Lake Elsinore Advanced Pump Storage (LEAPS)

and

Talega-Escondido / Valley-Serrano (TE/VS) Transmission Line

FERC PN-11858-002 and ER06-278-005 CPUC Docket 07-10-005

Northwest Power and Conservation Council
Pumped Hydro Storage Workshop
October 17, 2008

THE NEVADA HYDRO COMPANY, INC.

Issues to Discuss

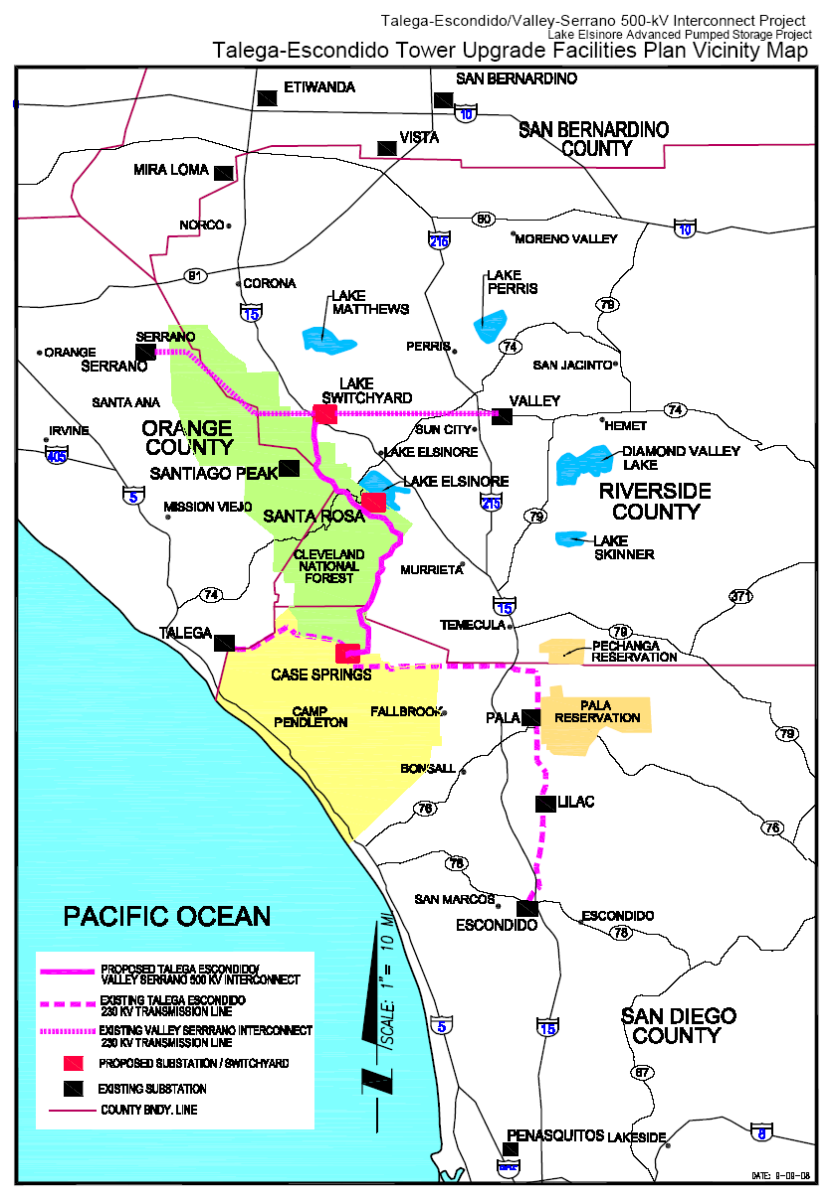
- Description of LEAPS
- LEAPS connection to grid via TE/VS Interconnect
- Benefits vs. Revenue
- Questions

