Continuous monitoring and benchmarking Guide for Capital Projects

Contents
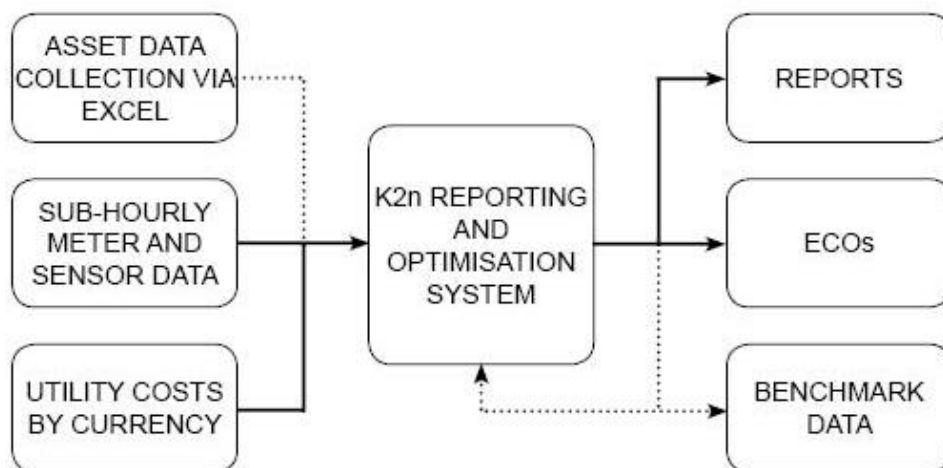
1   Introduction

ESFA and K2n have set up and developed the K2n National Database, based on the iSERV methodology, to establish realistic benchmarks and feedback in use for school buildings and have developed monthly reports to schools and their contractors. These reports will help to manage energy consumption and identify avoidable waste. The reports also enable the contractor to show compliance with their contractual deliverables relating to energy targets and feedback.

The iSERV methodology was developed under an EU funded project to produce benchmarks for energy end uses across a range of building types. The methodology and database used for benchmarking that was developed during this project has been rolled out in the UK via the K2n fully web-based platform. This platform provides the basis for the K2n National Database.

ESFA have adopted the iSERV benchmarking methodology and K2n National Database to produce national benchmarks for energy use for Schools.

The K2n National Database helps enable continuous improvement in schools energy and water performance based on potential savings identified by the collection and analysis of sub-hourly energy and water end use data. It monitors plant performance related to different activity areas and compares the performance to benchmark data for that relationship. It can be used by the School and/or contractor to identify Energy Conservation Opportunities (ECOs).

Contractors on ESFA school building projects are required to supply sub-hourly interval continuous monitoring data to the K2n National Database to enable automated reporting against the contractual ESFA targets on a monthly basis. Ideally this data would be supplied on a daily basis to the K2n National Database.

The K2n National Database provides the automated reporting of performance against benchmarks tailored to each School, using the 15 minute energy consumption data and other performance in use data such as zone temperatures and carbon dioxide levels. These reports can be sent to contractors and Schools.

The 15 minute data sent to the K2n National Database is also used to validate meter readings; to track the energy end uses of the schools; and to identify system performance problems.

2 Contractual Requirements

The sub-hourly continuous monitoring and benchmarking of water and energy end use loads, plus zonal temperature and carbon dioxide levels, via the iSERV methodology is required by the Project Agreement. The data collected will be reported to contractors and school facility managers to help identify and remedy problems such as inadequate system control, component failures, or wrong default settings.

Contractors should use the iSERV methodology, via the K2n National Database, to automatically monitor and report on schools' energy and water use.

As part of the contractual requirements, ESFA requires the energy and water use data, along with zonal temperature and CO_2 level data, to be submitted to the national database operated by K2n, in the format defined on the K2n building assets description spreadsheet. This ensures that the data for all schools in ESFA programmes can be analysed centrally to produce national benchmarks for schools and to monitor their performance in use.

The Contractor is required to complete the K2n building assets description spreadsheet for each School (originally termed the iSERV spreadsheet). The use of this spreadsheet ensures that all component, system, sensor and meter names relate to the correct physical items or spaces, and that the data is in the format required for use in the national benchmarking analysis.

