SOL LUX ALPHA

JOHN SARTER
OFF THE GRID DESIGN

SOL LUX ALPHA

Carbon Neutral Living + Transportation systems development

SOL LUX ALPHA – First PH Certified multi-unit **Nanogrid** to US Market

- 4 unit, 6 story, N+E using only PV within the building envelope

Passive House Institute US is a partner program with the U.S. Department of Energy's Zero Energy Ready Home Program.

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US DOE ZNERH recognizes Passive House as "high bar" for efficiency

SOL-LUX ALPHA

- **All electric – Fossil Fuel Free**

- Passive House PHIUS+ "Source Zero"
- US DOE Zero Energy Ready Home program
  (Energy Star, Indoor Air Plus, EPA "WaterSense")

Achieved first ever "**alternate path of compliance**"
to San Francisco's rigid **Green Building Code**

ZERO ENERGY READY HOME
U.S. DEPARTMENT OF ENERGY
HOUSING INNOVATION AWARD
WINNER 2018

PHIUS

PHIUS+

±C

Energy Star

The US Energy Star program guides builders and homeowners to the highest efficiency home appliance and other home energy products available in the USA today.

EPA WaterSense PARTNER

US EPA WaterSense

The US EPA WaterSense program helps save water and protects the environment by promoting WaterSense labeled products for homes, yards, and businesses, while taking various other simple steps to save water each day.

ZERO ENERGY READY HOME

Department of Energy

The United States Department of Energy has developed a partner program dedicated to the building of, the science behind and the energy generation for Zero Net Energy and Net Positive Energy homes in the US. Sol Lux Alpha was built to exceed even the DOE program's highest standards, which is measured and recognized a year after occupancy.

Cost effective, positive ROI Model of Development for ourselves and others to follow

PHIUS
Passive House Institute US

- Reduced interior volume to exterior surface ration = greater energy efficiency
- 2X6 studs on 16” centers, platform framing
- Double 5/8” Dense Glass exterior, double 5/8” Gypsum interior
  (Standard 2 hr. fire wall)

MINIMAL EXTRA COST FACTORS:

- Bibbed / Blown dens-pack fiberglass
- High quality (dual glazed) windows and doors
- Air sealing with liquid applied membrane and testing
- ERV (partially offset by reduced HVAC requirements)

STRATEGIES

PH Baseline + "industry best" high efficiency systems

- Air source heat pumps for HVAC, DHW, Dryers
- 100% L.E.D. lighting
- High Efficiency appliances AEK - Induction cooktops and Bosch "Benchmark" Appliances

Additional energy reduction features

- Automatic occupancy and vacancy sensors for HW recirc and receptacles

- Energy monitoring and management systems

- Automated HVAC and blinds for balanced solar gain / shading + privacy

NANOGRID systems

- Sunpreme GxB 380w Bifacial panels (up to 25% boost) = 475w
- 21 panels per unit / 12 for common area
- Rainwater Catchment system
- Integrated L.E.D. lighting "Energy as Art"

NANOGRID systems

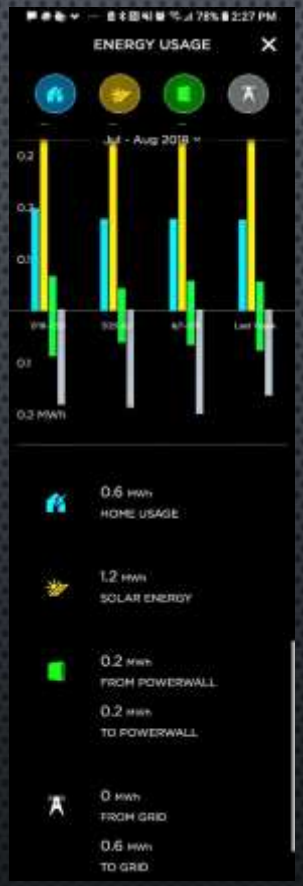
Tesla Energy Powerwall x 3 per unit

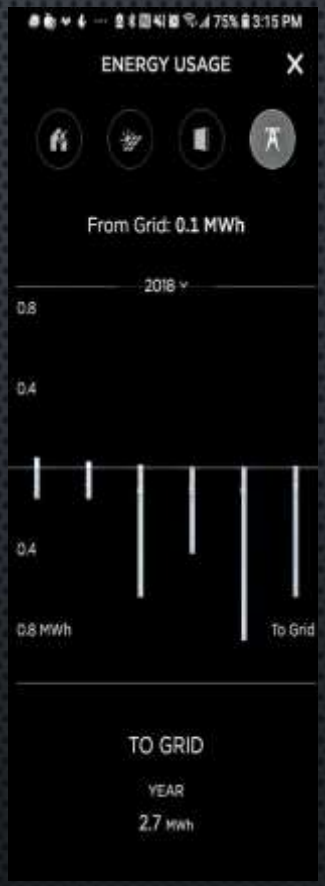
(40.5 kWh per unit)