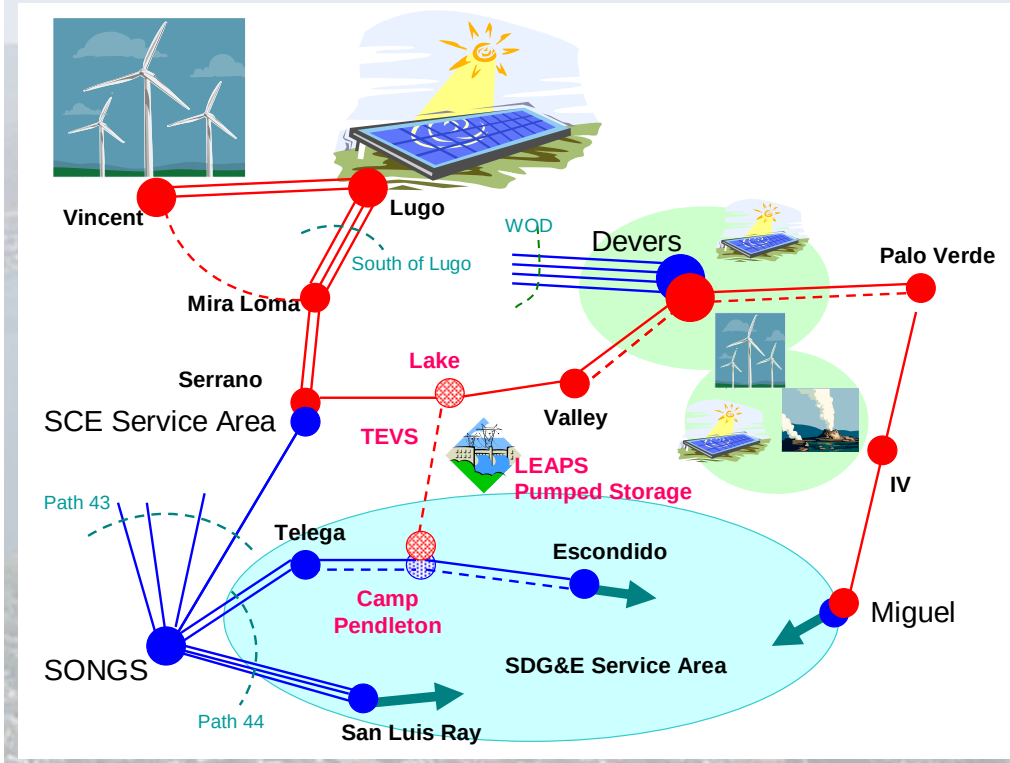
Lake Elsinore Advanced Pump Storage (LEAPS)

LEAPS + TE/VS Interconnection

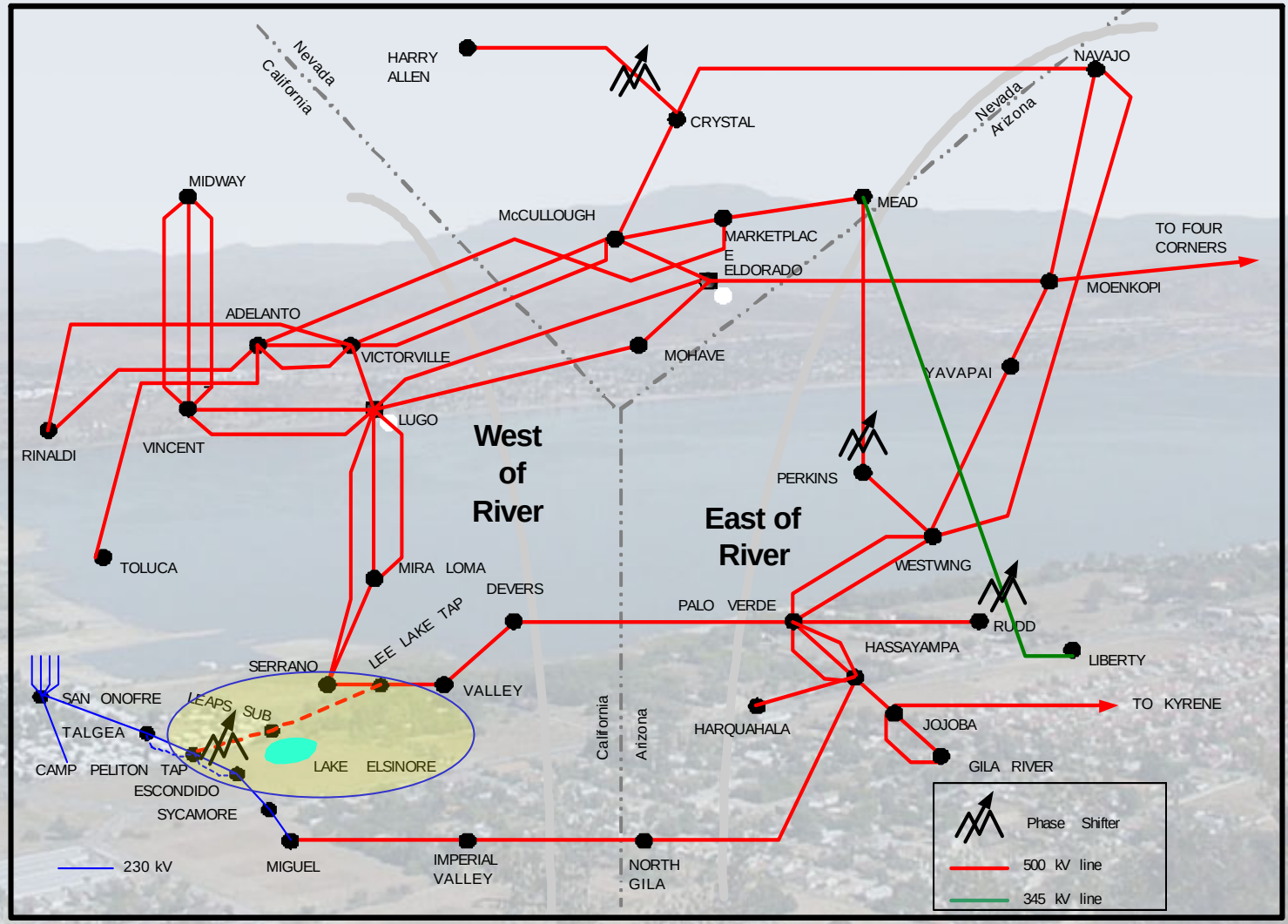
- 500 kV transmission line linking SDG&E into main California Grid + 500 MW advanced pumped storage
- Innovative, private sector solution with 500 MW of renewable storage.
- Only 500 kV link between San Diego and the robust SCE 500 kV system to the north.
- Final EIS issued January 2007.
- Construction start scheduled for 2009.
- Critical asset to help State manage renewables.
- Rate base ok'ed for TE/VS by FERC April 2008

