

CEC Discussion Topic

# **Tehachapi**

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# What are the physical limits of existing SCE facilities?

- 3-66 kV large subtransmission lines to Tehachapi  
(thermal capability = 268 MW)
- 2-66 kV long subtransmission lines  
(thermal capability = 152 MW)
- Ability to export 310 MW of wind generation based on actual loading
- Ability to serve 593 MW of customer load
  - North = 67 MW
  - South = 526 MW

Are there contractual limits on the transmission facilities that further limit the transmission capacity available to renewable resources?

- QF Contracts 365 MW
- Nameplate 352 MW
- Simultaneous 310 MW
- System Capability 310 MW

Are there other foreseeable future transmission line needs? What are they?  
When are they needed?

- Currently active generation interconnection requests 566 MW
- Deliveries beginning late 2005
- Other needs dependent on load growth, solicitation outcomes and market activities

How should the resources in the region be connected to the grid and major load centers?

- Carefully! There are many many unanswered questions at this time!!!!

Who's the buyer?

What's the machine?

Operational impacts of wind

Collector system requirements

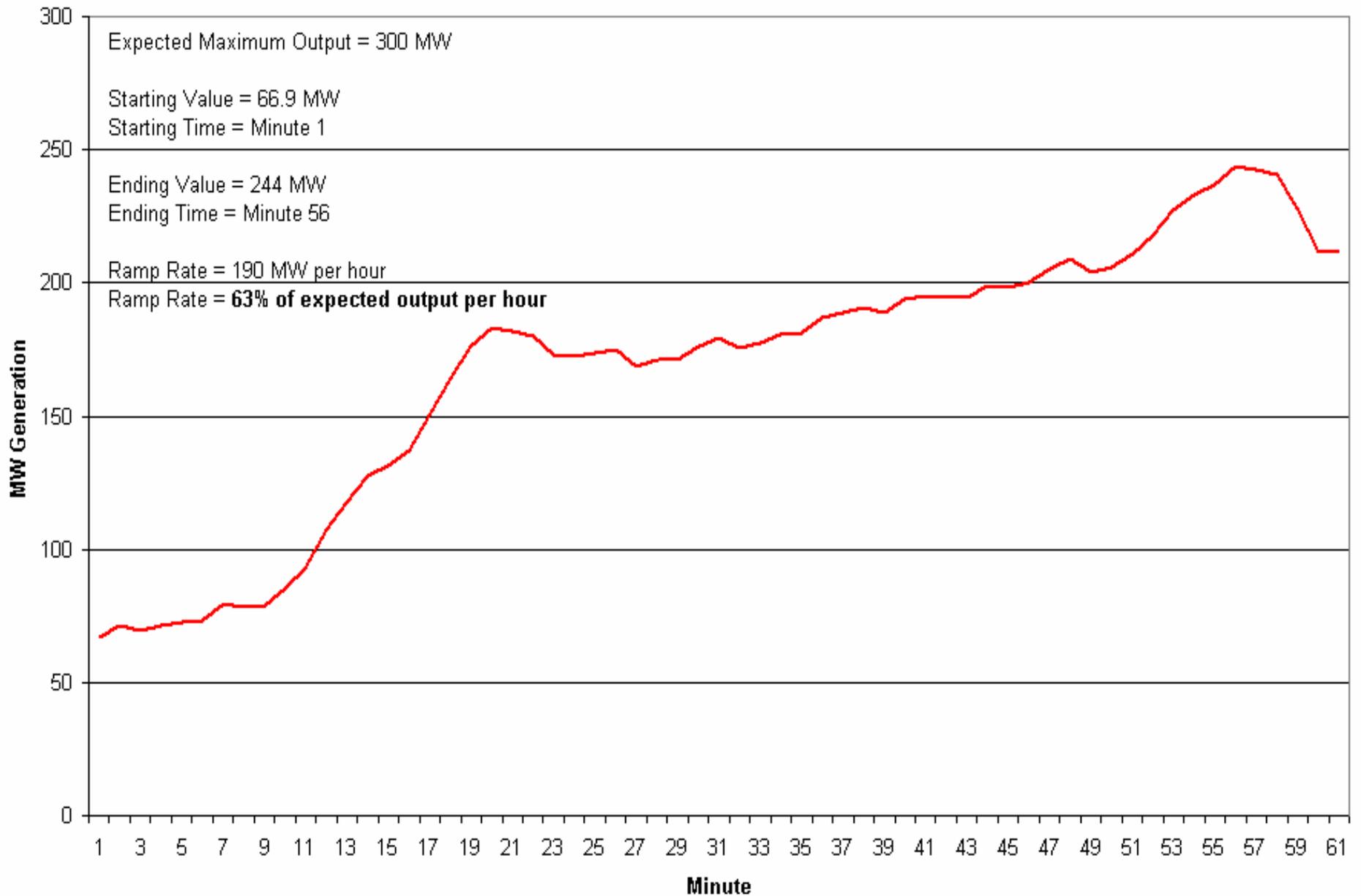
## Critical Question

- How much wind generation can be connected in a “single wind regime” without creating operability problems?
  - Ramp rates
  - VAR consumption

