

# K2n Building Services Design and Asset Spreadsheet Completion Guide – January 2019

## Purpose and operation

- The purpose of the Platform is to enable Clients to understand how the buildings they are funding are performing; the Contractors to understand how their designs work in practice; and the Occupants to operate their buildings efficiently.
- The DfE requires ([https://www.k2nenergy.com/priority\\_schools.htm](https://www.k2nenergy.com/priority_schools.htm)) contractors to describe their buildings, meters, sensors, systems, components and activities using the K2n building asset data sheet (found at <https://www.k2nenergy.com/resources.htm>). This link also provides the latest Asset Data Sheet along with an example of its completion.
- This completed sheet should be submitted to K2n for uploading to the K2n iSERV Platform. From experience K2n recommend that you commission us to complete the spreadsheet from your 'as-built' documents to ensure you are compliant with the requirements.

## Building services design recommendations

To meet the contractual reporting requirements, it is recommended that the following concept approaches to services design are undertaken:

- Ensure systems, meters and sensors are designed to enable performance of building and performance of occupants to be separated without any estimates. For example, occupant controlled small power and lighting circuits should have their own meters, including lighting separated from small power, without any HVAC or other building services connected to them.
- Extract fans, ventilation Heat Recovery Units and any other building services located in occupied spaces should be on their own separately metered circuit(s). One electrical circuit could supply the HRU fans in all classrooms for example.
- Many items of HVAC plant come with their own built-in data collection and this data can also be described and sent to the K2n Platform if available.

## Asset Spreadsheet Key Concepts

- All meters, sensors, components and systems entered into the spreadsheet become available to choose elsewhere in the sheet in context.
- All spreadsheet cells with <Ctrl-↓> in them have drop-down options to choose from. Some drop down boxes allow choice of more than one item e.g. components in a HVAC system.
- Describe and connect assets as they physically exist.
- Ensure sub-meters have parent meters chosen from a list of existing meters
- HVAC SYSTEMS are simply virtual collections of HVAC COMPONENTS. An HVAC component could serve only one system (e.g. an extract fan) or many systems (e.g. a boiler supplying separate heating and DHW systems).
- Describe as many HVAC systems as needed to replicate what would be seen as different systems on site e.g. you may have many Extract Fan systems and only one heating system but all are equally important in assessing end use energy demand.
- Meters connect ONLY to HVAC components, Lighting, Small Power and Other Systems. It is important that meters are connected to ALL the components and systems they supply. The platform handles disaggregating demand to each of the components.
- Spaces have Systems serving them. Meters are not connected directly to spaces.
- Sensors are connected to SPACES when they represent conditions in the space

- Sensors are connected to COMPONENTS when they represent conditions in the component
- Once the Asset Data sheet is complete, then the platform is ready to produce reports from Operational Data sent to the K2n platform.

## Practical tips/recommendations

### All contractors

- Ensure component, system, sensor and meter names relate to physical items or spaces where possible as these names will be used in the reports.
- You can copy and paste within the spreadsheet but do not paste over the <Ctrl-↓> cells, unless with contents which are available under the <Ctrl-↓>. For example, you can copy and paste the same HVAC system into all spaces.
- Always use the grey “Add a ....” boxes to add additional rows into the spreadsheet
- You can delete a row by highlighting it and pressing ‘delete’

