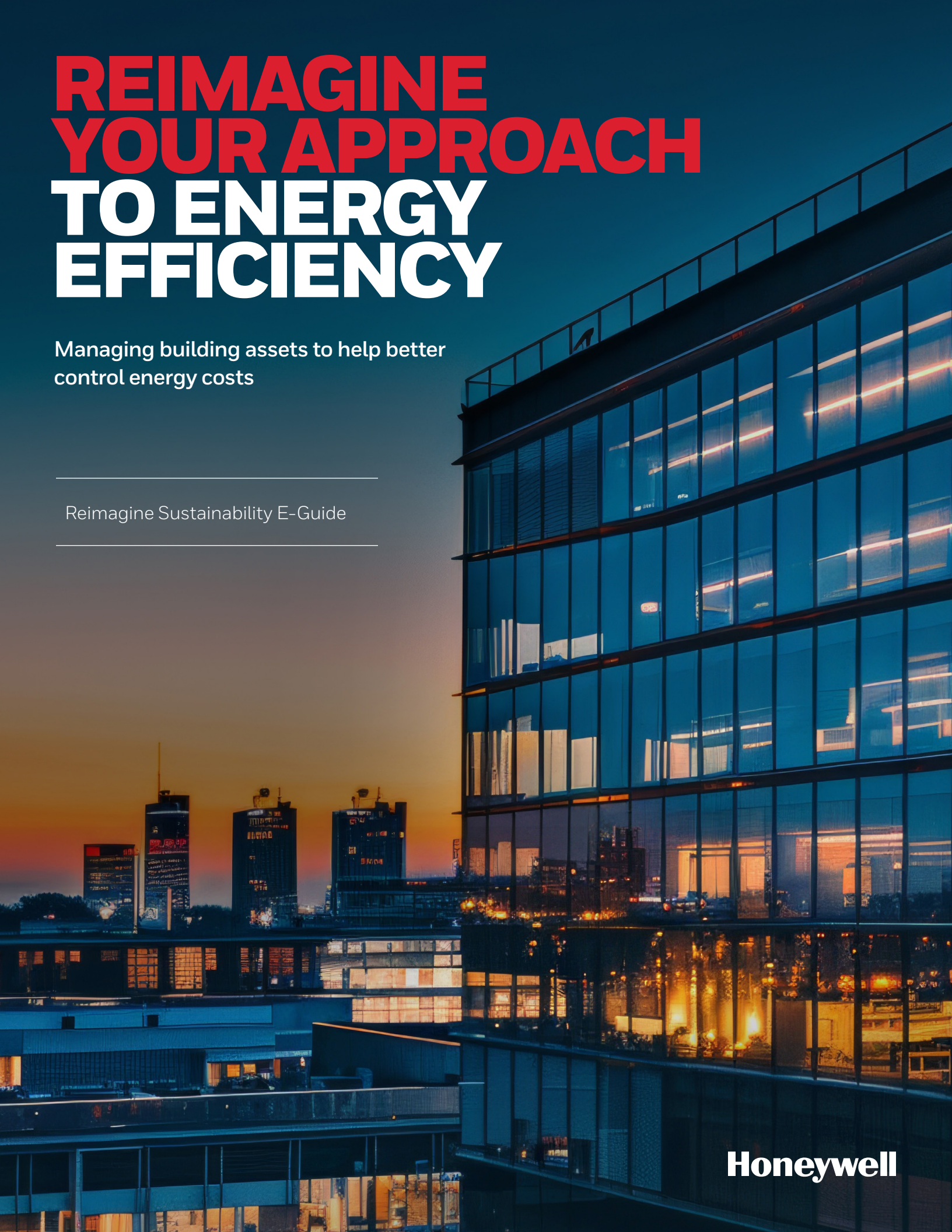
REIMAGINE YOUR APPROACH TO ENERGY EFFICIENCY

Managing building assets to help better control energy costs

Reimagine Sustainability E-Guide



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INTRODUCTION

Many companies continue to make significant sustainability pledges: more than 4,000 companies, including 48% of the Fortune 100 companies, have made science based target commitments.[1, 2] Whether or not your organization has pledged to reduce its environmental impact, most organizations want to reduce costs. Better managing energy use in your buildings is one way to help achieve that goal.

The buildings and construction sector is – by far – the most significant contributor to global greenhouse gases, accounting for 37% of all emissions.[3] Additionally, while declining, operational emissions,stemming from heating, cooling and lighting, account for about three-quarters of the total.[4]

The reason is simple: aging building stock in many countries is highly inefficient with poor designs, old equipment, and outdated controls.

