

**DOCKETED**

<b>Docket Number:</b>	19-IEPR-07
<b>Project Title:</b>	Electricity Sector
<b>TN #:</b>	229915
<b>Document Title:</b>	Transmission Planning Implications and Considerations of Offshore Wind
<b>Description:</b>	Presentation by Neil Millar, California Independent System Operator
<b>Filer:</b>	Raquel Kravitz
<b>Organization:</b>	California Independent System Operator
<b>Submitter Role:</b>	Public
<b>Submission Date:</b>	10/1/2019 3:58:23 PM
<b>Docketed Date:</b>	10/1/2019



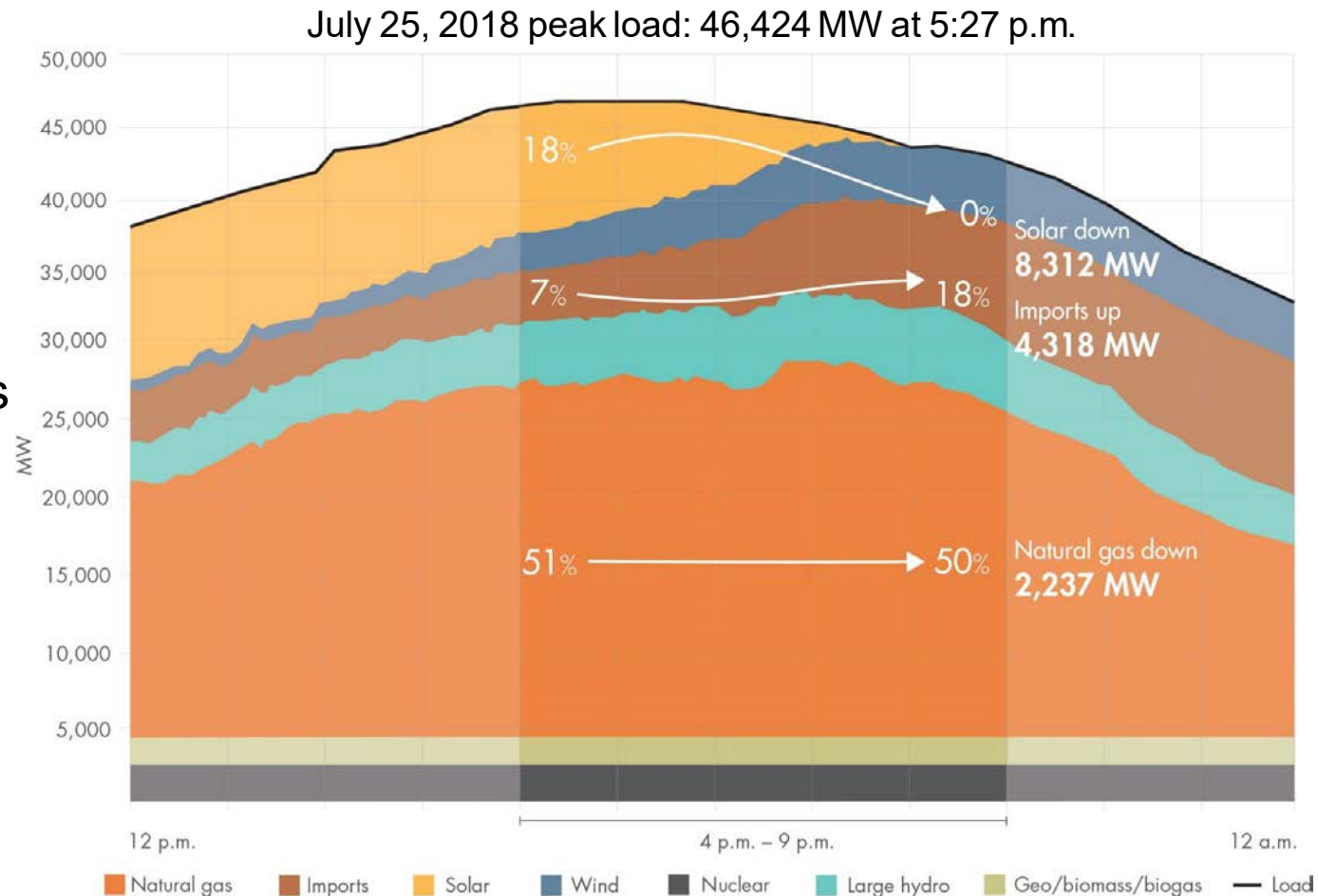
