



Cities, Micro-grids and the Climate Emergency

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What Do Smart Cities Do?

- Technically/economically integrate local resources, e.g. water, “waste”, energy, and communications
- Innovate in order to plug economic leaks, e.g. dollars spent for energy/water imports
- Coordinate in order to innovate, e.g. with out-sourced service providers

Smart micro-grids are an emerging platform for local services integration, coordination, innovation and long term economic optimization.



Smart Micro-grids?

Unlike carbon based micro-grids, renewable based micro-grids need to incorporate smart and robust suites of information, communications and control technologies, in order to:

- Forecast, regulate and match variable supply, storage reserves and variable usage.
- Optimize imports and exports
- Communicate price signals and otherwise inform consumer and prosumer direct and automated choices.

UC Davis West Village*



*Originally planned as a net zero community powered by a micro-grid, West Village is powered primarily by net metered solar arrays on roofs and parking lot canopies.

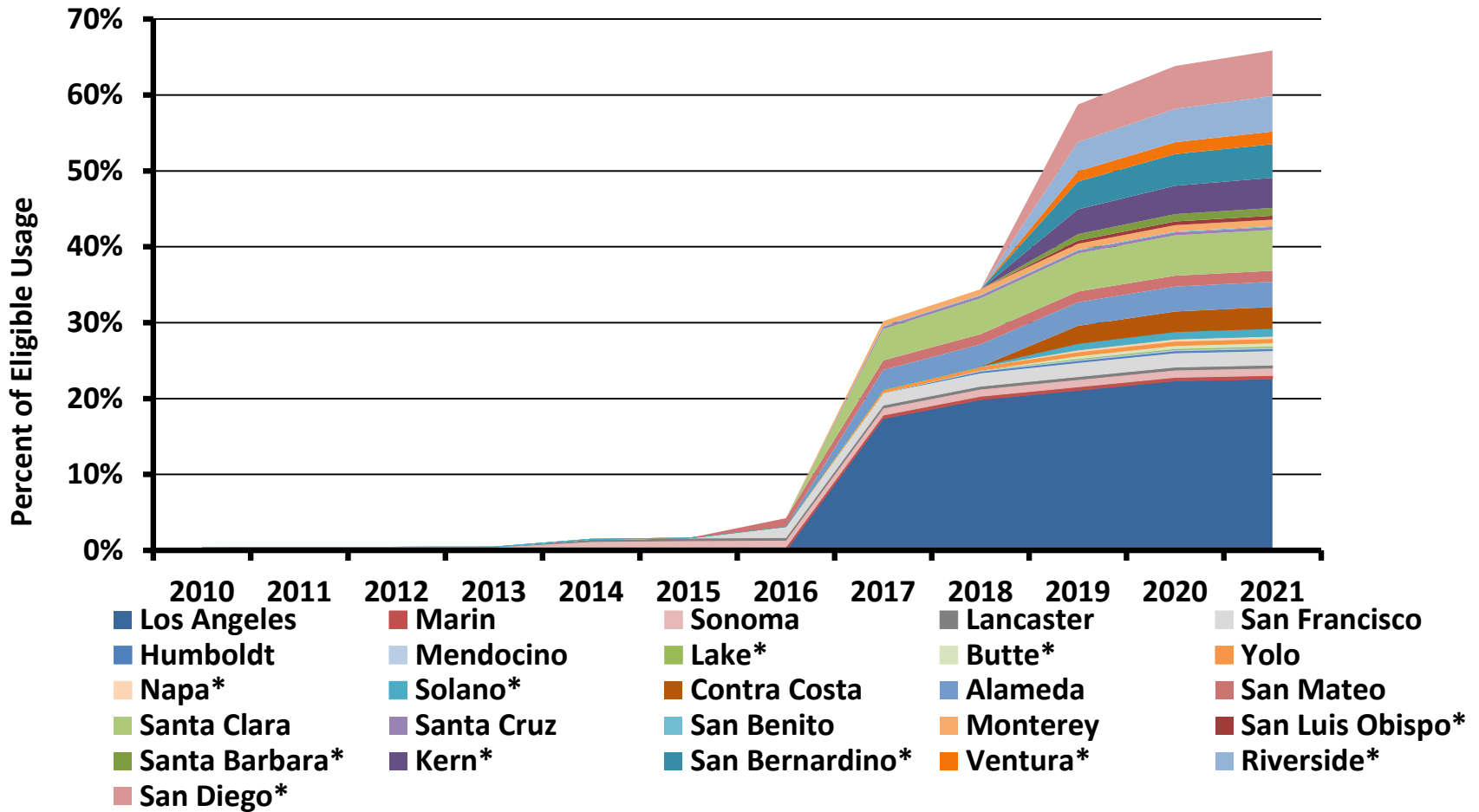


Community Choice Energy



CCE leverages the market power of aggregation, with a local agency responsible for purchasing wholesale electricity in functional partnership with an investor owned utility that owns and operates electricity delivery infrastructure.

