Progress in Home Solar Energy Storage

When Can I use my EV for Energy Storage??

Safety Message

Be Aware of the Situation

Topics of Discussion

- What do the systems that are available today look like?
- What might the system look like in the future?
- Are microgrids just now becoming fully functional?
- Update on Setec Power Solar charger
- Update on Andromeda chargers
- Barriers to EV integration (my opinion only!)

Pika Energy Offering

Appears to be the most advanced “hybrid” home solar system on the market:

Pros:

Grid tied

Auto transfer to home subpanel

Individual “string” based MPPT - up to 9 panels

240 VAC split phase inverter

EV compatible Lithium battery design

Smart App information portal

Cons:

Not Generator compatible (yet)

$$$’s

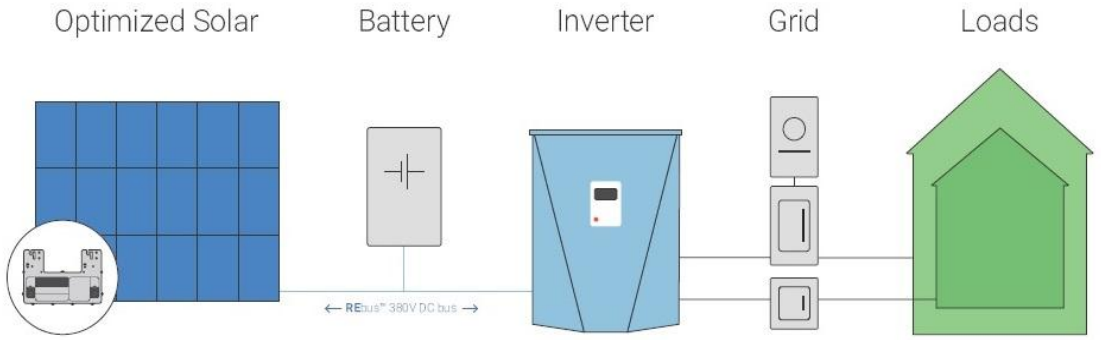
Proprietary high voltage DC bus (REbus)

No CHAdeMO or CCS or Tesla bi-directional energy controller (yet) for EV Lithium battery

Pika Schema

Pika ENERGY

The Pika Energy Island™



Hassle-Free Solar

PV Link™, is a sub-array optimizer that connects 2-9 solar modules. PV Link installs 85% faster than module electronics while handling complex rooflines and shading.

Storage Options

The Pika Energy Island connects to high voltage storage like lithium ion batteries without a separate battery inverter or storage interface, enabling truly simple solar plus storage.

Critical Loads

The 7.6kW Pika Islanding Inverter™ delivers seamless backup of critical loads in a grid outage, without the need for an autotransformer.

Affordable, clean battery integration for residential PV

SolarEdge Offering

A very familiar home solar offering::

Pros:

Grid tied

Auto transfer to home subpanel

Individual “panel” based MPPT -- more components (Pro?)

Solar supplement to home based level II charging

EV compatible Lithium battery designs Tesla Powerwall, LG compatible

Smart App information portal

Cons:

