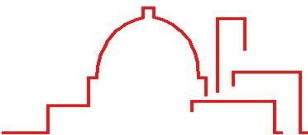


Iowa Hill Pumped-storage Project

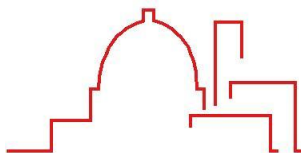
Scott Flake, PE

**Manager, Power Generation Department
Sacramento Municipal Utility District**



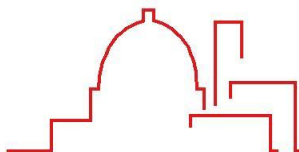
Why Pumped-storage?

- Pumped-storage provided large amounts of *dispatchable capacity*.
- Pumped-storage is a *proven and reliable* technology.
- Increased demand for dispatchable capacity is driven by *intermittent resources* (wind, solar) and *greenhouse gas* legislation (reduced reliance on fossil fuels).



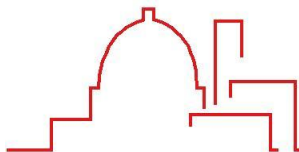
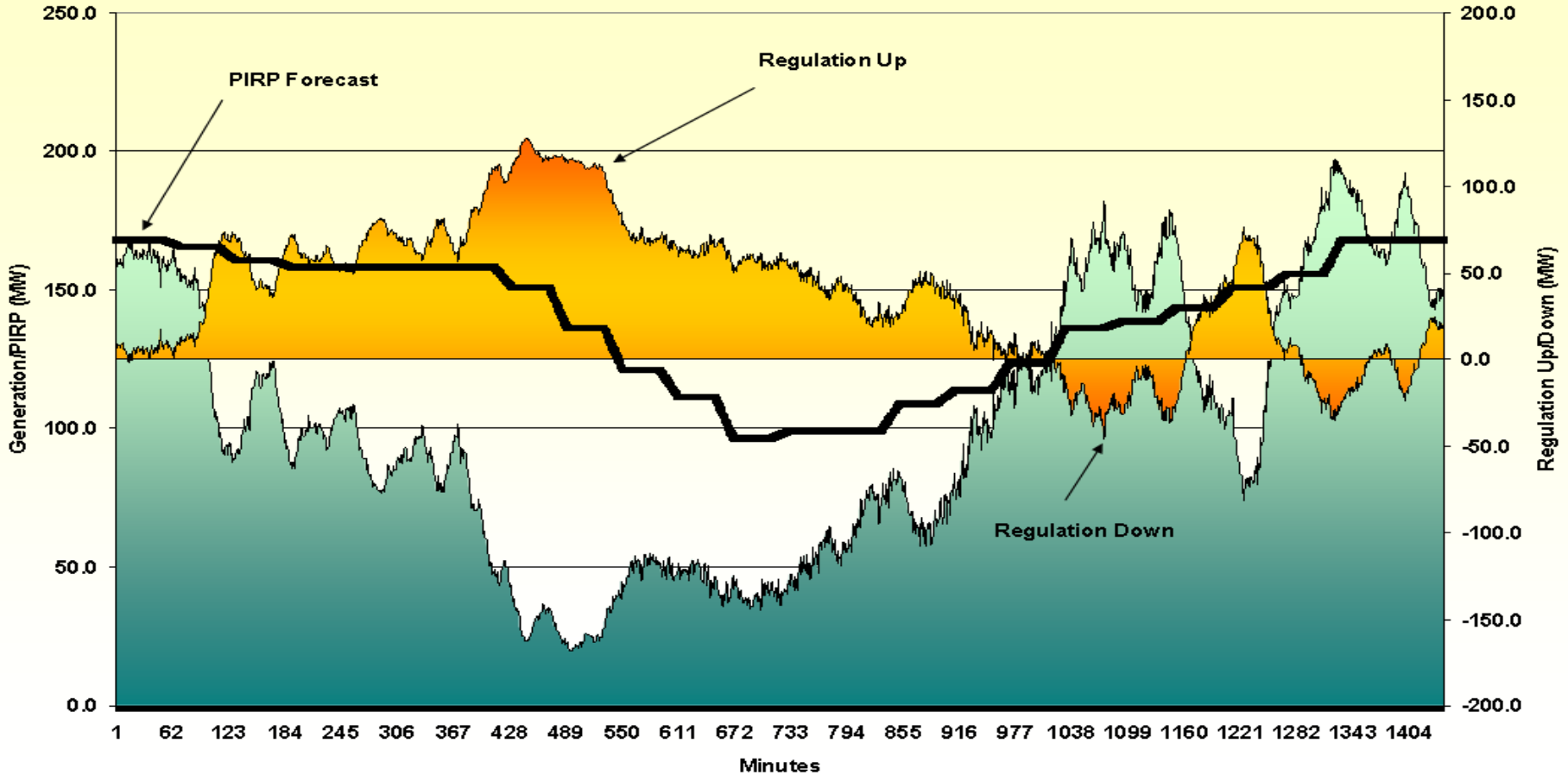
Renewable to Sustainable energy

