BEYOND ZERO: NET POSITIVE ENERGY

100% Renewable Energy Nanogrid Structures and Community Microgrid Development
For the Transition to Highly Resilient Renewable Energy Systems

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100% RENEWABLE, N+E NANOGRID STRUCTURE

- GENERATES > than all required Energy for the Structure with 100% site based renewable energy systems

- STORES site produced energy in on-site Energy Storage system(s) (ESS)

- MANAGES the energy within systems with site based and cloud based management / control systems

- INTERCONNECTIONS for NRG export/import with the local grid or microgrid, AND/OR operates in an “islanded” mode in grid disruption events

- Export excess ENERGY for revenue
- Import/export excess grid energy for Grid Balancing services
- Excess generation Provides for site EV Charging
BIPV SOLAR TRELLIS
ENERGY AS “ART”

• SunPreme Bifacial 380w Panels produce up to 30% more energy (Up to 494 Watts per panel !!)

• Highest Bifacial boost effect is achieved when raised high off roof

• 96 panels X 380 + 30% = Boost to 47.4 Kw Array

• Allows mix of direct and filtered light

• Roof deck garden / kitchen / lounge area under

• Designed for Integrated Rain Catchment

• Designed for Integrated LED lighting
**SOL LUX ALPHA; USA’S FIRST MULTI UNIT PASSIVE HOUSE CERTIFIED**

“NANOGRID”- CARBON NEUTRAL LIVING + TRANSPORTATION SYSTEM

**Net Positive Energy**: How do we do this?

- **COLLABORATIVE DESIGN** – **PARAMOUNT!** Owners, Architects, Engineers, G.C., P.M., Subcontractors

- **DEFINE PROJECTED, AND AN OPTIMIZED** ENERGY BUDGET to work towards

- Identify Goals, Site R.E. Assets, Limitations, **Passive Solar** Design ideals for the site

- **Systems** for Integration, best products and practices (WITH subcontractors)

- Route Mech and Plumbing inside the thermal envelope, **CONSULT SUBCONTRACTORS**
N+E ... HOW DO WE MAKE IT POSSIBLE?

- **PASSIVE SOLAR SITING AND DESIGN** – Design will vary by climate and by site.

- **PASSIVE HOUSE** – **COST EFFECTIVE** 2x6 platform frame, double dens ext. double gyp interior, dual pane windows/sgd’s, Liquid applied air/water barrier, bibbed& blown dens-packed fiberglass.

- 100% LED Lighting (with occupancy sensors)

- Ultrasonic vacancy sensors – receptacles – reduce “vampire” loads.

- Highest efficiency appliances

- Synergy of systems – i.e. Convective loop between HPWH / Fridge. Black alum panels behind outdoor condenser for HPWH.

- Waste heat or light energy recapture?

- Energy MONITORING – TESLA ENERGY APP (or “Sense” App, etc).
SOL-LUX ALPHA
100% RENEWABLE
NET POSITIVE ENERGY NANOGRID

CARBON NEUTRAL
LIVING AND TRANSPORTATION SYSTEM

• Ultra High-Efficiency Multi-Unit Phius+ Source Zero Certified Building

• 47 Kw FULL ROOF COVERAGE SUNPREME Bi-Facial Raised Trellis BIPV
  (10 kW for ea unit; 7 kW for common areas & elevator)

• Fully integrated EV charging infrastructure and management.
  (Off peak charging as ancillary grid asset and saves $$)

• Future ready - V2B / V2G infrastructure

• 24 kWh – 2 BLUE PLANET ENERGY / SONY Towers for common + elevator
• 40.5 kWh (x 4) – 3 TESLA powerwalls per unit = 186 kWh Total for building

• Energy Management Systems (EMS) Monitor + Manage the variable R.E.+Storage assets, to maximize self consumption & variable tariffs of Grid
186 KWH LITHIUM ION ENERGY STORAGE

- 12 TESLA POWERWALLS / 2 SONY BLUE ION TOWERS
- TESLA for AC POWER / SONY for DC to 3 Phase AC
- LiFe Po4 Produces no heat or gases = No venting required for Lithium Batteries
- Small, scalable modules can be distributed within building or units
- Battery Chemistry = Indoor rated, U.L. Listed

WHY ENERGY STORAGE?

