

# Company Overview

ENEROX - Building Energy Storage Infrastructure

cellcube



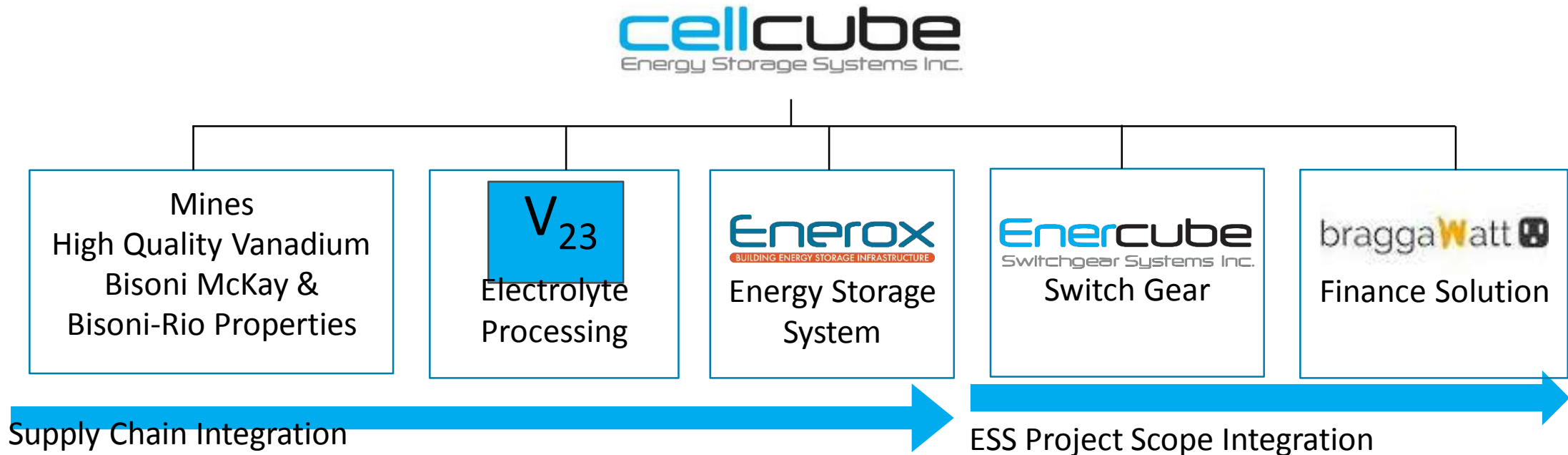
Status: Q3 2018

Information subject to change without notice.



# Enerox is part of the CellCube Energy Storage Systems Inc. Family

Integrating best in class technology into an end-to-end energy storage infrastructure portfolio



