



ENHANCE YOUR DECARBONIZATION JOURNEY WITH SIEMENS' BUILDING X

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This whitepaper demonstrates Siemens' software-forward approach to decarbonizing buildings with a "one-stop" platform for sustainability—Building X. The Building X platform streamlines data collection and reporting with the Sustainability Manager, Energy Manager to enhance operations, and Comfort AI for proactive maintenance and optimization. Through the Building X partner ecosystem, building operations are automated; new opportunities for green initiatives, real-time monitoring and dashboard visualization, and monitoring resource consumption are identified; and pre-plan resource allocation and predictive maintenance to optimize building utilization, occupant comfort, and well-being are supported. The practical sustainability capabilities of Building X have been demonstrated in PRODEA INVESTMENTS, University of East London and COHERENT case studies as supporting Siemens' customers decarbonization goals and net-zero journey.

TOOLKIT FOR DECARBONIZING BUILDING PORTFOLIOS

The building sector contributes 40% of the global energy demand and one-third of the world's Greenhouse Gas (GHG) emissions. The race to achieve the goal of net-zero emissions by 2050 will require a transformative approach to the construction, operation, and maintenance across the entire lifecycle of the building industry.

Architecture, Engineering, and Construction (AEC) processes are becoming integrated and multidisciplinary, and digitalization is assisting in streamlining the process from conception and construction through operation and building demolition.

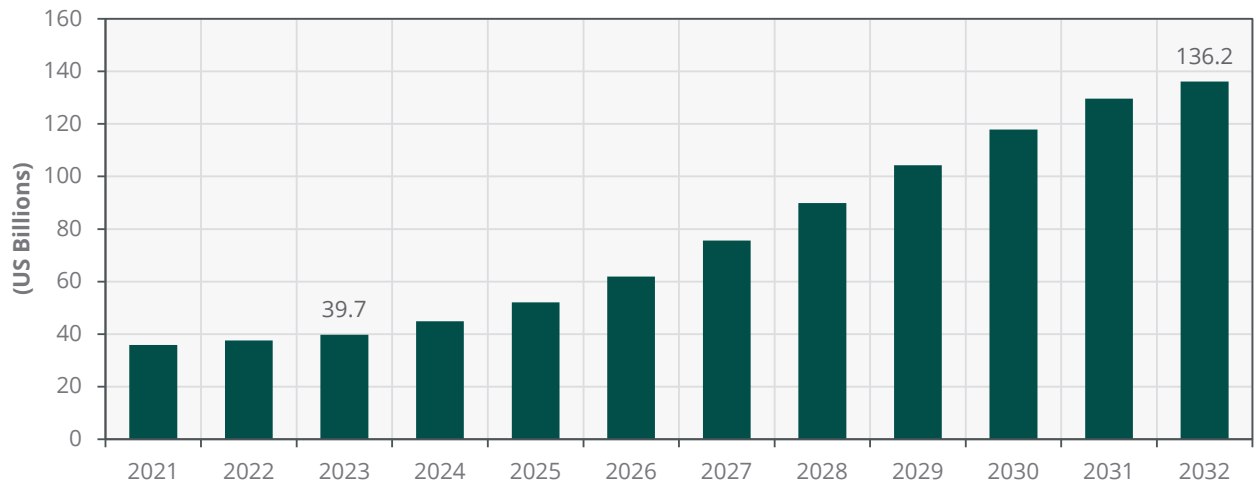
According to recent reports, non-compliance results in tax penalties, resulting in up to a 30% increase in operational costs and up to 20% higher insurance premiums. Smart building management platforms are capable of digitalizing, capturing, managing, monitoring, and improving the real-time performance of a building across a broad cross section of commercial building operations such as energy, lighting, air quality, water, waste, Heating, Ventilation, and Air Conditioning (HVAC), fire, and safety. Building owners and managers use a software-forward approach to manage utility services, monitor equipment, detect leaks, and lower operating costs. This reduces manpower requirements and improves the operational performance of the building stock. Data collection capabilities, monitoring occupant wellbeing, and operator demands have encouraged the Building Management System (BMS) market to create open, secure, and flexible platforms, encouraging cross-disciplinary multi-vendor engagement and third-party integration and connectivity.

