



# CREATING SUSTAINABLE BUILDINGS

**Part 2**  
of our  
Smart Office  
Series

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## Achieving sustainability through intelligent systems

### • The necessity of sustainable offices

Globally, buildings are responsible for about 36% of all energy consumption and 39% of all greenhouse gas emissions over their lifecycle.<sup>1</sup> As world governments set ambitious sustainability targets for their respective jurisdictions, buildings will receive a significant amount of regulatory attention in the near future. Buildings' upgrading and improvements will help to remove a considerable share of energy use and emissions. In sustainability agreements such as the EU Green Deal, reducing building emissions is a central element in reaching those goals.<sup>2</sup> In the coming decades, office buildings are well-positioned to lead the way in sustainability innovation due to new technologies and a wave of new smart office innovations.

In order to stay attractive to investors and tenants, offices must be outfitted with state-of-the-art design and technology. Staying up to date with the cutting-edge requires more frequent, shorter, and less comprehensive renovation cycles, which present ample opportunities to upgrade building technology and incorporate the latest technology to suit tenants and office users.

1) Abergel, Thibaut, et al. 2019. "2019 Global Status Report for Buildings and Construction: Towards a zero-emissions, efficient and resilient buildings and construction sector." International Energy Agency and the United Nations Environment Programme, December 11, 2019. <https://www.worldgbc.org/news-media/2019-global-status-report-buildings-and-construction>

2) European Commission. 2019. "Building and Renovating: The European Green Deal." Accessed August 3, 2020. [https://ec.europa.eu/commission/presscorner/api/files/attachment/859198/Building\\_and\\_Renovating\\_en.pdf.pdf](https://ec.europa.eu/commission/presscorner/api/files/attachment/859198/Building_and_Renovating_en.pdf.pdf)

Additionally, pressure to achieve sustainability goals has come not only from regulatory bodies but also from consumers and society at large. Firms of all sizes and industries have set ambitious sustainability targets for themselves to stay competitive in the race towards net-zero emissions. A sustainable office with environmentally responsible offerings allows companies to effectively sell themselves to environmentally minded talent. As the sustainability-minded Generation Z begins to graduate from schools and enter the workforce, this trend will likely become more pronounced. Employers will be expected to answer for many of their operating decisions in the near future, such as where the office coffee is sourced from, what percentage of energy usage comes from renewable sources, or if low-water consumption practices are in place.

While sustainable practices may initially seem like a cost line item, sustainable office buildings have a substantial business case behind them. A reduction of energy, water, heat and cooling usage will lower operating costs, and value-added services in sustainable offices can be offered to tenants to create additional revenue streams. Decision makers who act now to make their office portfolio more sustainable can secure early mover advantages, as long as designated funds are available from public sources and sustainable offices are still the exception rather than the rule.



**UWE HÖRMANN**  
Senior Partner,  
Roland Berger

**"Buildings are the key to the energy transition, but so far little has happened in the sector. We often talk about 'smart' devices, but a consequent smart building strategy is missing. Office spaces offer a great opportunity to showcase the impact buildings can have on reaching sustainability targets."**

- **The four dimensions of the sustainable office**

***Achieve carbon neutrality of both building and user***

The sustainable office can offer its occupants the chance to be effectively carbon neutral while inside, as their emissions footprint is actively tracked, managed, and offset. From using renewable energy to power personal devices to drinking ethically sourced coffee or eating local food that come from traceable sources.

***Use resources with absolute efficiency***

By minimizing energy usage, water consumption, and waste production, all resource consumption factors, including lighting, equipment, ventilation, cleaning, toilets, paper supplies, and so on must be optimized and/or updated to reflect high resource efficiency.

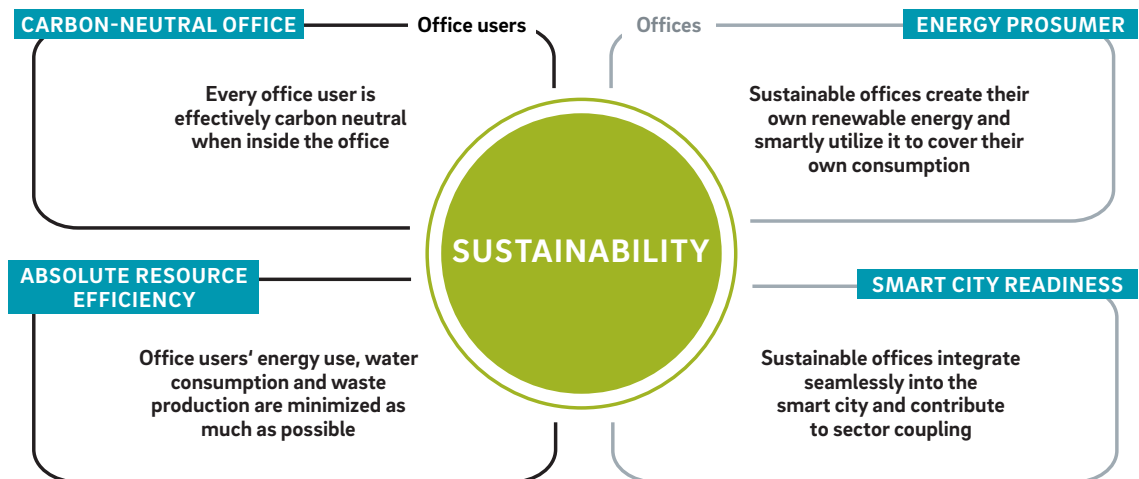
### ***Turn buildings into energy prosumers***

