

Battery Energy Storage Systems

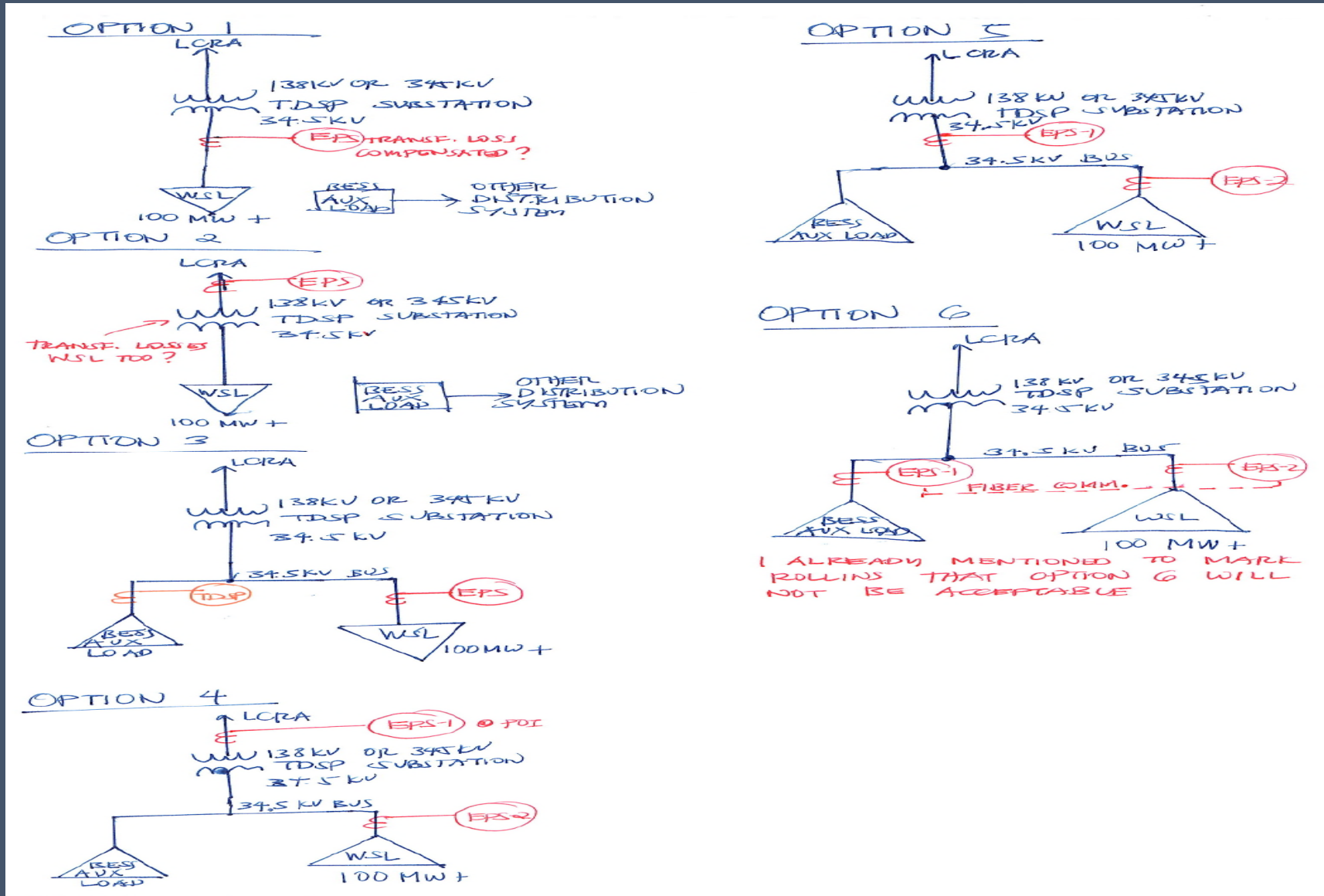
Wholesale Storage Load Metering
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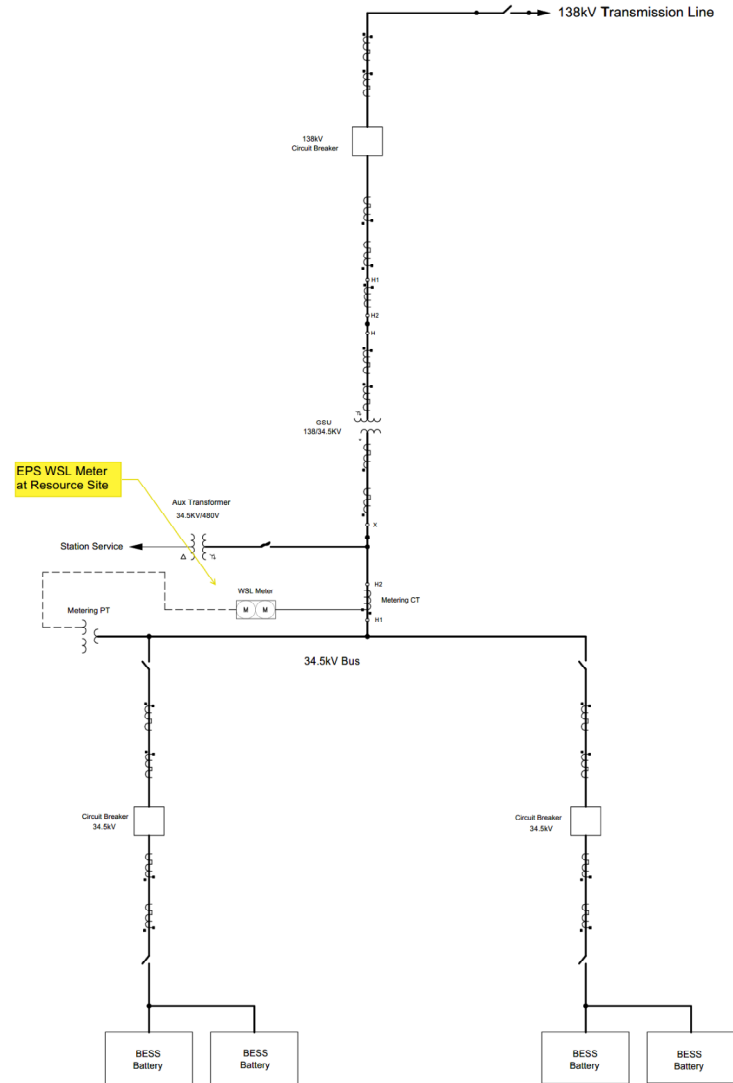
Initial Questions

