Scottish Engineering

Route map to net zero

Securing a Green Recovery on a Path to Net Zero

House keeping

> Please place your microphone on mute and camera off

> Session will be recorded

> Slides will be made available

Scottish Engineering

Aggreko Lomondgate

Roadmap to a Net Zero Carbon Operation

Iain MacLachlan
Emissions Reduction Program Manager

March 2023

aggreko

What Aggreko Does…..

Aggreko is a global supplier of mobile and modular power, temperature control equipment and energy services, headquartered in Scotland.

Aggreko is the world's largest temporary power company. It has more than 10 gigawatts of power across its fleet globally. The company employs over 6,000 people and operates across the world in more than 200 locations in 80 countries and has offices in every continent.

The business supplies short-term temporary power to a range of customers and applications including businesses, large events, music festivals, sporting events, industrial sites, and mines.

The items hired out include gas and diesel generators, load banks, heaters, air conditioners and chillers. Aggreko offers greener and cleaner HVO and solar powered generators and hybrid batteries that emit less emissions.

Aggreko's Commitment To Net Zero

Transparency, accountability, and ambitious sustainability goals

We are helping our customers hit their sustainability goals with cleaner technology. In parallel to this we are also reducing our own carbon footprint, and seeking to improve the lives our people and the communities we serve. All the while we are accountable and transparent about the progress we are making.

We are continuously monitoring our environmental impact

#1 Monitoring Energy Efficiency In Our Premises
#2 Reviewing Energy Efficiency In Transportation
#3 Increasing The Efficiency Of Our Operations

We are rapidly adopting emission reduction strategies

#1 Transitioning Electricity To Renewable Energy Sources
#2 Rethinking Business Travel
#3 Reducing Equipment Emissions
#4 Reducing Waste To Landfill

https://www.aggreko.com/en-gb/about-us/sustainability

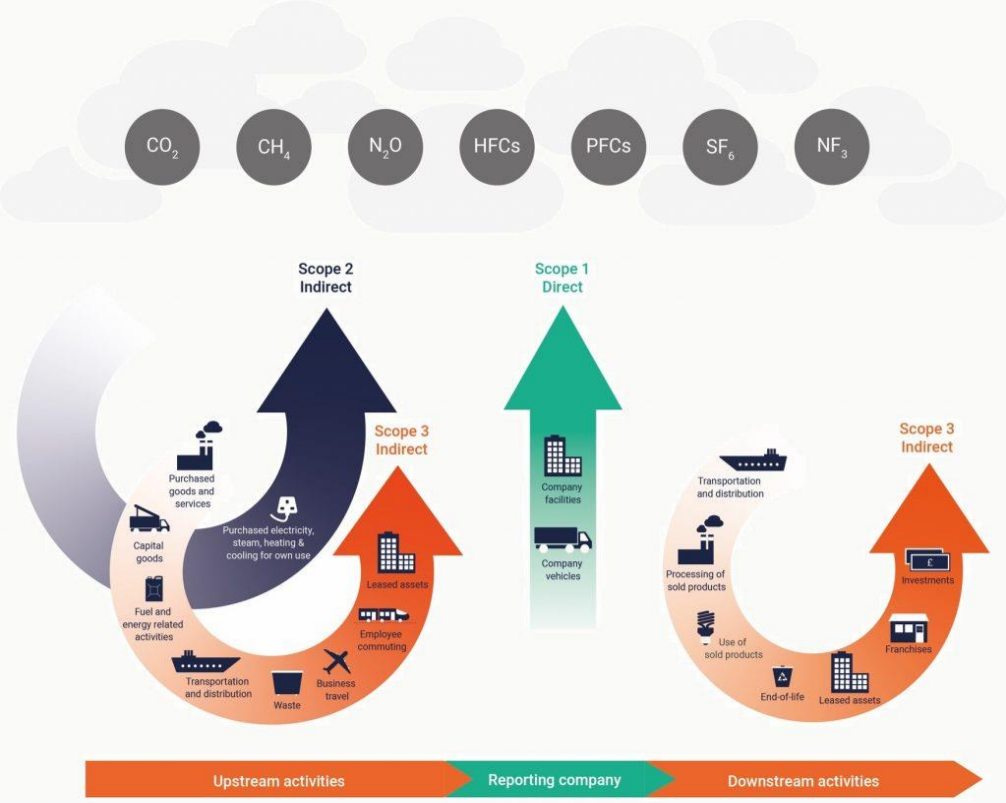
What Does This Mean?

Reduce the scope 1 and 2 greenhouse gas emissions from our facilities and operations

- Energy efficiency measures at facilities
- Consolidate facilities
- Cleaner energy sources (renewable grid, solar, storage)
- Cleaner vehicles (electric/hybrids/smaller vehicles)
- Increased remote monitoring to reduce travel
- Optimise testing using battery storage in place of loadbanks, alternative fuels
- Minimise F-Gas Losses
- Off-set residual emissions that we cannot reduce further

Reduce the local air quality emissions from our energy solutions

- Invest in cleaner emissionised products
- Supply air pollution control devices (where appropriate)
- No further investment in unregulated engines



Reduce the scope 3 greenhouse gas emissions intensity of our energy solutions

- Offer the lowest impact energy solution that is as clean as is economically possible for the customer
- Fuel switch (HVO, biodiesel, gas)
- BESS
- Renewable hybrids (solar, wind, storage)
- Data driven product optimisation (right-sizing)

Future additional goal – provide energy solutions that enable our customers to avoid emissions

- Waste to energy (flare to power, landfill gas to power)
- CHP
- Facilitate green grid distribution supported with storage
- Export surplus energy to the grid

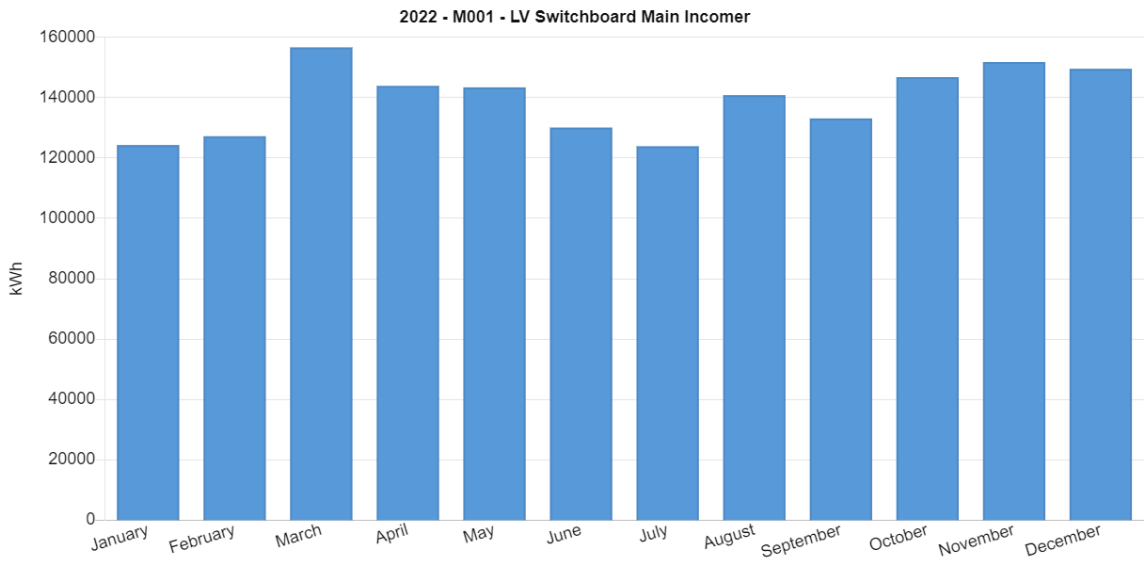
These solutions are all clean energy solutions but would not present a reduction in our scope 3 greenhouse gas emissions but they would present a reduction in our customer's reported emissions

Aggreko's Lomondgate Facility - Dumbarton

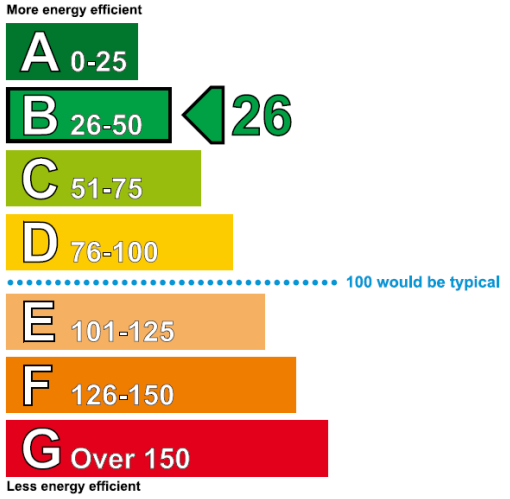
- Opened 2011
- Subject to further development 2021/22
- 19 Acre Site
- 170,000sq ft Manufacturing Space
- 27,000sq ft Office Space
- 86,000sq ft Depot Space
- Site Population – 350
- Global Centre for Manufacturing, Engineering & Supply Chain
- Repair & Refurbishment Centre
- Rental Depot

Energy Profile Of Lomondgate Facility - 2022

- Electricity Imported ~ 1,664,459kWh ~ 322T CO2e
- Electricity Exported ~ 392,272kWh
- Production Gas Consumed ~ 3,067,419kWh ~ 552T CO2e
- Facilities Gas Consumed ~ 2,257,008kWh ~ 406T CO2e
- HVO Fuel Usage ~ 150,348 litres (1,497,782kWh) ~ 5.3T CO2e



ISO 50001
ENERGY MANAGEMENT



The Lomondgate Net Zero Roadmap

Grid Consumption | Facility Upgrades | Process Changes

Electric Vehicles | Renewables

aggreko

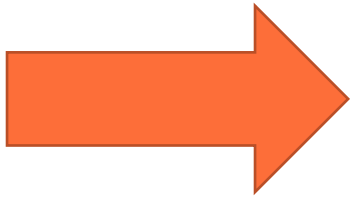
- Q3, Introduce Electric Cars & Vans as a replacement to diesel
- Integration of batteries
- Q3, rooftop solar solution, 650kWp
- Q3, Site power and lighting system upgrades and optimisation

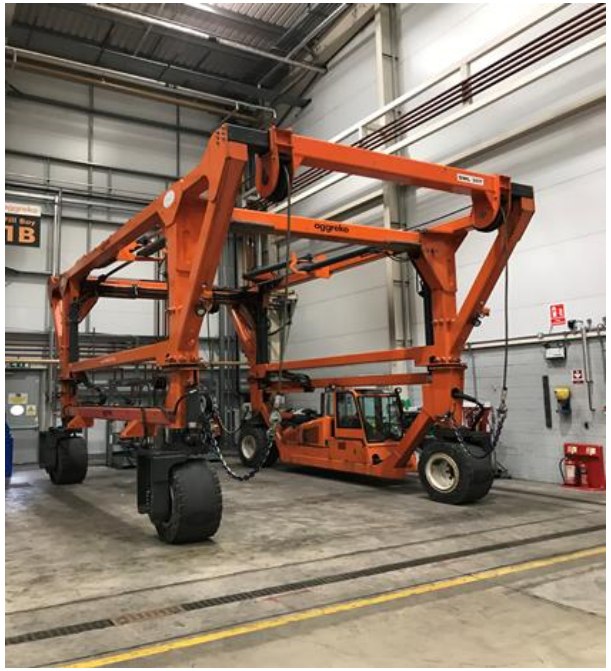
- Elimination of natural gas emissions from heating and hot water. Air sourced heat pump technology.
- Alternative renewable energy, e.g. hydrogen
- Waste heat recovery
- Removal of large site compressors
- Further Test Cell Developments

- Reduction of 600KW diesel (HVO) emissions by 50%. Reduced Test time.
- Q1, Product fuel type transition from diesel to HVO
- Q1, Full shop floor LED lighting solution installed
- Q1, Full office LED lighting system installed

