



**HOUSTONKEMP**  
Economists

# Efficiency of tariffs for new and emerging technologies

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Australian Institute of Energy Seminar

Oliver Nunn, Senior Economist  
Sydney – 30 June 2014

Our analysis focused on three case studies:

1. Air conditioners in Victoria
2. Solar PV in South Australia
3. Battery Storage in Queensland

# Case Study 1:

## Air conditioners in the SP AusNet network

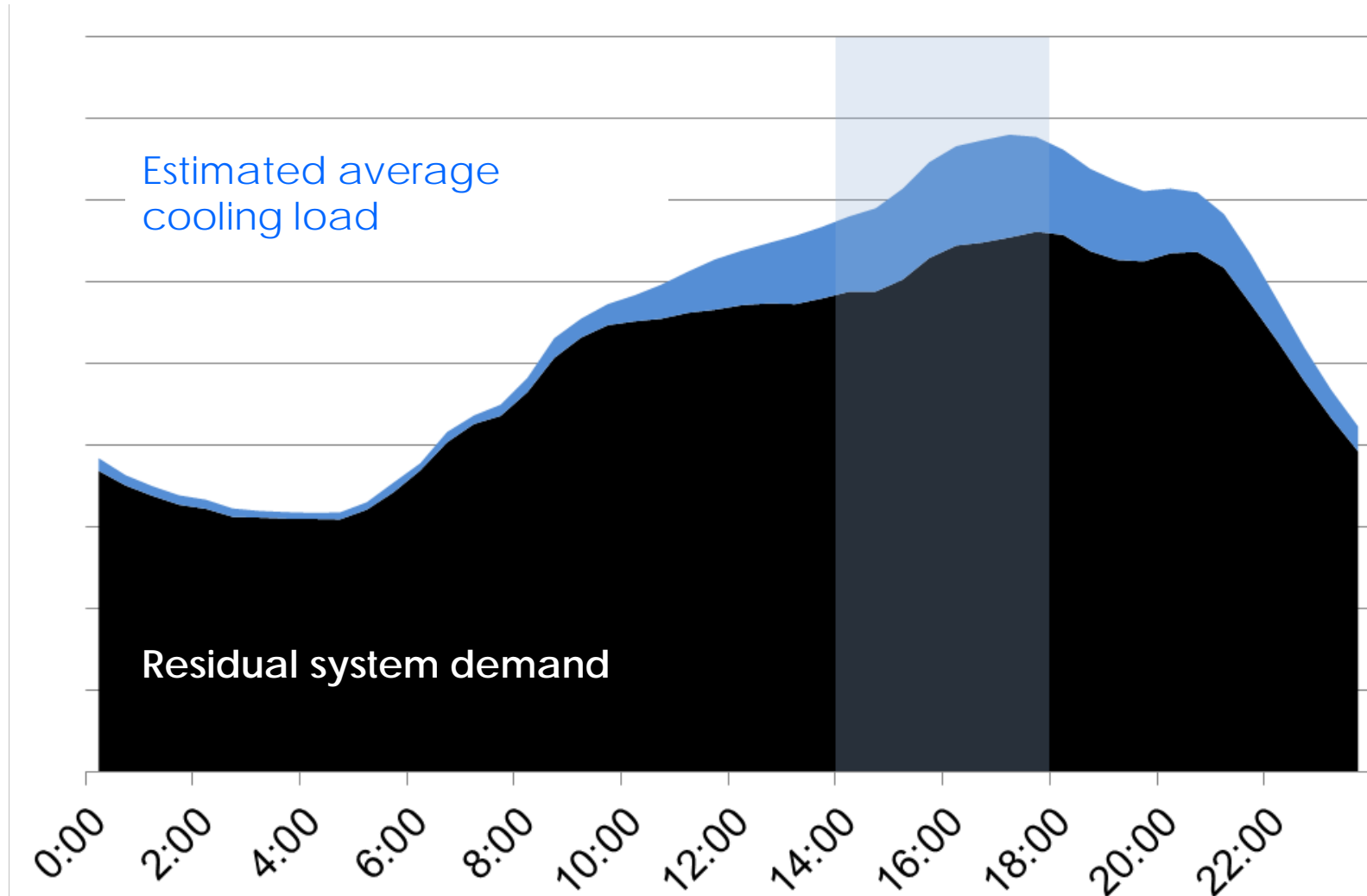


- Network tariff
  - Residential flat tariffs (NEE11– DUOS)
  - Residential ToU tariff (NSP11– DUOS) <sup>1</sup>
- Retail tariffs
  - Residential flat tariff (standing offer) <sup>2</sup>
  - Residential ToU tariff (standing offer) <sup>2</sup>

