

Resilience, Energy Resilience, & Local Energy Systems

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Resiliency Concepts

Resilience (general) => The ability of a system to continue to provide its intended functions & services when a system disruption occurs

1. Provide uninterrupted service with minimal reduction in service quality
2. Minimize the duration & population impacted by any service interruption

Community resilience depends on basic essential services =>

- Immediate: Water supply; food supply; medical care; shelter; wastewater
- Long-term: Economic stability; public health; housing; security

Many essential services depend on Energy =>

- Mobility; communication; space heating/cooling; food preservation; lighting

Energy Resilience requires local energy resources =>

- **Ensure continuity of energy services during utility grid outages**
- Invest in local energy resources & systems that can “island” from the grid

Today's challenges require local energy solutions

Sustainability & Decarbonization => **Energy systems a major contributor**

- Emissions result from human energy use, shaped by local arrangements
- City Planning => zoning; land use; housing; building codes; mobility services; economic development; public space; habitat; urban forestry

Resilience => **Maintain essential electric service when the grid fails**

- Carbon-free microgrids to power critical services & resilience centers

Energy Justice => **Democratize energy asset ownership & operation**

- Energy is a key social determinant of health, not just a commodity
- Local energy supply businesses build local wealth & economic resilience
- Mitigate historic harms & strengthen vulnerable neighborhoods

20th century electricity system structure is not conducive to local energy

Local energy is cost-effective & competes with the grid

Performance/Cost, Versatility, Resilience



Electricity service can be a locally owned & operated enterprise

- Policies to suppress DER* adoption raise incentives for grid defection
- Grid defection by affluent customers will worsen energy inequities

* DER $\equiv$ local or “distributed” energy resources of all types

Needed => An electric distribution network & local energy markets that

- **Unlock the full value of local energy resources**
- **Compensate non-utility investment in local renewable energy supply**

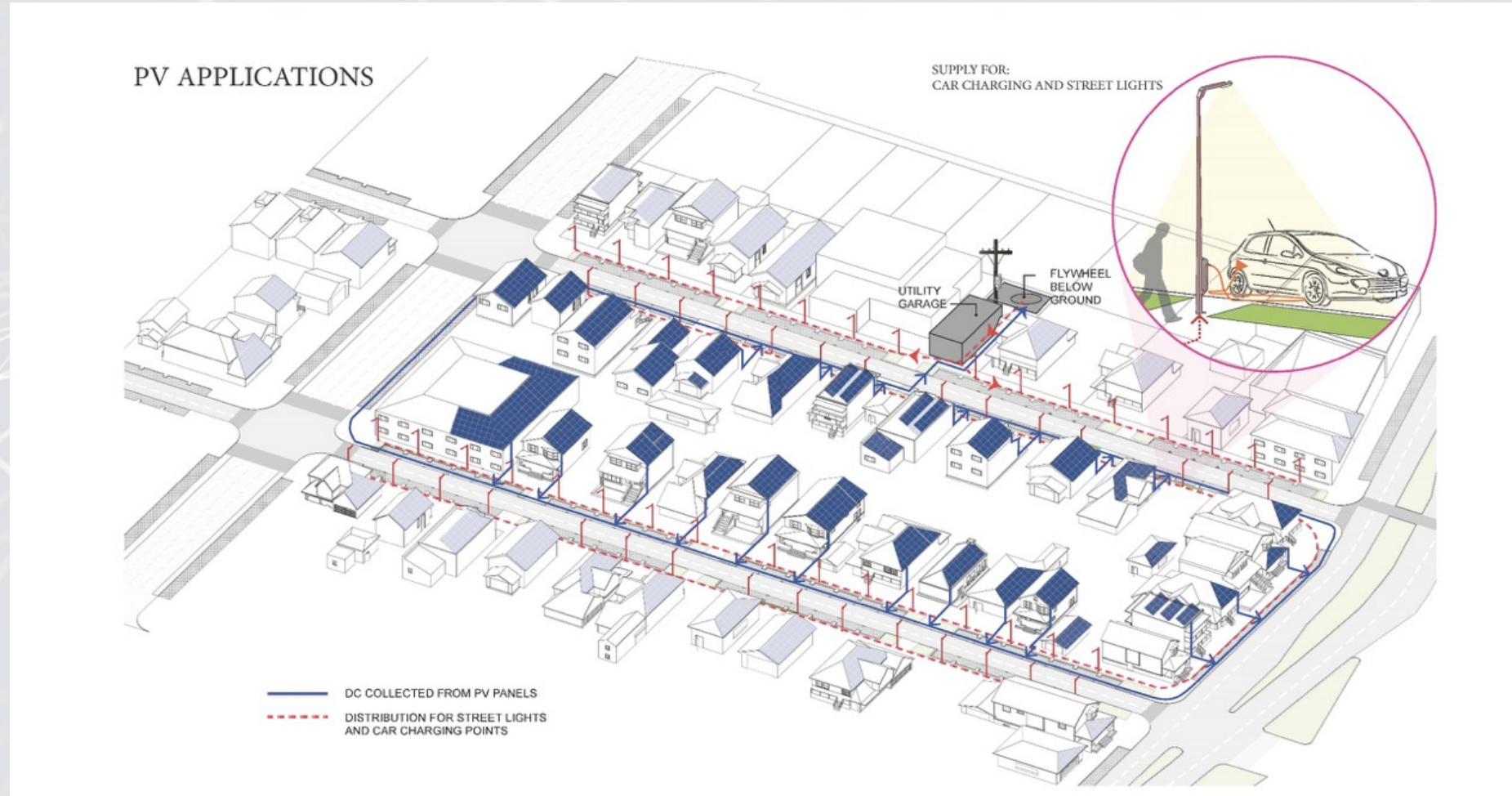
Some local energy possibilities

- **Compensate customers** to over-size rooftop solar+battery systems & provide energy to their neighborhoods.
- **Enable locally-owned co-ops & non-profits** to supply electricity & electric vehicle charging as integral components of the local economy.
- **Deploy municipal electrification projects** — public mobility fleets & school buses, powered by publicly-owned local renewable energy resources.
- **Retrofit neighborhood “resilience centers”** to provide emergency shelter, warmth, cooling, food, medical care, phone/internet service, & zero utility bills.
- **Build local energy planning capability** to integrate local power production with tree canopy, land use, public space, stormwater capture, etc. at neighborhood level.
- **Create multi-customer “community” microgrids** that can operate 24x365 & provide uninterrupted electric service to an entire neighborhood during grid outages.

