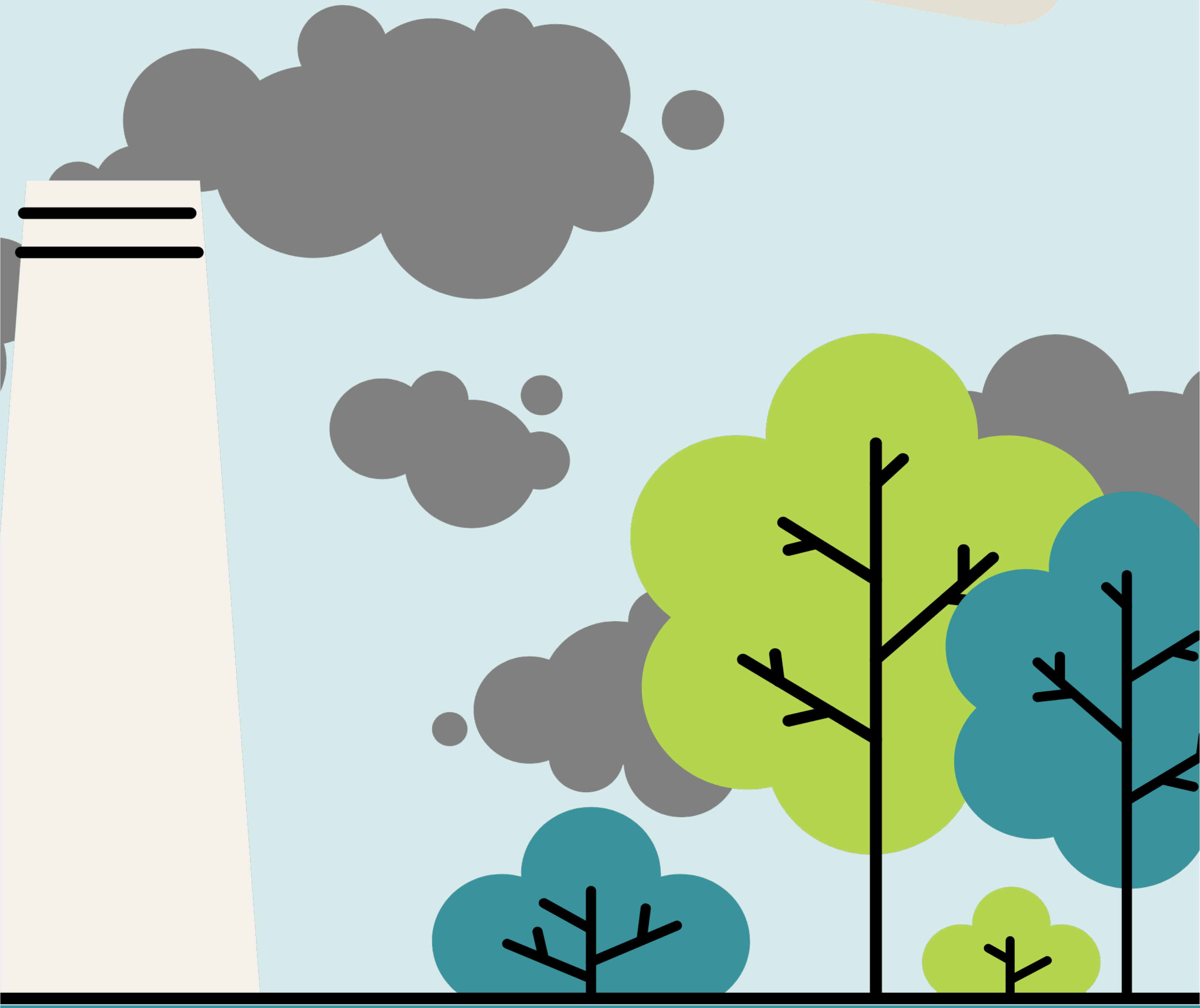
SFG20

Tackling Carbon through effective building maintenance strategies



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Tackling carbon emissions has become a growing concern in recent years, and those responsible for building maintenance can play a crucial role in mitigating their impact on the environment. This guide, developed by SFG20 – the industry standard for building maintenance, explores various strategies that building maintenance professionals can use to tackle carbon emissions through smart, effective, and sustainable maintenance practices.

First, it is important to understand the difference between embodied and operational carbon when planning and designing more environmentally friendly buildings.

Embodied carbon consists of the CO2 emitted in the production of a building i.e., the extraction and production of materials used during construction, their transportation, and the carbon released by plants and machinery throughout the building process. In the case of rebuilds, demolition adds to the embodied carbon of a site.

