In the matter of,) Docket No. 14-IEP-1
2014 integrated Energy Policy Report Update) Subject: Draft 2014 IEPR Update Report
(2014 IEPR Update)

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Comments of Sierra Club California

Sierra Club California respectfully submits these comments in response to the Draft 2014 IEPR Update Report.

These comments focus on the section entitled: "Update on Electricity Infrastructure in Southern California "in Chapter 9 and the related discussion in the Executive Summary.

1. **Contingency planning should include a preferred resources contingency plan to mitigate any projected implementation shortfalls in the conventional generation and/or transmission categories**.

   On page 194 of the draft IEPR report, it states:

   > "**Development of contingency mitigation measures that can be triggered if resource expectations do not match requirements.** These include (1) a possible request to SWRCB to defer compliance dates for specific OTC facilities for which a specific new power plant would allow retirement, and (2) conventional power plant proposals taken as far through the permitting and procurement processes as practicable, but then held in reserve to receive final approval and begin construction only if triggered."

   In the "Southern California Reliability" Workshop sponsored by the CEC and held at UCLA on 8/20/14, Mike Jaske from the Energy Commission gave a presentation on this issue entitled "Contingency Issues". In his presentation, he noted that there were **three** contingency options:

   "For aggregate shortfalls, three options being evaluated:
   – OTC compliance date deferral requests to SWRCB
   – IOU targeted renewable DG program
   – Conventional gas-fired projects permitted and procured, but not developed unless triggered" Slide 4

   "Targeted Renewable DG Program
   • Functionality comparable to generators

– Specific locations
– Provide reactive power capabilities
– Telemetry to allow control or schedule updates" Slide 5

The plan to meet SoCal reliability requirements, in light of the SONGS closure and OTC retirements, involves transmission, conventional gas generation and preferred resources (PR) components. Some expressed the original rationale behind having a contingency plan was to provide a backup in case planned preferred resources were not implemented as needed according to the plan. However, it is by no means certain that conventional generation and transmission projects will be completed on time. In fact, some of these proposed and approved conventional generation projects are currently being challenged. Conversely, in its recent LTPP Track 1 and 4 procurements, SCE is requesting CPUC approval to procure over 500 MW of a diverse portfolio of preferred resources projects. And it received over 1,800 proposals. So this initial step in the procurement of preferred resources is off to a good start and it appears that there is a large potential supply of preferred resources (PR) available for additional and future projects.

A preferred resources contingency plan could backup a shortfall of PR resources similar to the IOUs being permitted to over procure utility scale renewable resources to meet the RPS requirements in anticipation of a 30% project failure rate. But more importantly, a PR contingency plan could provide valuable backup in the event conventional generation and/or transmission projects fail. Preferred resources could actually be low risk, quick to implement and offer many advantages over the other contingency plan options. For example, solar PV firmed and shaped with storage could be targeted to be installed in local communities in the precisely needed sizes and in the best locations to meet local capacity requirements. When paired with storage, this resource can be flexible, dispatchable and provide frequency regulation, VAR support and other ancillary services to produce reliable energy and maintain the stability of the grid. Such projects are typically quick to construct in less than a year, do not require expensive emission credits, or permitting for gas lines and fuel storage, water, etc. and would be well positioned to support the expected rapid growth of customer sited behind-the-meter generation.

Therefore, we recommend that the phrase or its equivalent "…(2) a preferred resources contingency plan and (3) …" be inserted in the sited paragraph on page 194. Further, we request that the CEC work with the other agencies and SCE and SDG&E to develop a comprehensive preferred resources contingency plan that could address project failure of planned conventional generation and/or transmission facilities.

2. **Tracking progress in implementing transmission, conventional generation and preferred resources against the plan should be comprehensive, show actual progress against the plan, be completed at least annually and made publicly available.**

The Draft IEPR report does call for tracking progress on the implementation of the reliability plan. We would further recommend that this effort be enhanced to produce an integrated document showing progress for each of the three categories of resources – transmission, conventional generation and preferred resources. The report should be produced at least

annually and made publicly available. It should contain a reasonable level of detailed data similar to, for example, the CPUC's regularly updated "RPS Project Status Table" in Excel. This tracking report should document target go-live dates, actual go-live dates and project status against critical milestones. It should be organized by IOU (SCE and SDG&E) by each of the three major categories and for preferred resources by type of PR.

