SMERC
UCLA Smart Grid Energy Research Center

Smart Grid Energy Research Center

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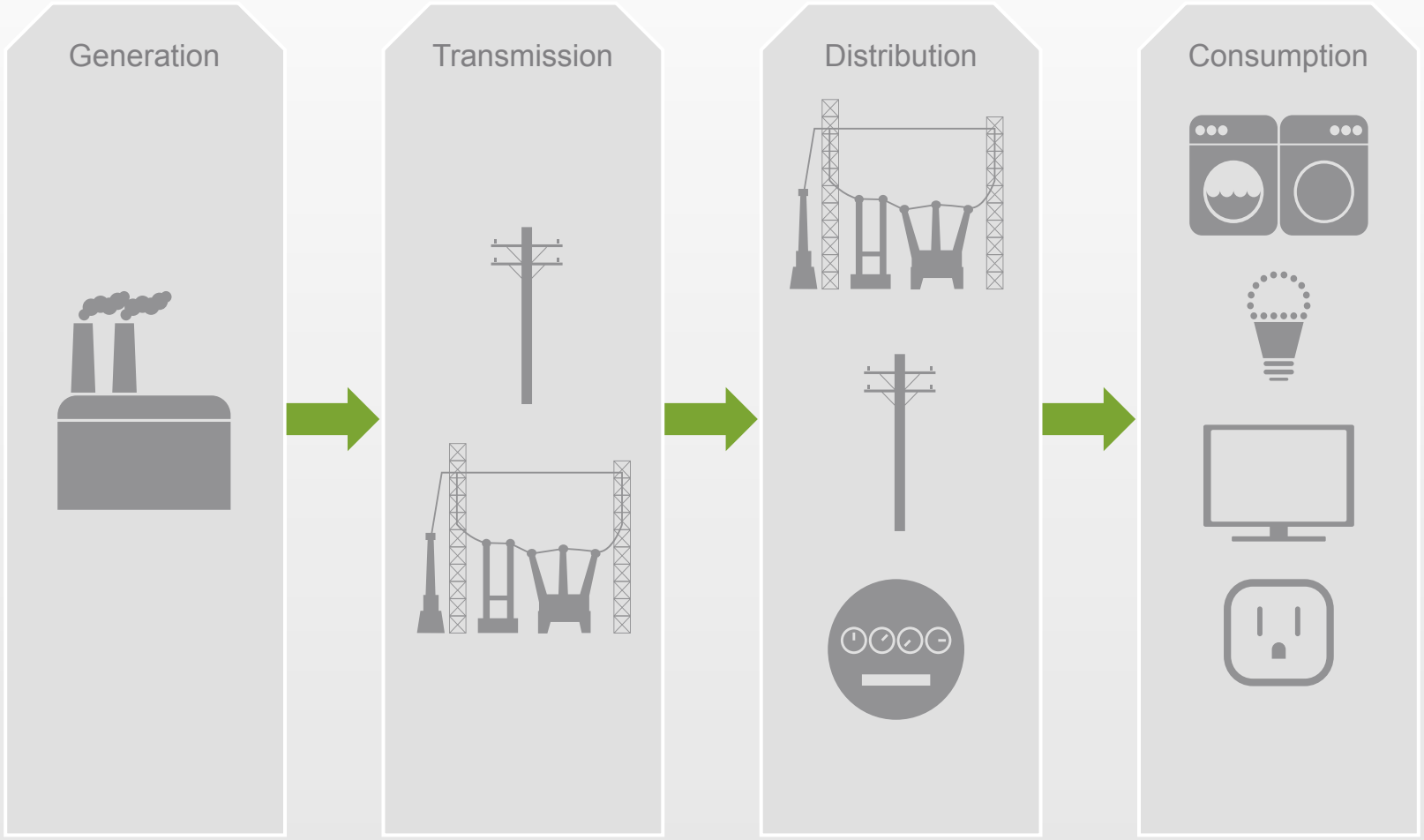
Smart Grid Energy Research Center (SMERC)

- **Major sponsors**
  - DOE Funded Regional Demo Grant – LADWP, UCLA, USC, JPL-Caltech
  - KIER-UCLA Smart Grid Grant
  - California Energy Commission - DR
  - DOE Funded EPRI, NESCOR Grant – EPRI + several DOE, University partners
  - SMERC IPP (Industry Partners Program): 18 industry members
  - CEC – Bi-directional EV charging

