Clean Coalition

Making Clean Local Energy Accessible Now

Community Microgrids

The Path to Resilience and Sustainability

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The Clean Coalition's mission

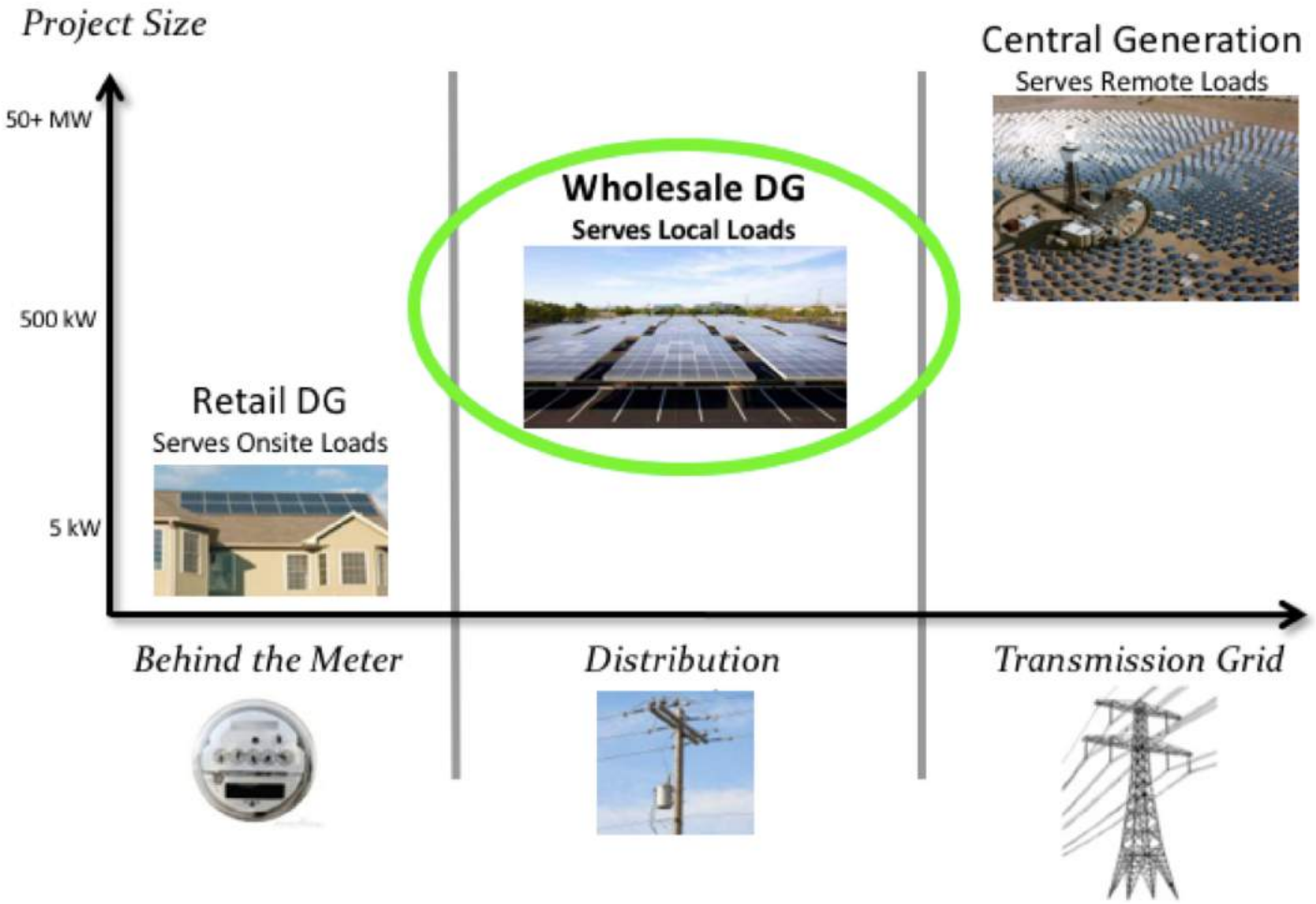
The Clean Coalition is a nonprofit organization.

Our mission:

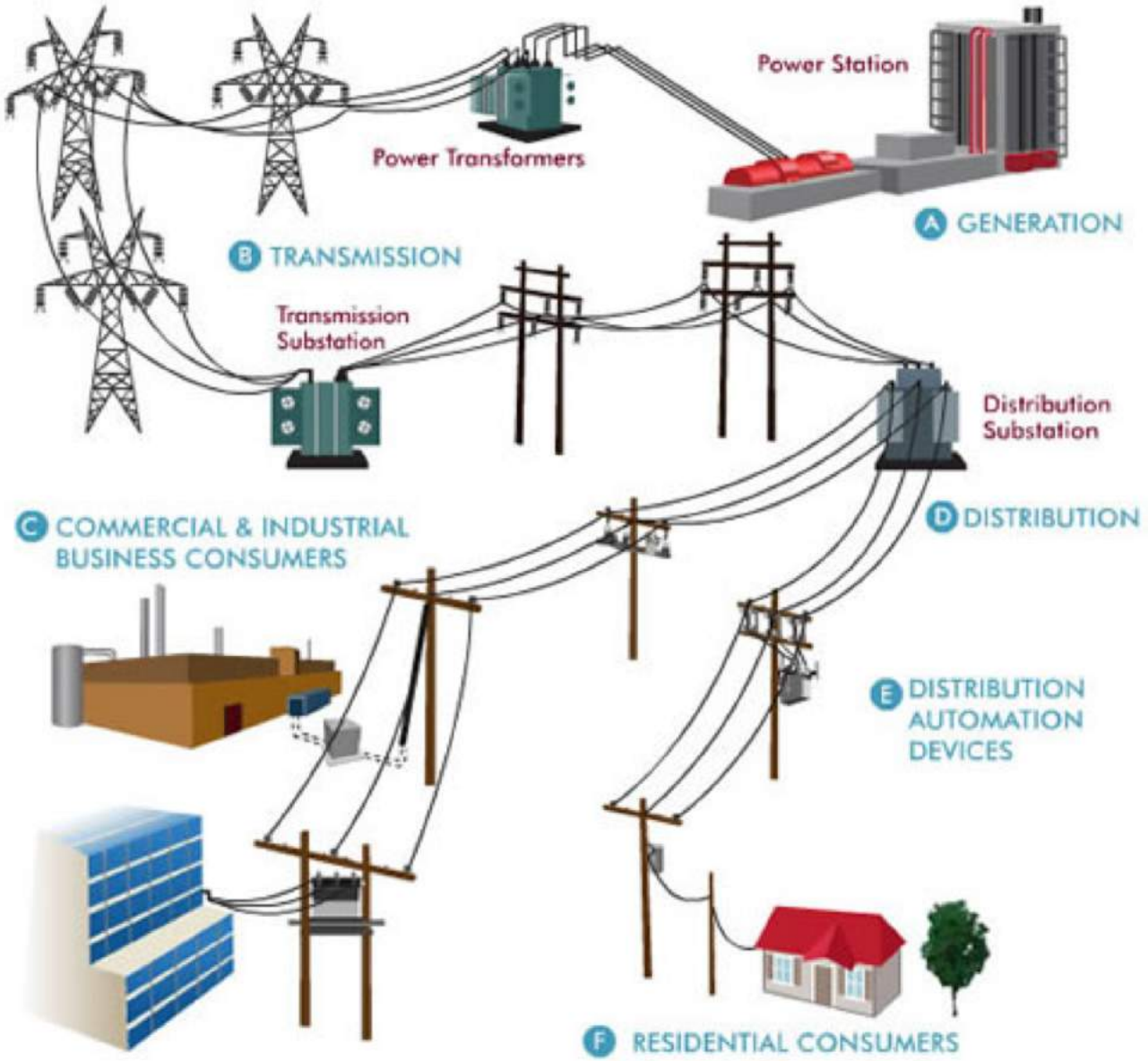
To accelerate the transition to renewable energy and a modern grid through technical, policy, and project development expertise.

The Clean Coalition vision: 25x25

From 2025 onward, at least 25% of all electricity from newly added generation capacity in the United States will be from local renewable energy sources



Our centralized power grid



An outdated and vulnerable system

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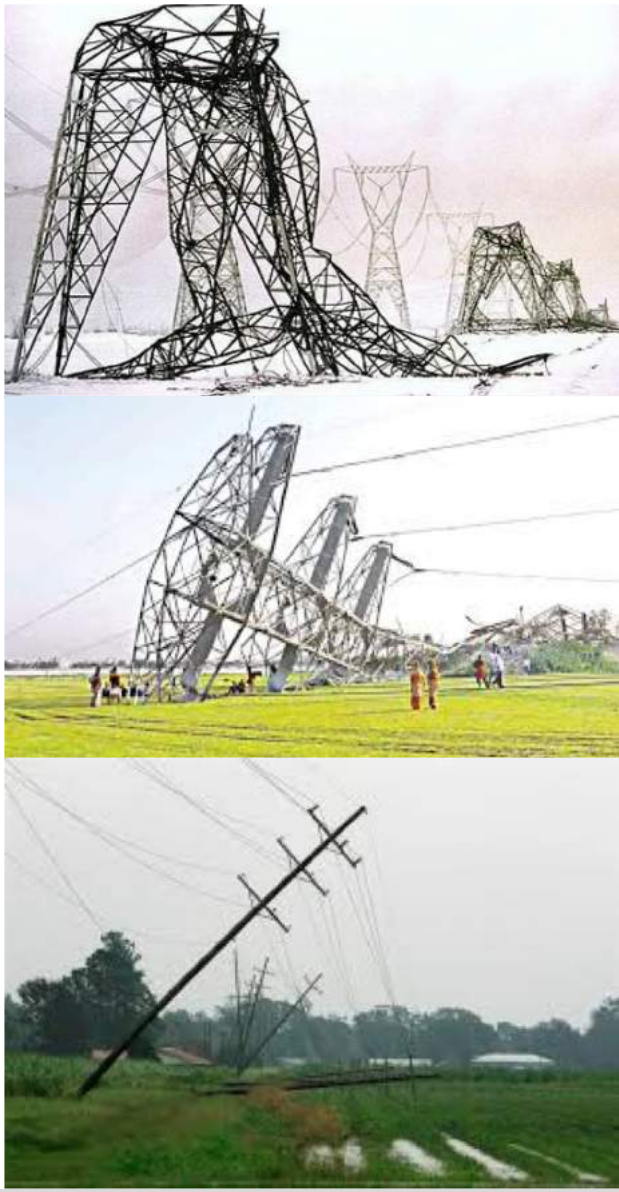
Our legacy, centralized power grid carries multiple critical risks.

