

# RISING CAPACITY DECLINING REVENUE

A VALUE ANALYSIS OF HOMOGENEOUS  
BESS COMPETITION

# — Chris Wu

Managing Director – Europe, at Cubenergy

EMBA Candidate

- London Business School & Colombia Business School

A Long Termist in Battery Energy Storage Industry





# 5MWH BESS DC BLOCK IN THE MARKET

<b>CATL</b>	20ft, 5MWh + Liquid Cooling
<b>CRRC</b>	20ft, 5MWh + Liquid Cooling
<b>CHINT</b>	20ft, 5MWh + Liquid Cooling
<b>SCETL</b>	20ft, 5MWh + Liquid Cooling
<b>SUNWODA</b>	20ft, 5MWh + Liquid Cooling
<b>HTHIUM</b>	20ft, 5MWh + Liquid Cooling
<b>CORNEX</b>	20ft, 5MWh + Liquid Cooling
<b>TrinaStorage</b>	20ft, 5MWh + Liquid Cooling
<b>SERMATEC</b>	20ft, 5MWh + Liquid Cooling
<b>SYL</b>	20ft, 5MWh + Liquid Cooling
<b>REPT BATTERO</b>	20ft, 5MWh + Liquid Cooling
<b>CALB</b>	20ft, 5MWh + Liquid Cooling

# HOMOGENEITY IN BESS PRODUCT DEVELOPMENT

From a buyer's perspective, homogeneity means that they can expect the same quality and characteristics from a product, regardless of where or when they buy it. Therefore, the market can determine their value based on supply and demand, and this leads to efficient pricing.

" In a world created by natural selection, homogeneity means vulnerability."

– Edward O. Wilson

" When companies are too similar, customers suffer because they get fewer choices, less innovation, and they end up paying higher prices as competitive pressure diminishes "

- Clayton Christensen

" Markets thrive on difference and diversity. Homogeneity breeds complacency, stifles innovation, and ultimately leads to economic stagnation. "

- Niall Ferguson (British Economist)

" The superior person seeks harmony without uniformity. "

