

Plenary Session

Grid 2.0

Grid Modernization for Local Energy Resources

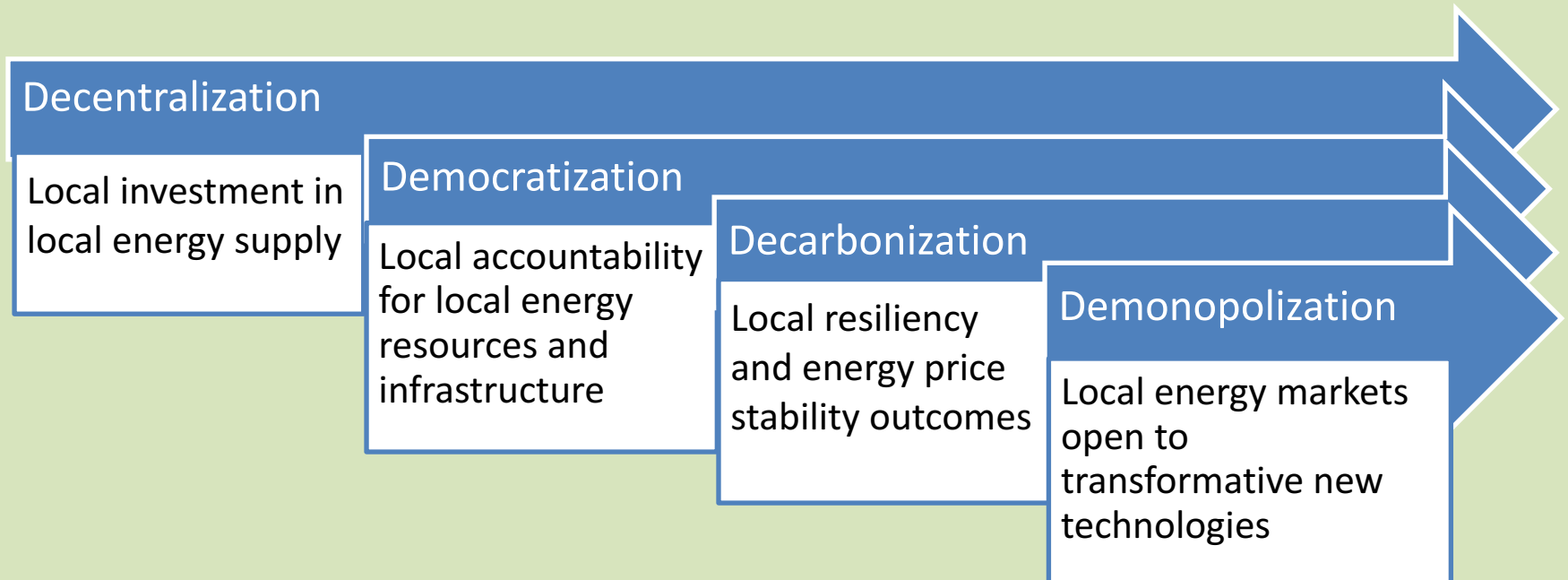
Gerry Braun

Statewide Energy Efficiency Collaborative Forum

Fresno, California

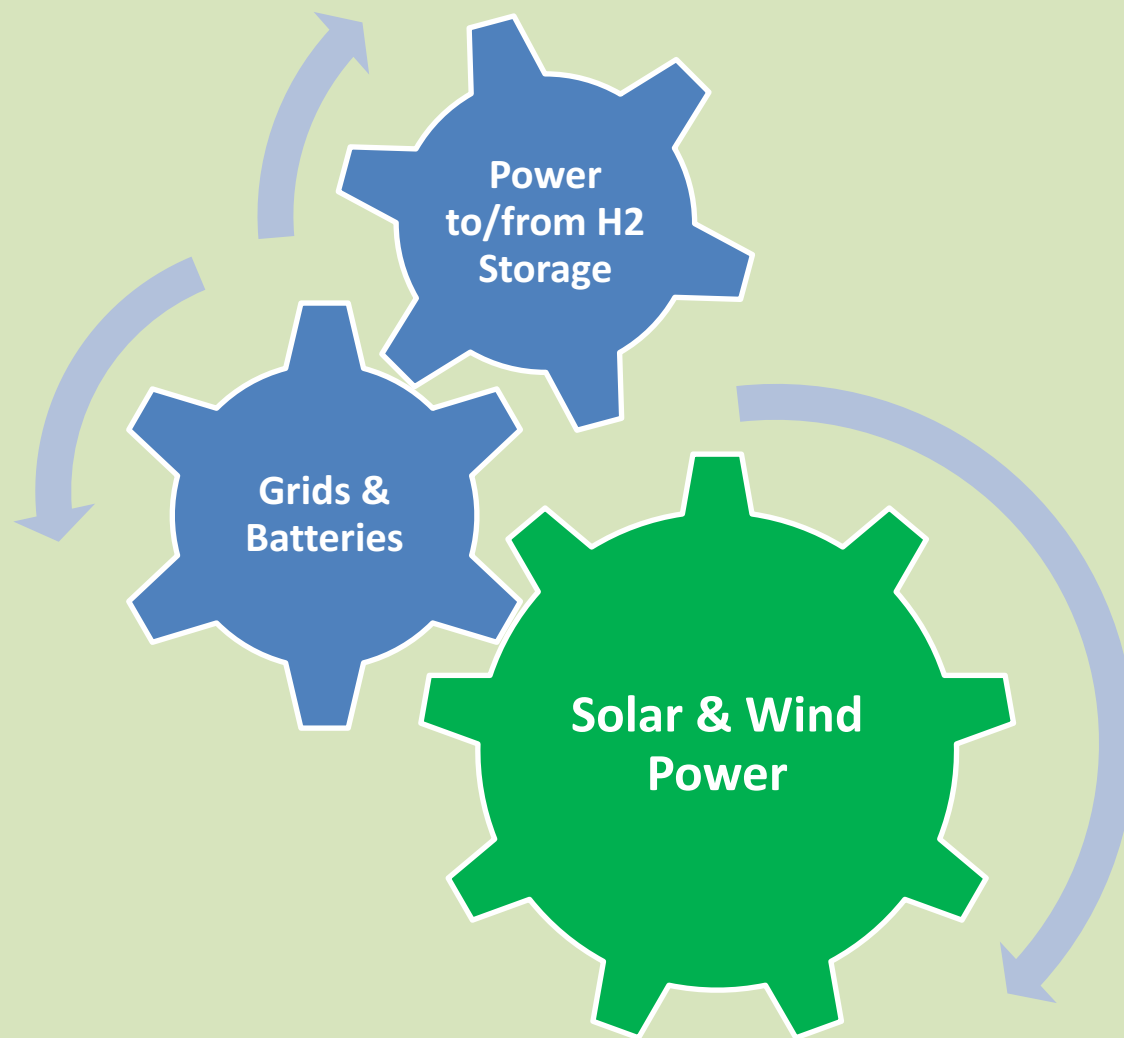
June 15, 2017

Outline



Linear version of a virtuous clean local energy circle

Decentralization: Integrative Clean Energy



Decentralization is a Local Choice

Grid Modernization Pathways: Follow the Money



