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Information on Southern California Reliability

The Nevada hydro Company is developing the 500 MW Lake Elsinore Advanced Pumped Storage (LEAPS) project located barely 20 miles from SONGS. It is also developing a 500 kV transmission line connecting SCE and SDG&E at 500 kV for the first time. This line now terminates barely 10 miles from SONGS. The Company has prepared three whitepapers that describe in detail how these two projects SOLVE the reliability problems facing Southern California.
We are providing them to this proceeding to that the Commission will have a full understanding of what is available, that is in accord with the Governor's mandates to reduce GHG emissions.
This filing provides the first Whitepaper of 3.

Additional submitted attachment is included below.

Building a Clean Energy State Without SONGS:

The Lake Elsinore Advanced Pumped Storage
and
Talega–Escondido/Valley–Serrano 500 kV Interconnect Project
FERC Dockets: P-14227, ER06-278
The Nevada Hydro Company

I. Introduction

The state of California is facing two major problems with regard to energy. The first is implementing an aggressive clean energy policy and the second in learning to live without the roughly 2,200 MW once produced by the San Onofre Nuclear Generating Station (SONGS).

II. Building a clean energy state

California has among the most aggressive clean energy policies in the world. California law requires that 33% of all energy used in the state be derived from renewable energy sources by 2020, as well as that the emission of greenhouse gases (GHG) be reduced to 1990 levels by 2020. Beyond that, California policies call for an overall 80% reduction of 1990 GHG emission levels by 2050. This will, in turn demand that over time, California will necessarily rely on an ever-greater percentage of renewable energy resources (*i.e.*, well beyond the currently mandated renewable portfolio standard of 33%) to meet its electric power needs. On top of this, the State's projected transition to a transportation fleet that increasingly uses electricity rather than gasoline or diesel as its motive power means that California's electric power needs will continue to grow, even with the expected implementation of state-of-the-art energy efficiency programs throughout the state.

However, most renewable energy resources are intermittent. The sun rises in the morning and sets in the evening; the state's ample wind resources are often at their most productive during off-peak hours; and geothermal power operates 24/7, meaning that there are numerous hours during the year when the power from geothermal facilities is or will be surplus. California therefore faces a major challenge on its path to a clean and renewable energy future: it must start developing advanced technologies that can reliably and effectively buffer the intermittency of renewable generation with the variable demands of electricity customers over the course of a day.

There are only three available technologies that can effectively address this lack of fit between the times during the day when renewable resources are available and the times when electric power is demanded by society. The first of these is demand response, which can help buffer the demands on the system during periods of peak load. However, in a largely post-industrial California, demand response cannot be reasonably expected to meet much more than 5% of the power system's needs for resources that can balance the discrepancy between when renewable energy is generated and when it is consumed. Moreover, demand response

inevitably runs up against consumer resistance. People may be willing to cycle their air conditioners off for up to 10 or 15 minutes an hour on a hot day, but they will not be willing to shift their air conditioning load to the nighttime when it is over 100 degrees outside at 3 p.m.

The second available buffering technology would be to install a fleet of gas-fired turbines (essentially, stationary jet engines). However, the combustion of fossil fuel creates GHGs, which will ultimately limit the ability of the State to deploy this technology broadly. Moreover, although the price of gas is currently low, there is always a risk of significant gas price volatility: prices were as high as $12/MMBTu as recently as 7-8 years ago. Finally, gas turbines can operate and produce power when the system has insufficient renewable generation to meet power needs, but gas turbines simply cannot absorb excess power during those hours when there is an overabundance of renewable generation (which will be increasingly the case as California deploys more and more renewable resources over the next 5 to 10 years).

However, the third available buffering technology – advanced storage – has none of the limitations of demand response or the drawbacks of an increased reliance on gas generation. Storage is clean, green and cost-effective. Moreover, storage can easily absorb excess renewable generation at night when the wind blows and during the height of the day when solar generation will often exceed demand. Finally, the potential of storage is virtually limitless. California will be able to build as much electricity storage capacity as it needs with minimal environmental restrictions. Some of that storage, mostly in the form of batteries, will necessarily be located on the distribution grid to help buffer local distributed generation from rooftop photovoltaic systems.

Under the oversight of the California Public Utilities Commission (CPUC), the State's utilities have signed contracts for well over 10,000 MW of new renewable generation resources, the bulk of which have not yet come on line. When these new renewable projects start coming on line later in this decade, California will be faced with major challenges to the stability of its grid, especially in Southern California where the hydroelectric resources (which can provide supplemental power when renewables are not producing to their full capacity) are much less abundant than in the northern part of the State. Further, to deliver that needed energy in the south from the northern part of the state during high demand periods can, does, and will cause costly congestion issues on the main transmission paths linking the north to the south, such as Path 26 from the Midway substation (PG&E) to the Vincent substation (SCE).

There is only one technology that can accommodate the significant potential for over-generation that the added new renewables will create, while, at the same time, providing large and reliable amounts of power during periods of peak load, and in a manner that follows load precisely and can, as a major bonus, provide abundant ancillary services, including fast regulation and fast ramping. That technology is advanced bulk storage.

Storage has been a subject of much discussion in California over the past 5+ years. Assemblywoman Nancy Skinner led the fight to enact Assembly Bill 2514 in 2010. The CPUC has initiated a proceeding to evaluate the long-term role for storage, and the California Energy Commission (CEC) and the California Independent System Operator (CAISO) have all held

extended workshops looking into the long-term value of storage for California. Utility executives have characterized storage as the "Holy Grail" of the clean energy future.