California ISO

# Transmission Planning Implications and Consideration of Offshore Wind

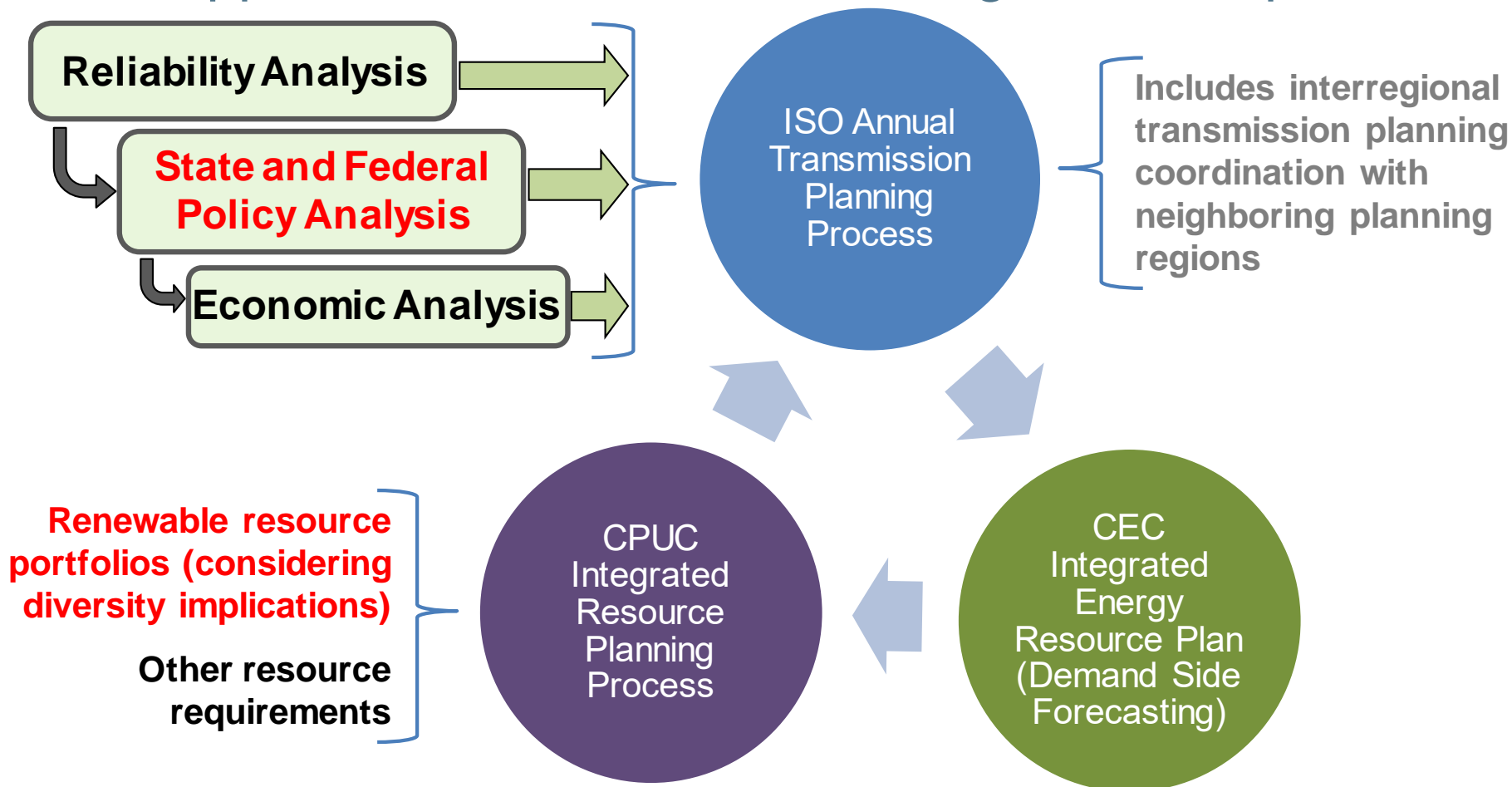
IEPR Commissioner Workshop on Offshore Wind  
Thursday, October 3, 2019  
San Francisco, CA

# The ISO supports broad diversity generally in resource procurement to meet 24-7-365 needs

- Increasing solar (grid or behind-the-meter) continue to exacerbate “duck curve” issues.
- Example: gas was available, but wind made an appearance and met part of the need during declining solar output.



