Energy's Effect on System Load

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Rooftop Solar (NEM)

- Net Energy Metering program credits customer excess generation (exports) against their consumption
- SDG&E has 85,000 Solar Customers, 85% Residential, 15% Commercial
- 558 MW of Installed Capacity- Over 75% Residential
- Adding about 15 MW monthly
- Virtual Net Metering- 100% of generation exported, billing mechanism
- Exports Mainly from Residential Customers

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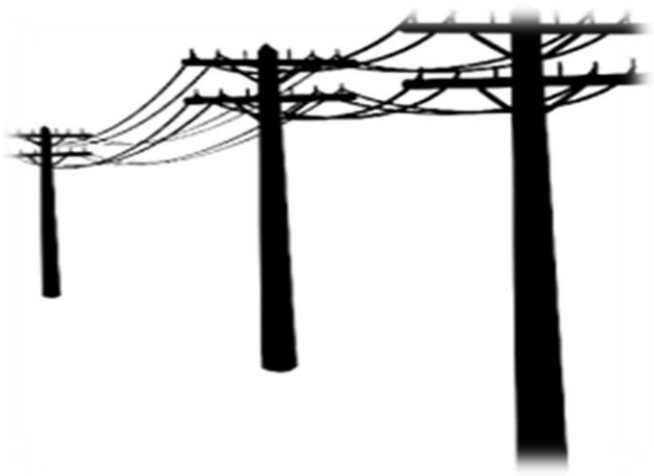
System Load and its uses in Load Research

System Load is the measure of energy/demand procured by the Utility to serve its customers. Measured at multiple generation points as well as transmission lines.

Dynamic Load Profiles

- Produced Daily
- Adjusted to System Load



Load Studies

- Produced Yearly
- Energy Adjusted to R1 (Official Sales)
- Peak Demands adjusted to System Load

Other uses include Demand Response Evaluation, Losses, among others.

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Before Solar

System load=energy delivered at meter + line losses

Prior to Smart Meters

Mechanical Meters ran backwards when customer exported loads,

at month's end was billed kWh

Smart Meter Deployment and increased Solar adoption converged about 2012

- Smart Meters (bi-directional) allow us to separate out exported load from imported load and quantify it by hour
- With the recent drop in cost of rooftop solar, both adoption and system sizes have increased, resulting in more exports to the grid

