Transforming Energy Foundation

Energy Management for Fossil Fuel Free Buildings

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Modules

- Introduction to Energy Management
- Policy commitments
- Understanding energy needs & use
- Identifying opportunities
- Implementing projects & processes
- Communications

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What is Energy Management?

Embedding thinking about energy into your everyday practices and building use, and proactively planning to retrofit your building to be fossil fuel free.

Good energy management will achieve these 3 objectives:

1. Reduce energy use
2. Reduce energy costs
3. Reduce carbon emissions

What Does Energy Management Involve?

Working with existing and new buildings and equipment to make proactive decisions and investments to achieve a fossil fuel free future. This process involves the following:

- Collecting data on your energy consumption
- Finding opportunities and taking action to save energy
- Shifting away from fossil fuels
- Tracking your progress by monitoring data

Net Zero and Carbon Neutral

• **Net Zero** means cutting greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere, by oceans and forests for instance.

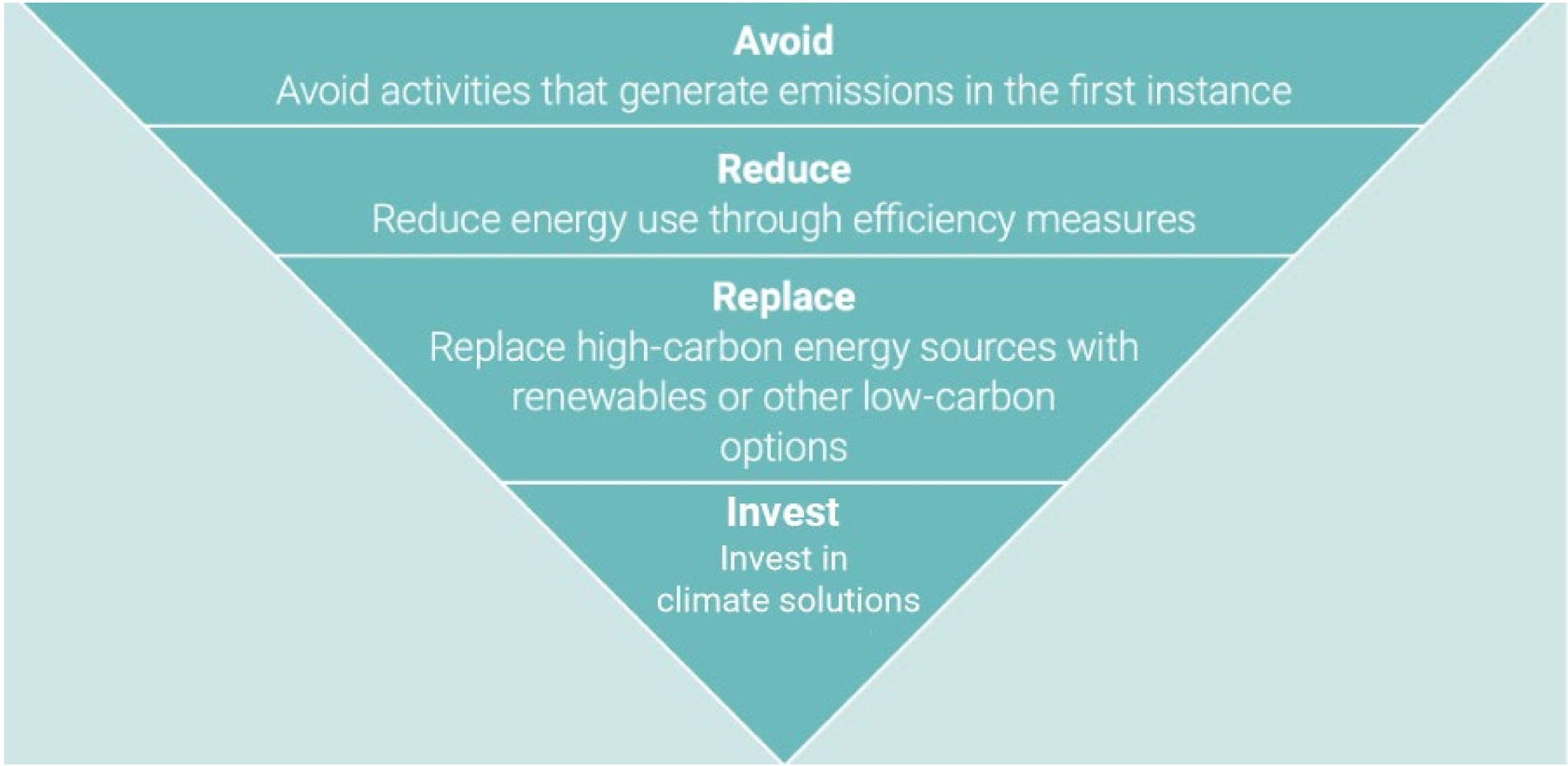
• **Race to Zero** is a global campaign to rally leadership and support from businesses, cities, regions, investors for a healthy, resilient, zero carbon recovery that prevents future threats, creates decent jobs, and unlocks inclusive, sustainable growth.

