Resilience in a Clean Energy Future
Sustainable Energy Incubator Workshop Series
Thursday, February 27, 2020
Energy Resilience Overview

Stephen Gunther
Center for Sustainable Energy
Energy Resilience

February 27, 2020

Stephen Gunther

Policy Manager, Distributed Energy Resources
One simple mission —

DECARBONIZE.™

Our vision is a future with sustainable, equitable and resilient transportation, buildings and communities.
About CSE

A mission-driven 501(c)(3) nonprofit organization
Offering scalable clean energy program administration and technical advisory services for more than 20 years.

A national footprint: HQ San Diego, CA
Regional offices: Brooklyn, Stony Brook, Boston, Oakland, Sacramento and Los Angeles

200+ dedicated, mission-driven employees
Managing ~50 projects and programs
National programs | Statewide incentive projects | Region-specific solutions
Areas of Expertise

- **Clean Transportation**: Adoption of electric vehicles and deployment of charging infrastructure
- **Built Environment**: Advancing energy efficiency and renewable resources
- **Technology Convergence**: Interconnecting systems to achieve decarbonization
Risks Facing California’s Energy Systems

- Wildfires and PSPS events
- Cyberattacks
- Earthquakes
- Extreme Weather Events
- Price Shocks

Impact Energy Supply, Delivery, and Demand
Resilience: “the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents.”

(Presidential Policy Directive (PPD) 21, 2013)

Resilience Triangle by Wang, Bartlett, and Miles (2012) used in The Oregon Resilience Plan

Community Resilience of the Built Environment, McAllister (2015)

Ultimate goal of resilience is continuity of normal system function (Francis and Bekera, 2014)
# Reliability vs. Resilience

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<tr>
<th>Reliability</th>
<th>Resilience</th>
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<td>• Preventing disruptions that are more common, local, and smaller in scale and scope</td>
<td>• Addresses high-impact events, the consequences of which can be geographically and temporally widespread</td>
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<td>• Focuses primarily on power interruption prevention</td>
<td>• Minimizes likelihood of, prepares for, and minimizes impact of large-area, long-duration outages</td>
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<td>• System function at N-1</td>
<td>• Consider correlated failures</td>
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<td>• Often measured by average power interruption duration for each customer served</td>
<td>• Industry-wide standards for measuring do not exist</td>
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Common Resilience Frameworks

Common Dimensions
- Economic
- Environmental
- Governance
- Infrastructure
- Social

Critical Infrastructure
- Communications
- Energy
- Transportation
- Water

Community Response
- Preparedness
- Mitigation measures
- Response capabilities
- Recovery mechanisms

Temporal stages
- Plan/Prepare
- Absorb
- Recover
- Adapt
Building a Resilient Grid

Questions to consider:
• What does the community want in a resilient energy system and how is it valued?
• Who should be bearing the economic risks that threaten the system?
• What are the end uses of a specific projects and what should be prioritized?
• How does the grid interact with other dimensions of resilience and what are points of interdependencies?
Examples of CSE Resiliency Efforts

Self-Generation Incentive Program (SGIP)
- DG and energy storage incentives
- $830M statewide budget for 2020 through 2025
- 63% dedicated to energy storage for disadvantaged customers in high fire threat districts (HFTD) or whose electricity was shut off during two or more discrete PSPS events prior to the date of application for incentives

Santa Rosa Junior College Microgrid
- Designed to island up to 27 campus buildings with renewable sources
- Demonstrate value streams (e.g., compensation for participation in DR programs or wholesale market services)

City of Del Mar Solar & Storage Demonstration
- Help the City meet Climate Action Plan goals
- High efficiency PV and energy storage system in coastal Civic Center and Town Hall
Contact Us

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Integrated Planning for Resilience

Kristen Torres Pawling
LA County Chief Sustainability Office
Countywide Sustainability Plan

Resilience in a Clean Energy Future
An LA without gas stations?

A county sustainability plan is the latest framework for a carbon-free LA

By Elijah Chiland | Aug 5, 2019, 9:19pm PDT

Oil derricks and refineries would disappear from the region.

Gas stations would become irrelevant.

Streetscapes would be dominated by electric vehicles, cyclists, and pedestrians.