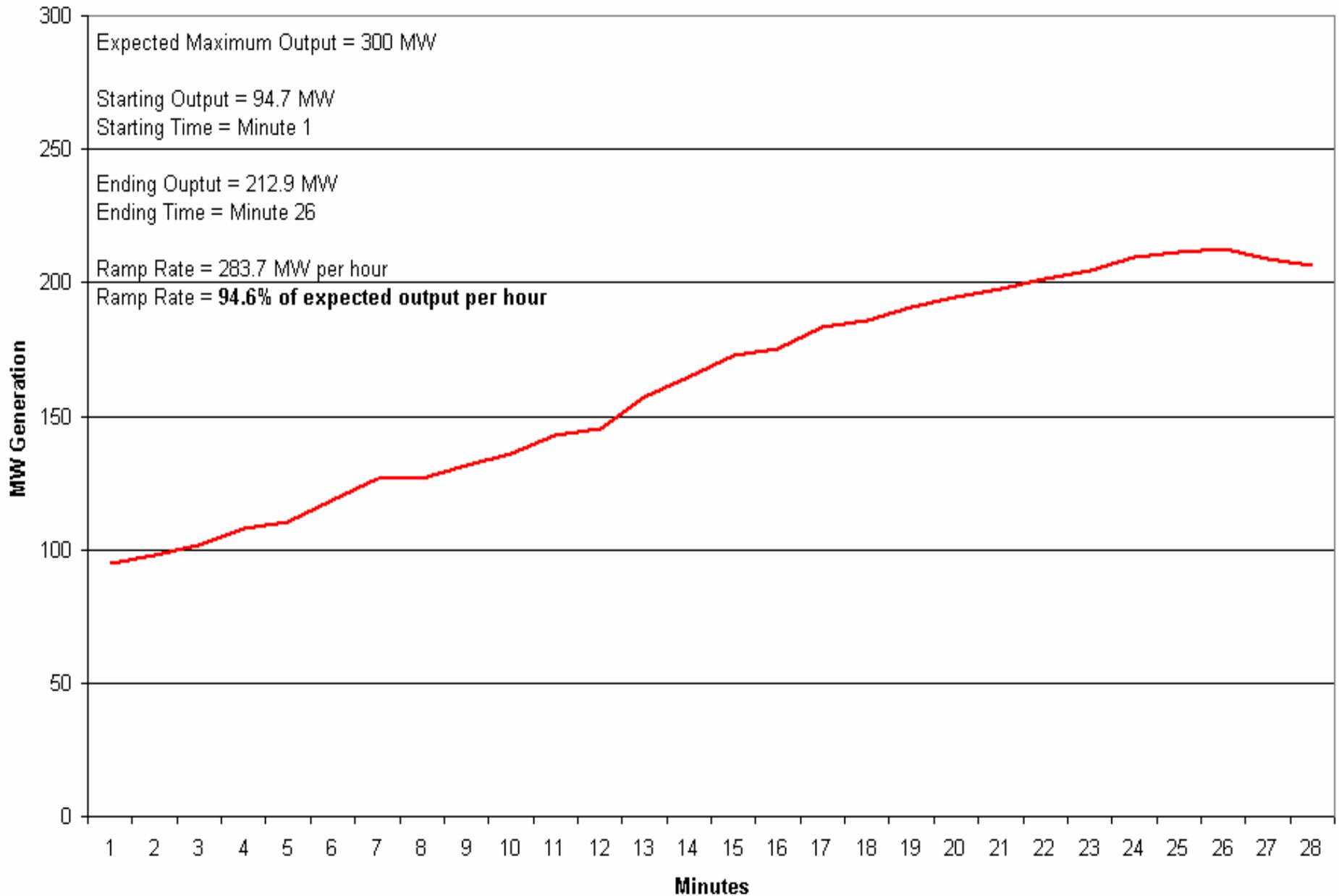
# Wind Production Ramp Rate

- Tehachapi production can ramp from 0 MW to 300 MW in a half hour
  - Would 4000 MW in Tehachapi ramp at 8000 MW/hour?
