County of San Diego

Regional Decarbonization Framework (RDF)
Update #2, Draft Report



Board of Supervisors

November 17, 2021

Item # 6

RDF Team

LUEG
Land Use & Environment Group

THE NOBLEST MOTIVE IS THE PUBLIC GOOD
COUNTY OF SAN DIEGO
MDCCCLI

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS

FEHR PEERS

Synapse
Energy Economics, Inc.

UNIVERSITY OF CALIFORNIA · SAN DIEGO · LET THERE BE LIGHT

School of GLOBAL POLICY & STRATEGY

USD

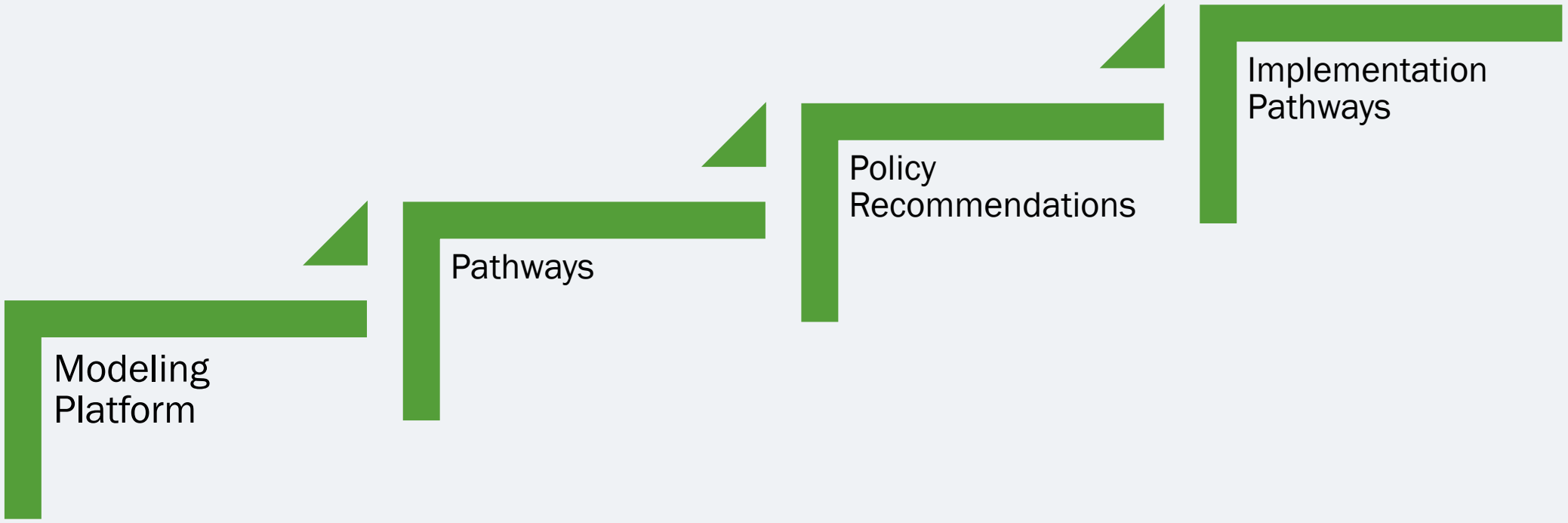
EPIC
ENERGY POLICY INITIATIVES CENTER
UNIVERSITY OF SAN DIEGO SCHOOL OF LAW

EVOLVED ENERGY RESEARCH

PERI
University of Massachusetts Amherst
POLITICAL ECONOMY RESEARCH INSTITUTE

MONTARA MOUNTAIN ENERGY

Developing the Framework



■ ENERGY ■ TRANSPORTATION ■ BUILDINGS ■ GREEN JOBS ■ AGRICULTURE ■ FORESTS

Board Actions

- RDF Directed
- July Update
- Nov. Update
- Feb. Update
- March Update
- August Integrated RDF for Approval

Community Engagement

- Aug. 25 -27 Focus Groups
- Sept. 13 Public Workshop
- Nov.- Dec. Public & Technical Working Group Review Draft RDF
- Jan.- Mar. Community Forums & Public Agency Presentations
- Mar.- April Sub-Regional Convenings

Project Details

- Contract with UC San Diego & team
- Define scope; energy modeling
- Sector-specific data modeling and analysis
- RDF Draft released
- Local Policy Opportunity Analysis
- Workforce Development Study
- Implementation Pathways

Technical Working Group → Group feedback sent to the report authors Dec. 3

NAME	ORGANIZATION	RECOMMENDED BY
David Flores	SD County Office of Supervisor	SD County Supervisor District 1
James Whalen	J. Whalen Associates	SD County Supervisor District 2
Cody Petterson	SD County Office of Supervisor	SD County Supervisor District 3
Shalini Vajjhala	San Diego Regional Policy and Innovation Center (SDRPIC)	SD County Supervisor District 4
Matthew Adams	Building Industry Association (BIA)	SD County Supervisor District 5
Allison Wood	San Diego Association of Governments (SANDAG)	San Diego Association of Governments
Kathleen Keehan	San Diego County Air Pollution Control District (APCD)	San Diego County Air Pollution Control District
Philip Gibbons	Port of San Diego	Port of San Diego
Chad Reese	San Diego International Airport	San Diego Regional Airport Authority
Shereen D'Souza Alt: Annalisa Schilla, Elizabeth King	California Environmental Protection Agency (Cal/EPA) & California Air Resources Board (CARB)	California Environmental Protection Agency & California Air Resources Board
Joe Gabaldon	San Diego Gas & Electricity (SDG&E)	SD County Land Use & Environment Group
Matthew Vasilakis	Climate Action Campaign	SD County Land Use & Environment Group
Satomi Zeigler	San Diego & Imperial Counties Labor Council	SD County Land Use & Environment Group

