Clean Coalition

The critical role of local solar in achieving 80% clean electricity by 2030

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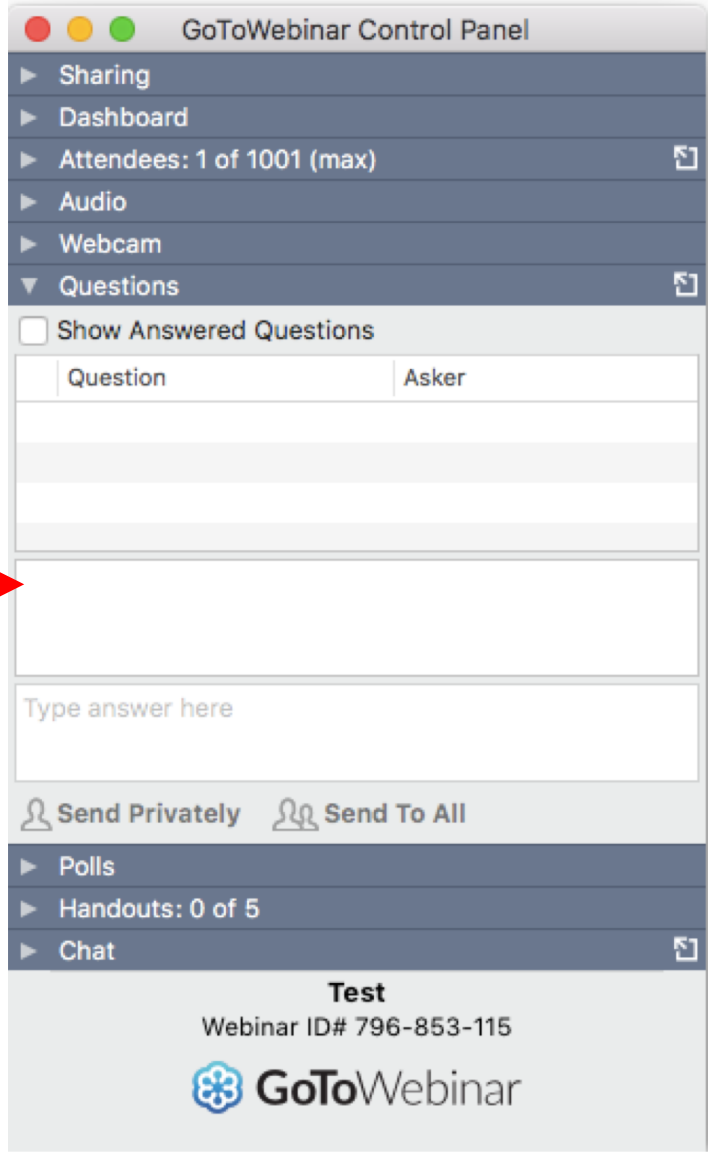
- For other questions, contact Rosana Francescato: rosana@clean-coalition.org



Mission

To accelerate the transition to renewable energy and a modern grid through technical, policy, and project development expertise.

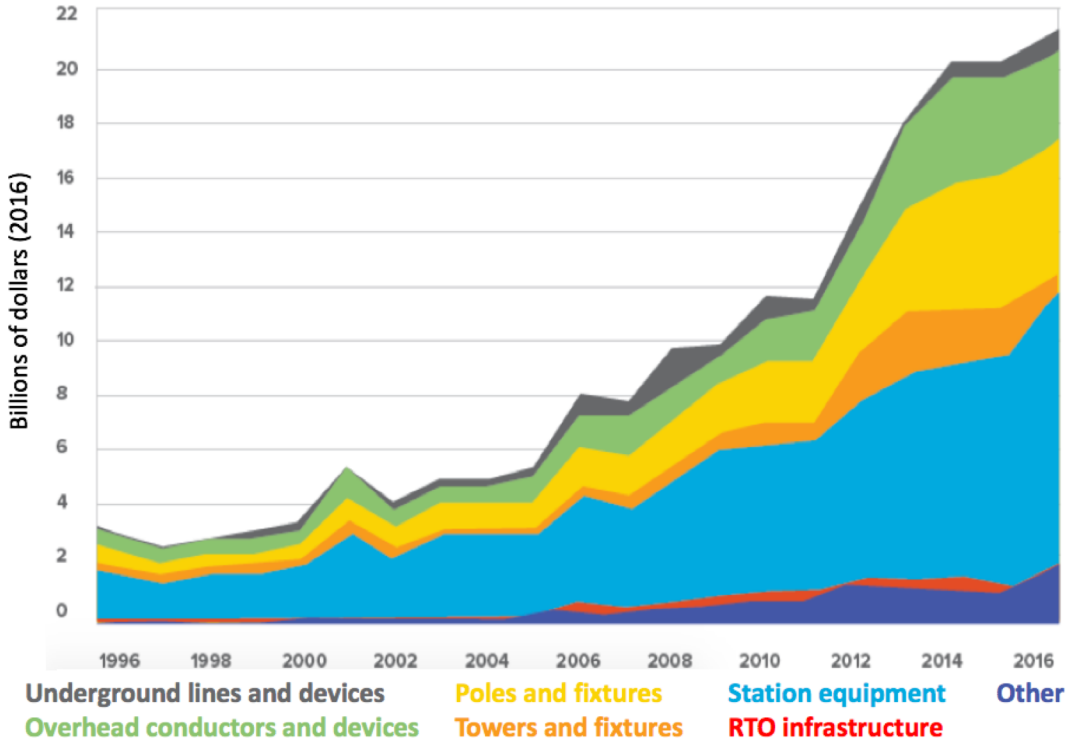
100% renewable energy end-game

- 25% local, interconnected within the distribution grid and facilitating resilience without dependence on the transmission grid.
- 75% remote, dependent on the transmission grid for serving loads.

Transmission costs are fastest-growing component of electricity costs

- Transmission costs are the fastest-growing component of your electricity bill.
- Guaranteed 12% return-on-equity (ROE) for transmission investments leads to conflicts of interest and perverse market outcomes — like the Transmission Access Charges (TAC) market distortion, **the real cost shift happening in California**.

The explosion in transmission spending by major utilities, 1996 - 2016



Transmission costs higher than they seem due to O&M driving ~10x increase to upfront costs

- Capital costs of transmission infrastructure represent a fraction of total transmission costs.
- Operations and maintenance (O&M) and ROE drive up transmission costs significantly over asset lifetime, with those excessive costs borne by ratepayers.

Nominal costs

Asset value capital cost ($100 base)	$100
Return	$197
O&M	$631
Total nominal ratepayer cost per $100 investment (50 years)	**$928**

Real costs, discounted for inflation

Discount rate	2.19%
Asset value capital cost ($100 base)	$100
Return, discounted	$140
O&M, discounted	$296
Total discounted (real) ratepayer cost per $100 investment (50 years)	**$536**

In nominal dollars, total lifetime ratepayer cost is nearly 10x the initial capital cost; O&M accounts for 68% of this because it increases much faster than inflation. In real dollars (constant value dollars, accounting for inflation), the total lifetime cost is 5x the initial capital cost, and O&M accounts for 55% of this.