  - How would the system “control” frequency???
  - System ability to adjust may limit wind production

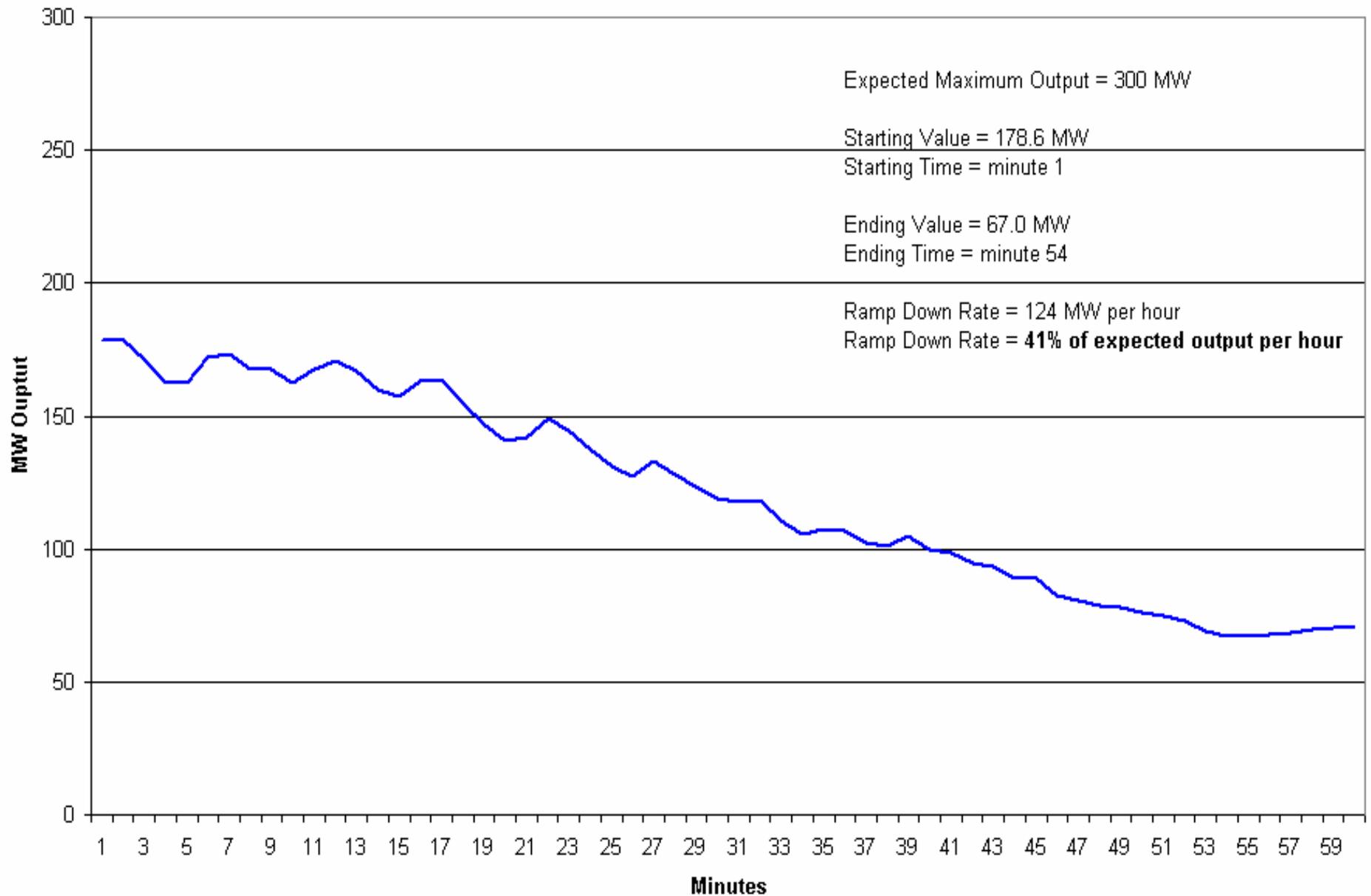
### Tehachapi Generation Ramp-up Rate Based on January 30, 2000 Metered Data