• Net zero differs from **carbon neutrality**, which places a greater emphasis on carbon offsets, and means that an organisation is offsetting as many emissions as they are emitting.

• **The Science Based Targets initiative** (SBTi) provides a clearly-defined pathway for companies to reduce greenhouse gas (GHG) emissions, helping prevent the worst impacts of climate change and future-proof business growth. Offsets and avoided emissions should not count towards SBT.

• For more information read **Julie's Bicycle Net Zero Resource**

Hierarchy of Good Energy Management



Investing in a clean and just climate transition

• For many organisations the largest part of their greenhouse gas emissions are in their supply chain and value chain (i.e. scope 3 emissions).

• Organisations to compensate for these emissions have sometimes purchased voluntary carbon offsets from third parties typically not related to their activities. However, there is growing momentum by organisations to apply an internal carbon price and use this sum to invest in projects either within their own operations or support the transition to a clean and just climate transition. This evolution of carbon offsets is called insetting.

• Additional resources: **Gallery Climate Coalition Strategic Climate Fund** and the **International Platform for Insetting**.

Electrification

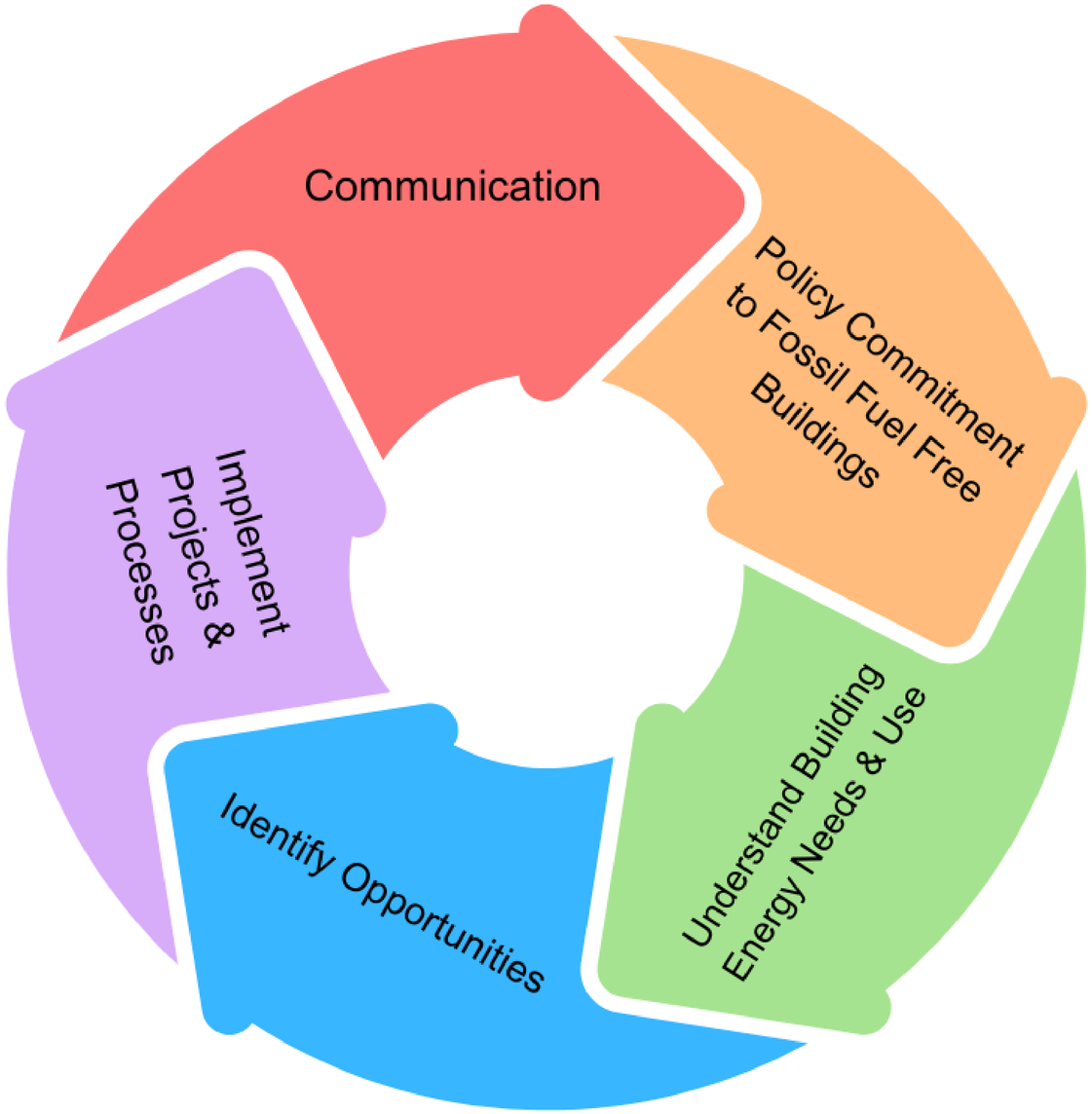
In order for the UK to achieve net zero emissions, energy needs to come from carbon free energy sources.

