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July 6, 2011

California Energy Commission
Docket Office, MS-4
Re: Docket numbers 11-IEP-1G, 11-IEP-1H
1516 Ninth Street
Sacramento, CA 95814-5512

RE: Distribution Infrastructure and Smart Grid

Dear IEPR Committee:

Pursuant to a request from the Integrated Energy Policy Report (IEPR) Committee, the Interstate Renewable Energy Council (IREC) and The Vote Solar Initiative (Vote Solar) respectfully submit these comments in response to questions posed for the June 22, 2011 IEPR Committee Workshop on Distributed Infrastructure Challenges and Smart Grid Solutions to Advance 12,000 Megawatts of Distributed Generation (Workshop).

IREC is a non-profit organization that has worked for nearly three decades to accelerate the sustainable utilization of renewable energy resources through the development of programs and policies that reduce barriers to renewable energy deployment. IREC has participated in renewable energy-related workshops, proceedings and rulemakings in nearly forty states during the past three years. IREC addresses topics that directly impact the deployment of renewable energy resources, including net metering rules, interconnection standards for distributed generation and community solar program rules. IREC has assembled model rules that reflect "best practices" in these areas.

Vote Solar, a project of the Tides Center, is a non-profit, public benefit, Internal Revenue Code Section 501(c)(3) organization established in 2002. With over 50,000 members throughout the United States, Vote Solar aims to address energy and environmental issues by bringing solar energy to the mainstream. Working with its partners to address barriers to solar development, Vote Solar focuses on advancing effective programs and policies that spur growth in solar markets and broaden participation in the solar energy economy. Vote Solar has worked on numerous

renewable distributed generation issues in California, including the implementation of the California Solar Initiative (CSI), net metering and interconnection policies, and the Renewable Portfolio Standard, and has intervened in five general rate cases of California investor-owned utilities in order to support fair value for distributed generation.

IREC and Vote Soar appreciate the opportunity to file these comments. IREC's prior comments, submitted on May 23, 2011, focused on the importance of establishing distributed generation program eligibility requirements to maximize the benefits of distributed generation. Distributed generation can provide a variety of distribution and transmission system benefits, as well as land use and environmental benefits. At the same time, IREC and Vote Solar appreciate California's goal of least-cost wholesale power procurement. In these comments, we offer a blueprint for cost-effectively achieving 12,000 MW of distributed generation in a way that also maximizes the benefits of distributed generation. Although we believe smart grid improvements and associated developments will be important to California's energy future, we believe the simple changes we recommend below will allow California to reach its 12,000 MW distributed generation goal cost-effectively in the immediate future.

Planning for the Future: Maximizing the Benefits of Distributed Generation

Distributed generation can offer significant benefits, including avoided construction of additional transmission lines, as well as land use and environmental benefits. Regarding the former, according to the 2009 CSI Impacts Report, currently installed capacity under the CSI program is providing transmission capacity benefits comparable to a 230-kV transmission line.[1] As for the latter, distributed generation projects are less likely to be sited on virgin land and have the potential to make use of rooftops or brownfield properties in urban and suburban areas that might otherwise remain undeveloped.

Obtaining these benefits requires appropriate siting. Specifically, transmission benefits can be obtained only if a generator is interconnected to a distribution grid and the electrical energy produced is consumed on the distribution circuit near where the generating resource is interconnected. If power flow requires use of the transmission grid, these benefits may be lost or lessened. Locating distributed generation close to load can also reduce line losses that occur when energy has to be transmitted over greater distances, can help defer transmission and distribution capacity upgrades and additions, and may reduce voltage variability and provide reactive power support. Similarly, land use and environmental benefits generally are increased if a generator is sited on rooftops, in brownfields, or on otherwise disturbed land that has minimal conservation value.

Unfortunately, many of California's wholesale distributed generation programs do not incentivize the location of generation in a way that maximizes distributed generation benefits. Although current programs have many beneficial features, their eligibility requirements generally allow systems to be sited anywhere within the California Independent System Operator (CAISO) territory. This raises a possibility that generators

[1] *See* CPUC California Solar Initiative 2009 Impacts Report, June 2010, Section 6.2.

participating in these programs will be interconnected on transmission lines, far from load. Indeed, during the workshop, representatives from investor-owned utilities, as well as other participants, pointed out this siting dilemma.