The fastest path to reducing a carbon footprint is to integrate sustainable tools into BMS systems to digitalize, visualize, monitor in real time, and optimize operations, while providing actionable insights to support decision-making. The biggest advantage of sustainable BMS tools is ease of deployment in new and retrofitted buildings with minimal disruption to occupants. Over time, building owners and operators benefit from increased compliance, tax incentives, improved brand perception, operational savings, and tenant appeal.

MARKET TRENDS—SUSTAINABILITY TOOLS FOR SMART BUILDING MANAGEMENT SOFTWARE

Modernizing the energy and utility industry, coupled with growing demand for sustainable energy sources and strict regulations for efficient usage of energy, have led to the increased adoption of sustainability tools embed into efficient Energy Management Systems (EMSs) and Building Management Systems.

**Total Smart Building Management Solution (with Sustainable Features) Revenue
World Markets: 2021 to 2032**



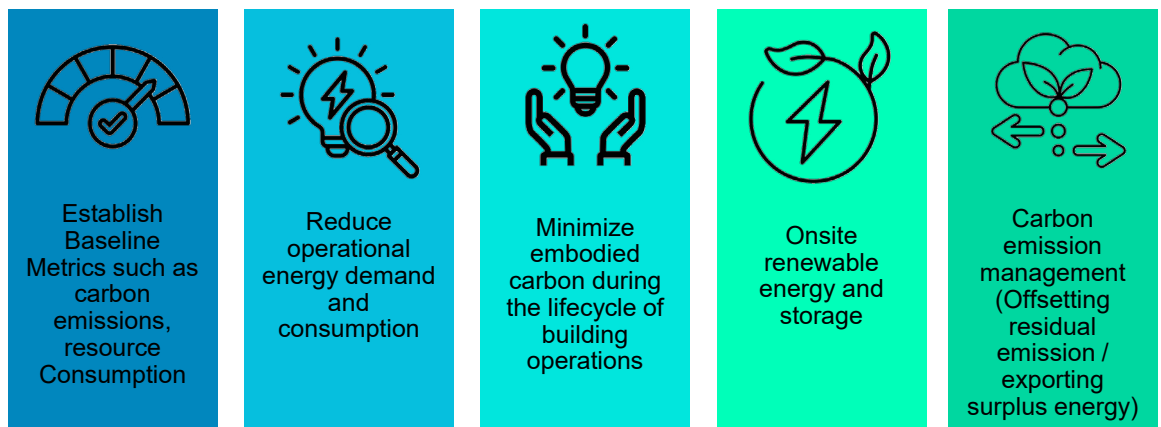
(Source: ABI Research)

ABI Research values the smart building management software (with sustainable features) at US\$39.7 billion in 2023, forecast to reach US\$136.2 billion by 2032 with an advancing Compound Annual Growth Rate (CAGR) of 14.7%. The forecast is based on extensive primary research interviews with the ecosystem value chain and comprehensive analysis of publicly available documents. North America is the largest shareholder, followed by Europe with a substantial market driven by the growth of renewable infrastructure, net-zero goals, quantifiable sustainable metrics for energy management solutions, renewables, and decarbonized infrastructure & services.

BLUEPRINT FOR ACHIEVING NET-ZERO GOALS

Businesses are implementing strategies to decarbonize their buildings and operations to achieve regulatory compliance and stay ahead of the competition. Figure 1 lists the most effective ways to reduce carbon emissions to meet sustainability goals and achieve net-zero targets.

