

# Mixing the Old with the New

Pacific Power Association

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# Global Expertise



## Local support

Able to provide full EPC solutions and post commission operational support.



## Strong History

Founded in 1911 in the US, with over 60 years of presence in Asia Pacific. S&C Electric Company is 100% employee owned.



## Bespoke projects

Catering to government bodies, utilities, public/private companies, we understand every project is unique.



## Reliability Products

Reducing the number of momentary outages for network customers



## Energy Storage

Fully integrated Power Quality Energy Storage Systems deployed locally.



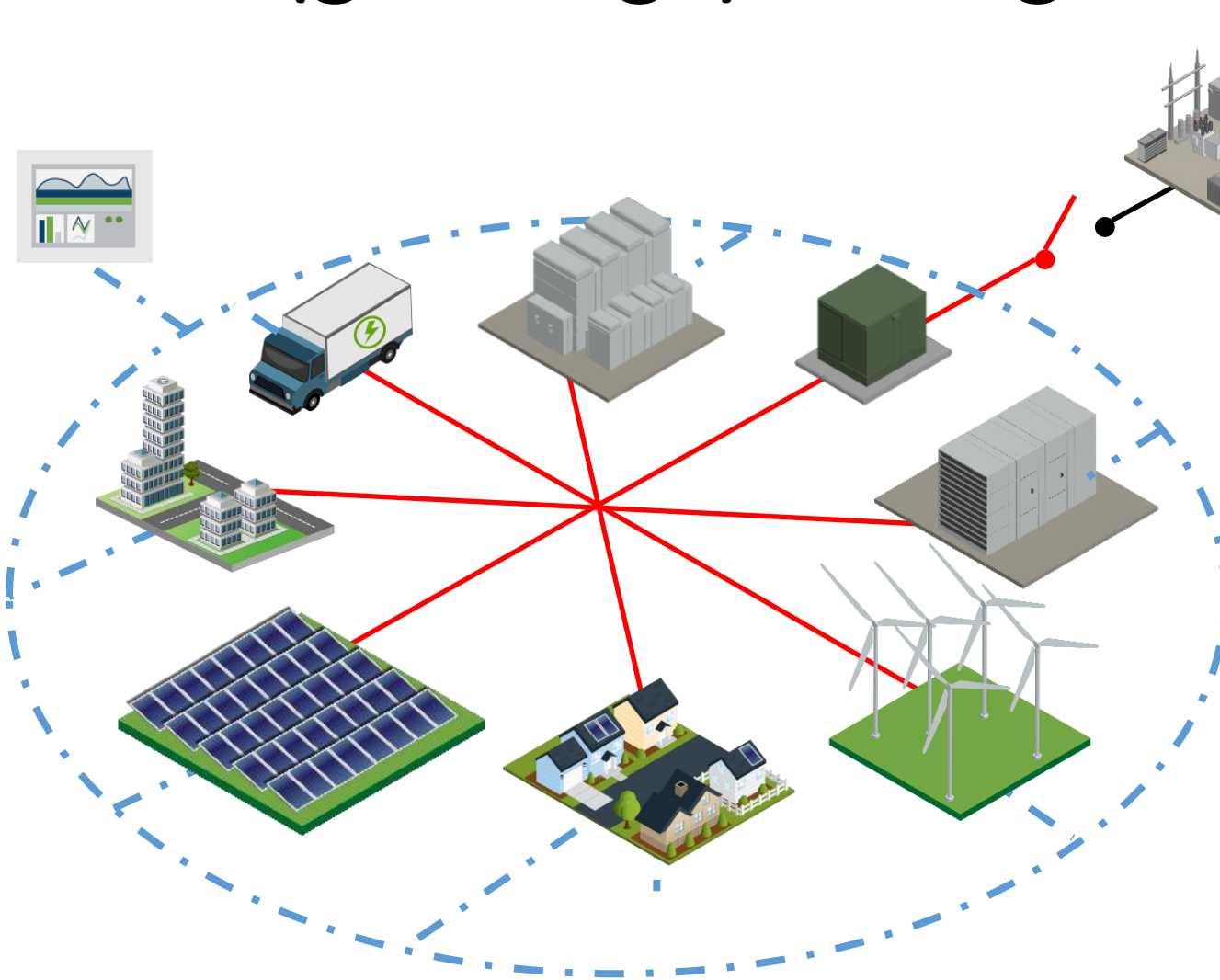
**3,000+**

Over 3,000 employees worldwide.