- Variable speed pumped storage bridges the gap from intermittent renewable capacity to truly sustainable capacity.
- Reduces carbon foot print by:
 - reducing or eliminating the need to fossil fueled peaker plants.
 - Minimizing the use of fossil fueled plants for regulation and peaking.
- Minimize the amount of water reserved from long-term storage to support ancillary services requirements
 - Water from long-term storage is limited
 - Integration of intermittent renewable capacity will cause SMUD to increase amount of water reserved for ancillary services

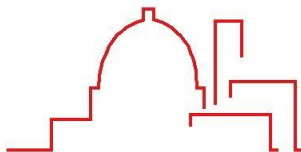
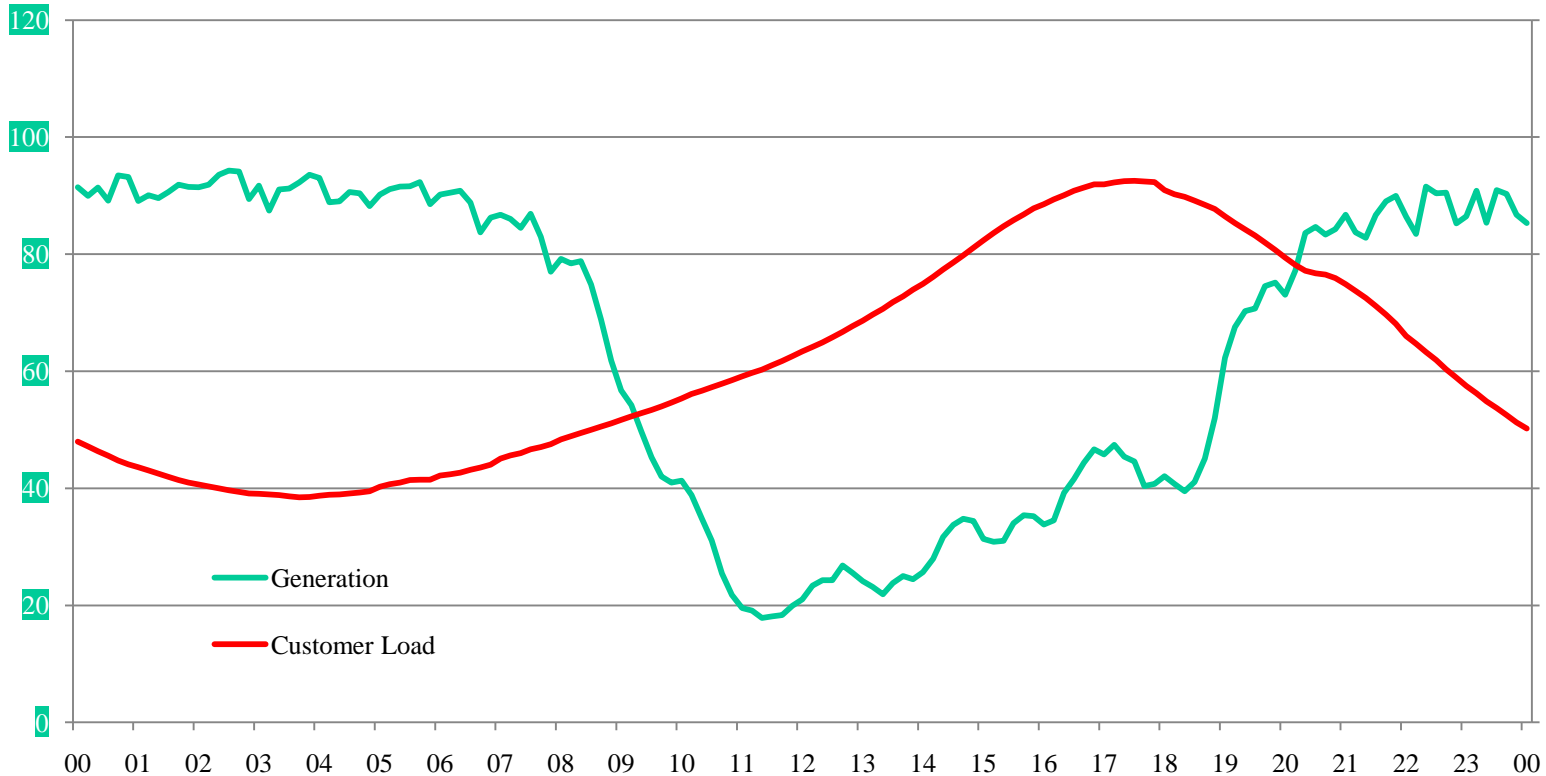