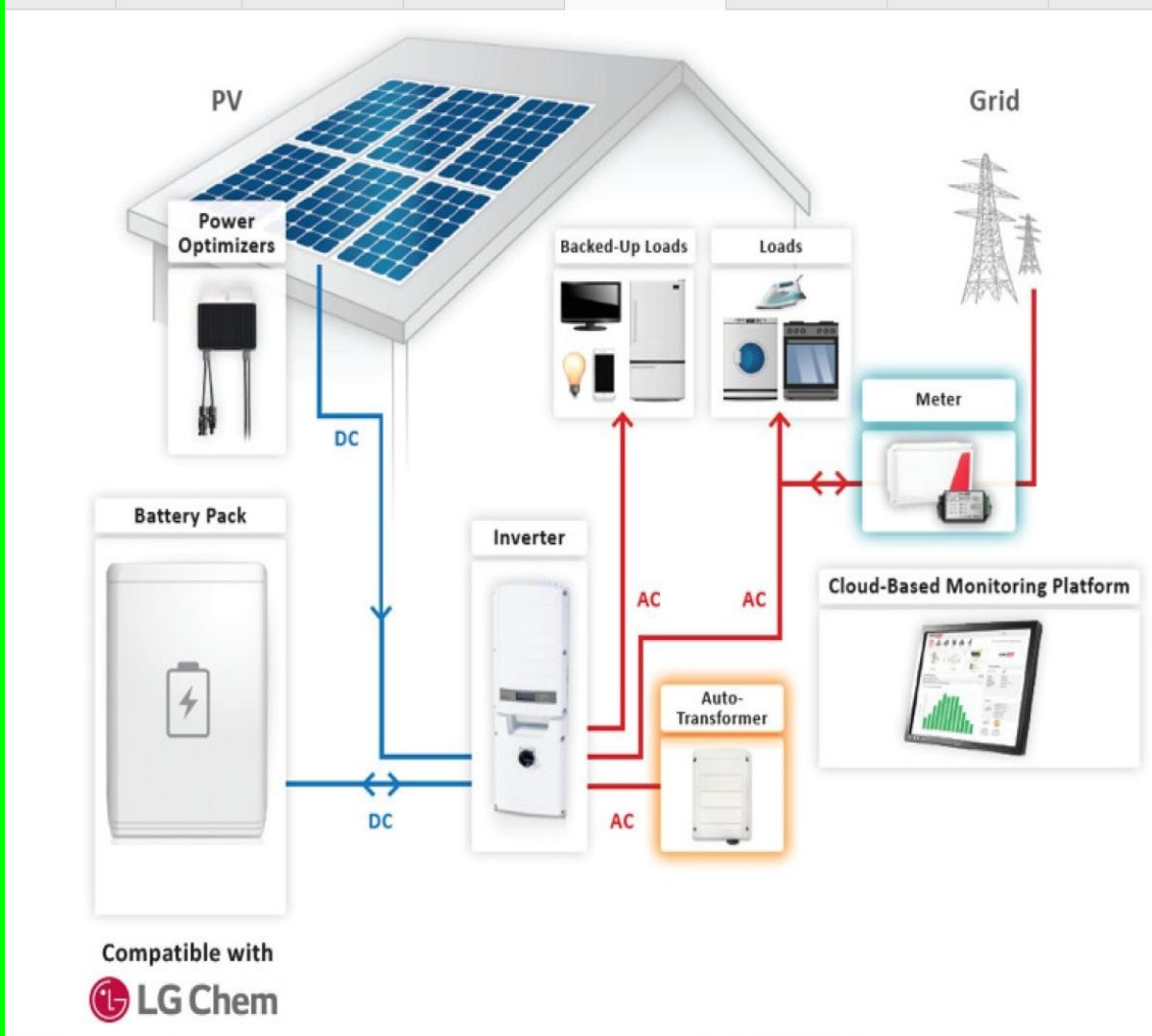
Not Generator compatible

$$’s

Requires an “autotransformer” for split phase