Project Location

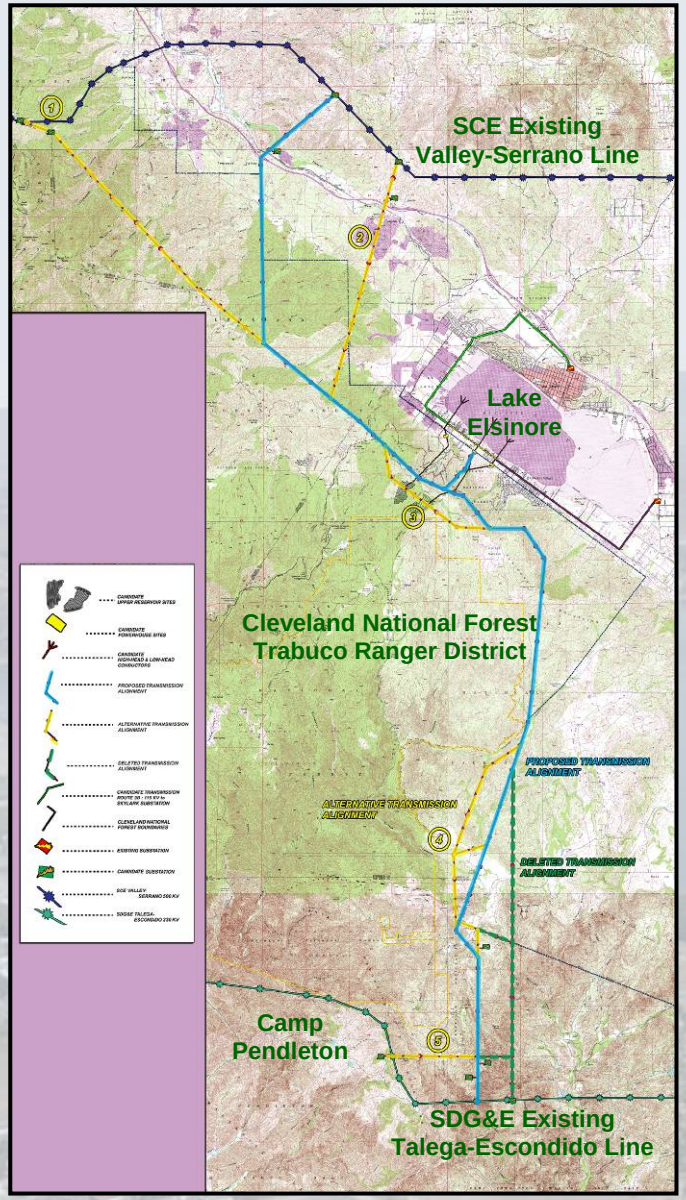


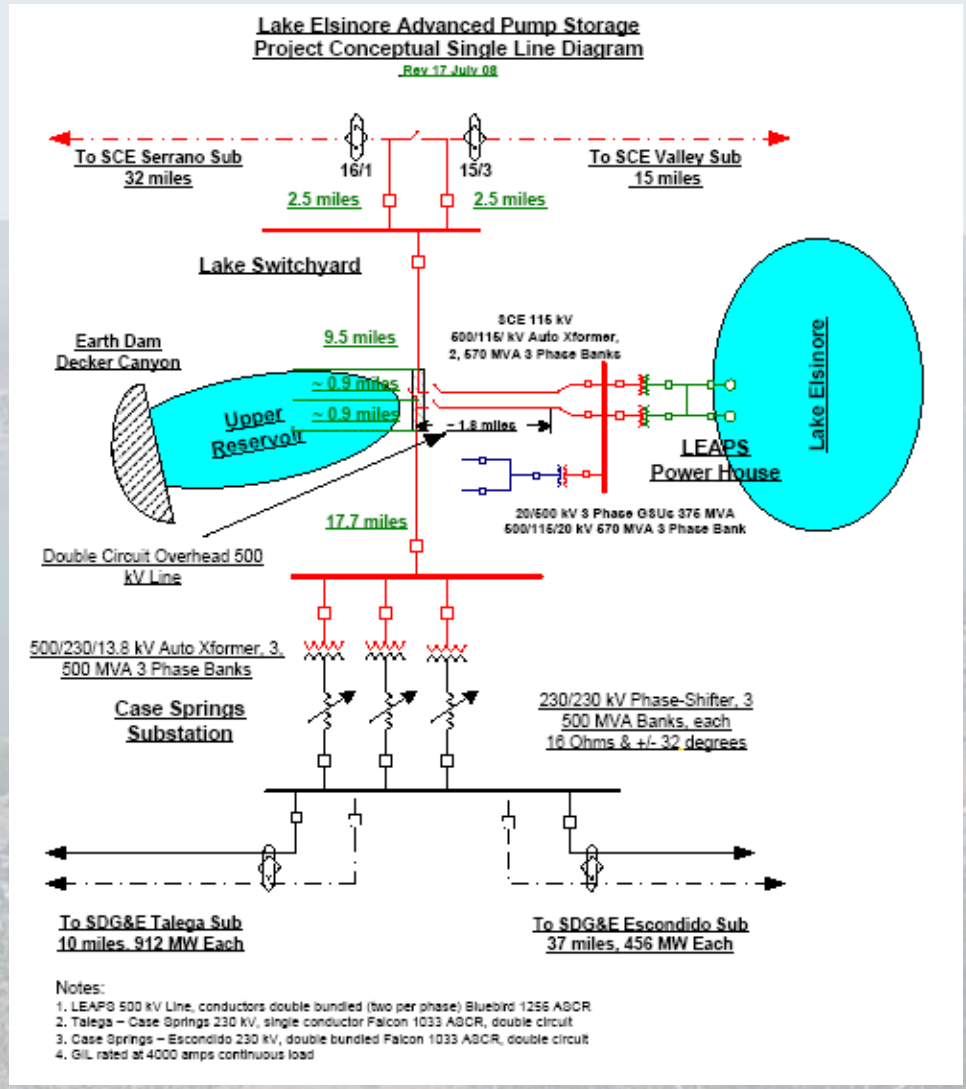


System Map and Connection



LEAPS + TE/VS


SCE Existing
Valley-Serrano Line
Lake
Elsinore
Cleveland National Forest
Trabuco Ranger District
PROPOSED TRANSMISSION ALIGNMENT
ALTERNATIVE TRANSMISSION ALIGNMENT
DELETED TRANSMISSION ALIGNMENT
Camp
Pendleton
SDG&E Existing
Talega-Escondido Line


