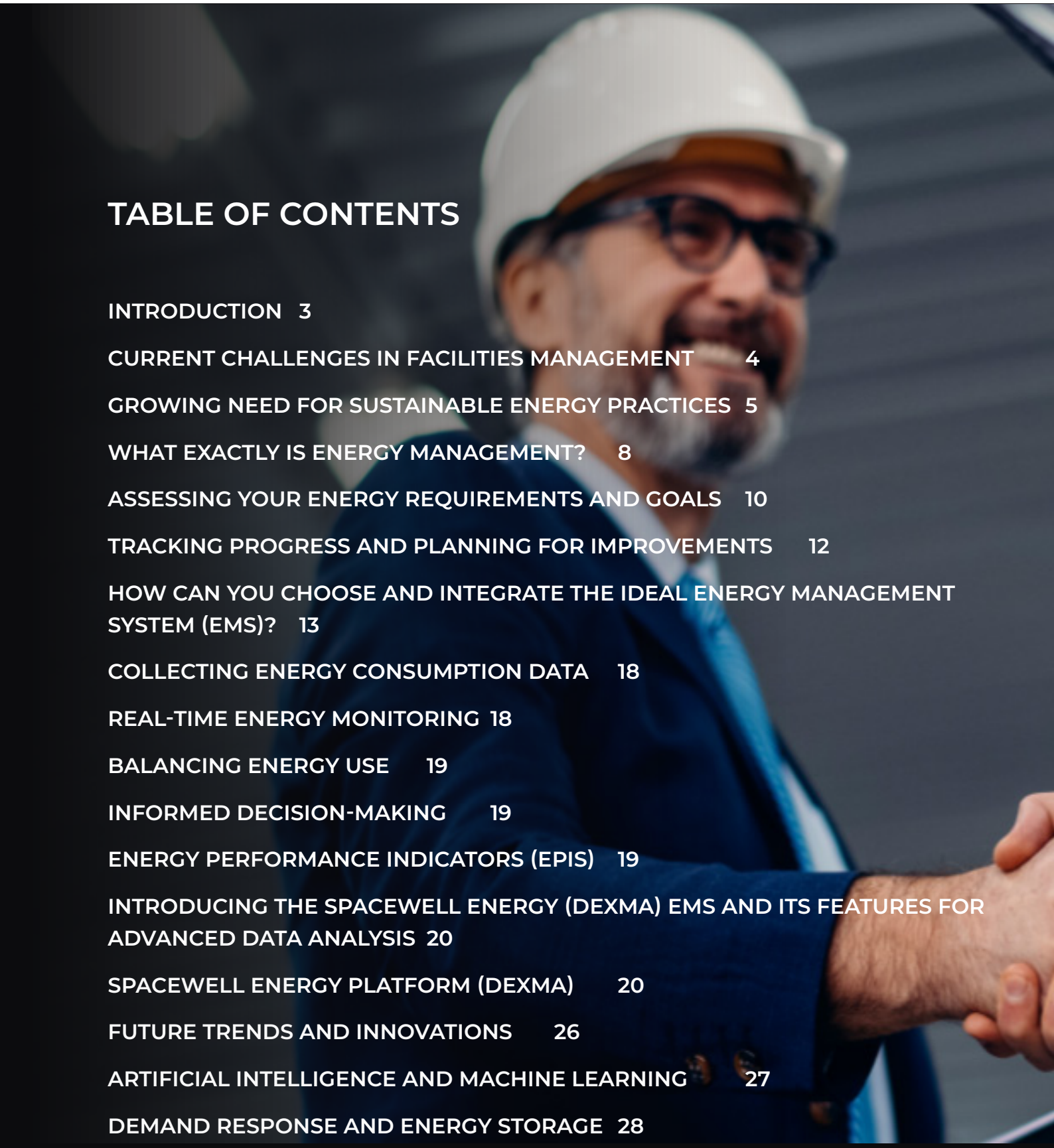
# Energy Management Systems:
Optimising Efficiency and Reducing Costs in Facilities Management

GUIDE

Energy SPACEWELL



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# INTRODUCTION

**The Facilities Management (FM) sector plays a vital role in ensuring that commercial buildings are functional, comfortable, and sustainable.** With growing awareness about the importance of using energy efficiently to save costs and protect the environment, the need for Facilities Managers to improve how they use energy within their buildings has become more critical than ever.

According to the Environmental Protection Agency (EPA), 30% of energy consumption within commercial buildings goes to waste. This inefficiency not only places undue strain on resources but also adversely impacts environmental sustainability. But the challenge lies in the fact that as a Facilities Manager, you may not always know exactly where energy is being wasted.

**To manage energy usage effectively, you need more than just strategic maintenance – you need insights backed by data that pinpoint precisely where energy is squandered.** Without this critical information, you're left grappling with a challenging guessing game, unable to harness the full potential of your expertise and resources. This is where energy management systems (EMS) come into play.

# ENERGISING FACILITIES MANAGEMENT THROUGH EFFECTIVE ENERGY MANAGEMENT SYSTEMS

At Spacewell Energy (Dexma), leading provider of technological solutions, we have prepared this guide with the aim of assisting you as a Facilities Management sector professional in understanding the present state of the UK market and explore energy-saving possibilities within Facilities Management through the adoption of advanced energy management systems (EMS). You'll discover that this move is designed to drive operational efficiency and lower costs in the long run.

**Our focus will be on showcasing the key role of these systems as a strategic method for proficiently overseeing, regulating, and enhancing energy consumption across various facilities.** Additionally, we'll examine the potential advantages that stem from the implementation of such systems, such as reducing energy waste, lowering utility costs, and enhancing sustainability practices.

## CURRENT CHALLENGES IN FACILITIES MANAGEMENT

### The Facilities Management Industry in the UK

Currently, the UK is dealing with various challenges, including the rising costs of living, strikes in some industries, energy supply issues, higher interest and inflation rates, and the persistent repercussions of the COVID-19 pandemic.

These factors have both direct and indirect effects on the Facilities Management Sector. Given that Facilities Management accounts for 10-25% of overall indirect spending in certain organisations, the focus on these services remains extremely important.

According to Frost & Sullivan, **the UK's facilities management industry witnessed a growth rate of 4.8% in 2022, with a projected expansion of 5.1% in 2023.** While this growth might seem positive on the surface, there are concerns due to rising costs affecting both clients and service providers, much of which is a consequence of inflation.

### Rising Energy Costs and Environmental Concerns

Due to mounting anxieties over climate change, the increasing cost of energy, and the critical goal of curbing energy usage, sustainability has risen on the priority scale for Facilities Management. As energy prices go up, businesses are facing increased operational costs, and this has directed their attention towards energy efficiency as a way to tackle these higher expenses and advance sustainability efforts.

But the **growing expense of energy is one part of the equation. There's also the environmental impact of using too much energy.** As we all deal with the consequences of using up resources and producing emissions, Facilities Management becomes a key area for making a positive change. By adopting sustainable methods that reduce energy consumption, cut down on waste, and use resources more wisely, businesses can lessen their impact on the environment and stay in line with ethical and regulatory requirements.

## The UK'S Energy Crisis

**Since the summer of 2021, the UK has been grappling with a severe energy crisis that has raised significant worries for households and businesses alike.** This crisis, sparked by a sharp increase in wholesale natural gas costs, has noticeably affected the cost of living and business operations.

**The core issue behind this turmoil?** According to NerdWallet, it stems from a mix of factors – including an **unexpectedly cold spell in Europe, heightened global energy demand, and supply disruptions from Russia due to their conflict with Ukraine.** Despite the UK's relatively minor dependence on Russia for gas imports (accounting for 4% of its total), the global energy markets are intricately linked, leading to an inescapable impact on Great Britain. As a result of these soaring energy costs, 31 energy companies in the UK had to shut down, which caused widespread instability in the energy sector.

When these energy companies couldn't pass on the elevated costs to customers with fixed contracts or price caps, the situation became even more complex. The remaining companies gradually began to increase charges for both households and businesses. Prior to government intervention, experts warned that average household energy bills might exceed £5,000 in 2023 – a significant burden for many.

