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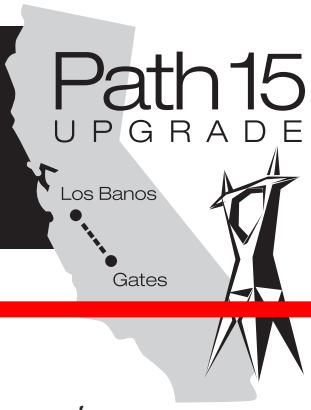
The Key Technology for GHG Reduction is Nuclear Power Generation - Part 7

Here is some technical information showing the interconnection between Diablo Canyon Power Plant (DCPP) and the Helms Pumped Storage Unit.

Note that solar power does not have this operational flexibility as all solar generating plants in California generate power according to a cosine squared curve centered around solar noon. Most solar power is generated plus or minus 2 1/2 hours from solar noon. This supply peak does not coincide with the electricity demand peak from late afternoon to early evening. Because of the north-south orientation of the California, the only solar power variation is a slight south to north reduction, presuming clear skies. (Many locations in the north part of California have frequent cloud cover, which causes a substantial decrease in solar power output.)

Additional submitted attachment is included below.

Path 15 Upgrade Project



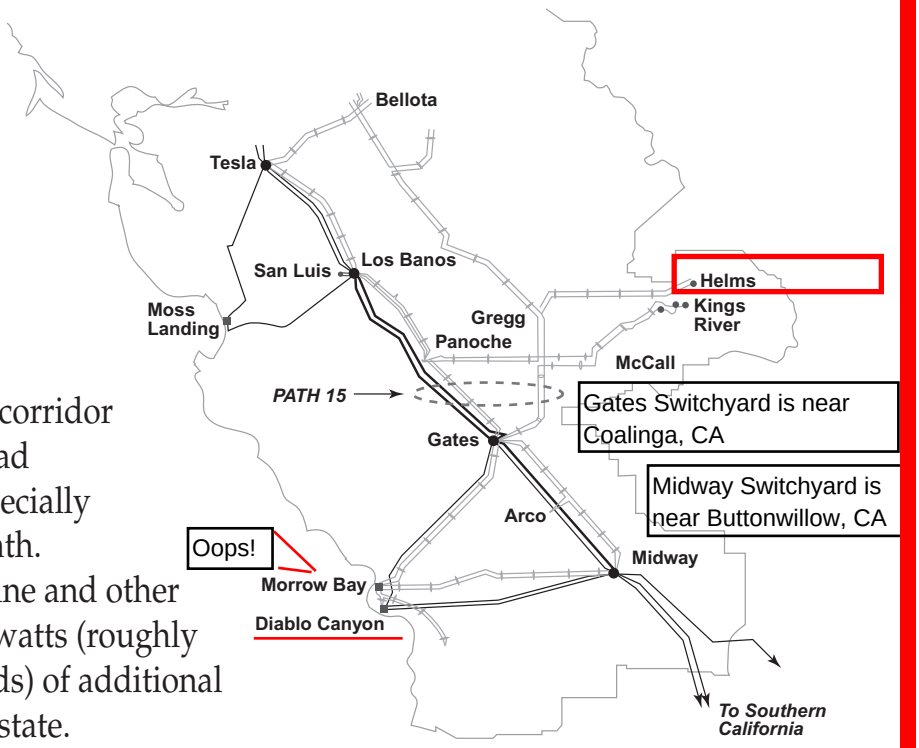
WAPA is the Western Area Power Administration

Current facilities

Path 15 is located in the southern portion of Pacific Gas and Electric Company's service area and in the middle of the California Independent System Operator's Control Area. Path 15 is rated at 3,900 MW and consists of these lines:

- Los Banos-Gates 500 kV
- Los Banos-Midway 500 kV
- Gates-Panoche No. 1 230 kV
- Gates-Panoche No. 2 230 kV
- Gates-Gregg 230 kV
- Gates-McCall 230 kV

Capacity through this transmission corridor is insufficient to carry the electricity load needed to maintain grid reliability, especially during periods of high usage on the path. Building a third 500-kV transmission line and other upgrades will allow about 1,500 megawatts (roughly enough to power 1.5 million households) of additional electricity to be transmitted across the state.



Third 500-kV transmission line conducts ~3,000 RMS Amperes. - GAN

Upgrade plan

The path upgrade will relieve constraints on the existing north-south transmission lines. The plan to increase the path rating is to:

- Construct a new 84-mile-long, 500-kV transmission line between PG&E's Los Banos and Gates substations.
- Modify the existing Los Banos and Gates substations to accommodate new equipment.
- Establish a second 230-kV circuit between Gates and Midway.

This plan will increase the nonsimultaneous south-to-north path rating to 5,400 MW from the existing 3,900 rating.

Western Electricity Coordinating Council approved the south-to-north rating increase in February 2003.

The project could become a model for relieving other transmission constraints throughout the country.

