Clean Coalition

Making Clean Local Energy Accessible Now

# Planning for a Distributed Energy Future

## Optimizing Local Resource Portfolios

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# Clean Coalition – Mission and Advisors

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## Mission

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

## Board of Advisors

**Jeff Anderson**
*Co-founder and Former ED, Clean Economy Network*

**Josh Becker**
*General Partner and Co-founder, New Cycle Capital*

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*Founder, California Cars Initiative*

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**L. Hunter Lovins**
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*Director, Colorado State University's Center for the New Energy Economy, and Former Colorado Governor*

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*Technology Executive*

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*Chairman, Foundation for the Defense of Democracies; Former Director of Central Intelligence (1993-1995)*

**Kurt Yeager**
*Vice Chairman, Galvin Electricity Initiative; Former CEO, Electric Power Research Institute*

# Community Microgrid Initiative

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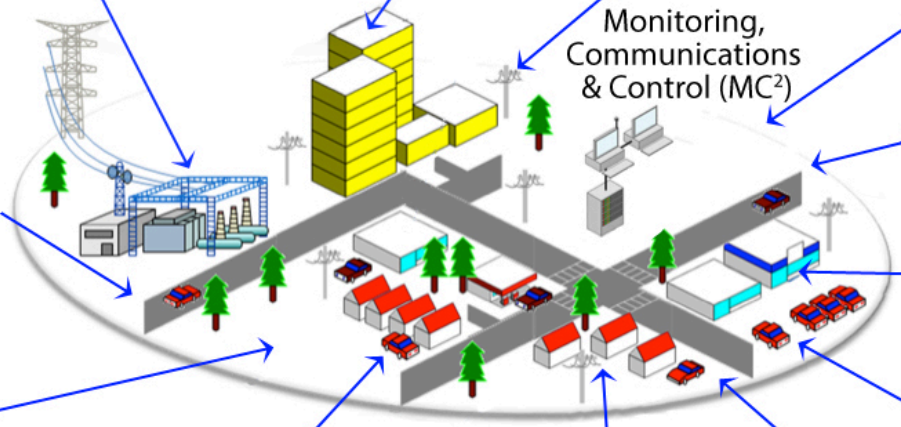
Grid Energy Storage

Distributed Generation

Switches & Power Electronics

Distributed Generation

Biopower Generation



Monitoring, Communications & Control ($MC^2$)

Energy Storage

Microturbine

Distributed Generation

Electric Vehicles (EV)

Home Energy System

Fuel Cells

Distributed Generation

# Community Microgrid Initiative – Objectives

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1 **Accelerate the transition to clean energy**
Achieve 25% or more of total energy consumed in a community from local renewables

2 **Improve grid reliability & resilience**
Use intelligent grid solutions such as advanced inverters, demand response, energy storage, forecasting, and electric vehicles

3 **Optimize for cost-effectiveness**
Perform advanced grid and cost scenario modeling in partnership with utilities

4 **Capture local economic benefits**
Secure predictable energy prices, reduce transmission-related costs & inefficiencies, increase local investment & jobs

5 **Replicate & scale**
Standardize modeling methodology & outcomes so results can be replicated and scaled across the country

# Hunters Point Project

## Overview

- Groundbreaking project in the Bayview-Hunters Point area of San Francisco, in collaboration with Pacific Gas & Electric
- Model for achieving 25% of the total energy consumed in the area as local renewables, supported by dynamic grid solutions
- Hunters Point substation has an average load of about 25 MW and serves a disadvantaged community of ~20,000 customers (about 90% residential, 10% commercial/industrial)

## Clean Coalition Deliverables (Phase 1):

- Site plan showing DG potential:  50 MW of new PV on commercial & residential rooftops, plus parking lots
- Detailed economic, energy, & environmental benefits
- Validated baseline powerflow model using PG&E data
- Dynamic powerflow model including local renewables + intelligent grid solutions
- Optimized portfolios (resources, reliability and costs)
- Standardized methodology/results for industry-wide scalability
- Recommendations for streamlined procurement & interconnection procedures to facilitate Phase 2 deployment

# California Distribution Resources Plans (AB 327)

- AB 327 requires California investor owned utilities to proactively plan for distributed energy resources.

- By **July 1, 2015**, each regulated utility shall submit to the CPUC a proposed **distribution resources plan** to identify **optimal locations** for the deployment of distributed energy resources.

