Comments on Customer Choice

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Customer Choice for Energy Resilience
Introduction and Summary Recommendations

Electricity infrastructure is vulnerable to both short and long-term disruption. This puts local and even regional economies at risk of disruption, degradation and even permanent collapse. Demonstrated and escalating vulnerabilities include natural disasters, cyber-terrorism, and cascading grid failures. No respite or universal design solution is on the horizon. Nevertheless, strategies deliver energy resilience, i.e. that insulate local energy infrastructure from vulnerability, are available and increasingly cost-effective. They require initiative, collaboration and investment.

Solar PV is foundational to local energy security and resilience. Unlike traditional backup power that becomes useless after three days when fuel storage is exhausted, local solar electricity provides a daily infusion of energy that can be stored as well as used. Solar micro-grids and co-located energy storage convert local solar capacity into resilient local solar capacity.

Local solar PV, local energy storage and community micro-grids are the essential triad of technologies necessary for local energy resilience and resilient solar communities

Cities and utilities can only create resilient solar communities by working together. There are already cases of limited city/utility collaboration around local energy resilience in other states. Early cases are also urgently needed in California.

Barriers to direct city/energy utility collaboration remain practically insurmountable the absence of political will and local energy management capacity. Utility/CCA collaboration and CCA/city collaboration are more readily and quickly achievable. Indirectly and over time, direct city/utility collaboration can be an intentional outcome of the work of a growing number of California CCAs that are committed to the development of clean local energy resources.

Community choice energy promises to be California's breakthrough opportunity to remove or at least lower the barriers to local energy resilience. The organizational triad necessary to create resilient solar communities in California includes grid owners, local jurisdictions and local energy service providers.

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The CPUC's Retail Choice White Paper should acknowledge the need to include local energy resilience as one of the primary objectives of California and global electricity sector regulation. It should also identify policy objectives responsive to this need. These objectives include:

1. Reducing barriers to city/utility and CCA/utility collaboration, especially with respect to the community level energy resilience and the deployment of resilient solar micro-grids.
2. Encouraging CPUC regulated electricity grid owners to develop capacity and business plans that support city initiatives to achieve energy resilience through the deployment of resilient solar micro-grids.

Other pillars of an energy resilience strategy are summarized at the end of the next section. Notably, many of them are enabled by locally controlled energy service providers. An energy resilience defeat could be snatched from the jaws of an emerging energy resilience victory if the CPUC's Retail Choice exploration leads to weakening rather than strengthening Community Choice in California.

Detailed Comments and Additional Recommendations

The CPUC's Customer Choice White Paper preparation effort is an important and welcome. It recognizes the need to prepare for and manage a process some thought leaders have dubbed "clean disruption". Electricity customer and community choices, when offered independently of state regulation, can be viewed as a threat to regulatory systems and business models that have served society well in the past. On the other side of this perceived threat is an important opportunity to address new and escalating energy system vulnerabilities.

Local energy resilience is feasible and economically imperative, but it requires local work and investment by energy service providers. Their work and investment must dovetail with local jurisdiction policies and local energy customer choices. This necessary integration will require unprecedented coordination and collaboration.

Preferred customer choices can be empowered by state regulatory interventions. To the extent possible they should be aligned with the resilience goals and policies of local jurisdictions and the locally based energy service providers they govern.

Community Choice energy providers can support efforts by their member jurisdictions to achieve energy resilience. In parallel, electric utilities can be encouraged to plan and modernize local grids, with emphasis on assets essential to local energy resilience.

Initially, collaborative efforts among cities, counties, regulated utilities and community choice energy providers will be essential to the timely development of energy resilience standards, guidelines and metrics.

Energy resilience is a fundamentally important 21st century policy goal. In its recent Customer Choice workshop, CPUC staff identified three primary goals for state electricity regulation, i.e.

affordability, reliability and decarbonization. A fourth goal cries out for inclusion, i.e. energy resilience.

Clean local energy resources are one key to local energy resilience. Solar electricity is cost-effective whether deployed on-site, on city controlled brownfield sites, or imported via high voltage grids. Battery storage, especially vehicle based battery storage is another key.

Solar PV costs and costs of residential and community scale battery storage have plummeted and can be expected to continue downward as experience accumulates and incremental innovation continues. Regulatory decisions should therefore avoid intentionally or unintentionally tipping the scales in favor of so-called utility-scale renewable plants. When this happens, it is typically the result of a sub-optimization that ignores resiliency benefits.