In California, how much “grid modernization” money is forecast to follow Wall Street pathway vs. pathways within communities?

Decentralization is a Local Choice

Grid Modernization Pathways: Follow the Money

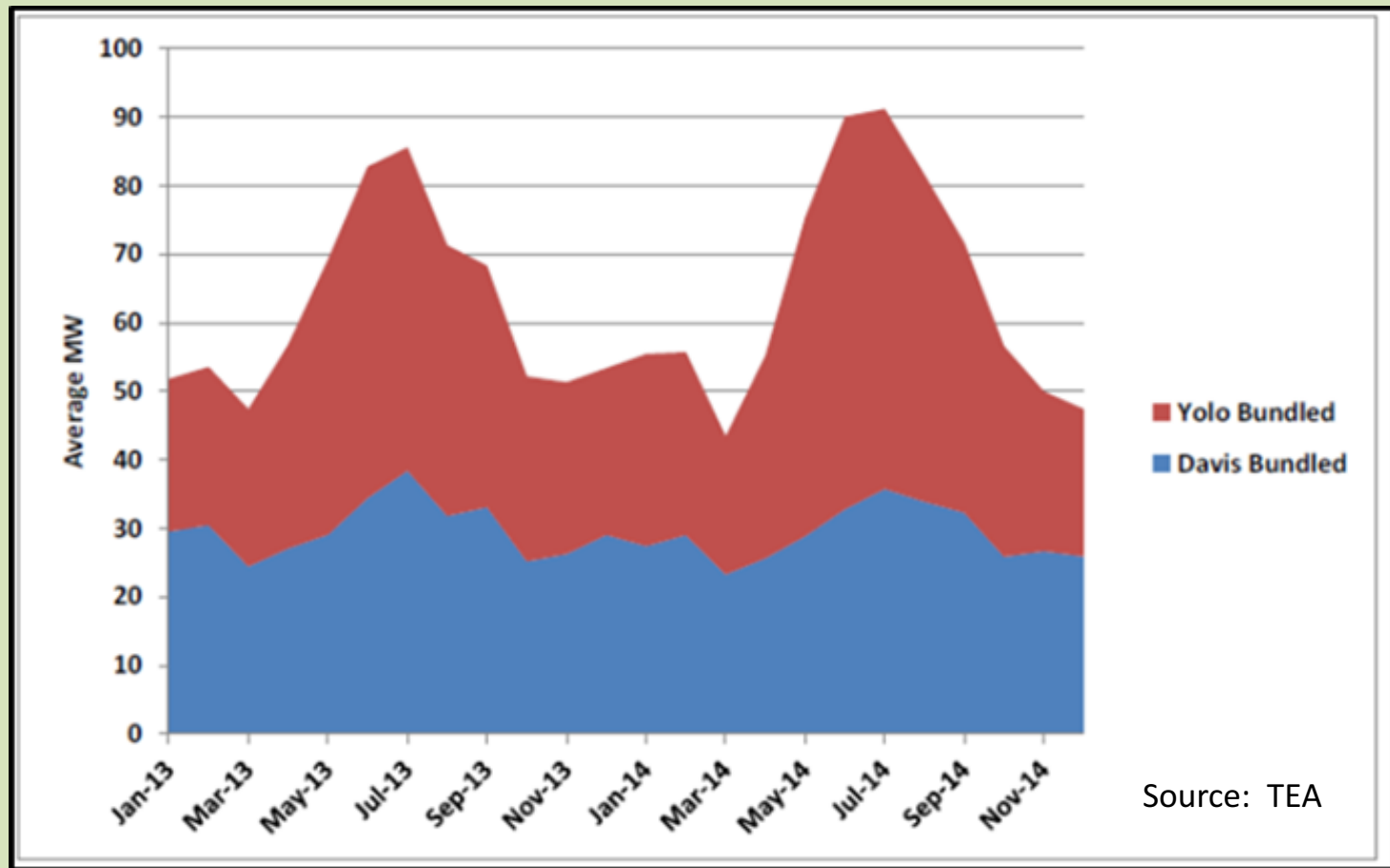


“The company (PG&E) expects to spend \$5.6 billion this year, including \$2 billion on distribution, \$1.2 billion on transmission and \$700 million on generation, with annual investments ranging from \$5.4 billion to \$6.4 billion over the next three years.”

