



# Effective Partnerships for Utility Scale VFB Deployments

IFBF 2025  
JLC

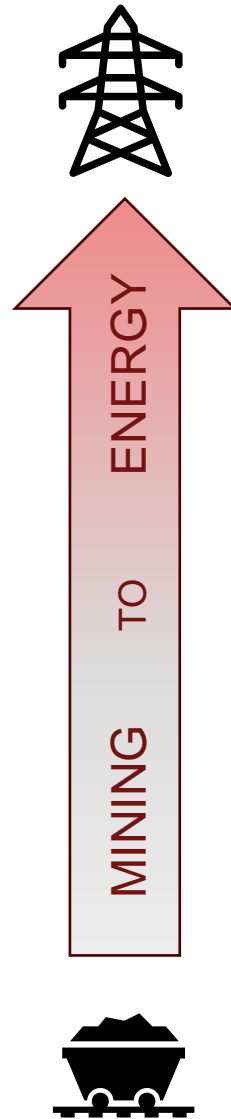


# Largest VFBs in North America, Australia and UK



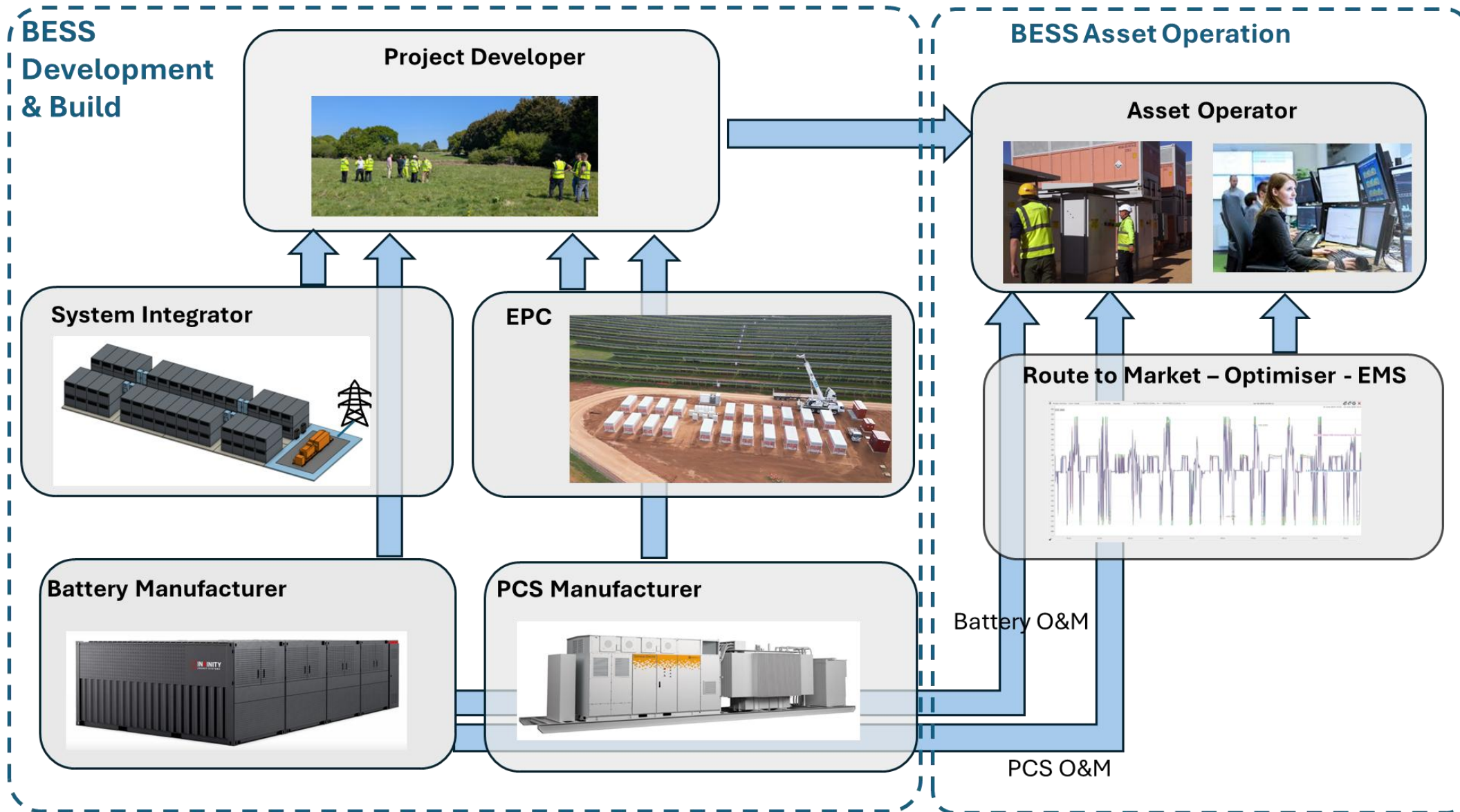
# Value Chain from Mining to Energy

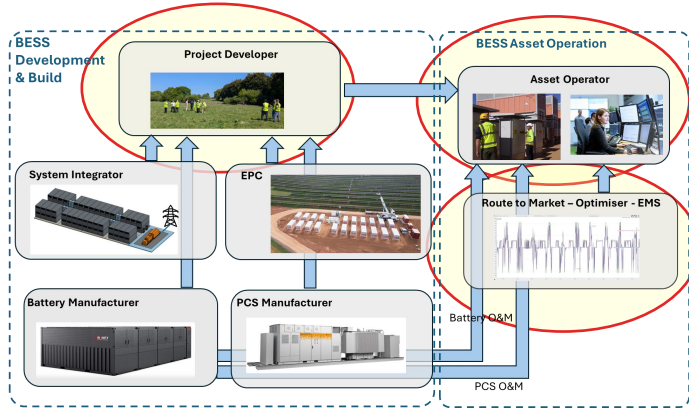
- For a successful BESS delivery, there mustn't be any gaps in the value chain.
- Project Partners cover all functions in a BESS project.
- Several roles are covered by the same company, important to identify them.
- VFB competitiveness depends on an effective end-to-end Value Chain



	Value Chain Actors	Role in the Value Chain
<b>Project Partners</b>	Asset Operator	Energy Trading
	Project Developer	BESS Business Case
	O&M Contractor	BESS Asset Operation & Maintenance
	System Integrators	BESS Engineering and Design
	EPC Engineering, Procurement, Construction	Site Works and BoP Civils, Cabling, Installation
	Route-to-Market EMS and Site Control	Full BESS Control System
	PCS Manufacturer	PCS Supply and Integration Support