UCLA Co-Generation Plant

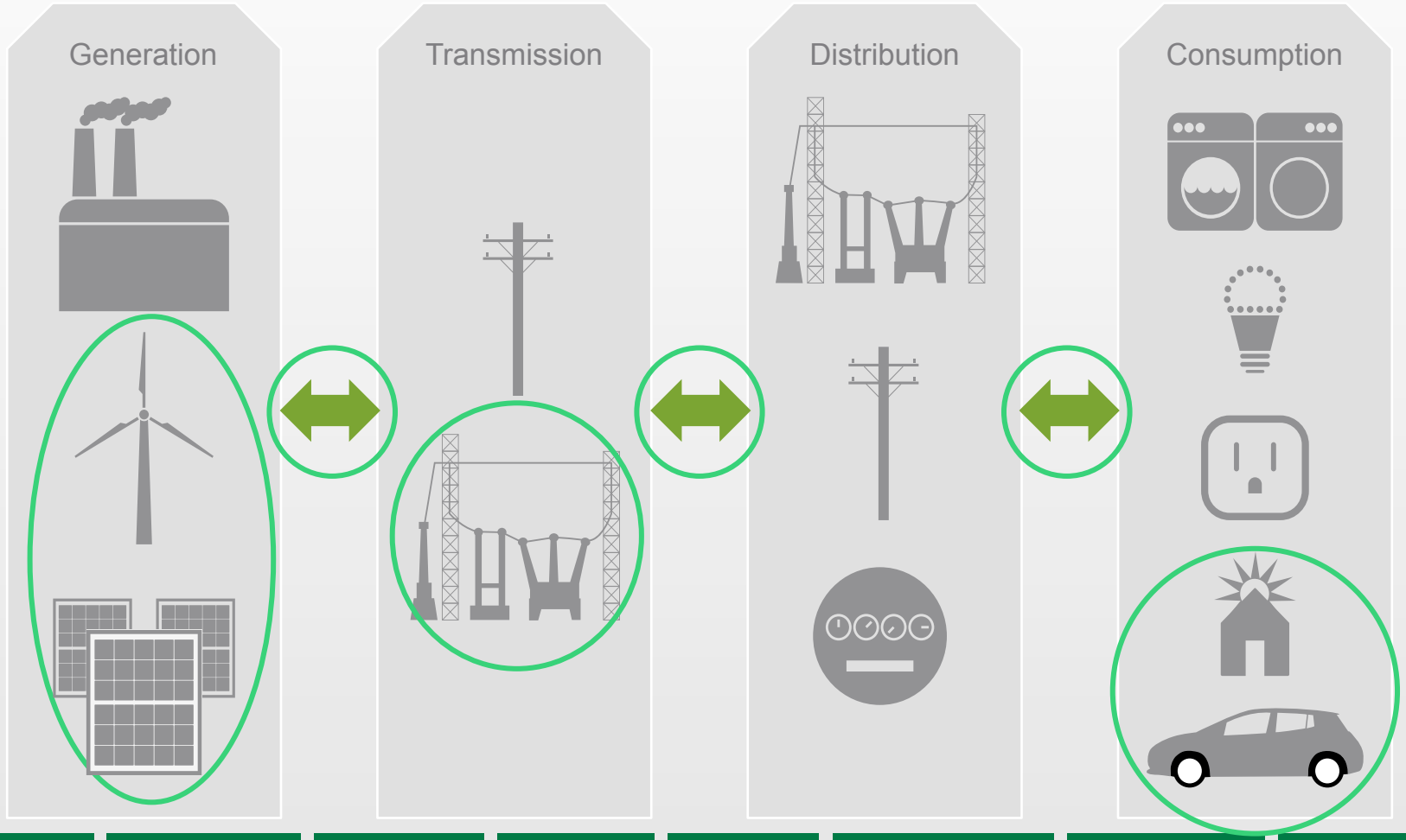
Traditional Electricity Flow Model

Traditional Hierarchical Model



New electricity flow model – the opportunity Smart Grid

Non-Traditional Hierarchical Model



Technologies?	Cloud intelligence	Wireless/ Comm.	Sense & Control	Storage	Mobile Devices & UI	Embedded Systems	Renewables: Solar, Wind, BioM, GeoT, Hydro

UCLA Smart Grid Energy Research Center (SMERC)

WINSmartGrid™

The UCLA WINSmartGrid™ is a network platform technology that allows electricity operated appliances such as plug-in automobile, washer, dryer, or, air conditioner to be wirelessly monitored, connected and controlled via a Smart Wireless hub.

EV Integration to the Grid

California constitutes a significant automotive market - a place where demanding and energy-conscious consumers come together with creative designers from Hollywood, resulting in an environment rich in ideas on automotive innovation.

Demand Response

Automated load control in smart buildings, smart offices, smart homes, smart appliances, renewable integration and local storage.

Cyber security of Communications Infrastructure

Cyber security is being studied and researched for EVSE infrastructure, HAN, and applications in residential and commercial DR.

