The Zero Carbon Transition

Getting started with Scope 1& 2 carbon emissions

2021

OUR AMBITION

OUR STRATEGY IN ACTION

BE WORLD LEADER IN THE ZERO-CARBON TRANSITION "AS A SERVICE"

Faster growth, higher value, better impact

Introduction

Energy & Carbon Solutions Team

- 30 Team Members
- Chartered Energy Managers
- Chartered Engineers
- Design Engineers
- Carbon Experts
- Technology Specialists
- Certified Measurement and Verification Professionals
- Project Managers
- UK wide locations

Agenda

1. What is ‘Carbon’?
2. What does ‘Net Zero Carbon’ mean?
3. Focus on Scope 1 Emissions
4. Focus on Scope 2 Emissions
5. How to develop a Net Zero Carbon Roadmap
6. Key technologies
7. Streamlined Energy & Carbon Reporting (SECR) Legislation

Poll 1:

Have you assessed the carbon footprint of your business or product?

Yes/No

1

What is ‘Carbon’?

Greenhouse Gases (GHGs) – Kyoto Protocol

The Kyoto Protocol is an international treaty that commits state parties to reduce GHG emissions; it was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005. ‘There are currently 192 participant states.

The Kyoto Protocol applies to **seven main greenhouse gases** deemed to be responsible for the majority of global warming:

- Carbon dioxide (CO2)
- Methane (CH4)
- Nitrous oxide (N2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF6)
- Nitrogen Trifluoride (NF3)

Carbon Dioxide Equivalent (CDE)

The carbon dioxide equivalency for a GHG is obtained by multiplying the mass and the Global Warming Potential (GWP) of the gas

For example:

1 tonne of Methane, CH_4 = 1 x 28 (GWP) = 28 tonnes CO_2 equivalent.

1 tonne of HFC-134a = 1 x 1300 (GWP) = 1300 tonnes CO_2 equivalent

Carbon Dioxide Conversion Factors

The DEFRA figures cover all types of carbon emissions that you can think of and many you might not think of:

- ✓ Refrigerants
- ✓ Business travel; land, sea & air
- ✓ Water supply, water treatment
- ✓ Material use in construction;
- ✓ Production of goods; food & drink, clothing, paper, white goods, plastics, metals, compost!

What is carbon? – Key points

When we talk about carbon, we are normally referring to it's gaseous form, Carbon Dioxide (CO_2)

There are seven main greenhouse gases (GHGs) - including carbon dioxide

Global warming potential (GWP) is a measure of how much heat a GHG traps in the atmosphere, relative to carbon dioxide

The GWP is used to calculate a Carbon Dioxide Equivalent (CDE) figure

We need to reduce all GHGs – not just carbon!

2

What does ‘Net Zero Carbon’ Mean?

Define Your Ambition!

- Zero Carbon?
- Net Zero?
- Carbon Neutral?
- 100% Renewable?

Define Your Ambition!

- **Zero carbon** means that no carbon emissions are being produced from a product/service e.g. zero-carbon electricity could be provided by a 100% renewable energy supplier.

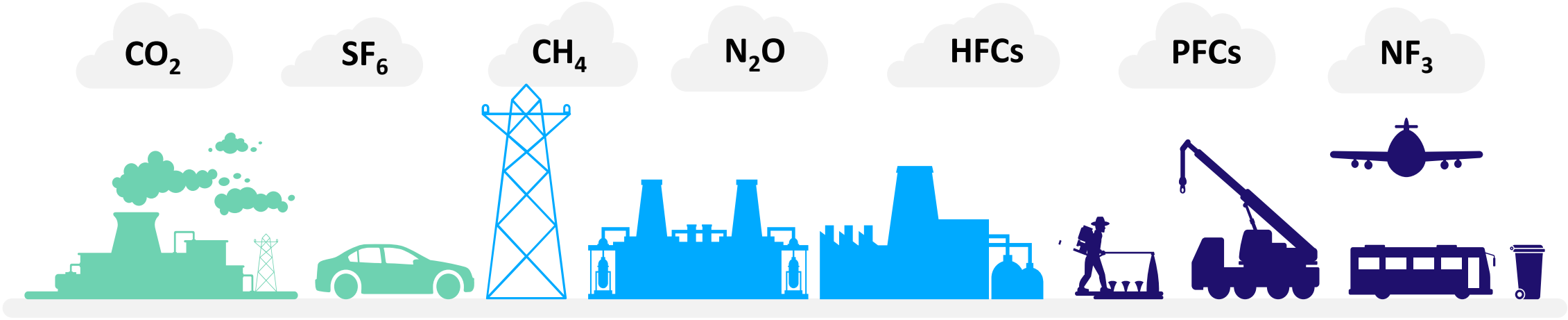
- **Carbon neutral** means that while some emissions are still being generated by a building/process these emissions are being offset somewhere else making the overall **net emissions zero**.

Define Your Ambition!

You need to define WHAT you are making Net Zero Carbon/Carbon Neutral

- Building?
- Borough?
- Process?
- Product?
- Business?
- Transport?
- Journey?

Types of Carbon Emissions



SCOPE 1

Direct emissions

Fuel combustion
Owned vehicle fleet
Process/Fugitive emissions

SCOPE 2

Energy indirect emissions

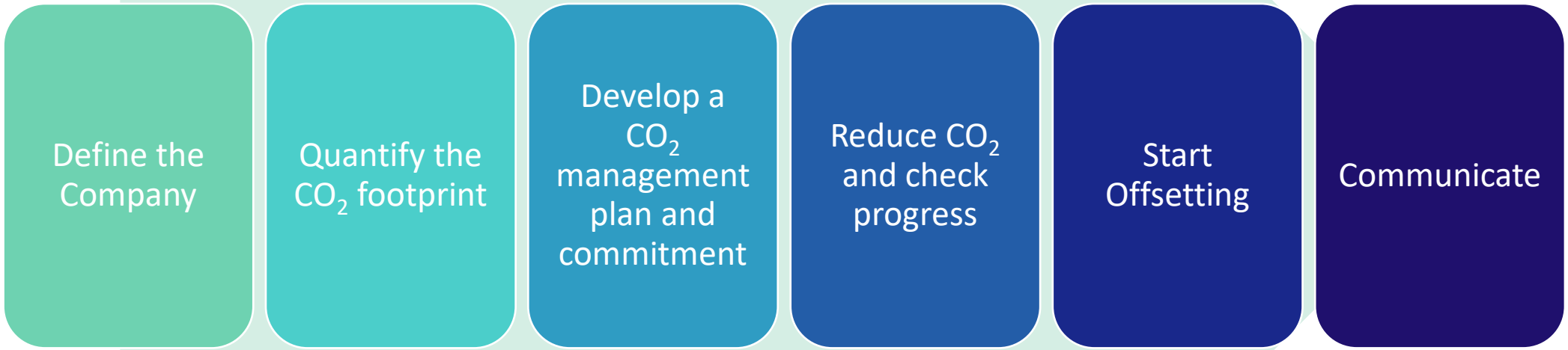
Purchased electricity for own use
Purchased heat, steam, cooling for own use

SCOPE 3

Other indirect emissions

Purchased goods and services
Product use
Waste disposal
Transportation and distribution
Employee business travel

The basis for most certification - PAS 2060



What does Net Zero Carbon mean? – Key points

Zero carbon, net zero and carbon neutral are often used interchangeably but they are different

Zero carbon means that no emissions are generated

Carbon neutral or net zero means that any emissions that are still being generated are being offset

You need to understand what you are making net zero and where your emissions are coming from

Accreditation standards are important – we recommend using PAS2060 (2050)

Poll 2:

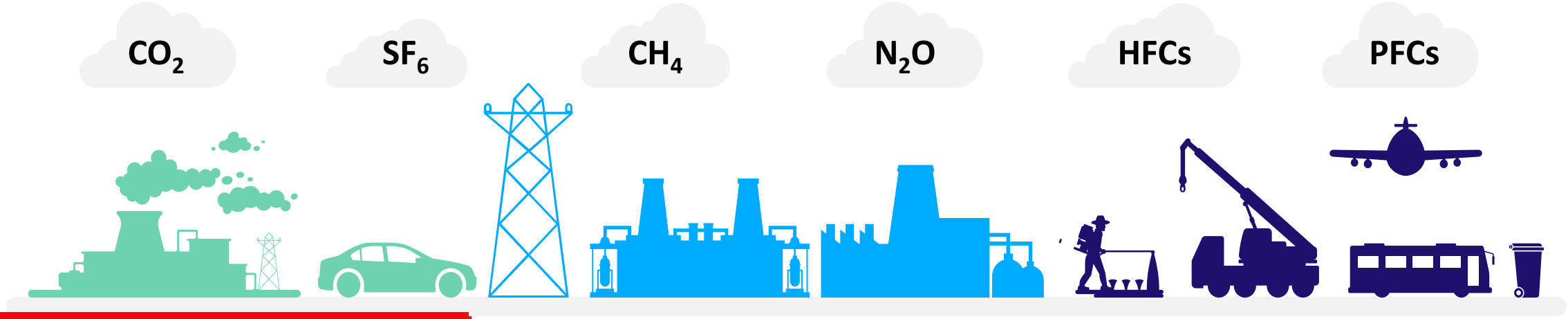
Has your organisation made a ‘Net Zero’ commitment?