Operational carbon is the carbon released from the ongoing operation of the building e.g., lighting, power, heating, ventilation, air conditioning, and other infrastructure such as lifts, automatic doors etc.

Reducing carbon emissions: embodied vs operational

In recent years, the focus has been on reducing operational carbon via initiatives such as the improvement of building insulation and installing energy efficient alternatives, such as LED lighting. Although these are proven ways for sites to reduce operational expenditure and carbon emissions, it should be noted that they still add to the embodied carbon of the site as new products and materials are used, and old ones removed and disposed of.

Embodied carbon can be reduced during the initial design and planning stages, such as by specifying construction products and materials that are available locally and extracted, manufactured, and delivered via low-carbon means, reducing waste through recycling wherever possible.

Newbuild vs retrofit

New buildings tend to be designed to be energy-efficient and use modern construction methods and are often considered a more attractive solution vs. refurbishing existing buildings. However, the energy and carbon involved in demolishing a site, disposing of waste materials, and undertaking a new building project creates a huge amount of carbon. When compared with retrofitting existing buildings, refurbishment saves energy and cuts operational carbon, so retrofit measures that will extend the life of a building will make a positive contribution to our net-zero targets.

Cutting carbon

Carbon emissions are categorised into scope 1, 2 and 3 emissions. Scope 1 covers direct emissions from owned or controlled sources. Scope 2 covers indirect emissions from the purchase and use of electricity, steam, heating and cooling. By using the energy, an organisation is indirectly responsible for the release of these greenhouse gas (GHG) emissions. Scope 3 includes all other indirect emissions that occur in the upstream and downstream activities of an organisation. For most businesses, the majority of their GHG emissions and cost reduction opportunities fall outside of their own operation and addressing Scope 3 emissions can help advance an organisation's decarbonisation and sustainability journey.

From HVAC systems and lighting to office equipment and refrigeration, building assets consume significant amounts of energy, accounting for a vast portion of carbon emissions in the built environment. However, through effective maintenance strategies, building maintenance professionals can make a positive impact by reducing energy consumption, minimising waste, and implementing sustainable practices, all while ensuring the smooth operation of building systems.

The following guidance is designed to provide some practical tips on how to approach and get started on your carbon reduction journey.

1 Conduct a carbon footprint assessment: Gain a better understanding of the carbon emissions associated with maintenance activities by conducting a carbon footprint assessment. This assessment will establish a baseline of current emissions, identify areas of high carbon impact, and determine where to focus mitigation efforts.

Typically, building assets with a high carbon footprint include:

- **Heating, ventilation, and air conditioning (HVAC) systems:** HVAC systems are typically the largest energy user in buildings, accounting for up to 40% of a building's total energy consumption.
- **Lighting:** Lighting can account for up to 35% of a building's total energy consumption.
- **Office equipment:** Office equipment such as desktop computers, printers, and copiers can account for up to 15% of a building's total energy consumption.
- **Refrigeration:** In commercial buildings, refrigeration equipment such as refrigerators and freezers can account for up to 10% of the building's total energy consumption.
- **Building Fabric:** A building's fabric includes its walls, roofs, windows, and doors, and can significantly impact energy usage by allowing heat to escape or enter the building.

Overall, these assets are critical to the functioning of a building but can consume large amounts of energy, making them key targets for energy efficiency improvements and maintenance plans.

Building maintenance professionals should identify opportunities to improve energy efficiency and prolong asset lifespan by identifying the maintenance tasks specified by SFG20 for those assets that are 'energy hungry' and consider implementation of the optimal tasks (colour coded amber). By implementing preventative maintenance, assets will be kept in good condition, use less energy and are more likely to realise their full intended design life.

2 **Develop a sustainability plan:** Building maintenance professionals should develop a specific sustainability plan that outlines clear, measurable goals to reduce their carbon footprint, such as upgrading systems or equipment, adjusting maintenance techniques, or reducing reliance on fossil fuels.

3 **Optimise equipment performance:** Regular maintenance of building systems and equipment has been shown to help them operate more efficiently, reducing energy consumption and greenhouse gas emissions. According to a study by The New Building Institute, reactive maintenance can increase energy use by 30% to 60% and decrease equipment lifespan.[1] A separate study by the U.S. Department of Energy's Federal Energy Management Program (FEMP) reports that preventive maintenance can result in energy savings of as much as 18% over a reactive maintenance program. Furthermore, depending on the facility's current maintenance practices, present equipment reliability, and facility downtime, the same report claims that many facilities purely reliant on reactive maintenance could save much more than 18% by instituting a proper preventive maintenance program.[2]

4 **Implement energy-efficient maintenance practices:** To reduce energy consumption and associated emissions, building maintenance professionals should evaluate a wide variety of options, such as updating inefficient HVAC equipment, replacing light fixtures with LED bulbs, and ensuring the building fabric is adequately insulated.