<b>VFB Production</b>	Flow Battery Manufacturer	FB OEM Original Design, Manufacturing, Assembly, FAT
	Flow Battery Subsystem Manufacturer	Specialist BoS Suppliers: Tanks, Pumps, Control Panels, Electrical, Mechanical
	FB Stack Manufacturer	Stack OEM Design, Manufacturing, FAT
<b>Supply Chain</b>	Stack Materials	Specialist Active Materials Manufacturing: Membranes, Electrodes
	Electrolyte Processing	Electrolyte Processing From base Feedstock
	Mining and base Metal Production	Extraction and base Feedstock processing

# BESS Project Partners





*Establishes the business case*

*Runs the Asset P&L*

### Project Developer

- BESS business case
- Site acquisition
- Planning application
- Grid connection
- BESS system procurement
- EPC Management

### Asset Operator

- BESS Operational P&L management
- O&M coordination, site management

**BESS Business Case**

*Generates Revenues*

### Route to Market – Optimiser - Dispatch - EMS

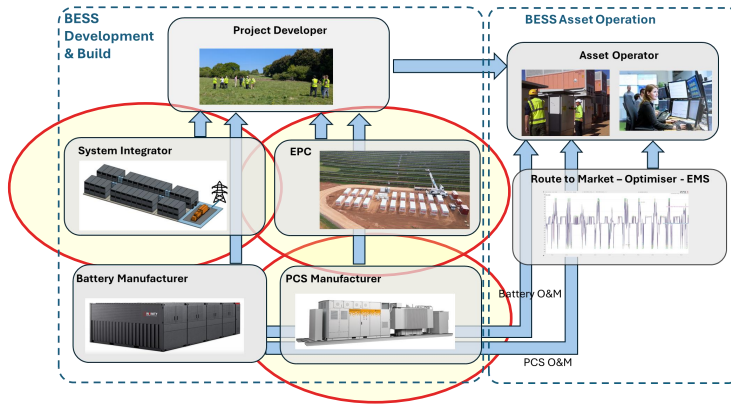
- Revenue generation: trading and grid services algorithms
- BESS dispatch charge and discharge set-points