Yes/No

3

Focus on Scope 1 Emissions

Types of Carbon Emissions



SCOPE 1

Direct emissions

Fuel combustion
Owned vehicle fleet
Process/Fugitive emissions

SCOPE 2

Energy indirect emissions

Purchased electricity for own use
Purchased heat, steam, cooling for own use

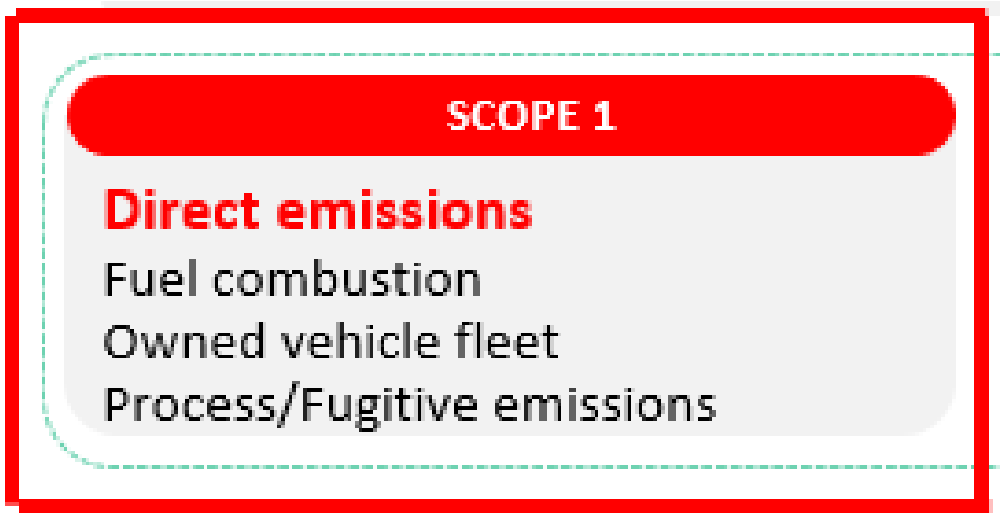
SCOPE 3

Other indirect emissions

Purchased goods and services
Product use
Waste disposal
Transportation and distribution
Employee business travel

Scope 1 Emissions - Definitions

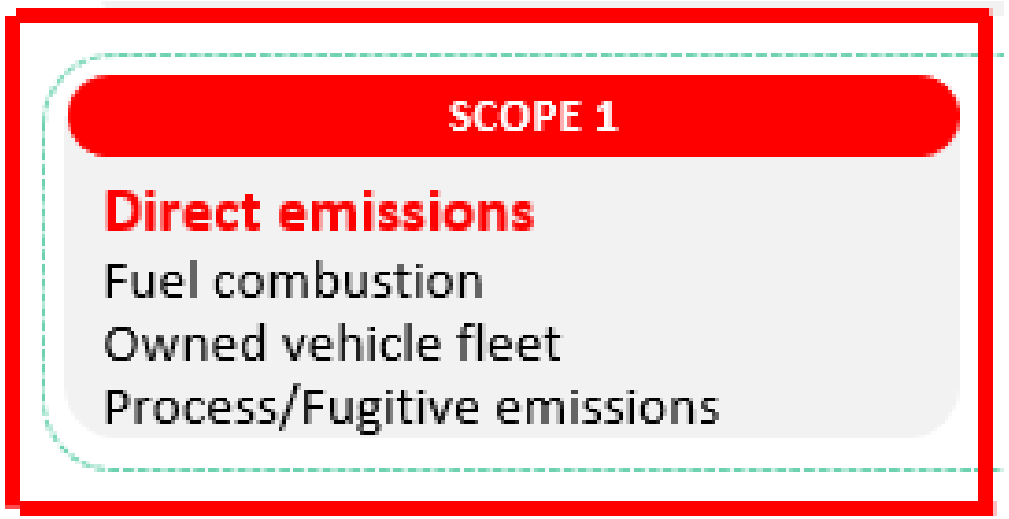
- Scope 1 emissions are direct emissions from company-owned and controlled resources i.e. emissions released to the atmosphere as a direct result of a set of activities, at a firm level. It is divided into four categories:
  - Stationary combustion
  - Mobile combustion
  - Process emissions
  - Fugitive emissions



Scope 1 Emissions - Definitions

Stationary combustion

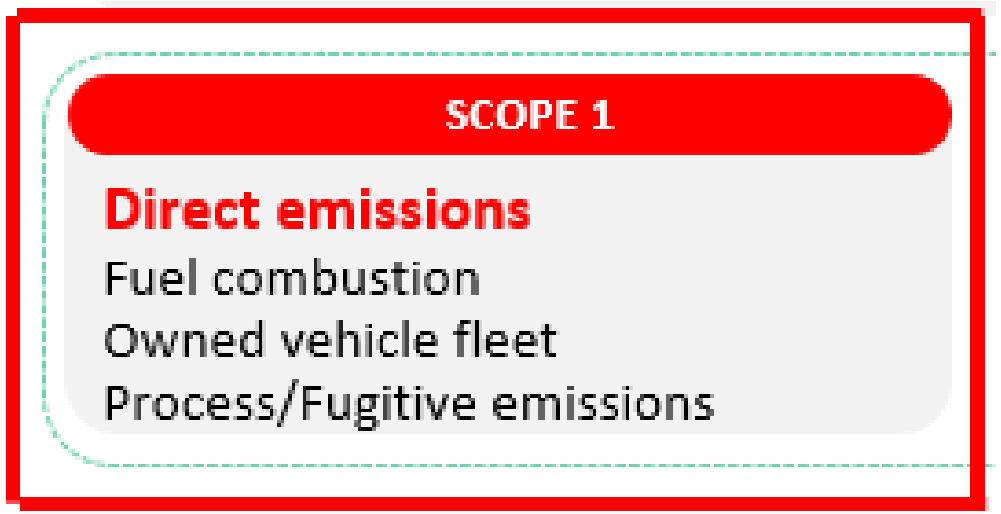
- Stationary fuel combustion sources include, but are not limited to, **boilers, simple and combined-cycle combustion turbines, engines, incinerators, and process heaters.**



Scope 1 Emissions - Definitions

Mobile combustion

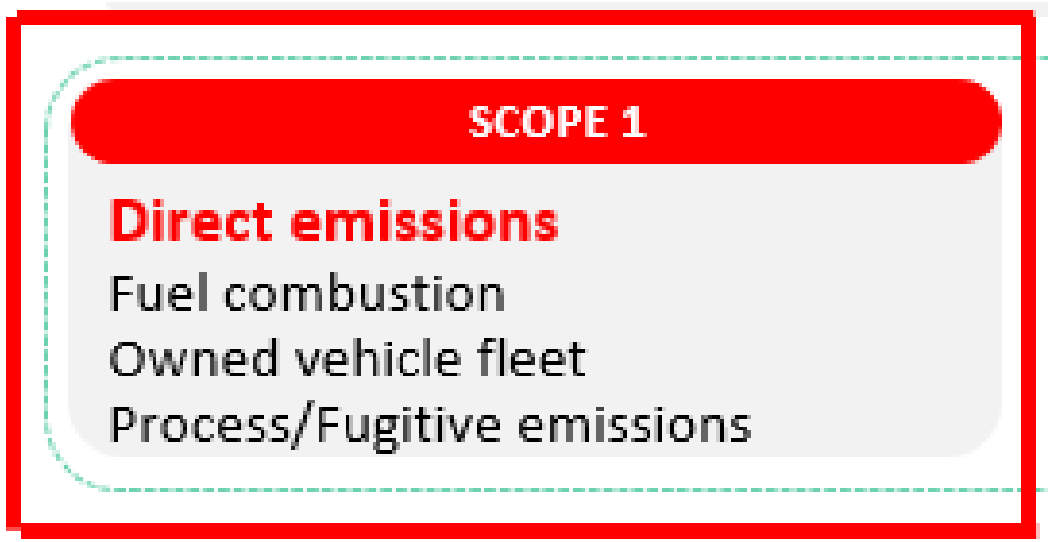
- all vehicles owned or controlled by a firm, burning fuel **(e.g. cars, vans, trucks, FLTs, ships, trains etc.)**
- Mobile heating/generation equipment **(e.g. boilers, generators)**



Scope 1 Emissions - Definitions

Process emissions

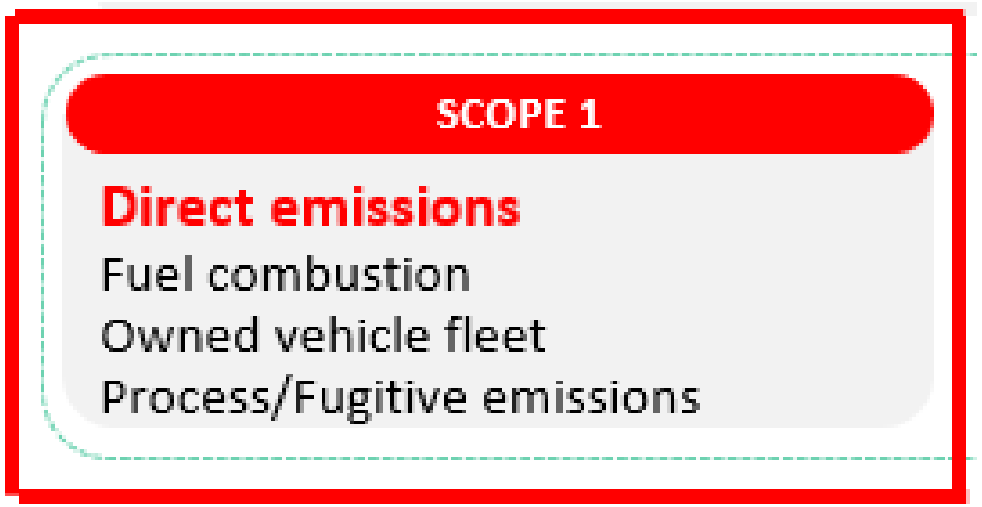
- Process emissions are released during industrial processes, and on-site manufacturing **(e.g. production of CO2 during cement manufacturing, factory fumes, chemicals)**



Scope 1 Emissions - Definitions

Fugitive emissions

- GHG emissions that are not released through a stack, vent, duct pipes or other confined air stream. These emissions include **equipment leaks and area emissions**. It can be difficult and expensive to estimate these emissions.



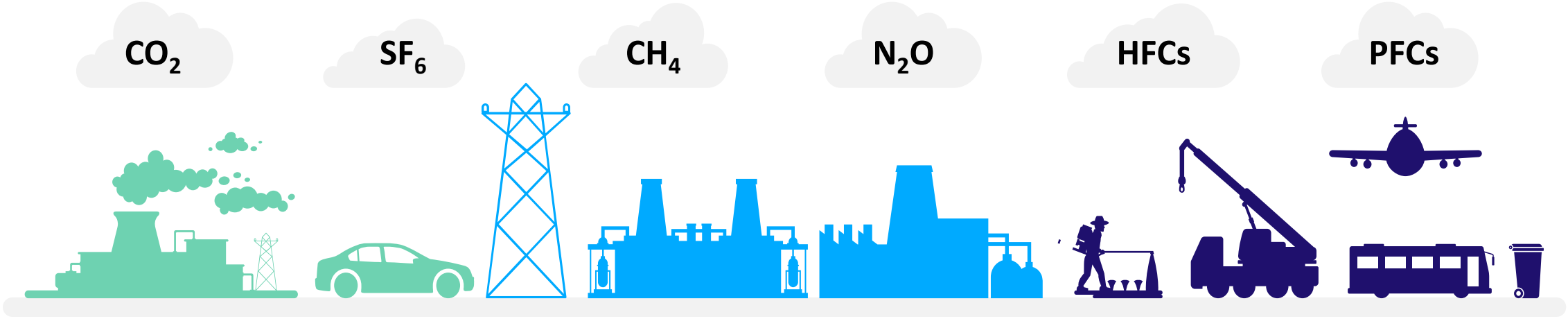
Where are your emissions from?

