Blueprint for the Development of Distributed Generation in California

IREC Interstate Renewable Energy Council

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IREC believes clean energy is critical to achieving a sustainable and prosperous future. As part of its mission, IREC expands consumer access to clean energy by developing best practices and standards that lay the foundation for a robust clean energy industry. To pave a path to a clean energy future, IREC generates objective analysis and advice for the benefit of energy consumers, policymakers, the renewable energy industry and the general public.

OVERVIEW

In this Blueprint, the Interstate Renewable Energy Council, Inc. (IREC) proposes nine recommendations essential to unlocking the potential of DG in California.

1. **Allow Californians to self-supply their energy needs by removing the state's NEM cap.**
2. **Implement a well-designed community-shared DG program to expand DG access to consumers that cannot host a system on-site.**
3. **Expand DG procurement programs to increase the use of DG in wholesale supply that serves all consumers.**
4. **Adjust DG procurement programs to incentivize development in higher-value locations.**
5. **Use interconnection policy to identify and incentivize DG development in higher-value locations.**
6. **Encourage jurisdictions to improve and streamline permitting processes for rooftop and ground-mounted DG systems.**
7. **Incorporate DG into utility distribution system planning and operations to cost-effectively integrate high penetrations of DG.**
8. **Incorporate realistic assumptions about DG growth and cost-effectiveness into transmission planning.**
9. **Align market participants' incentives in a way that encourages higher-value DG.**

INTRODUCTION

California has long recognized the benefits that clean distributed generation (DG) can provide to its citizens, and the State has demonstrated that well designed DG policies can be cost-effective, that is, their various benefits can outweigh the costs of their implementation and continuing operation. The state legislature and the California Public Utilities Commission (CPUC) have implemented numerous policies intended to facilitate DG growth, including:

- The California Solar Initiative (CSI);
- Net Energy Metering (NEM);
- Virtual Net Energy Metering (VNM);
- The Renewable Feed-In Tariff (FIT) Program;
- The Renewable Auction Mechanism (RAM).
- The Investor-Owned Utilities' Solar Photovoltaic (PV) Programs;
- The Self-Generation Incentive Program;
- The Efficient Combined Heat and Power (CHP) Tariff Program; and
- Qualifying Facilities (QFs) of less than 20 megawatts (MW).

Together, California's policies promote a range of benefits resulting from increased DG. The major benefits are avoided fuel use, reduced line losses, and reduced generation capacity requirements. In addition, DG offers the ability to defer costly transmission and distribution system upgrades and enables fuel hedging. When sited strategically, such as on rooftops, parking lots and other hardscape areas, or on brownfields and landfills, DG can put existing land and infrastructure to more productive use. At the same time, it can minimize the amount of virgin land and habitat that would otherwise be needed for power generation. Furthermore, DG can provide a range of other environmental benefits associated with clean energy, such as avoided emissions of greenhouse gases and other air pollutants.

California's prescient policy support for DG has resulted in unprecedented DG market growth and declining costs. In particular, the costs of solar PV are falling rapidly. At the same time, the PV market is growing rapidly. Likewise, energy storage technologies are also becoming more cost-effective. As a result of this market expansion and the associated decrease in costs, consumers increasingly have cost-effective options for DG. As Federal Energy Regulatory Commission (FERC) Chairman Jon Wellinghoff recently stated, in the theoretical race between central-station renewables and distributed-generation resources currently underway, "Right now, I'd put my money on distributed resources."

