Net Zero Strategy

How to reduce your emissions before considering any offsetting

"We believe passionately in the world's transition to net zero. We are a team of trusted technical advisors who meet and exceed our clients' aspirations."

Contents

In numbers

ITPEnergised

> 75% repeat business

> 65 countries, > 30 developing countries

Directly driving 7 of 17 UN SDGs

7. Clean energy 8. Economic growth 9. Industry and Infrastructure
10. No inequality 11. Sustainability 13. Climate action
17. Partnership

Delivered > 220 RE & storage projects in 2020

Helped 190 clients achieve carbon targets in 2020

> 10 locations globally

Our motivated staff are key to us and our clients

Commercially minded & technology-enabled

How we work with you

Our approach – life cycle

We think win-win and full project life cycle to help our clients grow.

- We're passionate about Net Zero. We are a team of industry leading trusted technical advisors who aim to meet and exceed our clients' aspirations, targeting growth markets and clients.
- We identify relevant trends and innovation:
  - Emerging technologies and future best available techniques
  - Key regulations that drive investment opportunities and risks
  - Market size, growth and behaviour in short and medium term
  - Strategic actions of participants and our network
- We are then better placed to understand your wider goals
- We provide expert and commercially focused guidance and scientific analysis
- We join the dots with other ITPE services that may be of benefit
- We close gaps in expertise needed with our comprehensive network

The UK is serious about achieving net zero emissions

UK enshrines new target in law to slash emissions by 78% by 2035

Following the UK Government's announcement to be Net Zero by 2050 many businesses have set their own ambitious targets to tackle climate change.

