Valley Clean Energy CAC Meeting

May 30, 2018
Davis Senior Center

Comparison and Examples of Utility Scale vs. Distributed Solar

- **Utility Scale – medium to large scale, typically designed as a stand-alone facility**
- **Distributed**
  - **Rooftop**
  - **Parking Lot**

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Rooftop and Parking Lot Solar

- Rooftop solar at the Winery, Brewery and Food Science Laboratory and solar panels shading cars at Parking Lot 1 on UC Davis Campus
- 756 kW capacity

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Rooftop and Parking Lot Solar

- Rooftop and parking lot solar at the City of Woodland Police Department
- 0.45 MW capacity

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Utility Scale Solar

- SMUD Feed-in-Tariff utility scale solar
- 10 MW capacity
- 128 acres

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Utility Scale Solar

- SMUD Feed-in-Tariff utility scale solar
- 18 MW capacity
- 160 acres

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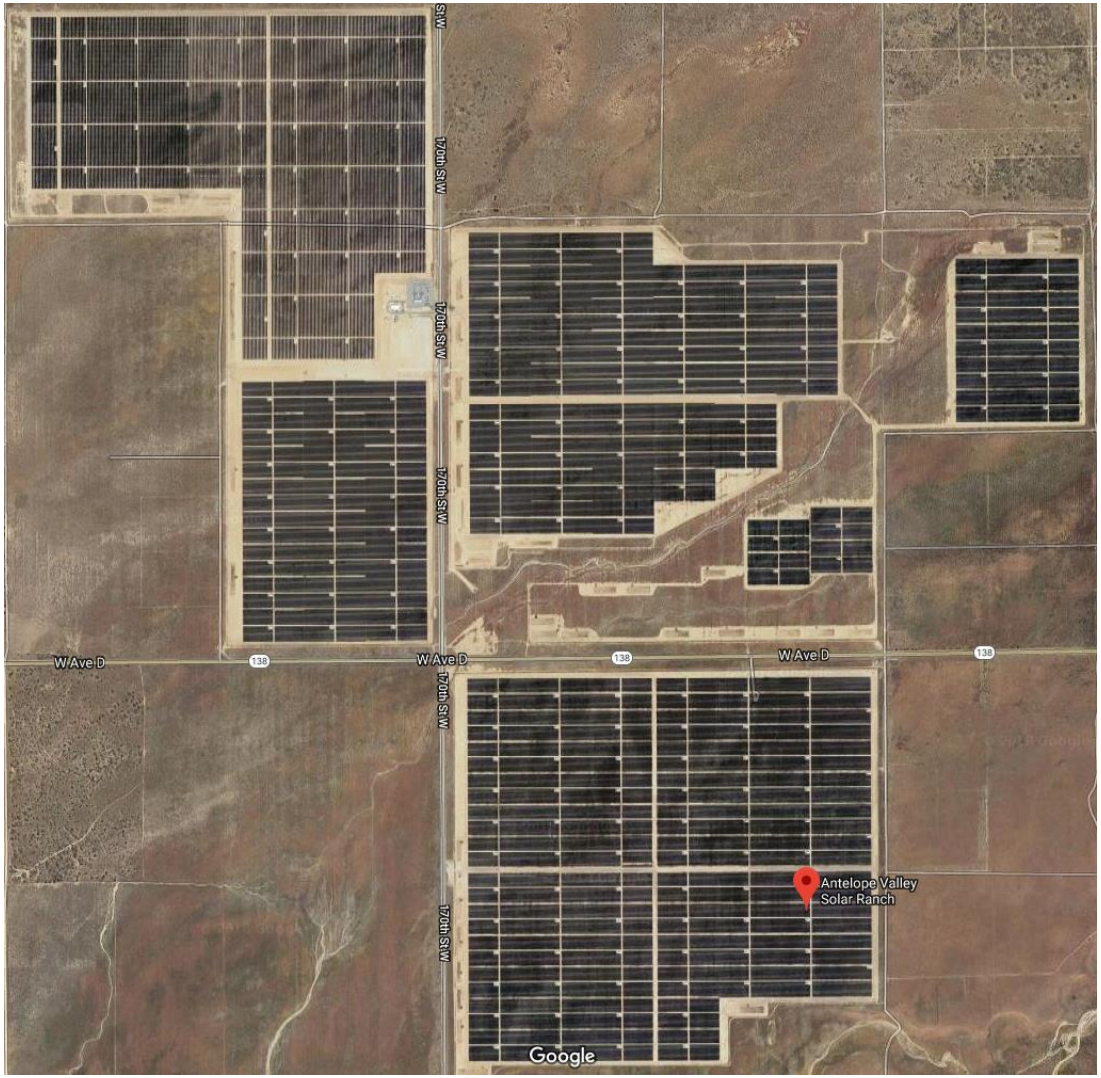
Utility Scale Solar