PG&E’s forecast for “behind-the-meter” generation additions in the next three years of roughly 1GW/year*. Related local investment will be in the range of \$3B/year or considerably higher if some PV additions include energy storage.

*DRP DER Growth Scenarios Workshop, May 3, 2017

Decentralization: Example of Demand Profile Differences – City (blue) vs. County (red)



Democratization: Two Visions of Community Choice

Old – Imported Energy



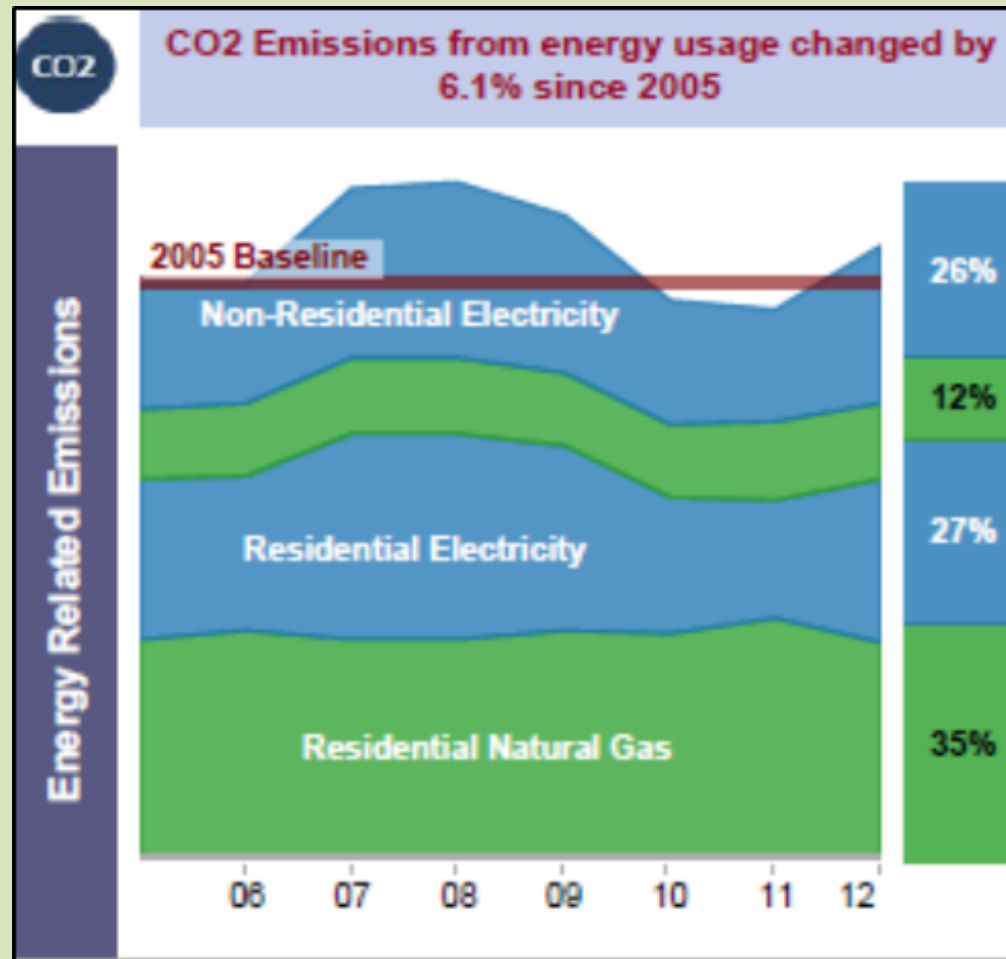
- Natural Gas Power Plants
- Utility Scale Renewables

