



# **Infrastructure Assessment: Current Issues**

**2012 IEPR Update Workshop**

Los Angeles, California

June 22, 2012

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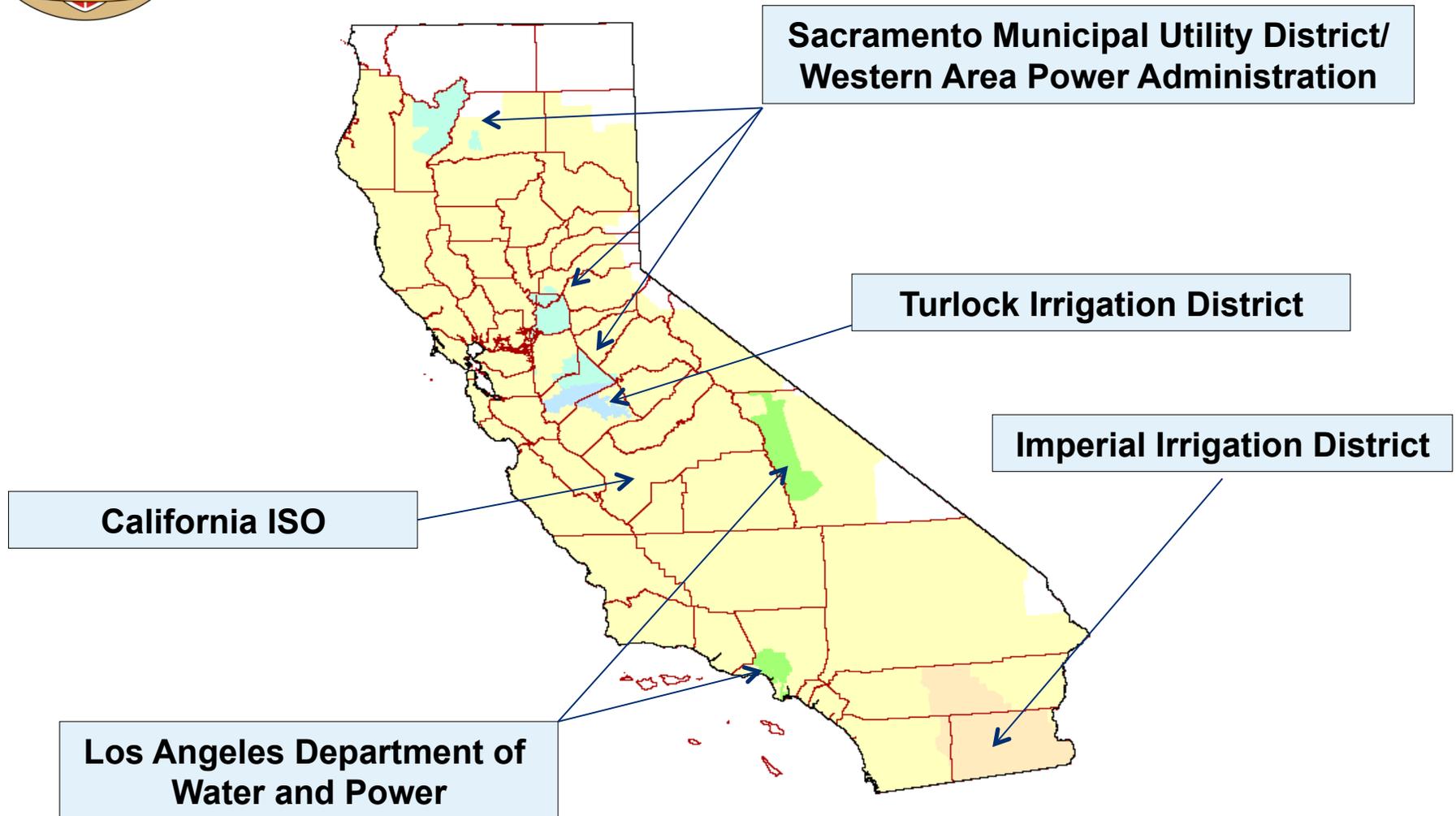
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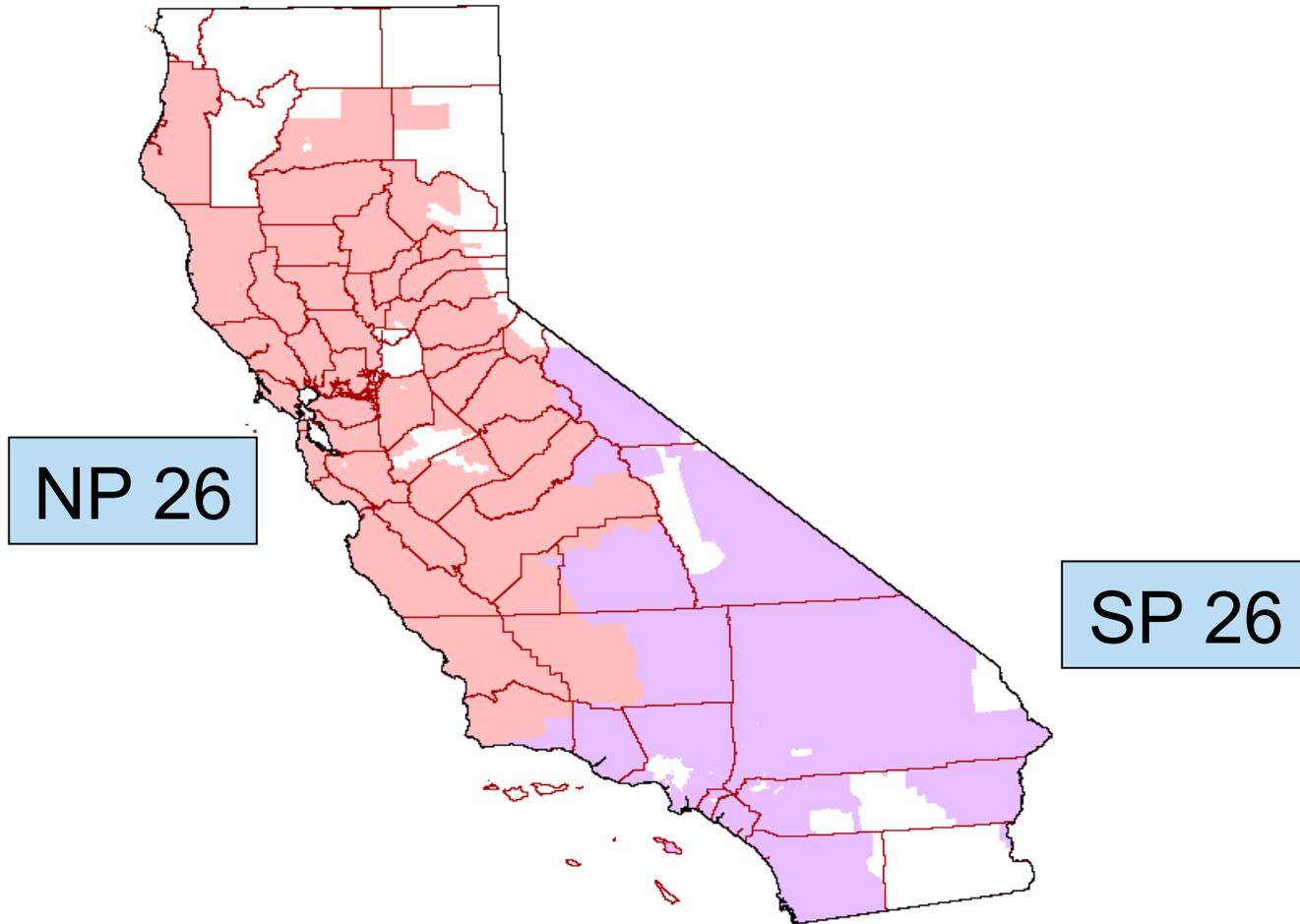