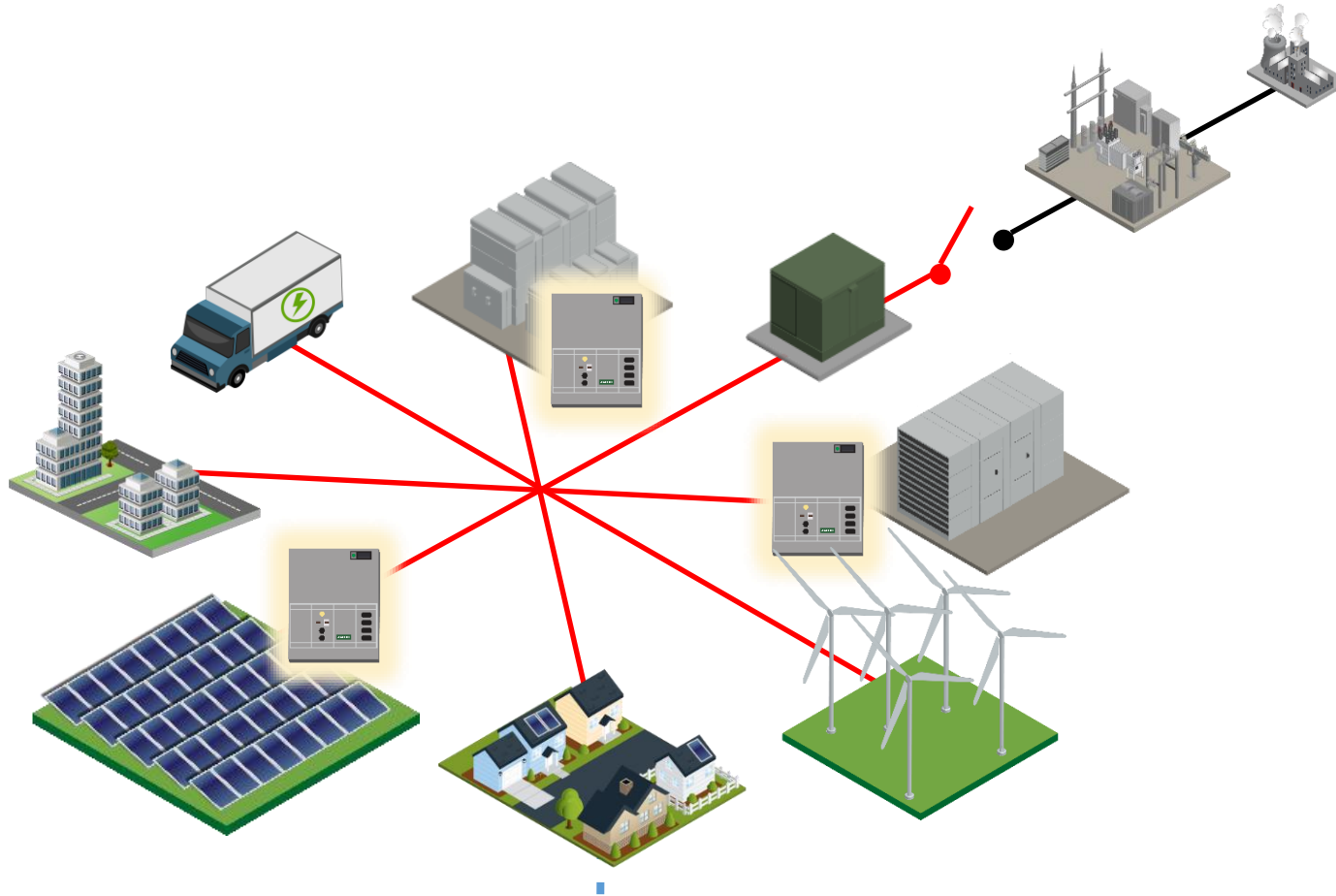


# The (grid-edge) microgrid



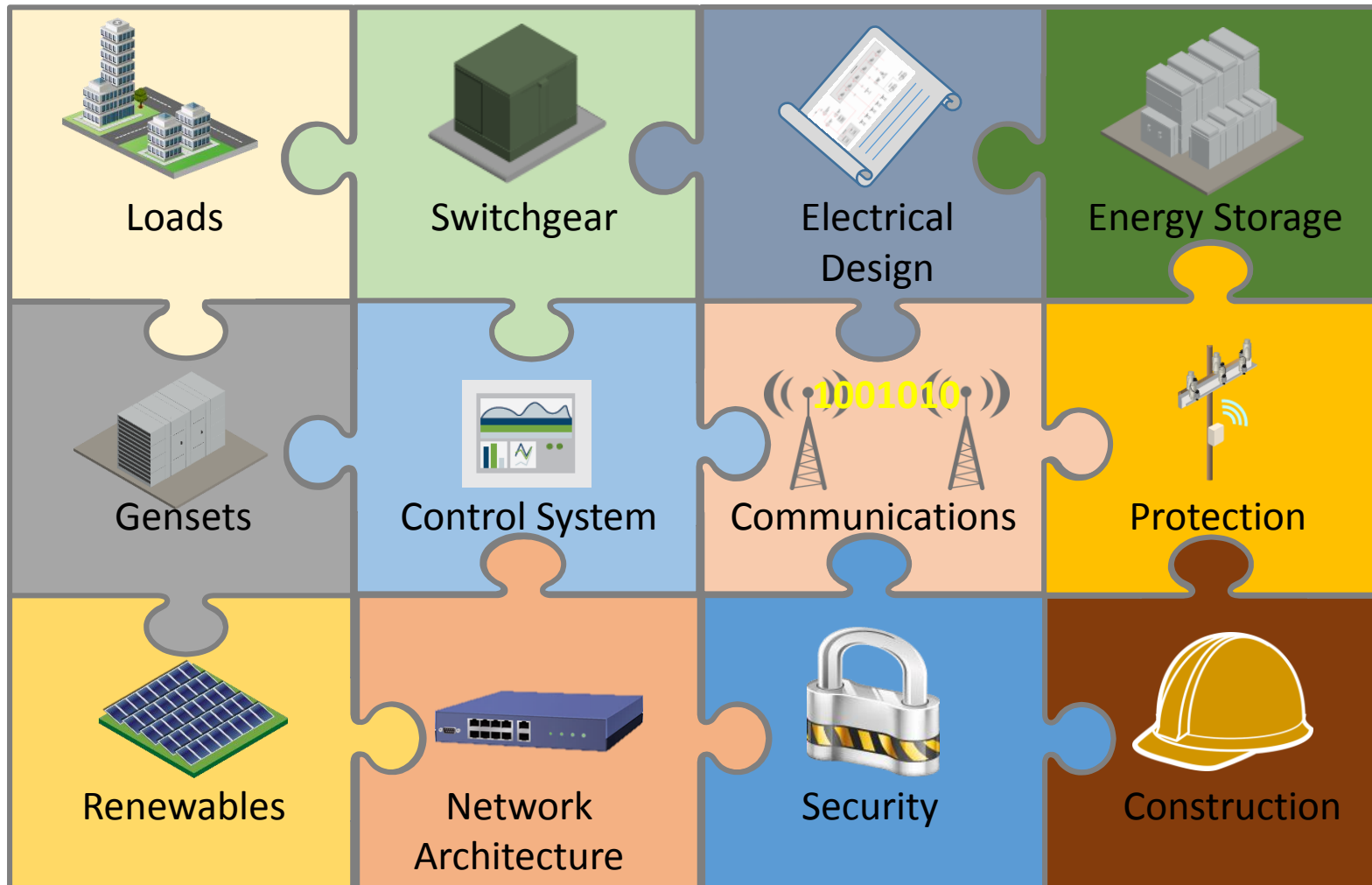
“A group of interconnected **loads** and **distributed energy resources** with clearly defined electrical boundaries that acts as a **single controllable entity** with respect to the grid and can connect and disconnect from the grid to enable it to **operate in both grid-connected or island mode.**”

