

PG&E's Pumped Storage Application September 7, 2011





Potential New Pumped Storage Project

- Mokelumne River Watershed
 - Project could provide 400 - 1,200 MW of storage capability by 2020
 - Size will depend on need and feasibility, licensing and design efforts
- Long lead time for licensing process and Project construction
 - Start FERC licensing – 2011
 - Complete FERC licensing and CPUC approval of Project– 2016
 - Construction – 2017-2020
- PG&E Application (A.10-08-011) requests recovery of up to \$33.5 million:
 - Evaluate Project feasibility;
 - If found feasible, the costs of completing the FERC licensing process; and
 - Prepare detailed design studies to finalize a CPUC application seeking cost recovery for construction of the Project



Multiple Benefits of Pumped Storage

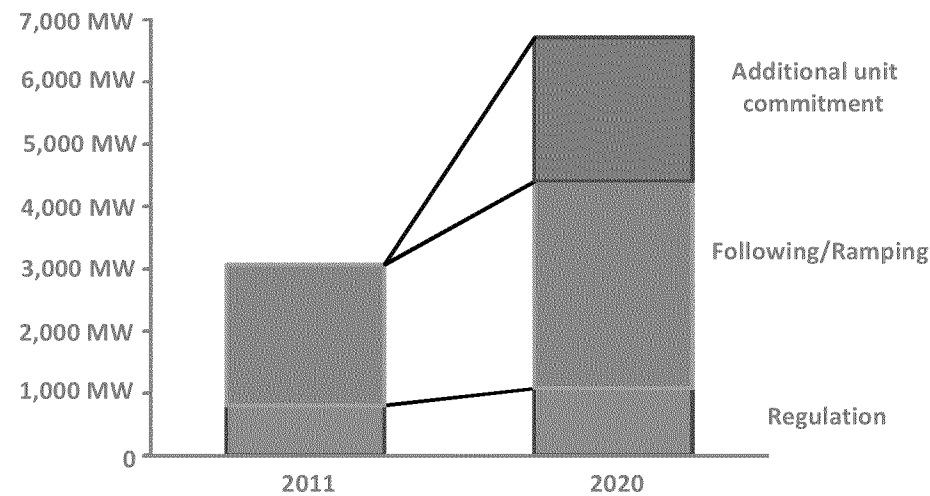
- A large amount of fast acting spinning reserve and electric system regulation capability, or generating capacity that is immediately available to meet fluctuations in electric demand and provide grid stability necessary to integrate intermittent renewable energy into the grid.
- Helps alleviate over-generation or minimum load condition by using excess energy to pump water into storage
- Reduces dependence on fossil fueled technologies and their associated greenhouse gas emissions otherwise needed to firm intermittent resources.
- Storage of economy energy, (surplus energy) that is sometimes available at night for daily cycling or during Spring snowmelt runoff conditions for seasonal storage.



Efforts to Help Define Storage Need and Competitiveness

- The grid of the future needs to be more flexible than it is today
- Studies show substantial increases in regulation, following/ramping, and increased unit commitment are needed to integrate renewable resources

Regulation, Following /Ramping and Unit Commitment Requirements*
(Summer 2011, 2020)



* Source: CAISO for Regulation and Following estimates; PG&E's estimate of additional unit commitment requirement.

- The LTPP Settlement states that the CAISO should present additional study results on renewable integration in the first quarter of 2012
- The information developed next year by CAISO and the other parties in the LTPP proceeding should inform the need for this Project