PIRP Hour Ahead Intermittency

July 31 Wind and PIRP Data

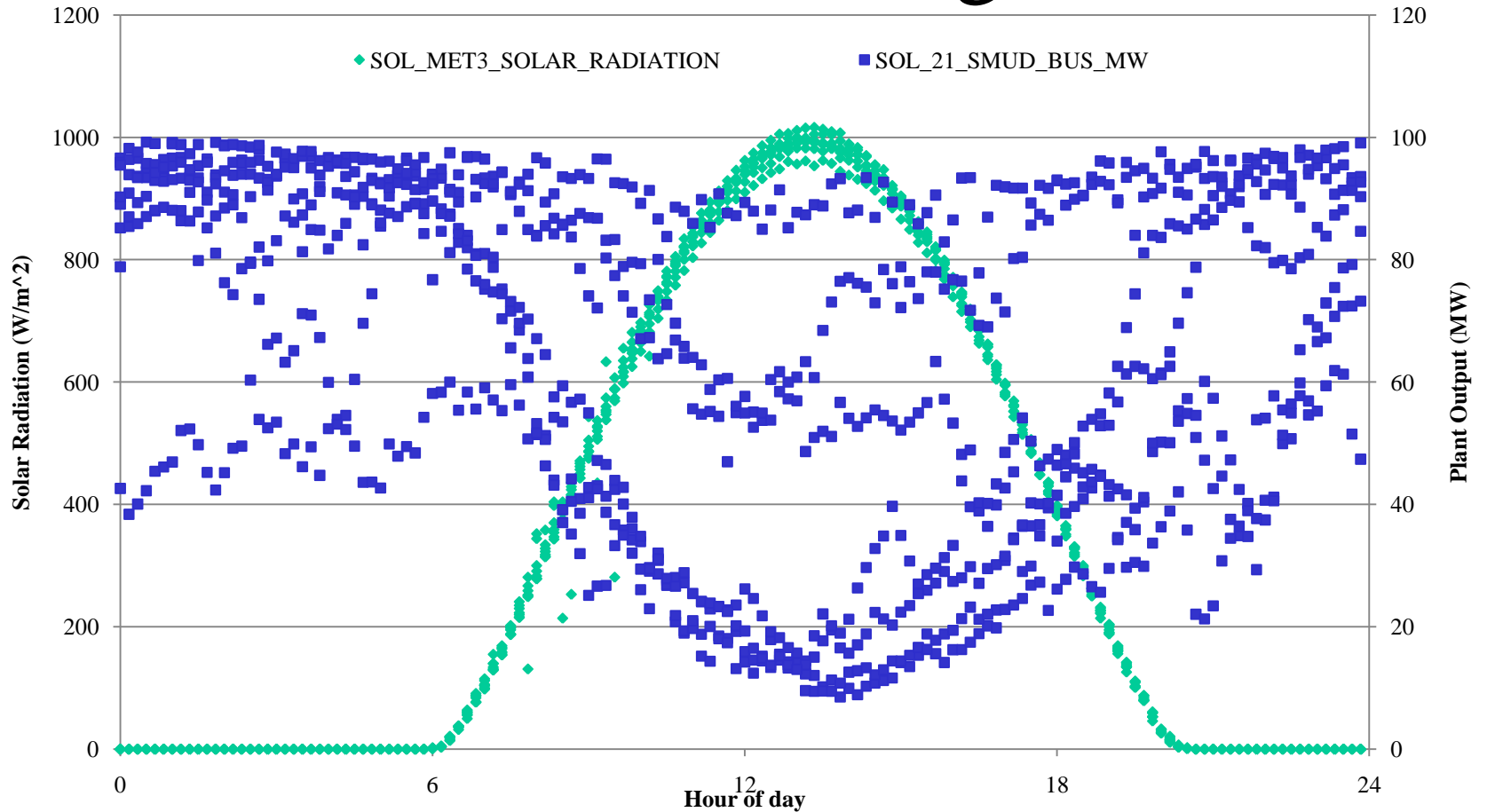


Generation and Load, MW - July 23



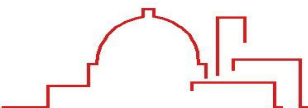
26Jul – 1Aug 2010

10 minute averages

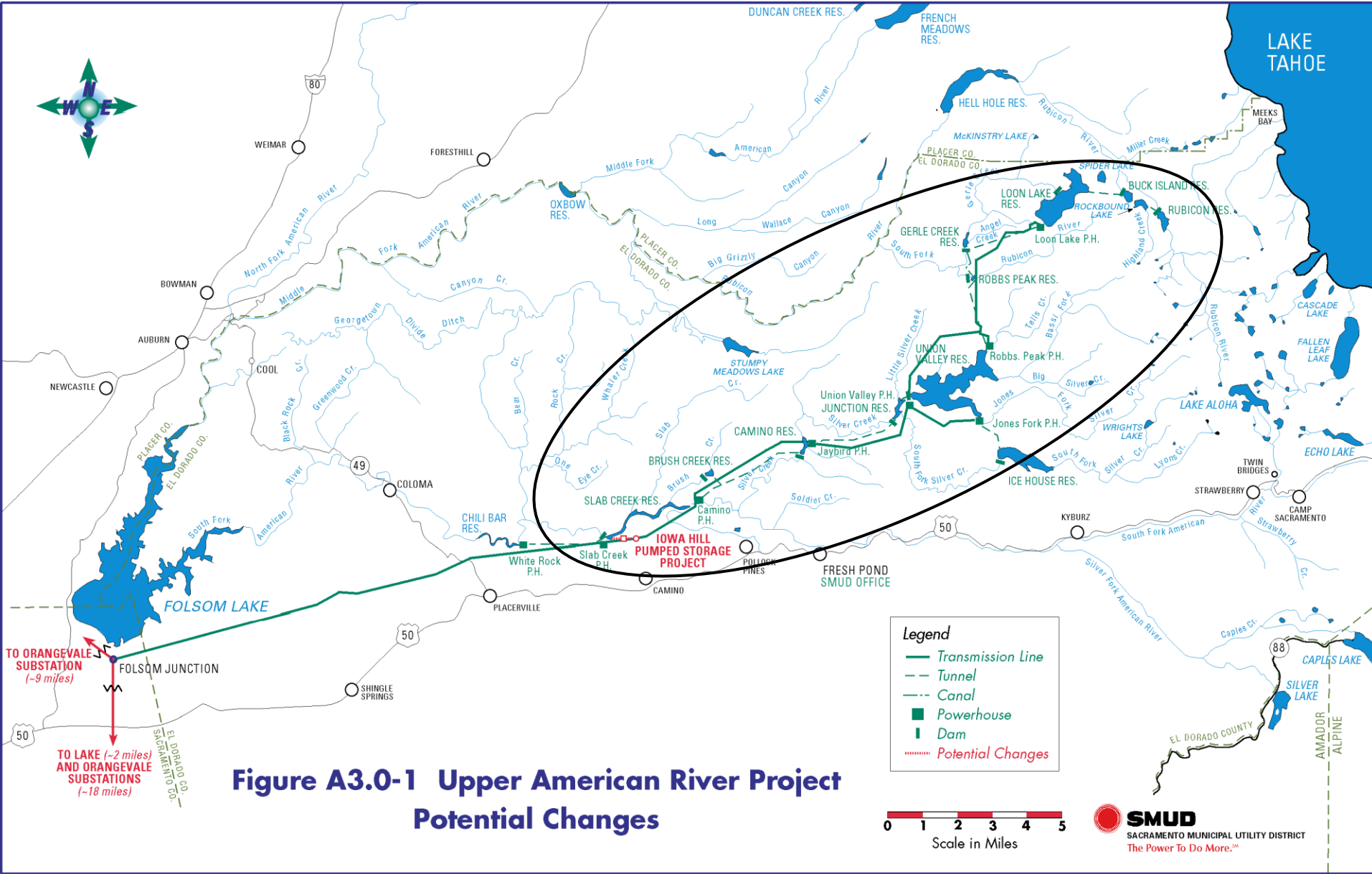


UARP Licensing Timeline - Including Iowa Hill

- Start relicensing 2001.
- FERC issues Final EIS – March 2008
- SMUD issues Final CEQA document – September 2008
- SWRCB issues 401 Water Quality Cert. – December 2010 (*tentative*)
- FERC issues New License – March-June 2011 (*tentative*)
- SMUD Board action on License Acceptance – April-July 2010 (*tentative*)



Existing Project



SMUD is a registered service mark of Sacramento Municipal Utility District.

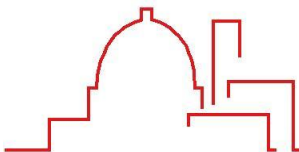


SMUD

**SACRAMENTO
MUNICIPAL
UTILITY DISTRICT**

Operation

- Variable speed option is critical to operational dispatch for managing intermittent energy and increasing sustainable energy.