**Enerox GmbH, Austria**

Research, Design, Manufacturing, Distribution of the integrated CellCube ESS

**EnerCube Switchgear Systems Inc., Canada**

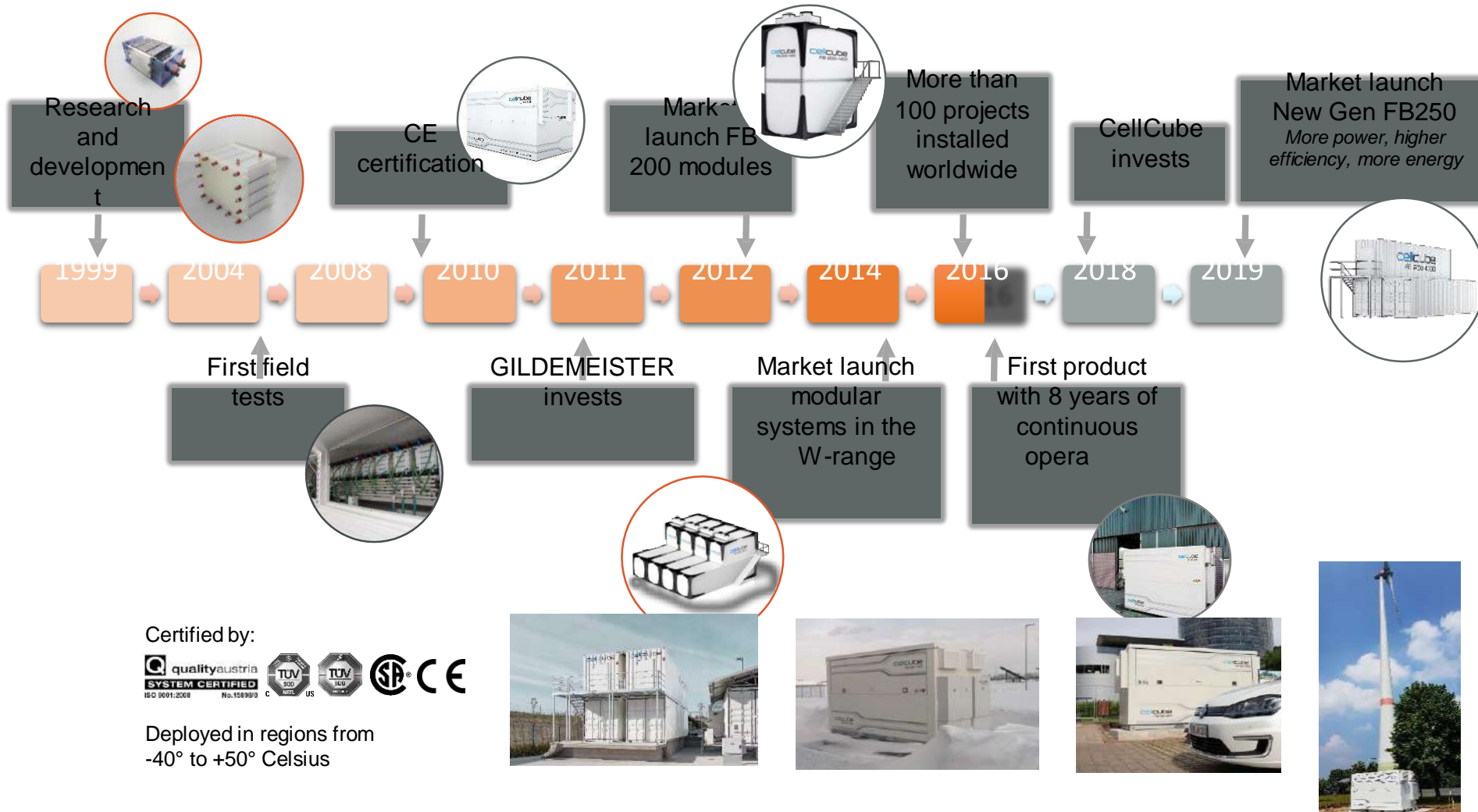
Design, Manufacturing, Distribution of Switchgear and Drive Equipment