LA County adopts bold sustainability plan

Hosted by Steve Chiotakis • Aug. 07, 2019 | LOS ANGELES

The LA County Board of Supervisors approved a new sustainability plan this week, affecting the 89 individual cities and the 10 million people living in the county. The plan includes 12 ambitious goals, including making parks and public lands more accessible, going fossil fuel-free in 25 years, and diverting nearly all of the county’s waste from landfills.
Background
The plan is:
- Aspirational, Comprehensive, Long-Term, Regional, Actionable

Plan is analogous to a strategic plan
- Sets out a vision and strategy, but does not include a detailed implementation strategy

Plan mostly addresses areas of County’s control
- Does include some areas where we can influence others (Metro, South Coast AQMD, etc.)
“While we have made progress in addressing many of our region’s challenges, we have a shared responsibility to address these inequities and increase community resilience.”

-Gary Gero,
Chief Sustainability Officer
Countywide Sustainability Plan Topics

- Water
- Energy
- Climate
- Air Quality
- Land Use and Transportation
- Open Space, Recreation and Habitat/Biodiversity
- Resource Recovery and Waste Management
- Public Health and Well-Being
- Economy and Workforce Development
- Housing

Alignment with LA City Sustainability Plan refresh where appropriate
Public Engagement
From Fall 2017 to Summer 2019

- More than 200 meetings and presentations to business groups, community and nonprofit organizations, cities and other public entities, academics, etc.
  - 11 half-day+ workshops attended by 600 people from 350 organizations.
  - 2 Cities Summits to discuss regional coordination and collaboration.
  - 5 Community Fairs
  - Tribal nations meeting
  - Many others

- Generated 6,000 recommendations which were ultimately turned into 12 Goals, 37 Strategies, and 159 Actions.

- Adopted by the Board of Supervisors in August.
What’s in the plan?
Goals, Strategies, and Actions

**Goals**

Broad statement of a desired future state

“Resilient and healthy community environments where residents thrive in place”

**Strategies**

More specific statement on the approach to achieve the goal

“Develop community capacity to respond to emergencies.”

**Actions**

Detailed statements on the policy or program to fulfill the strategy

“Train the County’s town councils, neighborhood associations, and other community organizations to become community emergency response teams (CERTs).”
High Level Goals

- Resilient and healthy community environments where residents thrive in place
- Buildings and infrastructure that support human health and resilience
- Equitable and sustainable land use and development without displacement
- A prosperous LA County that provides opportunities for all residents and businesses and supports the transition to clean economy sectors
- Thriving ecosystems, habitats, and biodiversity
- Accessible parks, public lands, and public spaces that create opportunities for respite, recreation, ecological discovery, and cultural activities
High Level Goals

- A fossil fuel-free LA County
- A convenient, safe, clean, and affordable transportation system that expands mobility while reducing car dependency
- Sustainable production and consumption of resources
- A sustainable and just food system that enhances access to affordable, local, and healthy food
- Inclusive, transparent, and accountable governance that supports participation in sustainability efforts, especially by disempowered communities
- A commitment to realize OurCounty sustainability goals through creative, equitable, and coordinated funding and partnerships
Goals, Strategies, and Actions

“Resilient and healthy community environments where residents thrive in place.”

“Develop community capacity to respond to emergencies.”

“Build capacity of retailers, including small stores, to sustain neighborhoods in the event of an emergency and ensure continued operations during and after a disaster.”

“Integrate climate resilience and adaptation into planning, buildings, infrastructure, and community development decisions.”

“Conduct a climate vulnerability assessment that addresses physical infrastructure vulnerability and use it to guide investments in buildings, infrastructure, and zoning and code changes.”
Sample Resiliency Targets

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<tr>
<th>Strategy 1F</th>
<th>Targets</th>
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| Minimize the exposure of vulnerable populations to pollution and reduce health disparities | **Countywide:**
| | **2025**
| | • 5,000 people trained on emergency response through the Community Emergency Response Team (CERT) program
| | • Offer 30% of CERT trainings in non-English languages
| | **2035**
| | • 10,000 people trained on emergency response through the Community Emergency Response Team (CERT) program
| | • Offer 40% of CERT trainings in non-English languages
| | **2045**
| | • 15,000 people trained on emergency response through the Community Emergency Response Team (CERT) program
| | • Offer 60% of CERT trainings in non-English languages |
### Sample Resiliency Targets