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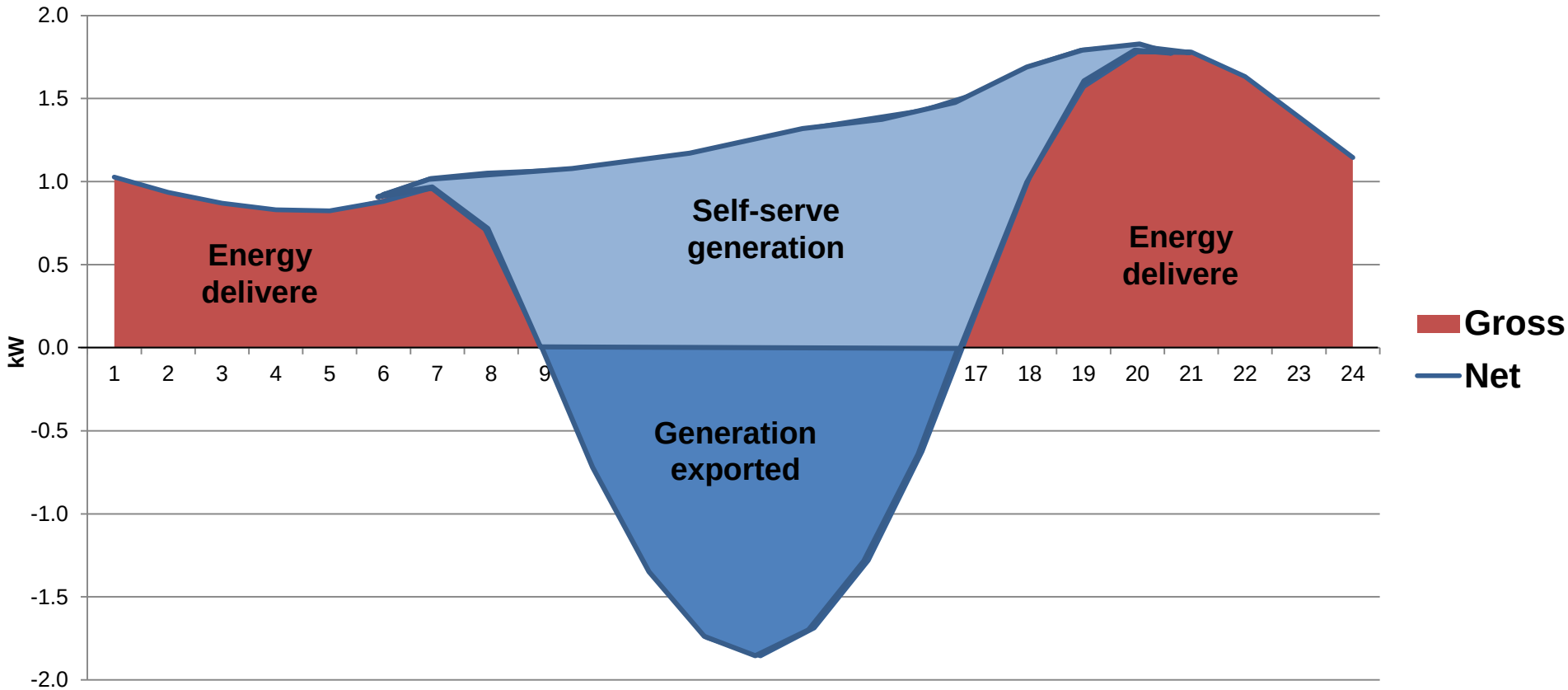
2015 Average Residential NEM Customer



Net Daily Usage=8.37 kWh **Daily Exports=9.27 kWh**

4.8kW system generating 21.7kWh

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Solar Generation's Two components