IREC and Vote Solar believe this disconnect exists not because the costs of interconnecting to the transmission system are lower than the costs of interconnecting to the distribution system—generally the opposite is true[2]—but rather because transmission system upgrades costs are reimbursed to the developer whereas the cost of distribution system upgrades are not. Consequently, transmission upgrade costs do not need to be incorporated into developers' wholesale power prices in the same way as distribution upgrade costs, making projects interconnected to the transmission system appear more financially attractive than a comparable project interconnected to the distribution grid. Although wholesale power prices may be lower for a transmission-interconnected generator, these generators may not deliver the same level of benefits, and therefore may not provide the same level of value. The different treatment of distribution and transmission upgrade costs, coupled with the broad eligibility requirements of some of California's wholesale programs, create a disincentive to locate distributed generation in a way that maximizes potential benefits.

Interconnecting Distributed Generation to the Distribution System: A Blueprint for Achieving California's 12,000 MW Goal

As IREC stated in its May 23 comments, to achieve California's ambitious 12,000 MW goal, California will need a range of retail and wholesale programs that can support distributed generation growth across a number of important market segments. To the maximum extent possible, IREC and Vote Solar believe California should orient its programmatic framework in a manner that promotes the benefits of distributed generation, which should in turn improve the overall cost-effectiveness of achieving the 12,000 MW goal. By carefully considering factors such as program eligibility requirements, streamlined interconnection processes, and the integration of distributed generation into utility planning processes, California can ensure that its 12,000 MW goal is achieved efficiently, cost-effectively and in a manner that maximizes distributed generation benefits.

Removing the Disincentive to Locate Generation on California's Distribution Systems

To encourage the siting of distributed generation on distribution circuits where generation can serve nearby load, IREC and Vote Solar recommend that California extend the cost waiver for distribution system upgrades that is currently in place for net-metered systems to cover additional types of generators that meet certain requirements.[3] Presently, net-

[2] For an example of typical transmission and distribution system interconnection costs, see Unitized Interconnection Cost Data from Hawaiian Electric Company (HECO), attached as Appendix A. As these data demonstrate, the cost to interconnect dramatically increases as the capacity of the line section involved increases.

[3] *See* Cal. Pub. Utils. Code § 2827(g); *see also* California Rule 21, Section C.1.d.

metered customers do not pay the cost of distribution system modifications that may be required to accommodate the interconnection of a net-metered system. Such costs are instead incorporated into utility distribution system costs that are paid by all ratepayers. In many respects, this is similar to the Federal Energy Regulatory Commission's (FERC's) treatment of transmission network upgrades. Recognizing the value of these upgrades to all users of the transmission system, FERC allows such costs to be folded into transmission rates.

IREC and Vote Solar recommend that the cost waiver for distribution system upgrades be extended to all distributed generation systems whose capacity addition would contribute to an aggregate generating capacity of less than 100 percent of minimum load on a distribution feeder. When aggregate generating capacity on a feeder is less than 100 percent of minimum load, there is reasonable assurance that electrical output from that generator will serve nearby load. Thus, the 100 percent of minimum load criterion can serve as a reasonable proxy for systems that provide the benefits of distributed generation discussed above. Ultimately, ratepayers pay the costs of distribution system upgrades regardless of whether those costs are incorporated into wholesale generation prices or distribution system charges. However, folding such costs into distribution charges has the benefit of removing a disincentive to locate new, wholesale distributed generation on distribution systems, thereby maximizing the benefits associated with distributed generation. As discussed below, this approach also better facilitates the specific incorporation of distributed generation into utility distribution system planning.

