WEF's Annual UK Onshore Energy System Review

Frances Warburton – Partner, EY

2 November 2023

Building a better working world

Market evolution: challenges and changes required to transition the energy system

Net Zero – where we are now?

- CCC progress report
- PM Net Zero announcements and implications
- National Infrastructure Assessment

Where do we have certainty now?

- FSNR/RIIO3 Framework decision
- Energy Act – CCUS, Heat and FSO arrangements enacted
- Hydrogen / CCUS backbone and clusters progressing

What will likely wait until after the next election?

- REMA decision and related reforms
- Whether hydrogen will have a role in heating
- How closely we coordinate with Europe on energy
- Level of public funding for Net Zero

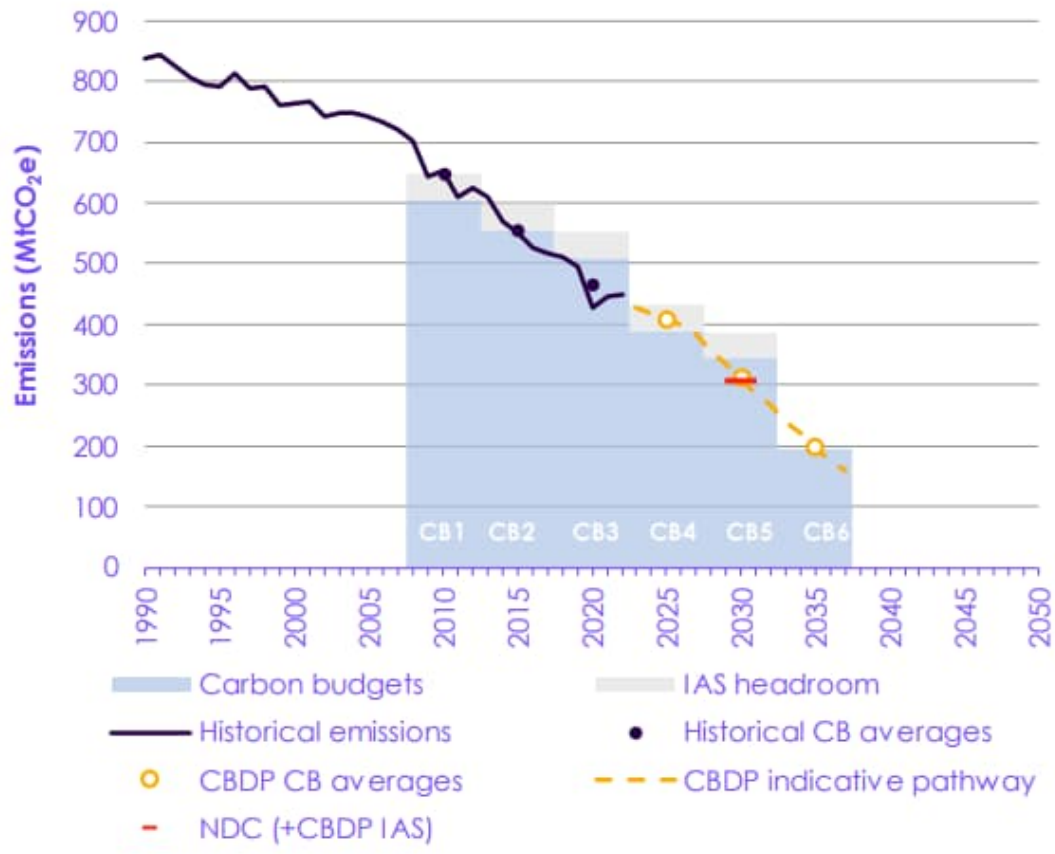
Net Zero – where are we on reaching our goals?