**Vanadium 23 Corp., Canada**

Mining and highest grade of Production for Vanadium and Vanadium Electrolyte

# CellCube is setting the highest standard in Vanadium Flow Batteries

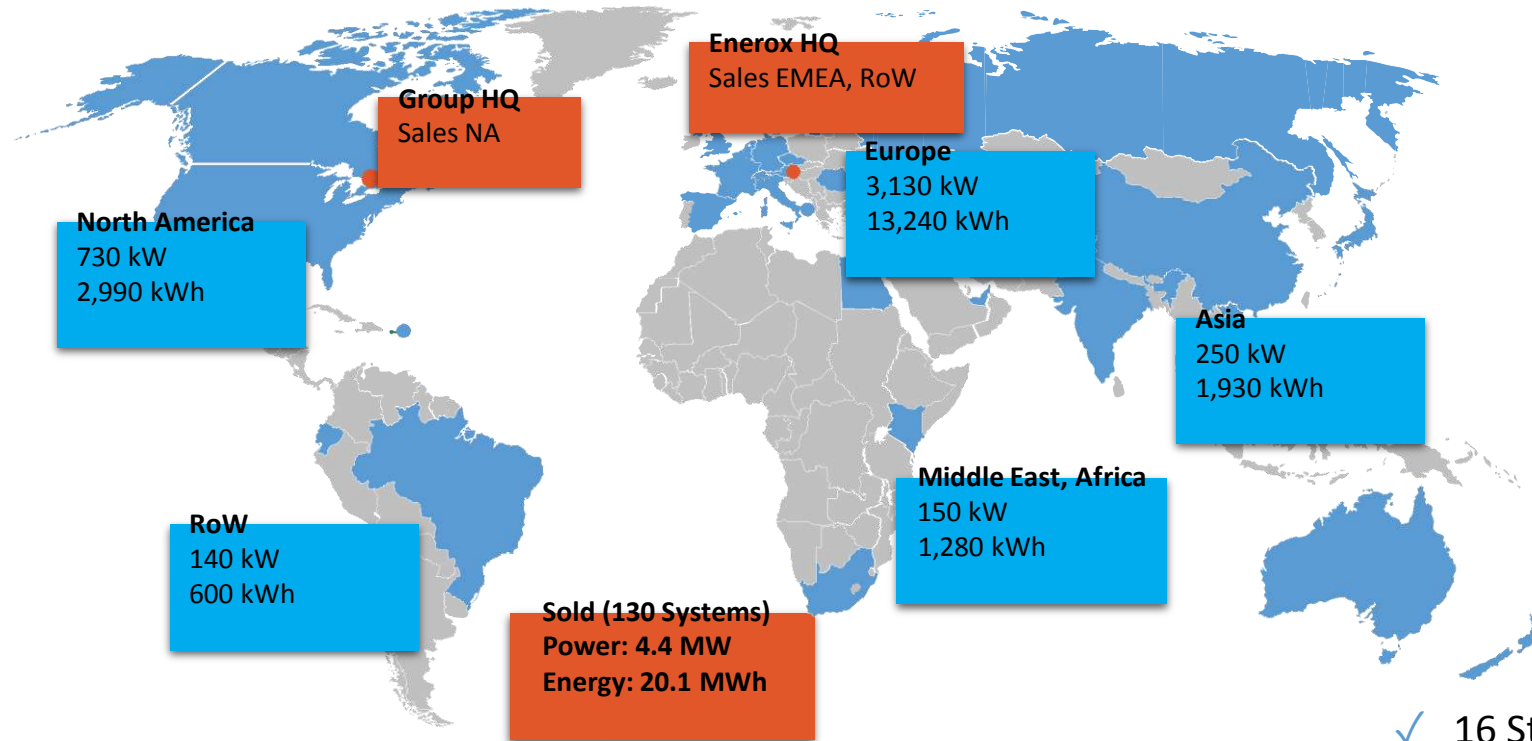
The ENEROX experience sets market leading standards - joining the CellCube Family in 2018





# CellCube business is entering now commercial large scale business

International business track record of Enerox (incl. Gildemeister)



- ✓ Daily Monitored
- ✓ Over 130 systems installed
- ✓ Products running since 2008
- ✓ 30 employees (Enerox) / 85 (Group)
- ✓ More than 2 Million Operational Hours
- ✓ 16 Storage Applications realized (Grid to Off-grid)
- ✓ >10,000 cycles achieved in single field deployment
- ✓ engineered with combined >100 years development expertise

Certified by:



# market & customer requirements move clearly into energy centric

Results from Market Research in 2018

The next generation energy storage (after the Lithium bubble) needs to offer

- ✓ More flexibility for conventional and renewable power generation
- ✓ To get Transmission and Distribution Grids future proof at lower TCO
- ✓ Reducing Levelized Cost of Electricity (LCo-E) by decreasing LCo-Storage

## Renewable Integration

**More PV & Wind are getting deployed**

Global renewable electricity generation is projected to grow by almost 45%, or 2,245 TWh to over 7,310 TWh in 2020

## Capacity Markets

### Power & Grid Flexibility

**More Peaking & Reserve Capacity is required**

Increasing RE integration challenges conventional peaking reserve. Renewable Baseload can provide Must-Run-Rate

## New Electrification

### De-Carbonization

**Less & replacement of Diesel / Gas off-grid**

Energy Demand in remote areas grows significantly.