- Triple redundancy
  (no single point of failure)
- 2-3 days energy for each unit
- Continually charged by PV

- No grid power required since commissioning (2.7 mWh export)

SOL LUX ALPHA OCCUPIED; RESULTS – UNIT #2





Daily-13 kwh /30 exp. Weekly-135 use / 126 exp. Monthly-600 use/600 exp. Yearly-2 Mw use/2.7Mw exp. Ann Grid-2.6 Mw export

NANOGRID systems

- Blue Planet Energy "Blue Ion" Towers for 3 phase loads (elevator & common areas)

- Tesla Powerwalls export 120/240V (Single phase only)

NANOGRID systems

- Integrated EV charging / wiring systems

- Ensures EV charging even during grid failure
- Level One charging recommended in grid outage

NANOGRID systems

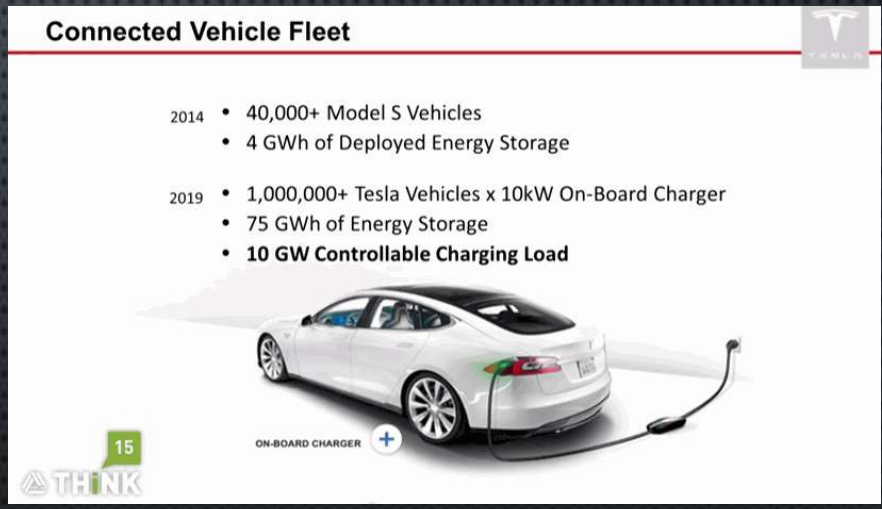
V2B Enabled Architecture

- Bi-Directional Vehicles and Chargers
- Allows expanded energy storage capabilities (reduces need for stationary ESS)
- Potentially *quadruples* energy storage for a building

NANOGRID systems

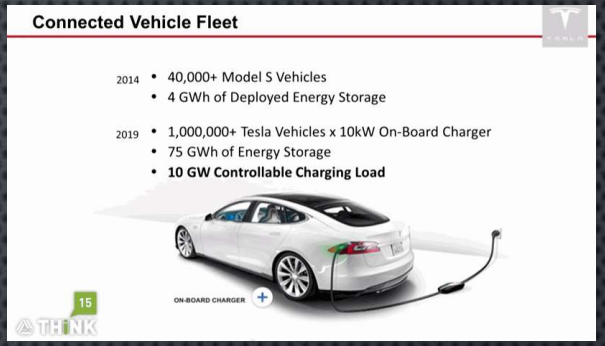
- Energy storage is a grid asset, IOU's will soon be PAYING owners to utilize it.

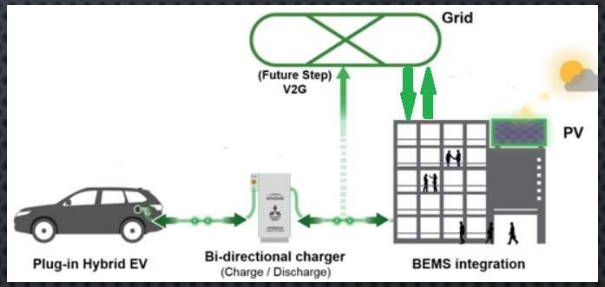
- V2B is another tool for grid balancing during periods of high renewable generation on the grid



V2B
(Vehicle to Building)

- **Reduces** need for site based ESS
- "**Mobile Energy Assets**" for community resilience
- EXTENDS "**NANOGRID**" TO "COMMUNITY **MICROGRID**"
- Enables the concept of a "**MOBILE MICROGRID**"



