Chapter 2: Project Purpose and Need

2.1 Overview

The California Environmental Quality Act (CEQA) defines "project" to mean "the whole of the action" that may result from either a direct or indirect physical change in the environment (14 CCR 15378[a]). In general, each "project" must be fully analyzed in a single environmental review document. In performing its analysis, an agency should not split a "project" into two or more segments but, in deference to the protection of the environment, examine the totality of the action, even when certain components of that action not fall within the jurisdiction of the agency.

As indicated by the California Energy Commission (CEC): "In many cases, certain generation-related components, in whole or in part, complement transmission-related components. Generation-related components benefit the transmission grid in several ways, including: providing voltage support, reducing heavy power flows on certain transmission lines, and minimizing the oscillatory nature of the electric system."[1]

Although The Nevada Hydro Company, Inc. (Applicant or TNHC) only seeks a Certificate of Public Convenience and Necessity (CPCN) from the California Public Utilities Commission (Commission) for a extra high-voltage transmission line extending from SCE's existing 500 kV transmission system in western Riverside County to SDG&E's existing 230 kV transmission system in northern San Diego County, including all network upgrades and ancillary facilities associated therewith, the Applicant's proposed Talega-Escondido/Valley-Serrano 500 kV Interconnect (TE/VS Interconnect) is a component of a larger projects that also includes a federally-licensed advanced pumped storage hydropower project. The Applicant's Lake Elsinore Advanced Pumped Storage Project (LEAPS) is being concurrently processed by the Federal Energy Regulatory Commission (FERC or Commission) in FERC Docket Nos. 11858 and ER06-278-005.[2] LEAPS is a pumped hydro storage facility with an installed generating capacity of 500 megawatts (MW) and a pumping capacity of 600 MW.

Both the TE/VS Interconnect and LEAPS (Project) are identified, described, and analyzed in this "Proponent's Environmental Assessment" (PEA).

In November 2007, the TE/VS Interconnect was designated as a transmission resource of "Statewide Significance" in the California Energy Commission's (CEC) 2007 "Strategic Transmission Investment Plan, CEC-700-2007-018-CMF." As indicated therein: The proposed Lake Elsinore Advanced Pumped Storage (LEAPS) project, planned jointly by the Elsinore Valley Municipal Water District and The Nevada Hydro Company, Inc. (TNHC), is a combined generation and transmission project located at Lake Elsinore in Riverside County. The LEAPS project meets all the requirements for inclusion in the '2007 Strategic Plan,' although there are still issues to be resolved with both the FERC, and the California ISO. The transmission portion of the project, sometimes referred to as the Talega-Escondido/Valley-

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[1]/ California Energy Commission [Aspen Environmental Group], Comparative Study of Transmission Alternatives: Background Report, 700-04-006, June 2004, p. 17

[2]/ The Nevada Hydro Company, Inc. and the Elsinore Valley Municipal Water District are joint applicants under FERC Docket No. 11858.

Serrano (TE/VS) line, would primarily be located in the Cleveland National Forest, which is located in both San Diego and Riverside counties. The 32 mile, 500 kV transmission component of the LEAPS project would connect to a tap on SCE's 500 kV Valley-Serrano line, as well as to a new substation near the existing Talega-Escondido 230 kV line where the line enters Camp Pendleton in Northern San Diego County. This would provide an interconnection between the SDG&E and SCE service territories much like the SDG&E Valley-Rainbow Project."[3]

The CEC further noted that, in 2004, "the California ISO noted that '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.'"[4]

In November 2006, in accordance with the provisions of Sections 1223 and 1241 of the Energy Policy Act of 2005 (EPAct 2005), identified LEAPS as an "advanced transmission technology," defined as a "technology that increases capacity, efficiency, or reliability of an existing or new transmission facility."[5] 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."[6] In March 2008, FERC again issued a ruling with regards to the LEAPS and TE/VS Interconnect. FERC approved rate incentives for the TE/VS Interconnect under Section 219 of the Federal Power Act of 1920 (FPA) and Order No. 679 in order "to provide the regulatory certainty necessary for [TNHC] to proceed with its project."[7]

