

aggreko

Y.Cube- Energy storage

Product Guide



Y.Cube – Energy Storage to Go

The Y.Cube is a ready-to-install energy storage system, comprised entirely inside a single standard 20 ft container.

This mobile and modular solution includes batteries, inverter, HVAC, fire protection and auxiliary components, all tested and pre-assembled by Aggreko experts, and seamlessly operated by our smart software.

The Y.Cube can be delivered and deployed almost anywhere. Single units can be easily combined to deliver the power and energy capacity required for your business. The system can cover a variety of applications



from 1 MW up to multi-MW power output and is available as power and energy version.

Even better: if your requirements change in the future, our commercial terms for the Y.Cube let you add or remove capacity and power wherever and whenever you need it. This gives you complete flexibility and enables you to adapt quickly to your business needs and changing market conditions.



PRODUCT VERSION	ENCLOSURE	POWER [KW]	DURATION [MIN]	TECHNOLOGY
Y.CUBE 30	20ft ISO HC	1,000	30	Lithium-Ion
Y.CUBE 60	20ft ISO HC	1,050	60	Lithium-Ion

Rent the Y.Cube – Energy Storage as a Service

In today's fast-evolving energy landscape, long-term commitments may lead to stranded assets and tied-up capital – especially with relatively new technology like battery storage.

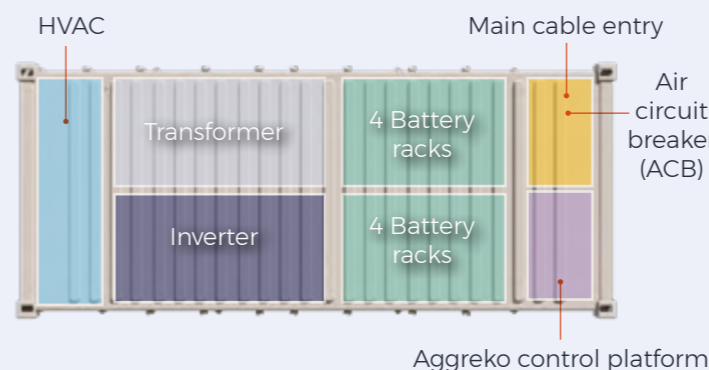
That's why many energy users opt for a risk-free, 100-percent reliable solution: Energy-Storage-as-a-Service (ESaaS). ESaaS lets you address your immediate storage requirements and tap into revenue opportunities in fast-evolving markets – without long-term capital commitment. It can provide maximum flexibility when

market conditions shift, such as when regulations change or ancillary service pricing fluctuates. Under the ESaaS program, we take full responsibility for your system design, installation, performance and maintenance. Rental agreements can range from a few months to years and are based on a fixed monthly or annual fee. Contract terms and system capabilities can also be easily adapted to fit changing business needs.

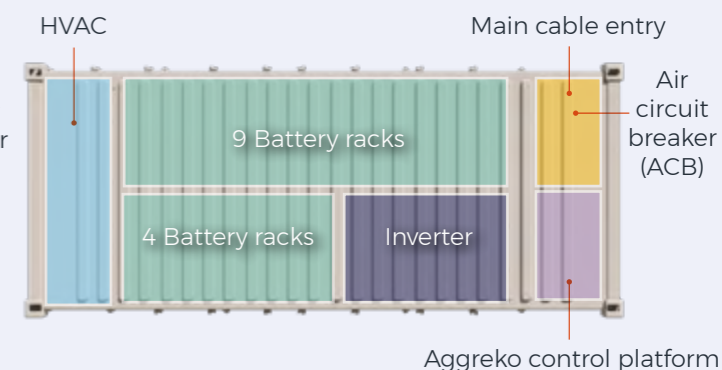
Last but not least, we take responsibility for the end of life of the batteries and their recycling.