- Antelope Valley Solar Ranch
  One utility scale solar
- 230 MW capacity
- Spread out over 2,100 acres



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IRP Resource Portfolio Results

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Resource Portfolio Alternatives

Portfolio	Portfolio Aspect	2018	2022	2026	2030
Base	Load Forecast	IEPR			
	Resource Mix	Least cost California resources. Local renewables if cost effective.			
	RPS	42%	42%	45%	50%
	Carbon Free	75%	75%	75%	75%
Cleaner Base	Load Forecast	IEPR			
	Resource Mix	**Least cost California renewables and Local renewables where cost-competitive**			
	RPS	42%	60%	70%	80%
	Carbon Free	75%	100%	100%	100%
Cleaner VCEA	Load Forecast	VCEA (Higher than IEPR due to omission of AAEE and AAPV)			
	Resource Mix	**Least cost California renewables and Local renewables where cost-competitive**			
	RPS	42%	60%	70%	80%
	Carbon Free	75%	100%	100%	100%
Clean Local	Load Forecast	IEPR			
	Resource Mix	Expand local wind, biomass, geothermal and solar from 2022.			
	RPS	42%	60%	70%	80%
	Carbon Free	75%	100%	100%	100%

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Resource Portfolio Renewables

	Base				CleanerBase				CleanLocal				Cleaner VCEA			
	2018	2022	2026	2030	2018	2022	2026	2030	2018	2022	2026	2030	2018	2022	2026	2030
Wind, MW	0	49	33	46	0	51	55	5	0	31	20	30	0	51	55	50
BTM Solar, MW	0	39	52	65	0	39	52	65	0	39	52	65	0	0	0	0
Solar, MW	0	69	91.5	91.5	0	120	140	173	0	85	89	104.5	0	121	150	190.5
Local Solar, MW	0	0	0	0	0	0	0	0	0	36.5	36.5	36.5	0	0	0	0
Geothermal, MW	0	0	0	0	0	0	0	0	0	6	6	6	0	0	0	0
Biomass, MW	0	0	0	0	0	0	0	0	0	0	10	10	0	0	0	0
4 hour Li-Ion Battery Storage, MW	0	0	3	20	0	3	7	20	0	3	7	20	0	3	7	20
RPS Delivered, %	42	42	45	50	42	60	70	80	42	60	70	80	42	60	70	80
Carbon Free, %	75	75	75	75	75	100	100	100	75	100	100	100	75	100	100	100