In its FERC filing, TNHC relies on "independently supplied reliability studies," including "The Comparative Reliability Evaluation for Alternative New 500 kV Transmission Lines into San Diego"[8] (Reliability Study) and the "Lake Elsinore Advanced Pumped Storage System Study"[9] (Interconnection Study). The Reliability Study references the 2003 Southwest Transmission Expansion Plan (STEP) Study, and concluded that a 500 kV line was desperately needed by San Diego, particularly in view of inability to permit Valley-Rainbow, the planned retirement of South Bay in 2009, and increasing San Diego load. Additional facilities or upgrades would be required to achieve an import limit increase from 2850 to 3600. The Interconnect Study, among other cases, evaluated the TE/VS Interconnect as a stand-alone (without LEAPS) and concluded that the line "would inject another source of power to the SDG&E 230 kV system resulting in a more robust system."[10]

Based on TNHC's evidence, FERC found that these power flow analyses affirm 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

[3]/ California Energy Commission, Strategic Transmission Investment Plan, Final Joint Committees Report, CEC-700-2007-018-CMF, November 2007, p. 105.
[4]/ Ibid., p. 106.
[5]/ Federal Energy Regulatory Commission, Order on Rater Request, Docket Nos. ER06-278-000 et seq., issued November 17, 2006.
[6]/ Ibid., p. 12.
[7]/ Federal Energy Regulatory Commission, Order on Rate Incentives and Compliance Filing, Docket Nos. ER06-278-000 et seq., issued March 24, 2008, p. 21.
[8]/ Kyei, John, Comparative Reliability Evaluation for Alternative New 500 kV Transmission Lines into San Diego, Grid Planning Department, California Independent System Operator, April 17, 2004.
[9]/Utility System Efficiencies, Inc., Lake Elsinore Advanced Pump Storage System Study, March 9, 2005.
[10]/ Op. Cit., Order on Rate Incentives and Compliance Filing, Docket Nos. ER06-278-000 et seq., p. 12.

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, TNHC stated that the 2003 STEP Report 'concluded that a new high voltage electrical transmission line between Riverside and San Diego Counties is critically need to serve future load growth.' If built today, the TE/VS Interconnect would be the first 500 kV transmission line connecting SCE and SDG&E's transmission systems."[11]

FERC concluded that the "TE/VS Interconnect project will ensure reliability, consistent with the requirements of Order No. 679"[12] 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."[13]

In January 2007, FERC and the United States Forest Service (USFS or Forest Service) released "Final Environmental Impact Statement – Lake Elsinore Advanced Pumped Storage Project, FERC Project No. 11858, FERC/FEIS – 019F"[14] addressing both LEAPS and a "transmission lines only project." Under the Commerce and Supremacy Clauses of the United States Constitution, the FPA preempts state law that would otherwise apply to FPA-licensed projects, except where the FPA reserves state authority over a specific issue. One of the primary exceptions is the water quality certification issued under Section 401(a) of the Federal Clean Water Act (CWA). FERC appears unable to issue the LEAPS hydropower license until the Applicant can secure a Section 401(a) water quality certification from the State Water Resources Control Board (SWRCB). The SWRCB has indicated to the Applicant that, prior to that discretionary action(s), an adequate CEQA document is required. The SWRCB has further indicated to the Applicant that, should the Commission accept CEQA Lead Agency status of LEAPS and the TE/VS Interconnect, the SWRCB would serve as a Responsible Agency.

Because of the interrelationship between LEAPS and the TE/VS Interconnect, including the Applicant's involvement in both activities, pursuant to CEQA, the Applicant is requesting that the Commission prepare a single CEQA document addressing both LEAPS and the TE/VS Interconnect in sufficient detail as to allow the SWRCB and such other agencies as my possess discretionary authority with regards to either or both components, to utilize a Commission-prepared document for the purpose of demonstrating CEQA compliance. This request and this interrelationship requires that the Applicant describe, in this PEA and in such other supplemental documentation as may be requested by the Commission, the "whole of the action" now under consideration.

2.1.1 Project Objectives

A pumped storage facility requires a number of specific component parts. Among those, there must exist or there must exist the ability to construct both an upper (forebay) and lower (afterbay) reservoir in close proximity and separated by sufficient height differential (head) to

[11]/ Ibid. p. 13.
[12]/ Ibid.
[13]/ Ibid., p. 23.
[14]/ 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.

effectively operate. In describing pumped storage facilities, the FERC notes that this type of facility is particularly effective at sites having high heads (i.e., large differences in elevation between the upper and lower reservoir).