SCOPE 1

4

Focus on Scope 2 Emissions

Types of Carbon Emissions



SCOPE 1

Direct emissions
Fuel combustion
Owned vehicle fleet
Process/Fugitive emissions

SCOPE 2

Energy indirect emissions
Purchased electricity for own use
Purchased heat, steam, cooling for own use

SCOPE 3

Other indirect emissions
Purchased goods and services
Product use
Waste disposal
Transportation and distribution
Employee business travel

Scope 2 Emissions - Definitions

Scope 2 emissions are indirect emissions from the generation of purchased energy from a utility provider i.e. all GHG emissions released to the atmosphere, from the consumption of purchased electricity, steam, heat and cooling.

- For most organizations, electricity will be the unique source of scope 2 emissions
- Energy used/lost by the utilities during transmission and distribution falls into scope 3.

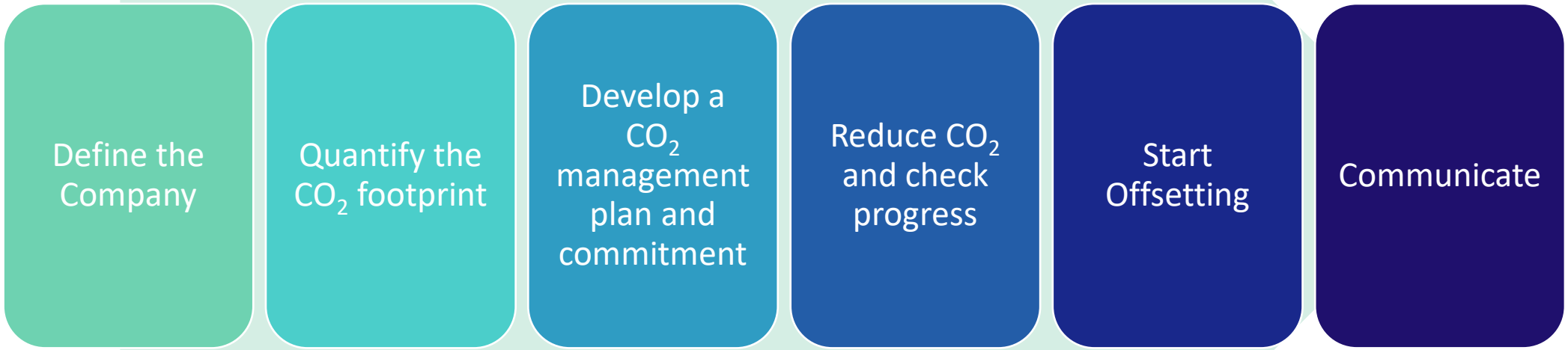
Where are your emissions from?

SCOPE 2

5

Developing your Net Zero Roadmap

The basis for most certification - PAS 2060



Methodology

Analyse

Analyse scope 1 and 2 emissions

Calculate carbon footprint

Plan

Assess options & timescales

Complete investment appraisal

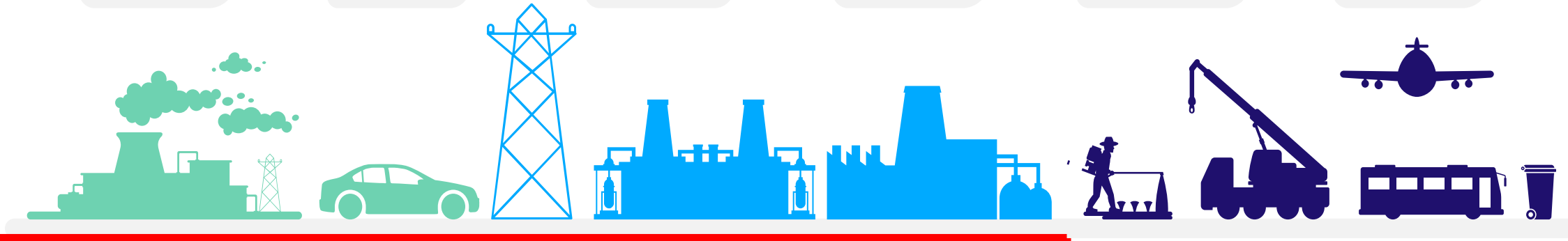
Produce zero carbon roadmap

Act

Delivery of recommendations in zero carbon roadmap

Analyse - Quantify the emissions

CO_2 SF_6 CH_4 N_2O HFCs PFCs



SCOPE 1

Direct emissions

Fuel combustion
Owned vehicle fleet
Fugitive emissions

SCOPE 2

Energy indirect emissions

Purchased electricity for own use
Purchased heat, steam, cooling for own use

SCOPE 3

Other indirect emissions

Purchased goods and services
Product use
Waste disposal
Transportation and distribution
Employee business travel

Analyse - Emissions Data

Scope 1

Gas meters/gas bills

Site generation data

Fuel deliveries

Fuel expense claims

Mileage Claims

F-Gas Registers

EPR Data

Process Calculations

DEFRA Conversion Factors

Scope 2

Electricity Meters/Bills

Sub-meters

Site renewable generation

Heat Meters

Steam Meters

DEFRA Conversion Factors

Analyse - Operational Data

Operations

Production Data

Staff/Occupancy

Site floor area

Site ‘Volume’

Weather (degree days)

Revenue

SECR - Carbon Intensity Ratios

Analyse - Understanding the Sources

BREAKDOWN OF EMISSIONS FROM SCOPE 1 & 2

433,414 tCO_2e

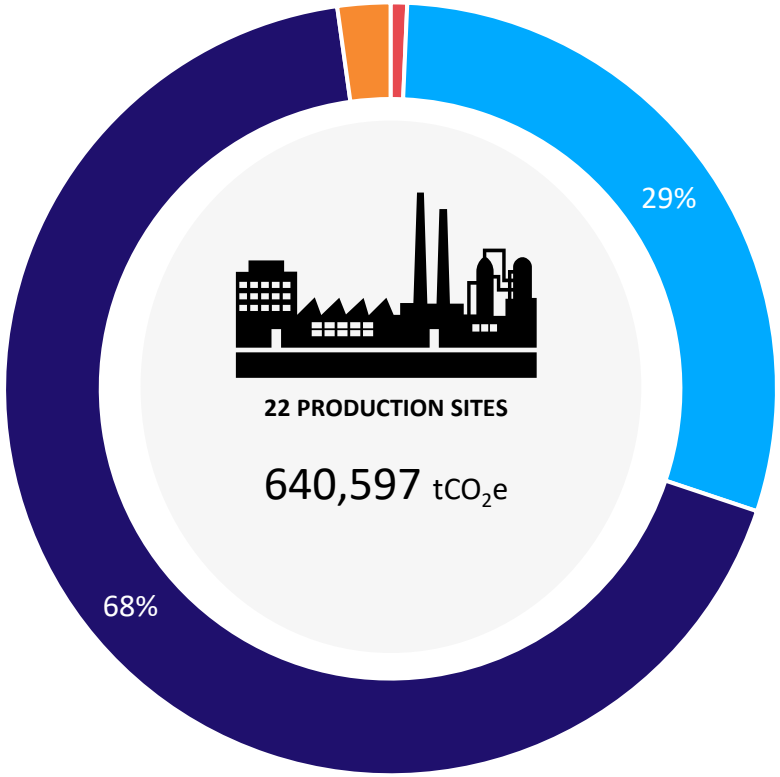
Emissions from **Natural Gas**

4,420 tCO_2e

Emissions from **Light Fuel Oil**

0 tCO_2e

Emissions from **Bioliquid**



188,606 tCO_2e

Emissions from the **Electricity grid**

14,157 tCO_2e

Emissions from **Purchased Heat**

Analyse – Produce carbon footprint

Analyse

Full business Energy Review – usage and cost data analysis, opportunities list, ESOS evidence pack

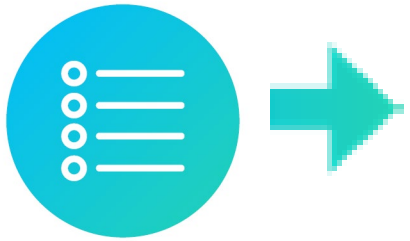
Output - Business Carbon footprint – Scope 1 & 2 emissions for an organisation