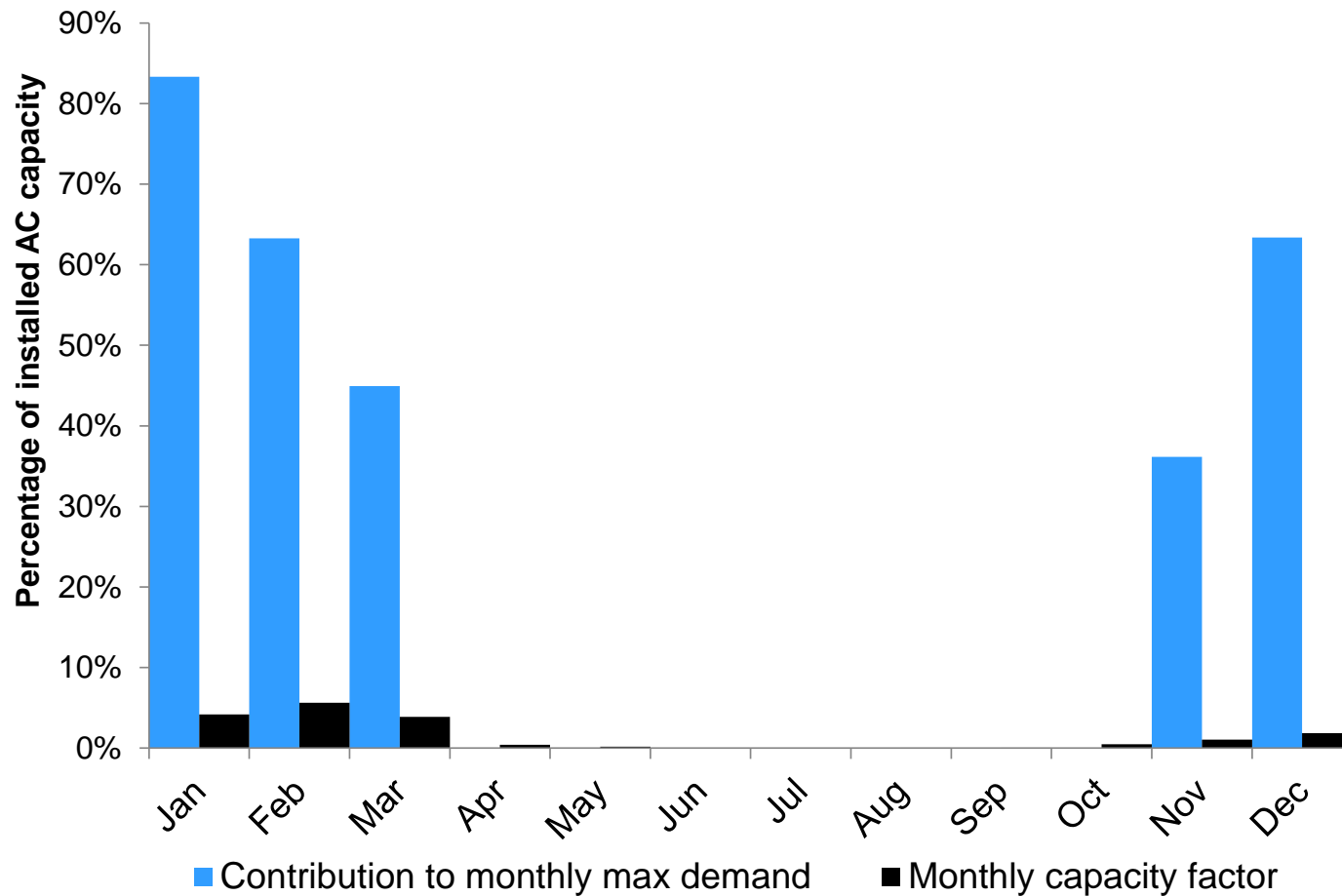
1. Only a handful of customers are on this tariff. All input data is for NEE11.

