

# Transmission for Renewables

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## Indian Energy Solutions 2007

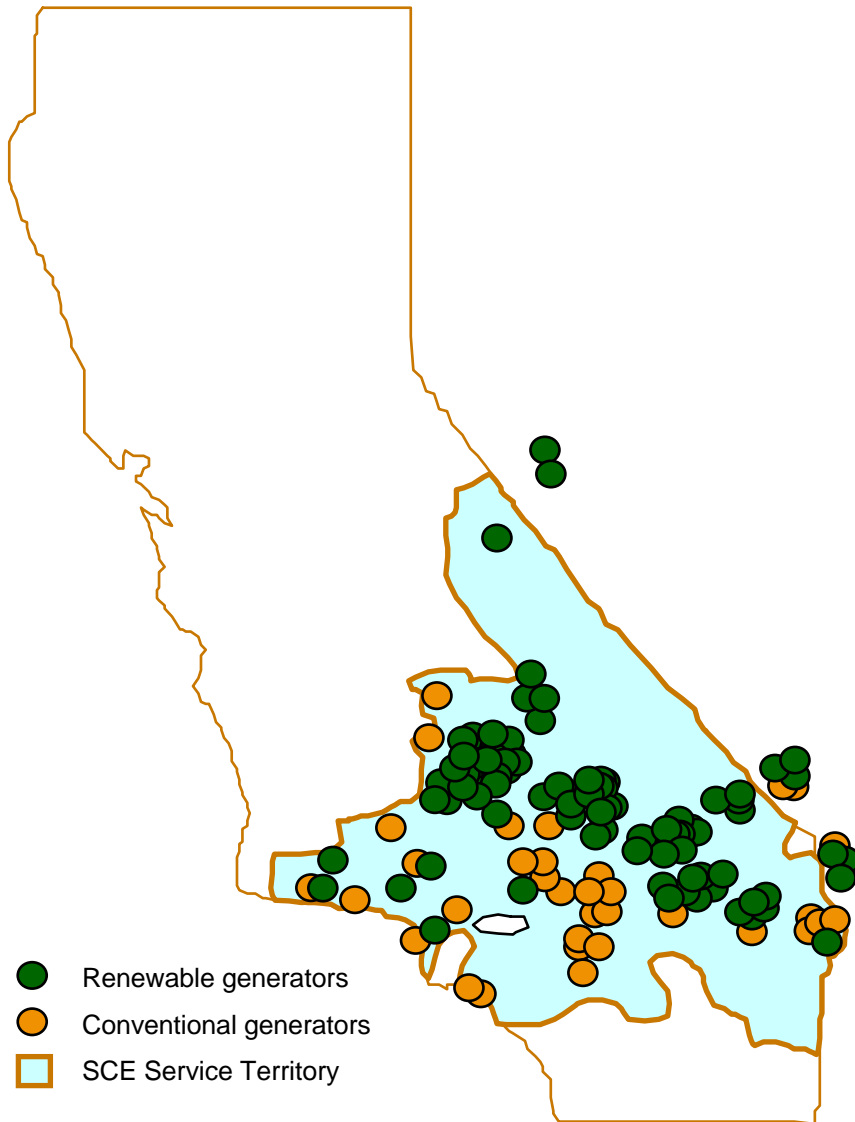
November 29, 2007

# Transmission for Renewables - Outline

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- Current state of renewable generation development in SCE service area
- Renewable generation is different, requires unique solutions
- Disconnect between length of development cycle for generation versus transmission
- Challenges to transmission for renewables
- Possible solutions to challenges
- Additional solutions in California
- Potential impacts on Tribal Lands
- Current trends in renewable generation development
- Developer risks and mitigation options

# Generators are Stepping Up, Getting into the Queue



- Record number of generation interconnection requests in SCE Territory<sup>1</sup>
- 130 active requests, comprising approximately 40,000 MW
- +28,000 MW of renewable generation, concentrated in several geographic areas
  - Most of renewables in inland areas
  - Most of electricity demand near the coasts
- SCE system peak load Summer 2007: 23,303 MW

