



Continued monitoring for energy performance is normally led by a property manager, with input from the facilities manager. Technical support from an energy manager or other competent individual is usually central to the process.

Continued monitoring for energy performance involves consideration of the following four steps:



## STEP 1: ENERGY MEASUREMENT AND DATA COLLECTION FROM ADVANCED SUB-METERING

It is important to be able to measure a property's energy consumption profile frequently, regularly and accurately. Reliable advanced metering and sub-metering enables detailed and effective energy monitoring and analysis.



## STEP 2: KEY PERFORMANCE INDICATORS

Key performance indicators (KPI) support a property's continuous improvement in energy performance. KPIs provide visibility of the fulfilment of energy objectives and drives improvement by encouraging energy efficiency measures to be delivered

Good energy KPIs will be visible to stakeholders. The meaning of KPIs should be clear, including the extent to which a property is making progress in relation to the performance being measured through the KPIs.

There are two types of KPIs that an energy manager should consider:

### STRATEGIC KPIS: High-level or industry-level measures.

A strategic KPI that is commonly used to track and benchmark a building's performance is the energy usage intensity (EUI).

The EUI expresses a building's energy use as a function of its size. EUI is typically expressed as energy per square meter per year. This is calculated by dividing the total energy consumed by a building in a year by the building's total gross floor area. EUI can be defined as a building's energy performance indicator.

As a building's energy usage intensity is related to the building's total energy usage, it is important that accurate data from the main utility meters can be obtained.

By using EUI, a building's energy performance can be benchmarked against comparable and/or average buildings.

By using data from advanced sub-meters, it is possible to review how system components, such as lighting and HVAC systems, for example, compare to industry standards.

For example, comparing a property's EUI against CIBSE's Guide F: Energy Efficiency in Buildings, which includes industry benchmarks for different building types and system components.

To benchmark buildings, The Real Estate Environmental Benchmark (REEB), a publicly available operational benchmark of environmental performance for commercial property in the UK, is also beneficial.

### CONTROL-SPECIFIC KPI: This focuses on specific plant and equipment.

For example, a KPI could be set for optimal setpoints for HVAC systems, so that deviations from optimal parameters can be reviewed. Deviating from optimal parameters can be due to fault equipment or control settings which would increase a property's energy usage unnecessarily.

## STEP 3: WHEN AND WHERE ENERGY IS USED

Monitoring and analysing collected energy consumption data, profiles and patterns and comparing these to KPIs benchmark helps to identify areas of energy wastage. In turn, this enables opportunities for energy performance improvement to be identified and evaluated, and progress towards energy targets to be assessed.

As part of this, it is important that energy usage patterns are reviewed through consideration of annual, monthly and seasonal changes in demand. By using accurate data from advanced meters, energy managers can investigate data at a granular level to support understanding changes in peak load times and baseload.

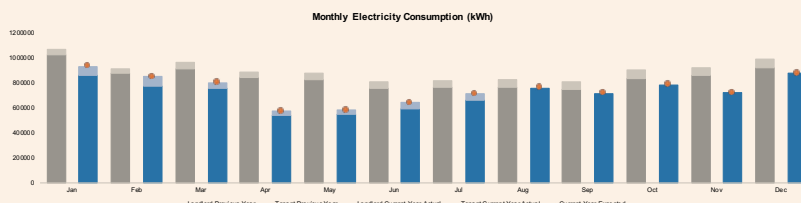
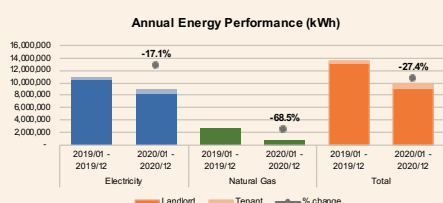
## STEP 4: ENERGY REPORTING

Energy reports are important for keeping track of a property's energy performance and the extent to which progress is being made against targets. Compiling an energy report can also encourage on-going energy monitoring by a range of property stakeholders.

Energy reports may be in the form of dashboards that can be used to engage with stakeholders, including property managers, employees and occupiers, who can use the information contained within the reports to act on energy saving recommendations.

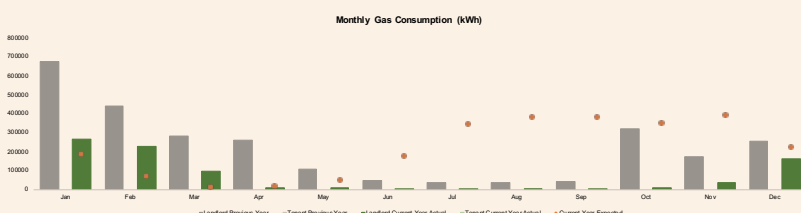
Dashboards should be shared with stakeholders on a regular basis (typically monthly), and should present information in an understandable and engaging way. An example of an energy dashboard which demonstrates how monthly consumption changes over time and how a building is performing against a target can be seen below.

### Example energy performance dashboard of a shopping centre



#### Energy target: Reduce energy intensity by 40% by 2030 (kWh/m<sup>2</sup>)

	Baseline 2016/17	Current 2020/12	Target 2030
Total energy consumption (kWh)	15,189,684	9,853,540	9,113,811
Intensity (kWh/m <sup>2</sup> )	74	48	44
Floor area (m <sup>2</sup> )	205,623		
% reduction		-35%	-40%



On the above charts, orange dots indicate expected consumption based on external temperature. If the column is below the orange dot then the system is operating efficiently but if the column is above the orange dot then the system is less efficient vs the previous year.

#### Raw data

Utility	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Electricity	Previous year	1,075,318	921,159	970,386	890,468	881,702	815,037	822,602	832,916	815,898	904,992	930,222	999,662	10,860,362
	Current Year Actual	938,558	862,585	807,589	576,171	585,152	646,922	717,324	762,199	717,716	789,950	724,745	881,599	9,000,509
	YoY % change	-12.7%	-7.4%	-16.8%	-35.3%	-33.6%	-20.6%	-12.8%	-8.5%	-12.0%	-12.7%	-22.1%	-11.8%	-17.1%
	Current year Expected	938,558	862,585	807,589	576,171	585,152	646,922	717,324	762,199	717,716	789,950	724,745	881,599	9,000,509
	Actual vs Expected	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Natural Gas	Previous year	682,359	442,157	286,262	261,453	109,563	50,951	40,093	39,098	44,044	320,614	174,099	257,520	2,708,213
	Current Year Actual	266,093	232,326	97,359	12,852	9,161	5,906	5,607	5,454	6,978	11,286	36,687	163,322	853,031
	YoY % change	-61.0%	-47.5%	-66.0%	-95.1%	-91.6%	-88.4%	-86.0%	-86.1%	-84.2%	-96.5%	-78.9%	-36.6%	-68.5%
	Current year Expected	185,794	68,829	8,153	14,440	47,044	176,145	347,206	384,343	385,951	350,131	393,846	222,931	2,584,815
	Actual vs Expected	43.2%	237.5%	1094.1%	-11.0%	-80.5%	-96.6%	-98.4%	-98.6%	-98.2%	-96.8%	-90.7%	-26.7%	-67.0%