AREF
The Association of Real Estate Funds

Energy Saving Solutions

For Real Estate

Effective from:
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Foreword

Energy costs continue to rise, placing increasing pressure on operating budgets whilst the transition to net zero remains a critical priority for our sector. This guide is designed to help you - whether you're a landlord, property manager, asset manager or tenant - identify practical technologies that can reduce both energy consumption and costs.

This guide presents over 40 energy-saving solutions, each summarised on a single page for easy reference. Every solution details what it is and how it works, which asset types it's suitable for, the benefits and business case including costs, payback periods and savings, key issues to consider, and resources with supplier examples. This standardised format allows you to quickly compare technologies and assess their relevance to your specific circumstances.

We developed this resource by surveying AREF ESG committee members about solutions they've successfully piloted, gaining insights from direct, real-world experience. We conducted comprehensive research by reviewing UKGBC's Solutions Library and Commercial Retrofit Innovation Map, which features over 500 solutions. Throughout this process, we collaborated closely with UKGBC, energy specialists and industry practitioners to identify and validate the most effective technologies for reducing energy consumption in commercial buildings.

Every building is different and requires individual assessment. Before implementing any measure, you should seek independent professional advice from appropriate technical, financial and legal advisors. You must conduct thorough due diligence before committing to any capital expenditure. It is essential to follow recognised retrofit best practice, prioritising passive, fabric-first improvements before moving to active solutions.

We accept no responsibility for implementation outcomes, actual savings achieved, or the performance of any supplier, product or technology mentioned. Supplier listings are provided for information only and do not constitute endorsements. You must conduct your own independent assessment of all potential suppliers and solutions.

This guide will only improve with your input. We welcome feedback on your experience implementing these technologies—particularly the challenges you've faced, lessons learnt, and tracked business cases. Please share your insights and any other potential technologies to include in future editions with us at **info@aref.org**

Thank you for your commitment to creating more sustainable, efficient buildings.

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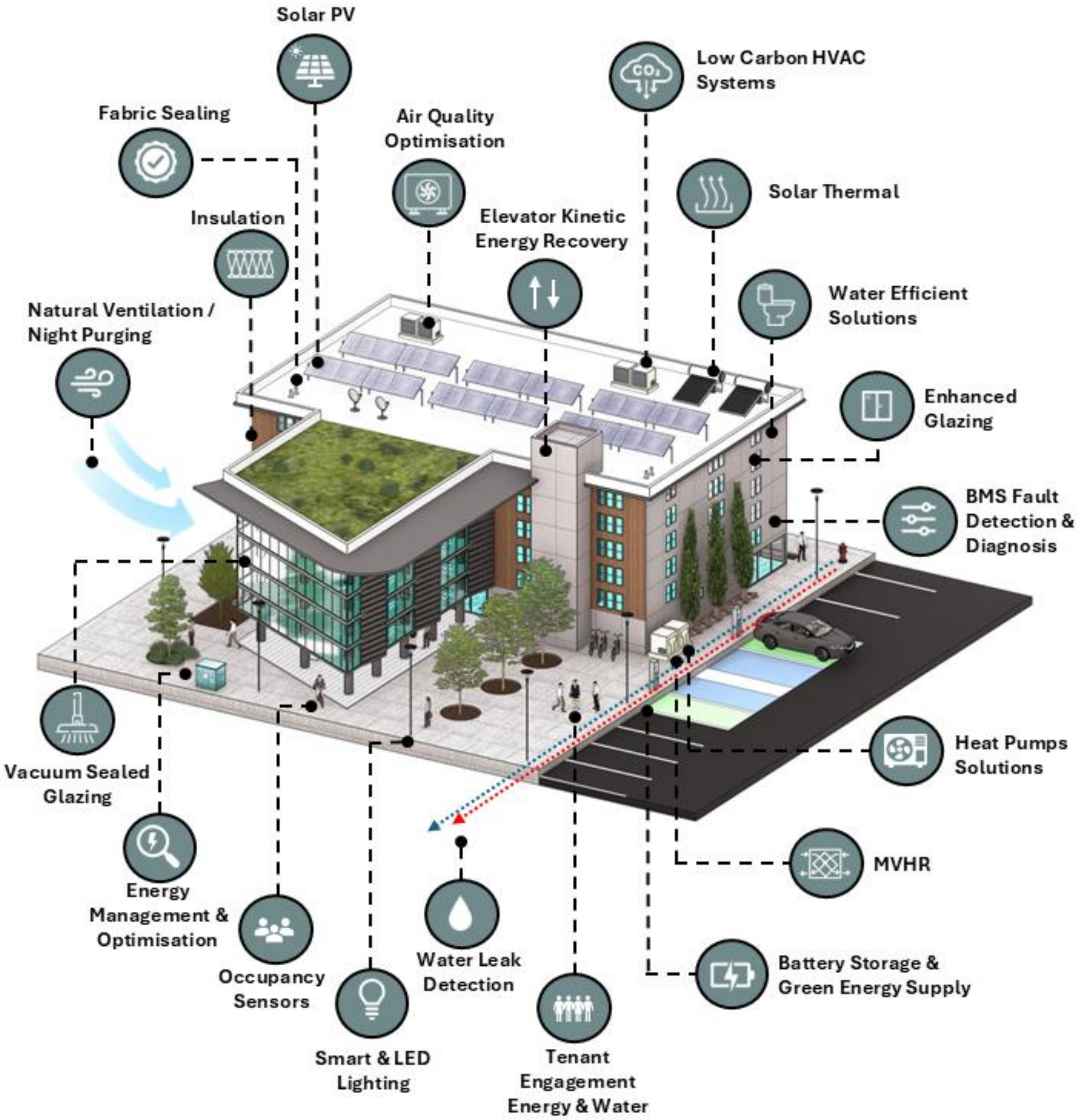
About AREF ESG & Impact Investing Committee

AREF champions sustainable real estate practices that minimise environmental impact, accelerate net zero transition, and recognise buildings as vital spaces for thriving communities.

Graphic Overview of Energy Saving Solutions for Real Estate

The graphic below shows all the options covered in this report, including how they work, where they're best applied, and their relative benefits, costs and risks.



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Net Zero Energy Audit

What is it?

A Net Zero Energy Audit is a structured assessment of how a building uses energy today and what changes are needed to align it with a net zero pathway. It goes beyond a conventional energy audit by explicitly:

- Quantifying current and projected energy use and carbon emissions
- Identifying efficiency, electrification and on-site renewable opportunities
- Mapping these into a sequenced, costed roadmap towards net zero (or near-zero) operation

It typically combines data analysis (bills, metering), site inspections including analysis of building services condition, stakeholder interviews, and modelling to produce evidence-based recommendations with indicative savings, costs, and carbon impact.

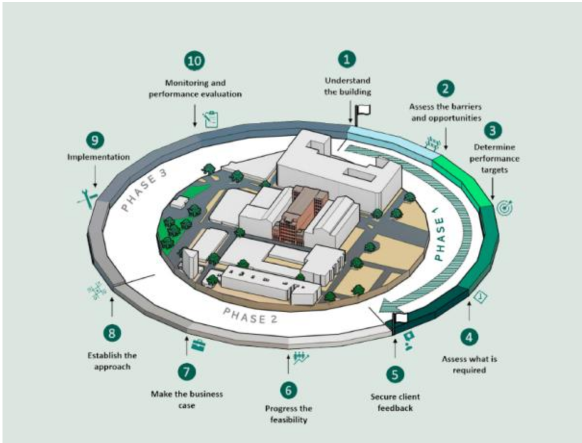


Image Source Develeco

Asset Type

- Large/complex buildings (offices, hospitals, universities, shopping centres, logistics hubs) with high energy consumption and multiple systems/tenancies
- Portfolio net zero strategies at key decision points (lease events, refurbishments, plant end-of-life, capex cycles)
- Less critical for small, low-energy buildings with standard measures

Benefits

- Understanding of building services condition
- Baseline for energy use, costs, and carbon emissions
- A list of interventions or recommendations
- A phased retrofit roadmap adjusted to landlord/tenant policies, lease events, and CAPEX cycles
- Clear investment strategies for highest impact solutions

Business Case

A Net Zero Energy Audit will help to form the business case on potential solutions and technologies to adopt.

Key Issues to Consider

- Integration with planned improvements – coordination of all planned retrofitting actions under one umbrella rather than treating each planned action in isolation
- Data quality – accurate metering, submetering, operational data, and occupancy schedules
- Requirement for accurate O&M and other key information
- Match audit depth to the situation: Use tech for rapid, scalable portfolio screening; bring in consultants when you need investment-grade assurance before significant capital deployment.

Resources & Suppliers

Supplier: This case study - DEVELECO	Other suppliers: Map Mortar

Building Improvement - Insulation

What is it?