# California Balancing Authorities





# California ISO Zones





## Load - Resource Balance (MW) (illustrative)

Peak Demand	31,200
Less <b>Uncommitted Energy Efficiency</b>	(1,500)
Total Demand	<b>29,700</b>
Existing Supply	27,500
Additions:	
Conventional (e.g. fossil)	2,000
<b>Combined Heat and Power</b>	500
<b>New Renewables</b>	3,000
Less Retirements	(4,000)
<b>Demand Response</b>	800
Net Interchange (Imports)	4,500
Total Supply	<b>34,300</b>
Supply - Demand	4,600
<b>Reserve Margin</b>	<b>15.5%</b> <sup>4</sup>



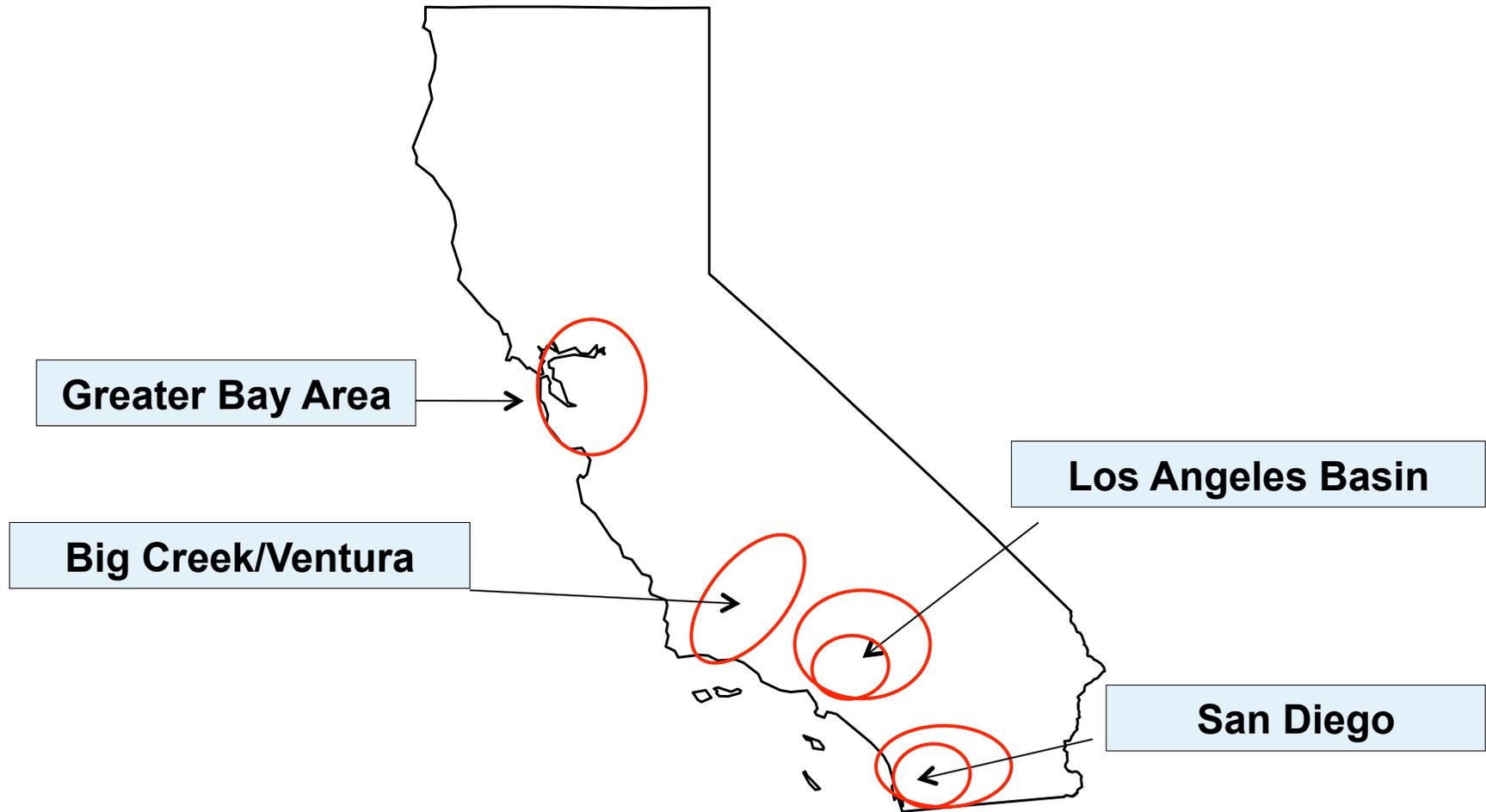
# Caveat

Adequate planning reserve margins at the system and zonal levels are necessary but not sufficient for reliability. Other requirements are:

- Local capacity requirements
- Stability requirements (e.g., inertia)
- Flexibility requirements (quick-starting, fast ramping, wide range of output)
- Capacity of generation resources must be appropriately valued; 15-17% reserve margin may be insufficient if this is not the case