Project financing

The project will be financed substantially with non-Federal funds. Project participants are Western Area Power Administration, a Federal agency, Pacific Gas and Electric Company and Trans-Elect New Transmission Development, under this public-private partnership.

PG&E will perform the substation and 115- and 230-kV system work and receive about 18 percent of the new transmission capacity. On Feb. 12, 2002, the U.S. Bankruptcy Court approved up to $75 million for PG&E to do the work.

Western will complete all planning work, acquire land rights and manage the construction project. Western will retain a 10-percent share. Congress appropriated $1.328 million in FY 2001 to fund project startup.

Trans-Elect will provide the remaining funding for the transmission line and own the remaining transmission rights (about 72 percent).

Estimated project cost is $306 million.

In early August 2003, Moody's Investors Service assigned a Ba1 bond rating to $95 million of senior secured bonds and a Ba3 rating to $56 million of senior secured bonds. Moody's assigned stable ratings outlooks to each company.

On Sept. 15, 2003 Trans-Elect's New Transmission Development Company, which is responsible for funding the transmission line, provided Western with $76 million to start work on the transmission line.

System benefits

Upgrading Path 15 to remove transmission constraints is crucial to the reliability of California's power system. In early 2001, Path 15 constraints limited the amount of power that could be shipped from Southern California and the Southwest to Northern California, resulting in rotating power outages in Northern California. Eliminating the potential for such outages is expected to benefit the state's economy.

In addition to enhancing reliability, the Path 15 upgrade will create a more robust electricity market in the West by permitting greater power transfers between southern and northern California, increasing the ability to use the least-cost power source.

On Sept. 25, 2001, the ISO filed testimony with the California Public Utilities Commission

supporting the need for the Path 15 Upgrade. The testimony stated it is "economically justified to reduce the risk of high prices associated primarily with the exercise of market power by strategically located generation and the existence of drought hydro conditions but also other factors such as the risk of a low level of new generation development in Northern California. An examination of historical congestion costs and studies undertaken by the ISO show that:

1) between September 1, 1999 and December 31, 2000, congestion on Path 15 cost California electricity consumers up to $221.7 million; and
2) using reasonable assumptions, the $300 million cost of upgrading Path 15 could potentially be recovered within one drought year, plus three normal years. Further, upgrading Path 15 is consistent with a broader strategy to put into place a robust high-voltage transmission system that supports cost-effective and reliable electric service in California and a broader and deeper regional electricity market."

ISO to assume operational control

PG&E and Trans-Elect will turn over the operational control of their entitlement in the project to the California Independent System Operator. Western intends to turn over the operational control of its share to the ISO.

The project will be operated following accepted utility practice as a transmission facility within the ISO control area.

Project status

Western released a solicitation for an Engineering, Procurement and Construction Contract for the transmission line work on Jan. 31, 2003.

Maslonka & Associates Inc., Mesa, Ariz., was selected in May 2003 for the $87 million contract to construct the 84-mile, high-voltage transmission line.

PG&E awarded two contracts to Burns & McDonnell in June 2003 for the 500-kV substation modifications and the 230-kV shunt capacitor work. PG&E will perform all other work. Work began on the PG&E portion of the project in summer 2003.

The Coordinated Operations and Interconnection Agreement outlining coordination and interconnection of the Path 15 Upgrade with the existing PG&E electric system was filed at the Federal Energy Regulatory Commission on April 1, 2004. PG&E and Trans-Elect have completed the Transmission Control Agreements and Transmission Owner Tariffs necessary to turn over the operational control of these facilities to the ISO. Western is in the process of finalizing the necessary agreements.

The project participants negotiated a Programmatic Agreement with the Native American tribes and state and Federal agencies spelling out consultation procedures and methods to

protect historical and cultural resources and Native American cultural sites, including burial sites.

Western has acquired the necessary easements to construct the project.

The U.S. Fish and Wildlife Service issued a Biological Opinion for the project in June 2003 and Western obtained other necessary permits.

Western issued the construction notice to proceed on Sept. 15, 2003.

Project timeline

Fall 2003—Construction began

Late 2004—Line energized

Western's role as project manager

Western will:

- own the transmission line and 10 percent of the transmission rights in recognition of funding ($1.328 million appropriated in FY 01) provided to date and other contributions as project manager.
- ensure the necessary negotiated project agreements are executed; that participants are actively involved in the process; and that participants cooperate to move the project forward. Western performed lead Federal agency efforts for the National Environmental Policy Act process and has acquired necessary land rights.

Project history

Utilities in the 1980s recognized the potential for constrained power flows over Path 15 under certain conditions. Western, the Transmission Agency of Northern California and PG&E studied possible additions to relieve constraints in 1988 as part of the planning for the California-Oregon Transmission Project. Western and others prepared an Environmental Impact Statement on a proposed Path 15 upgrade as part of COTP planning. The EIS concluded that Path 15 upgrades would produce no significant adverse environmental impacts. But for a variety of reasons, the Los Banos-Gates Transmission Project was not built.

