

PV Export: Shedding Light on the Sunshine Resource

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Purpose of Analysis

- Use CSI participant billing records to characterize the frequency, timing, and magnitude of exported PV energy.
- Assessment compares participants by a number of strata:
 - Program administrator, sector, system size.

Data Sources

- Power Clerk – Used to identify various participant strata.
- Interconnect – Used to identify system connection date.
- Billing records – All available monthly billing records dating back to 2007
- Interval data – For a small number of sites



Overall Sample

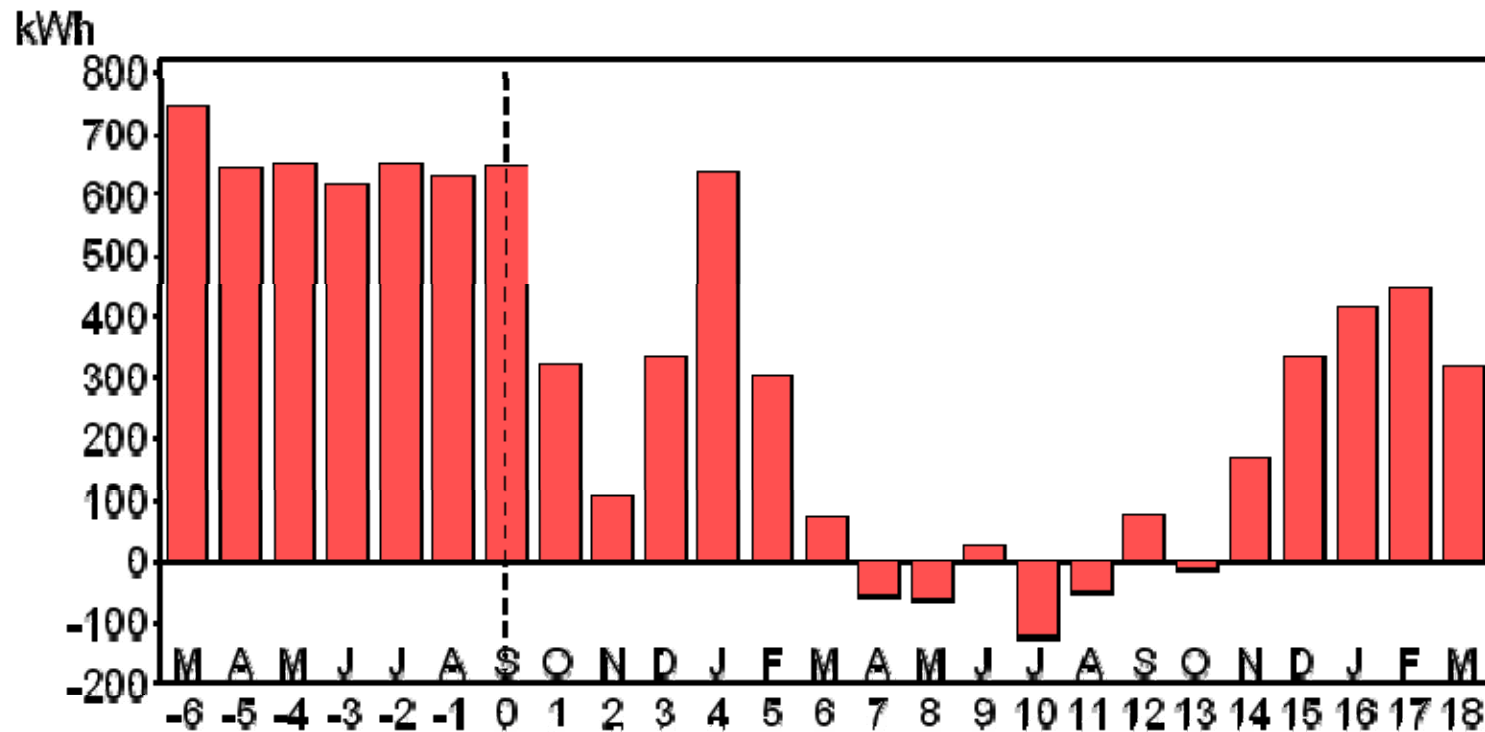
- Includes nearly the full population of CSI participants:

	Program Administrator											
	PG&E			SCE			CCSE					
	Sites	Sector Percent	PA Percent	Sites	Sector Percent	PA Percent	Sites	Sector Percent	PA Percent	Sites	Sector Percent	PA Percent
Residential	20,421	95.1%	56.7%	10,406	95.6%	28.9%	5,210	97.6%	14.5%	36,037	95.6%	100.0%
Commercial	697	3.2%	60.5%	362	3.3%	31.4%	93	1.7%	8.1%	1,152	3.1%	100.0%
Gov./Non-Profit	344	1.6%	68.9%	122	1.1%	24.4%	33	0.6%	6.6%	499	1.3%	100.0%
All	21,462	100.0%	56.9%	10,890	100.0%	28.9%	5,336	100.0%	14.2%	37,688	100.0%	100.0%



Monthly Net Export

- A net export of electricity is visible in negative values in the billing records:

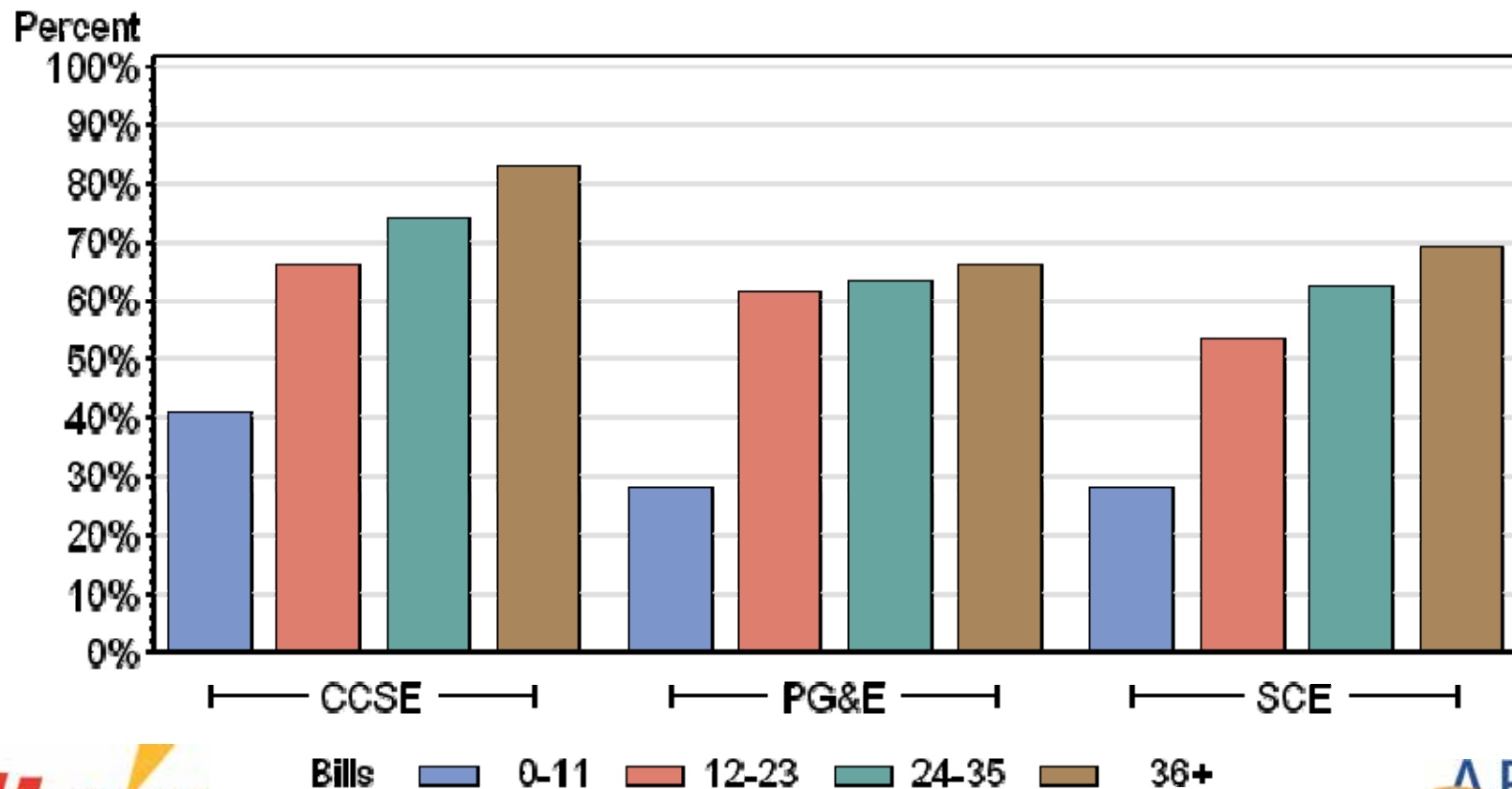


Billing Periods from Install



Residential Bill Exports

- Percent of participants with at least one export month:



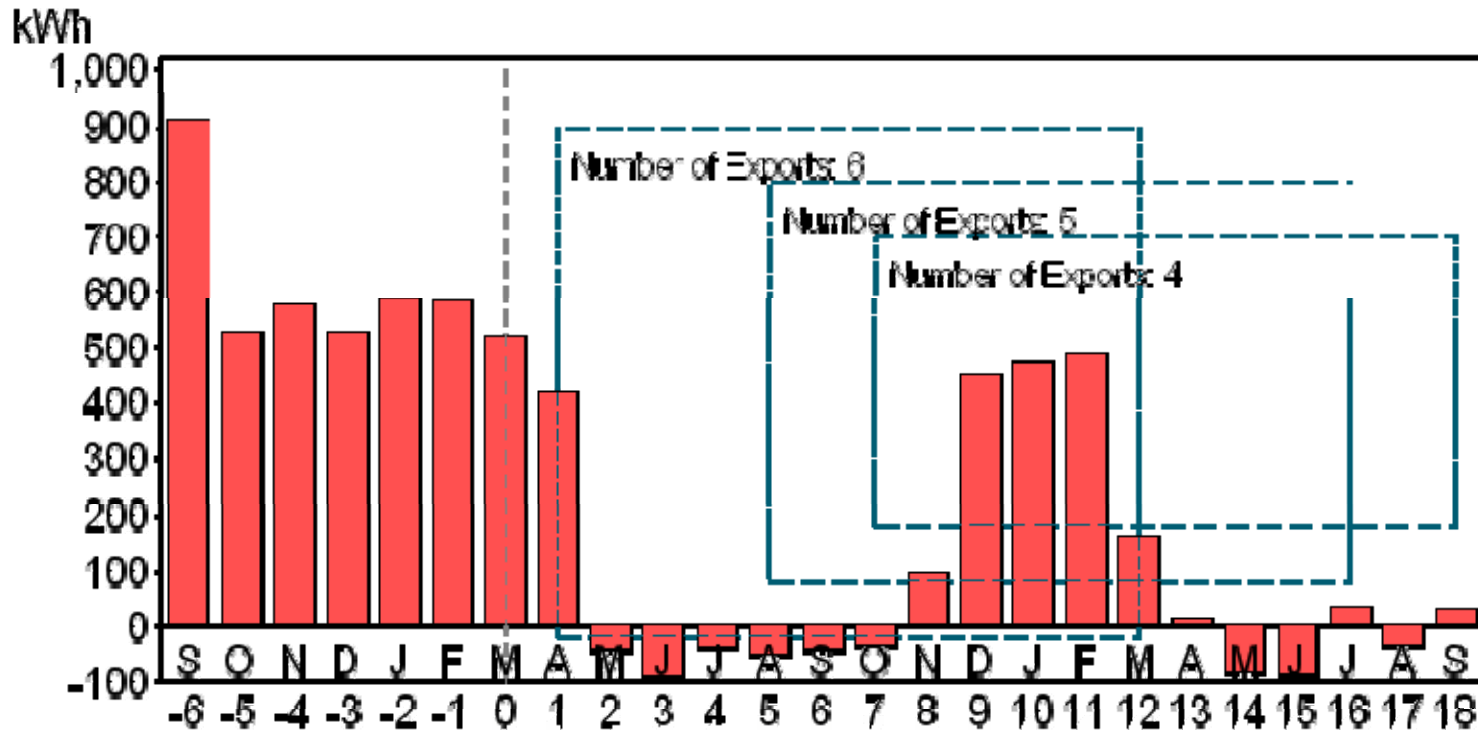
Monthly Export Highlights

- After one year, around 60% of participants will have at least one month of net exports
- SCE has fewer participants with exports than PG&E or CCSE
- Exports are less common for non-residential sites (35% to %40%)



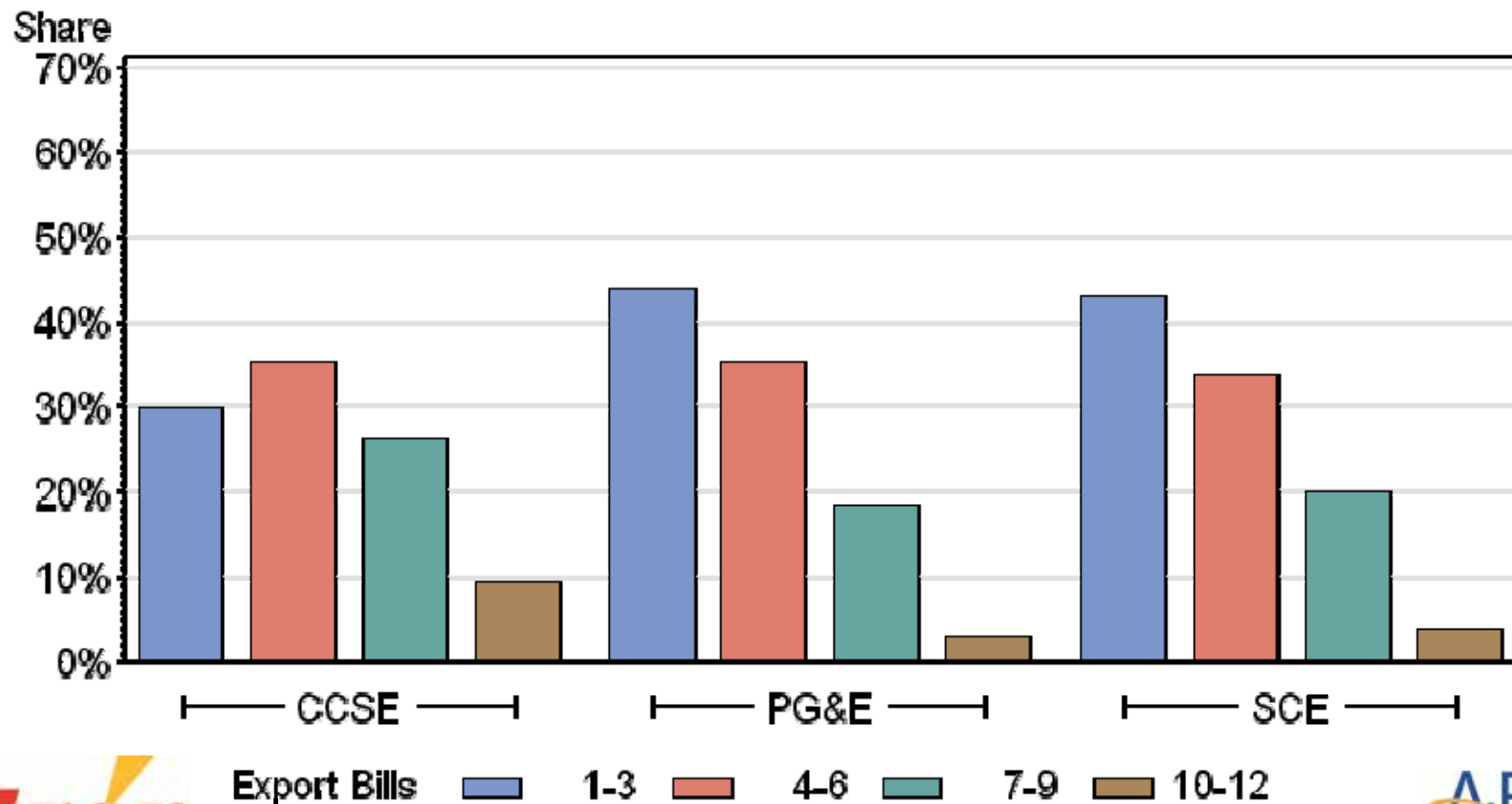
Export Frequency

- Number of times over a year with monthly net export:



Residential Export Frequency

- Share of sites by the most exports in any one year span:



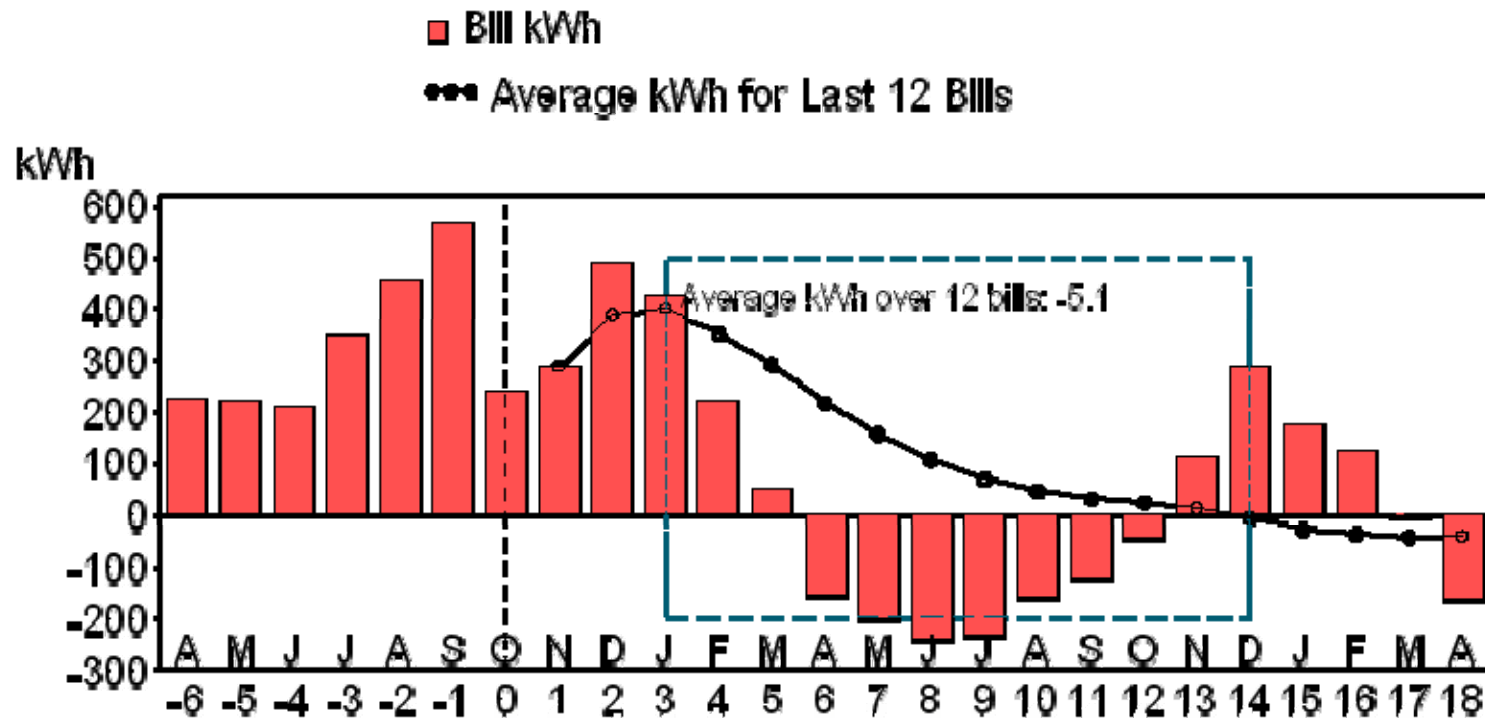
Export Frequency Highlights

- CCSE participants have more exports per year than SCE or PG&E.
- Majority of CCSE residential sites has six or more exports in a year.
- For non-residential sites, it is far more common to have more exports in a year.



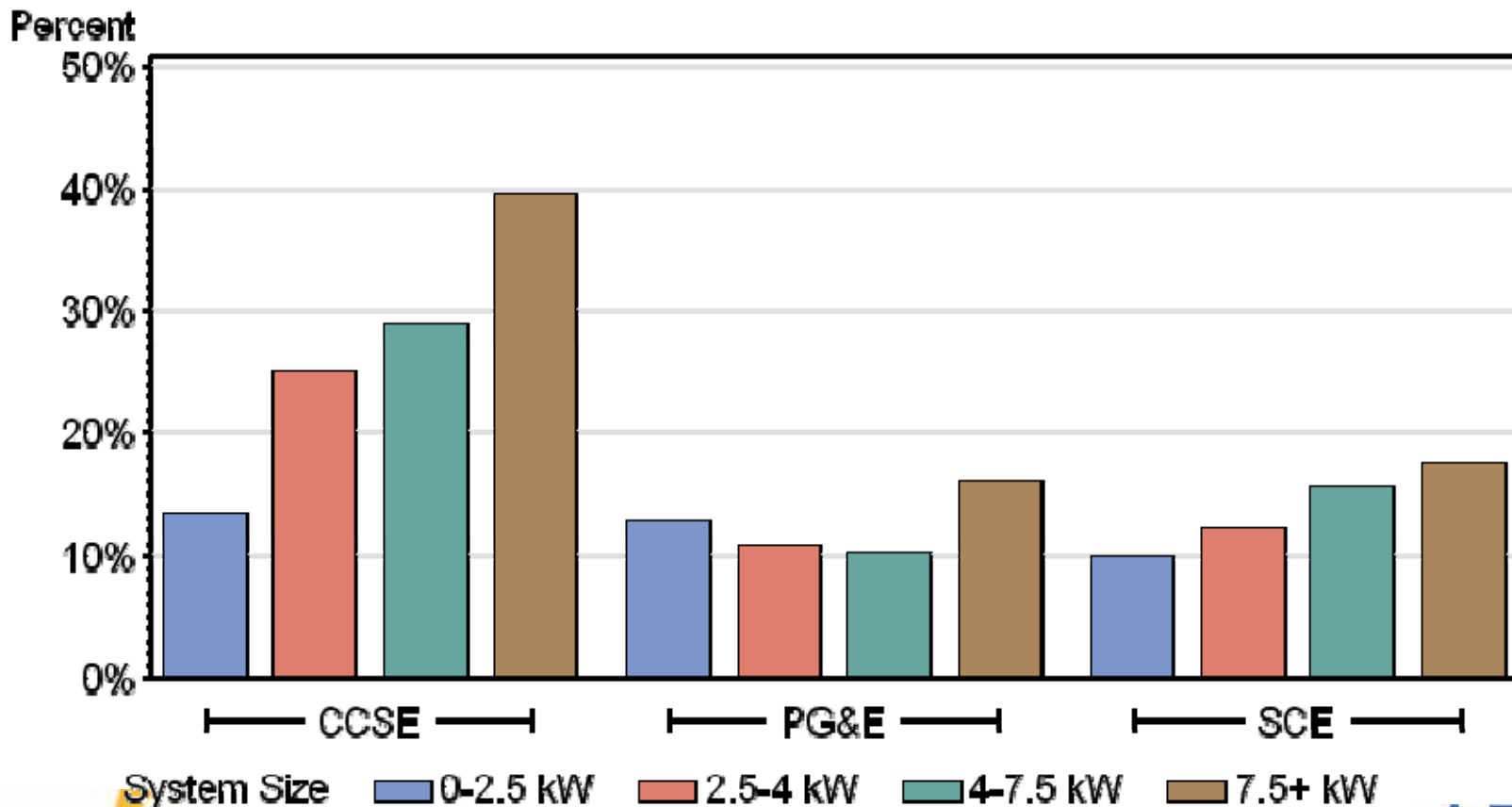
Annual Net Export

- Net utility consumption over any one-year span is negative:



Residential Net Exporters

- Percent of participants with annual net exports:



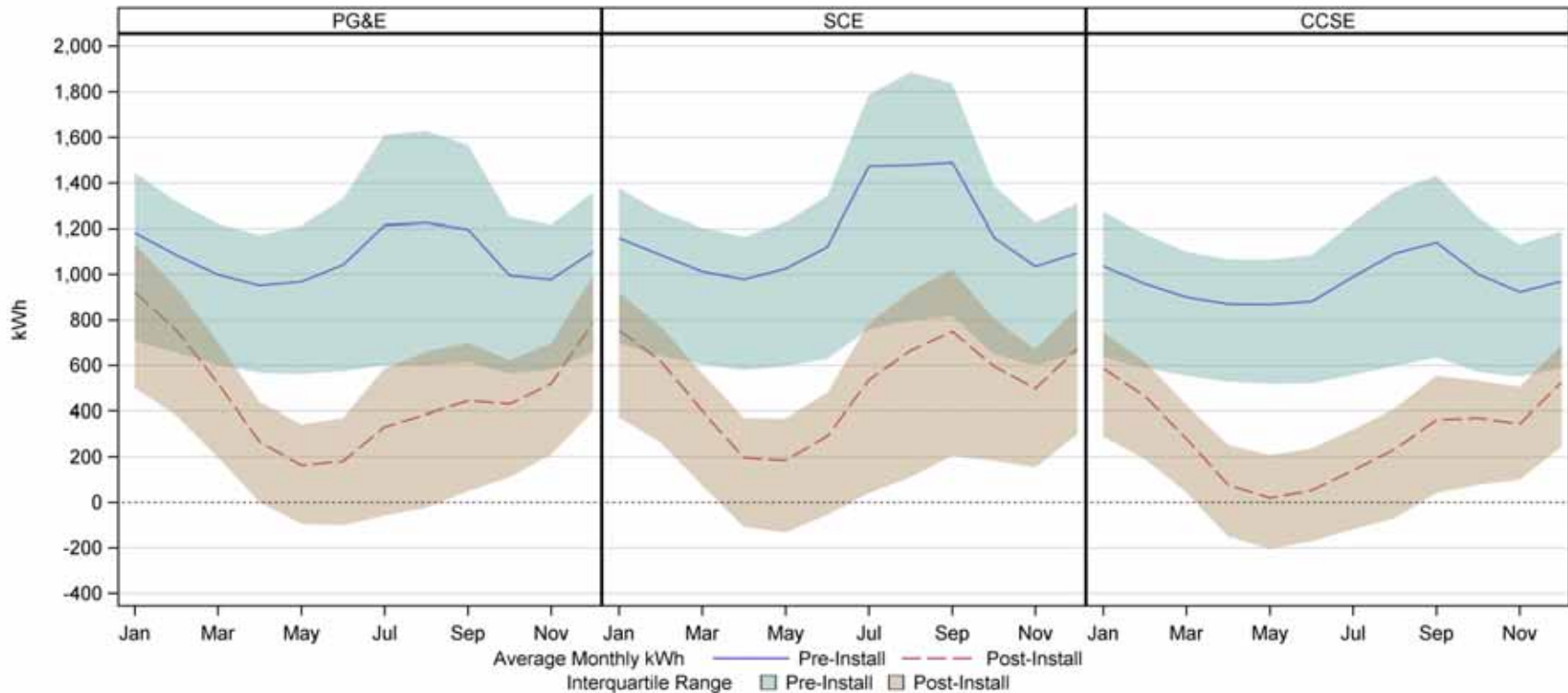
Annual Net Export Highlights

- Overall, 14% of residential sites are annual net exporters
- For CCSE, 1 in 4 residential sites had annual net exports
- Relationship to system size strong for CCSE, less for the other PAs