Demand for conventional gensets drops at same time to be replaced by PV & Wind plus storage

## Smart Cities & Communities

**More micro-grids and smart infrastructure needed**

Increase of distributed generation and e-mobility drives demand for local flexibility.

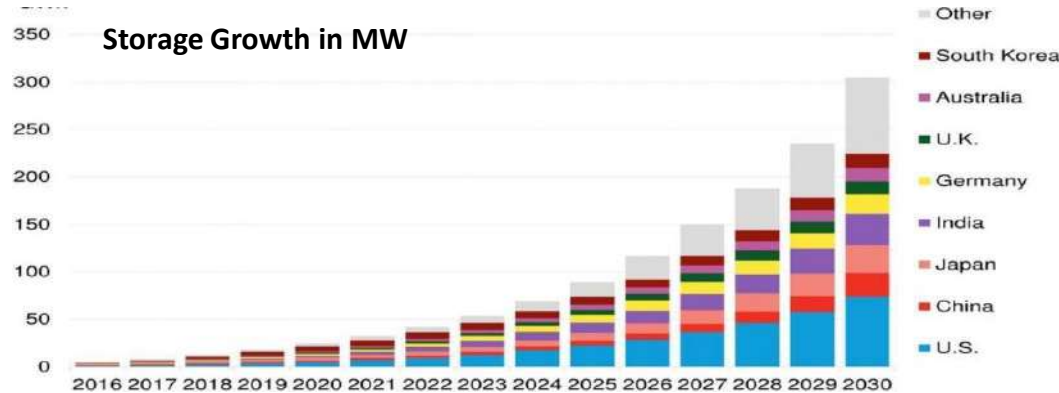
Annual distribution revenue expected to reach nearly US \$20 billion by 2023



