



IRP Modeling Advisory Group:
Selected slides from the 3/29/18 presentation
that have updated RESOLVE results using the
2017 IEPR forecast with the 42 MMT core case.



Energy Resource Modeling Team
April 23, 2018
California Public Utilities Commission

Peak Load Forecast Input Differences **Updated**

- Baseline consumption peak increases by ~3,500 MW by 2030
- EV peak demand decreases by ~300 MW by 2030
 - despite significant increase in EV energy demand, suggesting EV demand is spread outside of peak hours
- Other on-site self generation peak reduction increases by ~800 MW by 2030
 - due in part to on-site storage incremental to that projected in the CPUC 1,325 MW storage target)
- Energy efficiency peak savings decrease by ~2,000 MW by 2030
- IEPR mid TOU shape shows significantly less peak reduction than original assumption

Net Effect: CAISO coincident peak increases by >5,000 MW by 2030 (not including BTM PV impact because it is separately modeled by RESOLVE through ELCC surfaces)

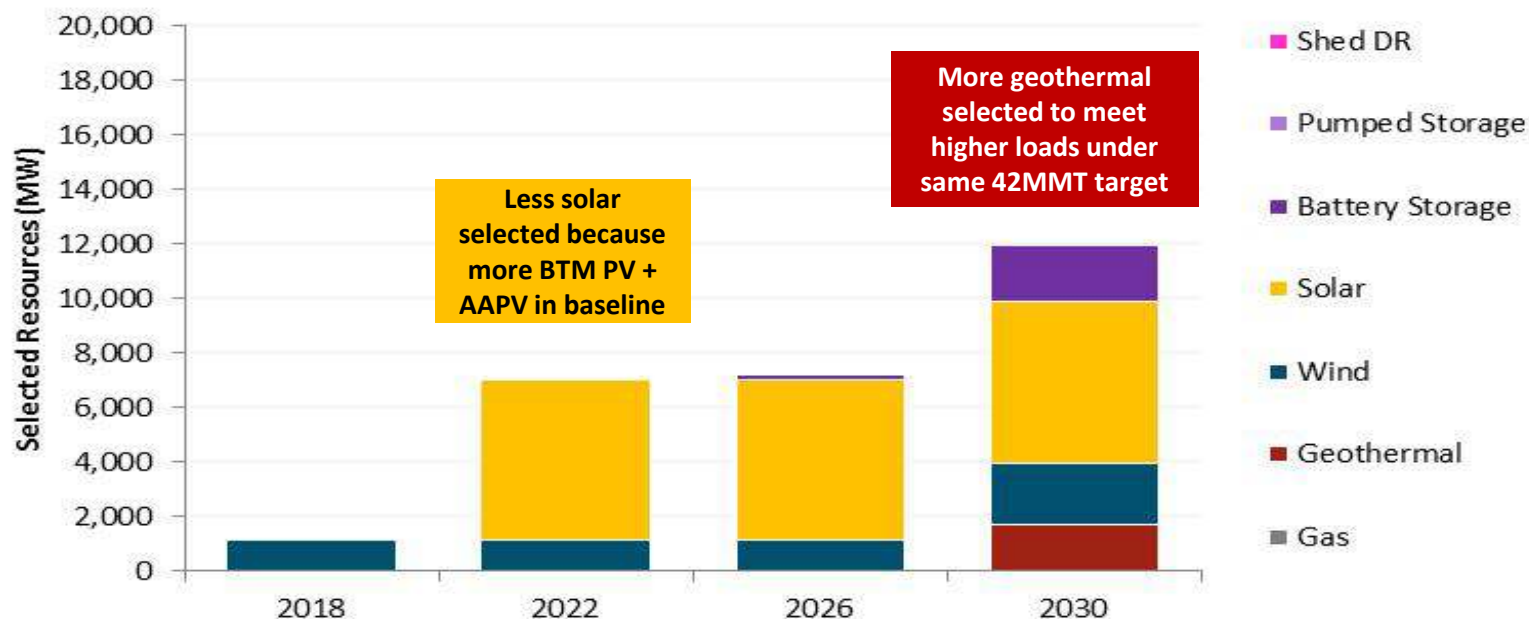
CAISO Peak Demand for PRM (MW)	2018		2022		2026		2030	
	Reference	2017 IEPR	Reference	2017 IEPR	Reference	2017 IEPR	Reference	2017 IEPR
Baseline Consumption	50,711	50,949	52,191	53,977	53,861	56,821	55,571	59,046
+ Electric Vehicles	98	66	271	296	662	566	1,133	827
+ Other Electrification	31	18	98	48	155	81	209	106
- Load-Modifying Demand Response	-196	-139	-216	-169	-232	-191	-232	-196
- Other On-Site Self Generation	-2,092	-2,256	-2,342	-2,768	-2,572	-3,092	-2,628	-3,404
- Energy Efficiency	-1,159	-354	-3,190	-1,892	-5,301	-3,859	-7,414	-5,431
- TOU Effects	-990	0	-996	-187	-1,005	-187	-1,015	-214
= Total Coincident Peak (w/o BTM PV)	46,404	48,283	45,815	49,342	45,568	50,162	45,624	50,734

Results – Selected Resources in 42 MMT 2017 IEPR

Updated

- 42 MMT core case using 2017 IEPR inputs
 - Baseline and EV load increased
 - Projected BTM PV increased and AAEF decreased
 - AAEF, EV, and TOU shapes updated
 - Burner-tip natural gas price forecast lower