- This architecture is **costly, aging, inefficient,** and a **highly vulnerable security risk**
- **Extreme weather events** are occurring more frequently, further demonstrating the **vulnerability** and **high cost**
- **Cyber attacks** are a **growing risk,** and an attack on a centralized system can **impact millions**
- To ensure both **local and national security,** we must move quickly to a new solution: a **resilient system**



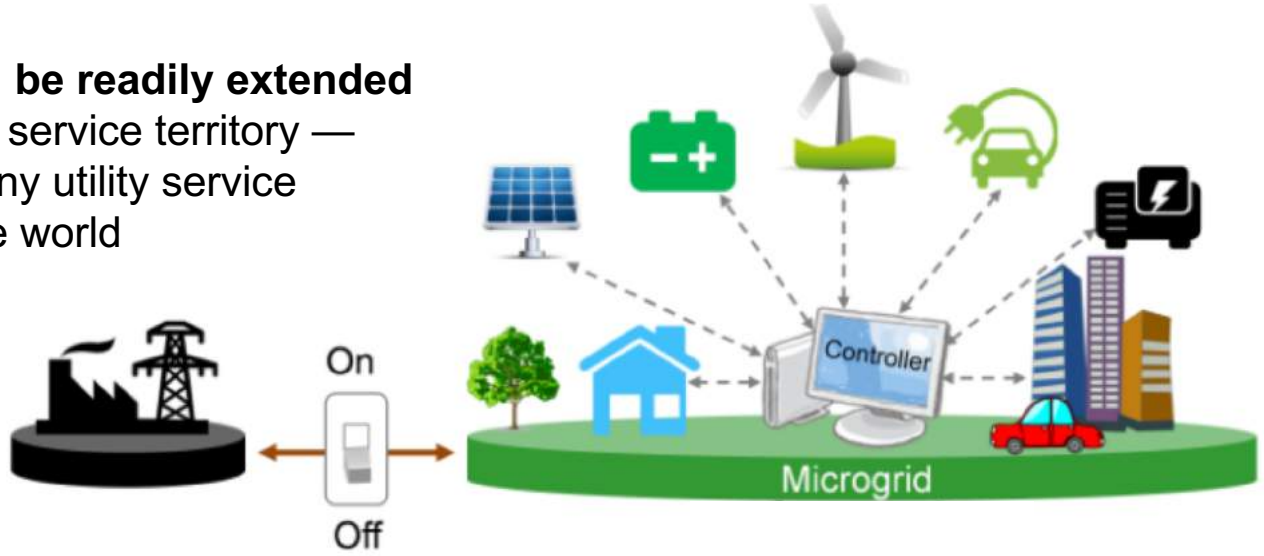
What are Community Microgrids?

Community Microgrids: The building blocks of a resilient power system

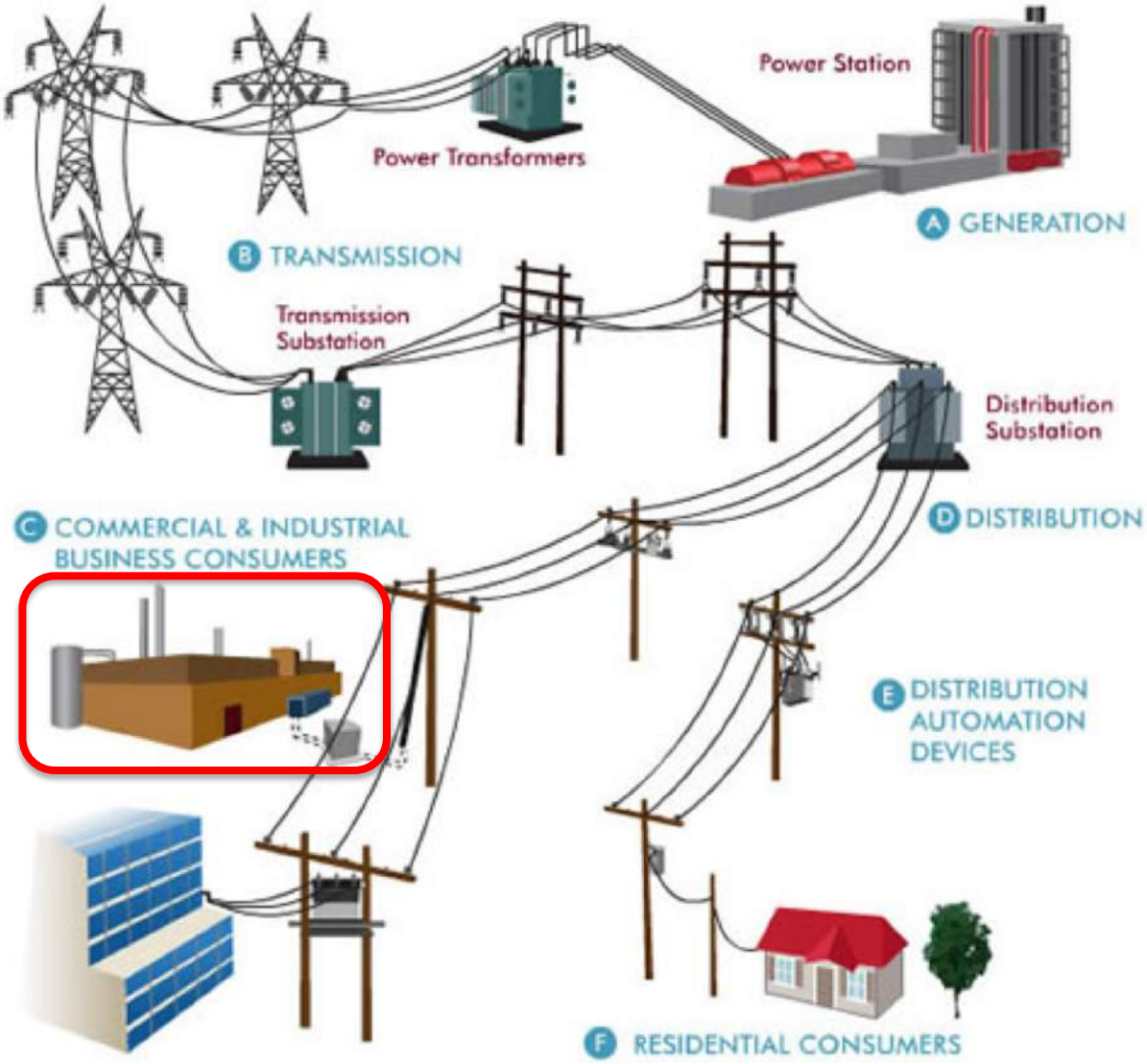
Clean Coalition

A modern approach for designing and operating the electric grid, stacked with local renewables and staged for resilience.

- Four basic components:
  - Solar, energy storage, demand response, and monitoring, communications, & control
- Key features:
  - A targeted and coordinated local grid area served by one or more distribution substations — **can "island" from the grid**
  - Optimal **deployment of clean local energy generation**
  - **Ongoing, renewables-driven backup power** for critical and prioritized loads across the grid area
  - A solution that **can be readily extended** throughout a utility service territory — and replicated in any utility service territory around the world



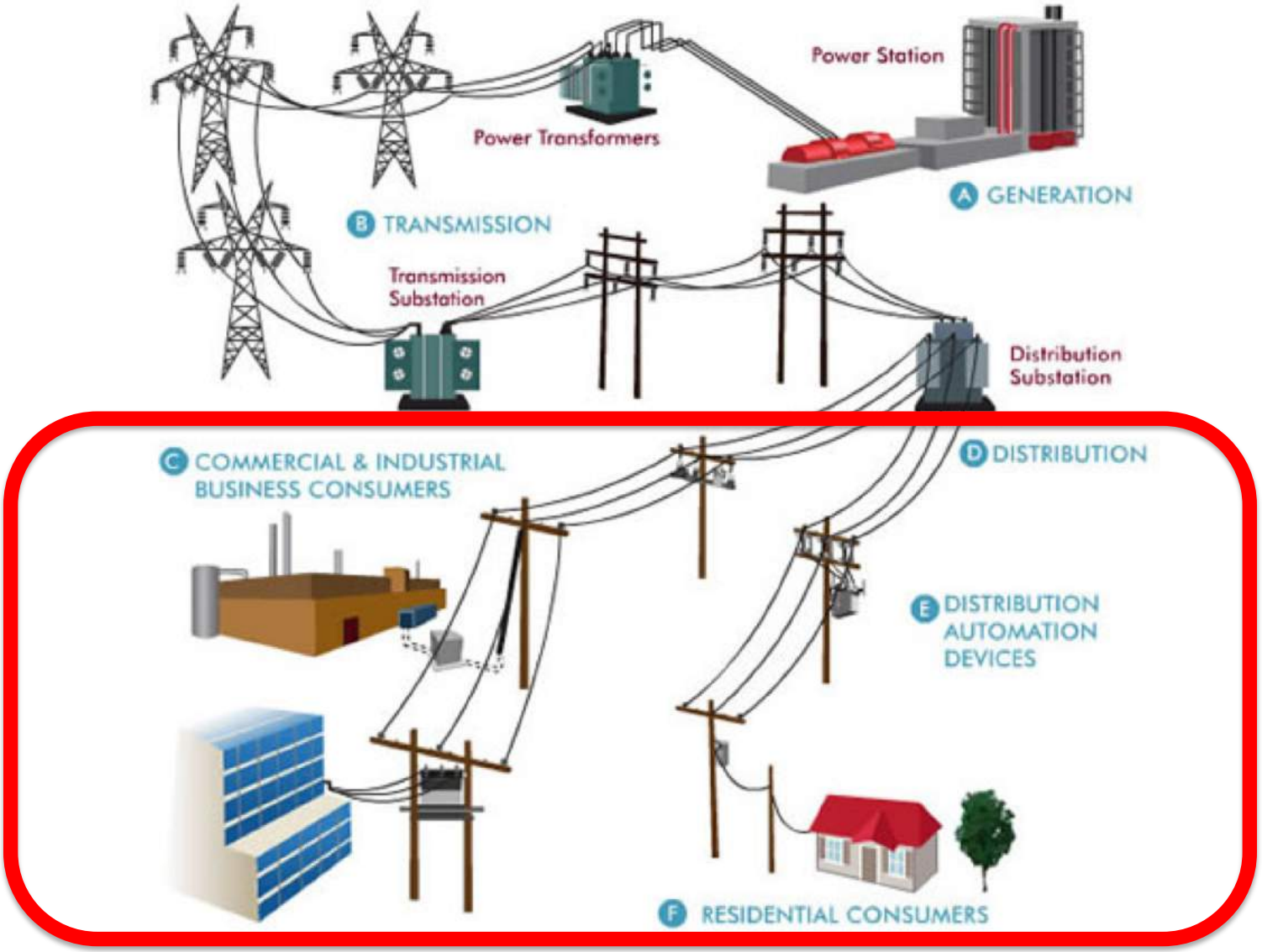
Traditional microgrids focus on single customers



Source: Oncor Electric Delivery Company

Community Microgrids serve thousands of customers

Clean Coalition



Source: Oncor Electric Delivery Company

Community Microgrids compared to traditional microgrids

Feature	Community Microgrid	Traditional microgrid
Scale	Spans an entire substation grid area, benefitting thousands of customers.	Covers a single customer location or a small number of adjacent locations.
Cost	Lower costs by deploying distributed energy resources (DER) more broadly and using a systems approach that identifies optimal locations for DER.	Maximizes benefits for a single customer; does little for the local grid. Replicating across an entire community area is very expensive.
Grid resilience and security	Provides backup power to prioritized loads that are critical to an entire community.	Provides backup power to only a single location or customer.
Scalability	Enables easy replication and scaling across any distribution grid area.	Requires tedious work to implement at each individual location.