3. The reliability plan requirements should be updated annually, documented and made publically available.

The Preliminary Reliability Plan that was initially developed in September of 2013 was never formally approved but has served as a guideline to CAISO, the CPUC in finalizing its LTPP decisions, and SCE and SDG&E in determining what the needs are and how to achieve them. When SONGS closed unexpectedly in summer of 2013, there was appropriately much concern amid high risks of fully knowing the system needs and how best to meet those needs. A lot has happened since then that has changed the current reliability landscape situation.

a. CAISO has implemented many projects and has many more in the pipeline to provide reactive power/VAR support, restore enhanced system reliability under contingent events and provide new paths of import deliverability to meet local capacity requirements in the LA Basin and San Diego load pockets.
b. The CPUC issued its Storage Decision in 10/2013 now requiring 1,325 MW of storage as a critical preferred resource.
c. The CPUC issued its Track 4 LTPP decision addressing procurement requirements to SCE and SDG&E to meet LCR needs.
d. The CEC issued its California Energy Demand (CED) report forecasting an essentially flat electricity demand growth curve through 2024.
e. SCE has completed its initial procurement solicitation under the Track 4 decision including over 500 MW of preferred resources of which over 250 MW are storage projects.
f. Distributed generation growth continues to accelerate, in part due to continually declining costs.

The agencies should produce an updated report annually documenting the status of needs and calculating a conceptual "net short" of grid needs for the LA Basin / San Diego load pockets. These needs will change as components of the plan have been and are being implemented, as we learn what the real load growth patterns are (it is possible that there could be negative load growth), how rapidly distributed generation behind the meter and in front of the meter continue to grow, the status of the IOUs smart grid deployments, the status of SCE's preferred resources pilot program, etc. The point is that the plan needs to be continually modified to reflect the new facts on the ground. This can then help guide appropriate future mitigation and *we believe will show no need for future procurement of climate-polluting gas-fired generation.*

Therefore, we recommend that the planned needs for grid resources in the LA Basin / San Diego load pockets for a number of key factors be updated in an annual publicly available report. It would be logical to combine this "needs plan" with the "tracking report" described in our recommendation in #2 above.

4. A report should be produced annually from the CPUC that documents storage costs and is made publicly available.

The CPUC produces an annual report (the "Padilla Report") documenting the costs of renewable projects by IOU, by technology and by project size.

Storage is an increasingly critical resource that has the potential to meet a large portion of growing flexible resource and ancillary services needs. Storage is going through rapid maturation and cost reductions similar in some ways to the maturation of the solar PV market. There is inadequate publically available data on the costs of storage projects during this period of more rapid uptake and declining costs. The CPUC can provide this data from approved contracts while de-identifying specific projects as it does with the Padilla Report. This data could be very useful to the agencies, IOUs and other stakeholders in future grid planning.

5. The agencies should stop approving any more gas-fired peaker plants and instead look to energy storage and demand response to meet flexible resource needs.

Note: Unless otherwise noted, all quotations below are from: ***"Guide to Procurement of Flexible Peaking Capacity: Energy Storage or Combustion Turbines?"*** *By* Chet Lyons, Energy Strategies Group, October, 2014; (http://www.energystrategiesgroup.com/wp-content/uploads/2014/10/Guide-to-Procurement-of-New-Peaking-Capacity-Energy-Storage-or-Combustion-Turbines_Chet-Lyons_Energy-Strategies-Group.pdf).

In addition to existing conventional peaker plants, SCE and SDG&E are planning to build several new gas-fired peaker plants as part of their strategy to replace OTC plants. SDG&E is planning to build the Pio Pico plant which consists of three peakers and the Carlsbad Energy Center which is another six. This is a total of 9 X 100 MW peakers or 900 MW of new peaker plants.

SCE has recently proposed a new 98 MW peaker at the Stanton Energy Reliability Center and another 316 MW of peaking capacity in the Moorpark load pocket for a total of 414 MW of gas-fired peaking resources.

While fully appreciating and supporting that reliability is the highest priority for the state's electricity grid, storage and other preferred resource solutions can help maintain and improve that reliability in a more cost effective way while essentially eliminating GHG and criteria pollutants from these resources. Over-procurement of still more gas-fired power is a waste of ratepayers' money and a diversion from truly clean and feasible renewable options.