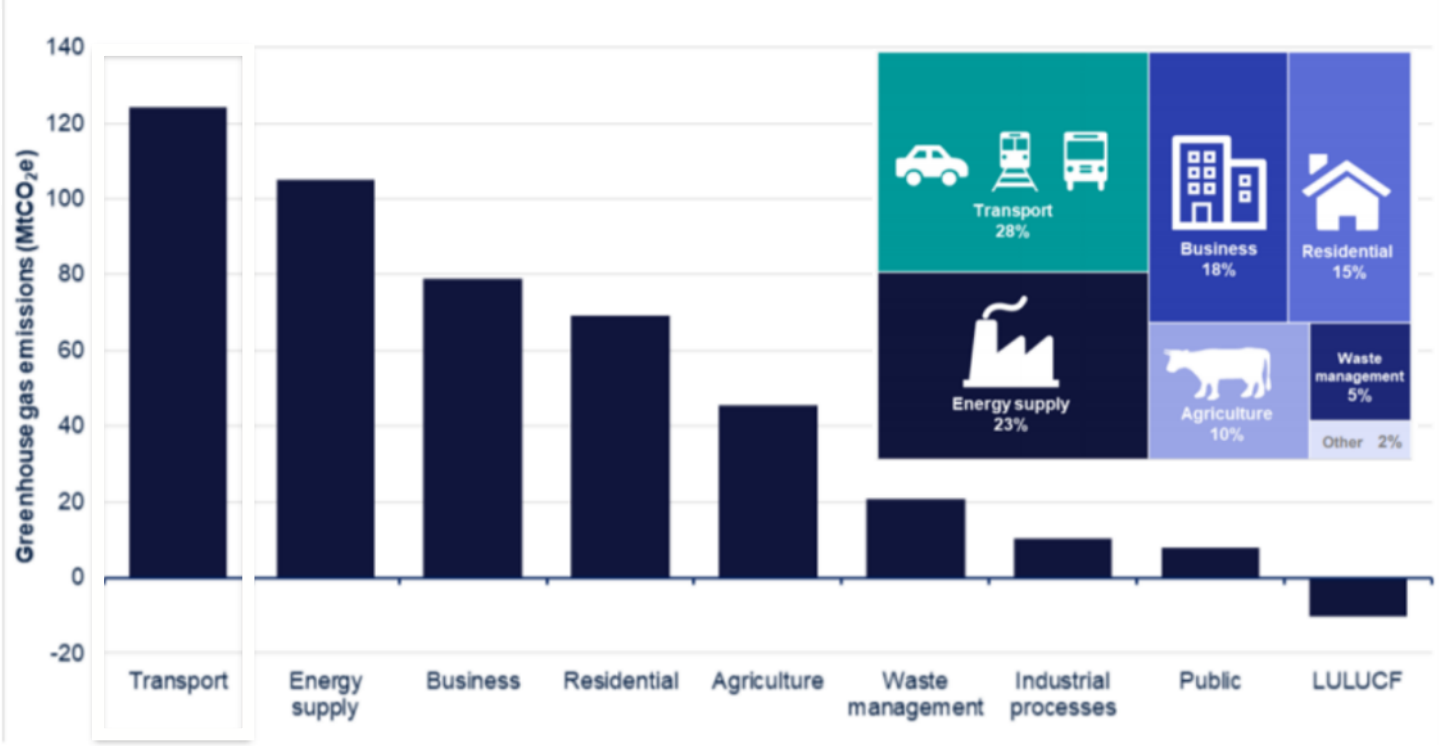
GAS BOILERS TO BE BANNED FROM NEW HOMES BY 2025

UK set to ban sale of new petrol and diesel cars from 2030

UK carbon price trades at £50 as market opens for first time

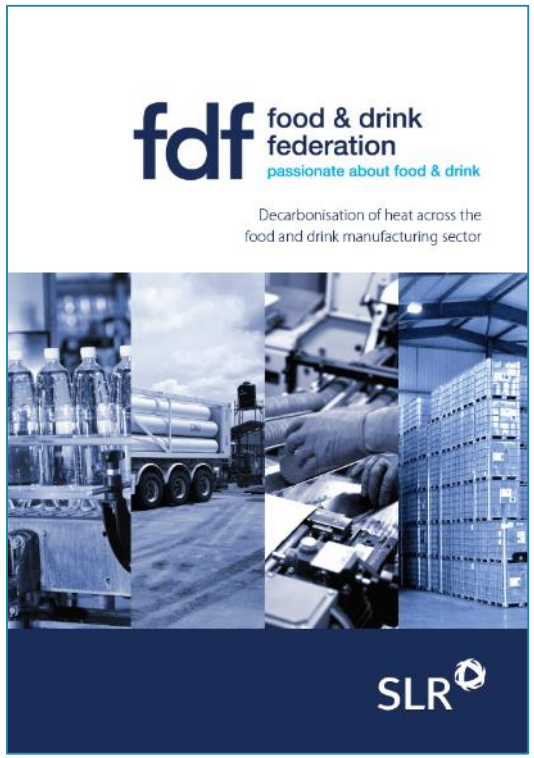
Early pricing levels suggest big UK polluters may face higher costs than groups in the EU

Greenhouse gas emissions by source sector, UK, 2018 (MtCO2e)

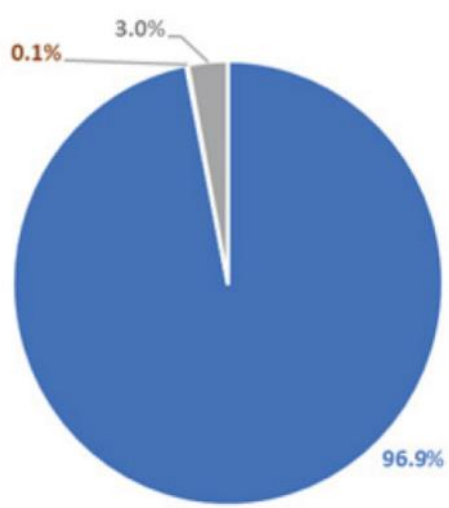


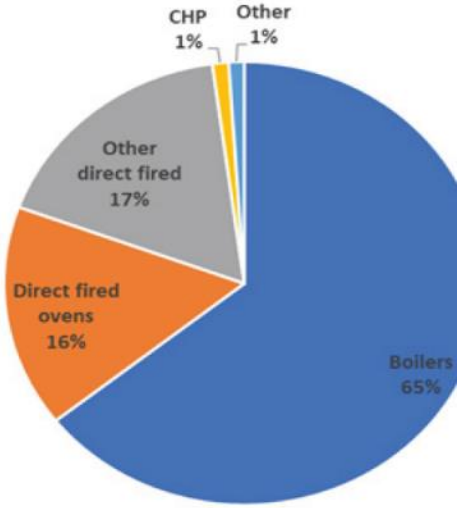
The UK food and drinks industry have set their own emission reduction targets

