

DOCKETED

Docket Number:	15-MISC-05
Project Title:	2015 Bulk Storage Workshop
TN #:	206696
Document Title:	PG&E Bulk Storage Presentation
Description:	N/A
Filer:	Collin Doughty
Organization:	PG&E
Submitter Role:	Public Agency
Submission Date:	11/19/2015 10:15:32 AM
Docketed Date:	11/19/2015

UNDERSTANDING CURRENT STATE OF PUMPED STORAGE BENEFITS AND BARRIERS

Michael L. Jones

Power Generation

Pacific Gas and Electric Company

**California Energy Commission & California Public Utilities Commission
Bulk Energy Storage Workshop**

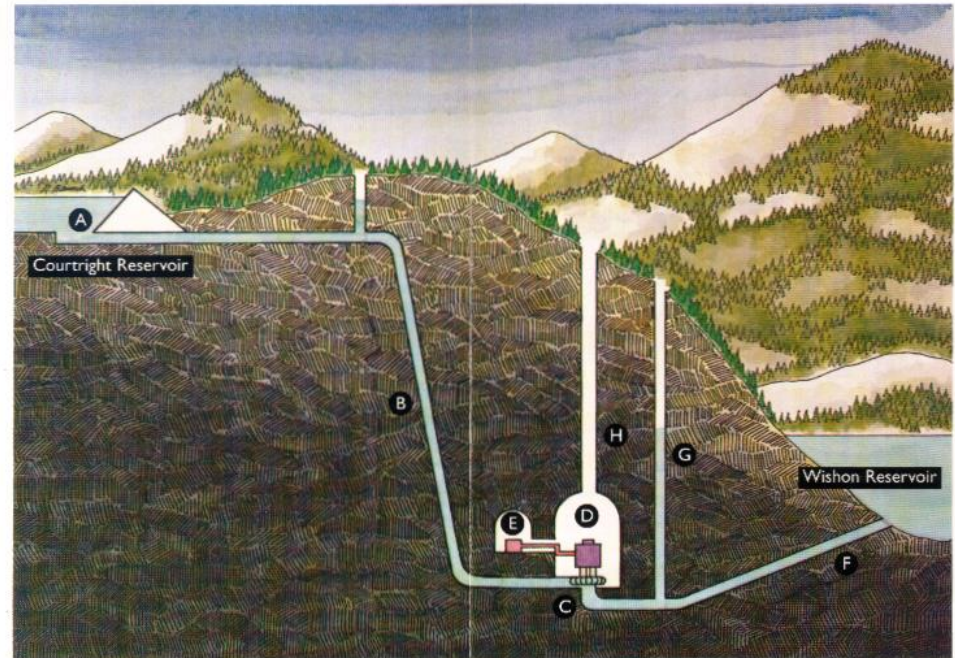
November 20, 2015





Helms Pumped Storage Facility

Location	Central California, about 50 miles east of the City of Fresno
Commissioned	June 30, 1984
Upper Reservoir	Courtright Lake 123,000 Acre Feet
Lower Reservoir	Lake Wishon 129,000 Acre Feet
Installed Capacity	Three units; 1,212 MW generating; 930 MW pumping



A-Courtright, B-Supply Tunnel, C-Turbine, D-Generator, E-Transformer, F-Wishon, G-Surge Chamber, H-Elevator



Benefits of Helms Operations

PROVEN large storage technology frequently called on to support Grid Operations

Highly **FLEXIBLE** resource used to provide energy, capacity and ancillary services

Exceptionally **FAST** ramping capabilities with each unit capable of ramping 80 MW / minute