Future – Local Energy +



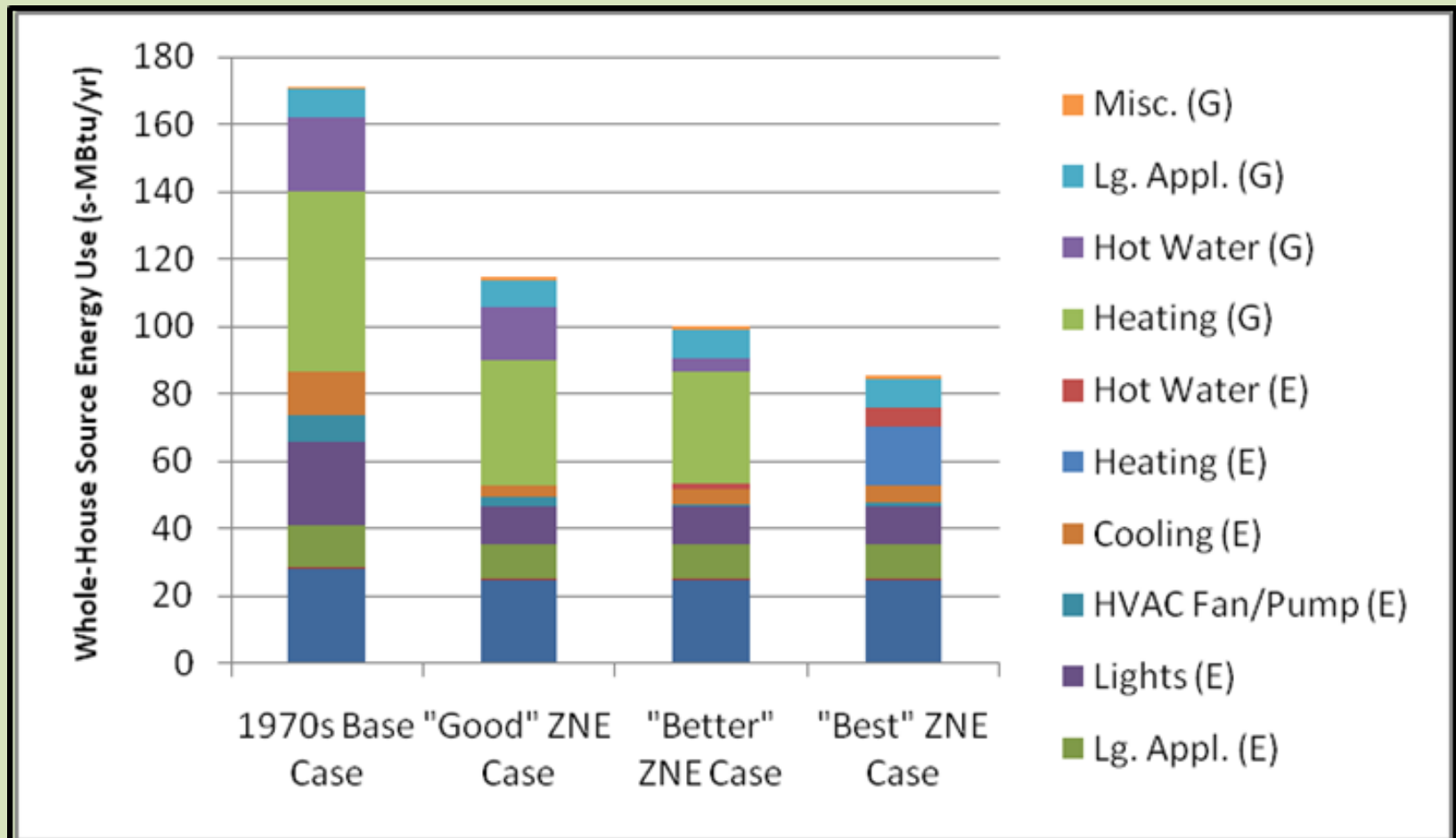
- Utility Scale Renewables and Storage
- Community Solar & Wind
- On site Solar
- Zero Carbon Vehicles

Decarbonization: Buildings Sector GHG Emissions Profile for Davis, California

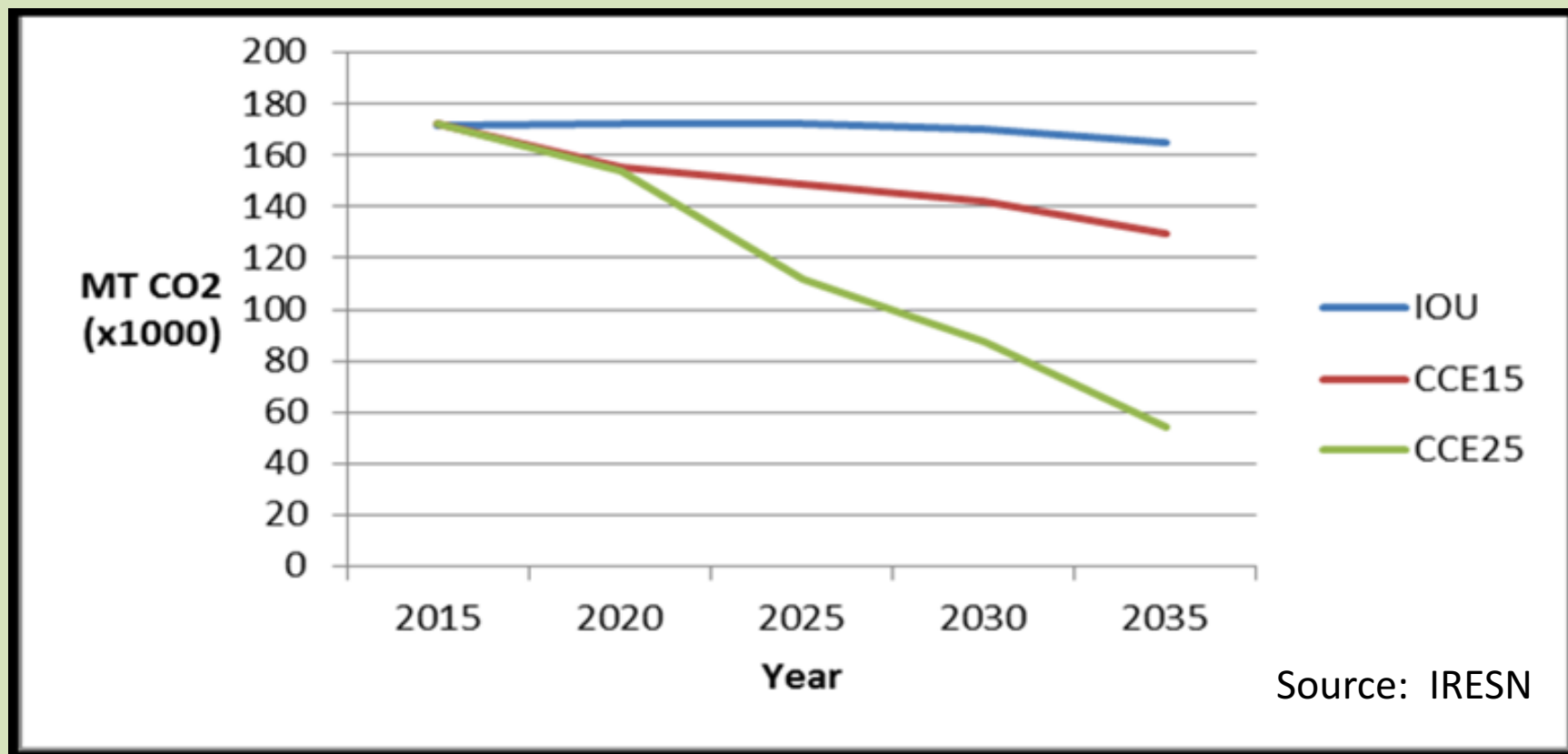


Source: PG&E

Decarbonization: 1970s Vintage Home Net Zero Retrofit Energy Usage Reductions (Davis, CA)