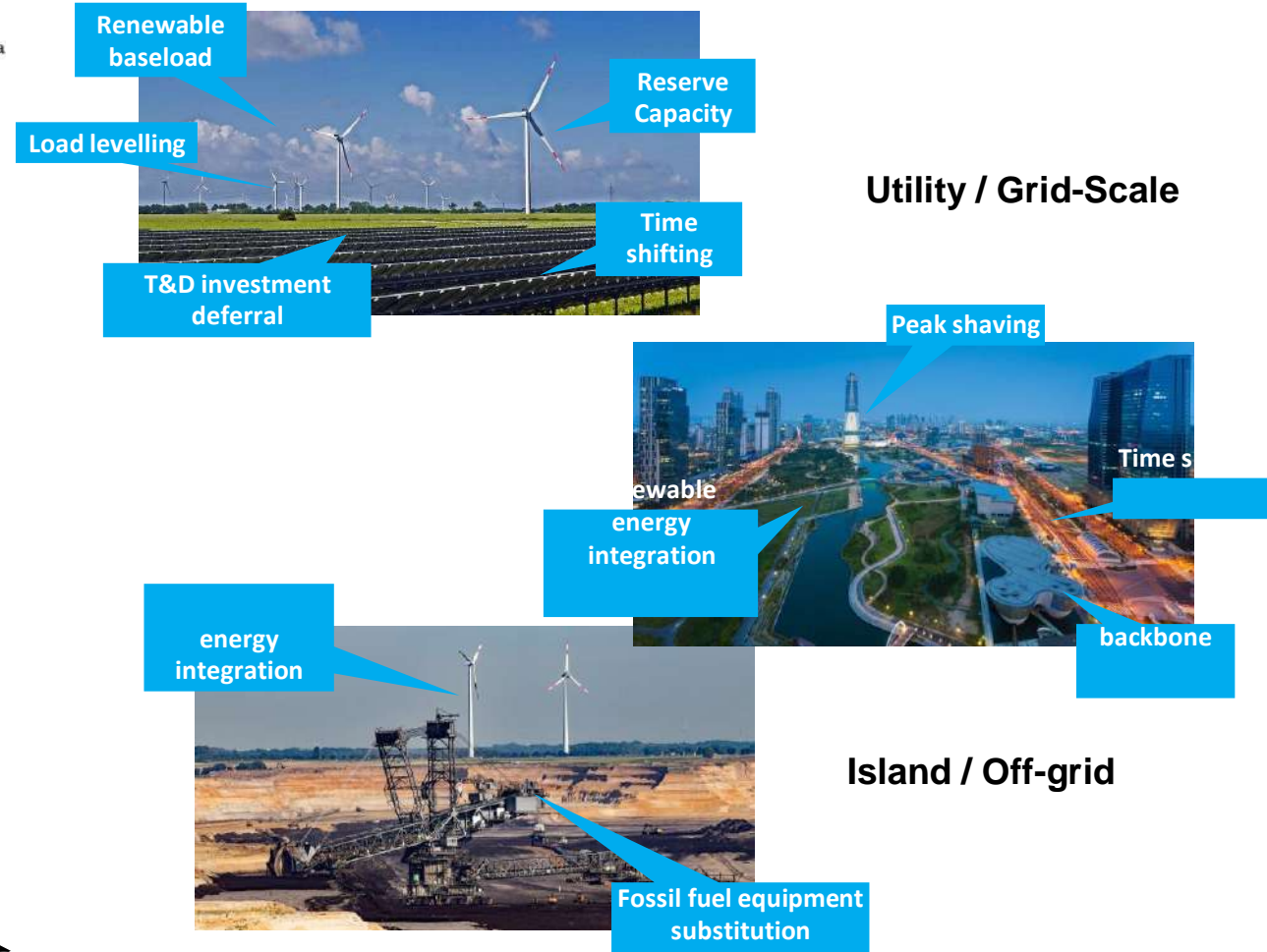
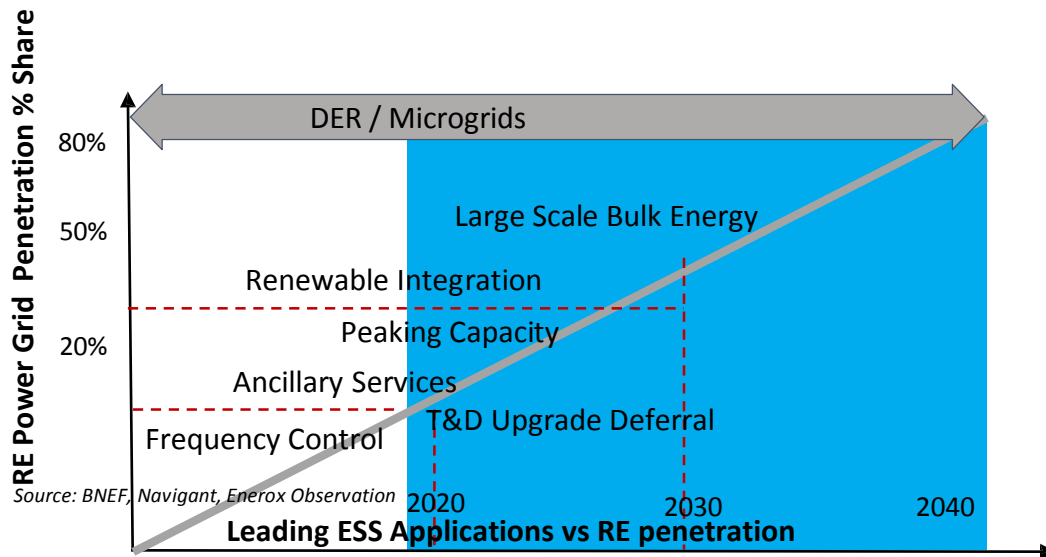
Source: Navigant Research, Bloomberg Energy, CellCube

# Based on market demand we offer competitive energy centric solutions

CellCube's portfolio covers capacity and microgrid markets



Source: Bloomberg New Energy Finance





# CellCube's solutions focus on reduction of LCOE and TCO

CellCube solution overview for selected market segments



## Utility Scale Solutions

- Peaker Plant Solutions
- Reserve Capacity
- Renewable Baseload
- Curtailment avoidance
- T&D investment deferral
- Ancillary Services