- How do we meter a stand alone Battery Energy Storage System (BESS) connected at a transmission level voltage?
- Is the aux load supplied by an outside source (distribution line) or over the transmission line?
- What are the typical aux loads?
- Where is the physical location of the aux transformer?
- How do we determine aux load and wholesale storage load (WSL) for settlement?

Brainstorming Options with ERCOT

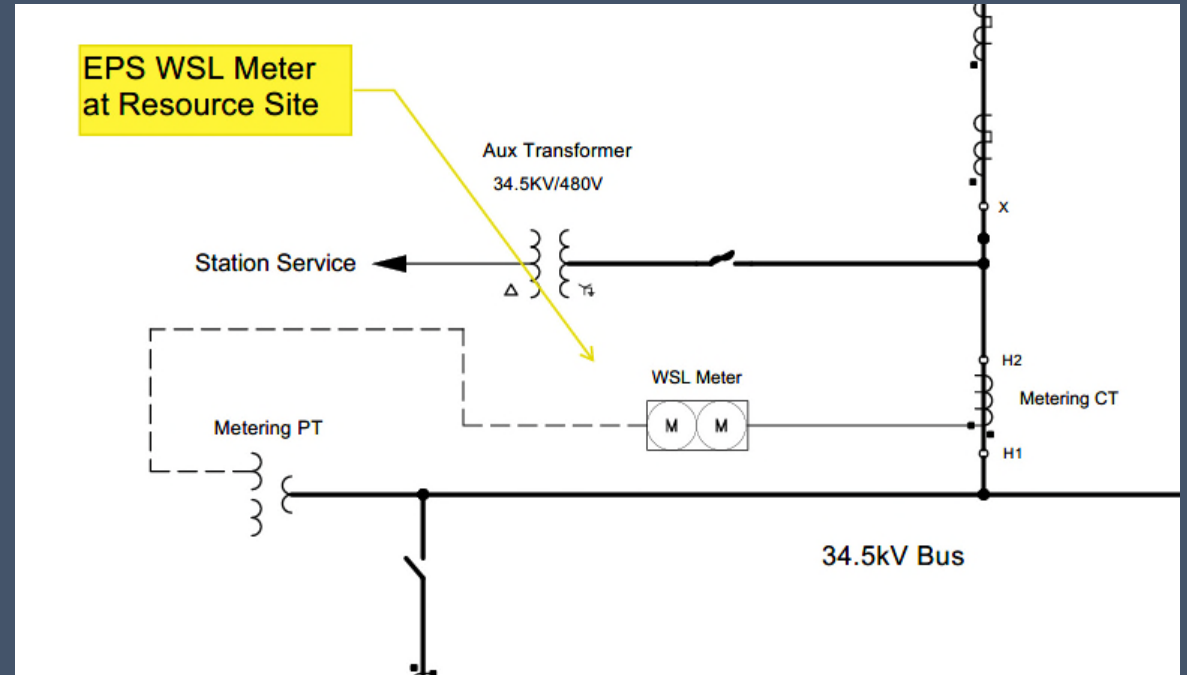


Resource Site BESS One Line



EPS WSL Meter at Resource Site

EPS WSL Meter at Resource Site



Metering at Resource Site

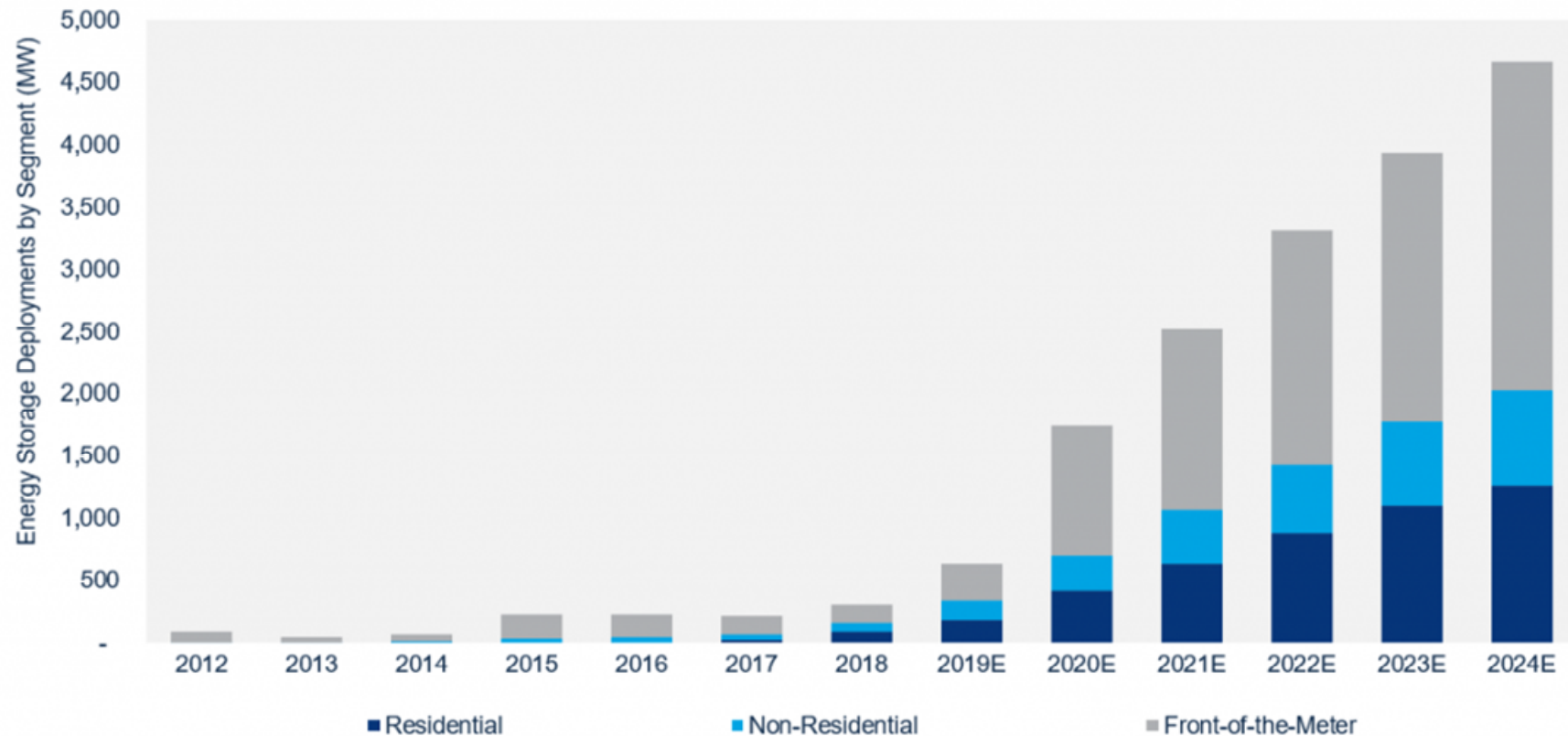
- Protocol 10.2.3.1(1) (C): Each TSP and DSP shall install, control, and maintain the meters, recorders, instrument transformers, wiring, communications, and other miscellaneous equipment required to measure electrical energy, as described in this Section and SMOG.
- TSP ownership of CTs/PTs inside Resource Entity's 34.5kV switchgear? What are other utilities doing?
- BESS is a system that uses underground cable between modular battery shipping containers and switchgear.
- Short construction time compared with Wind or Solar.

U.S. Forecast Energy Storage

U.S. energy storage annual deployments will reach 4.7 GW by 2024

Utility procurements, changing tariffs and grid service opportunities all drive the market forward

U.S. energy storage annual deployment forecast, 2012-2024E (MW)



Source: Wood Mackenzie Power & Renewables