Decarbonization: GHG Emission Reduction in Three Scenarios for Davis, California

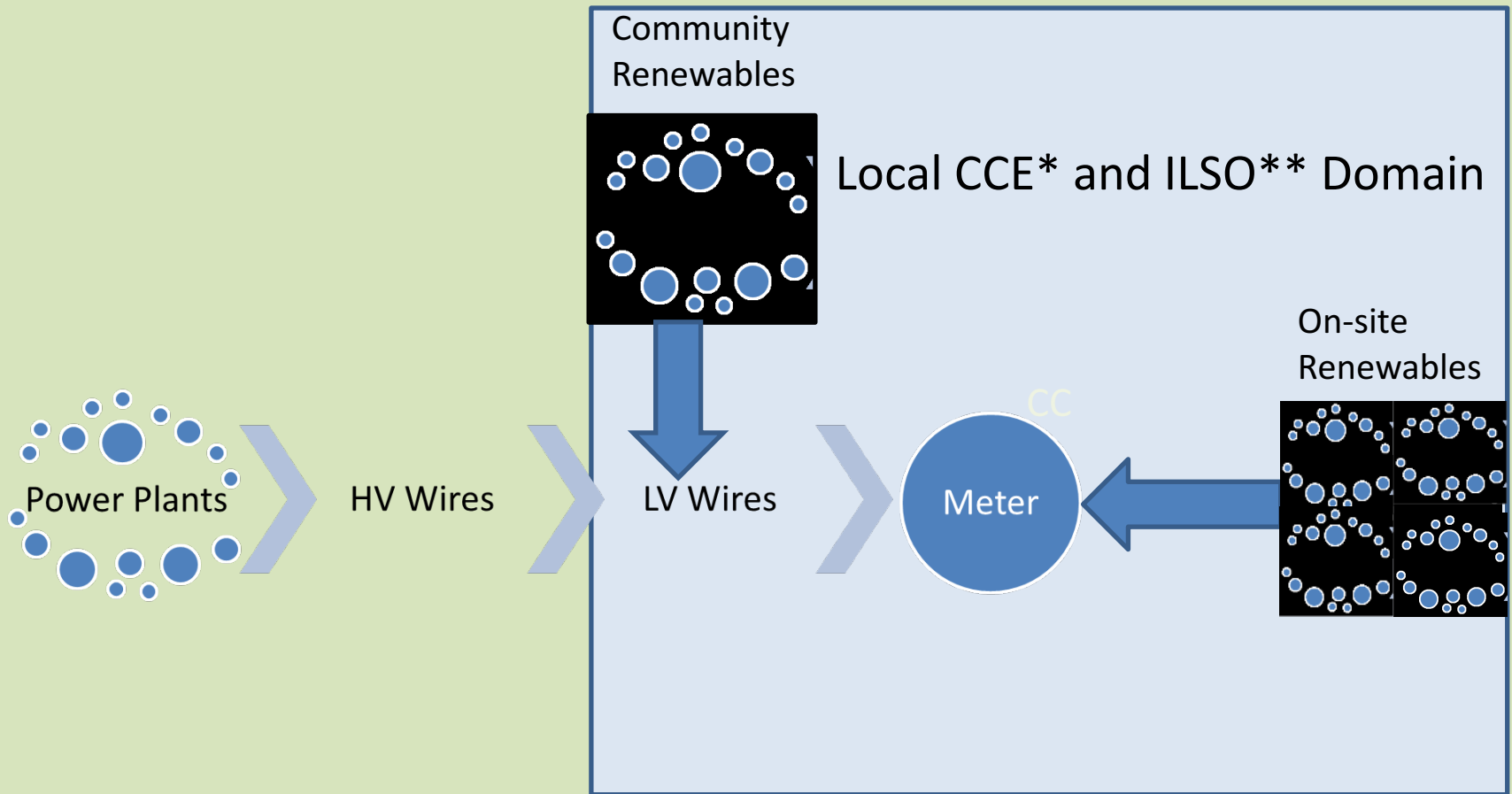


IOU = Business as Usual

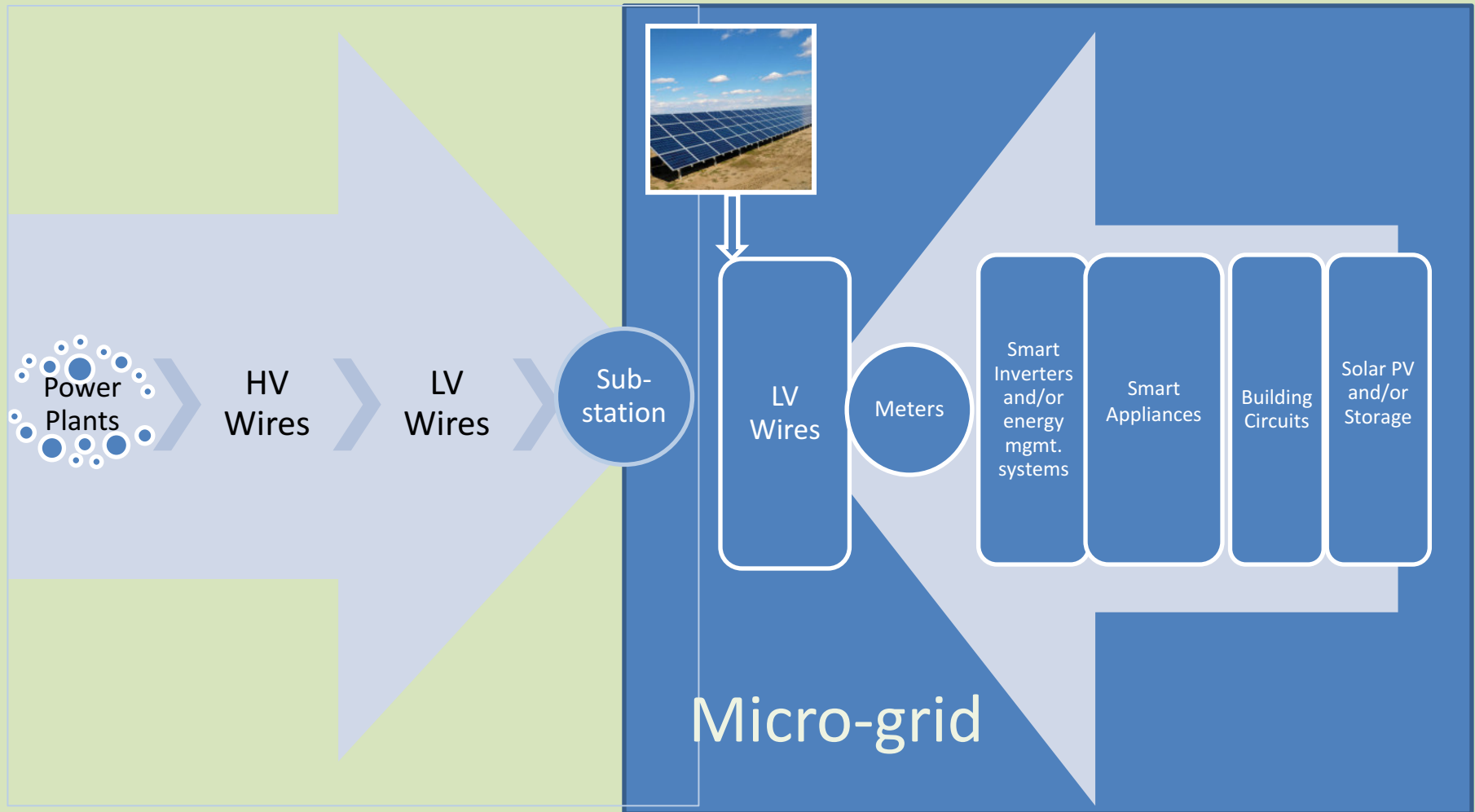
CCE15 = Community Choice Energy (CCE)

CCE25 = CCE with Local Energy Resource and Fuel Substitution Emphasis

Demonopolization: System Architecture for Local Clean Energy Resources



Demonopolization: Solar Micro-grid Concept



Recap - 1

- Energy/transportation technology tipping points make energy decentralization inevitable.
- Importing energy means exporting dollars. Now how much to import is becoming a local choice.
- Community choice enables community solar and also urban/rural energy exchange.
- Timely local decarbonization hinges on mass marketing of smart energy retrofits.

Recap - 2

- Community Choice is natural partner in clean local energy resource (CLER) deployment, not a substitute for active city/county engagement.
