20 practical things to do to decarbonise your building

This checklist was developed as part of the development of a crioss-industry webinar on 20 practical steps you can take now towards decarbonising your building.

1. Identify your problems and objectives

Develop KPIs for your business objectives based on your priorities

- Healthy Building
- Decarbonisation
- Design consumption vs. actual consumption

Each of these will require different strategies and affect the rate at which you can decarbonise. For example, if your priority is the wellbeing of the occupants and you increase ventilation, this will have an impact on the energy use and thus the rate of decarbonisation.

2. Check your temperature setpoints

This is one of many zero-cost improvements to an existing system that can have significant results. For example, a 1ºC setpoint reduction can lead to an 8% annual saving in energy and carbon.

3. Check your occupancy time schedules

Another zero-cost improvement. Are your time schedules set correctly? Determine how long it takes for the building to reach the correct temperature and set your timers to that amount of time before the building becomes occupied (Check this setup as automatic optimisation). Optimisation is self-learning and will adjust the plant on time (with a max early-on time set) to ensure building is up to temperature for occupancy start time. It will also turn plant off early if the setpoint is maintained via the self-learning program. Remember to also ensure that HVAC systems are turned off (or reduced to frost protection) when the building is unoccupied.

This also applies to other building systems such as lighting.

4. Check alarm handling and prioritisation.

Specifiers often specify far too many alarms, resulting in too many alerts and desensitisation to them. Identify which are critical to your organisation and its decarbonisation objectives, and ensure that an adequate escalation process to ensure that these are acted upon quickly.

5 Wider deadband

A deadband is a temperature range in which neither the heating nor cooling system turns on. The wider deadband prevents the thermostat from activating heat and cooling in rapid succession. This conserves energy by providing a range of temperatures requiring no energy consumption.

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6 Location of sensors

Sensors are an important means of controlling a building, but thought needs to be given to where they are located. A temperature sensor in a kitchen located on the wall above a kettle will cause the air conditioning to be on for too long, wasting energy and carbon.

7 Sub-metering

It's a truism that "you can't manage what you don't measure". The installation of sub-meters to monitor your energy usage allows you to identify areas of excessive energy usage. Ideally, this should be granular enough to allow you to identify specific equipment (e.g. a refrigerator) which is showing excessive energy consumption. This has the additional benefit of feeding back into your maintenance programme and preventing failures.

Consider adopting an energy management platform to visualise the different areas of your building.

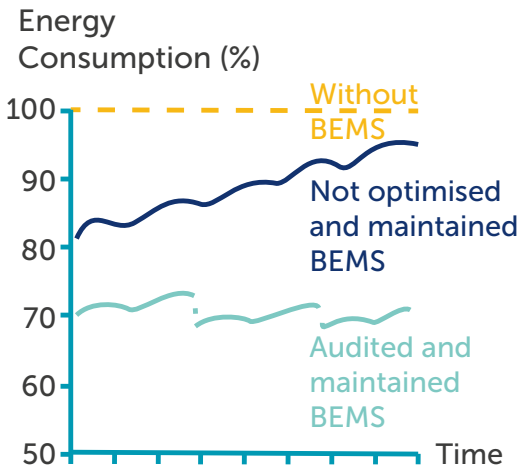
8 Is additional zoning required?

Are large areas controlled by a single point? This can often lead to temperatures being higher than necessary in some areas of the space. Consider zoning to apply more precise control on a smaller area.

9 Get a service and maintenance contract

It is widely recognised that implementing a BEMS system can reduce most buildings' energy and carbon by 20%. However, if left, over time this saving gets lost as setpoints and timers get changed, or worse, plant is set to manual and always on.

NEED FOR A MAINTENANCE CONTRACT



For illustration purposes only.
energy savings can vary from site to site

By regularly reviewing the BEMS strategy and conducting regular planned preventative maintenance, energy-saving is maintained and can even be further increased.

10 Switch to demand-based control

Whilst adjusting timers is an effective and inexpensive first step, a more effective medium-term solution would be to switch to demand-based control. Timers will turn on and off at specific times, irrespective of whether the rooms are occupied or not. A demand-based system uses sensors to detect occupancy or, for example, outside air temperature and responds accordingly only when required.

