Renewables 100 Policy Institute

CCAE Webinar

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Diane Moss
Founding Director
d.moss@renewables100.org

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Policy Institute

Go 100% Renewable Energy Project

GO 100% RENEWABLE ENERGY

Who has committed so far?

Jurisdictions representing about **1.76 billion people** (and counting…)

who've transitioned or are committed to transitioning within the next few decades to **100% renewable energy** in at least one sector.

THAT'S NEARLY ONE QUARTER OF THE GLOBAL POPULATION.

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Companies are Going 100%


Wave of Corporations Joining 1000's of Small Companies in Committing to Going 100% for At Least Electricity

4 Drivers

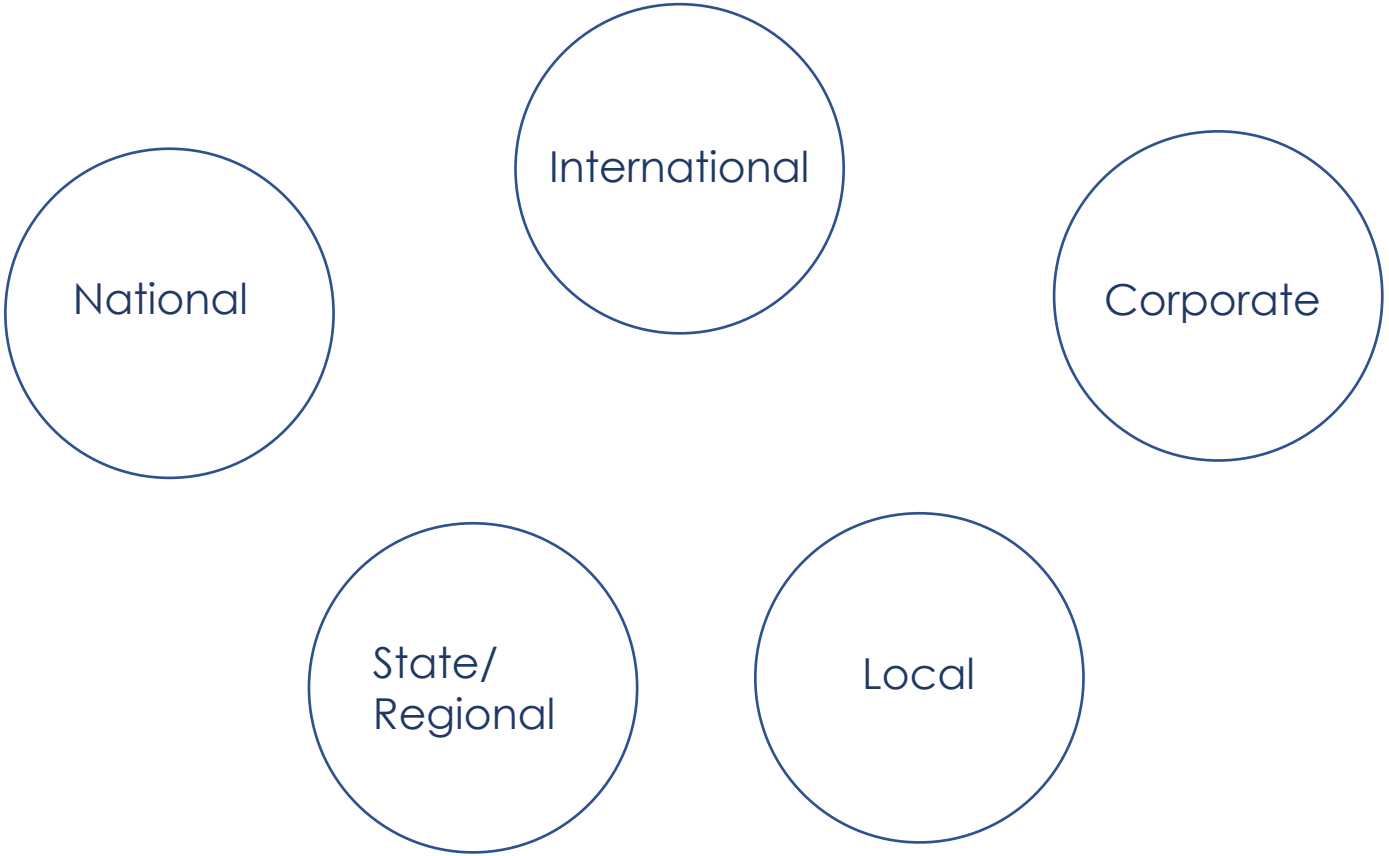
Policy

Economics

Technology Market Development

Advocacy/Public Support

Momentum Driver 1 - Policy



Momentum Driver #2 - Economics

Technology Pricing Keeps Dropping

- Solar panels down **63%** in past 5 years. **19%** last year alone. (SEIA)
- LED lighting fell **90%** from 2008-2015. (Goldman Sachs)
- Lithium Ion batteries down **73%** since 2010. (BNEF)
- Used ZEVs are starting to enter the market.
- Net zero building competitive w/ conventional (NBI, et al)

