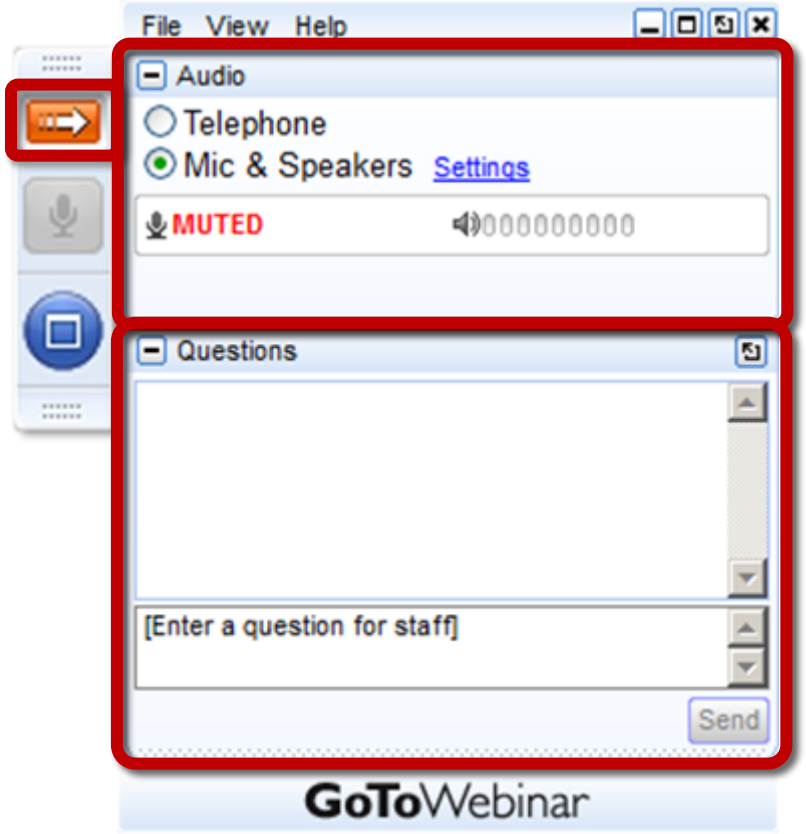
Benefits of Scaling Local Solar and Storage

November 22, 2021

Webinar Logistics



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CleanEnergy States Alliance


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100% Clean Energy Collaborative

Assists states and other entities that have 100% clean energy goals (or are considering adopting such a goal) by providing knowledge-sharing activities and analysis so that they can address program challenges and opportunities.

The 100% Clean Energy Collaborative is managed by the Clean Energy States Alliance in partnership with the US Climate Alliance.

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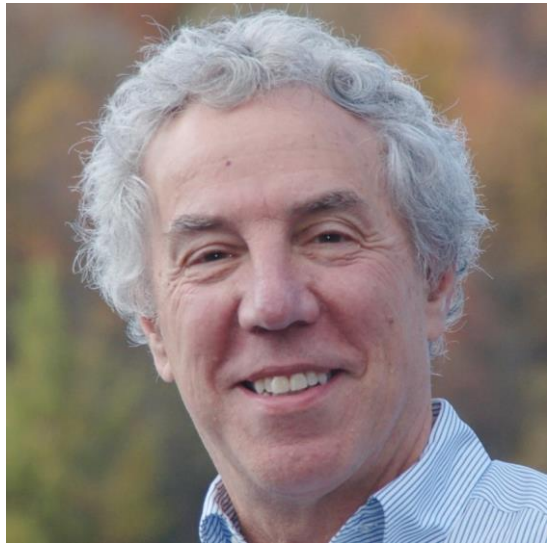
Webinar Speakers

Karl R. Rábago
Local Solar for All



Warren Leon
Executive Director,
Clean Energy States
Alliance (moderator)

MODELING 80% CLEAN ELECTRICITY BY 2030:

Growing distributed solar and storage is key to achieving the President's vision of 80% clean electricity by 2030

October 2021

What did we do?

Using an advanced grid model, we asked the question:

How do we build a grid that can achieve President Biden's clean energy goals at the lowest cost?

80% clean electricity and 50% economy-wide reductions by 2030 + 95% economy-wide reductions and 100% economy-wide electrification by 2050

Snapshot of our Modeling:

Growing distributed solar and storage is key to achieving the President's vision of 80% clean electricity by 2030

Least Cost Clean Energy Transition plan:

- Results in a minimum of **103 GW of distributed solar** and **137 GW of distributed storage** capacity
- Enables **579 GW of utility-scale solar** and **442 GW of wind**
- Saves **$109 billion** by 2030 over the utility-scale-only approach
- Adds **1.2 million local solar and storage jobs** by 2030
- Directing 50% of local solar capacity to low- and moderate-income (LMI) households could lower the energy burden for **8-15 million LMI households**
- Same conclusion as other studies (DOE Solar Future Study, SEIA's 30x30 analysis, Local Solar Roadmap, etc.): distributed generation must grow between **2 - 4x faster** than in the previous decade (2010 to 2020)

Problem: Utility Planning Models Were Designed For 19th Century Electric Grids and Policy Goals, Running on 20th Century Computers

- Utility planning historical assumes demand and builds large central station generation to fit, with a myopic focus on short-term costs, and considers transmission and distributed resources as an afterthought or static input.

