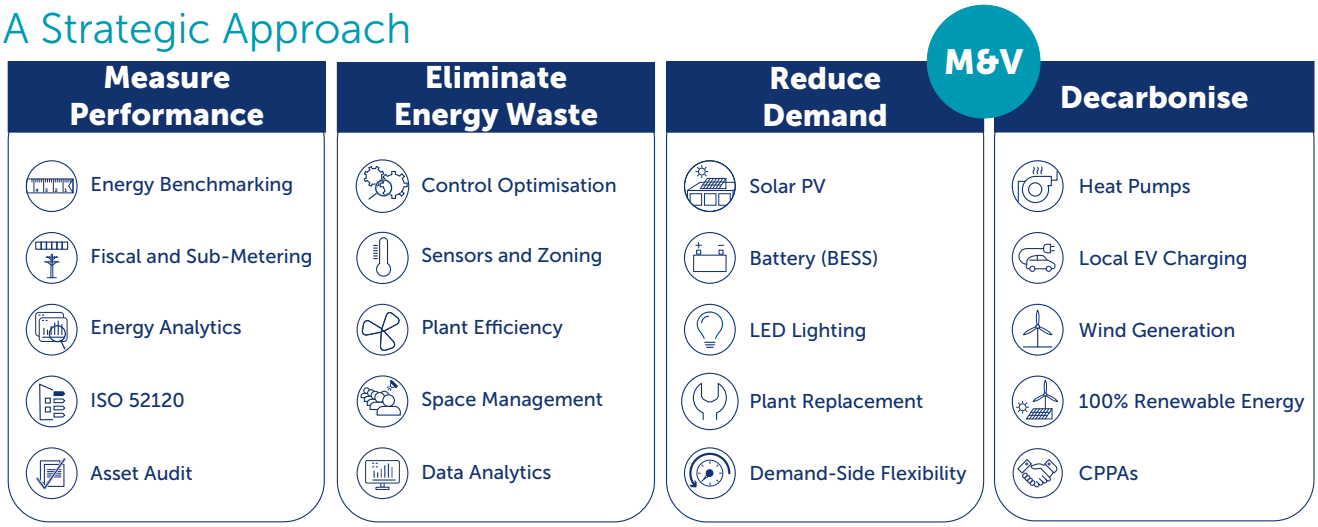
4-Steps to Decarbonising Buildings

A Strategic Approach



The global imperative to mitigate climate change has spotlighted the need to decarbonise buildings.

As significant contributors to greenhouse gas emissions, buildings offer substantial opportunities for emission reductions through energy efficiency, renewable energy adoption, and innovative building technologies. if you are a large business, you may be one of 400 RE100 members and have shareholders and employees who expect you to care about the planet. If you are a small business, you may form part of the scope 3 emissions of a larger business, which may force you to start engaging with decarbonisation.

Here, we outline a comprehensive guide to decarbonising buildings in 4 steps, applicable to both new constructions and the refurbishment of existing structures.

Step 1 - Measure Performance

In order to begin decarbonising your building and reducing energy use, you first have to know how energy efficient it is. There are a range of tools and techniques that you can apply to do this.

> *"You can't improve what you don't measure."*
> **Peter Drucker**

Energy Benchmarking

Remote Optimal™ Energy Benchmarking Calculator is an online tool that provides an estimate of your likely energy use (thermal energy and electricity) based on the type and size of your building, without having to set foot inside it. This can be compared with your energy bills to determine how energy-efficient your building is. If it indicates that your building is not efficient, and research shows that 75% of non-domestic buildings are not energy-efficient, then there are many options open to us to help you eliminate waste and reduce your energy demand.

Fiscal and Sub-Metering

Automatic Monitoring & Targeting (AM&T) sub-metering systems are specifically designed to measure energy usage, record metered energy data, and analyse and report on energy consumption. BEI is SSE's in-house Energy AM&T Solution.

Having a complete picture of your energy, carbon, and other services can make a huge difference. Engagement with an AM&T platform, such as SSE's Business Energy Intelligence (BEI), alone can drive down carbon and costs by approximately 10%. BEI, as with many AM&T systems, can be customised to give you an overview of not only your energy consumption but also water, EV, carbon, heat, and steam. It can record virtual, e.g. internally derived meters, and sub-metering. With this knowledge, you can make changes to cut your energy wastage, your bills and your carbon footprint.

