Connected Buildings Energy Management

A case study demonstrating cellular IoT business value to energy management and optimization for smart residential buildings

How cellular IoT connectivity can be a major profitability tool
While also aiding in the fight against climate change

Currently, the property sector faces serious challenges around energy usage and management. 36% of CO_2 emissions come from buildings, which accounts for 40% of energy use, and 75% of all buildings are wasting much of that energy due to several factors.

Not only that, growing urbanization, rising electricity prices and the increasing need for digital manageability are driving the rapid transformation of traditional buildings into smart buildings that are connected through cellular IoT. To quantify the value that cellular IoT connectivity can unlock for smart buildings, Ericsson and Arthur D. Little conducted a use case study together with Kiona, a leading Nordic proptech company serving over 55.000 commercial, industrial, residential and public buildings through IoT connectivity.

This report examines how cellular IoT can help maximize energy and resource efficiency in buildings while considerably improving profitability.

We also take a look at optimization of commercially operated residential buildings, addressing key challenges and quantifying benefits for property owners, facility managers and tenants. In this study, the example property owner gained about €165,000 in gross annual value from energy management and optimization alone, resulting in reduced annual energy costs by 10% and CO_2 emissions stemming from energy use by 9%.

Read on and let us show you how your business can benefit from cellular IoT connectivity, powered by Ericsson IoT Accelerator.

Contents

CHAPTER 1

Kiona and Ericsson: Turning traditional buildings into smart buildings

Kiona software and services
Enabling smart connected buildings,
powered by cellular IoT

Formed in 2021 through the merger of 4 well established proptech companies, Kiona offers energy management and optimization to property owners, social housing, housing cooperatives, district heating companies and residents.

As of January 2021, roughly 55,000 commercial, industrial, residential, and public facilities in Northern Europe use Kiona's solutions and services for building, refrigeration and energy management. Kiona provides independent software, hardware and supporting services to make all buildings connected, both old and new, so that they become a unified ecosystem that is possible to control and optimize digitally.

Kiona's vision is to stop all unnecessary energy usage and CO_2 emissions in buildings. By providing easy-to-use technology that puts the property manager in control, giving you the information you need to optimize energy use and the measures to significantly impact the fight against climate change.

With solutions for integration and connectivity, Kiona helps their customers achieve financial and sustainability objectives - digitalizing the heating, cooling, ventilation, and refrigeration systems in new and old buildings.

Kiona's solutions cover a large number of residential buildings and apartments, connected via mobile operators' cellular networks. Cellular IoT connectivity is vital to Kiona, providing the flexibility, control, simplicity and speed of deployment required to enable connected building and energy optimization.

Ericsson IoT connectivity management
Managing all connected IoT devices with Ericsson IoT Accelerator

The growing importance of secure connectivity means a growing need for a reliable and scalable IoT platform. The management of smart connected buildings is enabled by Ericsson IoT Accelerator, an award winning IoT platform that empowers enterprises worldwide to scale their IoT business from a single platform, while increasing speed to market.

Delivered as a service through Ericsson's partner network of 35+ telecom service providers globally, its dedicated core network coupled with secure global cellular coverage provides complete visibility and control of all connected IoT devices throughout their entire life cycles, no matter where in the world they are located.

