



SHOVEL READY FOR RECOVERY

A Blueprint for Jobs and Economic Recovery
Through Local Solar and Storage Investments

- I Executive Summary
- II Solar and Storage For All Communities
- III From Celebration to Shutdown
- IV Shovel Ready for Recovery
- V Re-Energizing the Industry: A Ten-Point Plan of Action
- VI A No-Regrets Investment and a Lasting Legacy
- VII Helping Communities Keep the Lights On
- VIII Conclusion

I. EXECUTIVE SUMMARY



California's local solar and storage industry is helping the state move to clean, renewable energy while also helping keep the lights on for everyday consumers and businesses. The industry also sustains tens of thousands of local jobs, and billions of dollars in economic activity within the state.

Today one million solar systems located at schools, farms, businesses, homes and low-income apartment buildings throughout California produce nearly 13 billion kilowatt hours (kWh) of clean energy each year, avoiding 5 million metric tons of CO₂ annually. Attached to a growing number of these solar systems are more than 30,000 energy storage systems, or batteries, connected to the grid and providing 1 million kWh of storage capacity. Local solar and energy storage projects are job intensive. Sixty full-time jobs are supported by every megawatt (MW) of local solar energy built, and California built over 1,200 megawatts of local solar in 2019.

COVID-19 and the resulting economy-wide shutdowns across the state brought a burgeoning distributed solar and storage industry to a temporary halt. The small and medium-sized businesses that make up the majority of the industry as well as the large manufacturers and national aggregators are regaining their footing as customer activity returns. With the right policies and investments - as outlined in the California Solar and Storage Association's (CALSSA) ten-point plan of action - California can bring a resilient solar and storage industry back stronger than ever to advance California's clean energy goals, create local jobs, build a more reliable energy grid, and give consumers choice and control over their energy decisions.



Credit: CALSSA

A commitment to expanding distributed solar energy and battery storage in California is a no-regrets investment that offers a lasting legacy. Acting on CALSSA's ten-point plan of action would add an estimated 250,000 solar job-years and nearly 50,000 additional storage-related job-years - jobs that are inherently local to the communities in which workers live. It would bring an estimated \$1.6 billion in residential energy savings and \$2.4 billion in non-residential energy savings per year. California would add nearly 16 million MWh in solar energy every year to California's energy portfolio and avoid an annual total of 12 million metric tons of carbon dioxide.

The benefits of local solar and energy storage technologies are shared throughout the state, including on low-income apartment buildings in the state's largest cities as well as in financially strapped Central Valley and other rural communities. In fact, local solar energy is more widely embraced by Central Valley consumers than their wealthier Bay Area counterparts. The same could be said about rural towns in northern California where home solar battery systems offer relief from continuous utility outages and utility-sparked wildfires. Local solar and energy storage industries bring local jobs, community savings, and economic opportunity to parts of the state often overlooked by technological revolutions.

Ten-Point Plan of Action for Solar and Storage

- 1 Launch One Million Solar-Charged Batteries Initiative
- 2 Launch Resilient Schools Initiative
- 3 Protect and Expand Net Energy Metering Policies
- 4 Cut Red Tape Through Automated Permitting and Virtual Inspections
- 5 Allow Customer Batteries to Help During Grid Emergencies
- 6 Unleash Power of Existing Ratepayer Storage & Equity Programs
- 7 Remove Utility Barriers for Connecting Solar & Storage Systems
- 8 Increase Efforts to Reduce Natural Gas Usage in Buildings Through Solar Hot Water Technologies
- 9 Expand and Extend the Federal Investment Tax Credit
- 10 Protect Clean Energy Investments from Unnecessary Local Taxes