- Variable speed provides dispatchable capacity while pumping and generating.
- Iowa Hill supports a weekly dispatch cycle that minimizes overall plant foot print and more closely matches the need to manage intermittent renewable resources, meet peak demand and provide grid services.



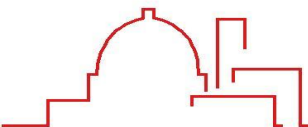
Environmental Attributes

Opportunities

- **No new dams across streams/ivers**
- **Underground water conveyance and powerhouse**
- **Use of existing infrastructure (transmission line, lower reservoir)**
- **Additional capacity with minimum air impacts**

Challenges

- **Construction phase**
 - **Fire risk**
 - **Transportation**
 - **Noise**
 - **Socioeconomics**
- **Long-term operations**
 - **Visual resources**
 - **Fish entrainment**
 - **Wildlife habitat loss**
 - **Reservoir turbidity**

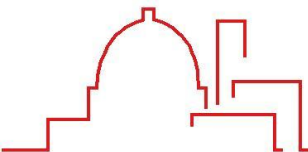


Load Serving Capacity and the Need for Local Generation

- Factors affecting new local capacity additions, like Iowa Hill, are contingent on:
 - Greenhouse regulations
 - Load Growth
 - Regional economic activity
 - Customer response to new information and programs ~ rates and AMI metering

Community Outreach

- Settlement Agreement reached with Federal and State land management agencies and filed February 2007
- Agreement between SMUD and El Dorado county and Water Agency reached clarifying and updating 50-year-old facilities use agreements
- Iowa Hill Joint Advisory Committee made up of local community members, County and water agency officials, and SMUD staff met over 20 times to develop a comprehensive set of community concerns to be evaluated in the licensing process



Proposed Iowa Hill Development Implementation

- SMUD Board approval for budget to conduct detailed feasibility studies – 2011
- Prepare detailed designs – 2011-2014
- Prepare & incorporate Mitigation Plans – 2011-2013
- SMUD Board action on final Engineering Design – 2014
- Construction – 2014-2019