Jobs

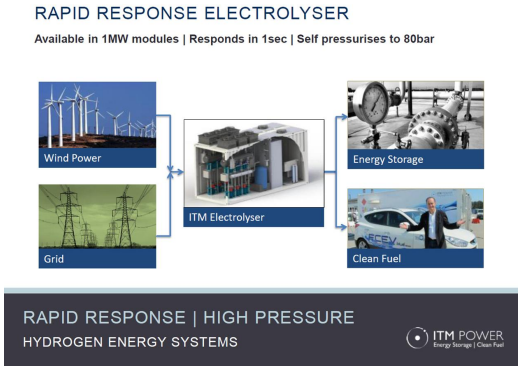
- **500k** clean energy jobs in CA = **10X** coal jobs in all the US
- More jobs in solar in US than oil and gas combined. (USDOE)

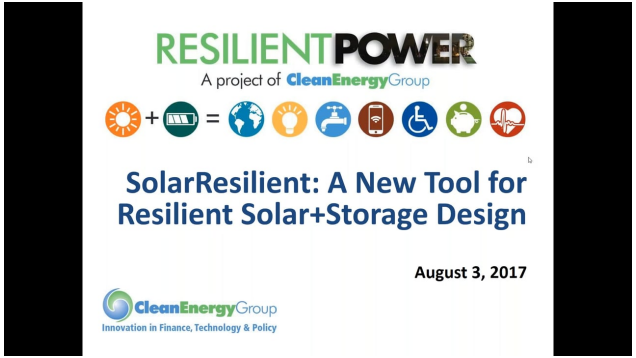
Momentum Driver 3: Technology/Market Development

Familiarity breeding contentment.

Momentum Driver 3: Technology/Market Development

New Tools and Solutions





Storage, planning and forecasting tools, energy management software, and more

Momentum Driver 4: Advocacy

Clean Energy, Climate Protection and Economic Progress Go Hand in Hand

100% Renewable Energy Is Good Politics Across Party Lines

Challenges & Opportunities

Data Gathering

- Gathering energy use data and getting passed privacy issues
- GHG inventories – less common than they need to be

Challenges & Opportunities

How to build a 100% renewable electricity supply that works best for the city's needs *and* with the larger energy system?

- Municipalities are part of a larger energy context and have to coordinate with other communities and the state rural cities
- Focus on 100% renewable generation megawatt hour credits ≠ matching load with consumption
- Most cities have to procure renewable generation outside city boundaries
- Cities, regions and states need to coordinate, cooperate, and balance priorities

Cross-jurisdictional coordination and cooperation is key.

Challenges & Opportunities

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Challenges & Opportunities

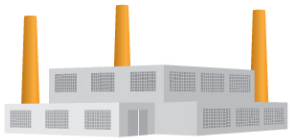
How to integrate other sectors beyond electricity ? Building Thermal? Transportation? Industry?

Challenges & Opportunities – Transitioning to an Integrated Energy Grid

Big Savings from Vehicle-Grid Integration (VGI)

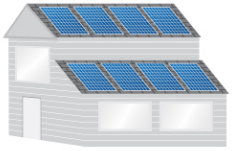
RECARGO

The U.S. electrical grid lacks energy storage.
Battery-powered cars could fill this gap, storing and returning energy as needed.



Grid operators can use EV batteries to smooth peaks and valleys in demand, avoiding use of peaker plants.

$150 million per year in avoided emissions costs for California alone and up to **$3 billion** in emissions savings nationwide



Rooftop solar can power cars, instead of going back to the grid. EV owners can use this "free" solar fuel.

Up to **$1000/vehicle/year** saved by consumers

EV owners are paid by utilities for allowing vehicle batteries to store energy, thus stabilizing the grid.

$300-$1000/vehicle/year saved by consumers and 15-25% cheaper fueling costs

EV battery storage can buffer peak demand on grid, preventing damage and wear of transformers and wires.

$300 million to **$1.6 billion** in annual grid system value

EV owners can schedule charging when greener renewable energy is most plentiful.