In early 2013, all three of the State's energy agencies held a Summit on the future of resource adequacy in California, attended by most of the agencies' Commissioners and Board Members, as well as by a critical mass of the State's key stakeholders on major energy policy issues. A number of the speakers acknowledged the high value that electricity storage, as a clean, highly flexible and reliable resource, would bring to the grid of the future. Indeed, there was consensus on the part of the active participants at the Summit that California will need a dramatically greater amount of highly flexible new energy resources as soon as three years from now. But where are the large storage projects? Where is there any major new "steel in the ground" storage project anywhere in the State, and particularly those scaled to address the utility–scale issues?

In the 1970's, Pacific Gas & Electric Company started building the Helms Pumped Storage project to help buffer the over-generation from its Diablo Canyon nuclear power plant. Helms was a successful project, but now, when the need for storage in California is greater than ever, where are the major storage projects that will unquestionably be needed to help maintain grid reliability in a world increasingly reliant on variable renewable generation, and that will do so in a manner that is environmentally superior and that imposes no burdens on the customers of the utilities?

Fortunately, there is such a project (actually, two closely related projects) that bears serious consideration by everyone who is concerned about California's energy future and who cares about electric power that is clean, reliable and local: the Lake Elsinore Advanced Pumped Storage (LEAPS) and Talega–Escondido/Valley–Serrano 500 kV Interconnect (TE/VS Interconnect) Project. Section IV of this Paper will describe these projects, explain their current permitting status and the challenges they face, and demonstrate the significant benefits that these projects will provide both to the grid and the ratepayers of Southern California. Finally, this paper will show why these projects are superior to all other projects that are currently under consideration by the CAISO in order to meet the long-term needs of the grid in Southern California now that SONGS is gone.

III. Coping with the loss of SONGS

The landscape of electric power supply in Southern California has fundamentally changed with the retirement of SONGS. Compounding this impact is the impending effects of the restrictions of once-through-cooling for existing and future generating stations along the pacific coastline.

The retirement of both SONGS has removed 2,150 MW of generation from Southern California. Because of its many years of high operating factor, utility reliability and economic planners for the area had developed a system highly dependent on its presence at full output. With its retirement, system reliability in both San Diego and the Los Angeles basins has been significantly diminished.

Also, the cost of electricity to customers in this area has shown a spike upward. This is likely due to a combination of both the loss of the low cost of energy from SONGS itself and the loss of SONGS ability to backstop imports of less costly power from external resources rather than using more costly internal generation. Further, since the loss of SONGS, the consumption of natural gas has begun trending upward, likely due to increased use of gas–fired generation to make up for the loss of SONGS

Compounding this impact to reliability is the impact of the California Water Resource Control Board (CWRCB) performance criteria for mitigating the effects of the use of water for generation cooling that is discharged into the ocean. Compliance is scheduled to begin on January 1, 2018. At this point, it appears none of the generation plants in southern California that are using this "once-through-cooling" (OTC) process have found a cost-effective way to meet these criteria. Thus, all generation located along the coastline will likely have to shut down as of that date, unless the CWRCB develops a revised plan.

Some efforts are under way to build replacement generators on or near these sites. However, under the best of circumstances, there will be less replacement generation built than will be retired.

An important effect of these two decisions has been to put emphasis on the need for the use of transmission to bring lower cost power into the San Diego and Los Angeles basins. Fossil-fueled generation near the high population density coastal area will be both more difficult to permit and more expensive to operate than has been enjoyed from those existing units that had once-through-cooling. Also, a review of the proposed renewable generation in the CAISO generation queue shows that much of it is well back from the coast and will put additional stress on a transmission system that must be made more robust to accommodate it.

The problem is that the grid manager is going to have to operate the system to assure that the energy produced is able to get to the load when needed. This will require a lot of new transmission and a means to manage the various resources (load following, fast response to outages, quick start, black start, etc.). These renewable resources are widely diverse in the time and location of their energy production. Nevada Hydro's projects have been designed precisely to meet these needs; and meet them in a cost effective manner.

IV. The Projects

For a number of years now, The Nevada Hydro Company (Nevada Hydro) has had two projects under development that connect to the grid approximately 10 miles from SONGS on Path 44 – South of SONGS. See the project location on Figure 1, below. These projects are referred to as the Lake Elsinore Advanced Pumped Storage project and the Talega-Escondido/Valley-Serrano 500 kV Interconnect project. The powerhouse associated with the 500 MW pumped storage project is less than 25 miles from SONGS at Lake Elsinore, within the Southern California load pocket.

The benefits that the two projects bring to the region have been well studied and well documented in both Federal and State venues over the years. In addition to the overall system

benefits that these two projects have demonstrated, the projects will help alleviate the resource constraints that are posed by the loss of SONGS in a more effective, more timely and less costly way than the other proposed resources that may be "on the table".