Backup power from Community Microgrids

- Community Microgrid:
  - Can provide backup power for an entire community during short outages
  - Connects multiple buildings and utility meters into a connected microgrid
  - Includes multiple Solar Emergency Microgrids within a reasonably close geographic area

- Solar Emergency Microgrid:
  - Provide indefinite, renewables-driven backup power for critical loads at priority facilities:
    - Police and fire stations, emergency operations centers and shelters, hospitals, and critical communications and water infrastructure
  - Usually has one meter — at a school that serves as a community shelter, a hospital, a police station, or a town center

- A key feature: separation of critical and non-critical loads

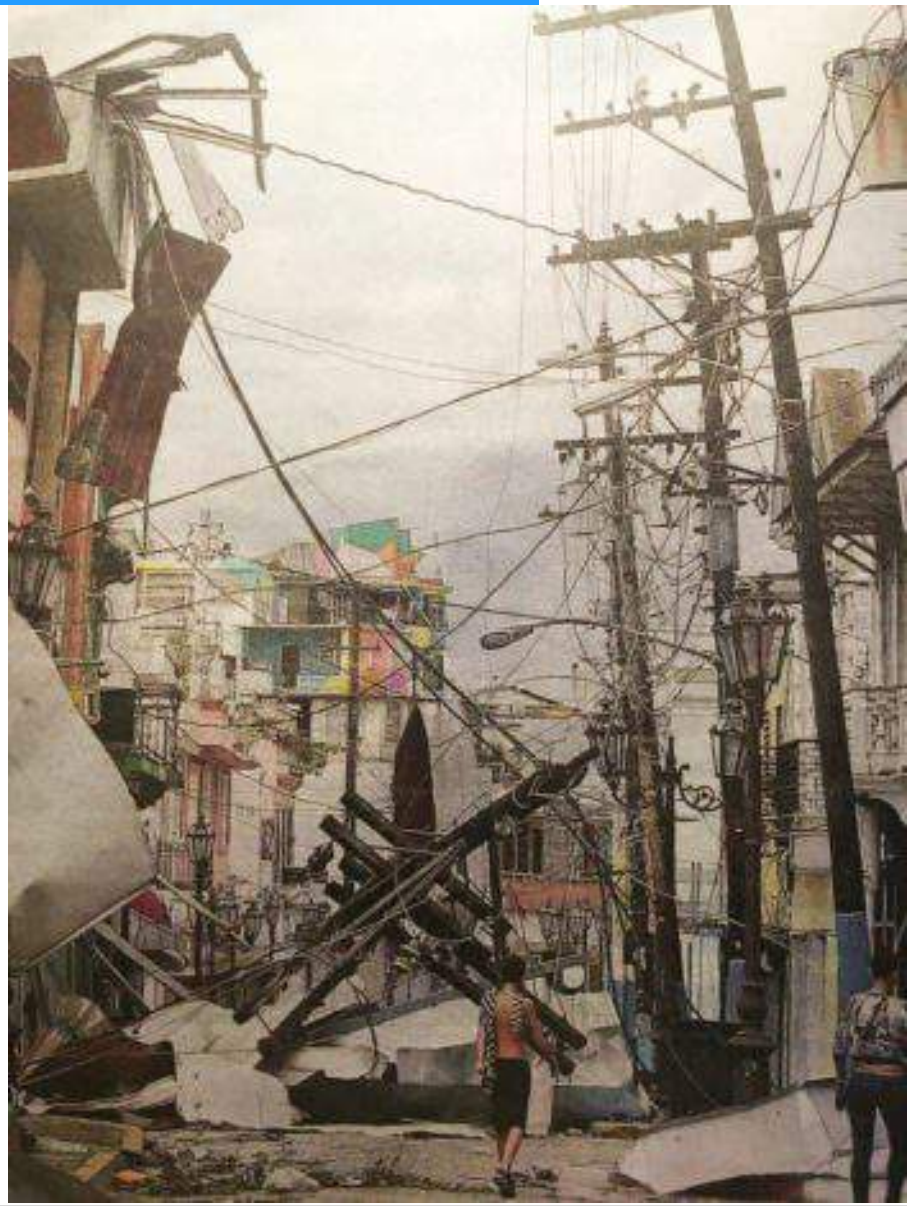
Community Microgrid benefits

A Community Microgrid brings communities four benefits not provided by today's centralized energy system

1. **Lower costs and increased economic investment**
2. **Improved overall performance**
3. **Resilience and security**
4. **Replicable, scalable model**

1. Lower costs, increased economic investment

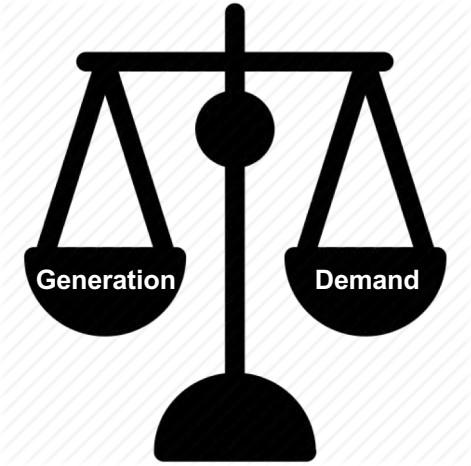
- **Reduces the cost of electricity**
  - Eliminates expensive peak periods and associated infrastructure costs
  - Reduces the need for expensive transmission lines
- **Creates local jobs**
  - Installation and maintenance of clean local energy keeps jobs local
- **Reduces costs in emergency situations**
  - Eliminates expensive diesel costs
  - Minimizes emergency response and shipment expenses
  - Keeps businesses open, serving the community and maintaining revenue streams

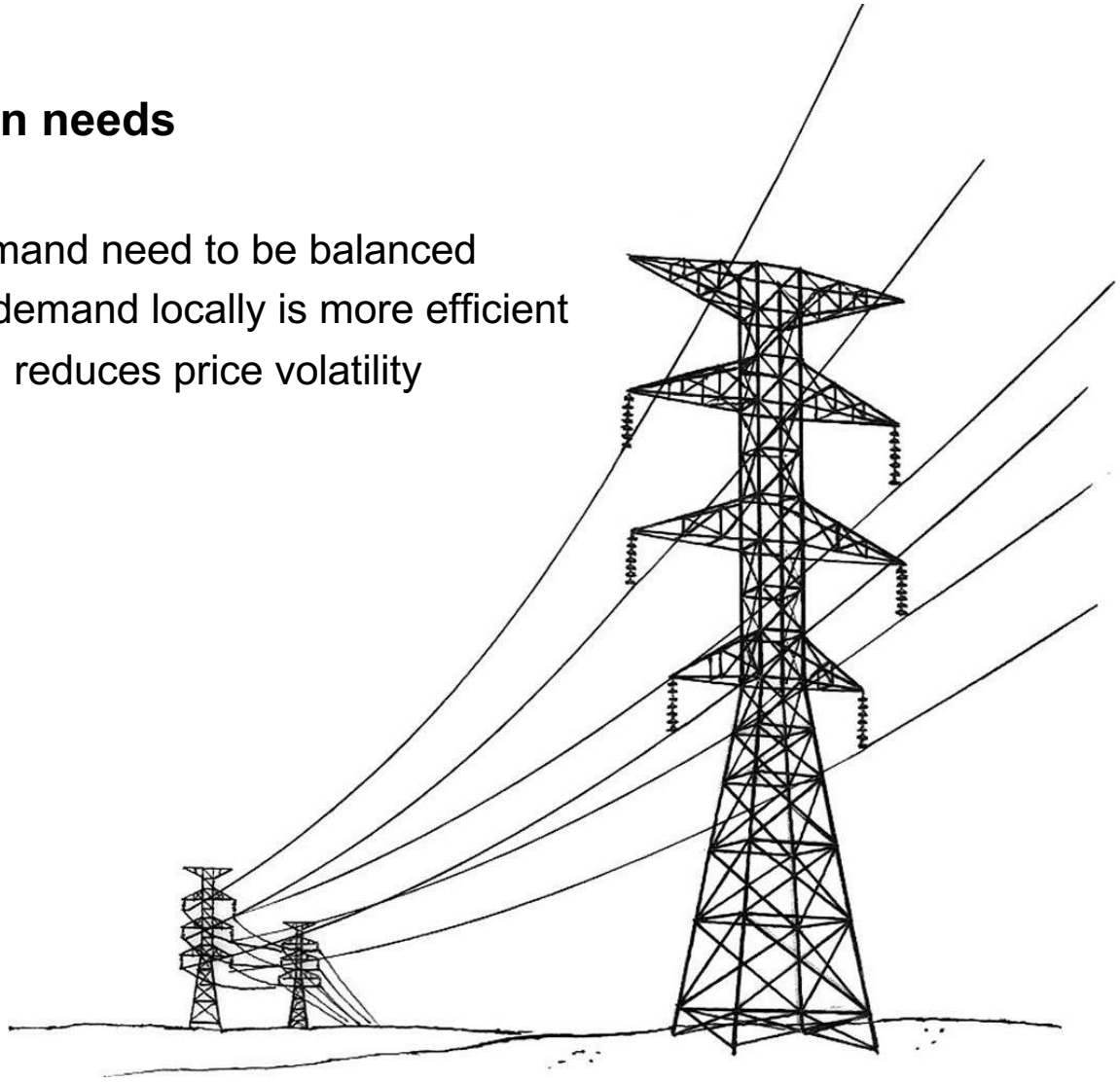


Manatí, Puerto Rico after Hurricane Maria
Photo: José Reyes

2. Improved overall performance

- **Replaces fossil fuels**
- **Serves local transportation needs**
- **Balances the grid**
  - Energy generation and demand need to be balanced
  - Balancing generation and demand locally is more efficient
  - This cuts energy costs and reduces price volatility