IREC and Vote Solar recognize that a small number of distribution feeders may be costly to upgrade and should be excluded from an expanded cost waiver. We suggest that utilities should be able to identify such feeders within their service territories, such that wholesale systems attempting to interconnect to these feeders would not be eligible for the extended cost waiver.[4] This suggestion mimics an approach that the Sacramento Municipal Utility District (SMUD) took recently with regard to pre-identifying distribution feeders where SMUD attempted to direct generators participating in its feed-in tariff program.[5] IREC and Vote Solar believe that the distribution system mapping tools being developed by California's three largest investor-owned utilities can be easily updated to provide similar information necessary to support implementation of an expanded cost waiver.

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4 IREC and Vote Solar do not intend for this proposal to apply to net-metered systems and solar PV systems up to one MW in capacity.

5 The SMUD Interconnection Map, which pre-identifies distribution feeders, is available at http://www.smud.org/en/community-environment/solar-renewables/Documents/InterconnectionMap.pdf.

Streamlining Interconnection and Integrating Distributed Generation into Utility Planning

IREC and Vote Solar recommend four additional steps to streamline interconnection and better integrate distributed generation into utility planning processes. By streamlining interconnection and integrating distributed generation into planning processes, California's utilities will be able to lower transaction costs for all market participants, including the utilities themselves and projects developers. These streamlining efforts will help realign incentives to encourage the benefits of distributed generation and allow California to achieve its 12,000 MW distributed generation goal at the lowest cost to ratepayers. They include:

- Integrating distributed generation into resource adequacy planning—IREC and Vote Solar believe that, to the extent distributed generation is located on distribution systems and meets the 100 percent of minimum load criterion described above, it should be deemed to be fully deliverable and to provide resource adequacy benefits. Distributed generation that satisfies these requirements is capable of delivering 100 percent of its output to nearby load and should not require a deliverability study to demonstrate that capability.

- Integrating distributed generation into distribution system planning—A number of studies have confirmed the ability of solar photovoltaic (PV) systems to have positive grid impacts, including the ability to reduce system loading at the distribution level during periods of high electricity demand. Depending on the precise timing and duration of solar energy production, installation of solar PV offers an alternative to the traditional utility practice of building additional distribution assets to meet load growth and maintain system reliability. However, solar PV can only offer this benefit if deployment of solar PV is integrated into utility distribution planning in a sustained fashion.

- Continuing distribution circuit availability and minimum load mapping—As discussed at the June 22 workshop, California's investor-owned utilities are working toward improved distribution circuit availability and minimum load mapping. IREC and Vote Solar believe these efforts are important to encouraging the beneficial siting of distributed generation, as they will provide essential distribution circuit information to utilities and developers. IREC and Vote Solar believe these tools should be updated to identify areas where distributed generation will provide sufficient value to qualify for a waiver of distribution system upgrade costs.

- Modifying technical review screens for "fast track" interconnection—As IREC stated in its May 23 comments, modifying technical review screens for fast track interconnection is essential to encouraging increased interconnection of distributed generation. IREC and Vote Solar believe that generators that contribute to an aggregate capacity that is below 50 percent of minimum load, measured when a generator is expected to be online, should be eligible for fast track interconnection. Moreover, generators that contribute to an aggregate

capacity above 50 percent and up to 100 percent of minimum load should be able to interconnect through a supplemental review process without requiring a full interconnection study. We refer the Committee to IREC's prior comments on this topic for additional detail.

Smart Grid to Support State Environmental Goals

IREC and Vote Solar recognize the importance of smart grid and related technologies, including in particular storage technology, to California's energy future. We believe, along with many of the participants at the June 22 workshop, that moving toward a smarter grid will support the State's 12,000 MW goal, as well as other energy and environmental goals. At the same time, IREC and Vote Solar acknowledge the complexity of smart grid deployment and the necessary policy changes that will need to accompany that deployment. We look forward to working with the CEC, the CPUC, and other stakeholders in navigating these issues.

Although we recognize the benefits of these efforts, IREC and Vote Solar believe that California can move forward and achieve its goal for 12,000 MW of distributed generation without all of the technical and policy changes associated with smart grid implementation having been fully addressed. As several workshop participants noted, California's current distribution systems can accommodate much more distributed generation. We believe that the few, relatively simple policy changes outlined above will catalyze increased installation of distributed generation in a manner that maximizes the benefits distributed generation can provide.