Oakland EcoBlock: retrofit model for urban neighborhoods

Community microgrid serves all customers on the block; integrated with broadband, EV charging, grey water, stormwater capture, food production, ...

- Shared rooftop solar
- Shared energy storage (flywheel + battery)
- Dynamic load management
- Shared EVs & charging
- Microgrid controls for seamless islanding
- Single interconnection point to the utility grid
- CEC-funded demo project by UC Berkeley & Berkeley Lab
- **Existing laws & regulations kill commercial viability, reduce benefits & prevent replication**



Bottom-up planning for a local energy future

Bottom-up planning to optimize distribution-connected supply

- **Start from local energy needs & priorities** => granular demand forecast for a neighborhood, subdivision, city district of, tribal community, campus, rural town
- **Plan supply using a “local first” principle** =>
 - On-site on customer premises (behind the meter)
 - **Community-level shared resources (front of meter)**
 - Design assets to maximize production & supply surrounding community
- **Maximize PV + storage systems on the built environment** — warehouses, shopping malls, schools, parking lots, irrigation canals, etc. — ignored in planning processes
 - NREL (2016) rooftop potential: <https://www.nrel.gov/docs/fy16osti/65298.pdf>
 - California 74% annual electricity consumption; US average 39%
 - No land-use conflicts; no transmission needed; supports community microgrid
- **Then plan transmission system & wholesale market to meet residual demand**

Policies for a local energy transition - 1

Enable “multi-property” or “community” microgrids (CMG) to be financially viable, without depending on grants & subsidies

CA Legislation directed CPUC to “commercialize” microgrids (sb 1339 – 2018)

- Enable CMG to be financially viable businesses based on earned energy revenues
- Allow CMG to operate 24x365 as a single controllable entity — to serve internal customers from internal supply all year round

Instead, CPUC rules bring CMG under total IOU monopoly control

- PG&E’s “Community Microgrid Enablement Tariff” (CMET) => MG can operate **ONLY** during grid outages; can island **ONLY** at IOU discretion; **ONLY** IOU can operate it
- Assumes CMG have no value except as power backup for internal customers
- Result => CMG will only be viable with large grants or public/ratepayer funding

Policies for a local energy transition - 2

Democratize ownership of electricity assets & allow local electricity supply businesses

- Communities can build wealth by owning & operating productive energy assets
- **DER technologies available today** enable neighborhoods to have their own electricity systems — but they're blocked by monopoly control of distribution
- Compensate customers to maximize solar+storage installations & supply neighbors

Authorize local energy transactions within the distribution system

- **Physical reality** => Power injected into local distribution flows to serve local load, with no backflow onto the transmission system
- **Regulatory fiction** => Power injected into distribution flows up to the ISO, & then comes back down to serve customers
- **Result** => Local resource pays ISO participation costs while customers pay for transmission service they don't use => unfair cost burden on local energy

Policies for a local energy transition - 3

Reform the distribution utility as an “Open Access DSO”

- **Vision =>** An **open-access, participatory distribution network** to enable all DERs to engage in economic transactions for energy & grid services
- **Open Access DSO is the distribution counterpart of the ISO for transmission**
- **DSO has three core functions**
 - Operate & plan a reliable distribution network
 - Administer local markets for customers & DERs to transact energy & grid services
 - Coordinate with ISO at Transmission-Distribution interfaces
- **Open Access regulatory framework**
 - DSO performs natural monopoly functions only — network & market operation — & does not engage in competitive arenas
 - DSO is compensated on performance, not capital investment

Near-term actions to advance resilient local energy

- **Implement lots of local projects, such as community resilience centers**
 - Add solar + storage + controls to an existing building => minimal regulatory barriers; yields immediate resilience, energy cost & local economy benefits
 - Select places where people feel safe; seek new funding opportunities, e.g., SGC CRC
 - Look at New Orleans: <https://www.togethernola.org>
- **Give practical meaning to “community engagement” & “energy justice”**
 - Urge state agencies (CPUC, CEC, CARB) to resource & staff ongoing collaboration with cities, school boards, water agencies, CBOs, tribes
- **Work with city/county planners to develop local energy resources**
 - Urge state agencies to invest in local energy planning; SB 39 Electrification Plans
 - Urge CPUC (IRP) & CEC (SB100 planning) to consider solar+storage deployed on built infrastructure (warehouses, schools, etc.) in renewable energy planning
- **Develop business & financing models for locally owned & operated resources & microgrids**
- **Build a statewide movement — cities, counties, school boards, tribes, CBOs — for statutory/regulatory reform to remove barriers & promote energy democracy**

A surreal landscape featuring several power line towers. The towers are shaped like question marks, with the largest one on the right and smaller ones receding into the distance. Power lines stretch across the sky. In the background, a city skyline is visible on the horizon under a dramatic, cloudy sky at sunset or sunrise. The ground is a dry, scrubby field.

Thank you

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