The FDF has set a target to reduce emissions by 60% by 2025 from a 1990 baseline and achieving net zero emissions (all embodied carbon) by 2040 – Roadmap to Net Zero



- FDF published the decarbonisation of heat report last year
- Roadmap to Net Zero
- These seminars and working groups
- Basics:
  - low-grade heat can be electrified
  - other technologies may be needed to replace natural gas over the long-term for high grade heat

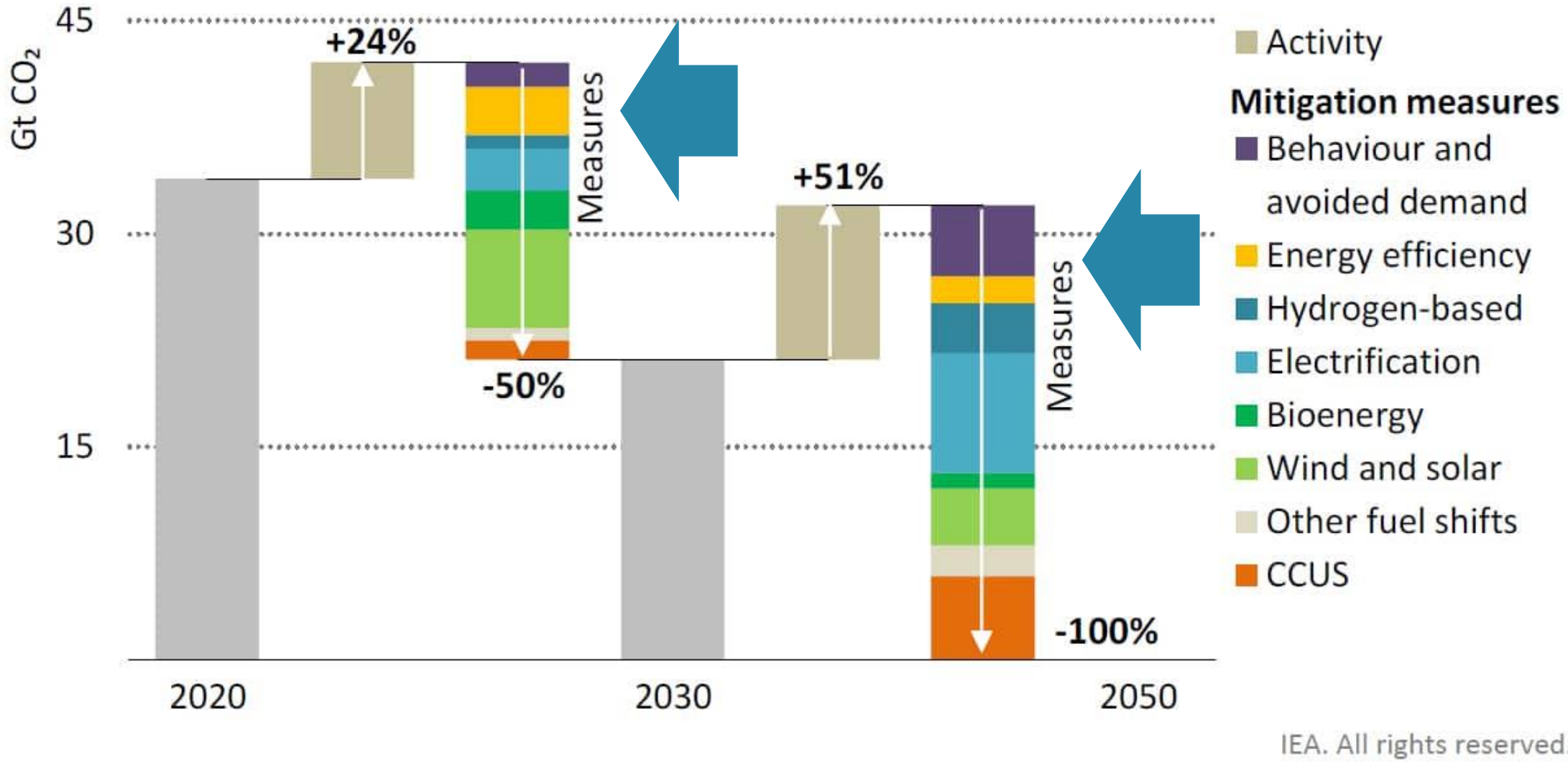




	2020	2025	2030	2035	2040	2045	2050
Boilers	Low carbon fuels, Renewables, Electrification (boilers or indirect heat users)			Low carbon fuels, Fully decarbonised gas, Hydrogen, Renewables, Electrification (boilers or indirect heat users)			
Direct Fired Overs	Electrification		Renewables, Electrification	Low carbon fuels, Fully decarbonised gas, Hydrogen, Renewables, Electrification			
Other Direct Fired	Electrification		Renewables, Electrification	Low carbon fuels, Fully decarbonised gas, Hydrogen, Renewables, Electrification			
CHP[5]	Renewables, Electrification (indirect heat users)			Low carbon fuels, Fully decarbonised gas, Hydrogen, Renewables			
Other	Electrification		Renewables, Electrification	Low carbon fuels, Fully decarbonised gas, Hydrogen, Renewables, Electrification			

Poll 1

IEA - Net Zero by 2050 Roadmap – Behaviour and Energy Efficiency



Demand side – Technologies Doing More with Less

Common Technologies that can be applied in the F&D sector

Boiler Plant

- Flash steam recovery
- Boiler trimming / new controls – to improve boiler combustion efficiency
- Boiler Feed Water Economiser (Flue Gas) – to recover heat from flue gases to minimise fuel consumption
- Auto total dissolved solids (TDS) / Reduce blowdown to a minimum – minimise heat loss from boiler
- Boiler blowdown heat recovery - waste heat recovery to minimise fuel consumption
- Boiler FD Fan fitted with variable speed drive (VSD) – minimises forced draught fan electricity consumption and improves boiler control response
- Increase condensate returns
- Insulation of all exposed surfaces

Compressed Air

- Leak detection – leaks account for >10% of demand
- Auto drains
- Variable speed drive compressors
- Compressor load management system with flow and power metering
- Change compressed air tools to battery powered where possible
- Heat recovery for space heating
- Heat recovery for process or boiler feedwater heating