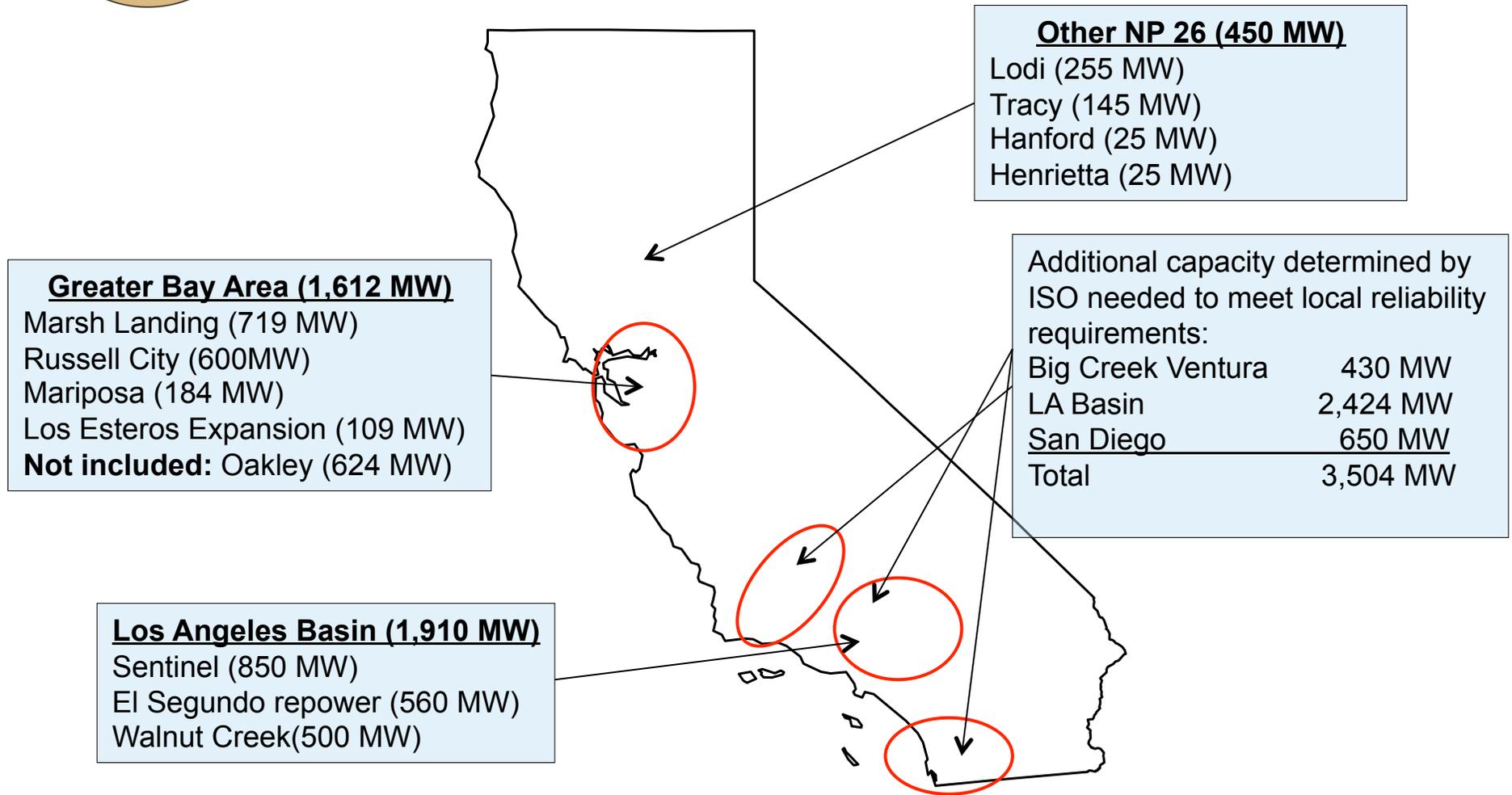


# Major California ISO Local Reliability Areas and Subareas



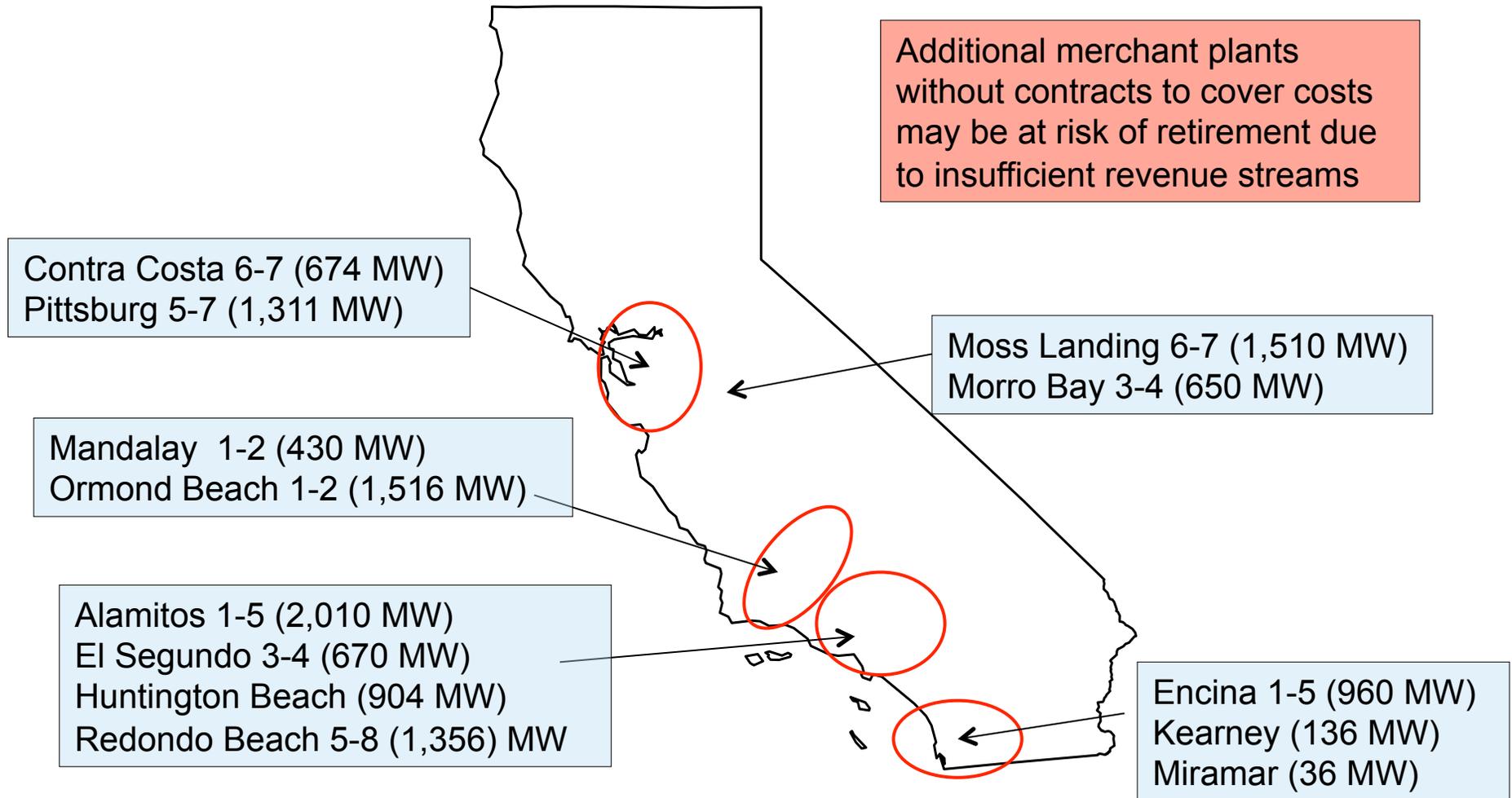


# Conventional Resource Additions





# Retirements through 2020 12,163 MW





## Impact of Uncommitted Energy Efficiency Programs is Uncertain

- Impact of yet-to-be funded, designed and implemented energy efficiency programs not included in load forecast
- 2020 assumptions used in 2010 LTPP proceeding based on 2009 IEPR study:
  - NP26: 2,496 MW
  - SP26: 3,192 MW
- Updated estimates for 2012 IEPR Update are being prepared and will be available shortly



# Combined Heat and Power is Uncertain

- Targets for development set by ARB (4,000 MW by 2020 in AB 32 Scoping Plan), Governor's Office (6,500 MW by 2030)
- QF settlement at CPUC set target of 3,000 MW of new CHP
- 2010 CPUC Long-Term Procurement Planning proceeding assumptions (for 2020):

Area	MW Added	Demand-Side <sup>1</sup>	Supply-Side
PG&E/NP 26	782	401	409
SCE	641	360	307
SDG&E	82	58	28
<b>Total SP 26</b>	723	418	335
<b>Total</b>	<b>1,505</b>	<b>819</b>	<b>744</b>

<sup>1</sup> Increased to account for 7.7% transmission losses



## Combined Heat and Power (cont'd)

- 2012 ICF study funded by Energy Commission
- Comparison of base case to LTPP assumptions (2020 values):

Area	ICF Study <sup>1</sup>	LTPP
PG&E/NP 26	636	782
SCE	347	641
SDG&E	141	82
Total SP 26	488	723
<b>Total</b>	<b>1,123</b>	<b>1,505</b>

<sup>1</sup> Also projects CHP development for LADWP (224 MW), SMUD (47 MW) and other areas in Northern (44 MW) and Southern California (60 MW), for a total of 1,498 MW.