Plan – Evaluate the options

- ISO 50001 Gap Analysis
- Site surveys

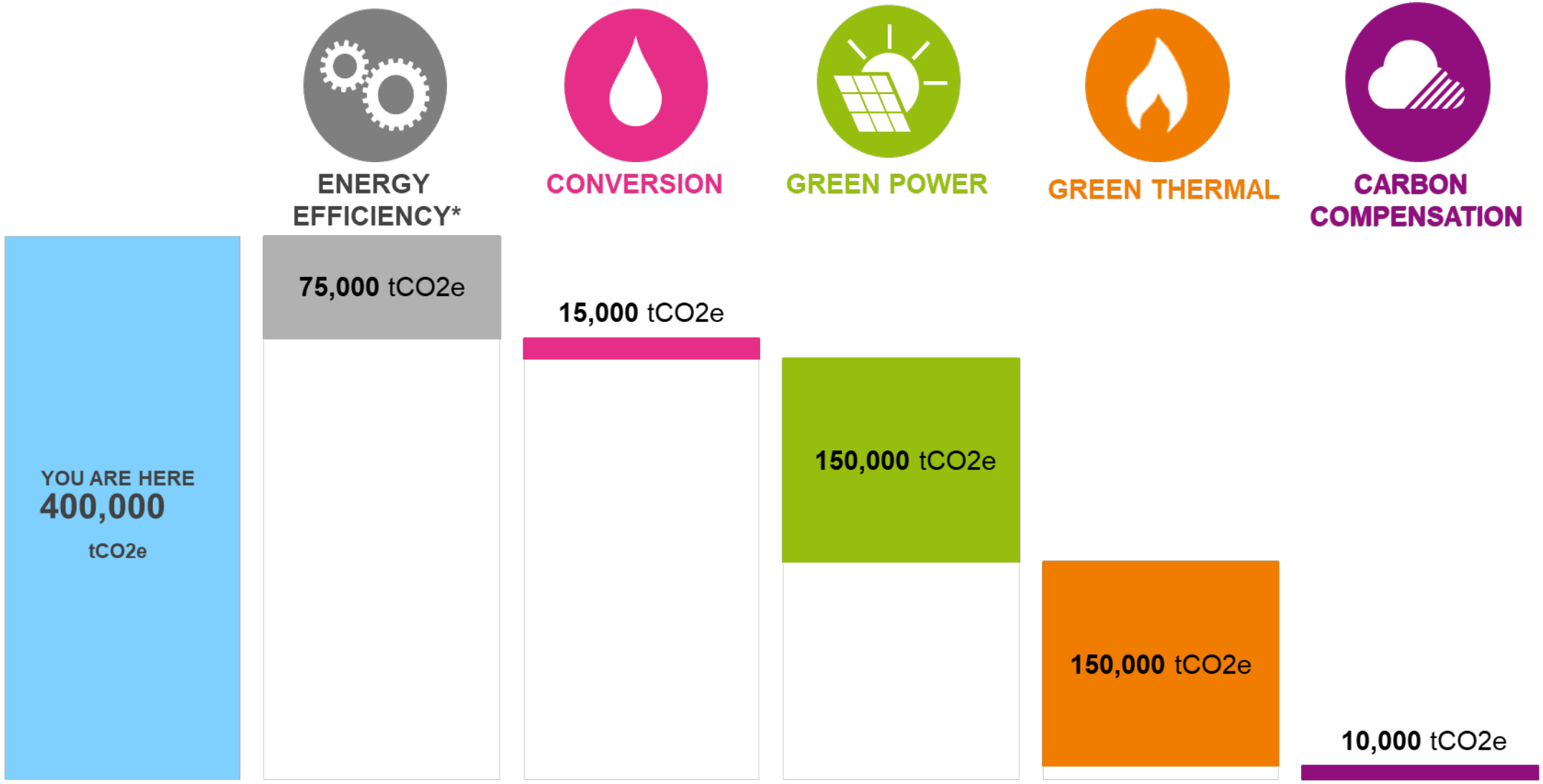
- Assessment of efficiency scope across your organisation
- Assessment of utilities/ heating conversion scope across your organisation
- Assessment of on-site renewables scope across your organisation
- Assessment of offsite renewables/PPA scope across your organisation
- Assessment of routes to offset across your organisation

- Estimation of investment required, potential grants /incentives, funding options
- Estimation of timescales



Output - Formulation of Zero Carbon Roadmap

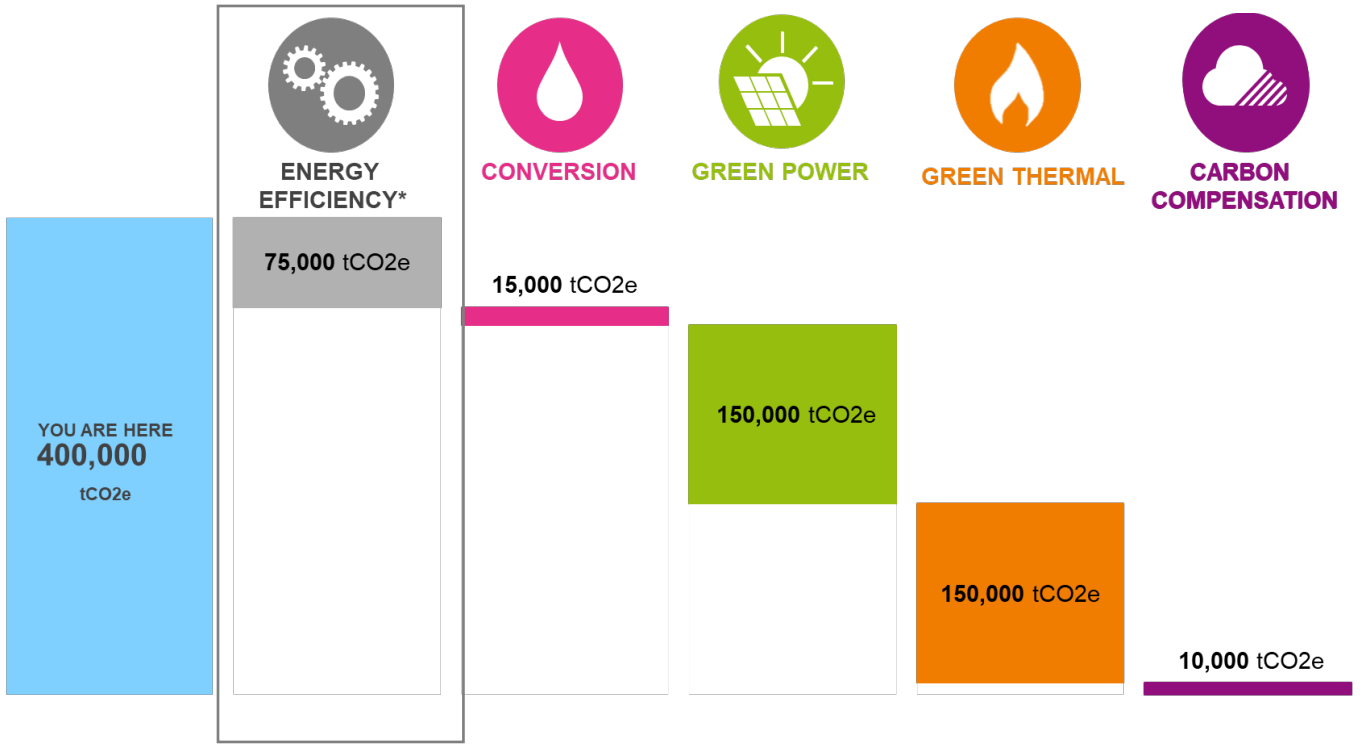
Plan - Carbon waterfall



6

Key Technologies & Solutions

Energy Efficiency



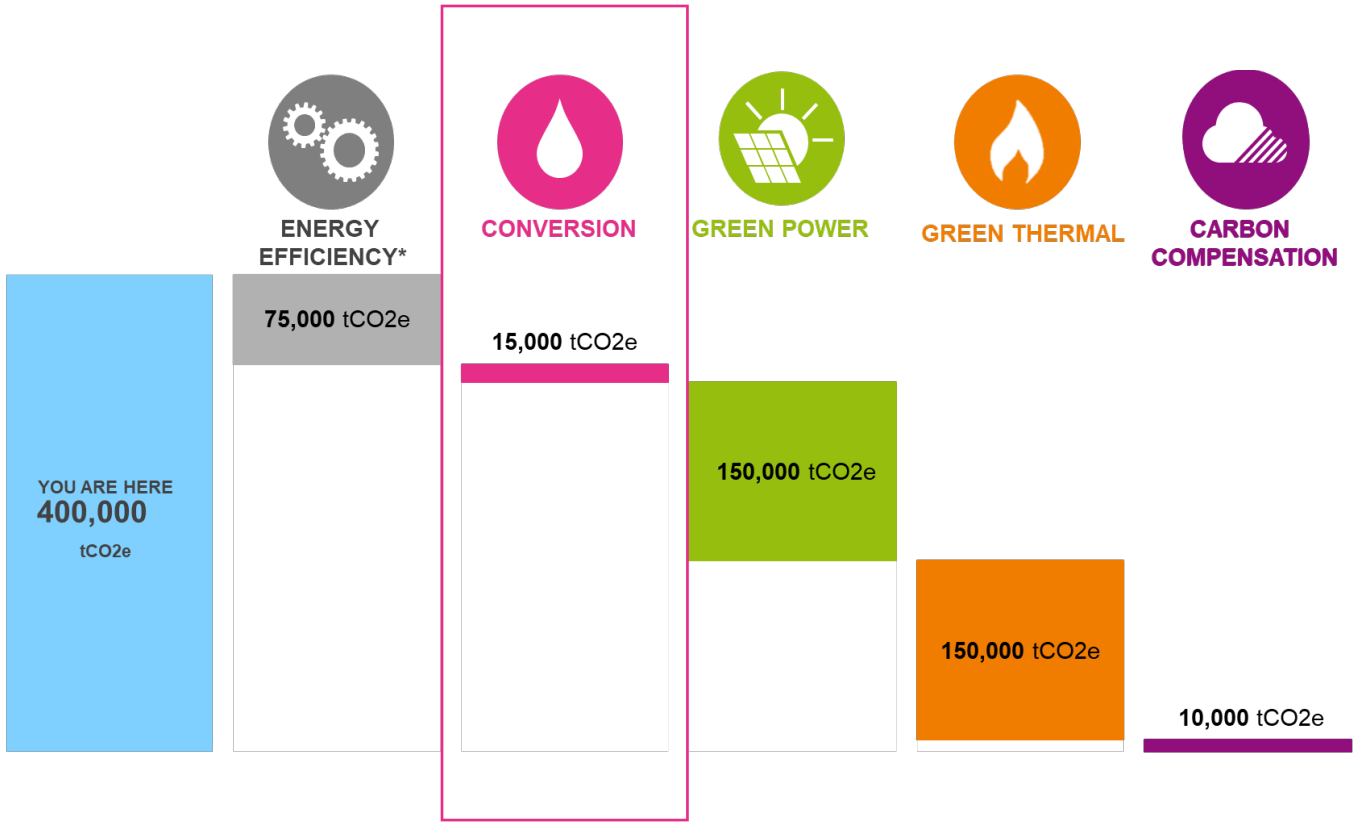
Energy Efficiency Technologies

- LED Lighting
- High efficiency motors
- Variable speed drives
- BEMS Controls
- Combustion burner upgrades
- Heat recovery units
- High efficiency chillers
- High efficiency compressors
- Metering