- System rationalisation – dead legs due to changes on site
- Pressure reduction or use smaller dedicated compressor for higher pressure demands

Demand side – Technologies Doing More with Less

Common Technologies that can be applied in the F&D sector

Refrigeration

- Check that the best form of heat rejection equipment has been chosen
- Consider potential for pre-cooling a building/process using an ice storage system using off-peak electricity
- Investigate opportunities for heat recovery in the form of warm air or hot water
- Check the condition and thickness of pipework insulation
- Maximise free cooling
- Consider adiabatic cooling
- Consider natural refrigeration systems like ammonia
- Hot defrost systems to minimise defrost cycles
- Are the compressors oversized for current demand?

Process, Heat Recovery and Utilities

- LED lighting – solution available for most lighting needs
- Variable speed drives for motors – high electricity prices improve payback
- Process heat recovery – air preheat
- Space heating – radiant panels for high roof areas
- Building energy management systems – to control HVAC systems and lighting
- Water conservation & rainwater harvesting
- HVAC – heat recovery on AHUs – thermal wheels, run-around coils
- Power factor correction in right environment
- Replace old transformers
- Specify high efficiency motors

Energy Management – Employees Doing More with Less

ISO50001 and The Energy Conscious Organisation (EnCO)

ISO50001

- The international energy management standard
- Accepted as a route to ESOS compliance
- ISO 50001:2018 is the latest version of the standard

The **Energy Conscious Organisation** (EnCO)

- A behavioural change programme created by ESTA and EI that improves the way your organisation interacts with energy for a simple, structured approach that future-proofs organisations, creates the required skillsets and gathers evidence for a Net Zero world powered by people.
- An EnCO is an organisation that is externally recognised as measurably reducing energy consumption by applying behaviour change techniques.
- There is hard commercial evidence to show that changing behaviours to embed and maintain a good energy culture can easily make savings equal to or in excess of traditional engineered improvements.
- These opportunities to change behaviour have the potential to deliver 50 per cent of total potential energy savings.