The balance between centralized and localized solar and storage deployment is pivotal in an energy resilience context. Higher shares of local vs. imported solar result in lower cost local energy resilience. Proportions of solar and storage deployment are equally important. Striking the latter balance can be a local policy choice but it also needs state regulatory support.

Some cities in California already have levels of on-site solar penetration in the twenty to thirty percent range. These cities are already well positioned for affordable long-term energy resilience once local storage capacity catches up with local solar capacity.

The cost of local energy resilience is already much less than the related avoided cost of disaster related power outages and other localized outages. Whatever the level of solar penetration, all California cities should develop resilience goals and metrics. They should start engaging with energy service providers regarding energy resilience now.

For its part, to guide the achievement of energy resilience state-wide, the CPUC should determine a preferred future balance between centralized renewable electricity supply vs. local (i.e. community and on-site) supply. Higher shares of local vs. imported solar result in more cost-effective local energy resilience whereas higher shares of centralized renewable generation make good use of fully amortized transmission infrastructure. The balance between local and centralized solar and storage deployment must in any event reflect state and local resiliency goals and related policy choices.

The CPUC can also help create conditions for profitable local solar and energy storage work force development. The CPUC can ensure that grid modernization investments organized around the 20th century grid operation business model cost-effectively enable local energy resilience. The CPUC can also encourage the creation of new local market structures necessary to make resilient solar communities a “win” for both municipalities and local grid owners.

Finally, the CPUC should recognize that cities and counties have a big stake in state policy decisions related to energy resilience. For example, deployment of utility scale plants requires investments in high voltage transmission that compete with investments in modernizing local grids to make them capable of accommodating solar micro-grids and higher proportions of local solar supply.

Many factors, including climate change, are eroding local energy resilience globally and in California. The term resilience implies springing back, rebounding. A community may be buffeted in a variety of ways. Resilience requires local capacity to restore essential services, whether they are related to health, shelter, food, safety, commerce, communications, water, or energy. Energy has a special place as an enabler of other essential services.

Energy resilience is taken for granted in much of the US because damage to infrastructure can be quickly repaired in most cases. But in extreme cases it cannot, and the frequency of extreme cases is increasing. Our experience with extreme events in California demonstrates that their impacts are typically localized. Across a wide area, there is resilience. However, locally, the impacts extreme events can be overwhelming.

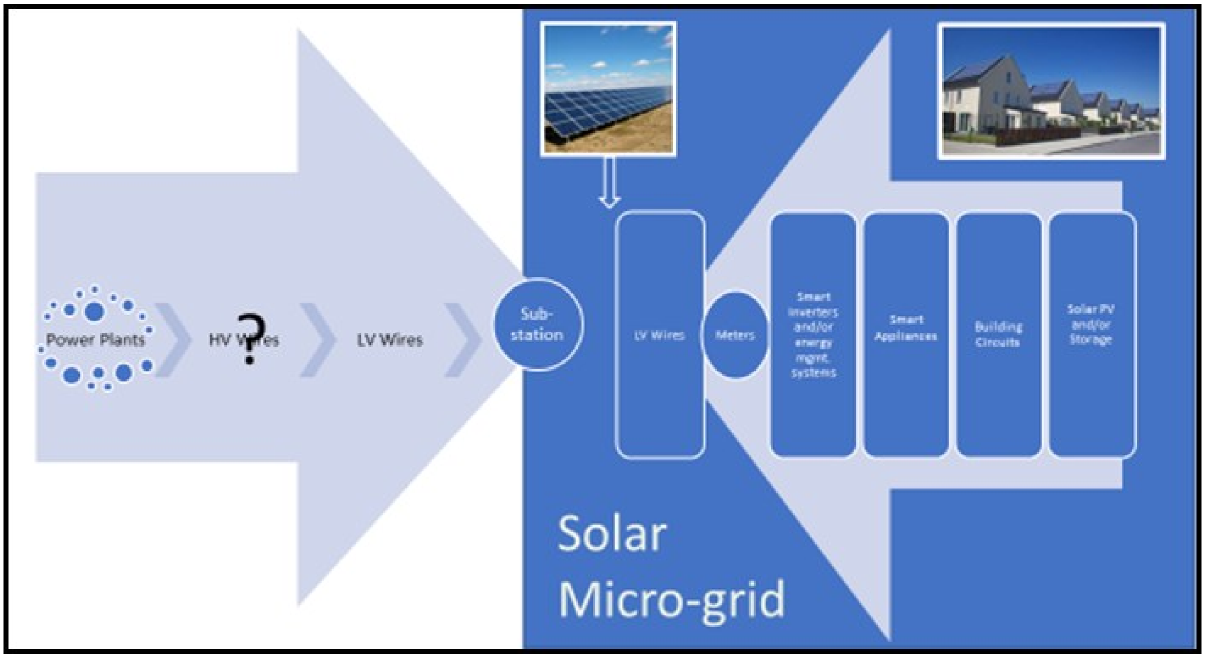
Energy Resilience is Affordable Crisis Insurance. Statistically predicted costs to local economies of extended post-disaster electricity outages greatly exceed life cycle costs of solar plus battery installations that would mitigate or avoid the outages.