II. SOLAR AND STORAGE FOR ALL COMMUNITIES

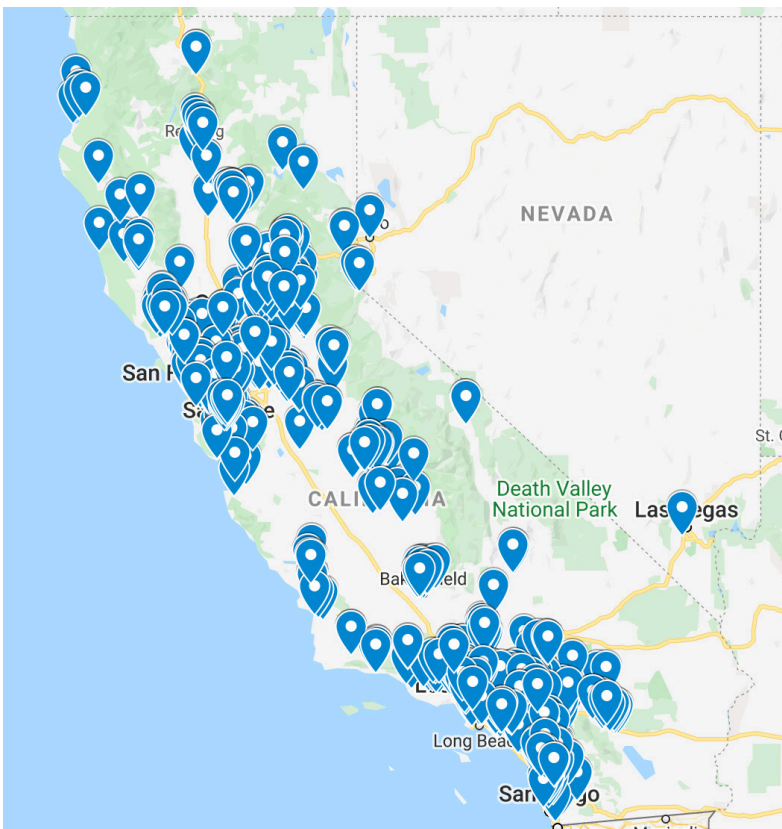


Solar and energy storage in California is at the forefront of the nation's clean energy revolution. The industry set an audacious goal of achieving one million solar roofs in 2006 and celebrated the achievement in 2019, marking the significant job growth and economic activity this particular type of clean energy – local, distributed, and sun-based – was bringing to the Golden State.

More than 3,000 companies make up California's solar and storage industry. The types of companies - a large majority of which are small and medium-sized community-based businesses - include contractors and installers, distributors, engineers and developers, financiers, manufacturers, and a wide variety of service providers, such as software developers.



Former Governors Arnold Schwarzenegger and Jerry Brown were honored for their leadership in achieving 'One Million Solar Roofs' during celebration at Buchanan High School in Clovis in 2019. (Credit: Andrew Aldama)



California is home to thousands of contracting businesses that employ local workers installing solar energy and energy storage systems throughout the state.

Local or distributed solar energy and battery storage developments are a job-intensive industry employing 77,000 Californians prior to the Covid-19 pandemic. This is more people than the workers at the state's five largest utilities combined. These workers install more than 3 million solar panels a year on rooftops, parking lots and farms throughout the state. In fact, sixty full-time jobs are created for every megawatt (MW), or 1,000 kilowatts (kW), of local solar energy installed. In 2019, California workers installed 1,200 MW of local solar per day.

Opportunities in the solar and storage industries are not just jobs for workers but family supporting career paths with social significance. Many companies have varied recruitment pipelines, training partnerships and entrepreneurship opportunities. Because solar and storage work is not concentrated in a specific region of California, but rather occurs in every part of the state, the job creation benefits are geographically diverse. And because the bulk of the jobs are construction related, the benefits are also localized making them impossible to export to other states or countries.

Centering Equity & Accessibility in the Workforce

Sunrun's 9-year partnership with GRID Alternatives has generated over 15 MW of solar energy for 4000 low-income households, and around 100 million dollars in lifetime savings. In 2019 alone, Sunrun and Grid installed 5 megawatts of solar for 1,178 low-income families, which will provide \$25 million in lifetime savings.

The scope of the project supports solar power installations for low-income households, alongside job training programs and philanthropic partnerships. Most recently, Sunrun and GRID Alternatives teamed up to provide free energy storage systems to low-income consumers in wildfire-prone areas.

Sunrun is committed to enabling access to clean energy and achieving important diversity milestones, such as centering women, veterans, and people of color in its hiring programs. Sunrun has actively refined its solar installation training program to meet the needs of the company's talent pipeline, allowing for a larger pool of applications and diversifying job profiles—from installation to sales and operation management. The company has been active in hiring and retaining trainees, with over 50 individuals from workforce training programs joining the



Grid Alternatives and Sunrun partner to build solar roofs for low-income homeowners throughout California as well as provide hands-on experience for workforce training programs. (Credit: Sunrun/Grid Alternatives)

Sunrun team. Through its work with the East Bay Community Energy (EBCE) in Oakland, Sunrun is providing 500 kilowatts of power from home solar and battery systems installed in Alameda County. Utilizing California's Solar on Multi-family Affordable Housing (SOMAH) program and the Self Generation Incentive Program (SGIP), Sunrun's talent teams have established philanthropic partnerships and comprehensive training programs, creating quality workforce development for communities disproportionately impacted by racial and economic inequity.

Driving Local Business Growth through Community Based Hiring

One of California's most experienced solar and energy storage installers, Luminalt, began in 2004. Its female co-founder is the qualifier for Luminalt's CSLB C-46 solar specialty license. Luminalt is San Francisco's only certified Women Business Enterprise in the solar field. Under then-Mayor Gavin Newsom, Luminalt was the first solar installer in San Francisco to become GoSolarSF workforce development-certified, recruiting from community-based organizations with diverse pools of trainees. Committed to developing and promoting from within, individuals recruited from Community Based Organizations (CBOs) are now crew leads, and account for a certified electrician, a co-owner, and member of the leadership team. Luminalt champions racial and gender diversity at all levels of operation: from leadership to hiring and operations.