In 1990, the Tudor Engineering Company (TEC) published a reconnaissance-level investigation which identified the potential to construct a pumped storage hydropower project in the Elsinore Mountains, in proximity to Lake Elsinore. As indicated therein, "[p]umped storage units are used by various utilities to mitigate the effects of daily peaking problems. The southwest region of California, however, has few sites that can be utilized for pumped storage, either because of insufficient or varying water supplies or an unacceptable elevation between the upper and lower reservoirs."[15]

The area identified in the TEC study represents the only suitable location in the general project area possessing an existing water body of sufficient size to serve as a project facility, substantial elevation differences (delta) over a relative short distance to allow for the operation of a large-scale pumped storage project, and proximity to large metropolitan areas with identified energy needs. Since those physiographic and locational conditions are not readily reproducible, the Lake Elsinore area represents the only known locale in southern California that can accommodate a pumped storage facility sufficient to accommodate large power levels and long discharge times. Unlike an idea or a product that can be taken from its source, exported, and then produced in distant areas, pumped storage is dependent upon the existence of definable variables that impose real-world restrictions on its location and duplication.

As such, the primary goals of the Project are to: (1) take advantage of the unique combination of an existing water body, sufficient topographic variation (high head), and proximity to southern California energy markets to allow for the construction and operation of a modern and efficient pumped storage facility; and (2) connect the pumped storage facility to the CAISO-controlled grid in a manner which allows the stored power to serve the power needs of both the San Diego and Los Angeles metropolitan areas. Based on those primary goals, the following Project objectives have been formulated.

I. The objectives of the "transmission component" of the Project include:

   1. Reduce congestion. Provide additional high-voltage transmission capacity to reduce congestion on the CAISO grid and thus reduce energy costs for CAISO consumers.
   2. Provide 1,100 MW of incremental transmission import capability to San Diego. Provide at least 1,100 MW of additional import capacity to SDG&E system at all times to enhance San Diego load area's access to renewable resources available through the WECC/CAISO transmission grid.
   3. Provide 1,100 MW of incremental transmission import capability to San Diego. Provide at least 1,100 MW incremental transmission import capability for SDG&E under G-1/N-1 conditions to satisfy reliability criteria and to reduce the cost to SDG&E ratepayers of CPUC Resource Adequacy capacity.

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[15]/ Tudor Engineering Company, Report on Reconnaissance Level Investigation of Lake Elsinore Pumped Storage Project, June 1990, p. 1-2.

4. Provide an interconnection between SDG&E and SCE transmission systems. Provide SDG&E with the first 500 kV interconnection with SCE and thus to the CAISO 500 kV network and thereby enhance the integration and operational reliability of the CAISO transmission grid.
5. Further long-term infrastructure planning efforts. Provide a potential future option for further expansion of the CAISO grid by contributing to the creation of a 500 kV link from Arizona-Imperial Valley-San Diego 500 kV facilities to the 500 kV network in the Los Angeles basin.
6. Provide access to the planned pumped storage facility. Provide the CAISO grid with access to the planned LEAPS pumped storage hydropower generation plant, a location-constrained facility.

II. The objectives of the “pumped storage component” of the Project include:

1. Store off-peak power. Store excess off-peak energy production in the CAISO region, including off-peak production by wind generation facilities in the Tehachapi region and/or elsewhere, geothermal generation, and other existing baseload generation and release such energy by operation of the LEAPS hydropower generators as needed during peak-demand hours.
2. Integrate intermittent renewable resources. Provide 500 MW of regulation, fast responding spin, and load following capability to integrate intermittent renewable resources procured by southern California Load Serving Entities (LSEs).
3. Facilitate the development of workable competitive wholesale markets. Provide 500 MW of regulation, fast responding spin, and load following capability to facilitate the development of workable competitive wholesale markets.
4. Provide black-start capability. Provide 500 MW of black-start capability, allowing for the restoration of network interconnections, to the CAISO southern California transmission system.
5. Provide voltage support. Provide voltage support for wind energy integration in the southern California electrical region.

2.1.2 Analysis of Project Objectives

This section will provide the Commission with a brief analysis of the reasons why attainment of these objectives is necessary or desirable to meet the goals and objectives of the Commission and State.

For each of these objectives, there are potentially a variety of ways each can be achieved. These alternatives have been analyzed fully in Chapter 6.2. Of these potential alternatives, some have been eliminated from further consideration for the reasons discussed in Chapter 6.2.3. Other alternatives remain under consideration and are analyzed fully in Chapter 6.2.4. Because of the synergies among the Project components, The Applicant believes that on balance, the Project can provide for the attainment of these objectives with minimal impact and cost effectively.