Insulation refers to materials generally installed within the building fabric elements (e.g., walls, roofs, floors, etc) that reduce the rate of heat transfer between the internal and external environments. In simple terms, it helps to keep heat inside during colder months while keeping excessive heat outside during warmer periods. This is achieved by trapping air or using materials with low thermal conductivity.	 Image Source Kingspan

Asset Type

Insulation is a universal energy efficiency measure applicable to virtually all building types, but its suitability and priority can vary:

- Older buildings (pre-1990s):
- Assets like offices, retail, leisure centres, and residential blocks with high heating/cooling loads
- Assets undergoing refurbishment or extension

Benefits

- Reduced energy consumption
- Enhanced occupant comfort and wellbeing
- Improved EPC ratings and asset value
- Reduced risk of overheating with solar control
- Extended building fabric lifespan by reducing condensation and moisture damage

Business Case

Etude analysed the energy efficiency of a large 1970's listed office building in central Scotland and proposed insulation measures to reduce heat loss. Fabric proposals were prioritised and grouped into packages of work, calculating and reporting the reduction in annual heating energy and heating load, package capital cost, and operational carbon emissions reduction for each. The packages for improving roof and wall insulation, replacing windows, and insulating the floor above an unheated under croft will provide savings in heat loss of 62.4%, and reduce the peak heat load of the building by 64.9%. This will help to deploy low carbon heat pumps and remove fossil fuel consumption on site. Insulation should always be specified on a case-by-case basis by specialists that understand building physics and condensation risk.

Key Issues to Consider

- Can lead to moisture and other unintended consequences. Condensation risk analysis should be undertaken.
- Cost - retrofit insulation can be disruptive and expensive, sometimes leading to a weak business case.
- Internal Wall Insulation can lead to loss of floor area.
- U-value targets - careful insulation material selection and thickness is essential for achieving optimal u-value targets and required performance.
- Fire performance - fire safety regulations, especially in multi-storey buildings must be met.
- Planning - external insulation changes would usually require planning permission especially for listed buildings or those in conservation areas.

Resources & Suppliers

Supplier: This case study - Etude	Other Suppliers: Rockwool, Kingspan, IndiNature, Knauf

Building Improvement – Double/Triple Glazing Windows

What is it?

Glazing optimisation is choosing the right windows and glass materials to make buildings more energy-efficient and comfortable. This means picking glass types and window placements that let in enough light while controlling heat gain and loss.	 Image Source Get a Window

Asset Type

All buildings with single glazing

Benefits

- Reduced energy consumption
- Improved thermal comfort (cooling & heating benefits)
- Improved EPC rating

Business Case

Rehau supplied around 1,000 replacement high performance double glazed uPVC windows to Kelson House, a 25-storey 1960s residential block on the Isle of Dogs, as part of a wider regeneration scheme for One Housing. The new casement windows were specified to improve thermal performance, airtightness and safety, with the window U-values improved by around 30% compared with the original units, alongside trickle vents for background ventilation and automatic opening vents in common areas for smoke control. Residents have reported fewer draughts and noticeable reductions in energy bills, indicating lower heating demand and improved comfort in this exposed high rise location. Glazing replacements should always be designed on a case by case basis by specialists who understand building physics, ventilation strategy and condensation risk.

Key Issues to Consider

- Higher upfront costs with extended payback periods, particularly for high performance glazing systems with low U-values and specialist frames and installation requirements.
- Improved thermal performance does not always translate into proportionally large annual energy savings, especially in relatively mild climates, well-insulated buildings or where heating demand is already low.
- Potential reduction in solar gain and natural light transmission, which can be a disadvantage where passive solar heating and daylight are important to comfort, winter performance or overall energy strategy.

Resources & Suppliers

Supplier: This case study - Rehau	Other Suppliers: ChromoGenics Fineo Glass Luxwall

Operation Energy Operational Energy Use

Building Improvement - Shading Window Coating

What is it?

A solar control coating reduces the window's solar heat gain coefficient (g-value) by reflecting and absorbing a portion of incoming solar radiation, which directly limits overheating risk. There are also glass coatings available that reversibly transition from transparent to white to reduce solar gain in hot weather, allowing buildings and greenhouses to regulate their own temperature without electrical input.

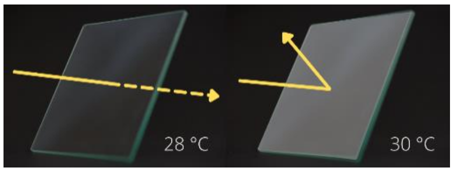


Image Source Albotherm

Asset Type

All buildings with windows (i.e. hotels, offices, supermarkets).

Benefits

- Reduced energy consumption & overheating risk
- Can be either internally or externally applied
- Increased temperature comfort
- Optimised light levels (blocks excessive sun while allowing light for maximum plant growth)

Business Case

Albotherm's low emissivity insulation and smart coating technology can cut building energy use and costs by reducing unwanted heat gains. Their films and coatings can deliver energy savings of more than 10 percent, helping hotels and commercial buildings lower energy bills by up to 10 percent while reducing interior heat gain by as much as 70 percent, creating more comfortable indoor environments with less reliance on mechanical cooling.

Key Issues to Consider

- Installation quality and adhesion failure risks - Window film performance is critically dependent on installation technique, with poor surface preparation being the primary cause of premature failure.
- Impact on daylighting and beneficial solar gains needs to be considered.
- Maintenance and original glazing warranty considerations
- Limited durability and maintenance requirements compared to factory-applied coatings - Window films are inherently less durable than factory-applied low-emissivity (Low-E) coatings, with typical lifespans of 5-15 years for residential applications and up to 15 years for commercial installations under warranty.

Resources & Suppliers

Supplier: This case study - Albotherm

Other Suppliers:
Microshade
NxLite
Window Insulation
Notan

Building Improvement - Vacuum sealed glazing

What is it?

Vacuum insulating glazing technology is a glazing innovation engineered to prevent thermal pass-through, thereby reducing energy demand of building systems for heating, ventilating, and air conditioning. The technology sandwiches a vacuum between two thin layers of glass, with the airless gap blocking heat transfer and sound.

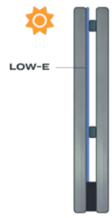


Image Source Luxwall

Asset Type

All buildings with windows (i.e. hotels, offices, residential buildings).

Benefits

- Reduced energy consumption
- Increased thermal comfort
- Reduced external sounds
- Part of retrofit projects

Business Case

FINEO vacuum insulating glazing has been used to upgrade historic and listed buildings where retaining original timber frames is essential. Existing single glazed sashes are reglazed with slim vacuum units (with U-values around 0.7 W/m²K instead of roughly 5.8 W/m²K for traditional single glazing), significantly improving thermal performance and comfort while preserving the original appearance. This demonstrates a strong business case for vacuum insulating glazing in projects where conventional double or triple glazing is constrained by heritage requirements but energy and comfort performance still need to be improved.

Key Issues to Consider

- Generally more suited to new-build.
- Higher upfront costs and limited product availability, often requiring specialist suppliers, longer lead-in times and careful handling during transport and installation.
- Long term durability of the vacuum cavity and edge seals, with loss of vacuum potentially degrading thermal performance and complicating maintenance or replacement strategies.
- Integration with existing or new frames, including constraints on pane size and thickness, acoustic performance, visual appearance (such as visible support pillars) and compatibility with heritage or planning

Resources & Suppliers

Supplier: This case study - Fineo

Other Suppliers:
Vacuum Glazing UK

Operation Energy Operational Energy Use

Building Improvement - Insulating Window Coating

What is it?

A window insulation coating for retrofit applications as an alternative to full window replacement. That improves window thermal performance by up to 40%. The technology aims to reduce heat loss, overheating, and condensation.

Image Source UKGBC

Asset Type

All buildings with windows (i.e. hotels, offices, residential buildings).

Benefits

- Reduced energy consumption
- 20-40% thermal resistance improvement, reducing energy use
- Blocks 99% of damaging Ultraviolet & 83% Infrared light
- 50% reduction in condensation, reducing mould growth.

Business Case

The window insulation coating significantly improves thermal performance, particularly for older buildings with poor-performing windows. A Nottingham Trent University study demonstrated a reduction in U-value by 1.09W/m²K, improving from 2.63W/m²K to 1.54W/m²K, representing a 41% improvement in thermal performance. For modern windows, a Liverpool John Moores University study showed the U-value improved from 1.2W/m²K to 1.1W/m²K, an 8% improvement. The coating is most effective on lower-performance windows where it substantially reduces heat loss, though benefits are more modest on newer, high-performance glazing. However, no specific monetary savings or energy cost reductions are provided in these studies.

Key Issues to Consider

- Needs specialist design input to ensure building performance is not adversely impacted – overheating, beneficial solar gains, daylighting
- High cost
- Structural considerations
- External visual impact considerations
- Planning application cost considerations
- Existing window warranty impacts
- Ongoing maintenance implications

Resources & Suppliers

Supplier: This case study - Window Insulation included
UKGBC Solutions Library

Other Suppliers:
Solar Gard
Tintfit

Operation Energy Operational Energy Use

Building Improvement - Fabric Sealing

What is it?

