COALITION FOR COMMUNITY SOLAR ACCESS

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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:

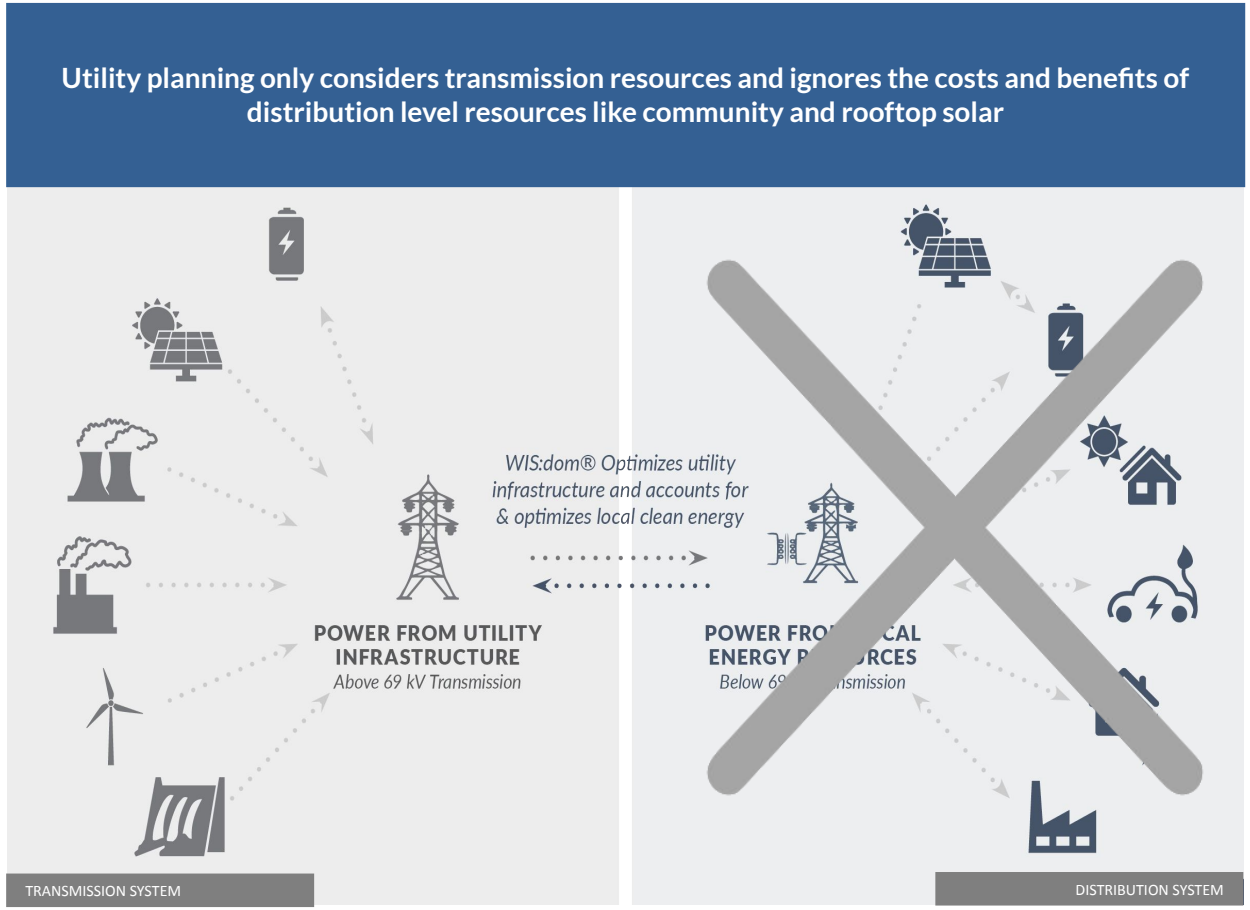
Growing distributed solar and storage is key to achieving the President's vision of 80% clean electricity by 2030