From here on, unsubsidized solar electricity can be an economically competitive choice for local electricity customers, including local governments. Incremental costs of adding energy storage to a fleet of existing on-site solar arrays is repaid almost immediately in terms of post-disaster economic activity it makes possible that would otherwise be delayed. As solar and battery storage costs continue to plummet, disaster recovery benefits are additive to other life cycle cost savings.

The decision facing cities and counties is not whether to deploy. Rather, the emphasis should be on where and how to deploy solar to capture additional economic benefits beyond routine electricity supply. A city or school system should begin its energy resilience program by prioritizing its own critical electricity uses. At a minimum, in cases where solar is not yet pervasive locally, publicly owned facilities should be equipped with battery coupled solar at least to a level sufficient to power critical electricity uses indefinitely in the wake of a disaster.

Energy resilience is essential to economic resilience. Site level energy resiliency is gaining traction with home-owners and industries, especially those vulnerable to exceptionally high costs of business downtime. Energy resilience through battery coupled local solar electricity deployment results in economic resilience as well as opportunities for electricity rate stabilization.

Energy costs are a major factor determining a community's economic health and stability. Improving the energy resilience of economically vulnerable communities should receive special emphasis in the first phase of any city-wide energy resilience initiative.



As local energy resources are brought on stream, cities and utilities can work together to leverage individual energy user investments in energy resilience. Such leveraging requires aggregation by cities, energy service providers or independent businesses. Costs and benefits of programmatic or entrepreneurial local aggregation will determine the most effective approach.

<u>Energy Resilience Requires Change.</u> Extreme "natural" disasters in California, Texas, Florida and the Caribbean have recently resulted in broad area electricity outages lasting long enough to threaten local economies and impede physical and economic recovery efforts.

Maximum energy resilience will be realized only where the local jurisdiction, and/or a local developer/integrator has a plan. One essential plan element is deployment of clean local electricity supply and storage resources in sufficient quantities and groupings to deliver continuous supply matching localized demand.

Another plan element is deployment of micro-grids. Micro-grid controllers include suites of information, communications and control technologies that optimize imports and exports, forecast, regulate and match variable supply, storage reserves and variable usage, and communicate price signals and otherwise inform consumer and prosumer direct and automated choices.

<u>Local vs. Regional Grid Investment.</u> At lower overall variable renewable penetration levels, centralized deployment may be an easy, relatively cost-effective, though inherently slow, process. Investor owned utilities are understandably glad for the opportunity to make related investments that fit a comfortable and familiar business model.

Accordingly, where regulatory policies do not recognize the need for local energy resilience, decisions regarding cost allocation and renewable resource and storage deployment may favor centralized rather than local deployment.

This approach misses the opportunity to integrate at the scale at which new supply and storage technologies can be quickly deployed and at which they can deliver multiple rather than singular economic and reliability benefits, especially related to the integration of energy and transportation infrastructure.

Regional grids are a convenient platform for integration of centralized supply and storage, while local grids impose significant and costly impediments to local deployment of clean supply and storage capacities.

Eliminating or at least minimizing the impediments is technically feasible. Even so, it may not be a priority or even an attractive option for grid owners under current regulatory frameworks. So, the impediments must be circumvented.

<u>Solar micro-grids circumvent impediments and are an essential platform for local energy resilience.</u> It is easy to see from the schematic on the preceding page why collaboration is generally necessary between the local grid owner and the local jurisdiction.

