

SPACEFLOW

# UNDERSTANDING A RESIDENTIAL BUILDING'S ENERGY-SAVING INVESTMENTS



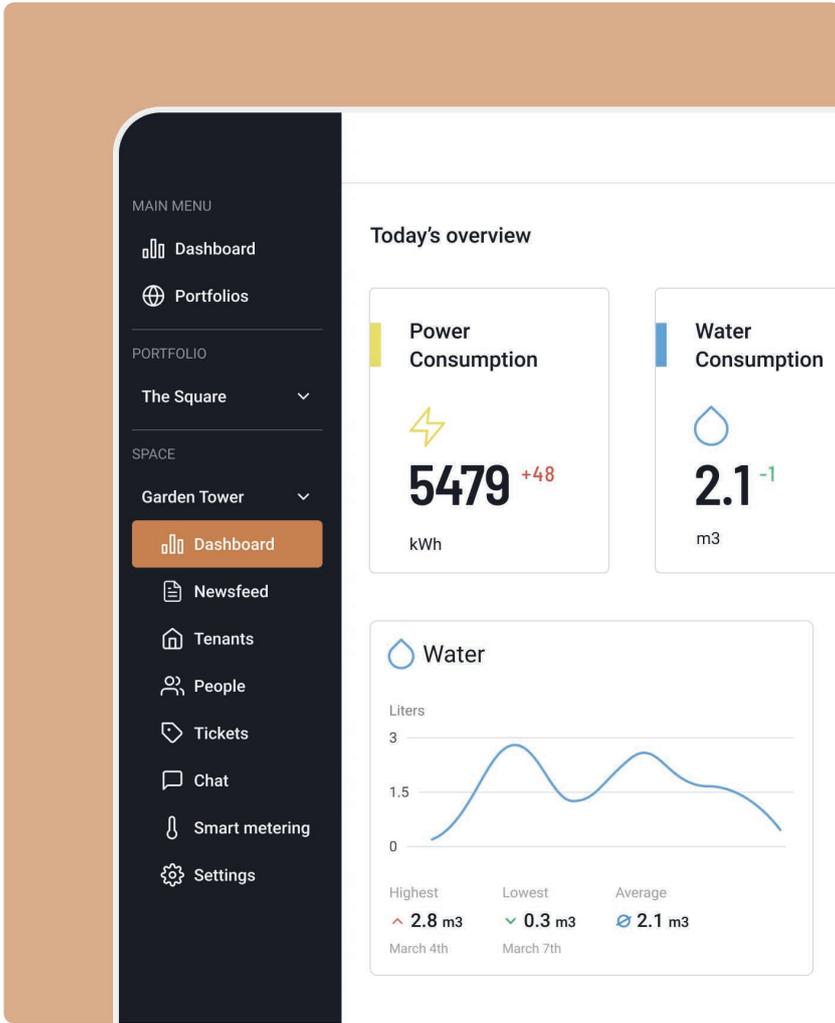
# INTRODUCTION

As the world becomes more environmentally aware, the ramifications of our actions are put under a microscope. Everything from the cars we drive to the food we eat is looked at from an angle that asks what the big picture or long-term effects are of what we're choosing now.

Buildings are no exception to this awareness microscope. Additionally, what a building does to conserve energy has become an important part of the place's brand and community. Companies looking for office space claim a large portion of a building and have a valid stake in the environmental, social, and governance (ESG) criteria of the space.

However, residential buildings have a different story as each individual is one of many if not hundreds or thousands of stakeholders with varying priorities. The owners and operators of residential portfolios have ESG targets to meet to reduce vacancies and improve retention as well as to abide by new or future regulations and legislation around a building's operational performance. Yet, there is a disconnect within residential portfolios due to the lack of transparency in usage costs in real time.

In this paper, we will discuss the growing trend of energy responsibility and how residential portfolios can successfully approach and address the challenge of investing in energy savings. Then, we will cover the expected costs and savings associated with energy investments, opportunities for payback, and the projected roadmap for energy savings. We will also address the trend from other areas that benefit and we'll look at how FLOW by Spaceflow and Flowbox addresses energy investment now and in the future.