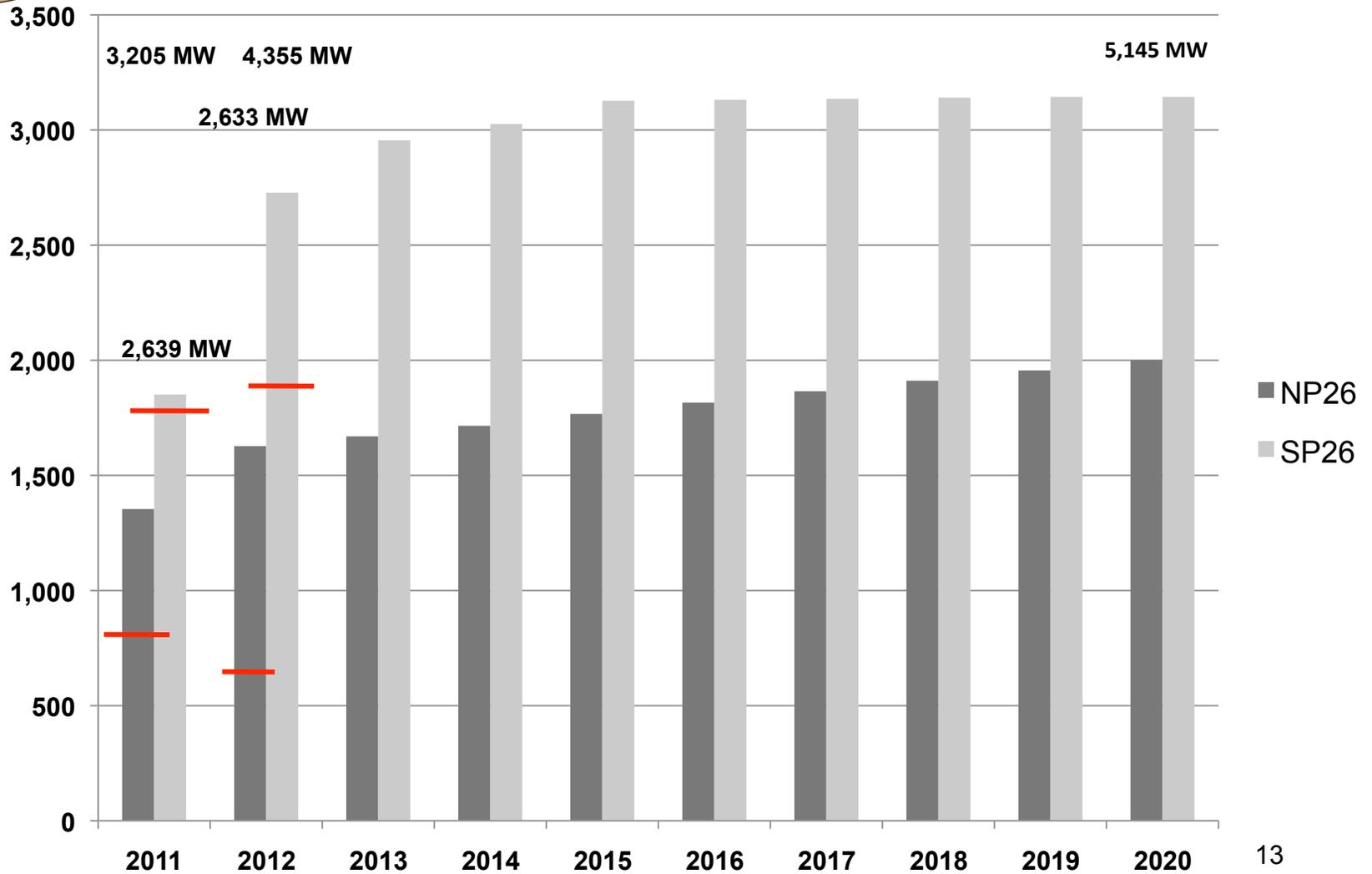


## Combined Heat and Power (cont'd)

- While higher rates and lower gas prices provide incentives for CHP, parties at February 2012 IEPR workshop questioned whether Settlement targets and/or ICF projections would be realized
  - Extension of contracts with existing QFs counts toward settlement target
  - Existing CHP has advantage in ongoing IOU RFOs
  - CHP must ultimately compete on least-cost, best-fit basis
  - POUs cite limited opportunities for CHP development
- 2011 IEPR filings by IOUs (for 2020):
  - PG&E - **488 MW**
  - SCE - **253 MW**