The Contractor is required to take out the initial K2n subscription and setup this service for the school in the first year, and help the school to use the K2n National Database reports to benchmark the performance of the school. The Contractor is then required to pay the ongoing annual K2n costs for the handling of the data by the K2n national database.

The Contractor should use the K2n National Database to prove that all connected meters are connected and working correctly in the first year, to enable them to remedy any faults in the metering or other systems during the defects period. Further information can be obtained from www.k2nenergy.com.

In addition to the above requirements, the Contractor may use the included reports from the K2n National Database to provide the contractual monthly, annual or other custom reports for schools on energy consumption and system performance. Other systems approved by ESFA may be used for this aspect if preferred.

2.1 Further guidance for Contractors on use of the iSERV/K2n National Database for continuous monitoring and benchmarking of PSBP capital projects

2.1.1 Monthly reports of achieved performance

The included K2n reports can be used to provide the feedback interface for the school users by means of the agreed monthly reporting templates. Providing these monthly reports to the Schools will enable them to provide appropriate control over those energy consumers which they influence, helping the overall School energy targets to be achieved. Alternatively, Contractors can choose to use other energy management reporting software to produce similar feedback reports for the school provided that the report formats have been approved by the ESFA.

Monthly K2n reports can be set to report progress against any designated end of year month. For the first year this will be based on sector average consumption profiles, for year two onwards this will be profiled against the previous twelve months for the School. This enables tracking of consumption over the year, prediction of progress against energy targets to be assessed, and allows early corrective action to be taken if needed.

2.1.2 Data required

To participate in the wider community of Building Owners/Operators/Energy Managers providing data to K2n and the ESFA, which enables up-to-date national benchmarks to be produced and maintained for ESFA funded schools and their systems, the ESFA requires the Contractor to comply with the K2n data reporting standards. To enable this to happen the data from schools must be submitted in the agreed format. If the Contractor chooses to use a similar system to K2n to record and analyse data and to produce reports, the system still needs to upload monthly 15 minute data to the K2n National Database for ESFA benchmarking purposes. The data format will need to be compatible with the K2n National Database. Approval will depend on demonstration of regular successful transfer of the data.

This requires the Contractor to fully describe each School with the data requested in the fields in the K2n building assets spreadsheet. If not already provided the latest version can be obtained on request from info@k2nenergy.com. Please request from

K2n the latest ESFA spreadsheet to be sure to receive the correct version. A completed spreadsheet for an example school will also be provided.

The operational data required for the meters and sensors described in the K2n building assets spreadsheet can usually be exported via a BEMS system, or directly from meters and sensors with the appropriate data collection and transmission facilities.

Alternatively, manual transmission of the data to a dedicated email address can be used to transmit the data to K2n. This will need to be sent by midnight on the 1st day of each month, including all data for the previous month, to enable inclusion in the automated reports which will be sent to the Contractor and/or the School.

The minimum level of sensor data required is zone space temperature sensor data for each heating zone, and data from an outside air temperature sensor. This allows the energy performance to be evaluated. If additional sensor data is provided, e.g. room temperature data for each room and CO_2 sensor data, further insights into the effectiveness of the building services HVAC systems can be provided to the school and Contractor. Contractors can use this data to aid seasonal commissioning adjustments. Correlating the internal conditions with energy consumption enables the identification of avoidable energy use, building performance and controls issues, and sensors or meters that are likely to be out of calibration. This provides a powerful means of remote system diagnosis.

The K2n National Database is capable of assessing energy use per space if appropriate sensors are in place, and this is also included within the stated costs set out below.

2.1.3 Costs

Contractors for schools pay the initial standard K2n support setup cost, which includes the first years rental cost, and then the school pays the ongoing annual support costs after the first year. See cost details in section **Error! Reference source not found.**.

The support setup cost includes email and analytical support from K2n for the first full year of data provided to the platform. This support will help to validate the data and assist in identifying meter and sensor data errors. This enables the ESFA and the Contractor to be sure that defects in the monitoring and building systems are identified and corrected during the first year. In addition to the mandatory meter data required, Contractors can also take advantage of providing sensor data for all monitored zones to help 'fine-tune' the building operation. This service is provided within the annual cost and has already proved valuable to Contractors who have

been early adopters of the system and have developed their reporting interface with K2n.