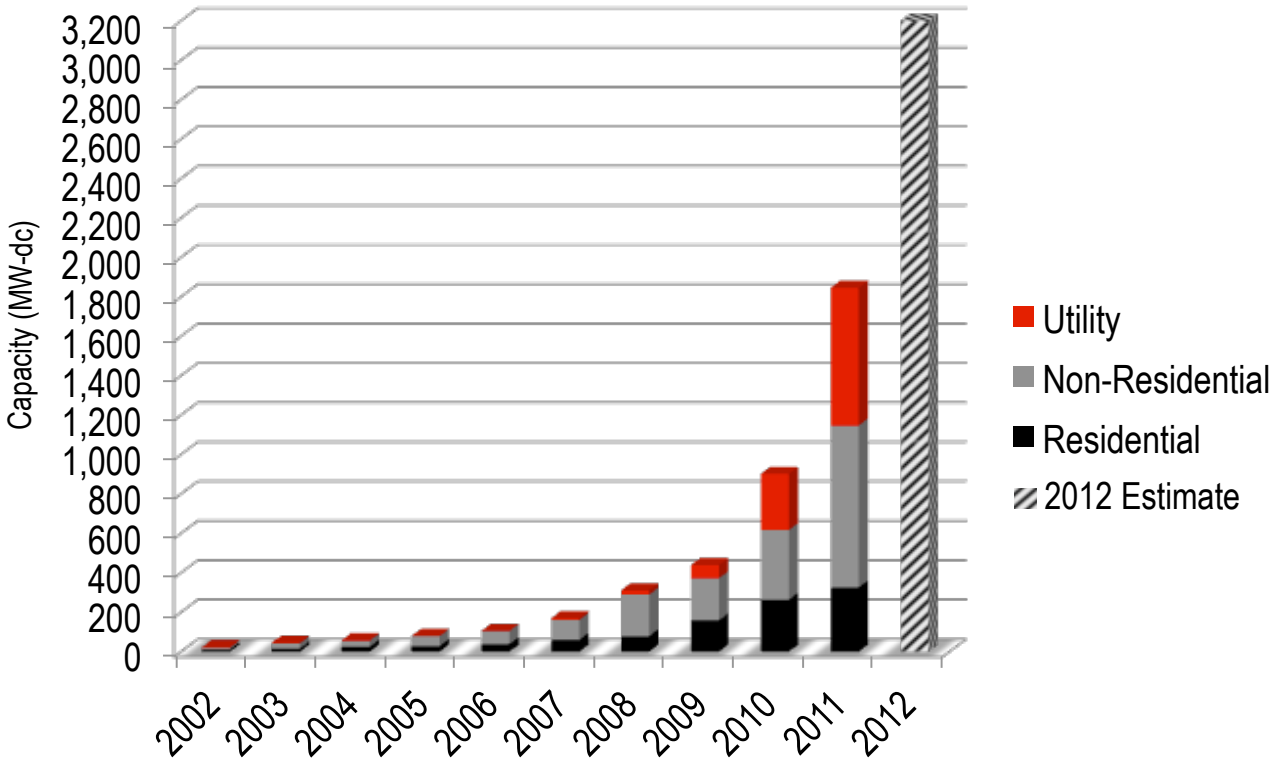

Figure 1: Annual Installed Grid-Connected PV Capacity by Sector (2002-2012)

The central premise of IREC's nine recommendations is that California should maintain its support for DG and prioritize higher-value DG going forward. DG projects can provide a host of benefits, but not every DG project offers the benefits equally. Siting of DG facilities is critical because many of the benefits are location-specific and are maximized when DG is located near the customers it serves. The closer generation is to load, the less the energy has to travel to serve its intended purpose, thereby reducing line losses and the infrastructure that is required to transmit the energy. In addition, capacity benefits and many of the land use benefits are location specific. For example, NEM clearly facilitates generation on-site, at load, which inherently has a higher value than energy developed further away. Other policies beyond NEM can also facilitate strategically sited DG, and California should focus on ensuring that its DG policies promote siting in high value locations.