Implementation Pathways

San Diego
Regional Decarbonization Framework

SDG POLICY INITIATIVE

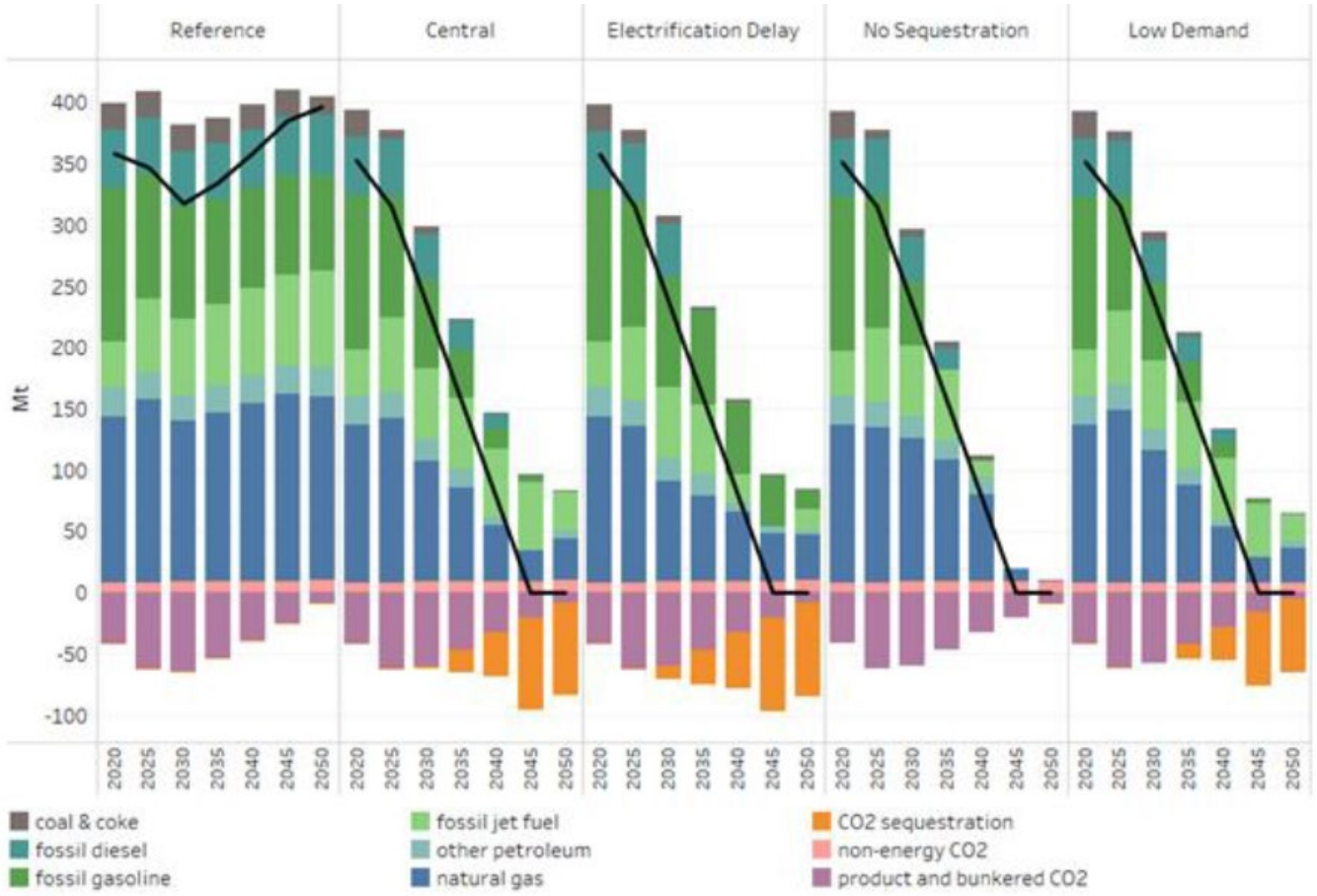
Gordon C. McCord
School of Global Policy and Strategy
UC San Diego