- **United States:** More than 75% of the commercial building stock was built before 2000.[5]
- **Europe:** 76% of office buildings are at risk of obsolescence by the end of this decade if improvement investments are not made.[6]
- **Asia Pacific:** the building stock is relatively younger and more than 70% of facilities require some type of optimization to meet tenant needs.[7]

Rising energy prices are another critical factor compelling organizations to invest in energy efficiency and conservation measures. Global energy consumption growth increased in 2023 by 2.2%, much faster than its average 2010-2019 growth rate of 1.5% per year.[8]

Energy prices are surging globally, impacting businesses and households alike. Recent data reveals the extent of these increases:

- **North America:** U.S. prices in 2023 were approximately 15% higher than in 2019.[9]
- **Europe:** Despite a net -4.6% drop in EU energy prices in 2023, several countries saw large price increases including Netherlands (+86%), Poland (+35%) and Germany (+20%). These were only somewhat offset by the price decreases registered in Denmark (-39%), Spain (-30%) and Sweden (-20%).[10]
- **Asia Pacific:** Wholesale prices in Japan and India also remained above 2019 levels and Australia has an annualized growth in electricity of 4.7% from 2019-2024.[11,12]

With these factors in mind, it's important to prioritize efforts to help better building energy use.

ENERGY EFFICIENCY VERSUS SUSTAINABILITY

The typical building requires both electricity (e.g., lighting, workstations) and thermal energy (e.g., heating, cooling). While electricity demand is typically met by the local utility, many buildings fulfill thermal needs with on-site combustion of natural gas or other fossil fuels. Combined, these usages deliver essential building services such as indoor air quality, comfort controls, and lighting.

Facility managers aiming to better manage electric and thermal energy use without compromising building services often focus on energy efficiency. Implementing building automation and optimization techniques can significantly help enhance energy efficiency often reducing the building's overall operational costs.

Sustainability, while related to energy efficiency, has a broader scope. It considers the carbon intensity of a facility, accounting for emissions from both electricity consumption and on-site fossil fuel combustion. Generally, electricity consumption has a lower carbon intensity than natural gas combustion. Therefore, a sustainability-focused facility manager may strive to improve energy efficiency and pursue on-site renewable generation while reducing or eliminating on-site fossil fuel use.

Inherently, a more efficient building will have lower carbon intensity (higher sustainability) and reduced operational costs. Yet a less energy efficient building may achieve higher sustainability by converting on-site fossil fuel systems to electric systems or installing on-site renewable generation. The downside is that these sustainability measures may sometimes lead to higher energy expenditures. For example, a study in the United States found that electric heat pump systems incur about 30% higher operational costs than natural gas furnaces, based on an electricity price of $0.11/kWh and a natural gas price of $0.70/therm.[13] On-site clean energy generation can also be costlier in terms of total electricity costs. The intermittency of many clean energy systems like solar can add complexity to operational management.

Sustainability isn't just about the energy source. Achieving – and maintaining goals – means creating energy supply resilience, managing demand charges, and negotiating with local utilities on issues like feed-in tariffs and demand response programs.

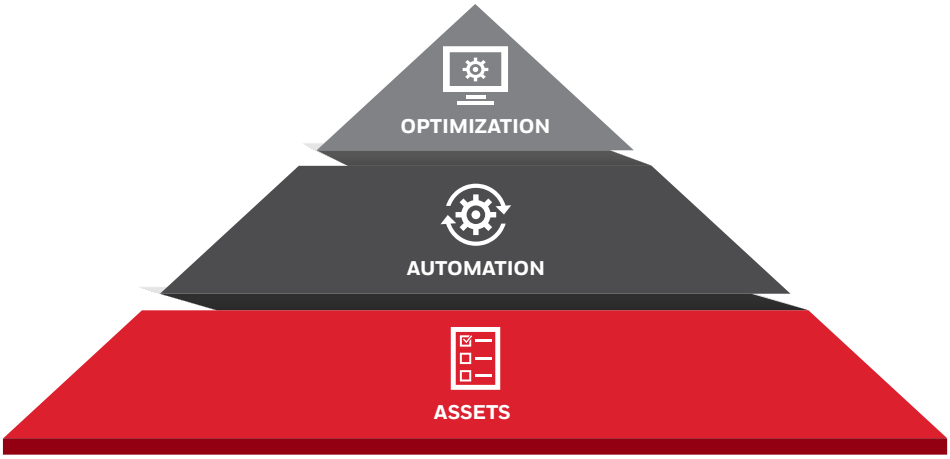
Facility managers must navigate the complexities of achieving energy efficiency and sustainability without escalating operational costs, especially during a period of growing electrification, on-site generation, and increased grid outages. This requires meticulous planning and exceptional execution. Honeywell can assist in helping building owners and operators support their energy efficiency and sustainability goals by creating a clear path toward meeting carbon reduction commitments while addressing transition costs to deliver a more energy efficient solution.