While California is a leader in promoting DG today, the State's policies need to be reexamined to ensure that they adequately support higher-value DG in the future. For example, California's NEM cap is currently 5% of aggregate customer peak demand. Over the long term, if this cap is not raised or removed, many California energy consumers will not be able to benefit from on-site DG, which will represent a significant lost opportunity to harness consumer interest in clean energy resources for the general benefit of California's citizenry. Beyond on-site generation, there is also interest in participating in community-shared DG; however, little community-shared DG development has occurred in California due in large part to the lack of policy support. On the wholesale side, policies do not effectively incentivize higher-value DG development near load. Likewise, although California has recently made great strides in reforming its interconnection policy, it could be further improved to make interconnection time and cost more certain in higher-value areas close to load.

A set of coherent DG policies in California that direct development into higher-value areas could provide an opportunity for utilities to better integrate generation into their distribution system planning. Rather than responding solely to changes in load, utilities may be able to conduct advanced planning to accommodate additional generation, which could lower upgrade costs for developers and ratepayers, while also promoting a more stable distribution grid. This advanced planning could also enable utilities to integrate energy storage into these higher-value DG areas to firm generation capacity. To provide more certain cost-recovery to utilities, state policies could be designed to provide utilities appropriate incentives via rate structure redesign. As a whole, this approach would create a highly reliable, decentralized grid, and allow California to avoid a significant amount of new generating capacity and new transmission infrastructure.

RECOMMENDATIONS

REC proposes nine recommendations to unlock the potential of DG in California. Because many of the benefits of DG are location-specific, our overarching recommendation is that policies be put in place to promote the siting of DG in higher-value locations. Achieving DG's potential will require coordination across multiple programs and regulatory entities. If done properly, however, these principles can ensure a win-win-win for developers, energy consumers, and utilities.

1. Allow Californians to self-supply their energy needs by removing the state's NEM cap.

NEM is squarely permitted under the federal Public Utility Regulatory Polices Act (PURPA) and Congress encouraged states to adopt NEM policies in the Energy Policy Act of 2005. Indeed, NEM has been implemented in 43 states, and California was an early pioneer. NEM allows California energy consumers to fulfill their own energy needs in a simple and intuitive way through a range of renewable technologies, including PV, wind, biogas and others. No other option exists in California that simply and cost-effectively facilitates homeowners' and businesses' abilities to install and benefit from renewable generation. In addition, because it involves on-site generation, NEM naturally encourages a tight connection between generation and load. As in nearly all states offering NEM, California's rules explicitly require that NEM generation primarily serve on-site needs.

Today, California is number one in installed PV capacity due to the strength of its NEM program. In 2001, 42% of net metered installations in the country were installed in California. Power-purchase agreements (PPAs) and leases are now expanding NEM generation across income levels. While 17 states do not restrict NEM capacity, California caps NEM generation at five percent of "aggregate customer peak demand." Although a recent CPUC decision clarified the meaning of that phrase in a way that expanded the number of megawatts of on-site DG allowed, many of California's utilities are on track to reach the NEM cap in the next five years. To ensure that California energy consumers will be able to continue to install DG on their homes and businesses, California's NEM cap should be removed. Any concerns about NEM customers' contributions toward utility cost recovery can be addressed through rate design, as discussed below.

2. Implement a well-designed community-shared DG program to expand DG access to consumers that cannot host a system on-site.

Although many California energy consumers benefit from on-site self-generation, many others are unable. The National Renewable Energy Laboratory (NREL) estimates that only 25% percent of residential rooftops in

the United States are well situated to install solar PV on-site. Nonetheless, many of the remaining 75% of consumers want to support and benefit directly from PV development. A well-designed community-shared DG program would provide these consumers a solar pathway by creating a direct link between a consumer's energy choices and the promotion of PV benefits. Moreover, such a program could open renewable energy options for low-income energy consumers, many of whom have been historically excluded from direct participation due to the design of current programs that promote customer-sited DG. A community-shared DG program could be designed to be revenue-neutral for non-participating ratepayers. Examples of successful community-shared DG programs exist in 14 states, including statewide programs as well as utility-run programs at investor-owned utilities, municipal utilities and cooperatives. For example, in California, the Sacramento Utility District (SMUD) has its SolarShares program, which it has operated since 2008, and which is often cited as a successful example of community-shared solar. Building on this, California should put in place a program that enables a wider range of consumers to participate in community-shared solar.