Energy Management – Employees Doing More with Less

The Energy Management Matrix

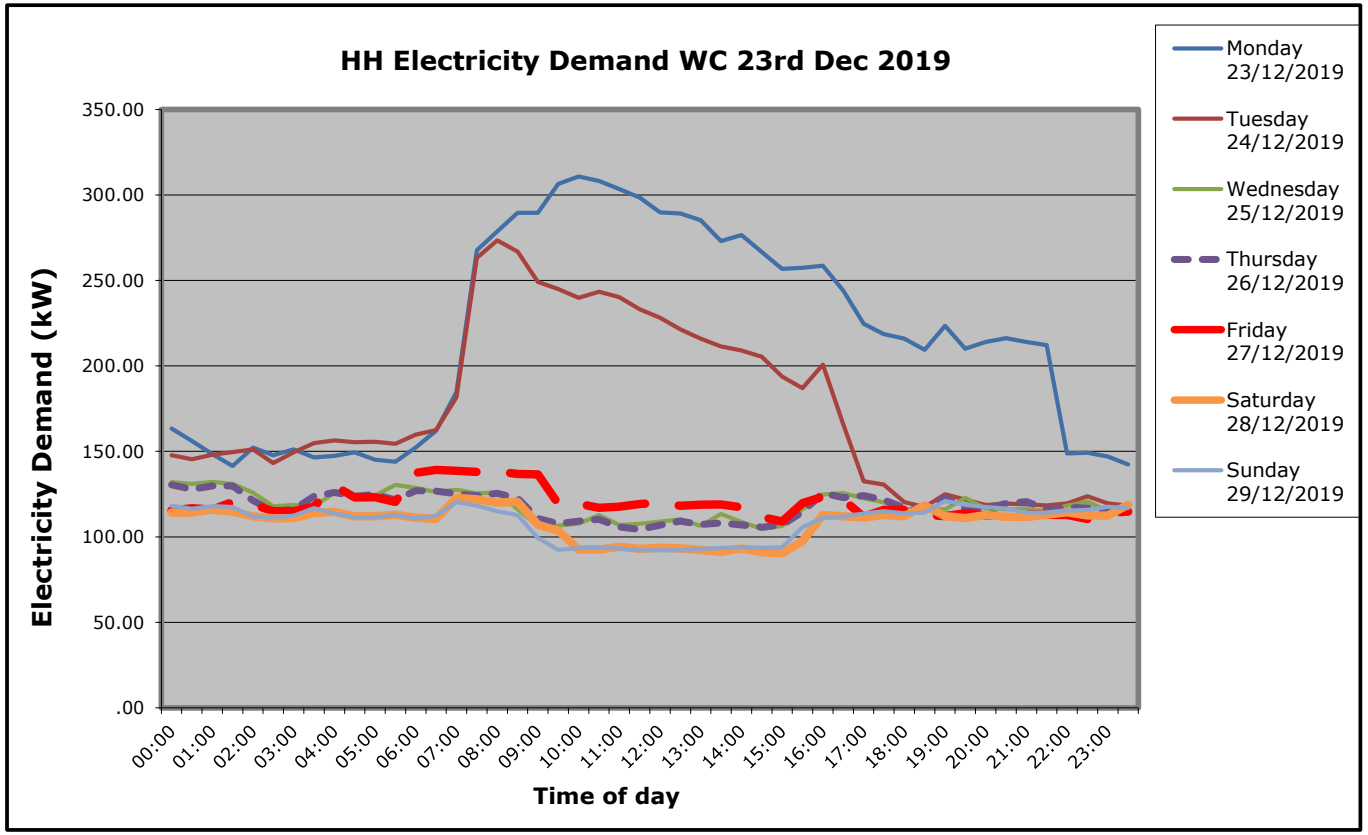
Level	Energy Policy	Organisation	Motivation	Information Systems	Marketing	Investment
4	Energy policy, action plan and regular review have commitment of top management as part of an environmental strategy	Energy management fully integrated into management structure. Clear delegation of responsibility for energy consumption.	Formal and informal channels of communication regularly exploited by energy manager and energy staff at all levels.	Comprehensive system sets targets, monitors consumption, identifies faults, quantifies savings and provides budget tracking.	Marketing the value of energy efficiency and the performance of energy management both within the organisation and outside it.	Positive discrimination in favour of 'green' schemes with detailed investment appraisal of all new-build and refurbishment opportunities.
3	Formal energy policy, but no active commitment from top management.	Energy manager accountable to energy committee representing all users, chaired by a member of the managing board.	Energy committee used as main channel together with direct contact with major users.	M&T reports for individual premises based on sub-metering, but savings not reported effectively to users.	Programme of staff awareness and regular publicity campaigns.	Same payback criteria employed as for all other investment.
2	Un-adopted energy policy set by energy manager or senior departmental manager.	Energy manager in post, reporting to ad-hoc committee, but line management and authority are unclear.	Contact with major users through ad-hoc committee chaired by senior departmental manager.	Monitoring and targeting reports based on supply meter data. Energy unit has ad-hoc involvement in budget setting.	Some ad-hoc staff awareness training.	Investment using short-term payback criteria only.
1	An unwritten set of guidelines	Energy management is the part-time responsibility of someone with limited authority or influence	Informal contacts between engineer and a few users.	Cost reporting based on invoice data. Engineer compiles reports for internal use within technical department.	Informal contacts used to promote energy efficiency.	Only low cost measures taken.
0	No explicit policy	No energy management or any formal delegation of responsibility for energy consumption	No contact with users.	No information system. No accounting for energy consumption.	No promotion of energy efficiency.	No investment in increasing energy efficiency in premises.