# TRACKING ENERGY INVESTMENTS

Tracking energy investments happens in two silos:

## Costs and savings

### COSTS

With something as appealing as saving energy and reducing related costs in a residential portfolio, the first thing building owners and operators often ask what is the trade-off? The costs of investment can be financial, either fixed or variable, or measured in other ways like stress, disruption, and discomfort.

No two residential buildings are the same and projecting costs is a complicated equation. There are some base-line costs that are stable across a variety of building sizes, ages, and styles. "Whole-building green retrofits can cost anywhere between \$2.00-7.00 per square foot (\$21.00-75.00 per square meter), depending on the building's age, existing design, purpose, and the level of savings being targeted," explained Iain Campbell, Vice President of Global Energy and Workplace Solutions at Johnson Controls in an [Urban Land Institute report](#).

Investments can look very different based on the goals of the building. For example, investment could be put into adding solar panels, investing in new HVAC components, or upgrading a building management or building automation system. BMS can be costly to install and maintain ([ranging from \\$2.50-\\$7.00 per square foot](#), or \$27.00-75.00 per square meter). Less expensive options could include weatherizing a building so that sources of air leakage are eliminated and improving insulation so less

energy is used to reach the same level of comfort. Or, replacing existing light fixtures with LED, which ranges from \$100-150 per fixture and \$6-9 per bulb.

By using less energy, other variable costs can also be reduced. Some areas are billed for electricity by their peak daily load so reducing how much energy is used on the hottest days can lower the cost per kW for the entire year. "Rule of thumb is for every 100 kW the demand goes up it is about [ten to twenty thousand dollars extra in energy cost](#) for the year," said Srikant Subramaniam, Director of Analytics at David Energy.

Unlike commercial buildings that have an easier time getting buy-in for a retrofit program and are able to show operations savings with more ease, residential portfolios can have many tenants to coordinate with or band together for approval. Especially now that many residential buildings are also the place of work for many, it's challenging to find a good time for installations to go in or systems to be turned off for a period of time. As management teams are already stretched thin while managing installations, an increase in occupant complaints will only enhance a stressful environment.

# SAVINGS

Just like what investments into energy cost, the savings gained can be quite varied. "We see wide variation in the ROI, with simple payback periods ranging widely from two to 15 years," stated Campbell. However, savings in utility costs can be realized almost immediately once new systems and processes are installed. "Generally, utility costs are approximately \$2.50 a square foot (\$27 per sq m), and if we reduce energy use by 20 percent, we've saved 50 cents a foot (\$5.40 per sq m)," said [David L. Pogue](#), National Director of Sustainability at CB Richard Ellis.

Some investments are easier to calculate savings on. For example, LED lights can save up to [85 percent on costs](#), while also producing less heat and lasting up to 40,000 hours.

Savings realized are not limited to financial gains but can include increased workforce productivity within the buildings. When building systems are optimized for better energy efficiency through automation, smart sensor capabilities, and other more updated functionalities, there is less need for building facilities management teams to walk the premises nonstop. Instead, these teams can focus on addressing known problems and addressing preventative maintenance schedules.

Overall, savings calculations need to be based on facts and those facts only come from data. As buildings work to understand how energy is used within the structures and develop ways to save energy costs, data is required for both a baseline measurement as well as capturing gains. Without connecting systems and people like is done in Spaceflow's platform, savings can only be estimated.



# PAYBACK OPPORTUNITIES FOR ESTIMATED SAVINGS

The initial investment for upgrades can be a complex matter. If tenants are saving money on utility bills, should they be expected to invest upfront? If building owners are making the full investment, will they see any financial payback beyond rental premiums and the value of the building? The answer continues to change as green opportunities arise and green financing methods increase.