2. Energy Australia and Origin Energy.

# Air-conditioner contribution to demand – 2013

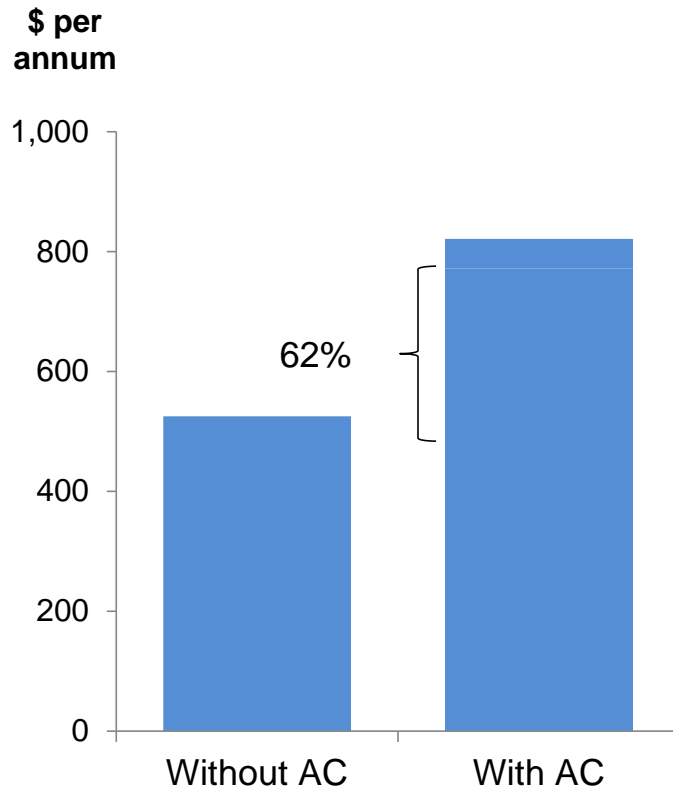


# Air-conditioners have low capacity factors, but contribute greatly to maximum