Beyond the financial strain, the impact was palpable in other ways too. According to the International Monetary Fund (IMF), the spending power of UK households decreased by around 8.27% in 2022, creating a noticeable pinch in everyone's wallets. Such a significant drop in purchasing power resulted in less disposable income, posing a setback to businesses across the board.

This entire episode underscores the UK's heavy dependence on natural gas, with nearly half of the country's energy coming from it in 2021. Throughout 2022, gas continued to play a vital role in providing the predominant share of electricity in Great Britain, accounting for 38.5% of the total generated power. However, we also observed substantial transformations in other technologies during the past year.

The ripple effect on businesses is clear, causing energy bills to rise and budgets to tighten, thus amplifying financial pressures.

## Growing Need for Sustainable Energy Practices

**As the energy crisis persists in the UK, the**

**Facilities Management Sector is facing a pressing need to embrace sustainable energy practices.** It's never been clearer that there are too many vulnerabilities stemming from a heavy reliance on conventional energy sources, which is prompting businesses to seek more reliable and environmentally responsible solutions.

**The focus on sustainability isn't just an environmental consideration; it's a strategic business move** that will help Facilities Management to enhance their operational stability.

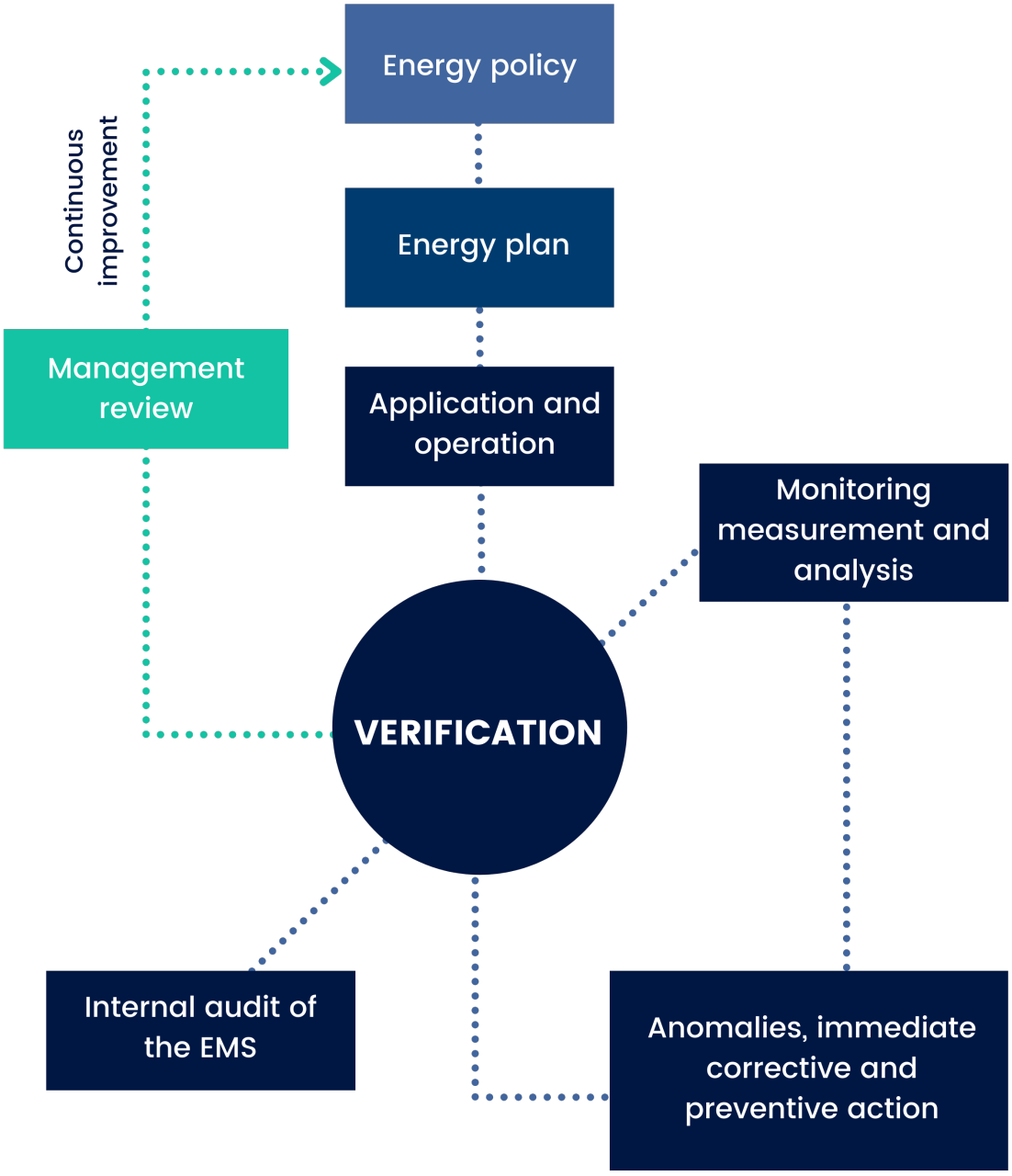
## Structured Planning for Challenges

Every Facilities Manager needs a structured plan to address challenges, often driven by compliance with statutory and policy requirements. Similar to other aspects, the surge in energy-related legislation,

reporting mechanisms, and the push for efficiency means that the responsibility for energy management should be shared across the entire organisation.

For successful energy management, a systematic process aided by technology is essential to assess energy usage comprehensively. Through monitoring and analysis, facility managers can identify various opportunities for making enhancements that lead to greater efficiency and reduced waste.

## ISO 50001 PROCESS FLOWCHART



The ISO 50001 standard, **the global benchmark for Energy Management, adopts the "plan, do, check, act" model, commonly used in engineering for driving enhancements.**
Still, facilities managers should understand that energy management lacks a one-size-fits-all solution. According to the Institution of Engineering and Technology (IET), an effective system should:

(a) have appropriate policies in place and include processes that employ a wide variety of tools, all of which have been adapted for the local needs of the business;

(b) reflect strategic direction;

(c) include procedures that make the best use of resources;

(d) have clear aims and objectives that are quantifiable and are 'SMART' in nature; and

(e) be flexible enough so that it is adaptable in response to changes in use, changes to the overall size of the estate, or changes to occupancy.

## WHAT YOU NEED TO KNOW ABOUT THE UK'S ENERGY SAVINGS OPPORTUNITY SCHEME (ESOS)

### Mandatory Energy Audits for Big Companies

The Energy Savings Opportunity Scheme (ESOS) **introduces a requirement for large companies to conduct energy audits.** This initiative compels participants to perform a comprehensive assessment of their energy consumption across various aspects, including buildings, transportation, and industrial operations.

### Practical Implementation and Auditing Process

In practice, the scheme involves **an auditor examining your organisation's energy data over a 12-month period**. Additionally, they will survey your facilities using energy consumption profiling to pinpoint areas of energy usage and wastage. This comprehensive review enables auditors to create a list of practical recommendations tailored to enhance your organisation's energy efficiency.

### Applicability and Impact

**ESOS impacts «large UK undertakings» and their corporate groups, encompassing businesses, non-profit entities, and other non-public-sector organisations.** The criteria for inclusion involve having more than 250 employees, an annual turnover exceeding £44 million, and an annual balance sheet total surpassing £38 million.

The goal is to ensure that organisations meeting these criteria contribute to national energy efficiency goals and sustainable practices.

# A CLOSER LOOK AT ENERGY MANAGEMENT SYSTEMS

**Facility managers are growing more conscious of how much their buildings affect the environment. And to address this, the implementation of smart energy management systems is gaining traction. These systems enable facility managers to monitor and regulate energy consumption within their buildings or organisations, promoting more efficient utilisation of energy resources.**

## WHAT EXACTLY IS ENERGY MANAGEMENT?

**As a facility manager, energy management should be a cornerstone of your strategy. It involves a comprehensive approach to oversee, plan, and optimise energy consumption within your facilities and infrastructure.** Ultimately, energy management is a proactive and systematic strategy that holds a pivotal role in effective facilities management programmes.