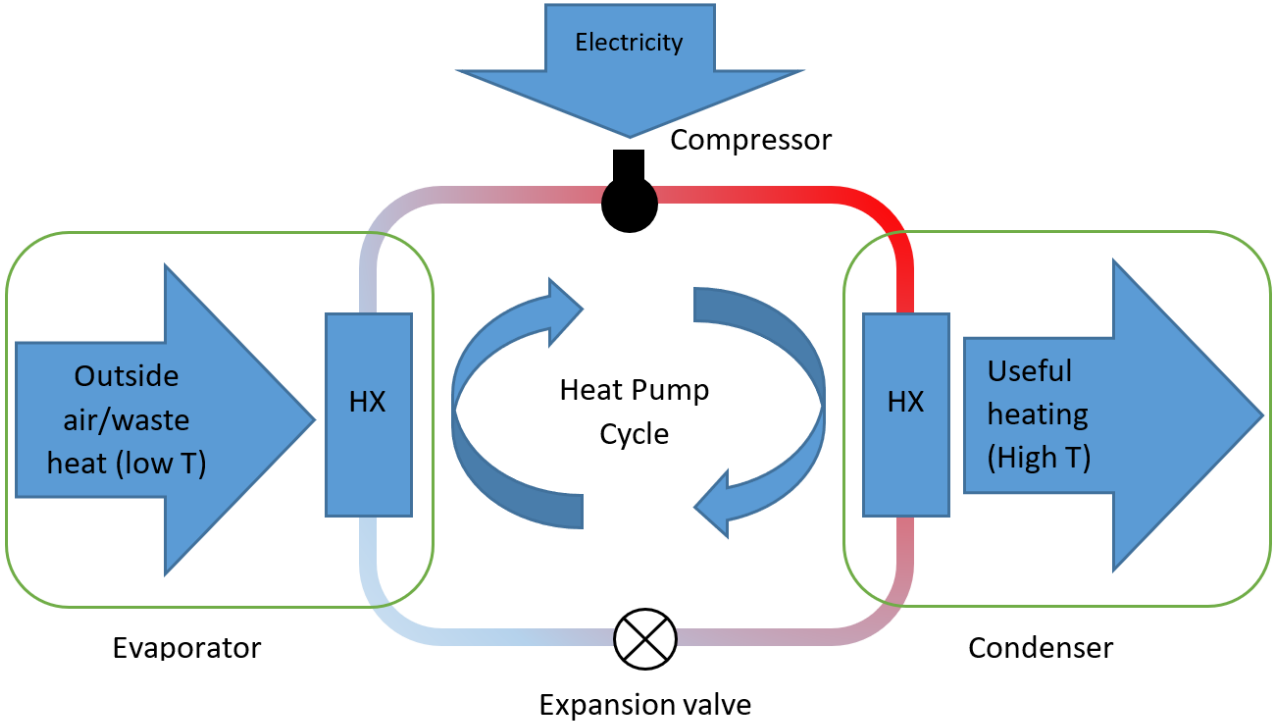
Behavioural change

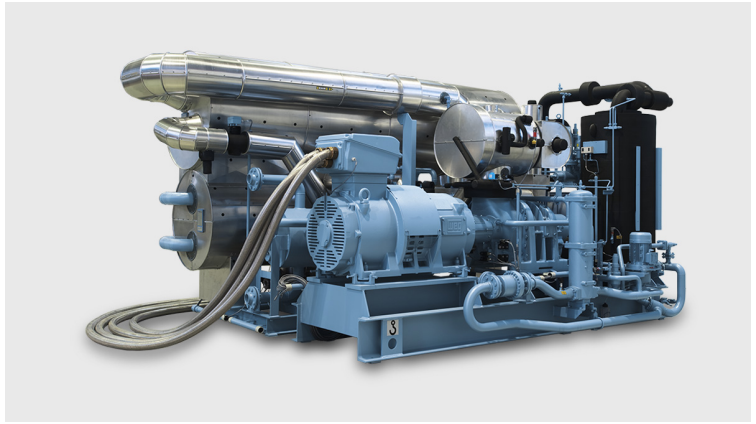
- *Top level buy – in*
- Corporate Sustainability Policy
- Employee engagement - Get everyone involved!
- Data driven – Metering, Monitoring & Targeting
- Awareness & Training
- Regular communication - *Feedback*
- Competitive culture
- Incentives
- Supply chain engagement

Conversion


ENERGY EFFICIENCY*
CONVERSION
GREEN POWER
GREEN THERMAL
CARBON COMPENSATION
YOU ARE HERE
400,000
tCO2e
75,000 tCO2e
15,000 tCO2e
150,000 tCO2e
150,000 tCO2e
10,000 tCO2e