At an organisational level this means your organisation should focus efforts energy reduction and investing in the electrification of your building.

Methods to do so include:

- Moving away from all fossil fuels: e.g., oil and gas
- Installing heat pumps or where available connecting to district heat network for heating
- Purchasing 100% renewable electricity, e.g. wind and solar
- If your property allows for it, installing onsite renewable energy generation (e.g. PV solar panels).

Components of Good Energy Management



Policy Commitment to Fossil Fuel Free Buildings

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Policy

In your organisational environmental policy, there should be a commitment to be fossil fuel free in your buildings.

- In your policy it is important to be clear what the boundaries of your responsibilities are (i.e., what is counted and what is not)
- The policy will be underpinned by an environmental action plan
- The policy and action plan should be reviewed on a regular basis (e.g., annually).

Components of a Fossil Fuel Free Commitment

Component	
Targets	▪ Energy intensity ▪ Fossil fuel phase-out targets.
Date	▪ The date you aim to achieve your target ▪ The UK is committed to net zero by 2050, mandated by law. Any earlier commitment is driving positive change.
Reporting Schedule	▪ E.g., Annually ▪ Results should be reported in energy terms (kWh) and energy intensity (ex. A relative metric such as kWh per £ turnover).

Roles & Responsibilities

Who has responsibilities for energy in your organisation?
Depending on your size, these responsibilities could either fall under an existing role or have a dedicated employee. All staff however should understand the importance of, and be involved in, reducing energy demand and driving change through the organisation.

A good rule of thumb:

- Every £1 million of energy spend should equate to the full economic costing of one staff member.
- 5-10% of energy spend should be on energy management per £1 million spend.

Energy Managers

Energy managers do not have a time critical role, but must have the time to organise information and develop energy use interventions to future proof their organisation.

The person who holds this responsibility may be different depending on the size of an organisation. It may be someone’s full position or part of their responsibilities.

They must have readiness and be proactive in understanding energy use, testing improvements, and working towards investment in low-carbon solutions.

Energy Manager Duties

Action	Timings/Notes
Organise and monitor energy data	Weekly
Look for free opportunities	• Tweaking Buildings Management Systems (BMS) • shut down equipment not in use • engage with staff and customers e.g., on green travel options)
Cost up interventions	Ongoing
Report regularly to board	Quarterly
Compliance checks with internal policies and external regulation	Annually
Leave an audit trail	Staff handovers
Bill validation	Monthly
Equipment procurement	Ongoing
•Oversee maintenance and energy specialist contractors	Ongoing

Energy Managers

At larger or more complex organisations, you will need a manager who has competencies around the following. They will often hire a contractor.

- Electrical systems
- HVAC systems
- Motors and drives
- Industrial systems
- Building envelope (what separates the inside from outside of your building)
- Building automation
- Control systems
- Combined Heat and Power (CHP)
- Lighting systems
- Maintenance
- Boiler and steam systems
- Thermal energy storage systems
- Commissioning, measurement and verification

Compliance

Scheme	Mandatory?	Qualification	Description
ESOS	Yes	Large (250+ employees)	Energy Savings Opportunity Scheme to ensure UK enterprises in the UK are energy efficient and to identify ways to save energy.
SECR	Yes	Large (250+ employees, £36M+ turnover, £18M+ balance sheet)	Streamlined Energy and Carbon Reporting to ensure UK businesses annually report on energy and carbon emissions and efficiency measures.
DECs	Yes	Buildings over 250 m2	Display Energy Certificates are records of actual energy usage of buildings that must be publicly displayed.
EPCs	Yes	Domestic and commercial buildings available to buy or rent	Energy Performance Certificates give properties an energy efficiency rating from A to G.

Compliance

Scheme	Mandatory?	Qualification	Description
ISO 50001	No	Any size business	A standard which provides guidance on energy efficiency through development of an energy management system.
ISO 14001	No	Any size business	A standard which provides guidance on environmental management through the development of an environmental management system.
PAS 2060	No	Any size business	Carbon Neutrality Standard and Certification which allows organisations to demonstrate carbon neutrality.