# Demand Response is Uncertain



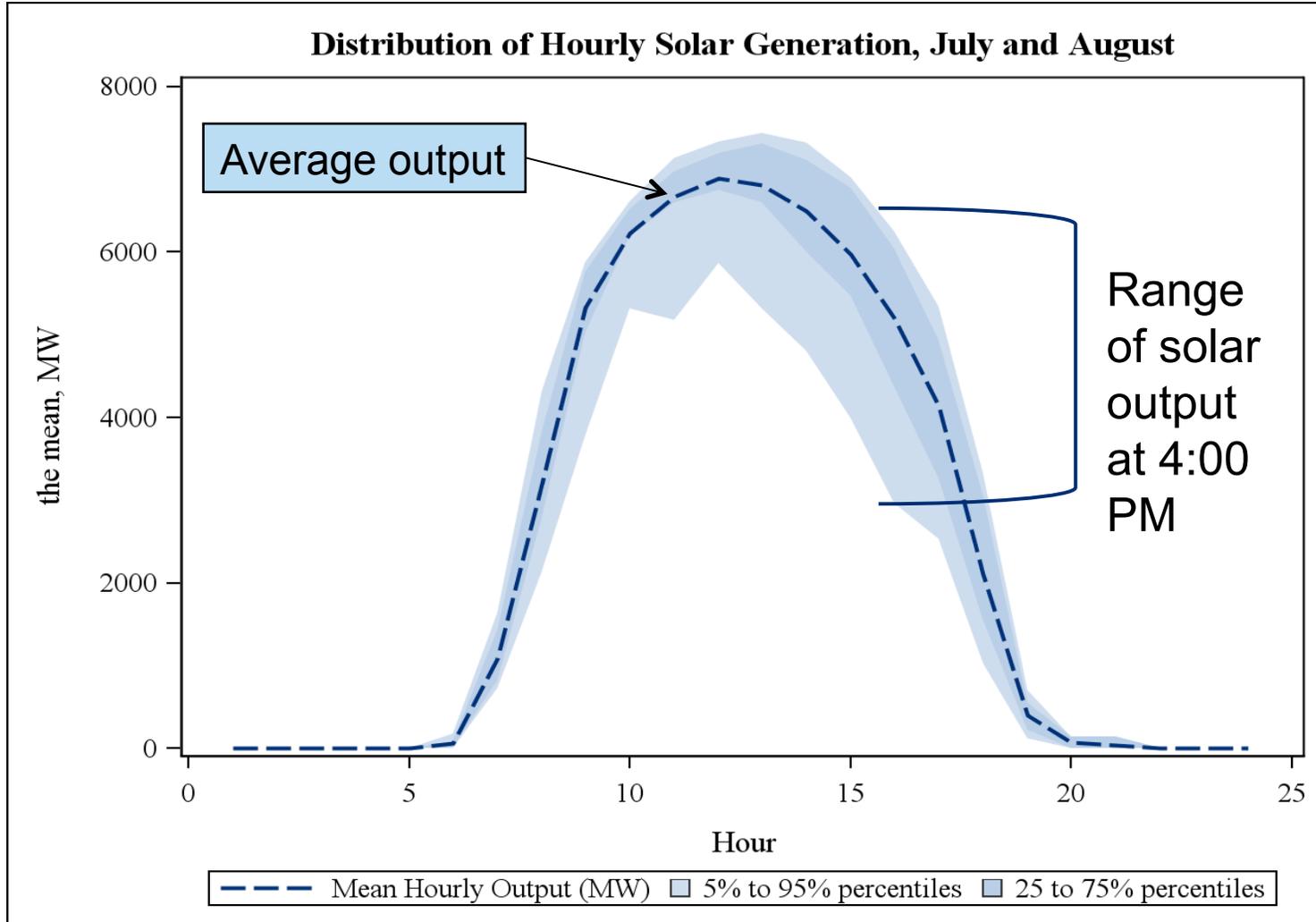


# Renewable Resource Development

- Two scenarios developed by CPUC for 2010 LTPP are being evaluated
  - Cost-constrained case
  - Environmentally-constrained case
- Latter is high distributed generation case, accordingly with more capacity in NP26, local reliability areas
  - 33% build-out is all but complete by 2018
- Capacity of resource is based upon dispatch value in ISO transmission planning studies
  - Solar: 55%
  - Solar Thermal: 69-72%
  - Wind: 25-52%