This is an automated technology that works by sealing leaks in ductwork in both residential and commercial buildings. Using a patented, non-toxic aerosol sealant, the process pressurizes duct systems, driving sealant particles directly to leaks to seal them from the inside without coating the entire duct. This technology is suitable for both new constructions and retrofits.	 Image Source : Jointing Tech

Asset Type

Residential and commercial buildings

Benefits

- Reduced energy consumption
- Reduced energy waste from conditioned air escaping through leaks
- Improved HVAC efficiency

Business Case

Aeroseal fabric sealing is an automated ductwork sealing technology for residential and commercial buildings. Using a patented, non-toxic aerosol sealant, it pressurises the ductwork so that sealant particles are driven directly to leaks, sealing them from the inside without coating the entire duct, and it is suitable for both new build and retrofit projects. A case study in Ottawa, Canada found that duct leakage was reduced by 92 per cent and an Energy Recovery Ventilator that had previously been underperforming was transformed, delivering 20 per cent more air than required while running at around half its previous power.

Key Issues to Consider

- Requires approval from Fire Engineer
- Complexity of identifying all air leakage pathways - effective fabric sealing requires comprehensive identification of all air leakage points throughout the building envelope, many of which are subtle or hidden.
- Material selection and installation quality challenges - fabric sealing effectiveness is critically dependent on selecting appropriate materials for each application and achieving high-quality installation.
- Variable energy savings and extended payback periods - while fabric sealing combined with insulation improvements can deliver average energy savings of 15% on heating/cooling costs (11% on total energy), actual savings vary significantly based on climate, building type, existing envelope performance, and occupant behaviour.

Resources & Suppliers

Supplier: This case study - Aeroseal	Other Suppliers: Quattro Seal

HVAC – Flue Gas Recovery Technology

What is it?

A transition technology which helps lower natural gas and other utility consumption, prior to fully electric HVAC transition. The Flue Gas Recovery system is an easily retrofitted transition solution that works in conjunction with natural gas fired heating boilers.	 Image Source: [Carbon Cap Inc](#)

Asset Type

Multi-residential and other buildings.

Benefits

- Reduced energy consumption
- Retrofits solutions

Business Case

Carbon Cap's Flue Gas Recovery (FGR) system is a mechanical waste heat recovery solution that captures energy from boiler exhaust to preheat domestic hot water or supply air, improving the efficiency of boilers in multi-residential and commercial buildings. A case study in Ontario, Canada found that, by reclaiming this waste heat, the FGR system could cut natural gas use by around 15 to 25 per cent in multi-residential buildings, demonstrating its value as a cost-effective retrofit for reducing fuel consumption, emissions and operating costs.

Commercial standalone installations costs range between £6,000-£8,000. Commercial developments can eliminate upfront costs with financial solutions such as shared savings arrangements and splitting energy savings between building owner and technology provider ideally over 2-4 year agreements.

Key Issues to Consider

- Not a 'Net Zero ready' solution – transition technology only
- Best suited for multi-residential and commercial buildings with consistently high hot water demand, e.g. apartment blocks, hotels, gyms, leisure centres.
- Modest improvements of 5-7% in gas consumption achieved in modern condensing boilers whereas older non-condensing boilers can improve gas consumption by up to 52%.

Resources & Suppliers

Supplier: This case study: - Carbon Cap Inc included UK GBC Solutions Library	Other Suppliers: Airflow Deep Green	Isometric Outcomes Partel PureThermal Inergys

Operation Energy Operational Energy Use

HVAC-R – Optimised Compressor Efficiency

What is it?

This smart technology reduces the electricity usage (kWh) and demand (kW) of air conditioning, refrigeration and heat pump systems by improving the performance of their compressors while maintaining temperature and humidity control.

Image Source: Smartcool

Asset Type

All buildings with HVAC-R units

Benefits

- Reduced energy consumption
- Improved energy efficiency for all air conditioning, refrigeration and heat pump systems (HVAC-R)
- Reduced operation and maintenance costs for facilities
- Reduced carbon footprint and compatibility with green initiatives

Business Case

Optimised compressor efficiency technologies, such as Smartcool's retrofit controls, improve the way HVAC-R compressors cycle so they use less electricity while maintaining comfort and existing warranties. Case studies indicate savings of around 20 to 30 per cent on HVAC-R energy consumption in suitable applications. To prepare a desktop proposal and establish the likely payback period, the client would need to provide HVAC-R unit specifications, details of the current electricity tariff, and accommodate an initial site visit or survey.

Key Issues to Consider

Limited case studies and real-data on cost benefits – as with most smart / tech solutions
Compressor Optimisation is not suited to:

- Systems That Already Use Advanced, Integrated Optimisation
- Equipment With Poor Maintenance or Mechanical Issues
- Systems With Critical, Non-Negotiable Temperature Requirements

Resources & Suppliers

Supplier: This case study - Smartcool

Other Suppliers:

Mechanical Ventilation Heat Recovery Systems (MVHR)

What is it?

An energy recovery ventilation system that uses an air-to-air heat recovery unit to recover wasted heat. The system delivers a constant fresh air supply to a building whilst simultaneously extracting waste heat from stale air before it is expelled to the outside environment. Heat recovery units can recover up to 95% of normally lost heat depending on the unit and the application.


Image Source A&S Mechanical

Asset Type

All buildings – less beneficial in older, 'leaky' (air tightness) buildings

Benefits

- Energy and cost saving benefits
- Ventilation losses are much lower than with simple extract fans or window opening.
- MVHR can cut space-heating demand and running costs, and may allow smaller, more efficient low-carbon heating systems to be installed.
- Internal comfort levels - heat recovery helps maintain more stable indoor temperatures and reduces cold draughts from incoming air, improving thermal comfort while still meeting ventilation requirements.

Business Case

Daikin Europe compared two similar retail stores in Belgium, one with only exhaust ventilation and one with a heat recovery ventilation unit added to the same HVAC system. The store with heat recovery cut HVAC energy use by around 15% and allowed 7 kW less heating/cooling capacity to be installed, improving both operational costs and capital efficiency over the life of the system. Despite a higher upfront cost, Daikin report a payback of under 9 years and lifecycle savings of roughly €9,100 over 22 years, making MVHR a compelling business case where long-term energy and comfort performance are priorities.

Key Issues to Consider

- Airtightness – most effective in airtight buildings with air leakage rates below 5 m^3 / ($h \cdot m^2$) @ 50Pa.
- Heat recovery efficiency – savings on heating bills of 25%-50% can be achieved only if MVHR unit and all ductwork is located entirely within building envelope.
- Maintenance – annual filter replacement, professional servicing every 2-5 years. Poor maintenance results in noise, poor indoor air quality, reduced efficiency and possibly system failure.

Resources & Suppliers

Supplier: This case study - Daikin

Other Suppliers:
A&S Mechanical

Energy Management - Voltage Optimisation

What is it?

All electrical equipment supplied for the UK is designed to function at a minimum of 216 volts (v), with an ideal voltage of 220v. However, this contrasts to the average voltage supplied of 242v. This excess voltage leads to a higher than necessary consumption of energy and therefore larger monthly bills. This technology, known as a voltage optimiser, can be used to bring the building's voltage in line with the optimal amount of 220v and therefore reduce consumption and save money.

Image Source: [Energy Ace]

Asset Type

All buildings and uses with electrical equipment.

Benefits

- Reduced energy consumption
- Aligns with BMS seasonality
- Integrates with existing systems
- No operational disruption or system upgrades

Business Case

Voltage optimisation systems such as EnergyAce's residential Compact unit reduce incoming mains voltage to optimal levels so homes and small businesses use only the electricity they need, cutting consumption and helping to protect appliances. The technology can deliver up to 20 per cent savings on electricity bills, with EnergyAce offering a 10 per cent kWh reduction guarantee or a refund of the unit cost. For a typical project the client supplies the last 12 months of half-hourly data and recent electricity bills, a site visit is scheduled and a temporary data logger is installed to monitor voltage over a seven day period; this data is then analysed to produce a tailored proposal setting out the cost of the optimiser, projected savings and expected payback period.

Key Issues to Consider

Factor affecting voltage optimisation:

- The load mix heavily influences VO effectiveness
- VO adds little value if the electrical supply is already well optimised
- VO could impair torque, shorten lifespan, or cause fault trips.

The above is established by a site inspection.

Resources & Suppliers

Supplier: This case study - Energy Ace

Other Suppliers:
Powerstar

Operation Energy Operational Energy Use

Energy Management - Occupancy Sensors

What is it?

A state-of-the-art software platform that collects data from micro-sensor technology, processing information on occupancy, energy and air quality, and translating it into actionable insights to help create a healthy and productive environment whilst reducing operational costs and meeting sustainability targets.

Image Source: Leviton

Asset Type

All buildings with variable occupancy (i.e. hotels, offices, schools)

Benefits

- Reduced energy consumption
- Reduced cost
- Improved wellbeing and productivity

Business Case

Occupancy sensor and analytics solutions such as Aireavu's can unlock significant energy and space efficiency gains in large office buildings. In one London office case study, detailed occupancy monitoring identified an annual energy saving opportunity of around £1.15 million and a potential CO_2 reduction of approximately 1,950 tonnes per year, alongside minimum space optimisation savings of about £183,000. Crucially, the data showed that 63 per cent of energy was being used when occupancy was below 1.4 per cent of capacity, highlighting the scale of wasted energy that smarter, occupancy-led control strategies can address.