Figure 1 : Strategies to Achieve Net Zero

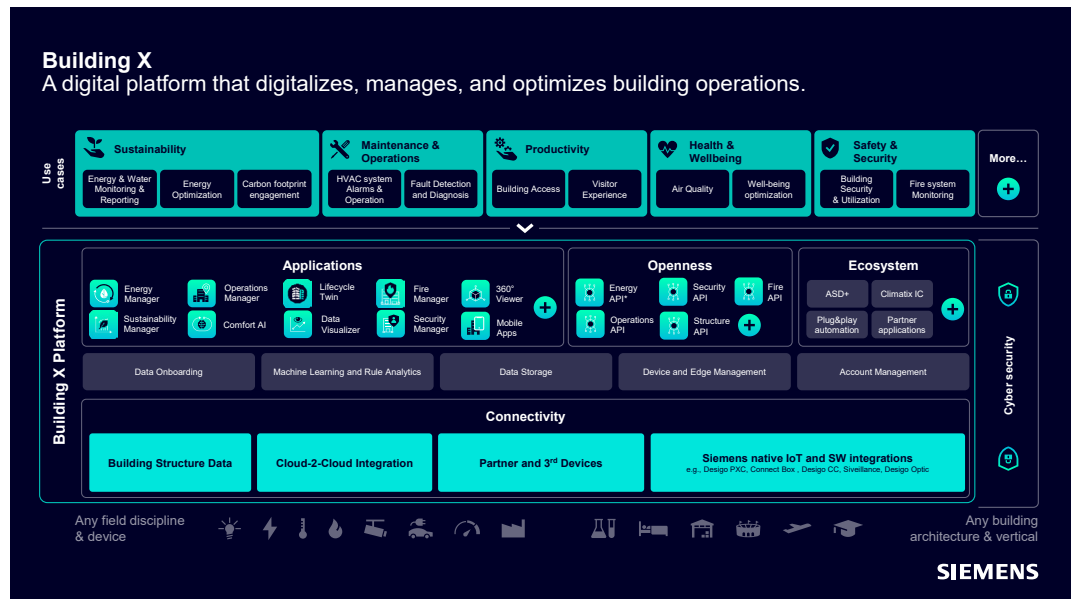


(Source: ABI Research)

DIGITALIZING & DECARBONIZING WITH SIEMENS' BUILDING X SUSTAINABILITY MANAGER

Siemens Xcelerator is a comprehensive, integrated, and modular suite of software, applications, and services to digitize a company's portfolio. Digital transformation drives sustainability through data-driven insights & decision-making, and team collaboration, derisking supply chains through transparency and resource efficiency. Building X is one of the key platforms of Siemens Xcelerator that empowers commercial building owners and operators. The platform provides actionable insights to increase operational performance and data-driven decision-making, thus increasing the building value and driving efficient operations.

Figure 2 : Building X Dashboard & Functionalities



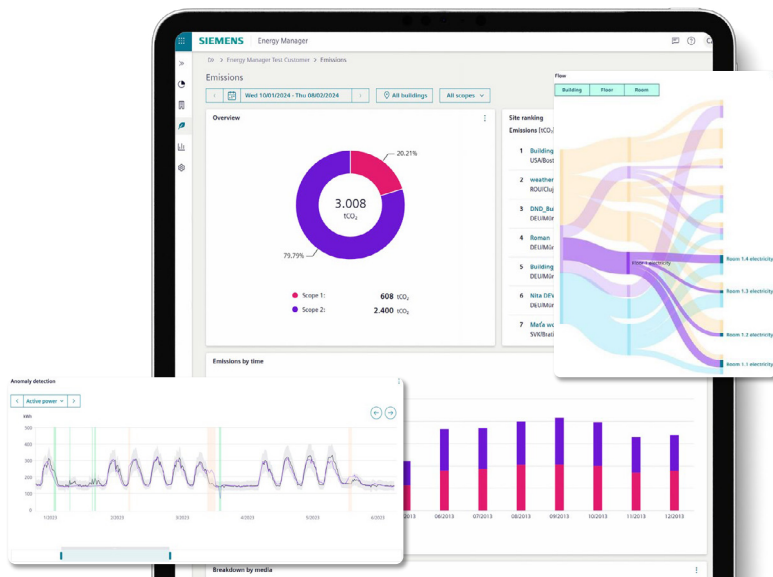
(Source: Siemens)

Siemens' Building X open ecosystem solution supports organizations' net zero strategies and digital transformation at scale through the process depicted in Figure 2. The applications within the Building X digital building platform streamline sustainability reporting, energy management, asset planning, and compliance. Through data collection and in-depth analysis, sustainability managers and building operators can identify opportunities to achieve energy efficiency, reduce carbon emissions, support decarbonization goals, and reduce a business' environmental impact.