THREE LEVELS OF MORE ENERGY EFFICIENT BUILDINGS

Achieving an energy efficient outcome requires addressing inefficiencies at every level of a building's energy management plan.

Each level in this pyramid is critical to energy efficiency. The most effective interventions and solutions will vary by organization and time. Improving building performance to reduce its energy impact is a journey rather than a singular event.

Systems and assets must also work together within the wider building framework to help realize energy savings and prevent operational inefficiencies from undermining them.



- **The asset level** where replacing or upgrading aging and inefficient equipment like heaters, chillers, boilers, and lighting can help reduce energy consumption
- **The automation level** of building management systems, lighting and refrigeration controls to enable more efficient operation of HVAC and other significant assets
- **The optimization level** can identify critical correlations and variables as well as continually tune systems to enable more efficient outcomes depending on demand, occupancy, weather, energy costs, and other factors

START WITH YOUR BMS

Building control is the foundation of any energy reduction journey. Honeywell Advance Control is designed to automate building management and support a building's energy efficiency strategy, combining the latest technologies with decades of innovation and domain expertise. The controllers feature built-in cybersecurity and technology to help deliver faster network speeds while using existing wiring with single-pair Ethernet (T1L), helping to reduce installation time, cost and waste.

LAYER ON TECHNOLOGY TO BMS - MANAGE EVERY BUILDING SYSTEM – IN ONE PLACE

Solutions such as Honeywell Enterprise Buildings Integrator (EBI) is more than a BMS. Using its open system capabilities, it allows facility managers to integrate and automate building management, fire and life safety, and security in one place, eliminating the need for managing building systems in silos. Additionally, the Energy Manager tool within EBI provides responsive, web-based reports to help monitor and optimize energy use.