# GridMaster: Distributed intelligence

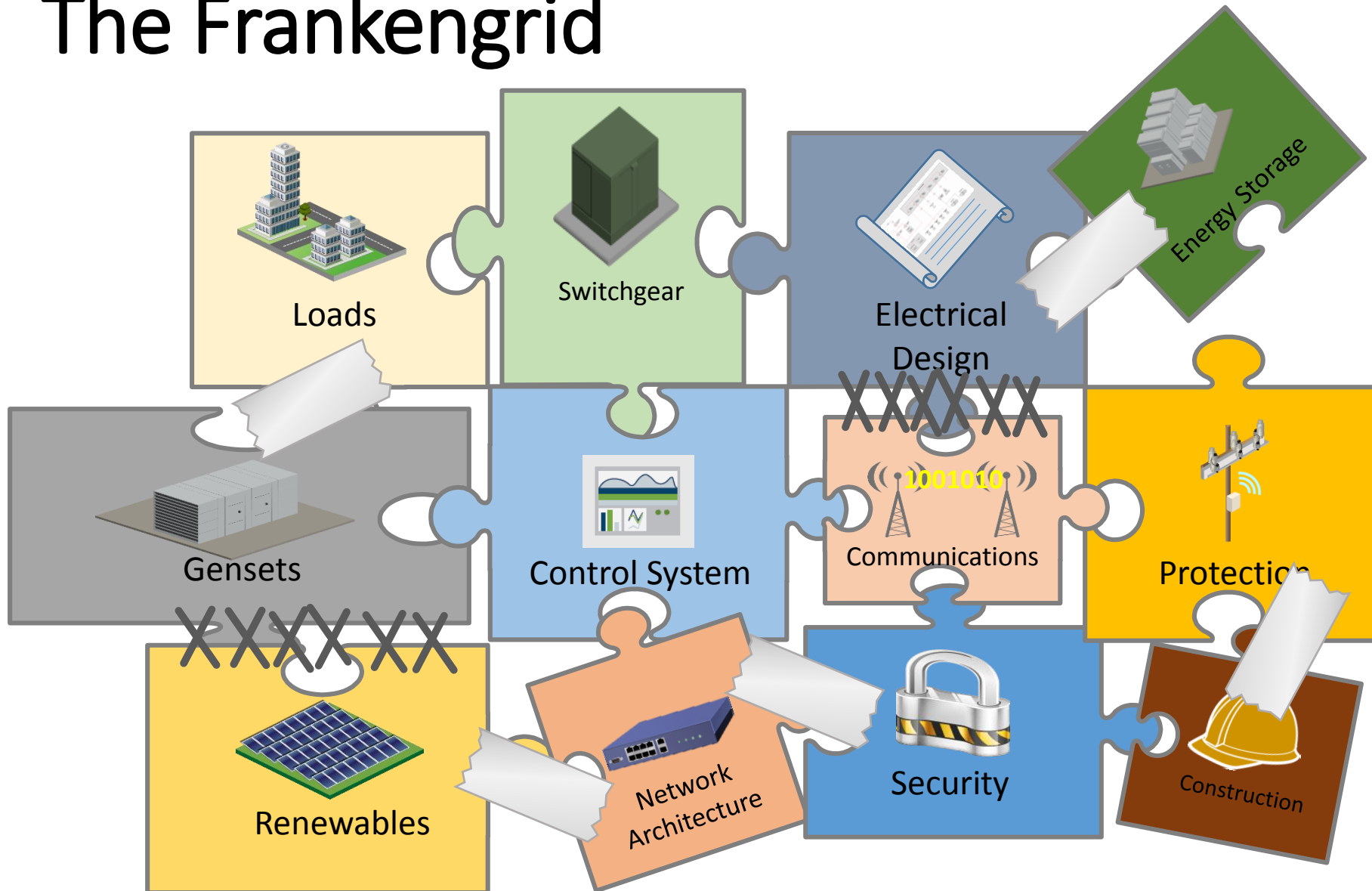


S&C's IPERC GridMaster Controller.