PV USA, a 1MW community solar project in Davis, CA

3. Expand DG procurement programs to increase the use of DG in wholesale supply that serves all consumers.

In addition to expanding consumer options directly via the above policies, policymakers may also encourage DG through an expansion of wholesale DG procurement programs. California has implemented a wide variety of procurement programs focused on DG, more than any other state, including the RAM, the FIT, utility PV programs, and a QF program. Together, these programs have incentivized significant investment in new DG capacity in California. Most of these programs, however, are reaching the end of their allocated capacity. For example, the last RAM solicitation is scheduled for May 2013, and, in spite of a recent increase in program capacity, most of the State's available FIT capacity is subscribed. Additionally, while QF enrollment is uncapped, the price is currently too low to attract significant new DG. At the same time, as evidenced by the continuing growth in interconnection requests, a significant number of projects are currently under development in an attempt to gain contracts for the capacity that does remain in these programs. If

these programs come to an abrupt end, considerable investment in time and resources could be lost, which in turn would harm the nascent DG market. Furthermore, energy consumers would lose the opportunity to benefit from the investments already made in developing DG facilities. An expansion of these programs would both provide continuity in the marketplace and allow planners to select the lowest-cost projects from a highly competitive wholesale DG market.

4. Adjust DG procurement programs to incentivize development in higher-value locations

California's current DG procurement programs do not prioritize development in higher-value locations, having the lowest interconnection costs and the greatest potential to defer utility upgrades to their transmission and distribution systems. Locating DG near substations is regularly cited as being beneficial. Both the QF program and the RAM allow participants to interconnect to the transmission system and they do not provide any guidance regarding high value locations. While the FIT requires interconnection to utilities' distribution systems, which encourages the location-specific benefits of DG to some degree, the FIT is not as effective as it could be in incentivizing development in higher-value areas.

Locating on the distribution system is only one factor relevant to determining whether a project is of high value. Procurement programs could use a more nuanced view of DG that looks at more than whether a project has a distribution or transmission level interconnection, particularly in light of the amount of sub-transmission in place in the state. Going forward, DG developers that locate in higher-value areas under wholesale procurement programs should be compensated for the benefits associated with their site selection. For example, a procurement program, such as the RAM or the FIT, could quantify the benefit of locating DG in particular higher-value areas and provide an appropriate price signal to locate in those areas. Compensating generators for the benefit ratepayers receive through grid benefits, such as avoided infrastructure investment, should hold ratepayers indifferent to the program. Providing compensation would encourage projects to locate in high value areas, where higher land costs may otherwise discourage them from locating.

Solar panels on San Francisco's Moscone Center

Photo credit: Penni Gladstone

5. Use interconnection policy to identify and incentivize DG development in higher-value locations.

California's DG interconnection process—Rule 21—provides expedited interconnection for generators that pass certain technical review screens, which already has the effect of promoting interconnection in load pockets. Nevertheless, Rule 21 could be improved to further incentivize interconnections in such higher-value areas. In particular, the rule could provide greater cost certainty related to interconnecting in these areas, as well as greater certainty regarding the time the interconnection process would take in these areas. Importantly, such certainty could be provided without impacting ratepayers. To provide certainty regarding costs and timeliness, Rule 21 could specify prioritized interconnection zones that met a set of criteria that align with the highest value locations on the distribution system within each utility's service territory. These prioritized interconnection zones could overlap with the higher-value areas identified in procurement programs, such as the RAM and the FIT, which would be eligible for appropriate compensation, as described above. By clearly defining the contours of these higher-value areas consistently across interconnection and procurement policies, it should be possible to more precisely quantify the benefits provided by DG located in these areas and incentivize development accordingly.