- "**Optimal locations**" = locations with **highest net value** to grid and ratepayers
  - Each plan must "evaluate locational benefits and costs" of distributed energy resources to the electric grid and ratepayers
  - Values include, without limitation, capacity needs, investments in distribution infrastructure, safety benefits, and reliability/resilience benefits.

# Innovation – Advanced Distribution Grid Modeling

- The Clean Coalition uses sophisticated powerflow modeling and cost-benefit analysis tools to reveal **how** – and precisely **where** – local renewable energy can be supported in the distribution grid by intelligent grid solutions.

- The Clean Coalition team works with utilities and modeling tools providers to improve tools for seeing, and planning enhancements for, the distribution grid.

# Guide Developers Towards Optimal Locations

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## Status Quo in California


## Clean Coalition Proposal for California

# Location Matters – Local Renewables

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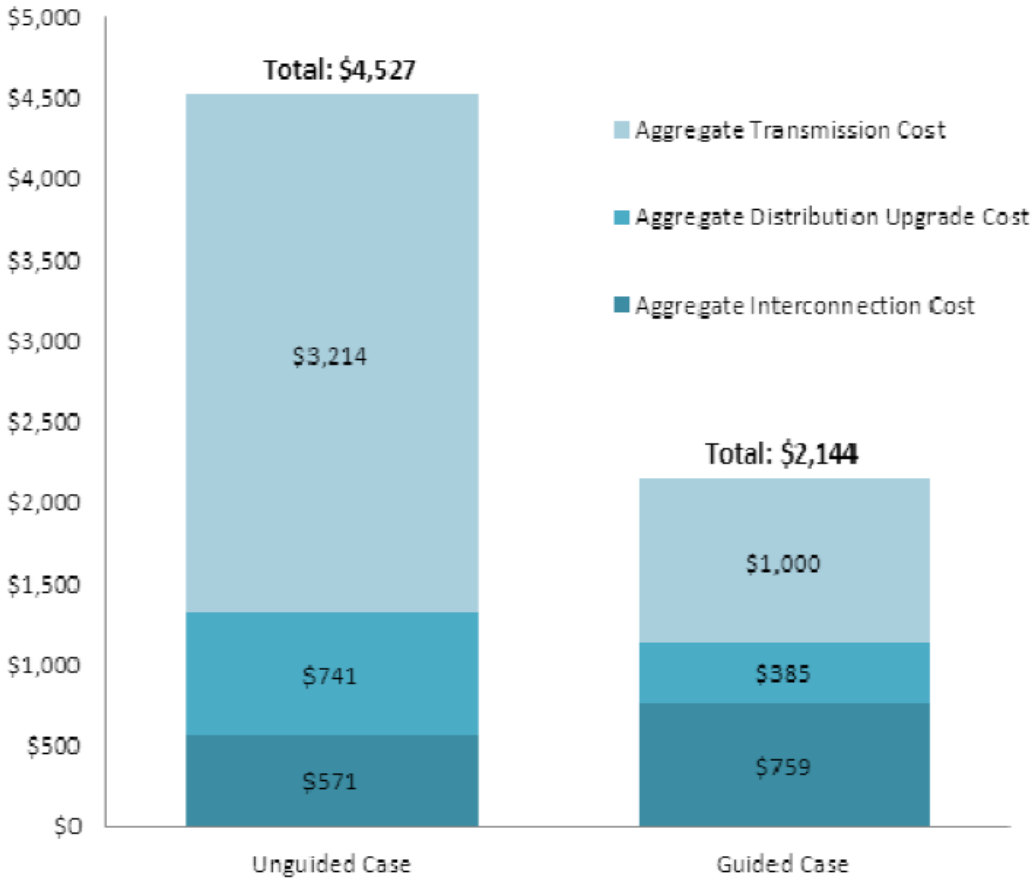
Southern California Edison found that siting renewables projects closer to consumers could reduce their T&D upgrade costs by over $2 billion.