Microgrid

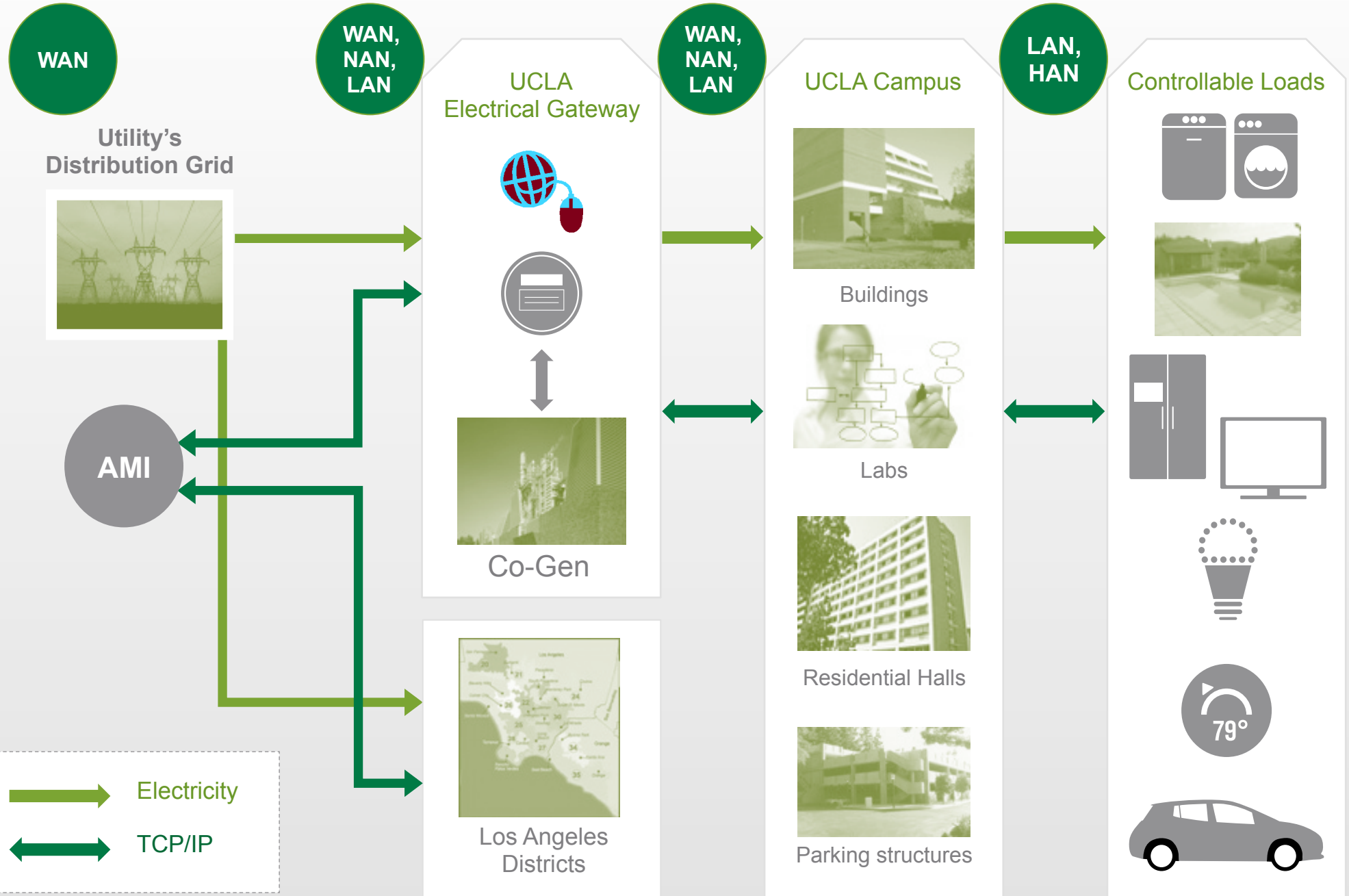
Comm, sense and control for integrating renewables, EVs and smart loads

Transactive Control of Smart Grids

Price based high speed control of smart loads, EVs, and storage.