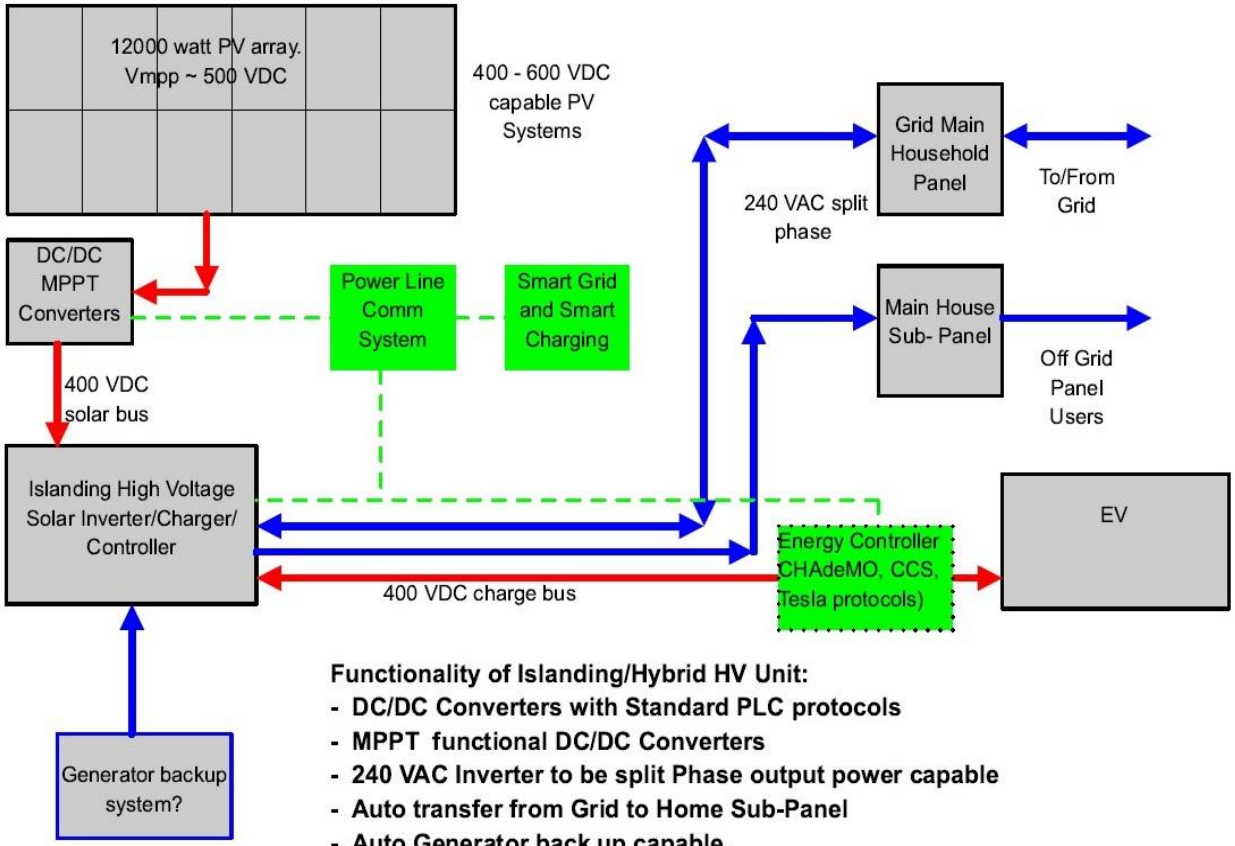
No CHAdeMO or CCS or Tesla bi-directional energy controller (yet) for EV Lithium battery