Overall, building maintenance professionals can reduce their carbon footprint by using best practices and innovative technologies. Regular analysis and continued improvements will help tailor maintenance activities to become more sustainable and efficient, contributing to overall environmental health.

Embrace the circular economy

The circular economy is an approach to resource management that aims to minimise waste and promote sustainability by keeping products and materials in use for as long as possible. In contrast to the traditional linear economy that follows a "take-make-dispose" model, the circular economy seeks to create a closed-loop system where products, materials, and resources are continually used, reused, and recycled. In the context of building maintenance, adopting circular economy principles can help reduce carbon emissions by minimising waste and preserving resources while also promoting sustainable operations. Efficient building maintenance is a key enabler of the circular economy as it allows for the refurbishment, repair, and repurposing of existing assets, reducing the need for new construction and lowering overall carbon emissions.

In the following section, we explore the circular economy in more detail and discuss how efficient building maintenance can help reduce carbon emissions and promote sustainability within the built environment.

Efficient maintenance can significantly affect embodied carbon in buildings in several ways:

Reduced material consumption: Maintaining buildings through efficient practices can help avoid the need for unnecessary replacements or repairs, leading to lower material consumption and less waste. By implementing regular, preventative maintenance an asset is more likely to realise its full intended lifespan, thereby reducing embodied carbon associated with premature replacement.

Extended building lifespan: Proper maintenance can help prolong the lifespan of buildings and their components, reducing the need for premature replacements and the associated embodied carbon. As the embodied carbon associated with the construction of a typical new building can be equivalent to 20 years' worth of its operational carbon emissions,[3] extending a building's lifespan can make a fundamental difference to an organisation's carbon footprint.

Sustainable material selection: When replacement or repair is necessary, choosing sustainable and low-carbon materials can contribute to lower embodied carbon in the maintenance process.

Overall, efficient maintenance helps minimise embodied carbon associated with building maintenance and has the potential to significantly lower a building's carbon footprint over time. By integrating sustainable practices into facility maintenance programs, building operators and owners can reduce their buildings' carbon footprint while making them more resilient and cost-effective.

Reduce energy usage

Efficient maintenance can have a significant impact on energy usage in buildings in several ways:

1 **Optimal equipment performance:** Regular and efficient maintenance of building equipment and systems can help to ensure optimal performance. This can lead to significant reductions in energy usage, as inefficient equipment and systems are often significant contributors to energy waste. For example, ventilation systems with blocked or dirty filters will require additional energy to run versus a well-maintained system.

2 **Improved energy efficiency:** Efficient maintenance practices can lead to improved energy efficiency, with benefits such as reduced heating and cooling loads, less equipment downtime, and greater control over energy usage patterns. The Department of Climate Change, Energy, the Environment and Water recently published the results of its refrigeration and air conditioning bench-testing project. It clearly demonstrates that preventative maintenance minimises technology failure, reduces refrigerant leaks, and increases the energy efficiency of properly installed equipment. Some of the Key findings quantified the impact of common faults for the equipment tested. For example, for refrigerated display cabinets, a 40% blocked condenser reduced the system performance and increased its energy consumption by around 16%. For walk-in cool rooms, contaminated refrigerant had the greatest negative impact on system performance, with the energy consumption increasing by almost 70%. [4]

3 **Building fabric maintenance:** Proper maintenance of building fabric, including air sealing and insulation, can greatly improve energy efficiency by reducing air infiltration and heat loss. This can lead to lower energy bills, reduced carbon emissions, and a smaller environmental footprint.

4 **Use of smart technologies:** Efficient maintenance programs can incorporate smart building technologies that monitor energy usage and provide data for analysis, enabling building operators to identify inefficiencies and make targeted improvements.

5 **Energy audits:** Regular energy audits can help identify areas where energy usage can be decreased and energy efficiency improved, providing a roadmap for maintenance teams to plan and implement energy-saving measures.

Efficient maintenance has a significant role to play in the reduction of energy usage and operational carbon emissions. There are substantial opportunities for energy savings through the implementation of effective maintenance programs. Overall, efficient maintenance can have a significant positive impact on energy usage, helping buildings to save energy, reduce costs, and reduce their environmental footprint.