TAC cause massive market distortions — the real cost shift happening in California

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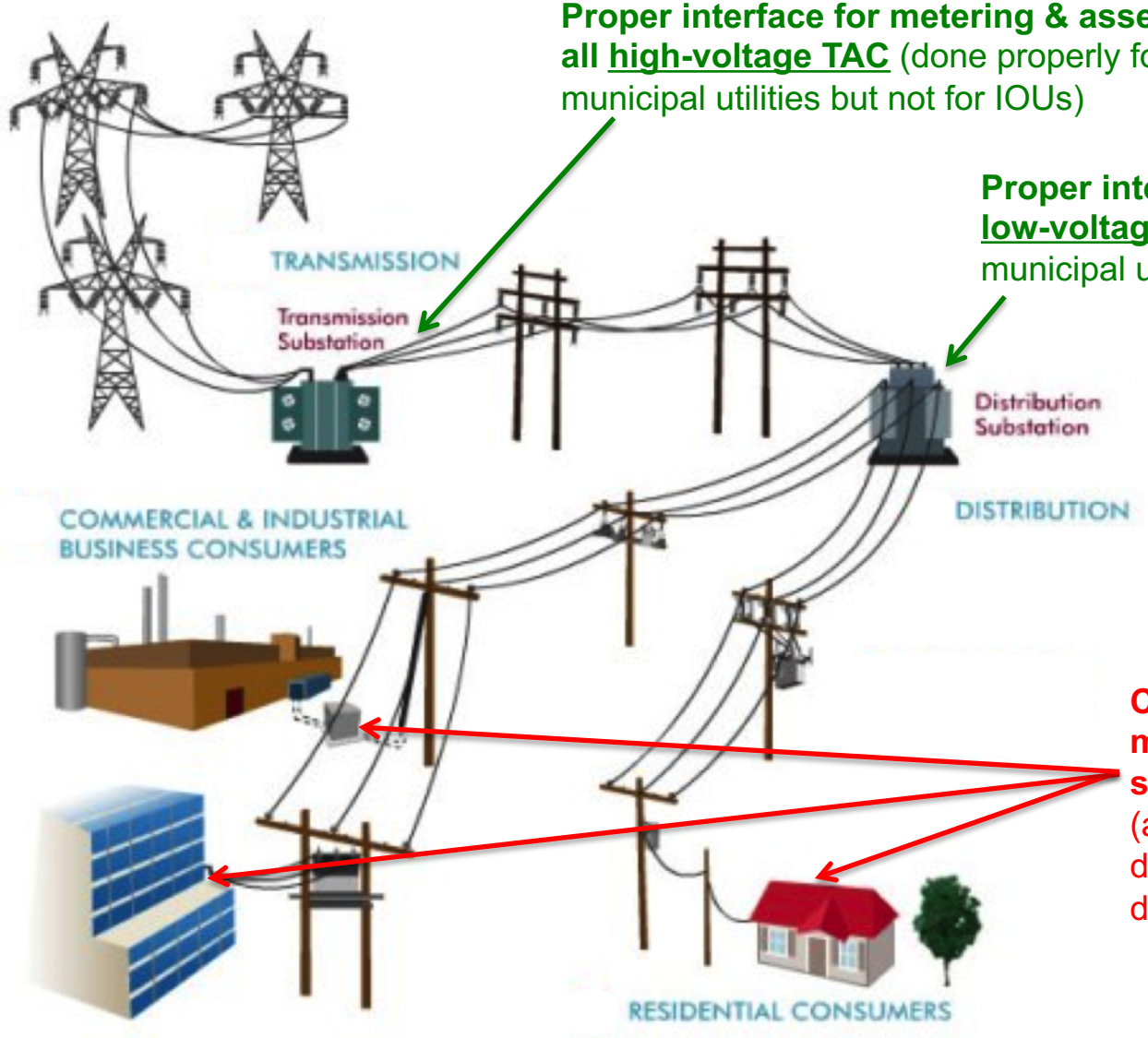


Proper interface for metering & assessing all high-voltage TAC (done properly for municipal utilities but not for IOUs)

Proper interface for metering all low-voltage TAC (done properly for municipal utilities but not for IOUs)

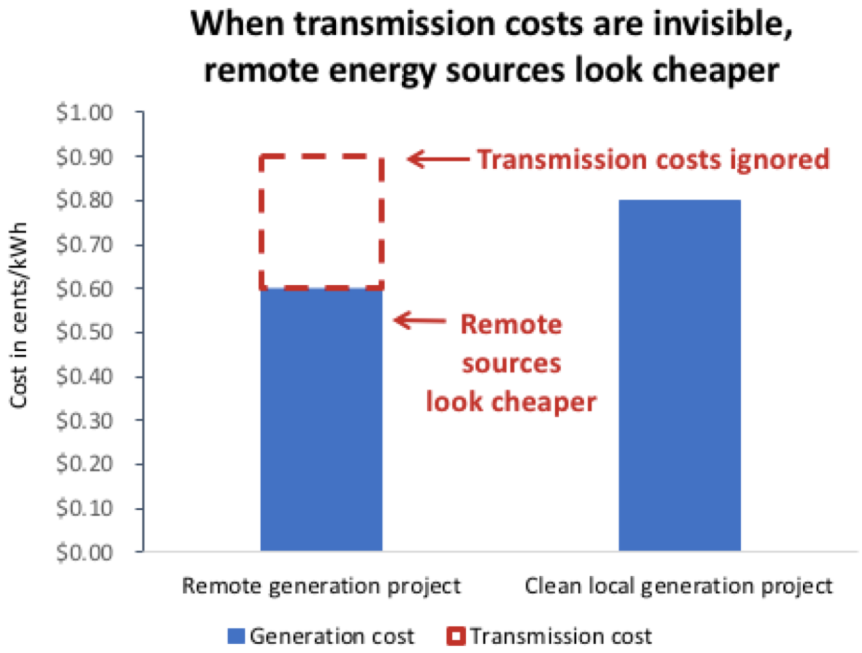
Current interface for metering TAC in IOU service territories
(at customer meters, with no distinction of energy from next door vs 1,000 miles away)