# The ideal: The seamless microgrid

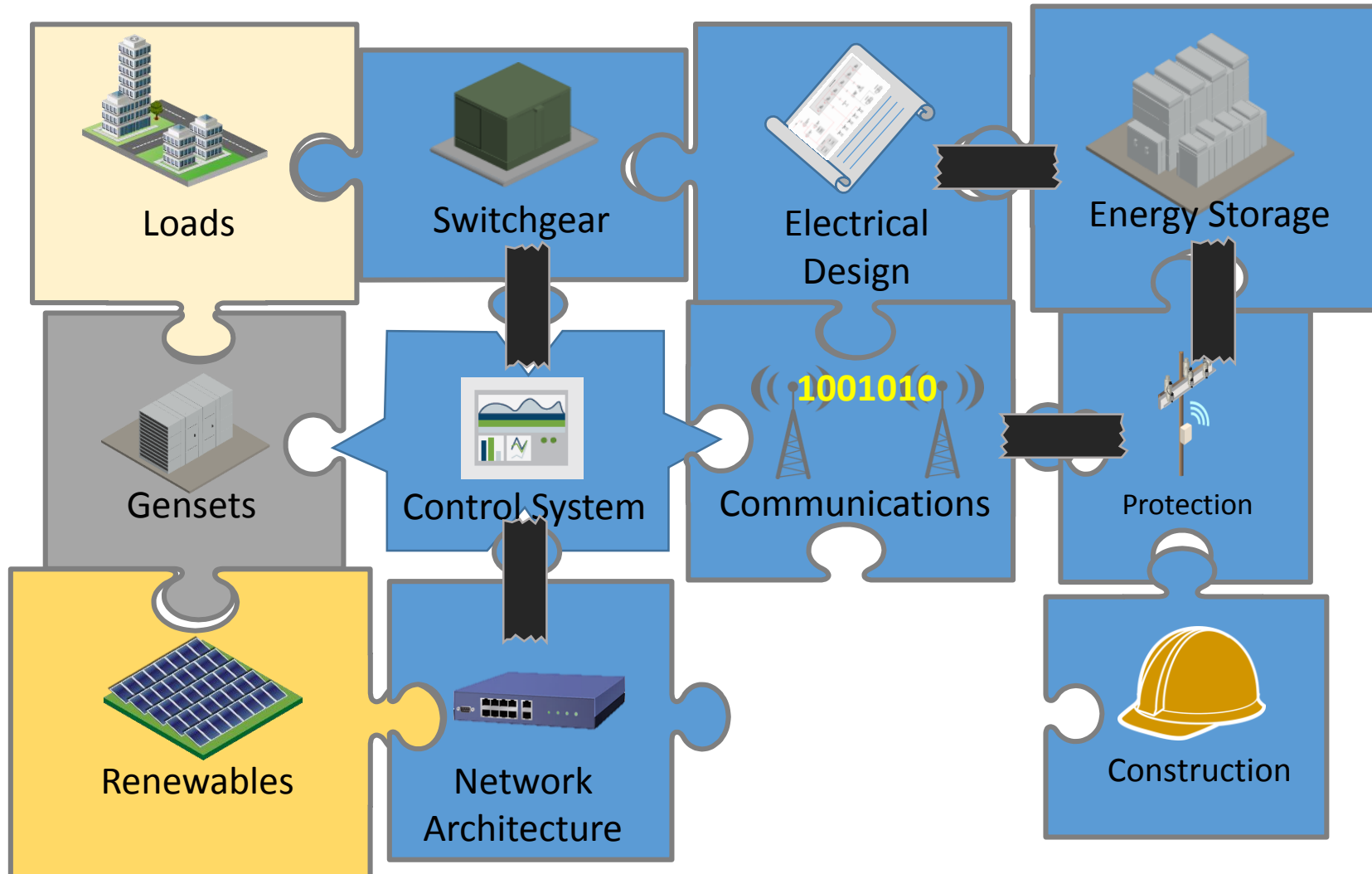


# The Frankengrid



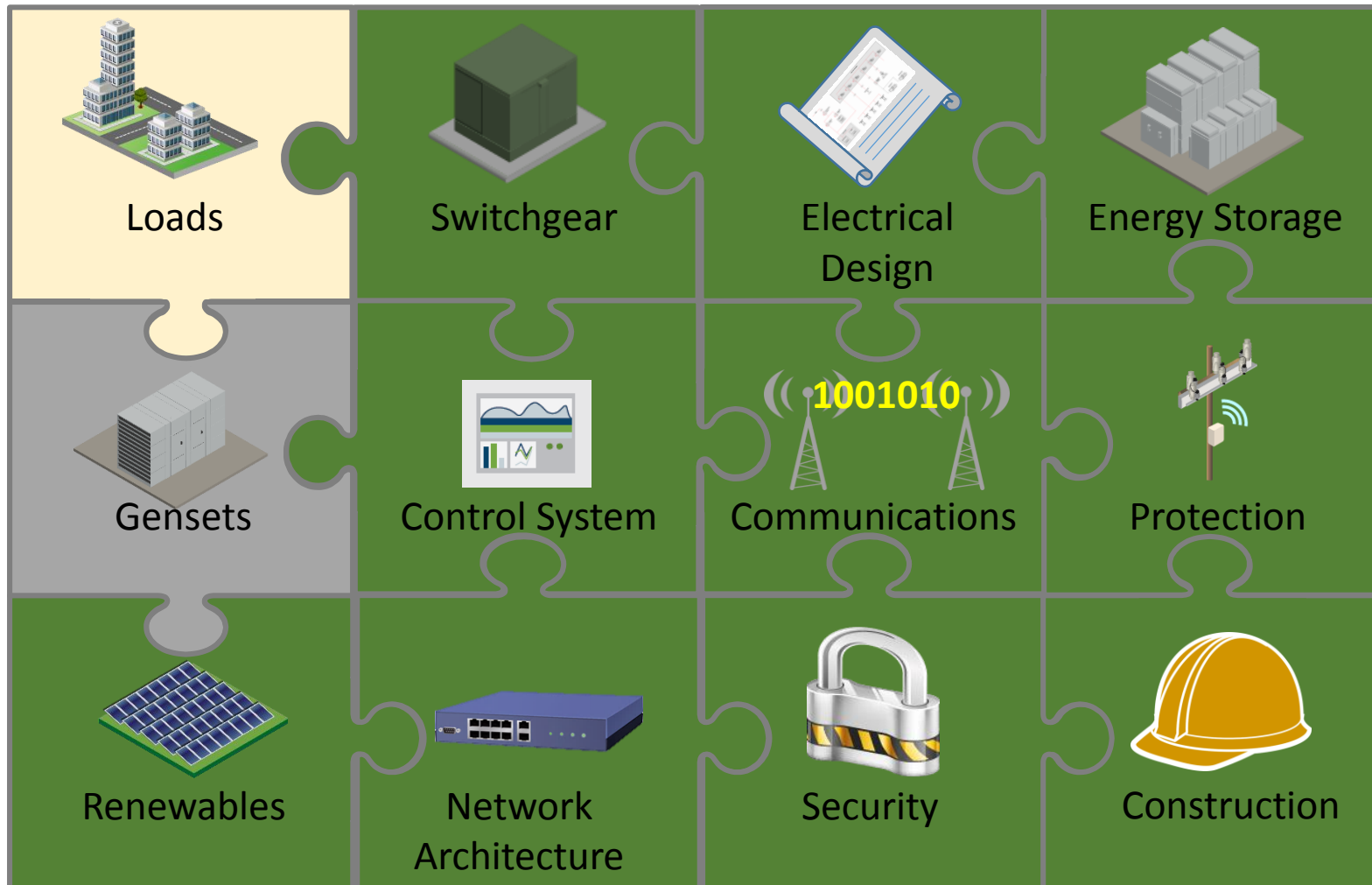


# The Megacorp Grid





# Our Answer: The Total Microgrid





# Behind the Meter?

“During the LCL trials the uptake achieved was **24%**. This suggests that the response would only be 24% of that achieved if uptake of a ToU signal were to be mandated. “

*Source: Residential Demand Side Response for Outage Management and as an alternative to network reinforcement, By: **UK Power Networks***



# Total Capability of Battery Energy Storage



## Renewable Smoothing

Counteract variability in renewable generation



## Peak Shaving

Reduce highest level of energy consumption



## Energy Time Shifting

Save when cost of energy is low and use when costs are high



## Transmission Congestion Relief

Reduce peak transmission capacity requirements



## Frequency Regulation

Balance grid frequency by supplying either load or generation



## Voltage/VAR Support

Maintain consistent voltage by varying reactive power