Understand Building Energy Needs & Use

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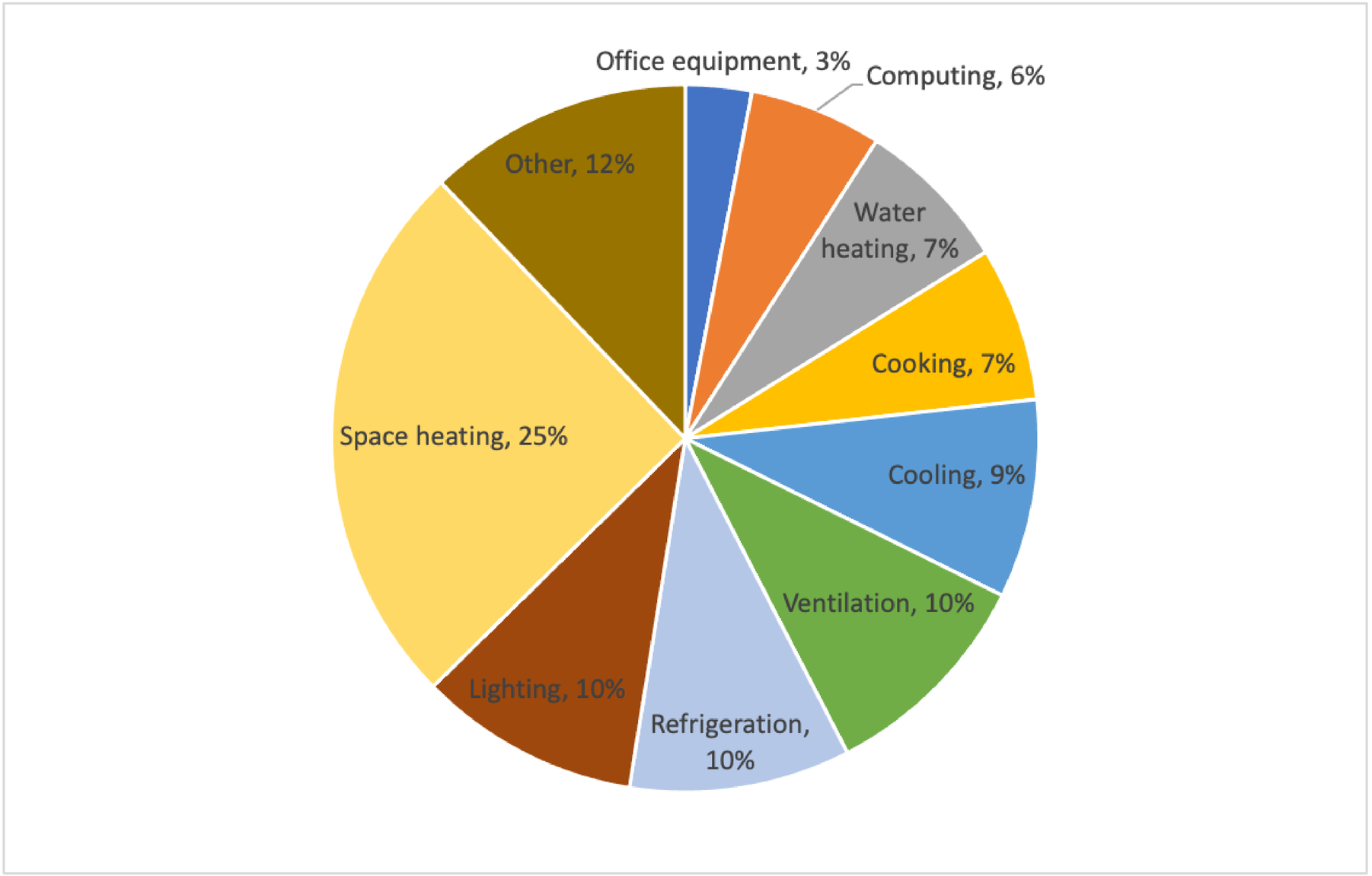
Drivers of Your Organisation’s Building Energy Use

1. **What you do** as an organisation
2. How what you do is **anticipated to change** (ensure alignment with your business development plans)
3. The **buildings** you occupy (e.g., Your infrastructure, the fabric of your building)
4. The **equipment** you have (e.g., AC units, gas heating, etc.)
5. Your **management** and **procedures**.
6. The **behaviour** in your buildings (e.g. Do people turn off the lights or set thermostat controls?)
7. The **geography** of your buildings (e.g., Where in the country it is located, the position or orientation in relation to the sun and wind).

Example of Energy Use in a Building



Units of Energy Measurement

Unit	Description
Watt (W)	The rate at which energy is changed from one form to another
1000 Watts	1 kW
kWh	1 kW for 1 hour
Power in W or kW	What a piece of equipment requires to run, what wires can cope with
Energy in kWh	What we pay for

Energy Audits

An energy audit is a review of the following:

- What equipment there is in a building
- The age and efficiency of that equipment
- How the equipment is used
- How effective the equipment is
- How energy is used in a building
- What alternatives are there to reduce energy use in a building

What is Involved in an Energy Audit?