Energy Analytics

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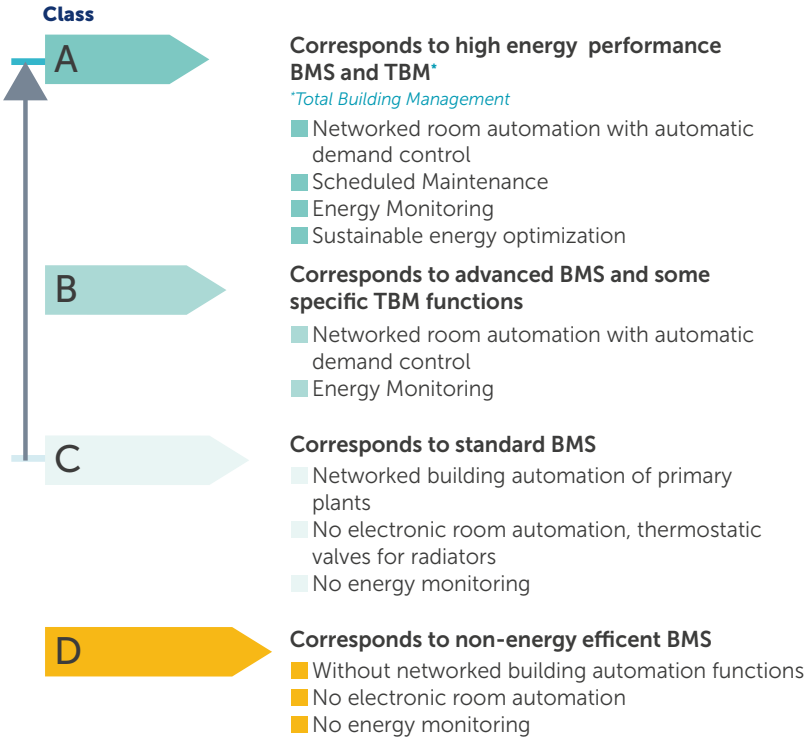
sse Energy Solutions



ISO 52120

There is an International Standard for Building Automatic Control Systems (BACS) aka Building Energy Management Systems (BEMS), specifically designed to assess BACS/BEMS performance. It was created by the European (CEN TC 247) committee in 2006 under its Energy Performance of Building Directive, and has been independently verified by the Technical University of Dresden. It was awarded an ISO accreditation in 2021 and was incorporated into the latest UK Building Regulations Part L2 in 2022.

Like the energy efficiency rating on a refrigerator, the Standard rates BACS/BEMS systems into efficiency classes from A to D. Energy efficiency Class C is the baseline for buildings with a standard BACS/BEMS. Buildings in which the BACS/BEMS is not operating efficiently are rated as Class D and typically use 35%-50% more energy than those in Class C, depending on the property type.

Changing the control to a demand-led, rather than a time-based strategy, can result in an average energy reduction of between 18% - 39% when moving from a C to an A rating, depending on the building type.

Asset Audit

A review of all of the controls assets in the building can be carried out. In addition , the fabric of the building will be reviewed from the perspective of insulation, and potential locations for future behind-the-meter assets such as solar/PV panels.

Step 2 - Eliminate Energy Waste

Once you know how and where energy is being used, you can start to eliminate areas of wasted energy. Research shows that these methods can in some cases savings of between 18% and 39% could be achieved depending on the type of building and the installed systems.

Control Optimisation

An effective control strategy is one of the simplest and most cost-effective ways to eliminate waste. The correct use of timer controls can prevent energy from being consumed when it is not required, such as at night. Preventing heating and air conditioning from competing with each other, or preventing occupants from manually overriding set points, all of which can result in wasted energy but, are easy fixes.

Sensors and Zoning

Building on from timers, to achieve an ISO 52120 Class A rating , it is necessary to apply a demand-driven strategy, whereby building systems, such as HVAC and lighting, are only used when a room or zone is occupied, this may require additional sensors. In addition to commonly used outside air temperature sensors that are used to switch off heating when temperatures are high, occupancy sensors ensure that HVAC is only activated when rooms are occupied.

Many modern lighting systems use occupancy sensors to turn off lights in unoccupied rooms. By linking these systems to a BEMS/BACS, the Heating,

Ventilation and Air Conditioning (HVAC) can also be turned off, the underlying principle of ISO 52120 standard. Rather than heating or cooling a large area uniformly, the addition of zones allows more selective control of the space with HVAC being used only in occupied zones.

