Cities Can Lead the Way to a Decentralized Clean Energy Future

South Bay Cities COG General Assembly, March 23, 2023

Lorenzo Kristov, PhD, Principal Market Architect
Electric System Policy, Structure, Market Design

The Context: Urgent 21st Century Mandates

1. **Sustainability** => **Stop making climate disruption worse**
   - Decarbonize, electrify, reduce & displace fossil fuels throughout society
2. **Resilience** => **Prepare for imminent impacts** of damage already done
   - Power essential municipal & community functions during grid outages
3. **Energy Justice** => **Center environmental, social & economic justice**
   - Energy is a crucial factor in neighborhood health, not just a commodity
   - Maximize clean energy benefits for ALL communities
   - Mitigate historic harms & inequities from energy practices
   - Ensure a just transition to a clean energy economy

All three goals require local solutions

1. **Sustainability & Decarbonization** — **address the sources of emissions**
   - Zoning & land use; building codes; development strategies
   - Housing — affordable, densified, transit-oriented, electrified
   - Mobility strategies, public spaces, habitat, urban agriculture & forestry
   - Climate Action & Adaptation Plans; City/County General Plans
2. **Resilience — maintain power during grid outages**
   - **Don't depend entirely on the grid:** Build carbon-free microgrids to power critical services & "resilience centers" when the grid goes down
3. **Energy Justice, Equity**
   - Target vulnerable neighborhoods — health, economic & resilience benefits

Local energy systems are essential for today's urgent needs but existing policies present major barriers.

Some local energy possibilities

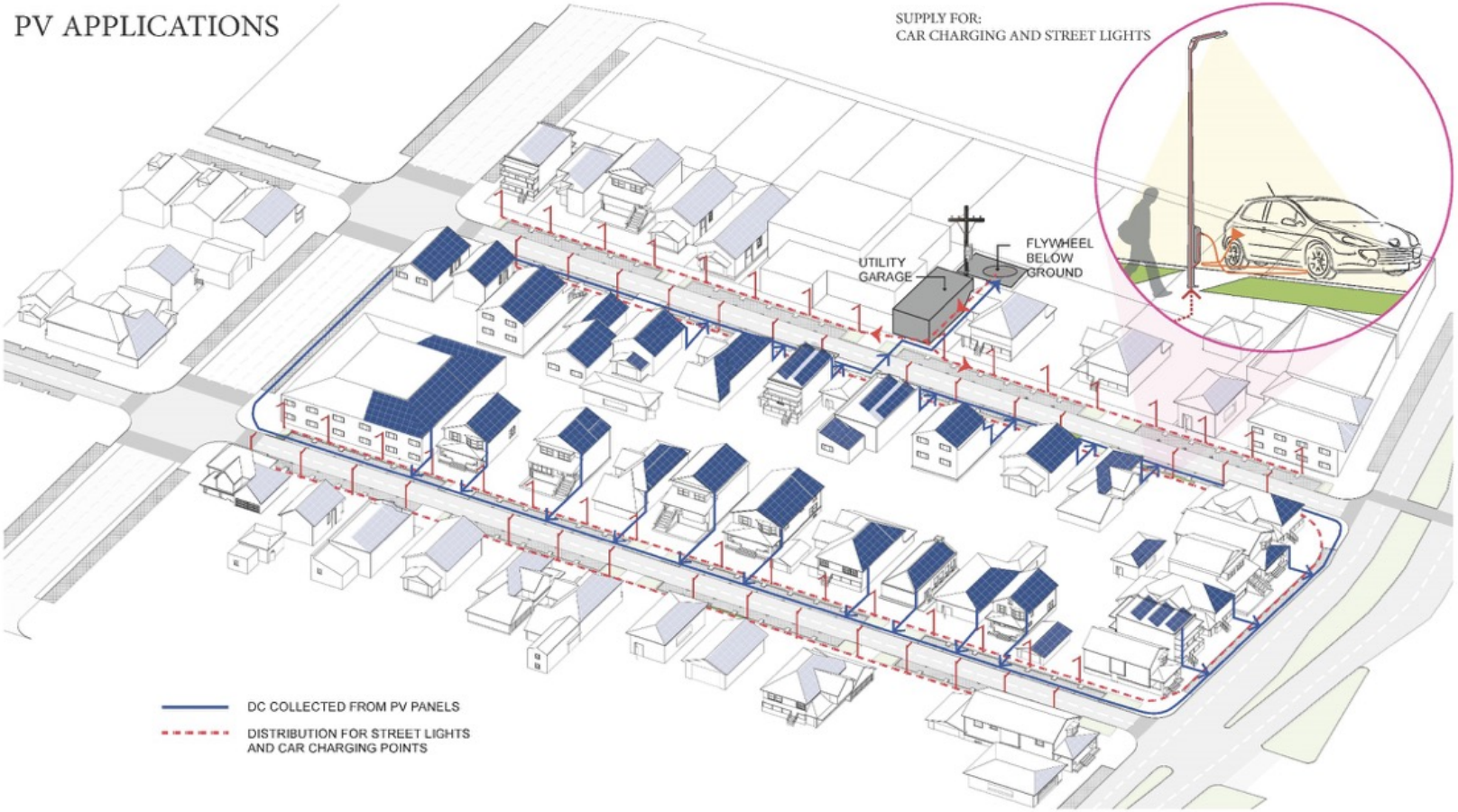
- **Compensate individual customers** to over-size rooftop solar+battery systems to provide energy to their neighbors.
- **Enable locally-owned co-op businesses** to supply electricity & electric vehicle charging as integral components of the local economy.
- **Deploy municipal electrification projects** — public mobility fleets & school buses, powered by publicly-owned local renewable energy assets.
- **Retrofit neighborhood "resilience centers"** to provide emergency shelter, warmth or cooling, food, medical care, phone/internet service, & zero energy costs year-round.
- **Build local energy planning capacity** to co-optimize local power production with tree canopy, land use, public space, stormwater capture at neighborhood level.