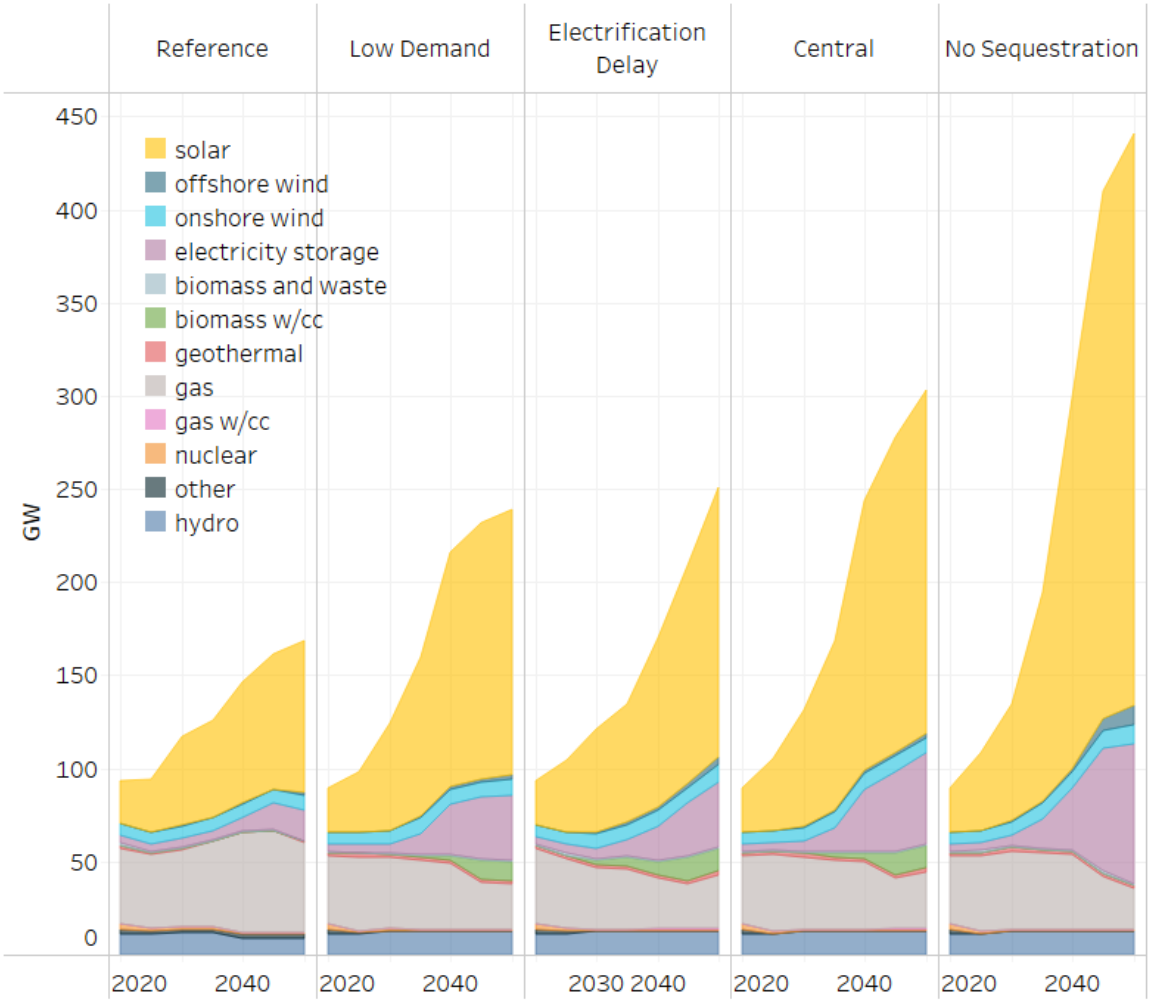
RDF Study Approach

- Framework aims to provide technical pathway to decarbonization to inform policy-making in regional, county and city governments towards reducing greenhouse gas emissions in the San Diego region
- Important to emphasize this is a draft technical analysis, more forthcoming work on policy instruments
- Begin with national/state energy model of deep decarbonization to guide San Diego region modeling
  - Ensures San Diego regional pathway is coherent with statewide pathway to decarbonization
  - Energy systems are interconnected, jurisdictions should move in lockstep
  - Net zero emissions before mid-century, consistent with Paris Agreement and following state mandate

RDF Study Approach

- Begin with national/state energy model of deep decarbonization to guide San Diego region modeling





RDF Study Approach

- Experts model sectors with county/local policy options:
  - Renewable energy production
  - Transportation
  - Natural Climate Solutions
  - Buildings
  - Employment Impacts
- RDF does not identify "right" pathway, and instead shows multiple ways forward to highlight tradeoffs, decision points, risks and synergies

RDF Study Approach

- Produce specific, quantitative pathways to decarbonization highlighting tradeoffs, for example
  - How much renewable energy needs to be produced by when, and where should it go to minimize cost?
  - Where should it go if ecosystems and biodiversity protection are prioritized?
  - Or if we avoid using high value agricultural and urban lands?
  - Or if we prioritize rooftop solar and urban infill in marginalized communities to reduce energy costs and create jobs?
- Model the entire region as a system to inform and help align all jurisdictions

RDF Study Approach

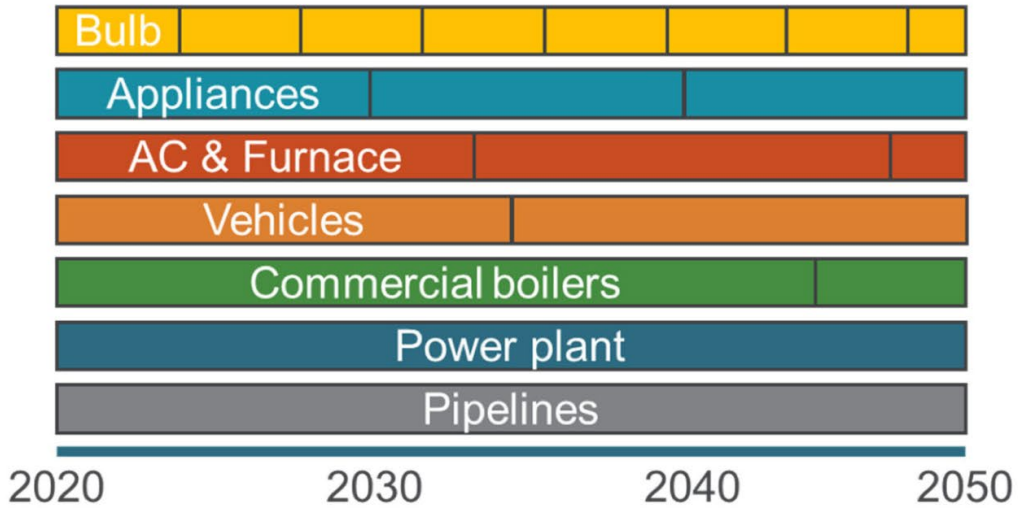
- Focus on proved, scalable technologies
  - Planning around wind, solar, EVs and not technologies that are in pilot or theoretical stage (wave energy, fusion)
- Highlight uncertainties, emphasize need for ongoing planning process as technology and policy landscape evolve
  - Renewable energy development in Imperial County or Mexico might avoid needing higher-cost renewables in the San Diego region
  - Federal/state development of offshore wind could reduce land-based infrastructure need
  - Development of scalable and low-cost carbon capture technologies for gaseous fuels
  - In all cases, useful to have a decision-making system ranking sites/policies/investments that is updated continuously

RDF Study Approach

- Identify "low regret" policies and investments
  - Near-term actions common across pathways, worthwhile regardless of how longer-term uncertainty resolves itself
  - Examples:
    - Low-cost renewable energy sites
    - Electrification of transport
    - VMT reduction
    - Replacing end-of-life heating capital stock with electrified alternatives
    - Leave land with natural carbon sequestration potential undeveloped

Value of Pathways Approach

- Identifying and lowering the risk of dead-end strategies
  - Costly investments that reduce emissions but cannot achieve full decarbonization
- Identifying commonalities in pathways under sensitivity analyses
  - "Low-regret" strategies
- Situating near-term policy targets with respect to long-term goals
  - Short-term investment goals consistent with 2035 or mid-century targets
- Identifying key decision points
  - For example, timing of capital replacement cycles to avoid stranded assets



Overview of the lifetimes of common energy consuming or producing infrastructure.

RDF Sector Expertise

- Federal and state energy modeling:
  - Evolved Energy Research
- Geospatial Analysis of Renewable Energy Production:
  - Montara Mountain Energy & UC San Diego
- Accelerating Deep Decarbonization in Transport:
  - Fehr & Peers
- Natural Climate Solutions:
  - Montara Mountain Energy & UC San Diego
- Decarbonization of Buildings:
  - Synapse Energy Economics
- Employment Impacts:
  - Univ. of Massachusetts, Amherst
- Policy and Institutional Considerations:
  - UC San Diego
- Local Policy Opportunities:
  - EPIC, Univ. of San Diego
- San Diego as a Model
  - Sustainable Development Solutions Network