1. As of October 31, 2007, includes requests to interconnect to SCE's transmission and distribution systems

November 29, 2007

Map not to scale

# Renewable Generation is Different

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- Renewable resources often located far from existing transmission and load centers
- Renewable generation often develops in smaller increments over a number of years
- Existing transmission system in California is congested, needs substantial upgrades to deliver new generation to load centers
- Disconnect between length of development cycle for generation versus transmission
  - Generation development (from concept to completed construction) can take 3-5 years
  - Transmission development can take 7-9 years
  - Building in advance of generation presents added risks to utilities
    - Will generators materialize?, or “If you build it, will they come?”
    - Will utilities obtain 100% cost recovery?
- Promise of economic development benefits
  - jobs, greenhouse gas emission reductions, income from alternative land use

# Challenges to Transmission for Renewables

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- Sheer volume of interconnection requests have bogged down the interconnection study process
- Integration of large-scale intermittent resources such as wind and solar
  - Wind does not usually blow when you want it (daily peak)
- Siting transmission on Federal and State Lands (BLM, US Forest Service, US Fish & Wildlife, State Parks)
- Multi-state transmission lines
- Siting on Tribal Lands
- Ever-present NIMBY
  - EMF
  - Viewshed

# Possible Solutions to Challenges

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- Interconnection study process:
  - Clustering of interconnection requests
- Integration of large-scale intermittent resources:
  - Requires additional generation and voltage support equipment
  - Further development of pumped hydro storage
- Siting on Federal and State Lands:
  - National Interest Electricity Transmission Corridors
  - Proposed State corridors
- Multi-state transmission lines:
  - Provide off ramps
- Siting on Tribal Lands:
  - Joint development efforts
- Ever-present NIMBY
  - Public involvement early and often

# Additional Solutions in California

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- Renewable Energy Transmission Initiative (RETI)
  - Statewide stakeholder process to develop transmission for renewable resources
  - Joint effort among the California PUC, California Energy Commission, California ISO, investor owned utilities, publicly owned utilities, as well as energy developers and land owners
    - Identify competitive renewable energy zones (CREZ) within California (and possibly other western states and Mexico)
    - Rank-order each CREZ by cost effectiveness and access to existing transmission
    - Develop detailed transmission plans to deliver the renewable resources to load in the most cost-effective and environmentally benign manner
- Location Constrained Resource Interconnection Facility (LCRIF, aka “trunkline”) financing mechanism
  - Relieves generators of upfront cost responsibility for qualifying trunkline facilities
  - Generators pay ongoing costs as they interconnect to the LCRIF

# Potential Impact on Tribal Lands

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- Tribal Lands have been proposed for generation siting as well as transmission siting
  - Potential for economic development revenue streams
  - Knowledge and experience in rights-of-way negotiations
  - Are projects consistent with existing Tribal land-use plans?
- Generation development partners or on-your-own development efforts may benefit from the following:
  - 1. Participate in RETI stakeholder process
    - <http://www.energy.ca.gov/reti/>
  - 2. Get into CAISO queue
  - 3. Participate in utility procurement solicitations (RFOs)

# Current Renewable Generation Industry Trends

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- From developer perspective (Edison Mission Energy):
  - Supply/demand imbalance
    - RPS demand pull (now in 25+ states)
    - Wind turbine availability remains constrained
  - Rising off-take prices
    - Rising all-in costs, driven by commodities like steel and concrete
    - Seek synergies from larger turbines/projects, leverage greater buying power
  - Increased competition
    - Consolidation/M&A
    - New entrants including foreign-owned entities
    - Higher development pipeline valuations
    - Utility rate base projects
  - Production Tax Credit (for wind) uncertainty (expires 12/31/08 unless extended)

# Developer Risks and Mitigation Options

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## Risks

- Construction
- Equipment performance
- Capacity factors
- Power pricing
- Production Tax Credit expiration

## Possible Mitigation Options

- Hire experienced contractors, utilize fixed priced contracts, insist on warranties
- Buy well-proven turbines and other equipment from manufacturers that provide performance and repair warranties
- Perform extensive on-site data and expert forecast analysis, geographical diversification
- Negotiate fixed price long-term PPAs, evaluate merchant exposures in highly liquid markets, no fuel price risk for wind and solar
- Compute ROI with and without PTC