Local electricity systems are needed, feasible & cost-effective,
but we don't have policy & planning frameworks to enable them.

Oakland EcoBlock: retrofit model for urban neighborhoods

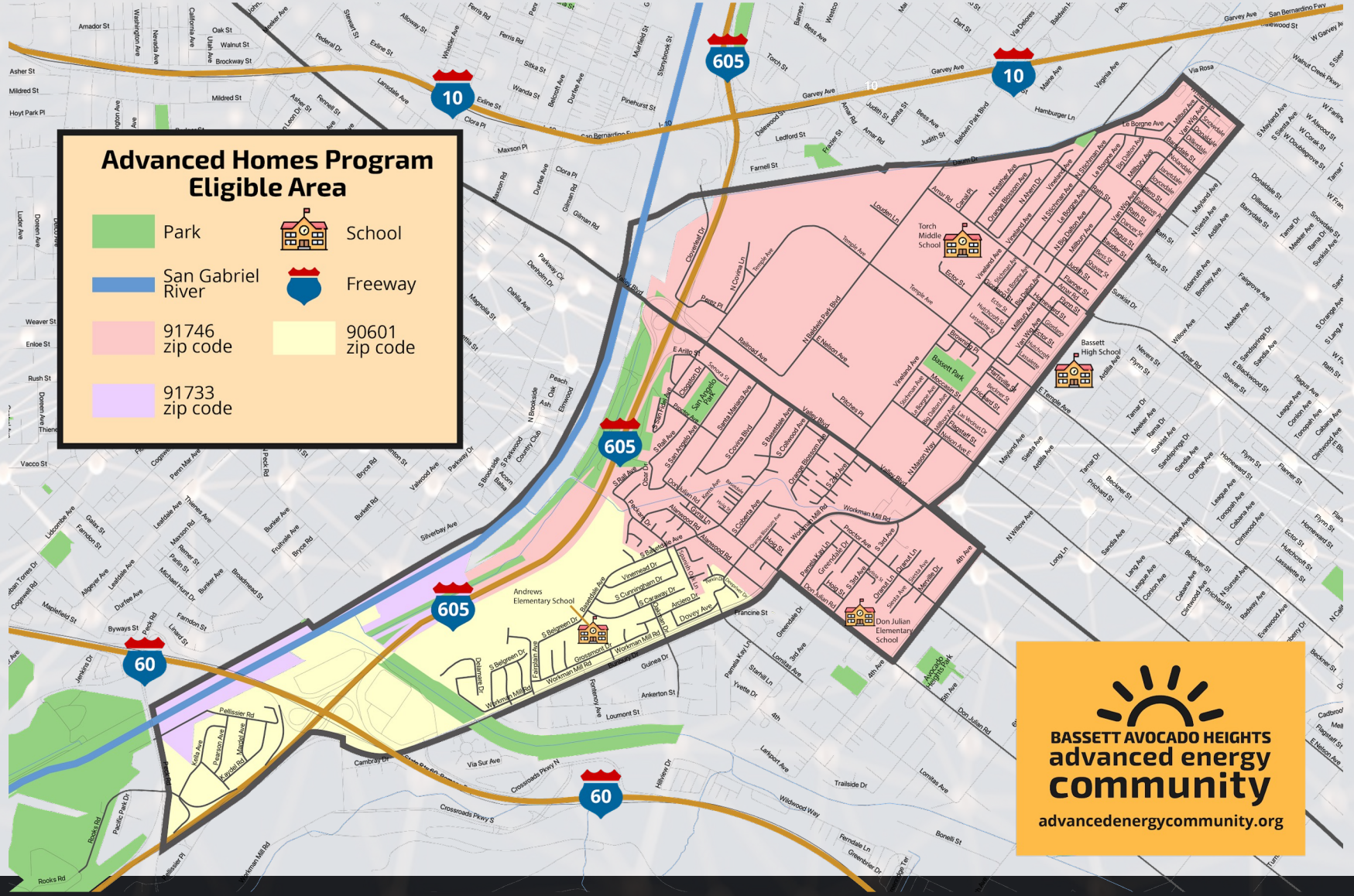
Community microgrid serves all customers on the block; integrated with grey water, stormwater capture, EV charging, food production, broadband …