demand

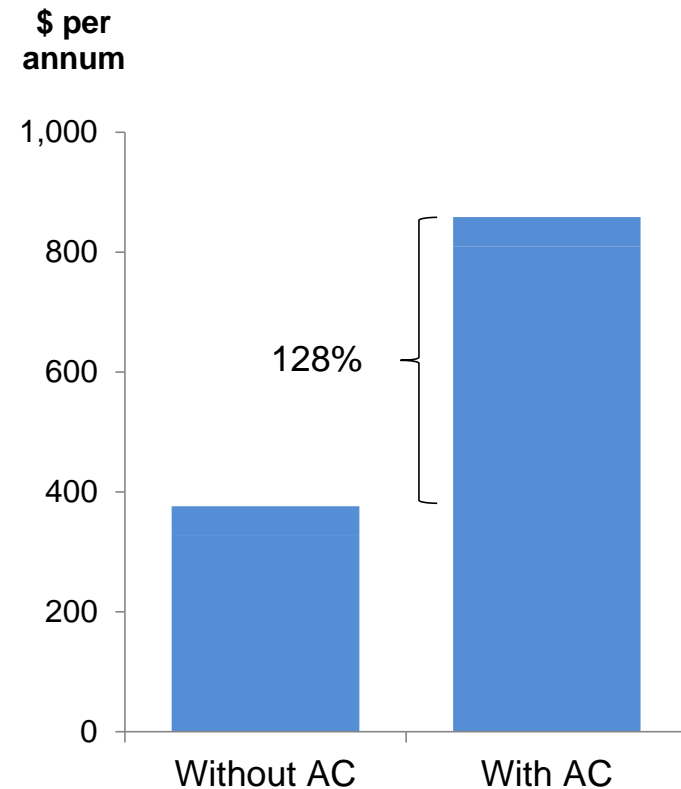


# Using an air conditioner increases a customer's network bill

## Inclining block tariff

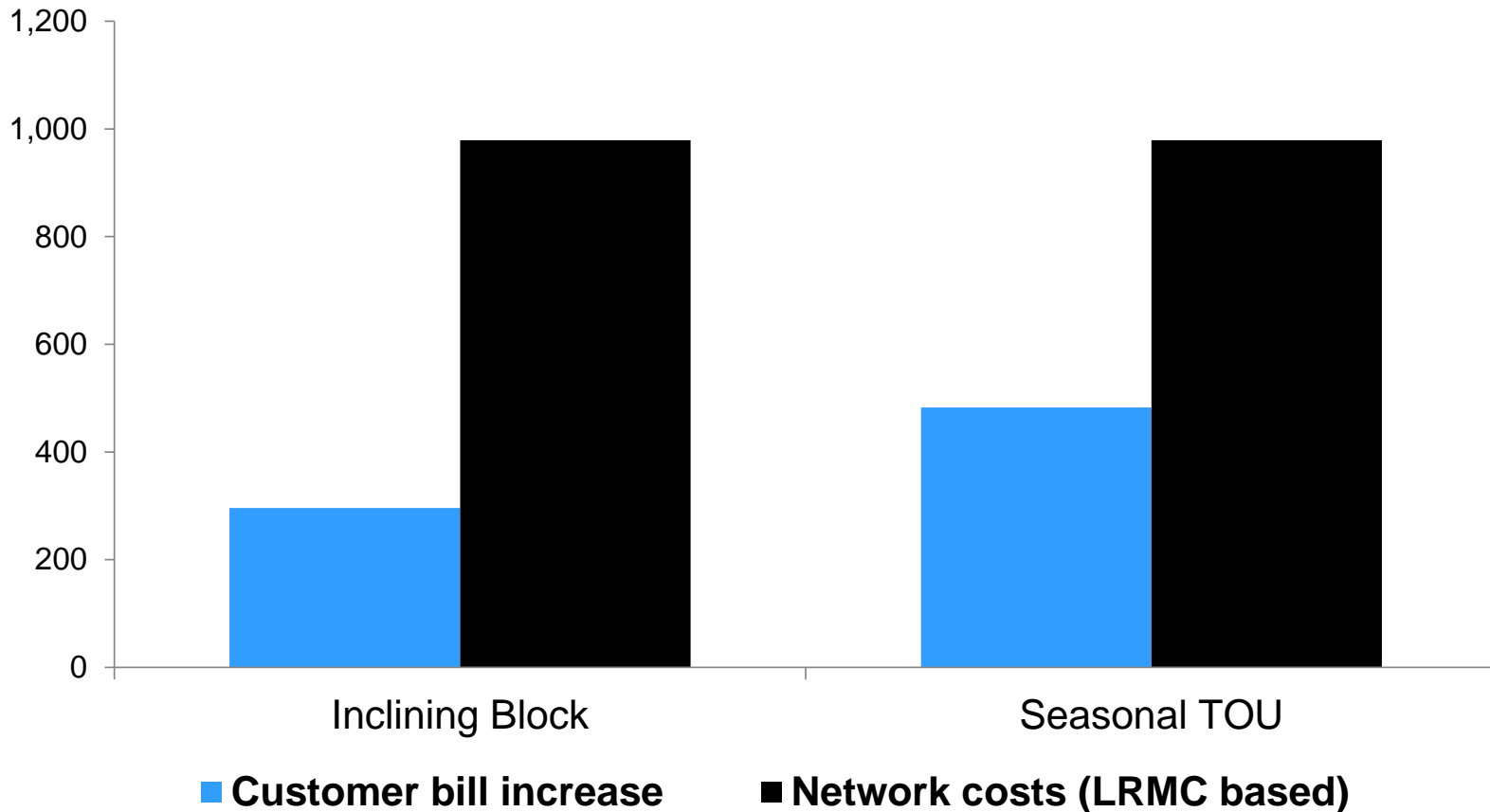


## Seasonal TOU tariff



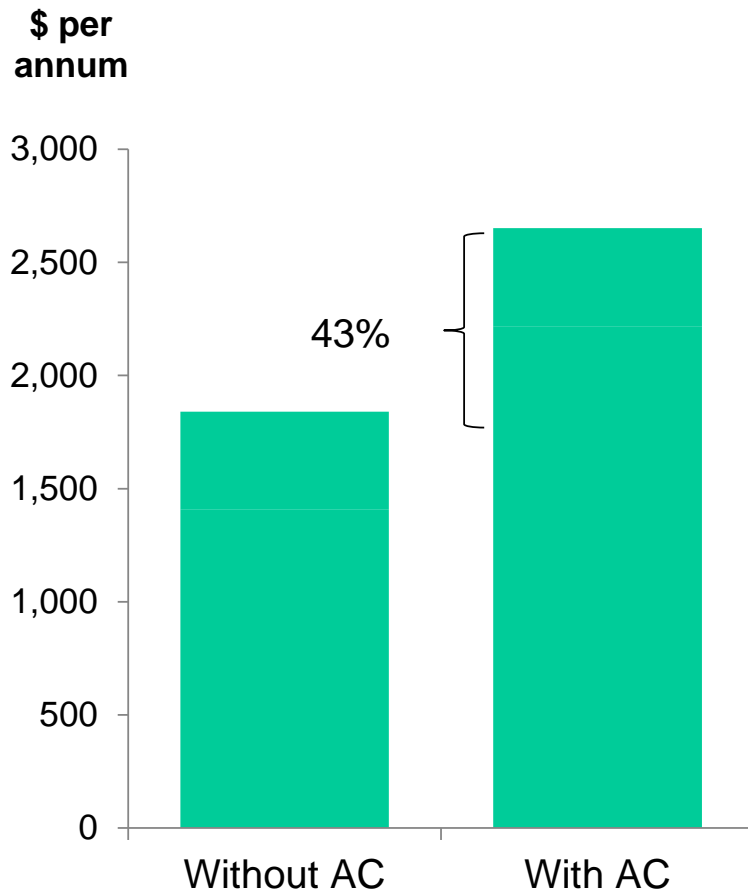