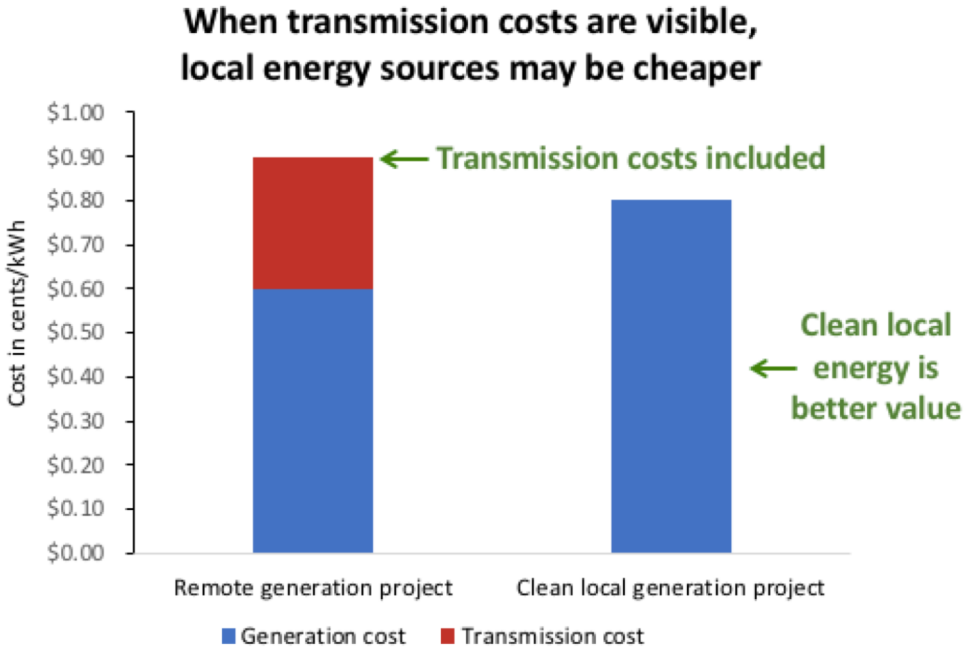
TAC market distortion: The real cost shift

- Transmission Access Charges (TAC) in California's IOU service territories are metered and assessed incorrectly, at the customer meter.
- That's like paying extra shipping & handling fees for something you pick up next door, or paying a toll if you don't cross a bridge.
- This is the real cost shift happening in California.

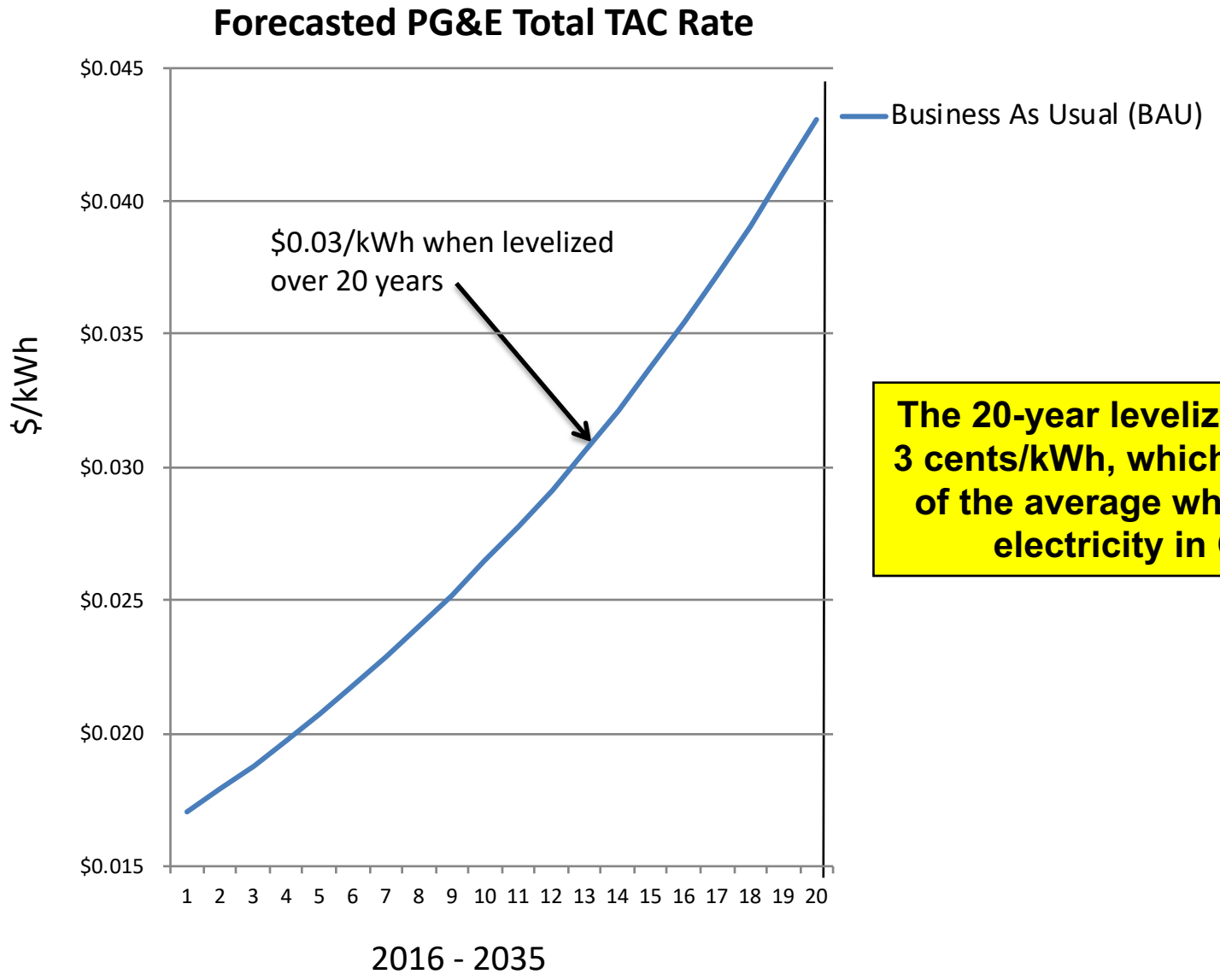
How the TAC market distortion cost shift makes local renewables look less cost-effective

- 3¢/kWh is being stolen from local renewables, making them look more expensive.
- Stealing funds from DER-driven Community Microgrids that deliver community resilience.