1. Self Serve Generation- Load Consumed on-site behind the meter

   Reduces the need to draw from the system, therefore lowering system peak demands

2. Exported energy goes onto power lines and into surrounding meters

   9.27 kWh * 73,000 = 676 MWH energy

   1.7 kW * 73,000 = 124 MW at solar peak

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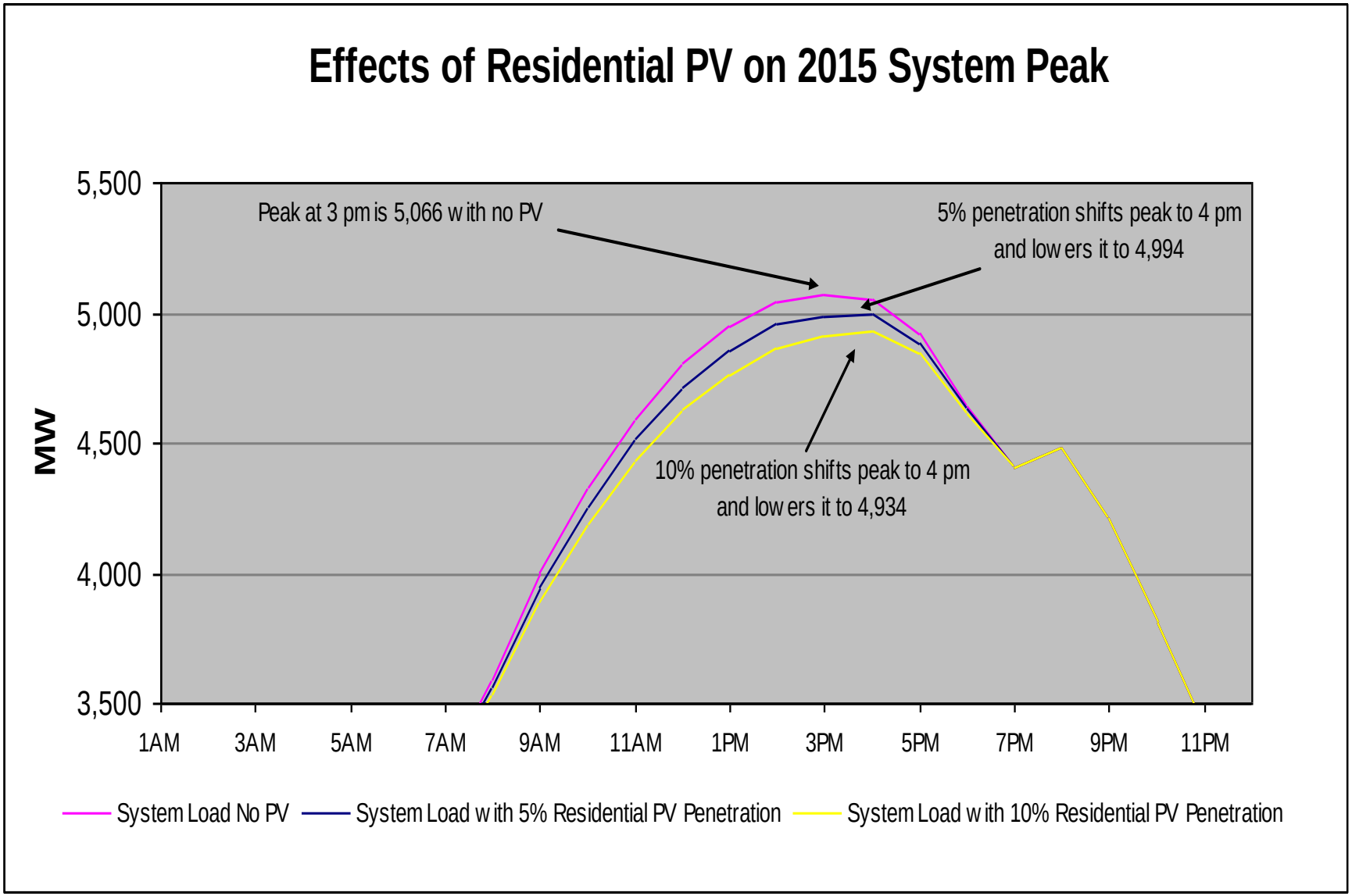
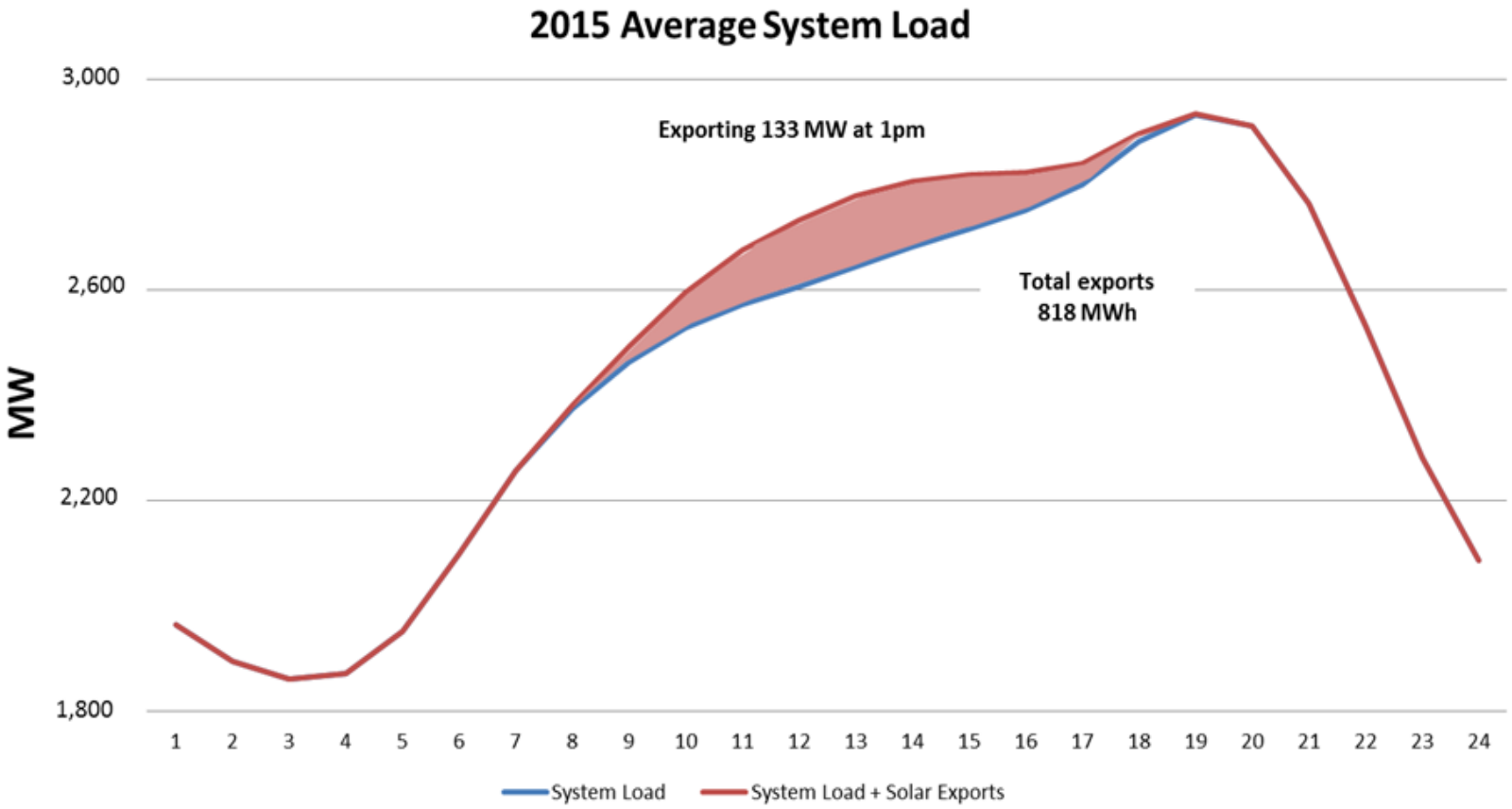
2005 Prediction of 2015



Exported Load vs. System



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If system Load is what is procured, and Net Energy exports are delivered to other customers, what is reported as sales?

R1, SDG&E's Official Sales Report, feeds off of monthly consumption totals. It does not however, incorporate netted energy that is negative. In other words, if a customer exports more than they import, their consumption is treated as 0. Therefore,

Delivered Load>R1

But since R1 capture some exports,

R1> System Load

Resulting in three different measurements

Delivered Load>R1>System Load

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What does this un-measured load mean?

- If system load understates the total load consumed at the meter, won't coincident to system peak estimates be understated as well?

  We have traditionally used system peak as a control total for coincident peak demands.

- We believe that this is especially true for Residential rates where exports are more common
- Cost allocations are based on peak demands as a way to recover infrastructure expenses, **would the result of understated demands cause a cross subsidies**?

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What is the solution?

- Continue to ignore exports
- Change Current Reporting to incorporate all exports
- Create Multiple reports
  i. Sales at time of delivery
  ii. Net sales at month end
  iii. Area load (including COGEN)
  iv. Other

What may influence this issue in the Future

- NEM rules, credits, excess pay rate, etc.
- TOU rates
- Adoption of Storage Batteries might reduce the level of exports

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