SolarEdge Schema



Future System Schema

Islanding/Hybrid EV based Home Solar System

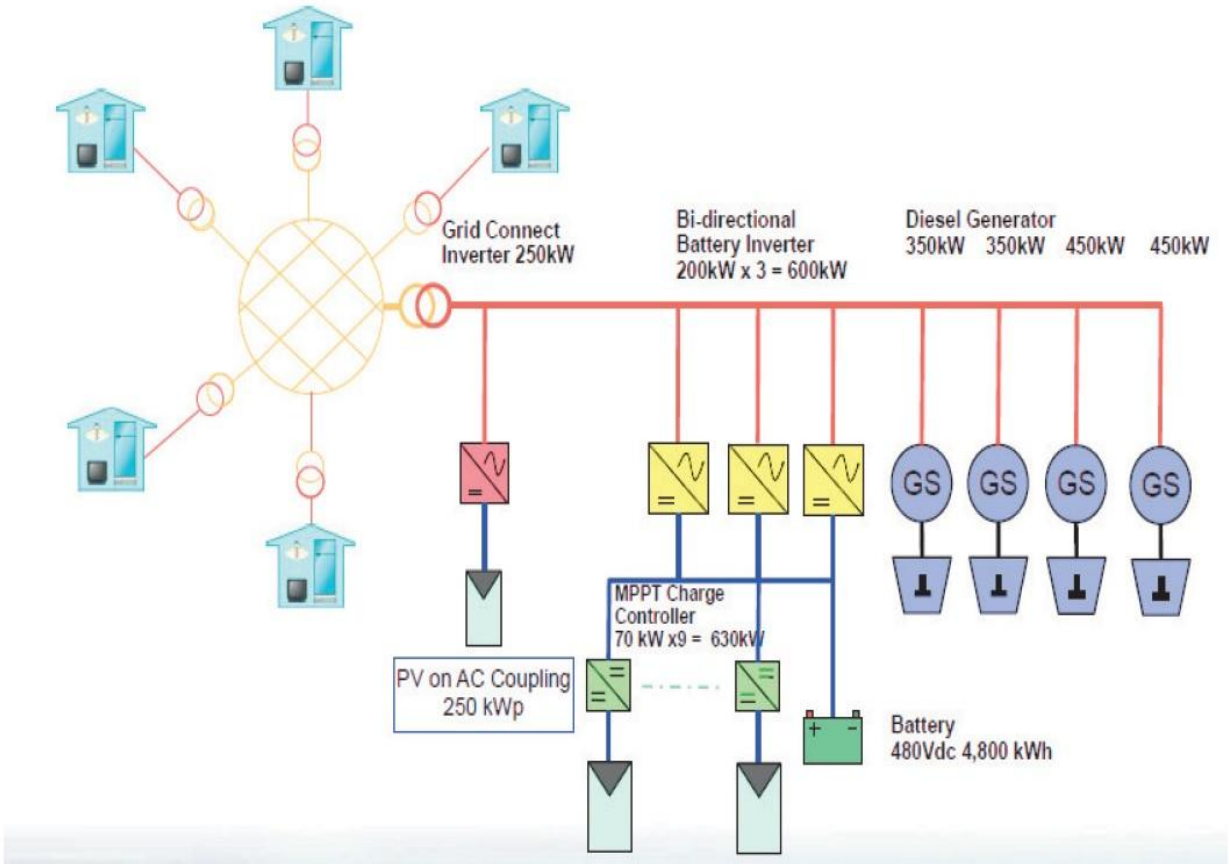


Functionality of Islanding/Hybrid HV Unit:

- **DC/DC Converters with Standard PLC protocols**
- **MPPT functional DC/DC Converters**
- **240 VAC Inverter to be split Phase output power capable**
- **Auto transfer from Grid to Home Sub-Panel**
- **Auto Generator back up capable.**
- **Bi-directionalCHAdeMO/CCS/Tesla EV Protocols and connectors**
- **App based Real Time Electrical Pricing (or TOU) and EV Trip Planning and configuration control.**

Typical Microgrid schema

MW Scale PV Hybrid Systems (Malaysia)



The Princeton Power bi-directional charger is the game changer for microgrids?

Charger (CA-15/CA-30)

PRINCETON POWER SYSTEMS
Clean Power Made Simple™

Overview: V2X EV Charger - CA-15/CA-30

DC FAST-CHARGING

Following the successful rollout of the first mainstream electric vehicles (EV's) in North America in early 2011, several new makes and models have been introduced in the marketplace, and demand has steadily increased. Reducing charging time is key to improving the owner experience, and to improving fleet management capabilities. DC Fast-charging with the CA-15 and CA-30 provides 50-100 miles of range in less than 20 minutes versus traditional AC Level II chargers that can take up to 10 hours of charge for the same range.

VEHICLE-TO-GRID FUNCTIONS

An electric vehicle is a battery on wheels, and represents a valuable energy storage resource. EV's can provide backup power to local buildings, smoothing resources for renewable energy, and even get paid to provide services to the electric utility and grid operators. The CA-15 and CA-30 are the only commercially-available charging stations to unlock these capabilities for compatible vehicles.