- Q3, Increased exportation capability to the grid. TwinPack 50 & 60Hz. QSK60 Gas.
- Q2, Elimination of diesel emissions from “depot” operation
- Q2, Reduction / avoidance of NGG emissions by 30%
- Q1, Introduced EV charging stations

Diesel To HVO





Up to 90% lower net CO_2 emissions

All-year-round performance

Approved drop in alternative to diesel

Biodegradable and non-toxic

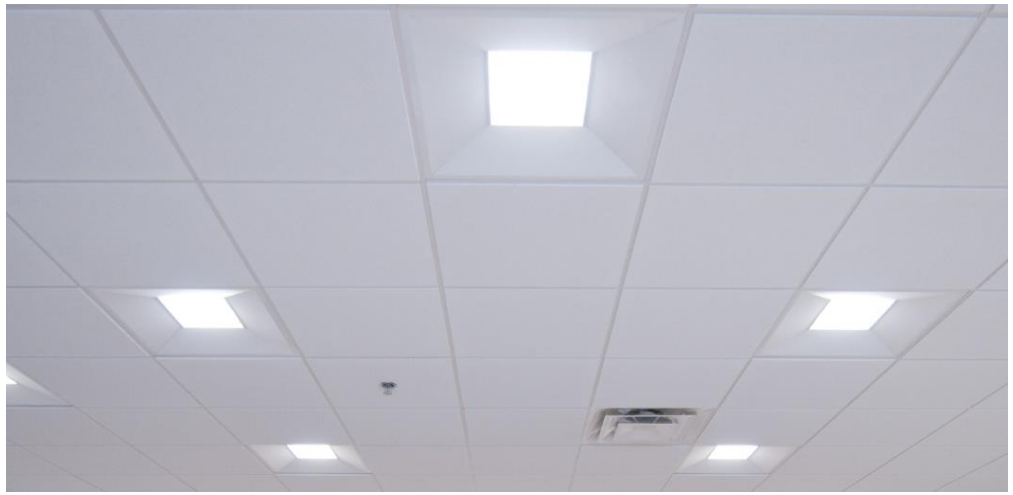
WHITE DIESEL	
500-999	172.73
1000-1999	168.73
2000-5999	168.48
6000-12000	167.23

WHITE HVO	
500-999	238.66
1000 to 2499	231.66
2500 to 4999	228.66
5000 to 9999	225.66

HVO +37%

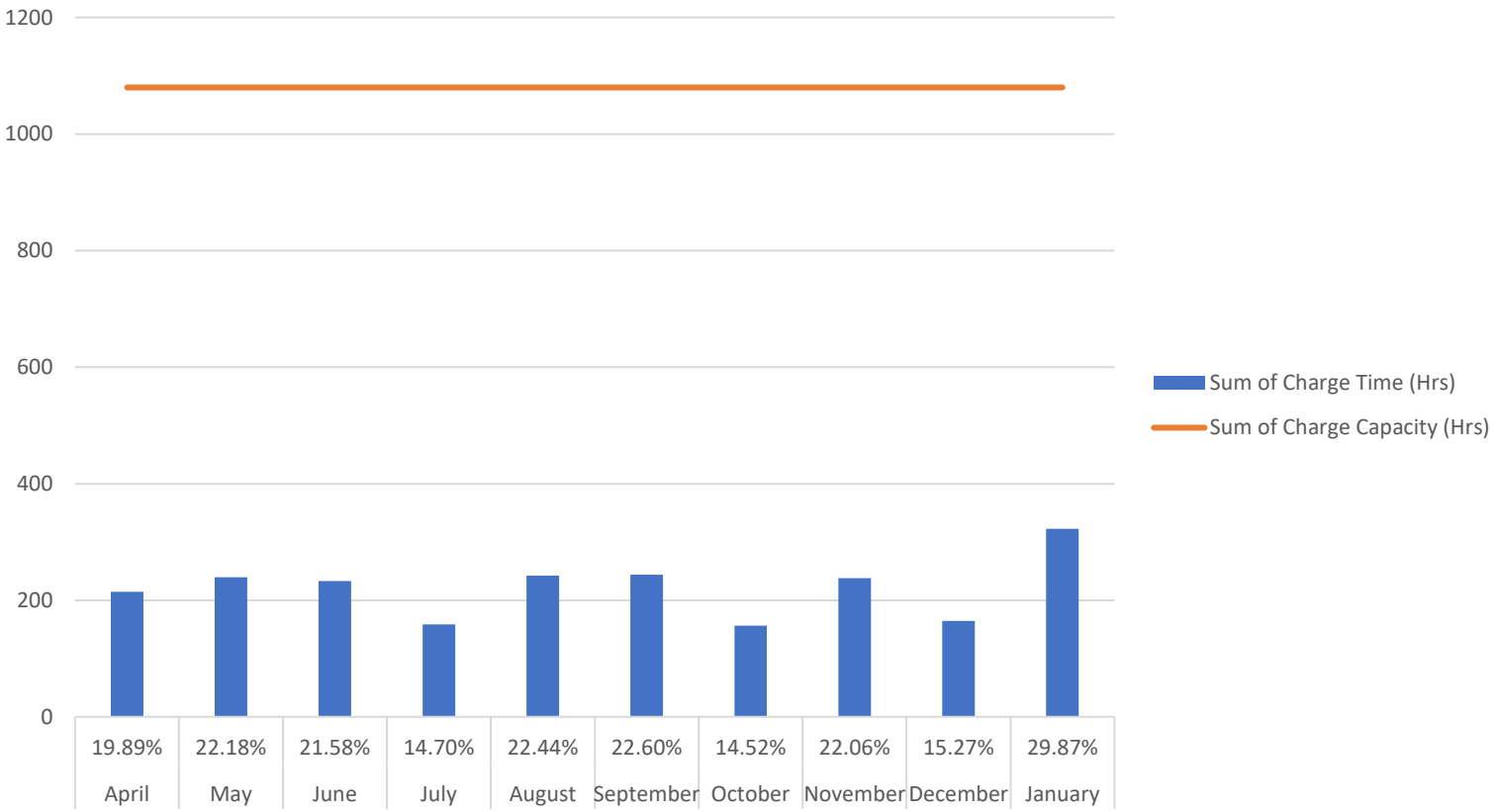
For every 1,000 litres of diesel burned, you will produce 3.6 tonnes of greenhouse gas CO_2, compared to just 195kg GHG CO_2 for every 1,000 litres of HVO burned

Lighting & Electrical Systems Upgrading



- Upgraded factory & office lighting 2021 ~ estimate 250,000kWh electricity saving per year.
- Motion sensing, light sensing, fully controllable system.
- Improves lighting performance & reduces costs.
- Estimated ROI ~ 3.5 years.

Installation Of EV Charging - Utilisation



11,787kWh Provided
(equivalent to 35,361 miles)

Saving of 9.7T CO2e
(Tank to Wheel)

TIME BASED UTILISATION – 21%

The amount of CO_2 saved is calculated using the following assumptions:

- The average EV consumes 1 kWh every 3 miles;
- The average internal combustion engine (ICE) car emits 0.27465 kg of CO_2 per mile;
- UK Government figure of 0.21107 kg per kWh of electricity produced (this includes generation, transmission & distribution).

Changing Our Product Test Times

Reduced the power run test times on all Aggreko Lomondgate manufactured products and grid connect/synchronise all products…..

- Test cells produced approximately 500,000kWh of electricity in 2022.
- Reduction of 44% from previous test methods.
- 25% was utilised to run the factory. 75% was exported.

Introduction Of Batteries

In 2023 we are looking to further increase the utilisation of self produced electricity.

650kwp Rooftop Solar Installation

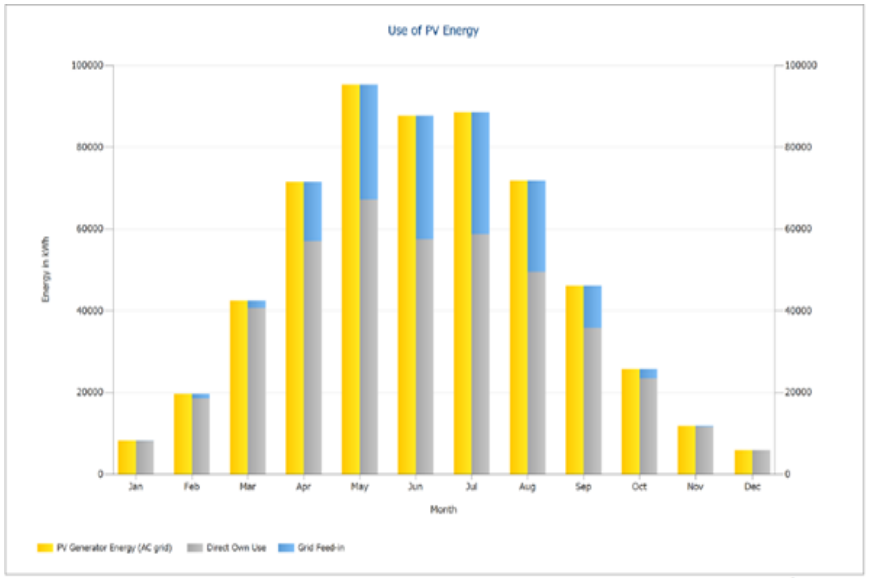
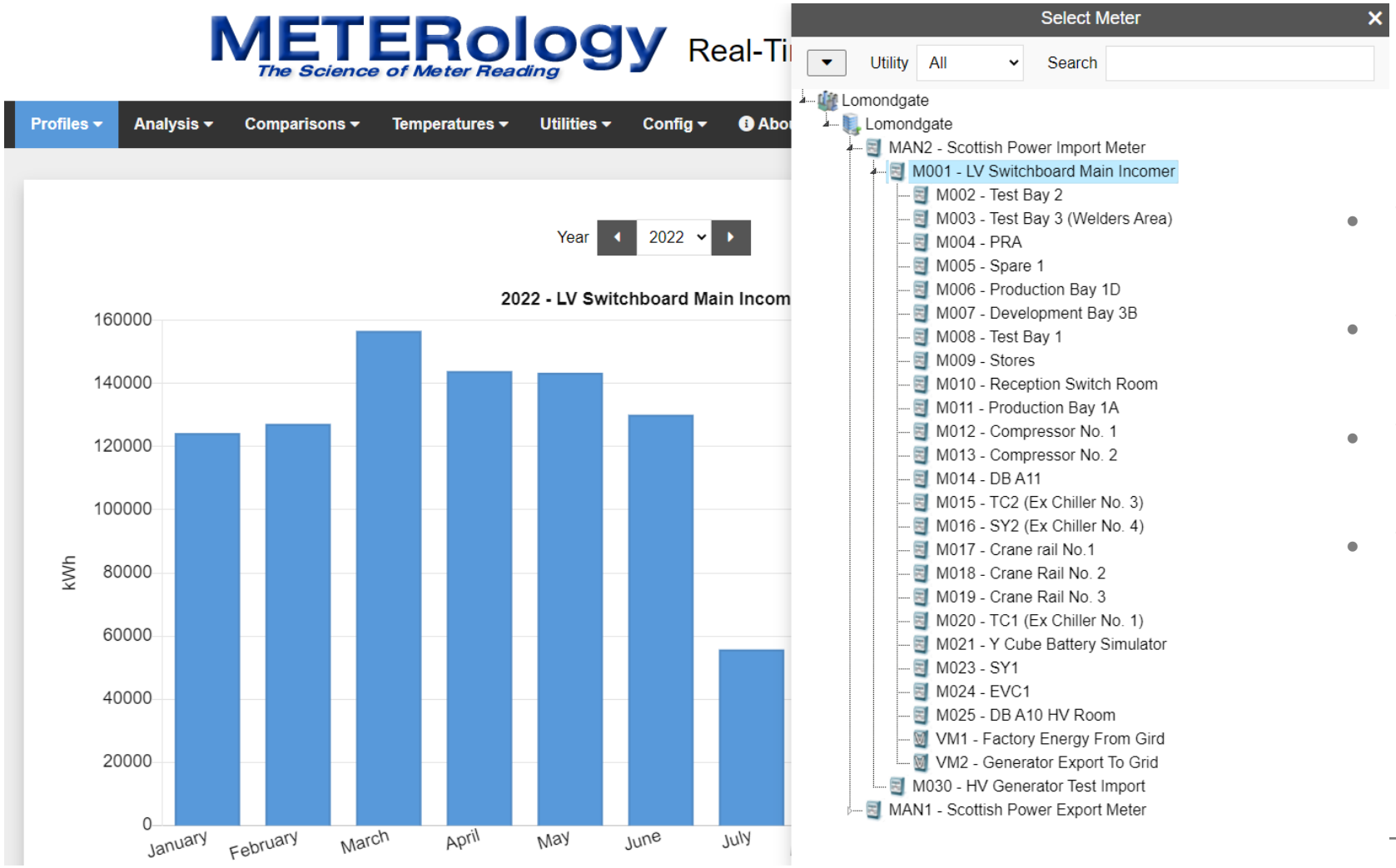


Figure: Use of PV Energy

- PV Generation – 652kWp
- Annual Performance Yield – 834kWh/kWp (544,151kWh provided)
- Expect 80% Usage. 20% Exportation.
- Self Sufficiency – 25%. Saving of £87k pa at 0.20p per kWh
- ROI – 5.5 Years.
- CO2 Reduction – 115.5T*

*CO2 savings actually zero as we are on a Green Electricity Tariff.