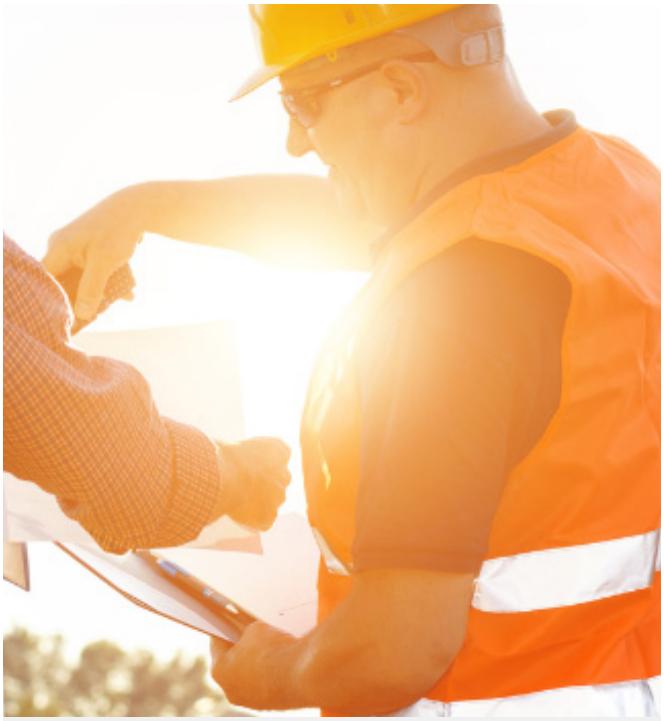
**By focusing on energy management, you can achieve several key objectives: saving costs, reducing your facilities' carbon footprint, and maintaining optimal performance of your critical assets.** This is particularly relevant in the context of the global push toward a low-carbon future, where cleaner and more efficient energy practices are essential.

### Contributing to Sustainability and Climate Goals

In alignment with the broader goals of environmental sustainability and combating climate change, energy management practices hold immense promise. Facilities that integrate these practices into their operations can play a significant role in curbing greenhouse gas emissions, conserving precious natural resources, and addressing climate challenges head-on.

### Empowering Smart Energy Decisions and Savings

**Energy management systems (EMS) empower facility managers to make informed decisions that translate into tangible financial savings and resource conservation.** The core capabilities of these systems revolve around energy monitoring and control. While standalone energy monitoring systems are available, the real power lies in energy management systems (EMS), which offer both monitoring and control functionalities, often at the circuit level.



# What are the Essential Components of an Energy Management System?

## Configuration

Replicating what happens energetically in a building or in an energy-consuming system is not easy. Although it may not seem so at first glance, the configuration and customisation possibilities in an EMS are key to exploiting the data efficiently afterwards.

## Analysis Module

This is where the EMS must demonstrate its full potential because the user will spend hours analysing data. Easy and efficient analysis allows Energy Managers to identify consumption patterns, anomalies, savings measures, etc.

## Alert Engine

In order to reduce the time spent analysing data, once a favourable pattern has been identified, alerts allow automated detection of deviations from that pattern. An EMS with a good alert module is essential for scaling your energy services.

## Reporting Tools

It's not just about analysing data and achieving energy savings, reporting those savings and everything related to energy consumption is just as important. A good EMS stands out for its reporting capabilities, whether through reports or interactive dashboards.

## HARNESSING ADVANCED TECHNOLOGIES FOR ENERGY MANAGEMENT

Today, smart technologies like the Internet of Things (IoT) and Building Automation Systems (BAS) have become incredibly vital tools for facility and building managers.

They're able to streamline tasks and provide you with valuable insights to enhance your building systems. With a growing focus on sustainable and efficient buildings, integrating these smart solutions is key to improving your operations, cutting costs, and meeting environmental goals.

## Shift to Sustainable Operations

We've seen how the demand for environmentally friendly buildings has made smart technology integration absolutely crucial. It's all about balancing efficiency with environmental responsibility. These technologies offer a toolkit for building managers to enhance the triple bottom line: people, planet, and profit.

## Smart Sensors and Predictive Insights

Managing air quality and infection control should be high on your priority list. To do this effectively, you need a proactive approach, and this is where IoT-enabled smart sensors come in.

These sensors are spread throughout the building and monitor spaces in real time. They don't just passively observe; they predict occupancy patterns. This predictive functionality not only optimises space utilisation but also plays a pivotal role in safeguarding occupant health and well-being.

## Better Air Quality and Infection Control

Since smart sensors are able to track air quality and occupancy patterns, they can help you make informed decisions that positively impact the indoor air quality of your buildings. These sensors also act as early warning systems, allowing timely infection control measures. This real-time data enables you to adjust ventilation, airflow, and temperature based on occupancy, benefiting both well-being and efficiency.

Also, the proper management of materials used in production, such as waste and chemicals, as well as their recycling, can be a challenge in terms of environmental impact.

# IMPLEMENTING AN ENERGY MANAGEMENT SYSTEM

## Assessing Your Energy Requirements and Goals

**Managing energy efficiently while ensuring occupant comfort can be a challenge for many Facilities Managers,** but it's worth noting that striving for both are not conflicting objectives. When you have a clear picture of how energy is used in your building, you can start developing strategic approaches to enhance both energy efficiency and overall building performance.

## Energy Audits and Benchmarking

**Start by** conducting energy audits **and assessing your facility's energy performance.** This involves analysing energy usage, spotting wasteful areas, and establishing benchmarks for progress. This information helps you, as a Facilities Manager, create targeted action plans. Benchmarks are crucial for understanding energy use but can't be fully grasped from utility bills alone because these bills provide only a general view and lack insights into complex building operations.

**External benchmarking reports, comparing your building's energy usage to similar ones, provide a more comprehensive performance understanding.** This approach helps you identify weaknesses and establish realistic energy consumption goals. However, internal benchmarking is essential for the assessment and improvement of operations.

**Internal benchmarking involves comparing your building's current performance against its past Internal benchmarking involves comparing your building's current performance against its past performance, using historical data, including weather and geographic data, from the building's network of equipment, sensors, and devices.** This assessment unveils the impact of maintenance and enhancements on underperforming equipment, while also highlighting opportunities for future progress.

The Spacewell Energy Platform by Dexma compares your site's consumption pattern levels and weather and geographic data with similar buildings in our database to provide accurate insights and potential energy savings figures.


## MONITORING AND DATA ANALYTICS

Real-time energy monitoring and advanced data analytics tools **provide you with a unique window into your energy usage patterns,** allowing for a much deeper **understanding of how your building operates in terms of energy consumption.** By tapping into these tools, you gain access to a detailed breakdown of where exactly energy is being used.

Instead of drowning you in raw data, advanced analytics platforms translate energy usage information into clear charts and graphs that are easily understandable, and through these visuals, you can see exactly how individual machines and systems in the building are performing.

These tools can also pinpoint areas where improvements can be made, like spotting equipment problems or inefficiencies, so it can help you make informed decisions to optimise energy use and cut down on operational expenses.

## ELIMINATING DATA SILOS

When managing buildings that cater to individual needs, it's important to collaborate with multiple stakeholders and get everyone's input if you want to achieve significant results. By integrating different data sources and eliminating silos, you will be able to obtain more comprehensive insights and strengthen cooperation among various departments and stakeholders throughout the building value chain.

For more insights on how data sharing bridges gaps between stakeholders, watch Spacewell Energy's webinar here.

## TRACKING PROGRESS AND PLANNING FOR IMPROVEMENTS

As a Facilities Manager, it's important to regularly assess the effectiveness of your energy management strategies and initiatives to make sure they're producing the targeted results. Tracking helps you figure out if the changes you've made to manage energy are actually working and how well they're working. Sometimes, you might need to adjust or rethink a system to get the results you want.

Introducing new facilities, machinery, and technological investments often lead to increased efficiency within Facilities Management, and this also means that tracking can reveal how these new additions have amplified energy management savings. Consistent performance reports and timely alerts are important for maintaining the ongoing success of the savings strategies you have implemented.