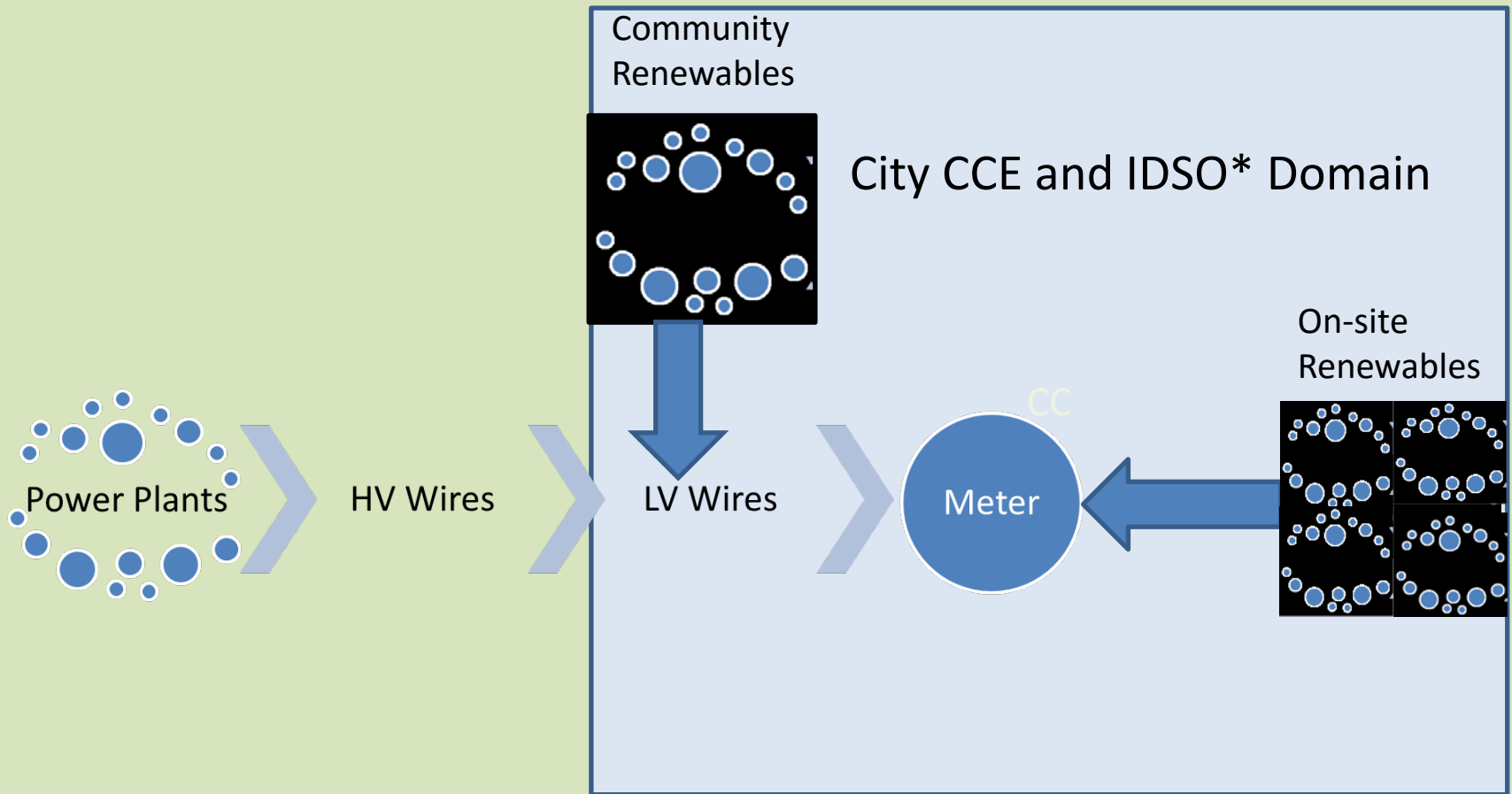
CCE at a Tipping Point in California



Source: Ezra Beeman, Energeia

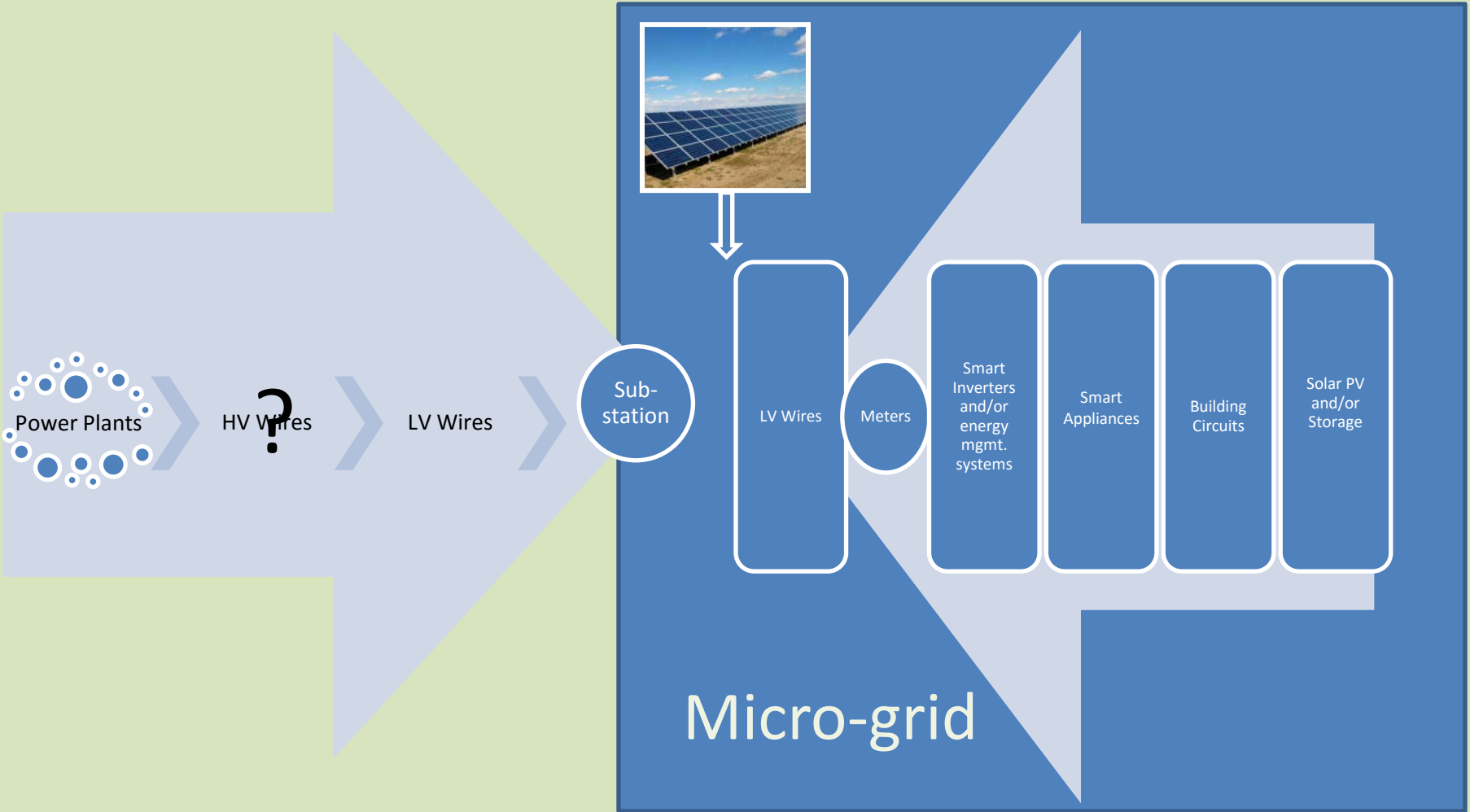


Electricity Supply Decentralization



*Independent Distribution System Operator

Solar Micro-grids





Let's assume we have a decade...

...to get on a steep downward path to zero carbon.

We'll need local actions and capacities that are quick, far sighted, integrative, and replicable.

No unanswered questions other than "Why wouldn't you do this?"

“Emergency Management”

Functionally Replicable Municipal Actions

Supply	Decarbonization – Wind/Solar
Buildings	Electrification – Heat pumps
Transportation	Substitution – H ₂ for C
Infrastructure	Integration – Micro-grids
Decisions	Decentralization – CCE/DSO

CCE = Community Choice Energy

DSO = Distribution (aka local) System Operator



First Steps

Data

- City/Utility Sharing

- Site and Local Partner Development

Models

- Integrated Energy Analysis

- Local Macro-economic Analysis

Capacity

- Energy Management Staffing

- Local Broadband

Local Policy

- Carbon Negative Development Guidelines

- Electrification Retrofit Incentives

State Policy

- Community Choice Energy

- Micro-grid Incentives

Thank you!

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