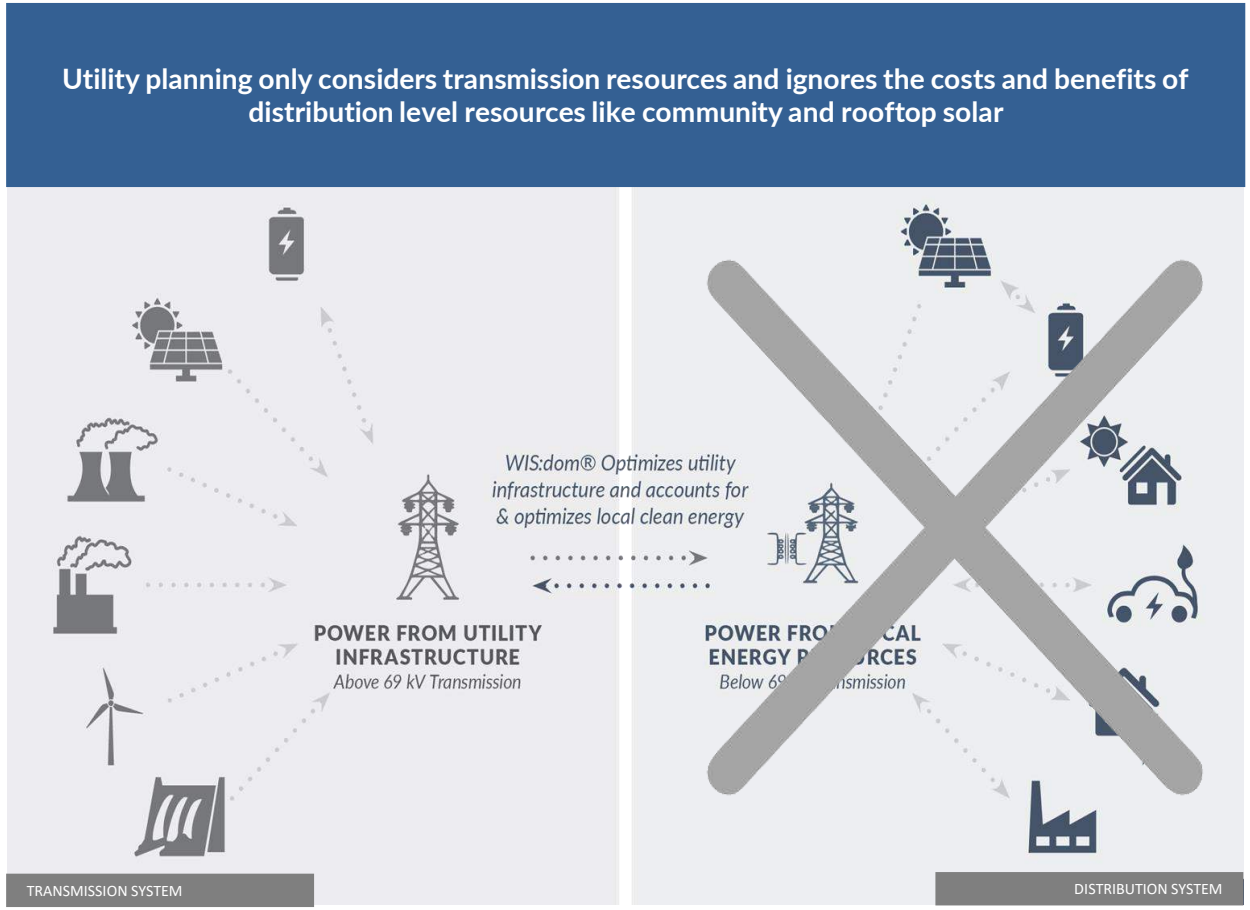
- **These models are used in resources plans and rate setting, but have many flaws:**

  - **Data sets are limited and large-scale** - hourly time slices, no high-resolution climate and weather forecasts, T&D costs are rarely considered or treated with plug-in numbers

  - **Not really system planning but instead, central station planning** - not all resources are considered dynamically and don't account for total system costs and benefits (like T&D costs and savings)