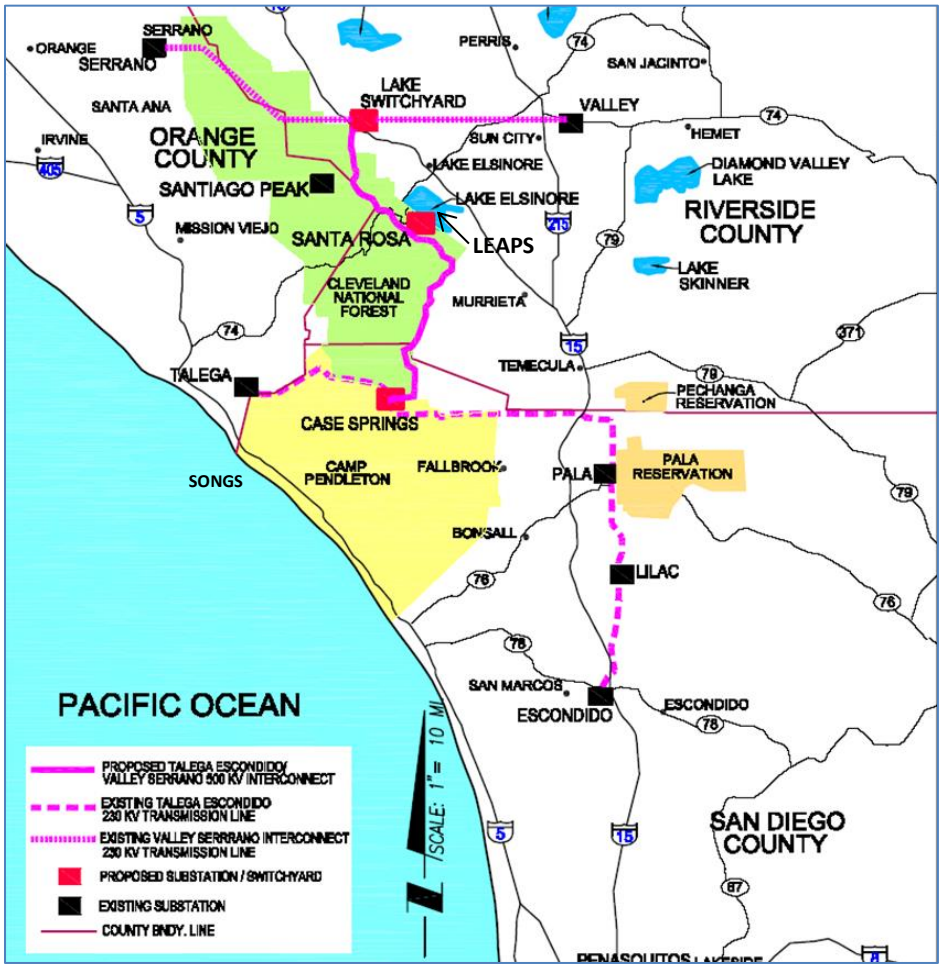

Figure 1 – Location of the LEAPS and TE/VS Projects

- The Lake Elsinore Advanced Pumped Storage (LEAPS) project is a 500 MW generation/600 MW load advanced pumped storage facility. The LEAPS project was being licensed by Federal Energy Regulatory Commission (FERC) in Docket P–11858, and is now under limited additional review in FERC Docket P–14227. LEAPS has an advanced position in the CAISO queue (QP#72), and the system impacts of the project have been fully studied under the CAISO's Large Generator Interconnection Procedures. Nevada Hydro completed updates to the existing Large Generator Interconnect Agreements (one each with SDG&E and SCE) for the facility.
- The Talega–Escondido/Valley–Serrano 500 kV Interconnect (the TE/VS Interconnect) is a 500 kV, 32-mile transmission line that will interconnect LEAPS to the grid and connect

the service territories of both San Diego Gas & Electric Company (SDG&E) and Southern California Edison (SCE). Equally important, however, this project will link the San Diego load pocket and the CAISO's 500 kV electrical backbone, which does not currently extend into SDG&E's service territory.

Nevada Hydro has been working diligently for a number of years to move the projects forward, including permitting for rights-of-way, environmental review, engineering and detailed technical planning (construction sites, staging areas, *etc.*). For example:

1. In January 2007, the FERC and the United States Forest Service (USFS)[1] released their "Final Environmental Impact Statement – Lake Elsinore Advanced Pumped Storage Project"[2] (Final EIS), which addressed both LEAPS and a "transmission lines only project." In Appendix B of the Final EIS, FERC staff included a "Need Determination for the Lake Elsinore Advanced Pumped Storage (LEAPS) Project's Talega-Escondido/Valley-Serrano 500-kV Transmission Line." In this Appendix, FERC staff concluded that the TE/VS Interconnect would be "an appropriate long-term solution to southern California's transmission congestion bottlenecks as well as the transmission constrained, generation-deficient San Diego area."[3]
2. The CPUC has completed an extensive analysis of both projects under the California Environmental Quality Act (CEQA) in connection with its analysis of the Sunrise Powerlink project proposed by SDG&E.[4] That analysis included a review of the TE/VS Interconnect as a CEQA alternative to the Sunrise project. The TE/VS Interconnect was identified as the environmentally superior transmission project in that proceeding.
3. As ordered by the Administrative Law Judge (ALJ) at the CPUC, Nevada Hydro is preparing to refile its application for a Certificate of Public Convenience and Necessity (CPCN) for the TE/VS Interconnect. This refiling is expected to occur within the next month or so. As a result, Nevada Hydro can have the TE/VS Interconnect and LEAPS projects operating in real time prior to other proposed alternatives identified in the CAISO draft 2012-2013 Transmission Plan.

As the TE/VS Interconnect is nearly fully engineered and sited, LEAPS and the TE/VS Interconnect are nearly "shovel ready" during this critical period when time is of the essence in order to identify and start construction on the key resources that will be needed not only to replace the damaged SONGS facility, but just as importantly, to provide a significant amount of desperately needed, highly flexible new capacity on line in time to help address the growing

[1]/ As nearly 30 of the total 32 mile length of the TE/VS Interconnect traverses the Cleveland National Forest, the participation of the Forest Service has been instrumental in advancing the projects.

[2]/ Federal Energy Regulatory Commission and United States Department of Agriculture – United States Forest Service, *Final Environmental Impact Statement – Lake Elsinore Advanced Pumped Storage Project*, FERC Project No. 11858, FERC/FEIS – 019F, January 2007.

[3]/ Final EIS, at page B–2.

[4]/ *In the Matter of the Application of San Diego Gas & Electric Company for a Certificate of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project*, Application 06–08–010.

challenge of integrating an increasing amount of variable renewable resources onto the grid in Southern California.