The integrated applications are agile and support managing and optimizing building operations, while tracking local and global frameworks and regulations, such as the Science Based Targets initiative (SBTi), Carbon Risk Real Estate Monitor (CRREM), and New York City Local Law 97, that can affect sustainability efforts.

BUILDING X'S SUSTAINABILITY FEATURES IN ACTION

The Building X digital building platform functions as the foundational digital thread linking the building operators to the digital ecosystem. Building X actively integrates and communicates with supporting applications, namely Energy Manager, Sustainability Manager, Operations Manager, and Comfort AI.



(Source: Siemens)

Building X Energy Manager

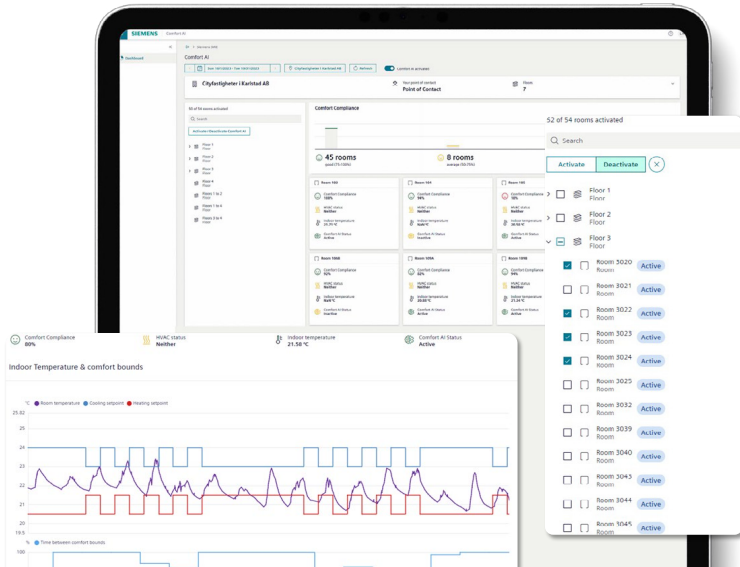
The Energy Manager application enables building operators to optimize energy consumption, visualize building operations, and monitor sustainability Key Performance Indicators (KPIs). Additional features and future updates will measure Scopes 1, 2, and 3 emissions of operating energy consumption, heatmap-based inefficiency detection, energy flow monitoring to map patterns, and anomaly detection for consumption, cost, and emissions through building operations.



(Source: Siemens)

Building X Sustainability Manager

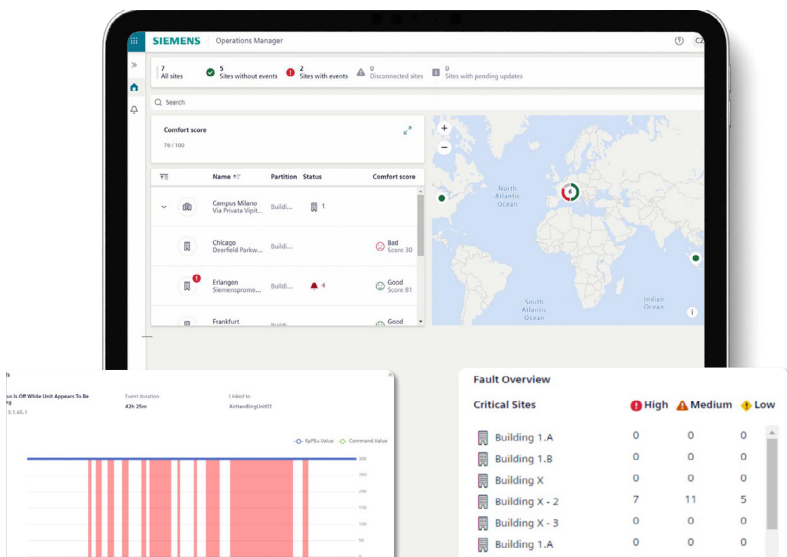
The Sustainability Manager supports building operators and stakeholders with understanding the building's performance, and the tracking, measuring, and real-time monitoring of operations against sustainability and compliance targets. The built-in Carbon Risk Real Estate Monitor (CRREM) and SBTi Compliance initiative tool recommends practical science-based strategies to reduce carbon emissions in line with the Paris Agreement's objectives. Additional features and future updates will support compliance reporting, benchmarking of building portfolios against standards like ENERGY STAR, dashboard visualization, Scope 3 reporting, and configurable triggers/alerts.