## HOW CAN YOU CHOOSE AND INTEGRATE THE IDEAL ENERGY MANAGEMENT SYSTEM (EMS)?

**An energy management system (EMS) is essential for Facilities Management teams that are truly committed to optimising energy consumption, cutting down expenses, and enhancing environmental sustainability.** Given the plethora options available in the market, choosing the right energy management system (EMS) can be tough, but considering the following factors should help you make an informed decision:


### Integration with Your Current Set-Up

Before you select an EMS, you need to confirm that it is compatible with your existing systems. The right EMS should effortlessly integrate with these systems and offer a unified interface so that you can oversee and control energy use across all systems. Keep in mind that systems that don't match well can lead to data issues, like loss, duplication, or inconsistencies, which ultimately undermine the EMS's effectiveness.

### Data Gathering and Analysis

An effective EMS should provide real-time insights into your facilities' energy consumption, which helps you pinpoint wasteful areas and enable prompt corrective actions. It should also offer tools to help you really see and understand energy data, so that you can find patterns and make informed decisions. This data-driven approach is essential for identifying energy-saving opportunities, optimising energy usage, and cutting costs.

## User-Friendly Interface

Another key attribute that you need to consider in an EMS is, of course, its user-friendliness. It's important that the **system is straightforward and simple to navigate and offers clear and concise reports along with** an intuitive dashboard**.** This ensures that both technical and non-technical users in your team can easily access and interpret the information, which will, once again, facilitate effective decision-making and enhance the overall usability of the system.


## Cost Evaluation and ROI Assessment

Examine the costs associated with each EMS solution, including upfront expenses, licensing fees, and ongoing maintenance charges. And then, compare these costs with the potential benefits you can gain from the EMS, such as energy savings, better operational efficiency, and other positive impacts on your operations.

## Ongoing Performance Tracking and Evaluation

After selecting and implementing the EMS, you need to consistently observe how it performs and assess its success in reaching your energy management objectives. **Regularly go through energy data, study reports, and make all necessary adjustments to enhance energy efficiency and attain your intended results.**

## Employee Engagement and Training

Establishing an effective energy management system (EMS) goes beyond just setting it up on paper. **You need to actively involve everyone in your team and provide them with the necessary training** to ensure that each of them not only grasps the importance of energy efficiency and the impact of their choices on energy consumption, but that they also gain practical skills to actively participate in the collective effort.

According to research, employees who are truly engaged in their work tend to be driven by more than just financial incentives. They are dedicated to the organisation's purpose and believe they have a meaningful part to play in advancing its long-term goals. This dedication translates to higher productivity, with companies that have engaged employees seeing a 22% increase in how much work gets done. On the whole, businesses with employees who are highly engaged also make about 21% more profit. These engaged companies even see their profits growing up to three times faster compared to their industry counterparts.

# Here are four approaches that you can use to empower and inspire your team to actively support your energy strategy:

## #1 Raise Awareness

Launching awareness campaigns can help employees grasp the significance of energy efficiency and motivate them to adopt energy-saving practices. These campaigns might involve posters, emails, newsletters, and other communication methods.

One effective approach involves regularly distributing or displaying reports on the intranet. These reports would cover things like how much energy is currently being used, goals for using less energy, and suggestions for saving energy. It's important to do this regularly, especially if there is a high turnover of employees.

## #2 Provide Training

Given that most employees typically don't have a strong technical background, it's crucial to provide them with a simple and accessible means to understand how to manage facilities properly and contribute to conservation efforts.

This can be done through training programmes that equip them with knowledge about energy management and the skills to identify and implement energy-saving actions. These programmes can be conducted either online or in-person and can cover a range of topics, from energy audits to using energy-efficient technologies, enabling employees to identify and implement energy-saving measures.

## #3 Introduce Incentives

Motivate employee involvement by offering incentives. These could take various forms, such as internal competitions, comparing performance between different facilities or offices, or recognizing and rewarding employees who identify energy-saving opportunities. This fosters a sense of personal responsibility and contribution to energy management.

## #4 Establish Feedback Channels

Make energy management a dialogue with your employees. Create a structured channel for them to share their thoughts, propose energy-saving ideas, and highlight potential areas for improvement. This encourages collaboration and a shared responsibility for using energy efficiently, while also offering a platform for continuous enhancement of your energy-saving strategies.

In addition, make sure to acknowledge and celebrate their achievements in energy conservation initiatives. While doing so, provide constructive guidance on how things can be further improved. By drawing comparisons with other offices or considering the broader global context of energy management, you can reassure the rest of your team that their efforts are part of a larger movement toward energy efficiency.

# Energy Efficiency Measures and Strategies to Reduce Costs in Facilities Management

In Facilities Management, when evaluating the energy needs of your buildings and putting energy-saving measures into action, you have to take a close look at key factors that can uncover opportunities to cut costs and optimise energy consumption.

**Here's a breakdown of the five key factors to focus on:**

## Optimise Your Lighting Systems

Increasing the efficiency of your lighting is one of the simplest ways to reduce the energy costs for your facilities. Advanced lighting systems hold the capacity to significantly enhance application efficiency. They can provide the precise amount and spectrum of light, exactly when and where it's needed, surpassing the capabilities of existing systems.

The fluid interplay of variables like occupancy, tasks, available daylight, and other environmental demands in constructed spaces mandates that lighting systems themselves are adaptable. This, in turn, calls for advanced lighting controls that extend beyond basic functionalities such as automated timers, occupancy sensors, photosensors, and dimmers.

## Maximise Your HVAC System Output

Effectively managing energy consumption in heating, ventilation, and air-conditioning (HVAC) systems is extremely crucial when it comes to overseeing your building projects. This is because among all the various building services installations and electric appliances, HVAC systems account for the largest portion of electricity consumption.

Optimising an HVAC system involves skilfully managing all its parts as a unified system, 24/7, to use minimal energy without compromising building performance. This requires close coordination between various elements such as chillers, boilers, air handling units, ductwork, thermostats, and sensors. These components must work together effectively to achieve the best results. Also, it's important to use dedicated software that routinely gathers and studies data from the system to pinpoint more ways to improve efficiency and measure how well the system is performing overall.

It is possible to save energy without making occupants uncomfortable.

By adjusting key operational parameters like chilled water temperature and supply air temperature, you can achieve significant energy savings right away.

### Boost Building Envelope Performance

A building envelope includes elements like walls, windows, the roof, and the foundation, which all function as a shield against the outside environment. Envelope technologies are responsible for about 30% of the primary energy consumption in residential and commercial buildings. They have a big impact on how comfortable it is inside, how much natural light comes in, how well the place is ventilated, and how much energy is needed to heat or cool the building.

When the building envelope is constructed with high-quality materials, like ample insulation or energy-efficient windows, it effectively maintains indoor temperatures at a comfortable level. Proper sealing of gaps and openings in the building envelope, such as sealing around windows, is also essential to prevent the infiltration of air (or leaks). This careful construction significantly contributes to a building's overall energy efficiency and comfort.

### Upgrade Current Building Systems through Retrofitting

Revamping older buildings through retrofitting holds great promise. According to Project Drawdown, potentially up to 80% of energy is squandered due to factors like unnecessary lighting, electronics being left on, and gaps in the building structure allowing air leaks.

**The process of retrofitting works best when you focus on selecting a set of widely applicable improvements. It's effective to implement a package of sustainable technology investments across your property portfolio. When you group these improvements t**ogether, you can plan for the simultaneous installation of new equipment and technologies, which means you can better address how these measures interact with one another.

### Integrate Renewable Energy Sources

If you are looking to amplify energy efficiency and curtail expenses, your **Facilities Management team can also incorporate Renewable Energy Sources (RES) into your buildings, such as solar panels, geothermal systems, and hydroelectric systems.** But keep in mind to carefully evaluate the practicality and cost-effectiveness of each option before putting them into action and ensure that your building's Energy Management System (EMS) is set up to make the most of these clean energy sources.