### Tehachapi Ramp-Up Rate Based on January 25, 2000 Metered Data



### Tehachapi Generation Ramp-Down Rate (Based on February 17, 2000 Metered Data)



# Wind Machine VAR Consumption

- Depends on machine technology
- System voltage is affected
- Local variable VAR resources may be necessary
- Transmission conceptual plans were prepared WITHOUT machine data.

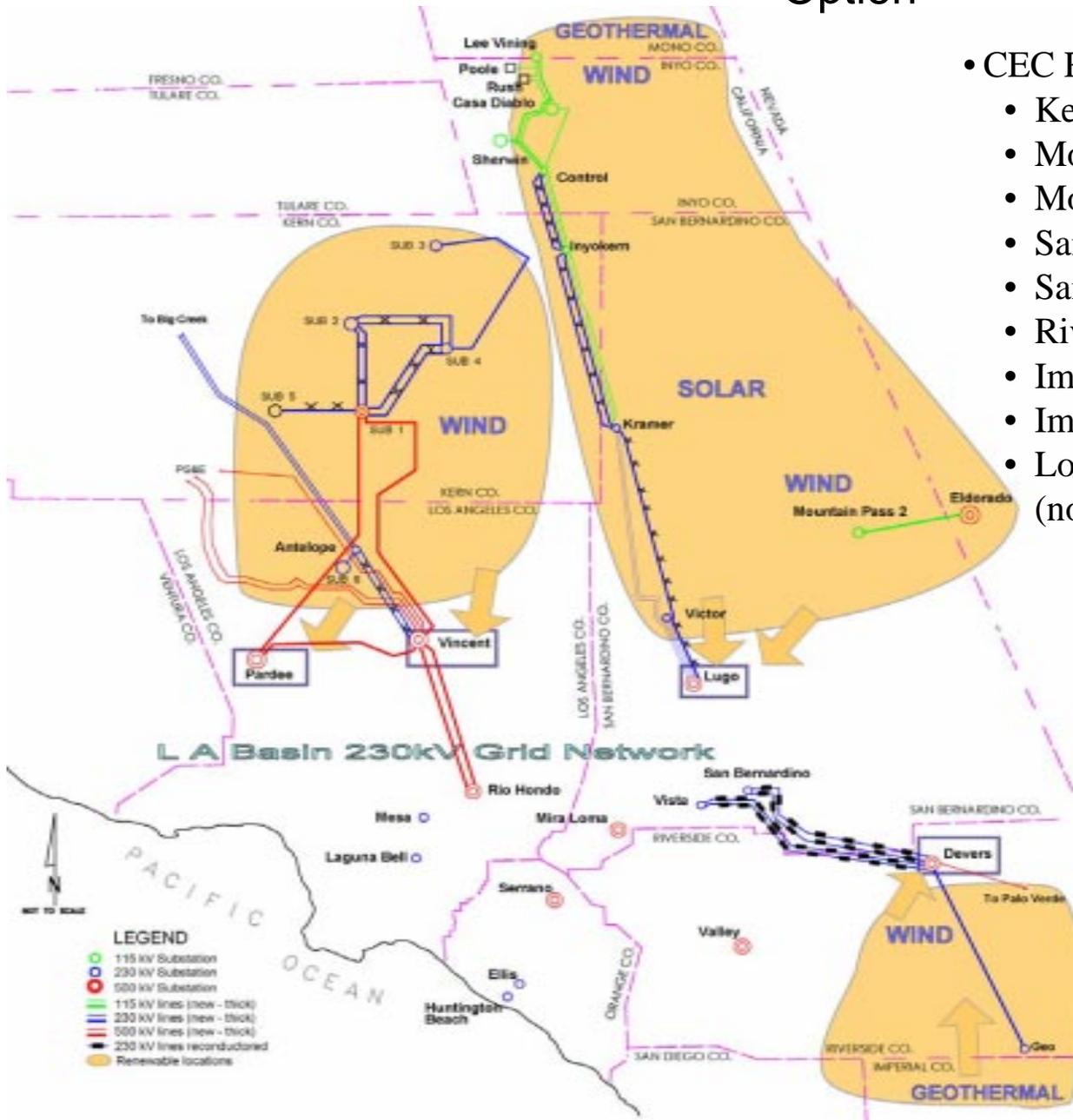
Are there other interconnection alternatives?