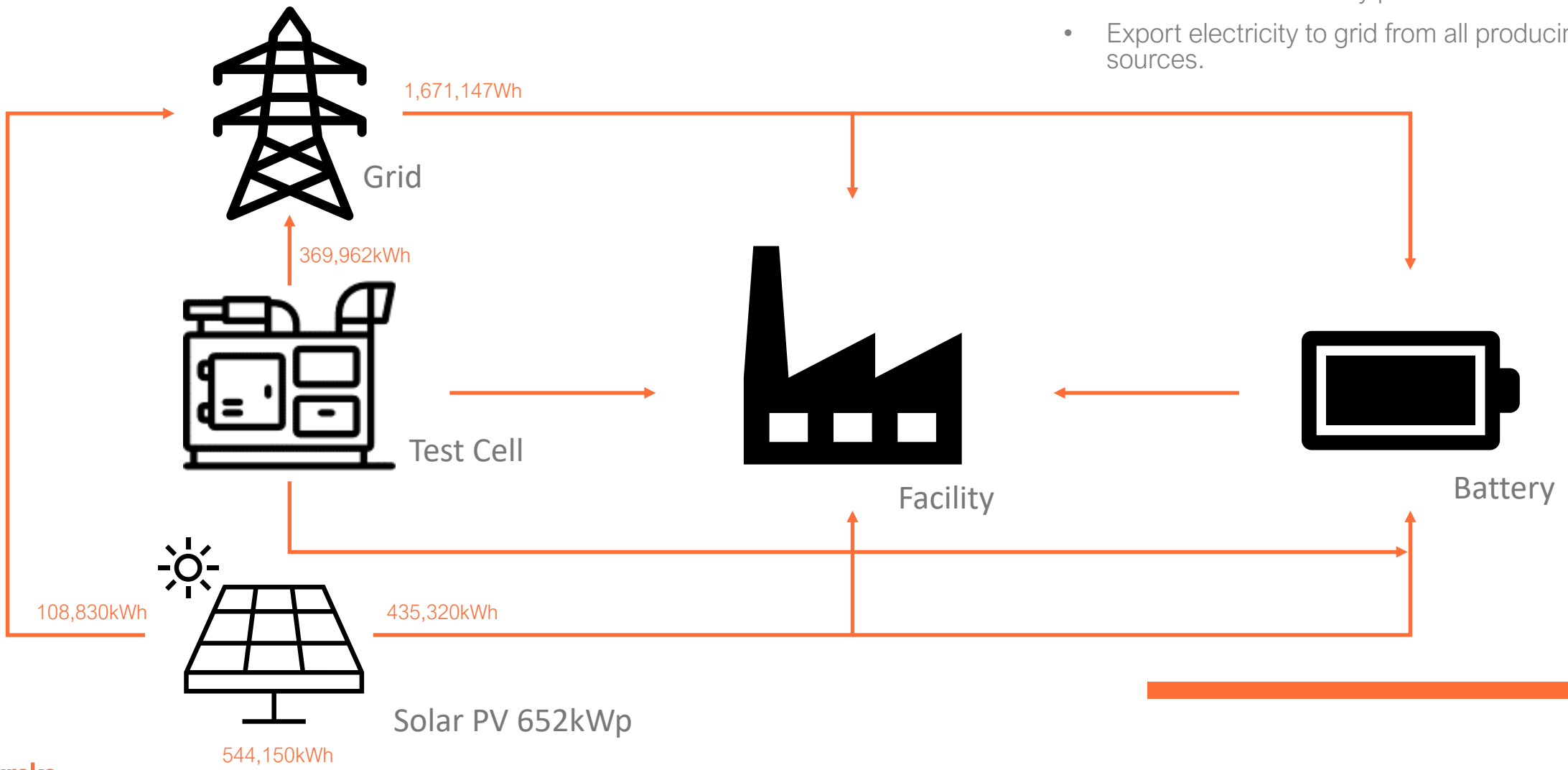
Understanding Your Energy Distribution



- What is your power level when in standard operation?
- What and when do you see power spikes?
- What is your power level when non-operational?
- Where is your power being consumed and does it make sense?

Future State Lomondgate Electricity System

- Minimise electricity import from grid.
- Maximise use of self generated & renewable electricity.
- Store excess electricity produced.
- Export electricity to grid from all producing sources.



Lomondgate 2022 Emissions Scorecard

Facility Gas – 406T	*Scope 1*	
Product Testing Gas – 552T	*Scope 1*	(243T Saving)
Grid Electricity – Zero #Green Tariff	*Scope 2*	(322T Saving)
Company Owned Vehicles – 2T	*Scope 1*	
HVO Consumed (Burned) – 5.3T	*Scope 1*	(543T Saving)
Lost Refrigerant Gas – 12T	*Scope 1*	

Lomondgate CO2e emissions for 2022 approximately

977.3Tonnes

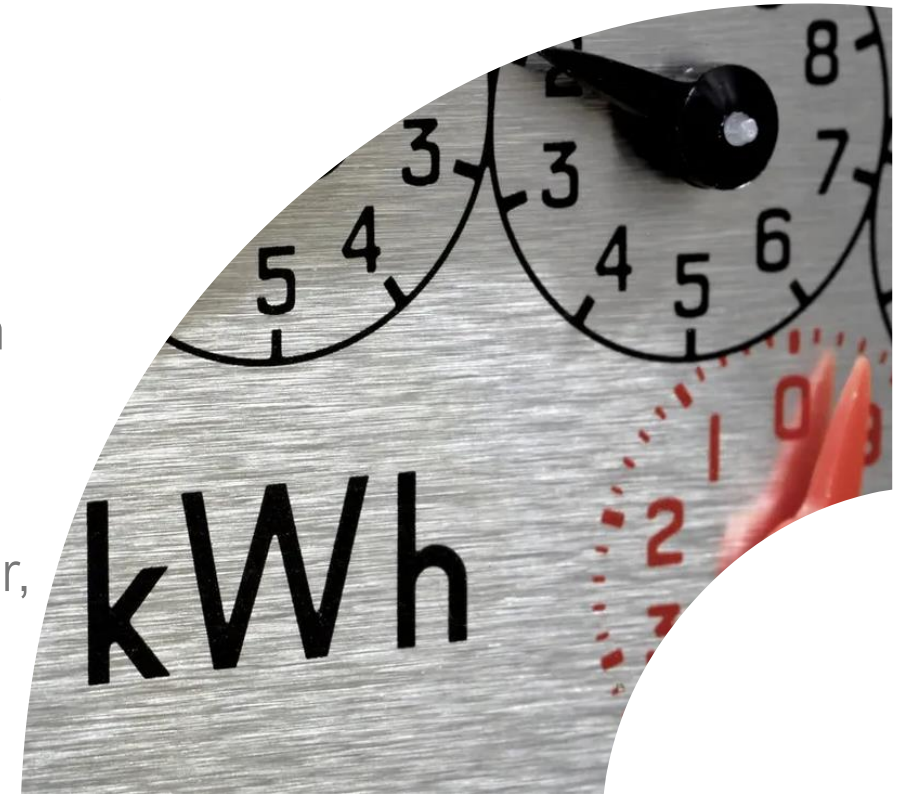
Eliminate, Reduce, Substitute…….

Key principles for emissions reduction for our facilities:

Eliminate – Remove excessive power consumption elements from our facility or operations

Reduce – Reduce consumption by identifying and replacing inefficient/old lighting, heating and other power consumption systems

Substitute – Replace fossil fuel driven systems with electric e.g. gas heating / cooling or alternative fuels (e.g. HVO, solar, storage)



Agenda

Developing a SMART roadmap to Net Zero

Itinerary – Contributions

- Webinars
  - Micro-site and downloads
  - Methodology (W7)
  - SMART Roadmap (W9)
  - Ambitions (W10)
  - Solutions (W11)
  - Offsetting (W12)
  - Costs (W13)
- Training
  - NMIS
  - UWS
- 1-to-1
  - Engagements
  - Tier 1 findings
  - Tier 2 findings

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Contributions

Webinars

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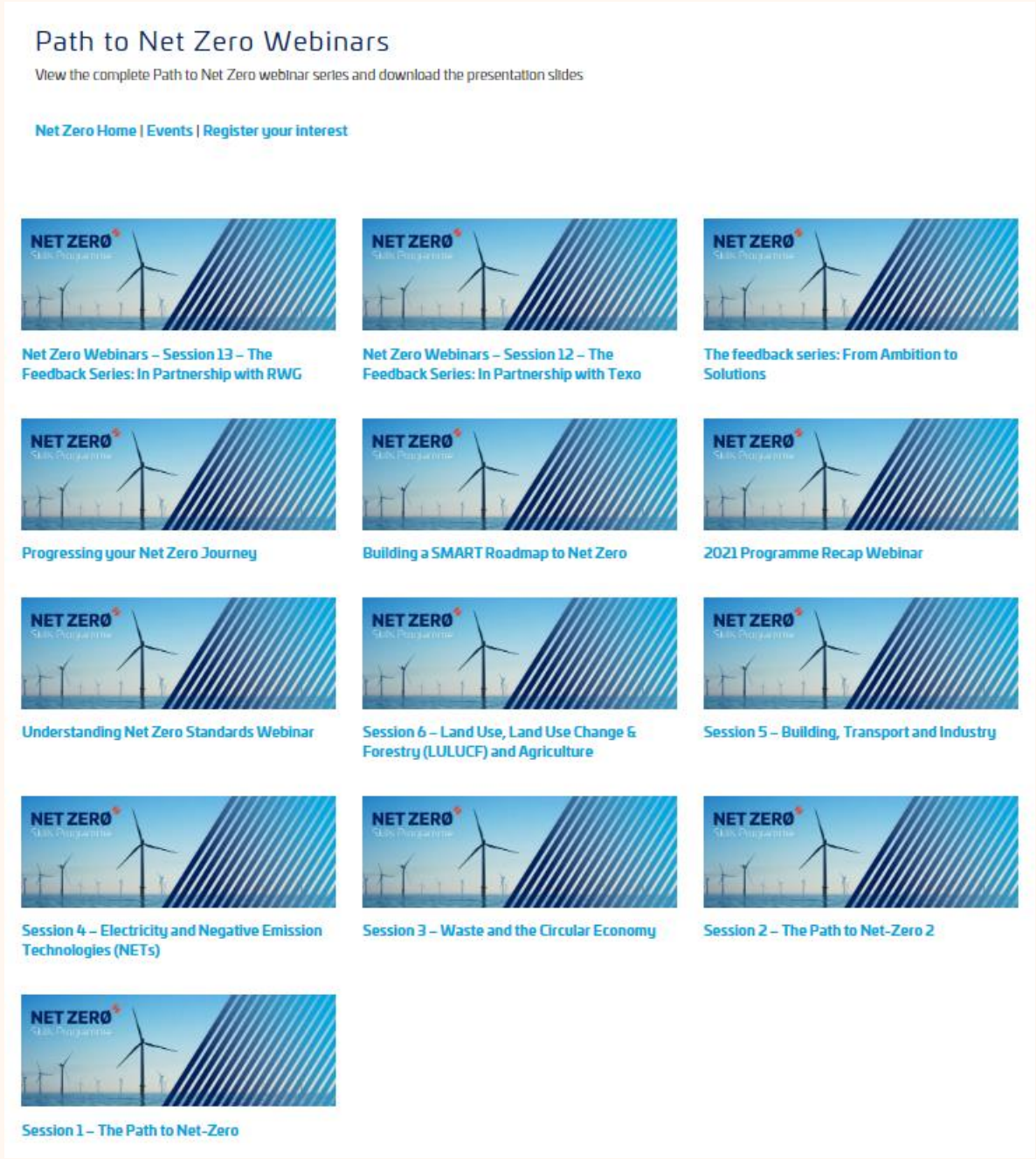
Webinars