V. The Challenge

Going back at least 15 years, and with SONGS operating, officials have been aware of the vulnerability facing the Southern California grid. For example, in a March 2001 letter to the CAISO, SDG&E said, "We do not believe we can delay the permitting process [for their proposed Valley–Rainbow Project[5]] any longer without potentially jeopardizing reliability in 2004."[6] The CAISO confirmed this need in a filing to the CPUC that it considered Valley Rainbow as a "high priority" project "that is needed by 2004 in order to increase the transfer capability into the San Diego area to serve load".[7] Notwithstanding this need, the Valley-Rainbow project was ultimately unsuccessful. Since that time, only Nevada Hydro has proposed a project that can solve this continuing problem.

As system load grew over time in the San Diego and Los Angeles areas, system planners understood the regions' import requirements would increase commensurately because of the difficulty of installing new generation in the area. This difficulty was triggered by strict environmental regulations (especially air quality rules), but also by strenuous public opposition to any new industrial facilities. The Otay Mesa combined cycle plant was one of the few successful new projects, but the value of that project in diminishing the need for imports was substantially reduced by the expected retirement of the South Bay plant in 2010. As a result, the ability to use the northern 500 kV path from Palo Verde to Devers, together with the proposed 500 kV TE/VS Interconnect project, was seen as the way to bring a new major supply route into the coastal area between the SCE service area and the Southwest Power Link (SWPL) path, that comes into the SDG&E service area from the east.

In 2005, Congress directed, through Section 1221(a) of the Energy Policy Act of 2005, 119 Stat. 594, 946-951 (2005) (16 U.S.C. § 824p) (EPAct), that the Secretary of Energy identify "any geographic area experiencing electric energy transmission capacity constraints or congestion that adversely affects consumers" as a National Interest Electric Transmission Corridor (NIETC). On August 6, 2006, well before SONGS went dark, the United States Department of Energy (DOE) issued a preliminary National Electric Congestion Study (Congestion Study), designating the southern California region as a "critical congestion area" under Section 1221 of the EPAct. Although the Court of Appeal on unrelated procedural grounds ultimately overturned this designation, the underlying reliability challenges to the Southern California grid, as well as DOE's conclusions as to the critical congestion in the region, still describe the on–the–ground

[5]/ Described more fully in Section VI.C.1 below.

[6]/ March 22, 2001 Letter from James P. Avery, Senior Vice President Fuel and Power Operations to Terry M. Winter, President and Chief Executive Officer, CAISO.

[7]/ "Statement of The California Independent System Operator Corporation Regarding Priority Transmission Projects", March 20, 2001, filed in CPUC Proceeding I.00-11-001, "Order Instituting Investigation into implementation of Assembly Bill 970 regarding the identification of electric transmission and distribution constraints, actions to resolve those constraints, and related matters affecting the reliability of electric supply."

reality. Moreover, as the CAISO's draft 2012-2013 Transmission Plan and work since clearly shows, the shutdown of SONGS poses an equally serious challenge to the Southern California grid.

SDG&E has acknowledged the vulnerability of the area in the long-term resource plan that was submitted as part of its Sunrise Powerlink CPCN application. In that document, SDG&E itself identified a need for a second 500 kV transmission interconnection to meet the grid reliability requirements of the CAISO in 2010. SDG&E officials saw that planned new, renewable generation facilities that would interconnect at the Imperial Valley Substation would be an important new source of supply, and that the proposed Sunrise Powerlink Project, with its 500 kV line from Imperial Valley to an injection point nearby to the Miguel Substation (the terminus of the SWPL) would be a valuable, independent 500 kV supply path into the SDG&E system. However, because of the requirement that the Sunrise line have a shared right-of-way for over 30 miles with the SWPL line, the reliability officials at WECC classified the potential outage of both lines in that common corridor as a "Category C contingency". That is, if both lines in this common corridor were lost, system operation changes with controlled or planned loss of system load would be permitted, but cascading area failures would not be.[8] This NERC determination, while providing more import capability under many circumstances, had the effect of rendering the Sunrise Powerlink Project into a transmission line that was functionally and practically much less robust than the needed independent path for importing a growing power requirement into the SDG&E system. Thus, the now-built and operational Sunrise Powerlink Project was, ultimately, only a partially successful attempt at solving the import problem, which remains a challenge for the future that will necessarily require additional high voltage transmission feeding the SDG&E service area.

More recently still, the CAISO itself recognized the need for a new 500 kV connection, as was noted in recent CAISO testimony submitted to the CPUC in a case involving SDG&E's proposed procurement of new gas-fired resources:

> ***Q. Are there any feasible transmission mitigation solutions that can meet the 650MW to 950 MW need?***
>
> *A. As described above, the constraint driving these needs is the transmission system limitations between the SCE and SDG&E systems south of SONGS. During studies of the Sunrise Powerlink, the ISO studied transmission options to increase the transmission capability between these two systems in order to further reduce local generation needs in San Diego. However, the scope of the upgrades needed to meet a 650 MW to 950 MW need was essentially a new 500 kV line connecting the SDG&E system to the SCE system.*[9]

[8]/ Per NERC TPL 003-0a.

[9]/ Testimony of Robert Sparks on Behalf of The California Independent System Operator Corporation, Application of San Diego Gas & Electric Company (U902 E) for Authority to Enter into Purchase Power Tolling Agreements with Escondido Energy Center, Pio Pico Energy Center and Quail Brush Power, Application 11-05-023, (2012), page. 9.

Notably, this testimony did not address the ramifications of the SONGS retirement. Nor did it address the apparent vulnerability of the grid demonstrated, again with SONGS operating, on the afternoon of September 8, 2011, when an 11-minute "system disturbance" led to cascading outages (including the only 500 kV link from the East into the SDG&E system) and leaving approximately 2.7 million customers without power. This outage affected parts of Arizona, Southern California, and Baja California, Mexico. All of the San Diego area lost power, with nearly one-and-a-half million customers losing power, some for up to 12 hours. The disturbance occurred near rush hour, on a business day, snarling traffic for hours. Schools and businesses closed, some flights and public transportation were disrupted, water and sewage pumping stations lost power, and beaches were closed due to sewage spills. Millions went without air conditioning on a hot day.

