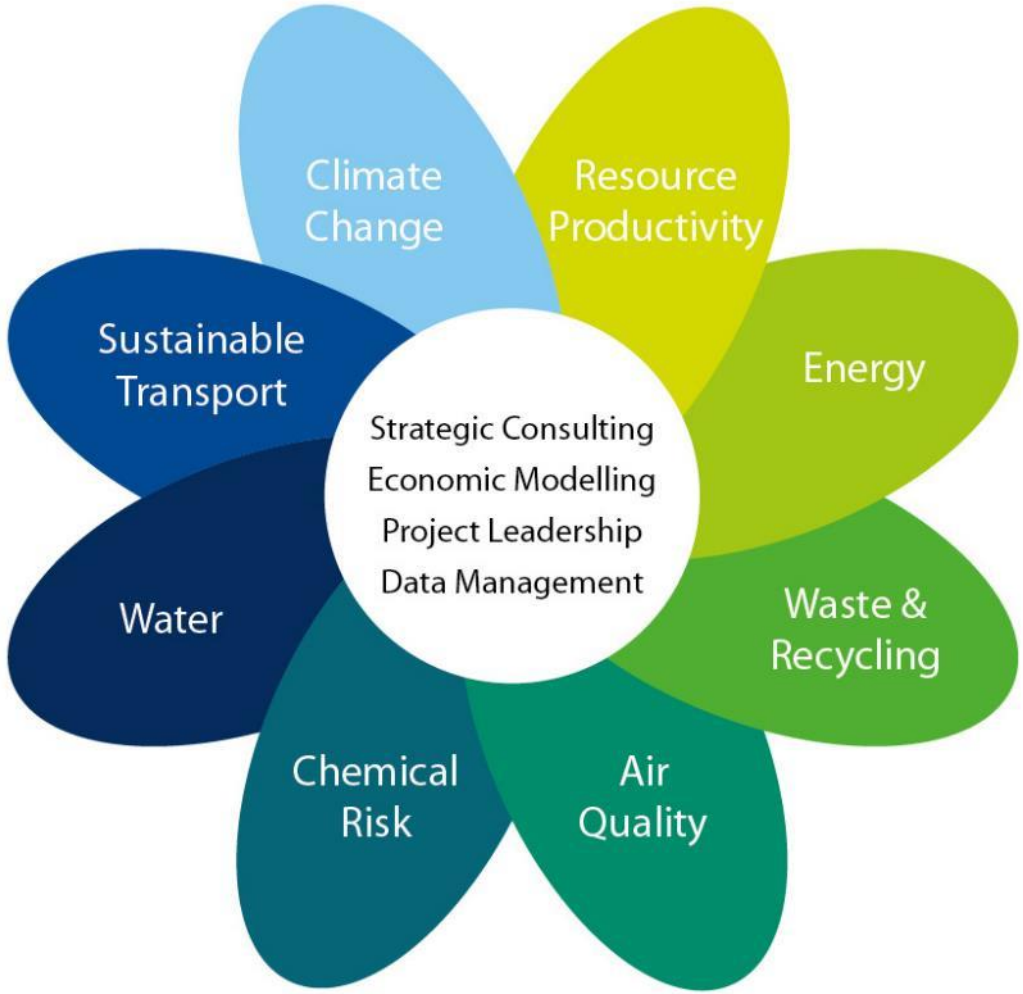
Introduction to Ricardo Energy & Environment

- Full suite of environmental skills and services
  - energy and climate change
  - emissions and air quality
  - resource productivity
  - waste management
  - sustainable transport
  - chemical risk
  - Water
- Strategic consultancy and project leadership for central and local Government, the European Commission, international governments, multinational corporations and a wide range of public and private sector organisations
- Operating to both ISO9001 and ISO14001



This project

Target

- Nature of target?
  - Energy-related CO_2? All GHG?
  - Scope – what to include?
- Level of ambition?

Action

- How to meet the target
  - Sectoral share of effort
  - Specific interventions
  - Policies

A carbon neutral / net zero target

- A balance between emissions and ‘removals’ (e.g. forestry, negative emissions technologies).
- What are other LAs doing?