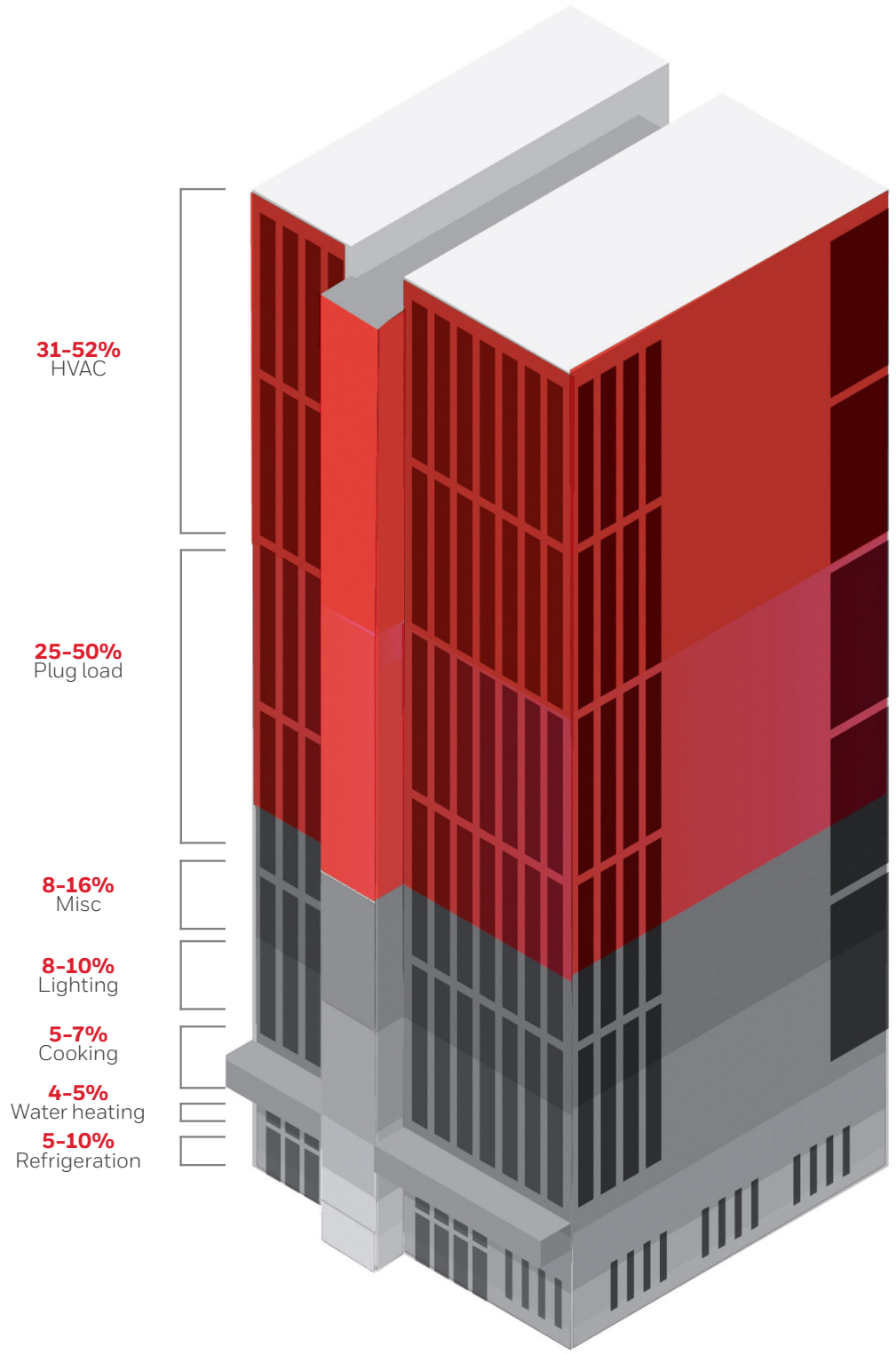
ONGOING INNOVATION

Managing energy use is an iterative and ongoing process and goes beyond just managing assets. While technology is arguably more mature and certainly more widespread at the bottom of the pyramid than at the top, we see continuous innovation at each level.

Traditionally, BMS controls have focused on heating, cooling and lighting – all vital for addressing a building's energy efficiency. Plug loads are often neglected, even though peripheral appliances and devices can frequently account for a quarter or more of electrical use in commercial buildings according to the U.S. General Services Administration.[14] The significance of plug loads grows as HVAC and lighting efficiency measures lower overall building energy consumption. In high-efficiency buildings, plug loads may account for more than half of the total energy consumption.[15]

HONEYWELL CONNECTED POWER

Designed to help manage building energy use, the Honeywell Connected Power solution can help control and manage plug-in power usage at an individual outlet level via an on-premise or cloud-based BMS. Dashboards display actionable insights on plug load usage across the building to enable better monitoring and control to help reduce consumption.



OPTIMIZATION AND ARTIFICIAL INTELLIGENCE

The optimization level holds exciting innovations. Honeywell Forge Sustainability+ for Buildings | Carbon and Energy Management solution can deliver insights, actionable intelligence and optimization to help manage energy use. Building owners and operators can:

- **Monitor** energy use, Scope 1 and Scope 2 emissions and other KPIs and help prioritize cost-effective ways to save energy. Its standard reporting provides a detailed overview of the building or building portfolio.
- **Control** live meter data for CO_2 emissions, energy and utilities. The solution integrates with any BMS to manage alarms and alerts, monitor setpoints, and adjust schedules. It also enables non-intrusive load management to break down energy consumption to the equipment level for control and optimization.
- **Optimize** both historical and real-time data to autonomously adjust systems to achieve desired parameters, optimize energy intensive assets, and extend asset performance and lifecycle.

Artificial intelligence and machine learning tools can help unlock almost endless optimization opportunities tailored to specific buildings.

Solutions like Honeywell's Forge Sustainability+ for Buildings | Carbon and Energy Management can identify and optimize building equipment using data on weather, indoor air quality, usage, occupancy, electricity prices, and other factors and makes autonomous adjustments at a 15-minute interval that would be impossible to do manually. As the number and range of connected devices and assets in a building grow, so do the opportunities to identify new areas to better manage energy efficiency.

To the extent that there is a limiting factor for optimization, it is not computing power. Rather, it is the ability to capture, contextualize and analyze data from a wide range of assets and equipment from different manufacturers across the building.

A FRAMEWORK FOR EFFECTIVE ACTION

Building owners and operators should deploy a structured and strategic approach to how they manage energy use across each level.

Unplanned and ad hoc improvements across the different levels of control may fail to concentrate resources on the changes and technology that will deliver the best return on investment. The interdependencies and relationships between systems within the building may even mean poorly planned changes undermine existing efforts to improve operational efficiency and reduce energy use. Finding an appropriate financing route can also make a significant difference.

A structured approach should include baselining the building's energy use; identifying and developing energy conservation measures and optimization; implementing changes with holistic regard to the portfolio of assets and building systems; and identifying the most appropriate form of financing for the business' needs.