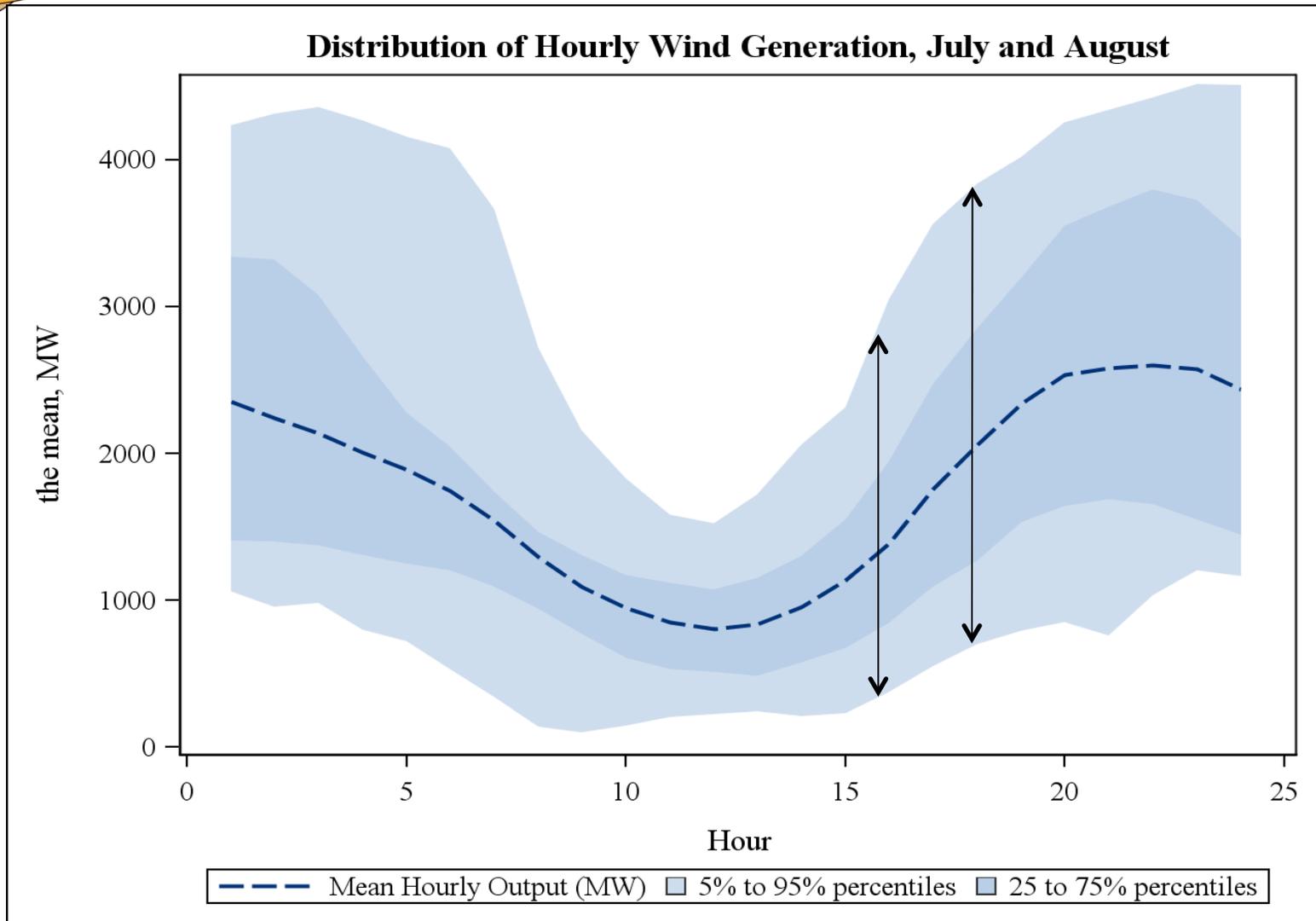


# Solar Output Varies



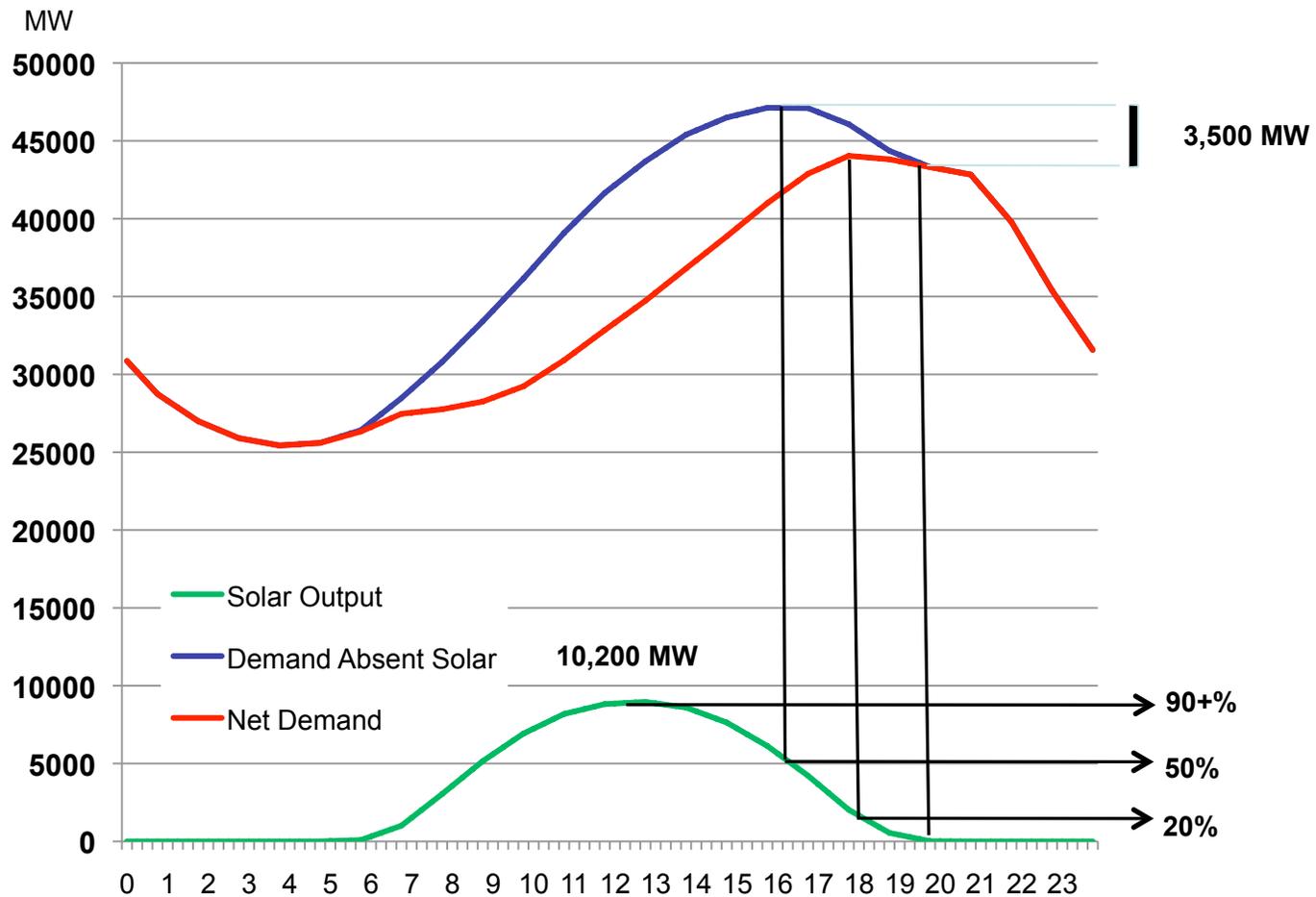


# Wind Output Varies





# Limits on Solar Capacity Value (illustrative values)





# Imports are Uncertain

- Basing available imports (net interchange) for planning purposes on historically observed average values is problematic
  - Most high load days don't reflect stressed conditions
  - High reserve margins can reduce need for imports
  - Net interchange will change as California procures resources out-of-state, NP 26 utilities contract with SP 26 renewable projects
- Studies for 2021/2022 use 2012 Maximum Import Capability as determined for consideration in resource adequacy settings
  - ISO 11,225 MW
  - SP26 10,132 MW
  - NP26 4,843 MW
- Long run values need to consider California contracts with out-of-state resources, available energy and capacity surpluses in neighboring states



# NP 26 Reserve Margins without Preferred Resource Targets

	2018	2021
Peak Demand	23,408	24,323
Less <b>Uncommitted Energy Efficiency</b>	0	0
<b>Total Demand</b>	<b>23,408</b>	<b>24,323</b>
Existing Supply	25,750	25,750
Additions:		
Conventional (e.g. fossil)	2,074	2,074
<b>Combined Heat and Power</b>	0	0
<b>Renewable (Cost constrained case)</b>	1,612	1,612
Less Retirements	(4,145)	(4,145)
<b>Demand Response (2012 levels)</b>	682	682
Net Interchange (Imports)	4,843	4,843
<b>Total Supply</b>	<b>30,816</b>	<b>30,816</b>
Supply - Demand	7,408	6,493
<b>Reserve Margin</b>	<b>31.6%</b>	<b>26.7%</b>



# SP 26 Reserve Margins without Preferred Resource Targets

	2018	2021
Peak Demand	30,349	31,602
Less Uncommitted Energy Efficiency	0	0
<b>Total Demand</b>	<b>30,349</b>	<b>31,602</b>
Existing Supply	24,677	24,677
Additions:		
Conventional (e.g., fossil)	1,910	1,910
Combined Heat and Power	0	0
Renewable (Cost constrained case)	4,446	4,446
<b>Additional Capacity for Local Reqs.</b>	650	3,504
Less Retirements	(2,244)	(8,008)
Demand Response (2012 levels)	1,944	1,944
Net Interchange (Imports)	10,132	10,132