CHAdeMO CAR CHARGING

50 – 500 Vdc
CA-15 (15 kW maximum charge rate)
CA-30 (30 kW maximum charge rate)
CHAdeMO connector and connector cable

Features

- CHAdeMO Compliant
- V2G, V2B, V2H (bi-directional)
- UL 1741 Listed (Grid-tied and off-grid/backup)
- UL 2202 Listed (EV Charger)
- Nissan Leaf™ V2G Certified Compliant

OUTDOOR KIOSK CHARGING STATION SOLUTION

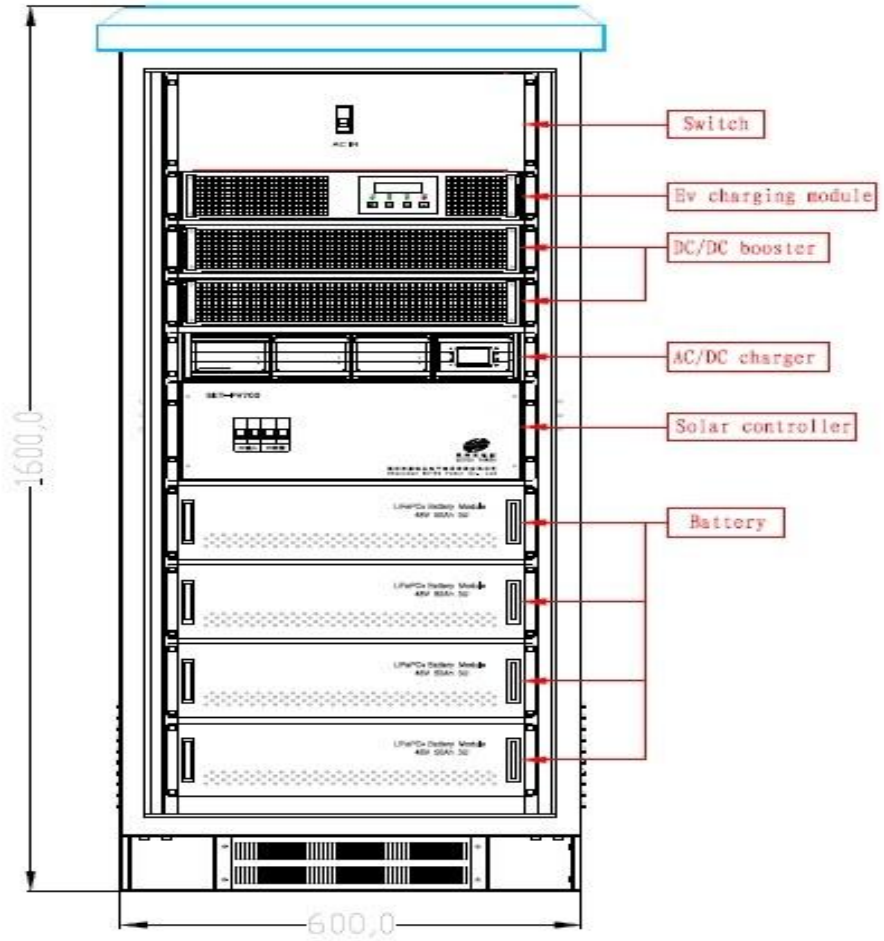
Both the CA-15 and CA-30 are freestanding 'kiosk-style' charging stations perfect for installation in dedicated parking spaces without the need for any physical infra-structure other than a concrete pad. Each station comes standard with a 17' cable and cable docking attachment. Charging stations include a touch-panel interface that allows vehicle operators to manage and monitor charging.

FLEET MANAGEMENT SOFTWARE

The CA-15 and CA-30 provide unprecedented control capabilities for fleet operators. The charging stations can interface with a variety of fleet-management software applications, including the common Open Charge Point Protocol (OCPP).

Update on Setec Power offering - 10kw Solar Charger

2017. 05. 03



Update on Andromeda Power offering - Demand Response

DESCRIPTION

ORCA Incisive are Electric Vehicle Chargers capable of Demand Response (DR). Incisive is offered in two models: *Zen* (Wall Mount) and *Strada* (Bollard Mount), suitable for residential and commercial indoor and outdoor locations.

Zen and *Strada* perform Level 2 SAE J1772 charging (208-240 VAC) up to 80 AMPS with communication capabilities to report on transactional data and participate in DR events. *Zen* and *Strada* embed 4G LTE technology and use OCPP 1.6 protocol to communicate with the AP cloud Central Station. The OpenADR certified cloud VEN communicates with the Power Utilities to participate in DR Programs.

