PANEL 2: Energy Storage Applications and Economics (Costs, Benefits and Revenue)

Doug Divine
Eagle Crest Energy

2011 Integrated Energy Policy Report Committee Workshop on Energy Storage for Renewable Integration

April 28, 2011

Sacramento, California

Eagle Crest Energy is:

- A 1300 MW closed-loop pumped storage facility being developed at an economically depleted iron mine that will provide utility-scale electricity storage to southern California designed to store in excess of 23,000 megawatt-hours
- Federal hydro license expected by end of year 2011
- Built with proven, commercially available technology
- Adjacent to a major southern California transmission corridor
- Ability to significantly reduce GHG emissions and enable additional variable generation to be developed in So Cal
- 500 construction jobs per year for four years and 50 permanent jobs during operations in eastern Riverside County

Costs of
Utility-Scale, Grid Connected Energy Storage

Eagle Crest
Energy Company

- Cost Estimates - $1500 - $3000/kw for large pumped hydro energy storage
- Energy storage should be built when it is a long-term least cost solution
- Often difficult to quantify the future value and forecast the amount needed of utility-scale storage, but flexibility of the existing pumped hydro storage fleet has allowed this resource to provide tremendous value historically

Benefits of Utility-Scale, Grid Connected Energy Storage

Eagle Crest Energy Company

- Capacity
- Swap value of peak/off-peak energy differential to provide customers lower cost energy
- Ancillary services including comparable levels of incremental and decremental reserves
- Transmission
- Greenhouse gas reductions
  - Reduce renewable energy overgeneration (for example, off-peak wind during high-hydro periods)
  - Reduce frequent start/stops of gas peakers and improve overall efficiency of the gas fleet

Revenue Sources for Utility-Scale, Grid Connected Energy Storage

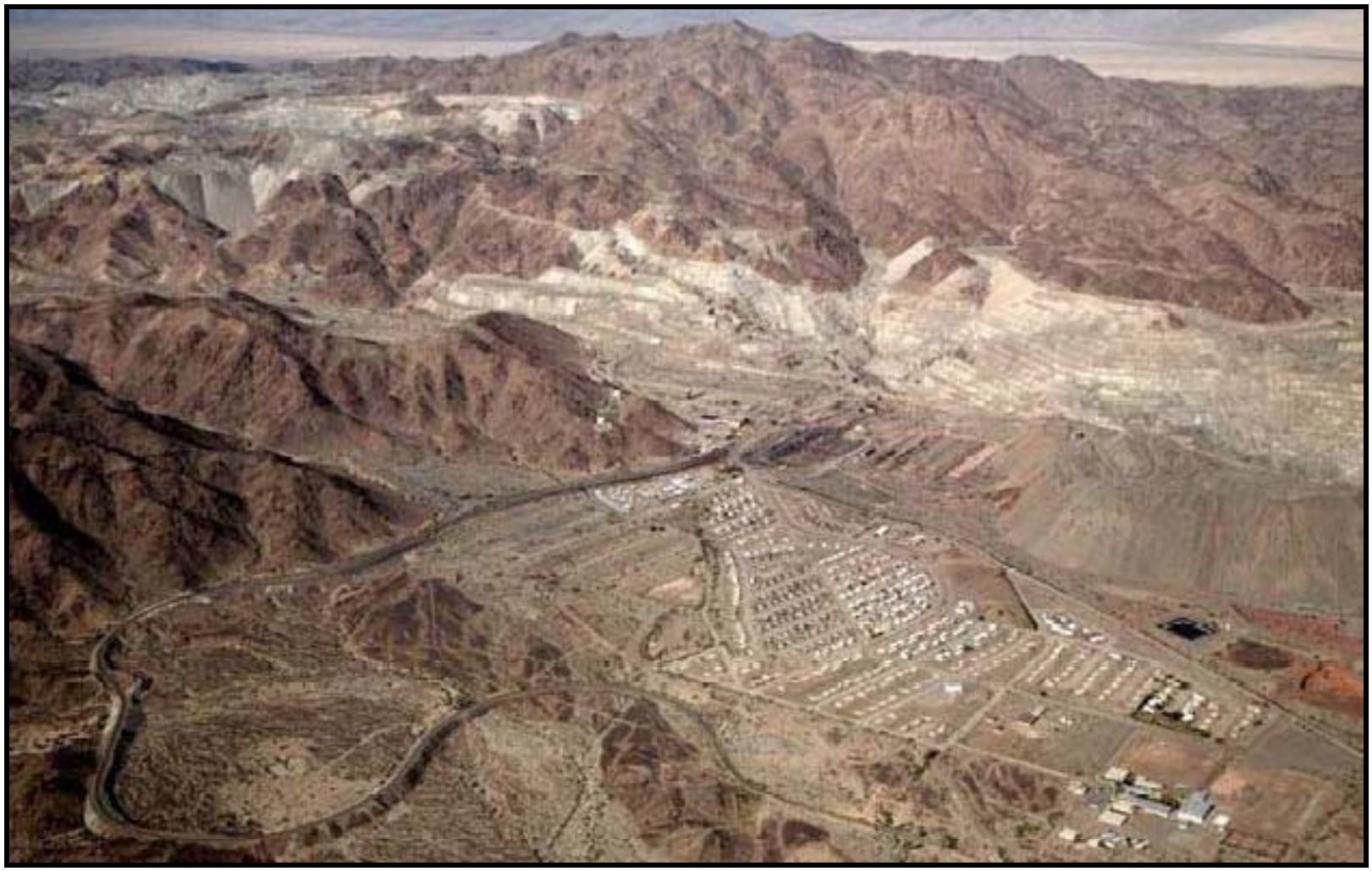
Eagle Crest Energy Company

- Large pumped hydro storage projects are long-lived assets – 50 plus years – need long-term agreements
- Due to the nature of electric markets in California and U.S. financial markets, unlikely that a non-utility owner would construct a facility without partnership or off-take agreements with IOUs or MOUs
- Revenue Sources
  - Utility ownership – rate-based asset
  - Contract storage agreements between load serving entities and independent owner/operators
  - Treatment of some or all of a storage project as an Advanced Transmission Asset and cost recovery through the TAC

Recommendations – AB 2514 Energy Storage Implementation for Utility-Scale, Grid Connected Energy Storage

Eagle Crest Energy Company

- CPUC should determine utility-scale storage equivalent of MPR, which would include:
  - Capacity
  - Off peak/on peak swap value of energy
  - Ancillary services, including comparable levels of incremental and decremental reserves
  - Greenhouse Gas savings (using conservative assumptions)
  - Recognize many storage projects may also provide additional transmission system benefits, to be determined on a case-by-case basis according to an approved protocol
- CPUC should recognize that utility-scale, grid connected storage to assist with variable energy generation integration requires contract terms of 20-25 years
- In order to provide for variable energy integration and system reliability, “least regrets” targets for utility-scale, grid connected storage should be set for IOUs and MOUs in California



THANK YOU

Eagle Crest
Energy Company