Clean Coalition

Making Clean Local Energy Accessible Now

North Bay Community Resilience Initiative:

The path to energy resilience and sustainability

John Sarter

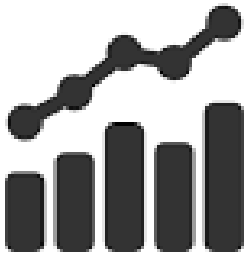
Program Manager, NBCRI

Clean Coalition

415-342-7199 mobile

johns@clean-coalition.org

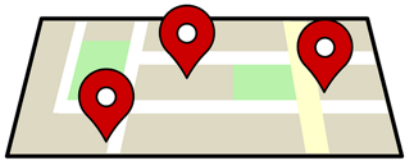
Clean Coalition; Areas of Expertise



Analysis & Planning

Full cost and value accounting for DER; siting analysis

- PG&E
- PSEG
- SCE



Grid Modeling & Optimization

Powerflow modeling; DER optimization

- PG&E
- PSEG
- SCE

Program and Policy Design

Grid planning, procurement, and interconnection

- LADWP, Fort Collins, PSEG
- City of Palo Alto (FIT and solar canopy RFP)
- RAM, ReMAT
- Rule 21 & FERC

Community Microgrid Projects

Design and implementation

- San Francisco, CA
- Long Island, NY
- Montecito, CA
- U.S. Virgin Islands

Clean Coalition (501c3 nonprofit); Mission

To accelerate the transition to renewable energy and a modern grid through technical, policy, and project development expertise

Reaction vs. Resilience

Reaction to disaster is how we are operating now, by declaring emergencies, and implementing temporary emergency measures for rapid rebuilding after catastrophic events. This is *important*, however…

Resilience can be created by resolving to move forward proactively *for the long term* in ways that will increase our ability to strategize, rebuild in better ways, adapt, and better manage resources that stay powered and fully capable when catastrophe strikes again.

North Bay Community Resilience Initiative: Aims

- Track, publicize, and support cutting-edge resilience-creating energy efficiency, electrification, and microgrid incentives, plus policy advancements by SCP, MCE, BayREN, BAAQMD, and others.

- Procure and develop a database of model structures with “Community Microgrid-ready” designs: For new and retrofit residential, commercial, and municipal bldgs.

- Develop “Electrification & Community Microgrid Ready” (ECMR) document for homeowners and installers

- Develop Community Microgrid roadmap beginning with “Critical Facility” microgrid pilots such as fire stations, hospitals, and places of refuge.

- Position these pilots in areas that are conducive to expansion into Community Microgrids

- Develop all as a model for resilience in rebuilding, and for ***proactive resilience*** and community modernization

North Bay Community Resilience Initiative: Team

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Sonoma Clean Power

MCE

PG&E

Minerva Ventures
Charting a Resilient Path

Bay Area Air Quality Management District

County of Sonoma
Energy and Sustainability

biraenergy

rcpa
Regional Climate Protection Authority

Stone Edge Farm Microgrid

Rebuild NorthBay
Foundation

Ann V Edminster
AVE Design AVEnues LLC

Off the Grid Design
Creating a Sustainable Future

center for climate protection

Berkeley Lab

Aim 1: Support and promote Advanced Energy Rebuild programs for Homes and stuctures

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Support for Rebuilding with Efficiency, Electrification, and Resilience

Sonoma Clean Power

- Sonoma Clean Power (SCP) and MCE Advanced Energy Rebuild: SCP, MCE, Pacific Gas and Electric Company (PG&E), and Bay Area Air Quality Management District have joined efforts to help homeowners affected by the firestorms to rebuild energy-efficient, sustainable homes.

PG&E®

- The SCP program offers two incentive packages tailored to Sonoma and Mendocino Counties.

Bay Area Air Quality Management District

- Each package has a flexible performance pathway or a simple prescriptive menu. SCP offers up to $17,500 in incentives to electrify, add solar + energy storage, Connected EV's, and upgrade to "connected" appliances

MCE

- MCE has similar "Advanced Energy Rebuild" program for the Napa fire rebuilding efforts.

Aim 2: Model Structures - Advanced Energy Rebuild Homes

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Showcase and provide case studies of homes being rebuilt utilizing the "**Advanced Energy Rebuild**". Up to $17,500 incentives from Sonoma Clean Power and MCE, to go "all electric" and "microgrid ready"!