A Luminalt crew member completing an installation. (Credit: Luminalt)

California is home to over fifty companies involved in the manufacturing of solar equipment. These manufacturers are located throughout the state. The table on the right shows some of these companies and the products they manufacture.

Company	Product	City
Green Solutions	Energy Storage	San Leandro
Invinity Energy Systems	Energy Storage	Oakland
NeoVolta	Energy Storage	Poway
Primus Power	Energy Storage	Hayward
RePurpose Energy	Energy Storage	Davis
Blue Power Systems	Energy Storage	Gilroy
Electriq Power	Energy Storage	San Leandro
Energport	Energy Storage	Fremont
Paladin Power	Energy Storage	Temecula
SimpliPhi Power	Energy Storage	Oxnard
Go Electric	Inverter/Power Electronics	Carlsbad
NH Research	Inverter/Power Electronics	Irvine
Span.IO	Inverter/Power Electronics	San Francisco
Chilicon Power	Inverter/Power Electronics	Simi Valley
Chint Power Systems	Inverter/Power Electronics	Pomona
Darfon America Corp.	Inverter/Power Electronics	Mountain View
Enphase Energy	Inverter/Power Electronics	Fremont
EPC Power Corp.	Inverter/Power Electronics	Poway
Maxout Renewables	Inverter/Power Electronics	Livermore
Pathion	Inverter/Power Electronics	Los Gatos
SMA America	Inverter/Power Electronics	Rocklin
SolarEdge Technologies	Inverter/Power Electronics	Fremont
Tigo Energy	Inverter/Power Electronics	Los Gatos
RST Cleantech USA	O&M Equipment	Tarzana
SolaTrim	O&M Equipment	Loomis
CHERP, Inc.	PV Modules	Claremont
Phono Solar	PV Modules	San Diego
Solaria	PV Modules	Fremont
SunSpark Technology	PV Modules	Riverside
Eco Foundation Systems	Racking/Mounting	Sacramento
Everest Solar Systems	Racking/Mounting	Vista
IronRidge	Racking/Mounting	Hayward
Nextracker	Racking/Mounting	Fremont
Nuance Energy Group	Racking/Mounting	Santa Monica
Pegasus Solar	Racking/Mounting	Richmond
Power-Structures	Racking/Mounting	Grass Valley
ProSolar	Racking/Mounting	Oxnard
QuickBOLT	Racking/Mounting	Livermore
Roof Tech	Racking/Mounting	San Diego
Solar Carports Direct	Racking/Mounting	Cottonwood
Sunmizer Solar	Racking/Mounting	Petaluma
Tamarack Solar Products	Racking/Mounting	Arcata
FAFCO	Solar Thermal	Chico
Heliodyne	Solar Thermal	Richmond
Hyperlight Energy	Solar Thermal	Lakeside
JTG/Muir	Solar Thermal	Oakland
Malden Solar	Solar Thermal	Los Angeles
Skyven Technologies	Solar Thermal	Fresno
Solid California	Solar Thermal	San Diego
Sunbank Solar	Solar Thermal	Santa Cruz
SunEarth	Solar Thermal	Fontana



Staff examine a solar thermal panel at SunEarth's manufacturing unit in Fontana. (Credit: SunEarth)



Staff hard at work at SunEarth's manufacturing unit in Fontana. (Credit: SunEarth)

The upfront cost for a solar energy system has plunged two-thirds since 2006, helping make clean, reliable energy more affordable to more consumers.

Lower-income homeowners and rural residents are benefitting significantly from adopting solar thanks to lower prices, incentive programs, and financing options that allow consumers to share the upfront costs of the energy systems with other investors while benefiting from the clean, reliable energy. In recent years, a growing share of solar has been installed for lower-income households, which spend more of their income on electric bills than middle- and upper-income households. Nearly 50 percent of California's rooftop solar market is in neighborhoods at or below the median household income of \$70,000 a year. Many people are surprised to learn places like California's Central Valley are seeing some of the biggest increases in rooftop solar usage, with per capita utilization exceeding the state's coastal population centers.

Targeted solar incentive programs are helping low-income households enjoy the benefits of solar energy. The Single-family and Affordable Solar Homes (SASH) and Multifamily Affordable



A solar electric and solar hot water system on a low-income housing complex in San Jose, CA. (Credit: Sun Light and Power)

Solar Housing (MASH) programs have dramatically reduced the electricity bills for residents of nearly 10,000 homes and 300 apartment complexes with on-site solar. As incentive funds for MASH were nearing depletion, the Legislature established a successor program, the Solar On Multifamily Affordable Housing (SOMAH), which allocates up to a billion dollars over ten years to install solar on more low-income housing across the state. SOMAH now has nearly 400 projects in the queue that will serve over 30,000 rental units when they are completed.