- Economically optimum CLER deployment may require creation of local independent system operators.
- Solar micro-grids provide resiliency benefits and enable more economically efficient mixed portfolios of residential and community solar.

Let's help one another remember:
We are at a point in human history where, if it isn't
happening, it's because we aren't doing it!

Thank You!

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Electrified Transportation; We Need to Plan How to Plug In

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How We Are Used to Fueling our Vehicles



How Electric Vehicles are Fueled



EVs Come in All Sizes and Functions



Electric Vehicles Will Need to Integrate into Existing Structures

Energy/Water Efficient Homes and Businesses...

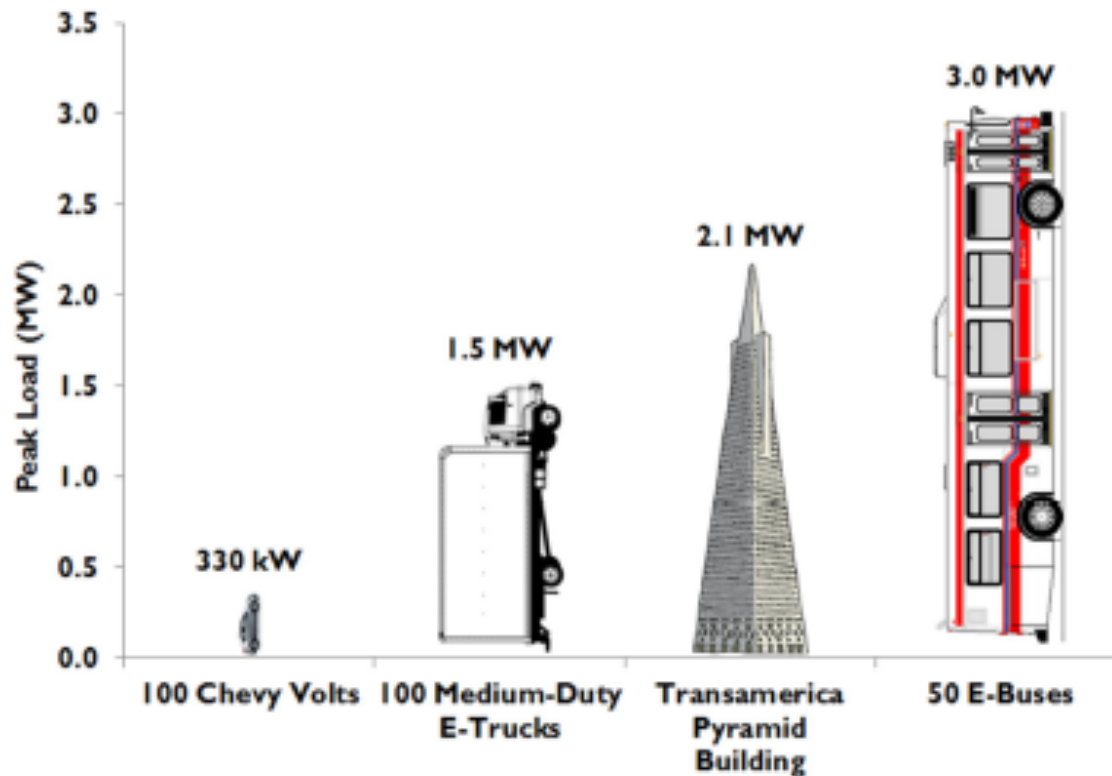


Will support Zero Emission Electric Vehicles!