With regards to the TE/VS Interconnect, the following additional information provides an explanation and further elaboration of the Project’s objectives.

- **Reduce Congestion**. Section 1221(a) of the EPAct 2005 (Siting of Interstate Electric Transmission Facilities) requires the Secretary of Energy to 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, 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 2005. The Congestion Study defined "critical congestion area" as those "areas of the country where it is critically important to remedy existing or growing congestion problems because the current and/or projected effects of the congestion are severe."[16]

  As further indicated in the Congestion Study: "San Diego is the Nation's seventh largest city, that demand in this area is served by a combination of internal capacity and imported power, and that virtually all of the imports are delivered through two points of interconnect. Neither of these points of interconnection is capable of meeting the peak load import requirements of the area if the other is out of service."[17]

  In an October 10, 2006 letter to the DOE, the CEC expressed its support for DOE's identification of southern California as one of two critical congestion areas.[18]

  Not only is the Project located in roughly the middle of this NIETC, but by providing 1,500 MW of additional extra high-voltage transfer capacity available to the San Diego area, the TE/VS Interconnect will reduce congestion in this critical congested area of the CAISO-controlled grid and, thereby, reduce the energy costs to CAISO consumers.

  As discussed in <u>Chapter 6.2</u> (Description of Project Alternatives and Impact Analysis), there are potentially a variety of means to reduce congestion, including adding new local generation, reducing or managing demand, and using alternative routings for transmission interconnections. Most of these strategies are, however, beyond the ability of the Applicant to bring to fruition. By proposing both a new transmission interconnection and new generation (pumped storage) within a critically congested area, the Applicant's Project will help reduce congestion and enhance reliability.

- **Provide 1,100 MW of incremental transmission import capability to San Diego**. The Project will provide incremental transmission import capability for SDG&E under G-1/N-1 conditions to satisfy reliability criteria and to reduce the cost of reliability. The CPUC's resource adequacy (RA) policy requires its jurisdictional load-serving entities (LSEs) to procure the bulk of their wholesale electric needs through forward procurement mechanisms. The Commission has established a capacity-based RA obligation. This RA procurement obligation includes a CAISO determined Local Capacity Requirement (LCR). The CAISO determines the LCR by identifying specific areas within the CAISO Balancing Authority Area that have limited import capability and determines the

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[16]/ United States Department of Energy, National Electric Transmission Congestion Study, Energy, August 2006.
[17]/ Ibid., pp. 45-46.
[18]/ California Energy Commission, Letter to United States Department of Energy, Response to U.S. Department of Energy's August 2006 National Electric Transmission Corridor Study: Comments of the California Energy Commission, October 10, 2006.

generation capacity necessary to mitigate the local reliability problems in those areas to meet FERC-approved reliability criteria. The procurement cost of LCR capacity has been greater than the procurement cost of RA capacity.

Currently, there are only two power import path to the SDG&E service area, the Southwest Powerlink (SWPL) line and the South of SONGS[19] path (WECC Path 44). The reliable import capability is determined by taking the worst single contingency (SWPL line out) in the SDG&E system and making sure the SDG&E system still meets the WECC/NERC reliability criteria. After the contingency, all power flow originally on SWPL will have to flow through the South of SONGS path, as South of SONGS is the only remaining import path from the rest of WECC. Currently, the South of SONGS limit is 2,500 MW.

The TE/VS Interconnect provides a third and distinct import path to the SDG&E service area. For reliability analysis, after the loss of the most heavily loaded path (SWPL), the original flow on SWPL will now flow, divided between South of SONGS and the TE/VS Interconnect. Studies showed that about one-third of the original flow on SWPL will be flowing on the TE/VS Interconnect, and that about two-thirds of the flow on the South of SONGS path.

A sensitivity study showed that without the TE/VS Interconnect, after the loss of SWPL, the flow on South of SONGS was 3,643 MW. In order to keep the flow below 2,500 MW and meet reliability requirements, SDG&E has to reduce about 1,100 MW of import and replace that power with about 1,100 MW of generation originating inside SDG&E service area. With the TE/VS Interconnect and phase shifter operating to schedule flow at 500 MW to SDG&E, the same case and contingency showed that the flow on South of SONGS is 2,507 MW with power flow on the TE/VS Interconnect at about 1,154 MW.