In addition to diversifying the residential market, California's non-residential solar energy adoption is also varied. More than 1,000 farms have their own on-site solar energy systems as do more than 2,000 public schools. Police stations, fire departments, water treatment plants and many other government agencies are investing in local solar energy and energy storage systems to help save taxpayers money and build more resilient local energy supplies for the community.

Solar energy and energy storage are central to California reaching its ambitious clean air goals. Since 2006 customer solar systems have avoided 24 million metric tons of CO₂ (the equivalent of getting 5 million cars off the road for a year), over 19,000 tons of smog pollutants (equivalent to the annual pollution of 4.5 million cars), and 450 trillion BTUs of natural gas (equivalent to annual consumption of 25 large natural gas-fired power plants). Today, 1 million solar roofs in California produce nearly 13 billion kWh of pollution-free electricity per year (equivalent to the output from eight large natural gas-fired power plants) and avoid 5 million metric tons of CO₂ per year (the equivalent of taking over a million cars off the road).



Solar installation at the Alameda Public Library. (Credit: Sun Light and Power)

2019 Solar and Storage Installations

2019 was a big year for distributed solar and storage in California.

Overall there were 159,000 customer-sited solar power systems installed statewide, including 3,000 community projects at schools, water treatment plants, commercial buildings, and farms. On average, California built 436 solar roofs every day, representing more than \$11 million in daily economic activity.

Those 2019 installations alone resulted in 1,261 MW of clean power capacity. 73 percent of that activity, or 933 MW, was built by and for residential buildings. The vast majority of solar installations occurred in the territories of investor-owned utilities - PG&E, Southern California Edison, and San Diego Gas and Electric. Installations from publicly-owned utilities like SMUD and LADWP account for 72 MW, or 6%, of the installed capacity despite serving 20% of the state's ratepayers¹.

Looking at the 318 MW of capacity added through non-residential solar installations within the areas of the investor-owned utilities in 2019, 16 percent were for schools and 69 percent were for local businesses seeking utility bill relief and energy reliability. The remaining MW installed were divided among industrial, military, nonprofit and other types of government facilities such as fire stations or government cooling centers.

All of the above statistics are related to solar photovoltaics, the rooftop panels that convert sunlight into electricity. However, California is

also blessed with another type of solar energy technology: solar thermal, or solar hot water systems. Here, rooftop solar panels collect heat from the sun, instead of photons, and use it to pre-heat water well above 120 degrees Fahrenheit reducing the need for natural gas, propane, or electricity to heat water. Solar hot water technologies are also used to heat swimming pools to extend the season for one of California's favorite activities. California has built over 12,000 solar hot water systems in the past decade, and well over a million swimming pool heaters. These systems reduce California's reliance on natural gas by 10 million therms per year. They also support many local jobs. One of the growth sectors within the solar thermal industry of California is multi-family affordable housing complexes that have great needs for hot water and an incentive to lower both their energy costs and their carbon footprint.

Turning to energy storage, California saw more than 11,000 customer-sited storage systems installed in 2019, 97 percent of which were residential. Overall 141 MW of storage capacity was added in California last year, with residential installations accounting for 47 percent of the installed capacity. 97 percent of installations occurred within the territories of the investor-owned utilities. Similar to solar, most of the non-residential battery storage installations were on commercial and educational facilities. Today, there are more than 23,000 consumer-adopted energy storage systems with a total capacity of 480 MW.

¹ These five utilities cover approximately 90% of the state's electric ratepayers. California is also home to several smaller publicly-owned utilities or irrigation districts as well but there is no central repository of annual solar data for these utilities. Market activity would be in addition to the numbers shared in this report.

² Does not include municipal utilities other than SMUD and LADWP. See also Note 1.

2019 Solar Installations²: Top 25 Cities By MW

San Diego: 61.0 MW
Los Angeles: 48.5 MW
Bakersfield: 48.0 MW
Fresno: 44.5 MW
Stockton: 20.9 MW
San Jose: 19.5 MW
Clovis: 15.7 MW
Escondido: 12.8 MW
Oceanside: 12.6 MW
Visalia: 11.6 MW
Chula Vista: 11.5 MW
Chico: 11.3 MW
Sacramento: 10.4 MW
Moreno Valley: 9.8 MW
El Cajon: 9.4 MW
Vallejo: 9.0 MW
Madera: 8.8 MW
Corona: 8.7 MW
Rialto: 8.5 MW
Carlsbad: 8.3 MW
Vacaville: 8.1 MW
Irvine: 7.9 MW
Riverside: 7.8 MW
Santa Rosa: 7.7 MW
Yuba City: 7.6 MW
Fairfield: 7.3 MW
Chowchilla: 7.2 MW