Zen and *Strada* meet safety, functional, and efficiency requirements based on codes, standards, and recommended practice.

BENEFITS

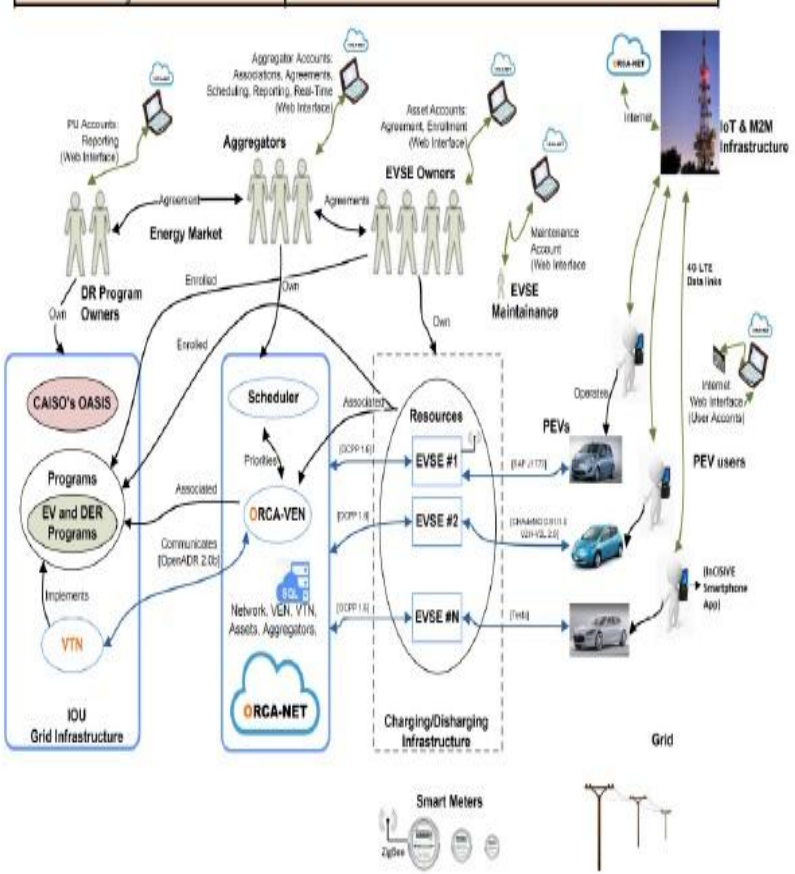
- Demand Response enabled with Energy Measurement.
- Touch LCD display with intuitive user interface.
- ORCA NET cloud back office.
- Access control by optional card reader (*Strada*).
- Perfect for home and commercial use.

andromeda

ORCA Incisive Zen and Strada

Charge Ready SAE J1772

Update on Andromeda Power Chargers. All are Demand Response Capable



The automatic participation of EVSEs to DR events of power curtailment (within EV Programs) is managed from the cloud by means of two communication protocols: OpenADR 2.0b communication with the Power Utilities (IOU), and OCPP 1.6 communication with the EV chargers.

Aggregators manage and group EVSEs so that they can appear to the utilities as a single entity or a set of groups of entities geographically localized, or according to other classification criteria.

PEV users interact with EVSEs by the App InCiSIVE installed on their smartphone and/or smartwatch and have the possibility to Opt In/Out in DR events.

Barriers (IMO)

- It is NOT technology
- Cost? - Managing your own energy with 100 kWh storage provides powerful economic leverage - both “fuel” and electricity
- Power Companies “kill” the incentives - is going off-grid really an option?
- EV manufacturers - penalize bi-directional energy?
- Proprietary protocols - smart grid and smart charging standards are a must
- Carbon “pricing” - is it inevitable?
- Massive manufacturing shifts of major industries (say 20 kw home solar)
  - 100 million EVs
  - 6 billion solar panels
  - 170 billion pounds of batteries
  - 100 million (plus) power systems
  - Not to mention bus, truck, school bus, train, etc.etc.etc.
- Hydrocarbon Industry will NOT BE HAPPY!