Since the TE/VS Interconnect will provide 1,100 MW of additional transmission to the San Diego load area under this contingency condition, it will reduce SDG&E's LCR by the same amount while satisfying the CAISO's reliability criteria. As such, the TE/VS Interconnect will reduce the cost of reliability to CAISO ratepayers.

Additionally, California has adopted an aggressive Renewable Portfolio Standard (RPS). Under the State's RPS policy, LSEs are required to procure 20 percent of their energy needs from renewable resources by 2010. This RPS requirement is likely to increase to 33 percent by 2020 or sooner. In a significant number of cases, renewable resources are located in areas that are remote to the State's load centers. As such, additional transmission infrastructure will be required for the State's LSEs to access the pool of available renewable resources in as cost-efficient manner as possible.

19/ SCE and SDG&E are currently interconnected at the San Onofre Nuclear Generation Station (SONGS) switchyard. SCE owns the north half of the SONGS switchyard and the four 230 kV transmission lines to the SCE service area. These four SCE lines comprise what is known as Western Electricity Coordinating Council (WECC) Path 43 or the "North of SONGS path." SDG&E owns the south half of the switchyard and the 230 kV lines to its service area. These five SDG&E lines comprise what is known as WECC Path 44 or the "South of SONGS path."

As indicated in California's "2007 Integrated Energy Policy Report," the CEC "has expressed concern that SDG&E's margin of safety is not large enough to ensure that it meets the 20 percent by 2010 goal and has encouraged SDG&E to procure, through contracts or development of utility-owned facilities, RPS energy equivalent to 20 percent by 2010 plus a 20 to 30 percent margin of error."[20]

By providing 1,100 MW of additional import capacity to SDG&E, the TE/VS Interconnect will provide access to a larger and more diversified pool of renewable resources, including developing wind energy resources in the Tehachapi area, solar energy from the Mohave area, geothermal energy from the Imperial Valley, and other renewable resources from the Pacific Northwest, the western United States, and Canada.

Imperial Valley geothermal resources can be delivered to the San Diego area by means of the TE/VS Interconnect over the existing SCE and Imperial Valley Irrigation District (IID) networks. With the addition of IID's Coachella-Devers transmission line, this additional capacity will further enhance delivery of IID's renewable energy resources into the CAISO-controlled grid and over the TE/VS Interconnect into San Diego.

As a result, by providing San Diego consumers more economical access to the Imperial Valley and other areas rich in renewable resource potential, the Project is an essential element in the State's efforts consistent with Senate Bill 1078 and California's "Energy Action Plan" (EAP). By providing access to the San Diego marketplace, the TE/VS Interconnect will encourage the development of such resources, thereby diversifying the State's resource mix and reducing its reliance on fossil-fueled generation.

Enhanced access to renewable resources will promote the attainment of California's RPS and greenhouse gas (GHG) emission reduction objectives and will do so in an economically efficient manner, by reducing SDG&E's renewable resource portfolio risk.

- **Provide an interconnection between SDG&E and SCE transmission systems**. The State's existing 500 kV bulk transmission "backbone" runs from the Oregon border through the SCE service territory but does not connect with the San Diego area. San Diego's system currently connects to the rest of California via 230 kV lines running north through the San Onofre Nuclear Generating Station (SONGS) and 500 kV lines running east to Imperial Valley. The CEC confirms that a new "northern 500 kV interconnection would improve the reliability of California's transmission system and increase the state's overall ability to import lower-cost power from Arizona, Mexico, and the Desert Southwest. In 2004, the California ISO noted that '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.'"[21]

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[20]/ California Energy Commission, 2007 Integrated Energy Policy Report, CEC-100-2007-008-CMF, 2007, p. 120.
[21]/ Op. Cit., Strategic Transmission Investment Plan, Final Joint Committees Report, CEC-700-2007-018-CMF, p. 106.

San Diego is the nation's seventh largest city and the nation's sixth largest county with an economy producing in excess of $70 billion of goods and services per year. Yet it depends on this single set of 230 kV lines and a single 500 kV line to tie it into the transmission network outside the San Diego area to obtain the electricity imports needed to support its economy. Among the electric service areas in the State, only the San Diego region is so underserved.

The TE/VS Interconnect will provide SDG&E with the first 500 kV connection directly to the robust network of SCE and thus to the CAISO 500 kV network backbone. By doing so, the facility will enhance the integration and operational reliability of the CAISO transmission grid.