# Data Monitoring and Analysis

The first step towards improving your energy system's efficiency is to understand how much energy your buildings use and where it comes from. To do this, you need to get a clear picture of all the activities happening in your buildings, and this can be done by carefully and continuously collecting and analysing energy consumption data.

**Data monitoring and analysis is instrumental in modern energy management systems because it empowers Facilities Managers to make informed decisions, optimise efficiency, and identify opportunities for cost savings and sustainability improvements.**

## BASELINES

Baselines are important tools in Facility Management that serve as foundational benchmarks for assessing performance, tracking progress, and making well-informed decisions. Essentially, it represents the starting point or initial level of your facility's energy use, operational efficiency, or other important factors and acts as a reference that you can compare future changes and improvements against.

Setting up baselines involves careful data collection and analysis to get a comprehensive picture of your facility's condition at a specific moment. Once you have the baseline data, you gain valuable insights into how your facilities are performing over time, and this helps you spot inefficiencies, establish achievable goals for enhancement, and gauge the effectiveness of your strategies. For instance, by comparing energy use data with the baseline, you can evaluate the impact of energy-saving measures, calculate the return on your investment, and adjust your tactics accordingly.

## DATA MONITORING

Regardless of your objectives — whether they involve enhancing ESG performance, cutting energy expenses, or supporting the environment, keeping track of your energy use is extremely important. By monitoring energy data, you can find wasteful or inefficient energy use and create plans to cut consumption and costs.

## COLLECTING ENERGY CONSUMPTION DATA

Gathering detailed data about energy consumption on the demand side has been a challenge in many countries globally. Despite this challenge, recognising the significance of the demand-side within energy systems, particularly in terms of energy efficiency, is widespread.

To effectively monitor progress in energy efficiency, understand the various factors influencing energy consumption (such as economic activity, building structures, and efficiency measures), and create relevant and comprehensive energy efficiency metrics, you need to possess data related to specific sub sectors or end-use categories.

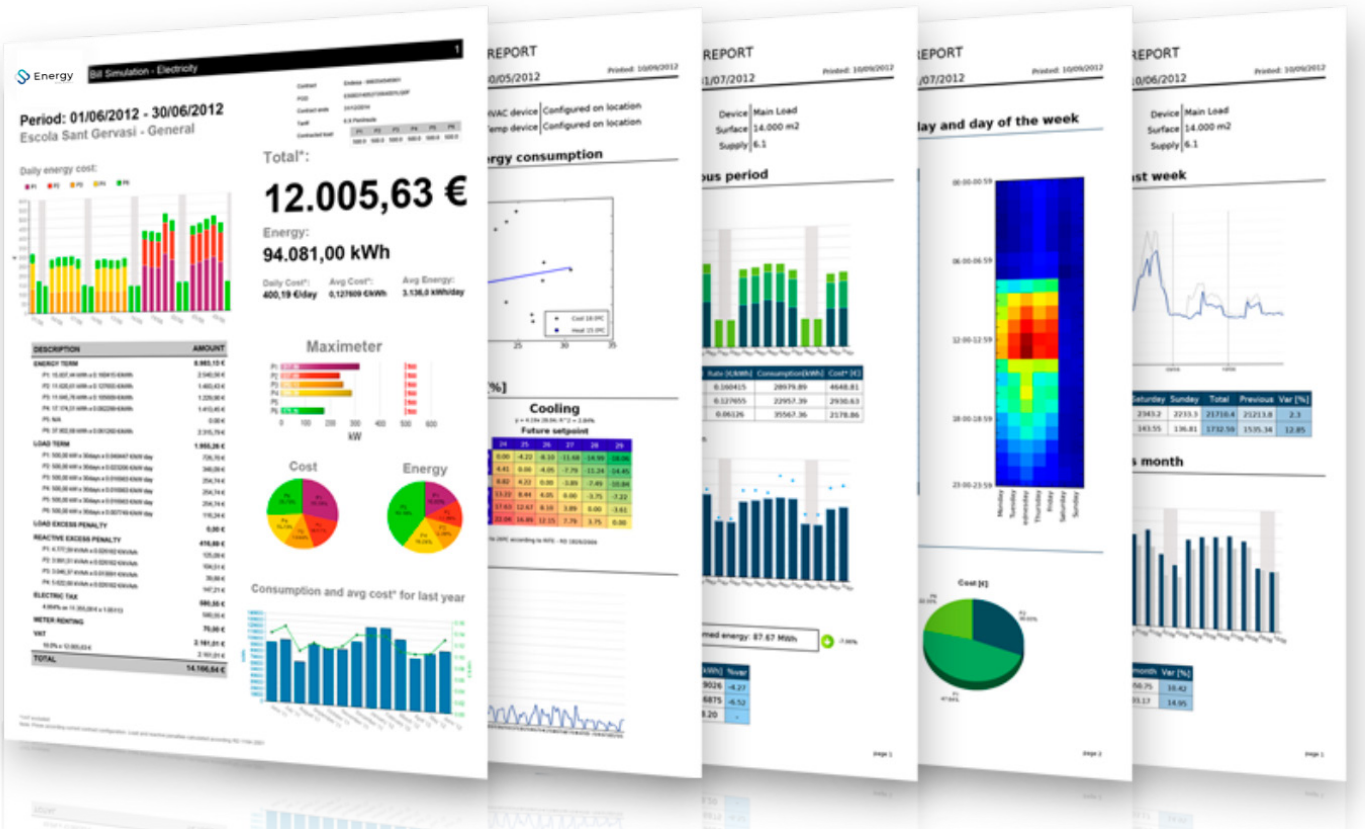
## REAL-TIME ENERGY MONITORING

In an Energy Management System (EMS), real-time energy monitoring offers valuable advantages for Facilities Managers. Here's how it helps you respond promptly to energy issues:

**Detecting high energy use:** Real-time monitoring lets you track energy use as it happens, even for specific equipment and areas. This helps you find areas using too much energy and take fast action to fix any problems.

**Fast solutions:** You can quickly make changes to improve energy use. For example, if an area or equipment is using a lot of energy, you can adjust settings, plan maintenance, or fix possible equipment issues.

**Participating in demand response:** Real-time data lets you join demand response programs that help you cut energy use during peak times or when the grid needs help. With an EMS, you can respond to signals, adjust energy use, save money, and help the grid.



## BALANCING ENERGY USE:

Real-time monitoring helps you smooth out energy use. By getting alerts about high use times or using strategies like reducing air conditioning, you can save energy and lower peak charges on your bills.

## INFORMED DECISION-MAKING:

The EMS's real-time data lets you make informed choices about energy. By studying how energy is used in real time, you can find problems, save energy, and improve overall energy use.

# Evaluation Performance

Your Facilities Management team is required to assess its environmental accomplishments in relation to the Environmental Policy, Environmental Objectives and Targets, as well as other benchmarks for environmental performance. This evaluation, known as the Environmental Performance Evaluation (EPE), is an internal procedure designed to facilitate the ongoing control of accurate and substantiated data.

The EPE uses indicators to gather data present and past performance against the environmental performance standards you've set for yourselves and the goal is to help you figure out if your energy management system (EMS) meets these standards.