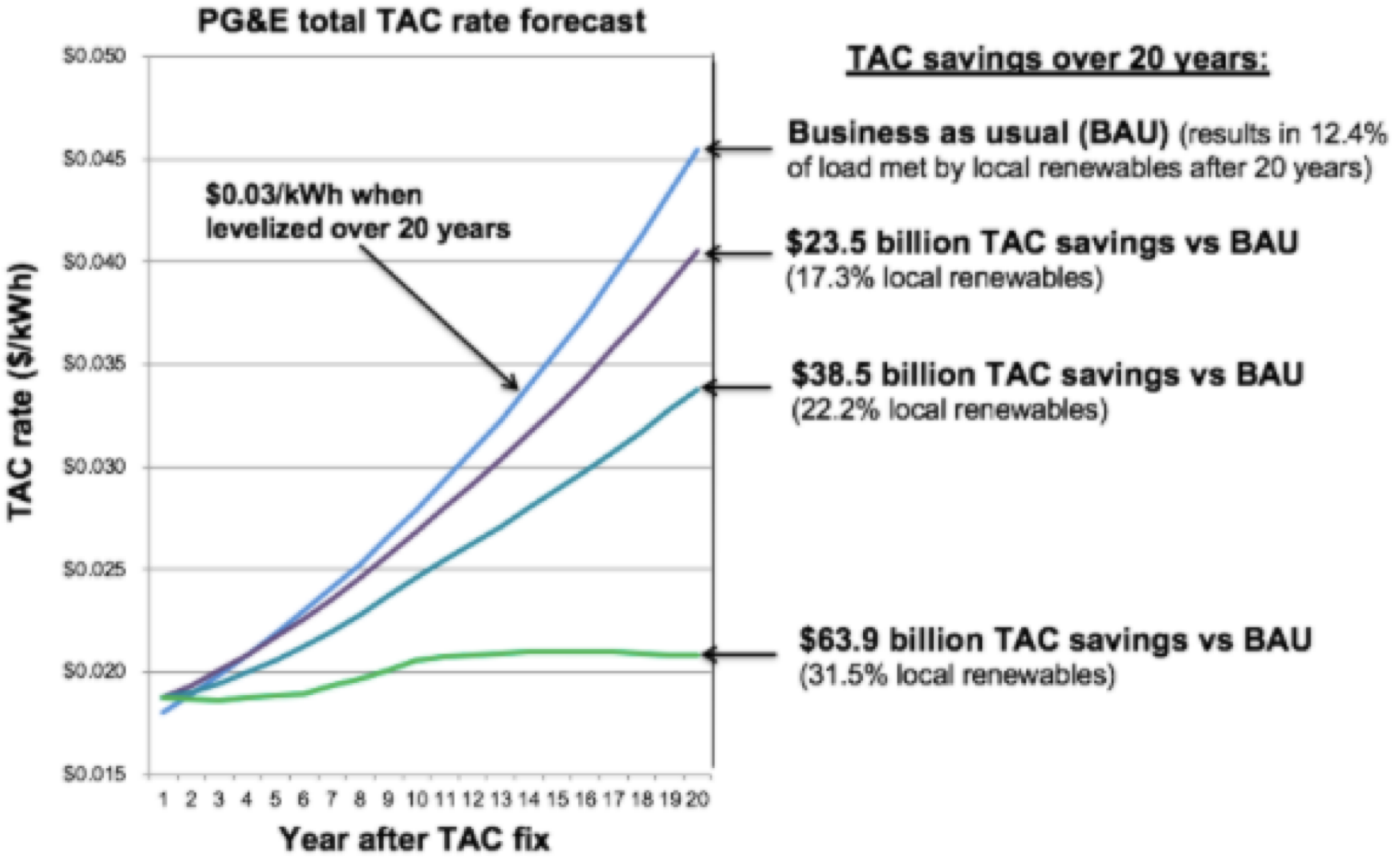
TAC are growing fast to ~4.5 cents/kWh over 20 years (levelized 3 cents/kWh)



The 20-year levelized TAC is about 3 cents/kWh, which is roughly 50% of the average wholesale cost of electricity in California!

Not fixing TAC could cost Californians $60 billion over the next two decades

- Generating energy closer to where we use it = less expensive transmission infrastructure, which lowers costs for ratepayers.
- Continuing with business as usual could cost Californians ~$60 billion in avoidable transmission costs over 20 years.



Proposed TAC reform and supporters

1. Only charge transmission fees for energy delivered through the transmission system.
2. Have procurement reflect both the energy purchase price and the delivery charges.

Nearly 90 organizations supporting, including CALSSA, Sunrun, Vote Solar, Sierra Club California, The Climate Center, 350 Bay Area, 350 San Diego, Enphase, Microgrid Resources Coalition, California Alliance for Community Energy, California Consumers Alliance, Californians for Energy Choice, Center for Biological Diversity, Center for Sustainable Energy, Climate Action Campaign, East Bay Power Alliance, Environment California Local, Fossil Free California, San Diego Energy District — and many more.

- For more, see: https://clean-coalition.org/policy/transmission-access-charges
- Sign on your organization to support the TAC Campaign: https://forms.gle/x6vdjz8Qg5YUqckKA

Presenter

Karl R. Rábago operates Rábago Energy, based in Denver, Colorado. Mr. Rábago has more than 30 years of experience in energy and climate policy and markets and is recognized as an innovator in utility regulatory issues relating to clean and distributed energy services and technologies. He is a frequent author on electricity industry issues and has provided testimony as an expert witness in more than 120 electric and gas utility regulatory proceedings. Mr. Rábago serves as Chair of the Board of the Center for Resource Solutions, a San Francisco-based non-governmental organization that manages the Green-e Certification program for green power products, and on the Board of Solar United Neighbors.

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LOCAL SOLAR FOR ALL

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:

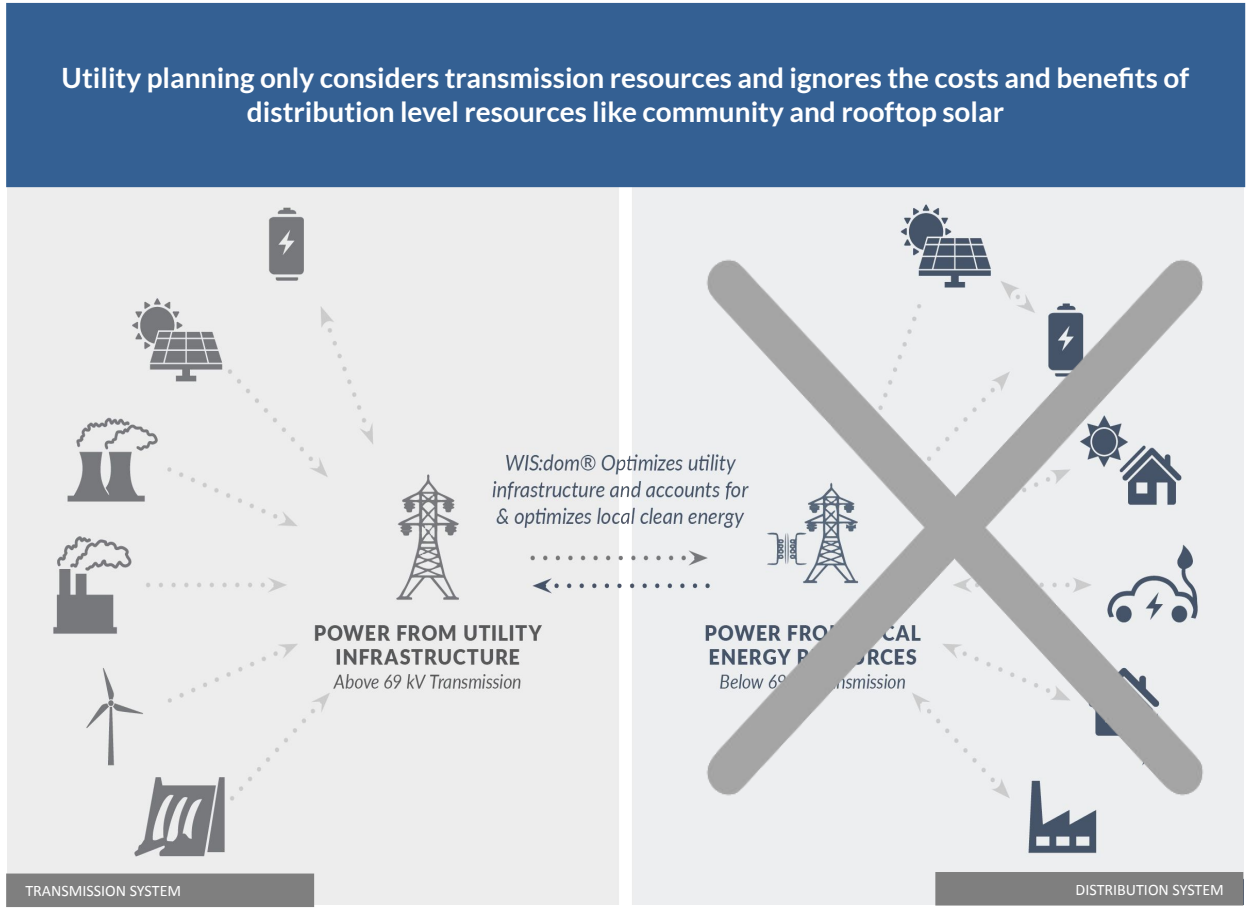
Growing distributed solar and storage is key to achieving the President's vision of 80% clean electricity by 2030

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**



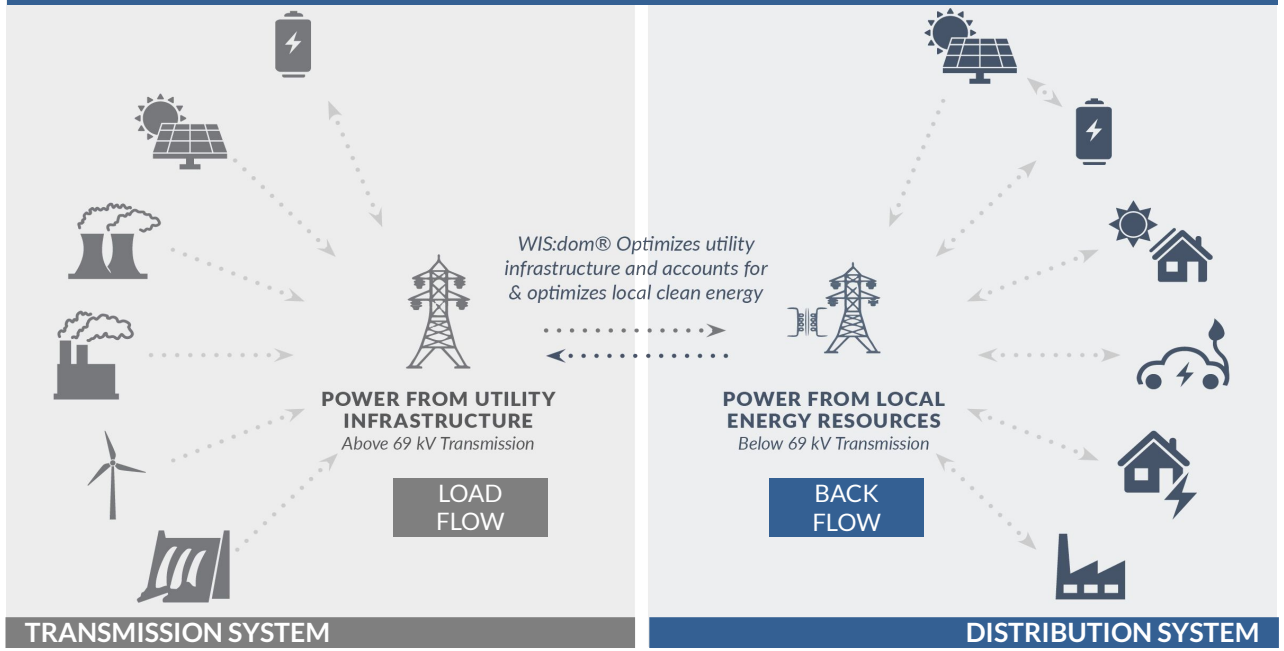
Solution: 21st Century Total System Planning Modeling

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

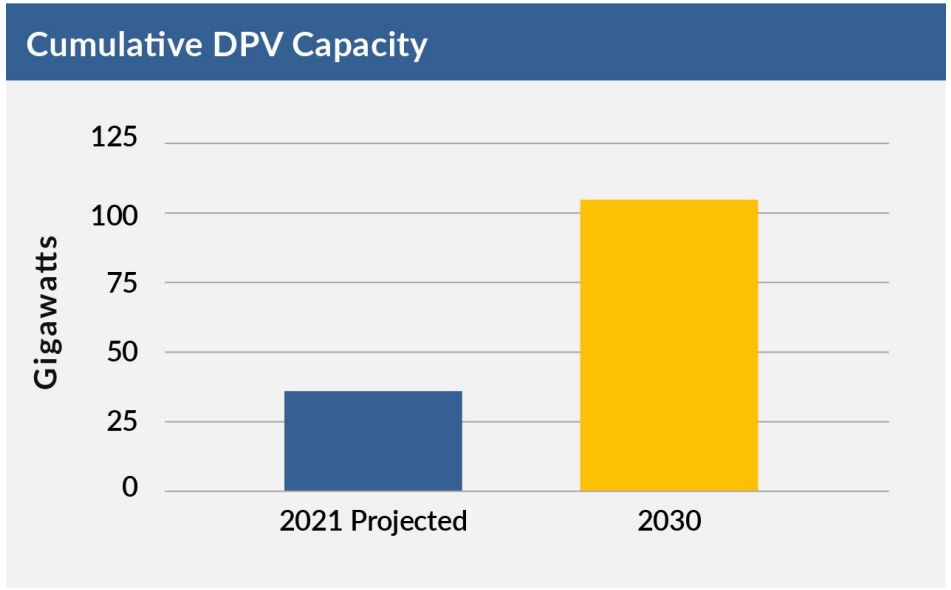
80% CLEAN ELECTRICITY BY 2030
+
50% ECONOMY-WIDE REDUCTIONS BY 2030
+
95% ECONOMY-WIDE REDUCTIONS BY 2050
+
ECONOMY-WIDE ELECTRIFICATION BY 2050
+
NO DER OPTIMIZATION
+
NO NEW LOCAL SOLAR + STORAGE PAST 2021