(Source: Siemens)

Building X Operations Manager

The Operations Manager tool monitors, trouble shoots, and controls building operations remotely to increase productivity and reduce operating costs. The applications support fault detection and diagnosis, comprehensive analysis of building data, and applied analytics such as anomaly detection, data quality, and comfort optimization.

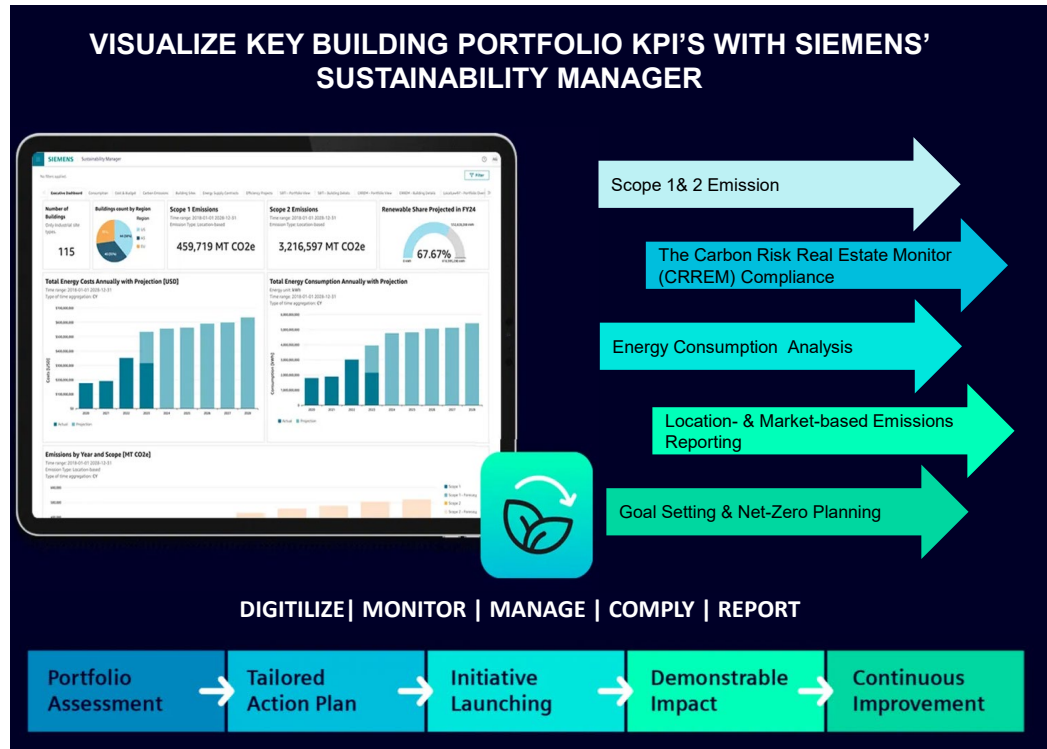


(Source: Siemens)