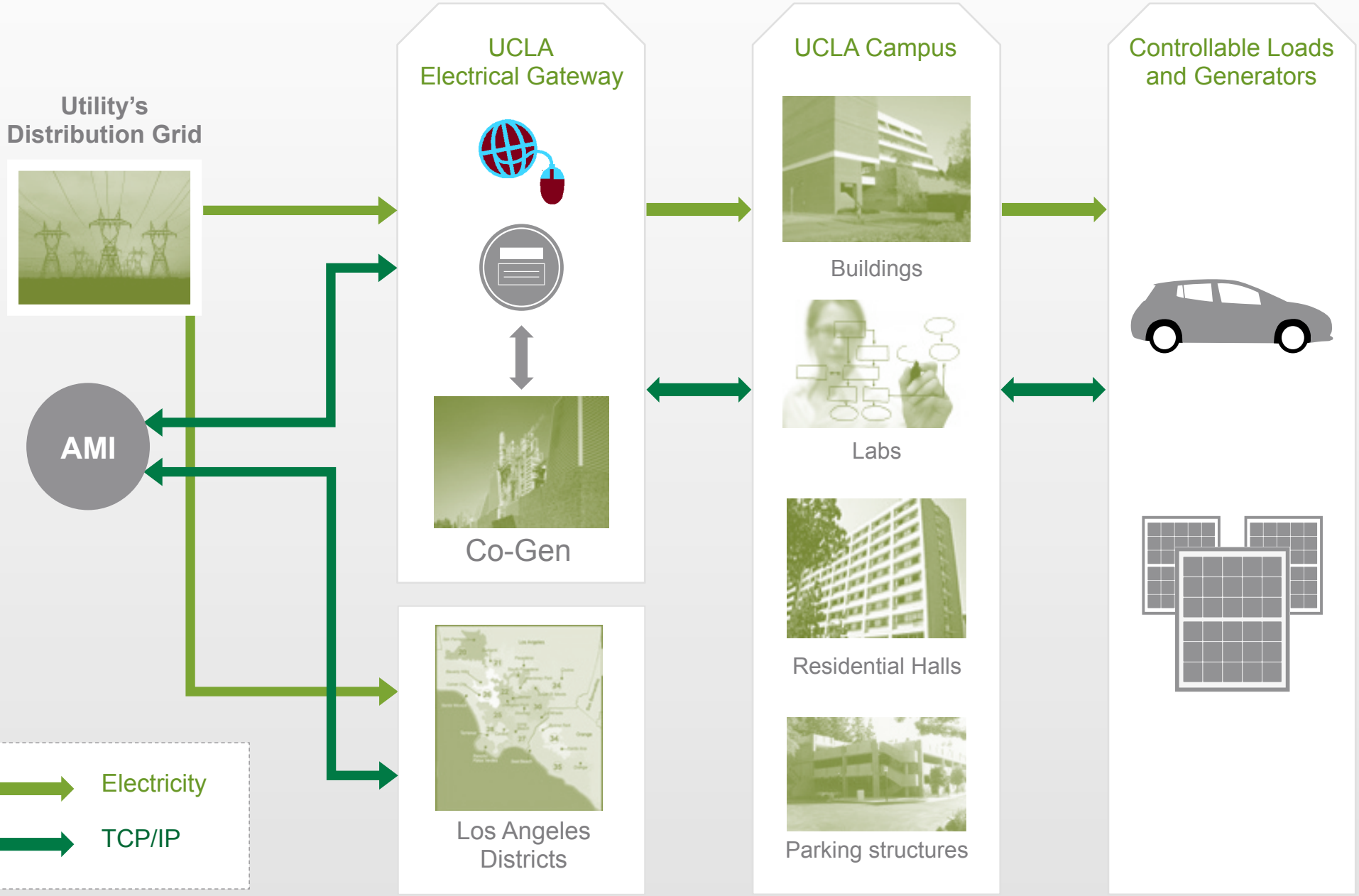
WINSmartGrid™

Power and Information Flow



WINSmartGrid™

Power and Information Flow



Electric Vehicles – EVs available in todays market

Scion iQ EV

Fiat 500e

Toyota RAV4 EV

Chevy Spark EV