## Characteristics of VFBs for

## Business Case and Optimization logic

- No degradation = Unlimited Cycling
- Long Duration = 4 to 12+ hours
- RTE is a key parameter for the business case
- Full depth of discharge = increased trading
- No fire = advantage for planning permission
- Durability 25 years = CAPEX vs REPEX
- End-of-life value of Vanadium

# Building the BESS

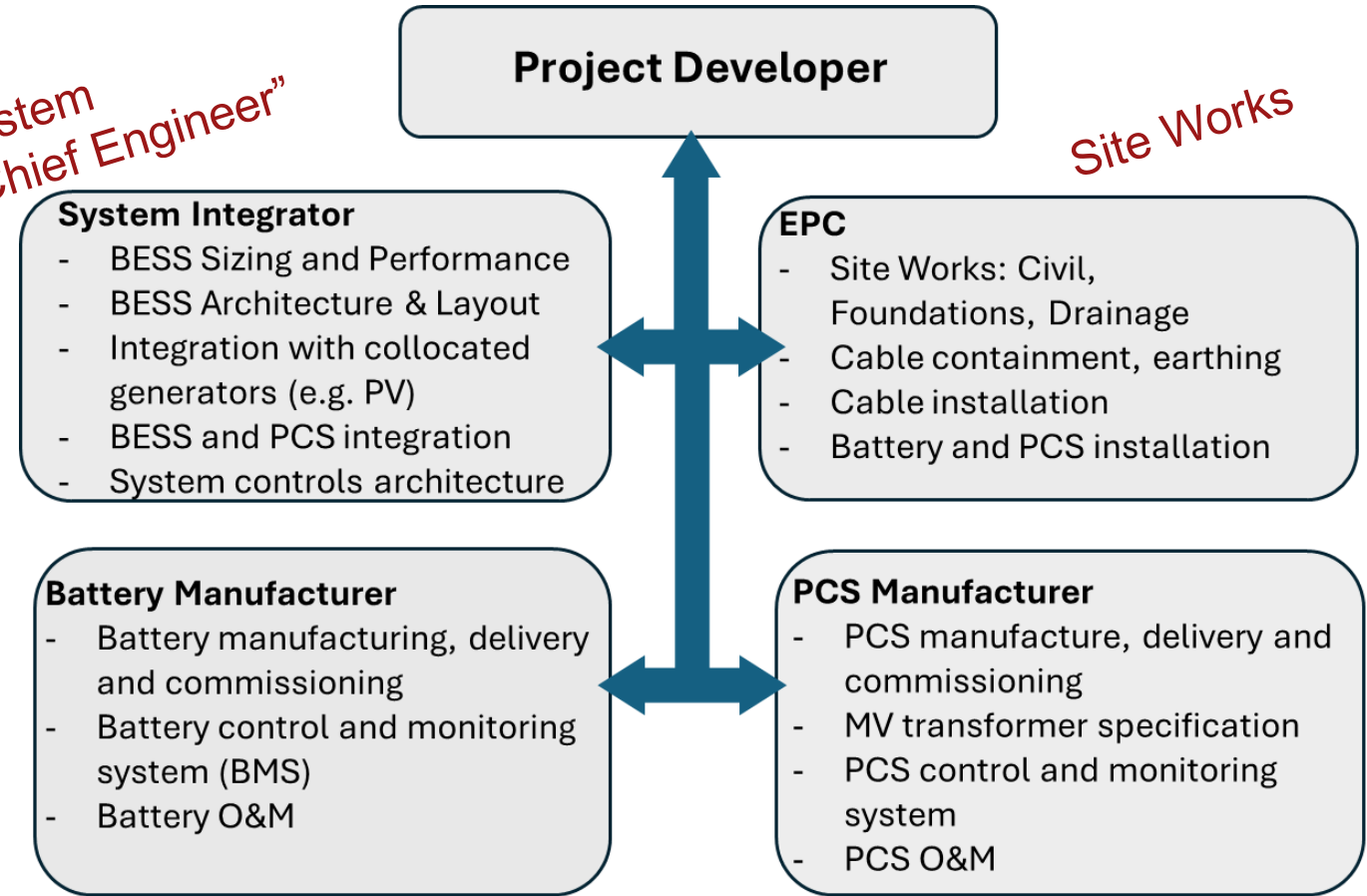


## VFB Specifications for Partners Building the BESS

- System Integrator
  - VFB Sizing and Performance
  - System level Controls integration
- PCS integration
  - DC voltage, initial charge, controls
- EPC (Engineering Procurement Construction)
  - Minimize site work costs = plug-and-play
  - Larger footprint, no fire risk

*System "Chief Engineer"*

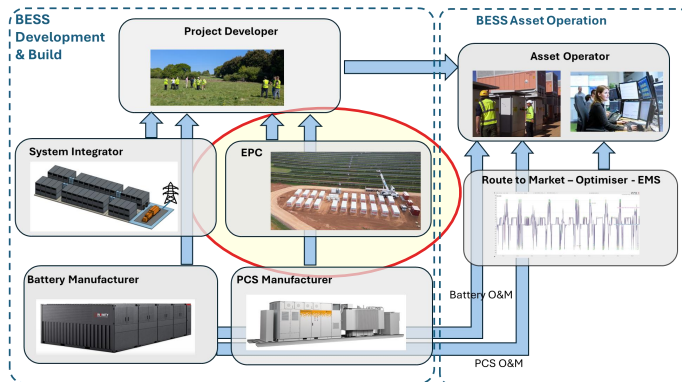
*Site Works*



**VFB and PCS are One System**

# Role of the EPC

## Engineering, Procurement, Construction



*The EPC is your Best Friend*

### Site Ready for BESS Commissioning

- Energisation of the PoC with DNO
- Earthing and safety checks
- Aux supply Power Up

### The EPC has the Local Knowledge

- Electrical Regulations
  - Regulatory compliance: design rules, qualified engineers and technicians