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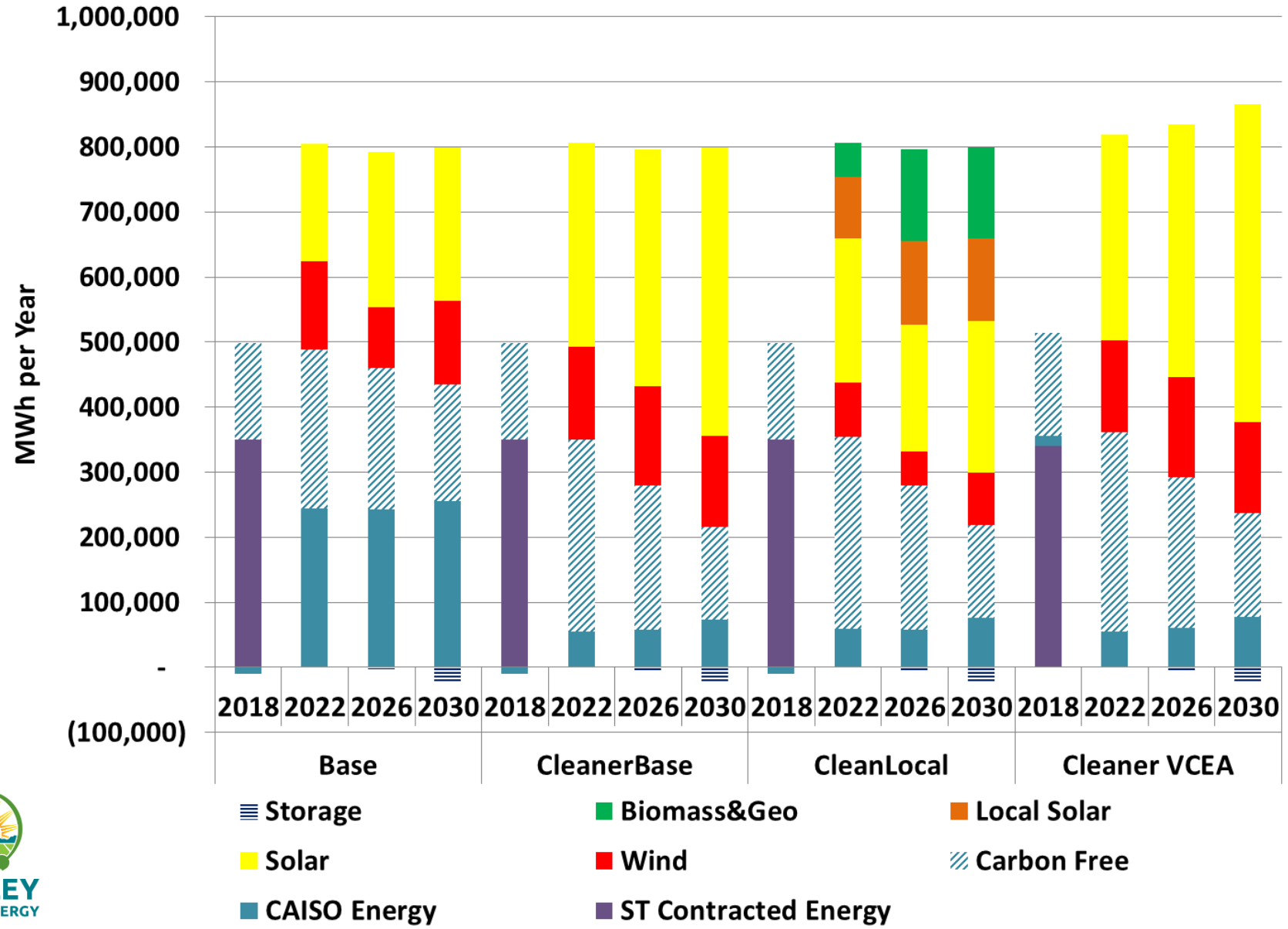
Resource Portfolio Generation Mix