CHAPTER 2

The property sector:
A building block
of challenges and
expectations
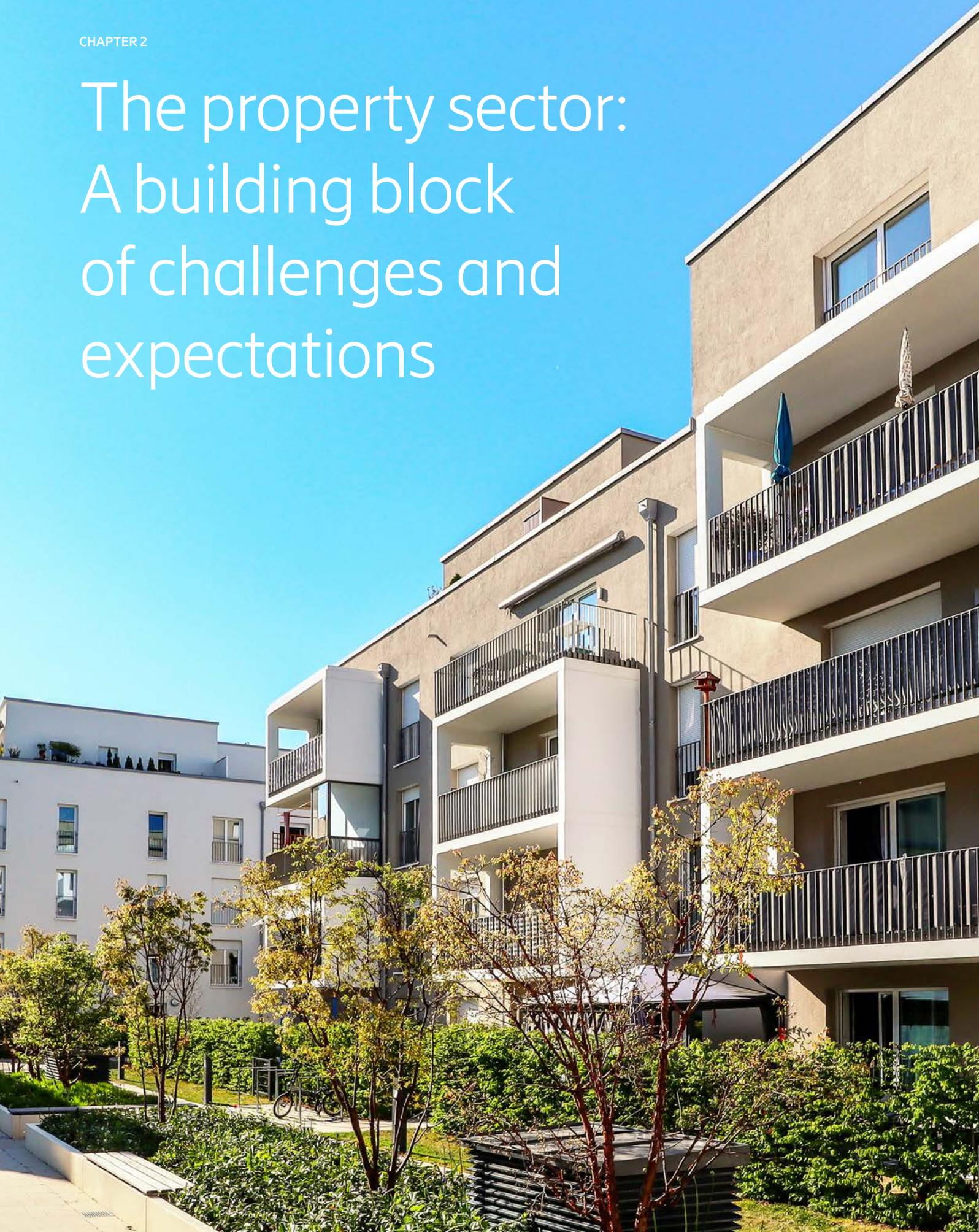
Understanding the challenges facing the property sector

Rising energy costs, old buildings and the carbon footprint

Three quarters of Europe's buildings are not energy efficient.

Urbanization: Urbanization is transforming communities into densely populated areas, which means property owners need to use the space they have much more effectively, building up data intelligence to monitor supply and demand.

Environmental concerns: 36% of the world's CO_2 emissions and 40% of its energy consumption are related to buildings. [1] At the same time, the EU has the target of cutting greenhouse gas emissions by at least 55% by 2030. As a result, regulators are pressuring property owners to implement new policies to reduce their environmental footprint.