A micro-grid can operate as a "virtual power plant". In this case, supply and storage are "behind" the grid owner's revenue meter and not under the grid owner's operational control except by agreement with energy users and prosumers. Instead, they are subject to the local jurisdiction's ordinances and permitting requirements. As with net metered solar installations, both utility and city have important independent regulatory authority and responsibility.

In other cases, community solar and community storage facilities may support micro-grid operation. In these cases, the city can have an active role in their ownership, operation, and cost recovery.

Micro-grids are proven and technically feasible platforms that can be deployed as a retrofit or in lieu of local grid expansion. As an incremental grid expansion investment supporting land and housing development, a micro-grid's incremental costs are modest in relation to overall project costs. The micro-grid's value as an integration platform and resiliency enabler greatly exceeds its cost.

As a targeted upgrade in a specific sector of a local grid, the same is true, provided there is sufficient inter-connected supply and storage capacity in the sector.

Absent frameworks for city/utility collaboration, community micro-grid deployment will lag local solar and storage deployment. This means both local decarbonization and local energy resiliency outcomes may be limited and unevenly distributed geographically unless there is policy support for local energy resiliency.

All costs must be recovered if a micro-grid project is to be successfully realized. Avoided costs of imported electricity and its delivery must suffice to pay for localized energy supply and storage. If they don't also suffice to pay for micro-grid functionality, the grid owner and /or local public and private sector participants must find ways of allocating and recovering the costs of resiliency and other services the micro-grid can provide. In these cases, the economic value of energy resilience may justify the cost of a micro-grid platform.

Outage-related costs can be avoided through increased deployment of solar micro-grids. In cases where local solar and storage capacity supports a substantial share of local demand, the incremental cost of micro-grid enabled local energy resilience can be less than the related avoided cost of disaster related power outages and other localized outages.

Grid owners typically have the technical skills to engineer and install the necessary controls, protections and inter-connections. They are generally not eager to do so, unless there is a way to fully recover related costs and perhaps capture an additional financial incentive. Some major US utilities are starting to deploy micro-grids in major US cities, suggesting they have developed ways of recovering the related costs

Solar micro-grids are the building blocks of resilient solar communities. Creating a resilient solar city or community requires strategies that target both settled and new neighborhoods. In either case, local solar and storage deployment can be accelerated or impeded by local policies, priorities, capacities and relationships.

Settled neighborhoods and sub-communities are by far the heavier lift. Initial steps are crucial because there are plenty of obstacles to remove ahead of actual deployment. Data exchange, integrative analysis, policy and program development and code and permitting changes are all necessary or at least advisable, and they take time. Early spade work is essential.

New land development projects can result in resilient solar communities, but only if the land use permit or land lease is conditioned on achieving this result. Micro-grid ownership and operation must be part of the project plan and budget. Again, developers and local grid owners must recover their costs. This means making energy resilience a priority and knowing the costs in advance and creating revenue streams to pay them.

In early implementation stages, needed local government capacities can be outsourced to some extent, but collaborative relationships cannot. Strategy cannot be outsourced. There is also a need to benchmark and build capacity within local government to manage energy resilience implementation.

Some initial capacity building steps include:

- Initiate data exchange with an electric utility and be prepared to pay.
- Complete data driven integrated energy resource analysis.
- Create a multi-year menu of public sector energy resilience retrofit projects

- Initiate development of codes and permitting standards for new energy resilience projects, e.g. make permitting of new home building and mixed-use development subject to credible, verifiable plans for neighborhood solar resilience.
- Prepare to negotiate with land and infill project developers with solar resilience as part of your bottom line.

State and local goals and policies must be aligned to achieve state-wide as well as local energy resilience. Some California cities have general resilience goals. They should be prepared to collaborate with energy service providers and grid owners to specifically achieve local energy resilience. Collaboration is possible if the terms are win-win. State policy should encourage state regulated utilities to be prepared to support their end of the necessary collaboration.

City and county governments and energy utilities have synergistic roles to play. Tactics available to local governments include ordinances that require new buildings and neighborhoods to be ready for on-site energy supply and storage retrofits, micro-grid retrofits, and energy management automation compatible with grid owner policies and plans.