The National Energy Policy, released in May 2001, recommended the Department of Energy take action to explore relieving the constraints on Path 15.

On May 28, 2001, U. S. Energy Secretary Spencer Abraham directed Western to complete the planning needed to relieve Path 15 constraints and determine whether investors would be interested in financing the upgrades.

Western received 13 responses to a Federal Register notice by the July 13, 2001, deadline and

recommended nine interested parties as project participants.

The Path 15 Partnership; Kinder Morgan Power Co.; Mirant Americas Development Inc.; PG&E National Energy Group; Williams Energy Marketing and Trading Co.; and the Transmission Agency of Northern California withdrew at various times in the process.

Western issued a Supplement Analysis to the 1988 Environmental Impact Statement on Dec. 20, 2001, and a second Supplement Analysis addressing subsequent issues, such as transmission line realignment, in May 2003.

The CPUC issued a Final Environmental Impact Review on March 5 that found the proposed transmission corridor west of Interstate 5 is the environmentally superior alternative.

Participants signed a Letter Agreement and filed it at the Federal Energy Regulatory Commission on April 30, 2002. The agreement provided $1.5 million in initial funding and outlined the overall terms and conditions for the project. FERC accepted the terms of the letter on June 12, 2002.

The California Independent System Operator's Board of Directors approved a Path 15 upgrade on June 23, 2002.

Trans-Elect provided $1.5 million in initial funding on July 3, 2002, to finance preliminary work.

On Dec. 30, 2002, the project participants executed the Construction and Coordination Agreement. This document spelled out the project terms and conditions in more detail than previous documents and provided an additional $8.5 million to Western in initial funding.

On May 22, 2003, the California Public Utilities Commission granted PG&E's motion to withdraw its Application for a Certificate of Public Convenience and Necessity for Path 15 and found that the Final Supplemental Environmental Impact Report on the project can be used as the Environmental Impact Report, allowing PG&E to proceed with the project under Federal authority with the principal project partners.

On Oct. 23, 2003, the Western Electricity Coordinating Council released the north-to-south path rating of 3,265 MW for the Path 15 Upgrade Project.

Project participants

Western is a Federal agency within the Department of Energy. It markets electricity from Federal water projects in a 15-state region of the West and manages more than 17,000 miles of transmission lines.

Pacific Gas and Electric Company is one of three California-based investor-owned utilities. PG&E delivers electricity and natural gas to 13 million consumers in northern and central California.

Trans-Elect, Inc., based in Reston, VA is the first independent transmission company in North

America. It holds interest in and serves as general partner for assets totaling nearly $1 billion, which represents 12,600 miles of transmission lines in the U.S. and Canada. Trans-Elect's New Transmission Development Co. was launched in Fall 2002. NTD's singular focus is to develop and construct new electric transmission lines.

Updated: June 1, 2004

Posted on August 1, 2014 http://www.pgecurrents.com/2014/08/01/helms-at-30-hydroelectric-plant-delivers-safe-clean-affordable-energy/

Helms at 30: Hydroelectric Plant Delivers Safe, Clean Affordable Energy

By Denny Boyles

FRESNO — PG&E marks 30 years of commercial operation at Helms Pumped Storage Project this month. The hydroelectric facility was considered an engineering marvel when it was built and came online in 1984, and continues to play a vital role today as well in California's clean energy future.

This month marks the 30th anniversary of the Helms Pumped Storage Project, which produces enough electricity to power the cities of Fresno and Oakland.

Helms operators can take the plant from an idle state to full generation in eight minutes. That ability to quickly ramp up and down plays a key role in integrating intermittent renewable resources such as wind and solar onto the power grid, said John Conway, PG&E senior vice president for Energy Supply.

"Helms and our Diablo Canyon Power Plant give us the unique capability to fully integrate a significant amount of clean energy into the power supply while still ensuring that we can meet the energy demands of our customers," Conway said. "When it began delivering power 30 years ago, Helms played a key role for California and our customers. That role has only grown as our electric grid has evolved."

Nestled high in the Sierra Nevada Mountains about 50 miles east of Fresno, Helms features two reservoirs and three hydro pump-generators. The generators can produce a total of 1,212 megawatts of electricity or enough to power the cities of Fresno and Oakland. Nearly four miles of 28-foot diameter tunnels connect the powerhouse and two reservoirs.

[See a video tour of Helms.]

During times of high electric demand, water flows downhill from Courtright Lake at the higher elevation (8,200 feet) through the powerhouse. When there is excess generation online, the pumps can be reversed, pushing the water uphill from Lake Wishon at the lower elevation (6,500 feet) to recharge the upper reservoir.

With nearly 4,000 megawatts of generation, PG&E has the largest privately owned hydroelectric system in the nation, stretching from the Southern Cascade Mountain Range south along the Sierra-Nevada Mountains to Bakersfield. PG&E's hydroelectric system produces enough energy to power almost 4 million average homes.

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