Energy inefficient buildings: Three quarters of Europe's buildings are not energy efficient today, and more than a third (35%) of the buildings in the EU are over 50 years old.[2] These buildings are not likely to be upgraded any time soon — only 0.4% to 1.2% of the building stock is renovated annually, depending on the country.[3]

Growing expectations from tenants: In "cold rent" markets, where the tenant pays separately for their energy use, tenants feel the cost of energy inefficient buildings in their wallets, especially with rising energy prices. They are also increasingly aware of the environmental impact energy-inefficient buildings have.

These growing expectations of society have only put additional pressure on property owners and facility managers to optimize energy usage.[4]

Lack of digital control: Property owners in traditional buildings also have limited digital control of their facilities, which means managers are forced to make expensive on-site visits to properties to resolve issues that a right digital solution could address remotely.

This creates problems for tenants as well, because it extends the amount of time between making a complaint about temperature levels and their resolution. With digital controls, facility managers can provide faster response to e.g. temperature complaints and, in many cases, can address potential issues before tenants even realize there is one.

Together, all the above challenges highlight the need for energy management and optimization improvement. Turning your building into a smart building enables that.

IoT meets the property sector
A revolution in energy management and optimization

It's no surprise that the number of cellular IoT connections are increasing exponentially. Promising vast potential to create value in terms of improved efficiency, sustainability and safety for industries and society[5],

IoT connections are expected to grow from 1.7 billion in 2020 to 5.9 billion by 2025, which is a 57% compounded annual growth rate (CAGR).[6] In 2021, broadband IoT (4G/5G) overtook 2G and 3G as the

technology that connects the largest share of all cellular IoT connected devices, accounting for 44% of all connections. By the end of 2027, 40% of cellular IoT connections will be broadband IoT, with 4G connecting the majority.

IoT has useful applications in a wide array of industries, from automotive and industrial manufacturing, to energy & utilities and transport & logistics, which we explored in our previous report

"Connected Truck Transport: A case study demonstrating cellular IoT value to the transport and logistic industry".