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**



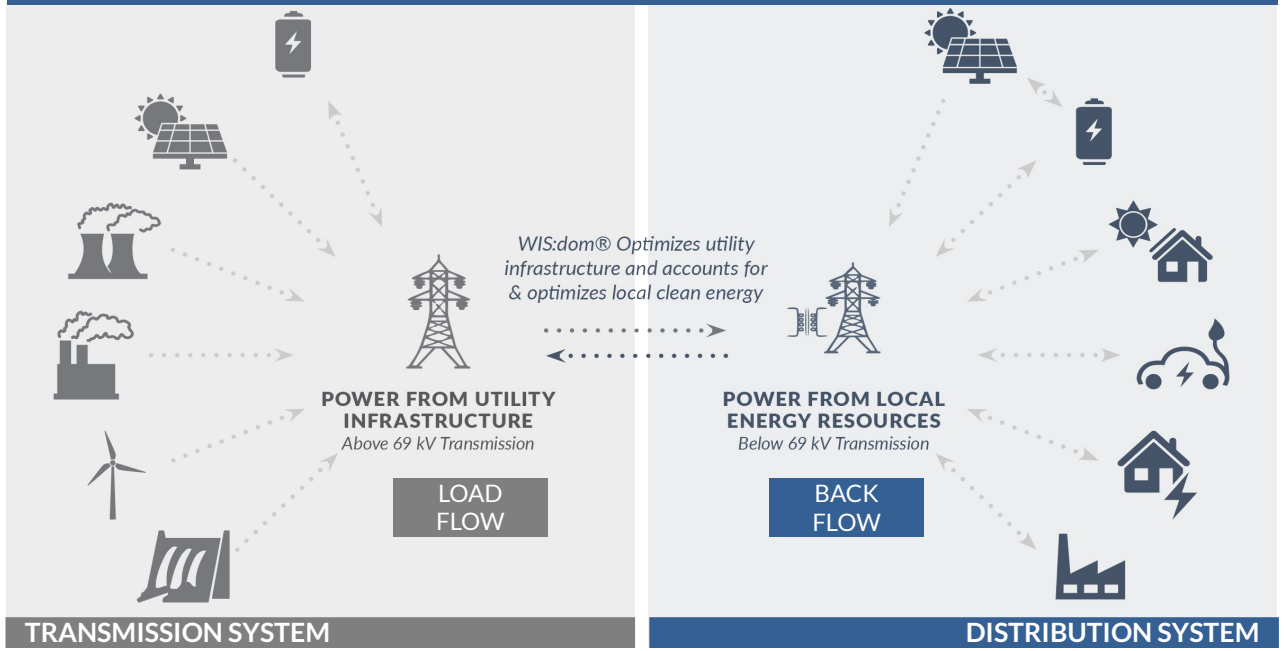
Solution: 21st Century Total System Planning Modeling

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

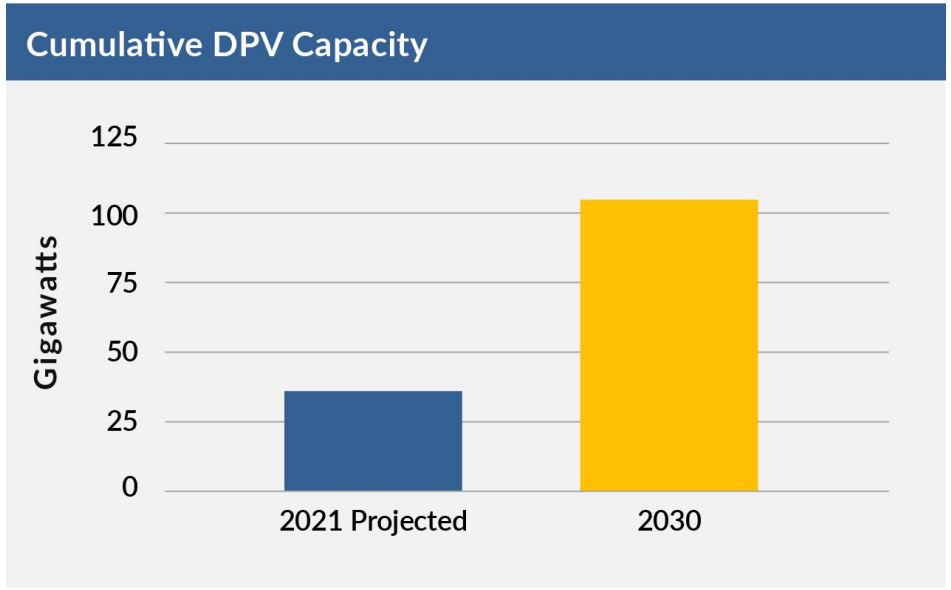
80% CLEAN ELECTRICITY BY 2030
+
50% ECONOMY-WIDE REDUCTIONS BY 2030
+
95% ECONOMY-WIDE REDUCTIONS BY 2050
+
ECONOMY-WIDE ELECTRIFICATION BY 2050
+
NO DER OPTIMIZATION
+
NO NEW LOCAL SOLAR + STORAGE PAST 2021