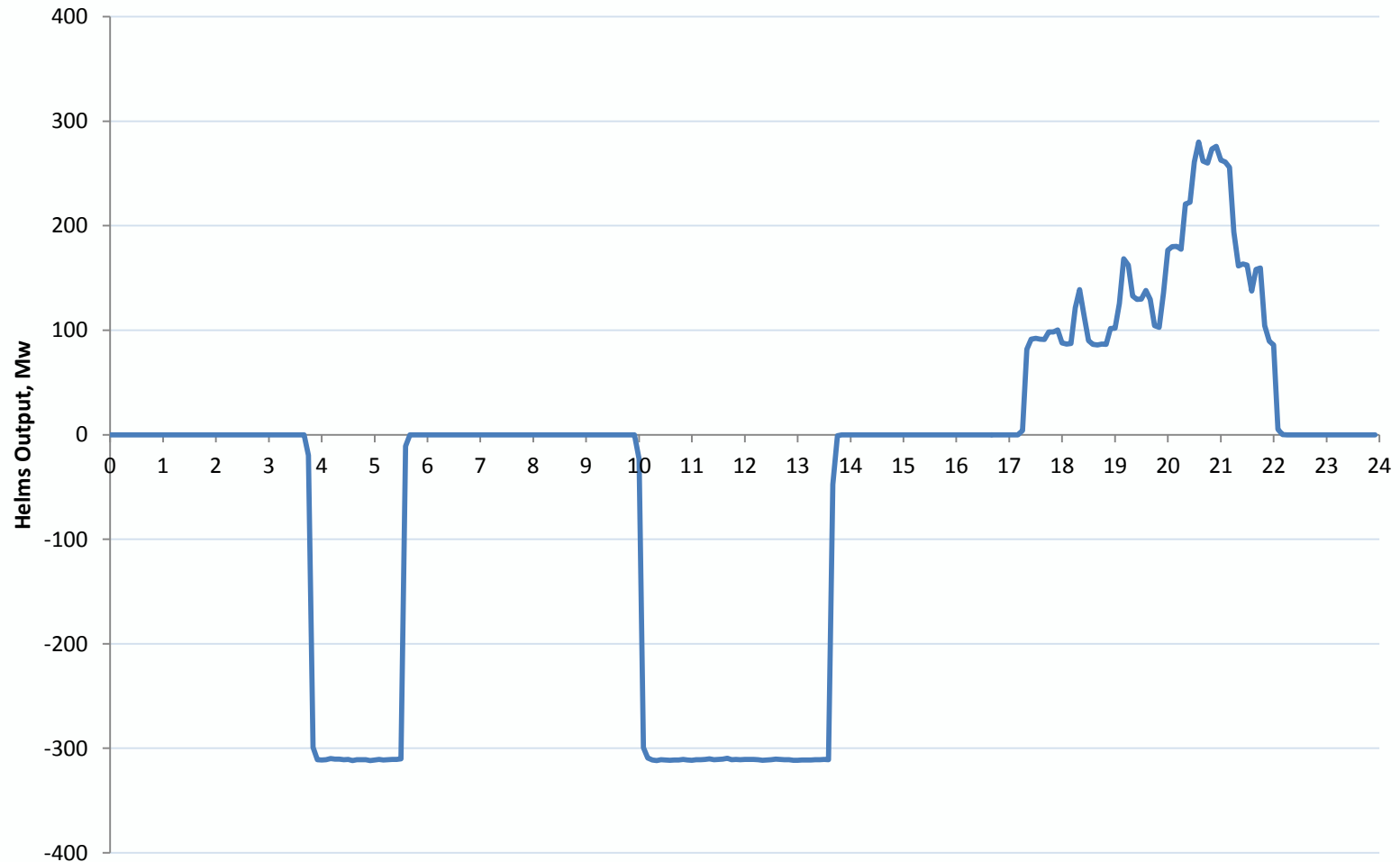
Pumping capabilities **REDUCE** overgeneration

Capable of **EVOLVING** with the changing energy landscape



Mid Day Pumping

Actual Day in July





Barriers

Large capital outlay with long development timeframe

Recognition of value of services

Equitable cost allocation to all who benefit

Ensuring asset capabilities can be fully utilized