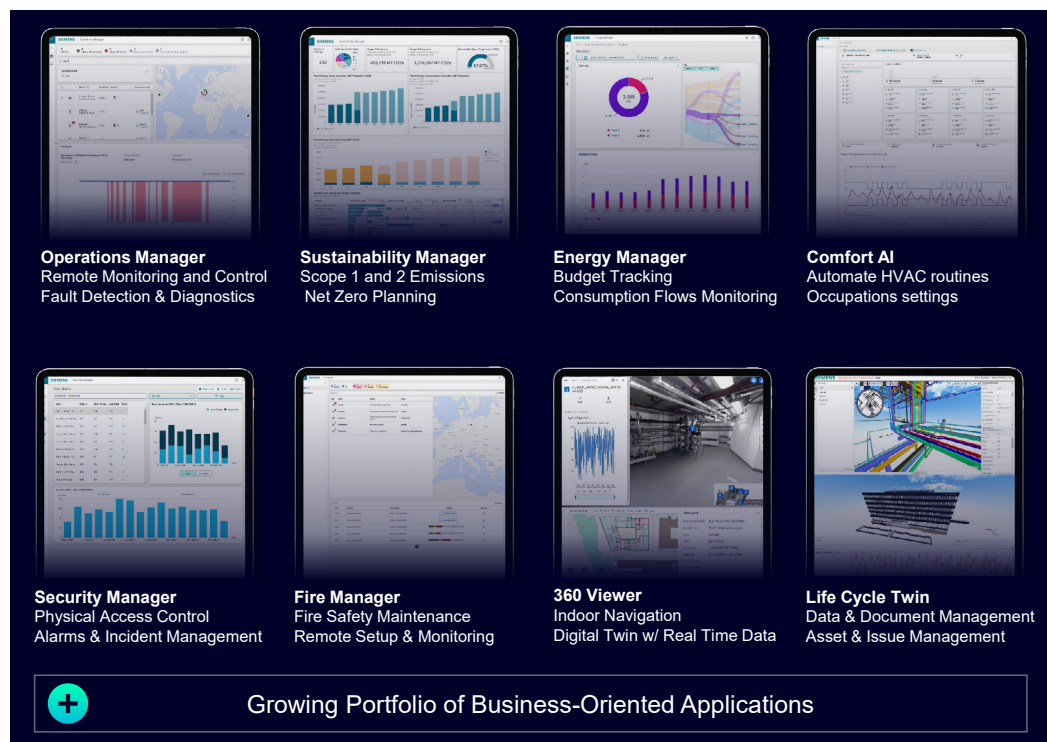
Building X Comfort AI

The Comfort AI application uses AI to reduce workloads and supports predictive maintenance by improving tenant comfort through real-time insights into comfort compliance on a granular level. The Artificial Intelligence (AI)-driven application enhances indoor comfort and HVAC automation, while maintaining comfort KPIs by optimizing environmental data and intelligent algorithms.

Visualize Key Building Portfolio KPI's with Siemens' Sustainability Capabilities



One of the primary benefits of Siemens' Sustainability Management tools for smart buildings is enhancing building efficiency through identifying and reducing the operational hotspots, thus saving costs and ensuring optimal asset management.

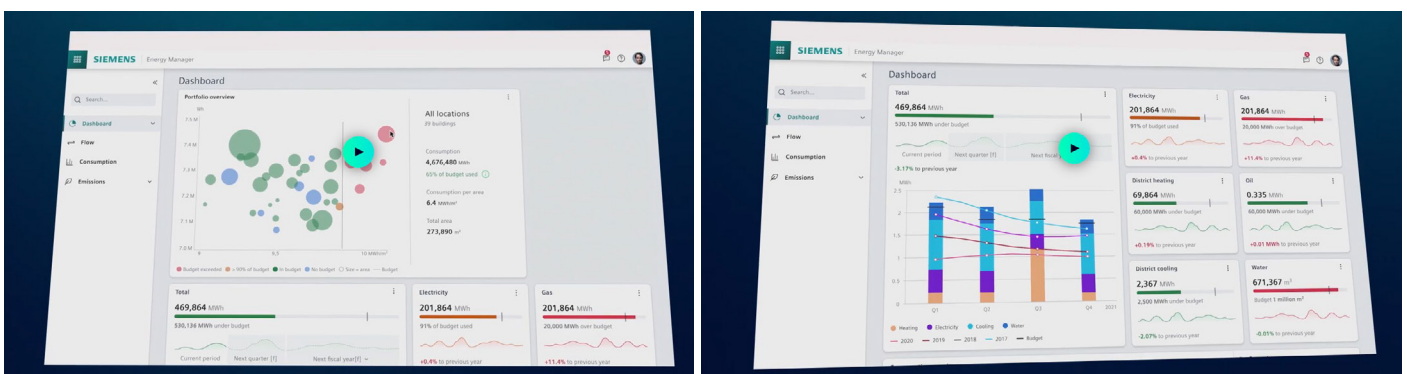


PRODEA INVESTMENTS PIONEERS SUSTAINABILITY STANDARDS IN THE REAL ESTATE INDUSTRY WITH SIEMENS' BUILDING X



(Source: PRODEA Investments)