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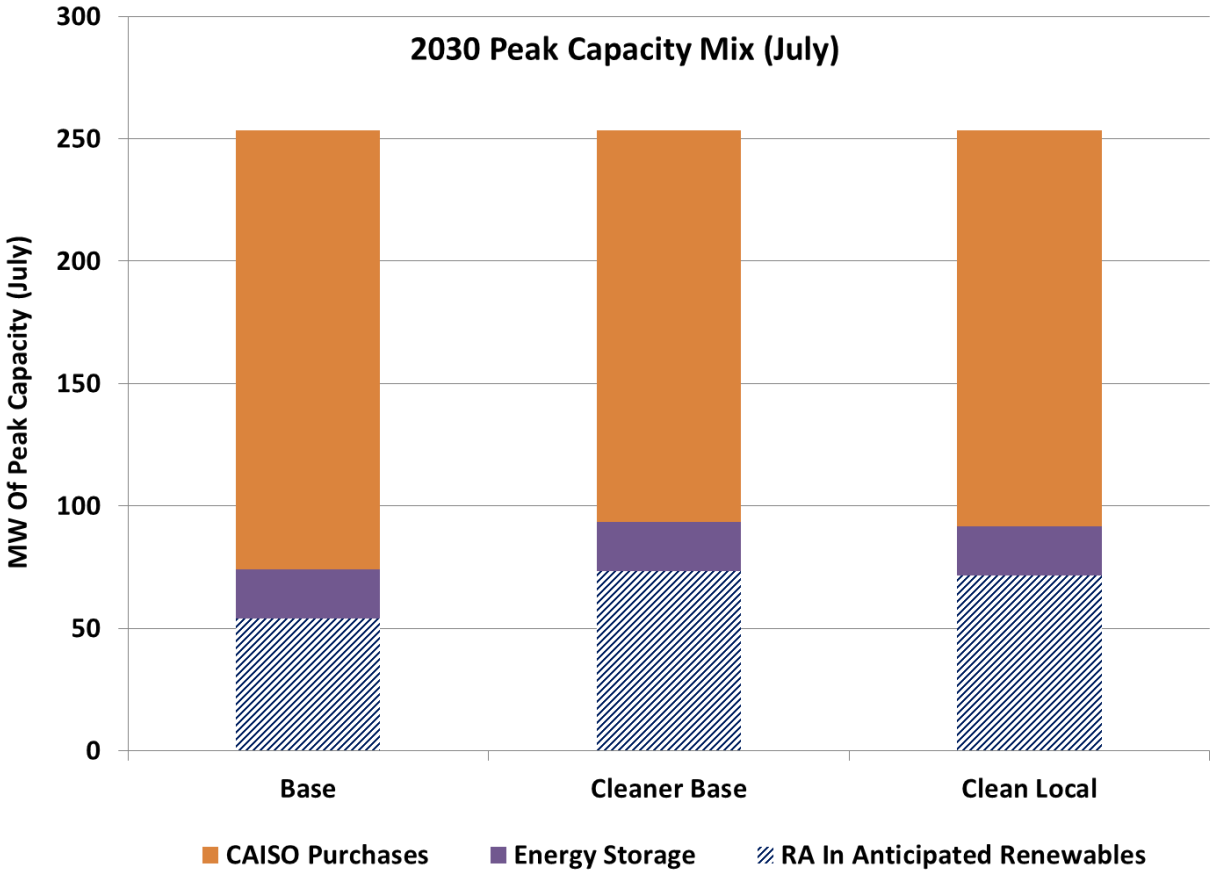
2030 Snapshot of Peak Hour



Despite High Percentage of energy supply in contracted renewables, significant market purchases necessary to balance portfolio and have capacity available at peak