Key Issues to Consider

- False triggering – Sensors are susceptible to false activations from HVAC air currents, rapid temperature changes, reflective surfaces, steam, electronic interference (RFI/EMI), and activity in adjacent spaces.
- Coverage limitations and scalability costs – No sensor offers 360-degree coverage, creating potential blind spots in corners, behind obstacles, or in large open areas.
- Limited case studies and real-data on cost benefits – as with most smart / tech solutions

Resources & Suppliers

Supplier: This case study - Aireavu

Other Suppliers:

Utopi
Beringar
Cosysense
Direk
UbiqiSense

Energy Management - Power Factor Correction

What is it?

All mains powered electrical equipment are rated according to their power factor (electrical efficiency), a rating above 0.95pf (95% efficient) is generally considered as good efficiency with the maximum attainable being 1.00pf (100% efficient). The degree of electrical efficiency is improved by the introduction of Power Factor Correction, a system that introduces power factor correction capacitors to counteract the negative effects of all types of inductive loads like motors.	 Image Source: Energy Ace

Asset Type

Automatic PFC is best for dynamic loads such as factories, workshops, or HVAC-heavy buildings.

Benefits

- Reduced energy consumption – kw/h losses. Savings dependent on level of improved efficiency.
- Reduced cost
- Potential to increase KVA - more power available for an increased load e.g. adding machinery or to remove gas supply

Business Case

Power factor correction improves the electrical efficiency of a site by installing capacitor banks to raise the power factor and reduce reactive power charges. For a typical EnergyAce project, a site visit is arranged to measure the existing power factor and determine the appropriate unit size; if the site is operating below about 0.95 power factor, correction is usually viable and can significantly cut energy costs and kVA demand. The price included within the quotation is then dependent on the size and rating of the power factor correction equipment required.

Key Issues to Consider

PFC not appropriate in the following scenarios:
- High harmonic distortion with no mitigation
- PF already close to 1.0
- Voltage is unstable or near upper limits
- Loads vary so widely that fixed PFC would overcorrect

Resources & Suppliers

Supplier: This case study - Energy Ace	Other Suppliers: Powerstar

Operation Energy Operational Energy Use

Energy Management - Energy Monitoring & Analytics

What is it?

An energy monitoring and analytics platform is an AI-powered system that transforms complex building energy data into actionable insights. These platforms use artificial intelligence to analyse high-accuracy data from buildings and convert it into meaningful information that informs decision-making around comfort, carbon emissions, and costs. The platform typically operates as a Software-as-a-Service (SaaS) solution. Installation involves a data gateway connecting existing Building Management Systems (BMS) to cloud-based analytics, with hardware installation completed in a single visit.

Image Source: IES

Asset Type

Commercial and public buildings.

Benefits

- Reduced energy consumption
- Increased staff comfort
- Tracked Net Zero progress

Business Case

A multi-academy trust implemented an energy monitoring and analytics platform to reduce costs and carbon emissions. The facilities team used the system to identify energy-saving opportunities, achieving savings of £103,644 and avoiding 356 tonnes of CO2 in less than one year. A lack of case study data results in lower certainty in terms of projected energy savings.

Key Issues to Consider

- Sufficient sub-metering, correct locations and reliable comms so data is accurate and complete.
- Clear KPIs, dashboards and alerts that turn raw data into actionable findings, not just graphs.
- Defined responsibilities, review cycles and processes so identified issues lead to real energy savings.
- Limited case studies and real-data on cost benefits – as with most smart / tech solutions

Resources & Suppliers

Supplier: This case study - Grid Edge

Other Suppliers:
75F
CIM
Cosysense
Deepki
Demand Logic
GridDuck
IES
Fantom Factory
Para
Re:Sustain
Safecility
SkySpark
Trigrr

Energy Management - Smart Thermostats

What is it?

Smart thermostats are advanced devices that go beyond simple temperature control, incorporating sensors to monitor occupancy, CO2, humidity, and light to proactively manage HVAC systems for optimal indoor comfort, air quality, and energy efficiency.

Image Source 75F

Asset Type

All buildings with HVAC systems.

Benefits

- Reduced energy consumption
- Improved air quality
- Improved wellbeing

Business Case

Smart thermostats and IoT-based building controls, such as those offered by 75F, can significantly reduce heating and cooling demand while improving comfort and control. A Hilton hotel using 75F’s solution recorded a 10 per cent reduction in overall energy use compared to its baseline benchmark, while a New York based energy services company reported a 50 per cent reduction in heating energy and a 33 per cent reduction in cooling energy after deploying 75F’s smart controls in its headquarters.

Key Issues to Consider

- Suitable sensor types, numbers and locations so spaces are measured accurately.
- Clear responsibility, proper commissioning and intuitive controls for users.
- Defined comfort/energy targets, data access, and a route to verify promised savings.

Resources & Suppliers

Supplier: This case study - 75F

Other Suppliers:
Ecobee
Nest
Plugwise
Utopi

Operation Energy Operational Energy Use

Energy Management – BMS Fault Detection and Diagnosis

What is it?

Fault Detection and Diagnostics (FDD) is a data-driven method for identifying issues affecting energy performance, equipment health, and occupant comfort. It analyses operational data from building systems (HVAC, BMS, meters, IoT sensors) to detect anomalies, find causes, and recommend fixes.

Typical workflow:

- Detection - identify abnormal behaviour
- Isolation - pinpoint asset or subsystem
- Diagnosis - find root cause
- Prioritisation - rank by impact
- Action - assign work
- Verification - confirm fix

Leading FDD platforms also identify optimisation opportunities, refine controls, and support continuous improvement, reducing energy use while maintaining comfort.

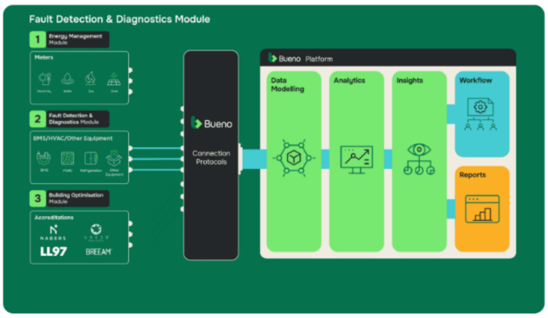


Image Source Bueno Analytics

Asset Type

Applicable to any building with a BMS or sub-metered plant and equipment and large commercial properties with complex HVAC systems.

Benefits

- Reduced energy consumption
- Improved building ratings
- Increased comfort and wellbeing
- Portfolio governance,
- Tenant engagement

Business Case

Analytics-led optimisation can deliver strong returns, with many projects paying back in under 12 months, often under 6, on energy savings alone. These tools are increasingly critical to achieving and maintaining high NABERS UK ratings and proving performance-in-use, while growing evidence links better operational efficiency and ratings to higher asset values, stronger tenant retention and lower lifecycle costs.

Key Issues to Consider

Understanding your target outcomes is the strongest predictor of a successful FDD deployment. Your priorities determine:

- how success is measured
- which buildings to target first
- which data sources to integrate
- how insights are interpreted what actions are prioritised

Resources & Suppliers

Supplier: This case study – Bueno Analytics

Other Suppliers:
Clockworks Analytics
CopperTree Analytics
Demand Logic

Energy Management – Ai and Autonomous Control

What is it?

This technology connects to your Building Management System (BMS), using digital twin technology and machine learning to model building performance in real-time. It monitors systems continuously, identifies inefficiencies, and makes remote adjustments to reduce waste without disruption.

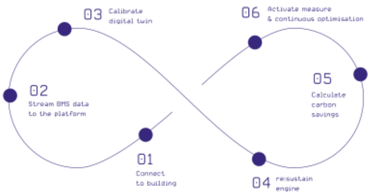


Image Source Re:Sustain

Asset Type

Suitable for office, retail, logistics, and mixed-use commercial buildings with a BMS system in place.

Benefits

- Reduced energy consumption
- Fast ROI: 3–5 months
- Aligns with BMS seasonality
- Integrates with existing BMS systems

Business Case

Under this model, the client reviews contract terms with no upfront cost and, if proceeding, signs a three-year performance-based agreement with an option to exit if forecast savings are below 15 per cent. Where projected savings are 15 per cent or more, both parties approve and the measures are activated; otherwise no action is taken and the agreement lapses. A current lack of case study data means there is lower certainty around projected energy savings, which should be factored into decision making. That said, there are options available which limit client cost exposure until 'real' energy savings are generated.