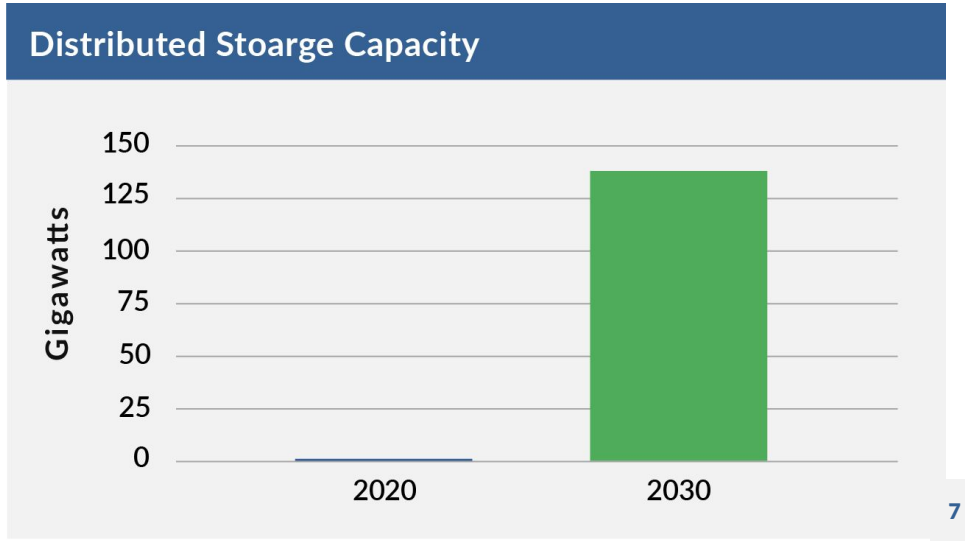
Model assumes zero additional growth of local solar and storage past 2021 and only considers and weighs cost impacts from a central transmission-level grid perspective. Changes to, and upgrade costs for, distribution infrastructure are not considered, they are merely additional costs computed after a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

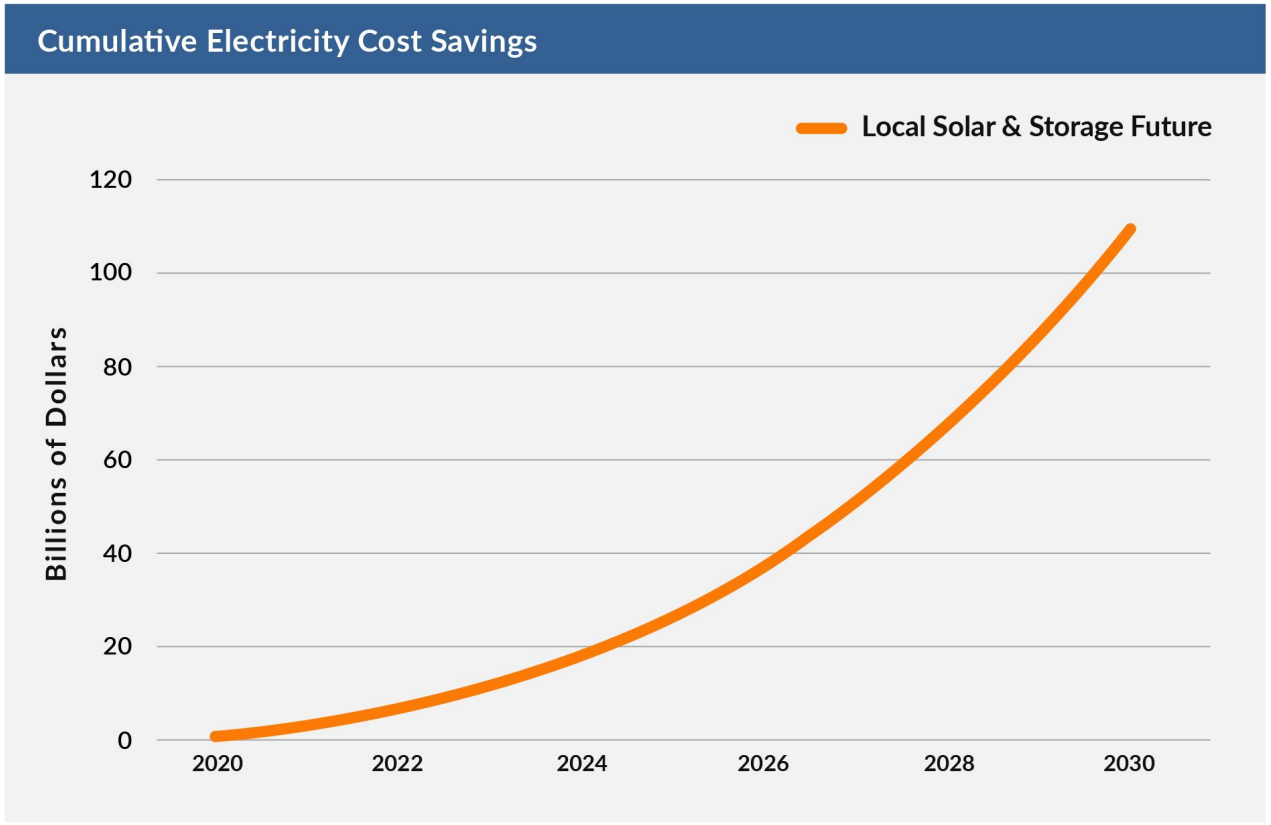
- We must also add 137 GW of distributed storage to optimize the power generation and improve resilience. Together local solar and storage enable future savings and support deployment of large-scale renewables.





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

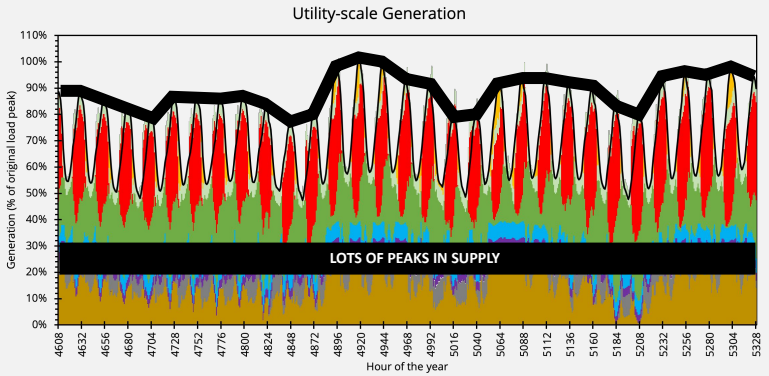
- Initial investments in utility-scale and distribution level grid infrastructure and capacity drive huge long-term savings relative to traditional electricity grid system planning.
- The savings captured in this chart include only monetary grid costs and benefits, it doesn't include indirect societal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