Key Takeaways: Geospatial Analysis of Renewable Energy Production

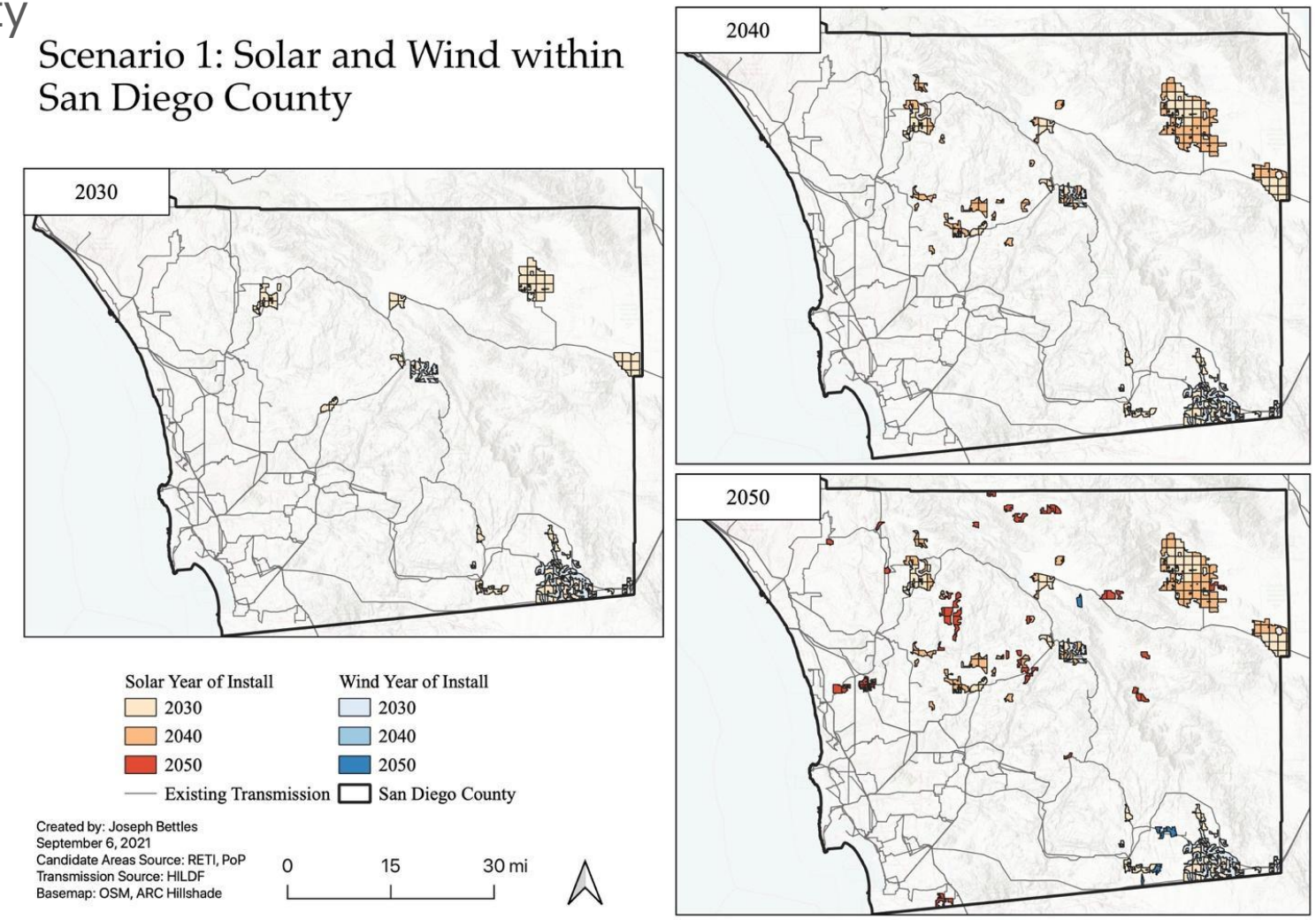
- The region has sufficient available land area for wind and solar generation to approach a fully decarbonized energy system in line with the California-wide system model
- Meeting standards for reliability will require significant but uncertain investments in a suite of additional resources, including excess intermittent and flexible generation, storage, and demand-side management
- The chapter informs decision-making by providing a series of site-selection scenarios that prioritize land value, ease of development, and environmental impact as well as proposing a strategy for addressing reliability
- Significant solar and geothermal potential of Imperial County is a large potential resource for San Diego that may require upgrades to the transmission network
- The County should coordinate with state agencies (CPUC Integrated Resource Planning team, CPUC Resource Adequacy team, CAISO Transmission Planning Process team, CAISO Local Capacity Requirements team) to ensure the reliability of the system