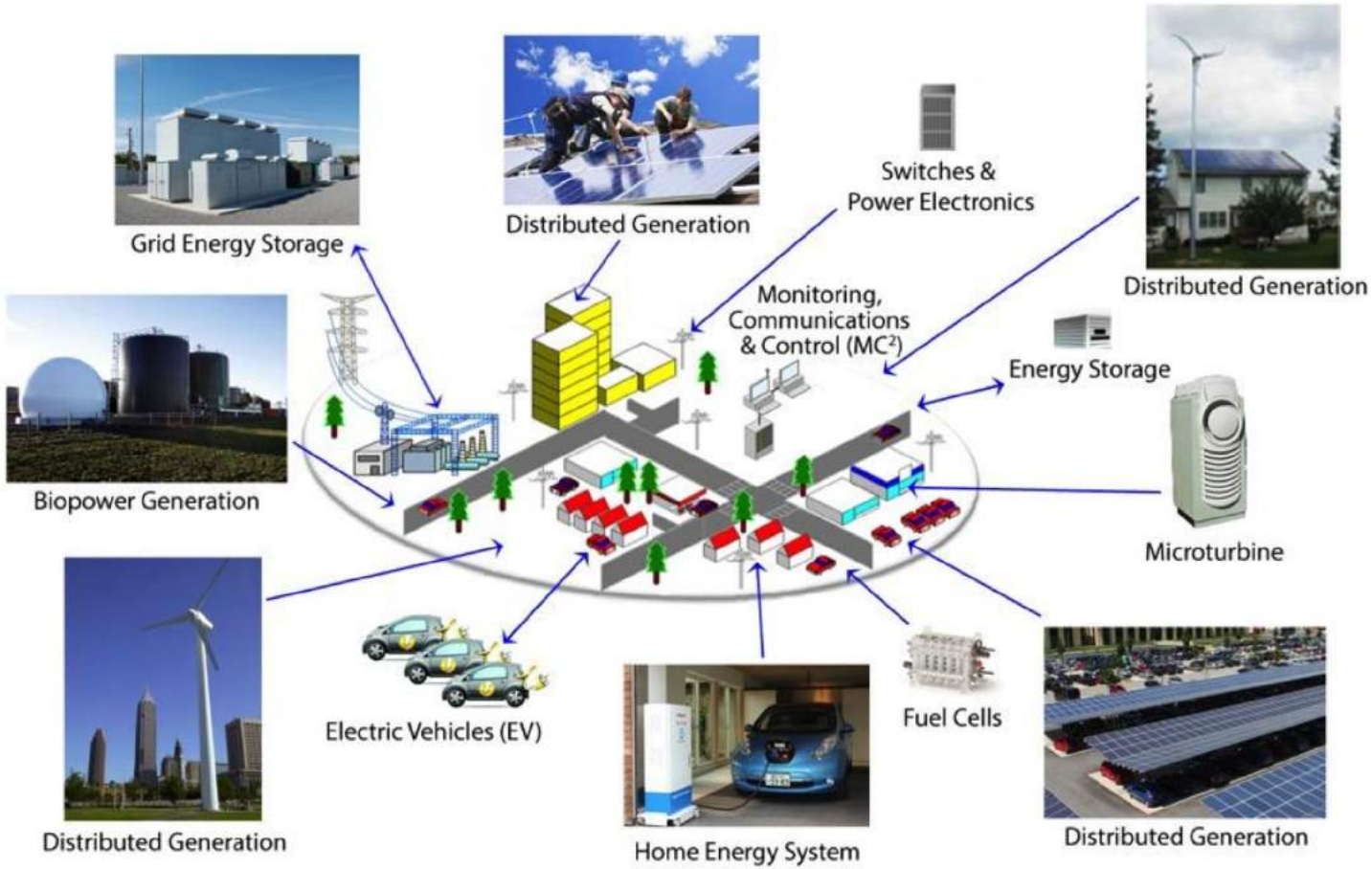


3. Resilience and security

- **Provides indefinite renewables-driven backup power** to critical and priority loads during emergencies
- **Provides ongoing resilience** to withstand multiple disaster and/or cybersecurity scenarios

4. Replicable and scalable model

- Can cover an **entire substation area**
- Can be **scaled** and deployed in any community



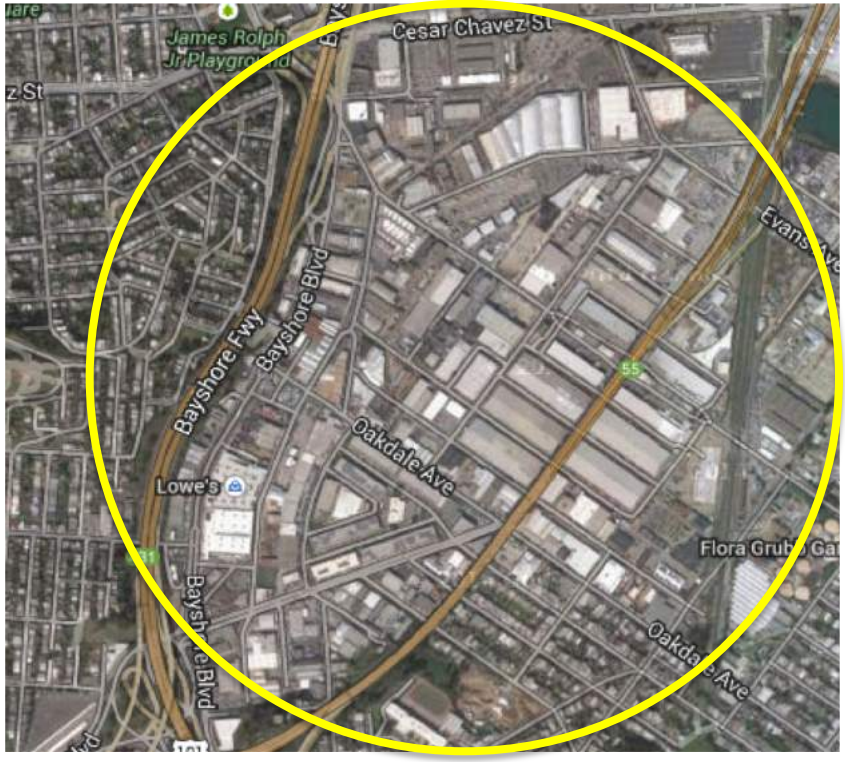
Where to site Community Microgrids: Opportunity in vastly untapped commercial-scale solar market

Clean Coalition

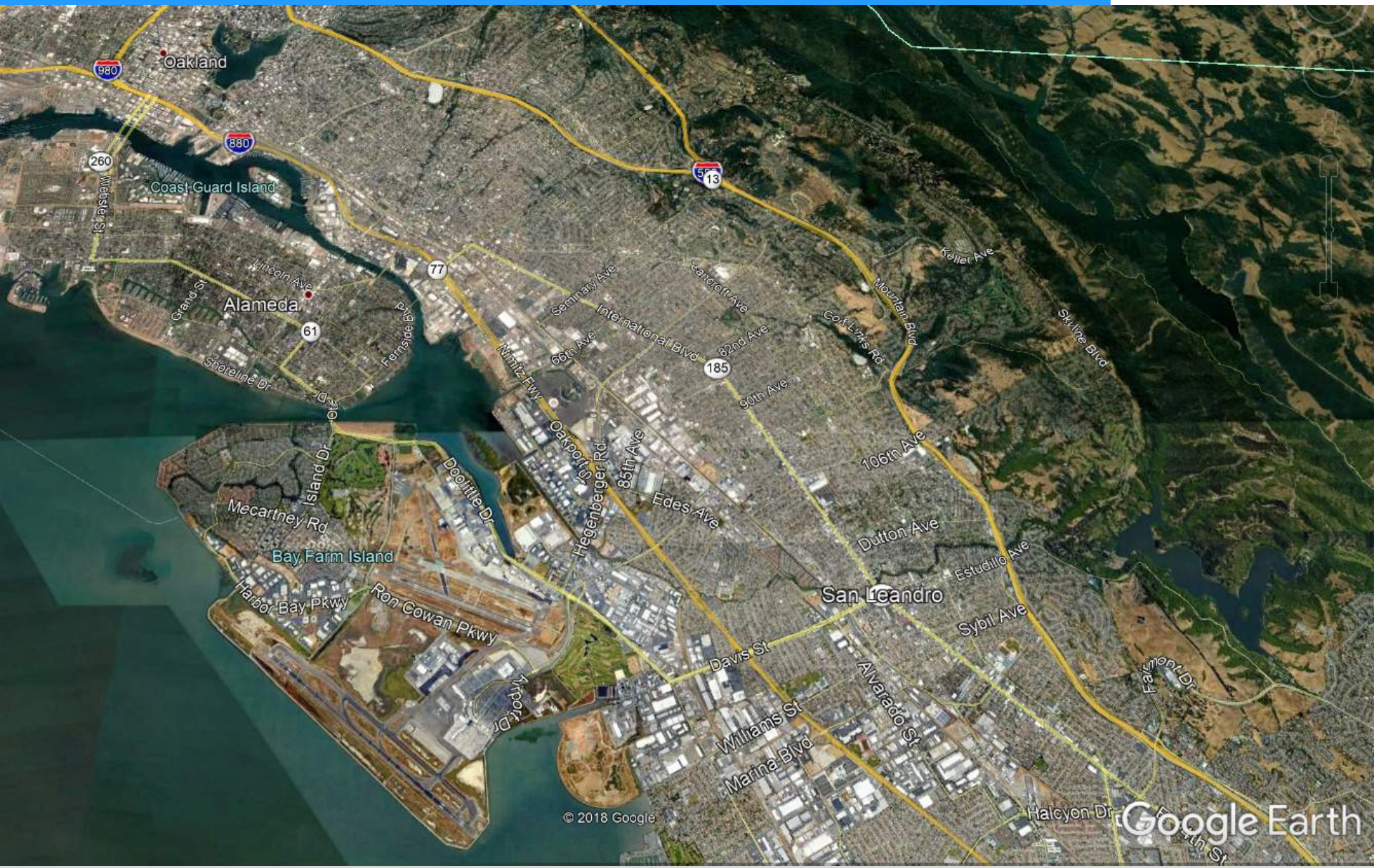
Commercial and industrial customers are typically the largest electricity users and emitters of GHG.

They also match well with solar.

1. **Most generation:** Larger roof and parking spaces generate more energy
2. **Lower system costs:** Larger PV systems reduce overall costs
3. **Best grid locations:** Large loads served by existing power lines and transformers
4. **Matching load profiles:** Larger daytime loads match solar generation
5. **Financially motivated:** Larger bills, including demand charges, plus roof and parking lease opportunities