Net Zero micro-site

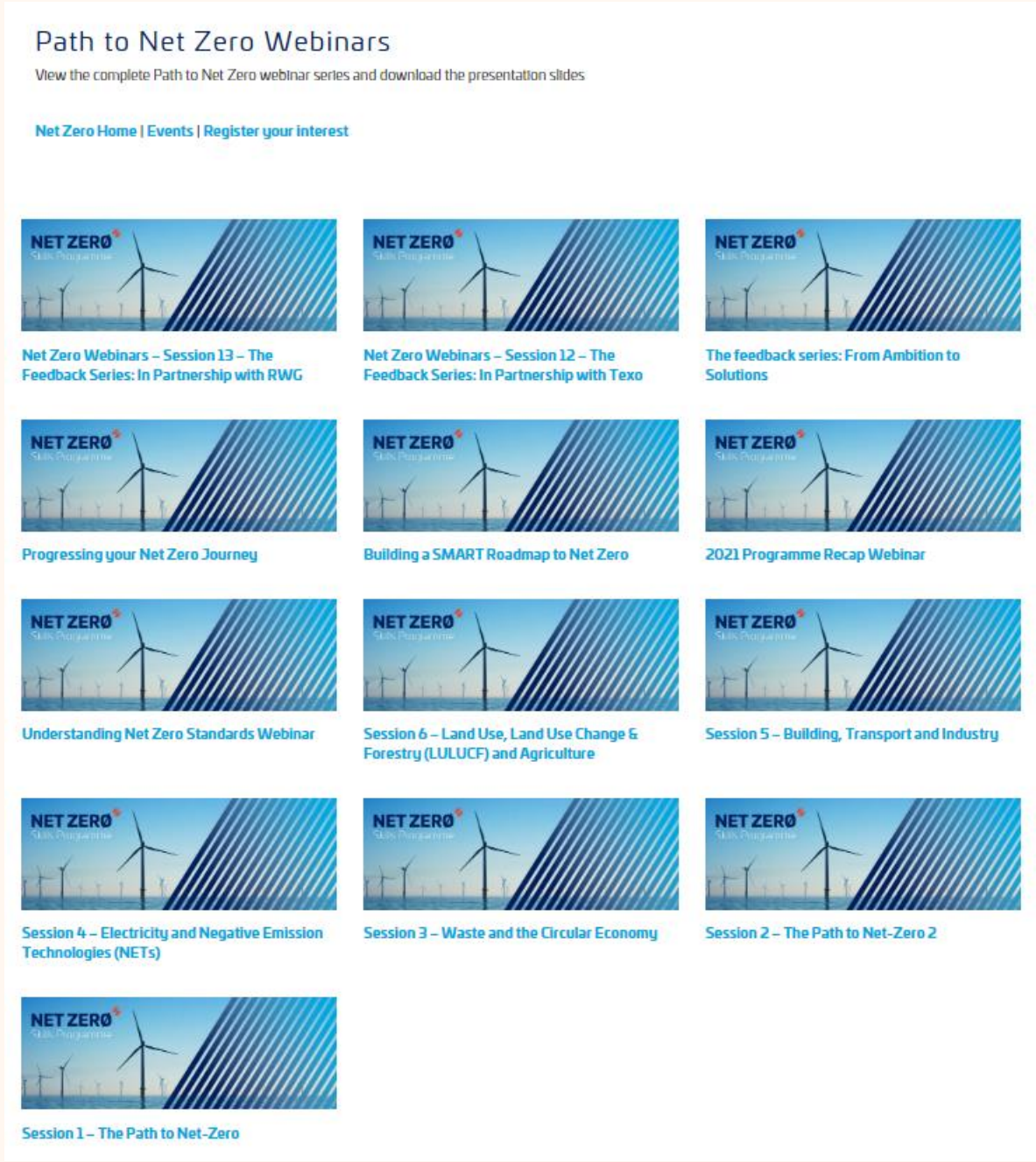
- https://www.scottishengineering.org.uk/net-zero-skills/path-to-net-zero-webinars/
- Videos and slides



Webinars

2021

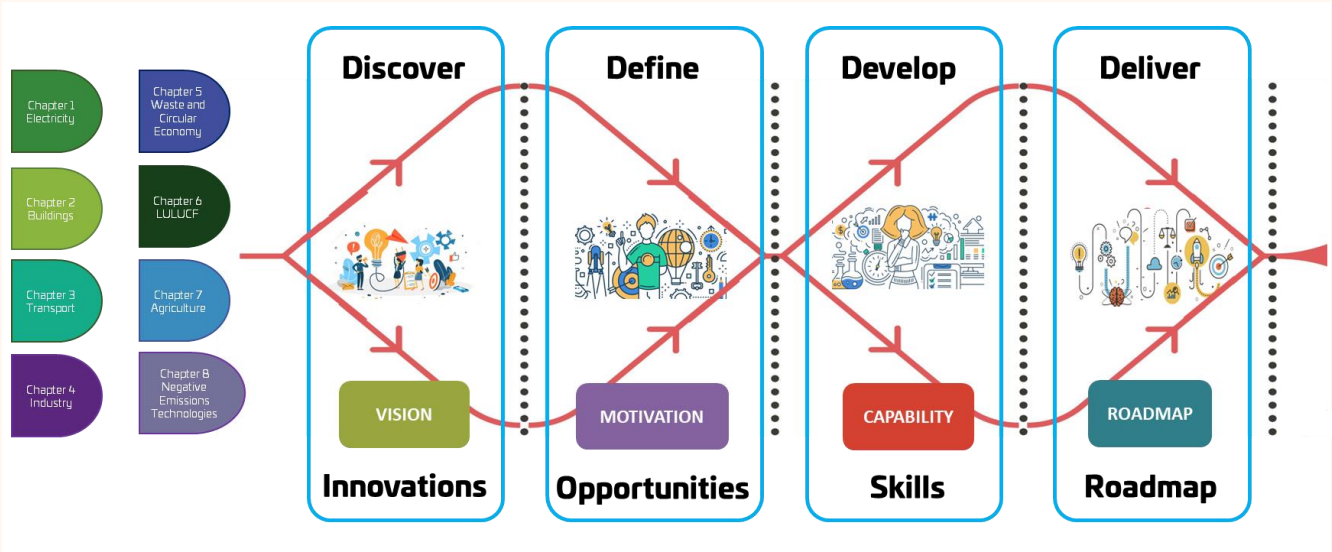
- **Awareness series** (1 and 2) – Net Zero lean thinking:
  - The 5Ws and 2Hs of Net Zero, part 1
  - The 5Ws and 2Hs of Net Zero, part 2
- **Chapter series** (3 to 6) - based on Scottish Government Climate Change Plan eight chapters:
  - Chapter 1: Electricity and Chapter 8: Negative Emissions Technologies
  - Chapter 2: Buildings, Chapter 3: Transport and Chapter 4: Industry
  - Chapter 5: Waste and the Circular Economy
  - Chapter 6: Land Use, Land Use Change and Forestry (LULUCF) and Chapter 7: Agriculture



Downloads

Form horizontals (chapters) to verticals (4Ds)

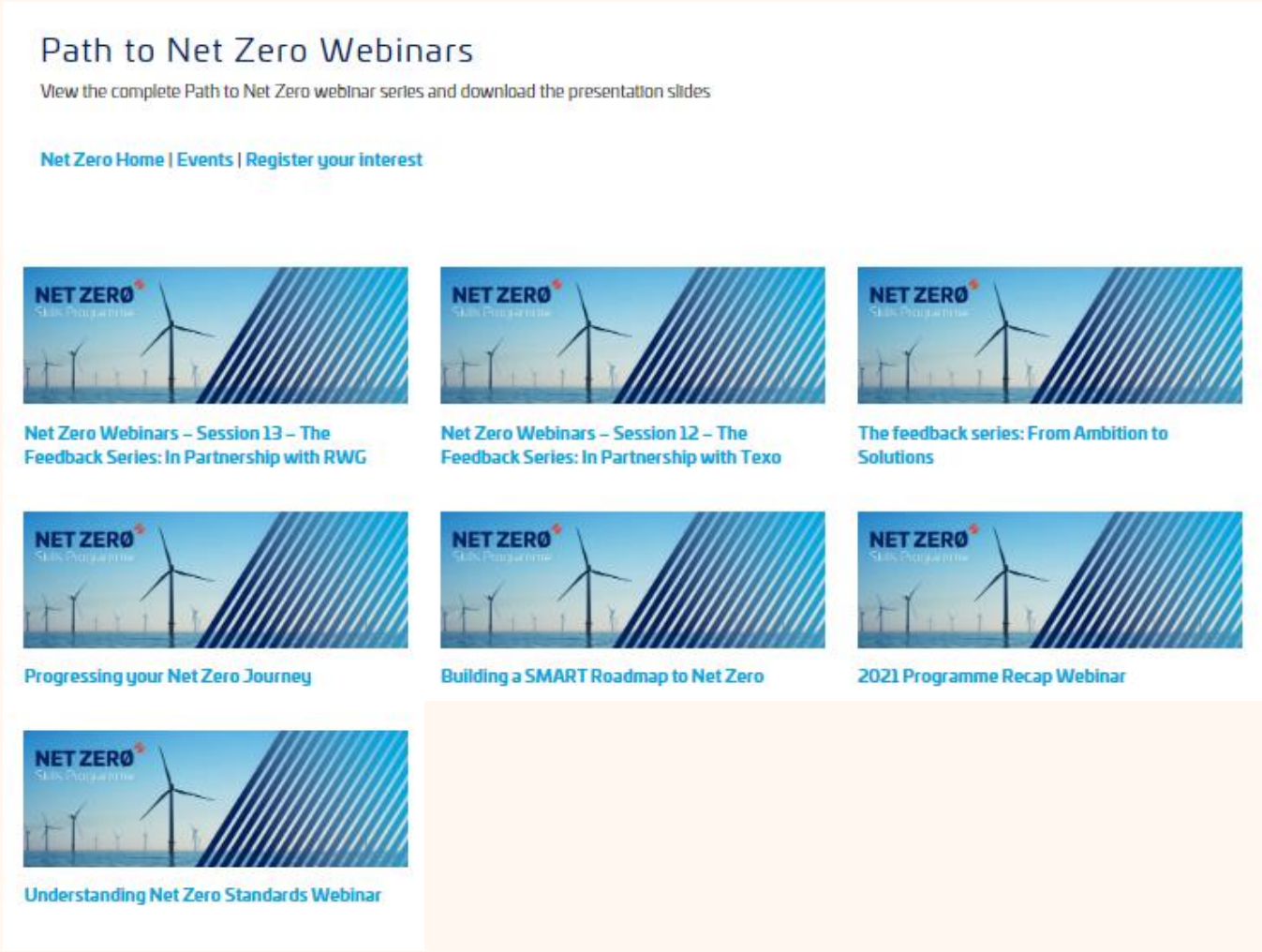
- https://www.scottishengineering.org.uk/understanding-each-chapter-of-the-scottish-government-climate-change-plan-ccp/
- **Discover** – Innovations: this is a list of all the innovations for all 8 chapters that can be used to inspire, to define ambitions, and develop a vision.
- **Define** – Opportunities: this is a list of all the opportunities for all 8 chapters that can be used to identify opportunities to leverage innovations in Scotland and further afield.
- **Develop** – Skills: having articulated a vision and identified the opportunities, it is likely that new skills will be required. This summarises where and how these skills could be gained across all 8 chapters (OSF model).
- **Deliver** – Roadmap: This is a consolidation of all the examples and means to develop and fund a roadmap.