While the Staff report[10] on the outage prepared by the FERC and the North American Electricity Reliability Corporation (NERC) did not recommend physical changes to the system in order to prevent a recurrence of such an outage, Nevada Hydro has concluded and can demonstrate that had its TE/VS Interconnect been on line that day, much if not all of the damage that did occur could have been avoided.

Now, with SONGS gone and with coastal power plants scheduled to shut down as well, this need for enhanced transmission between the SCE and SDG&E systems is a matter of urgency

VI. The Benefits of LEAPS and the TE/VS Interconnect

Nevada Hydro has demonstrated the reliability and economic benefits of its facilities on many occasions. Independent sources, including the CAISO have confirmed Nevada Hydro's own view. What follows is a summary of some of the existing independent analysis -- from FERC, from the State of California, and from the CAISO – that supports the conclusion that LEAPS and the TE/VS Interconnect can and will provide significant overall benefits to the grid in Southern California. This history of positive analytical results leads to the unmistakable conclusion that, by failing, to date, to approve the TE/VS Interconnect as a needed project, regulators may have been doing a disservice to the region and to its ratepayers.

A. FERC's Reliability Conclusions

In November 2006, under the provisions of Sections 1223 and 1241 of EPAct, the FERC identified LEAPS as an "advanced transmission technology," defined as a "technology that increases capacity, efficiency, or reliability of an existing or new transmission facility."[11] In its

[10] / *Arizona–Southern California Outages on September 8, 2011, Causes and Recommendations*. Prepared by the Staffs of the Federal Energy Regulatory Commission and the North American Electric Reliability Corp., April 2012.

[11] / Federal Energy Regulatory Commission, *Order on Rate Request*, Docket Nos. ER06-278-000 et seq., issued November 17, 2006 ("2006 Rate Order"), at ¶ 27.

decision, FERC stated that "Nevada Hydro has proposed a project that may help meet the needs of the CAISO in managing the grid and serving load."[12]

In March 2008, the FERC granted certain rate incentives for the TE/VS Interconnect. The premise for the FERC's action was its finding that, "Nevada Hydro, through independent evidence provided in this proceeding, has adequately demonstrated that its TE/VS Interconnect project will ensure reliability, consistent with the requirement of Order No. 679." [13]

In its application, Nevada Hydro relied on "independently supplied reliability studies," which were prepared by CAISO staff in connection with the CAISO-sponsored planning processes. At that time, the CAISO itself stated, "The transmission line proposed in association with the Lake Elsinore Pumped Storage project would allow the San Diego area to import substantially more power from surrounding areas and would greatly enhance electric system reliability."[14]

Based on the evidence submitted, the FERC concluded that the proposed TE/VS Interconnect

> *will add another major transmission path into the San Diego area with a potential for increasing San Diego's import capability including relief on currently limiting Path 43 (North of San Onofre) and 44 (South of San Onofre) while maintaining adequate system reliability and, therefore, satisfy the Commission's FPA section 219 requirement. In its initial application, NHC stated that the 2003 STEP Report 'concluded that a new high voltage electrical transmission line between Riverside and San Diego Counties is critically needed to serve future load growth.' If built, the TE/VS Interconnect would be the only 500 kV transmission line connecting SCE and SDG&E's transmission systems."*[15]

The FERC concluded that the "TE/VS Interconnect project will ensure reliability, consistent with the requirements of Order No. 679"[16] and that the proposed transmission project "is not routine in nature, but will provide a critical link between two major transmission corridors in California, linking the San Diego basin to the main CAISO grid."[17]

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[12] / *Id.*, at ¶ 26.

[13] / Federal Energy Regulatory Commission, *Order on Rate Incentives and Compliance Filing*, Docket Nos. ER06-278-000 et seq., issued March 24, 2008 ("2008 Rate Order"), at ¶ 27.

[14] / *Motion to Intervene and Comments of the California Independent System Operator Corporation in Support of Lake Elsinore Advanced Pumped Storage Project*, Docket No. P-11858-002, at 3 (Apr. 2, 2004).

[15] / 2008 Rate Order, at ¶ 26.

[16] / *Id.*, at ¶ 27.

[17] / *Id.*, at ¶ 57.

B. Conclusions of the California Energy Commission

The State of California has also developed an independent view of the potential benefits of these projects. As required by state law, (Section 25324 of the State's Public Resources Code), the CEC (along with the CPUC and the CAISO) adopted a strategic plan for the state's electric transmission grid. This plan identified and recommended actions required to implement investments needed to ensure reliability, relieve congestion, and meet future load growth.

In the Joint Committees Report prepared by the CEC concerning the "Strategic Transmission Investment Plan" for the 2007 Integrated Energy Policy Report Proceeding (06-IEP-1F), the CEC Electricity Committee found that "[b]oth the transmission and generation that comprise the LEAPS project could provide significant benefits to California". The project (both LEAPS and TE/VS Interconnect) were among the five new transmission projects recommended for the 2007 Strategic Plan.

Indeed, the TE/VS Interconnect has been designated as a critical statewide transmission resource by the CEC since its 2007 Strategic Transmission Investment Plan, CEC-700-2007-018-CMF." In that report, the CEC advised that this, and other recommended projects "are strategic resources that require specific, swift, and priority consideration by state regulators."

More recently, in its December 2013 Integrated Energy Policy Report, the CEC noted that TE/VS Interconnect is under consideration for solving the dilemma caused by the SONGS shutdown.