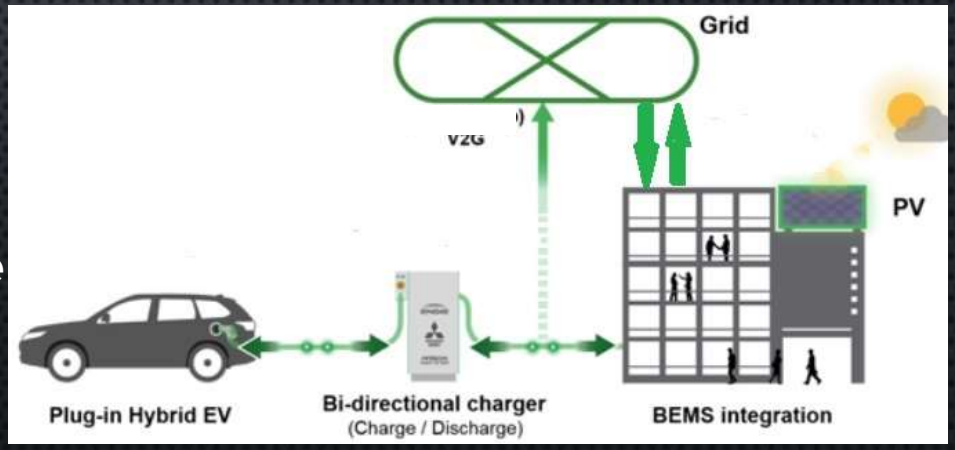


"Mobile Microgrid"

"Grid-Optimal" prosumer Nanogrids + bi-directional EV's =
"Mobile Community Microgrid" Systems

- **Unoccupied buildings** do not need much energy

- **Minimize "stand by" loads** = small site based ESS +
  bring Mobile Energy with you…
  (<u>Anywhere</u> you go!)