Battery Storage Installations: Top 10 Counties By MW

Los Angeles: 32.0 MW
San Diego: 24.9 MW
Orange: 20.3 MW
Santa Clara: 7.0 MW
Alameda: 6.8 MW
San Bernardino: 6.2 MW
Riverside: 5.1 MW
Sonoma: 4.8 MW
Contra Costa: 3.1 MW
San Mateo: 2.9 MW

III. FROM CELEBRATION TO SHUTDOWN



Bernadette Del Chiaro, executive director of the California Solar and Storage Association cheers on the hundreds of solar workers attending the Million Solar Roofs celebration event at Buchanan High School in Clovis, December 2019. (Credit: Andrew Aldama)

The solar and storage community celebrated achieving the installation of a million solar roofs serving diverse communities and energy needs across the Golden State with a star-studded celebration event at a high school in Clovis on December 12, 2019.

Encouraged by the resounding success of the initiative, solar stakeholders in California set a new goal for a new decade: the installation of one million solar-charged batteries by 2030.

The vision for a million solar batteries is as critical as it is revolutionary. Battery storage smooths out energy pricing for households and businesses, relieves pressure on the electric grid and helps cover critical peak loads, helps further California's clean energy and pollution reduction goals, and grants consumers an unprecedented level of independence and self-reliance.

The time is ripe for solar batteries

- | Solar and battery technologies are transforming the future of energy and creating new opportunities for California to reach 100% clean, renewable energy.
- | The ability to store energy where it will be needed and ready for use when it is needed is a simple but revolutionary step forward.
- | Breakthroughs in battery technology are transforming clean energy. Battery companies have introduced dozens of products for residential and commercial customers. Bundled with solar panels, batteries store power to use throughout the day and night. With the help of public policy, battery costs will continue to decline as adoption increases and technology improves.

Building Efficient and Resilient Public Structures



West Valley Community College's parking lot solar system helps provide shade and lower-cost energy for the campus. (Credit: Sunpower/West Valley Community College District)

SunPower's collaborative effort with the West Valley-Mission Community College District in Silicon Valley goes a long way toward demonstrating the need for solar and storage in building efficient and resilient public structures. The partnership includes a 1 MW of photovoltaic system installed in 2011 at each West Valley College and Mission College. Both colleges are in the second phase of collaboration, expanding the solar photovoltaic systems by a total of 5.4 MWs and adding 3 MW energy

storage capacity to help reduce demand charges (utility usage fees applied to large commercial customers) and provide grid services. The two-college district is able to reduce their energy bills by relying on both their solar photovoltaic systems and the solar-charged battery storage system to lower their usage of electricity drawn from the grid during peak hours where the grid is most stressed and prices are highest. Mission College is among the first institutions entering a power purchase agreement with Silicon Valley Power, partnering with the city to sell excess energy, and earning \$2.5 million in revenue from utility and grid service programs. Self-powering institutions like the District's colleges also helps them meet their own Zero Net Energy and climate-solution goals.

A Smart Use of Battery Storage Promises Widespread Benefits for a Local Water District

The Ventura River Water District serves approximately 5,700 customers in Ojai. It pays an annual energy bill in excess of \$100,000 in large part because of the surge of energy it takes powering up two booster stations needed to send thousands of gallons of groundwater from wells up to hilltop tanks that deploy water back down to customer taps. Pumping water uphill from a stand still requires a lot of energy and the water district's utility company charges an extra fee when the big pumps start up. These demand fees account for

about one-third of the district's annual energy costs. With a grant paid for over five-years, the Ventura River Water District is working with Tesla to apply for and install battery storage at its facilities. The batteries will be charged overnight, using off-peak electricity. Then, the batteries will be used to power up the booster pumps at a time when energy is most expensive. The benefits will be widespread. The Ventura River Water District will save money on energy costs which in turn helps lower costs for consumers. The local energy



Caption: Bert J. Rapp, General Manager of Ventura River Water District, marks off the area where batteries are to be installed later this year. (Credit: Ventura River Water District)

grid will no longer need to plan for the district's surge in energy use during periods of high demand. In times of emergencies like the 2019 Thomas fire the district will not have to rely on pollution-causing diesel generators to keep the power on and can instead deploy the energy stored in its batteries.

Three months after the Million Solar Roofs celebration, the COVID-19 pandemic turned this optimistic growth industry into one desperate for recovery amid the realities of the shelter-in-place orders.

Operations at most solar and storage companies throughout the state were significantly reduced or curbed completely due to COVID-19 related work prohibitions. As a result, a high percentage of solar workers were laid off or furloughed.

In an industry survey, 92 percent of responding solar and storage companies indicated a negative impact on their operations from COVID-19. 89 percent cited a decline in sales, with 51 percent pointing to a sales drop of at least half. Companies reported laying off 21 percent of employees, which would represent 15,000 layoffs across the industry.