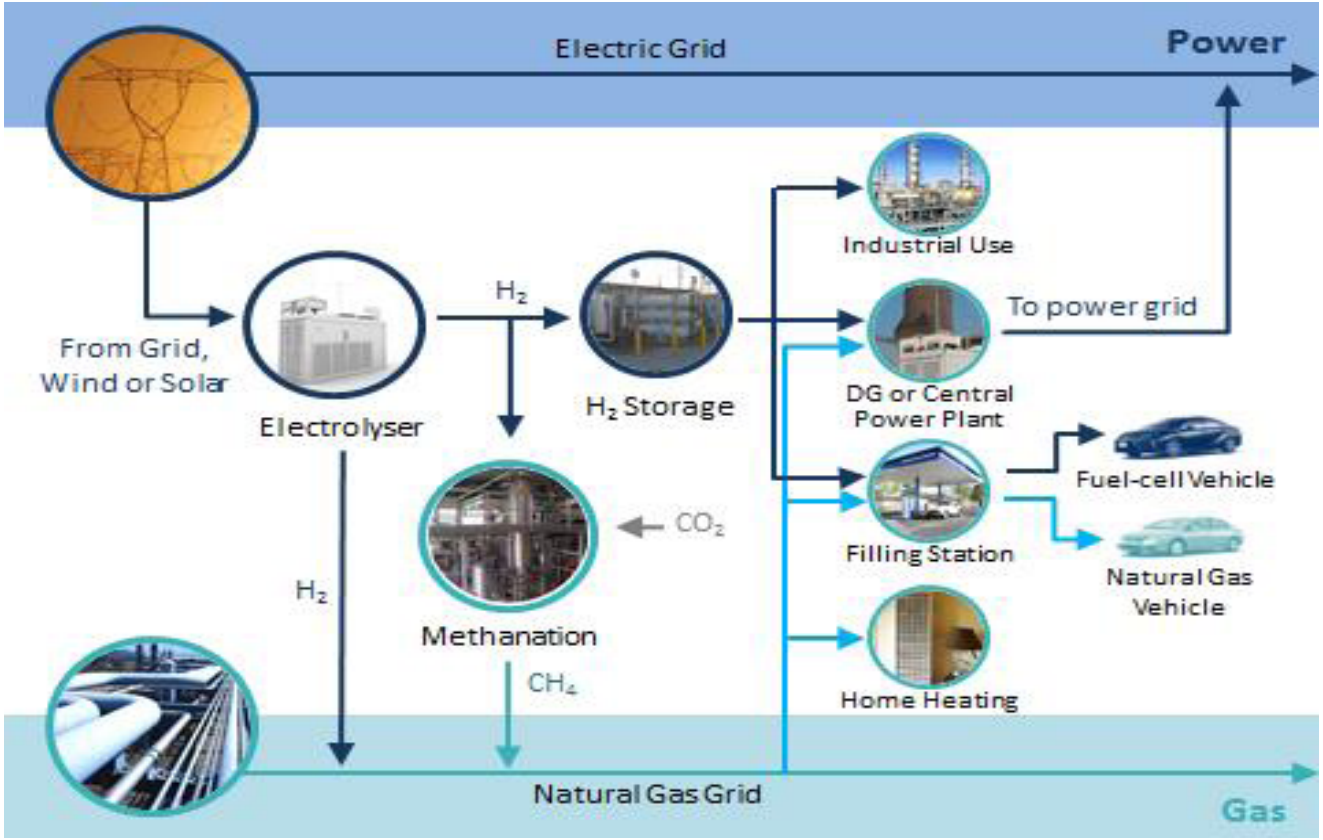
Up to **$4 billion** in annual benefits for renewable energy

Calculations: www.chargemanager.com/vgi-calcs.html

Sources used in calculations

Challenges & Opportunities – Transitioning to an Integrated Energy Grid

Power to gas combines familiar technologies in new ways to create innovative clean energy solutions across sectors.



Challenges & Opportunities

How to protect the most vulnerable?

Local Governments in US

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Examples Committed to 100% Renewable Power Procurement Community Wide

Lancaster, CA by 2020
Marin County, CA by 2020
San Francisco, CA by 2030 (building thermal and transportation by 2050)
San Jose, CA by 2022
San Diego, CA by 2035
South Lake Tahoe, CA by 2032
Miami, FL (by 2035
Orlando, FL by 2050
East Hampton, NY by 2020 (other sectors by 2030)
Multnoma County, OR by 2050
Portland, OR by 2050
Columbia, SC by 2035
Salt Lake City, UT by 2032
Olympia, WA by 2035

Examples that have already achieved it

Palo Alto, CA (by the end of 2017, also working on gas sector)
Greensburg, KS Burlington, VT
Aspen, CO by
Georgetown, TX

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Trends Among Successful Early Adopters

Photo credit: Agrokraft

- **Large land areas per capita**

100% RE targets in dense urban areas are on the rise (e.g. San Francisco, San Diego)

- **Strong local leadership** - community, business and government

- **Recognition of economic and environmental reasons**

- **Choice over power procurement**
  - Smaller cities with public utilities
  - Cities and Counties with Community Choice (CCA)

  California mostly, where cities/counties tend to adopt CCAs for climate protection vs. only for reducing power bills.