The new generation of tenants and property managers expect digital ways of working – and providing them is by no means out of reach. What once forced managers to make expensive on-site visits to resolve issues in their properties, 80% of such issues can now be addressed digitally, saving money and time.
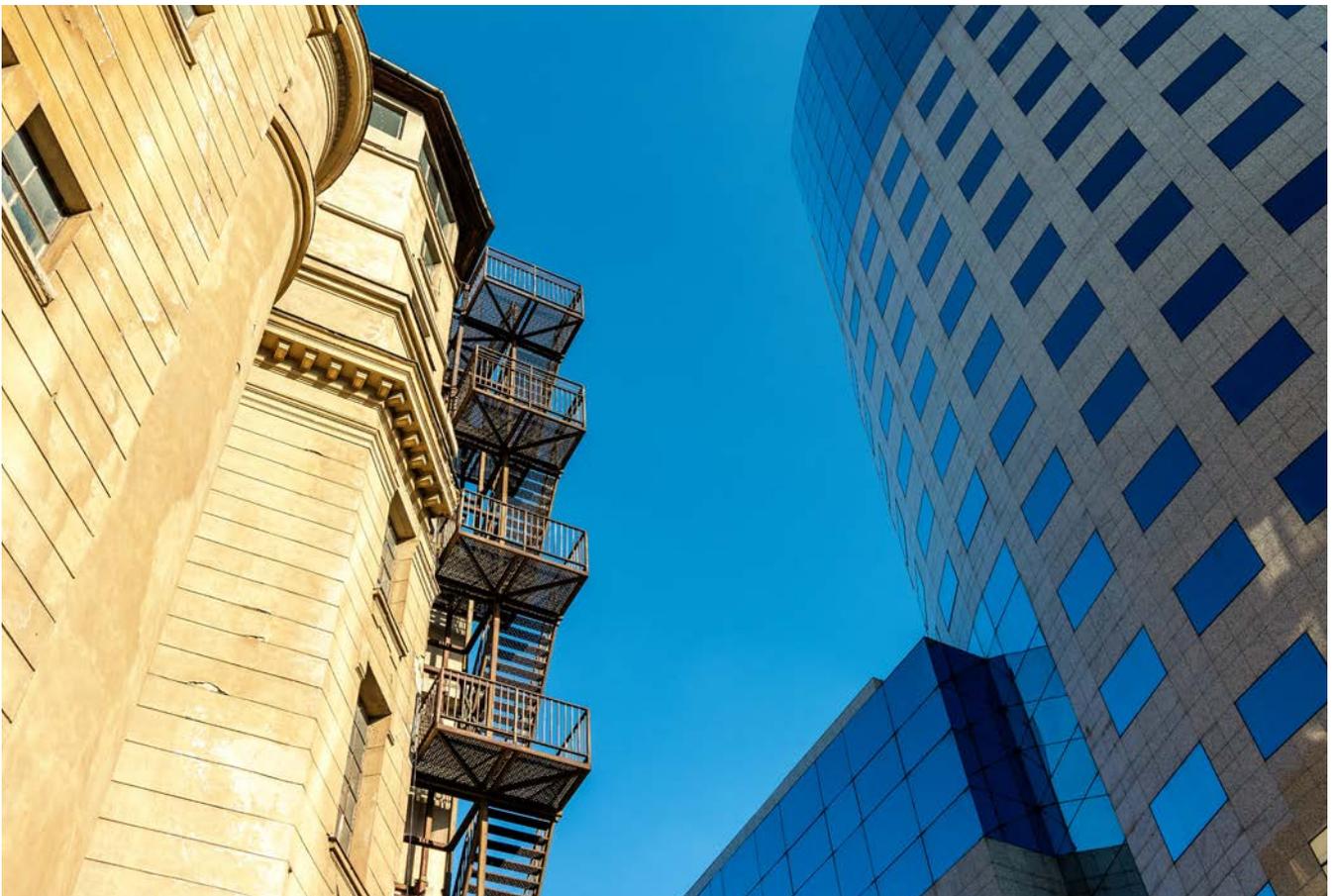
Your property doesn't have to be brand new to reap the benefits of cellular IoT. It's a great way to increase the value of older properties.

In fact, the reduced costs from building management digitalization represents 13% of gross annual value. In many cases, managers can even address potential issues before they become a big expense or become faulty. With the appropriate IoT and connectivity technologies, property managers could collect five times more data points.[7]
By connecting buildings with smart solutions, vast amounts of data can be collected and actions can be taken to reduce energy consumption, thereby also reducing the carbon footprint and providing a better, more responsive service.

Plus, with the foundation of cellular connectivity, it becomes easier to add additional intelligence and capabilities with new data points.

Connecting apartment buildings to cellular IoT will reduce annual energy costs by 10%.

CHAPTER 3

# Exploring the benefits of connected smart buildings

What are smart buildings?
And what can they do for you?

Smart buildings are defined as structures with automated processes that control the building's operations. Where there is limited control in traditional buildings of facilities,

IoT connectivity enables the digital control necessary for temperature regulation, ventilation control, refrigeration, lighting, HVAC, security and other systems by installing eSim sensors throughout each building, both new and old.

Once installed, these sensors send real-time data through cellular IoT connectivity for energy monitoring, management and optimization. As a result, user comfort is maximized while minimizing energy consumption.[8] Electricity, heat and water consumption data is fed into a platform, which then analyzes the energy peaks to streamline energy consumption, making remote adjustments and creating self-learning optimization.

Cellular IoT enabled services provided by Kiona Edge:
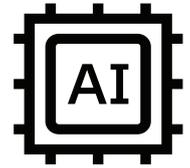
Energy optimization with AI
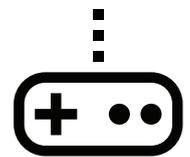
Remote heating controll

Measuring and visualization

Reports and Insights

Analytics

Deviation monitoring

The study examined a Northern European residential property owner with 35 properties covering 140,000 total square meters over 1,680 apartments. The organization has a total annual revenue of €14,360,000.