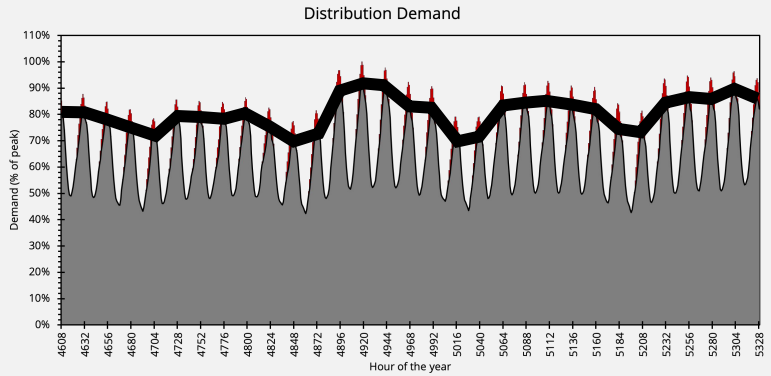


Local Solar + Storage Smooths the Load

UTILITY-SCALE GENERATION ⟷ **DISTRIBUTION DEMAND**

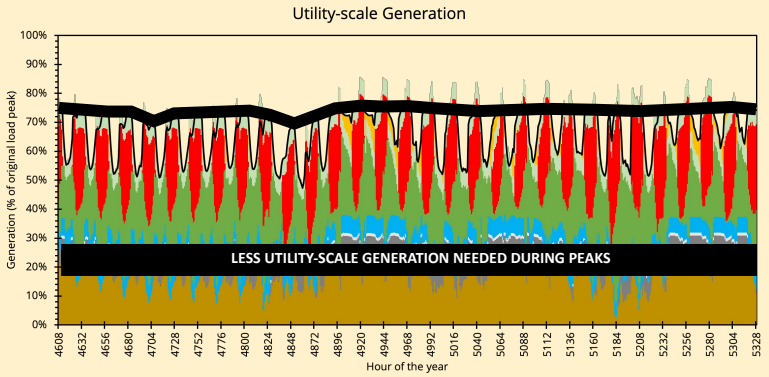
Utility-Scale Only
(summer month in sample state)

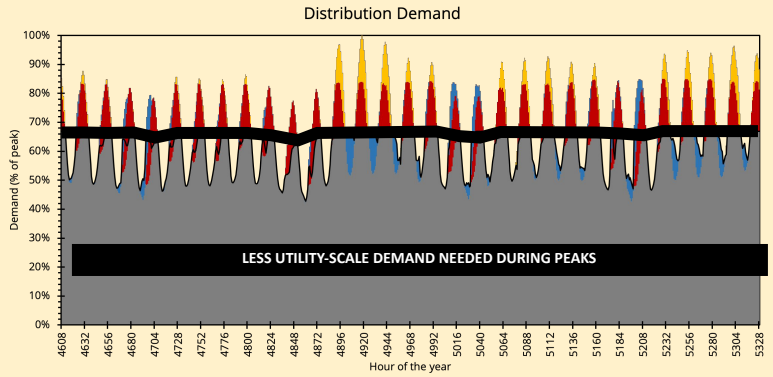




- Demand is sharp and spiked, and supply ramps up and down to meet peaks
- More firming capacity and peaker plants are required to meet demand at times of the day when customers are using the most electricity
- Distributed solar + storage have minimal impacts on “shaping load” and meeting system needs

Optimized DER
(summer month in sample state)



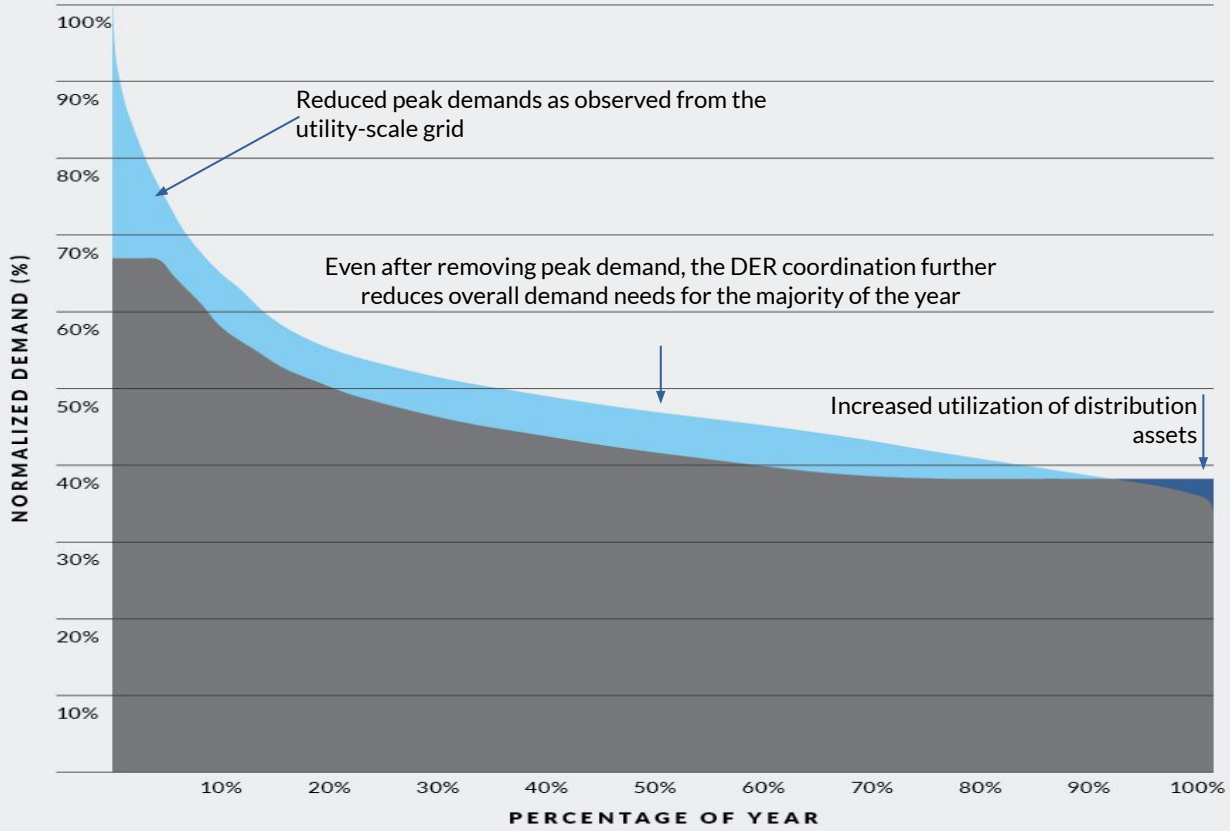


- Demand is smooth because local solar + storage can be deployed at peak times and reshapes load from the perspective of the utility grid
- Permanently eases stress on system during critical peak hours & reduces how much bulk-scale power is needed to serve the distribution grid
- Less bulk power = less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