- **Further long-term infrastructure planning efforts**. The California Independent System Operator has noted that the "CAISO has begun developing a vision of an adequate 500 kV backbone transmission system for the state."[22] According to the CAISO, it is the lack of this type of backbone transmission that gives rise to the exercise of market power and the need for broad market-wide mitigation measures. Correcting this deficiency through transmission upgrades would, according to the CAISO, be more prudent than relying on ongoing regulatory intervention.[23]

  In addition to providing for the first 500 kV connection for San Diego into the CAISO-controlled grid, in the future, the TE/VS Interconnect could possible serve as the northern leg of a 500 kV full-loop around San Diego. This option would not be exercised by the Applicant but might be considered by the Commission as part of its long-term planning efforts.

- **Provide access to the planned pumped storage facility**. With the State increasingly focusing on how to integrate the mandated renewable resources into the grid, LEAPS is the only large project on the horizon which is able to provide 500 MW of renewable storage and firming while also providing increased grid reliability and enhanced access paths to renewable basins.

  By providing the CAISO grid access to LEAPS, the TE/VS Interconnect will allow the grid the full benefit of the flexibility that facility can provide. This includes storage and firming of renewable resources and particularly intermittent renewable resources, like wind. In addition, LEAPS will provide 500 MW of regulation and fast responding spin to integrate intermittent renewable resources generation procured by southern California's LSEs and 500 MW of storage regulation and load following capability to facilitate the development of workable competitive wholesale markets. This, combined with the ability to provide voltage support, will help the grid integrate wind and other renewable energy resources in the southern California electrical region.

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[22]/ California Independent System Operator, Testimony of Armando J. Perez, Stephen Thomas Greenleaf and Keith Casey on behalf of the California Independent System Operator, Application 01-04-012, September 25, 2001, p. 19.
[23]/ California Public Utilities Commission, Proposed Alternative Decision of Commissioner Peevey, A. 01.04-012, mailed May 1, 2003, p. 14.

Sites for pumped storage facility hydro are relatively rare, particularly so in southern California. The location identified for LEAPS is likely the only site capable of efficiently supporting a large-scale facility. If the State is to utilize the capture the benefits of pumped storage, LEAPS must be connected to the CAISO-controlled grid.

With regards to LEAPS, the following additional information provides an explanation and further elaboration of the Project's objectives.

- **Store off-peak power**. As indicated in the "National Energy Policy," the "nation's most pressing long-term electricity challenge is to build enough new generation and transmission capacity to meet projected growth in demand."[24] The nation's and the State's electric generation system must have sufficient operating generating capacity to supply the peak demand for electricity by consumers (including the transmission and distribution losses associated with power delivery). An additional amount of reserve power plant capacity must be operational to act as instantaneous back-up supplies should some power plants or transmission lines unexpectedly fail. According to the Western Systems Coordinating Council (WSCC), to reliably deliver power, control area operators should maintain operating reserves of seven percent of their peak demand (including losses). If operating reserves decline below that level, customers that have agreed to be interrupted in exchange for reduced rates may be disconnected. If operating reserves get as low as one and one-half percent, firm load will likely be shed locally, resulting in rotating blackouts, in order to avoid system-wide blackouts.[25]

  As noted by the CEC: "It is the long-term planning application usage of resource adequacy requirements that ultimately drives construction of new generating facilities – or 'new steel in the ground.' Peak loads are gradually increasing throughout the West because of economic expansion and population growth. As loads increase over time, the existing installed base of 'steel in the ground' electric generation is gradually becoming inadequate for reliably meeting future loads, on a planned basis."[26]

  As reported by SDG&E: "Beginning in 2010, overlapping transmission and generation contingencies, as defined by the CAISO, on peak days could result in a situation where the sum of available in-area generation and existing import capability could not meet load in the SDG&E service area, potentially resulting in involuntary load shedding."[27]

  Although there exists disagreement among experts as to the timing when the demand for new generation facilities will arise, there is consensus that future demand exists. As reported by the San Diego Association of Governments (SANDAG): "Current trends indicate that electricity peak demand will nearly double, increasing by more than 4,000