There are four components to our Net Zero goals:

1. An obligation for the UK to reduce its greenhouse gas emissions by 100% from 1990 levels by 2050
2. An obligation to meet 5-yearly Carbon Budgets
3. The 2030 Nationally Determined Contribution (NDC) to reduce greenhouse gas emissions by at least 68% by 2030, compared to 1990 levels.
4. The Carbon Budget Delivery Plan (CBDP) (published in March this year) sets the proposals and policies to deliver Carbon Budgets 4-6

Progress to date:

- The UK achieved the first two carbon budgets and is likely to have achieved the third.
- The 2030 NDC and latter carbon budgets are significantly more challenging.



Where are we now? CCC's June 2023 Net Zero progress report indicates we still have a way to go

Table 1
Summary of progress against key indicators

Surface transport	Energy supply	Buildings	Industry	Agriculture and land
Electric car sales (G)	Grid storage (G)	Electricity to gas price ration (G)	Bioenergy use in industry (G)	Livestock numbers (G)
Battery cell prices (O)	Dispatchable low-carbon capacity in development (G)	Greening Government commitments (G)	Electricity use in industry (O)	Livestock exports (G)
Petrol / diesel car intensity (O)	Offshore wind (O)	Low-carbon share of heat supply (O)	Energy consumption per unit of GVA (O)	Food waste (G)
Petrol/diesel van intensity (O)	Onshore wind (O)	Energy efficiency measures (R)	Private sector targets (R)	Woodland management (O)
Van km (O)	Unabated gas (O)	Heat pump installations (R)	Industrial process emissions (R)	Crop yields (O)
HGV km (O)	Refineries emissions (O)	Heat pump costs (R)	Hydrogen use in industry (W)	New woodland (R)
Electric van sales (R)	Solar PV (R)	Trained heat pump installers (R)	Pipeline of hydrogen projects (Gr)	Peatland restoration (R)
Car km (W)	Active demand response (W)	Residential energy demand (W)	Industrial energy efficiency (Gr)	Anaerobic digestion (R)
Public chargepoints (W)	Low-carbon hydrogen production (W)	Non-residential energy demand (W)	Pipeline of industrial CCS projects (Gr)	Energy crops (W)
Public transport demand (LGr)	Oil and gas production emissions (W)	Non-residential buildings energy intensity (W)	Industry consumption emissions (LGr)	Meat consumption (W)

- EVs - Growth in electric car market surpassing previous estimates. 17% new car sales BEVs in 2022. Too early (post pandemic) to say whether overall emissions are on track
- Power decarbonisation - there is need for a stand-alone plan for 2035 target.
- Buildings remain a significant emitter, contributing to 17% of emissions. There hasn't been significant progress post-2010. For the UK to reach its Net Zero goal, a concerted effort is required to transform how energy is used in its vast number of homes and commercial buildings.
- Industry is the third highest emitter of carbon. The Government's Carbon Budget Delivery Plan (CBDP) aims for a 69% reduction in industrial emissions by 2035 from 2022 levels.
- The CBDP focuses on CCUS and hydrogen, with lack of strategy for industrial electrification, especially in the steel sector.

PM's 20th September Net Zero announcements are not as significant as first thought

Transport

- Ban on the sale of new internal combustion engine (ICE) vehicles has been postponed from 2030 to 2035.
- However zero emissions vehicle (ZEV) mandate confirmed. Starting from January 2024, 22% of vehicles sold should be electric, which will increase to 80% in 2030 which will support emissions reduction.
- CCC said "Delaying the fossil car phase-out date to 2035 is expected to have only a small direct impact on future emissions, due to the now-confirmed ZEV Mandate."