## Microgrid Solutions

- Optimized Energy Supply
- C&I Solutions
- Grid Stability Services
- Energy Backup Services
- EV charging infrastructure



## Offgrid Solutions

- Fuel Cost Reduction
- Peaking Capacity
- Green Energy Supply

# Power and Storage Capacity – flexible, scalable, available and cheap

CellCube Product Families

**cellcube**  
FB 250-1000

Flow Battery

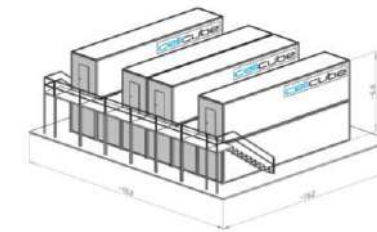
Rated Power in kW

Usable Energy  
Capacity in kWh

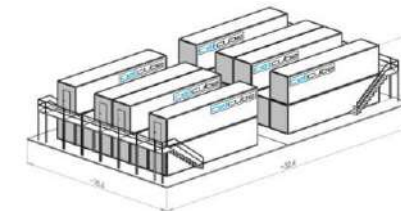


Product	Power Output	Usabel Energy Capacity (kWh)
FB 250	250 kW	1000 (4 hours)
		1500 (6 hours)
		2000 (8 hours)
FB 500	500 kW	2000 (4 hours)

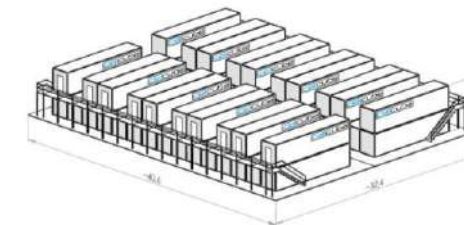
Scalability  
(examples)



1MW – 4 MWh



2MW – 8 MWh



10MW – 40 MWh

US: IEEE 1547, UL 1741 | UL 1973, UL 508, UL 9450, NFPA 70, CA Rule 21 (pending) CA: CAN/CSA-C22.2 AU: AS 4777  
DE: BDEW, VDE-ARN-4105 IT: CEI 0-16 & 0-21 GB: G59, G83 BE: C10/C11 RU: GOST EU: CE | Other codes and standards pending



# CellCube is a provider and partner for an end-to-end service

## Overview of Service Options

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### **SOLUTION DESIGN**

Fit for Purpose Analysis Modelling &  
System Simulation Integrating  
Renewables & Power Systems  
Research & Development / Customized Solutions



### **TURNKEY SOLUTION**

Containerized DC/AC Storage System – PCS selection optional  
Integrated Battery Management System (BMS) – EMS optional  
Standardized communication interfaces  
Installation, Integration and commissioning services  
Balance of Plant (optional)



### **OPERATION & MAINTENANCE SERVICES**

Basic System Maintenance  
Extended system warranty  
Monitoring & System Optimization Services  
Performance Guarantees

# Our Customer and Partner base

## Utilities/DSO/TSO



## C&I/Integrator/Solar



## University/Institute



More customers in industrial and commercial space

# Our value proposition puts our clients into a leading market position

## CellCube Product & Solution Highlights



- ✓ Commercially viable solutions for long duration storage systems for 3 -10 or more hours of energy storage
- ✓ Scalable into the multi hundred MW range
- ✓ Global Monitoring 24/7 available
- ✓ No capacity degradation and unlimited cycling
- ✓ 100% usable depth of discharge
- ✓ Finance Solution with bankable assets and rental option
- ✓ Service life of up to 30 years
- ✓ Safe, non-flammable, non-explosive, environmentally friendly
- ✓ Products in the field running over 10 years
- ✓ CellCube tested with more than 10,000 uninterrupted cycles
- ✓ Commercial Model available for temporary deployment



# cellcube

Thank you very much for your attention!

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Solar Eco Systems  
Go green, turn on the sun

**Enerox**  
BUILDING ENERGY STORAGE INFRASTRUCTURE