– Confucius



# Next

# 2024

**6.25  
MWh  
@20'ft**

**7  
MWh+  
@20'ft**

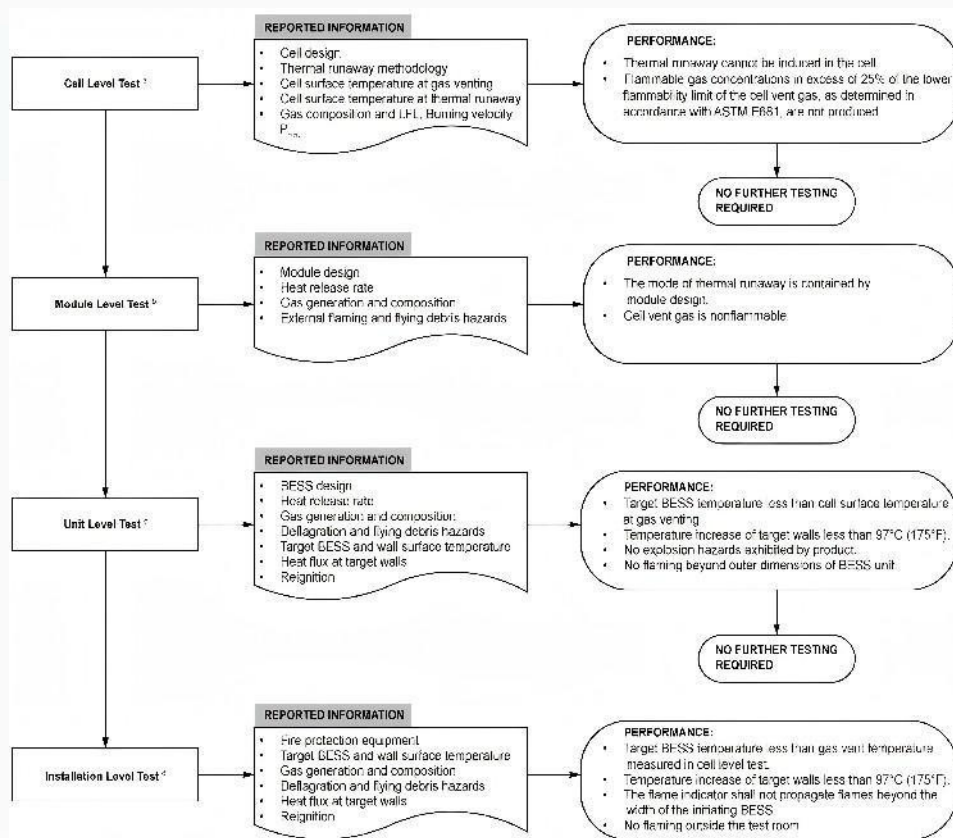
**8  
MWh+  
@20'ft**

**10MWh?  
100MWh?@20'ft**

Any risk on increasing energy density?

# UL9540A TESTS

## A MAIN CRITERION FOR THE SAFETY EVALUATION



Thermal runaway examination  
and test on design  
and function of target unit

**CELL TO INSTALLATION**



# CONSTRAINTS ON UL9540A TESTS

- Cubenergy achieved UL9540A certification at the string level in 2021;
- All battery strings of Cubenergy have been certified according to UL9540A standards;
- While the UL9540A test is rigorous, the repeatability of test results cannot be guaranteed.



## SINGLE TEST LIMITATION

The UL9540A test is performed only once on the target sample. As it is not a repeatable experiment, it cannot guarantee a consistent effect in preventing energy storage systems (ESS) from thermal runaway.



## DESIGN REGULATION LIMITATIONS

While the UL9540A test evaluates safety, it does not serve as a design regulation. Consequently, it cannot ensure consistent protection against thermal runaway across different ESS designs.

# LIMITATIONS ON NFPA 855

NFPA 855 is a standard currently under development, providing comprehensive guidance for a wide range of energy storage systems (ESS) on complex issues



## Irreversible Reaction

Once thermal runaway begins, it is an electrochemical reaction that cannot be halted electrically. It remains uncontrollable by any electronic or switchgear interventions.

## Limitations of Existing Protection

The current protection design, aimed at isolation and fire resistance, can only reduce the damage but cannot eliminate the inherent threat of thermal runaway.



# RISK ON HIGH ENERGY-DENSITY BESS

## Illustrative Scenario



A 100kWh Battery Energy Storage System (BESS) experiencing thermal runaway can be compared to an electric vehicle catching fire and exploding.

A 5MWh BESS housed in a 20ft container is comparable to having 50 electric vehicles on fire and exploding within a space measuring 20ft x 8ft x 8ft. The electrochemical energy released during thermal runaway, along with the chemical energy from explosions or conventional fires involving flammable gases, can be up to 100 times greater than the energy stored in the system.



# HIGH COST ON TRANSPORTATION & SITE INTEGRATION

Dimension of 5MWh DC Block:  
20' HC Container;  
55MT approximately.



## > 45MT:

Battery packs must be partly delivered to the site:

- Additional cost on transportation:  
45MT with additional 50% cost against <32MT ESS, and only base port allowed;  
Additional cost on 10MT battery pack transportation;
- Additional cost on site integration + SAT;
- Additional lead time on site integration + SAT.

## < 32MT:

Integrally transportable to the site:

- Plug-and-play at the site;
- No site integration needed;
- FAT instead of SAT;
- Saving on lead time.



# HIGH COST ON O&M

Around 5,000 battery cell of 314Ah in one 5MWh DC block;

Central system that 12 battery strings in one container connected at one DC busbar;

Passive-balancing of BMS;

Manual calibration.





# PV vs. ESS

## HOMOGENEITY & DENSITY

Power Density vs.  
Energy Density;

Hardware vs. High-  
Intelligent  
System(hardware +  
software + AI in the  
future);

Same concepts on  
Central/String  
Structures;

Same requirements  
on balancing of the  
system while ESS is  
way more demanding  
in balancing.