Local Solar + Storage Shapes the Load

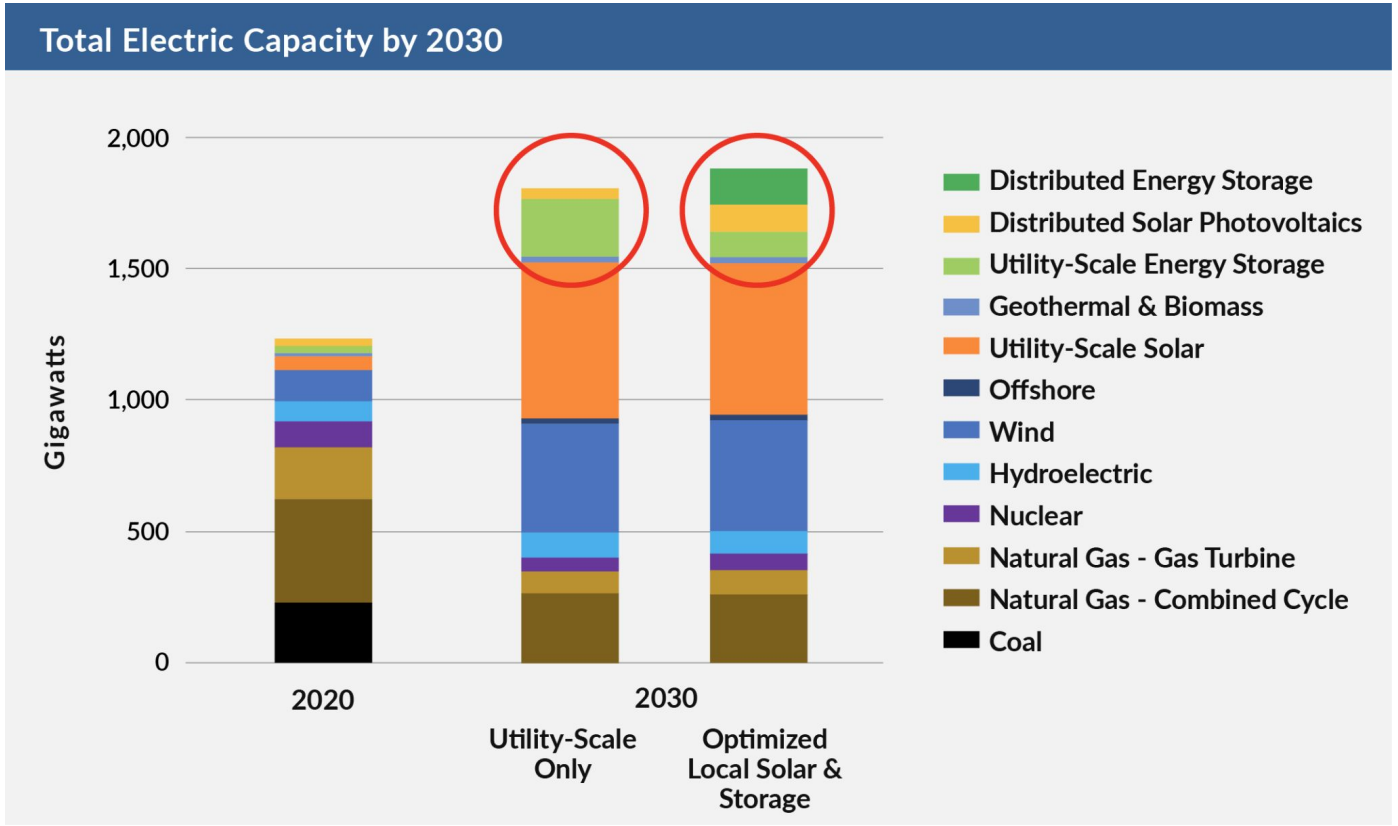
- The entire grid is really only needed a few hours of the year, driving higher costs for everyone with a utility-scale model. Right-sized local solar + storage shaves the peak and saves money across 80% of the hours in the year.
- Local solar + storage shapes the load seen by utility-scale resources,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



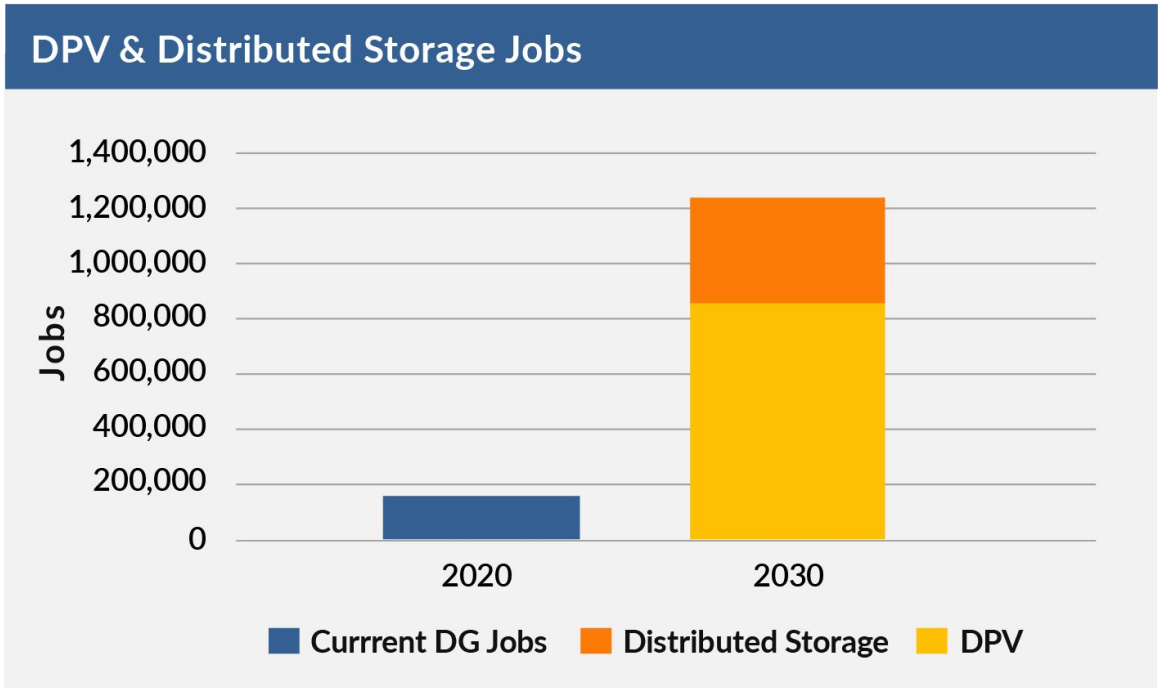
Installed Capacity in 2030

- 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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- 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)

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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