Having a "microgrid" means when the power goes out, your power **stays ON!!**

Hirsch Solar Powered Residence

Mini-split Heat Pump

H.P Water Heater

L.G. Chem Energy Storage

Induction Cooking

Model Structures: Design Database

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Developing a **"Design Database"** for model structures for New and retrofit residential, commercial, and municipal buildings

- In collaboration with high "performance based" building organizations in the USA:
  - US DOE Zero Energy Ready Home Program & US DOE "Solar Decathlon" Homes database
  - Passive House Institute US
  - USGBC / New Buildings Institute "Grid-Optimal"
  - Net Zero Energy Coalition
  - Rocky Mountain Institute

ZERO ENERGY READY HOME U.S. DEPARTMENT OF ENERGY

PHIUS Passive House Institute US

nbi new buildings institute

U.S. GREEN BUILDING COUNCIL USGBC

Net-Zero ENERGY COALITION

ROCKY MOUNTAIN INSTITUTE

Electrification & Community Microgrid Ready (ECMR) specifications document

- Developed by the Clean Coalition and a team of industry experts, as a Guideline for Homeowners and trades installers to easily install necessary wiring to be all-electric and "microgrid ready"

- All-Electric benefits; Safer and healthier homes and communities;
  - Elimination of natural gas which is highly flamable, and produces formaldehyde and other toxic gases within the home and community
  - EV adoption = Reduction and eventual elimination of all fossil fuels
  - EV's can become "mobile energy" assets, saving *and making* money
  - Reduced reliance on outside fuel & energy sources
  - Reduction of greenhouse gases
  - REVENUE for homeowners by using your connected assets as grid assets

- Microgrid benefits; Energy resilient homes and communities
  - Ability to stay powered in grid outages = Resilience and Security
  - Ability to use behind the meter and community energy storage as "grid assets" = revenue stream
  - Energy produced by local renewable sources = local jobs

Microgrids and Community Microgrids

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- **Microgrid**: A coordinated set of behind-the-meter (BTM) local renewable energy, energy storage, and other Distributed Energy Resources (DER) that can be islanded (from the local grid) at the customer meter.

- **Community Microgrid**: A coordinated set of local renewables, energy storage, and other DER that can also be islanded, (from the larger grid) across a defined distribution grid area to provide indefinite renewables-driven resilience to critical community facilities, and other structures within the community.

Benefits of Microgrids

- **Financial and Impacts of Building or "Unit" Scale Microgrids**

- Lower operation costs (near "0" energy bills)
- Revenue from excess energy export (HOA **dividends**??)
- Renewable transportation energy – (100% R.E. EV charging)
- All electric and "tighter" buildings = better I.A.Q. = healthier homes
- Energy "resilience", and fire "resilience" (with fire resistive materials)
- Home is a community resilience asset / and a grid asset
- Elimination of fossil fuels (reduced GHG emissions)
- Safer buildings and communities

- **= Higher appraised property values**

Critical Facility Microgrids

- **Critical Facility Microgrids**; “Island” from the Grid in the event of grid outage or disruption to power critical loads for community services, safety, and security. They include renewable energy, and energy storage assets.
  - **Hospitals**; Kaiser Permanente Richmond Microgrid
  - **Fire Stations**; City of Fremont Fire Station Microgrid
  - **Places of refuge**; Seattle Community Center Microgrid
  - **Campus Microgrids;** Stone Edge Farm Microgrid