Heating

- Ban on the sale of oil, liquid petroleum gas (LPG), and new coal heating for off-gas-grid homes has been postponed to 2035 from 2026.
- Exemptions to the 2035 ban on fossil-fuel boilers for those who find it hard to switch to low-carbon alternatives.
- Grant for air-source and ground-source heat pumps through the boiler upgrade scheme increased to £7,500.
- Scrapping of regulations on minimum energy efficiency standards (MEES) for rental properties.
- CCC says "While a 2035 phase-out date for fossil boilers is potentially compatible with Net Zero, the exemption of 20% of households from the phase-out will have an impact on emissions all the way out to 2050"

Infrastructure

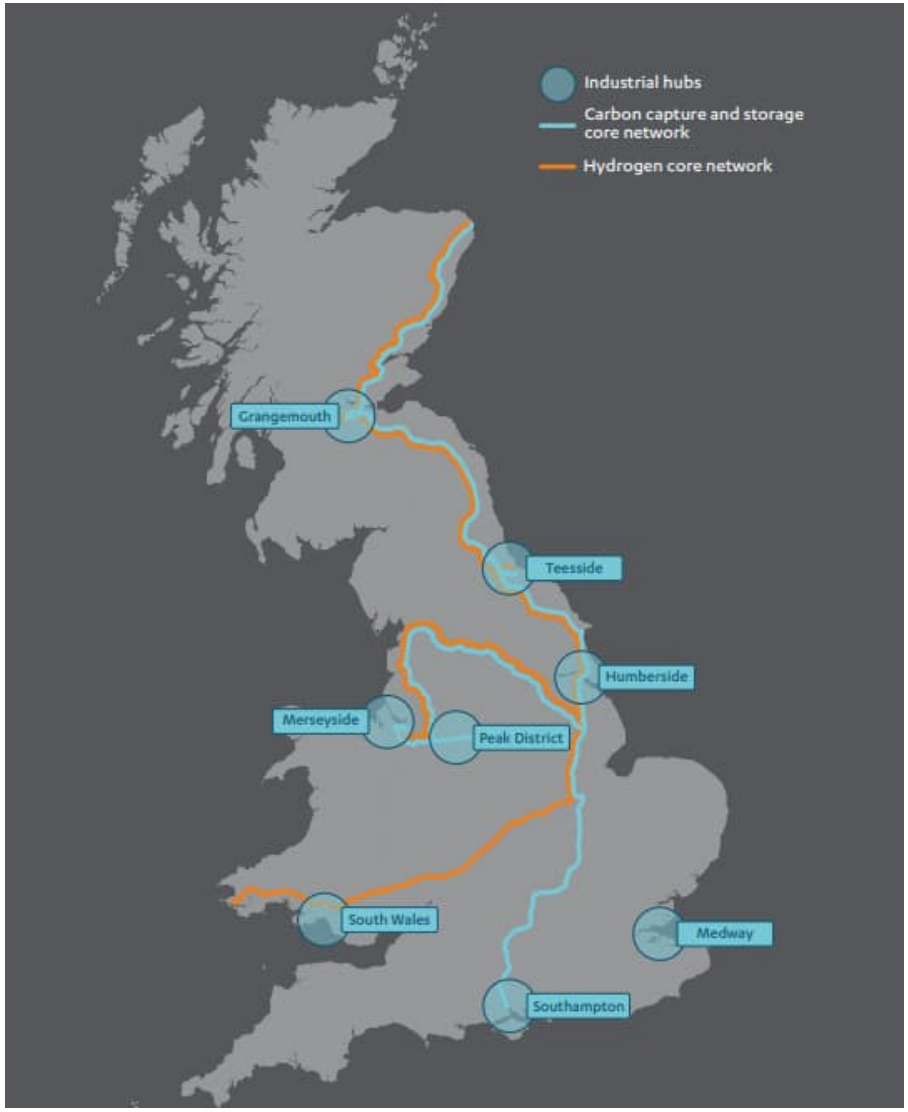
- Current grid infrastructure development is slow, taking up to 14 years, which hinders the deployment of energy technologies like offshore wind and nuclear. New reforms to expedite the "most nationally significant projects" and optimize grid connections are planned, and the "UK's first-ever spatial plan for that infrastructure".
- CCC says "There was a welcome high-level commitment to a spatial energy infrastructure plan and to changing the process for electricity grid connections"