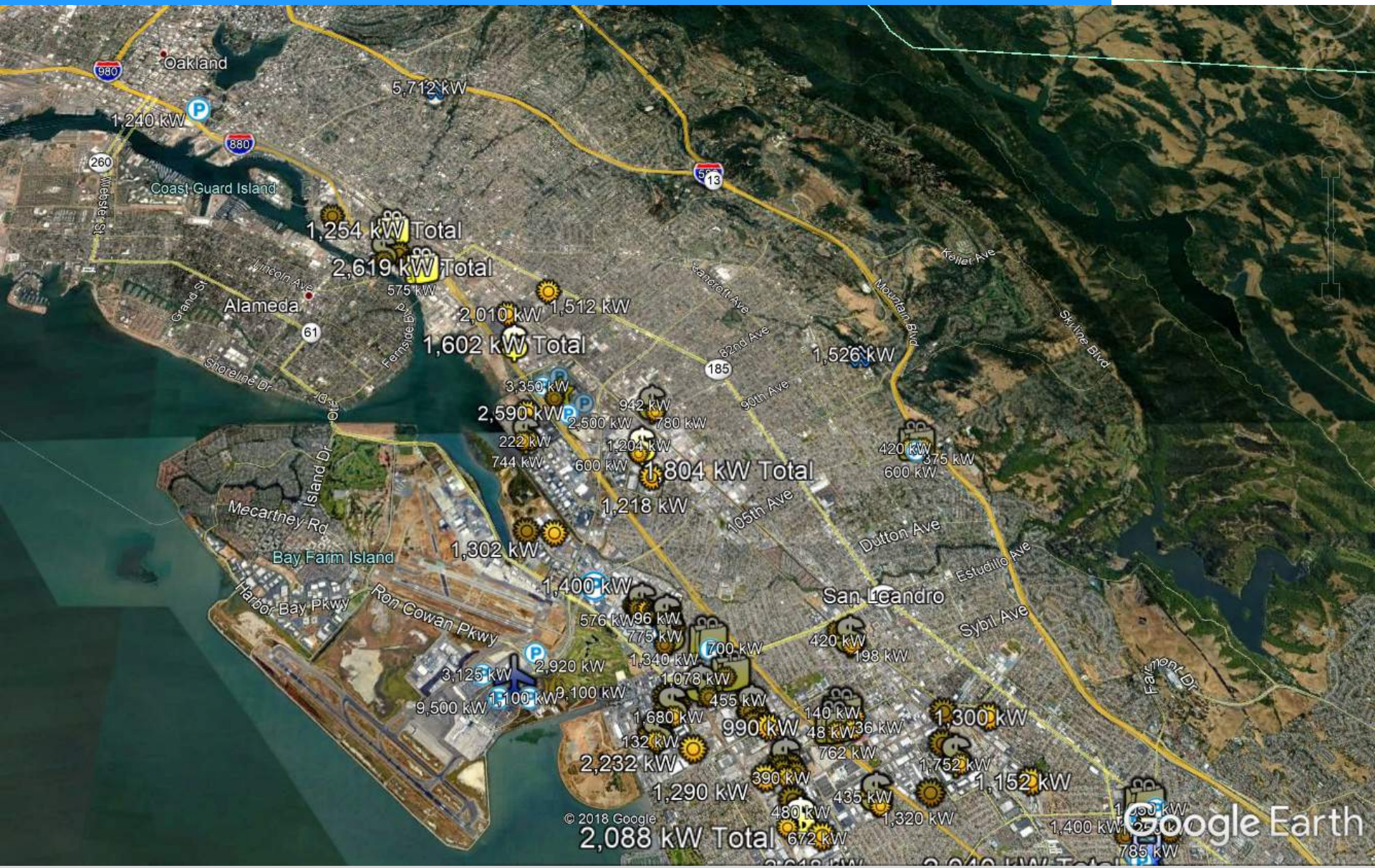


Untapped solar potential: Oakland/San Leandro area now



Untapped solar potential: Oakland/San Leandro area with commercial-scale solar

Clean Coalition



Thank you. Any questions before we continue?

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Making Clean Local Energy Accessible Now

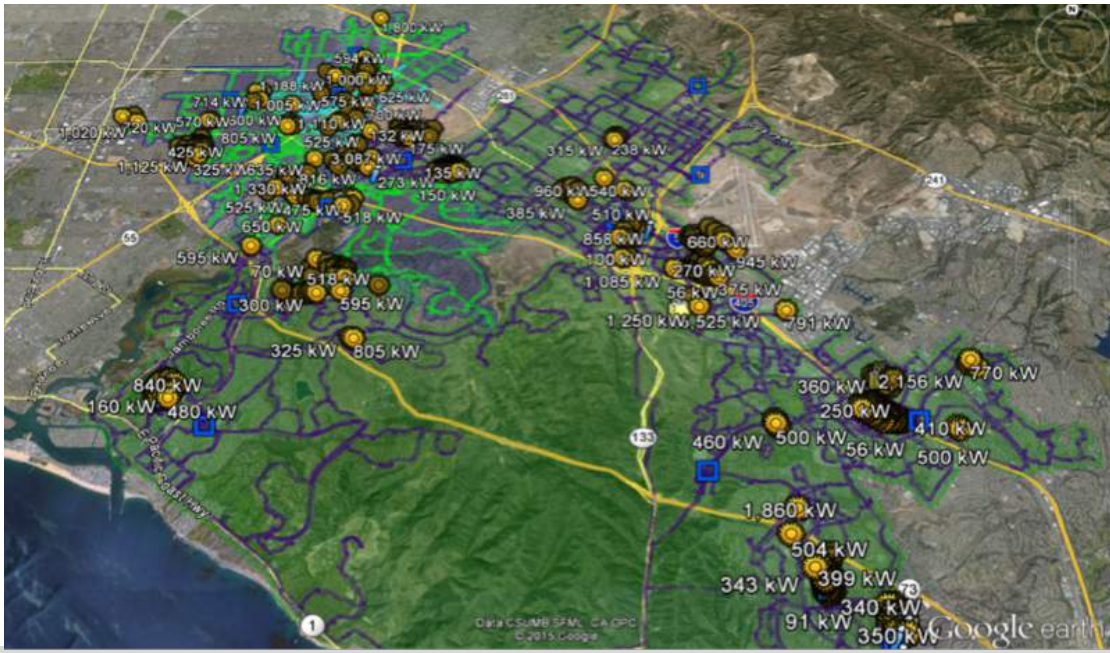
Community Microgrid examples

How to create Community Microgrid projects

Clean Coalition

Methodology

- Step 1: Staging
  - Define goals, identify sites, produce functional design, align stakeholders
- Step 2: Planning
  - Secure load data, run economic analyses, produce engineering design, pursue funding
- Step 3: Deployment preparation
  - Raise funds, produce an RFP, produce finance-ready engineering design, secure permits
- Step 4: Deployment
  - Execute contract with sites, secure financing commitments, produce permit engineering and construction drawings, construct the Community Microgrid(s), test and commission equipment
- Step 5: Operations and maintenance



California gas peaker plants

Setting a precedent: Community Microgrids eliminate gas peakers

- Influenced by Clean Coalition cost analysis, the California regulators are rejecting new peaker plants, such as Puente in Oxnard, CA, in favor of solar+storage (key feature of Community Microgrids)
- In Jan 2018, the California Public Utilities Commission also announced that PG&E will be required to use renewables and storage instead of gas-fired plants run by Calpine
- This appears to be “the first time a utility will procure energy storage to replace existing gas plants for local capacity needs.”
- Leveraging this important analysis can prevent future new gas plants across the country

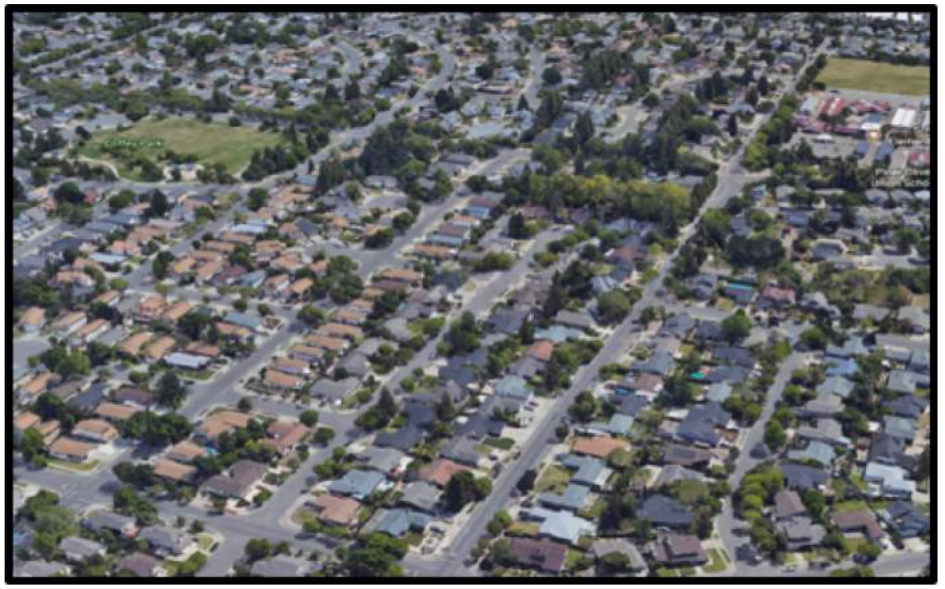
Source: https://www.greentechmedia.com/articles/read/pge-must-solicit-energy-storage-ders-to-replace-three-existing-gas-plants

North Bay Community Resilience Initiative

Clean Coalition

Initiative goals

1. **Rebuild fire-impacted areas with high levels of sustainability** in homes, buildings, and the electric grid, enabling a modern, distributed, carbon-free system that delivers substantial economic, environmental, and resilience benefits.
2. **Establish a blueprint** for rebuilding disaster-destroyed areas resiliently, in a timely and cost-effective manner.
3. **Provide a model** for operating a modern local energy system that incorporates local renewables.
4. **Ensure that building codes are advanced** to achieve more resilient, safer, and cleaner building stock and communities — includes standardized housing designs.
5. **Lower ratepayer costs** by using DER to defer or avoid substantial costs.



North Bay Community Resilience Initiative

- The initiative will combine the optimal solar siting opportunity of commercial and industrial sites with the opportunities of homes and apartment buildings.
- A target of 30 MW of solar PV could include these types of sites:

Example: Large rooftop
- PV square feet = 47,600
- System size = 714 kW

Commercial: 18 MW

Example: Large parking lot
- PV square feet = 37,800
- System size = 567 kW

Parking lots: 2 MW

Example: 50 average rooftops
- Average PV square feet = 343
- Average system size = 5 kW

Residential and multi-dwelling units: 10 MW

North Bay initiative: Economic benefits

Clean Coalition

Benefits over 20 years of installing 30 MW of local solar PV on the built environment:

Energy benefits

- **$150M**: Spent locally vs. remotely
- **$50M**: Avoided transmission costs
- **$20M**: Avoided power interruptions

Economic benefits

- **$120M**: New regional impact
- **$60M**: Added local wages
- **1,000 job-years**: New near-term and ongoing employment
- **$6M**: Site leasing income

Environmental benefits

- **46M pounds**: Annual reductions in GHG emissions
- **10M gallons**: Annual water savings
- **225 acres**: Land preserved

Based on a Clean Coalition analysis

North Bay Community Resilience Initiative

Clean Coalition

North Bay Team

- Clean Coalition
- Sonoma Clean Power
- PG&E
- Rebuild North Bay
- Center for Climate Protection
- County of Sonoma, Energy & Sustainability Division
- Regional Climate Protection Authority
- Bay Area Air Quality Management District
- Design AVEnues, LLC: EE/ZNE expert Ann Edminster
- Stone Edge Farm Microgrid
- Wave One
- Other city and county leadership