Webinars

2022

- **Net Zero series** (7 to 9)
  - Standards, which one to choose – Selecting the right methodology, including Excel file with more details for each standard
  - Summary of 2021 including findings and learnings from our 1-to-1 programme
  - Roadmap – Building a SMART roadmap
- **Feedback series** (10 to 13)
  - Scottish Engineering ambition with guest: Babcock and Wilcox Diamond Power
  - From Ambition to Solutions: Ideation and Innovation
  - Offsetting not Greenwashing with guest: Texo Group
  - Net Zero and Energy costs with guest: RWG



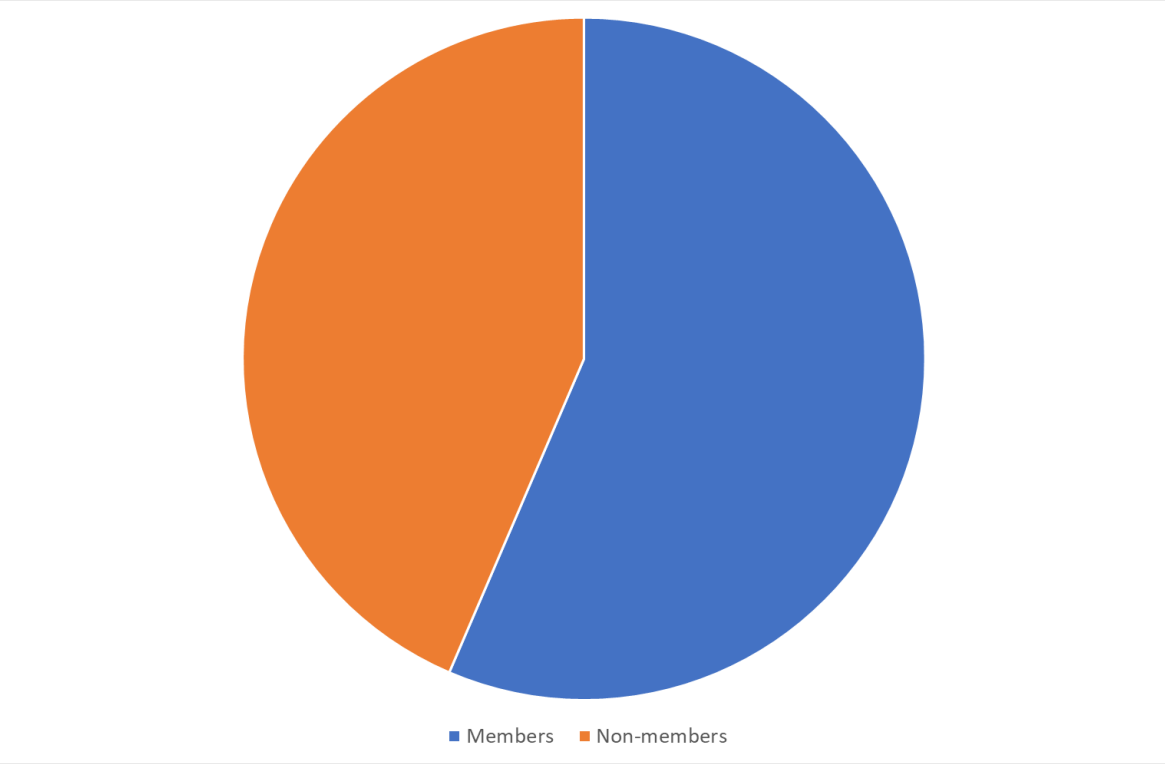
Downloads

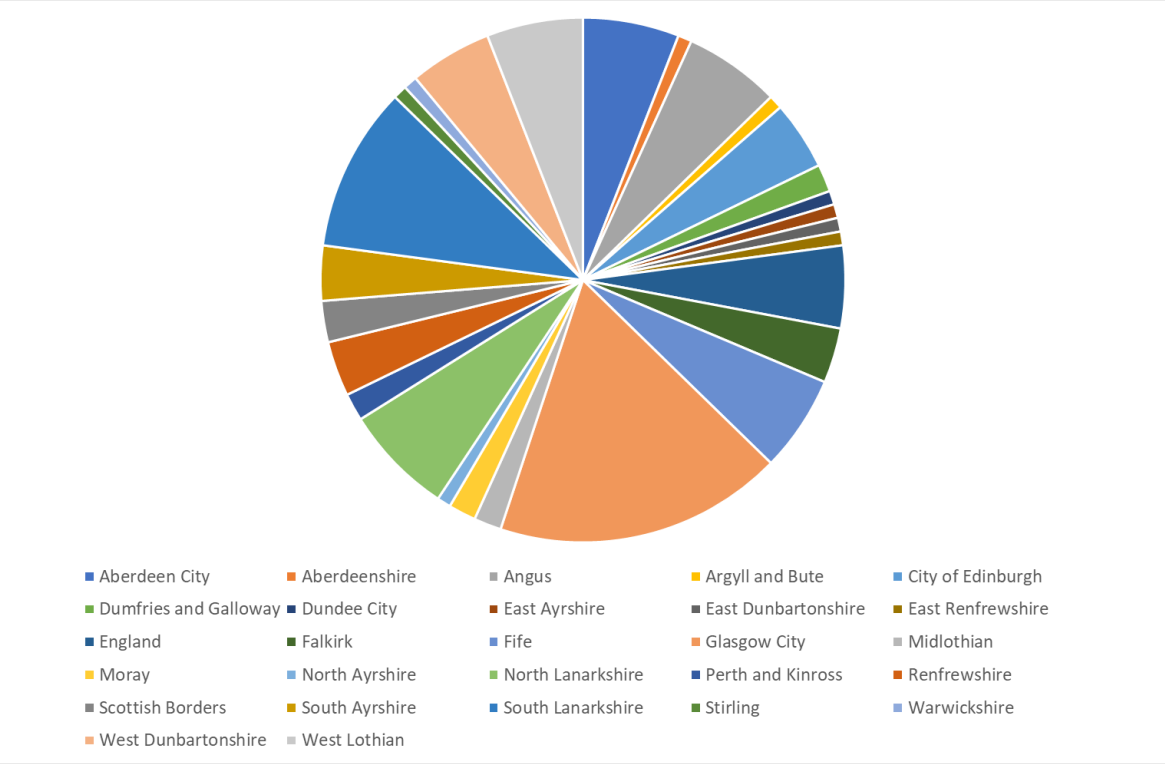
Methodology

- https://www.scottishengineering.org.uk/understanding-net-zero-standards-webinar/
- View Net Zero Survey results: Net_Zero_Skills_Webinar_7.pdf (scottishengineering.org.uk)
- Download the summary of standard requirements discussed in the webinar: Summary of Standard Requirements.xlsx (sharepoint.com)

Webinars

Engagement





Webinars

Webinar 7 - Methodology

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Takeaway

The Greenhouse Gas Protocol (Global)	Science Based Targets Initiative (Global)	ISO14064 series (International)	PAS series (National)

- All the standards converge on:
  - Principles: Relevance, Completeness, Accuracy, Consistency and Transparency
  - Boundaries: organisational and operational
  - Reporting, claiming and third party verification
- The main divergences are in:
  - What is and is not included in the reporting (completeness - scopes)
  - How are the claims made (accuracy - methodologies)
  - How are the claims verified (transparency – reporting)

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Webinars

Webinar 9 – SMART roadmap

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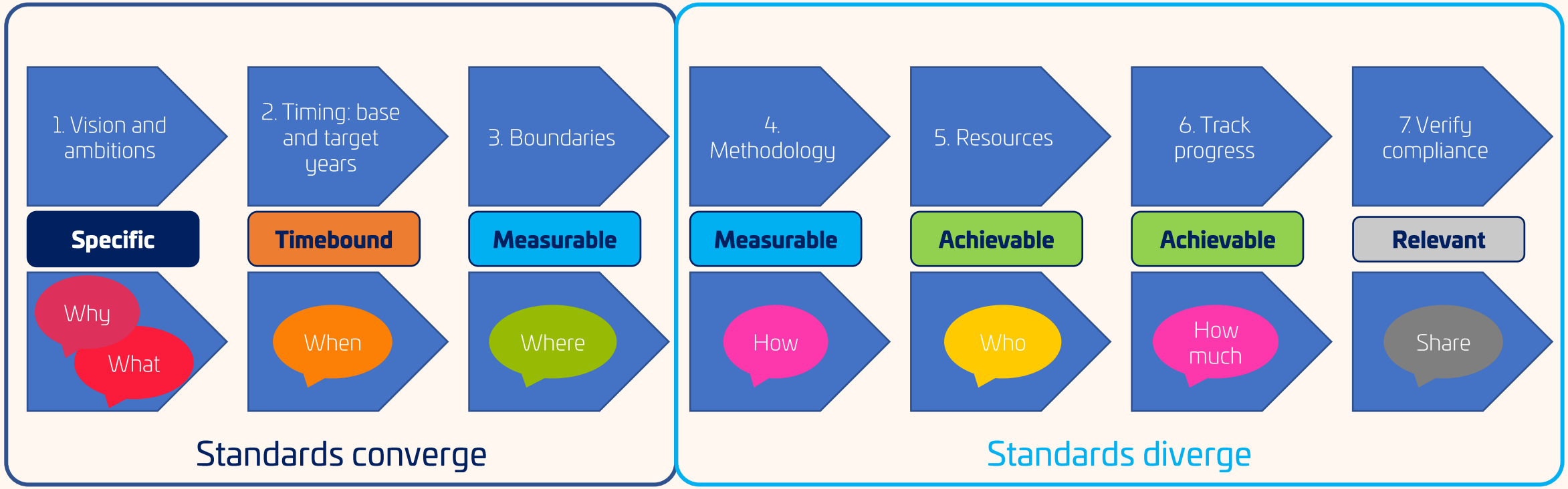
Specific | Measurable | Achievable | Relevant | Timebound

Takeaway



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Takeaway

- Why > Because if you do not, someone else will ⇨ competitors
- What > Because it differentiates: be ready before it hurts ⇨ organisation
- When > From when (base year type) to when (target year ambition)
- Where > Boundaries, organizational and operational
- How > Use the standard that fits your industry and your organisation
- Who > Are the stakeholders skilled and interested ? Are the funds available ?
- Share > Share the roadmap and the progress made