Solar and storage companies in California have since found ways to safely work within social distancing guidelines across the state, and the market is slowly returning, but the industry is still in need of a boost. As of July 2020, 80% of company respondents reported being still negatively impacted by Covid-19 with 18% in the extreme negative category compared to 41% in April.

California cannot afford a reduction in solar energy and battery installations on residential, commercial and public buildings. This would dramatically impede progress towards California's clean energy goals and the effort to help more Californians secure energy that is both renewable and reliable.

Leadership and Preparedness: A Roadmap for Recovery

In mid-March 2020, CEO Vincent Battaglia started preparing an eight-week plan to assess how many people out of Renova Energy's 205 employees might be impacted by the COVID-19 pandemic not just physically but economically as well. After tailoring Renova's three-month pipeline, company leadership proactively negotiated with lenders, vendors, and bankers to lower near-term costs and get through the crisis. Despite a lack of clarity in city and state guidelines over what constituted 'essential work', Renova Energy, a solar and energy storage installation company based in Palm Desert, managed to reshuffle jobs, communicate with their customers, and ensure minimal disruption in workflow. The twenty workers who were furloughed were hired back at full capacity beginning June 1. Having invested half a million dollars in enterprise solutions to ensure company departments were in sync with one another, Renova easily transitioned to virtual meetings and trainings. New requirements and CDC advisories were quickly communicated and crews were equipped with protective equipment while practicing social distancing guidelines.



The Renova Energy team built a roadmap for recovery during the COVID-19 pandemic through preparedness and steady communication. (Credit: Renova Energy)

IV. SHOVEL READY FOR RECOVERY



Despite the widespread economic impacts of COVID-19, interest in solar and storage from consumers looking to save money and secure reliable clean energy remains high, especially in the wake of prolonged grid outages and wildfire disasters. **Solar and storage companies in California are reporting a pipeline of projects and a general sense of cautious optimism in the future if steps are taken now to support this still-emerging industry.**



(Credit: GRID Alternatives)

Increasing solar and storage capacity in California can be one of the most fast-acting and community-centered ways to generate economic activity. Public investments in solar and storage drive economic activity and create jobs quickly at a time when the state is desperate for both. Training and installation jobs offer a promising career opportunity for workers displaced from other industries.

Just as California has a lot of people in need of jobs, our state has a lot of solar and storage work in need of doing. Local solar and battery storage projects are one of the most 'shovel-ready' infrastructure investments. Solar and storage projects

occur everywhere bringing the promise of jobs and consumer savings to every part of the state. Projects take anywhere from a few days to a few months to complete, can be done safely outdoors, and have the added value of making our communities more energy resilient to future disasters or planned electricity outages.

The best part of opening up more solar and storage across California is that the benefits are localized: local customers, serviced by local businesses, create jobs that are inherently and permanently local, that increase local clean energy capacity, which in turn helps local ratepayers save money.

V. RE-ENERGIZING THE INDUSTRY : A TEN-POINT PLAN OF ACTION



Recovery and growth of the state's most promising clean energy marketplace will require that policy makers remove barriers and encourage on-going consumer

investment. Prior to the pandemic, the state's local solar and storage industry supported more full-time jobs than all the traditional fossil-fuel dependent utilities combined.

CALSSA's ten-point plan of action is aimed at helping to guide and inform policy making in the next six months with short- and longer-term goals.

1

Launch One Million Solar-Charged Batteries Initiative

Fourteen years ago, California embarked on a great vision to build a million solar roofs through a variety of incentive policies. The initiative worked, leading to three times the amount of clean energy than originally anticipated. California should once again set an ambitious goal for itself for energy storage. First, the state should launch a new statewide program to incentivize consumer adoption of energy storage that will lead to a million solar-charged batteries, with a major focus on equity and resiliency.

2

Launch Resilient Schools Initiative

California should create the Clean Energy Resilient Schools Bond program, with the goal of equipping 2,000 K-12 public schools with solar-charged batteries. This initiative should be funded through state revenue bonds repaid over time through savings in school utility costs. The program should include technical assistance to support schools applying for a resiliency grant and to help manage a schools' process for procurement and installation of a storage system with the best combination of price and performance. Revenue bonds will not have a state budget impact while financing as much as \$900 million in construction immediately.

3

Protect and Expand Net Energy Metering Policies

California's local solar and energy storage market is dependent on the availability of net energy metering policies that give consumers a way to send surplus energy generated by their solar panels or stored in their solar-charged batteries back to the grid for compensation in the form of a bill credit. This simple policy mechanism has been a foundational driver of today's growing rooftop solar market. It should be protected for the general consumer and expanded to help drive more clean energy investments in low-income and disadvantaged communities and to drive higher adoption rates of energy storage.