  - **Doesn't consider DERs as a resource** - DERs are static inputs at most

  - **Long-term social and environmental impacts addressed only superficially**



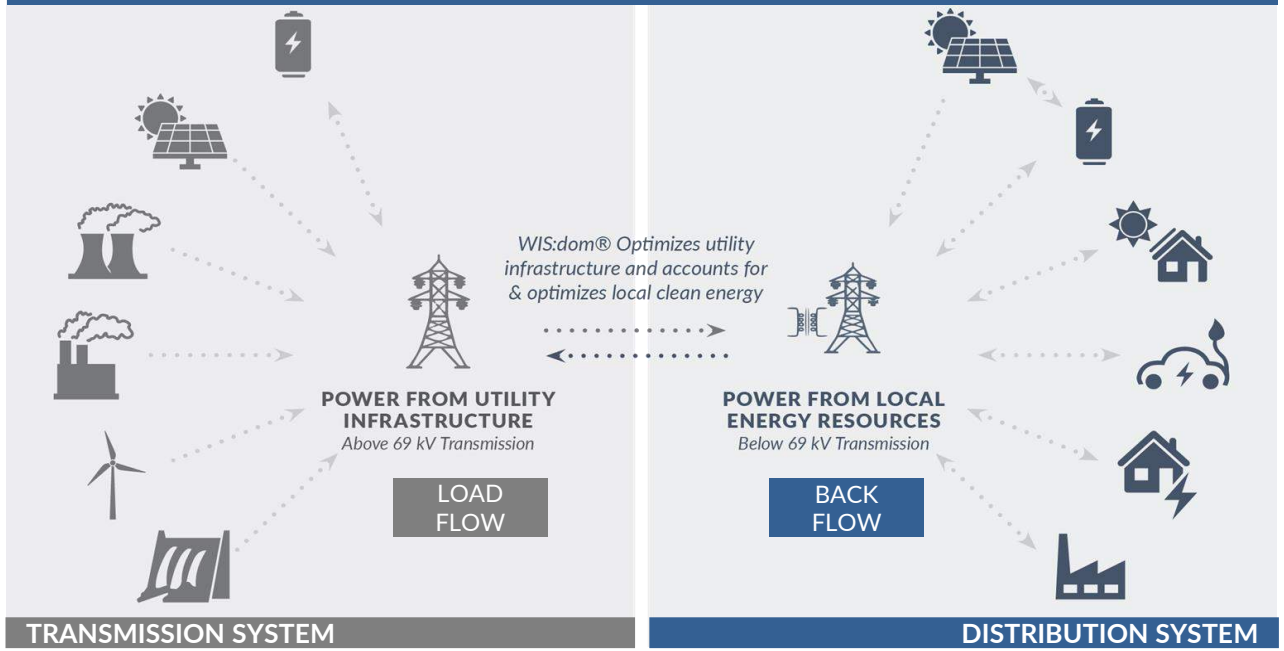
Solution: 21st Century Total System Planning Modeling

1. **MORE & BETTER DATA PROCESSING**

2. **TOTAL SYSTEM and POLICY PLANNING COORDINATION**

3. **LOCAL CLEAN ENERGY INTEGRATION & OPTIMIZATION**

WIS:dom optimizes utility infrastructure (left) + integrates all resource options including local energy produced on the distribution grid (right)



What Did We Ask the Model to Map Out?

Optimized Local Solar + Storage

80% CLEAN ELECTRICITY BY 2030
+
50% ECONOMY-WIDE REDUCTIONS BY 2030
+
95% ECONOMY-WIDE REDUCTIONS BY 2050
+
ECONOMY-WIDE ELECTRIFICATION BY 2050
+
DER OPTIMIZATION
+
LOCAL SOLAR + STORAGE CONSIDERED AS RESOURCE

The model considers distribution infrastructure requirements and determines that leveraging local solar + storage deployment to serve local load and/or reduce peak load, could lessen the need for some of the distribution infrastructure as well as forgoing additional utility-scale generation and transmission buildout. Model looks at CONUS only.

Constrained DER

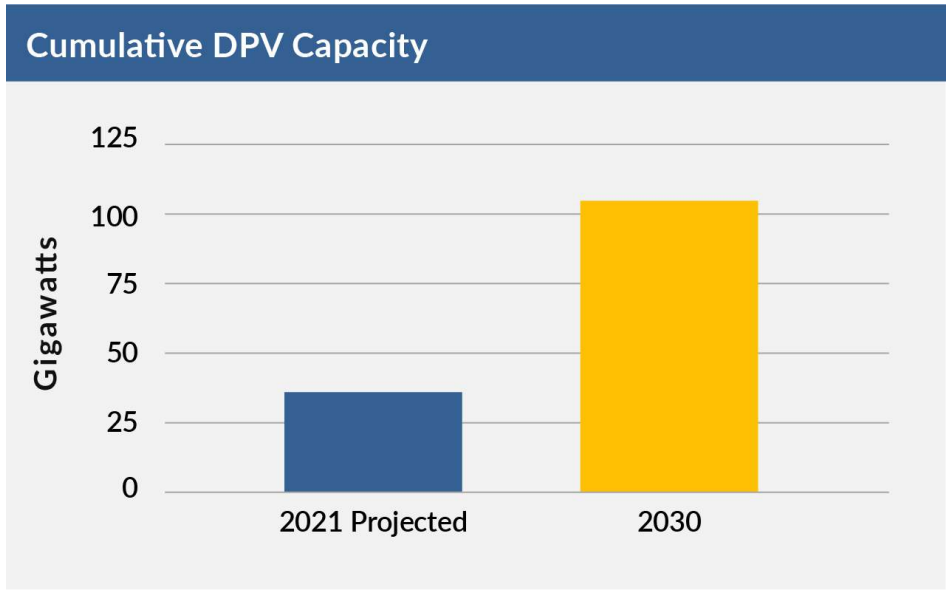
80% CLEAN ELECTRICITY BY 2030
+
50% ECONOMY-WIDE REDUCTIONS BY 2030
+
95% ECONOMY-WIDE REDUCTIONS BY 2050
+
ECONOMY-WIDE ELECTRIFICATION BY 2050
+
NO DER OPTIMIZATION
+
NO NEW LOCAL SOLAR + STORAGE PAST 2021