Lake Elsinore Advanced Pump Storage
Project Conceptual Single Line Diagram
Rev 17 July 08
To SCE Serrano Sub
32 miles
16/1
15/3
To SCE Valley Sub
15 miles
2.5 miles
2.5 miles
Lake Switchyard
SCE 115 kV
600/115/ kV Auto Xformer,
2, 670 MVA 3 Phase Banks
Earth Dam
Decker Canyon
9.5 miles
~ 0.9 miles
~ 0.9 miles
~ 1.8 miles
Upper
Reservoir
Lake Elsinore
LEAPS
Power House
20/600 kV 3 Phase GSUs 376 MVA
600/115/20 kV 670 MVA 3 Phase Bank
17.7 miles
Double Circuit Overhead 500
kV Line
500/230/13.8 kV Auto Xformer, 3,
500 MVA 3 Phase Banks
Case Springs
Substation
230/230 kV Phase-Shifter, 3
500 MVA Banks, each
16 Ohms & +/- 32 degrees
To SDG&E Talega Sub
10 miles, 912 MW Each
To SDG&E Escondido Sub
37 miles, 456 MW Each
Notes:
1. LEAPS 500 kV Line, conductors double bundled (two per phase) Bluebird 1256 ASCR
2. Talega – Case Springs 230 kV, single conductor Falcon 1033 ASCR, double circuit
3. Case Springs – Escondido 230 kV, double bundled Falcon 1033 ASCR, double circuit
4. GIL rated at 4000 amps continuous load

Pump Storage Project Description

- 500 MW pumped storage.
- Upper reservoir in Decker Canyon of the Cleveland National Forest.
- Lake Elsinore to be the lower reservoir with penstock tunnels for inlet/outfall.
- Power plant ~ 240 ft below the surface of Lake Elsinore.
- Advanced pump storage plant:
  - Pump lower reservoir water to upper reservoir during off peak energy periods,
  - Return water through the turbines and generate power during peak energy periods.
- Will be one of the most efficient pump storage plants in the world.

Easy LEAPS Performance Facts

- 82%+ wire–to–wire efficiency for electricity storage.
- Pump for 1 hour (@ 600 MW) allows generation for 1 hour (@ 500 MW).
- Daily maximums:
  - Generation: 12 hours at 500 MW
  - Storage: 12 hours at 600 MW
  - Nominal Storage: 6,000 MW Hours
- Fully dispatchable in 15 seconds.
- Can operate for up to 18 continuous hours in emergency.
- Lake will fluctuate ± 6 inches to a maximum 18 inches.

Comparison to Other Generation Types

- High Capital Expense (compared to thermal generation).
- Low O&M cost (compared to thermal generation).
- Extended Asset Longevity - (compared to thermal).
- Significantly lower GHG emissions (wind is expected to be a significant component in the pumping energy source portfolio).
- Potential for remote operation.
- Very reliable (high equivalent availability - 93+%).
- Predictable and short start time, avoids uneconomic startup time typical of cycling intermediate resources (CC).
- No minimum run time.

Turbine – Leaps Comparison

	Peaker	Combined Cycle	LEAPS
Air Quality Issues	NOx, CO, VOC, PM10 Offsets	NOx, CO, VOC, PM10 Offsets	None required
Dispatchability	10 – 60 minutes	1 – 4 hours	15 Seconds
Black Start	10 – 30 minutes	No	15 Seconds
Dispatchable Capacity	Can produce either energy or capacity	Dispatchable capacity limited between 70-100% full load	Dispatchable capacity from 1-100% of full load
Regulation	No	Yes; limited to 5 MW/min.	Yes; up to 500 MW/min.
Spinning Reserve	No	Yes; limited to 5 MW/min.	Yes; up to 500 MW/min.
Voltage Support	Yes; but typically not used for voltage support	Yes	Yes. When pumping and generating
Comparable Heat Rate	Appx. 10,000 – 12,000	7,000	Appx. 18% more efficient than lowest off–peak rate
Alternative Fuels or Renewables	No	No	Yes; can source pumping energy from renewables
Mitigation of Overgeneration Conditions	No	No	Yes; up to 600 MW of pumping load during off peak periods

Talega-Escondido / Valley-Serrano (TE/VS) Transmission Line

Talega-Escondido / Valley-Serrano Transmission Line Project Description

- 28.5 mile 500 kV transmission line, with a portion underground.
- Up to1,600 MW throughput capacity.
- Most of the line runs through National Forest land.
- Only 500 kV link from San Diego into main California Grid.
- Allows for 1,100 MW import to San Diego in contingency conditions
- Can link real renewable resources (like Tehachapi wind resources) for use in San Diego.
- Required to connect LEAPS to grid but may be built as stand-alone project or may be started before LEAPS.