11 Boiler/chiller advanced control

Boilers can waste fuel continuously. They will be set to maintain a minimum internal set point. However, due to standing losses, the boiler will often fall below this set point, and the boiler will fire to maintain the temperature in the circuit, even when there is no demand or requirement for heating. A simple change to the boiler operation, such as reducing the number of on/off cycles for a given period, implementing a demand-based strategy or the addition of sensors to differentiate between system losses or heating demands. Savings can be made in the region of 10-25%, which can equate to thousands of pounds of unnecessary spend and tonnes of unnecessary carbon emissions.

12 Weather compensation

The requirement for a building to provide heating and cooling will vary depending on factors such as bright sunshine or sub-zero temperatures. Whilst outside air temperature (OAT) sensors will provide some level of control, such as maintaining a minimum temperature to prevent frost damage,

more advanced systems, based on local weather forecasts can now predict the likely heating and cooling requirement. For example, if the temperature is planned to be high, there will be no need to pre-heat the building in time for occupancy.

13 Healthy buildings sensors linked to mechanical control

Due to the threat of CoronaVirus, many Building Managers have responded by setting their ventilation systems to 100% operation, in order to reduce the amount of recirculated air and reduce the build-up of contagions. Bringing 100% fresh air from the outside and setting fans to maximum speed, exponentially increases the amount of energy consumed in heating and cooling spaces.

By fitting the addition of sensors to monitor occupancy or measuring CO_2 levels in return air, a demand-based strategy can be implemented, bringing the system t back to a sensible energy baseline while maintaining the safest possible environment.

14 Link your BEMS to your lighting control

The lighting in your building is likely linked to room sensors that detect whether the room is unoccupied and can be turned off. You could install similar sensors to turn off your BEMS as well, but since the sensors are already there, why not link the lighting system to your BEMS and achieve the same result.

15 Re-label your HOA's to "Manual Override"

The Hand-Off-Auto (HOA) switch is an industry term for what is essentially a manual override.

When switched to manual, your plant is not under BEMS control and will keep running until someone switches it back. This results in a huge waste of energy and carbon To the lay-person, the significance of this might not be apparent so a quick, low-cost solution would be to label such switches as "Manual Override"

Consider setting up BEMS alarms that trigger when a piece of plant is set to manual, with appropriate escalation to ensure that the situation is rectified.

16 Train your operators

Misuse of the manual override is just one reason that your operator needs to know what they are doing. An incorrectly set-up BEMS can result, for example, the central heating in a room 'fighting' with the air conditioning, resulting in a massive waste of energy and carbon.

Various organisations, such as BSRIA and the BEMS manufacturers offer training courses from the basics to advanced levels.

17 Treat the cause not the symptom

Maintenance is often subject to budgetary constraints, kept to the lowest possible level while achieving a minimum acceptable operating standard, or in some cases only carried out in response to failure.

This can be a false economy as failure to check and calibrate sensors, continually optimise the system in response to seasonal demands and patterns of use can be many times more expensive in terms of energy consumption than the saving made by not maintaining the system.

The energy savings, avoidance of downtime and the benefits of an improved occupied environment will always greatly outweigh any savings that would be made by having an insufficient maintenance regime.

18 Review high energy-consuming buildings

Even if you do not (yet) have sub-metering, you can ask your energy supplier, to provide you with half-hourly energy data. This will show you the consumption of energy over time and location. Here an energy management platform would be highly beneficial, as would the services of a Data Collection Data Aggregation (DCDA) provider.

If you have several buildings in your estate, you can use the energy management platform to compare energy consumption in comparable buildings and identify those with elevated consumption.

19 Conduct energy reviews

Periodic reviews of building performance and energy data are important. League tables are a great tool for the identification of particularly underperforming buildings. The comparison of energy data with previous years, in or out of hours or even comparing days of the week with weekends you can quickly identify a baseline and spot anomalies in the control strategy.

By anticipating the seasonal variation of outside temperatures and defining the expected levels of operation for major plant items, it is possible to alarm and quickly identify when the system is exceeding its expected levels of operation and wasting energy.

Energy consultants can also advise on more efficient sources of heating and cooling, with modern equipment offering an improved level of efficiency. The application of Variable speed drives (VSD) on fixed speed pumps and fans can also offer energy savings as speeds can be reduced and ramped down in response to demand.

20 Switch to renewable energy

Many energy providers can now deliver 100% renewable energy. Whilst this is easy to adopt in terms of electricity, there are other systems such as gas-fired boilers and combined heat and power (CHP) systems which are more difficult to switch.

At present, 100% renewable energy tariffs can sometimes be slightly higher than carbon-intensive ones. This is why, whatever their source, it is important to adopt the above solutions to minimise your energy usage and to reduce your carbon and cost.

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

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