4

Cut Red Tape Through Automated Permitting and Virtual Inspections

California should launch a statewide initiative to dramatically cut red tape and speed up installation timelines. California should ensure that all building departments link up with the SolarApp+, an online national portal software system developed by the National Renewable Energy Lab (NREL). The SolarAPP+ is a free online portal that provides instant and standardized permitting, as well as virtual inspection practices. "No touch" permitting is not only safe during a pandemic but it also cuts costs for installers and speeds up timelines so consumers can benefit from their clean energy system as soon and as cheaply as possible.

5

Allow Customer Batteries to Help During Grid Emergencies

Currently, customers do not have a way to sell power to utilities when wholesale energy prices spike. Utilities can sign contracts with companies that operate fleets of customer batteries to provide power as "virtual power plants (VPP)," but they don't get credit for this energy toward their energy procurement needs. Rules at the grid operator (CAISO) and the Public Utilities Commission form unnecessary obstacles to customer participation in energy markets. These rules can be fixed quickly when agencies make it a priority.

6

Unleash Power of Existing Ratepayer Storage & Equity Programs

The Self Generation Incentive Program (SGIP), managed by the California Public Utilities Commission, is an excessively complex program for consumers, businesses and government entities funded through small monthly surcharges on natural gas bills. Although the purpose of the program is to encourage consumers to invest in energy storage and other clean energy technologies, many consumers and equipment providers avoid the program due to its onerous paperwork and strict limitations. The utilities that administer the program do not have a natural incentive to make it successful and the CPUC's focus is elsewhere.

7

Remove Utility Barriers for Connecting Solar & Storage Systems

Every time a customer wants to install a solar or storage system, the utility must review the proposed installation for grid safety and adherence to various tariff requirements. For many small systems this is a straightforward and quick process. For larger projects, it is often time consuming and painful. Utilities have agreed to make certain changes to their interconnection review processes to make some of the steps more relevant to actual projects, but the utilities are incredibly slow to implement those changes. Years can go by before databases are updated and processes are improved. There could hardly be a more shovel-ready project than one that is waiting for approval to construct. The CPUC should increase its oversight of utility implementation of changes to the interconnection review process.

8

Increase Efforts to Reduce Natural Gas Usage in Buildings Through Solar Hot Water Technologies

Consumers should be given an extra boost from the state to invest in fuel switching at their homes and businesses. The program should be technology neutral and include zero-carbon water heating technologies such as solar hot water systems. A framework has been established for the Building Decarbonization Pilot Programs administered by the CEC and the CPUC, but there is not enough funding in those pilots for consumer rebates. Stimulus funds should supplement the new framework to include consumer rebates. Using handbook language from previous programs like CSI-Thermal will ensure the program is shovel ready. We recommend a three-year program budget of \$300 million.

9

Expand and Extend the Federal Investment Tax Credit

As Congress looks to recover jobs and spur new economic activity that leads to job growth and consumer savings, they should prioritize extending and expanding the Investment Tax Credit (ITC) for distributed clean energy. Currently, the ITC provides consumers with a 26% credit for solar and energy storage systems in 2020, steps down to 22% in 2021, and expires for residential systems in 2022, while lowering to 10% for commercial systems that same year. Congress should increase the tax credit to drive more consumers toward clean energy purchases, extend it out beyond 2022, and allow for stand-alone energy storage as well.

10

Protect Clean Energy Investments from Unnecessary Local Taxes

We need to ensure financed (leases and Power Purchase Agreement) distributed solar and solar and storage systems for both new homes/buildings and home/building retrofits qualify for the state sales and use tax exemption. It is also important to retain the maximum rate of the ad valorem tax on real property to 1% of the full cash value even if there is a subsequent change in ownership.

How market stimulation helped California reach 1 million solar roofs

Market stimulation worked for expanding rooftop solar. Approximately 970,000 of the first million solar systems were on homes and approximately 30,000 were for commercial customers, farms, and government buildings. While the original goal was to build 3 gigawatts (GW) of rooftop solar, the market continued to grow even after the rebate program ended, allowing California to far surpass its goal with over 9 GW installed today. Every day, over 427 consumers go solar in California with an increasing number including solar-charged batteries. Today, 7% of Californians have their own solar system, a number that is growing by nearly 1% per year.

VI. A NO-REGRETS INVESTMENT AND A LASTING LEGACY



A commitment to advancing solar and battery storage across California is a smart investment to grow our economy and create needed jobs.



Crew members hard at work at a customer-sited solar installation. (Credit: CALSSA)

Solar and storage can be instrumental in creating safe, skilled economic opportunities for workers in California. As many industries continue to struggle with the economic slowdown from the Covid-19 pandemic, there is a chance to provide California workers with employment in safe, regulated conditions and to build sustainable energy and economic infrastructure.

Acting on the CALSSA's ten-point plan of action would add an estimated 250,000 solar job-years and nearly 50,000 additional storage-related job-years, on top of one of the state's already promising job markets employing 77,000 workers each year. One job-year represents a full year of work for one person.