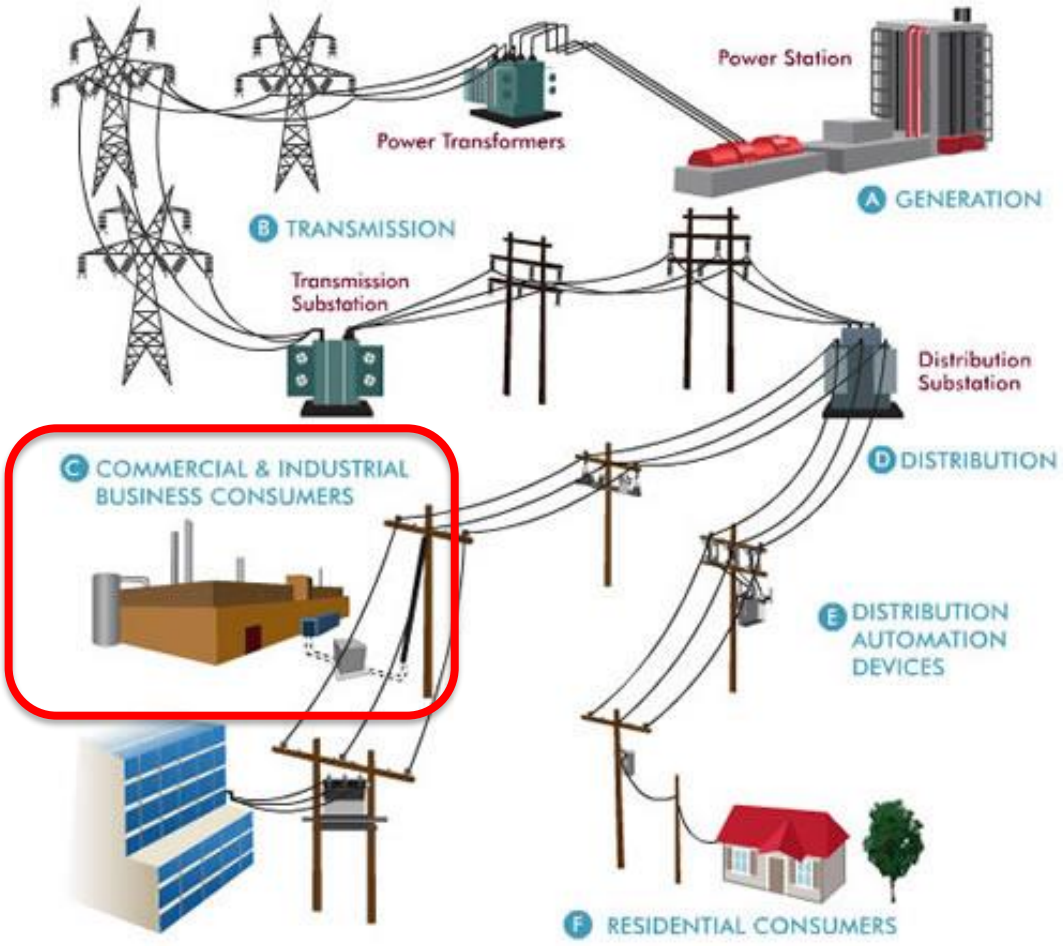
Kaiser Permanente Richmond Microgrid

Freemont Fire Station MIcrogrid

Seattle Community Center Microgrid

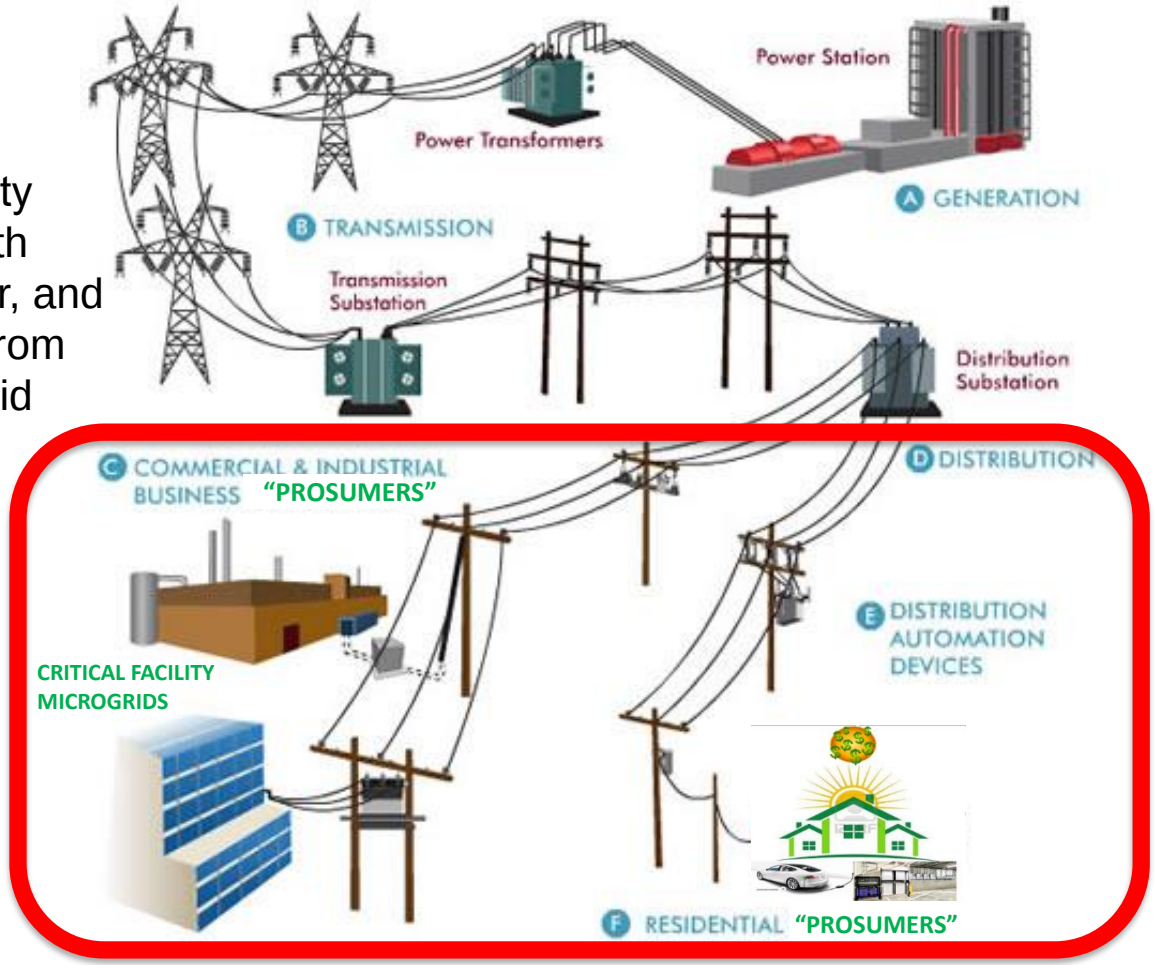
Stone Edge Farm Microgrid

