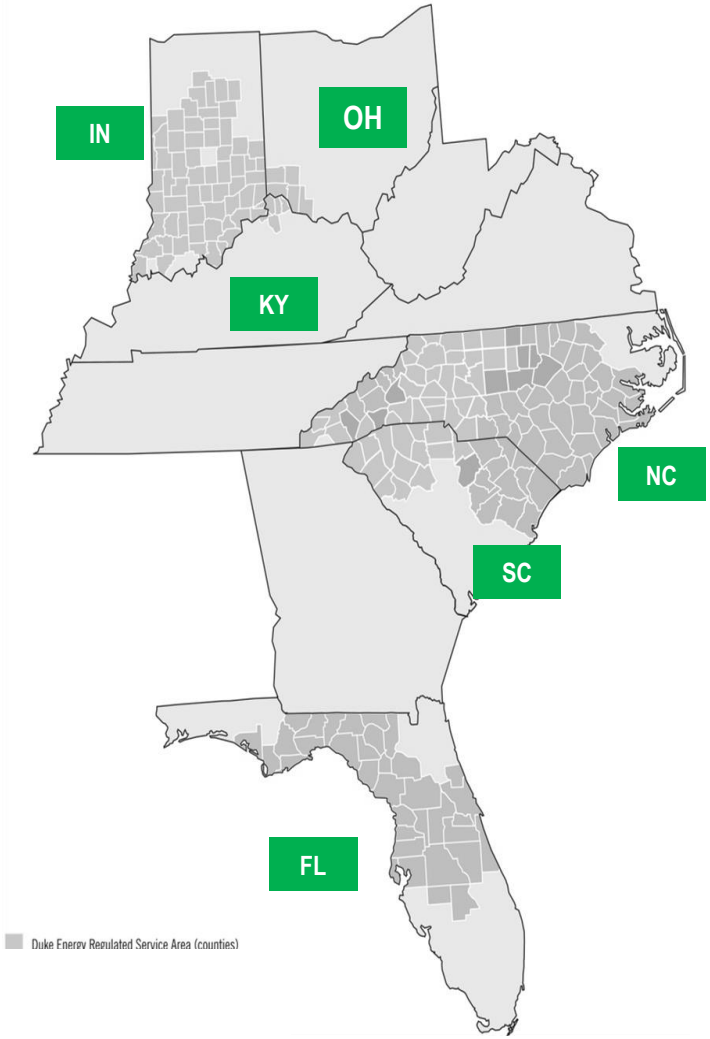
Energy Storage and Duke Energy

Mike Rowand – Director, Technology Development

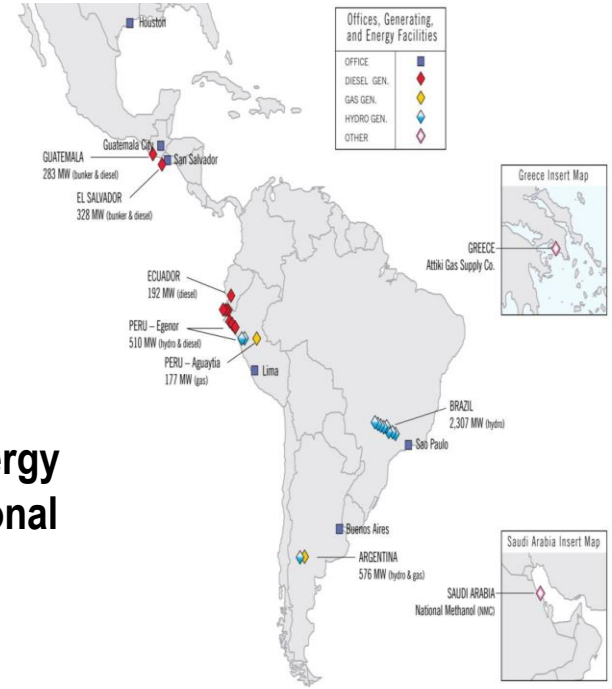
DUKE ENERGY®

Franchised Electric & Gas



Duke Energy Renewables

Duke Energy International



Energy Storage Project Summary

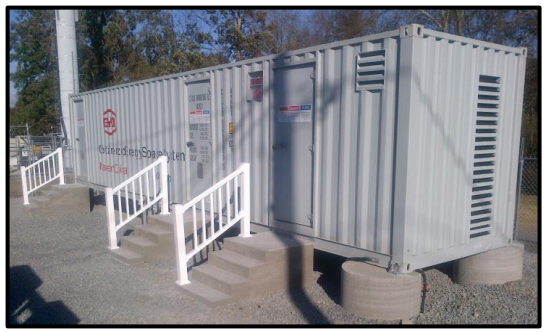
36 MW / 24 MWh
Advanced Lead Acid
West Texas (with commercial group)

