



# Energy Storage Solutions Brief

IOTech's edge software is helping the providers of Battery Energy Storage Systems (BESS) deliver safer, more efficient, and cost-effective solutions to their customers.



# Solution Benefits

- Supports seamless data acquisition / control with the lower level BMS, EMM and PCS systems
- High flexibility to adapt to different battery and inverter vendors, and different site configurations
- Data normalization to the SunSpec model
- Data fusion, system control logic and data visualization at the edge
- Longer-term data historian / analytics functions and reporting
- Reduce development costs and time to market for new IoT capabilities
- Simple integration into 3rd party software stacks



# Enabling Intelligent Battery Energy Storage Systems

Competitive advantage, innovation and product differentiation are fundamental to creating successful commercial offerings that resonate with customers and help BESS vendors capture market share. Gathering, standardizing, and then exploiting the rich data held in the underlying battery, inverter and other equipment control systems allows BESS customers to optimize equipment performance, diagnose faults, and make informed decisions around charging vs. discharging and bidding for supply.

Meanwhile, BESS vendors need to build and deliver these capabilities quickly, in a repeatable fashion, and in a cost-effective, non-proprietary way. They need to be able to choose and easily integrate energy products from a variety of equipment suppliers to for example, maximize energy density, and create the most appropriate overall hardware and software solution for each of their customers or customer sites.



IOTech edge software solutions are helping BESS vendors to exploit the rich data held in the underlying battery, inverter and other equipment.

## Solution Description

The first step is to access all the field data such as voltages, currents, SOC, temperatures and more, held in for example each equipment supplier's battery / environment management or power control system. Several problems are immediately apparent:

- Each supplier maps and names the required data in subtly or often completely different ways. Some use SunSpec conventions, others do not or only partially comply
- While the suppliers do provide data APIs, these often implement different OT protocols: while one might use Modbus, others may use different standards such as CAN bus or OPC-UA
- There is a need to overcome the fragmentation of data across the 'islands' of automation provided by each supplier – and avoid over-reliance on their own, often proprietary and costly hardware / software control systems





IOTech provides easy-to-use software products and tools to help overcome barriers to adoption:

### The Energy Data Fusion Platform

- IOTech have created a universal data API parser which can scan a supplier's data specification and automatically create a data 'profile' or mapping of their data into a standardized, fully SunSpec compliant format
- The data profiles are then configured using IOTech's management tool and loaded into Edge Xpert or Edge Xrt IoT software platform products, where IOTech's 'smart connectors' take care of both running the data mappings, and communicating over the appropriate protocols. The net result is that field data from across the BESS equipment is then quickly and efficiently available in a single format, in one place, and regardless of the heterogeneity of the suppliers' underlying data and communications protocols. And, for commercial or other reasons, if one equipment supplier is swapped out for another, the system can be quickly reconfigured to communicate with the new supplier's systems
- IOTech's software runs any commodity edge hardware gateway or industrial PC, and can also run in virtualized environments if desired. It is a very cost-effective, open solution

Once the data is being securely accessed, translated, and ingested into this Data Fusion Platform (based on Edge Xpert or Edge Xrt), IOTech can then start to provide value-added activity with it at the edge, for example:

- Correlate and analyze data from various BMS, EMMU and PCS sources to ensure balanced, safe, and efficient operations of the overall energy solution. Edge Xpert has a dedicated Node-RED rules engine embedded to support such functions
- Provide local data trends and alerts to field operatives to assist for example in fault diagnosis and maintenance
- Develop and execute control logic functions across the underlying equipment
- Store the data tags as time series entries in InfluxDB for arbitrary querying or visualization via Grafana
- Filter and stream the data to a variety of endpoints: cloud applications, SCADA systems and back to local controllers where required



# Solution Architecture

## The Energy Data Store

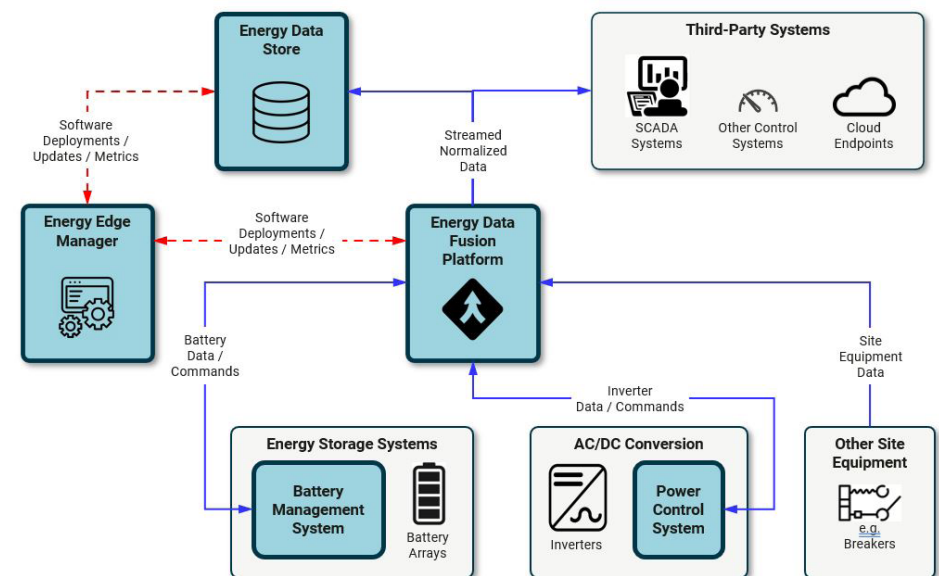
IOTech offers a higher-level enterprise data historian solution, again based on Edge Xpert, for long-term data storage and mining, embedding of sophisticated analytics and decision support applications, and regular or ad hoc operational reporting through BI tools such as Tableau.

## Energy Controllers

At the other end of the stack, IOTech are also investigating using Edge Xrt to potentially act as a longer-term replacement option for the equipment suppliers' proprietary control systems, bringing flexible and cost-effective 'software-defined control' right down to the field level.

## The Energy Edge Manager

IOTech's latest product, Edge Builder, is ideal for managing and orchestrating the various energy applications at the Edge, including Data Fusion and Data Store offerings. It can provision edge hardware nodes, and then deploy, manage, update and orchestrate the applications which run on these nodes. All this is done at scale, meaning BESS vendors can easily manage their software solutions across sites and their customer base.



## Edge Products for BESS

IOtech's BESS data solutions are built on top of Edge Xpert and Xrt software platforms. These provide a suite of capabilities implemented as a set of microservices that can be deployed containerized and or virtualized. Through simple configuration tools, the frameworks allow users to easily select which components to deploy for each use case, including standard components (for example OT protocol connectors) provided with the product, as well as user defined components.

### The key Platform Features Include:

- Core data components including publish-subscribe bus, data logging and local storage
- Device services / connectors / exporters including out-of-the-box support for integration with multiple OT device and IT endpoints including Modbus, BACnet, OPC UA, MQTT, PROFINET, Ethernet/ IP, EtherCAT, REST/HTTP and more
- Embedded leading open-source tools for data storage (InfluxDB), visualization (Grafana), and business rules definition / execution (Node-RED)
- Extensive Graphical tooling to configure and monitor the platform. SDKs to support user-defined developments are also included
- Can be deployed on commodity x86 (64 bit) and ARM (32 and 64 bit) architectures, running a range of Linux as well as more specialized RTOS variants



Grafana Dashboard





For additional information on our products,  
contact us at [info@iotechsys.com](mailto:info@iotechsys.com)

Visit our website  
[www.iotechsys.com](http://www.iotechsys.com)