Smart Electric Drive

BMW ActiveE

Mitsubishi i-MiEV

Honda Fit EV

Ford Focus Electric

Tesla Model S

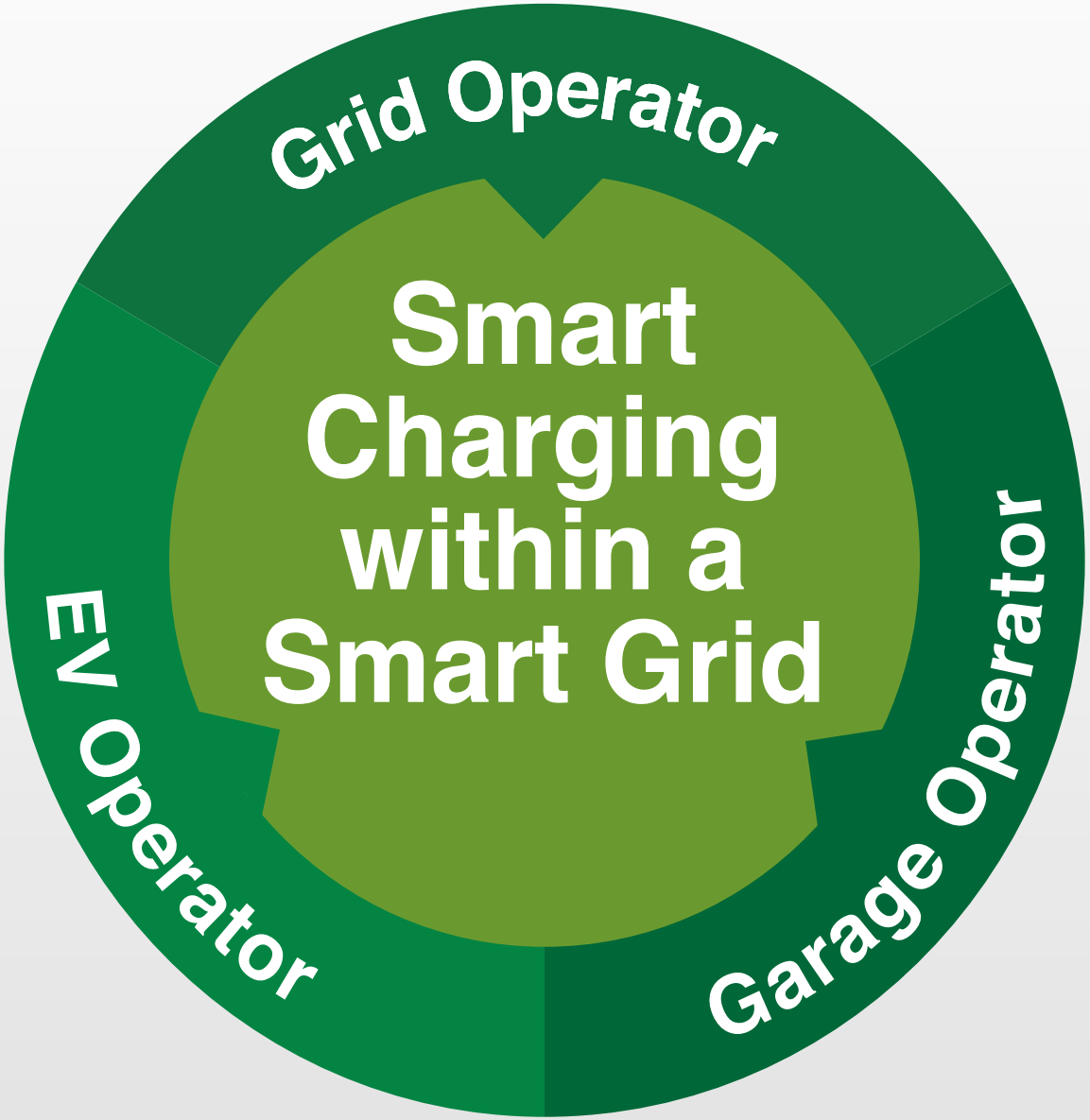
Nissan Leaf

Toyota Prius Plug-in

Chevy Volt

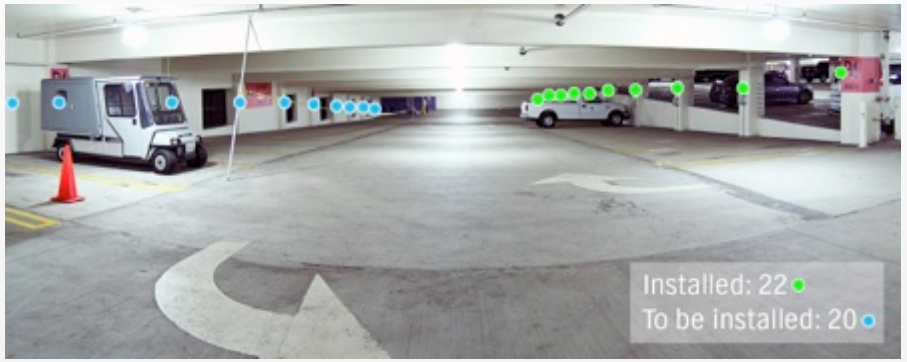
EV Smart Grid Integration:

Fundamental Approach



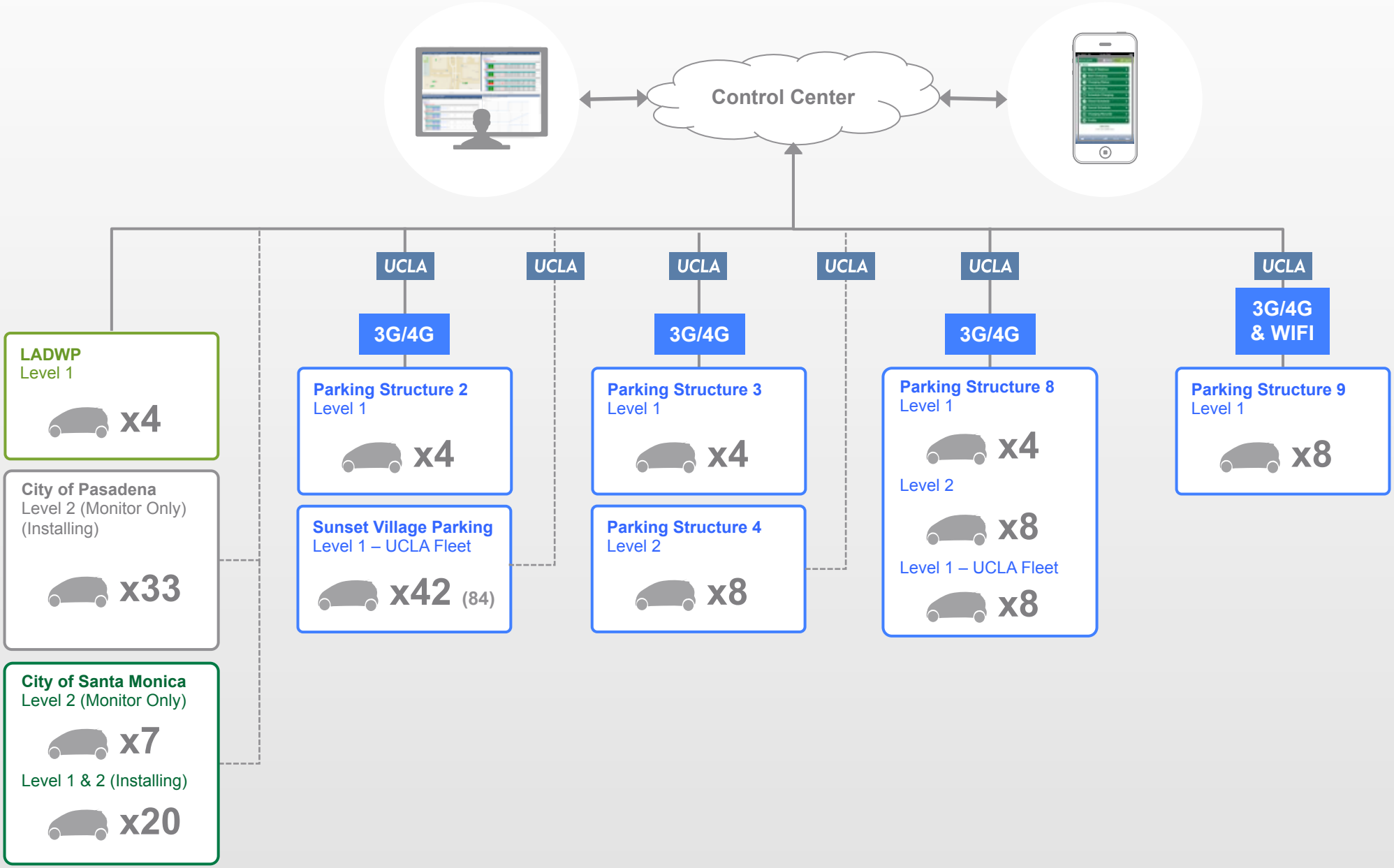
WINSmartEV™ - Mobile Web App

SMERC Monitoring and Control Center
Monitoring & Control

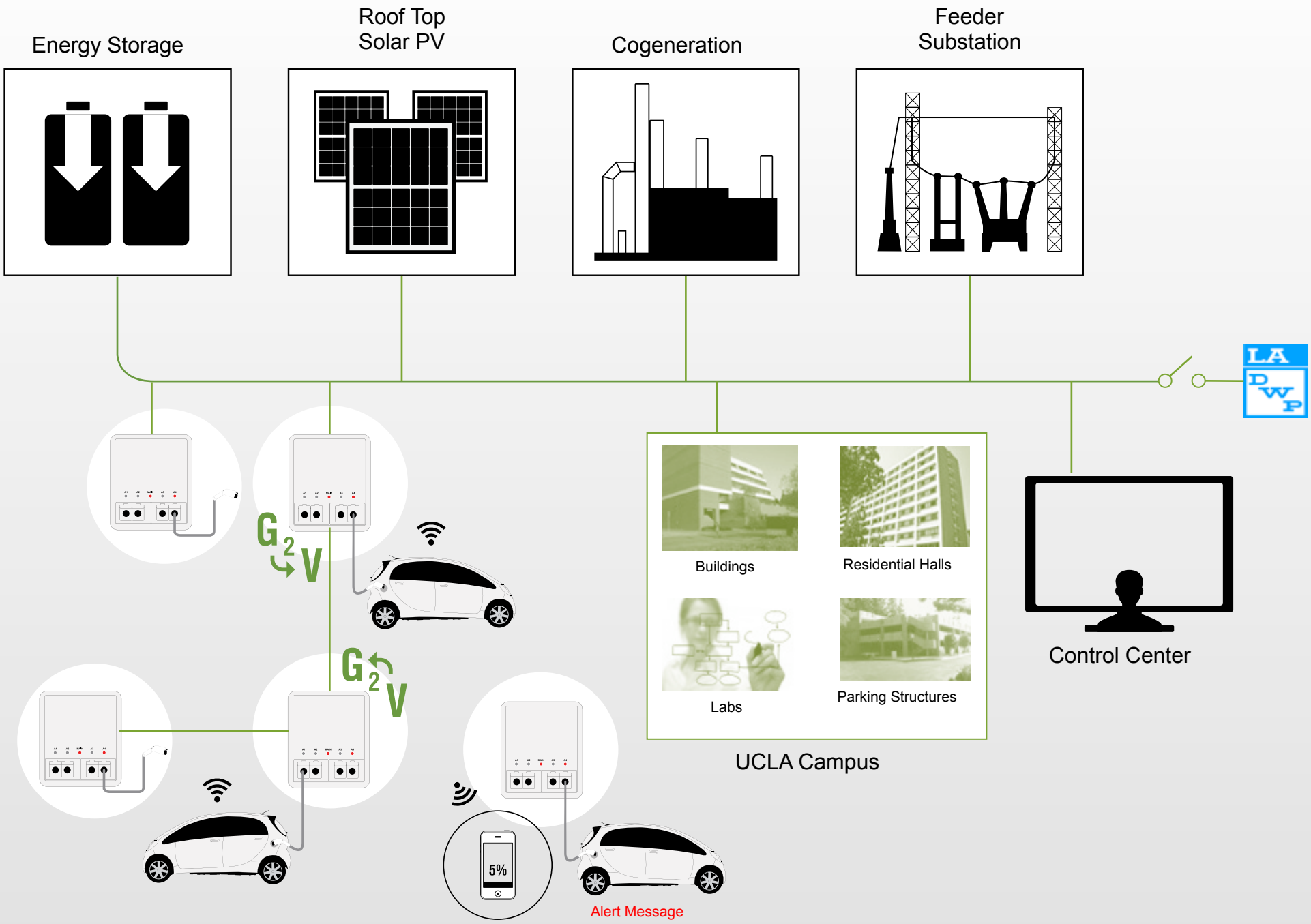


WINSmartEV™ Infrastructure

The current WINSmartEV™ infrastructure at UCLA, LADWP, City of Santa Monica, and City of Pasadena consists of 150 EVSmartPlug™s.