Critical Facility microgrids focus on single customers



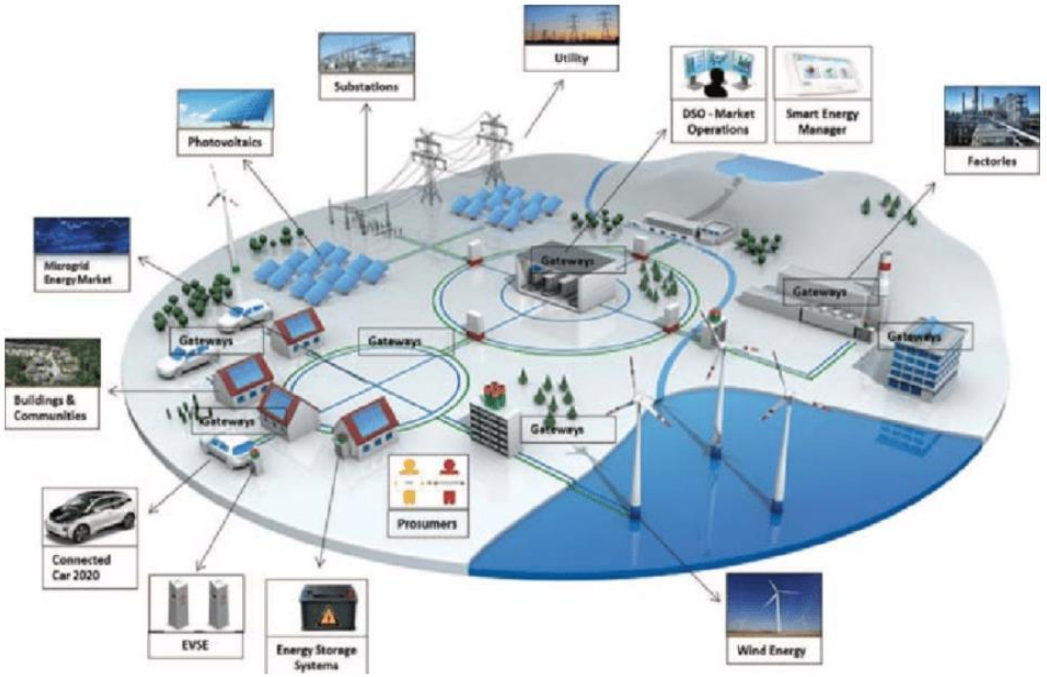
Community Microgrids can serve up to thousands of "prosumer" and "consumer" utility customers