### BEMS and meter installer

- The reporting requires you to procure a means of collecting, storing and transmitting data to the K2n Platform. Data transmission will usually be to a unique email address which K2n will provide to you. To date almost all data collection and transmission to the Platform is performed via a BEMS system.
- BEMS and outstations to be capable of storing up to 6 months data before overwriting to allow for external data collection failures for an extended period
- BEMS to be ideally capable of running on a headless PC to prevent PC being turned off accidentally
- BEMS to be equipped with 4G or other standalone data access to enable data collection separate to School Network. This is due to a number of data collection failures occurring due to over-zealous IT security.
- It is recommended this operational data be collected at 15 minute intervals and be automatically sent DAILY to the K2n platform from the moment the BEMS or other data collection system is commissioned. This enables us to identify and inform you of some meter and sensor problems early enough for them to be rectified at minimum cost and disruption e.g. incoherent main and sub-meter readings or unusual sensor values.
- Download list of meters and sensors from BEMS or other Data Collection System once building is near completion or from finished building
- Download operational data files for all meters and sensors from the BEMS. Copy the Unique ID from these files into the spreadsheet EXACTLY as they appear in the data file
- Ensure meter and sensor data collection regime is set to ‘precision’ or high accuracy to ensure data resolution is correct. Do not allow the BEMS to interpolate between data collection intervals.
- Electricity meters and CT’s installed should be capable of recording to 2% accuracy and 1 Wh resolution ideally. Gas meters should be accurate to 2% as well as 0.1 kWh resolution if possible. Water meters should resolve to 1 litre and be within 3%. Heat meters should resolve to 0.1 kWh and 5% accuracy.
- Data should also be collected at this 1 Wh resolution for most sub-meters to enable the detail required for action to be seen. Main incoming meters are usually OK at 0.1 kWh resolution. Meter ‘flips’, e.g. 9999 to 0, are handled automatically by the K2n platform.

### M&E Contractor

- Major data failures occur through a lack of a separately metered main incomer for each Utility into the building, and through not metering every main supply off each distribution board. Failure in one meter cannot be accommodated in the mandatory reports in this instance.
- Design all circuits to allow clear separation of occupant and building consumption. Separate out Server Room Small Power and Cooling loads to enable appropriate control actions to be shown.
- M&E contractor should complete the meters and sensors information
- M&E contractor should provide details of all HVAC components and connect these via HVAC systems to the spaces they serve. They should also connect the correct utility meters to the components they supply.
- M&E contractor should describe the number of separately metered lighting and small power systems and connect each to the spaces they serve and their meters
- M&E contractor should connect sensors to the spaces or components they belong to

### Building designer/Facilities Manager

- Note design occupancy on Building row, along with Gross Internal Area of building to include all serviced floor spaces, including cupboards, stores, plant rooms and circulation areas.
- Download list of spaces, their GIA, NIA, TFA areas, and primary activities from space utilization databases or from BIM models where possible. Choose closest activity from <Ctrl-↓> choices.
- Each separately metered External Lighting system should be assigned an approximate area it illuminates. These areas should be noted as 'external space' under 'activity type'

### Validation and checklist

The 'validate' button on spreadsheet shows unused items and critical errors on data entered. It does NOT note if you've described everything that should be there.

All headings marked with a \* are mandatory fields and must be completed

Most headings have a description available by pressing <Ctrl-↓>

Basic checklist:

Item	Y/N
Does the services design allow separation of building use from occupant use for all utilities?	
Have all Building Services components been described in the components section?	
Have all separately metered lighting and small power systems been described?	
Have all meters for which data will be collected been described?	
Have all sensors for which data will be collected been described?	
Has the Unique ID for each meter/sensor been copied EXACTLY from downloaded data?	
Have all meters been connected to ALL the HVAC components, lighting and small power systems they serve?	
Have all HVAC components been connected to ALL the HVAC systems they serve?	
Have all Sensors been connected to the HVAC systems and Spaces they monitor?	
Do the number of HVAC, Lighting and Small Power systems described agree with the number expected from the data availability?	
Are all HVAC, Lighting and Small Power Systems connected to ALL spaces they serve?	

A consultancy service is offered, if needed, from [info@k2nenergy.com](mailto:info@k2nenergy.com)

### In operation

Once the spreadsheet is loaded, then we move into the operational phase. This requires:

- An email address, to which all data should be sent from each School, will be issued by K2n to whoever is nominated as the person responsible for sending the data.
- Email addresses for recipients of reports from the system to be provided to K2n.
- It is recommended to upload data automatically to the K2n platform each night. This minimises delays in identifying missing or unexpected data and provides a second repository for any data collected.
- Whilst we take great care with the data supplied it is still possible for errors to occur and the end user is strongly urged to maintain their own data records for each meter as well.
- The initial registration fee covers 15 months use of the K2n platform where full utility data is available, to enable the first annual EFA compliance report to be issued. Further use of the system will incur further agreed annual costs.