UCLA Microgrid Integration – EVs, solar and stationary storage

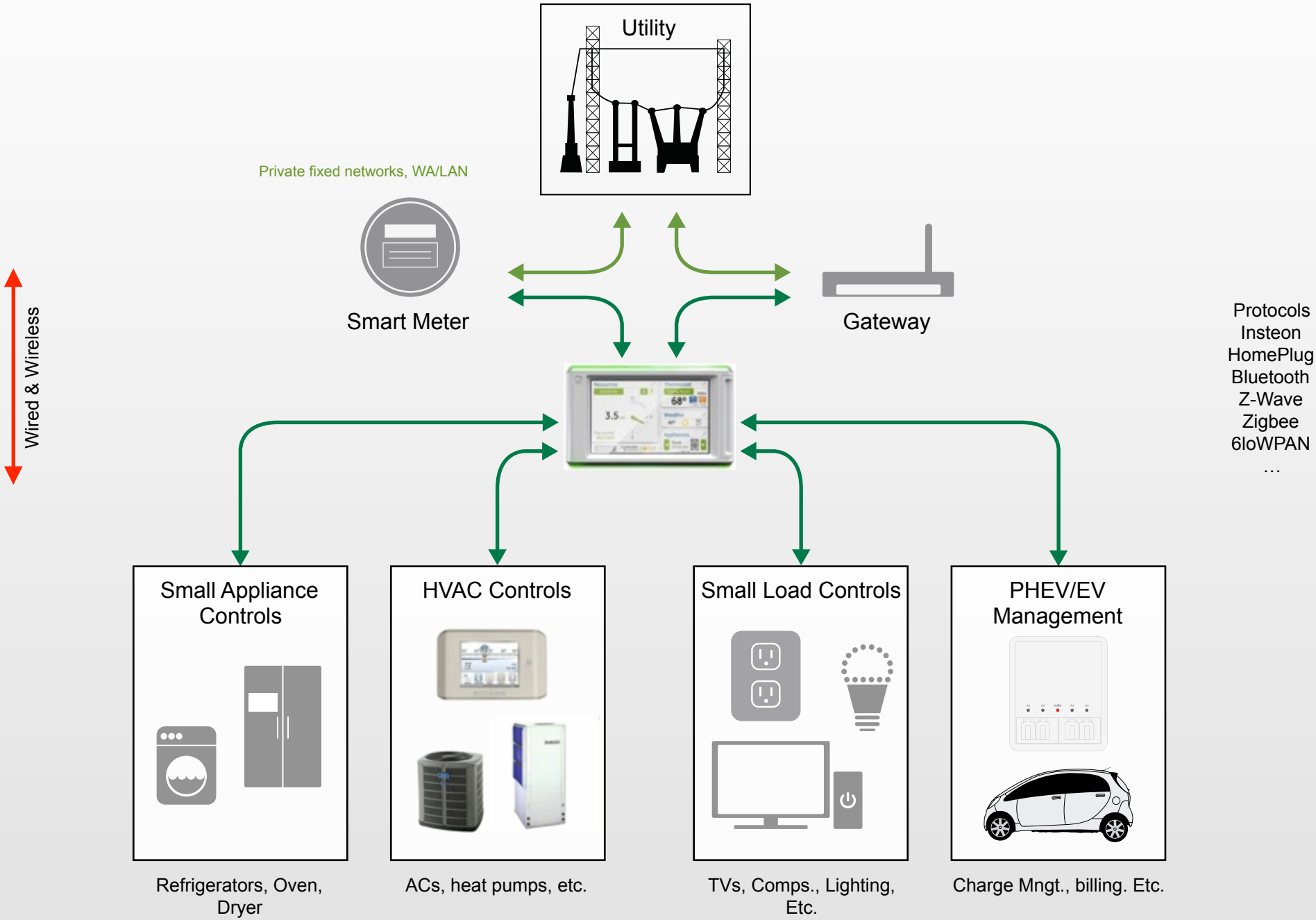


Vehicle to Grid (V2G)