The CPUC Should Not Dismiss PG&E's Application

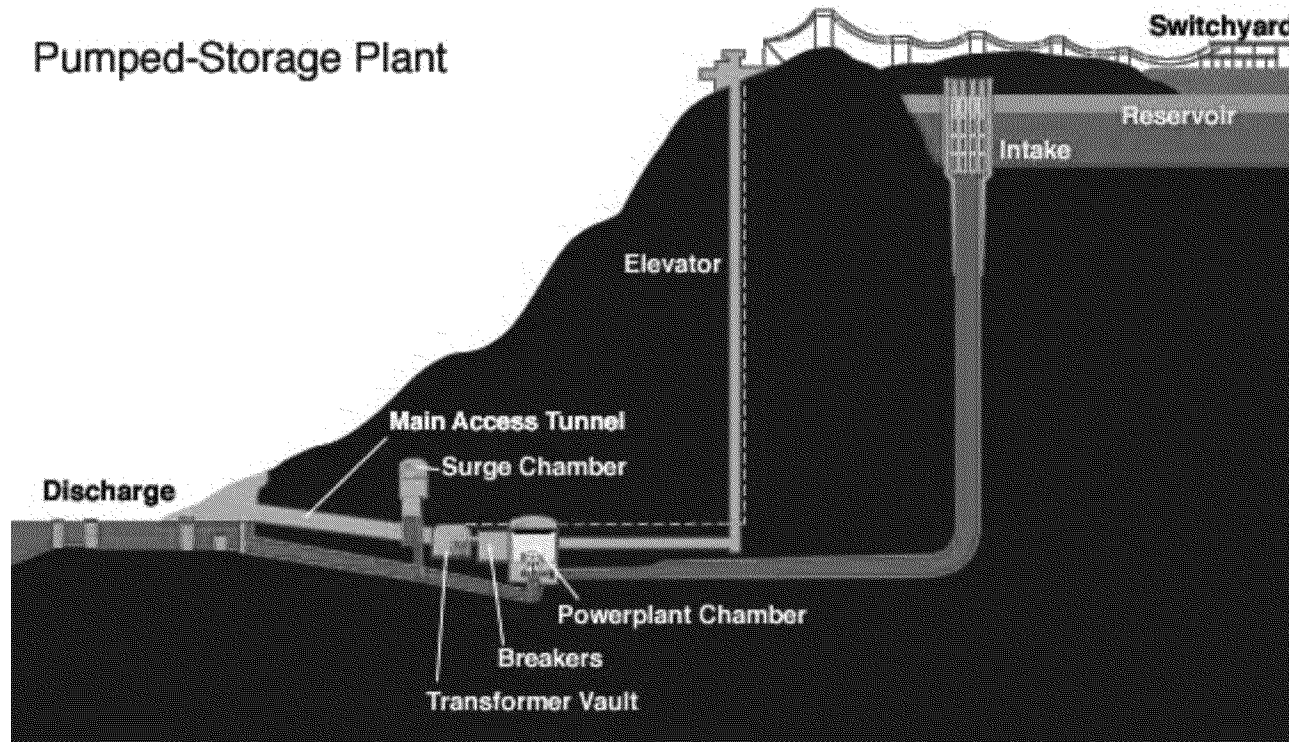
- Application is not premature given the extensive lead time for pumped hydro; prudent to approve the Application now
- If the Commission does not approve the Application now, it is premature to dismiss the Application
 - The CAISO and other parties will be providing additional analysis on renewable integration and the need for additional capacity in early 2012
 - The development of a pumped hydro project for PG&E's customers has significant lead times



Appendix



How Does Pumped Storage Work?



A typical pumped-storage development is composed of two reservoirs ... situated to maximize the difference in their levels. These reservoirs are connected by a system of waterways along which a pumping-generating station is located (see illustration). Under favorable geological conditions, the station will be located underground, otherwise it will be situated on the lower reservoir. The principal equipment of the station is the pumping-generating unit. The machinery is reversible and is used for both pumping and generating; it is designed to function as a motor and pump in one direction of rotation and as a turbine and generator in opposite rotation.

http://en.wikipedia.org/wiki/Pumped_storage showing Tennessee Valley Authority's Raccoon Mountain Pumped Storage Project; and <http://www.answers.com/topic/pumped-storage?cat=technology>