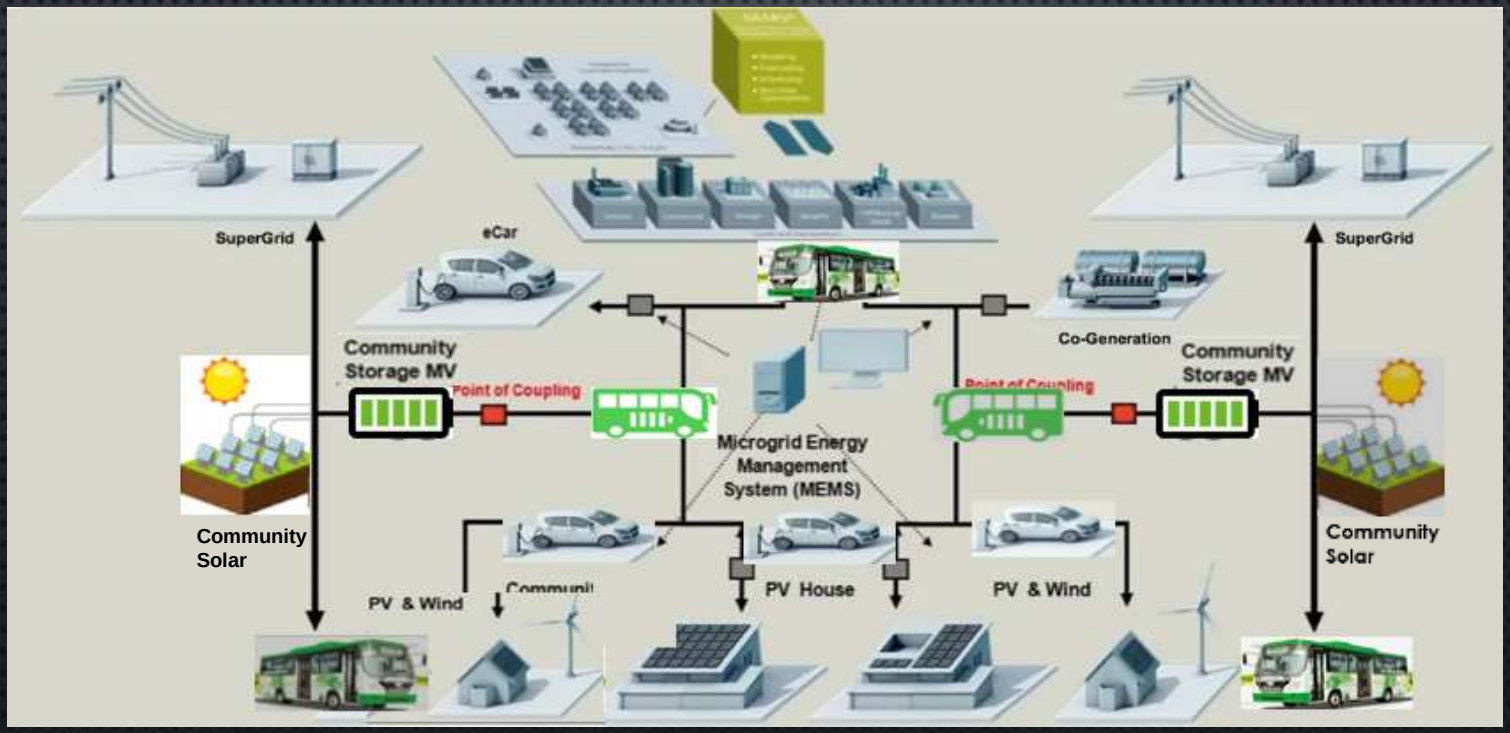


“Mobile Community Microgrid”

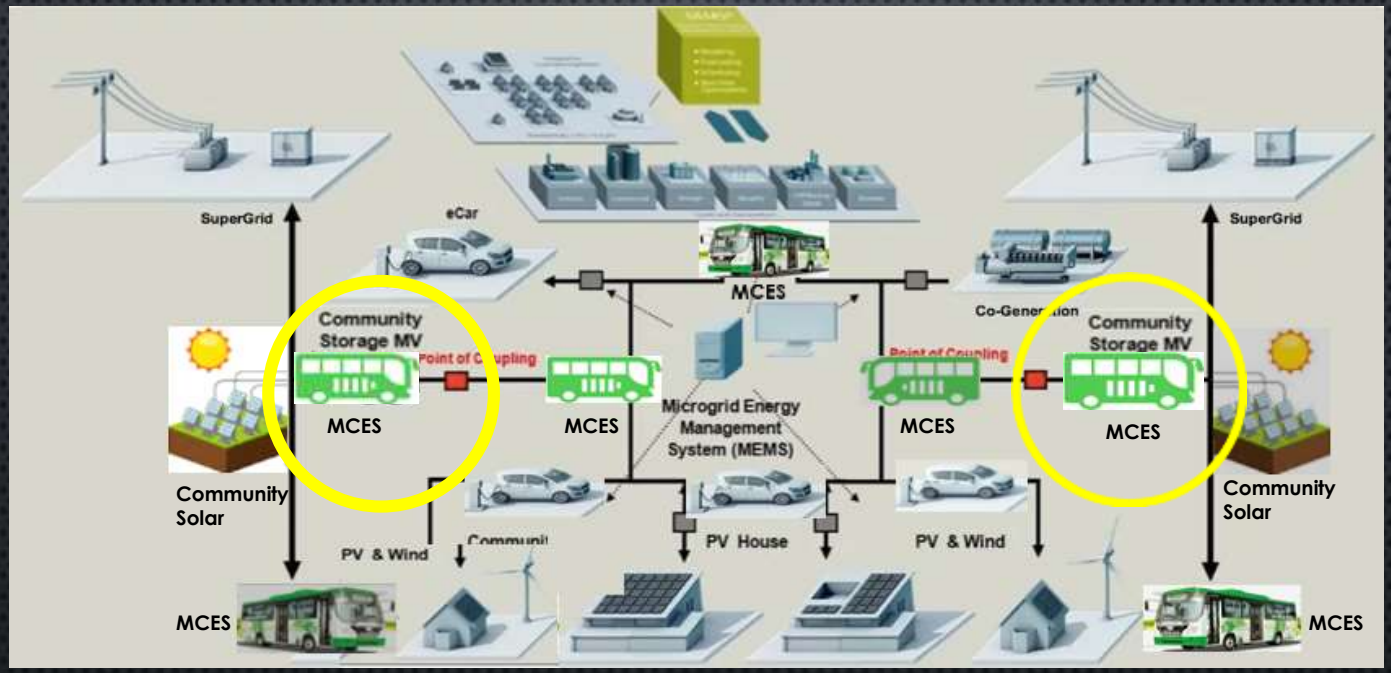
The More “prosumer” Nanogrids + Mobile Energy Resources
=
Reduced need for <u>community scale</u> Solar + Wind + Storage

MOBILE MICROGRID

Add Community Scale R.E. + Storage @
Nodes of Grid Connection: provides ancillary
Grid services and Backup Community Microgrid services



Mobile Community Energy Storage Systems (MCES)



Greater resilience by virtue of distributed **MOBILE** systems and fewer single points of failure

Next Generation Projects:

- DC Nanogrid/microgrid systems (reducing inverter losses)
- Energy recovery (from waste, water and…)
- Light Energy recapture
- V2B and V2G integration
- AEV integration
- “Energy Hub” developments for Microgrid Communities and Campuses.

THANK YOU !

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