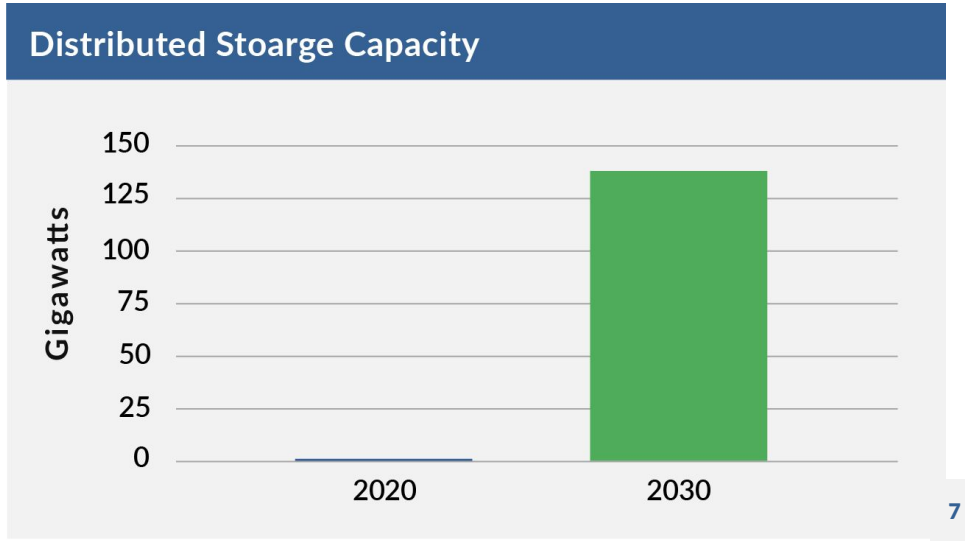
Model assumes zero additional growth of local solar and storage past 2021 and only considers and weighs cost impacts from a central transmission-level grid perspective. Changes to, and upgrade costs for, distribution infrastructure are not considered, they are merely additional costs computed after a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