18th October National Infrastructure Assessment recommendations for energy and net zero

The NIC recommends that Government:

1. target a total of 60GW of short duration flexibility by 2035, phasing out unabated gas fired generation so that it generates less than two per cent of electricity by 2035
2. ensure that by 2030 multiple large scale power stations are deployed for gas generation with CCS and hydrogen fired generation
3. reform governance arrangements to enable the transformational change in network infrastructure, including the FSO developing a strategic spatial energy plan by 2025, and establishing Regional System Planners in time to inform the ED3 control starting in 2028
4. reduce energy demand from buildings and commit long term funding to deliver low carbon heat across the public sector estate, social housing and for households on lower incomes
5. support seven million buildings in England to switch from fossil fuel heating to a heat pump or low carbon heat network by 2035
6. not support the rollout of hydrogen heating and plan for the end of the use of natural gas for heat by banning new connections to the gas network from 2025 and ending the sale of all new fossil fuel boilers in 2035
7. commit to the development of a carbon transmission and storage network that can transport and store at least 50MtCO2 e per year by 2035
8. commit to the development of a core hydrogen pipeline network that is operating no later than 2035
9. target establishing a minimum of eight TWh of large scale hydrogen storage to be in operation by 2035
10. accelerate deployment of EV public charge points to reach 300,000 public charge points by 2030 and keep pace with sales of electric vehicles

National Infrastructure Assessment set out proposals for core hydrogen and CCUS networks



Hydrogen core network

- Outlines that by 2035, networks for the storage and transmission of hydrogen and carbon should be operational.
- These should prioritise access to hydrogen for potential large users located in industrial hubs, including chemicals, steel, and high-temperature heat users where electrification is difficult.
- These should connect these users to probable sites for both electrolytic and carbon capture enabled hydrogen production.
- Core network should connect Grangemouth, North East Scotland, Teesside, Humberside, Merseyside, and South Wales.

CCUS core network

- Government should commit to the development of a carbon transmission pipeline and storage network that can transport and store at least 50MtCO_2e per year by 2035.
- These would link up and prioritise decarbonisation for the biggest emitters: cement and lime, carbon capture and storage-enabled hydrogen, petrochemicals, and chemicals industries.
- Core network connections should include Grangemouth, North East Scotland, Teesside, Humberside, Merseyside, the Peak District, and Southampton.

Energy Act 2023 was passed on 26 October

CCUS

- Introduction of business models for CCUS and hydrogen to attract private investment with long-term certainty
- Establishment of an economic regulation and licensing framework for CO2 transport and storage (T&S) networks

Heating

- Creation of market-based mechanism to boost investment in the low-carbon heat and reduce the cost of heat pumps
- Plans for a large village hydrogen heating trial by 2025 to inform decisions on hydrogen's role in heat
- Implementation of heat network zoning in England to identify cost-effective heating solutions

Regulation

- Establishment of a Future System Operator for efficient energy planning in both electricity and gas systems
- Promotion of competition in onshore electricity networks, aiming for savings up to £1 billion by 2050
- Introduction of multi-purpose interconnectors (MPICs) as a new licensable activity
- Amendment to Ofgem duties to include reference to net zero targets and 5-year Carbon budgets, guiding regulatory decisions to support the government's net zero objectives
- Compensation for Energy Intensive Industries (EIIs) under the 'British Industry Supercharger'

Generation and storage

- Government aims to increase UK's nuclear capacity to 24GW by 2050 with Great British Nuclear
- Clarification on the treatment of electricity storage, categorising batteries and pumped hydro storage as distinct subsets of electricity generation.