Simple Audit:

- Walk around of buildings
- Written notes on each room
- Written notes on equipment

Intermediate Audit:

- Analysis of energy use data from energy meters to see energy use by fuel and area
- Recommendations for efficiency, costings, savings opportunities

What is Involved in an Energy Audit?

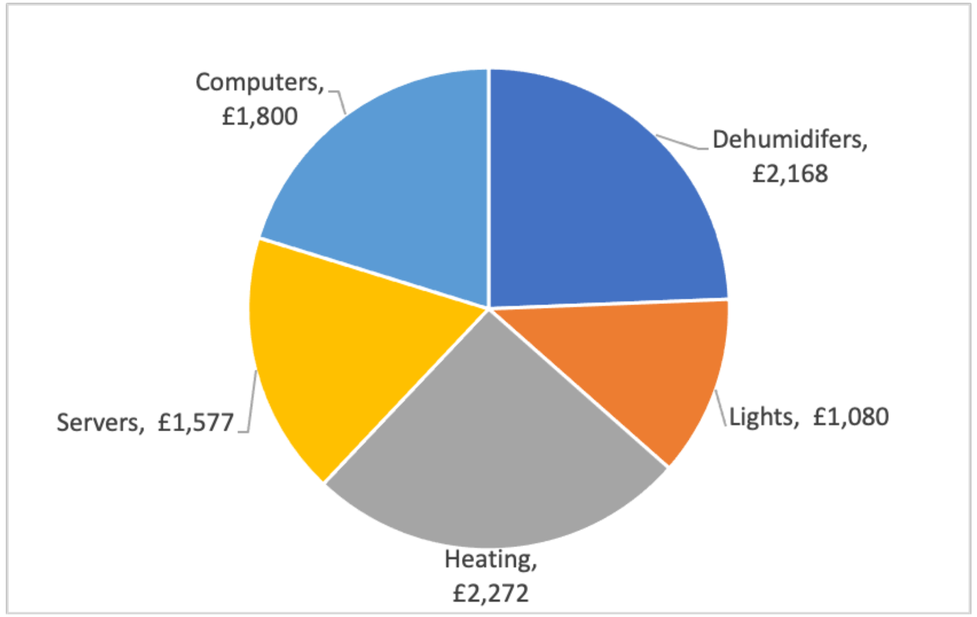
Night Audits:

- Visiting buildings out of hours
- Assess what is left on overnight (e.g., lights, computers).

(An advanced capital investment grade audit would involve a specialist to assess feasibility, cost, and savings of specific opportunities, e.g., Replacing gas boilers with heat pumps).

Example of Energy Use Findings from Audit

Annual Energy Cost by End Use, £



	Power (kW)	Annual use (kWh)	Annual use £
dehumidifiers	1.65	14,454	2,168
lights	2.40	7,200	1,080
heating		56,800	2,272
servers	1.20	10,512	1,577
computers	4	12,000	1,800

Energy Analysis

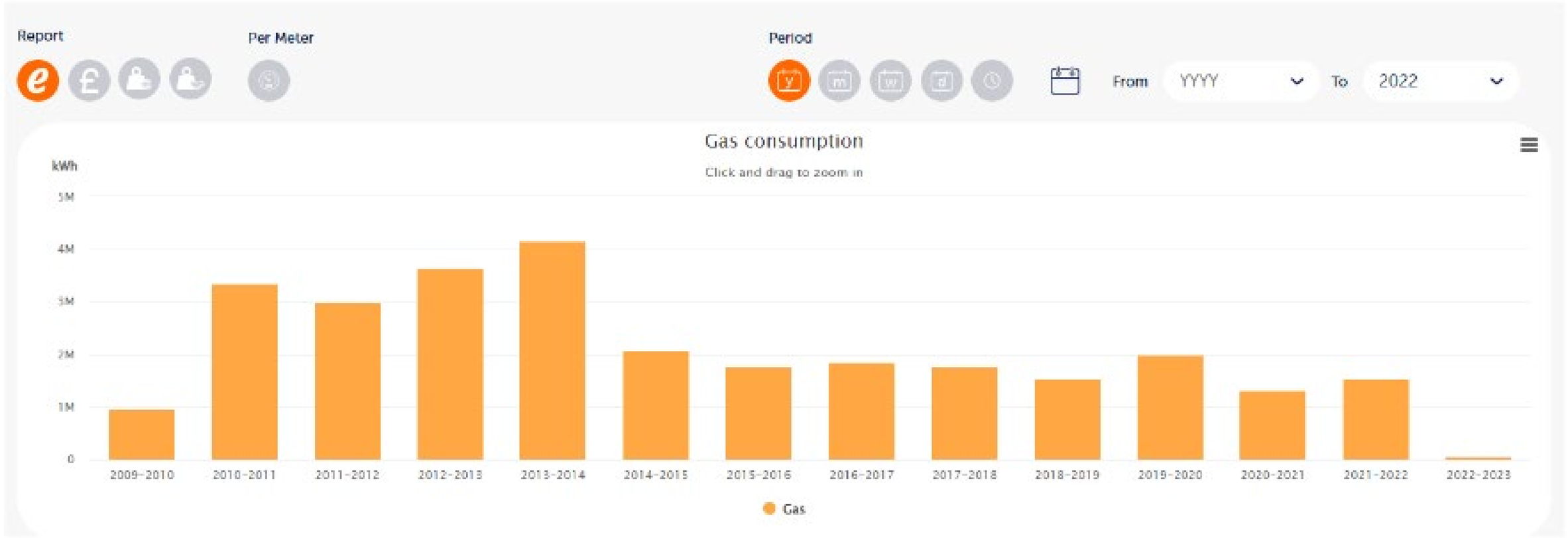
Steps to energy analysis:

- Data is collected from invoices or meter readings and is broken down by fuel type (e.g., electricity, gas, renewables)
- Convert these invoices into kWh

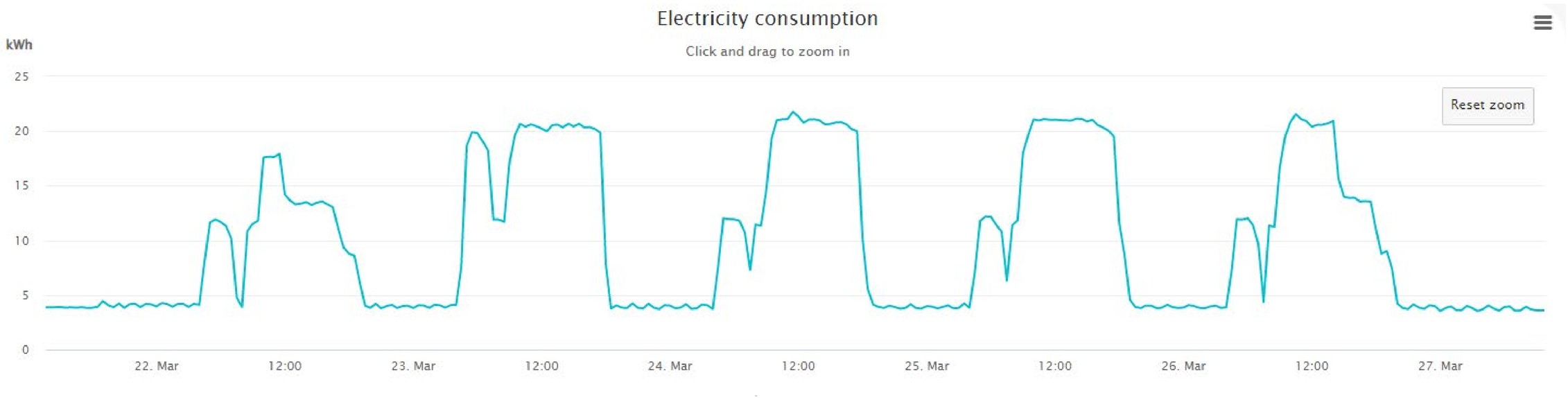
An energy analysis aims to measure how much energy is being used each year by fuel type. It is recommended to collect this data on a monthly, weekly, daily basis, and where possible with meters a half-hourly basis.

Comparison

To see variation, range, patterns, and significant changes, it is important to compare periods of energy use such as month-to-month to see seasonal variation, and year-to-year to track improvements. E.g., year-to-year use:



Example of Energy Consumption Data



Daily electricity use profile for 5-day period

Every peak is showing daytime day use. The dropped flat lines is showing overnight. The small peaks is likely to be when the first group of people come into the building before full opening - e.g. if this were a museum 8-10am is when staff come in and then 10am being when doors open and visitors come in.

Benchmarks

It is useful to look at data results per meter squared of your building in order to understand:

- How your building compares to another similar building
- Your other buildings
- Your building’s performance year-to-year

This means it is important to collect data on your floor area when gathering information.

To start measuring your energy impacts and track annual progress, access our Creative Climate Tools **here.**

Identify Opportunities

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Creating an Action Plan

Looking at your data and completing an energy audit will produce a list of opportunities. The next step will be to create an action plan which activates which of these opportunities you will take forward.

An action plan will cover all of your sustainability initiatives, with specific building energy tasks including retrofit projects and management improvements.
An action plan includes:

- Roles and responsibilities
- Timeline
- Budgets
- Key Performance Indicators (KPIs)

For more guidance on writing a policy and action plan, access our guide **here**.