Permitting History
(For both Projects)

- 9/15/00 – Submitted preliminary application to FERC
- 2/21/01 – FERC issued preliminary permit #11858-000
- 9/09/03 – Draft FERC application distributed to 140 agencies and interested parties
- 2/2004 – Final Application filed with FERC
- 5/2004 – USFS agrees to cooperate with FERC for NEPA
- 2/25/05 – FERC accepts License Application for Filing
- 2/28/05 – FERC issues REA
- 3/28/05 – Interconnection Application filed with CAISO
- 2/17/06 – Draft Environmental Impact Statement issued by FERC
- 10/2/06 – Final Route Map issued by FERC and USFS
- 1/30/07 – Final EIS issued By FERC
- 9/2009 – California PUC accepts CEQA lead

Project Status

Permitting:

- Route in National Forest approved by USFS August 2006.
- Final EIS published by FERC and USFS January 30, 2007.
- Final USFS Sec. 4(e) conditions published March 2007.
- CEQA in process with PUC as lead agency.

Connection to grid:

- System Impact Studies and Interconnection Studies with SDG&E/SCE/CAISO completed.
- Interconnection agreements with SDG&E/CAISO approved by FERC on May 8, 2008 (Docket ER08-654)
- Interconnection agreements with SCE/CAISO now under negotiation.
- Approval to connect to CAISO grid granted by CAISO March 2007.

FERC granted rate base treatment for TE/VS, April 2008

Engineering for TE/VS now underway.

500/230 kV transformers on order

Project Estimated Cost

- LEAPS Total Cost: ± $750 Million
- TE/VS Total Cost: ± $350 Million

- System upgrades: ± $100 Million

Project Benefits

Grid Benefits

- Store off peak to sell on peak (renewables & overgeneration management).
- Dispatchable in 15 seconds (with units spinning).
- Black start in 10 minutes.
- Full range of ancillary services.
- Provides regulation, load following and voltage support.
- Increased system reliability.
- Management and conservation of renewable resources.
- FERC has identified LEAPS as “advanced transmission technology” under Energy Policy Act of 2005 .

Pumped Storage Benefits

- Fast Start
- Fast ramp rate
- Superior Spinning Reserve
- Reliable Capacity Resource (Hydro)
- Intermediate Resource with peaking Capabilities
  - Cycle Time / Starting Cost
- Voltage Support - multi mode
- Black Start
- Significant Regulation Capability
- Thermal Generation Optimization
- Very reliable / timely starting
- Efficiency 82+%
- Fuel diversity/hedging
- Storage Volume / Weekly / Daily Cycles
- Flexibility !!

Benefits of TE/VS

- Construction should commence in 2009.
- Brings 1,100 MW of reliability to San Diego starting in 2010.
- Links to real renewable resources like Tehachapi and Imperial Valley.
- In addition, TE/VS connects San Diego to main, robust California grid.

LEAPS Benefits ($)

- CAISO found $100 - $150 million in annual benefits.
- We see at least $200 - $250 million in annual benefits.
- Benefits include production cost savings, ancillary services, wind integration, overgeneration & capacity.
- Excludes energy, RPS, greenhouse gas, black start, and other benefits.

Paying for Pumped Storage: Converting Benefits to Revenue

Paying for Pumped Storage: Converting Benefits to Revenue

- Rate base???
  - Utility owned vs. non-utility owned
- Long-Term Contracts (PPA)
- Link to Renewables?
  - Firming intermittent resources
  - Rapid response
  - Load following
  - Market development?
    - Timing for new products?

Converting Benefits to Revenue (cont'd)

- Markets?
  - Energy Markets: Off/on peak spread
  - Ancillary services
    - Regulation up/down
    - Spinning reserve
    - Voltage support
    - Black start
  - Other?

Key Team Members

- Nevada Hydro Company
- Morgan Stanley
- Voith Siemens Hydro
- Siemens Power Transmission & Distribution
- Elsinore Valley Municipal Water District