Key Issues to Consider

- Reliable meters/sensors and robust links to BMS / plant so the AI is acting on accurate, complete data.
- Clear operating rules, safety limits and simple manual override so autonomous actions never compromise comfort or safety.
- Defined performance metrics, explainable control logic and clear responsibility for tuning, faults and ongoing optimisation.
- Limited case studies and real-data on cost benefits – as with most smart / tech solutions

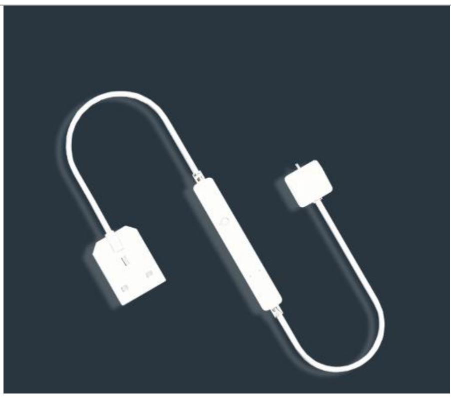
Resources & Suppliers

Supplier: This case study - Re:Sustain Included UK GBC Solutions Library

Other Suppliers:
75F
Brainbox AI
Cosysense
Dabbel
Eisox
Envigor
LightFi
Optimise AI
R8 Technologies
Rensair
Smartcool Systems
Trigrr
Unifi.ID
Velbus
Xwatts
Grid Edge

Energy Management - Small Power – Sockets

What is it?

Smart plug and socket technology consists of AI-powered plug adapters that fit into standard three-pin or European plugs. The devices use patented technology with high-frequency data sampling and deep learning algorithms to analyse electrical energy data, providing real-time monitoring of appliance performance and energy consumption for predictive maintenance.	 Image Source Verv

Asset Type

Commercial office buildings, Hotels, Industrials, Retail, Student accommodation, Healthcare facilities.

Benefits

- Reduced energy consumption
- Supports Net Zero goals

Business Case

At a commercial workspace in County Hall, smart monitoring revealed an inefficient appliance that, once corrected, delivered £6,000 of savings on that single unit alone. On the back of this result, the organisation rolled out smart monitoring across all major appliances in the County Hall workspace to capture further savings and support ongoing predictive maintenance.

Key Issues to Consider

- Choose smart sockets for the right loads and locate them where key plug-in equipment can actually be controlled and monitored.
- Set clear on/off schedules, linking to occupancy or time-of-use tariffs so savings happen automatically, not manually.
- Use metering data to highlight waste, while keeping controls simple so users do not just override or unplug devices.
- Limited case studies and real-data on cost benefits – as with most smart / tech solutions

Resources & Suppliers

Supplier: This case study - Verv

Other Suppliers:
Measurable Energy
Cquel
Gridduck

Lighting – LED

What is it?

Light Emitting Diodes (LEDs) are highly efficient electrical light sources that work through a one-directional current flow. They function by using two conductive materials placed in contact when electricity is applied, atoms in one material become energised and release electrons into the other material, producing light directly.	 Image Source: Oeo Energy Solutions

Asset Type

All asset types

Benefits

- Reduced energy consumption
- Relatively low upfront cost
- Minimal disruption and option to carry out upgrades out of hours
- Improved EPC rating
- Lower heat output (and overheating)
- Longer lasting than regular light bulbs.

Business Case

LED lighting solutions from manufacturers such as Signify can dramatically cut electricity use compared to traditional sources, using up to 90 per cent less energy than incandescent and halogen bulbs and around 60 per cent less than older fluorescent fittings, while delivering the same or better lighting performance.

Key Issues to Consider

- Energy savings and ROI - typically reduce electricity consumption from lighting by 50%-80%. Benefits include lower electricity bills and reduced cooling loads.
- Lifespan and maintenance - typical lifespan of 25,000 - 50,000 hours compared to 1,000 – 2,000 hours of a standard bulb. Minimal replacement costs and disruption to building users.

Resources & Suppliers

Supplier: This case study - Signify, included UK GBC Solutions Library

Other Suppliers:
Airis Solutions
E-Energy
Rentalite

Lighting – Smart Lighting

What is it?

Wireless lighting control systems incorporate sensors into luminaires, enabling smart building services such as occupancy detection, asset tracking, and indoor navigation. Smart lighting systems work without an internet connection or central control hardware, luminaires and sensors simply plug in, and the system can form a mesh network of tens of thousands of sensors without manual configuration.

Image Source: Ingy

Asset Type

Commercial spaces such as offices, supermarkets, retail warehouses & industrials.

Benefits

- Reduced energy consumption
- Increased productivity
- Luminaires, zoning and sensor types/locations so spaces are lit effectively without nuisance switching
- Improved wellbeing

Business Case

Ingy's smart lighting platform combines connected luminaires and sensors to cut both project costs and energy use. One case study reported a 30 per cent reduction in CAPEX compared with alternative solutions, while another showed that the intelligent lighting controls enabled energy savings of up to 80 per cent, demonstrating the strong financial and sustainability case for this approach.

Key Issues to Consider

- High upfront cost
- Possibly better suited to new build or extensive refurbishments
- Higher maintenance costs
- Enhanced user training required
- Ongoing OPEX costs sometimes linked to specific products (software, apps, etc)
- Proper commissioning, tuneable settings and monitoring is required to verify savings and maintain comfort and visual quality over time.

Resources & Suppliers

Supplier: This case study - Ingy

Other Suppliers:
75F
Agranergy
Helvar

Operation Energy Operational Energy Use

Vertical Transport- Elevator Kinetic Energy Recovery

What is it?

Industry-leading ultracapacitors allow for the recharging of electric traction elevators. The ultracapacitor pack in the system is used to capture braking energy (that would otherwise be burned in the braking resistors) when the cabin is going down, and to re-use it to help lift the elevator on its journey up the shaft. Unlike other methods that use resistors or batteries for braking purposes, these supercapacitors store up power until needed again during operation which helps reduce reliance on electricity from grids. The two-wire connection simply plugs into any existing elevator drive, making installation quick and easy.	 Image Source Skeleton

Asset Type

All buildings with lifts

Benefits

- Reduced energy consumption
- Improved efficiency classification of the elevator
- Easy-to-install solution
- Aligns to retrofit projects

Business Case

Case studies of Skeleton Technologies' ElevatorKERS show that installing the ultracapacitor-based kinetic energy recovery system can cut elevator energy consumption by more than 50 per cent, and in some applications reduce it by up to 70 per cent, by capturing braking energy that would otherwise be wasted as heat and reusing it to power subsequent lift movements.

Key Issues to Consider

- Check lift usage, travel distances and counterweighting to confirm there is enough up/down traffic to justify recovery.
- Ensure recovered energy can be safely fed back (to the building or storage), with suitable inverters, protection and coordination with other plant.
- Meter recovered kWh, verify payback, and plan maintenance so added electronics do not reduce overall lift reliability.
- Limited case studies and real-data on cost benefits

Resources & Suppliers

Supplier: This case study - Skeleton	Other Suppliers: RJ Lifts, AL-Lifts

Operation Energy Operational Energy Use

Tenant Engagement - Energy

What is it?

A year-long competition leveraging behaviour change and minor reprogramming to drive down energy use in commercial buildings. This is an innovative approach that brings landlords, building managers and occupiers together and, through gamification, mobilises them to reduce their consumption.	 Image Source Energysaver

Asset Type

All commercial buildings

Benefits

- Reduced energy consumption
- Improved building certifications
- Engage tenants on the building's net zero and wider sustainability journey

Business Case

In the CUBE Competition, participating office buildings have collectively delivered around 15 GWh of energy savings and £4 million of reduced expenditure, with typical participants on track to cut costs by 12 to 15 per cent and top performers achieving savings of more than 30 per cent. Across the portfolio, average energy intensity has fallen from 262 kWh/m² to 215 kWh/m². A flagship case study at 40 Holborn Viaduct in London illustrates what is possible, with the building reducing its energy consumption by 38.8 per cent through behaviour change and targeted operational improvements.

Key Issues to Consider

Split Incentives (Landlord vs. Tenant Benefits)
The biggest barrier: who pays vs. who benefits.
Examples:

- Tenant pays utility bills - less motivation for landlord-funded upgrades.
- Landlord pays for common-area energy - little tenant influence on savings.

Communication & Education Gaps: Tenants may not understand:

- How building systems work
- What behaviours impact energy use
- What responsibilities they have
- Access to Data & Transparency: Tenants need clear, timely energy data to understand impact

Resources & Suppliers

Supplier: This case study - Cube

Other Suppliers:
Smart Spaces
Hello Energy

Operation Energy Energy Generation

Building Integrated PV

What is it?

A building-integrated photovoltaic (BIPV) system replaces conventional roofing or façade materials rather than sitting on top of them. The modules feature a thin photovoltaic layer integrated into metal sheeting, installed like standard seam metal roofing. The system maintains the aesthetic appearance of a traditional non-solar roof whilst generating electricity, with electrical connections made discreetly beneath the roof sheeting between the battens.	 Image Source: Energypedia

Asset Type

Buildings with high daytime energy consumption such as commercial offices, retail stores, schools, and industrial facilities where operational hours align with peak solar production. Not generally seen as a retrofit measure – typically associated with new-build developments or extensive cut and carve redevelopments where design integration can be more easily and cost effectively achieved.