#### Strategy 2A

<table>
<thead>
<tr>
<th>Minimize the exposure of vulnerable populations to pollution and reduce health disparities</th>
<th>Targets</th>
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<tbody>
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<td>Countywide:</td>
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<tr>
<td>2025</td>
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<td>• Convert 10% of heat-trapping surfaces to cool or green surfaces</td>
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<td>• Reduce by 15% the number of heat-stress emergency departments visits per 100,000 residents</td>
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<td>• Convert 20% of heat-trapping surfaces to cool or green surfaces</td>
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<tr>
<td>• Reduce by 45% the number of heat-stress emergency departments visits per 100,000 residents</td>
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<td>• Convert 30% of heat-trapping surfaces to cool or green surfaces</td>
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<tr>
<td>• Reduce by 75% the number of heat-stress emergency departments visits per 100,000 residents</td>
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Timeline

Board Adoption - August 2019
Priorities Development - February 2020
Annual Progress Report - August 2020
Roadblocks and Best Practices

Rebecca Hausheer
The Energy Coalition
Today

- The Energy Coalition
- Laguna Woods Village Case Study
  - Community Overview
  - The Energy Coalition Scope
  - Electrical Infrastructure Assessment Barriers
  - Best Practices
  - Microgrid Feasibility Analysis
- SoCalRENE’s Pathway to Zero Program
Introducing The Energy Coalition (TEC)

Our “Why?”

TEC’s mission is to empower communities to leap into the future of clean energy.

We envision a future in which communities are energy-producing networks and clean energy is affordable and accessible for everyone.

What We Do

TEC is creating the building blocks for a new energy economy in which communities become energy-producing networks and clean energy becomes affordable and accessible for everyone.

How We Do It

A customizable suite of service options:

- Program Design & Project Implementation
- Education & Workforce Development
- Marketing & Outreach
- Policy & Master Planning
Who We Are

- 63 staff members across four offices
- 462 combined years in energy industry
- 18M kWh energy reduction in 2019
- 218 Public agencies reached in 2019

Sample Project Experience
Laguna Woods Village
DER Case Study
The Community

- Laguna Woods Village is Southern California’s “premier active lifestyle community for people 55 and older”
- 18,500 residents
- 3.4 square miles
- Governed by 3 HOAs and fourth Corporation responsible for all shared community amenities
- Constructed in 1963 and has aging infrastructure
Community Resiliency Goals

❖ Increase energy diversity and reduce dependence on fossil fuels
❖ Reduce overall energy costs
  ➢ Mitigate escalating utility costs resulting from TOU rates
❖ Supply critical facilities with energy during outages
❖ Avoid electrical power outages
❖ Provide EV charging stations throughout community
TEC Scope & Objectives

1. Assess electrical infrastructure for immediate upgrades

2. Identify grid capacity issues for future EV charging stations and develop a plan for action

3. Analyze microgrid potential and estimated costs to island critical facilities
Electrical Infrastructure Assessment Challenges

- Collection of utility energy data
- Utility transformer data
  - 15/15 Rule: unknown capacity for DERs
  - Access to transformers
- Infrastructure ownership uncertainty
- EV charger siting challenges
- Who pays for electrical infrastructure upgrades?
Best Practices

❖ Meetings with various SCE departments
  ➢ Account Representatives, Local Planning Department and Distribution Engineers
❖ Customer requests and shares utility data
❖ Sample transformers in the field
❖ Leverage SCE Charge Ready program
  ➢ Submit program application
  ➢ Provide potential meter locations for EV charging stations
  ➢ SCE pays for transformer upgrades where necessary
Microgrid Analysis

**Goal:** Provide a set of conceptual design scenarios for a resilient microgrid

**Microgrid Objectives:**
- Resiliency and reliability
- Cost-effectiveness
- Increased renewable energy penetration
- Reduced Greenhouse Gases (GHG) and air emissions

**3 Scenarios Evaluated:**
- Island indefinitely
- Most cost-effective
- Meets owner objectives
Proposed Microgrid

Scenario 3:

1. Replace diesel generator
2. Maximize solar on adjacent land
3. 8 hrs of battery

Microgrid Benefits

1. Resiliency and reliability
2. Increased renewable energy penetration
3. Energy cost savings
4. Reduced greenhouse gases and air emissions
5. Support load for EV chargers
Pathway to Zero Program
SoCalREN’s Pathway to Zero Program

SoCalREN’s Pathway to Zero was created to support public agencies within disadvantaged communities on a path towards zero net energy.