## Black Start

Initiate power and provide sync frequency for generation sources



## Frequency Response

Balance frequency quickly (<2 seconds) after a sudden change of power consumption or generation



## Local Capacity

Provide energy, typically in constrained areas of the grid



## Transmission Deferral

Postpone investments in transmission assets



## Distribution Deferral

Postpone investments in distribution assets



## Retail Energy Time Shifting

Sell energy at the retail rate versus the wholesale price



## Islanding

Operate independently from the grid



## Spinning Reserve

Provide energy to cover in case of primary generation loss



## Power Reliability

Support loads when the grid loses power



## Power Quality

Protect loads from momentary events such as power interruptions and voltage sags and swells

# Experience



Total energy



Total power



Total installed experience



Battery chemistries



Total grid-scale projects



Continents with S&C projects

# Energy Storage Islanding Applications

Field, BC, Canada

1MW, 7MWh

Sodium Sulfur Battery





# Energy Storage to address Remote Power Quality

Queensland, Australia

25kW, 100kWh (20 sites)

Lithium Ion battery



# Energy Storage for Dynamic Islanding

Victoria, Australia

2MW, 2MWh

Lithium Ion battery



# Energy Storage to Reduce Diesel Emissions

Catalina Island, California, USA

1MW, 7MWh

Sodium Sulfur Battery





# Energy Storage for a MicroGrid

Santa Rita Jail, California, USA

2MW, 4 MWh

Lithium Ion

On site generation includes

Diesel Generators

Fuel Cells

Wind Turbines

Solar (PV)



When a disturbance to the utility grid occurs, the automatic disconnect switch enables the facility to "island" itself from the main utility grid and independently generate and store its own energy.

Utility power enters the facility at the "Point of Common Coupling"

PG&E utility interconnection or "Point of Common Coupling" and static disconnect switch



Two 1.2 MW backup diesel generators



Distributed Energy Resources Management System (DERMS)



The distributed energy resources management system (DERMS) serves to reduce peak demand during normal grid-connected operation or during a demand response event.