"**Prosumers**": Utility customers that both produce energy for, and consume energy from the grid or microgrid



Community Microgrid benefits

- Reliability and power continuity
- Local control of energy
- Permanent local jobs in energy, installation, and maintenance
- Local energy for EV transportatic systems
- Network of “Prosumers” share th use, generation, and revenue of from energy.
- No “Peaker” Power Plants
- Reduced transmission losses
- Enhanced safety
- GHG reductions
- Resilience and energy security
- National Security
- Reduced Global conflicts
- Peace time infrastructure spending



CEC California Microgid Roadmap

to thousands of “prosumer” and “consumer” utility customers

Nanogids and Community Microgrids for revenue and RESILIENCE

www.solluxalpha.com

Panasonic Microgrid Smart City, Japan

Sol Lux Alpha

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
- All electric – Fossil Fuel Free
- Passive House PHIUS + US DOE Zero Energy Ready Home program (Includes Energy Star, Indoor Air Plus, EPA "WaterSense")
- **WINNER of the US DOE Housing Innovation Award for Multi-Family**
- **WINNER of 2018 PHIUS "Best overall Project" in North America**

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

PHIUS

PHIUS+
The Passive House Institute US (Phius), maintains and certifies the highest standards for site energy efficiency in the world today.

ENERGY STAR

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.

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

Net Positive Energy – How do you get there?

Passive House Baseline + industry best efficient systems

Passive House methodology reduces energy for HVAC by 80%

- **Passive Solar design**
- **Air source heat pumps for HVAC, DHW, Clothes drying**
- **100% L.E.D. lighting**
- **Automatic occupancy and vacancy sensors**
- **AEK – High efficiency Induction cooktops and Bosch "Benchmark" Appliances**
- **Next Gen projects - Moving to DC Appliances and systems**

Sol Lux Alpha Nanogrid systems

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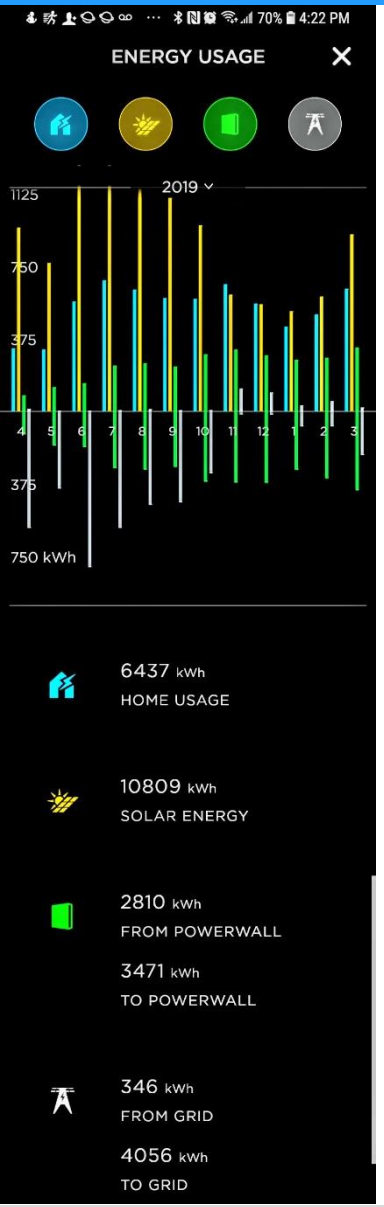
SOL LUX ALPHA - Nanaogrid systems

- **Sunpreme** GxB 380w Bifacial panels (up to 25% boost) = 475w
- **Tesla Energy** Powerwall x3 (triple redundancy, 2-3 days energy)
- **Blue Planet Energy** “Blue Ion” for 3 phase loads (elevator & commons)
- **VEHICLE-TO-BUILDING (V2B) ENERGY** enabled