Sonoma Clean Power

PG&E

REBUILD NORTHBAY FOUNDATION

wave 1 PALO ALTO

Stone Edge Farm Microgrid

center for climate protection

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

COUNTY OF SONOMA ENERGY AND SUSTAINABILITY

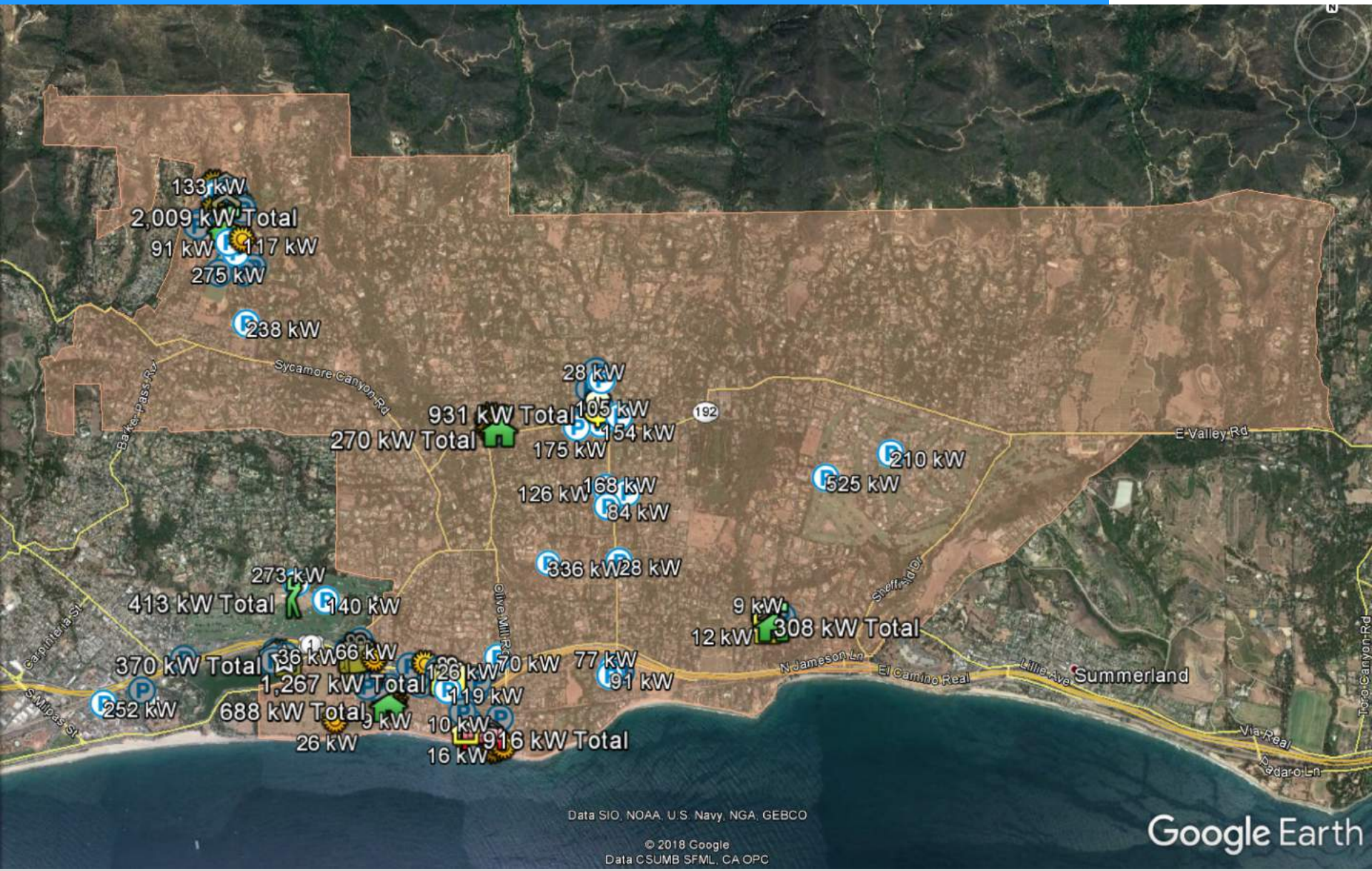
ANN V EDMINSTER DESIGN AVEnues LLC

Montecito Community Microgrid Initiative

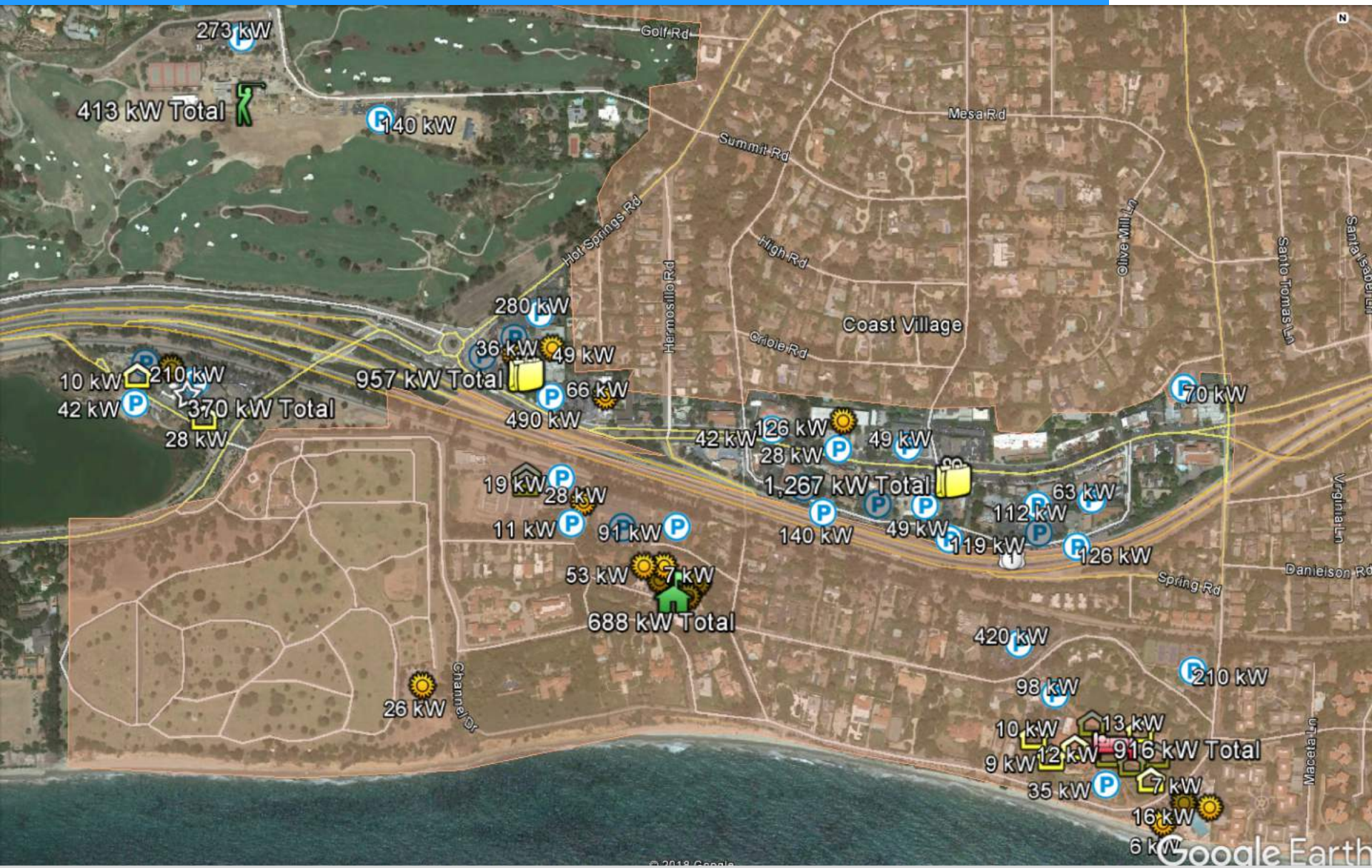
Initiative goals

- **Stage a Community Microgrid** with the Montecito Fire Protection District headquarters, Montecito Water District headquarters, and an array of commercial properties.
- **Create indefinite renewables-driven energy resilience** for critical Montecito Fire Protection District and Montecito Water District facilities, as well as other critical facilities.
- **Stage a Community Microgrid** in the Montecito Lower Village (part of the City of Santa Barbara).
- **Provide a near-term showcase for additional Community Microgrids** throughout Santa Barbara and Ventura Counties, and beyond.

Montecito Community Microgrid Initiative: Lower Village commercial-scale solar potential

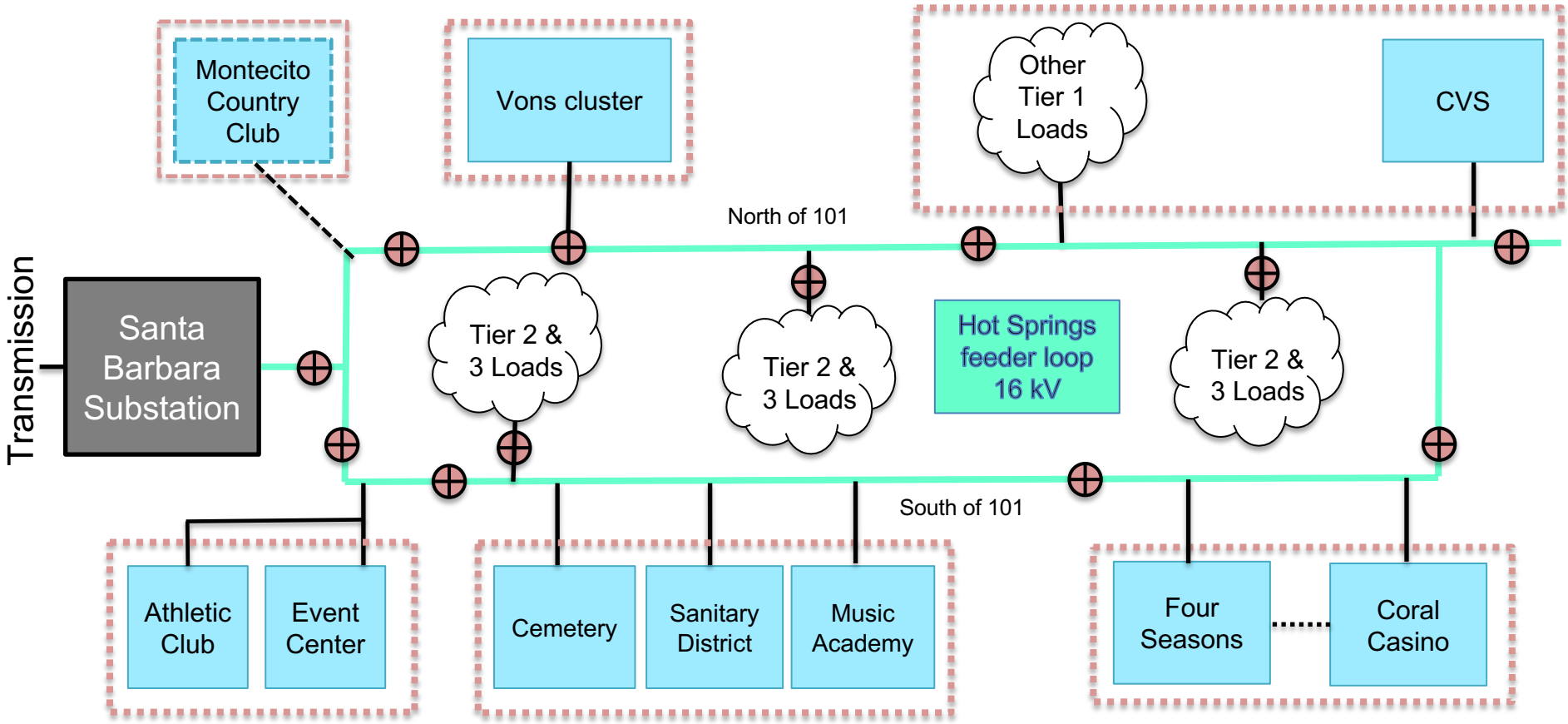


Montecito Community Microgrid Initiative: Lower Village Community Microgrid map view