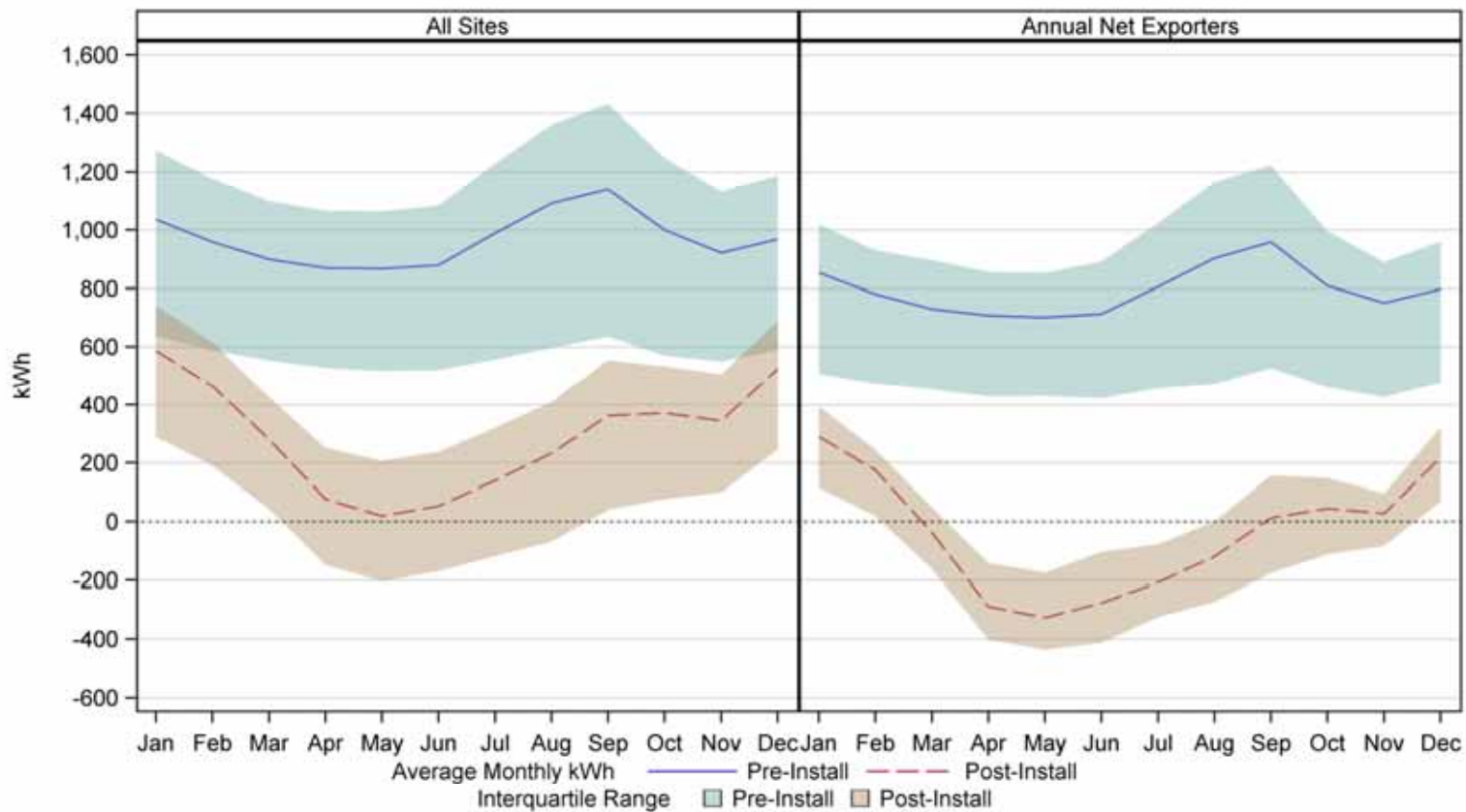
Pre/Post Annual Load Profiles

- All Residential Sites



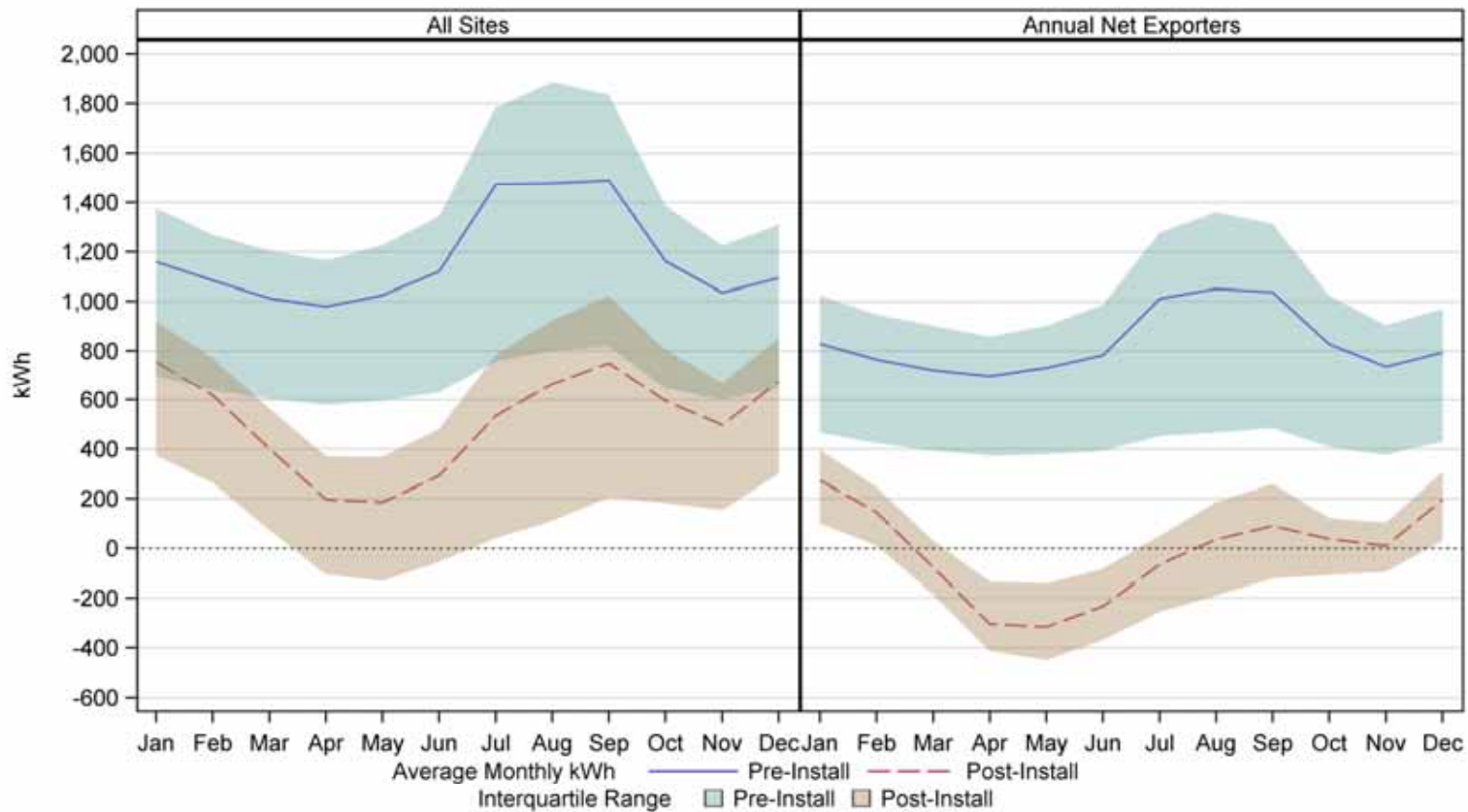
Pre/Post Annual Load Profiles

- CCSE Residential:



Pre/Post Annual Load Profiles

- SCE Residential:



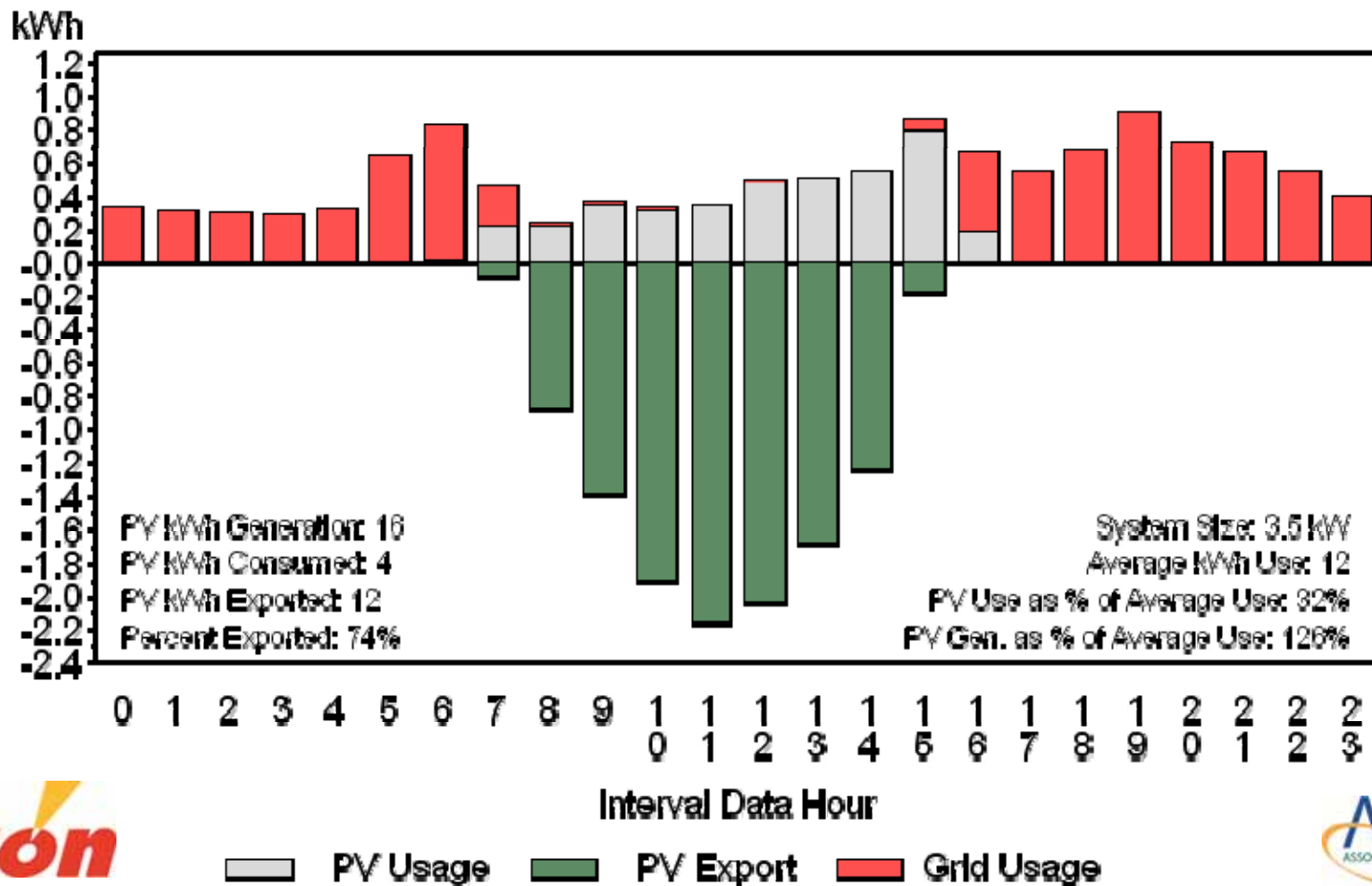
Monthly Net Export Summary

- Net export in monthly bills occurs for the majority of CSI participants
- 10% to 20% of participants show annual net export
- Magnitude of net export is small
- But monthly bills present an incomplete picture...



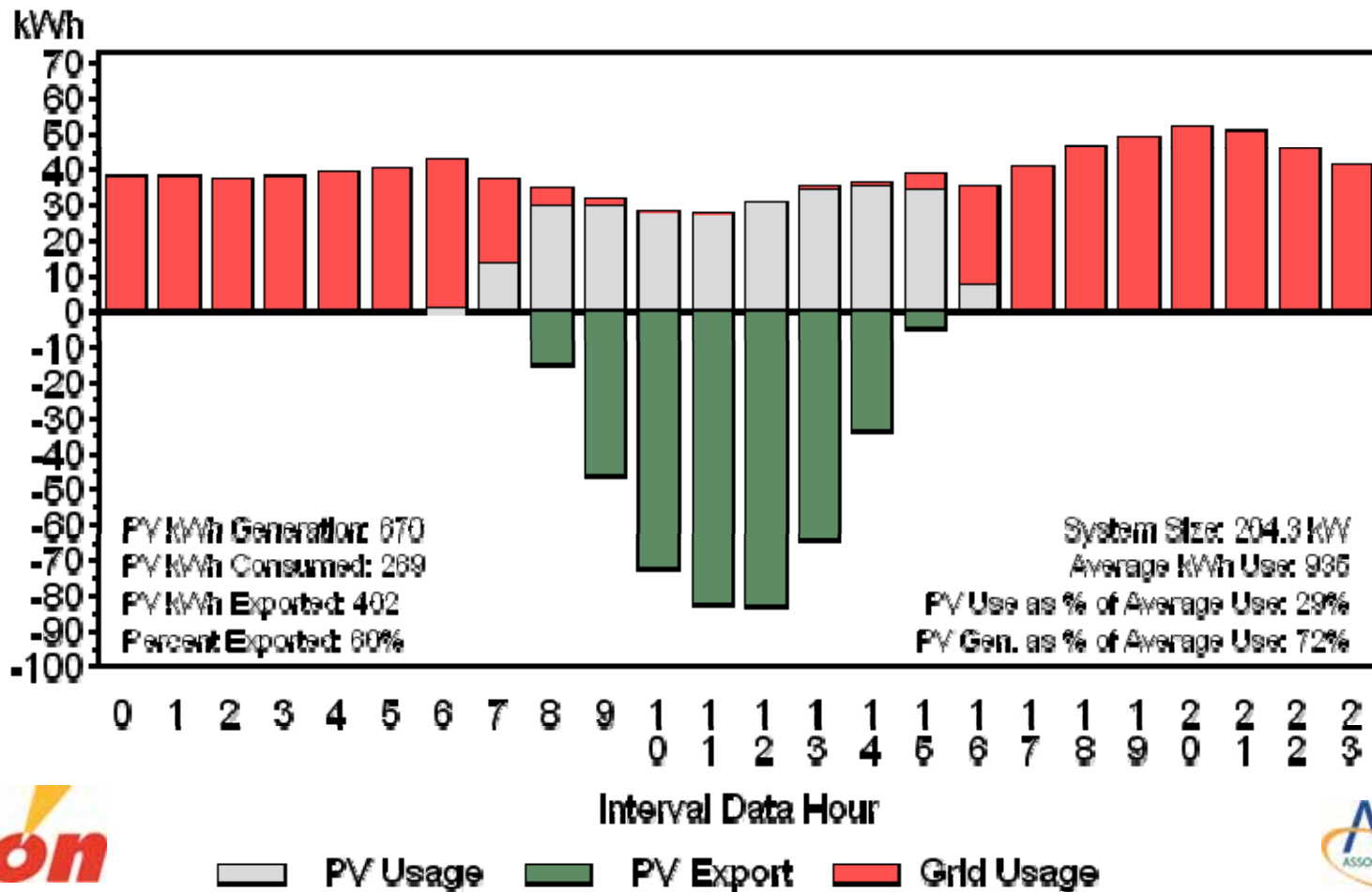
Interval Data Analysis

- Hourly profile for a bill with net exports:



Interval Data Analysis, cont.

- Hourly profile for a bill without net export:



Value of Interval Data

- On their own, interval data can show:
 - Likelihood of export
 - Size of export
- Combined with generation data, interval data can show:
 - Grid usage
 - PV usage
 - PV export