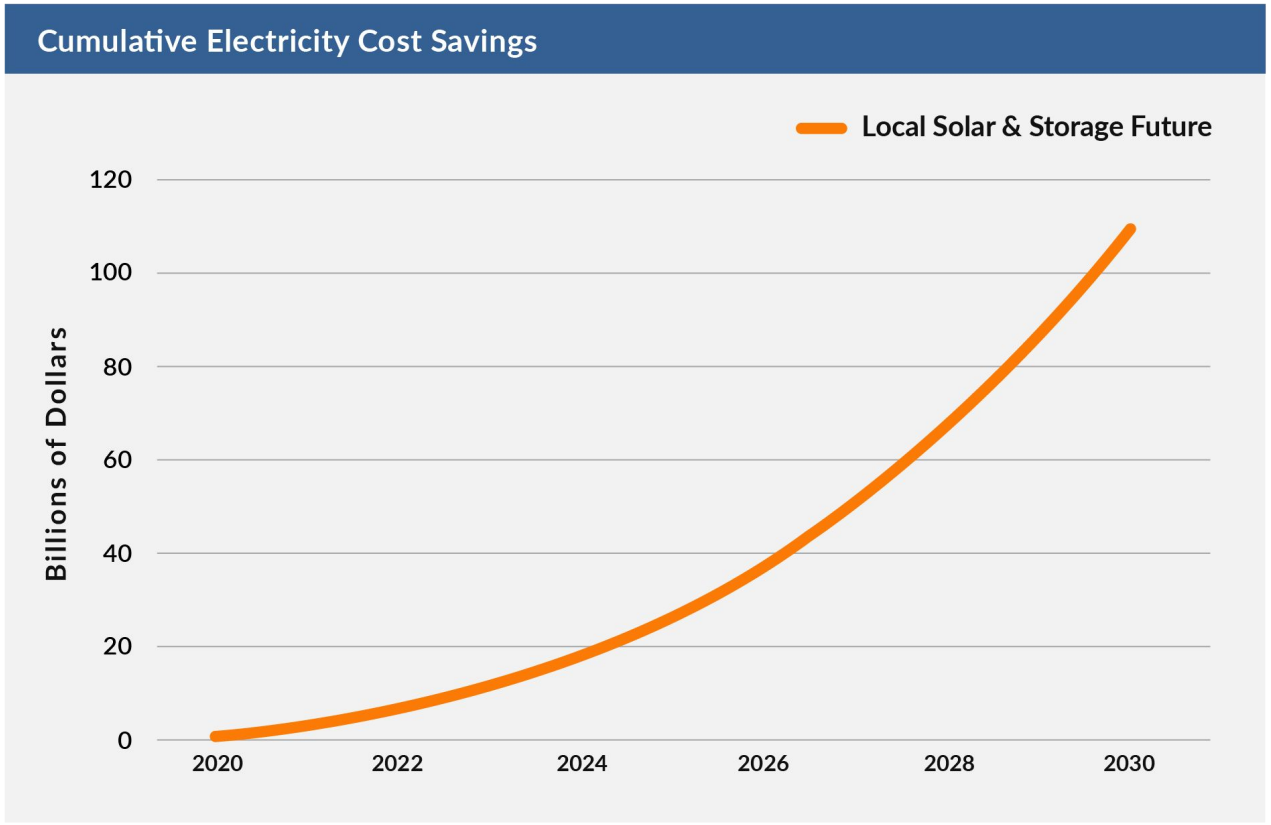
- We must also add 137 GW of distributed storage to optimize the power generation and improve resilience. Together local solar and storage enable future savings and support deployment of large-scale renewables.





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

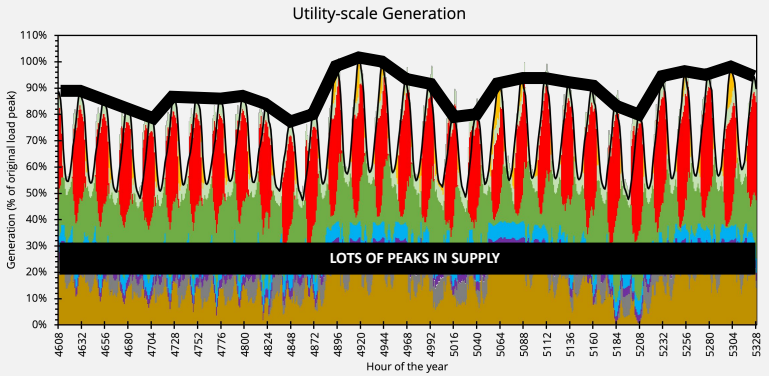
- Initial investments in utility-scale and distribution level grid infrastructure and capacity drive huge long-term savings relative to traditional electricity grid system planning.
- The savings captured in this chart include only monetary grid costs and benefits, it doesn't include indirect societal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