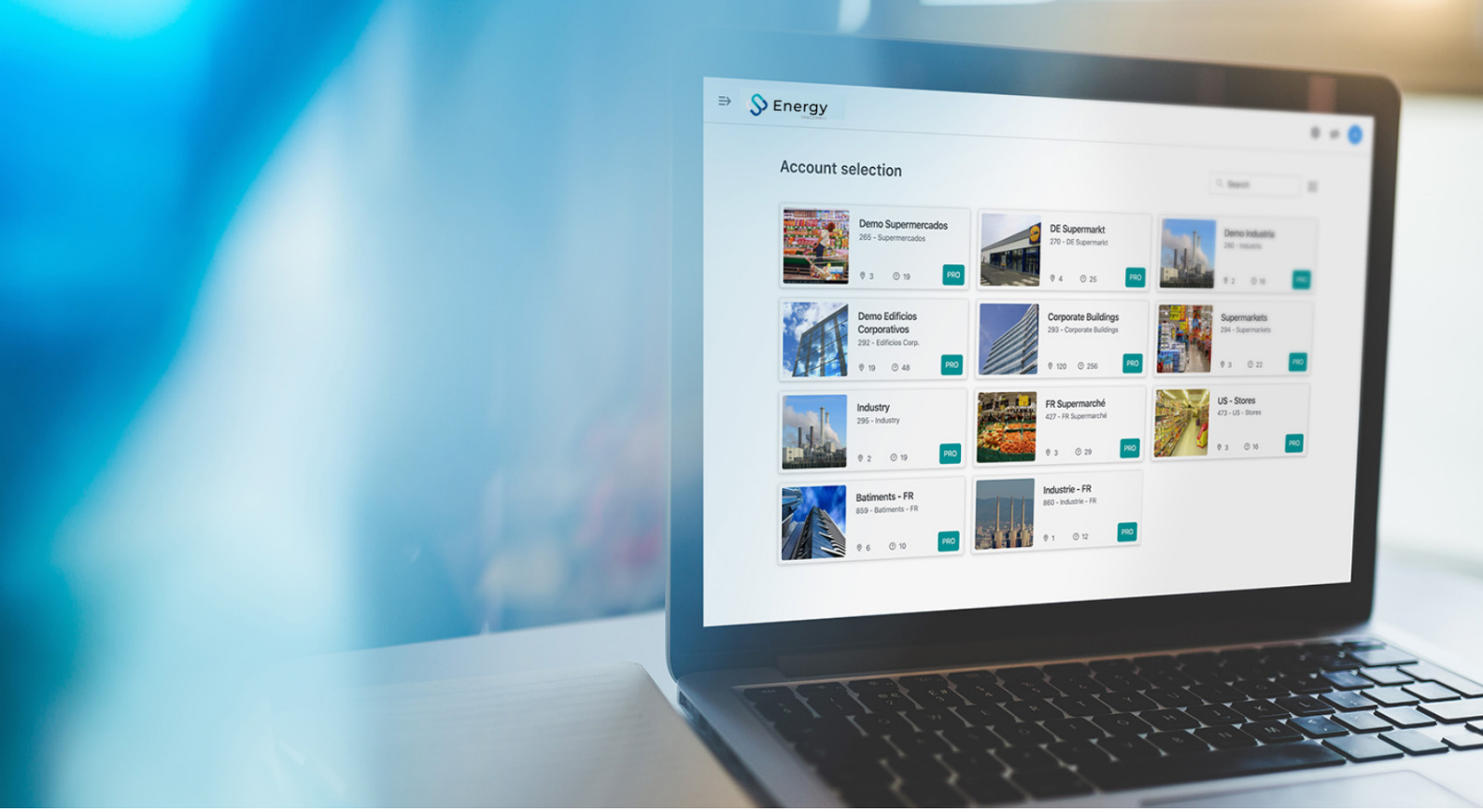
**It's designed to help you consistently gather trustworthy information, so you can figure out if your environmental management system meets the standards set by Facilities Management.**

## ENERGY PERFORMANCE INDICATORS (EPIS)

**Energy performance indicators (EPIs) are a set of quantifiable metrics that provide insights into how effectively your facility is using energy and where improvements can be made to save energy and cut costs.**

EPIs also have a benchmarking aspect. When you compare how your facility uses energy to other similar buildings, you can gain a clearer perspective on where your facility stands in terms of energy efficiency. This comparison can show both areas where you're doing well and areas that need more attention.

By using EPIs to track progress over time, you can **measure the impact of your energy-saving initiatives and adjustments, and this long-term monitoring helps to ensure that energy efficiency improvements are consistent and sustainable**.




## INTRODUCING THE SPACEWELL ENERGY (DEXMA) EMS AND ITS FEATURES FOR ADVANCED DATA ANALYSIS

Using the Spacewell Energy (Dexma) EMS, a complete energy management solution, you'll get a clear picture of how energy is used in your facilities to help you drive operational efficiency and lower costs in the long run.

The data analysis capabilities offered by the Spacewell Energy (Dexma) EMS can support you in understanding energy usage patterns more deeply, pinpointing inefficiencies, and applying specific strategies to optimise performance.

## SPACEWELL ENERGY PLATFORM (DEXMA)

The Spacewell Energy Platform (Dexma) **serves as a centralised hub that gathers, stores, and analyses energy consumption data from different sources in your facility**.

What's so great about the platform? You can easily incorporate it into your existing set-up. The Spacewell Energy Platform (Dexma) includes a wide range of over 200 hardware integrations, and we're continuously expanding this number with integrations from more than 50 different vendors.

In addition, our EMS offers a fully open API that allows our partners to further customise the platform with integrations with other systems of their choice, or by adding extra functionalities to the platform. Apps can be made private or public in Spacewell Energy's Apps Market

## What are the main ways the Spacewell Energy (Dexma) Platform benefits Facilities Management?

**1. Gain insight into energy consumption**
Understand exactly how much energy you're using to decrease both your operational expenses (energy bills) and your environmental impact (pollutant emissions). Improve your reporting procedures by generating customised reports and clear, easily comprehensible dashboards that present information effectively.

**2. Streamline reporting**
Improve your reporting procedures by generating customised reports and clear, easily comprehensible dashboards that present information effectively.

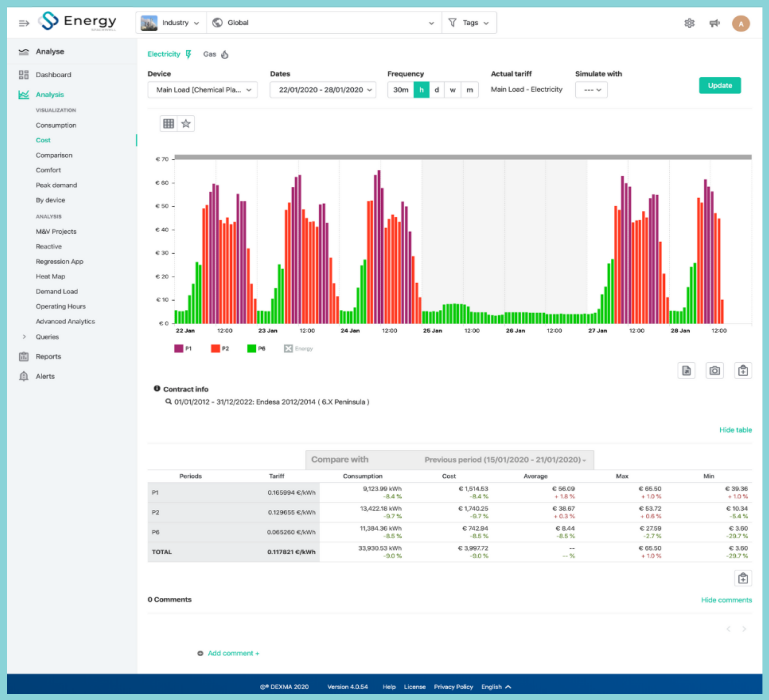
**3. Harness AI benefits**
Take advantage of AI-driven insights and data for comparing your performance to the market norms. This data will then be translated into specific measurements to identify opportunities for cost savings within your portfolio.

**4. Automate anomaly detection**
Utilise AI for automatically spotting unusual patterns, enhancing the efficiency of energy management for your assets. This is particularly valuable in pinpointing inefficiencies that might be hard for human observation to detect.

## SPACEWELL ENERGY - DEXMA ANALYSE

**Did you know that just 30% of your buildings could save you 70% on energy?** Spacewell Energy - Dexma Analyse is the quickest, toughest, and most adaptable solution around, and lets you keep a close eye on every factor affecting your energy use.

With Spacewell Energy - Dexma Analyse, you can get data from your sensors, no matter the protocol or the hardware you choose. It takes all this real-time info and turns it into smart advice for saving energy. And this solution isn't just for now – it's ready for your future growth too. Whether you're managing one facility or many, it can handle it all.