Energy Management – Employees Doing More with Less

Top ten tips

1. Complete the energy management matrix
2. Senior management engagement
3. One page energy/carbon policy
4. Switch off conveyors when not moving product
5. Create shutdown procedures to minimise out of hours demand
6. Staff energy suggestion scheme
7. Initiate weekly analysis of main fiscal meter supplies and submeters
8. Repair compressed air leaks
9. Raise awareness of energy costs and carbon emissions via staff noticeboards
10. Appoint a site energy champion

Analyse out of hours demand and carry out surveys



Poll 2

Onsite generation and low and zero carbon supply technologies

Potential technologies to consider but no one size fits all

Electrical Generation

- Wind turbine generation – on site or adjacent land
- Solar PV – on site or adjacent land
- Geothermal CHP
- Wave - very site specific!
- Tidal - very site specific!
- Hydro - very site specific!
- Battery energy storage – combined with solar/wind
- Hybrid renewables solution – solar and wind
- Supplying electric boilers or other processes

Thermal Technologies and Associated Technologies

- Gas fired CHP - turbine/engine – be aware of carbon issues
- Solar thermal – very poor returns
- Fuel cells CHP – with hydrogen or gas
- Biomass boiler and biomass CHP
- AD and use of waste streams
- Heat pumps – high temperature coming on to market
- Alternative Fuels like HVO
- Absorption cooling – with biomass
- Current situation for hydrogen
- Thermal energy storage status of carbon capture and storage

Supply side low and zero carbon technologies

Example of solar PV technology review

Solar Photovoltaic (PV) technology works on the principle that energy from the sun is converted to electricity. PV cells are used to convert solar radiation into Direct Current (DC) electricity. The DC electricity is then inverted to AC electricity for use in buildings or for export to the grid.

Solar photovoltaic technology is likely to be one of the most viable renewable technologies for inclusion across at the sector as:

- The technology is relatively easy to install
- The technology generates electricity which is typically consumed at point of generation
- Capital costs have reduced significantly over the last couple of years