Nonogrid to Microgrids = Resilience + Revenue



Sol lux alpha N+E "Nanogrid" condominium zero carbon living + transportation

San Francisco, Ca

- **6 story 4 unit building** – generating approx. 2x energy required from solar PV completely within the building footprint
- Excess energy = **4056 kWh** (4 Megawatts – 1 of 4 units)
- **SCP Excess Generation Tariff** – 4056 kWh X Retail rate + $.01 (up to $5000 maximum annually)
- If retail rate is avg of $.10/kWh - $.11 x 4056 = **$446.16 check**
- Excess energy for approx 15,000 miles EV driving per unit (15,000 mi. / 30mpg = 500 gallons fuel x $3.50 = **$1,750.00**
- **Add Energy Storage** – "Load shift"; charge from solar and during low tou rate periods, **use** and **sell energy** back at **PEAK** tou rates !

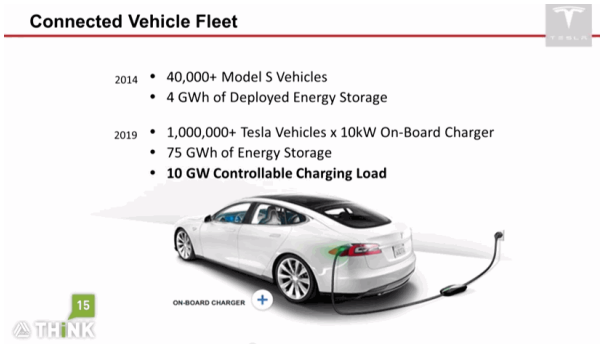
HIGHLY RESILIENT MICROGRID STRUCTURES = PROSUMER NETWORK

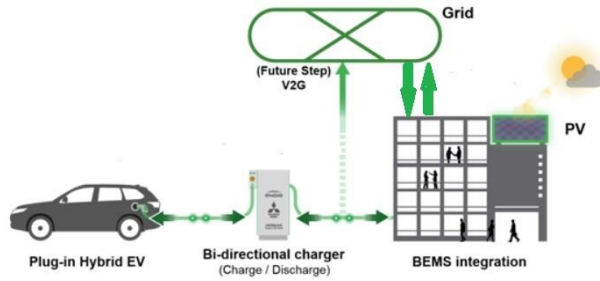
V2B Technologies

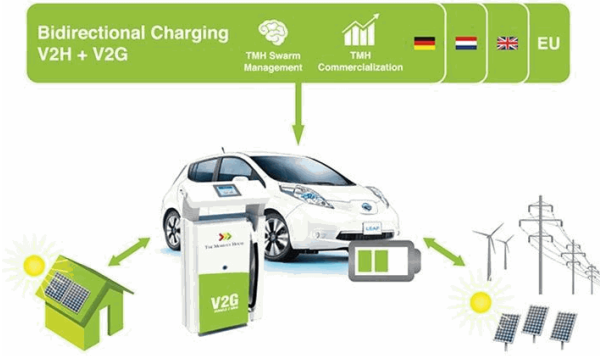
V2B

(Vehicle to Building energy transfer)

- Enables V2G
- EXTENDS "**ENERGY**" BEYOND THE BUILDING
- **Reduces** need for site based ESS
- "**Mobile Energy Assets**" for community resilience







Future Trends: "Mobile Energy" Microgrids

- Microgrids + bi-directional EV's = Aggregated "Mobile" Community Microgrids

- Solar PV can export to grid or charge EV's at daytime when solar energy is peaking
  - EV's can bring that energy "home" and use for residential power at evening/night

- Charge EV's when rates are low, and use in evening when rates are high (load shifting)

- Once stationary and mobile ancillary ESS grid services are enabled at scale,
  - (and aggregated) fossil fuel peaker plants become unnecessary

- More behind meter ESS + mobile ESS assets results
  - in reduced need for community scale solar / wind + ESS's

- Greater resilience is created by virtue of distributed
  - systems, and fewer single points of failure

- "Mobile energy" from bi-directional EV's
  - reduces need for site based ESS & transmission wires

- Add Community Scale R.E. & (mobile) storage at
  - points of grid connection to provide ancillary
  - grid and microgrid services = revenue for the microgrid

Volkswagen Announces: "Elli"