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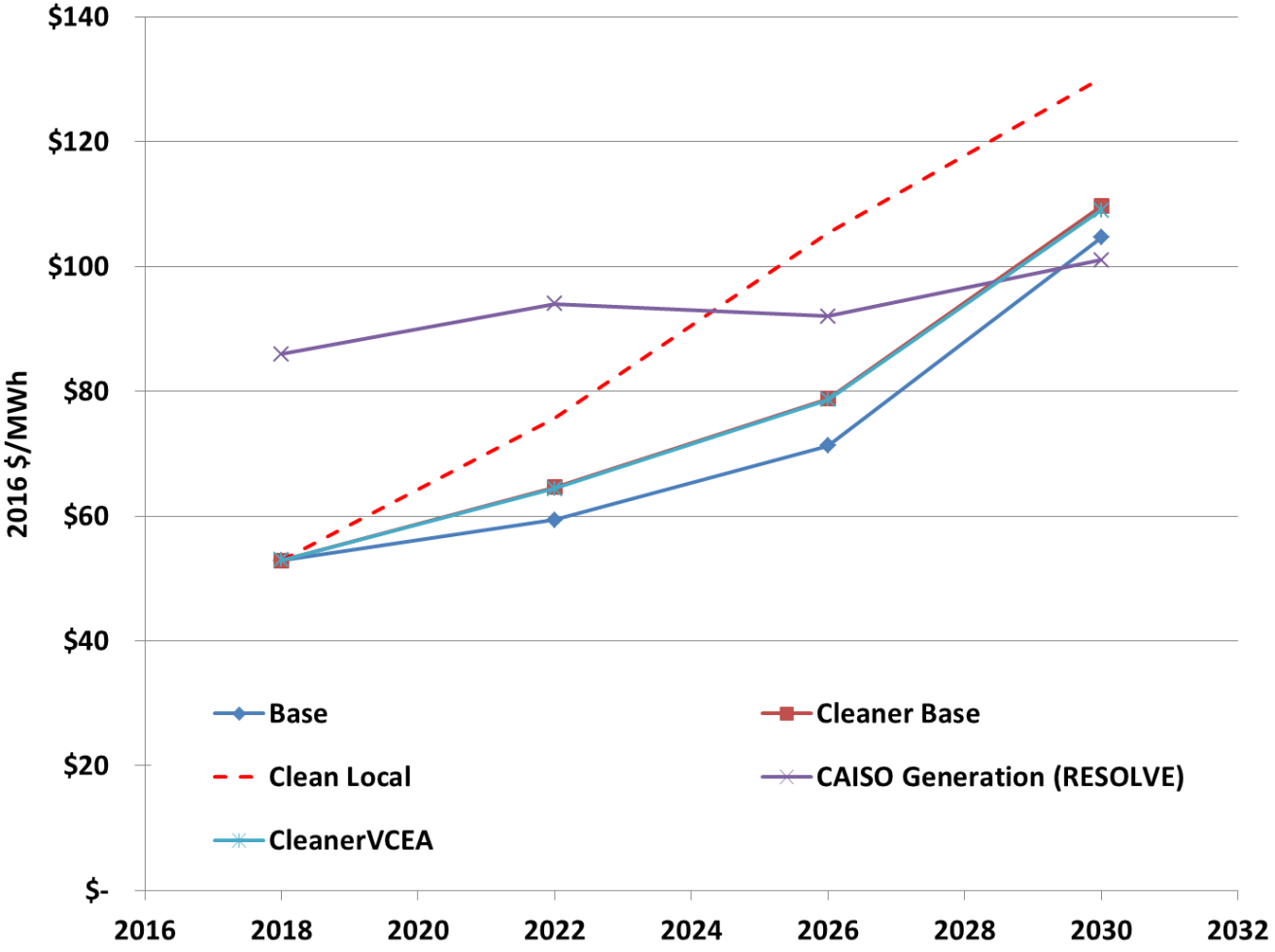
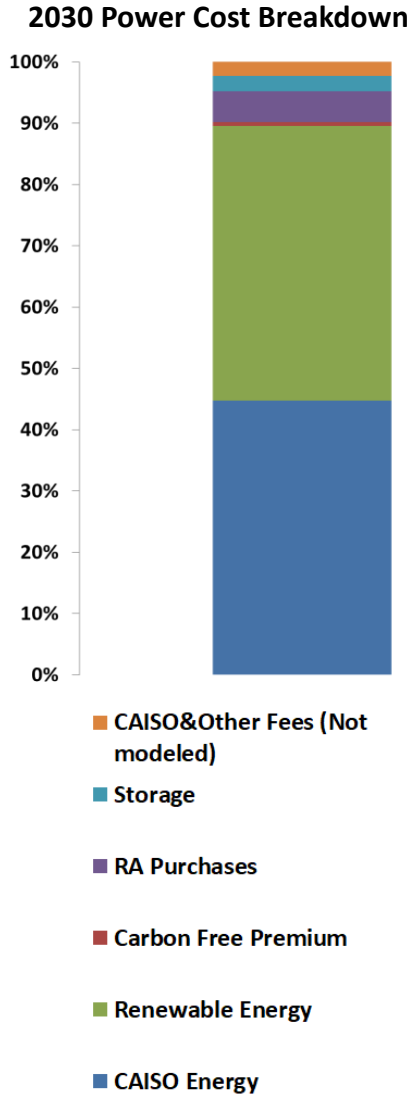
Resource Portfolio Capacity at Annual Peak Hour