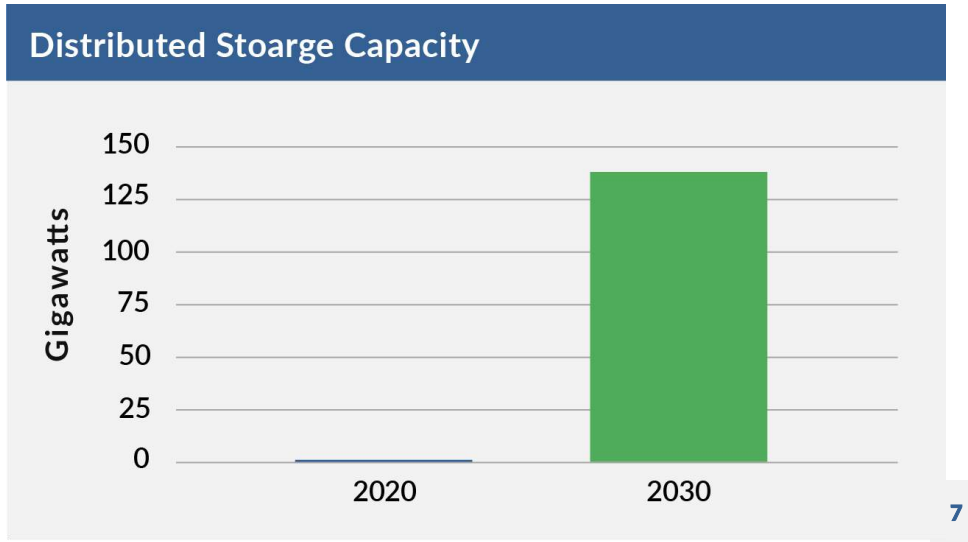
Model assumes zero additional growth of local solar and storage past 2021 and only considers and weighs cost impacts from a central transmission-level grid perspective. Changes to, and upgrade costs for, distribution infrastructure are not considered, they are merely additional costs computed after a solution is found. Model looks at CONUS only.

Local Solar + Storage Capacity Key Takeaways

- The U.S. must deploy a minimum of 103 gigawatts (GW) of distributed, local solar power (including residential, commercial and community) by 2030 to achieve least cost - that's over 65 GW of new distributed solar in the next eight years.

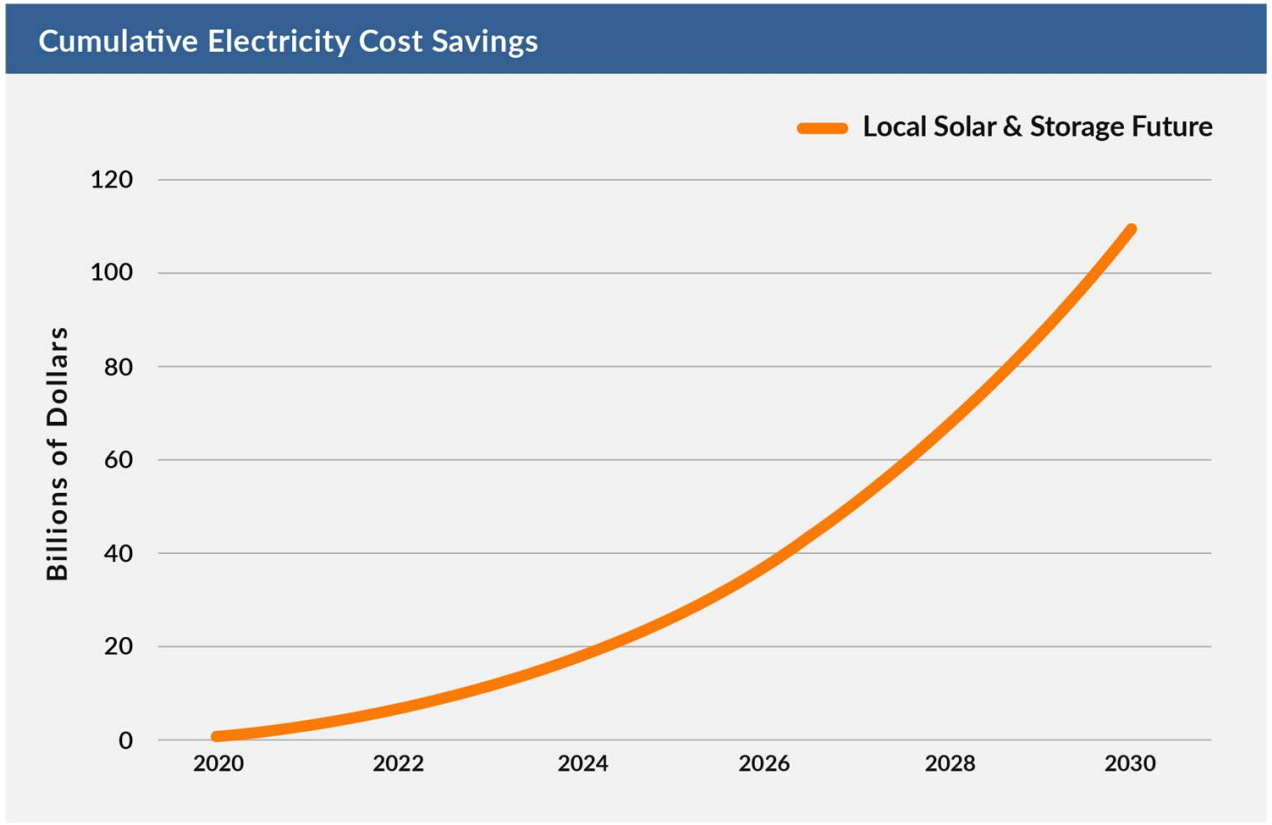
- We must also add 137 GW of distributed storage to optimize the power generation and improve resilience. Together local solar and storage enable future savings and support deployment of large-scale renewables.