Benefits

- Reduced energy consumption
- Reduced electricity bills
- Possibly cheaper construction costs in new-build scenarios – saving on roof materials
- Income potential through Smart Export Guarantee (SEG) payments
- Minimal maintenance

Business Case

In 2017, a 60m² (7.7kW) solar roofing system was installed. During 2019, the system produced 7,357kWh of energy, with 6,414kWh used for the property's own consumption and the remainder sold to the grid. Instead of paying for electricity used during the year, the client was paid an extra €125 for the supplementary green electricity produced demonstrating that the system eliminated annual electricity bills entirely whilst generating additional income from excess energy.

Key Issues to Consider

- Dual functionality complexity due to façade or roof integration i.e. BIPVs will be expected to operate as building fabrics and electricity generation systems.
- Possible reduced energy yield per kWp, due to orientation and shading.
- Fire safety compliance requirements.
- More expensive than standard roof-mounted PVs, due to bespoke design and various compliance requirements.
- Longer return of investment (ROI) periods compared to conventional roof mounted PVs.
- Might need specialised supply chains which can lead to delays.

Resources & Suppliers

Suppliers: This case study - Roofit Solar, included UKGBC's Solutions Library

Other Suppliers:
Onyx Solar
Polysolar
SolarLab
Solskin

Operation Energy Energy Generation

Rooftop Photovoltaics

What is it?

Solar photovoltaic (PV) panels on rooftops convert sunlight into electricity for on-site consumption, significantly reducing electricity bills and providing protection against rising energy prices.

Image Source: AIKO

Asset Type

Buildings with high daytime energy consumption such as commercial offices, retail stores, schools, and industrial facilities where operational hours align with peak solar production.

Benefits

- Improved energy efficiency
- Reduced cost
- Improved EPC rating
- Attractive payback periods

Business Case

In a recent commercial solar case study, small to medium sized enterprises installing rooftop systems in the 20 kW to 50 kW range were found to save between about £4,595 and £11,895 per year on electricity bills, while a larger 250 kW installation delivered annual savings of up to £40,000. Taken over the lifetime of the system, these reductions in operating costs illustrate the scale of financial impact that appropriately sized on site solar can provide for energy intensive businesses.

Key Issues to Consider

- Roof condition and structural integrity should be confirmed through structural assessment.
- Shading and roof orientation for optimal performance in the Northern hemisphere a south facing orientation should be opted for. A solar shading analysis should be able to confirm best suited orientation.
- Planning permission and building regulations special consideration should be given to listed buildings and conservation areas.
- Long term contractual and financial commitments
- Grid connection and utility requirements for systems exceeding 3.68kWp or 11kWp, the Distribution Network
- Operator application process can take up to 11+ weeks.
- Ongoing maintenance and costs (regular cleaning, annual inspections and inverter replacement costs)

Resources & Suppliers

Suppliers: This case study - AIKO PV Project Management: Electron Green	Other Suppliers: 1KomaMa5 Convert Energy Dualsun ESE Solar Maxeon	Oxford PV Power Roll Recom Technologies So Blue Solivus Naked Energy

Rooftop Solar Thermal

What is it?

Solar thermal technology uses the sun's energy to generate heat for water heating and solar cooling systems. Infrared radiation from the sun penetrates the panel through a top glass plate and becomes trapped inside, increasing the temperature. This heats tubes filled with liquid (containing anti-freeze in the UK) which circulates from the panels to a hot water cylinder, transferring heat to the water. The pump operates until the desired cylinder temperature is achieved, then stops until the temperature drops.

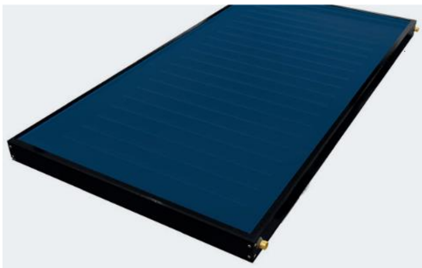


Image Source: Convert Energy

Asset Type

All buildings with high daytime energy consumption.

Benefits

- Can cover a large share of hot water demand using free solar energy, cutting fuel use and bills.
- Reduces carbon emissions and can lower running hours and wear on boilers or heat pumps.
- Roof-mounted solar thermal uses relatively little roof area.

Business Case

At the All England Lawn Tennis Club in Wimbledon, a solar thermal array of 130 VirtuHOT collectors was installed on the Aorangi hospitality building to preheat water for electric heaters and cut reliance on gas. The system is designed to meet at least 40 per cent of peak hot water demand during the Championships, delivering around 36.5 MWh of renewable heat and saving roughly 6.2 tonnes of CO_2 each year.

Key Issues to Consider

- Hot water demand profile and system sizing most cost-effective for buildings with high hot water demand such as hotels, hospitals and multi-residential properties.
- Roof condition, structural capacity and space requirements.
- Complexity and integration challenges – more complex components compared to PVs, including additional tank space requirements.
- Vertical pipe pressure management in high rise buildings, legionella risk management and segregation from back up heating system during maintenance.
- Maintenance requirements and lifecycle costs.
- Economic viability - higher costs compared to PV alternatives.

Resources & Suppliers

Supplier: This case study - Naked Energy	Other Suppliers: Chromasun Senergy	Solimpeks SunMaxx Solar Naked Energy

Operation Energy Energy Generation

Rooftop Hybrid (PV and Solar Thermal)

What is it?

This technology uses a hybrid solar panel. The panel simultaneously captures thermal and photovoltaic energy, with high-performance cells at the front maximising electricity production and a multi-layer system at the back that efficiently recovers heat for applications such as domestic hot water. The technology consists of a series of layers whose design and arrangement minimise thermal losses of the panel and maximise electrical production thanks to the cooling obtained from photovoltaic cells.	 Image Source: Abora

Asset Type

Hotels and Industrials.

Benefits

- Improved energy efficiency
- Reduced cost
- Temperature control
- One hybrid panel generates the same energy as 5 photovoltaic panels and costs less than 5 photovoltaic panels.

Business Case

Project analyses of hybrid solar installations have found that combining electricity and heat production in a single panel can dramatically cut demand from the grid. In monitored schemes using Abora's aHTech hybrid panels, energy consumption from the utility bill has been reduced by up to 80 per cent, with associated CO_2 emissions cut by around 95 per cent, highlighting the impact that high efficiency hybrid systems can have on overall building energy performance

Key Issues to Consider

- Higher upfront costs and limited availability of installers
- System complexity and requirement for dual integration, electrical and thermal connections complicate installation compared to standalone systems while dual functionality require careful coordination during installation.
- Heat Management and stagnation risk
- Supplementary heating systems requirement – thermal output unable to reach high temperatures
- Market maturity and performance variability limitations
- Maintenance and lifecycle considerations complexity – maintenance requirements for PVs and solar thermal combination due to dual functionality and lifespan compromise due to inadequate heat management

Resources & Suppliers

Supplier: This case study - Abora	Other Suppliers: Convert Energy Dualsun Naked Energy	Soblue Solmpeks

Operation Energy Energy Generation

Air Source Heat Pumps

What is it?

Air source heat pumps take heat from the air and transfer it to a fluid refrigerant. This fluid passes through a compressor, which raises the fluid's temperature and transfers the heat to your central heating system. They work by taking thermal energy (heat) that's naturally in the air. Even when it feels cold, there's still plenty of heat there that can be used. Heat pumps take this heat and raise its temperature before transferring the heat to your central heating system.	 Image Source: Heat from air

Asset Type

All asset types

Benefits

- Reduced energy consumption
- Reduced cost
- Improved EPC
- Considered a renewable technology

Business Case

There are case studies available that demonstrate cost savings to the end user and therefore financial payback. That said, the installation of air-source and electric-based HVAC systems should always be carefully considered, particularly when replacing existing gas systems that run on cheaper energy tariffs. Air-source systems should be considered where assets are properly insulated to avoid significant heat losses, therefore maximising the efficiencies of installed systems. Heat loss and payback calculations should always be undertaken prior to installation to ensure client and end users are aware of the potential implications.

Key Issues to Consider

- Building fabrics and insulation – heat pumps perform optimally within better insulated properties
- Low temperature operation, ASHPs operate at 35ºC to 55ºC flow and return temperatures unlike traditional gas boilers
- Running costs and operation
- Generally higher embodied carbon (per unit weight) within ASHPs compared to gas boilers
- Refrigerant gas leakage is anticipated. This can be harmful to the environment and to building occupants
- Spatial considerations, ASHPs require more space than gas boilers

Resources & Suppliers

Supplier: This case study - Bedrock Energy	Other Suppliers: Arkeon Cinergi Clade Daikin Eon	HERU Kensa MasterTherm Mitsubishi Electric pureTHERMAL THERMALearth

Operation Energy Energy Generation

Ground Source Heat Pumps

What is it?