1 MW fuel cell



2 MW advanced energy storage system



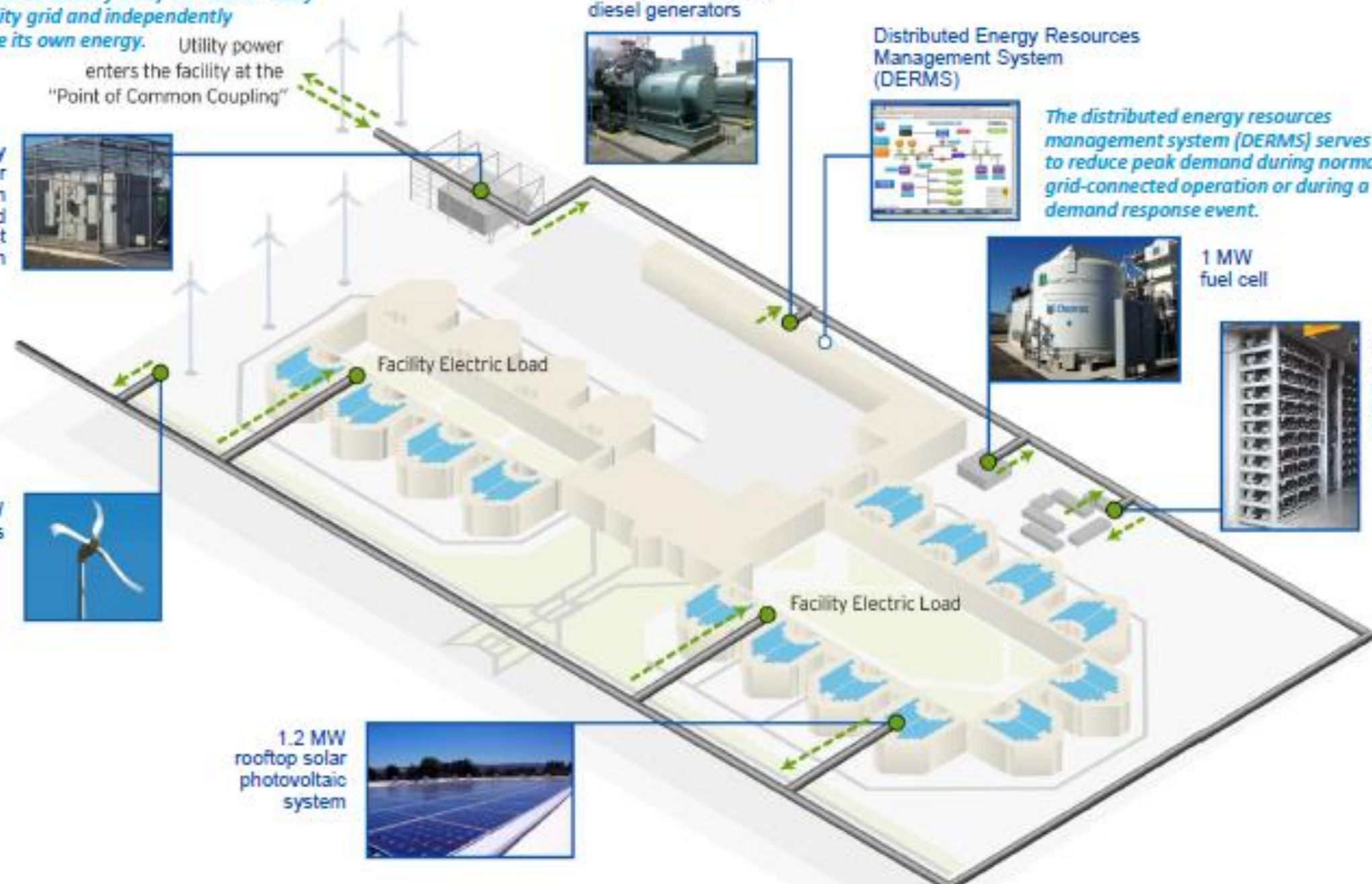
Facility Electric Load

Facility Electric Load

Five 2.3 kW wind turbines



1.2 MW rooftop solar photovoltaic system





Please visit us at:  
[www.sandc.com/energystorage](http://www.sandc.com/energystorage)

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