Layout – Top view

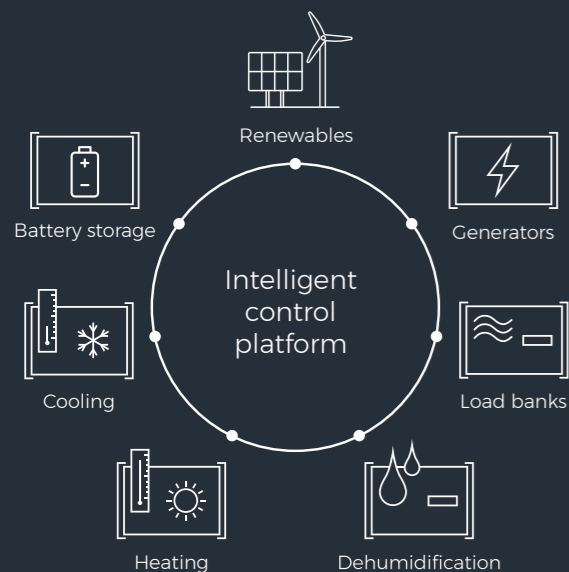
Y.Cube 30



Y.Cube 60



Our turn-key solutions



One Single contract

We are your expert and experienced partner

- Risk free**
 We guarantee 24/7 reliability of our systems for zero asset investment and low implementation costs with 100% service.
- Flexible contract**
 No need to commit long-term. Our commercial terms let you add or remove capacity and power wherever and whenever you need it.
- Maximised value**
 Multitasking is no problem for our smart software. It manages different energy services in parallel, allowing you to stack multiple revenue streams. No exposure to market risks.
- Best-in-class technology**
 No need to worry about updates and warranties! With our solutions, you benefit from always having the latest hardware, controlled by our superior software.

All-in-One and ready to install

The Y.Cube includes everything you need for an intelligent energy storage system: the DC battery block and the conversion system to connect the battery to the grid.

The power variant also contains a transformer for easy grid connection. We take care of everything and make it easier for you to concentrate on what matters most.

On top of these key storage components, the Y.Cube includes everything you need for a safe and stable operation: HVAC to keep the batteries at their optimum temperature, controls to provide the required storage application and a fire detection and suppression system for additional safety. All

components are installed, commissioned and tested at the factory.

Aggreko control platform

Our intelligent software allows fast response times and precise energy management to increase battery performance. It determines in real-time how to dispatch the Y.Cube as well as all other microgrid assets to maximise value for our customers while maintaining grid reliability and power quality.

Our control platform can easily be configured to your needs and adapted when new market applications emerge, keeping you on top of things.

Key features and benefits



Mobile and modular

Single units can be easily combined to deliver the power and energy capacity required for your business



Quick setup on-site

All-in-one and ready-to-install storage system reducing footprint and installation costs



No capex

Rental model gives you flexibility to adapt to your future needs and avoid stranded assets



Easy integration

Fits perfectly with our thermal power systems for an optimised hybrid solution



Fast deployment

Up and running in less than 3 months after contract signature, without lengthy financing set up



Boost your returns

Our smart storage software manages different applications simultaneously, allowing you to stack multiple revenue streams for better returns

Available Services

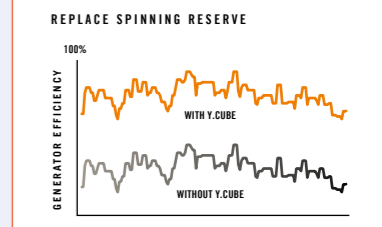
- Spinning reserve displacement
- Ramp rate control
- Load / peak shifting
- Frequency regulation
- Energy arbitrage
- Black-start
- UPS / bridging power
- Transitional power
- Power factor correction



Typical applications

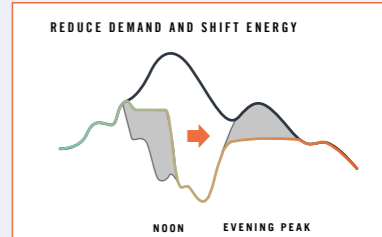
Spinning reserve displacement

Thermal plants create spinning reserve capacity by running extra generators, resulting in lower loading of the plant and higher fuel consumption. Adding battery storage to act as spinning reserve helps to increase the overall efficiency of your plant by running less generators at a higher load.



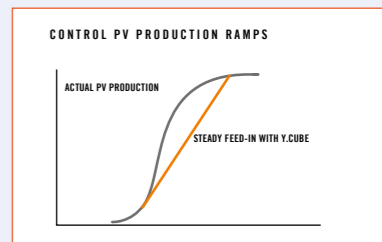
Peak shaving

Peak shaving is designed to prevent supply bottlenecks and relieve the grid in times when demand is very high. This is done either by having consumers cover their additional power needs by activating generators or storage devices like industrial batteries, or by matching their needs to the supply.



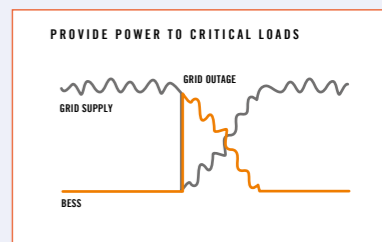
Ramp rate control

Grids cannot easily absorb large variations from renewable generation. Battery storage "smooths" the PV plant and strengthens the grid by providing critical system services to buffer the impact of fluctuating power demand and supply.