Scaling Local Solar + Storage Saves Ratepayers $109.6 billion by 2030 vs. Utility-Scale Only Approach

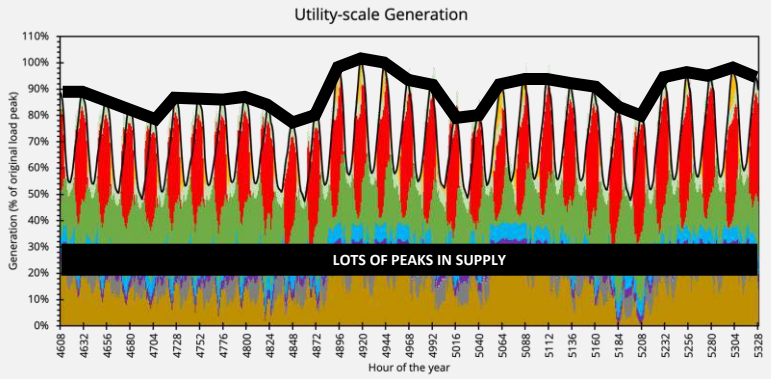
- Initial investments in utility-scale and distribution level grid infrastructure and capacity drive huge long-term savings relative to traditional electricity grid system planning.
- The savings captured in this chart include only monetary grid costs and benefits, it doesn't include indirect societal benefits.
- Savings would be greater if we achieve advanced technology/price targets.

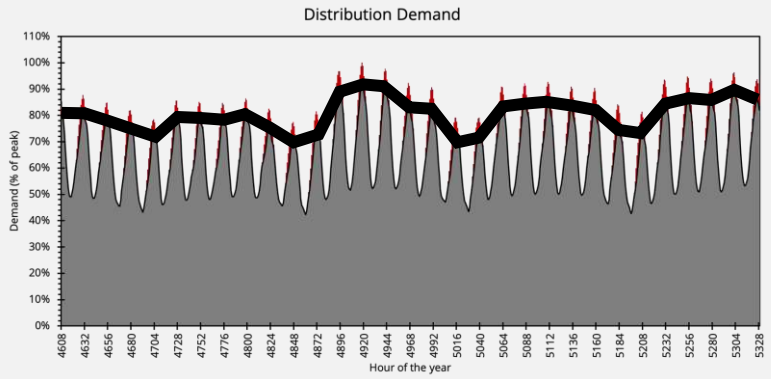


Local Solar + Storage Smooths the Load

UTILITY-SCALE GENERATION ⟷ **DISTRIBUTION DEMAND**

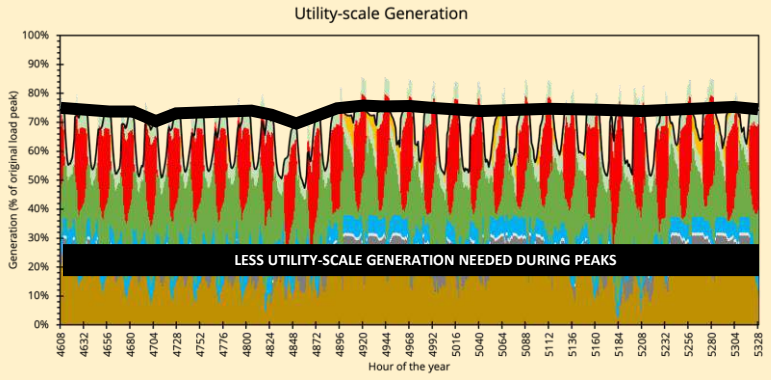
Utility-Scale Only
(summer month in sample state)