## Spacewell Energy Dexma Detect

Unlike traditional methods that offer only broad-brush projections, the Spacewell Energy - Dexma Detect solution analyses your actual energy usage patterns to provide you with precise and individualised suggestions for optimising your energy consumption. This isn't guesswork; it's an intelligent and data-driven approach that ensures you're not leaving potential savings on the table.

One of the most remarkable features of Spacewell Energy - Dexma Detect is its convenience. There's absolutely no need to disrupt your daily routine with on-site audits or invest in additional equipment. This feature seamlessly integrates with your existing energy infrastructure, making it an effortless solution that genuinely delivers results.

## Spacewell Energy Dexma Optimise

Efficiently managing a portfolio of buildings can mean dealing with a huge load of data – well over 10 million readings a year. That's a lot for your Facilities Management team to handle. With Spacewell Energy - Dexma Optimise, you don't need to watch every single reading.

This solution comes with 24/7 anomaly detection, ensuring that irregularities in energy consumption patterns are promptly identified and flagged. And as your portfolio expands, Spacewell Energy - Dexma Optimise will easily adapt to the increased demand, ensuring that no irregularity slips through the cracks.

But this tool goes beyond being a simple anomaly detector. Dexma Optimise can also reveal unusual patterns and trends, giving you valuable insights to make more informed decisions when it comes to reducing energy consumption.

# EVALUATING PERFORMANCE AND COST SAVINGS

## Key Performance Indicators (KPIs)

**Key Performance Indicators (KPIs) are metrics that help gauge critical factors that drive an organisation's success.** In the context of Energy Management Systems (EMS) and efforts to enhance energy efficiency, KPIs are employed to evaluate the effectiveness of these systems and measures.

Consider the following: You're tracking how much energy your business uses, measured in kilowatt-hours (kWh), and last month, you saw that the energy usage went down. Does this mean your business is doing better at saving energy? Or could it be that fewer people were working or the business was slower, which naturally used less energy? KPIs help you look beyond the basic numbers to see if real improvements are happening or if there are other reasons behind the changes in energy use.

Although it may seem easy to define a set of energy KPIs, it's important not to underestimate the process. If the KPIs are not effective, it can lead to overlooked insights, uninformed decisions, and possibly dysfunctional behaviours.

## Which KPIs should you employ?

- Energy consumption per square foot: This metric gauges the energy used per unit of space, revealing high consumption zones and potential energy-saving possibilities.
- Energy intensity: Energy intensity quantifies energy usage concerning a specific output, like production or revenue, and it enables tracking of energy efficiency enhancements over time.
- Greenhouse gas emissions: This indicator quantifies emissions of greenhouse gases resulting from energy consumption and helps you in monitoring your facilities' environmental impact and progress towards emission reduction.
- Attained cost savings: This evaluates the financial savings resulting from energy-efficient measures. It assists Facilities Management in assessing the economic advantages of their energy management initiatives.
- Kilowatt-hours per unit produced: This KPI assesses energy consumption for each production unit and highlights areas for energy reduction without impacting production levels.

# MEASURING ENERGY SAVINGS AND COST REDUCTIONS

There are various methods to measure the energy savings that result from using an Energy Management System (EMS) and adopting energy-efficient practices. Some ways to accurately determine the amount of energy saved include using energy meters, analysing utility bills, and using software analytics.Top of Form

## Energy Meters

Energy meters are tools designed to measure the amount of energy used in your facility. They're useful for keeping tabs on energy consumption both before and after implementing energy-efficient measures. A specific type of energy metre, called interval meter analytics, goes even further by analysing data at intervals of an hour or less.

## IPMVP Protocol

The Facilities Management sector places a great deal of importance on the International Performance Measurement and Verification Protocol (IPMVP) for a few reasons. The IPMVP is a standardised method for

evaluating the effectiveness of energy efficiency and sustainability projects across different facilities. By offering a structured framework, it helps you, the Facility Manager, accurately assess how well your energy-saving initiatives, such as upgrading equipment, improving buildings, and refining day-to-day operations, are truly performing.

Beyond its role in ensuring transparency and dependability in energy-related projects, the IPMVP also equips decision-makers with credible data, enabling them to make well-informed choices regarding the allocation of resources and future planning. In the grand scheme of things, the IPMVP encourages a more effective and thoughtful utilisation of resources, leading to cost savings and the promotion of environmentally-conscious practices.

## Software Analytics

Energy management software takes in and analyses data from various sources like sensors, weather predictions, and building automation systems. It can perform in-depth analyses to address concerns related to utility bills, energy-saving initiatives, energy wastage, and other operational factors.

By carefully examining energy usage data, you can figure out and understand complex issues. Also, the Spacewell Energy Platform can create detailed reports that lets you compare different loads, assess energy use across equipment types, timeframes, facilities, and more. This helps you find the times when you use the most energy and get detailed explanations of where and how your facilities use energy – which is really helpful for managing expenses effectively.

## Life Cycle Cost Analysis

Life Cycle Cost Analysis (LCCA) is a method of assessing all the expenses related to owning and using a building or its systems over its entire lifespan. This includes everything from buying it to maintaining it and eventually getting rid of it.

LCCA is particularly valuable when you have different options for a project that meet the same performance requirements but vary in terms of their initial and ongoing expenses. This analysis helps in comparing these options to identify the one that provides the highest overall cost savings.

For example, imagine you're deciding between two different HVAC systems for a building. One system might be more expensive to install but is more energy-efficient, resulting in lower monthly operating costs. LCCA would help you determine if the higher initial cost is justified by the savings in operating expenses over time. It's a way of making informed decisions that balance both immediate and long-term financial considerations in building projects.

# ASSESSING RETURN ON INVESTMENT (ROI)

Buildings are responsible for 40% of total energy consumption in Europe. About half of this energy is used when the building is being built, while the other half occurs during the lifetime of buildings (IDEA) – for things like lights, heating, and water. Once a building is running, it uses a steady amount of energy throughout its life to work properly and keep users comfortable and safe.

The problem is that it can be tough to tell the difference between energy that's necessary and energy that's being wasted, which can lead to using more energy than necessary.

So, what's the solution?

The first step is gathering data. This data can come from your bills, metres, and systems that track energy use. The more detailed the data, the easier it is to understand and make informed decisions. This is where an energy management system (EMS) comes in. It helps organise and analyse the data, making it simpler to figure out where you can save energy without sacrificing comfort or safety.

# FUTURE TRENDS AND INNOVATIONS

## Smart Grid Integration

Smart grids refer to electricity grids that intelligently incorporate Information and Communication Technologies (ICT) throughout the entire process, starting from electricity generation all the way to reaching the end customers. They facilitate two-way communication among energy producers, consumers, and distribution systems, which allows for real-time monitoring and control of data.

## What Are the Key Components and Capabilities of a Smart Grid?

Smart grids are made up of various parts, such as smart meters, sensors, communication networks, and control systems. These components operate together to support functions like responding to demand changes, managing the distribution of electricity loads, predicting maintenance needs, and ensuring the effective distribution of energy.

## What Are the Potential Benefits of Integrating EMS with Smart Grids?

**Real-time monitoring:**

Integration with smart grids enables immediate tracking of energy usage, which helps pinpoint areas where energy can be saved.

**Optimised energy distribution:**

EMS can assist in distributing energy effectively by keeping a dynamic balance between energy supply and demand in real-time.

**Increased grid stability:**

By controlling energy flow and lessening the chances of power disruptions, EMS improves the stability of the grid.

**Improved response to demand:**

The bidirectional communication between EMS and smart grids boosts the capacity to react to changes in energy demand, which permits the reduction of energy consumption during periods of highest usage.

## ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

**There are a lot of great, new idea**s emerging about smart grid technologies, like microgrids, demand-side management, and peer-to-peer electricity trading. But these concepts complicate the role of Energy management Systems (EMS) because they deal with intermittent and decentralised energy sources that can be stored.