Key Takeaways:
Geospatial Analysis of Renewable Energy Production

Scenario 1: Least-cost, high local capacity

Central scenario:
~50,000 GWh in 2050

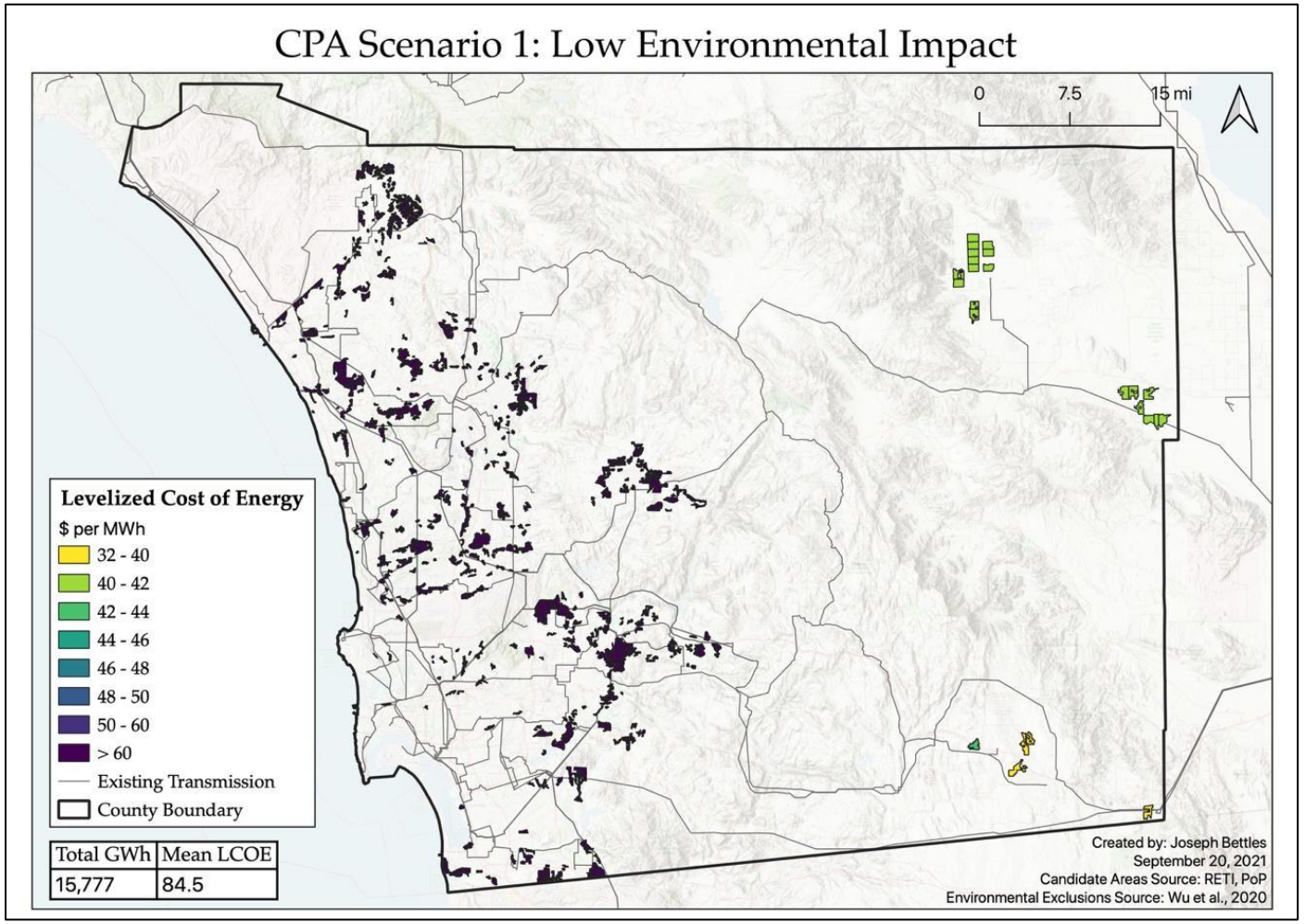
- Area affected:
  - 2030 - 60,140 acres
  - 2040 - 105,368 acres
  - 2050 - 130,205 acres
- Enhanced planning, zoning, permitting processes, and institutional capacity-building needed to accelerate progress



Key Takeaways: Geospatial Analysis of Renewable Energy Production

Scenario 2: Avoid areas of high conservation value

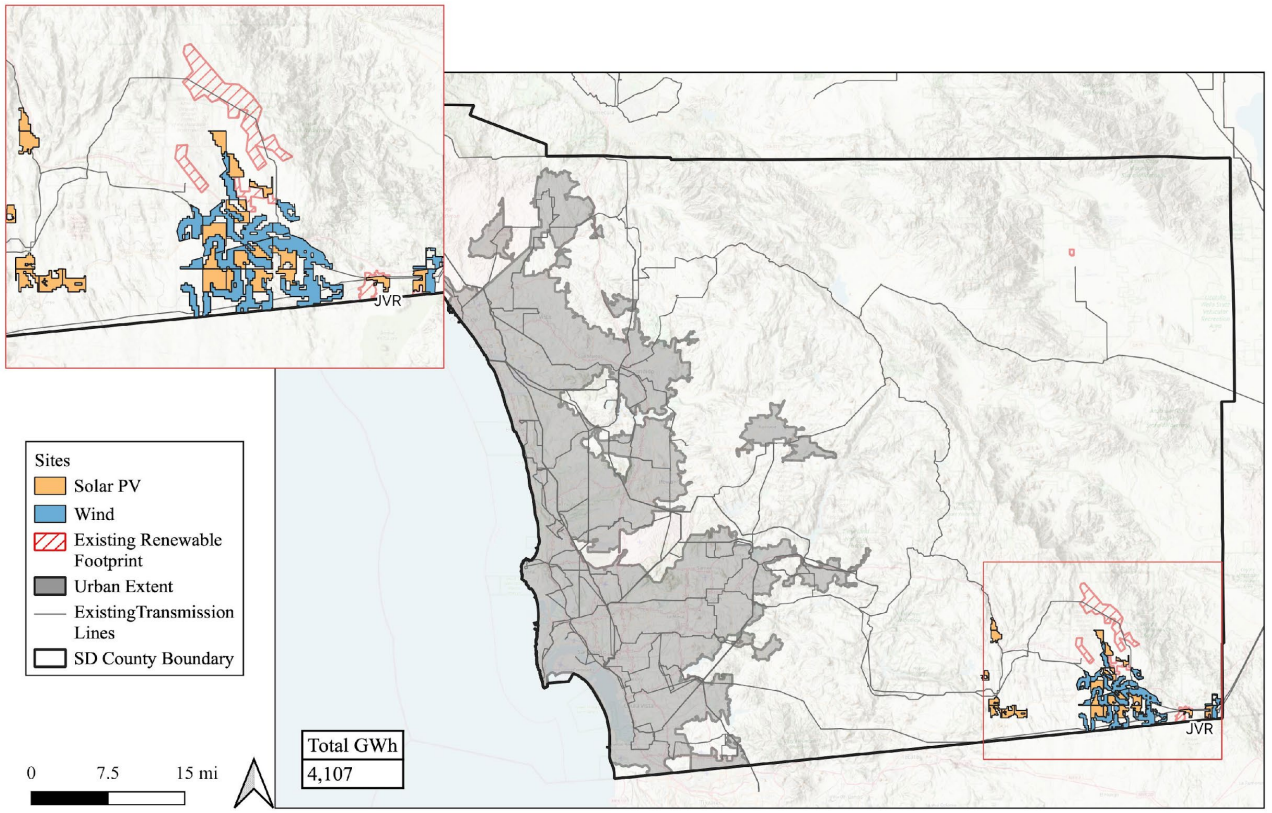
- Increase infill solar
- 69% shortfall of electricity need
- Rooftop and urban infill solar provide 5-30% of required clean electricity
- Multiple scenarios show flexibility of these tools for region to choose a path forward
- Evaluate tradeoffs while making the system-wide arithmetic work



Key Takeaways:
Geospatial Analysis of Renewable Energy Production

- Scenario 1: Least-cost, high local capacity
- Scenario 2: Avoid areas of high conservation value
- Scenario 3: Avoid high-value land
- Scenario 4: Avoid land with natural carbon sequestration potential
- Scenario 5: High transmission deliverability

- Common across scenarios:
  - High commercial interest, near existing and planned renewable sites, including the JVR site approved in 2021
  - Least-cost CPAs across scenarios
  - Favored along with rooftop and urban infill solar, and regardless of transmission upgrades
  - Favored in statewide planning proceedings (CPUC IRP and CAISO TPP)
  - All scenarios require careful consideration of environmental justice issues