Electrical Loads for ZEV Fleets

Figure 14: Peak loads for various electric vehicle fleets (without mitigating grid impacts)

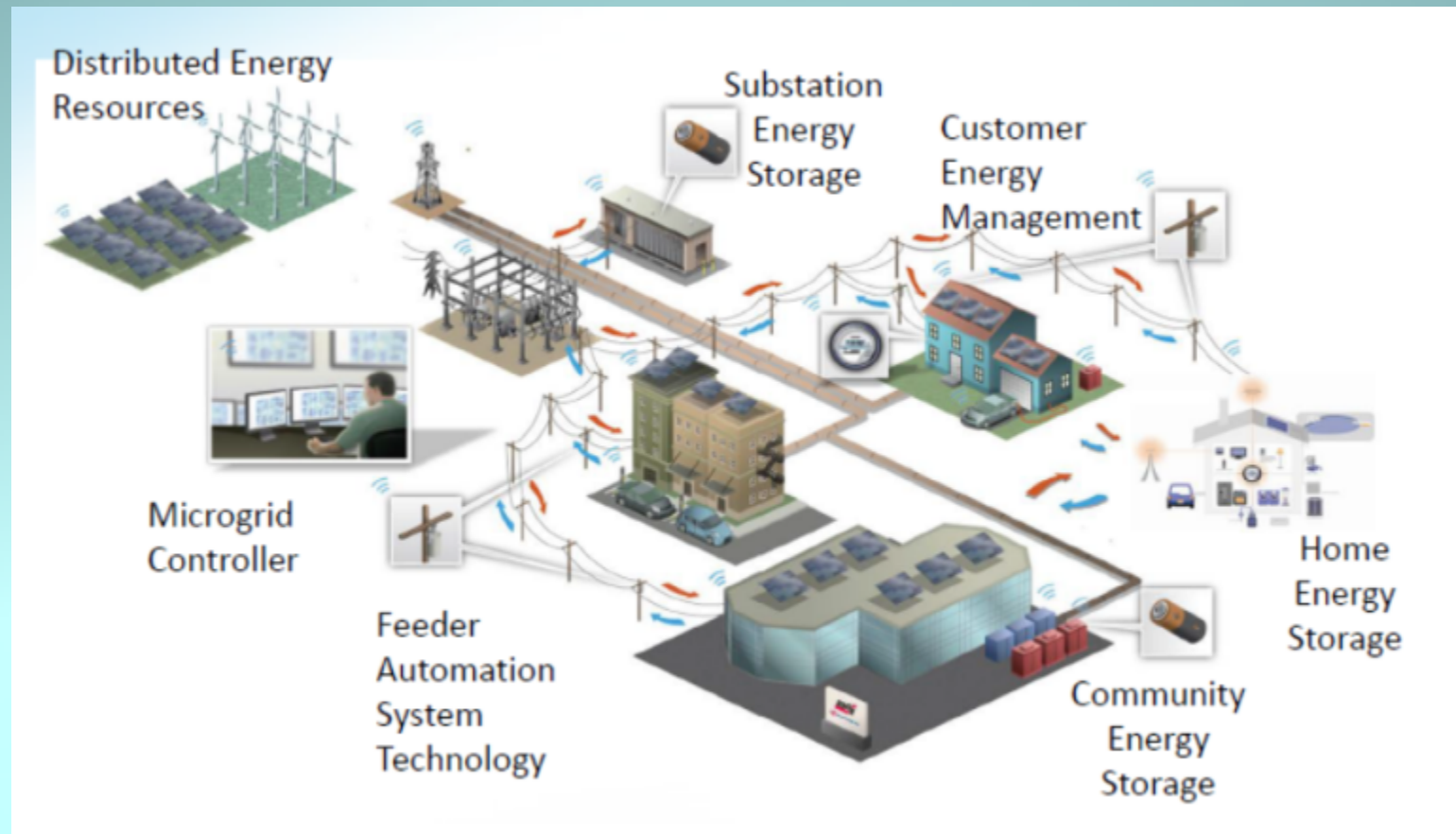


Assumptions: the Chevy Volt charging rate is 3.3 kW, the medium-duty E-Truck charging rate is 15 kW and the E-Bus charging rate is 60 kW. The peak load for the Transamerica Pyramid building is from [26].

This Requires Planning

- We must move to planning holistic integrated community scale deployments of renewable energy, advanced energy storage, transit oriented development, and supporting infrastructure for advanced electrified transportation.
- These developments should incorporate renovation and efficiency upgrades of existing buildings with new construction while blending onsite energy production with energy-efficient equipment and energy storage.

What Will These Communities Look Like? It Could Be Something Like This...



Questions?

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Grid 2.0 & Local Governments & Sustainable Energy & Growing Up

SEEC Forum 2017

When I grow

up I want

to be...

What we wanted...

- **Increase PV & DER**
- **Increase EVs**
- **Save MONEY**
- **Reduce GHG**



What we got...