Offered in conjunction with our energy programs, it maximizes energy efficiency opportunities and drives the integration of Distributed Energy Resources (DERs).

Benefits of Pathway to Zero

- Customized high-level review of DER options like solar water heating, demand response, and photovoltaic and battery storage systems
- Energy efficiency and DER comprehensive audit
- Objective third-party guidance for project planning
- Reduction of energy bills and greenhouse gas emissions

Learn more at socalren.com/PathwaytoZero
A Tailored Project Delivery Approach

A dedicated SoCalREN Project Manager supports a project at every stage

- Enrollment
- Benchmarking
- Procurement
- Evaluation & Audit
- Construction
- Completion
Register now for access to free energy efficiency resources

SoCalREn’s online toolkit contains free case studies, webinars, guidebooks, marketing resources, and more to help public agencies on the path towards a sustainable energy future. Join now to check it out!

socalren.org/join
Thank you!

Questions?

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213-797-7808
Energy Resiliency Case Studies

Steve Baule
Los Angeles Department of Water and Power
Los Angeles Department of Water and Power

The nation's largest municipal electric utility, began delivering electricity in Los Angeles in 1916

LADWP’s Power System:

- Supplies more than 23 million MWh of electricity each year
- LADWP has over 7,850 MW of generation capacity from a diverse mix of energy sources
- 3,636 miles of transmission lines spanning five states
- LADWP will be 100% Renewable by
LA Climate Extremes in the last 10 years

One of Wetest Year of Decade followed by Driest Year of Decade (2017-18)

Highest Peak Energy Load in LA History: 6,502 MW, August 2017

Hottest Day in L.A. History: September 27, 2010, 113° in Downtown LA
July 6-10 2018 Heat Storm

- Sudden Extreme Record Temps
- 750+ Overhead & Underground Outage Incidents
- Highest peak energy demand ever for a July in Los Angeles
Communities Most Impacted with overloaded Circuits during the 2018 Heat Storm
# Snapshot: Heat Wave Temps & Customer Impacts

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<th>July 4 WED</th>
<th>July 5 THURS</th>
<th>July 6 FRI</th>
<th>July 7 SAT</th>
<th>July 8 SUN</th>
<th>July 9 MON</th>
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<td>88°/65° DTLA</td>
<td>108°/69° DTLA</td>
<td>104°/79° DTLA</td>
<td>98°/75° DTLA</td>
<td>96°/74° DTLA</td>
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<td>86°/61° WSFV</td>
<td>103°/62° WSFV</td>
<td>117°/73° WSFV</td>
<td>110°/83° WSFV</td>
<td>102°/80° WSFV</td>
<td>103°/76° WSFV</td>
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**CUSTOMERS IMPACTED**

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**CUSTOMERS RESTORED**

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Fire Vulnerability in Northern Los Angeles
Saddle Ridge Fire

- Brushfire on October 10, 2019 started in 1400 block of Saddle Ridge Dr
- Fire spread in the Southwest direction and jumped HWY 5 pushed by wind gusts up to 60mph
- 8800 acres were burned
Energy Import Capacity Lost by Saddle Ridge Fire

- Total of 23 Transmission line relays in less than 14 hrs
- Complete loss of Pacific DC Intertie
- Complete loss of south of Barren Ridge Lines
- 2 of 5 lines lost on the VIC-LA path
- Total loss of approx 5,500MW of external Transmission
- 1,442MW of remaining external generation for LA’s 3,331MW Demand
- LADWP’s internal In basin generation kept the power flowing
Moving Forward

- **Infrastructure Improvements**
- **Continue to harden system**
  - Also will enhance transportation/building electrification
- **Demand Response**
- **Distributive Energy Resources**
Clean Grid LA

• In February 2019, Mayor announced decision to not repower ocean cooled thermal units at Scattergood, Haynes and Harbor

• 1660MW of in-basin power generation must be replaced/offset by 2030

• Determine investments and timelines to achieve goal and integrate into the 100% Renewable efforts

• Internal Steering Committee and Stakeholder participation
Challenges

• Over generation of renewables
• Upgrading the Transmission and Distribution Systems
• Maintaining Reliability
• Managing Electrification
• Sensitivity to Rate Impacts

LADWP’s Current Transmission System & Generating Resources
Sustainable Energy Incubator Workshop Series
Thank you!

Sustainable Energy Incubator Workshop Series