Key Takeaways: Decarbonizing the Transportation Sector

- Based on the regional policy context including SANDAG's Draft 2021 Regional Plan, the County's Electric Vehicle Roadmap, local jurisdiction policies and guiding documents, and the A2Z Gap Analysis, the County has a strong policy foundation for reducing emissions related to transportation.
- Nevertheless, projected annual emissions in 2045 and 2050 are inconsistent with the levels of reductions required by EO S-3-05, EO B-30-15, and EO-B-55-18 for carbon neutrality.
  - RDF model calls for reduction of 25-47% by 2030, 51-82% by 2035, 100% by 2050
  - SANDAG estimates show reduction of 26% by 2030, 33% by 2035, 34% by 2050.
- Opportunity areas exist to accelerate EV adoption and VMT reduction based on existing countywide policies and patterns of vehicle ownership, travel behavior, and land use development.

Key Takeaways: Natural Climate Solutions

- Natural climate solutions offer carbon dioxide sequestration and storage in vegetated lands (e.g. chaparral, forests, woodlands, wetlands and riparian areas), but they cannot generate enough negative emissions in the San Diego region to achieve net zero emissions alone.
- To help reach net zero, invest in NCSs and minimize carbon emissions from land. Local data need to be collected and integrated into regional carbon calculations.
- The most effective and inexpensive NCS in the San Diego region is to avoid land use change to leave natural land cover intact, except for other decarbonization actions such as siting renewable energy infrastructure.
- Other NCSs considered include carbon farming (farming practices that increase carbon sequestration and storage and minimize GHG emissions on agricultural lands), wetland protection and expansion, and urban forestry. In general these are less effective and more expensive. Large-scale habitat restoration and reforestation is expensive and may not be effective.
- NCSs offer quantifiable co-benefits beyond decarbonization.

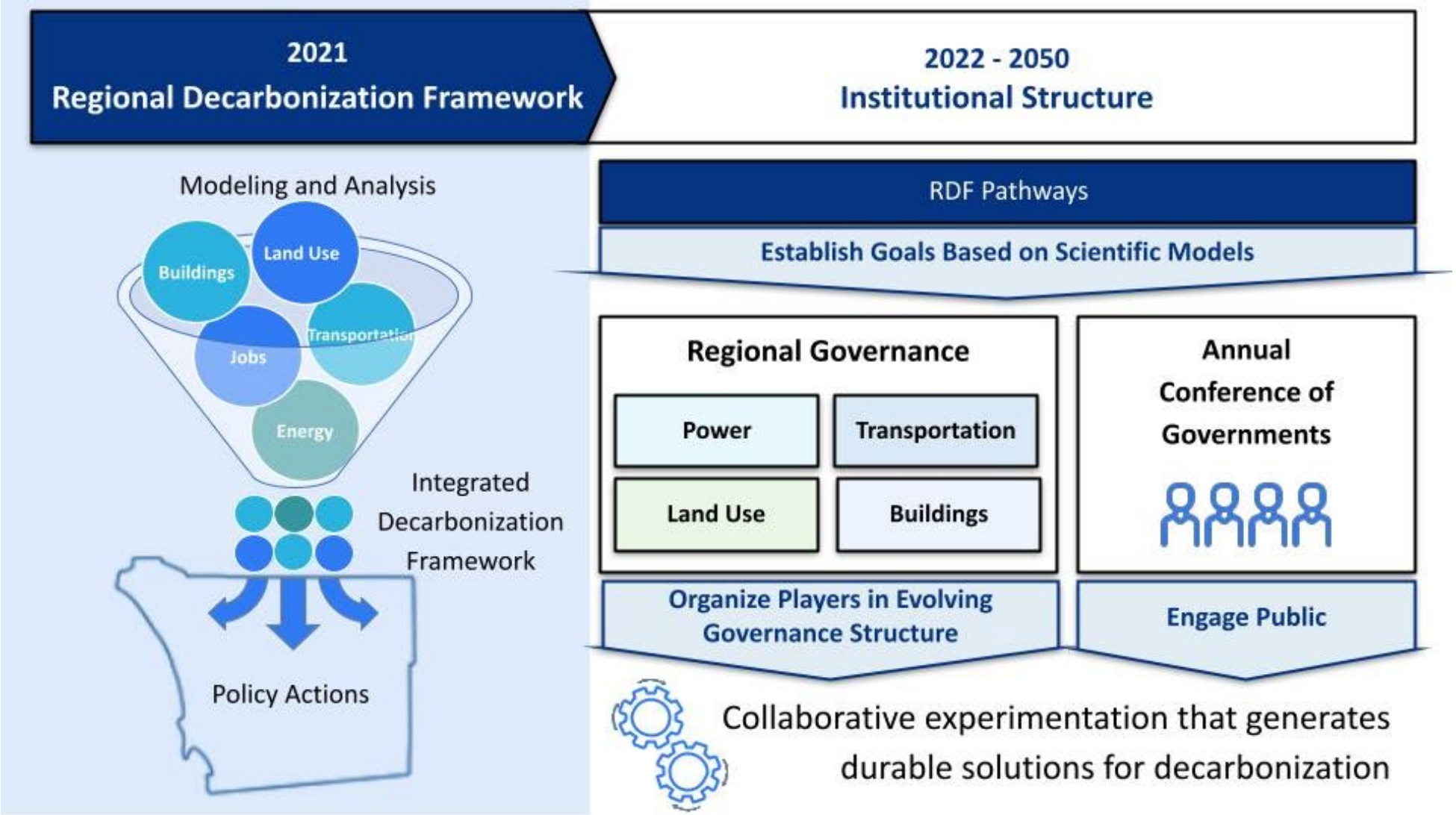
Key Takeaways: Buildings

- Reducing emissions from space heating and water heating should be a primary policy focus for buildings within the Regional Decarbonization Framework
- Policies should support increasing adoption of efficient heat pump-based space and water heating systems in both new and existing buildings, with particular focus on assistance for low-income residents and rental buildings
- Some existing fossil fuel equipment systems will only turn over once by 2050. Replacing end-of-life fossil fuel heating systems with electrified systems is low-hanging fruit. This is a near-term priority
- Low-carbon gaseous fuels can be used for hard-to-electrify end uses, though research and piloting is required
- Stranded cost risk is mitigated by minimizing unnecessary extensions or replacements of the gas pipeline system and by accelerating depreciation of existing utility assets.
- Improved data gathering is a low-cost, foundational action for future policy development

Key Takeaways: Policy Considerations

- Reduction of GHG emissions is a coordination problem for cities and agencies. Solutions require mechanisms to incentivize sharing of information, capacity, and technology between jurisdictions.
- Each sector has near-term actions that will be worthwhile regardless of how longer-term uncertainty resolves itself. These near-term "no-regret" or "little regret" policies should be prioritized.
- A region-wide governance structure for decarbonization (regional steering committee; sector working groups; front-line advisors) could incentivize experimentation and adapt to changing technological and political realities. A Conference of Governments can meet periodically to facilitate coordination and engage stakeholders.
- For the San Diego region to have a measurable impact on global emissions it should seek to generate followership among other regions so that innovations can be expanded and replicated.