Webinars

Webinar 10 - Ambitions

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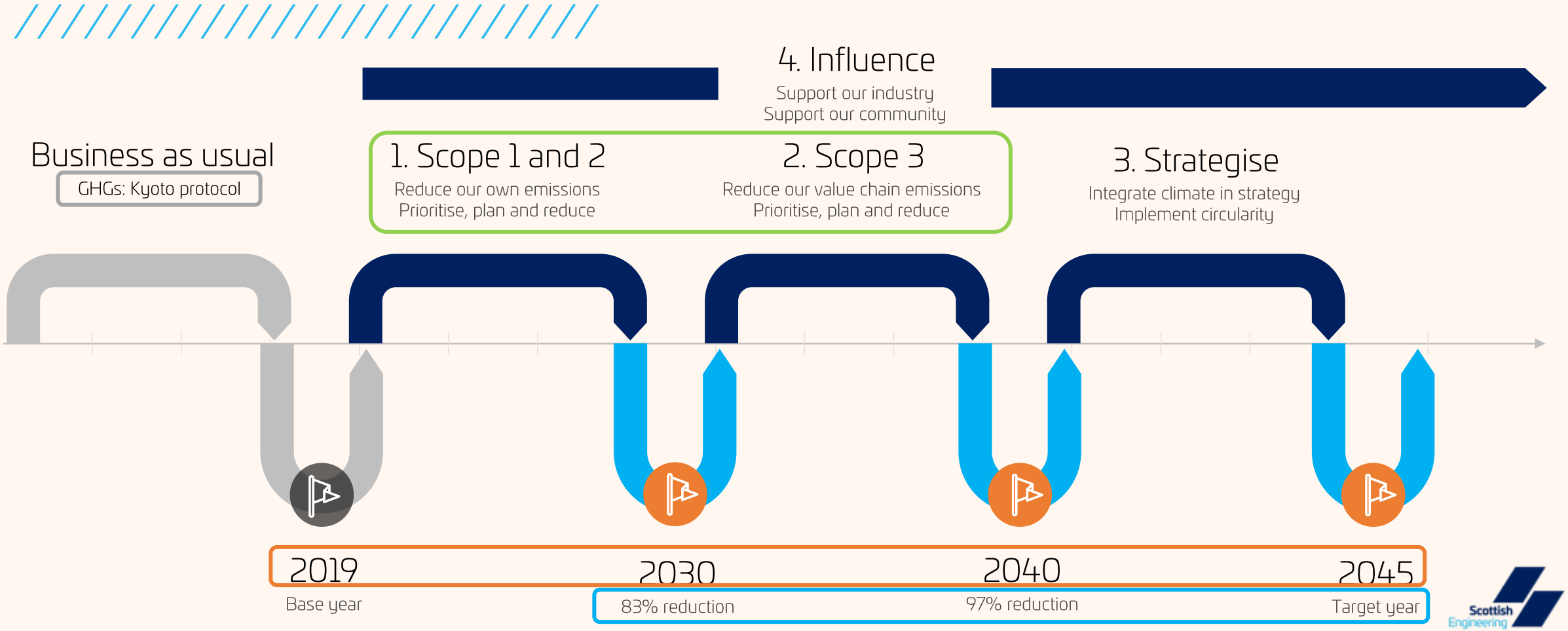
Lessons Learned

- Identify what you already have in place and what can be done to make it that little bit better
- Use the tools that you already have or are familiar with
- Don’t beat yourself up about going round in circles – it’s part of the process
- Accept help – make use of the one-to-one sessions with Eric

Roadmap

Timebound
Relevant
Achievable
Measurable
Specific

Scottish Engineering - Net Zero by 2045 at the latest



Webinars

Webinar 11 - Solutions

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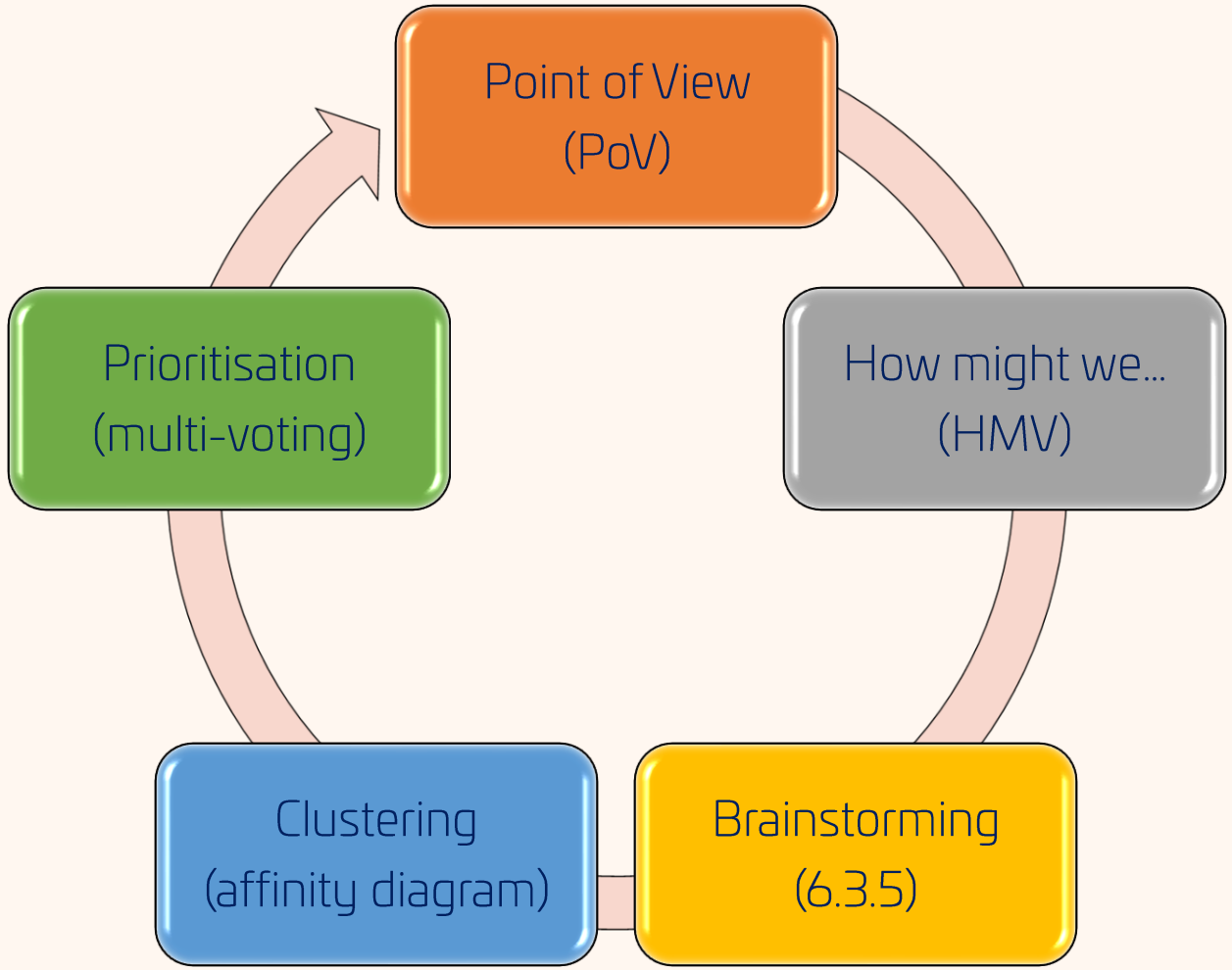
Ideation

Brainstorming

- 1 PoV
- 2 HMWs
- 130 Ideas (5 people)
- 17 Clusters
- 3 Priorities



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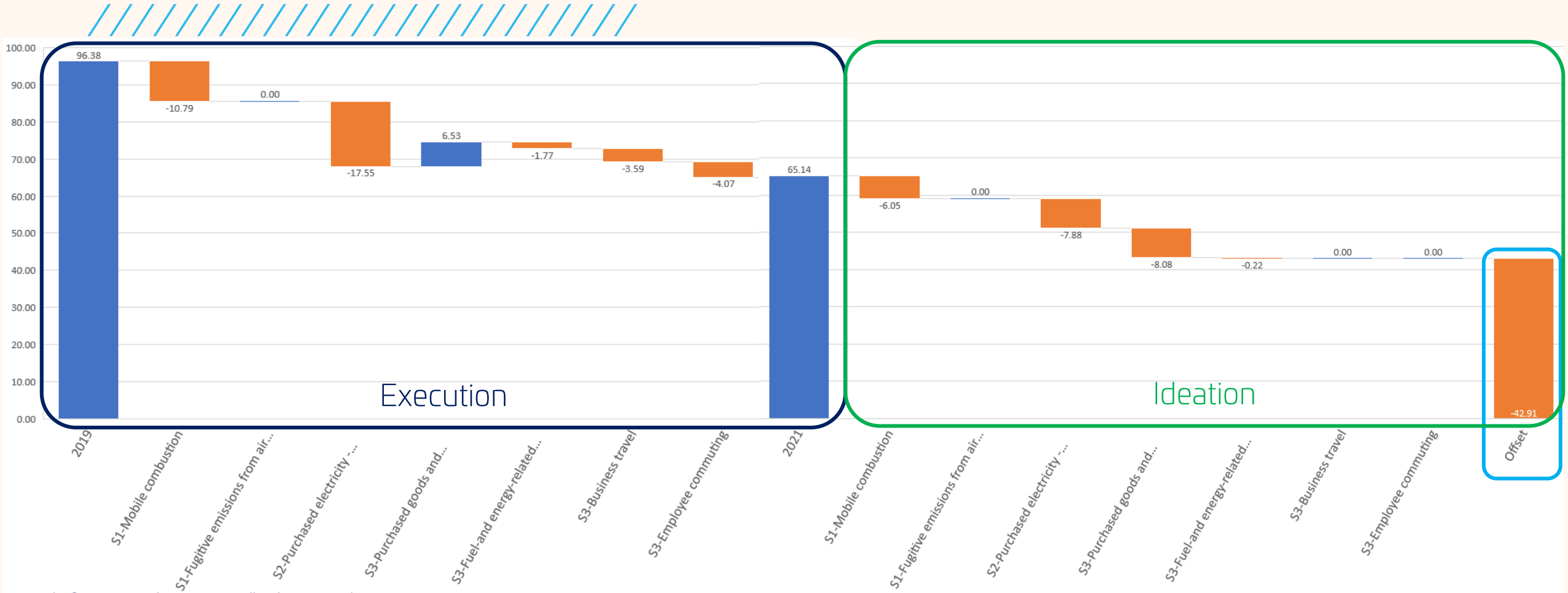
Carbon Reduction Plan



Webinars

Webinar 12 - Offsetting

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Production of our emissions statement and report

Texo Group Limited

Carbon (GHG) Emissions Report

2020/21

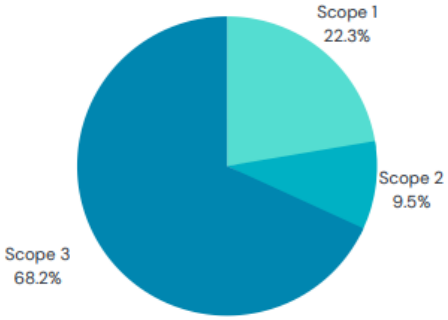
Completed by Carbon Neutral Britain Ltd
1st April 2022
Project No: 01159

5 - Results and Impact

5.1 Summary

Texo Group Limited
Carbon (GHG) Emissions

Reporting Period - 01/12/20 - 30/11/21



244.44
Scope 1
Direct Emissions

104.15
Scope 2
Energy Indirect

746.02
Scope 3
Indirect Other

Total Carbon Footprint

1,094.61 tCO^2e

GHG Emissions 2020/21 - 1,094.61 tCO^2e
GHG Emissions per FTE - 9.12 tCO^2e

Completed 1st April 2022

5.2 Emissions by Scope

244.44
Scope 1
Direct Emissions

The main Scope 1 emissions occurred from the company owned/leased vehicles and the mileage completed within the reporting period. Other emissions were created from combustion sources (generators) and the fuel consumed, as well as refrigerant gas recharge from commercial AC units.

104.15
Scope 2
Energy Indirect

The main Scope 2 energy emissions occurred from the electricity consumption from the multiple organisation sites, with a small amount of additional emissions produced from staff working at home. These emissions were attributed to additional energy usage that would not have otherwise occurred at home.

746.02
Scope 3
Indirect Other

The main Scope 3 emissions occurred from organisation waste, with a high volume produced going directly to landfill. Other emissions were created from hotel stays (across Europe), staff commuting, business travel, inbound delivery of goods and organisation water usage.