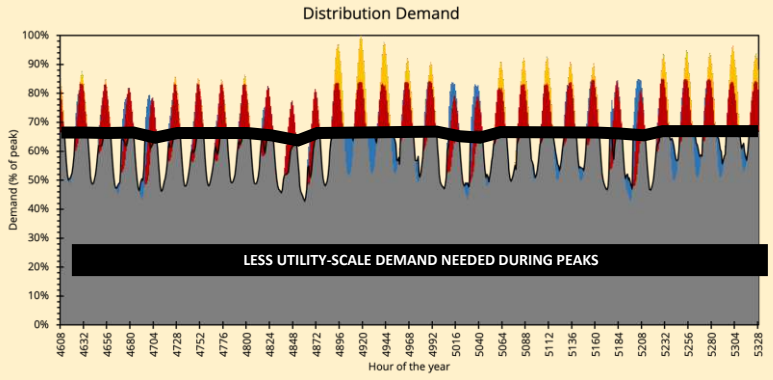




- Demand is sharp and spiked, and supply ramps up and down to meet peaks
- More firming capacity and peaker plants are required to meet demand at times of the day when customers are using the most electricity
- Distributed solar + storage have minimal impacts on “shaping load” and meeting system needs

Optimized DER
(summer month in sample state)



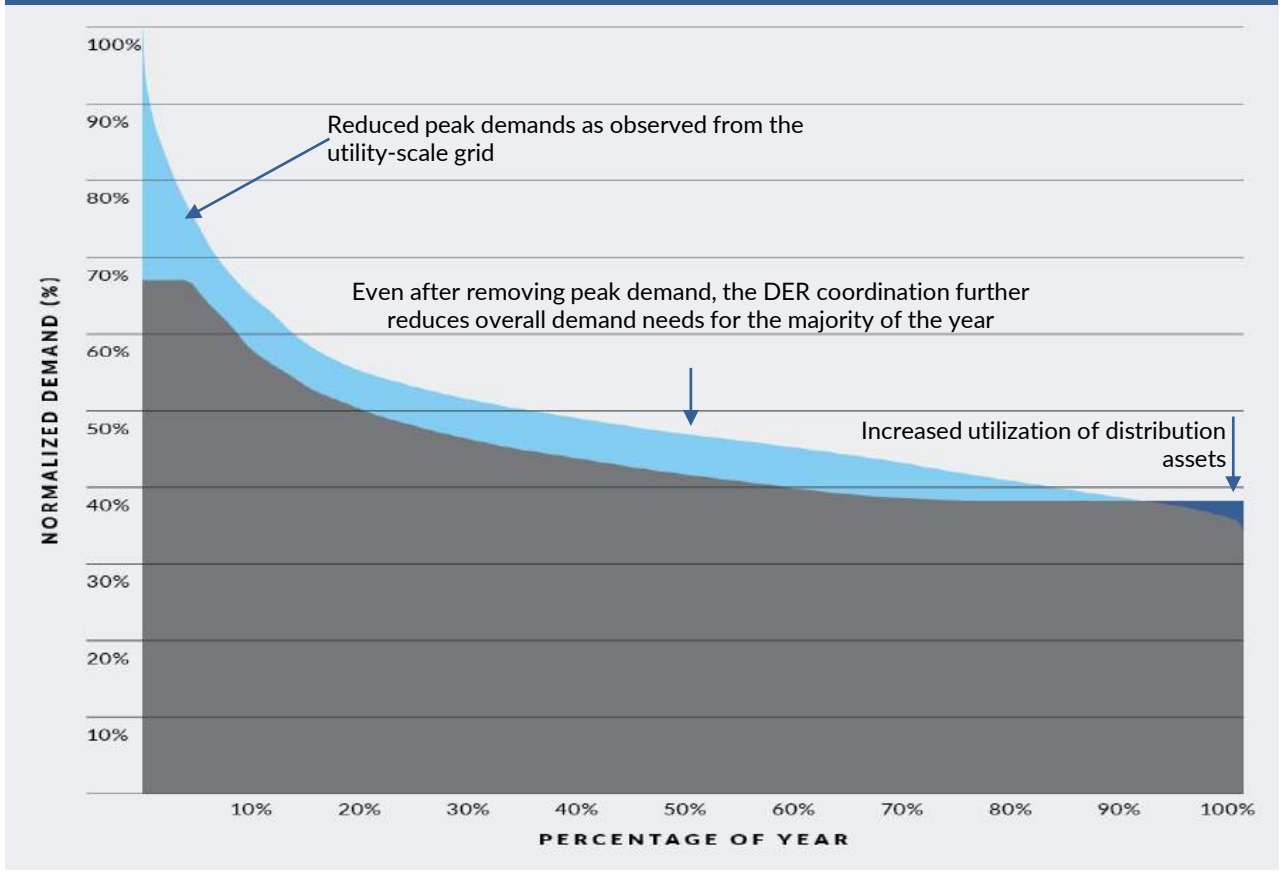


- Demand is smooth because local solar + storage can be deployed at peak times and reshapes load from the perspective of the utility grid
- Permanently eases stress on system during critical peak hours & reduces how much bulk-scale power is needed to serve the distribution grid
- Less bulk power = less money on expensive peaker plants and firming capacity thus overbuilding the system