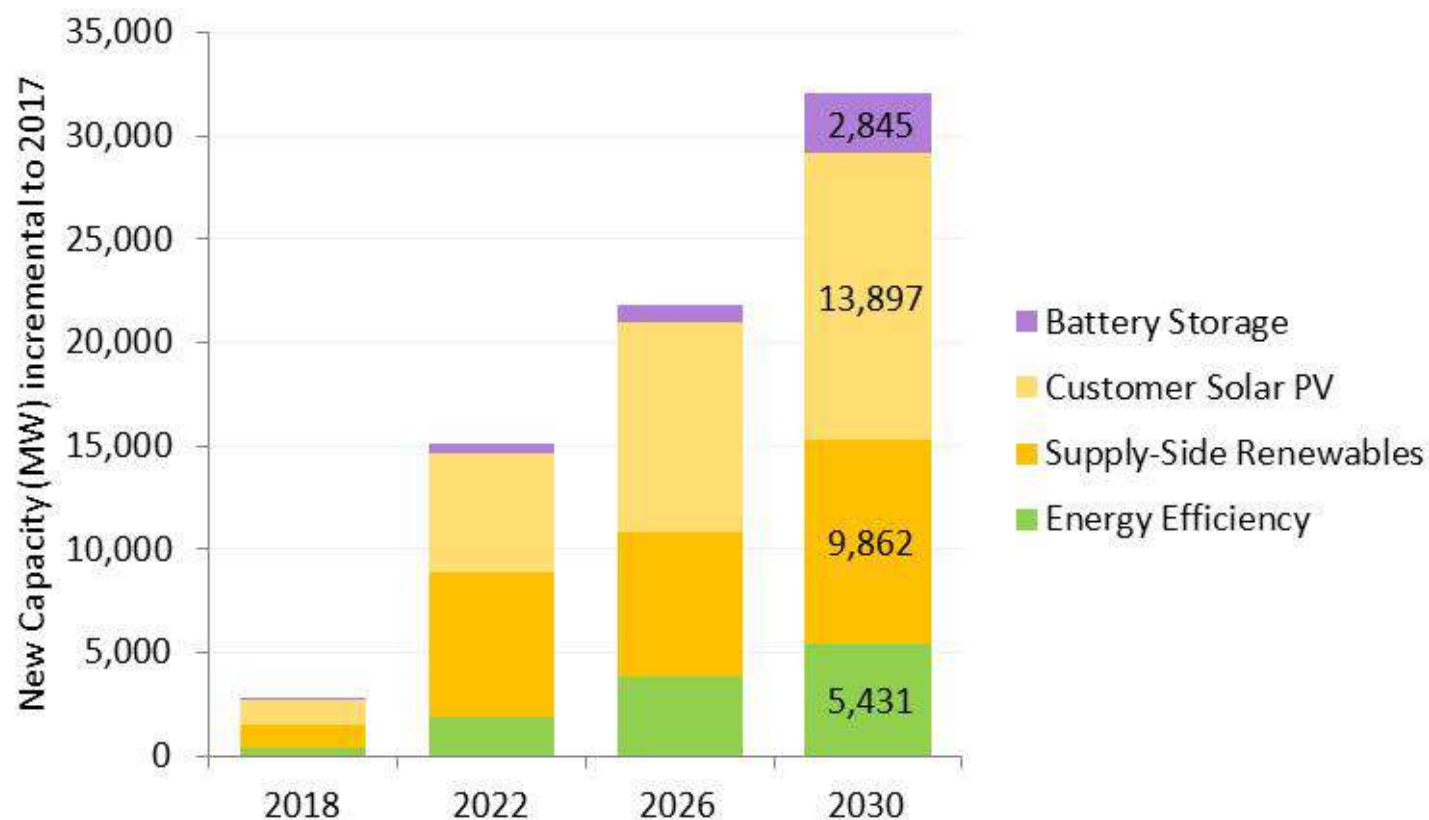
42 MMT 2017 IEPR



New (Incremental to 2017) Capacity of Resource Types in 42 MMT case using 2017 IEPR **Updated**

- Can be compared to Figure 6 in D.18-02-018
 - Includes modeled storage target, incremental to 2017

42 MMT 2017 IEPR



RESOLVE 2030 Results Comparison **Updated**

- **Total resource cost increases moderately, a more diverse portfolio is selected, the GHG shadow price increases – these results may be due to multiple factors**
 - More BTM PV is included, which avoids utility scale PV, but has a higher cost
 - Overall load is higher and subject to the same 42 MMT GHG target
 - More geothermal and wind are selected, less utility scale PV is selected
 - Lower burner tip gas prices means the net cost of GHG-free resources goes up because avoided gas generation is less expensive
- **Increase in peak load using 2017 IEPR reduces reserve margin to 22%**
 - No impact on selected portfolio because planning reserve margin constraint still isn't binding at 22% reserve margin.

Category	Metric	Unit	42 MMT Reference - 2030	42 MMT Reference 2017 IEPR - 2030
Load Forecast	Net Energy for Load (excl. BTM PV)	<i>GWh</i>	242,474	255,038
	BTM PV	<i>MW</i>	15,941	19,992
Selected Resources	Geothermal	<i>MW</i>	202	1,700
	Wind	<i>MW</i>	1,145	2,246
	Solar	<i>MW</i>	8,828	5,916
	Battery Storage	<i>MW</i>	1,992	2,104
Cost	Total Resource Cost	<i>\$MM</i>	\$46,394	\$46,966
	GHG Shadow Price + Cap & Trade	<i>\$/tCO2</i>	\$150	\$218
PRM	1-in-2 Peak Load	<i>MW</i>	45,624	50,734
	Actual Reserve Margin	<i>%</i>	31%	22%