402 kW / 282 kWh
Sodium Nickel Chloride
Mt. Holly, NC

75 kW / 42 kWh
Lithium Titanate
Indianapolis, IN (Carmel)

250 kW / 750 kWh
Lithium Polymer
Charlotte, NC

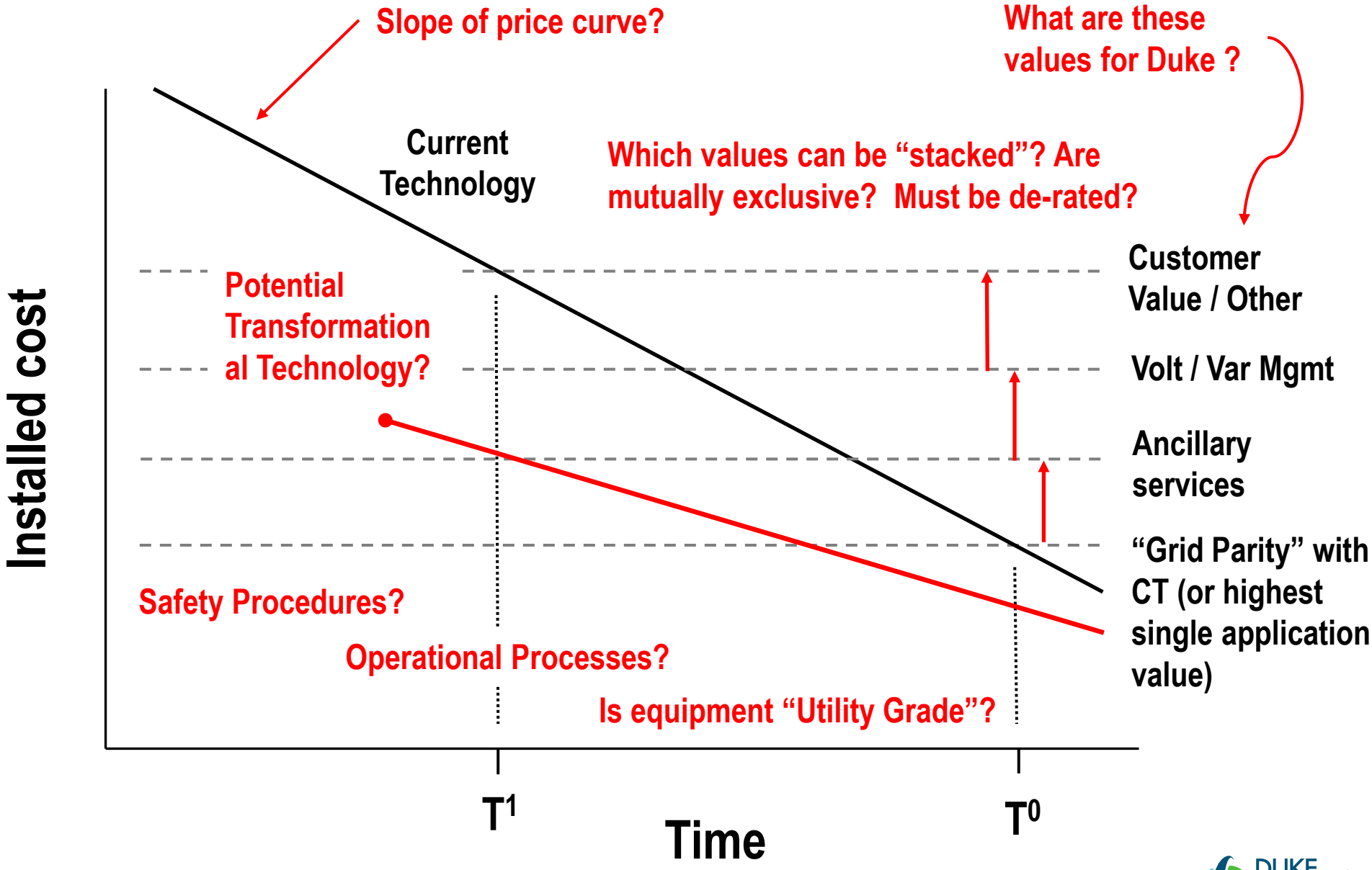
25 kW / 25 kWh
Lithium Ion
Charlotte, NC