C. CAISO Findings

Nevada Hydro's projects have been reviewed and have been found to have value in at least three separate CAISO-sponsored planning processes over nearly a decade. It is important to note that over this long period, the CAISO's view on the value of the projects has not changed. A summary of these findings follow.

1. The Valley-Rainbow Board Approval

In 2001, CAISO staff, in a memo and presentation to the Board, recommended approval of SDG&E's Valley-Rainbow transmission project. In this material provided to the CAISO Board, staff noted the controversy surrounding the route SDG&E proposed, and suggested that SDG&E pursue the TE/VS Interconnect route (referred to as "the forest route"). This shows that CAISO staff had concluded that the TE/VS Interconnect was (and remains) electrically identical to the Valley-Rainbow project. The CAISO Board approved the project, and its approval was not tied to a specific project or a specific sponsor. In it resolution, the Board noted that "a 500 kV project such as the Valley Rainbow project, is needed". SDG&E chose not to follow-up on this suggestion to pursue other routes. As Nevada Hydro cannot find a Tariff (or other provision) that causes Board decisions to "expire", Nevada Hydro believes that this Board action effectively approved the TE/VS Interconnect as well as Valley-Rainbow.

2. The Southwest Transmission Expansion Plan

A few years after the Board's action in connection with the Valley-Rainbow project, the Southwest Transmission Expansion Plan (STEP) was established to plan, coordinate, and implement "a robust transmission system among Arizona, Nevada, Mexico, and Southern California." Nevada Hydro was asked by the CAISO to participate in the STEP process, and Nevada Hydro agreed to do so.

Under the STEP, the CAISO was the focus for transmission planning activities for California projects. The two California projects of interest to STEP were the TE/VS Interconnect and Sunrise (then known as Imperial Valley-San Diego Expansion Plan or ISEP). In 2004, the CAISO Grid Planning Department published findings in which it detailed the reliability benefits of each project and the additional benefits to be realized if the two projects were combined.

Thus, the STEP study updated and reaffirmed the CAISO Board's earlier findings on the system benefits of Valley-Rainbow. The STEP study showed both reliability and economic benefits to the region of each project (i.e., the TE/VS Interconnect and SDG&E's ISEP, as well as the additional benefits to be realized if both projects are built.

3. CAISO South Regional Transmission Plan

In 2006, the CAISO commenced the CAISO South Regional Transmission Plan ("CSRTP"). CSRTP studied the three proposed southern California projects: Sunrise, Tehachapi, and both the LEAPS pumped storage facility and the TE/VS Interconnect separately. The three sponsors (SDG&E, SCE, and Nevada Hydro, respectively) were required to participate. Other interested parties participated as well.

An August 31, 2006 memo to the CAISO Board stated: "The LEAPS Project consists of a 500 kV transmission line project . . . that would connect SCE's transmission system with that of SDG&E's (LEAPS transmission line) and is accompanied by a 500 MW pumped storage power plant built next to Lake Elsinore (LEAPS power plant) and connecting to the LEAPS transmission line." A September 19, 2006 presentation demonstrated the economic benefits of the TE/VS Interconnect both as a stand-alone project and as part of a combines set of projects including Sunrise in the base case analysis. The studies performed under CSRTP, reaffirming the STEP findings, showed that the combined value of both the TE/VS Interconnect and Sunrise is higher than for each project individually. However, CAISO Staff chose not to take the TE/VS Interconnect project to the CAISO Board for approval at that time, because staff felt that it needed FERC to decide on the treatment of the LEAPS pumped storage facility (which FERC has since provided).

VII. Project Value Today

A detailed economic cost-benefit analysis that was performed on the two Nevada Hydro projects in 2010 by the well-respected energy engineering and economics consulting firm, ZGlobal, demonstrated that as a stand-alone project, the TE/VS Interconnect would provide a net benefit to California ratepayers of more than $38 million

per year. Specifically, the analysis demonstrated an annual savings in energy production, renewable portfolio compliance and local reliability costs resulting from the development of this project – approximately $191 million annually – would be substantially greater than the project's annualized costs – approximately $153 million. These benefits fall into three categories: (1) customer benefits, which are the savings that consumers will enjoy due to the lower cost of energy production resulting from the operation of the project; (2) producer benefits, which are the difference between the price at which energy is sold and the price that it costs sellers to create it; (3) reductions in transmission congestion revenue; and (4) societal benefits, which reflects the overall net change in the total benefits of the project to energy consumers, producers and transmission owners. ZGlobal's analysis estimated the total societal benefit of the TE/VS Interconnect Project to be approximately $68 million in 2015.

It is noteworthy that these estimated benefits relate only to the TE/VS Interconnect Project. When net benefits of the LEAPS Project are added, the overall total societal benefits of the projects – nearly $117 million per year – are almost twice as great. With LEAPS on-line, the system will benefit from much greater access to key ancillary services, including spinning and non-spinning reserves, quick start and fast ramping capabilities, improved integration of renewables, decreased potential of wind curtailments and substitution away from thermal generation during peak hours, thereby decreasing the emissions from gas-fired power plants in Southern California during the hours when those emissions are most likely to contribute to exceedances of health-based air quality standards.

Finally, it should be mentioned that ZGlobal is currently updating is cost/benefit analysis to reflect the shutdown of SONGS. Initial indications are that under the SONGS shutdown scenario, the net benefits of the Nevada Hydro projects will be substantially greater than they were shown to be in the ZGlobal analysis of several years ago. Depending on the metric applied, benefit-cost ratios from the construction of the TE/VS Interconnect alone are between 2.0 and 2.7.