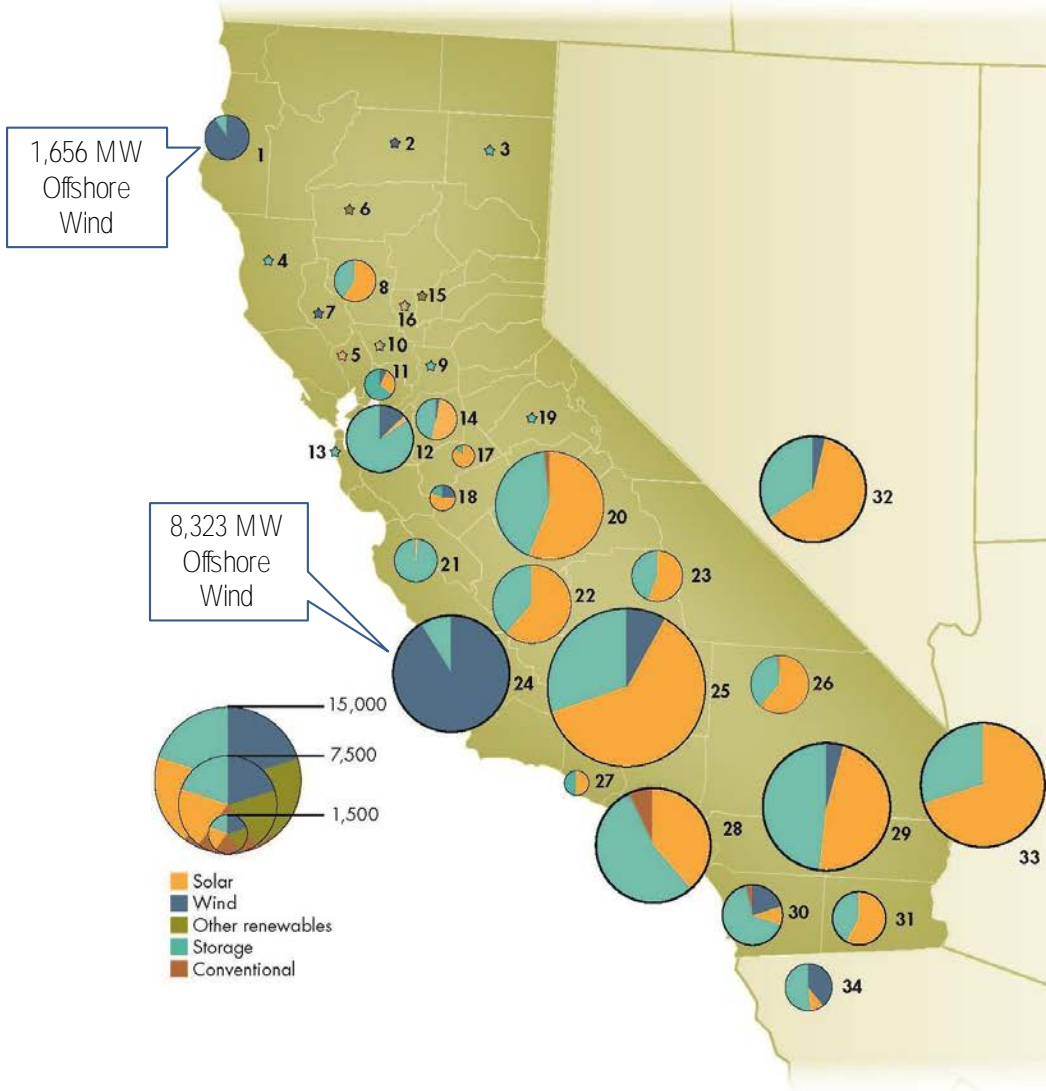
The ISO's annual transmission planning process is integrated with the agencies' resource planning efforts and supportive of diverse renewable generation portfolios



# The Generator Interconnection Process is a two year process tied to the planning cycle

- Phase 1 study assesses reliability and deliverability for reasonable MW amounts (based on TPP portfolios) when queue is very large
  - Each project must post a security deposit and makes a choice in entering phase 2 – whether it is willing to pay its own delivery upgrade costs or simply rely on available system capacity
- The Phase 2 study reflects only those moving forward, and identifies additional major delivery upgrades only for customers willing to pay for the upgrades
  - ISO allocates existing deliverability to the most viable projects, and a customer “willing to pay” may choose to proceed even if not allocated existing system capacity, and a second posting is again necessary
- Proactive transmission development through TPP is a key advantage for generation seeking to site in an area, increasing the likelihood the transmission will be timely, and minimizing funding responsibilities