Ofgem considered new regulatory models for RIIO-3

Ofgem investigated three regulatory 'archetypes' for RIIO-3

Regulatory model	Description	Comment
Archetype 1: Plan and deliver	▸ Investment needs defined through new strategic planning processes. ▸ Costs kept low through tendering.	▸ Reduced business plan focused process. ▸ Question of *who* is best to specify strategic network needs and *how* to achieve cost-control.
Archetype 2: Ex ante incentive regulation	▸ Investment need proposed by companies and approved by the regulator. ▸ Cost and output incentives in place to ensure efficient delivery.	▸ Status quo option: improved RIIO-2 with a simplified reporting approach. ▸ Additional uncertainty mechanisms. ▸ Suitable for BAU activities.
Archetype 3: Freedom and accountability	▸ Regulator sets out high-level objectives. ▸ Network companies pass through costs demonstrating efficiency ex post.	▸ There are examples of ex post regimes, but would requires big shift in regulatory dynamic

Ofgem’s Future Systems & Network Regulation (FSNR) framework decision was published on 26 October

Ofgem concluded that:

- the GT, GD and ET price controls from April 2026 will resemble an evolution of RIIO-2 for ongoing activities, largely using the "Incentive Regulation" Archetype, and will be called RIIO-3.
- we will implement a parallel regime for the review of major projects that are needed to meet the strategic challenges and where the timeline for decision-making will not necessarily fit with that for a RIIO-style price control. These will follow a model closer to the "Plan and Deliver" Archetype. At this stage, the sector where we have identified this as a priority is ET.
- once government decisions are made on the future of hydrogen for heating, we will revisit the appropriate form of regulation for any decisions to make structural changes to the gas networks.

REMA is considering a range of fundamental and incremental reforms to market arrangements

Review of Electricity Market Arrangements (REMA) market reform options

Wholesale market - Location	National pricing	Zonal pricing	Nodal pricing	Local imbalance pricing			
Wholesale market - Price formulation	Pay-as-clear		Pay-as-bid				
Wholesale market – Technology split	Unified Market		Split by characteristic				
Wholesale market - Dispatch	Self-dispatch		Central dispatch				
Wholesale market - Balancing	National		Local then national				
Mass low carbon power	Existing CfD	CfD with more price exposure	Deemed generation CfD	Supplier obligation	Revenue cap and floor	Dutch subsidy	Equiv. firm power auction
Flexibility	Optimised CM	CM with flex enhancements	Supplier obligation (inc. CPS)				
Capacity adequacy		Capacity payment	Centralised reliability option	Decentralised reliability option	Targeted tender	Strategic Reserve	
Operability	BAU	BAU+	Co-optimisation	Local markets	Changes to CfD/CM design		Dedicated support scheme

*Options marked in red will not be considered further by Government, while options marked in orange have been discounted as standalone mechanisms but are being considered as part of a larger reform package.

Ostend declaration of 24th April heralds a new era for coordinated development of the North Sea

Ostend declaration signed in April this year by UK, Norway and EU members France, Germany, Ireland, Denmark, the Netherlands and Luxembourg

Goal is to boost offshore wind power generation to 120 gigawatts by 2030 and at least 300 GW by 2050

In addition, commitment to development “energy islands” – connected renewable generation sites at sea – and CCUS and hydrogen networks

LionLink will be the first Multi-Purpose Interconnector (MPIC) and an important step in the journey to a more interconnected North Sea

EY | Building a better working world

EY exists to build a better working world, helping to create long-term value for clients, people and society and build trust in the capital markets.

Enabled by data and technology, diverse EY teams in over 150 countries provide trust through assurance and help clients grow, transform and operate.

Working across assurance, consulting, law, strategy, tax and transactions, EY teams ask better questions to find new answers for the complex issues facing our world today.

Ernst & Young LLP

The UK firm Ernst & Young LLP is a limited liability partnership registered in England and Wales with registered number OC300001 and is a member firm of Ernst & Young Global Limited.

Ernst & Young LLP, 1 More London Place, London, SE1 2AF.

UKC-027792 (UK) 02/23. Creative UK.

ED None

ey.com/uk