VIII. The Advantages of Storage

LEAPS provides the State with a variety of cost-effective enhancements, including increased reliability and more efficient use of grid resources. Grid benefits include the full range of ancillary services, shifting on-peak to off-peak hours, providing 500 MW of generation near the load pocket and the storage of energy produced during off-peak hours for use during peak-demand hours. Most importantly, LEAPS will dramatically enhance the ability of the grid to effectively integrate, and make much better overall use of, a large amount of the variable energy production in Southern California. This can include off-peak power generated by efficient, baseload generation sources, (including geothermal generation located in the Imperial Valley) wind-generation located in the Tehachapi region, solar thermal generation in the Mojave area as well as other existing and planned renewable resources located throughout and beyond Southern California.

In terms of ancillary services, LEAPS provides 500 MW of regulation and fast responding spin to support grid operations the integration of intermittent renewable resources, and provides highly responsive load following capability. This, combined with the ability to provide voltage support, will help the grid manager effectively and efficiently operate an increasingly complex grid in the Southern California electrical region.

Because LEAPS can store off-peak power, including wind, solar and geothermal energy, the facility's operation will further the objectives of California's Renewable Portfolio Standards (RPS) and greenhouse gas (GHG) emission-reduction standards. LEAPS can also eliminate the need to construct new fossil fuel-burning power plants. Moreover, the Project's dispatchable pumping load will enable the most efficient and renewable generation sources on the Southern California grid to operate more hours each day. The efficient baseload energy generated during non-peak hours that LEAPS will absorb and store for later use can then be used to displace the operation during peak periods of those generation plants that are the least efficient and most costly to operate.

Finally, advanced pumped storage facilities like LEAPS are able to respond rapidly to continuously changing conditions and, thereby, enhance the maintenance of system-wide reliability. Pumped storage generation provides unique strategic, operational, and economic benefits, resulting in reduced operating risks, increased total efficiency, increased critical system control and reliability, and providing more value to the ratepayers. Pumped storage is widely accepted as a mature technology with proven reliability and effectiveness. It is currently the only proven technology available for storage of large quantities of energy and is the most efficient form of energy storage available.

IX. The CAISO's Plans for Addressing the loss of SONGS is Uncertain and Expensive

The CAISO has described its thoughts on actions needed to address the loss of SONGS.

In a July 2013 presentation by CAISO for a meeting held by the CPUC and CEC[18], a number of possible transmission alternatives were presented to address the reliability needs of the southern California electric system due to the retirement of the SONGS. These alternatives also addressed the present understanding of the needed response to the requirement of the "once-through-cooling" mitigation and future load growth in the San Diego and Los Angeles basin areas. These alternatives can be summarized as follows:

1. The TE/VS Interconnect perhaps including LEAPS.
2. Addition of new generation:

	2018	**2022**
L.A. Basin		3,800 MW
SDG&E	1,120 MW	785-920 MW

[18] CEC/CPUC Joint Workshop Electricity Infrastructure Issues Resulting from SONGS Closure, ISO 2013 Transmission Plan Nuclear Generation Backup Plan Studies (SONGS), July 15, 2013 PowerPoint Presentation.

3. New Transmission Projects:
    - Alberhill – Suncrest (Central) 500 kV
    - Valley–Alberhill–Viejo–new Cougar 500 kV
    - Imperial Valley – Songs HVDC Line
    - Sycamore – Penasquitos 230 kV line
    - Alamitos (or SONGS) – South Bay area HVDC Submarine Cable

While there is no one solution that will be able to resolve the extensive needs identified by the CAISO, the selection of proposals to provide the required solution must consider both timeliness and cost. The timeliness issues will be driven by the ability to get the necessary sites, rights-of-way, air quality studies, permits of various types and construction duration. Cost effectiveness will require the evaluation of the generation types and fuel costs that can be sited and installed versus delivery of resources located outside the area via the transmission system.

Since the TE/VS Interconnect has most of its permitting activities already completed and is seeking its final CEQA and CPCN approval from the Commission, it can be constructed and operating by late 2015 or early 2016. For its base configuration, this would provide 1,100 MW of increased import capability under normal conditions and 1,800 MW under contingency situations. If a cooperative effort were undertaken by SCE and SDG&E to use a portion of the Talega – Escondido 230 kV line path at 500 kV (and Nevada Hydro understands the corridor is already permitted for 500 kV), the full capability of the 500 kV line from Alberhill to Case Springs (2,600 to 3,400 MW) could be available to meet the needs of both the utilities.

The other theoretical (at best) proposals presented by the CAISO as “solutions” appear to Nevada Hydro to be largely speculative. Moreover, they appear be much more costly than the proposed TE/VS Interconnect, which has its detailed engineering and costing complete. Notwithstanding this, the CAISO was not, and could not be, specific as to how it proposes to fill these gaps within the timeframe in which the SONGS replacement resources will be needed. Given that another Southern California area blackout could be the consequence of delay, that planning process must be fully transparent and public process.

As mentioned, the resolution of the SONGS problem must also be carried out while existing gas-fired generators along the coastline are to be revamped to meet once-through cooling (OTC) regulation requirements imposed by the State Water Resources Control Board. This will, in some cases, involve shutting down existing power plants in the area in order to remove them and build replacements. Additionally, there is no promise or absolute determination that the total of generation from any of these plants, whether new or re-powered, will add up to the total that existed prior to the beginning of the SONGS shutdown.

Another issue that has not been addressed in the CAISO’s presentations, but should be, involves the ratings for Path 43 and Path 44. In Nevada Hydro’s view, in the absence of SONGS, the present ratings for these paths are of no value. Both Path 43 and 44 have ratings that are largely dependent on the presence of SONGS operating at full output. With SONGS being a strongpoint in the transmission system, because large amounts of power from it could flow

either north on Path 43 or south on Path 44, these import channels were quite important and useful. However, with SONGS not operating, the performance of these paths is quite different and much weaker. A recalibration of the measurements of the capability for importing power that uses these path ratings is required, and that recalibration must reflect current realities. A correct understanding of the actual transfer capabilities between the two utilities, which will result from a proper recalibration of import capabilities, will further underscore the uncertainty of the tentative plan that the CAISO is looking at in order to replace the capacity and energy that was, in the past, provided by SONGS. Furthermore, such a recalibration will underscore the value that LEAPS and the TE/VS Interconnect will bring to the system.