# Queue Map – Conventional & Renewables – July 24, 2019



Interconnection queue by county

County	# of Projects	Megawatts			Total
		Renewables	Storage	Conventional	
1 Humboldt	6	1910	201		2,110
2 Shasta	1	200			200
3 Lassen	2	21	27		48
4 Mendocino	1		31		31
5 Napa	1	30			30
6 Tehama	2	6			6
7 Lake	3	145	39		184
8 Colusa	9	1,198	825		2,023
9 Sacramento	1		59		59
10 Yolo	2	12	12		24
11 Solano	5	454	821		1,275
12 Alameda-Contra Costa-Santa Clara	24	634	3,510		4,144
13 San Francisco	1		250		250
14 San Joaquin	14	994	862		1,857
15 Yuba	1	6			6
16 Sutter	2	100	100		200
17 Stanislaus	7	657	108		765
18 Merced	12	833	200		1,033
19 Tuolumne	1		10		10
20 Fresno-Madera	45	4,734	3,562	123	8,419
21 San Benito-Monterey	6	30	1,867		1,898
22 Kings	24	3,443	2,176		5,619
23 Tulare-Inyo	13	1,285	1,014		2,299
24 San Luis Obispo	11	8,994	856		9,850
25 Kern	81	11,633	5,022		16,655
26 San Bernardino	24	2,035	1,232	38	3,306
27 Ventura	2	500	500		1,000
28 Los Angeles/Orange	28	3,893	5,469	700	10,062
29 Riverside	38	6,223	5,761		11,984
30 San Diego	35	1,233	2,709	141	4,082
31 Imperial	13	1,837	1,337		3,175

In-state Totals	415	53,041	38,560	1,002	92,604
32 Nevada	28	5,235	2,738		7,973
33 Arizona	24	7,383	3,157		10,540
34 Mexico	6	1,057	1,128		2,185
Out-of-state Totals	58	13,675	7,023		20,698
<b>TOTAL ALL PROJECTS</b>	<b>473</b>	<b>66,716</b>	<b>45,583</b>	<b>1,002</b>	<b>113,301</b>

# Offshore wind in ISO Queue – September 26, 2019

- The following table lists the projects that are currently active within the CAISO generation interconnection queue.

Project Name	Queue Number	Cluster	MW (Wind)	MW (Storage)	MW (@ POI)	FCDS / EO	POI
TEPONA OFF-SHORE WIND	1491	C11	161.9		156	FCDS	Humboldt Substation 115kV
TEMPEST GENERATION	1559	C12	1568	319.35	1500	FCDS	Round Mountain Substation 500kV
NIMITZ 2 GENERATION	1590	C12	1568	319.35	1500	FCDS	Diablo Canyon-Gates 500kV
LION ROCK OFFSHORE WIND	1599	C12	627		605	FCDS	Morro Bay Substation 230kV
SEAWOLF GENERATION	1600	C12	1568	319.4	1500	FCDS	Midway-Diablo Canyon #2

Still 1,656 MW

3,605 MW, down from 8,323 MW in July

- There was additional interest by off-shore wind developers with projects submitted into the CAISO queue for projects; however several have withdrawn the projects from the generator interconnection queue.
- This can be reflective of timing issues, not just interest in proceeding

# Observations

- North coast – local capacity a concern
  - Smaller project connecting to 115 kV already strains local infrastructure, “material” network upgrade required.
  - Larger project needs major interconnection, such as connection all the way to Round Mountain 200 miles – a potential new largest single contingency? COI interactions?
- Central
  - Morro Bay – capacity can readily replace retired generation
  - Previously studied a 2000 MW project at Diablo Canyon even while preserving nuclear plant with no major impacts, suggesting 3 or 4 GW without Diablo should be manageable
  - Consideration of re-purposing Midway-Diablo 500 kV circuit to reinforce 230 kV system currently on hold
- Future...
  - Path 15 (Los Banos-Gates) and Path 26 (Midway Vincent) concerns



# In achieving diversity benefits, the operating flexibility expected from the transmission system will need to be reconsidered

- A much broader range of uncertainty about the resources available at any hour of any day drive the need for more flexibility on the grid; the existing framework of studying deliverability and economic congestion may not suffice
- Consider February 4-6, 2019 - high loads in the Pacific Northwest, and high hydro output in northern California being exported to support those high loads, led to south-to-north limitations on COI export that were known, but that were not considered to be an issue until then.