In uncertain economic times, households and businesses of all types are looking to save. Solar and storage provides a sustainable solution to reducing costly energy bills. CALSSA's ten-point plan would bring an estimated \$1.6 billion in residential energy savings and \$2.4 billion in non-residential energy savings per year and enable utilities to reduce their costs, saving everyone money.

Investments in solar and storage are not only a job-creating and consumer savings stimulus but part of California's vision for the future of energy. Expanding solar and storage capacity in California will leave behind a more reliable energy system and drive us to a cleaner energy future.

Expanding solar and storage as outlined above would add almost 16 million MWh in renewable solar energy every year to California's energy portfolio, enough electricity to power nearly 2.5 million homes in California, in addition to the 1.2 million solar buildings already in place.

The additional renewable energy capacity is a significant step towards California's clean energy future by reducing greenhouse gas emissions. It would avoid more than 5 million metric tons of carbon dioxide from fossil fuels and nearly 7 million metric tons of carbon dioxide equivalent from fugitive methane, for a total of 12 million metric tons of carbon dioxide avoidance. This is equivalent to taking over 2.5 million cars off the road every year.

A fully realized solar and storage market would also shift 1.6 million MWh

of electricity to cover peak energy load, helping reduce the need for 3,000 MW of peak capacity (approximately 6-7 large gas-fired peaker plants), to significantly smooth-out California's overburdened energy grid and increase resilience which is especially important for homes, schools, public buildings, and grocery stores in fire prone areas.



(Credit: Bernadette Del Chiaro)

VII. HELPING COMMUNITIES KEEP THE LIGHTS ON



Blackouts in August 2020 provided a unique view into how distributed behind-the-meter solar and energy storage can, and did, significantly help overall grid reliability.

The fossil fuel industry and its supporters were eager to blame the blackouts on clean, renewable energy sources. In reality, an analysis by the non-profit organization Vote Solar showed California's fleet of fossil fuel power plants underperformed by 17%, leading to major shortfalls in resources during the heatwave. In contrast, solar outperformed expectations on August 14 and 15, helping make the weekend's shortfalls smaller and less extensive. In fact, solar energy played an especially critical role covering California's highest energy needs during the hottest part of the day, mid-afternoon, which is when the solar power really shines. Behind-the-meter rooftop solar energy systems contribute to the reliability of the electric grid by reducing energy demand from over a million different customer-sites statewide and exporting surplus power to neighboring houses and businesses.

During the August 2020 heatwave, California's energy regulators called upon the solar and storage industry to work with customers to voluntarily modify charging and discharging of their batteries in line with the grid's greatest needs. Many customers complied, without compensation, to help save the day as highlighted in the joint letter to the governor. Many more would have responded if program participation had been established ahead of time.

Nearly every battery energy storage device in California has the ability to communicate offsite at

near instant speed. But the California utilities do not have the software to communicate with the distributed systems and energy regulators have not set up a market mechanism for compensating storage customers.

As of August 2020, California has 30,000 batteries located at customer sites throughout the state totaling 500 megawatts (MW) with over 1,000 MWh of energy capacity. Aggregating all of these small batteries together would form a virtual power plant. California's energy complex needs to embrace smart, responsive, and advanced clean technologies. Although rules today prohibit these distributed storage systems to export all of that power to the grid and help meet emergency energy needs upon demand, the potential is there if policy makers align.



A Stem, Inc. energy storage system. (Credit: Stem, Inc.)

Resilient Energy, Resilient Communities

Communities around Sonoma County learned the importance of energy resilience following PG&E's Public Safety Power Shutoffs of 2019 and 2020 which combined with widespread local fires to make for an extended period of energy uncertainty. A small company with a staff of six, Synergy Solar occupies an indispensable space in the county as a local solar and storage service provider. Much of their business involves rebuilding from the previous fires that destroyed 5% of the community's homes, and serving communities who might have enhanced medical needs. With more intense wildfire seasons, and an increased need for resilient energy, the need for solar and storage will only grow more pressing.



Installing the battery and inverter at a home in California. (Credit: Bernadette Del Chiaro)



California currently finds itself in the midst of not one, but two crises: the unprecedented economic impacts of the COVID-19 pandemic, unrelenting wildfires, and related power shutoff events that threaten lives and livelihoods.



A solar canopy at Fountainhead Montessori school in Dublin, CA. (Credit: Solar Technologies)

Expanding local consumer-driven solar and battery storage capacity throughout the state is not only an efficient and effective boost to our local economy in the short term, but a no-regrets investment that leaves a lasting legacy.

Regrouping and reconfiguring policy goals around energy access, distribution, and storage is an essential need in building resilient communities, as well as steering the state towards clean energy goals.

To realize energy solutions that are sustainable, reliable, and clean, we need a coordinated effort to invest in more solar and storage for public buildings and institutions, and incentives for households and local businesses. It is time for state leaders to embrace and harness local solar and storage to power us into a resilient and clean energy future.