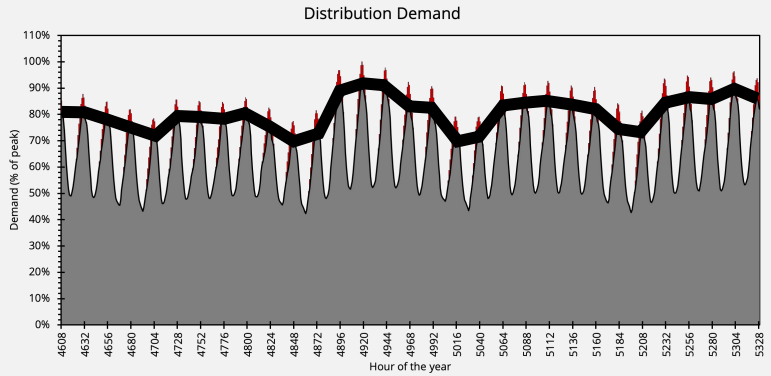


Local Solar + Storage Smooths the Load

UTILITY-SCALE GENERATION ⟷ **DISTRIBUTION DEMAND**

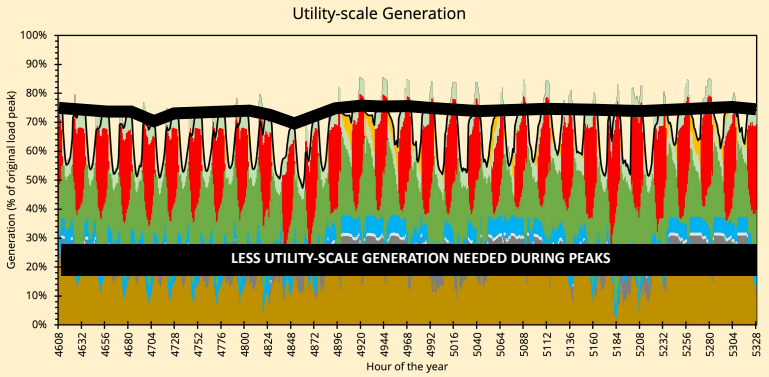
Utility-Scale Only
(summer month in sample state)

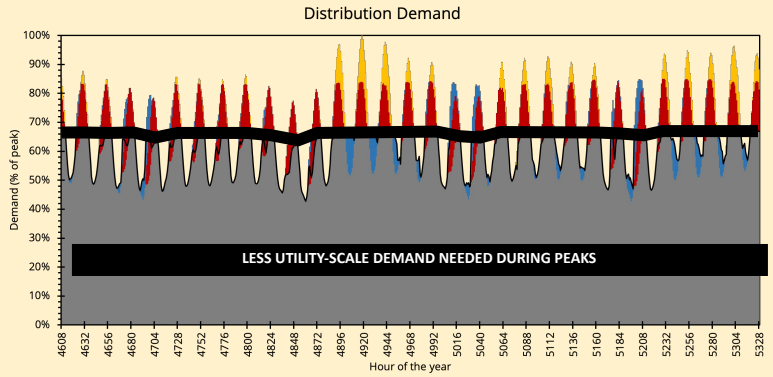




- Demand is sharp and spiked, and supply ramps up and down to meet peaks
- More firming capacity and peaker plants are required to meet demand at times of the day when customers are using the most electricity
- Distributed solar + storage have minimal impacts on “shaping load” and meeting system needs

Optimized DER
(summer month in sample state)