Local Solar + Storage Shapes the Load

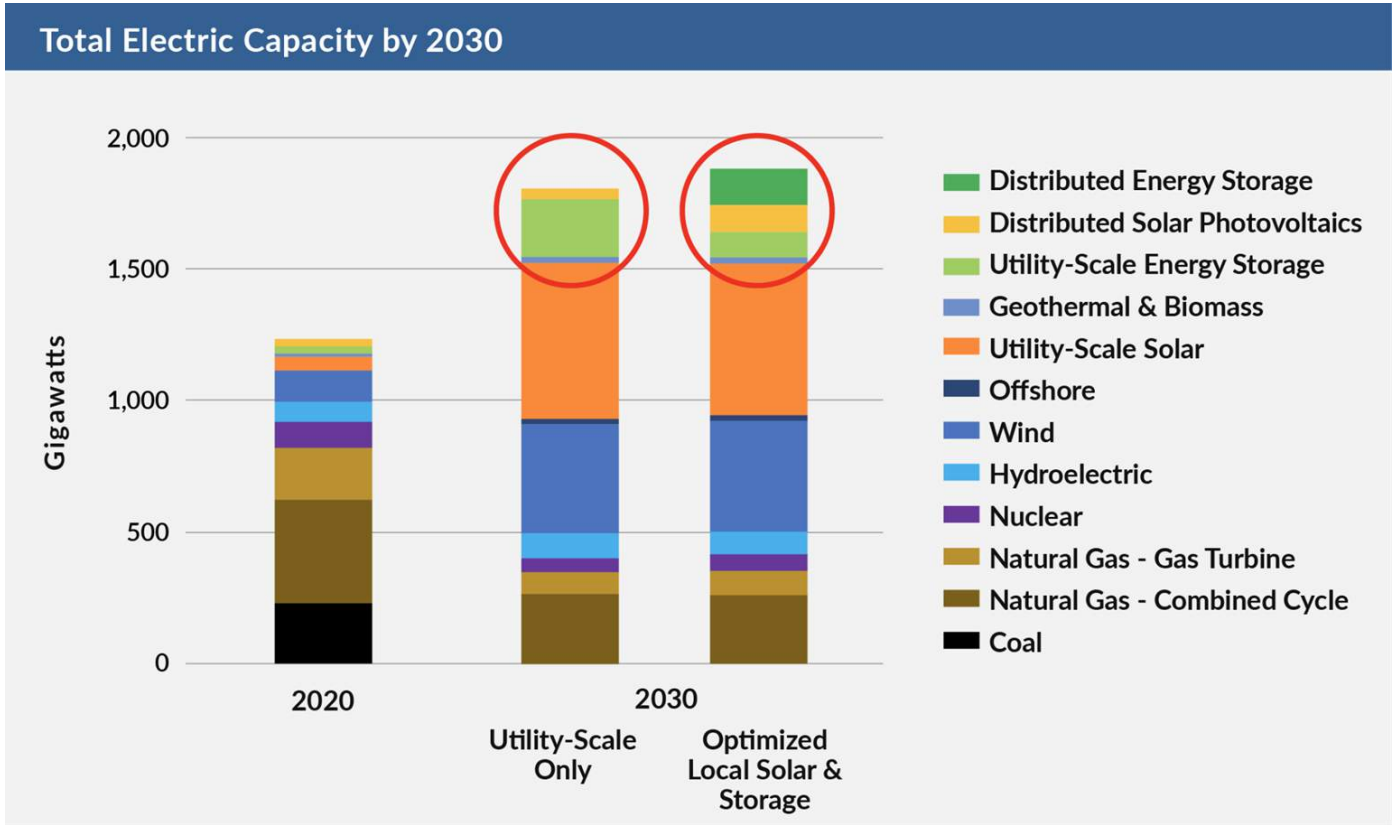
- The entire grid is really only needed a few hours of the year, driving higher costs for everyone with a utility-scale model. Right-sized local solar + storage shaves the peak and saves money across 80% of the hours in the year.
- Local solar + storage shapes the load seen by utility-scale resources, getting more value for bulk-sized variable renewables and other generation.
- The result is more local solar + storage reduces net demand and smooths overall demand to enable access to lowest cost utility-scale generation – more utility wind and solar and less fossil firming capacity.