PRODEA Investments is an established real estate investment company in Greece with total assets exceeding € 3.0 billion and a portfolio of more than 380 buildings in Europe. Its diverse commercial real estate portfolio includes green offices, hotels, logistics, and residential properties hosting a high-occupancy and long-term tenant base. PRODEA's in-house Environmental, Social, and Governance (ESG) team set an ambitious net-zero emissions target for current demands and future tenant needs to stay ahead of the competition. By the end of 2024, PRODEA Investments aims to exceed 50% of green-certified buildings.



(Source: Siemens)

Siemens' Building X platform supported this forward-thinking and user-centric strategy, with the target to boost tenant retention and increase operational efficiency across its diverse portfolio. The Building X application suite digitalized PRODEA's headquarters as the first pilot, realizing its goals through reliable datasets, and AI-powered analytics and decision-making. The Building X Energy Manager application and Siemens' Connect X300 gateway accelerated PRODEA's vision through real-time monitoring, optimizing energy, cost, and carbon emissions reductions, while complying with current sustainable industry standards such as LEED, WELL and the latest European Union (EU) environmental regulations.

UNIVERSITY OF EAST LONDON AND SIEMENS COLLABORATE TO CREATE A DECARBONIZED CAMPUS BLUEPRINT BY 2030

The University of East London (UEL) campuses in Docklands and Stratford house 25,000 students. In 2023, UEL partnered with Siemens to develop a structured net-zero roadmap to enhance student and staff well-being, and create learning opportunities and upskilling around the green economy through innovative technology test bedding.

The partnership will be executed in two phases:

- **Phase 1:** Energy and emissions reduction through system and equipment upgrades such as Light-Emitting Diode (LED) lighting and upgrades of BMS controllers.
- **Phase 2:** Installing renewable infrastructure across the campuses to decarbonize energy consumption to achieve up to 90% of zero-carbon energy.

The Living Lab will create opportunities to raise awareness through real-time data sharing and incorporate sustainability across curriculums.



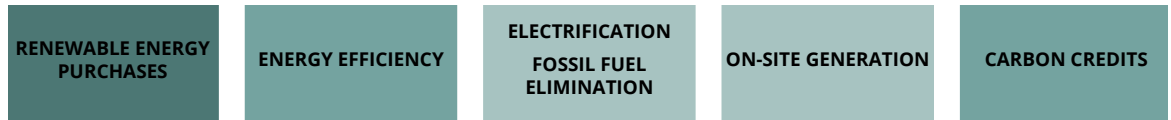
(Source: University of East London)

Siemens supported UEL by providing a holistic strategy for urban and campus sustainability through quantifiable metrics, namely:

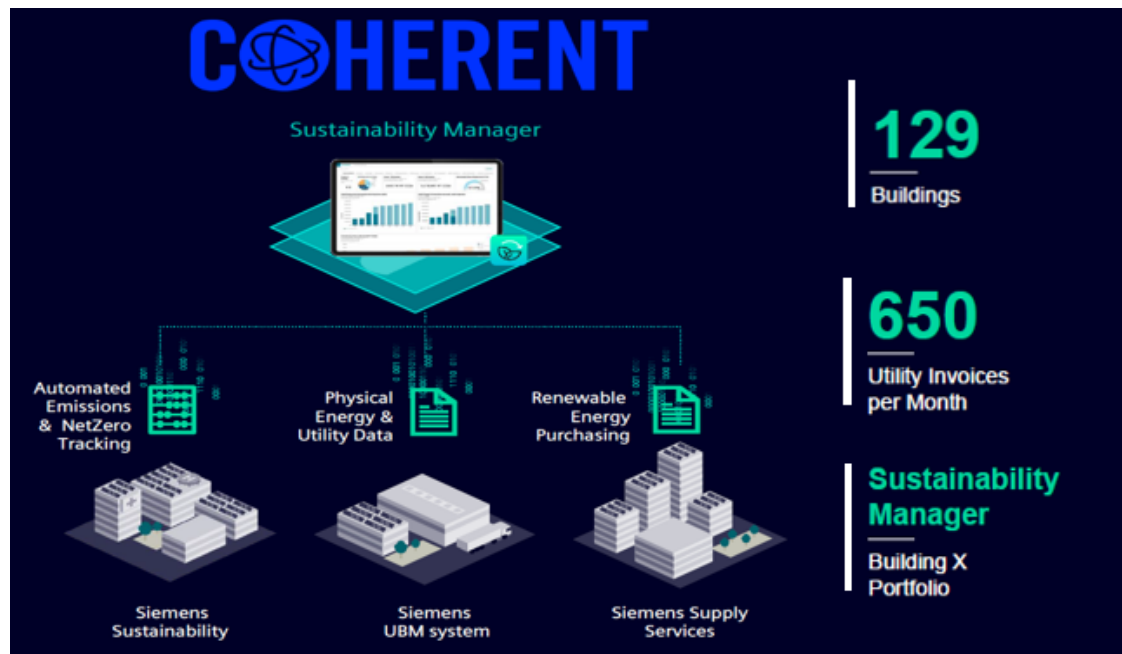
- Carbon emissions reduction by 10% from its 2020/2021 baseline to 2022/2023 during Phase 1.
- Installation of approximately 2 Megawatts (MW) of solar Photovoltaics (PV), with an estimated 1.2 Gigawatt-Hours (GWh) of zero-carbon electricity a year and 27 electric charging points.

SIEMENS' BUILDING X SUPPORTS COHERENT'S COMPREHENSIVE SUSTAINABILITY REPORTING AND NET-ZERO JOURNEY

COHERENT is a global provider of materials, networking, and laser equipment with a legacy of 52 years and 26,000 worldwide employees. To lower COHERENT Corp.'s emissions, the company's applied five levers:



Using Siemens' Building X Sustainability platform, COHERENT's applications, physical processes, and operational processes were streamlined and visualized to demonstrate energy utility data collection and renewable energy purchasing via Siemens Application Manager, automating emissions reporting and standard reportability for compliance and stakeholder engagement.



(Source: Siemens)

Siemens supported COHERENT with lowering energy costs, increasing renewable energy sources, and identifying a clear emissions reduction target to support its net-zero Journey.

- Holistic overview of physical and utility data to track COHERENT's energy emissions.
- Visibility on sourcing, consumption, and emissions trends for a US\$110 million corporate energy bill, accelerating the transition to a more energy efficient and sustainable business.
- In less than 4 years, COHERENT has gone from 0% renewable energy to achieving 50% and establishing a net-zero Scopes 1 & 2 GHG emissions target and Scope 3 supply chain emissions.
- COHERENT's team was a co-creative customer of the Building X Sustainability Manager, creating an intuitive, user-friendly visualization platform available across the project value chain.

CONCLUSIONS

The most effective way to reduce carbon emissions and decarbonize buildings is by measuring current energy demands, increasing energy efficiency of buildings and facilities, customizing operating schedules, and upgrading obsolete infrastructure. Digitalized building portfolios support facility managers in identifying and reducing the operational hotspots, thus saving costs and ensuring optimized asset management. Through the Building X Application Suite, building operations are automated and analyzed, supporting building owners and operators in identifying new opportunities for green initiatives such as installing renewable energy sources, and improving spatial quality like lighting, air quality, leak detection, etc. With real-time monitoring and dashboard visualization, building operators can communicate sustainability performance, monitor resource consumption, pre-plan resource allocation, and predict maintenance to optimize building utilization, occupant comfort, and well-being.

Siemens' Building X Sustainability applications demonstrate a technologically-forward approach, increasing energy savings, asset operations, and utilization, enhancing performance and reducing a building's carbon footprint. Siemens' Building X is transforming the built environment into sustainable, autonomous, and profitable buildings at scale.



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