- Avoid blackouts
- Peak demand & duck curve
- Increase reliability
- Fight for NEM
- Rolling Portfolio
- Too much solar is a bad thing?
- Do it **EQUITABLY**



SM ADVANCED ENERGY DISTRICT

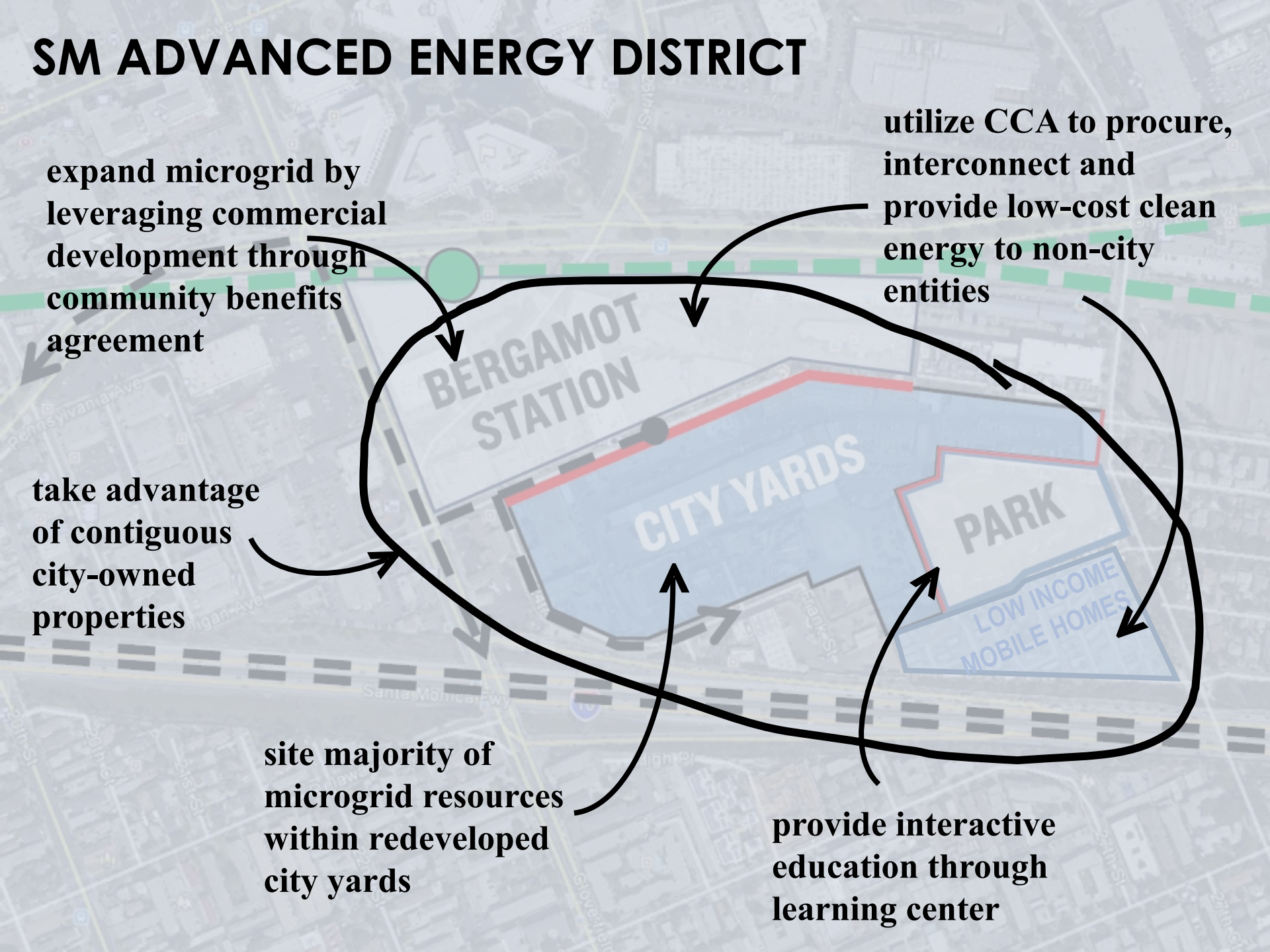
expand microgrid by
leveraging commercial
development through
community benefits
agreement

utilize CCA to procure,
interconnect and
provide low-cost clean
energy to non-city
entities

take advantage
of contiguous
city-owned
properties

site majority of
microgrid resources
within redeveloped
city yards

provide interactive
education through
learning center



Capability Maturity Model



GRID

- Centralized
- Unidirectional
- Fossil fuel based
- Low level of control

- Transitioning to mixed model
- Increased DER, responsive but not coordinated

- Decentralized
- Local, green
- Optimized for GHG & cost
- Integrated control

GOVT

- Low level of control & influence
- Recipient of programs & funds

- Microgrid buildings & campuses
- Administering program funds for integrated energy services

- Deploying DER
- Aggregating benefits
- Active grid management & planning

COMM

- Early adopters of solar, EE & EV
- No integration of DER
- Low level of DR participation

- Energy storage for DR & resilience
- Dabbling with Internet of Energy

- Connected homes & biz
- Optimize usage for GHG & cost



- **Coalition of CA local governments and non-profits**
- **Advocate for greater role in sustainable energy infrastructure, programs and policies**
- **Participate in regulatory proceedings**
 - **Investments, program design, funding, administration, EM&V**
 - **Rate design, NBCs**
 - **Pilot programs – RENs**



Plenary Session

Grid 2.0

Cary Garcia, Jr. | Statewide Coordinator

Gerry Braun | The IRES Network

Joseph Oldham | CALSTART

Garrett Wong | City of Santa Monica