- There are many alternatives!
  - Build to north or to south
  - Build 500 kV or 230 kV
  - Etc etc

# Figure: Tehachapi Area

Not for distribution

# SCE Conceptual Transmission Plan for 2017 with Tehachapi 500kV Option



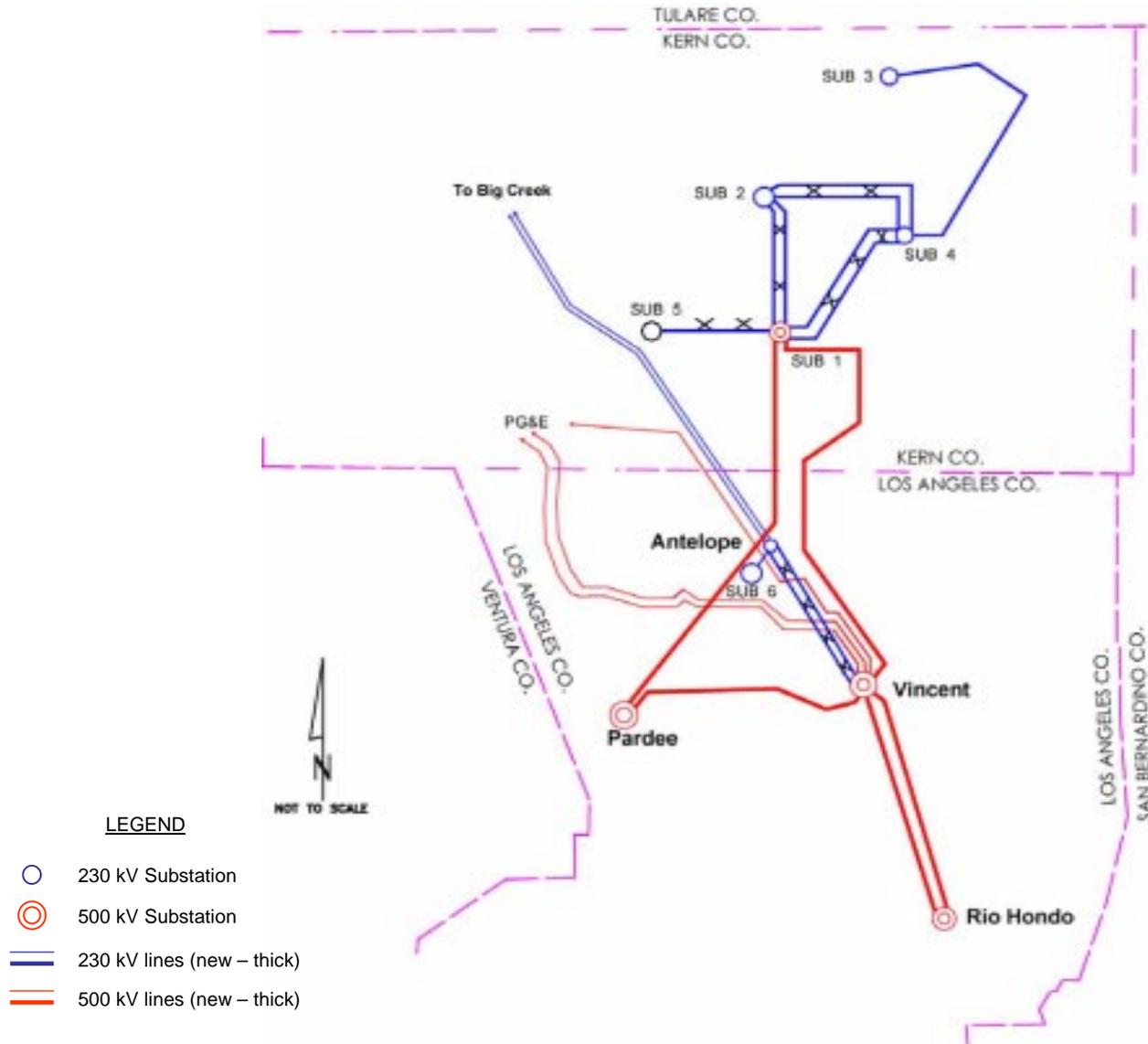
- CEC Renewables – 4220 MW
  - Kern/Los Angeles wind – 3080 MW
  - Mono geothermal – 155 MW
  - Mono wind – 30 MW
  - San Bernardino wind – 50 MW
  - San Bernardino solar – 120 MW
  - Riverside wind – 355 MW
  - Imperial geothermal – 240 MW
  - Imperial biomass – 80 MW
  - Los Angeles & other biomass – 110 MW (not shown)