The power of distributed energy solutions enables sustainable offices to intelligently balance loads, feed into the local grid, store electricity and heat, and sell surplus energy on the market. By generating its own renewable power and intelligently consuming its own electricity, smart office buildings work towards carbon negativity by prosuming (producing excess) energy to sell to others.

### ***Integrate infrastructure into smart city solutions***

Through sector coupling in heating and energy management and optimized service delivery, the sustainable office integrates itself into smart city solutions put forth by local government or initiatives. By integrating into the smart city, resources can be intelligently managed and organized in conjunction with city infrastructure.

## **The four dimensions of sustainability in the smart office**



Source Roland Berger



To achieve these sustainability goals, an office needs the proper infrastructure including sensors, building technology, and a data platform to intelligently optimize resources.

- **Smart offices as an enabler to achieving sustainability targets**

#### ***Reliable Information:***

Sustainability targets cannot be accurately tracked without the accurate and regular information. The smart office of the future not only monitors occupancy, environmental conditions, building functions, and resource usage across the entirety of the building, but also incorporates external data streams into its monitoring and analyses. This ensures an intelligent data array – in real time – across all relevant sustainability data, ranging from in-house energy consumption and water usage to integrated data on



"No one collects data systematically in our office right now. But we are prepared to invest in the hardware and software necessary to change that – we want the transparency."

**CHIEF TECHNOLOGY OFFICER**  
Technology Provider

office occupancy. External data can provide a wealth of information, including information on electricity prices and demand forecasts to enable energy trading or weather forecasts to help predict the building's own renewable energy production.

#### ***Establishing Transparency:***

Full emissions transparency and intelligent resource consumption is key to developing more sustainable, carbon-neutral offices. Data generated from an intelligent array of hardware and software can unveil insights into a property and how users interact with the building and its services throughout the day. State-of-the-art building HVAC, energy, water, and waste mgt. systems are all equipped with IoT sensors and intelligent controls that are interconnected via a digitally rendered building twin that acts as a central and open data platform, allowing for seamless integration into private, third party, and public data streams. Given full data transparency, the smart office can also address consumption and offset remaining emissions by itself. The smart office aids these goals through intelligent building controls and incentivization of users to reduce their individual consumption. By learning user's behavior patterns, the smart office knows when to start heating or ventilating spaces to avoid energy load peaks and when to turn off fixtures during periods of non-use. Smart office applications can ensure that office users are able to easily find adequate workspaces and can intelligently manage occupants' seating patterns to take only certain floors, maintain health-based distance, or both.

#### ***Carbon Offsetting and Reduction:***

Smart offices can incentivize users to use fewer resources by estimating each office user's share of overall consumption and then targeting high consumers to lower their consumption through subtle virtual or physical rewards that positively influence environmentally conscious behavior. Additionally, clever integrations into building infrastructure can further save energy usage and emissions, such as automatically turning off outlets when devices are fully charged.

Becoming truly emissions-free is very difficult in the modern world, and thus offsetting procedures must be put into place to make up for the inevitable emissions that are created. Through an environmentally conscious office design, incorporation of green elements, and automatic emissions certificate purchases, smart offices can aptly offset the emissions created by users. Green roofs and walls, automatically irrigated with intelligent building controls, not only bind CO<sub>2</sub> but also help stabilize inside temperatures and catch fine dust particles. Intelligent energy trading software allows the smart office to offset all other emissions by participating in emissions certificate programs to achieve carbon neutrality.

#### ***Effective Energy Management:***

In any decarbonization plan, the topic of renewable energy production's instability will come up. Distributed energy solutions utilize an optimized mix of renewable energy sources, such as solar panels, wind turbines, and energy storage solutions to ensure a reliable and sustainable energy mix. The smart office will have these energy generation methods strategically placed around the property (i.e. the roof) to allow for self-sustaining energy production. The office now becomes a self-contained microgrid that can cover its own consumption the majority of the time, with the opportunity to either store its excess production in batteries for later use or sell the energy into the larger

"The office of the future focuses on its environment just as much as on its users – sector coupling is the key word here. The office will be hyper-connected as one element of the smart city."