- Uninterruptable, safe, secure Energy, ALWAYS
- Energy / Fuel source during GRID OUTAGES
- Revenue $$ Grid balancing asset
- Saving $$ Charge off-peak for use at Peak (Time of Use)
V2B / V2G READY
VEHICLE TO BUILDING / GRID

• Bi-Directional Vehicles and Chargers

• Allows expanded energy storage capabilities (reduces need for stationary ESS)

• Potentially quadruples energy storage for a building

• Another tool for grid balancing during high renewable generation (Additional Revenue)

• Adds community resilience in emergencies (Mobile Energy Source)
V2B  
(Vehicle to Building)

- **Reduces** need for site based ESS

- **EXTENDS** “**NANOGRID**” TO “**MICROGRID**”

- “**Mobile Energy Assets**” for community resilience AND

- “**Mobile Grid**” reduces WIRE infrastructure
MICROGRID COMMUNITY DEVELOPMENT

- Multiple Renewable Energy Assets
  - Community Solar Farms
  - Community Wind and Hydro Generation
  - HYDROGEN Generators
  - Fuel Cells and Combined Heat and Power systems
  - Net Positive Energy NANOGRID Buildings “SOL LUX ALPHA”

- Site based and Grid Scale Energy Storage

- “Smart Grid” COMMUNITY based Energy Management Systems

**BENEFITS:**

- Scalable and expandable, Organic Growth. Start small and add as needed and as funds become available.

- Connect to, or “island” from the larger Grid (for RESILIENCE), Creating an interconnected “Grid of Microgrids”

- Isolated communities (Islands) and those at the end of Grid feeder lines

- CEC Roadmap for Microgrids:
BENEFITS AND DIVIDENDS

FINANCIAL IMPACT; @ BUILDING SCALE (Nanogrids)

• Lower Operational Costs (No energy bills)

• Revenue from excess energy export (HOA dividends??)

• FREE and RENEWABLE Transportation Energy (100% R.E. EV Charging)

= Higher Appraised Property Values
MICROGRID BENEFITS AND DIVIDEND$:

- **SOCIAL / ENVIRONMENTAL IMPERATIVE to DECARBONIZE**
- **CO2 & GHG ELIMINATION** in buildings - living & working + transportation sectors = **70% OF GLOBAL GHG EMISSIONS**
- **CLIMATE CHANGE REVERSAL**
- **BUILDING** and **COMMUNITY ENERGY RESILIENCE** for disaster preparedness (Harvey, Irma, Maria, Florence, Mangkhut)
- **NATIONAL** and **GLOBAL ENERGY RESILIENCE** and **SECURITY**
- **NO MORE** reason for **ENERGY CONFLICTS** (wars over fossil fuel energy)
- "**PEACETIME**" **NATIONAL Budget Shift** from "Military" to modernizing our "**National Energy Infrastructure**"
NATIONAL & GLOBAL BENEFITS AND DIVIDENDS

FINANCIAL IMPACT; @ COMMUNITY / NATIONAL / GLOBAL SCALE

- No New Powerplant investment + Transmission lines & losses
- PERMANENT and LOCALIZED Employment gains in Energy
- ZERO CARBON EMISSION Projects for Regional Mass Transit
- Better Community / National Health (Reduced medical costs)
- Reduced costs of Climate Change Mitigation and “Damage Control” & Rebuilding from Extreme Weather Events

= Higher GDP and GNH “Gross National Happiness”
NEXT GENERATION PROJECTS

• FULL DC systems (reducing inverter losses)

• Energy recapture (from waste, water and?)

• Light Energy recapture

• V2B and V2G integration

• AEV + V2B integration

• “Energy Hub” developments for Communities and Campuses.

• AEV – V2B Car shares and Mass Transit
SOI-LUX ALPHA Achieved the first ever “Alternate Path of Compliance” to the S.F. Green Building Code by certification with:

• Phius+ Source Zero Certification

• US DOE – ZERH Zero Energy Ready Home Program Certified

• US EPA WaterSense Certified

• 2018 US DOE Housing Innovation Award WINNER – Multi Family Category
THANK YOU!

QUESTIONS?

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