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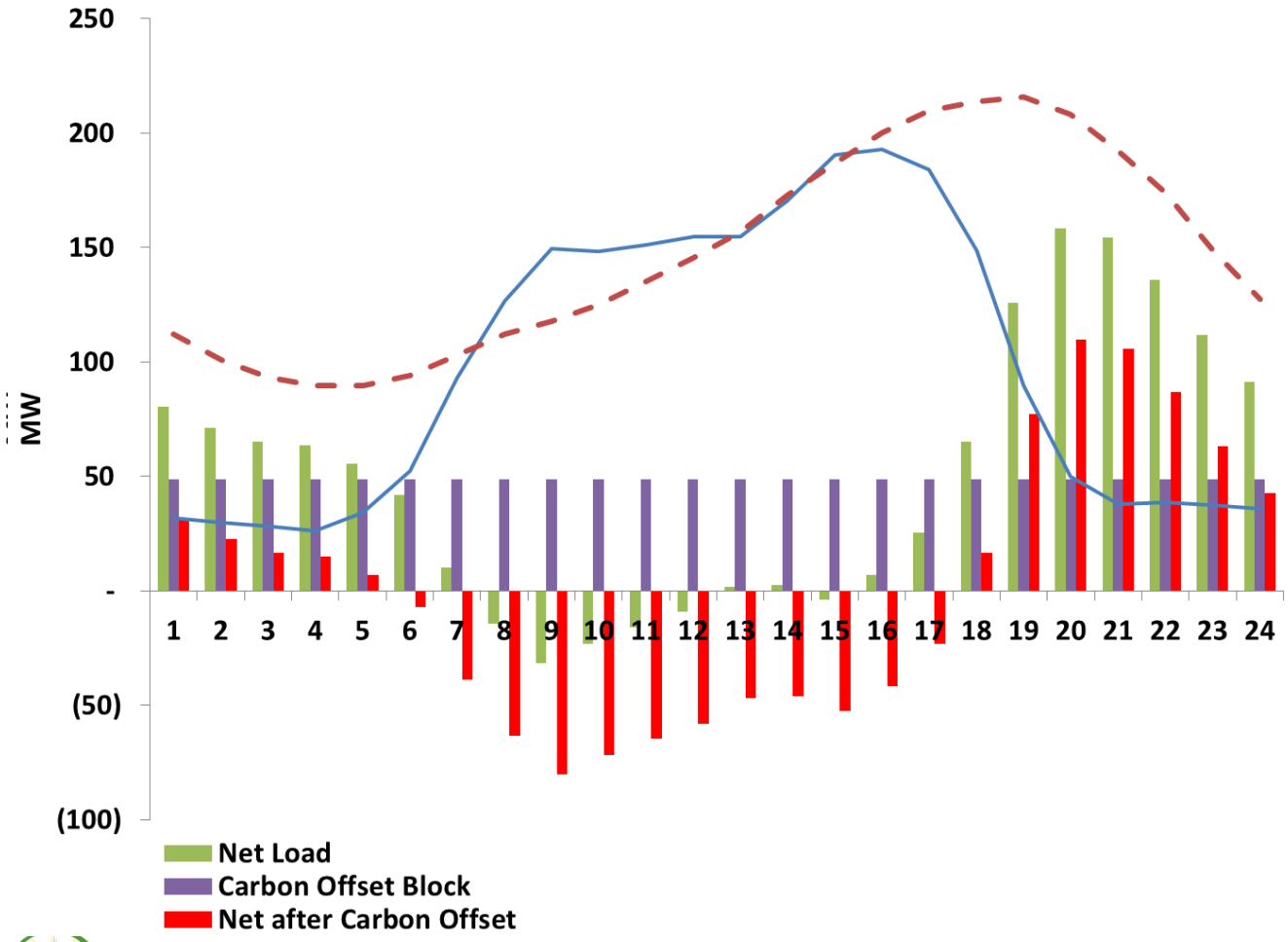
Carbon Neutral vs Carbon Free



Example of weekday in July 2030

Lower day-time emissions factor (than at night) means we can have 100% of total net energy provided by carbon free resources while having non-zero carbon emissions for the portfolio

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Observations & Recommendations

Observations	Recommendations
RPS eligible renewable energy costs lower than long term CAISO market prices High solar portfolio competitive with CAISO market prices	Pursue 50% RPS by 2020 and 80% RPS by 2030
Price premium for carbon free (non-RPS) energy expected to remain moderate	Target carbon neutrality (not carbon free) portfolio by 2022, depending on market price developments
Cost for renewable energy and storage have been falling dramatically in the past 10 years. It is likely that this trend continues	Contract for regulatory mandated amounts of RPS (65% of RPS obligation) and opportunistically pursue additional deals as they arise
Economies of scale continue to make large scale renewables more cost effective than smaller ones; Biomass and Geothermal are significantly higher cost and have limited potential in Yolo County	Focus on large scale "conventional" renewables to save costs and be open to local competitive offers
Local capacity development potential is sensitive to exact location and impact	Fine-tune procurement strategy and carbon goals later in 2018 or 2019 using results from RFO and IRP filings of other LSEs Conduct feasibility study for new renewable resources in Yolo county