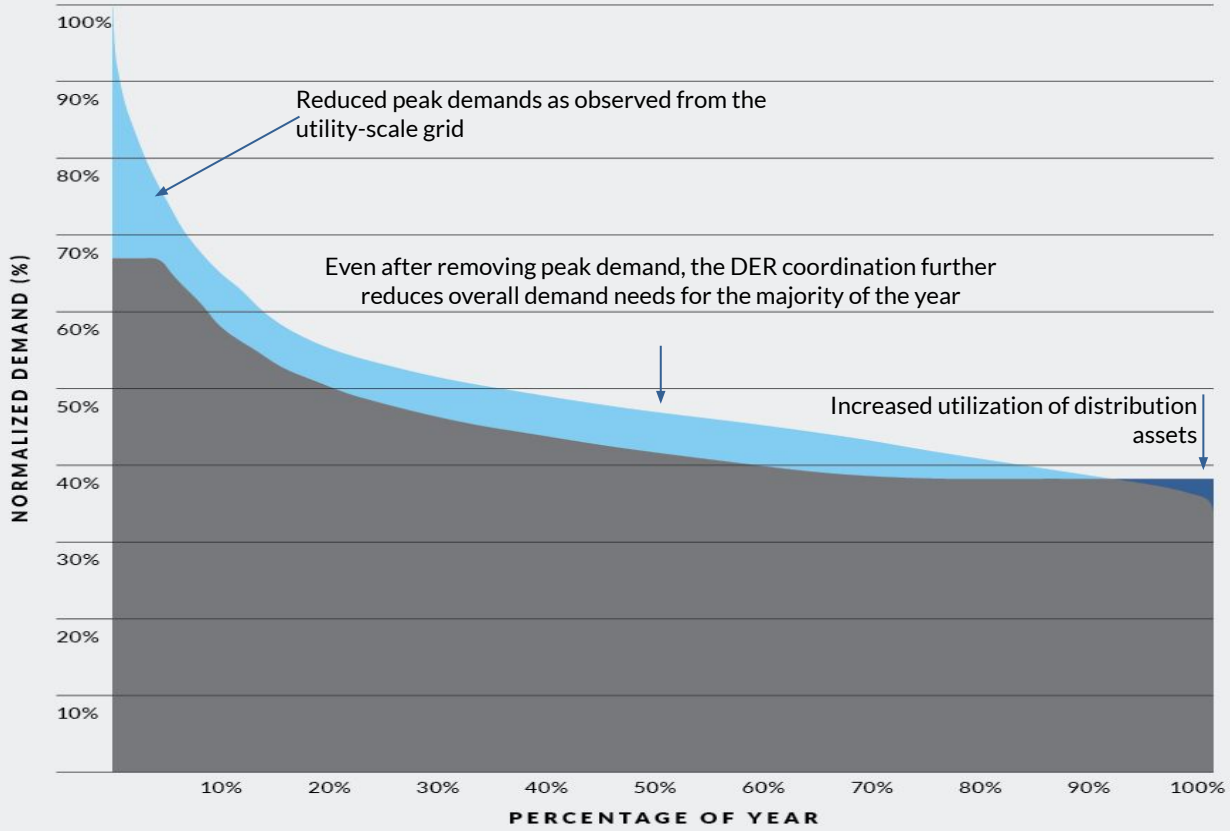


- Demand is smooth because local solar + storage can be deployed at peak times and reshapes load from the perspective of the utility grid
- Permanently eases stress on system during critical peak hours & reduces how much bulk-scale power is needed to serve the distribution grid
- Less bulk power = less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

Local Solar + Storage Shapes the Load

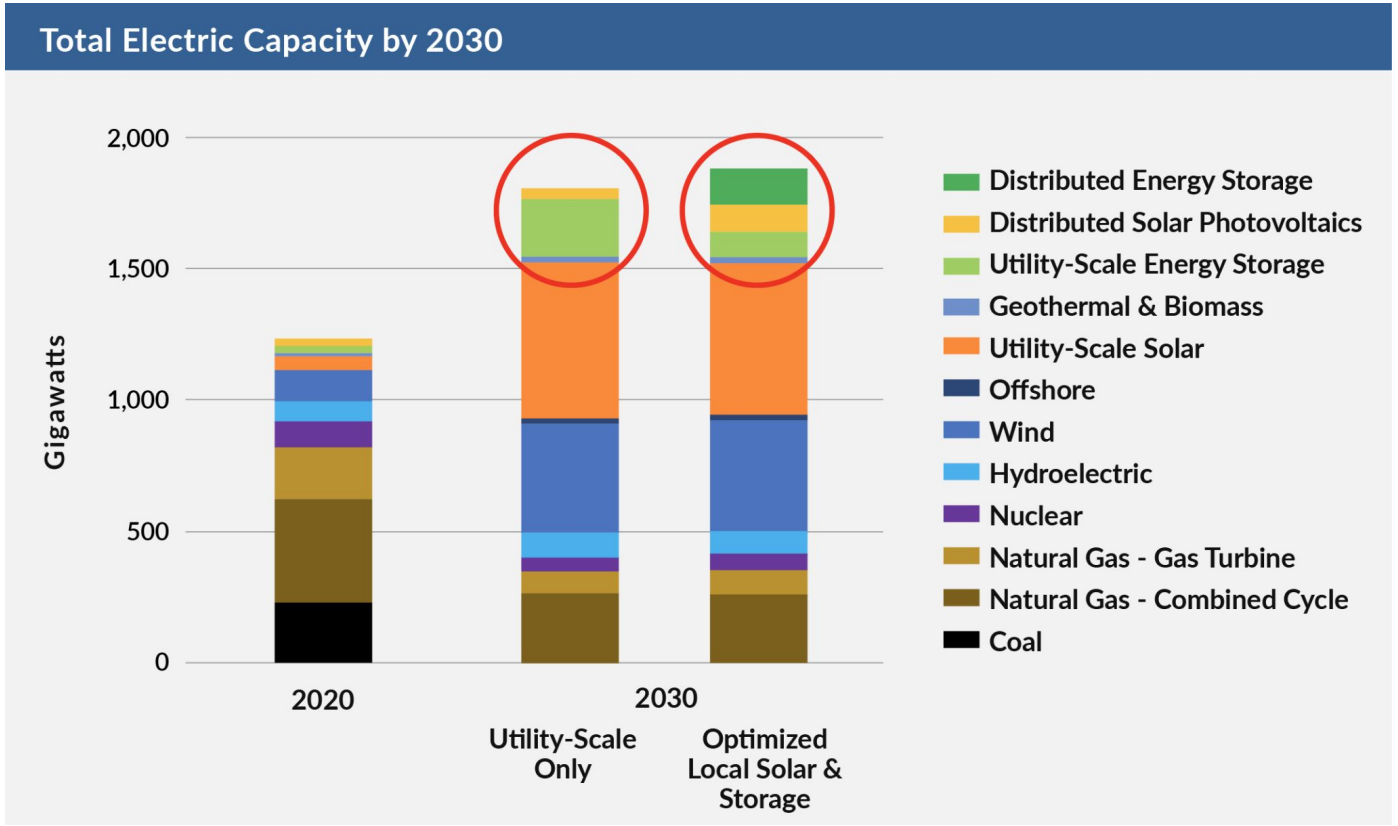
- The entire grid is really only needed a few hours of the year, driving higher costs for everyone with a utility-scale model. Right-sized local solar + storage shaves the peak and saves money across 80% of the hours in the year.
- Local solar + storage shapes the load seen by utility-scale resources, 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)