Example of a Building Energy Action Plan

Action	Timeline	Status	Flag	KPI
Building Fabric				
Install insulation				Insulation installed
Install double glazed window panes				Panes installed
Building Power				
Source 100% renewable energy				Get on a green tariff
Switch to LED lightbulbs				LEDs installed
Heating				
Install air source heat pumps				Heat pump installed
Renewables				
Install on-site PV solar panels				Panels installed

For more information on green tariffs and what you should be looking for, access our energy briefing here.

Implement Projects & Processes

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Typical Energy Efficiency Measures

Many energy audits will find the following opportunities to increase energy efficiency and improve emissions:

- Install a Building Management System (BMS) to programme heating, cooling and lighting systemsImprove building insulation
- Improve building insulation
- Improve pipework insulation
- Upgrade to double glazed window panes
- Source 100% renewable energy
- Switch to LED lightbulbs
- Install air source heat pumps

Switch Off Campaign – Behaviour Change

Steps to a successful switch-off campaign:

1. Identify all equipment left on unnecessarily (e.g., computers, lights, etc.)
2. Look at your data to measure energy use before the campaign
3. Create messaging and communications to teams you want to help activate change
4. Run a campaign to champion and encourage the switch off
5. Look at data after a week or month to see if the campaign has been successful

Building Management System

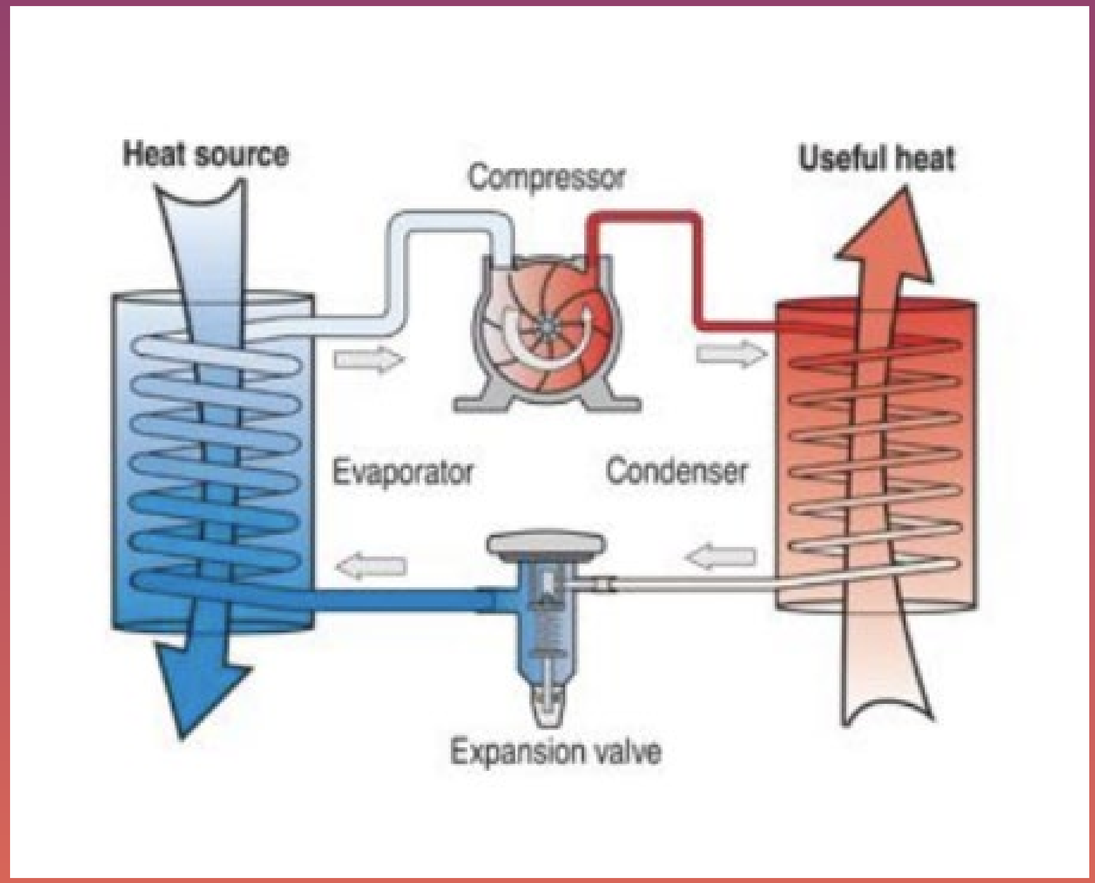
A Building Management System (BMS) is a control system which can allow you to monitor and effectively manage your power, heating, air-conditioning, and lighting systems.

You may already have a BMS system installed which you will be able to check, or you might need to install one.