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IRP Action Plan

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Additional Materials

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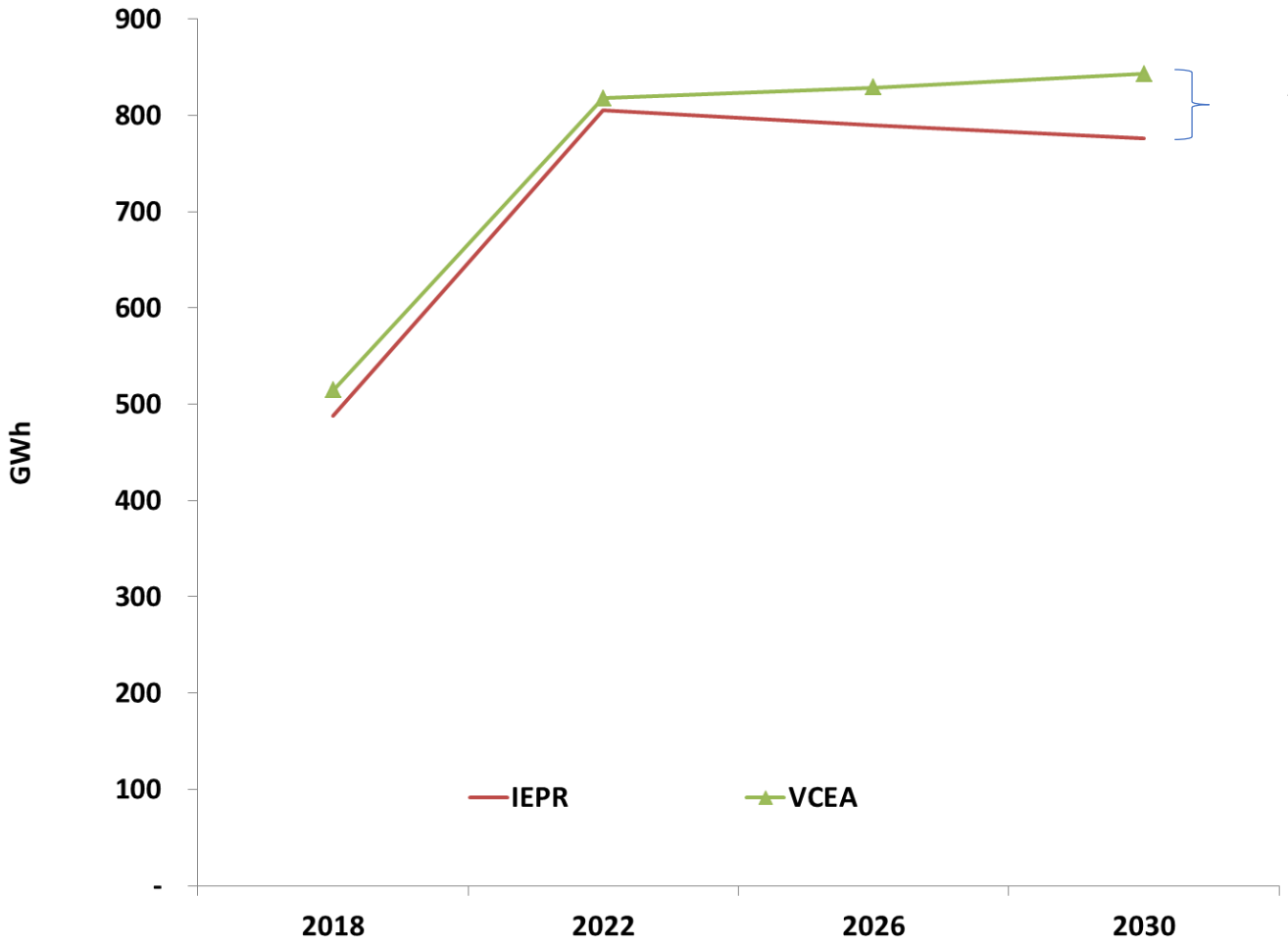
Annual Electricity Demand



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