Kiona installed sensors and smart meters throughout the units and buildings, which they would manage with Kiona Edge, that comes with a self learning AI engine connected to all buildings, allowing full control of indoor climate and optimized energy use.

Edge gathers data in real-time and connects to installations through sensors and control units, offering a tailored control strategy for each unique building.

The results were striking.

In this use case, the Northern European residential property owner was able to gain about €158,000 in gross annual value from energy management and optimization.

Annual energy costs were reduced by 10% and CO2 emissions stemming from energy use were reduced by 9%.

Addressing the biggest issue: the heating

Cutting costs through optimized energy management

As previously stated, 75% of all buildings in the EU are energy inefficient. Optimized energy use also represents 87% of gross annual value, which is why property owners and facility managers are choosing to upgrade their buildings to smart buildings.

Optimizing energy use stems from two major capabilities:

The first is the ability to lower the temperature for the entire building. Property owners typically work off average temperatures in properties, so when a few apartments have heating issues, owners need to increase the temperature for the entire building to keep all of them at a target average temperature. With energy management, owners can identify the apartments with heating issues, fix them, and decrease the temperature for the entire building, reducing costs.

The second benefit is optimized heating. For example, the outside temperature is typically at its coldest right before dawn, so there's no need to run heating functions hard to counteract this cold weather, because it will soon change. By working with such patterns in mind, energy optimization can decrease costs by 10% annually.
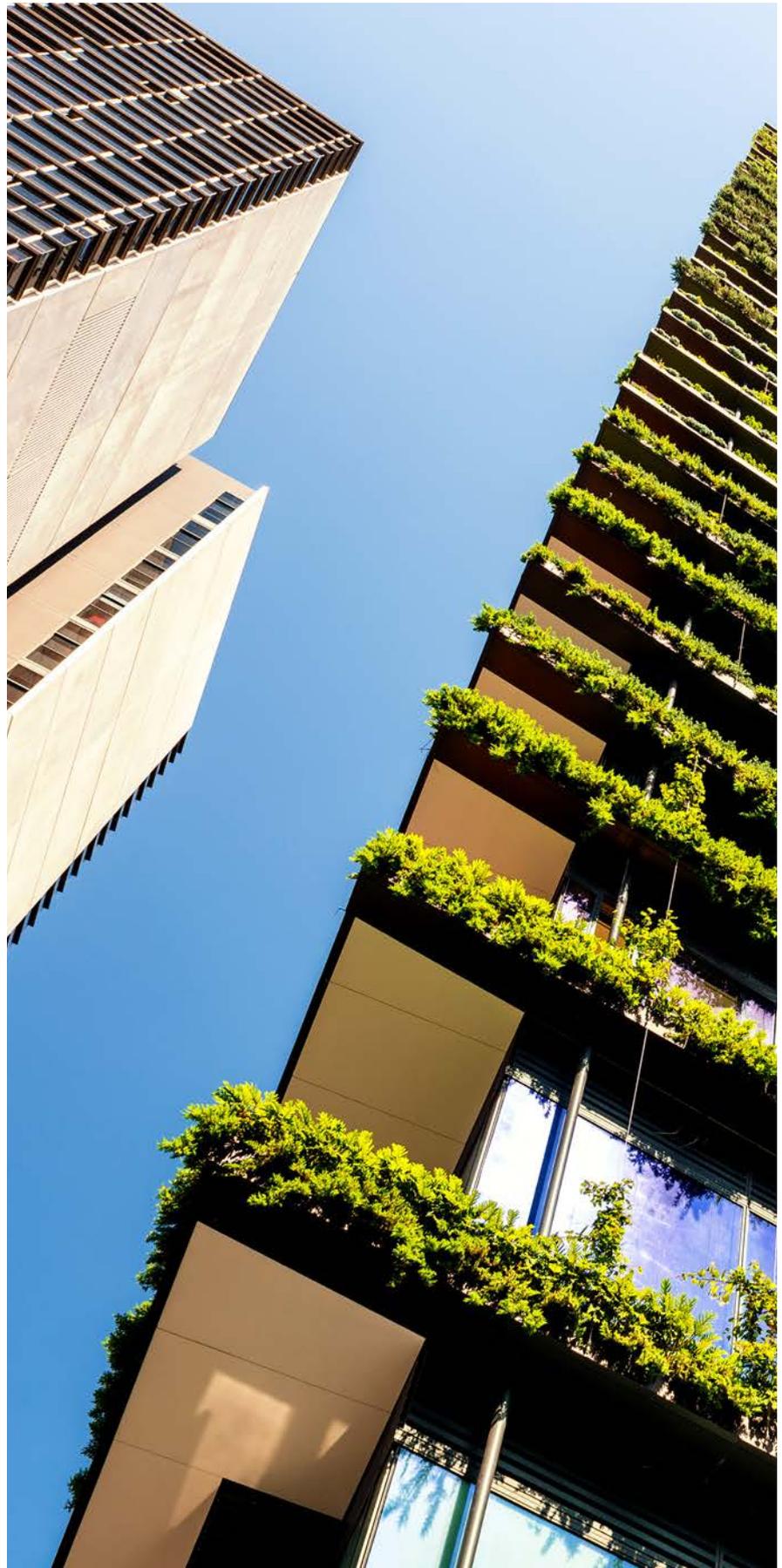
Transforming properties into buildings that work for you