Key Takeaways: Policy Considerations



Thank you

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SDG POLICY INITIATIVE

Other Considerations & Board Direction

Regional Equity

Workforce Development

Alternative Renewable Energy Sources

Regional Equity

1) Renewable Energy Siting Scenario to prioritize investments in frontline communities

2) Decarbonization of buildings discusses impacts to low-income residents and rental buildings

3) Land Use: Co-benefits of increased urban tree cover and distribution

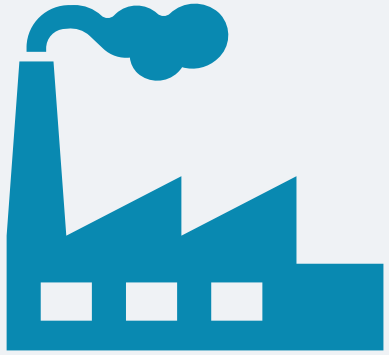
4) Local Policy Opportunity Analysis (to be presented to the Board in February 2022)

Workforce Development

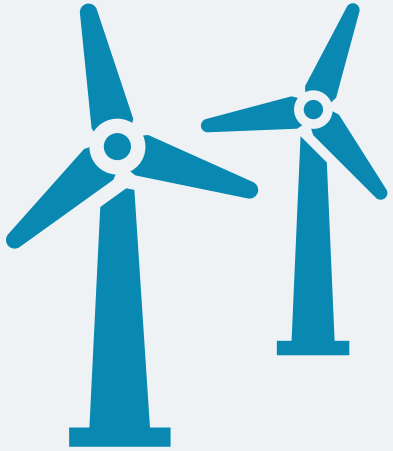
Dr. Carol Zabin
UC Berkeley Labor Center
Author of California's Jobs and Climate Action Plan for 2030

Betony Jones
Senior Advisor on Workforce, at U.S. Department of Energy
Author of High-Road Workforce Guide for Climate Action