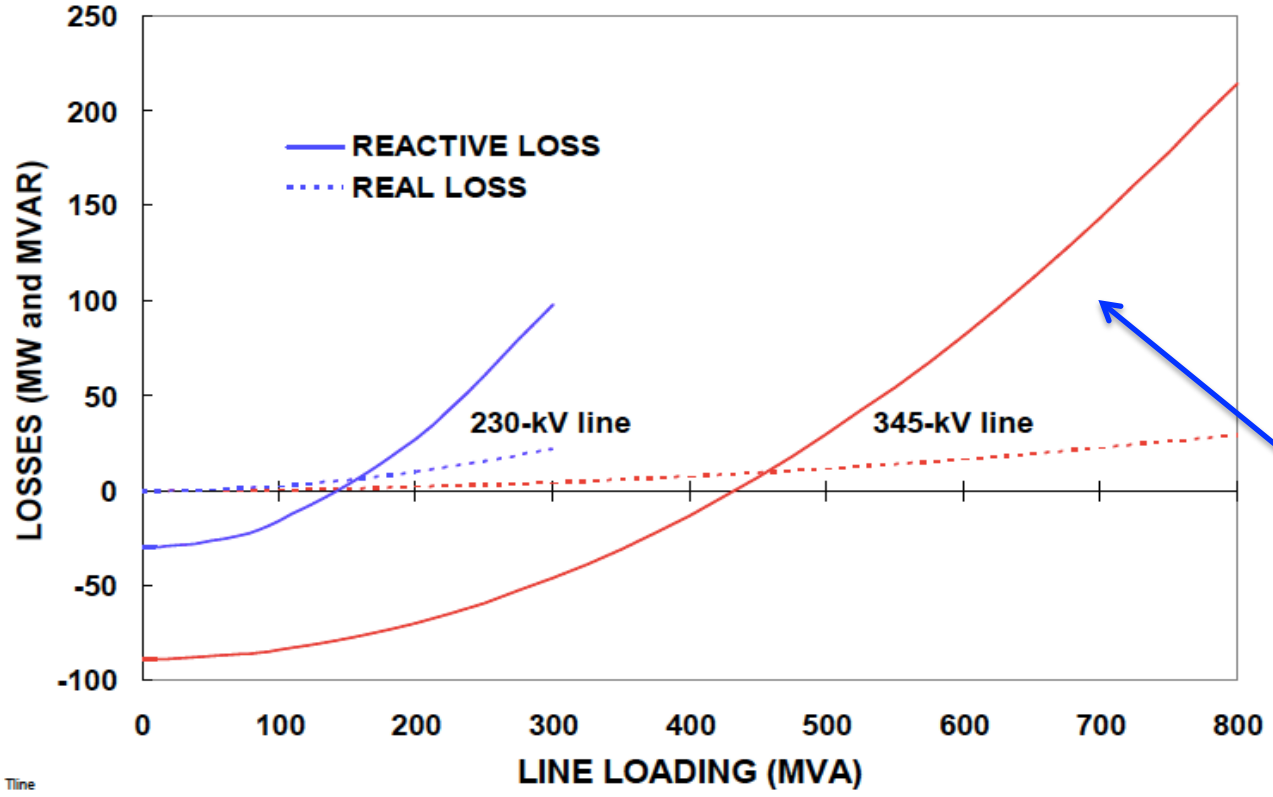



*Source: Southern California Edison (2012)*

# Location Matters – Distributed Voltage Regulation

"The old adage is that reactive power does not travel well."

*Oak Ridge National Laboratory (2008)*




T&D lines absorb 8-20x more reactive power than real power.

*Prevent Blackouts*: When a transmission path is lost, remaining lines are heavily loaded and losses are higher.

**Figure 1-1. Transmission line absorption of reactive power.**

Source: Oak Ridge National Laboratory (2008)

# Example: A Dynamic Distribution Grid

1. 6AM:
   - No PV impact

2. Noon:
   - 20MW PV causes overvoltage

3. Noon:
   - Advanced inverters set at 0.9 PF stabilizes voltage

# California Distribution Resources Plans (AB 327)

- Each Distribution Resources Plan must also:
  - **Propose standard tariffs/mechanisms** to deploy cost-effective distributed energy resources that satisfy distribution planning objectives.
  - **Propose methods to maximize locational benefits** and minimize costs of distributed energy resources in **existing programs**.
  - **Identify barriers** to the deployment of distributed energy resources, including, but not limited to, safety standards related to technology or operation of the distribution circuit in a manner that ensures reliable service.
  - **Propose utility spending** to integrate cost-effective distributed energy resources into distribution planning, with the goal of yielding net benefits to ratepayers.