Technology Summary: Solar PV roof mounted	
Criteria	**Comments**
Description of technology	Solar Photovoltaic (PV) technology works on the principle that energy from the sun is converted to electricity.
When output would be available and how it would interact with consumers	Solar PV panels produce electricity during the day only as they require daylight to generate power and the output is greatly reduced over winter. This means that solar could only be considered as a supplementary energy supply.
Interaction with other supply technologies	Both PV systems have been assessed on the basis that electricity generated is consumed on-site and any excess would be exported to the grid. The PV system sized to utilise the maximum available area results in 79% of generated electricity being consumed on-site, with the remaining 21% exported to the grid. The PV system sized to meet peak demand results in 92% of generated electricity being consumed on-site, with the remaining 8% exported to the grid.
Benefits	Solar PV panels are simple to install and maintain. The technology continues to become more efficient and capital costs are reducing.
Barriers	It is likely that ground mounted PV array would be subject to planning permission.
Incentives available	Feed in Tariff is no longer available having closed in March 2019. It is assumed that the assessed solar systems would export excess electricity to the grid and receive payment through the Smart Energy Guarantee scheme. (Expert Tariff £0.035 / kWh).
Technology maturity/risk	Solar PV is well established and involves relatively low risk.
Supply chain maturity and after sales support	Supply chain and after sales are well established with competitive market space.
High level costs and typical ROI	**Solar PV Array – Maximum Available Area System:** Budget cost would be ~£194k. (based on a cost of £700/kWp). Potential yield would be ~242,776 kWh per annum, with annual net benefit of ~£34k. Payback would be ~5.7 years with carbon savings of 61 tCO_2e per annum. **Solar PV Array – Typical Peak Demand System:** Budget cost would be ~£133k. (based on a cost of £800/kWp). Potential yield would be ~145,666 kWh per annum, with annual net benefit of ~£23k. Payback would be ~5.7 years with carbon savings of 37 tCO_2e per annum.

Best practice for offsetting the remaining emissions

Carbon offsetting market overview

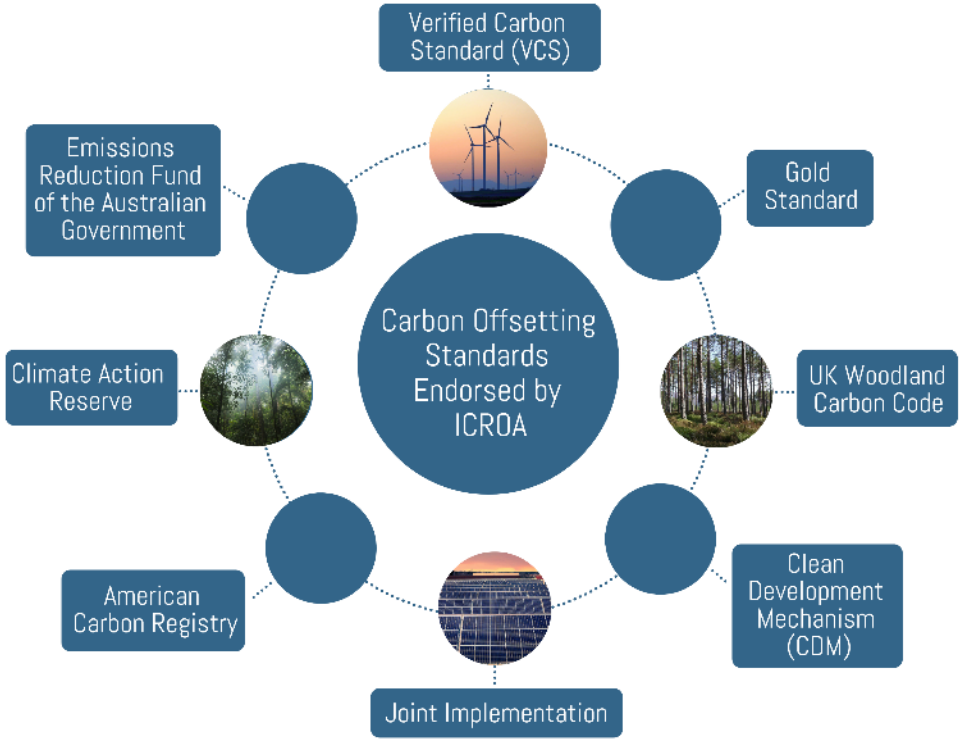
- The voluntary carbon offsetting market is growing and evolving rapidly as businesses increasingly commit to net zero and carbon neutrality.
- Navigating this market can prove challenging for businesses as there is no single certification program and several new frameworks and standards have recently been developed to support increasing demand.
- Companies need to develop a robust justification strategy for carbon offsetting to ensure public and investor challenges can be addressed and to mitigate any allegations of greenwashing.