Plant Efficiency

Effective preventative maintenance can significantly improve energy efficiency and thus reduce carbon emissions Through leveraging the insight

Space Management

from sensors and zoning, space management strategies can be developed, utilising data to inform conversations. For example, live data on water usage in showers can encourage people to use less, or monitoring occupancy levels in rooms can help to select the appropriately sized meeting room. Unified booking systems combined with space analytics data from lighting or dedicated sensors can help to deliver direct savings and support a wider behavioural change through internal campaigns.

Space Management

Data can be harmonised from different systems and protocols to provide what is commonly referred to as a “single pane of glass”. It is achieved by displaying the data in a common, easy-to-read format, so the need for action becomes clear

Step 3 - Reduce Site Demand The installation of solar or photovoltaic (PV) panels on your site means

Data Analytics

that, in addition to reducing cost and demand from the grid, your organisation can also get paid for excess electricity that you don’t use

Battery (BESS)

Whilst renewable energy is carbon and cost-free after the cost of installation, the sun doesn’t always shine, the wind doesn’t always blow and usage patterns don’t always align with electricity generation. It is therefore necessary to use a form of electricity storage for these occasions to ensure continuity of supply and to reduce or mitigate electrical energy supplied by the grid. Batteries are the most reliable and commonly used storage method and are almost always used in conjunction with on-site renewable energy assets.

LED Lighting

Compared to fluorescent bulbs, LED lights are up to 80% more efficient because as they convert 95% of their energy into light and only 5% is wasted as heat; while still using far less power to provide a strong and consistent light output at a lower wattage.

In addition, LEDs last 25 times longer than incandescent bulbs and up to 5 times longer than compact fluorescent lamps. Therefore, the facility team will not need to replace or maintain them as often, lowering overall maintenance costs.

Plant Replacement

The replacement of old, inefficient plant with its worn bearings and aging motors with new components will help to reduce demand

Demand-Side Flexibility

If your organisation is able to change when peak energy consumption is taken from the grid, it may benefit from demand-side flexibility. By reducing energy consumption at peak times, you can be rewarded with rebates or cheaper energy. The supplier or network will flag high-demand periods and your system will reduce consumption accordingly. This type of control will need an integrated BACS/BMS or other automatic control function to manage the process.

Step 4 -Decarbonise

Finally, all that remains is to decarbonise your energy

Heat Pumps

Unlike a boiler, where one unit of energy produces approximately one unit of heat, a heat pump delivers more heat than the energy supplied, typically up to three times the heat per unit of energy, and provided that the electricity is from on-site renewables or guaranteed 24/7 green electricity, the heat will be net zero carbon.

There are different types of heat pumps from individual building or room-based units wand can be either air source or water source. The efficiency of air-sourced pumps will vary depending on the outside air temperature but are easy to install.

Water-sourced and Ground-sourced heat pump efficiency is less dependent on the outside air temperature but is more complex and costly to install, but delivers on average, higher conversion efficiencies.

Local EV Charging

A major source of carbon emissions in any organisation is transport so hybrid and the use of all-electric vehicles represent an important path to decarbonisation

Wind Generation

Although you may think that a wind turbine is impractical on your site, there are more compact versions of the technology, which may well be applicable as a rooftop solution

Hover's unique, wind-flexible technology results in laminar air flow, which allows it to operate safely in urban areas and bypass the installation of costly transmission lines. Our wind turbine array generates efficiencies by bringing together the unique strengths of solar and the technological breakthrough of the Hover Array System, the Hover Wind-Powered Microgrid™ opens new doors for businesses and government agencies to achieve net zero.

100% Renewable Energy

Is essential l at this stage in decarbonisation to ensure that the energy you purchase is 100%, 24/7 renewable electricity. All of SSE's 100% renewable electricity is sourced from our own UK wind and hydro assets.

CPPAs

Corporate Power Purchase Agreements (CPPAs) are becoming an increasingly popular choice for companies wanting to reach net zero, as they offer up to 100% renewable power and a much-needed addition to the grid. A CPPA is a long-term energy contract (typically between 10-15 years) between an electricity corporate consumer and a generator or developer of renewable power. Typically, a CPPA would be between one generator and one corporate off-taker; however, to allow flexibility and greater uptake, a portfolio arrangement for off-takers is now also an option

Wherever you currently are on your journey to net zero, the 4-Steps approach can help the process, for example to avoid over-specifying on plant such as heat pumps or PV.

Talk to your local branch

Contact your local branch >

For a better world of energy

To find out more about how SSE Energy Solutions can help your organisation, get in touch today

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