After the first year, there is then an annual rental cost for subsequent years, which includes everything in the first years' costs except the optional annual support. The optional annual support package covers all support required from K2n including routine updates to School descriptions. Alternatively, this support can be purchased as needed at the hourly consultancy rate prevailing at the start of each year. These costs are detailed in the table at the end of this document.

The monthly reports sent to ESFA, schools and Contractors during the defects and liability period provide an independent assessment of the operational performance achieved against ESFA contractual targets. The ESFA will periodically confirm whether the K2n National Database continues to provide the means of demonstrating compliance with the contractual requirements for energy monitoring and reporting.

2.1.4 Detailed description of K2n support services:

2.1.4.1 Initial Support Setup Costs: (payable by contractor)

The Initial support setup costs allow for entering new Schools into the Platform and the first 12 months reports to the email addresses agreed with the Contractor. This includes emails, phone calls from K2n, and other remote effort required to make the school description and data robust.

The monthly emailed reports can be tailored by the Contractor from a range of existing reports, and can vary in their content for up to 10 different email addresses. In this instance 'first 12 months' means the period covering the first year's data made available to the K2n National Database i.e. it can be less than 12 monthly reports but will provide the first annual report on achieved performance as required by the ESFA.

The monthly reports start being provided once the initial support setup invoice has been paid.

2.1.4.2 Platform Annual Rental Costs: (payable by contractor for first 15 months and thereafter by the school)

After the first 12 months' reports, these are the ongoing costs that will be incurred for continued use of the K2n National Database and receipt of the reports as shown above. All data uploads, storage and monthly reports are included in this cost.

Annual costs are dependent on the volume of schools covered by each agreement i.e. volume discounts are achieved by the number of schools each contractor has on the platform.

Reporting is not required for year two onwards but the reports and data will still be of great value to the Contractor and School. These costs can either be paid on an annual basis one year in advance as noted in section 2.2.5. For example, a Contractor with a single Primary School would pay 12 months costs upfront of £300 + VAT, or for an agreed period of years upfront within their Capital Expenditure for the project.

2.1.4.3 Annual support package:

This covers reasonable email support for a school and any phone calls from K2n to the contractor for a year for up to 10 instances per school. Work covered by this package includes routine maintenance tasks such as updates to School descriptions sent by the school or contractor in the spreadsheet format required; changes to the reports included in monthly emails; changing recipients of reports; queries on monthly reports; and other routine tasks of this nature. This package must be purchased at the same time as the platform rental costs and follows the same billing mechanism i.e. 15 months upfront and then every quarter.

This package does not cover work by K2n to help populate the spreadsheets or identify problems with the School operation or systems. This type of work is covered by the next category if required. These costs cannot be incurred without a written request and quotation, so cannot be incurred inadvertently.

2.1.4.4 Ad hoc support (payable by contractor in first year following handover and thereafter by the school):

These are costs incurred for all work outside of the above categories, and for work that would usually be covered by the annual support package if this is not taken. K2n would consider these to be exceptional costs and would work to avoid them with the contractor where possible. A main example is a workshop as shown in the costs table, where K2n would provide specific time and support to a Contractor to help them maximise the value from the platform. Other examples would be where K2n have to spend time assisting the contractor in resolving operational issues, beyond ensuring the data in the platform is correct.

2.1.5 Schedule of K2n Support Costs for ESFA Schools

K2n Support Setup Costs (per school)

Variable Cost	Fixed Costs			
BMS Data to K2n Platform Setup	Configuring Primary School Spreadsheet (Optional)	Configuring Secondary School Spreadsheet (Optional)	Operational Data Setup	First Year Rental
TBA	£2,000	£3,500	£1,500	Free

Yearly Rental Costs By Volume

	Platform Annual Rental Cost (per school)		
	1 > 25 Schools	25 - 100	100+
Primary School	£300	£275	£250
Secondary School	£500	£450	£400
Optional annual support package	£100/school	£75/school	£50/school

K2n Ongoing Support - Ad Hoc

	Variable	Variable
	Workshop	Consultancy
Support Types	£1,000 + Expenses	£80 per hour

Inflation   **RPI Increase per year**

VAT   **All costs are subject to VAT at the prevailing rate**