



GWh-Scale Vanadium Flow Battery Systems for Data Centres and Critical Infrastructure

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Demand Drivers For GWh Scale VFBs

- Increased renewable energy generation on grids requires long-duration energy storage
- Data centres create larger, more variable loads
- Critical infrastructure needs to be safe, resilient, and provide a long asset life
- VFBs address these needs better than conventional alternatives



Rising renewables penetration and data centre driven load growth

Why Vanadium Flow Batteries for GWh Infrastructure?

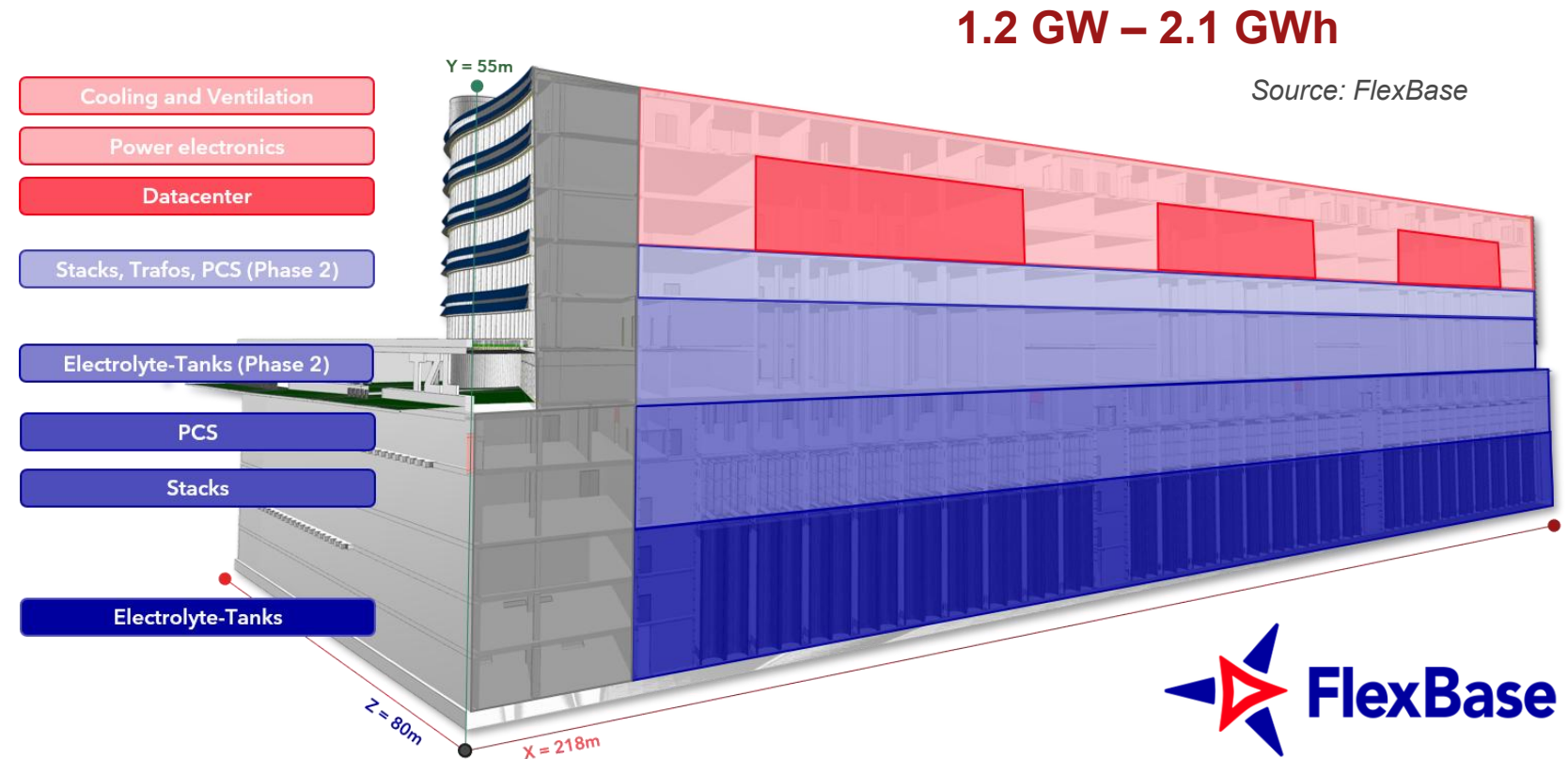
- Competitive LCOS for infrastructure deployment
- Flexible Use Cases – Value Stacking
 - Fast response for grid support and trading
 - Multiple cycles per day, no rest time between cycles
 - No self discharge for long duration energy storage
- Intrinsically safe water-based electrolyte
 - No thermal runaway or catastrophic fire risk
- Long Duration Energy Storage by principle
 - Optimal Power vs Energy sizing flexibility
- 30+ year life and > 20,000 Full Cycles
 - Very low degradation, either in time or number of cycles
- Safe to install in buildings and for vertical stacking
- >95% recyclability
 - Reusable vanadium electrolyte
 - Built with conventional metal and plastic recyclable materials



**Safe + Long Duration +
No Degradation + Flexible
+ Recyclable**

GWh Scale Deployment: Vertical VFB Stacking

- Vertical stacking increases energy density
~700 MWh/Acre
- Colocation with data centre or other large C&I assets
- Ideal for locating in highly populated areas with limited space



The FlexBase BESS is a reference system for GWh Scale VFBs

Bankability and Delivery

- Bankability based on proven technology, certification, financing model and lender confidence
- Industrial-scale delivery model
- Strong, multidisciplinary, integrated Project Team
- Early planning, civil works, and local-authority engagement
- EPC and process-integration partners are essential

Technical viability alone is not enough



Scaling Up the VFB Value Chain to GWh Scale

EMS optimised for VFBs
EPC engagement & training
System integration & Construction
PCS integration

x50 increased Capacity/Module
CAPEX: Volume production of
Standardized Products
OPEX: VFB designed for O&M

Automated stack production
Cell materials volume ramp-up
Electrolyte bulk production
V sourcing partnerships



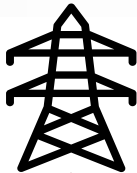
PROJECTS

PRODUCTS

SUPPLY CHAIN

Value Chain Actors

Asset Operator
Project Developer
O&M Contractor
System Integrators
EPC
EMS and Site Control Developers
PCS Manufacturer
Flow Battery Manufacturer
Flow Battery Subsystem Manufacturer
FB Stack Manufacturer
Stack Materials
Electrolyte Processing
Mining and base Metal Production



ENERGY

TO

MINING



Scaling-up the whole Value Chain

Conclusions

- VFBs are uniquely positioned for critical infrastructure and data centres
- Strengths: safety, long duration, lifetime throughput, flexibility, resilience, LCOS
- GWh-scale is achieved by:
 - Value chain
 - Modular design
 - Standard power electronics
 - Robust and Secure Control System
 - Industrial delivery capability
 - Bankable project structures
- Reference projects such as FlexBase are critical to accelerating scaling-up and adoption



GWh-scale VFBs are happening NOW