# CYCLES VALUE to NPV

12,000 cycles and 25 years project lifespan?

1. Battery cell cycles  $\neq$  BESS cycles

2. 25 years project lifespan is reasonable or not?

Degradation of the ESS will significantly bring down the revenue;

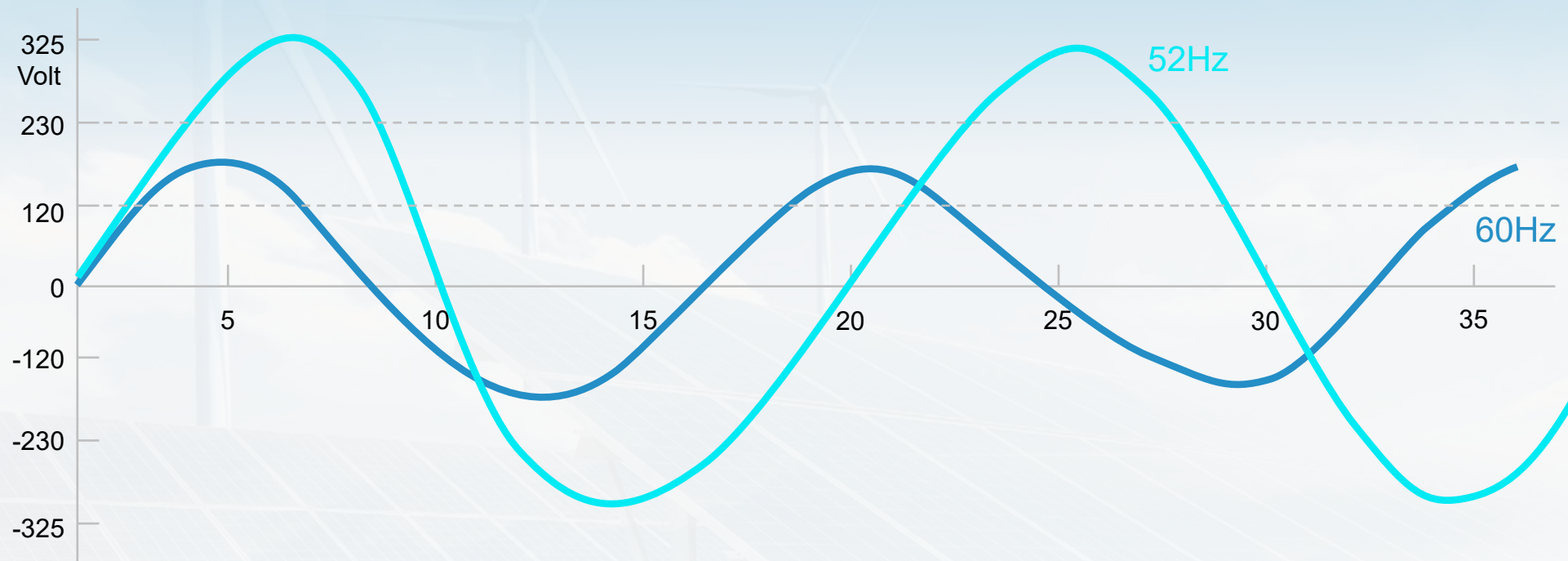
Increasing OPEX will wipe off large part of revenue;

100 million FCF in year 25 is likely only 9 million NPV in year 0.



# CONCLUSION

$$f(t) = A \sin(2\pi \cdot 50 \cdot t + \phi)$$



The waveform of 230 V and 50 Hz, Compared with 120 V and 60 Hz





**Renewable Energy Never Stops**



**Global cooperation contact**



**info@cubenergy.com**



**www.cubenergy.com**



**Follow & Check Case Study on LinkedIn**

**AVAILABLE  
RELIABLE  
ACCOUNTABLE**