Best practice for offsetting the remaining emissions

Ensuring carbon offsets are credible

- The International Carbon Reduction and Offset Alliance (ICROA) Code defines international best practice principles for carbon offsetting.
- Standards that are endorsed by ICROA must meet rigorous requirements to ensure the credits they certify are high-quality.

Standards endorsed by ICROA



ICROA principles of best practice

1. **Real**
   All emission reductions and removals can be proven to have taken place.
2. **Measurable**
   All emission reductions and removals can be quantified using recognised measurement tools, against a credible baseline.
3. **Permanent**
   Carbon credits represent permanent emission reductions and removals, and potential reversals must be mitigated.
4. **Additional**
   Emission reductions and removals would not have occurred in the absence of a market for carbon offset credits.
5. **Independently Verified**
   The project methodology must be audited by a third party.
6. **Unique**
   No more than one carbon credit can be associated with a single emission reduction or removal.

Best practice for offsetting the remaining emissions

Net zero and the role of carbon offsetting

- Carbon offsetting can play an important role within net zero strategies.
- Companies must undertake the measures outlined in the figure opposite to ensure net zero claims are credible.

Integrating carbon offsetting into net zero strategies

Carbon reduction strategy

- Businesses must first set a strategy to eliminate or reduce their direct emissions in line with international climate targets by 2050.
- Companies must communicate how carbon offsetting fits within broader plans for decarbonisation.

Select suitable carbon offsets

- To ensure net zero claims are credible, carbon offsetting must directly sequester greenhouse gases from the atmosphere (e.g. through reforestation) and not indirectly (e.g. renewable energy generation).

Transition to net zero

- Companies can choose to compensate or neutralise emissions that are still being released while they transition towards net zero.

At net zero

- Once net zero has been reached, companies must neutralise residual emissions in their value chain with an equivalent amount of carbon dioxide removals.

Case Study

Bruichladdich - Low Carbon Energy Feasibility Study

Client: Bruichladdich
Location: Islay, UK
Date: 2020

Bruichladdich Distillery, located on the southwestern tip of the remote Hebridean island of Islay, are producers of single malt whiskies and gin.

The business recently became B-Corp certified, highlighting their commitment to environmental and social issues. This year the distillery also switched to a 100% green electricity supply.

Bruichladdich engaged ITPEnergised to investigate the potential to decarbonise their energy use and production at the distillery even further. The study considered the feasibility of a number of different technologies to produce low carbon and renewable energy as well as additional energy efficiency measures.

"ITPEnergised met and surpassed our expectations throughout the project – we were impressed with the approach taken from the first meeting "

AJ Cunningham, Operations Manager, Bruichladdich

Our Role:

- **Assessment and evaluation of current energy use.**
- **Initial feasibility for a range of different technologies to assess potential.**
- **A site visit and workshop at the distillery.**

ITPEnergised worked with Bruichladdich to fully understand the nature of current and planned energy use at the distillery and to carefully select a range of potential technologies. This was followed by high-level feasibility assessment for all technologies, considering a range of aspects including maturity, risks, return on investment and carbon impact, among others. A site visit and workshop allowed Bruichladdich and ITPEnergised to clarify and discuss findings.

Outcome:

The final report has enabled Bruichalddich to take a more strategic look at decarbonising their energy use and production, ensuring that only technologies with real potential are considered further as the business looks to take more steps towards a low and zero-carbon future.

Some of our clients

BRUICHLADDICH
PROGRESSIVE HEBRIDEAN DISTILLERS

SHETLAND SPACE CENTRE

PURINA

T

WILLIAM GRANT & SONS
INDEPENDENT FAMILY DISTILLERS SINCE 1887

STOCK
SPIRITS GROUP

GILBERTSON & PAGE LTD.
Established in 1873.

MARICK

PRINCES

Nestlé

DEVRO

DSM

SIMEC

ESTD 1895
GORDON & MACPHAIL

aggreko

Some of our clients

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Bristol, London, Edinburgh, Glasgow, Aberdeen, Lisbon, Madrid, Delhi, Beijing, Canberra and Auckland

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