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Trends Among Successful Early Adopters

- **Official 100% RE targets** with timelines and practical **implementation plans**
- Once an official target and plan are in place, follow most or all other **Best Practices** to reach 100% RE target

San Diego, CA

2013: *Mayor's office committed to 100% RE target at Pathways to 100% RE conference*

2014: *New Mayor kept 100% renewable electricity target in Climate Plan with bipartisan City Council support*

2015: *Plan finalized state review*

Good Plans Come In Many Shapes & Sizes

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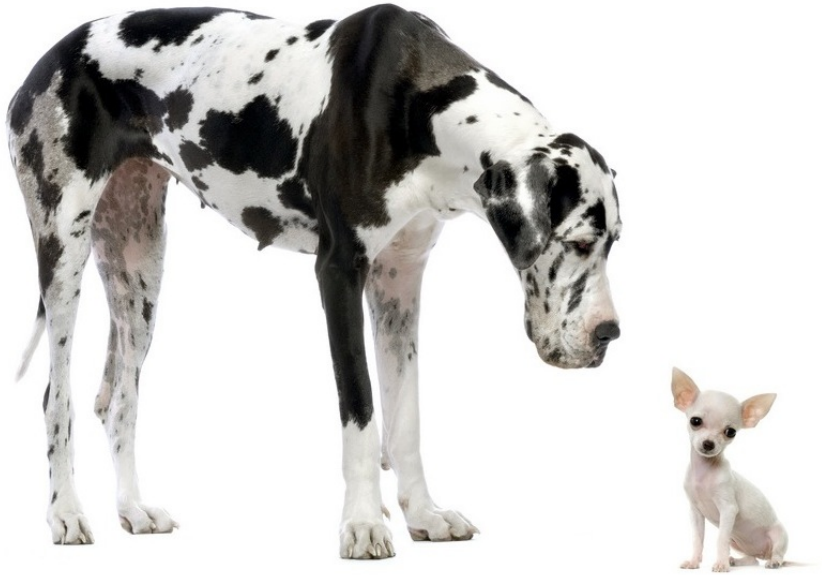

5 Good Plan Ingredients

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- Openly address Challenges and Solutions
- Thoroughly assess Resources, Cost, Financing Opportunities
- Analyze, Adjust, and Integrate Multi-jurisdictional Regulatory & Policy Frameworks
- Reflect Community Values
- Offer Useful Direction to Planners & Implementers

After 100% Goal & Plan: 10 More Best Practices

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1. Emphasize direct procurement of locally generated RE.
   - supports local jobs/economy
   - supports added RE coming online efficiently

2. Choose policies with "TLC" and adaptability
   - TLC = Transparency, Longevity, Certainty
   - Critical ingredients for sustained investment

3. Cut the red tape (building permits, etc).
   - Area where local government has broad control

4. Give as many as possible a chance to engage and profit.

5. Lead by example.

Greensburg, KS Green City Hall

After 100% Goal & Plan: 10 More Best Practices

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6. Track progress.
7. Set milestones & achieve at least one quickly.
8. Educate the community, including kids.
9. Consult other frontrunners for lessons learned.
10. Take a comprehensive view of the economics.

City of San Francisco: *1990 - Today*

Cut greenhouse gas emissions ***28+%***

Increased renewable electricity community wide ***44%***

Increased population ***over 19%***

Increased GDP ***78%***

Looking Ahead - A Short List

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- **100% renewable energy will continue to reach public acceptance as a concept, expanding from electricity to other sectors** - Debate will intensify on how, how fast, and who leads and profits.

- **More coordination will be needed between local, regional, and national governance entities.**

- **Solar will reach grid parity in most places,** adding to momentum.

- **New utility business models will continue to emerge** that focus on new services, customer opportunities, and tariff structures.

- **Building efficiency will continue to be imperative** and should translate to new state and local codes and standards

- **Storage and grid management solutions will play ever more important roles**, with debates focused on costs, wise use of limited resources, reliability.

- **Financing and investment will continue to respond to policy TLC.**

- **Negative impacts of reliance on conventional energy sources** will intensify, adding to pressure to accelerate the energy transition.

- **Thinking and planning will continue to evolve from separate sector grids to energy grids** and an **integrated renewable energy system.**