A ground source heat pump (GSHP) is a renewable heating system that extracts heat from the ground using buried pipes filled with water and glycol. A compressor raises this heat to a usable temperature for hot water and space heating. Powered by electricity, it's a clean, combustion-free alternative to fossil fuel heating.	 Image Source: Energy Saving Trust

Asset Type

Large commercial and industrial buildings, including retail, light industrial, office buildings, and commercial properties

Benefits

- Reduced energy consumption
- Provides heating and cooling
- Works simultaneously i.e. heat one room while cooling another
- Long lifespan

Business Case

Ground source heat pumps are highly efficient, with a properly designed system delivering low running costs throughout its lifetime. Whilst a new gas boiler operates at approximately 90% efficiency, a GSHP achieves around 400% efficiency. This means the energy you use goes further, requiring less overall and reducing monthly energy bills.

Key Issues to Consider

- Spatial requirements - horizontal ground loops require approximately 2.5× property size whereas vertical boreholes need 50-200m depth across multiple boreholes spaced 5-10m apart.
- Higher installation costs compared to ASHP
- Building fabrics and insulation – heat pumps perform optimally within better insulated properties
- Low temperature operation – ASHPs operate at 35°C to 55°C flow and return temperatures unlike traditional gas boilers which operate at 65°C to 75°C which would often mean that radiators should be sized 1.5 to 2.5 larger
- Disruption during installation
- Performance advantages over ASHPs – GSHPs offer 20-30% higher efficiency than ASHPs due to ground temperature stability.

Resources & Suppliers

Supplier: This case study - Thermal Earth	Other Suppliers: Vital Energi

Operation Energy Energy Generation

Combined Heat and Power

What is it?

Combined Heat and Power, also called cogeneration, is a system that generates electricity and useful heat at the same time from a single fuel source (natural gas, biomass, biogas, hydrogen mix, etc.).

Image Source: Viessmann

Asset Type

- Manufacturing & Industrial Plants
- Hospitals & Healthcare Facilities
- Hotels & Large Commercial Buildings
- Universities & Large Campuses
- Data Centers
- Wastewater Treatment Plants & Agriculture

Benefits

Major Financial Drivers

- Reduced energy consumption
- Reduced cost
- High efficiency = lower fuel costs

Business Case

In a typical commercial case study, analysis showed that replacing standalone gas boilers and grid supplied electricity with a high efficiency combined heat and power (CHP) system led to substantial reductions in both energy costs and carbon emissions compared with the existing gas heating setup. By generating electricity on site and capturing the waste heat for space heating and hot water, the CHP unit made far better use of the fuel input, lowering operating costs while also reducing reliance on higher carbon grid power.

Key Issues to Consider

CHP Is Not Appropriate When:

- Heat load is low, seasonal, or intermittent
- Electricity is cheaper than gas
- Grid power is already low-carbon
- The site cannot use most of the recovered heat
- Space, noise, or emissions constraints exist

Resources & Suppliers

Supplier: This case study - 2G Energy Ltd.

Other Suppliers: Edina

Operation Energy Energy Storage

Battery storage - Smart Grid

What is it?

A Battery Energy Storage System designed specifically for construction sites, providing diesel-free power in a ruggedised, portable format suitable for tough, space-constrained environments.	 Image Source: AMPD Energy

Asset Type

Available in various configurations, designed for the tough, dynamic, and space-constrained needs of construction sites.

Benefits

- Reduced energy consumption
- Generators, reducing noise pollution
- Safe for use in poorly ventilated areas
- Zero direct emissions (no CO, CO2, NOx, PM, or SO2)

Business Case

A case study at a Modular Integrated Construction site found the project was able to save HKD854,000/year (approximately £86,000/year) on diesel fuel costs and achieve 495,865 kg annual carbon reduction with a 61% CO_2 reduction. Furthermore, there was zero on-site air pollution resulting in better conditions for workers.

Key Issues to Consider

- System sizing and integration with renewables – battery capacity should be based on daily consumption patterns and PV generation if applicable.
- Fire safety and installation location – outdoor installations are preferred while indoor installations must include fire rated compartments, access to fresh air ventilation, and smoke detection.
- Installation costs and ROI would need to be carefully considered
- Lifespan, degradation and warranty limitations

Resources & Suppliers

Supplier: This case study - AMPD Energy, included UK GBC Solution Library	Other Suppliers:

Operation Energy Energy Storage

Battery-Enabled Green Energy Supply System

What is it?

An intelligent energy management platform that connects battery storage systems across multiple properties into a single coordinated network. Instead of operating as isolated assets, each battery becomes part of a wider system that collectively buys, stores, and deploys electricity at the most cost-efficient and low-carbon times. The platform integrates directly with on-site renewables such as solar PV, EV chargers, and heat pumps, creating a localised, flexible energy ecosystem that reduces reliance on the wider grid.

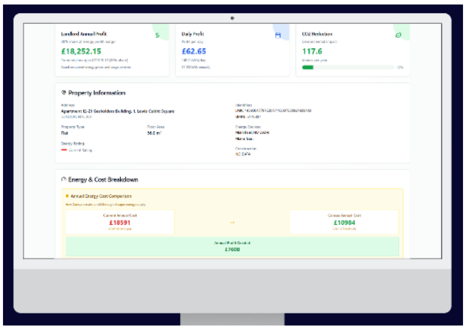


Image Source: Consus Energy

Asset Type

- Residential (Across all sub-sectors)
- Commercial (Offices)

Benefits

- Reduced carbon from sourcing 100% renewable electricity
- Reduced costs
- Real time monitoring
- Revenue generation

Business Case

During a pilot, the battery which was installed on the site, imported around 10 kWh of electricity from the grid during negative-price periods, effectively being paid 7.46 p/kWh to charge instead of paying the standard rate of 30 p/kWh. It was also found that, 1 kWh of stored energy was exported at 25.15 p/kWh on the same day, generating additional revenue and reducing overall energy costs. The pilot demonstrated the system's ability to capitalize on negative-pricing windows, supply energy efficiently, and sell surplus back to the grid for profit. When scaled across a portfolio, this approach can deliver significant cost savings and trading gains..

Key Issues to Consider

- Billing - Energy bills are paid retrospectively, with cash flow exposure after having paid for energy initially and recuperated over the monthly billing period. The energy the landlord purchases from us follows the same structure we use to procure it: three months' worth is paid upfront and then automatically recovered from the rental energy revenue generated by the tenants. (similar to existing PPA structures).
- High upfront CapEx is a challenge: the average installation cost is around £3,350 per residential property, while commercial systems typically run at £230 per kWh of storage. These investments usually come with a payback period of roughly four years.
- Space - Despite being a compact system, it takes up space and therefore, this solution is not suitable in ultra-high powered properties, without sub metering.
- Data Access - Needs access to historic consumption data to size systems accurately.

Resources & Suppliers

Supplier: This case study - Consus Energy	Other Suppliers:

Tenant Engagement - Water

What is it?

A data monitoring and tenant engagement platform that collects and displays real-time utility consumption data (electricity, gas, water) through screens and dashboards in buildings. The system helps real estate companies achieve ESG compliance and higher certification scores by raising tenant awareness and encouraging sustainable behaviour. It facilitates potential water and energy savings through behavioural change rather than physical interventions, though no specific quantified savings or detailed case studies with confirmed financial data are publicly available.	 Image Source: Adobe Stock

Asset Type

All types of commercial/public buildings.

Benefits

- Reduced energy consumption
- Improved Green building certifications scores

Business Case

In an office case study using hello energy's software and data driven insights, the building achieved energy savings of up to 3.5 per cent, equating to roughly €14,000 per year in reduced utility costs. Beyond the direct financial benefit, the platform also helped the owner and managing agent visualise performance, engage occupants and support ESG reporting, demonstrating how relatively modest percentage savings can translate into meaningful annual cash savings at portfolio scale.

Key Issues to Consider

- Lack of Data, Sub-metering & Transparency: Tenants cannot manage what they cannot measure.
- Awareness & Knowledge Gaps, Tenants may not understand:
    - What drives water + energy use in their space
    - How HVAC, lighting, or fixtures operate
    - How small leaks drastically increase water and energy consumption
    - The link between hot water use and energy bills

Resources & Suppliers

Supplier: This case study - Hello Energy	Other Suppliers:

Water Leak Detection & Monitoring

What is it?

Water leak detection technology connects pipes to WiFi, enabling real-time monitoring and control of water flow. The system provides continuous monitoring of water flow rates to detect abnormalities, with automatic shutoff that instantly isolates the water system when abnormal flow is detected, preventing leaks and minimising damage.

Image Source [Quensus]

Asset Type

Commercial office buildings, residential, construction sites, retail, industrial warehouses

Benefits

- Reduced energy consumption
- BREEAM support
- Water conservation through leak prevention

Business Case

A football stadium suspected of having a massive leak installed leak detection technology. Within 24 hours, the system identified faulty urinals and 21,000 litres per day wastage from loft water tanks. Repairs resulted in £12,000 annual savings (payback under two months), supply pipe replacement saved £82,000 per year, and data enabled a £57,000 rebate from the water supplier. Total: £94,000 annual savings plus £57,000 rebate.

An office block installed one unit monitoring the whole building (35mm pipe) and first floor (22mm pipe). The system alerted them to a low-level leak of 1,500 litres per day, costing £1,300 per year unbudgeted. Continuous monitoring saved 12% on annual billing. Automatic alerts triggered proactive maintenance and an estimated £50,000 had been saved from a potential burst.