SFG20 supports users in building an efficient maintenance plan, as it can be customised according to the unique situation of each facility. When building your maintenance plan there are many different factors to consider, such as:

Building, asset and system age: The age of buildings, assets and systems is a crucial factor when developing an efficient maintenance plan. Older assets may require more frequent maintenance, especially if there is a high probability and/or impact of failure. Assets may need to be replaced or upgraded, which would lead to a different maintenance strategy. Buildings that are reaching end of life would, most likely, receive a different maintenance approach vs. those that need to be maintained for several years to come.

Asset and system complexity: The complexity of building systems and assets can also have a significant impact on the maintenance plan. Complex equipment may require specialised skills and knowledge to maintain. All maintenance tasks must be carried out by a person that is competent and has the necessary skills and qualifications for that task.

Health and safety requirements: Safety must be a top priority in developing an efficient maintenance plan. Maintenance tasks must be executed under safe conditions following all regulations and laws, and specific safety considerations should be assessed when creating a maintenance plan.

Equipment and system usage: Understanding when and how building systems and assets are used can provide insight into how often maintenance should be performed and can help prioritise maintenance tasks.

Budget planning: Building an efficient maintenance plan requires budget consideration. You should prioritise the tasks required to keep your facility safe and legally compliant. Then layer on tasks according to the importance of each asset to your operation and those that will reduce your carbon footprint.

Data collection and analysis: Maintenance data should be collected and analysed using analytics tools to provide actionable insights, identify trends, and patterns as well as inform decision-making.

Staff skills and training: SFG20 identifies the competencies required for each task. Meaning that you have visibility over the potential areas you can upskill your in-house staff to be able to complete certain tasks, thereby saving money vs. tasks that are currently outsourced.

Overall, building an efficient maintenance plan requires a comprehensive understanding of building systems and equipment, along with prioritising safety regulations, budget, and data-driven insights.

Different maintenance approaches, such as reactive, planned preventative, condition based and predictive, can be blended to achieve an optimal plan that strikes the balance between ensuring that the assets are performing at their best while ensuring they are being maintained at the level suitable for their risk in that facility. This means that property managers can avoid over maintaining assets and sending engineers on unnecessary visits which creates unnecessary carbon impact. For example, less critical assets could be maintained on a 'run to fail' basis, and other assets can be maintained according to their usage, known as condition based maintenance. Be aware, that there are certain maintenance tasks that are statutory and, by completing them at the required frequencies and by a competent person, you will avoid fines and stay on the right side of the law.

What is SFG20 and how can it help you with tackling your carbon footprint?

SFG20 was developed by BESA, the Building Engineering Services Association, in response to a need for a best practice standard for maintenance. The SFG20 system has been designed and developed over three decades to keep pace with the changing maintenance profession, and it provides a technically robust standard that is also highly customisable to individual building needs. Totally unique, this web-based software is designed for facilities managers, building owners, contractors and consultants. It enables you to stay compliant whilst saving time, energy and money. In total, it offers over 2000 schedules, covering all possible aspects of a building and its operation – from building fabric and catering to water systems, heating and security. Each of these schedules provides insights into what maintenance procedures are legal requirements. It then further helps to categorise risk by indicating which tasks are mandatory, functional and discretionary. The system includes step-by-step detailed requirements for each maintenance task, with timings required for each – making scheduling and resource management easier. This can also prove particularly helpful for the tendering process. A client or consultant can create a clearly defined work package for contractors to quote for on a comparable basis. This also saves contractors significant time in the tendering process or in developing maintenance programmes for clients.

With legal compliance at its heart, the SFG20 system is constantly monitored and updated by a team of experts to ensure that it reflects the latest laws. A committee of industry professionals ratifies updates to ensure that any guidance reflects industry best practice. This saves users significant time and their own resource as well as giving peace of mind that their organisations will be fully compliant. One of the most important aspects of SFG20 for clients and contractors is that it provides flexibility as well as standardisation. Users can customise their own schedules to reflect the building (or buildings) that they maintain – enabling rapid location of any problem areas and reducing time on-site for technical teams. This ensures simplicity for users and reduction in on-site time results in a reduction of costs. And with the growing use of hand-held smart devices in the maintenance and FM fields, SFG20 can also be integrated with a number of leading Computer Aided FM (CAFM) software systems facilitating efficient, rapid and accurate working practices.

For more details on SFG20 or to request a demonstration with one of our experts, visit: SFG20.co.uk

References

1 newbuildings.org

2 U.S. Department of Energy's Federal Energy Management Program (FEMP), Operations and Maintenance (O&M) Best Practices Guide

3 Netzerocarbonguide.co.uk

4 Department of Climate Change, Energy, the Environment and Water (DCCEEW), UTR 165 Walk in cool room report

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