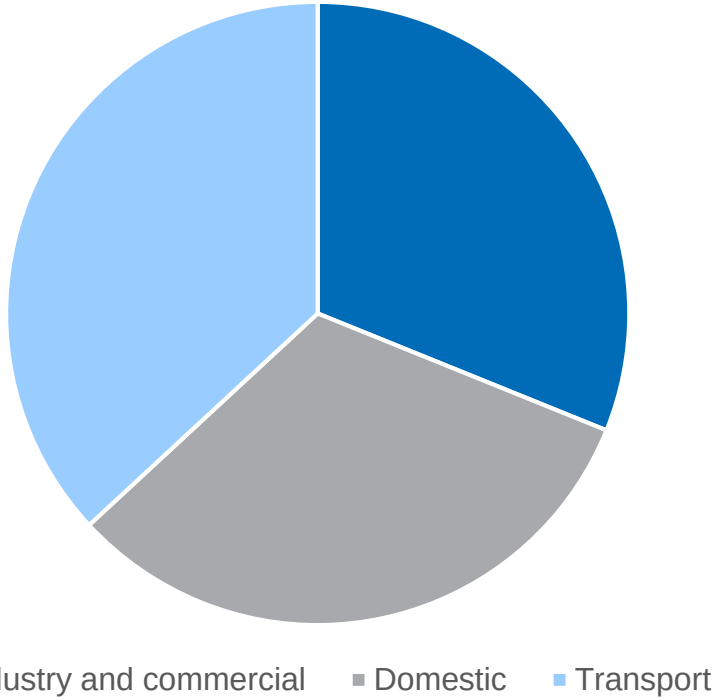
Target date	Council
2050	LB of Merton (plus 2030 for Council’s own emissions), London, Durham CC (amendment for 2030 defeated), Kent CC, South Cambridgeshire DC, RB of Windsor & Maidenhead
2045	Barnsley MBC
2038	Manchester CC
2030	Around 50! (including Sheffield)
2025-2030	Leicester CC
2028	Nottingham CC
2025	LB of Tower Hamlets, Teignbridge DC
Others	Some LAs have a target to ‘aspire’ to net zero by a certain date (e.g. 2030) – Bedford, Birmingham, Cheshire West and Chester
	Bradford MDC – 90% reduction by 2030 compared to 2005 levels
	No targets – some not yet voted on, others voted down (e.g. Devon CC). Doncaster to establish a date.
	No dates – e.g. Gwynedd CC & Powys CC - “carbon neutral eventually”
	Council operations only – e.g. LB of Redbridge

Committee on Climate Change advice

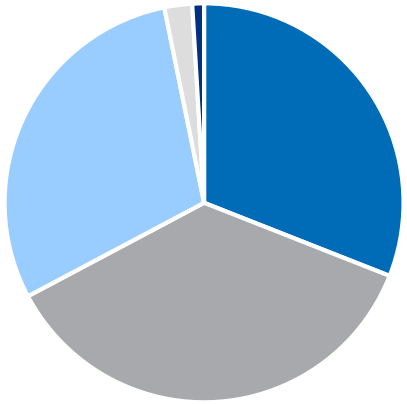
- UK should commit to net zero by 2050 (2045 for Scotland, 95% by 2050 for Wales).
- A net-zero GHG target for 2050 will deliver on the UK's commitment under the Paris Agreement.
- Current policy is insufficient for even the existing targets – while many of the policy foundations are in place, a major ramp-up in policy effort is now required.
- Overall costs are manageable but must be fairly distributed (annual resource cost of up to 1-2% of GDP to 2050).
- Some sectors (e.g. the power sector) could reach net-zero emissions by 2045, but for most sectors 2050 currently appears to be the earliest credible date.
  - "Setting a legal target to reach net-zero GHG emissions significantly before 2050 does not currently appear credible and the Committee advises against it at this time".
- To meet the target:
  - Resource and energy efficiency
  - Some societal choices, e.g. diet
  - Extensive electrification, particularly of heating and transport
  - Development of a hydrogen economy (to demand for some industrial processes, for applications in long-distance HGVs and ships, and for electricity and heating in peak periods)
  - CCS
  - Changes in the way we farm and use our land