In parallel, utilities can work with regulators and partner with local government to fund pilot programs and projects that target energy resiliency and offer micro-grid related services and electricity from community based solar projects.

Micro-grid and micro-grid ready projects are being planned and completed in other states. City and county governments can lead the way to local energy resilience by powering government operations with local solar resources. Projects around the US are underway that aim to lower electricity costs and generate positive annual net energy. These projects provide a foundation for broader local energy resilience.

Cities may partner with regional grid owners for broad adoption of best practices. They may elect to require that new residential and mixed-use communities be micro-grid ready, i.e. provide for net positive on-site electricity generation, EV/on-site storage and dedicated circuits for battery and EV charging.

For their part utilities can secure regulatory permission to undertake municipal solar resiliency projects, provide micro-grid turn-key design, construction and system operation service at reasonable, profitable prices, and offer all-solar tariffs based on community sited projects.

Another often overlooked key to local energy resilience will be project design that delivers top line and net revenue enhancement opportunities for the grid owner and sustainable, predictable long-term net revenue streams to the local jurisdiction.

Energy resiliency projects are a leading indicator of a potentially unstoppable market evolution that calls for policy attention. By themselves they inform but do not transform. Energy resilience needs integrated policy attention across the stakeholder spectrum.

In California the existence of pervasive and expanding on-site solar and battery storage capacity will create opportunities to leverage what is already paid for by adding the infrastructure necessary to use it in a grid emergency. In so doing, cities can assert and enforce a preference for locally sourced project services.

Municipalities and energy service providers must focus initially on barrier removal. Some tactics include setting goals, mining pilot project experience, creating fleets of publicly owned electric and fuel cell electric vehicles, and considering how energy, waste, water, and communication services can be more effectively integrated. Utilities, especially including Community Choice agencies should actively seek to develop resilience related revenue streams for reinvestment in resilience upgrades.

The CPUC can enable energy resilience policy integration. Energy resilience policy goals might include:

<u>CPUC:</u>

1. Develop resilient solar community standards and guidelines
2. Encourage cities to determine:
    a. the portion of their energy supply that is to be generated locally
    b. the portion of local electricity generation that must be available to be distributed locally.
3. Encourage solar installers to offer on-site storage options that are grid-interactive.
4. Invest in and incentivize grid modernization specifically to enable resilient solar communities and neighborhoods.
5. Get the rewards right. Make creating and supporting resilient solar communities “profitable” for both municipalities and grid owners.

<u>Energy Service Providers:</u>

1. Develop energy resiliency metrics and planning tools
2. Secure regulatory permission to account for local energy profiles and resource differences from one local jurisdiction to another.
3. Upgrade local assets to deliver resiliency and other grid services.

<u>Municipalities:</u>

Build local energy supply capacity, requiring preference for locally sourced project services

1. Aim for long term city-wide solar resiliency, applying lessons learned in achieving public sector and school system energy resilience.
2. Expand publicly owned EV and FCEV fleets that can be solar powered and deployed as grid-tied storage and generators during emergencies.
3. Develop local integrated infrastructure plans for energy, water, waste and communication services

<u>The CPUC’s Customer Choice White Paper can recommend goals and address current barriers to economically efficient and timely local energy resilience investments.</u>

1. Along with affordability, reliability and decarbonization, energy resilience should be a primary goal of CPUC electricity sector regulation.

2. Collaborative efforts among cities, counties, regulated utilities and Community Choice energy providers should be empowered and required, as it will be essential to the timely development of energy resilience standards, guidelines and metrics.

3. The CPUC should encourage California's local grid owners to develop business plans and the capacity necessary to support city initiatives to achieve energy resilience through the deployment of solar micro-grids.

4. To guide the achievement of energy resilience state-wide, the CPUC should determine the preferred future balance between centralized renewable electricity supply vs. local (i.e. community and on-site) electricity supply.

5. The CPUC can also encourage the creation of new local market structures and infrastructure configurations necessary to make resilient solar communities a "win" for both municipalities and local grid owners.

6. Micro-grids are a proven and technically feasible platform that can be deployed in lieu of local grid expansion or as a retrofit. As an incremental grid expansion investment supporting land and housing development, their incremental costs are quite modest in relation to overall project costs. Their value as integration platforms and resiliency enablers greatly exceeds their cost.

7. There is a currently unmet need to benchmark and build capacity within local governments to manage energy resilience implementation.

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