If you have a BMS system installed check the control settings are not resulting in cooling and heating happening simultaneously. When this happens it is typically before the ‘dead-bands’ between when heating and cooling comes on are too tight.

Heat Pumps

- Heat pumps are a form of electric heating which are 2-7 times more efficient than direct electrical heating.
- Heat pumps redistribute heat from a source and transfer the heat into your space.
- There are 3 types of heat pumps – ground source, water source, and air source.



Air Source Heat Pumps

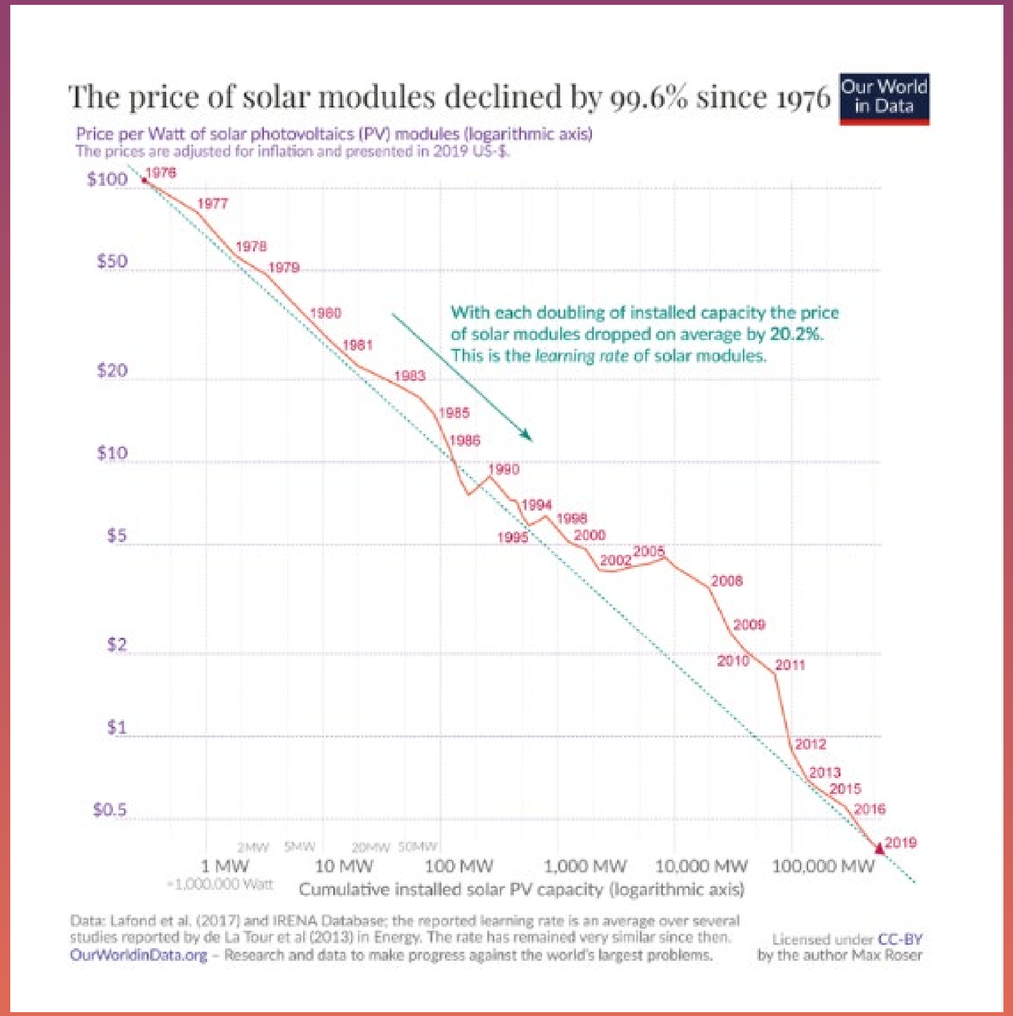
Air source heat pumps are typically recommended as they are:

- Cheap to install
- Cheaper to run
- The most popular option

Solar Energy

If the geography of your building allows, installing PV solar panels reduces fossil fuel use and saves money.

Solar panels cost £100 per m2 and generate 120 kWh per m2 per year.



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Communication Channels

Who	What	Opportunity
Board	Energy use report, energy investment needs	Help support funding
Staff	Switch-off campaign, energy management skills training	Achieve energy reduction targets
Solution Providers	Your service needs	Meeting your organisational spec
Suppliers	Ask for their sustainability credentials	Create pressure to improve and disclose practices
Visitors / Customers	How they can minimise impact. Read our audience travel guide here.	Further reach, achievement of energy reduction targets
Founders / Patrons	Achievements in energy reduction	Funding
Other organisations	Knowledge sharing	Build sector demand for solutions

Thank you

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