  - DNO interface : connection, switchgear
- Site Design and Construction
  - Construction H&S Rules
  - Site management
  - Civil works
  - Coordination of all Trades

### Electrical Installation

- Cable pulling in ducts
- Earthing network installation
- Electrical Connections between batteries, PCS and PoC

### Battery Installation

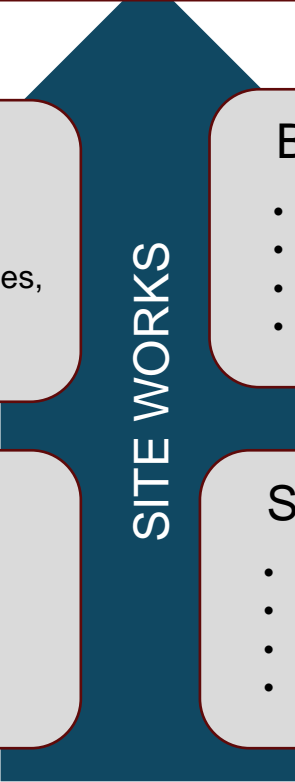
- Battery and PCS Logistics
- Craneage into position
- Site Equipment e.g. CCTV, Lighting
- Mechanical assembly

### Site Electrical Design

- Cable routing design
- Cable selection
- Auxiliary power supply
- MV switchgear selection
- PoC interface with DNO

### Site Design & Construction

- Site plan
- Foundation design
- Access and drainage design
- Civil works, foundations, trenches



# Summary – Partnerships for Large VFB Deployments

- Value Chain from Mining to Energy
  - End-to-end value chain, no gaps
- Project Developer creates the BESS
  - Establishes the business case
  - Coordinates all Project Partners for project delivery
- Asset Operator runs the BESS' P&L
  - Route-to-Market: key to generating revenues
- PCS and VFB are one integrated system
- The EPC is your Best Friend
  - Local regulations
  - All site works: civil and electrical