Electrification – Heat Pumps





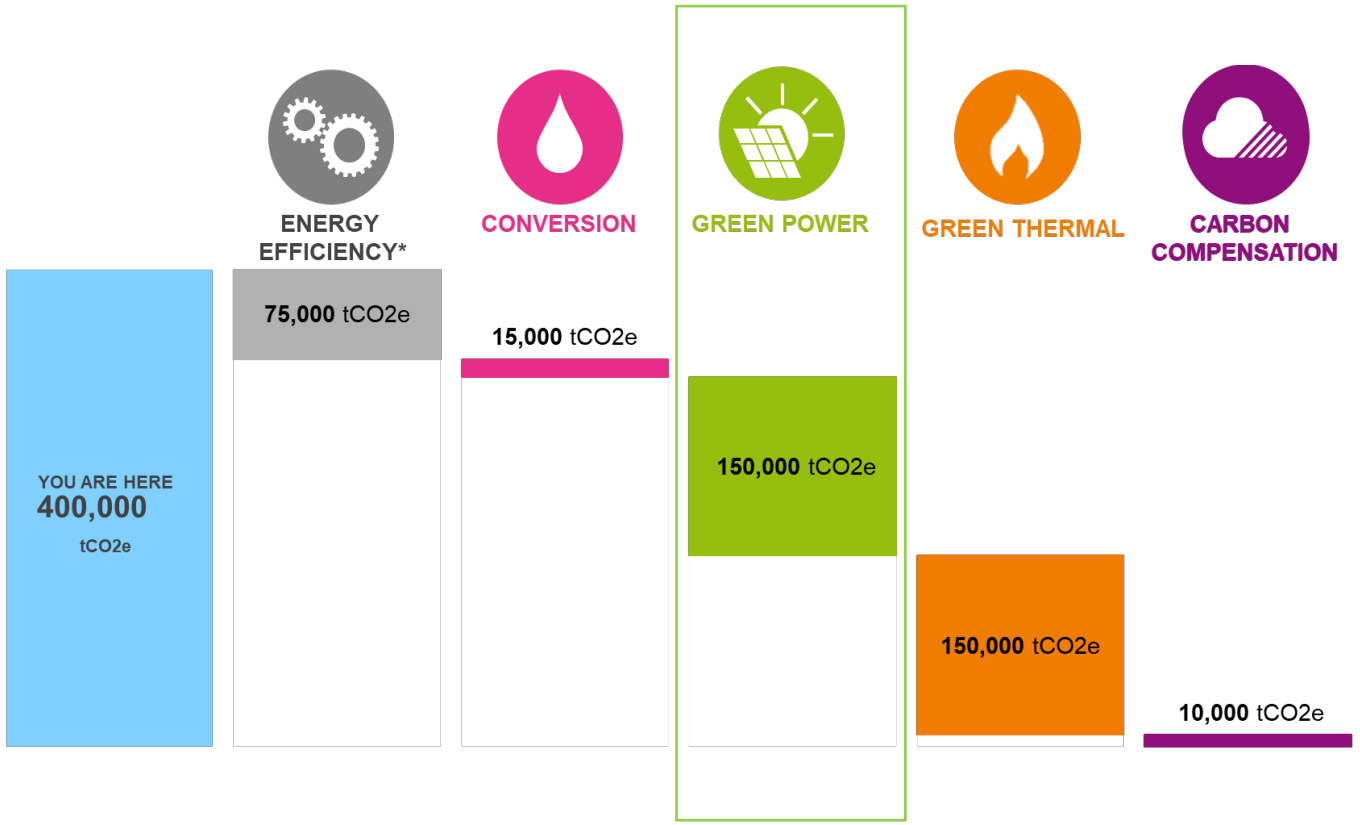
Electrification – Transport

Green Fuels


Filtered Used
Cooking Oil
Reacted Oil
with Glycerine
B100
Biodiesel

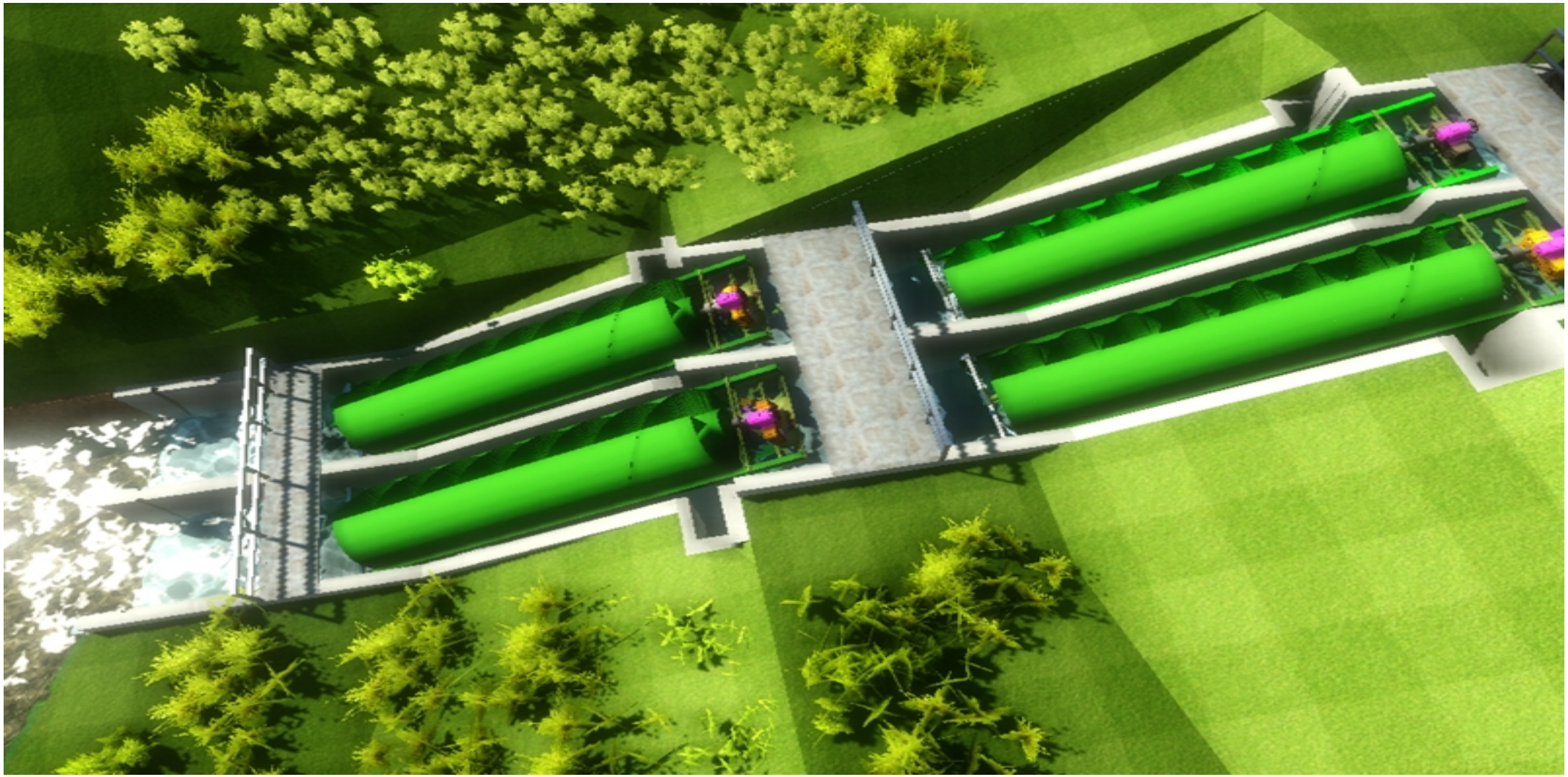

Grown
for
Biofuel

Green Power


ENERGY EFFICIENCY*
CONVERSION
GREEN POWER
GREEN THERMAL
CARBON COMPENSATION
YOU ARE HERE
400,000
tCO2e
75,000 tCO2e
15,000 tCO2e
150,000 tCO2e
150,000 tCO2e
10,000 tCO2e

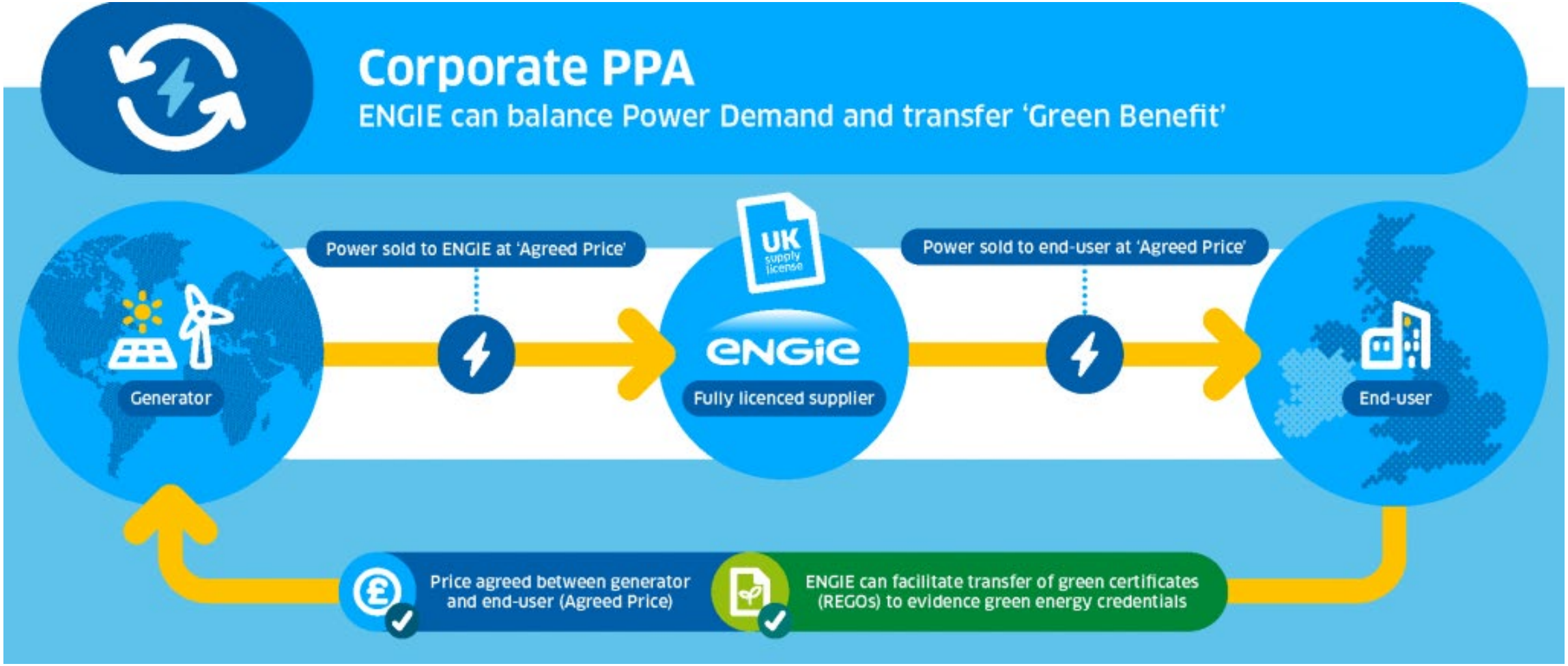
Renewable Electricity Generation – Solar/Wind