DER-Improved Load Duration Curve (example state)



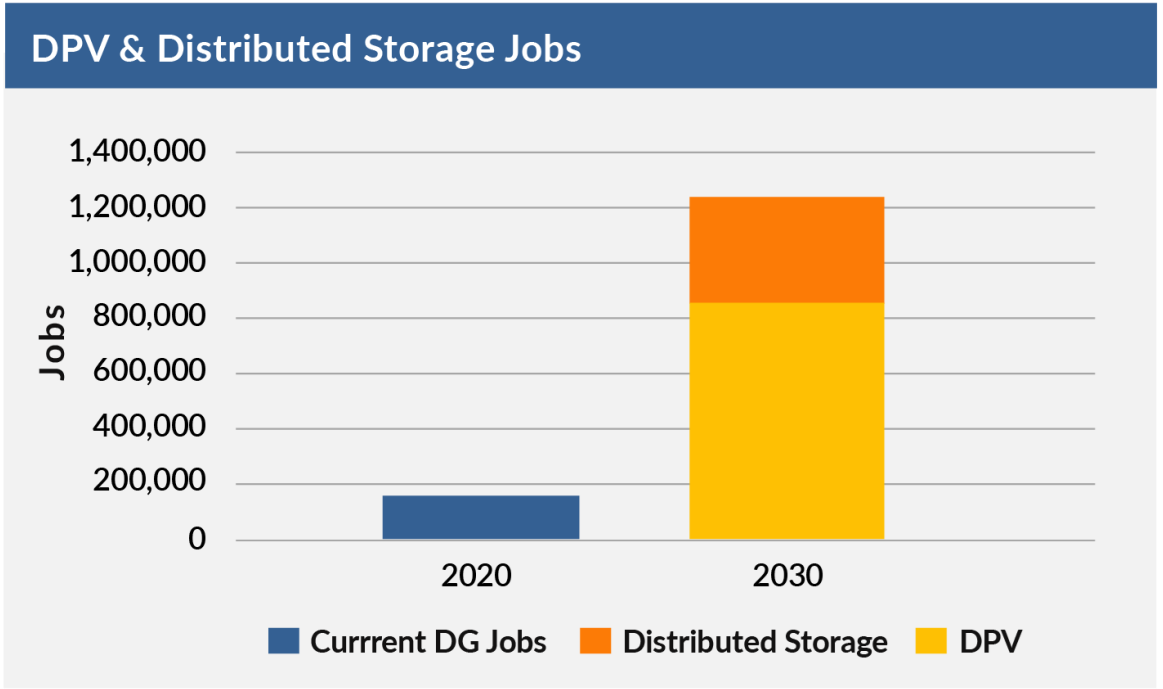
Installed Capacity in 2030

- Local solar + storage is essential to meeting capacity and generation needs by 2030 in the most cost-effective manner
- Local solar + storage enable and improve the economics of utility-scale solar and wind (over 50% of capacity and generation across all scenarios).
- By 2030, there is nearly 579 GW of utility-scale solar and over 442 GW of utility-scale wind installed.
- **TAKEAWAY:** Local solar + storage make large amounts of least-cost utility-scale solar and wind work.



Local Solar + Storage Add 1,200,000 jobs by 2030

- Local solar + storage add 861,000 local solar and 374,000 local storage jobs.
  - These include direct and indirect jobs, but do not include induced jobs (*e.g.*, the ripple effect of direct economic impacts).
- Local solar creates more jobs on a per MW basis than does utility-scale electricity generation.
  - This difference is largely a result of more construction and operations jobs from distributed energy facilities.
  - DPV has an average job/MW-ac ratio of 8.4 compared to UPV's job/MW-ac ratio of 3.4*.



*Actual ratios are state-specific and are tied to basic assumptions from NREL's JEDI and the IMPLAN modeling tools, adjusted further by actual jobs numbers provided in the Solar Foundation's annual solar jobs report.

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Key Takeaways: Local Solar + Storage is Critical to Achieving Climate and Equity Goals at the Lowest Cost

What we knew before:

- American customers want local solar + storage
- Local solar + storage allows us to target benefits of clean energy more equitably through increased access and jobs
- Local solar on the grid today provides meaningful benefits to the electric grid

What we know now:

- Growing local solar + storage benefits the entire system and all ratepayers by reducing and smoothing electric demand
- This is NOT the time to slow the development and deployment of local solar + storage
- We must grow local solar 2 - 4x faster than in the previous decade

What else can Local Solar + Storage Do?

- Assure we achieve the President's Justice40 goals
- Provide an insurance policy for development constraints for ~1 TW of utility-scale and transmission deployments
- Increase grid resilience
- Grow clean economy jobs
- Reach climate goals faster

Policymakers Must Double-Down on the Growth of Local Solar + Storage

- **Action in Washington :**
  - Congress should (1) extend and expand the solar investment tax credit (storage and ITX costs, direct pay, bonus credit for community solar projects serving at least 50% LMI); (2) create $10B in grant funding opportunities for rooftop and community solar, and (3) support distributed energy resources in the Clean Electricity Performance Program (CEPP).
  - A broad coalition of advocates representing civil rights, indigenous, environment, equity, rural, and business organizations have released a comprehensive policy roadmap on how Congress can ensure the equitable and just deployment of renewable energy through policies that support expanding local rooftop and community solar power for all.
- **Action in States:**
  - Establish clear and consistent policies to grow local solar + storage today and integrate and optimize local solar + storage into state energy planning.

COALITION FOR COMMUNITY SOLAR ACCESS

VCE VIBRANT CLEAN ENERGY

VOTE SOLAR

LOCAL SOLAR FOR ALL

Thanks!

Learn more at www.localsolarforall.org

October 2021

Thank you for attending our webinar

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