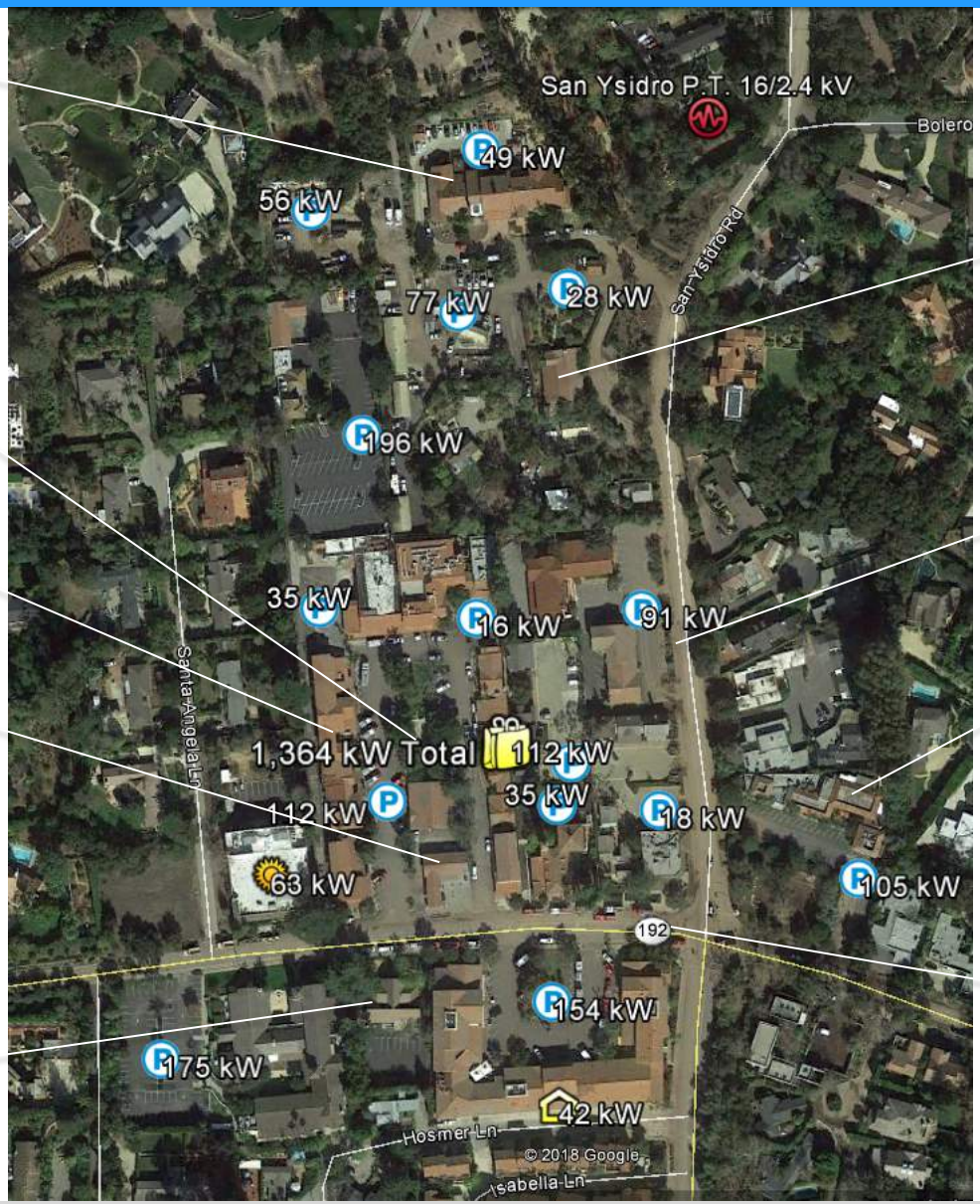
Montecito Community Microgrid Initiative: Lower Village Community Microgrid block diagram

Clean Coalition



Montecito Community Microgrid Initiative: Upper Village Community Microgrid potential

Clean Coalition



Fire Dist. HQ

Wells-Fargo Bank

US Post Office

Gas Station

Montecito Association HQ

Water Dist. HQ

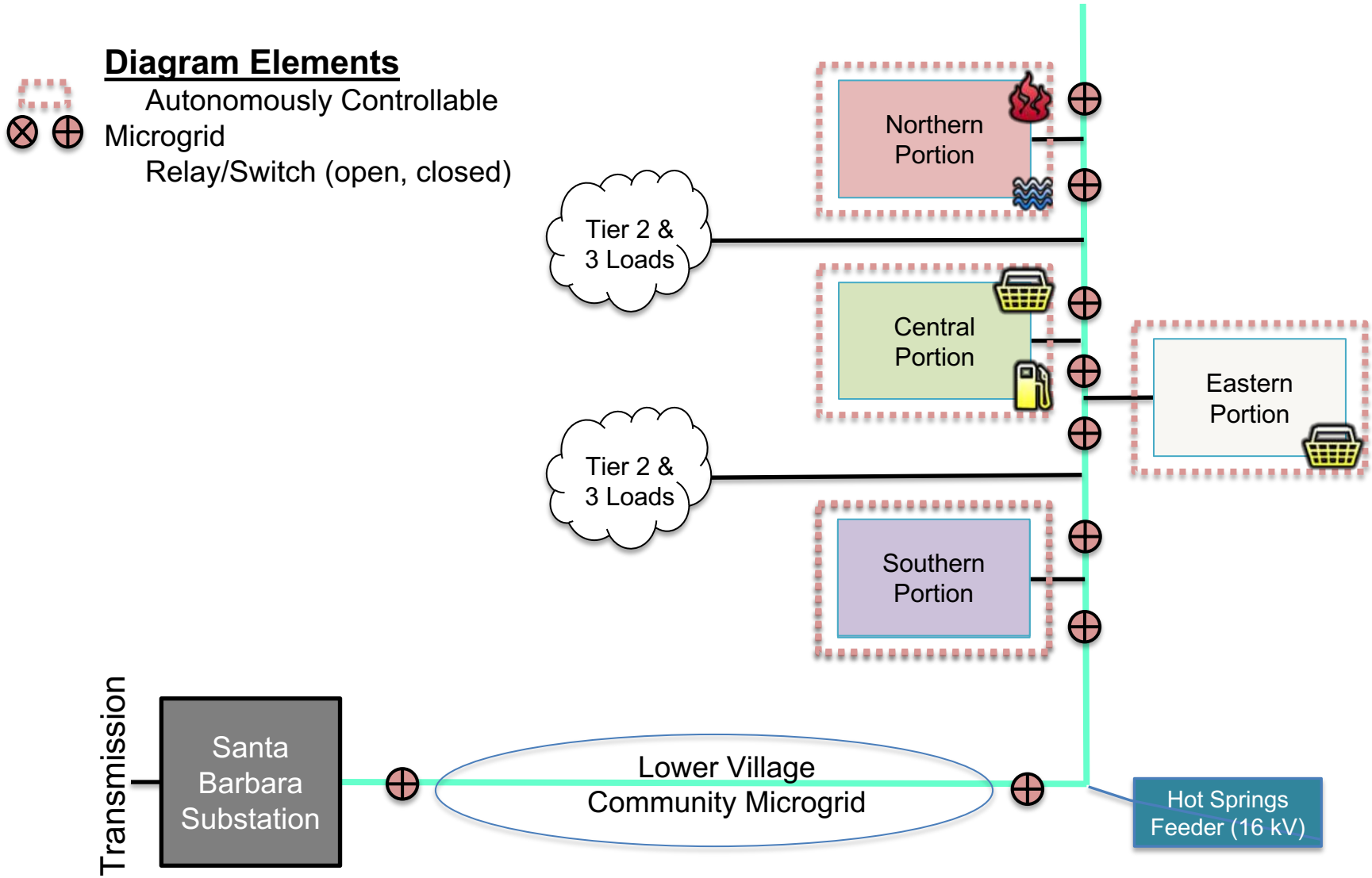
San Ysidro Rd

Market

East Valley Road / Hwy 192

Montecito Community Microgrid Initiative: Upper Village Community Microgrid block diagram

Clean Coalition



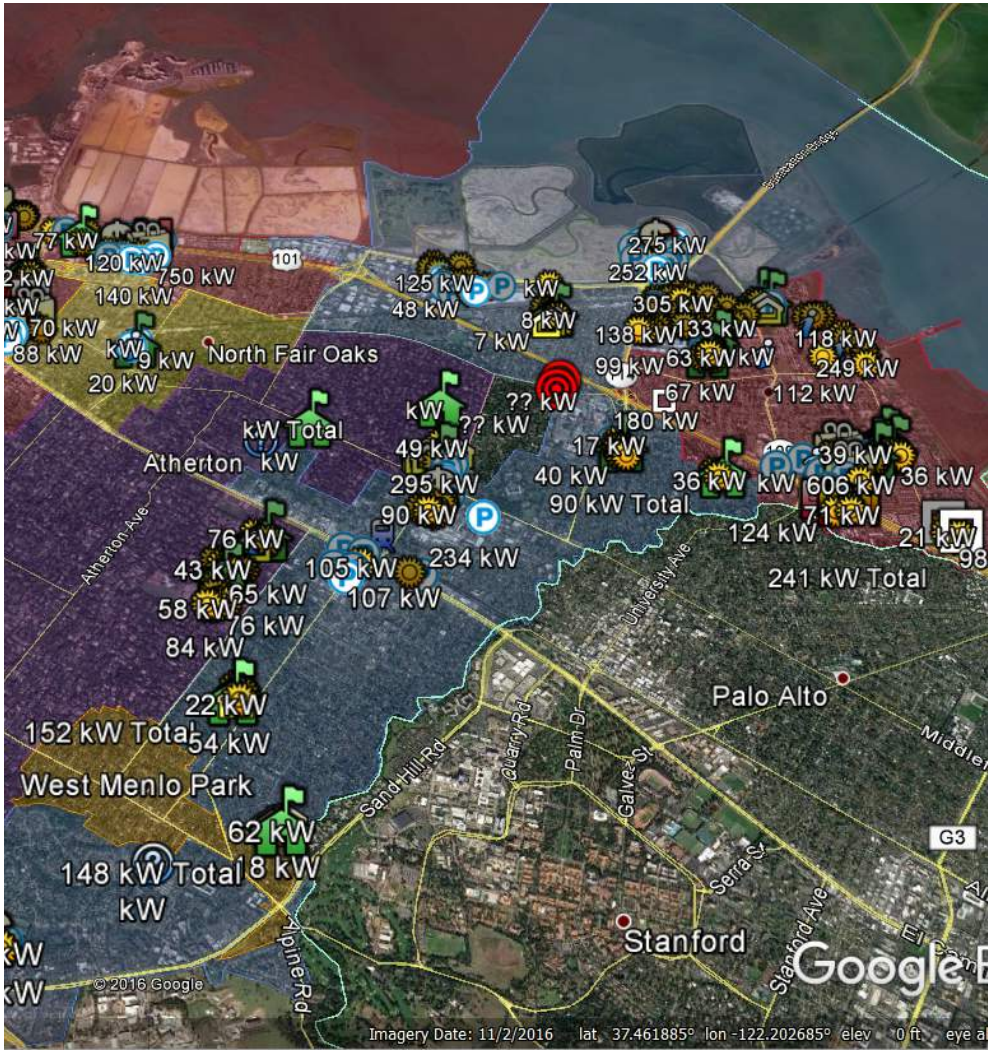
Peninsula Advanced Energy Community (PAEC) Initiative

Clean Coalition

Initiative goals

1. Accelerate the planning, approval, and deployment of an **Advanced Energy Community (AEC)**, a replicable approach to modernizing the electric grid, in southern San Mateo County.
2. **Showcase the benefits of AECs**: significant energy, environmental, economic, resilience, and security benefits.
3. **Overcome the barriers** of finding viable sites, securing project financing, and connecting AEC projects to the grid.
4. **Inform future action** by policymakers, municipalities, governmental agencies, utility executives, and other key stakeholders.