Increase property value while lowering CO_2 emissions

In this specific case, deployment of Kiona solutions, powered by connectivity management from Ericsson, also creates a one-time gross increase in property value of €263,000. Because energy costs represent a substantial amount of cost to property owners and tenants each year, energy management and optimization increases property value. Additionally, an estimated 5% of property value is tied to the operational costs of the building, of which a third is assumed to be related to energy costs.

By reducing energy costs, the property value can be increased due to better margins and are often calculated with a multiple above 10.

Outside of Northern Europe, property owners and facility managers will see additional benefits, such as lower CO_2 taxes on energy use in markets like Germany. Lower energy usage will reduce this kind of tax burden.

The property owners can also benefit from improved financing terms thanks to better energy ratings.

Did you know?
5% of property value is tied to the operational costs of the building.

Furthermore, energy optimization can qualify properties for attractive green loans.

There's also a lower risk of stranded assets, which lose value due to climate change and the global transition to a low-carbon economy. However, with lower energy usage, properties can receive better energy ratings, reducing stranded asset risk in markets where properties with poor ratings are difficult to sell.

Finally, while this study focused specifically on commercially operated residential buildings, similar solutions can be applied for commercial and industrial buildings, though products are typically more technical and specialized in these sectors.

For example, grocery stores can install IoT solutions to monitor temperature more efficiently, which reduces both costs and food waste.

It's time to advance the property sector
Where IoT-enabled energy management and optimization is a key tool

The residential property sector faces serious challenges around energy usage and management. Cellular IoT has the potential to unlock significant business value to energy management and optimization for smart residential buildings, providing tangible benefits to all stakeholders: reduced costs and increased property value for owners, more efficient and remote operations for facility managers, and more responsive, comfortable residences for tenants.

Those property owners that invest in connected smart building technologies now will be more competitive and profitable in the future, reducing the risk of older buildings becoming stranded assets.

Cellular IoT connectivity is a foundational technology to empower smart buildings and energy optimization, because it provides secure, ubiquitous coverage for transmitting data to and from sensors throughout indoor and outdoor environments. And as the use case analysis demonstrates, the financial benefits can be substantial.

Citations

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Get in touch at IoT@ericsson.com

Or read more on www.ericsson.com/enterprise

Ericsson
SE-164 80 Stockholm
Sweden Telephone +46 10 719 0000
www.ericsson.com

ericsson.com/iot