For instance, Renewable Energy So**urces (RES) are becoming more common, but they're unpredictable due to their variability. And this adds complexity to (EMS) because it needs to be more flexible and stable to manage energy in buildings effectively.**

Current EMS lack the abilities to handle these complex changes, like adapting to new conditions, predicting energy patterns, and optimising energy use. This is where Artificial Intelligence (AI) comes in. AI can provide new ways to create smart EMS that gather knowledge about building occupancy, predict faults or weather changes, and understand energy usage habits. All of this helps ensure comfort for occupants while making energy use more efficient.

AI can be used in various roles within a smart EMS. It can help create models (using multi-agent systems), learn patterns (using machine learning), and make decisions based on uncertain information (using fuzzy systems), among other tasks. These AI techniques can be integrated into EMS to enhance their capabilities.

## DEMAND RESPONSE AND ENERGY STORAGE

**Demand response and energy storage resources have the potential to play a major role in helping to smoothly incorporate renewable energy sources that can change over time into the main power grid.**

They offer benefits on two fronts: **operational value and capacity value.** On the operational side, they can lower expenses linked to using power grid assets and also add to capacity value by offsetting the need to invest in new assets.

What exactly is demand response? It involves providing incentives to encourage changes in electricity usage, either by shifting usage to different times or using less when needed. This helps keep the power system stable by managing peak demand and reduces the requirement for investing in peak power generation and battery storage. In Europe, the possibilities for demand response are promising, and it will continue to be a big topic in the years to come.

Different studies have examined how the EU might use energy storage in the future. These studies suggest that by 2030, there could be more than 200 GW of storage, and by 2050, over 600 GW. This is a significant increase from the current 60 GW of storage, mainly from pumped hydro systems, as of 2022. For the EU to do this successfully, it needs a strong, sustainable, and resilient set of industries that work together to create energy storage technologies.

## EMERGING TECHNOLOGIES AND INDUSTRY DEVELOPMENTS

### Energy Analytics

The rapid growth of big data and its related technologies is creating an exceptional opportunity in the market. This opportunity involves enhancing the energy efficiency throughout the lifecycle of the building sector, as well as in more effectively overseeing energy usage and production at the building level.

Today, buildings are generating increasing amounts of data due to the widespread use of advanced technologies like the Internet of Things (IoT), artificial intelligence (AI), blockchain, and big data. This trend is pushing us towards a future where buildings are smarter and more interconnected.

Big data analytics is employed to enhance energy efficiency in buildings, and this process involves gathering and examining extensive data from sources like sensors, weather predictions, and energy usage trends. The ultimate goal is to pinpoint areas within the building where energy conservation is possible.

### Energy-Efficient Building Materials

According to the International Energy Agency (IEA), to enhance the construction of energy-efficient buildings by 2030, we will need creative technical solutions and new business approaches that address the diverse energy requirements of different building types across various regions. Innovation is also crucial to enhance the financial viability of energy-efficient building technologies. This entails considering factors like energy costs, labour expenses, and the specific characteristics of building designs or retrofits.

### #1 Better Air Flow and Sealing Controls – Why Does this Matter?

How tightly a building is sealed affects how much energy it uses. In cold regions, cold air getting in through cracks can make buildings lose heat, which can lead to problems like mould, which affects occupants' health and the building's durability.

In hot regions, having control over airflow and ventilation is important for keeping buildings comfortable. Good building designs can allow fresh air in without using machines. Ventilation systems also help by removing indoor pollutants and controlling temperature.

#### What is the solution?

Some advanced solutions for controlling airflow are already available in the market (Technology Readiness Level 8), but they need more promotion and improvement. These technologies must still be refined and their costs lowered, especially for sealing cracks, using sealants, and testing effectiveness.

## #2 Advanced Windows – Why does this Matter?

Windows use 5-10% of a building's energy, even more for certain types like all-glass facades. Well-insulated windows can save energy in new and renovated buildings. Adjusting how much sunlight comes in can reduce heating/cooling needs, especially in glass-heavy structures, and using windows that let in more natural light can also cut down on lighting energy.

### What is the solution?

Some advanced windows are available in certain markets (Technology Readiness Level 6), but their global adoption is uneven. They often remain a niche option even when they're out there, but there's still plenty of potential to make them more energy-efficient.

In the next 5 years, **key priorities** for research to boost window energy efficiency include:

- Developing affordable materials that insulate well (U-values of 0.6 W/m²K or lower)
- Better manufacturing and cost-effective install methods
- Exploring vacuum glazing to improve thermal performance
- Creating windows that control solar heat (Solar Heat Gain Coefficients 0.08-0.65)
- Developing adaptable windows
- Investing in low-cost films to improve current windows

## #3 Integrating Storage and Renewable Energy in Buildings – Why Does this Matter?

Blending clean energy and storage technology for buildings tackles climate change on multiple fronts. For example, thermal energy storage cuts heating/cooling needs and boosts use of diverse renewables. Integrating renewables in building facades increases energy generation due to larger available space than rooftops.

### What is the solution?

Various solutions exist but at different stages. Thermal energy storage has different forms, like phase-change materials, and improving it means cheaper, smaller, and better heat transfer for building needs.

Integrating renewables, such as building-integrated photovoltaics (BIPV), needs more progress. BIPV could contribute 70% of added solar PV capacity by 2030. Other renewables also need R&D for broader use, like building-integrated wind turbines, combined solar-wind systems, adaptable solar facades, and solar roof tiles.

# TO CONCLUDE

This guide should give you a full picture of Energy Management Systems (EMS) as crucial tools within Facilities Management. **It highlights the importance of these systems, which not only contribute to a more environmentally sustainable future but also bring financial benefits for organisations by streamlining energy efficiency and reducing costs.**

Given the ongoing escalation of energy costs, persistent concerns about reliable energy sources, and the mounting demands of regulatory obligations tied to emissions and climate policies in the UK, you and your Facilities Management team have most likely already started experiencing the challenges of energy management.

Navigating through these challenges can indeed be demanding, but there's a proactive solution at hand, and that is to seriously consider the adoption of a comprehensive Energy Management System (EMS) within your facilities. To achieve effective energy management, you need to have a systematic approach in place that enables change.

This approach should be backed by technology that can thoroughly examine all the details of energy usage within your facilities: **what, where, why, and how** it's consumed. When you have an EMS in place that monitors and analyses this data, you will be able to pinpoint specific areas and possibilities for enhancing energy efficiency.

Not only will you be addressing immediate energy-related obstacles with the implementation of an advanced EMS, but you will also be positioning your Facilities Management team for a more resilient and responsible energy future.

**By now, you should fully understand the following:**

## ENERGY MANAGEMENT IS NOT JUST A PASSING TREND.

The way facilities operate has, and will keep on having, an impact on the environment. We all understand this now. Your aim should be to reduce this impact and continue doing so, because it's not a problem that will magically go away. The solution is smart energy management that keeps an eye on and controls how energy is used within your buildings.

## FACILITIES MANAGEMENT IS A CRUCIAL LINK IN THE ENERGY CONSUMPTION CYCLE.

Even small adjustments to Energy Management Systems (EMS), lighting set-ups, maintenance routines, or building designs can lead to substantial yearly energy savings. What's more, changes in how both Facilities Management teams and occupants utilise the facility contribute further to these energy-saving efforts. This collaborative approach towards managing facilities not only has immediate benefits but also contributes to long-term sustainability goals.

## YOUR ENTIRE TEAM SHOULD BE ON THE SAME PAGE.

Implementing an energy management system (EMS) is more than just setting it up. You should actively engage all team members and give them the required training. This ensures that each person not only understands the importance of energy efficiency, but also acquires the hands-on abilities to take an active role in the team effort.

# The Key Takeaway

**Adopting an Energy Management System (EMS) empowers Facility Managers to achieve cost savings, decrease environmental effects, improve operational efficiency, and showcase corporate sustainability efforts.**

**Through the implementation of the Spacewell Energy (Dexma) EMS and by keeping pace with the latest innovations and technological shifts, your Facilities Management team can actively and systematically work towards conserving energy, playing a role in creating a greener future.**

# Energy

SPACEWELL

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