Payback periods differ based on the type of investment and upgrades chosen. New York City buildings showed that projects with a [two to three-year payback](#) include lighting retrofits, ventilation upgrades, and building controls. Motor replacements, heating upgrades, and air conditioning upgrades have a payback period of around five

years and major HVAC upgrades and bigger projects may take seven to eight years. While the savings is appealing and can make projects like these possible, the initial investment might still pose a challenge.

Fifth Wall, a lead commercial real estate VC, has a climate technology fund to help real estate combat climate change. The fund recently led a Series B in Sealed, a company that pays for residential energy upgrades upfront and is later paid back through the owner's savings. Their success is based on an algorithm that combines usage and consumption data to predict energy use and savings and has expected energy reduction of up to 60 percent.

# ENERGY SAVINGS ROADMAP

Energy savings isn't isolated from other challenges property owners have. For example, increased O&M costs, new legislative requirements, and the necessity of mobility all impact projected energy consumption. It's all part of a journey to more responsive and environmentally responsible buildings.

As every property is unique, the corresponding Energy Savings Roadmap (ESR) will vary, yet guiding principles remain the same. It's important to define a future target and answer questions like: Which pain points do I want to eliminate? Are the green improvements a hygienic matter or a unique value proposition for my property? What are my capital investment limitations?

Future legislation and trends should drive priorities and provide inputs for the ESR. The roadmap should address efficiency goals, compliance goals, and future monetization upside potential from the value-added services.

The ESR must also consider legislation requirements such as the recent EU legislation. As of October 2020, remotely readable meters, which are typically installed in new buildings, are required to provide consumption and billing information at least twice a year or, if requested, quarterly. Looking to January 2022, the frequency changes to every month.

Information needs to be available on-demand and in real time but, as legacy BMS systems are not designed to provide that, a different solution is required. This is also true when speaking to the electrical grid, EV-charger providers, or other closed systems that serve a limited domain. "There is a clear need for an autonomous, superset platform, such as Flowbox, to orchestrate data from dif-

ferent domains and communicate with external systems and platforms. It is not a matter of 'if' but 'how fast,'" said Roman Garba, Commercial and Strategy Director of Flowbox.

And speed isn't the only factor.

**"We see greenfield projects designed with incumbent BMS systems which will not fulfill the new EU obligations. When the building is finished, the owner would need to immediately invest in an upgrade or new system to be compliant."**

*Petr Vanek, CTO of Flowbox.*

The key input to the ESR is the property's "health." This can be an assessment of in-building sensors and technologies and their compatibility and flexibility as well as how the existing BMS system fits into the ESR. This status will shape the ESR, and subsequently, the investment plan. Once the current state is understood, retrofit scenarios can be built to replace and expand upon old technologies. Flowbox uses autonomous and proactive control of the property's technology via edge computing and analytics.

# EXAMPLE OF AN ESR DELIVERED BY FLOW COULD BE:

- 01** Summarize priorities including existing pain-points, desired level of “greenness”, ESG
- 02** Collect building characteristics, assess in-building technologies, analyze electric bills
- 03** Build ESR proposal, divided into phases according to investment capabilities

---

Initial phase (focus: energy savings)—quick-wins, smart metering, data analytics and control of main energy consumption technologies by edge server or edge gateway with Flowbox microservices. Include real-time overview of energy consumption, carbon footprint, and performance reports (available in Spaceflow admin console and app).

---

Maturity phase (focus: ESG boost)—install of occupancy and air quality sensors, connect remaining technologies and other performance improvements (Flowbox), allowing for tenant control of selected technologies (Spaceflow).

---

Expansion phase (focus: charging premium and monetization)—EV charging, parking, grid flexibility services (Flowbox), payment gateway, marketing and advertising services (Spaceflow).



# ADDITIONAL BENEFITS

While financial benefits may be difficult to predict, they aren't the only rewards of buildings making investments into energy.