- Total circuit miles – 1656 miles
- Number of substations – 25
- Cost (NPV 2003 dollars) – \$1.219 billion

**Figure: 2017-2**

Confidential

# SCE Conceptual Transmission Plan - Details of the Tehachapi Area



For your preferred Interconnection: What level of resource development will this interconnection support?

- Conceptual Plans shouldn't be considered preferred YET
  - Further study is needed
  - Considered only ONE buyer (SCE)
- Need to consider impact on plans for different “buyers”

# Can it be staged to accommodate a phased development of the generation resource?

- A “preferred” plan should:
  - Be flexible to accommodate staging, different buyers, different wind connection points, different machine types, various development stages
  - Be rational, orderly and cost effective
  - Not be disruptive to current operations
  - Be timely
  - Have reasonable financing requirements
  - Fairly accommodate the needs of multiple developers
  - Avoid “piecemeal” decision-making and free-riding

Does this interconnection affect operation of the transmission system outside of the local area?

- YES!
- Big Creek system could be affected
- South of Vincent and South of Lugo could be affected
- Path 15 and Path 26 could be affected by deliveries to PG&E
- Path 44 could be affected by deliveries to SDG&E

Are there existing transmission corridors or will new corridors need to be developed?

- Both existing and new will be needed

What studies have been completed (powerflow, economic and/or environmental? And are they available to the public?