<b>Total Supply</b>	<b>41,515</b>	<b>38,605</b>
Supply - Demand	11,166	7,003
<b>Reserve Margin</b>	<b>36.8%</b>	<b>22.2%</b>



# NP 26 Reserve Margins and Uncertainties

	<u>2021</u>	$\Delta$	
Peak Demand	24,323		
Less <b>Uncommitted Energy Efficiency</b>	<u>0</u>	(2,496)	LTPP target
Total Demand	<b>24,323</b>		
Existing Supply	25,750	?	
Additions:			
Conventional (e.g., fossil)	2,074	624	Oakley
<b>Combined Heat and Power</b>	0	636	ICF study
<b>Renewable (Cost constrained case)</b>	1,612	?	
Less Retirements	(4,145)	(1,010)	Moss Landing 1-2
<b>Demand Response (2012 levels)</b>	682	1,319	LTPP target
Net Interchange (Imports)	<u>4,843</u>	?	
Total Supply	30,816		
Supply - Demand	6,493		
<b>Reserve Margin</b>	<b>26.7%</b>		



# SP 26 Reserve Margins and Uncertainties

	<u>2021</u>	$\Delta$	
Peak Demand	31,602		
Less Uncommitted Energy Efficiency	0	(3,192)	LTPP target
<b>Total Demand</b>	<b>31,602</b>		
Existing Supply	24,677	(2,246)	San Onofre
Additions:			
Conventional (e.g., fossil)	1,910		
Combined Heat and Power	0	488	ICF study
Renewable (Cost constrained case)	4,446	?	
<b>Additional Capacity for Local Reqs.</b>	3,504		
Less Retirements	(8,008)		
Demand Response (2012 levels)	1,944	1,248	LTPP target
Net Interchange (Imports)	10,132	?	
<b>Total Supply</b>	<b>38,605</b>		
Supply - Demand	7,003		
<b>Reserve Margin</b>	<b>22.2%</b>		



# Power Plant Outage Assumptions Matter

- At any point in time, some share of the generation fleet will be “out for maintenance.”
- Assumptions regarding the size of this share do not appear in load-resource balance tables (slides 19-22), but influence MW of generation needed to meet system reliability.



# Power Plant Outages Happening More Frequently?

- Historical averages may be poor indicators of true values
  - Amount of planned outages can be influenced by balancing authority (ISO) fiat
  - The higher the daily load (thus price), the more likely generators are to be available

**Average Daily MW out at hour of peak, Summer Weekdays, California ISO**