Interval Data Sites

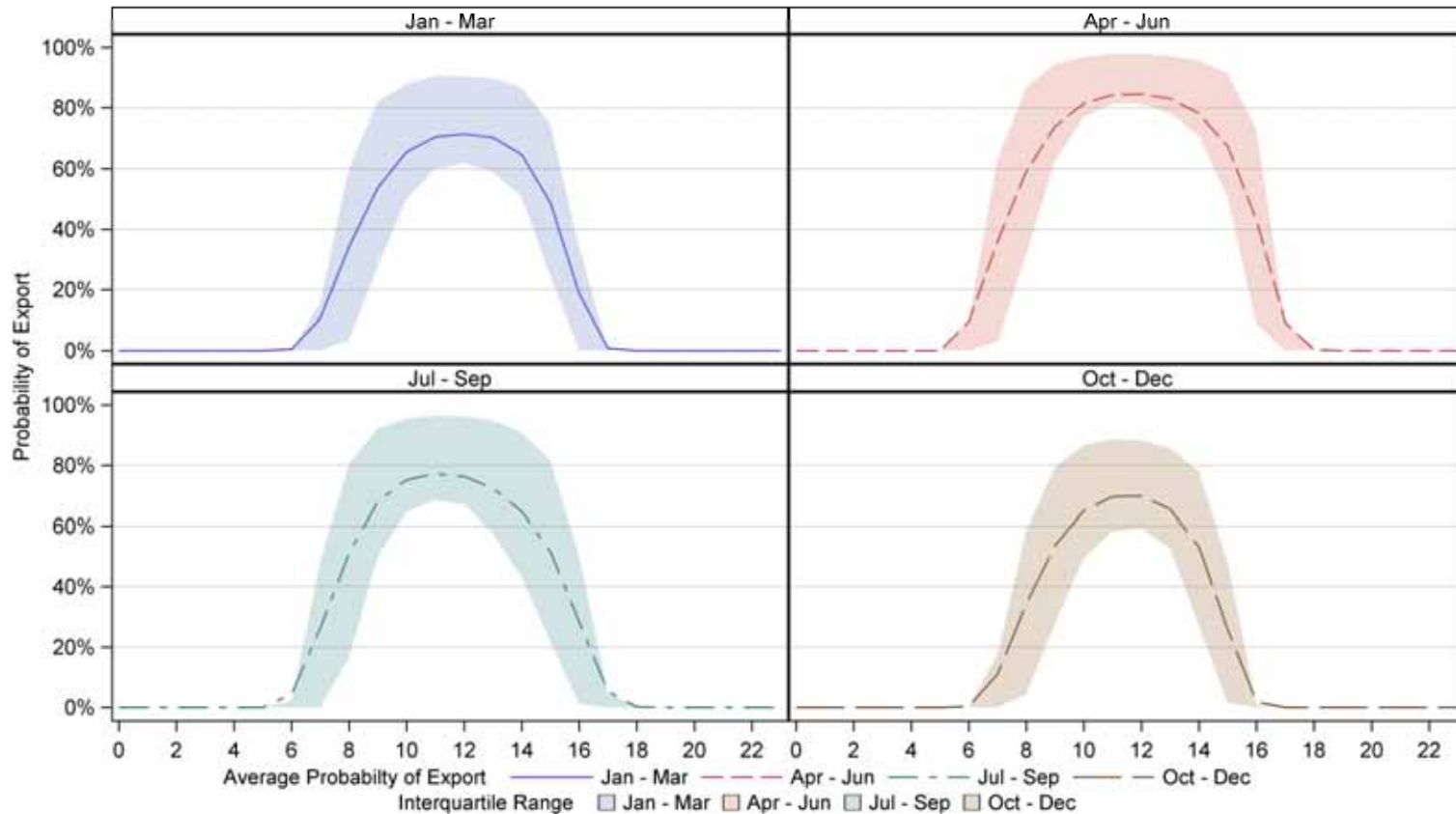
Interval Data Only

	PG&E	SCE	CCSE
Residential	1	765	191
Commercial	84	142	48
Gov./Non-Profit	34	47	19