Renewable Electricity Generation - Hydro

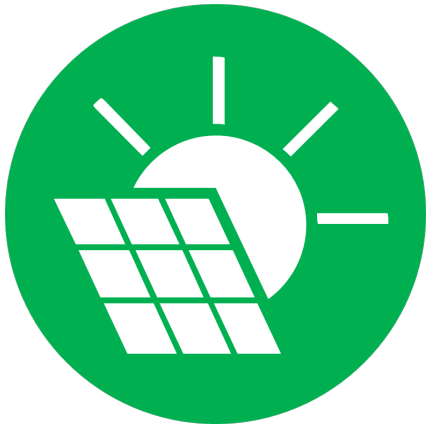


Energy Storage - Battery

Corporate PPAs – Buying Green



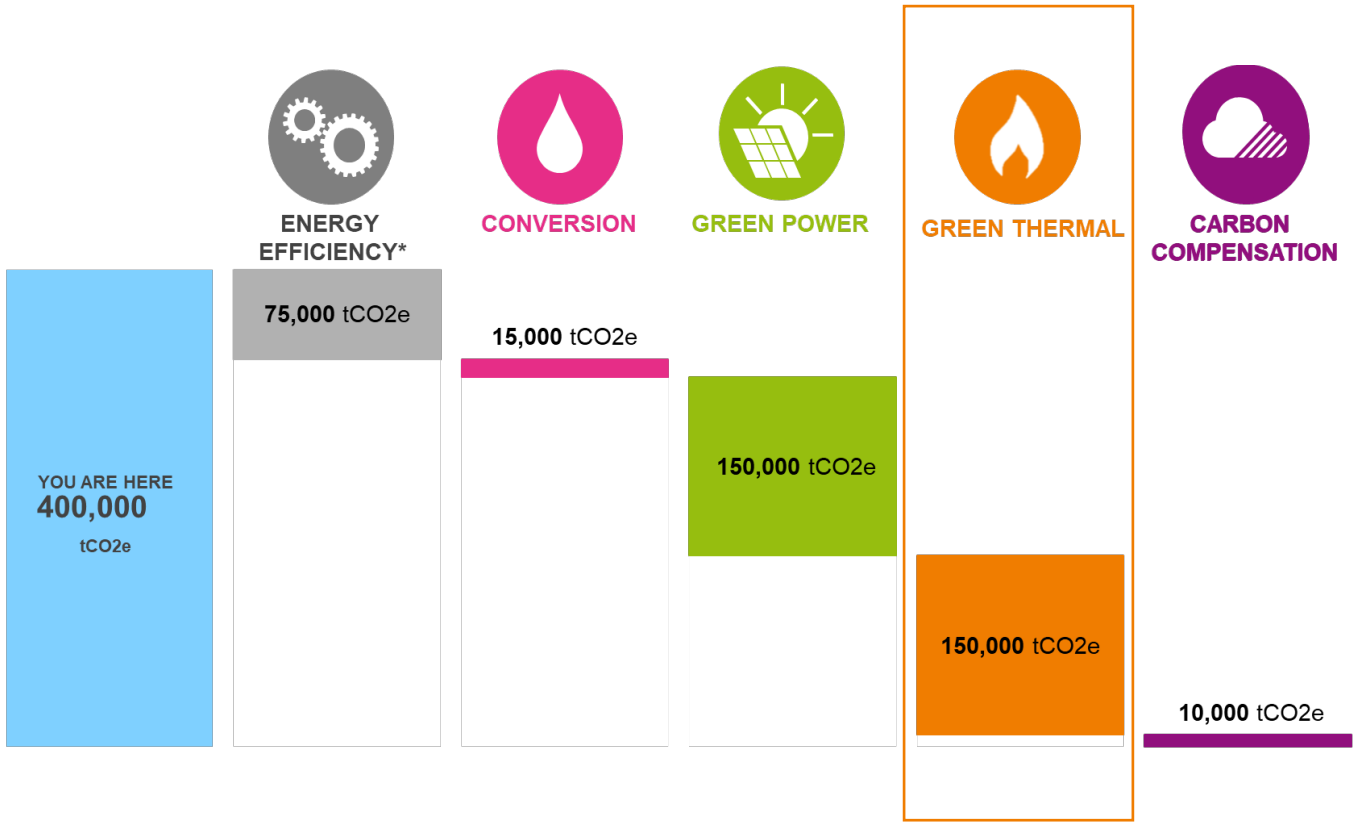
Renewable electricity supply



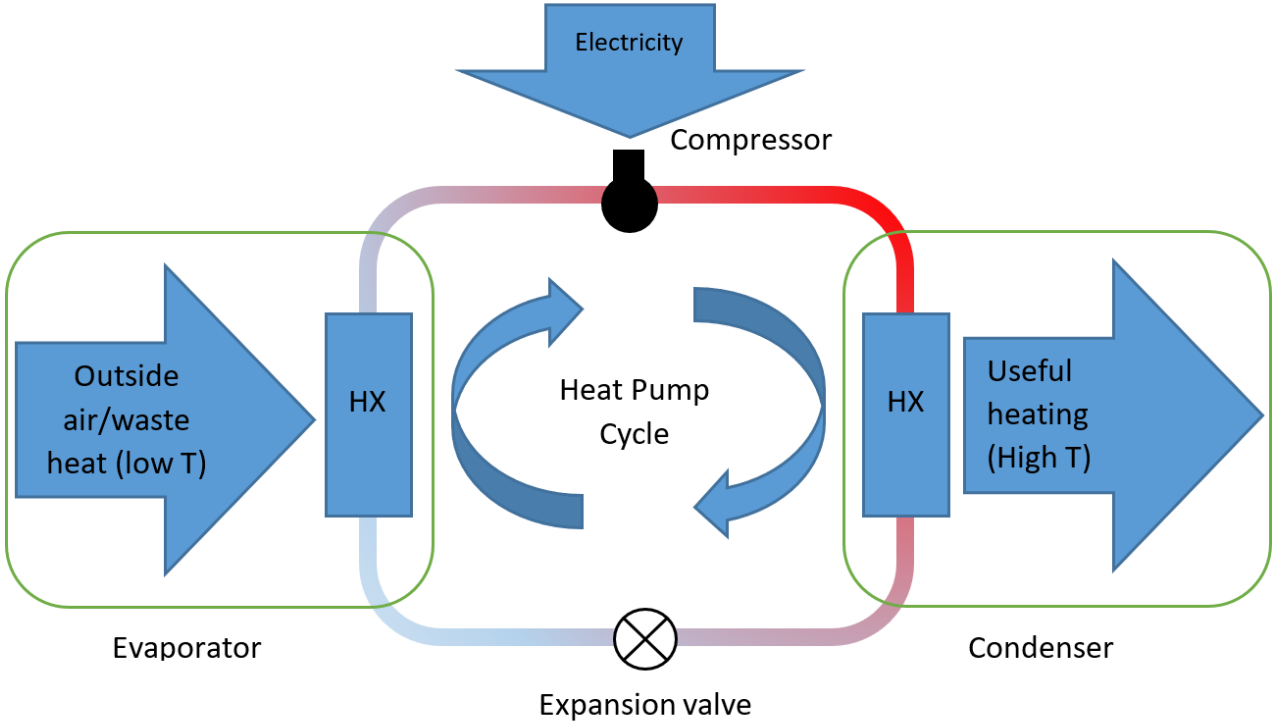
Electricity you buy via renewable energy contracts comes from **100% renewable energy sources,** such as wind or hydro-electric power – which produce zero carbon emissions and do not deplete finite natural resources.

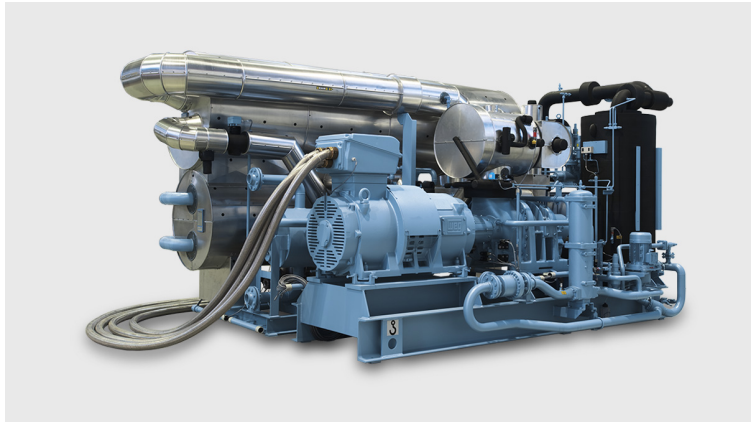
The origin of renewable electricity should be fully certified by **UK Renewable Energy Guarantees of Origin (REGOs)** or **EU Guarantees of Origin (GoOs),** meaning that all of the electricity you buy is fully traceable to specific renewable generators.