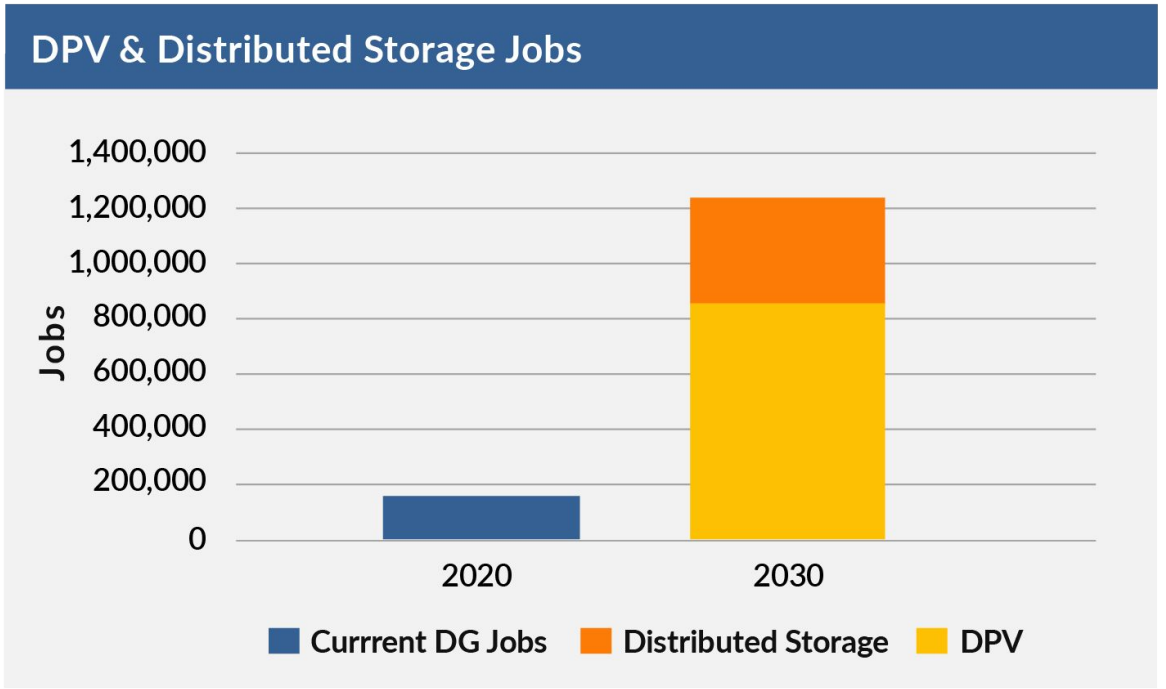
Installed Capacity in 2030

- 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 least-cost utility-scale solar and wind possible at-scale.



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.

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Thanks!

Learn more at www.localsolarforall.org

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