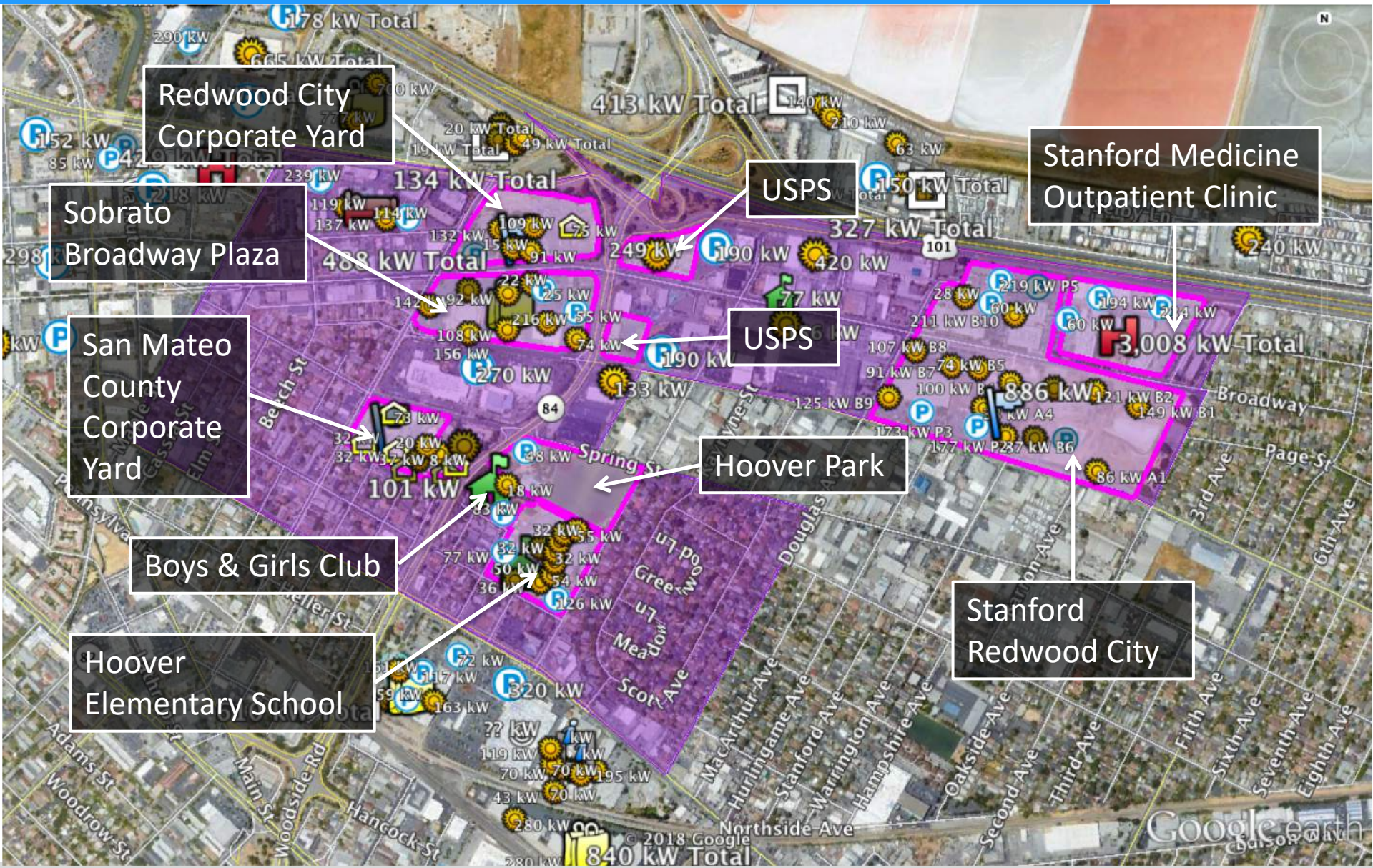
PAEC is made possible by a grant through the California Energy Commission's Electric Program Investment Charge (EPIC) program.



Solar Siting Survey showing part of PAEC region

PAEC Initiative: Redwood City disadvantaged community and Community Microgrid sites

Clean Coalition



Valencia Gardens Energy Storage Project

Clean Coalition

Initiative goals

1. **Enhance community resilience** by setting the stage for emergency renewable backup power in the event of a natural disaster or widespread grid outage.
2. **Increase access to clean energy** by creating more capacity locally on the distribution grid so that neighbors can go solar.
3. **Build on prior successes** by leveraging an existing showcase solar deployment.
4. **Demonstrate the viability of local energy storage** for ratepayers, developers, and the utility.
5. **Protect open space** by deploying in a dense urban community on built environments.

Valencia Gardens is a 300,000-square-foot housing development consisting of 218 low-income family units and 42 senior apartments. The project will add 500 kW of energy storage power to the roughly 800 kW of rooftop solar already interconnected to the local distribution grid.

MISSION HOUSING DEVELOPMENT CORPORATION

PG&E

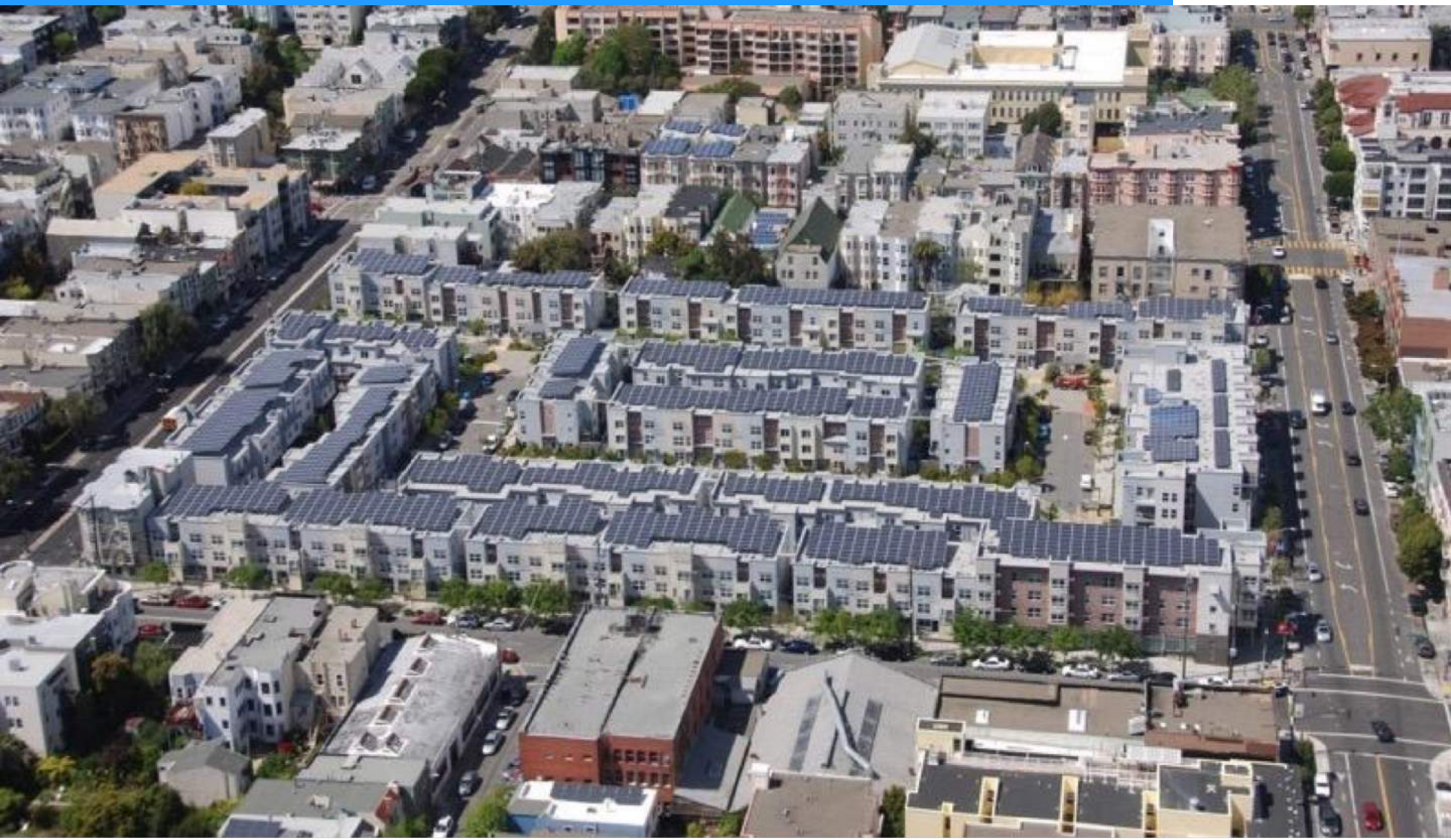
THE SEAL OF THE CITY AND COUNTY OF SAN FRANCISCO

PATHION POWER FORWARD

California ISO

Valencia Gardens Energy Storage Project partners

Valencia Gardens Energy Storage Project



Ecoplexus project at the Valencia Gardens Apartments in SF. ~800 kW meeting ~80% of the total annual load.

Puerto Rico: The Solar Saves Lives project

- **Solar Saves Lives goal**: Install Solar Emergency Microgrids at 12 of the 62 hospitals and medical clinics in Puerto Rico — one already installed
- **Team**: The Solar Foundation, Direct Relief, the Hispanic Federation, the Puerto Rico Primary Care Association Network, and New Energy PR

The completed 18 kW solar system at the Migrant Health Clinic in Maricao, Puerto Rico. Source: Kelsey Clark, The Solar Foundation

Every community deserves Community Microgrids

- Learn more: clean-coalition.org/our-work/community-microgrids
- Support clean local energy at the municipal level
  - Work with the Local Clean Energy Alliance
  - Work with the Clean Coalition: Solar Siting Surveys, feed-in tariff designs

Thank you. Any questions?

For questions, contact:

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Rosana Francescato
Communications Director
rosana@clean-coalition.org
415-282-2488

Further resources

More on microgrids:

- Meet the Microgrid (Vox)
- How Microgrids Work (Department of Energy)
- So What Is a Microgrid, Exactly? (Microgrid Knowledge)
- Community Microgrids for Disaster Resilience (Optimist Daily)
- How Solar Emergency Microgrids Keep the Lights on After Natural Disasters (PV Solar Report)
- Rebuilding with Community Microgrids in Wake of California Fires (Microgrid Knowledge)