6. Encourage jurisdictions to improve and streamline permitting processes for rooftop and ground-mounted DG systems.

The process of obtaining necessary environmental, land use, and building permits contributes significantly to the costs of DG systems. As rooftop DG continues to grow in popularity, municipalities are at risk of being overwhelmed by the volume of applications and thus will benefit from proactively redesigning their permitting process to be more efficient, which benefits both the municipal staff as well as solar developers and customers. The state should continue to support efforts that encourage consistency across municipalities where possible. Similarly, many communities are facing a high volume of applications for ground mounted DG systems but have not yet incorporated renewable energy systems into their comprehensive plans. Advanced comprehensive planning in California can further drive renewable energy systems into high value locations. Planning efforts can avoid conflict with other uses, prevent applications in impractical locations, and appropriately mitigate the individual and cumulative environmental impacts of ground-mounted renewable energy systems being installed in the state. Expedited permitting processes can also promote location within previously identified renewable energy zones. Local government should be asked to actively identify and participate in the facilitation of DG in high value areas.

7. Incorporate DG into utility distribution system planning and operations to cost-effectively integrate high penetrations of DG.

Through various statutory provisions, California law currently requires utilities to incorporate DG into utility distribution system planning and operation, and the CPUC has taken steps toward accomplishing this goal through contracting requirements and other measures. However much progress remains to be made. The utilities often point out that the distribution system was only designed with one-way power flow in mind. This thinking also appears to pervade the way that distribution system planning is approached, with a singular focus on customer load. However, as the success of NEM in California suggests, consumer preferences are changing and utility planning and management of the distribution grid should evolve in response. Distribution system planning that focuses purely on changes in load without taking into account that a portion of this load will likely be served locally by DG is unrealistic. Utilities do not have direct control over DG locations as developers may choose to site in locations with less grid value due to land costs and other factors. Nonetheless, DG sited in higher-value areas would be

more efficient and cost-effective than making costly distribution upgrades to facilitate development in remote parts of utilities' distribution systems. Going forward, utilities should be designing a system that can accommodate bi-directional flow and incorporating reasonable assumptions about changes in distribution system characteristics in light of the shift towards increasing penetrations of DG.

8. Incorporate realistic assumptions about DG growth and cost-effectiveness into transmission planning.

By concentrating DG and energy storage in high value locations, utilities could also avoid costly investments in transmission assets. To effectively avoid unnecessary transmission investment, however, transmission planning must incorporate realistic assumptions about DG growth and cost-effectiveness, as well. In addition, utilities should consider the alternative of integrating energy storage to firm DG capacity as an alternative to building out new transmission infrastructure. It is likely that zones where existing transmission constraints result in local resource adequacy benefits for DG and co-located storage, such as in San Diego Gas & Electric's service territory, would initially be most cost-effective in this respect. Ultimately, if investment in DG and co-located storage is more cost-effective than investment in transmission infrastructure, ratepayers should benefit from increased reliability without paying higher rates.

9. Align market participants' incentives in a way that encourages higher-value DG.

Effective policy design aligns incentives across market participants in order to achieve the policy's goals. In each of our principles above, IREC recommends rewarding market participants for making or facilitating choices that align with state clean energy policy goals, in particular the development of higher-value DG. Accordingly, retail utility rates should be designed to allow utilities to recover prudent investments that facilitate growth in higher-value DG, along with a reasonable rate of return. Recent and ongoing research shows that an important component of avoiding cross subsidies between NEM and non-NEM customers is ensuring that rates are designed in a manner that reflects both the costs and the benefits of customer investment in DG. Regardless of how rate redesign is achieved, it should fairly compensate utilities as well as California ratepayers and DG developers.

CONCLUSION

The growth of DG in California offers enormous opportunity for the state, but the full value of these investments will only be realized if focused attention is paid to encouraging development in the highest value locations. IREC believes that the policy recommendations above will help to build a cohesive approach to sustainable DG growth across the state.