Nanogrids with Energy Storage for Future Electricity Grids

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Agenda

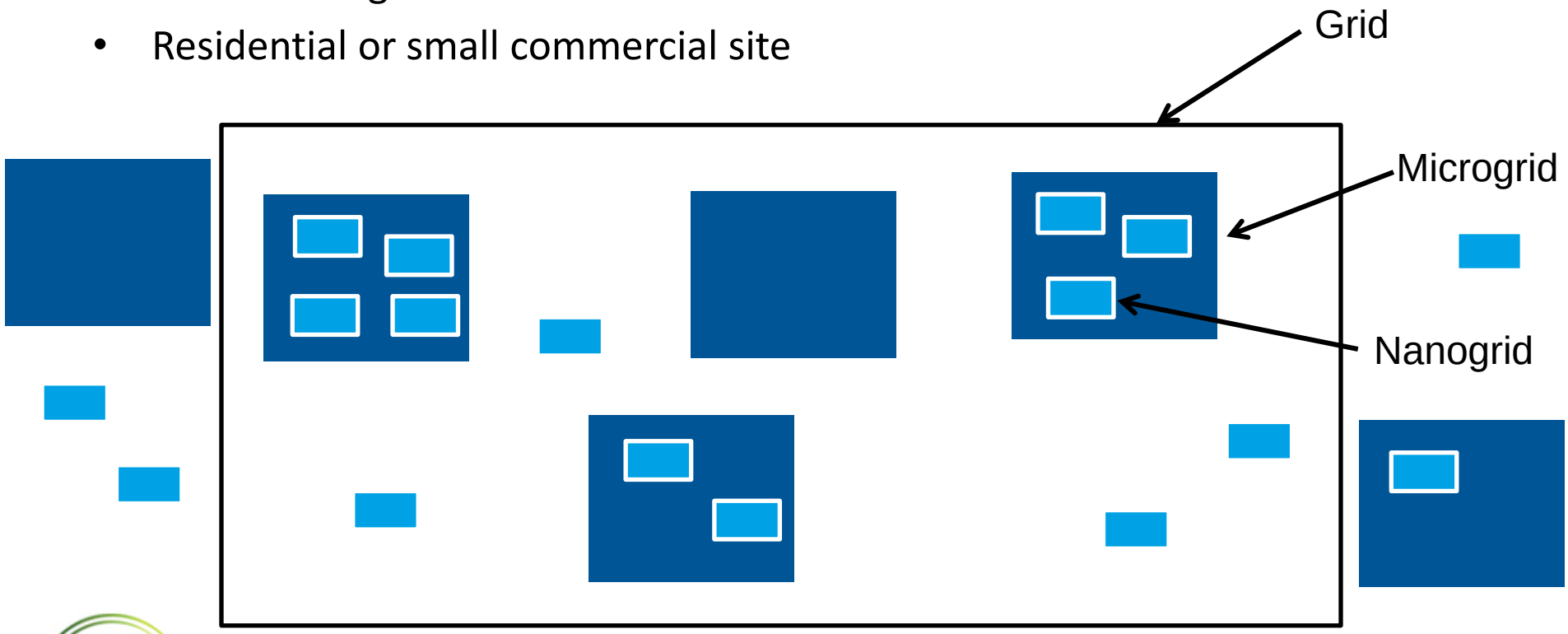
Nanogrid Definitions

Potential Markets for Nanogrids

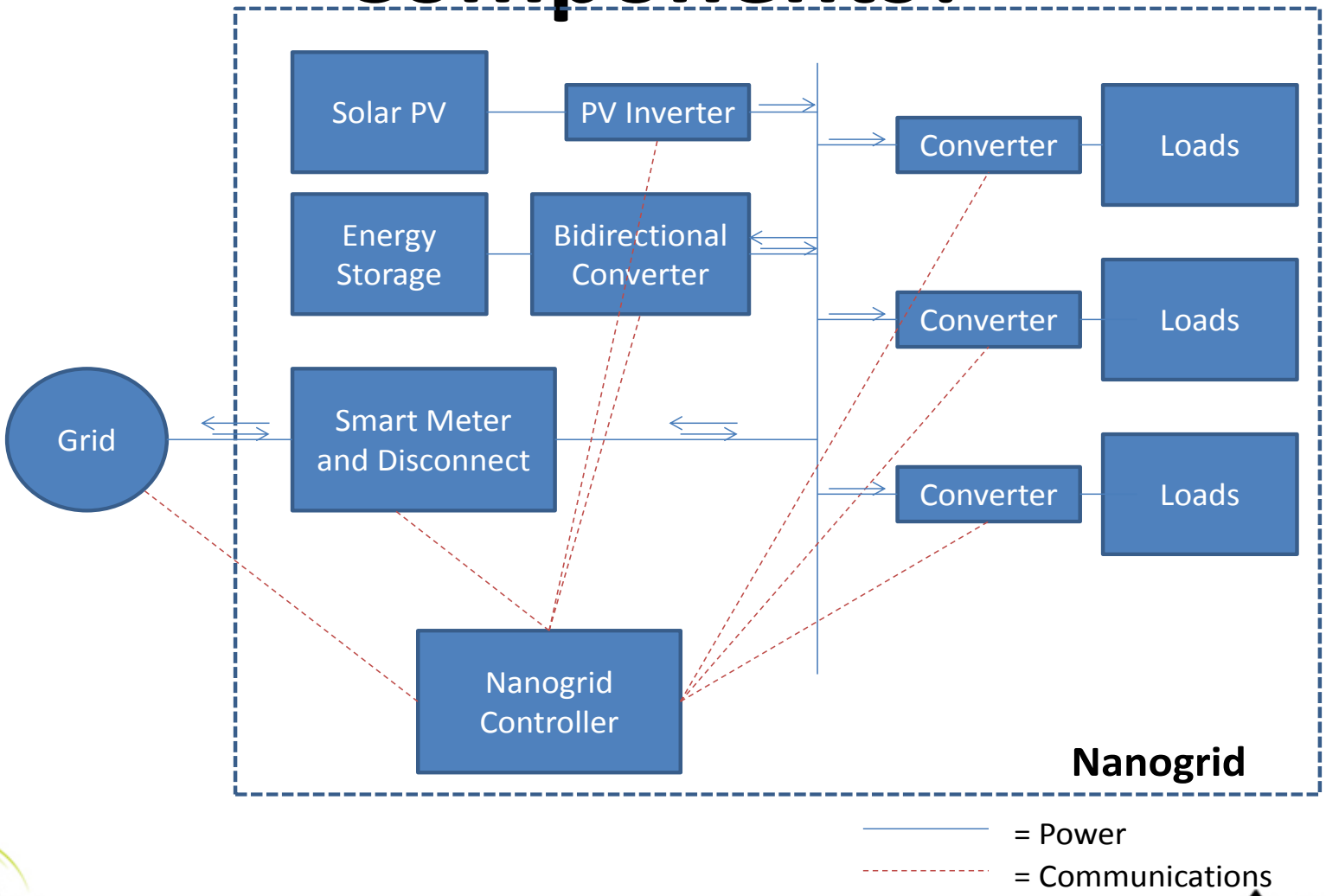
Nanogrid Use Cases

What is a Nanogrid?

- Building cell of a microgrid
- Smaller in size (< 50 kW)
- Behind a single meter
- Residential or small commercial site



What are Nanogrid Key Components?



Nanogrid Benefits

- Increase power quality and reliability
- Reduce peak load seen by grid and avoid peak energy costs
- Reduce transmission and distribution (T&D) losses by having on-site generation and energy storage
- Supply ancillary services to the grid
- Accelerate the adoption of distributed and renewable energy sources, and reduce fossil fuel use/carbon emissions

Potential Markets for Nanogrids

- Areas where backup power or power quality is valuable
  - Natural disaster / hurricane prone areas
  - Military installations
- Rural areas with weak electricity grids
- Developing countries with limited / no electricity access
- Areas where electricity is expensive
- Locations that have high renewable energy potential

Nanogrid Use Cases – Residential / Small Commercial

- Assumed PV and smart metering already exists
- Focus on the cost for energy storage and the controller

	Case 1 – Residential	Case 2 – Commercial
PV Array Size (DC)	6 kW	6 kW
PV Array average daily energy output	21 kWh	21 kWh
Peak Load	8 kW	30 kW
Emergency Load	2 kW	6 kW
ESS Size	5 kW / 5 kWh	15 kW / 15 kWh
ESS Cost	$7,500	$22,500
Nanogrid Controller Cost	$ 1,000	$ 1,000
Total System Cost	$8,500	$23,500

Approach

Select applicable value streams that can be achieved using current technology vs. advanced future technologies

Assign $ value for each benefit

Aggregate multiple energy storage benefits

Perform cost benefit analysis and return on investment (ROI) calculations

Remaining will be in the Poster

- Modeling details and assumptions including applicable value streams and how to aggregate them
- Use case ROI results
- Conclusions