**REAL ESTATE  
MARKET EXPERT**

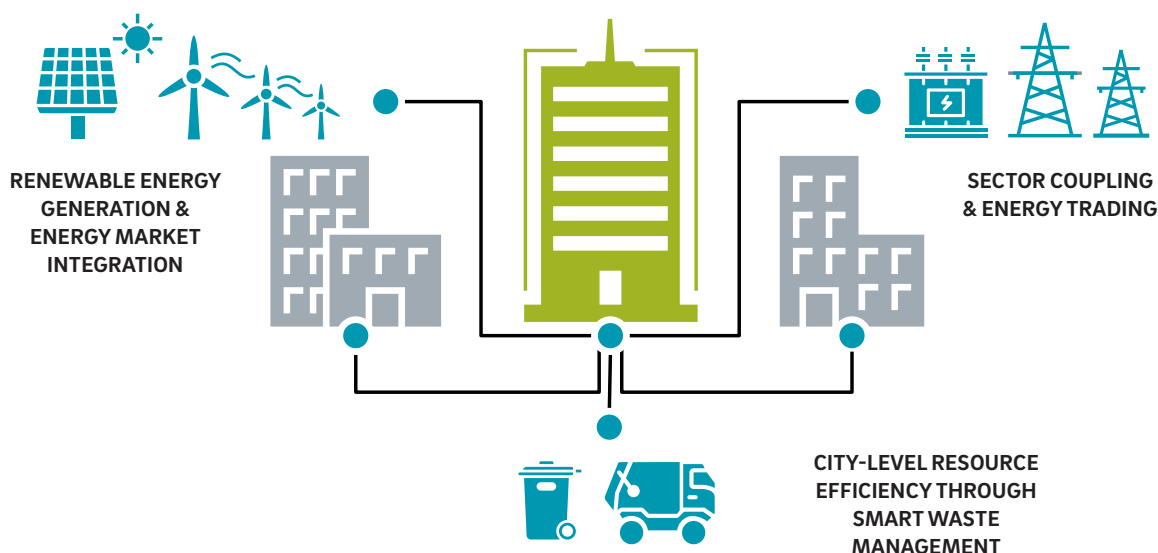
grid. Storage solutions allow for renewable energy to be used even during non-ideal weather for renewable energy generation or allow for rapid back-up generation services in the case of an outage. This optimized frequency response aids supply security and integrity for both the smart and office and the larger grid.

Additionally, sophisticated energy management systems monitor, control, and operate the microgrid and integrate it into the energy market. Through continuous load forecasting, the smart office can optimize energy trading by buying when energy prices are low and selling surplus energy when prices are high. As a prosumer, the smart office thus generates additional revenue for real estate players and allows office users to enjoy 100% renewable energy usage.

#### ***Integration Beyond the Building:***

As part of the push towards electrification, the smart office shares generation and consumption capacities with buildings in the vicinity to enable sector coupling. By integrating microgrids and energy technologies, resources can be used even more efficiently to maximize the share of renewables and to stabilize the grid in the instance of irregularities. Furthermore, the smart office can provide power for other uses, such as EV charging stations. By integrating with municipal services, smart offices can communicate the fill level of its waste systems via Smart Bin Sensor Modules so that collections are only made on demand.

## **Sustainability use cases in the smart city**



Source Roland Berger

Roland  
Berger 

- **The sustainable smart office as a business enhancer**

In realizing the sustainable smart office, real estate players can improve the financial performance of their office portfolio through value-added services and attractive offerings to both tenants and office employees.

## Sustainable smart office benefits



Source Roland Berger



"Sustainability is not just about energy savings – it is also about the wellness of occupants. When office users understand the benefits of the smart office, they will want to work for employers who can provide such an office."

**ERICA EATON**  
Chief of Strategy & Operations, Comfy

The financial case backing implementation of sustainable office technologies is not something of the far future — efficient usage of resources, such as energy, water, and consumables can save operating cost by up to 30%.<sup>3</sup> Aside from cost reductions, service offerings allow real estate providers with additional revenue streams stemming from both the energy market and their own tenants. These costs can be furthered minimized by taking advantage of energy pricing fluctuations and encourage office users to be more sparing with their resource consumption.

A sustainable smart office is a highly attractive rental option for tenants and employees alike, due to its future-forward value proposition and generational importance of sustainability and resource conservation. With these factors, businesses can be expected to actively seek out these offerings as their workforces grow and evolve.

- **Leading the way for sustainable buildings to become widespread**

Corporate office portfolio managers should reassess their post-COVID real estate needs and realize the early mover advantage as soon as possible. In the coming years, tenants,

<sup>3</sup>) Stakeholder interviews

employees, and policy makers alike will require drastic carbon-reduction measures, and an adoption of technology and environmentally friendly measures will save large capital expenditures or penalties down the road.

Developers can proactively address the global energy transformation by forming a clear strategy to address sustainability and connected office spaces. In that office utilization rates may take a long time to reach their pre-COVID levels, developers and companies must quickly find solutions to generate alternative sources of revenue in their buildings, and become more attractive to younger audiences to achieve success in the war for talent. As mentioned above, low-carbon multi-building strategies that contain scalable and interconnected solutions will prove to be the most sustainable business model for the future.

### ***Further reading***

#### **SMART OFFICE 1: THE FLEXIBLE OFFICE SPACE**

➔ [rb.digital/FlexibleOffice](https://rb.digital/FlexibleOffice)

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