## SATISFACTION

Investment in educating the tenant is an important part of a residential building's energy plan. Giving tenants access to their energy usage information is the best way to merge how energy is used in the physical world by watching it via a digital method. Spaceflow combines an operating system, an end-user app, admin console, and community engagement so that residential buildings (and commercial properties alike) are transformed into the digitally-driven realm. By combining sources of data into one solitary dashboard and enabling tenants to communicate directly with landlords or operators, issues creating energy waste can be solved quickly. Tenants that know they're making a positive impact through their efforts will feel more connected to the building and community.

When tenants feel as if they're contributing to the community, their personal stake and interest in the building increases. Community managers that make sure tenants are knowledgeable, aware, and connected are an important part of the success of a community and a priority at Spaceflow. "The community team works as a productivity benchmarking squad, making sure to celebrate when occupants are exceeding their sustainability goals by monitoring the data displayed in FLOW. This, in combination

with timely challenges such as minimising electricity use during summer or saving water in autumn, nudges the occupants in the right direction and gives them an added bonus in their efforts to make better decisions for the planet, while obviously saving money," explained Isabelle Jaconelli, Community Manager UK at Spaceflow.

# GAMIFICATION

How tenants use energy may not be understood. For example, plug load, ie anything that is plugged into an electrical outlet, can account for [50 percent of an energy efficient building's overall energy use](#). Once data is collected and shared, it's important to translate it into something people can truly understand.

**“20,000kW of usage doesn't mean anything to occupants. But, if you express the consumption as an environmental equivalent like cutting down 800 trees, you're going to get their attention.”**

*Comly Wilson, Director at energy management technology provider Enertiv.*

By removing the barriers between tenants and their energy usage, tenants can actually be empowered and motivated to make changes that positively affect how much energy they use. Gamification is the process of

taking something that already exists and using gaming techniques to promote participant engagement and since tenants often want to positively impact the environment and help their community meet goals, this method can be both engaging and successful. Or attempts to change behavior by presenting data like neighbor's energy usage in a strategic way, also called nudging, may initiate behavior modifications.

All and all, building transparency as made available through Spaceflow and Flowbox's mutual collaboration opens up for conversations that range beyond what events are on, looking more closely to the impact communities can have on a larger scale, and how something as simple as small adjustments to our day-to-day routines may have a powerful impact on the welfare of our planet, says Jaconelli, Community Manager UK at Spaceflow.





# SMART BUILDING STATUS

This trend towards energy responsibility is picking up speed. One of the challenges of being successful in energy efficiency and management is agreeing on the metric to measure progress. There are many industry standards around green buildings like LEED, WELL, BREEAM, ENERGY STAR, and RESET that have been around for years.

There are many reasons for buildings to work towards a certification. For one, tenants are willing to pay a premium for green building features; one study showed that LEED-certified buildings have a [9.3 percent rental premium](#) compared to non-certified buildings. Buildings that are both certified by LEED and ENERGY STAR may have a 9 percent rental premium. When it comes to selling the building, the sale price premium is about 25 percent. Tenants are shown to be aware of the certification of their building, too as 84 percent of tenants correctly identified the status of their building.

Additionally, a building can only become better if it knows where its current operations are. "If you are an institution with multiple buildings, the [certification is great](#)

[for benchmarking](#)," said Cathy Jackson, Director of Planning Administration at Yale.

**"With a certification, we can benchmark against our peers and can benchmark our buildings against each other. It's just a consistent framework that makes it very easy to compare and contrast our buildings and their impact."**

# FLOW: A SOLUTION FOR RESIDENTIAL PORTFOLIOS

“Buildings are accountable for up to 40% of the world’s greenhouse gas emissions and landlords thus need not only to react but to lead the way towards a sustainable future – now. Our aim is to help both landlords and tenants with monitoring and controlling energy consumption and quality indoor environment to exceed their wellbeing and sustainability goals,” outlines the vision Lukas Balik, CEO of Spaceflow. Spaceflow and Flowbox have partnered to create FLOW, a common product offering that helps landlords and building operators with their ESG goals. Today with [FLOW](#), buildings can monitor energy consumption, occupancy, air quality, temperature, CO2 levels, and humidity among other aspects. Later, FLOW will offer control and automation of building hardware in one platform. Using real time data, operations can be optimized and energy can be saved by streamlining the use of energy sources, reducing operating costs, and with FLOW’s expert advice for investment decisions.