- Community & rooftop solar
- Community energy storage (flywheel + battery)
- Dynamic load management
- Shared EVs & coordinated charging
- Mcrogrid structure allows seamless islanding
- Single interconnection point to the utility grid
- CEC-funded demo project by UC Berkeley & Berkeley Lab
- **Existing laws & regulations stifle commercial viability & prohibit replication of "multi-property microgrids"**



Advanced Energy Community (AEC) Project

- Advanced homes => VPP; community solar; local EV micro-transit; resilience hub
- **Bassett-Avocado Heights** in unincorporated LA County
- Disadvantaged Community (DAC) census tracts
- 60% of residents on CARE (low-income rate)
- 84% Hispanic
- $60,000 median income
- Predicted to experience over **40 additional extreme heat days (> 35C) per year by 2050**



Major industry trends collide with legacy policies

Distributed energy resources (DER) now compete with "The Grid"

- **DER rapidly improve** in performance, functionality, scalability & cost
- **The Grid gets more expensive & still vulnerable** to disruptions
- **Customers who can afford DERs no longer need The Grid**
- **Grid defection by affluent customers will worsen energy inequities**

Legacy 20th century policies favor utility-scale generation & transmission

- They assume new electrification load must be served by The Grid
- **They view DERs as a problem** requiring massive grid investment
- Worst-case planning inflates grid costs & stimulates grid defection

We need a new policy framework

- **Maximize societal & grid benefits of DERs**
- Encourage locally-owned & operated DERs & microgrids
- **Make DERs accessible to all people & neighborhoods**

We need multiple energy mind shifts

The utility-regulatory attitude

- From: DERs are a problem for the electricity system
- To: DERs are essential for meeting 21st century mandates

The electricity market concept

- From: Electricity is a commodity (suppliers supply & consumers consume)
- To: Electricity is a core determinant of neighborhood health & sustainability

The electricity planning paradigm

- From: Individual consumer choices, decisions & behaviors
- To: Neighborhood-level integration with housing, mobility, urban forests, etc.

The value of Energy Justice communities

- From: Passive recipients of grants & special regulatory treatment, charity
- To: Vital & needed economic producers of clean energy & societal value

Three policies for a bottom-up energy transition

1. Integrate energy planning into urban/county planning

- **Identify local needs & priorities; to replace usual "community engagement"**
- **Develop state agency partnerships with local governments, tribes, CBOs**
- **Invest in energy planning capacity at the local level (2022 CA SB 833)**

2. Adopt new regulations to allow local electricity transactions

- **Integrate electricity production into the neighborhood economy**
- **Over-size on-site DER to supply local energy & grid services**
- **Aggregate DER operation to flatten net load profiles**

3. Reform the distribution utility as an "Open Access DSO"

- Create an **open, participatory distribution network** to maximize DER value
- **Maximize the value of DERs to communities, the grid & society**

Strategies for achieving equitable local energy

- **Implement single-property microgrids** => **"community resilience centers"**
  - Add solar + storage + controls to an existing building => minimal regulatory barriers; immediate resilience, energy cost & local economy benefits
  - New funding opportunities, e.g., SGC CRC and CEC CERI
- **Urge state agencies (CPUC, CEC) to establish ongoing collaboration & communication with local government agencies & CBOs**
- **Lobby the state to invest in local energy planning capacity**
  - **Identify local priorities, select sites & design local energy projects**
- **Develop business & financing models for locally owned & operated DER projects & microgrids**
- **Build a statewide local government movement for statutory/regulatory reform to allow local electricity projects to serve local needs**

Deploy DERs for greater local self-reliance


To be continued.
Lorenzo Kristov
LKristov91@gmail.com
Electric System Policy, Structure, Market Design