Uninterrupted power supply (UPS) / Bridging power

UPS provides backup power when utility power fails, either long enough for critical equipment to shut down gracefully so that critical processes are not interrupted, or long enough to keep required loads operational until a generator comes online.





Granny Smith Goldmine: Building the standard of hybrid microgrids

Aggreko is building a hybrid renewable-energy-plus-battery-storage system at the Granny Smith gold mine in Western Australia, to be completed in 2019. The system, one of the world's largest hybrid off-grid microgrids, will comprise 8 MWp of solar power generation, as well as a 2 MW/1 MWh Y.Cube battery system, integrated with 24.2 MW of natural-gas generation.

The resources will be integrated and managed by Aggreko's control software platform maintaining full system availability and optimising the existing thermal assets. The solar-plus-battery system will lower fuel consumption by 10-13% and produce about 18 GWh of clean energy per year.

While the solar PV will reduce the need to run thermal generators, the battery plant will provide services such as spinning reserve displacement, PV ramp rate control and transient voltage/frequency support. The system will be operated by Aggreko and covered under a single rental contract - with no capital outlay.

A complete hybrid solution for the Amazonas region of Brazil

At one of our installations in the Brazilian rainforest, we add battery storage to our existing solution using our Y.Cube systems for spinning reserve displacement of thermal generators. Based on a 15-year PPA, the system operates 24 hours a day to serve multiple remotely located communities in the Amazonas region.

By operating 24/7, any opportunity to serve the load more efficiently and reduce fuel consumption has a major impact over the life of the system. Our hybrid solution uses the generators as the primary power source, with 1 MW Y.Cube systems providing the spinning reserve for each site. The batteries are primed to energise instantly should a generator trip off, which will bridge the gap until another generator comes online.

The addition of the Y.Cubes provides significant fuel savings and other economic benefits. These include increasing average generator loading by 10% - improving efficiency of the system - and reducing fuel use by 1% annually. By shifting spinning reserve capacity to the batteries, runtime on the generators is also reduced by 11%. This project will also cut the combined CO₂ emissions of the sites by 14,000 tons over the project life.

Technical data*

SYSTEM PERFORMANCE	Y.CUBE 30	Y.CUBE 60
POWER OUTPUT	1000 kW / 1100 kVA	1050 kW / 1160 kVA
ENERGY CAPACITY (NAMEPLATE)	610 kWh	1187 kWh
DURATION OF STORAGE, NOMINAL	30 min	60 min
OUTPUT VOLTAGE (±15%)	400 / 480 V, 3 phase	500 V, 3 phase
OUTPUT FREQUENCY (±10%)	50 / 60 Hz	
AMBIENT OPERATING CONDITIONS	-20 °C to +50 °C (-4 °F to +122 °F); Power rating reduced by 50 kW/°C above 47 °C	
ALTITUDE BEFORE DERATE	1500 m (4920 ft); de-rated operation up to 4000 m (13120 ft) on request	

PHYSICAL DATA	Y.CUBE 30	Y.CUBE 60
PROTECTION	NEMA 3 / IP55	
ENCLOSURE	20 ft standard container, CSC certified	
LENGTH	6060 mm (20'-0")	
WIDTH	2440 mm (8'-0")	
HEIGHT	2800 mm (9'-6")	
SHIPPING WEIGHT*	13,968 kg (30,794 lb)	11,200 kg (24,692 lb)
INSTALLED WEIGHT*	19,152 kg (42,222 lb)	19,500 kg (42,990 lb)

CONTROL FUNCTIONALITIES

GRID-CONNECTED OPERATION	Frequency regulation, ramp rate control, remote dispatch, demand management, voltage control and power factor correction, curtailment capture, load shifting, full four-quadrant operation
GRID-FORMING OPERATION	Grid-forming operation is provided by U/f-mode
CONTROL SYSTEM	Equipped with Aggreko Control Platform for battery management

STANDARDS AND CERTIFICATIONS*

- CE marked
- Compliant with: EN 61000-6-2, EN 61000-6-4, EN 62477-1, IEC 62477-1, IEC 62933-2
- Grid connection standards: BDEW unit certificate; VDE ARN 4110 (medium voltage), 4105 (low voltage)
- Fault Ride Through Capability: parameters for Low Voltage Ride Through (LVRT), High Voltage Ride Through (HVRT) and delivery of fault current to support the network can be tuned to fit requirements from local grid operator

*estimate - subject to change



Power **how** you need it,
when you need it, **where** you need it.



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