FLOW supports the sustainability goals of residential portfolios via optimized energy management and influencing change in tenant behavior. “With data at their fingertips, landlords and building operators can guide building enhancements and thus decrease operational costs and increase efficiency and profitability,” says Balik. FLOW has been shown to have up to 20 percent of energy savings and extend the lifetime of in-building technologies.

Down the road, end-users, as well as space administrators, will be able to control building hardware according to property management’s definition. Different user groups will be able to turn on/off lights, control HVAC, open/close

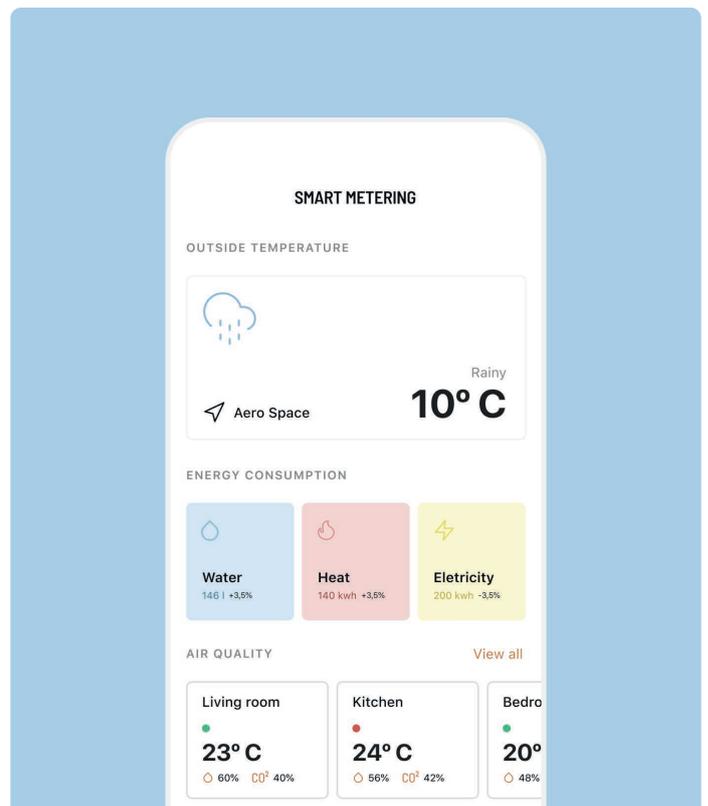
doors or window blinds, and much more via the Spaceflow app. And, in 2022, FLOW will allow automatization of user’s environments.

“In this phase, FLOW will help optimize building maintenance by detecting anomalies, eliminating human errors, and by performing preventive and predictive maintenance that uses AI and machine learning principles. These advanced big data analytics can contribute to the reduction of outages and increase of equipment lifetime value,” says Tomas Rendla, CEO of Flowbox.

# WHAT'S NEXT

Energy investment for residential portfolios has evolved from a way to cut costs and into an ESG responsibility. While reducing expenses is, of course, still at the top of mind as owners and operators try to make their buildings as profitable as possible, other priorities like community satisfaction and ESG are providing extra motivation. Additionally, upcoming legislation around the world that goes into effect in the next few months and years requires that buildings have real-time data to create more energy-efficient environments.

Residential portfolios have room for improvement and that can be successfully reached by paying attention to focus areas like sustainability, maintenance and operations, security, and community and services. Technology that connects, engages, protects, and optimizes tenants and their landlords is simply the next step towards the world we're building. Fortunately, the technology is already here.





# SPACEFLOW

To learn more about FLOW and ESG visit  
[spaceflow.io/en/flow/](https://spaceflow.io/en/flow/)

LEARN MORE