Green Thermal

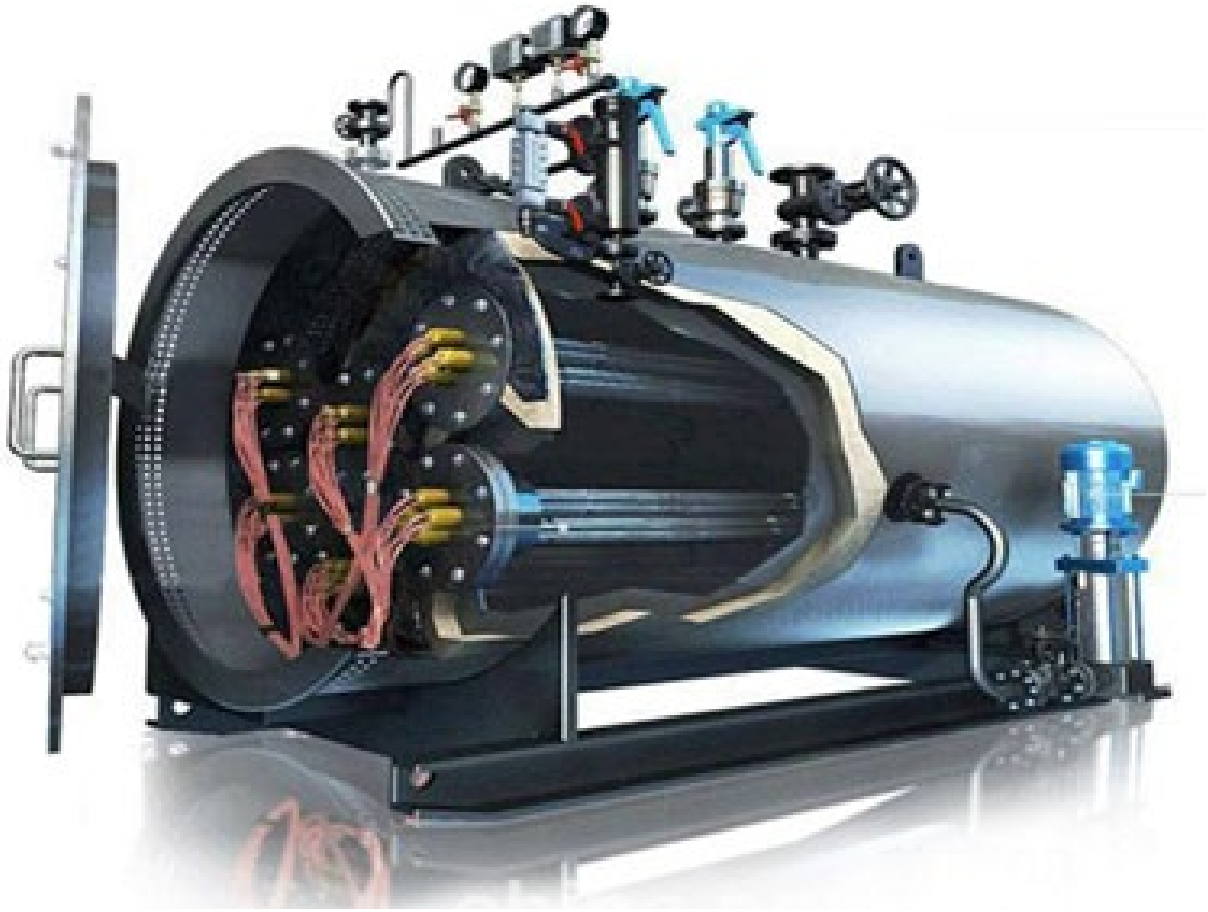


Electrification – Heat Pumps





Electrification – Industrial Boilers



Biomass/Biofuel

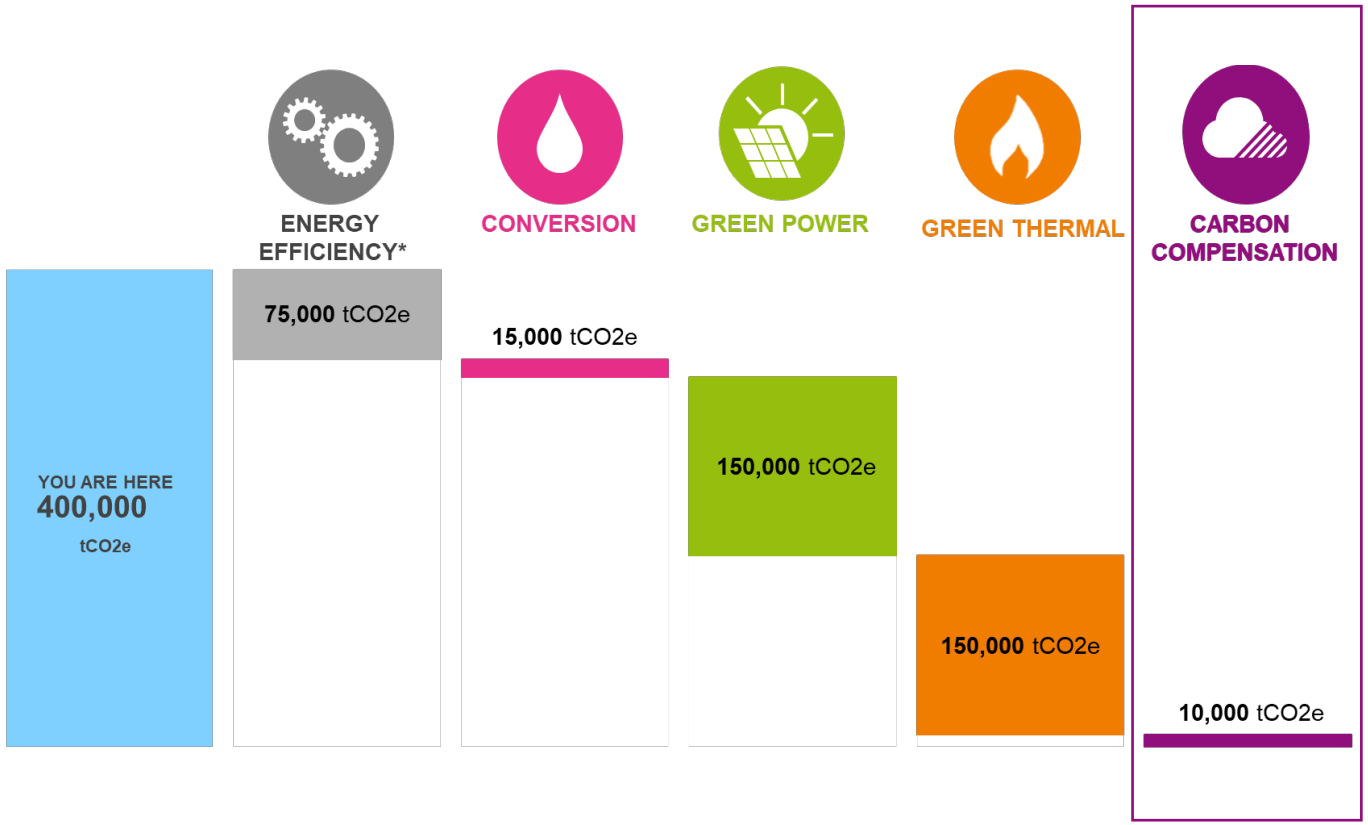
Hydrogen

Green Gas

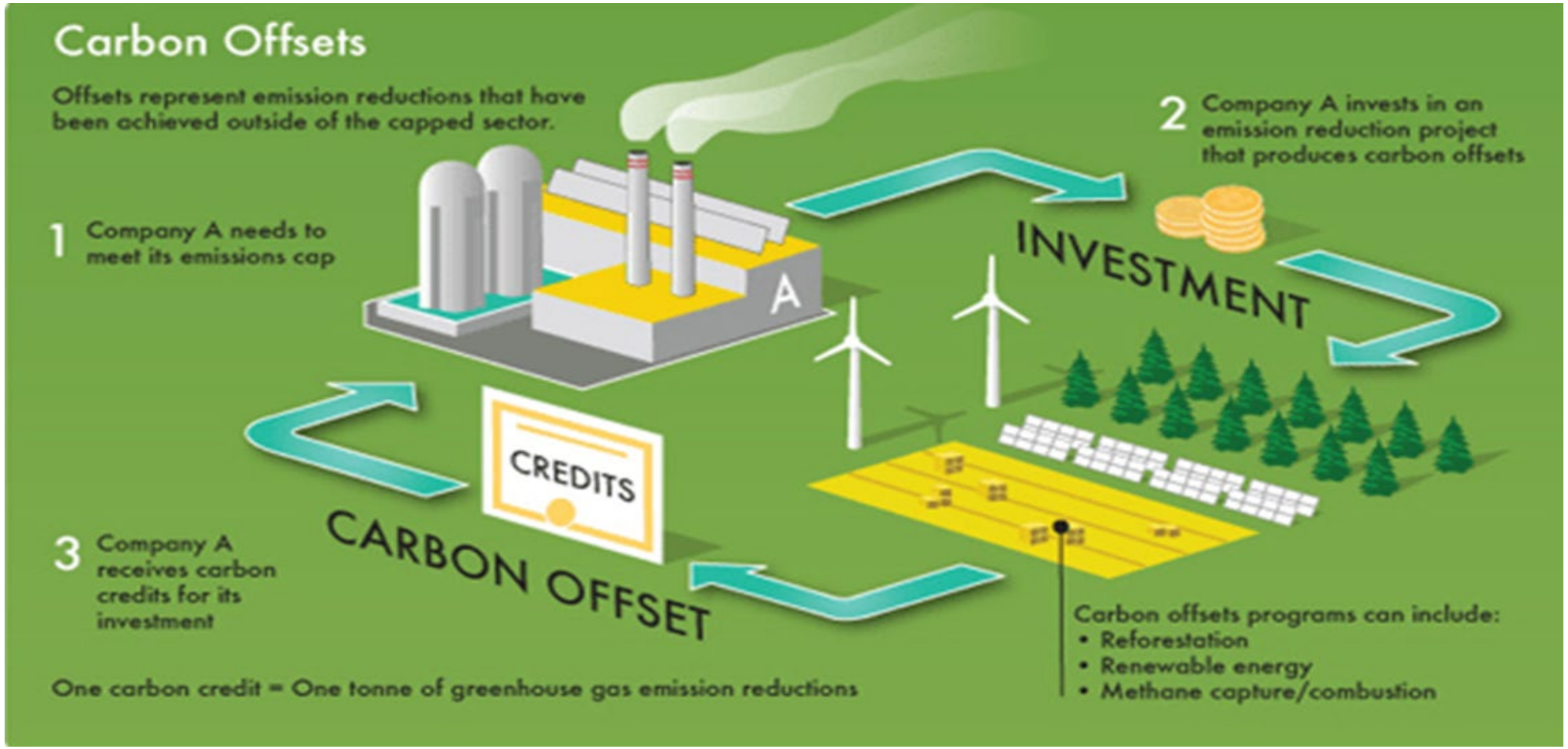
“Green gas” is sourced from generation plants that produce biogas from anaerobic digestion or landfill waste gas. Biogas produces at least 46% less carbon emissions than standard natural gas, enabling you to reduce your carbon footprint.

Renewable Gas Guarantee of Origin (RGGO), identifies exactly where, when and how it was produced. This gives you complete traceability and assures you that your gas comes from authentic biogas sources.

Carbon Compensation



Compensation



Carbon Offset or Inset

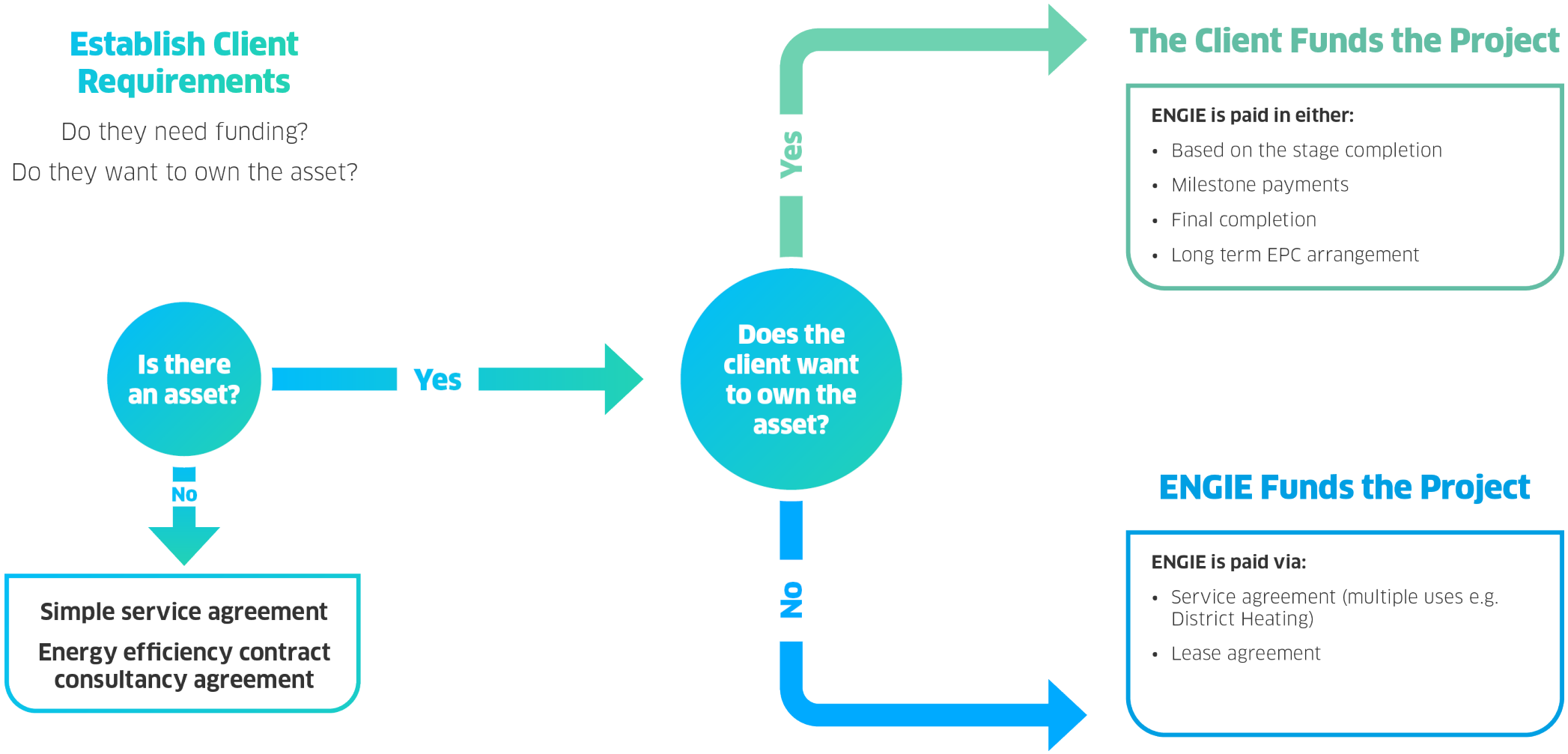
- Improved Cookstoves for Social Impact in third world countries
- Borehole Rehabilitation Projects in third world countries
- UK Tree Planting + Brazil Reducing Deforestation
- Landfill Gas Management & Power
- Wind farms
- Hydro Projects
- Solar Projects
- Geothermal
- Certified Emission Reductions (CERs)
- Gold Standard CERs
- Gold Standard Verified Emission Reductions (VERs)
- Verified Carbon Standard (VCS) certified credits

Financing Options

Establish Client Requirements

Do they need funding?

Do they want to own the asset?



Poll 3:

Are you aware of where your carbon reduction opportunities are?

Yes/Partially/No

7

First Step - Streamlined Energy & Carbon Reporting (SECR)

Streamline Energy & Carbon Reporting (SECR)

- SECR is a new mandatory energy and carbon reporting scheme that was introduced by the government in April 2019.

- SECR affects:
  - Quoted companies
  - Large unquoted companies
  - Large LLPs

‘Large’ is defined as having two of the following

Streamline Energy & Carbon Reporting (SECR)

Large Companies need to report on:

- UK energy use (as a minimum electricity, gas and transport)
- Scope 1 and Scope 2 greenhouse gas emissions
- At least one intensity ratio
- Information about energy efficiency action taken in the financial year
- Part of their annual accounts filed with Companies House

OUR AMBITION

OUR STRATEGY IN ACTION

BE WORLD LEADER IN THE ZERO-CARBON TRANSITION "AS A SERVICE"

Faster growth, higher value, better impact