BASELINING: YOU CAN'T MANAGE WHAT YOU DON'T MEASURE

Baselining is a necessary step to achieving energy reduction targets. Without a baseline, it is impossible to set realistic targets and track progress. In aiming to reduce energy use, businesses need to be able to compare their buildings, accounting for size and type, against established performance benchmarks. They can then target and prioritize poor performers within the portfolio.

This is the role the Carbon and Energy Management software plays, enabling building owners and operators to control and optimize energy performance against carbon reduction goals while improving occupant well-being. It provides a measure of both energy use intensity (EUI) and Scope 1 and 2 carbon emissions for each building.

Crucially, baselining can consider the economics of energy management and targets. Accounting for varying carbon taxes and energy costs across regions and countries, businesses can focus efforts that make the greatest contribution to energy use reductions while contributing to cutting costs.

ENERGY CONSERVATION MEASURES

Once the baseline is established and targets are identified, businesses can identify potential energy conservation measures (ECM) and their payback.

Organizations should seek a partner that can draw on a portfolio of solutions across each level of the building energy management – from assets to control to optimization. This will enable them to identify the upgrades and automation solutions that will deliver both the greatest potential energy savings and the return on investment that works for their business.

A holistic rather than piecemeal approach is essential for another reason: Any ECM can impact other areas of energy use, potentially reinforcing or undermining energy savings. For example, a shift to energy efficient lighting, eliminating the heat from inefficient bulbs, can change the load on the HVAC system. With more than 300 ECMs for consideration, a consultative, holistic approach that balances interdependencies across the portfolio of assets, controls and software is essential.

IMPLEMENTATION AND FINANCING

Choosing the right implementation partner is important – especially for organizations looking to manage energy use across a building portfolio on a global scale. Working with a global partner, organizations can create standards and best practices across their portfolio to more consistently identify and apply ECMs in similar buildings and avoid duplicative work.

Finance options can also help in determining the attractiveness and viability of projects. The flexibility of these options can help to provide fully-funded, end-to-end energy and data solutions to help enable projects that deliver results.

Energy performance contracts (EPCs), also known as energy savings performance contracts (ESPCs), are financial tools aimed at reducing a building's or organization's energy demand with avoided costs offsetting the capital investment required for the project. EPCs can vary significantly from one another in terms of project size and duration. There are multiple EPC models, which often differ from country to country according to local policy, legislation and accounting rules. For example, under a guaranteed savings model, the ESCO guarantees energy savings and bears the technical (performance and design) risk. The customer takes out a bank loan or uses equity to pay contractually determined fees to the ESCO and the bank keeps the difference. For the customer, the savings are guaranteed and there is no technical risk.

Energy as a service (EaaS) is a subscription-based model where the building owner faces little-to-no upfront costs with the ESCO owning the equipment and covering 100% of the installation costs. The ESCO provides end-to-end management of a customer's energy assets and services, including energy advisory, project development, asset installation, financing and measurement and verification solutions.

Honeywell offers project financing options that include financial models like ESPC and EaaS that can help public and private buildings better meet energy goals while enhancing resilience.

SUPPLY AND DEMAND: THE FUTURE OF ENERGY MANAGEMENT

Setting energy efficiency and sustainability programs in the broader context of the business' energy needs is crucial. Energy efficiency, emission targets and resilience are coexisting, and potentially competing, imperatives.

When taking a broader view, businesses can look beyond ECMs across assets, automation and optimization, all of which seek to reduce energy demand. To achieve the most ambitious energy efficiency and sustainability goals, however, businesses must increasingly look to supply. This means not just energy use but its origin, whether it is green energy (renewable) or brown energy (non-renewable polluting energy).

As the energy transition continues, on-site generation, storage, peak shaving and demand load management will continue to increase in importance. Demand charges can account for 30-70% of monthly utility costs for commercial buildings. Honeywell Forge Sustainability+ for Buildings | Power Manager provides the tools to help optimize energy costs by switching between the grid and on-site generation and storage; participating in manual and automated demand response programs; avoiding peak demand charges; and dynamically managing loads to extend supply and create energy resilience for critical assets.

CONCLUSION

Between rising energy costs and new demands on buildings, building owners and operators need tools that can help more consistently manage energy use to help create better predictability on utility bills. By looking holistically at building assets and identifying opportunities where technology can help better manage energy use – and ultimately costs – can make a difference in not only how your building operates. It's important to understand which technologies and partners will work best in your building to achieve your energy management goals.

Honeywell has the expertise and technologies to help support your energy efficiency efforts.

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