California Is Ready to Move Forward

IREC and Vote Solar believe the proposals described above provide a blueprint for cost-effectively achieving the State's goal of 12,000 MW of distributed generation. These proposals can be implemented immediately, and relatively easily, outside of the smart grid implementation process. Although IREC and Vote Solar acknowledge and fully supports the benefits of developing a smarter grid, we believe the benefits of increased distributed generation are within reach today.

IREC and Vote Solar appreciate the opportunity to file these comments.

Respectfully submitted this 6th day of July 2011.

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Appendix A:
HECO Unitized Interconnection Cost Data

Unitized Interconnection Cost Data (Reference RFP Section 3.11 and Appendix B, page B-29)

The per unit cost figures below are intended to be used to provide an estimated cost for Section B of the Interconnection Cost Information section of the Response Package (page B-29, Appendix B of the RFP). These cost figures include the interconnecting substation, communications, and transmission or distribution lines to connect the substation to the existing HECO system.

The Bidder should identify the components assumed for their project and the quantity assumed for each. Each section below provides notes on the assumptions for each of the unit cost estimates. If a bidder's project requirements are different than what is assumed in the notes, the bidder should identify each difference and provide an estimated additional cost or savings resulting from those different requirements.

Transmission & Distribution Lines

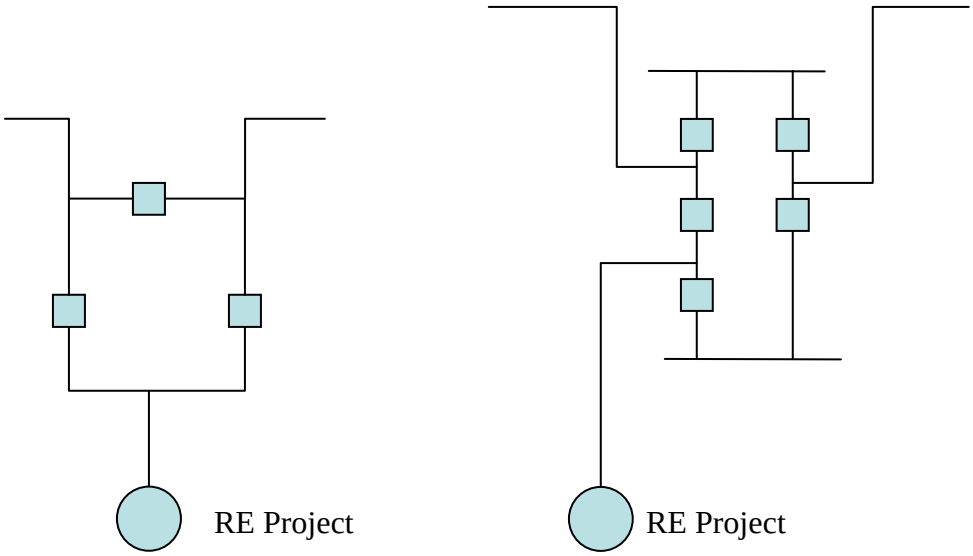
Component	Description	Cost per mile
1	New 138kV Overhead line (accessible 500' spans)	$3,122,000
2	New 46kV Overhead line (accessible 250' spans)	$685,000
3	New 12kV Overhead line (accessible 150' spans)	$809,000
4	New 138kV Overhead line (inaccessible 500' spans)	$3,902,000
5	New 46kV Overhead line (inaccessible 250' spans)	$856,000
6	New 12kV Overhead line (inaccessible 250' spans)	$736,000
7	138kV overbuild on existing 46kV line (accessible 500' spans)	$3,619,000
8	46kV overbuild on existing 12kV line (accessible 250' spans)	$1,992,000
9	138kV overbuild on existing 46kV line (inaccessible 500' spans)	$4,524,000
10	46kV overbuild on existing 12kV line (inaccessible 250' spans)	$2,490,000

Notes:

1. Easement and/or land costs are NOT included with these estimates
2. EA/EIS cost are NOT included with these estimates.
3. Components 7 and 9 - Overbuilding a 138kV line on existing 46kV pole line assumes the removal of the existing 46kV poles.
4. Components 8 and 10 - Overbuilding a 46kV line on existing 12kV pole line assumes the removal of some of the existing 12kV poles.
5. Components 4, 5, 6, 9 and 10 includes 25% Contingency for inaccessible or mountainous areas.
6. All estimates are escalated to 2009 costs.
7. All estimates are single respective circuits (i.e single 46kV ckt or single 138kV ckt with single 46kV ckt underbuild).
8. Components 1, 4, 7 and 9 assume steel pole construction.
9. Components 2, 3, 5, 6, 8 and 10 assume wood pole construction.
10. Components 7 and 9 - Extending the 46kV sized easement to a 138kV sized Easement is NOT included with these estimates
11. Components 8 and 10 - assumes the 12kV sized easement is acceptable for a 46kV line.

Substation

138kV Substation

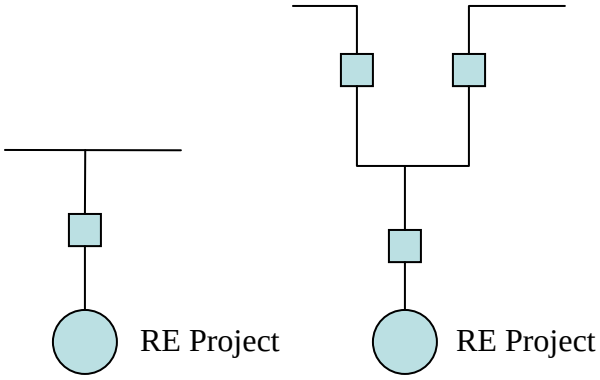


Component	Description	Cost
1	3 – 138kV circuit breaker substation	$7,278,000
2	5 – 138kV circuit breaker substation	$8,200,000

Notes:

1. Substation land that is received has been graded per HECO's CSA requirements. No costs for excavation and fill are included in the estimates.
2. Costs are in 2009 dollars.
3. Estimate does not contain any of the following costs: Telecom; Relay Coordination Study; Project Management
4. Substation relay protection requirements have not been identified, so costs are based upon typical line protection relaying requirements.
5. Control house and SCADA are included in cost estimates.

46kV Substation



Component	Description	Cost
1	1 - 46kV circuit breaker substation	$1,033,000
2	3 - 46kV circuit breaker substation	$1,600,000

Notes:

1. Substation land that is received has been graded per HECO's CSA requirements. No costs for excavation and fill are included in the estimates.
2. Cost are based upon a 12/2009 service date.
3. Estimate does not contain any of the following costs: Telecom; Relay Coordination Study; Project Management
4. Substation relay protection requirements have not been identified, so costs are based upon typical 46kV circuit breaker relaying requirements
5. No control house is needed and protective relays will be housed in an outdoor relay cabinet
6. SCADA requirements are included in the estimate

Telecommunications

1. Point-to-point microwave: $718,000 with the following assumptions:

    a. There is line-of-sight between the communications endpoints
    b. Frequencies are available.
    c. There are existing structures/buildings and available space on either end to house the radio equipment.
    d. Telecommunications grounding standards are up-to-date at both sites.
    e. -48VDC power is available.
    f. This estimate does not include any special permit/approval that is required site-specific.
    g. Space is available to locate antenna towers/structures at both ends.
    h. Interconnection to HECO's existing communications is not included.

2. Fiber with overbuild and new construction: $205,000 per mile with the following assumptions:

    a. The poles are in good condition and do not need replacing.
    b. The poles are not overloaded.
    c. The poles and the attachments are in accordance with NESC 2002 and no work is required to upgrade the poles to current standards.

3. Telephone: $82,000 with the following assumptions:

    a. Telephone communications is normally used for SCADA (Supervisory Control and Data Acquisition) applications.
    b. Depending on the interconnection to the electrical grid, telephone lines may be used for some protective relaying functions.