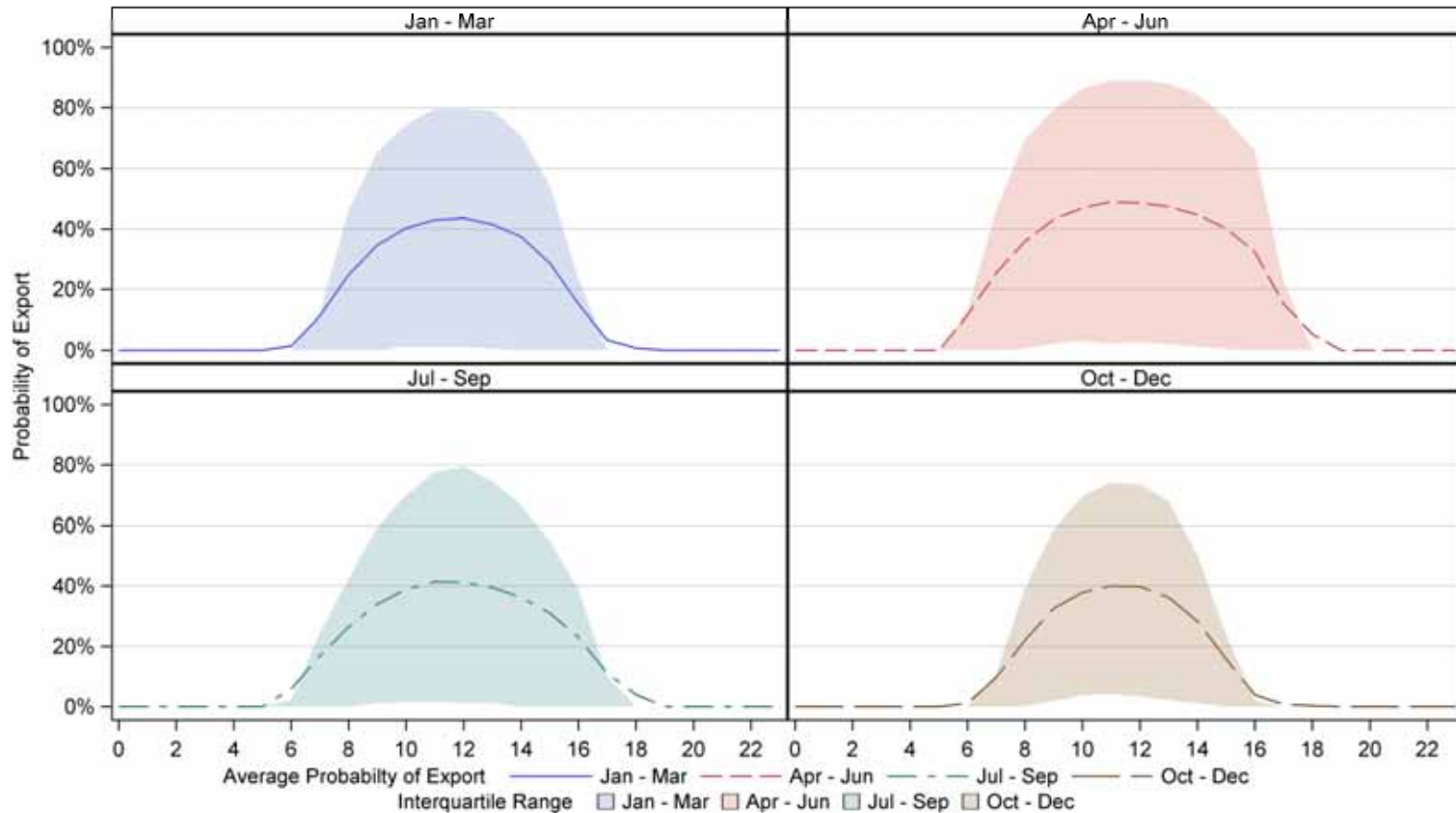
Interval and PV Generation Data

	PG&E	SCE	CCSE
Residential	-	45	60
Commercial	64	46	17
Gov./Non-Profit	11	9	7

Residential Export Probability

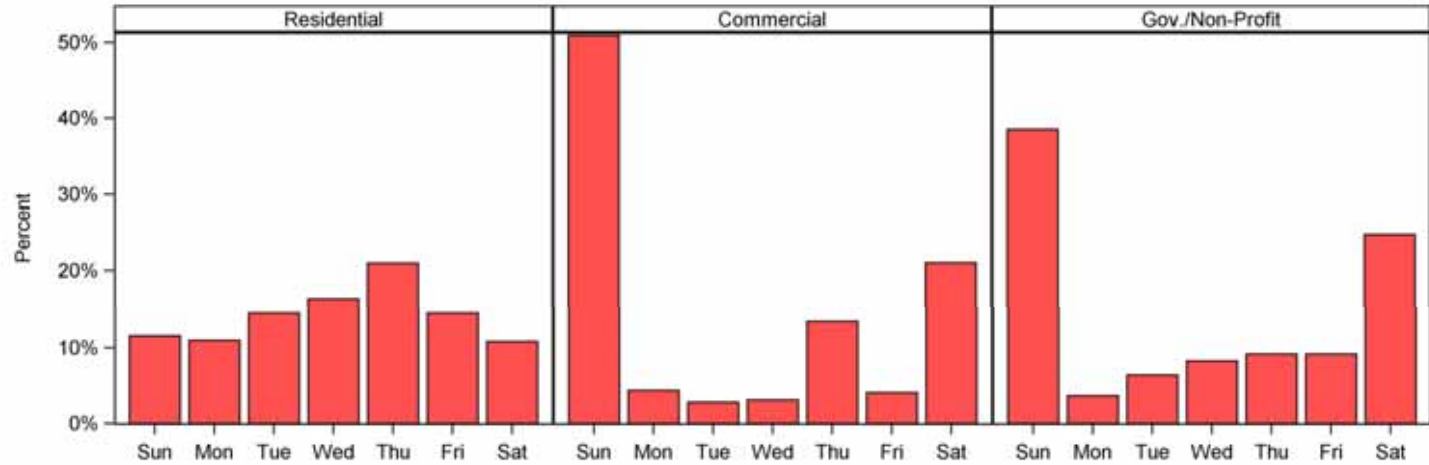


Non-Residential Export Probability

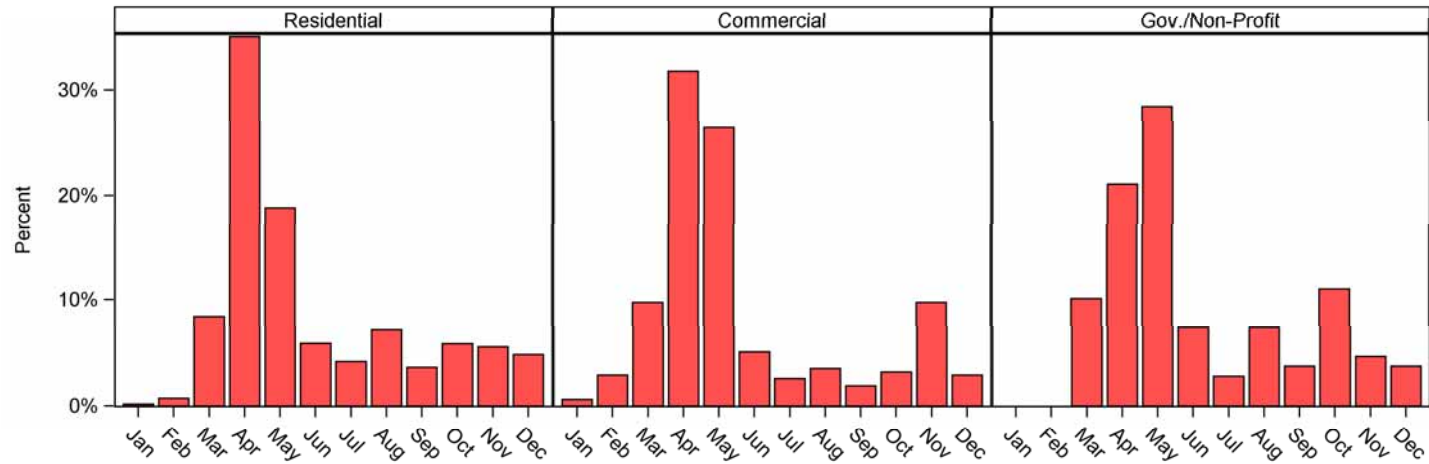


Timing of Peak Exports

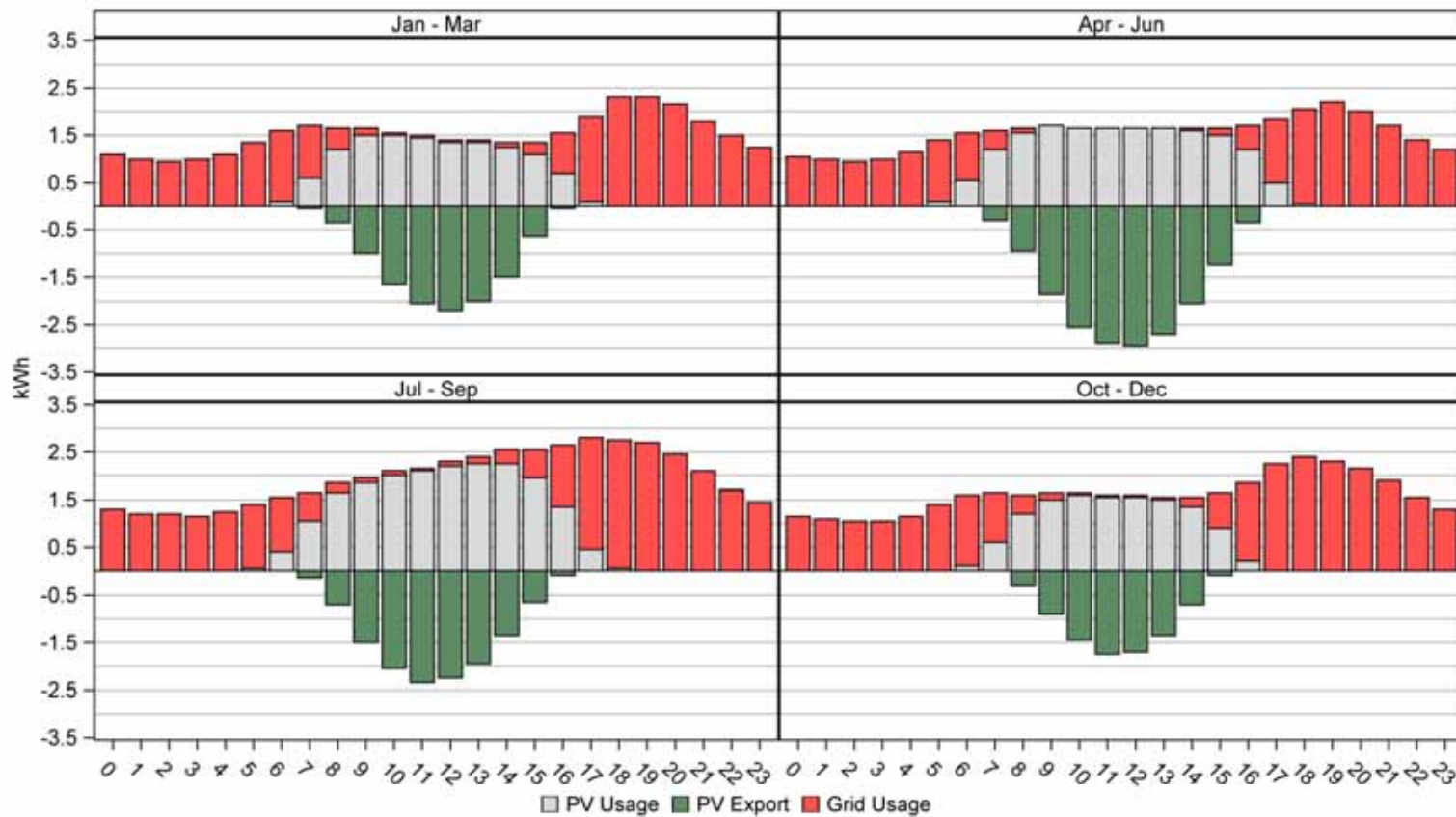
Day of Week



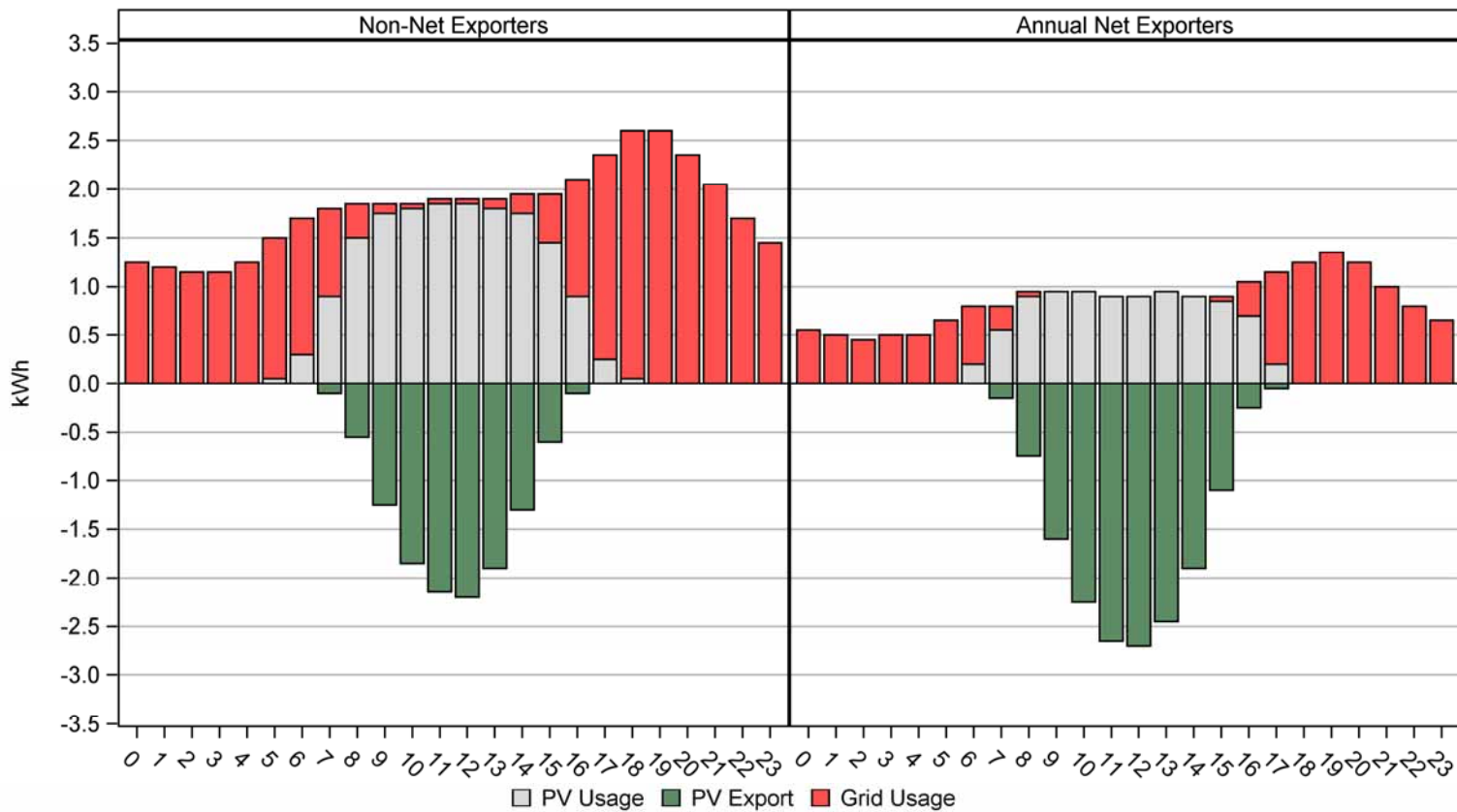
Month



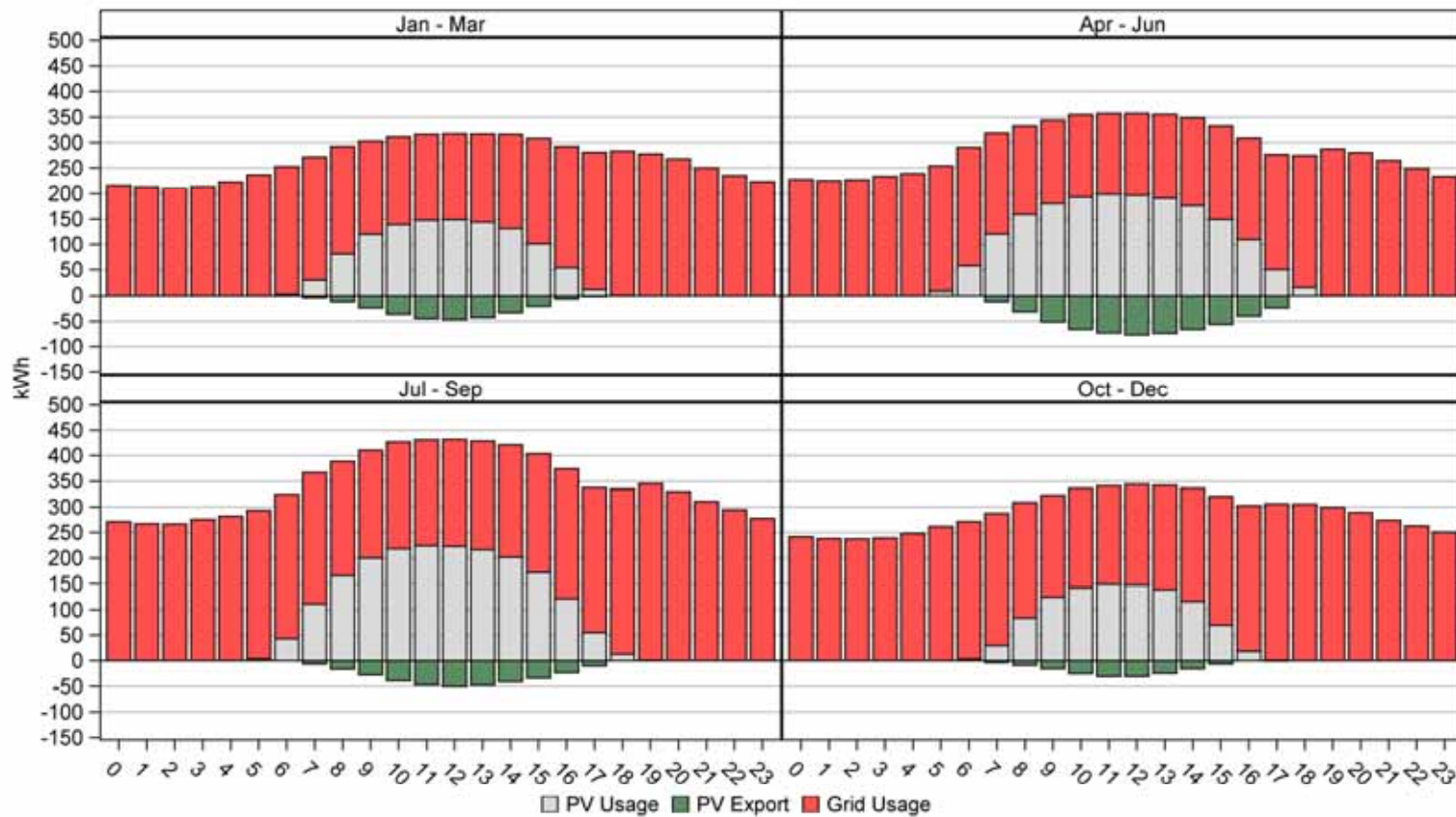
Residential Usage Profiles



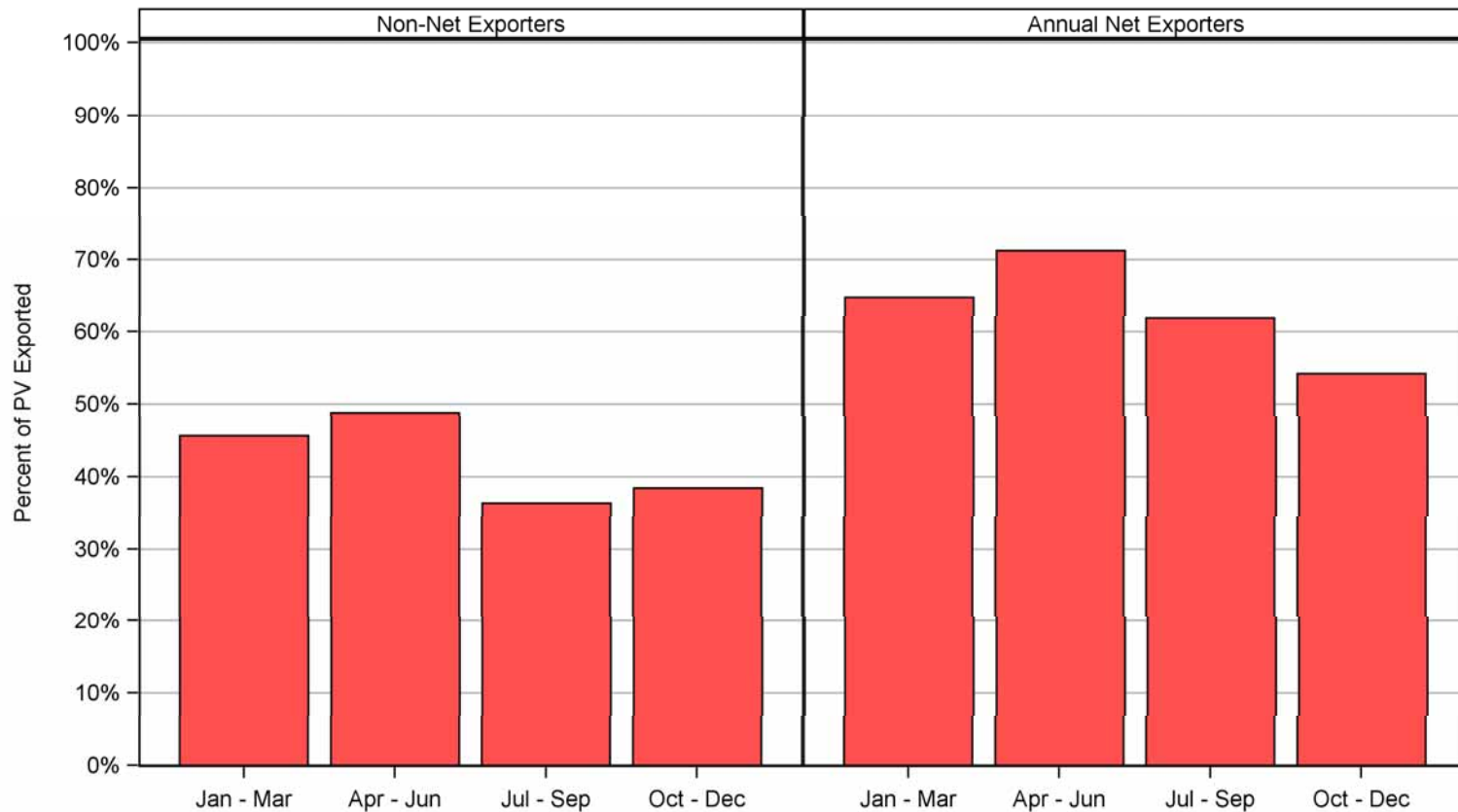
Residential Usage Profiles, Cont.



Non-Residential Usage Profiles



Residential Percent of PV Exported



Interval Data Summary

- A significant share of PV generation is not used by the site, even for sites that don't have net exports
- Residential sites represent a significant source of generation during mid-day hours
- Additional research necessary



Save the Date

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Oct. 15-17, 2012

**AESP's Fall Conference
Long Beach, CA**

Jan. 28-31, 2013

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