Offsetting...not greenwashing

Offsetting as part of the strategy, but not the strategy

- Offsetting must be concurrent to a carbon reduction plan or a net zero roadmap – it cannot be a license to pollute.
- Quality offsetting abides by 7 principles, included in standards (e.g. Gold Standard) and covered by accreditation (e.g. ICROA), that must be considered
- A wide range of projects qualifies as offsetting, but demand which is exceeding supply will impact pricing and therefore cost, which is perceived as being too low currently.

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Webinars

Webinar 13 - Costs

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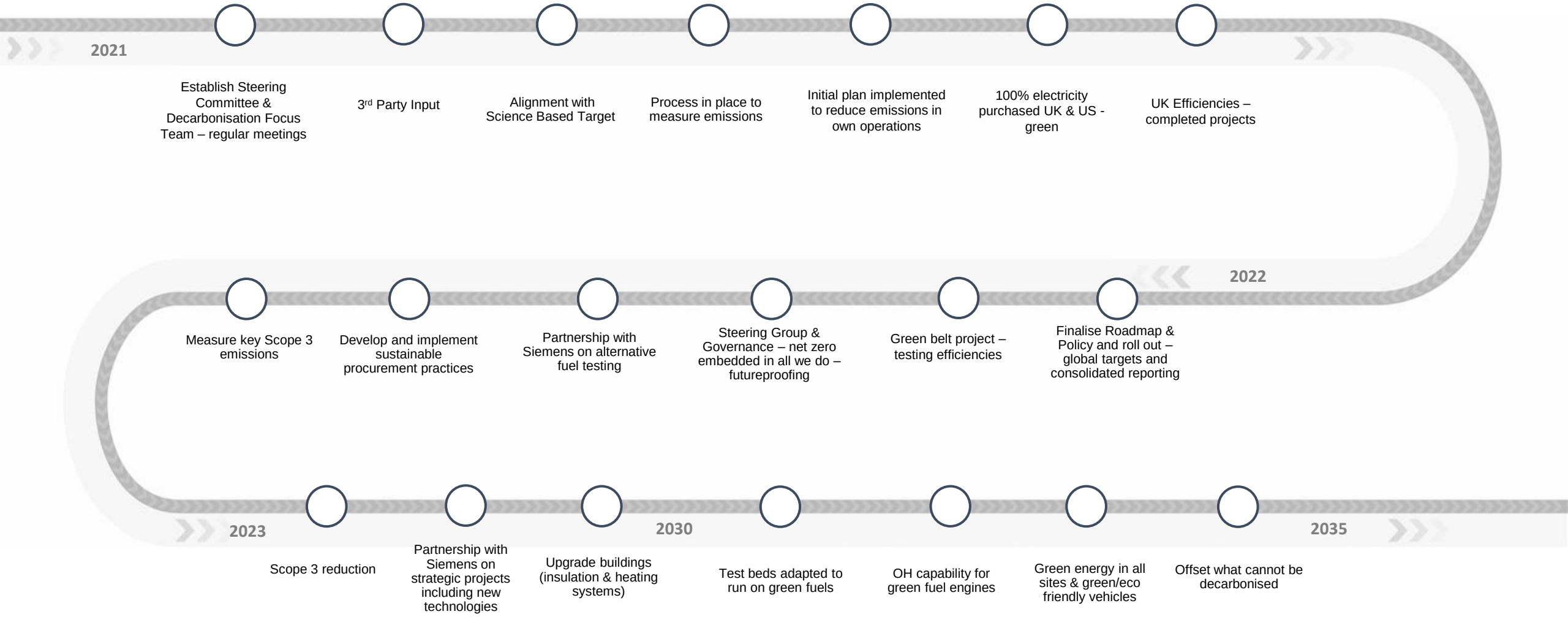
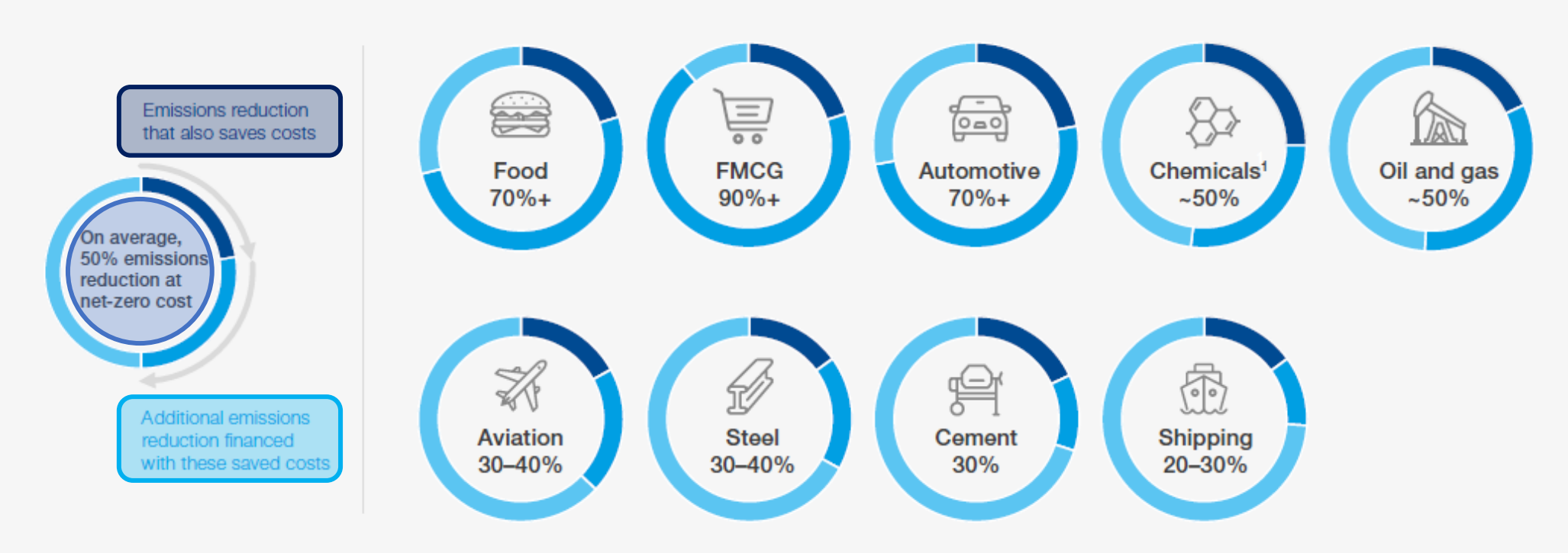
Outline Roadmap



Implementation

Companies can reduce significant Scope 1 and 2 emissions at net-zero cost



Net Zero or Energy savings

Both, they are concurrent

- Why: Net Zero is not going away and is affordable (at least getting on the journey)
- What: Efficiency (facility and process), Engagement (internal and external), Excess (waste and offsetting)
- How: leverage the former to deliver the latter

Contributions

Training

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NMIS

E-learning (WIP)

Part 1 - The What?

- Proposed learning objective - To understand what 'net zero' is and what exactly this means for the manufacturing sector

Part 2 - The Why?

- Proposed learning objectives – to understand what the legislation is and what standards companies will need to adhere to both now and over the next ten years.

Part 3 – The How?

- Proposed learning objective – to understand how to develop a plan to get there

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UWS

Post-graduate lectures

Programme

Session	Date	Topic
1	Dec. 14, 2022	Overview of the 7 steps, includes end of lecture expectations
2	Jan. 10, 2023	Step 1: Vision and ambition (What & Why)
3	Jan. 31, 2023	Step 2: Base and target years (When)
4	Feb. 2, 2023	Step 3: Boundaries (Where)
5	Feb. 7, 2023	Step 4: Methodologies (How), includes groups nominating their company
6	Feb. 9, 2023	Step 5: Resources (Who)
7	Feb. 14, 2023	Step 6: Progress (How much)
8	Feb. 16, 2023	Step 7: Verification and Communication
9	Feb. 21, 2023	Presentation 1 (3 teams): 20 mins presentation + 10 mins Q&A per team
10	Feb. 28, 2023	Presentation 2 (3 teams): 20 mins presentation + 10 mins Q&A per team

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Contributions

1-to-1

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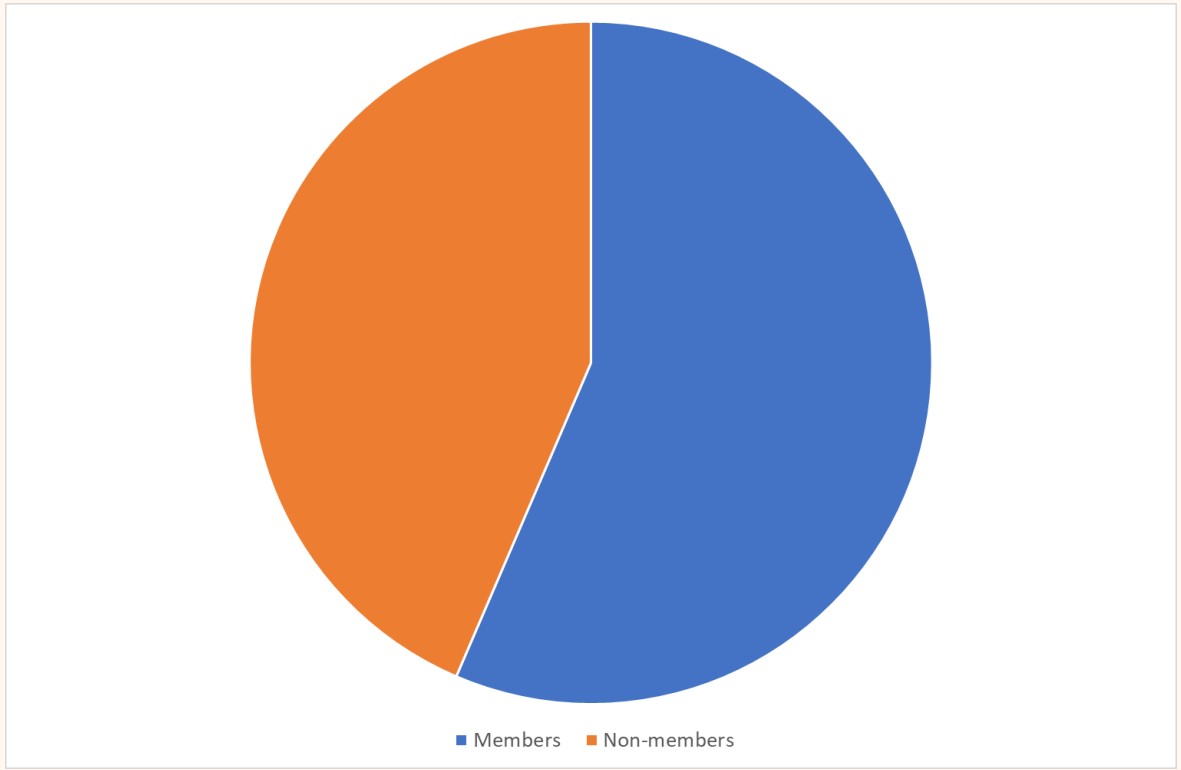
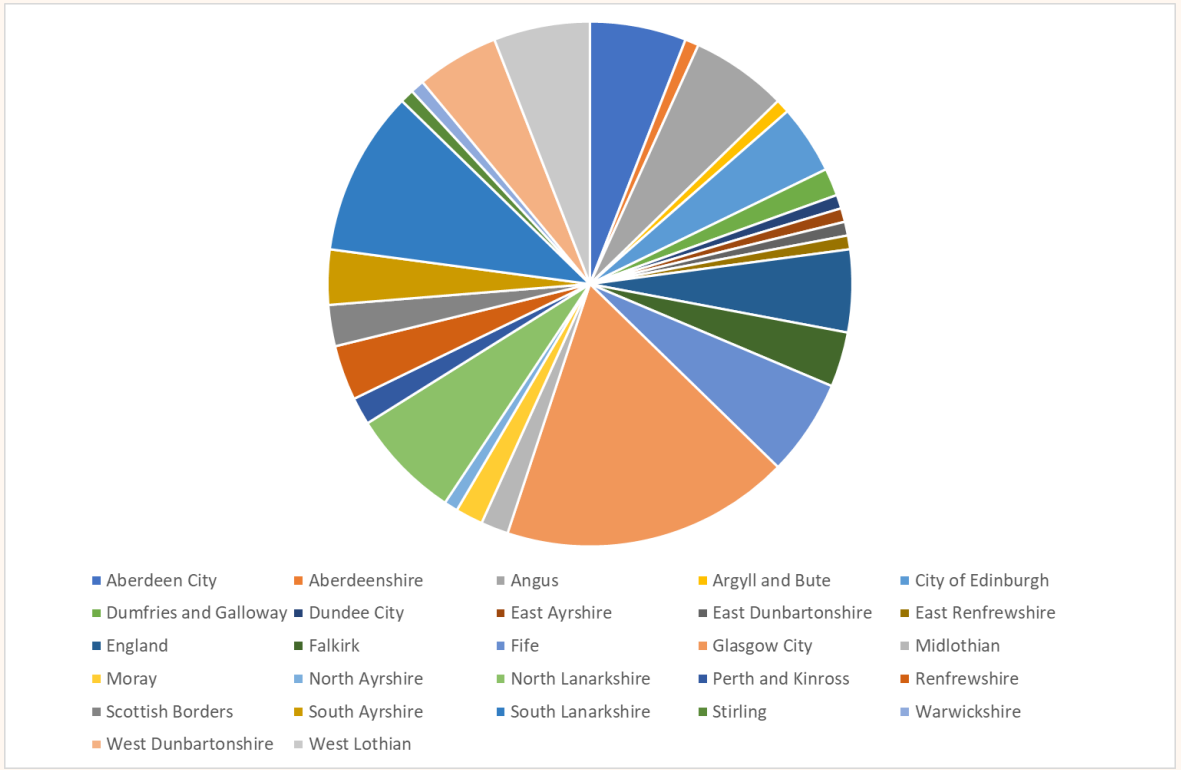
1-to-1