X. The Nevada Hydro Projects Are the ONLY Real Solution to the SONGS Crisis

LEAPS is a key project that will help alleviate the resource constraints that are posed by the loss of SONGS in a more effective, more timely and less costly way than the other proposed resources that were suggested in the CAISO's draft plan.

State officials looking for a solution to the SONGS dilemma should know that LEAPS and TE/VS Interconnect projects will provide numerous system benefits including:

- 500 MW of highly flexible and fast-ramping generation;
- A dramatic increase in the ability of the Southern California grid to absorb and integrate variable renewable generation, especially the absorption of off-peak resources and surplus wind energy that would otherwise have to be curtailed as the LEAPS project also provides 600 MW of load for off-peak renewable wind generation;
- 500 MW of carbon-free on-peak electrons;
- High quality MVARs at a cost that would be roughly half that of static VAR compensators;
- Local capacity in that portion of the SCE load pocket that would be most highly impacted by the loss of SONGS;
- Potential congestion relief on Path 26
  - That would not trigger the limitations of the SCIT nomogram; and
  - At a cost that would be significantly less than the Delany-Colorado River line that the CAISO proposed to approve as part of the current transmission plan;
- A new 500 kV line connecting the SCE and SDG&E service territories that the CAISO has long recognized as being needed; and,
- A dramatic enhancement in overall system reliability in southern California.

LEAPS and the TE/VS interconnect will provide major reliability improvements at both its north and south connection points. However, the far more important value-added of LEAPS is its electrical proximity to the existing SONGS substation. Talega is only a few miles north of SONGS. Thus, in terms of real power (megawatts) and reactive power (megavars), LEAPS and the TE/VS Interconnect are THE replacement for SONGS.

Moreover, as discussed above, advanced pumped storage is, and as more and more variable renewable resources are interconnected, will increasingly be, a valuable system asset. There is no such capability in Southern California. Fast starting, quick reversal between pumping and generating, and very high ramp rate capability provides grid operators with a tool for system control like none other. The location of LEAPS in the grid is also a significant advantage when coupled with the TE/VS transmission. Moreover, the project's phase shifters will provide discrete flow control.

One of the major problems with the disappearance of SONGS is the lack of voltage support in a critical area of the LA Basin. The increased flows on the 230 kV system from north to south, running at a high percentage of the area's line ratings during high load periods, causes significant increases in reactive power loss. The TE/VS Interconnect, at 500 kV, has much lower reactive power loss for the same flow rate than do the equivalent 230 kV line(s). In addition, LEAPS provides reactive support along the way.

There is no existing high voltage connection between the SCE and SDG&E systems. The September 2011 blackout clearly shows a need for power transfers under major contingencies that cannot be managed by the existing 230 kV lines. 500 kV interconnections are needed to handle problems caused by 500 kV contingencies. The size of both the SCE and SDG&E systems has grown to such a point that 230 kV lines are no longer adequate for the task of inter-utility flow management. The limit of flow management efforts or capability at 230 kV has now been exceeded. This situation has become even more tenuous with the need to push the supply locations back from the coastal areas, where the existing generation is likely to be significantly reduced because of once through cooling regulation limits.

As Nevada Hydro has stressed in a variety of venues, with or without SONGS operating, these projects can bring 1,100 MW of reliability to San Diego under normal operating conditions and can transfer 1,800 MW during emergencies. In addition, the projects can:

- Provide a reliability substitute for most of the SONGS facility (1,800 MW); and
- Prevent system collapse during usual NERC and CAISO testing requirements.

In addition to these benefits, the CAISO should note that LEAPS, like all advanced pumped storage facilities:

- Is dispatchable in 15 seconds (with units spinning);
- Provides black start in 10 minutes;
- Provides full range of ancillary services; and
- Provides regulation, load following and voltage support.

Finally, Nevada Hydro will construct LEAPS and its associated transmission for roughly $1.5 billion, whereas as the CAISO has noted, the alternatives that it has described would cost at least twice as much to construct and face unknown approval paths. Further, LEAPS can be operating by 2018 or 19.

XI. Conclusion

Given the State's exacting clean energy policies, there is an unquestionable need for the electric power system in California to move toward an environmentally sustainable future, while still maintaining highly reliable and efficient service at the least possible cost. Given this policy imperative, as well as the demonstrated history that the LEAPS and TE/VS Interconnect projects are needed and valuable assets to meet Southern California's mid- and long-term power system needs, there can be no doubt in the mind of anyone who is serious about meeting the State's policies that the LEAPS and TE/VS Interconnect projects are the very best projects that could be developed in that region in order to meet the challenges of:

(1) the ever-increasing need for highly flexible resources;

(2) the ever-expanding reliance in the region on variable renewable resources;

(3) the evident and hidden limitations on power flows into the region;

(4) the long-term imperative for California to move away from carbon-based energy resources; and

(5) the permanent shutdown of SONGS.

Despite the roadblocks they have faced to date on the road to being approved, these projects have a demonstrated history being accepted by regulatory and system-planning authorities that they are needed assets for the region. Moreover, these projects are a near perfect fit with the overall mid-term and long-term needs of the system in Southern California. As a result, regulators should embrace these projects and do everything within their power to help smooth their path forward. Not to do so would be a shame, both for the reliability and the flexibility of the grid of the future and for the ratepayers who depend on their leaders to plan for and oversee the implementation of an electric power system that is the cleanest, most reliable and most cost-effective system achievable.

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