The current situation

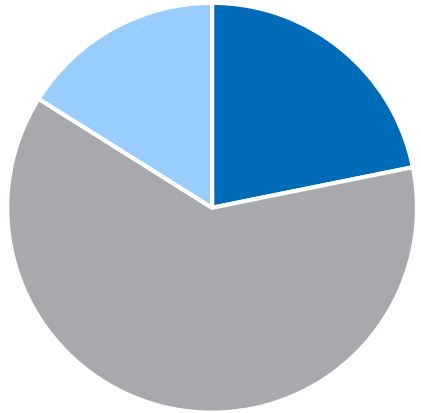
2017 CO2 emissions



2017 Transport CO2 emissions



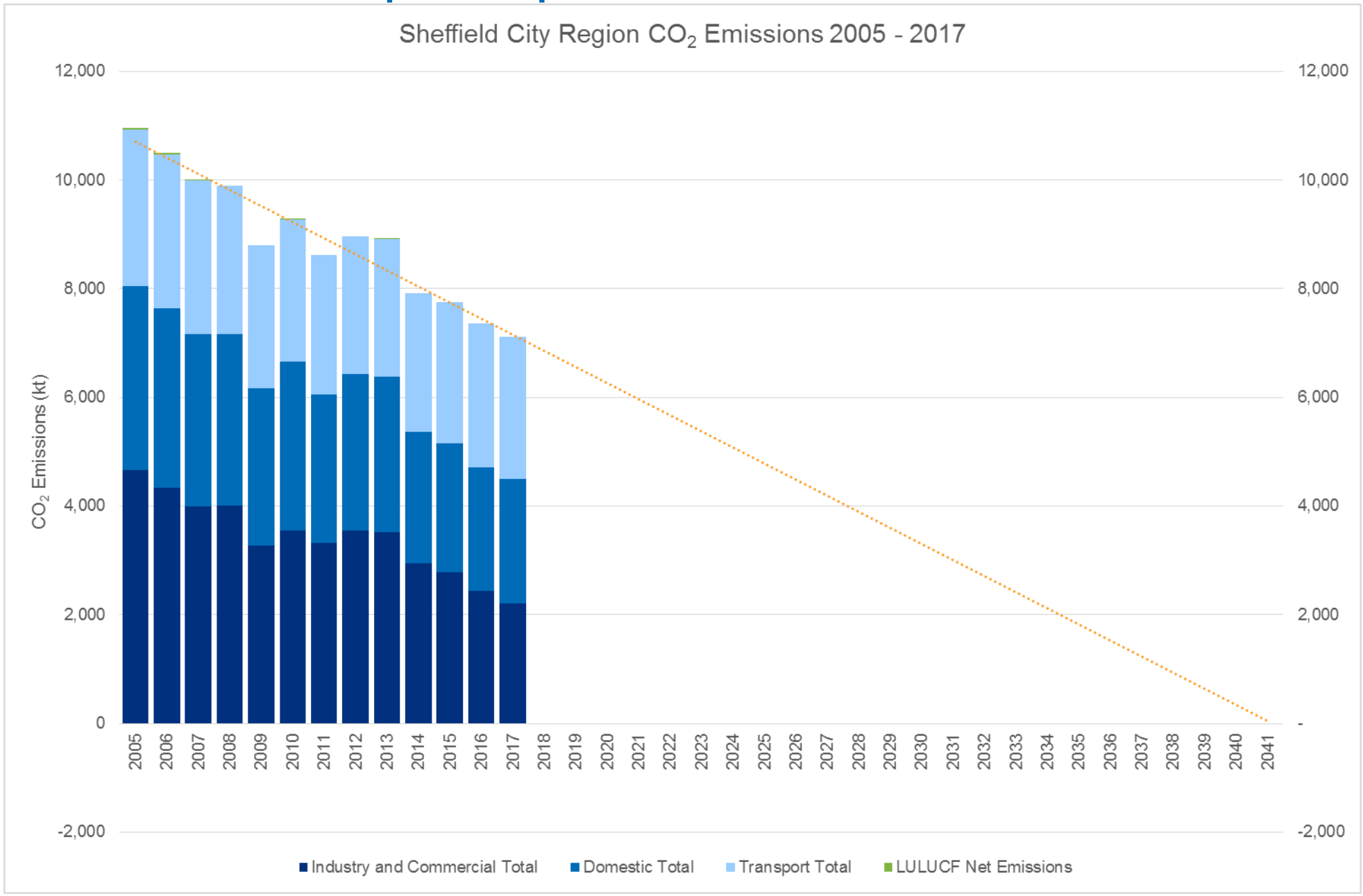
2017 Domestic CO2 emissions



The future?

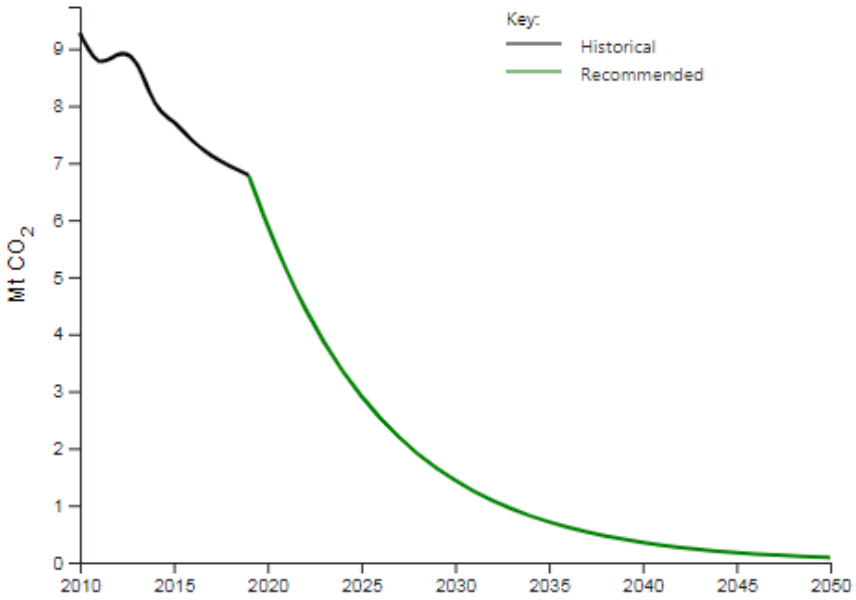
- What does net zero actually look like?
- Size of residual emissions depends on assumptions about removals.
  - The more removals that are assumed, the greater the residual emissions can be.
- But NETs are inherently uncertain – risky to bank on them too much?
- Precautionary approach – assume that any removals cover residual emissions in non-energy sectors (e.g. agriculture, waste) and that energy sectors reduced to zero?
- But – CCC advice = CCS is a necessity not an option. Assume aggregate annual capture and storage of 75-175 $MtCO_2$ in 2050.
- Paradox – the earlier the target date, the less you can justifiably rely on NETs.
  - Can't assume CCS for a 2030 target. Challenging to assume much CCS for a 2040 target.