The state has an Executive Order requiring it to reduce GHG emissions from the electricity sector to 80% of 1990 levels by 2050. In his address to global leaders at the United Nations Climate Summit on 9/23/14, Governor Brown said "… as of today, California generates about 450 million tons and we're going to reduce, by 2020, at least 25 million tons. And then in the next six months, we're going to set a goal for 2030 that will be more ambitious,…".

Approving new gas-fired peakers today risks continuing to produce GHG emissions for decades to come, further exacerbating climate change. Peaker plants are notoriously significant polluters and very inefficient for the energy they produce.

> "Partial load operation, ramping and start/stops typical of CTs used as peaking resources increase their emissions of CO2, NOX and SO2. Most CT peakers range from 30 to 42 percent in efficiency."

In California, gas peaker plants, (CTs) have a capacity factor of less than 7.5% making them very capital inefficient and their LCOE cost is $.78 / KWh making the energy they do generate very expensive.

Due to the likely further reductions in California GHG targets, any proposed new gas peakers may have to retire much sooner than their financed and physical lifetimes causing them to become stranded assets wastefully increasing electricity costs to ratepayers.

The need for more flexible resources and ancillary services, to integrate increasing penetration of wind and solar and to deal with increased over generation, is well known. The good news is that the state still has a few years to address these needs. This is because of all the existing flexible resources in the state's portfolio including resources now freed up from previously integrating SONGS and in light of the low load growth forecast by the CEC over the next ten years.

All the IOUs now have a variety of live battery storage projects providing a diversity of grid services and are gaining experience in their optimal use. SCE is to be commended for its recent procurement of over 500 MW of preferred resources including 261 MW of storage. As it deploys these resources it will gain additional experience further demonstrating their reliability, optimal management, cost effectiveness, etc. which can then guide further deployments which could be developed more rapidly than conventional alternatives if needed.

Because battery storage is non-polluting, needs no water, is quiet and needs no on site storage or pipelines of dangerous fuels, it can often be sited in optimal locations to meet local requirements and because it is modular can be optimally sized to cost-effectively best meet needs. And unlike gas peakers than can only generate, storage can also act as load and help mitigate curtailment from over-generation.

Battery arrays are inherently more reliable by virtue of their redundant design.
A battery storage array of 50 MW can have more than a million cells each acting as its own power plant. If one or a few fails the rest continue to work.

> "In generation nomenclature, "shaft risk" is a capacity resource's probabilistic contribution to loss of load in the event of failure. The shaft risk of a single large piece of equipment is much higher compared to capacity comprised of multiple smaller units operating in parallel.
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> For example, both AES Energy Storage and Beacon Power have reported operational availability of over 99 percent for their respective 20 MW storage assets performing

> frequency regulation. In contrast, the availability factor for a new 50 MW central station gas-fired peaker CT is approximately 92% percent based on total annual start-up and shut down time typical for a gas-fired CT used as a peaker."

Battery energy storage systems are now more suited to meet the new needs of the evolving grid while building new gas-fired peakers just perpetuates the old outdated and increasingly inadequate design and would require the grid to go through costly updating, as reduced climate and criteria emissions limits come into effect.

> "While CTs can start and ramp faster than CCGTs, they are snails compared to energy storage systems. Their limited speed makes them less suitable for a new mission becoming critical to the grid: stabilizing distribution circuits negatively impacted by high penetration solar PV.
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> The effective range of storage is 2 to 4 times the effective range of a CT based on nominal capacity. Storage can also switch from charging to discharging in less than 1 second. In combination with up to 20 times greater capacity utilization factor, storage is significantly more flexible than simple cycle peakers. This flexibility allows distributed storage to capture multiple value streams with the same peaking asset.
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> In contrast to simple cycle CTs, storage can easily be applied on a distributed basis. Aggregated and controlled as a fleet, multiple units of distributed storage can deliver regional peaking capacity and ancillary services (i.e., frequency regulation, spinning reserve), distribution circuit stability (i.e., voltage and VAR control, peak power augmentation), and distribution circuit upgrade deferral."

Because the central paradigm of grid design is rapidly shifting from large central generation to distributed generation (DG), associated flexible resources and ancillary services should also be co-located with the DG to best and most cost effectively meet local needs. This shift in architectural design inherently increases the reliability and resiliency of the grid.

> "Because solar PV is highly distributed, simply overlaying storage on a central station basis won't maximize grid performance or cost reduction. Storage enables more PV while mitigating stability problems at the distribution circuit level. Availability of cost effective and technically proven distributed storage will further accelerate the shift toward distributed power grid architecture. The central station approach utilities have used to meet peak power requirements is on the verge of a paradigm shift. Central station topologies will give way to distributed grid architecture."