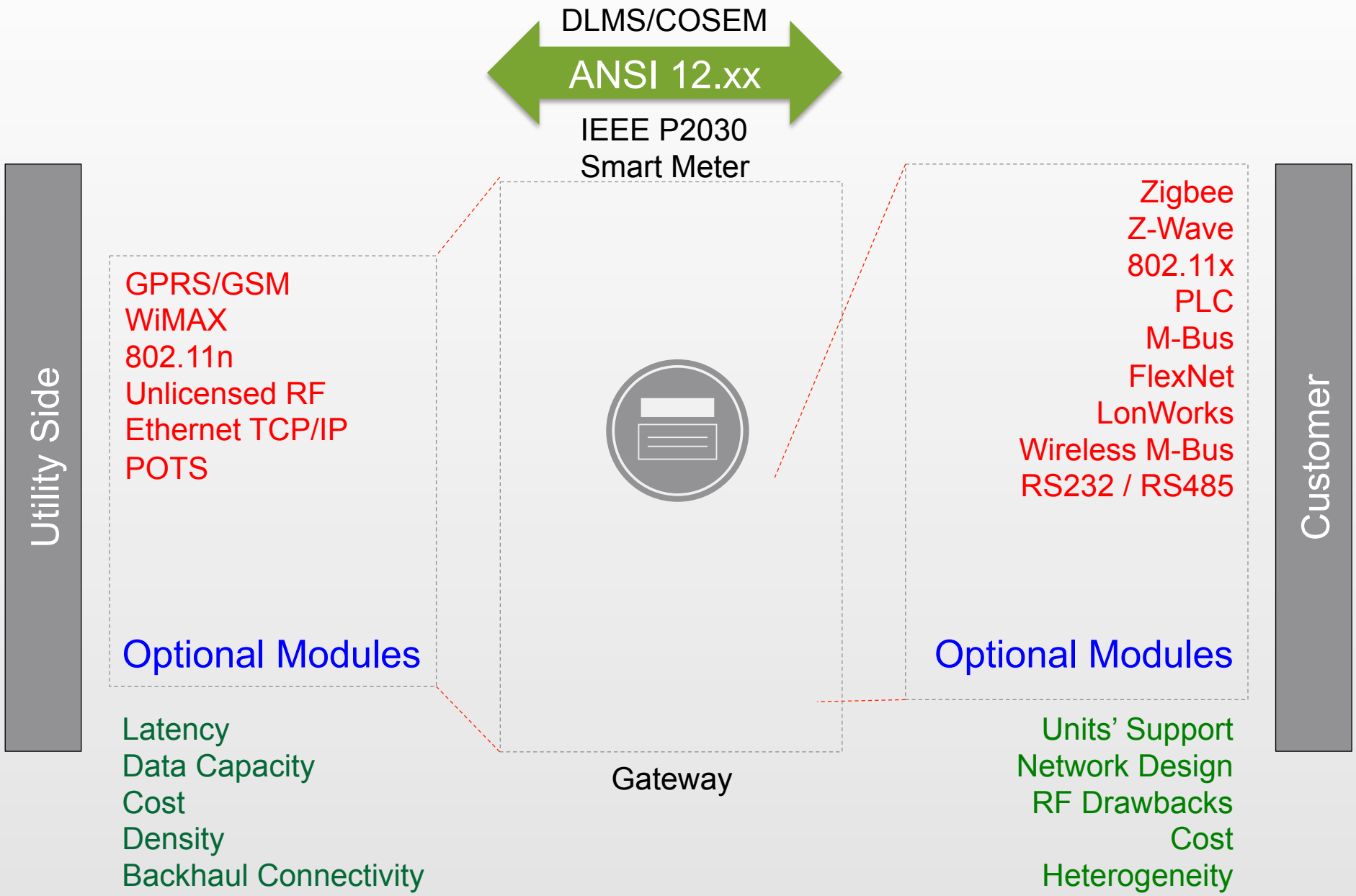
Phd Student, **Yubo Wang**, and SMERC Director, **Rajit Gadh**, testing vehicle to grid sytem with the Mitsubishi i-MIEV.

Modular Design for Interoperability with existing Technologies & Standards

Demand Response – Automation Network



HAN Device Portal Interfaces

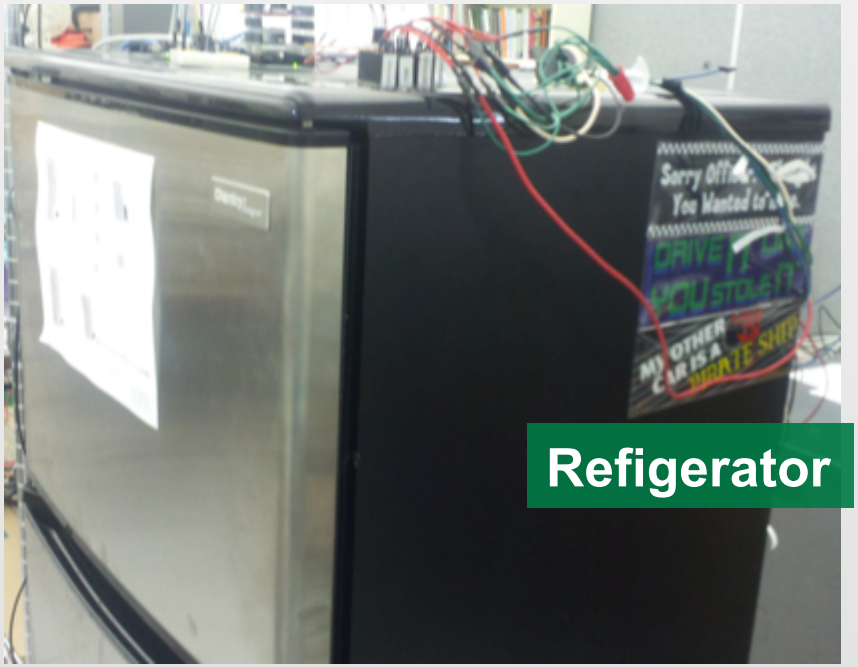


Aggregate Power Consumption

WINSmartGrid™ DR – Wireless Appliance Interface

HVAC BACNET

Lighting / LED



Refigerator

Dryer