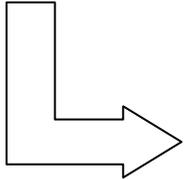
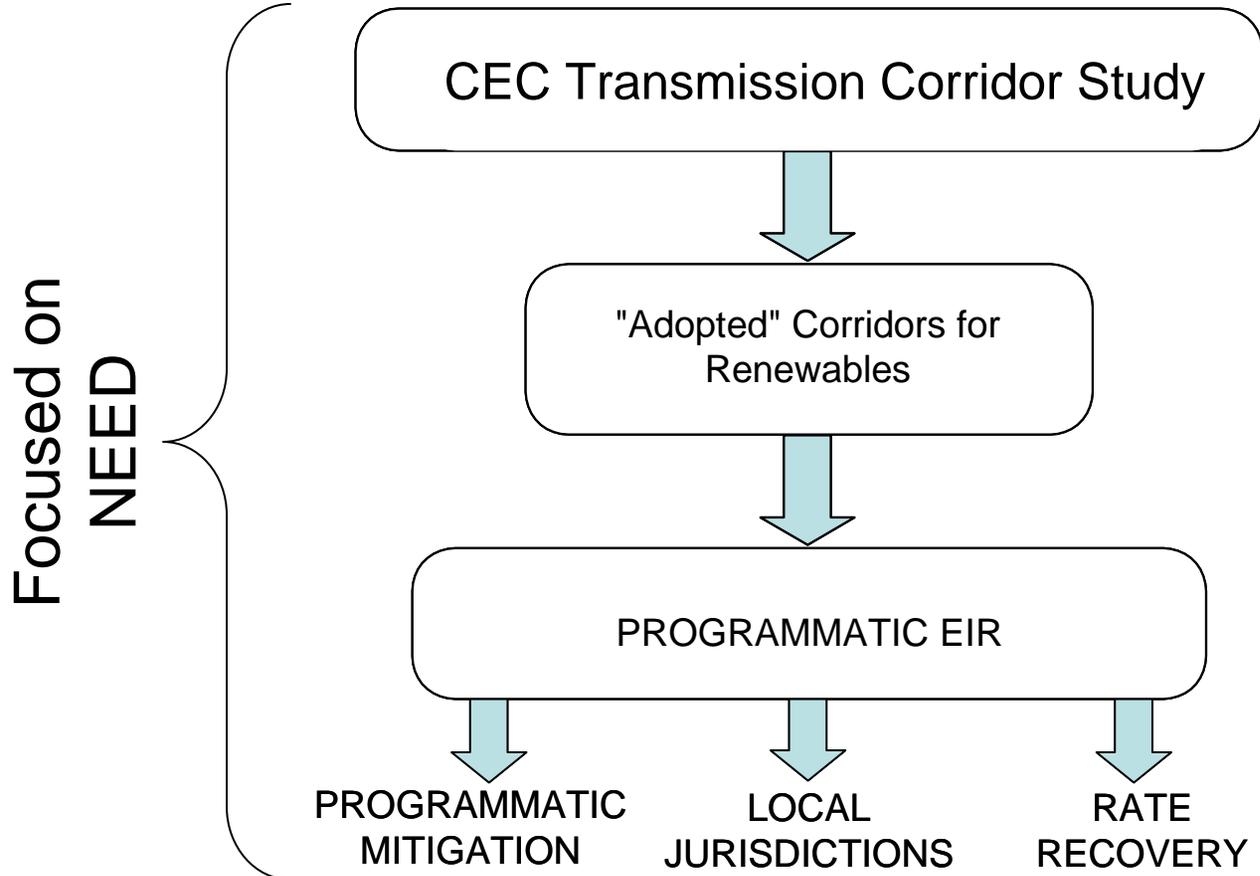
- Conceptual studies are public
- Environmental assessments of the line from Pardee to Cal Cement area have been performed, but will not be made public until a CPCN application, if any, is made
- Annual assessment results of Tehachapi area, not including new Renewables, are available
- System Impact studies are not made public

What kind of permits will be required for the transmission facilities and how long will it take to permit and construct them?

- Depending on facility scope, CPCN's or GO131-D permits may be needed for network upgrades
- Other public agencies may necessitate additional permits
- Procurement of long-lead time equipment and construction will take around 2 years minimum for 230 kV construction

# What do you recommend be done to facilitate the development of these transmission facilities?

- Corridor Planning should be initiated on the statewide Renewable Transmission Plan
  - Improving GIS databases to support feasibility and impact assessments could begin immediately
- Development of a Programmatic EIR, based on “adopted” corridors could facilitate:
  - Working with local jurisdictions on master planning
  - Developing Programmatic Environmental Mitigations
  - Supporting regulatory mechanisms to allow utilities to acquire and hold ROW for future use for longer than 5 years.



Facilitates specific projects

How should the system transmission needs and the transmission needs for renewable resources be integrated?

- Do the sensible and appropriate thing:
  - First, identify what is needed to separately interconnect and deliver generation
  - Second, identify what is needed separately for system needs,
  - Third, see if any of those projects can then be economically deferred, if they're all put together!
  - Voila!

How should the system transmission needs and the transmission needs for renewable resources be integrated?

- Don't do the nonsensical thing:
  - FIRST
    - propose a grossly too big or too small project
  - THEN
    - Hire the consultants and lawyers to look for system-wide benefits!

What should the 2005 Energy Report focus on?

- Programmatic EIR
- How much wind can be integrated on a statewide basis?