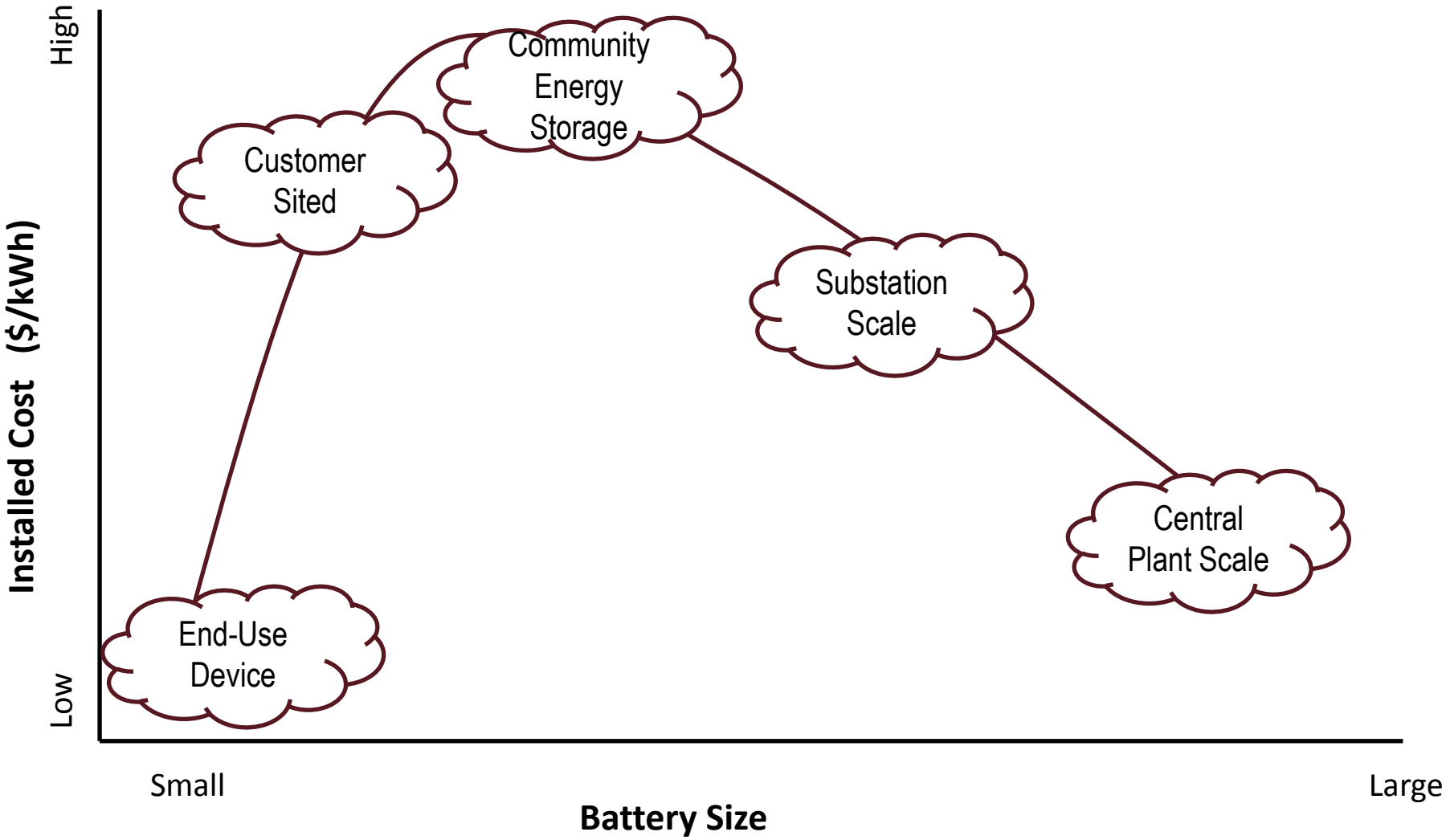
200 kW / 500 kWh
Lithium Iron Phosphate
Charlotte, NC

Testing different sizes at various grid locations (transmission, distribution and behind a customers meter) along with numerous chemistries.

Distributed Energy Storage – Emerging Tech Focus



Finding the Highest Value Point for Energy Storage



Energy Storage Observations

- Battery Cell & Module costs coming down quicker than installed system cost
- “Utility Grade” Reliability is still a question mark for Distributed energy storage systems.
- Existing Rate tariffs and Interconnection standards do not anticipate ES and could have unintended consequences
- Multiple, not easily quantified, value streams that stack across grid operations make ES business cases difficult
- The inverter is a key component of the ES value proposition for distributed systems