[24]/ National Energy Policy Development Group, National Energy Policy, Reliable, Affordable, and Environmentally Sound Energy for America's Future, May 2001, p. 1-5.
[25]/ When major outages occur, there is an increased risk of significant public health and safety impacts. Shortages of electricity can impose risk of very serious impacts on the public, potentially increasing the risk of deaths due to heat waves (Source: California Energy Commission, CalPeak Enterprise #7 Escondido [01-EP-10] Staff Assessment for Emergency Permit, June 1, 2001, pp. 3-4).
[26]/ California Energy Commission, Revised California and Western Electricity Supply Outlook Report, Prepared for the 2005 Integrated Energy Policy Report Proceedings Docket #04-IEP-1, CEC-700-2005-019-ED2, July 2005, p. 51.
[27]/ Avery, James P., Sunrise Powerlink, Chapter 1, Application No. A.05-12-014, San Diego Gas & Electric Company, August 4, 2006, p. I-16.

MW by 2020. This increase in demand is the equivalent to the output of about six to seven moderate generation plants."[28] The North American Electric Reliability Council (NERC) indicates that "[t]he siting of new generators, whether utility or merchant built, can clearly have an impact on the reliability of the interconnected electric systems. For example, locating new generators electrically close to demand centers will cause less of a burden on the transmission systems than generators built in remote locations. In some instances, constructing new generators near demand centers may actually reduce transmission system loading."[29]

As indicated by the CEC: "Electricity uses varies widely over the time of day and time of year. On a typical day, demand increases 60 percent from the midnight low to the afternoon high. Because air conditioning loads drive peak demand, California sees its greatest demand spikes during the summer months (June, July, August, and September). This variable load requires a generation system that is extremely flexible. The full available capacity of the system needs to be dispatched only to meet a few hours of peak demand."[30]

Although electricity cannot be directly stored, it can be converted to other forms of energy and then reconverted back to electricity when it is needed. Large-scale storage systems, such as pumped storage, provide the ability to utilize low-cost, baseload power, generated during period of low-demand, during peak-load periods. Without storage, the electrical industry must develop and maintain a delivery network capable of meeting the highest demand of the year. With storage, however, the electricity delivery system can be designed to accommodate a normal load and the stored energy can be used to respond to peak demands.

"Pumped storage plants are primarily peak generating facilities. During off-peak periods, water is pumped from a lower reservoir or body of water to an upper one. The water is then released for power generation during periods of peak power demand. Although a net consumer of energy, pumped storage can be economically viable because it uses baseload capacity during off-peak periods to create additional peak capacity. Pumped storage can also be used to provide emergency reserve generating capacity."[31] LEAPS can respond to a CAISO dispatch signal in and can provide up to 500 MW in 15 seconds.

- **Integrate intermittent renewable resources**. Adding significant quantities of wind capacity to the grid will create integration challenges for the CAISO that, if not properly planned for, may lead to unnecessarily high integration costs. For example, the unpredictable and intermittent nature of wind will increasingly place the CAISO operators in the position of having to adjust up or down other generating resources.

[28]/ San Diego Regional Energy Office, Energy 2020 – The San Diego Regional Energy Strategy, Creating a More Secure Energy Future for the San Diego Region, San Diego Association of Governments, May 2003, p. 16.
[29]/ North American Electric Reliability Council, Reliability Assessment: 2002-2011, The Reliability of Bulk Electric System in North America, Final Draft for BOT Approval, October 2002, p. 28.
[30]/ California Energy Commission, Revised California and Western Electricity Supply Outlook Report, Prepared for the 2005 Integrated Energy Policy Report Proceedings Docket #04-IEP-1, CEC-700-2005-019-ED2, July 2005, p. 13.
[31]/ Upper Mississippi River Basin Association, Nonfederal Hydroelectric Development and Licensing – A Perspective from the Upper Mississippi River Basin, May 1991, p. 4.

Without the additional regulation and quick responding spin capacity that LEAPS provides, the most optimistic scenario would have CAISO operators adjusting up or down the output of slow-responding, fossil-fuel thermal generation to integrate the additional wind capacity. This increased reliance on fossil-fuel thermal generation for purposes of integrating wind resources would be contrary to California's RPS and GHG emission-reduction objectives.

It would be more likely that CAISO operators would simply curtail wind resources. The least optimistic scenario would have CAISO operators blackout certain sections of the grid because of insufficient regulation capacity and fast responding spin required to level out any sudden, unexpected decrease in wind output.