Alternative Renewable Energy Sources



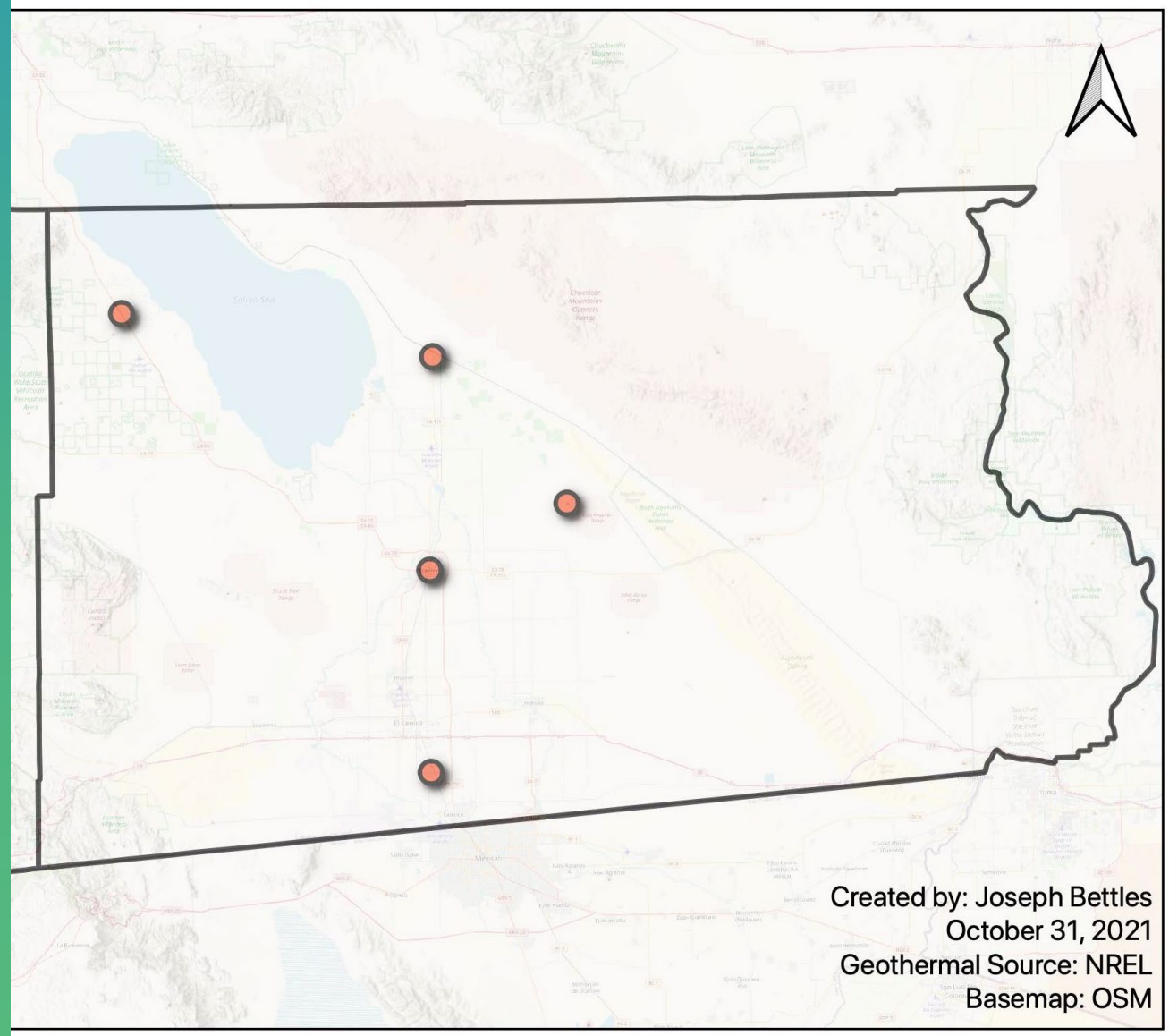
Geothermal



Off-Shore Wind

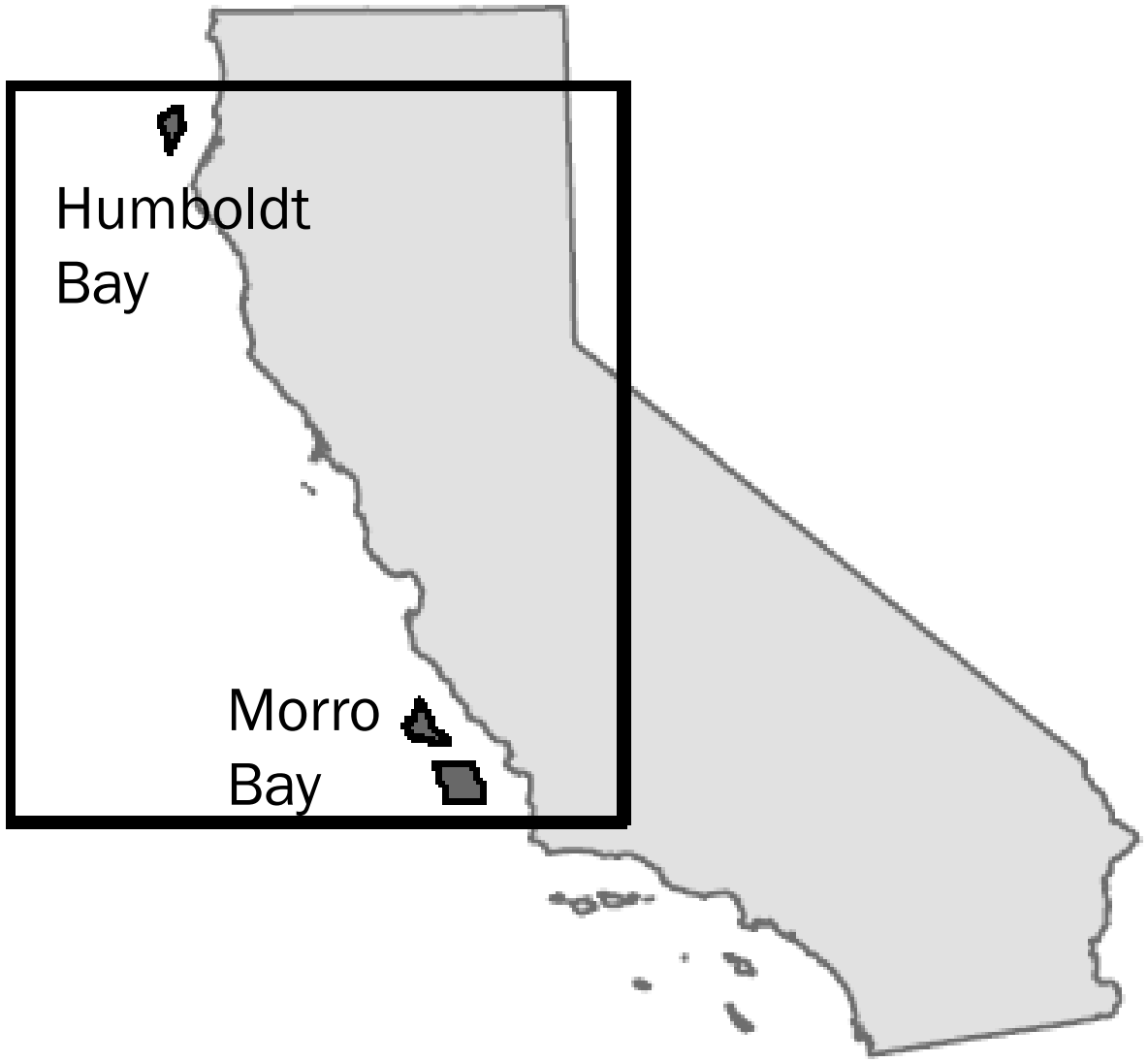
Ocean Wave Energy

Geothermal Sites

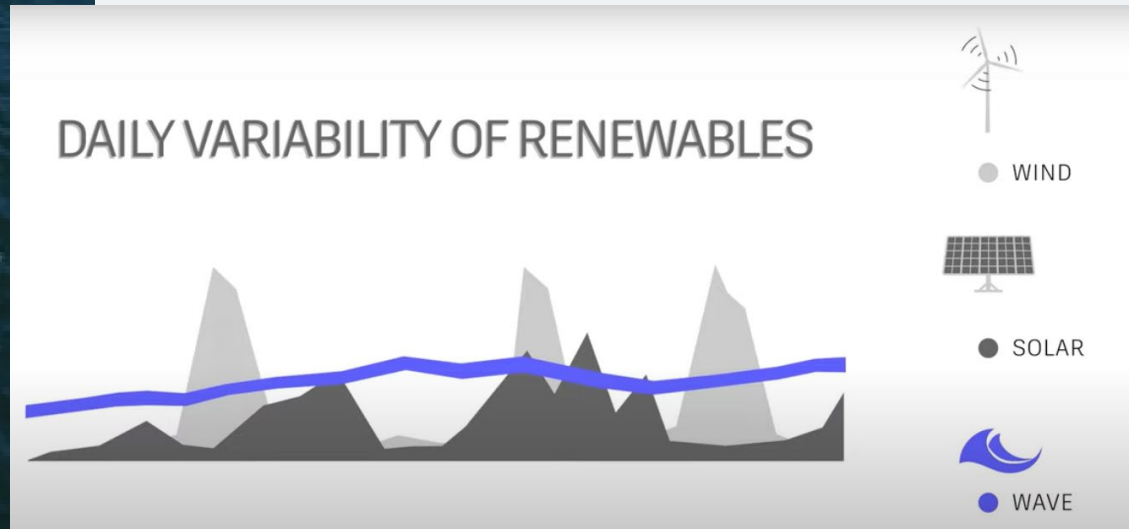


Lithium

Off-Shore Wind



Ocean Wave Energy



Next Steps

Local Policy Opportunity Analysis	February 2022
Initiate Implementation Pathways	
Regional Decarbonization Framework - Update	March 2022
Preliminary Workforce Development Study	

Adoption of **Integrated** Regional Decarbonization Framework including:

Implementation Pathways	
Workforce Development Study	August 2022