Agency staff and IOUs have expressed concern over costs of storage today but, in fact, this is based on old information.

> "As has happened with solar PV, storage is in the early stage of what will prove to be a disruptive decline in cost over the next 3 to 5 years. This will allow solar PV plus storage to replace conventional generation, transmission and distribution assets on a large scale. It will also turn the centralized power grid model inside out."

> …limited by the engineering constraints of central system design, utility transmission and distribution assets must also be overbuilt to meet daily and seasonal peak demand. This is why the potential of storage is so extraordinary. *Flattening system load with energy storage synergistically reduces the need for all major categories of utility asset investment, including generation, transmission and distribution."*

In California, the capital "instant" cost of a 100 MW gas peaker (CT) in 2013 nominal dollars is $1,261 / KW according to the CEC report, "Estimated Cost of New Renewable and Fossil Generation in California." May 2014; CEC-200-2014-003-SD. In the Energy Strategies Group paper, their study on relative costs between a storage and gas peaker solution found the following:

> "A major finding is that by 2017, the Capex for a 4-hour storage-based peaker is projected to be $1,390 per kW installed. When added benefits that accrue from locating storage on the distribution grid are considered, storage will be roughly competitive with many conventional simple cycle CTs in 2017 assuming mid-to higher range CT costs. For CTs at the higher end of the CT cost range, 4-hour storage will be a clear winner.
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> "By 2018 the CapEx of ViZn Energy's 4-hour flow battery storage solution, which we use as a proxy for the lowest cost flow battery technologies now being commercialized, is projected to be essentially the same as that of a conventional simple cycle CT. [*They used a cost of $973/KW $ for their "simple cycle CT" and $974 / KW or $244 / KWh for their flow battery in 2018. Since the California peaker cost is $1,261/ KW, the flow battery would be less expensive than the gas peaker in our state. Lithium ion battery energy storage systems may very well be cost competitive with gas peakers by then as well.*] Given the added economic benefits of installing storage in distribution, storage will be a disruptive winner against CTs even assuming a mid-range cost for a simple cycle gas-fired CT."

And the real costs of gas peakers may well be understated because they may not include the costs of pollution offset mitigation fees from Air Quality Management Districts, stranded asset early retirement costs, increasing carbon fees from cap-and-trade, and other external costs associated with more GHG emission impacts on human health and adverse effects on our economy from more climate change.

It turns out that installing energy storage at the distribution level has more economic value than doing so centrally. This is according to the cost-effectiveness modeling done using the Energy Storage Valuation Tools (EVST) developed by EPRI along with Energy and Environmental Economics (E3) for the CPUC during the storage proceeding.

> "Compared to the central station storage Use Case, the Use Case for storage located at a utility substation on the distribution grid adds distribution upgrade deferral and circuit stability control. This results in an extra benefit of $279/kW per year for 17 years. Further comparing the two Use Cases …, we see that breakeven costs for central station storage are $2,657 per KW and $664 per kWh, while breakeven costs for distributed storage are $4,000 per KW and $1,000 per kWh. Distributed storage

> has a much higher value than central station storage. That tells us where storage should be located to maximize benefits."

So in summary, we recommend that new gas-fired peakers should no longer be approved by the agencies and that storage and other preferred resources be utilized to meet the flexible resource and ancillary services needs of the grid.

Driven by current and future GHG reduction targets we must stop building any new gas-fired generation, including peaker plants. Storage solutions are proving themselves both in the field in California and globally to be superior in meeting the different and more complex needs of our rapidly evolving grid and are doing this cost-effectively. Meanwhile, gas peakers are quickly becoming too expensive, outmoded and incapable of meeting many of the critical new needs of the grid. Battery storage is especially effective when deployed at the distribution level close to distributed generation. Storage projects are cost effective today for many applications and are on a steep price reduction curve that will soon make them more cost effective than gas peaker plants for multi-hour generation applications.

> "When adding peaking capacity today, utility planners can choose between assets that better fit the emerging distributed grid architecture or the old and disappearing centralized approach to grid design. The choices we make today should be consistent with current and long-term cost-performance trends in fossil-based generation, solar PV and energy storage."

Thank your again for the opportunity to contribute to this important document that will play a key role in guiding the state's future energy policy.

Respectfully submitted,

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