Top-down assessment: simple extrapolation



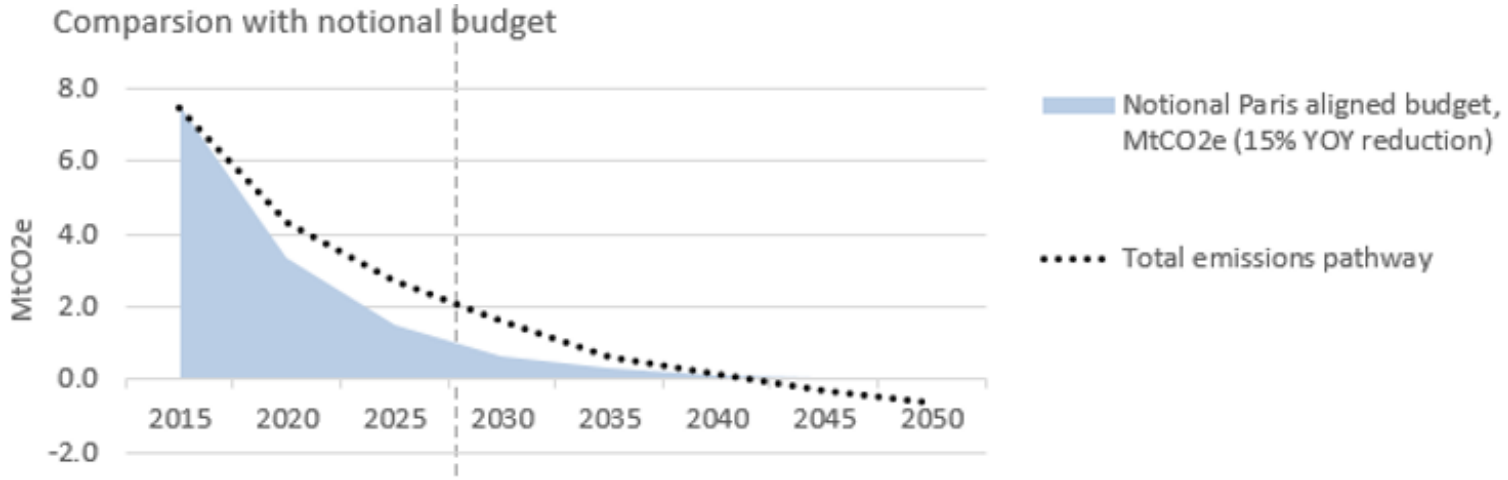
Top-down assessment: Tyndall Centre analysis

- Takes a global carbon budget and ‘shares it out’ to countries and then shares the UK portion to local authorities.
- Not an exact science, and does not indicate deliverability.
- Key messages:
  - SCR should stay within a maximum cumulative CO_2 emissions budget of 44.7 MtCO2 for the period 2020 to 2100. At 2017 CO2 emission levels, SCR would use this entire budget within seven years from 2020.
  - Reach zero or near zero carbon no later than 2042 (5% of carbon budget remains).
  - Would require average annual emissions reductions of 13.2%.
- LULUCF:
  - SCR should increase sequestration of CO_2 through LULUCF in the future, aligned with CCC’s high level ambition of tree planting, forestry yield improvements and forestry management.
  - Recommend it compensate for the effects of non-CO_2 GHG emissions (within the geographical area) that cannot be reduced to zero, such as non-CO2 emissions from agriculture .
- Also need to take action on aviation and shipping.



Bottom-up assessment: SCATTER

- A tool to assess different low carbon scenarios.
- A series of ‘levers’ – can choose level of ambition (1-4).
- Tool shows how emissions will change under different scenarios for each LA or combined authority.



- If all levers set to maximum – SCR would achieve net zero by between 2040 and 2045.
- So what does this mean…

SCATTER: emerging example assumptions for meeting net zero emissions

- Transport sector:
  - 25% reduction in total travel demand by 2030; share of distance travelled by car reduces by 22% by 2050
  - By 2035, 100% zero emissions vehicles and buses, complete railway electrification by 2025
  - 100% of zero emission cars use batteries by 2050
  - Road modal share falls to 50%; greater hybridisation. Rail freight is all electric
- Buildings sector:
  - 60% homes insulated, average thermal leakiness decreases by 75%
  - Energy demand for domestic lights and appliances decreases by 60%
  - Energy used for domestic cooking is entirely electric
- Commercial and industry:
  - Space heating demand drops by 40%, hot water demand by 30%, cooling demand by 60%
  - The proportion of commercial heat supplied using electricity is 80-100%
  - Electricity demand for lights & appliances decreases by 25%; energy demand for cooking decreases by 22%
- Waste sector:
  - Quantity of waste decreases 20%
  - 65% Recycling, 10% landfill, 25% incineration achieved by 2035, increasing to 85% by 2050

Bottom-up assessment: CURB

- A model developed for the World Bank for us by cities.
- Allows user to vary assumptions about specific policy interventions (i.e. not pre-set like SCATTER).

<<Modelling work is still ongoing and an update on CURB will be given at the Infrastructure Board meeting.>>