The CAISO has acknowledged the difficulty in planning for and integrating wind resources. In its November 2007 "Integration of Renewable Resources," the CAISO noted: "Additional storage capability would be of considerable benefit with the integration of large amounts of renewables, especially intermittent resources."[32] "A proven and deployed storage technology is hydro pump storage."[33]

- **Facilitate the development of workable competitive wholesale markets**. LEAPS will facilitate the implementation of California's MRTU energy and ancillary services market design by providing significant energy storage, regulation up and down, load following, and spin services. For example, LEAPS will be a "shock absorber" in the physical and economic systems by easily accommodating frequency deviations, large energy ramps, and significant mismatches between day-ahead schedules and real-time supply and demand. To the extent CAISO operators have the necessary tools to meet real-time deviations from schedules, LEAPS will minimize their need for out-of-market calls that end up harming workable wholesale competition.

- **Provide black-start capability**. Because there is always the possibility of natural disasters, malfunctions, and other events causing all or a portion of the southern California grid to go down, it is particularly vital to provide for the restoration of network interconnections to the CAISO and the southern California transmission system in the event of such grid-wide emergencies and contingencies involving SONGS. Having this capability, is a critical feature to grid management.

  LEAPS will be equipped to provide 500 MW of black-start capability and can routinely produce 6,000 megawatt hours (MWh), and, in an emergency, 8,000 MWh, of stored energy. In addition, LEAPS can synchronize to and bring up a segment of the 500 kV interstate loop between Valley, Talega, and Case Springs substations. LEAPS can, independently of all other power facilities, fuel sources and transmission, from a cold start, be on line and ready to supply energy into the grid in 10 minutes. It can then, through its control room and associated substations, isolate the local segments of the 500 kV transmission system and resynchronize at 500 kV. Once these critical transmission

[32]/ California Independent System Operator, Integration of Renewable Resources, November 2007, p. 10
[33]/ Op. Cit., p.11.

segments are re-powered, the facility can expand outward to other grid segments and synchronize them as well. This will allow other power facilities to come on line and provide additional power supplies as the grid becomes re-established and re-interconnected.

All facility control rooms and substations have state-of-the-art emergency power facilities and will provide long-term power supply to all critical equipment, communications, and telemetry systems. The LEAPS control room will be equipped to function as an emergency command center, and will be able to communicate, not only with the CAISO, but with federal, State, and military facilities as well.

- **Provide voltage support**. All high-voltage AC transmission lines provide positive voltage support (that is, provide VARs to the grid) when they are loaded below the "impedance loading" level (normally about 1,600 MWs for a 500 kV line) through line charging effect.

  All generators with excitation systems, which provide a range of lead and lag power factor (CAISO required +0.95 - 0.9 power factor for all generators), can help regulate transmission voltage. When in leading power factor, a generator supplies VAR to the system (increase voltage). When in lagging power factor, a generator consumes VAR from the system, thus reducing the transmission line voltage (when system is lightly loaded, transmission voltage tend to be too high, or above operating voltage limit). Further, VAR does not travel far. Local voltage support is, therefore, important to local areas. Because the location of the Project is central to SCE and SDG&E system, LEAPS can provide voltage support to both the SCE and SDG&E systems.

  In addition, SONGS has a voltage requirement imposed by the Nuclear Regulatory Commission (NRC) to maintain voltage and ensure off-site power to the station for safe shutdown. LEAPS can provide this voltage and off-site power requirement to the SONGS nuclear station.

  For SDG&E system, after losing the SWPL line, the system always has a low-voltage issue, particularly near Miguel and South Bay area as these are located at the end of the radial system from SONGS. The Project can provide voltage support not only by supplying VARs directly but also indirectly by unloading the existing South of SONGS transmission line.

  In terms of renewable resources, most forms of solar and wind energy conversion devices provide no reactive voltage support to the grid. In fact, these devices have a negative voltage support. With the increase of renewable energy requirements in California, voltage support will become a critical element (this will continue to become a more critical issue as the State moves toward the required 30 percent RPS level).

  By their nature, modern advanced pumped storage facilities provide large amounts of reactive support and can provide this support in all modes of operation. For example, pumped storage facilities can run dry, synchronized to the 500 kV system. In this mode of operation, the units produce no energy, but provide support services to the grid as synchronous condensers. In the wet mode of operation, the units provide energy simultaneously with all ancillary services, particularly voltage support.

Most importantly, LEAPS can provide, as required, large amounts of voltage support for the CAISO controlled grid. This additional capacity will offset the local amounts of reactive support consumed by the wind and solar resources as they come on line.