Engagement (221 to date, 65% with SMEs, 24% skill providers)



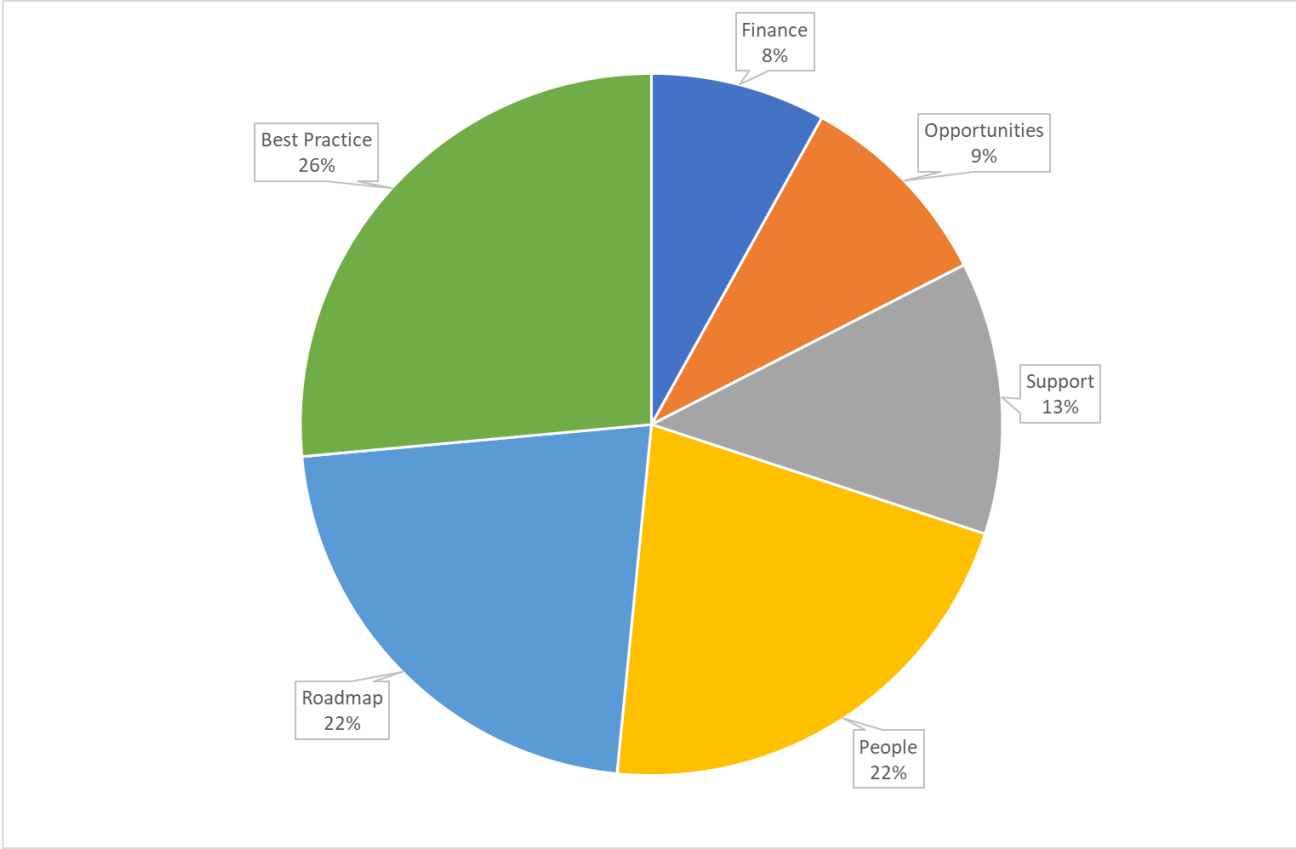


1-to-1

Queries, requests and needs and what we are doing to help

Tier 1

- Best practice (26%): methodologies, standards, pledges, legislation ⇨ guidance on standards and methodology, training and interventions
- Roadmap (22%): where to start, confusion, information overload ⇨ 7 steps SMART roadmap guidance
- People (22%): skills and training, driven by skill provider engagements (80%) ⇨ engagements, sign posting

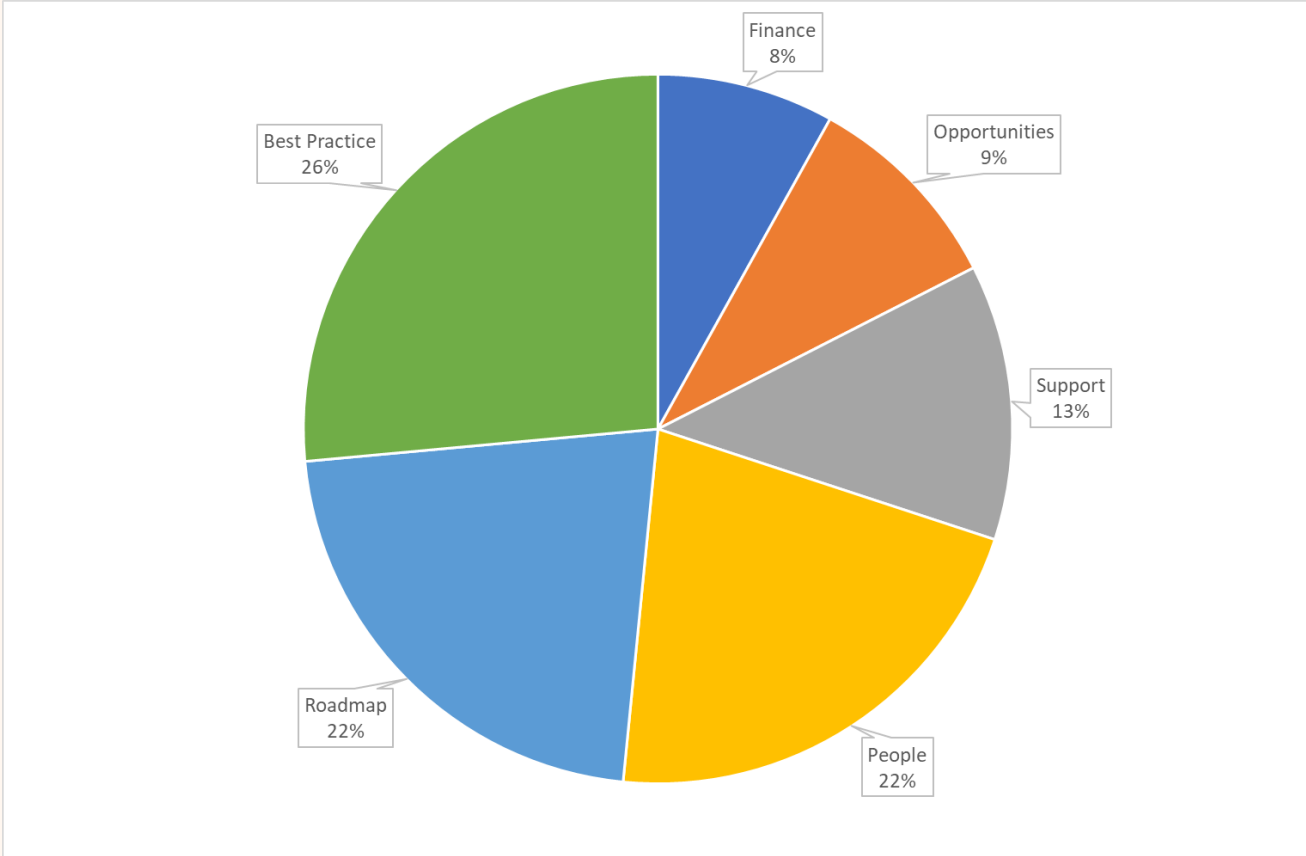


1-to-1

Queries, requests and needs and what we are doing to help

Tier 2

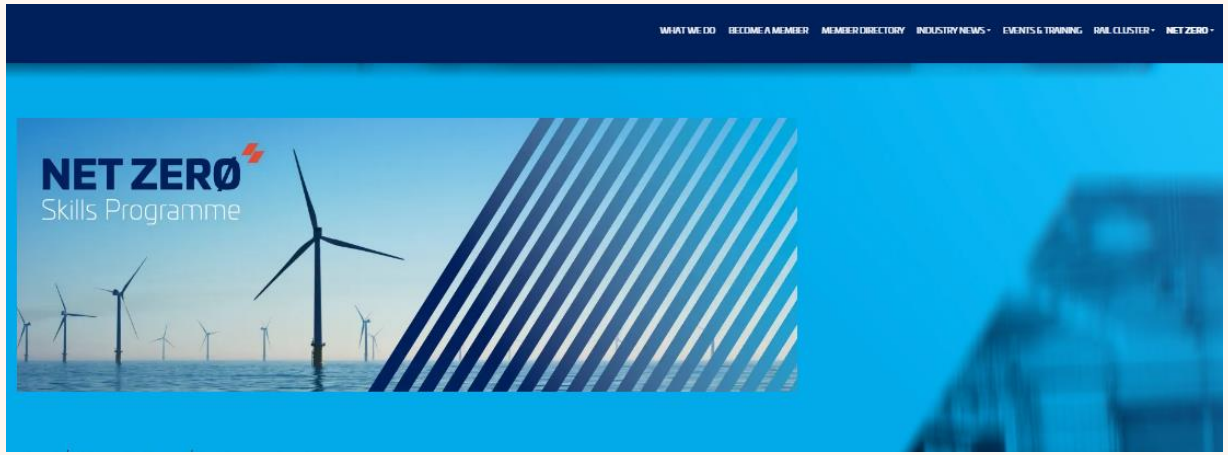
- Support - non financial (13%): webinars ⇨ holistic but generic, ideation guidance
- Opportunities (9%): net zero and innovation ⇨ peers, trends, 4Ds
- Finance (8%): funding (internal and external), costs, grants ⇨ FBS, case studies



Net-Zero Support Programme

Microsite

> https://www.scottishengineering.org.uk/net-zero-skills/



One-to-One

> Please make a note of interest to:
>> scoteng.org.uk
>> 0141 221 3181

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Scottish Engineering

Thank you

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