Key Issues to Consider

- Sensor Accuracy & Reliability: different technologies (acoustic, flow-based, pressure, moisture, ultrasonic, thermal) vary widely in accuracy.
- Coverage & Placement: leak detection is only as good as the placement of sensors
- Communication & Connectivity
- False Positives & False Negatives: False positives trigger unnecessary maintenance or shutdowns whereas false negatives fail to catch actual leaks.
- Sensor Reliability: Sensors may drift, degrade, or get clogged.
- Environmental Variability: Temperature, vibration, pressure fluctuations, and flow dynamics can all create patterns that look like leaks.

Resources & Suppliers

Supplier: This case study - Quensus	Other Suppliers: Guardian LAIER Showerkap Infersens Smart Flow	Watergate Wint Hydrelis

Water Efficient Appliances - Toilets

What is it?

This is a toilet cistern system that captures condensate water from air conditioning units and uses it to flush toilets instead of sending it to waste. Rather than allowing billions of litres of AC condensate to drain away annually, this system redirects that water for a practical purpose.	 Image Source UK GBC Solutions Library

Asset Type	Benefits
All types of commercial/public buildings.	• Reduced energy consumption • Reduced water wastage • Reduced cost • Green building certifications

Business Case	Key Issues to Consider
A case study found that water conservation translated to financial savings of £212.98 based on water rates of £3.19 per cubic metre System to flush toilets with waste-water from AC units. With each unit costing £160, the return on investment was achieved in 15 months.	• Actual vs. Rated Water Savings: many toilets are rated under ideal lab conditions. • Flush Performance & User Satisfaction: the most common concern with high-efficiency toilets (HETs) is poor flush performance. • Plumbing System Compatibility

Resources & Suppliers

Supplier: This case study - Encore included UK GBC Solutions Library	Other Suppliers:

Waste Water Heat Recovery

What is it?

Waste Water Heat Recovery for Showers (WWHRS) is a simple heat recovery technology that recovers the heat energy from wasted shower water. It uses it to preheat mains cold water and sends the preheated water to the shower and/or water heater.

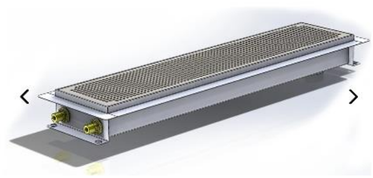


Image Source Recoup

Asset Type

All buildings with showers.

Benefits

- Reduced energy consumption
- Easy installation
- Part of retrofit projects
- Green building certifications

Business Case

A case study completed on a Gym in London found that calculations prior to installation of this drainage system showed saving predictions of £11,010.75 per annum, meaning the investment into all units installed would be returned within 1.1 years. In addition, this technology reduces CO_2 production by 43,000 kg per annum, along with reduced load on the facility's water heaters.

Key Issues to Consider

- Asset Suitability - most suitable for developments with high daily hot water demand such as hotels, student accommodations, gyms.
- Can be non-feasible to install as retrofit solution, due to spatial requirements and disruption/costs.
- Energy savings and ROI - water heating costs reduced by 20%-40% by recovering heat from showers.
- Maintenance and operational costs – no planned maintenance requirements due to being passive solution minimising costs throughout lifespan.

Resources & Suppliers

Supplier: This case study - Recoup included UK GBC Solutions Library

Other Suppliers:
Sanura

Operation Air Quality

Air Quality Optimisation Through HVAC

What is it?

This system employs IoT infrastructure combined with proprietary air pollution analysis and machine learning algorithms to manage a building's HVAC systems. By remotely controlling the Building Management System (BMS), it reduces the infiltration of polluted outdoor air into the building, reportedly achieving indoor air pollution reductions of approximately 40% or more. The technology optimises when and how a building "breathes" regulating air intake based on real-time pollution monitoring to maintain better indoor air quality whilst still ensuring adequate ventilation.	 Image Source Eagle Rivet

Asset Type

All types of commercial/public buildings.

Benefits

- Reduced energy consumption
- Decreased maintenance costs (such as air duct cleaning).
- Extended life span of HVAC components
- Reduced air pollution

Business Case

Urecsys is offered as a low cost, cloud based service, typically priced at around $0.18 per square metre per month (about £0.16/m²/month). Case studies indicate that its AI driven optimisation of outside air intake can deliver energy reductions of roughly 25 to 30 per cent in the power consumption of ventilation systems, by reducing unnecessary fan and conditioning loads while maintaining good indoor air quality.

Key Issues to Consider

- Ventilation Rates & Fresh Air Supply
- Filtration Efficiency: Filter selection is critical
- Contaminant Sources & Load: HVAC systems cannot solve everything if pollutant loads are high

Resources & Suppliers

Suppliers: This case study - Urecsys included UK GBC Solutions Library

Other Suppliers:
Rensair
Enverid
Aircuity

Natural Ventilation

What is it?

Natural ventilation is an energy-saving technology that uses passive strategies to supply outdoor air to a building's interior for ventilation and cooling. Unlike mechanical ventilation systems that rely on powered fans and ducts, natural ventilation systems harness natural forces, such as wind and thermal buoyancy to facilitate air movement through strategically designed openings, including windows, vents, roof terminals, and louvres.

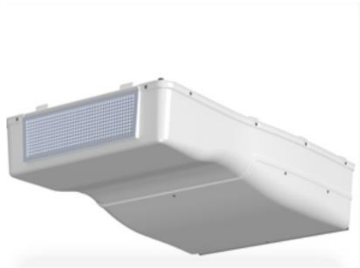


Image Source Passivent

Asset Type

Commercial, Healthcare, Leisure, Education, Offices

Benefits

- Reduced energy consumption
- Reduced cost
- Improved indoor air quality
- Low Maintenance required

Business Case

Studies comparing ventilation strategies indicate that naturally ventilated office buildings typically consume around 40 kWh/m² of energy per year, whereas mechanically ventilated buildings use between 50 and 90 kWh/m² annually, depending on the system type and level of fan power and heat recovery. This highlights the inherent efficiency advantages of well-designed natural ventilation, particularly in moderate climates, while also underlining the importance of system selection and control strategy when mechanical ventilation is required.

Key Issues to Consider

Natural ventilation works best in climates where: outdoor temperatures are comfortable for significant parts of the year, humidity is manageable and outdoor air quality is good.

Resources & Suppliers

Suppliers: This case study - Passivent

Other Suppliers:
Breathing Buildings
Monodraught

Night Purging Ventilation

What is it?

Night-Purge Ventilation (or "night flushing") keeps windows and other passive ventilation openings closed during the day, but open at night to flush warm air out of the building and cool thermal mass for the next day.

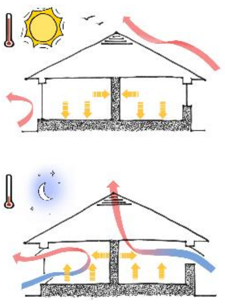


Image Source Venture Well

Asset Type

Commercial, Education, Offices

Benefits

- Reduced energy consumption
- Reduced cost
- Improved indoor air quality
- Low Maintenance required

Business Case

Case studies and simulation work on night purge ventilation show a wide range of potential benefits, with overall building energy savings reported from around 10 per cent up to as high as 83 per cent in favourable climates and building types. In addition to these whole-building reductions, targeting the cooling plant specifically can yield further gains, with some assessments indicating that optimised night purge strategies can cut compressor start up energy by up to 20 per cent. Together, these findings highlight the potential of using cooler night-time air to pre-cool the building fabric, reducing daytime peak loads and reliance on mechanical cooling.

Key Issues to Consider

Security can be a concern, especially in buildings that are unoccupied at night. This can be overcome with adequate security structures, such as bars or screens, or more sophisticated electronic systems.

Resources & Suppliers

Suppliers: This case study - Venture Well

Other Suppliers:
Breathing Buildings
Monodraught

Air Filtering Technology

What is it?

The technology uses electromagnetic filtration utilising active polarisation fields to bind micro-particulates together that standard filters let pass, like viruses, bacteria, and mould, and removes Volatile Organic Compounds (VOCs) and other harmful particulates. It uses low pressure drop media reducing strain on Heating, Ventilation, and Air Conditioning (HVAC) systems.

Image Source Blade Air

Asset Type

Commercial buildings, with HVAC systems

Benefits

- Reduced energy consumption
- Increased employee wellbeing
- Cleaner air quality
- Reduced air pollution

Business Case

Blade Air reports that its electrostatic filtration and indoor air quality solutions can deliver substantial efficiency gains at the HVAC system level. By reducing fan motor effort, sites can save up to 75 per cent in energy consumption for air handling, while improved filter design and longer service life can cut scheduled maintenance labour and related operational costs by up to 50 per cent.

Key Issues to Consider

- Filtration Efficiency (Particle Size Capture)
- Pressure Drop & Fan Capacity
- Maintenance & Replacement Frequency

Resources & Suppliers

Suppliers: This case study - Blade Air

Other Suppliers:
Vox Aeris
Rensair
Enverid
Air Quality
Camfil

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