# Air-conditioners impose costs on the network that exceed costs to the consumer

\$ per annum

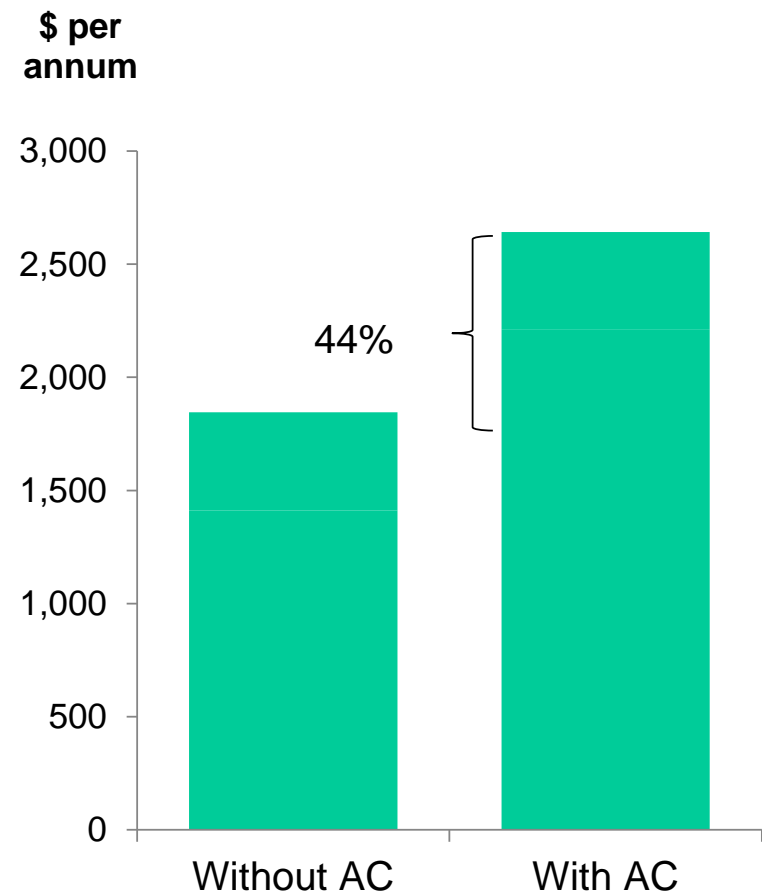


# Using an air conditioner increases a customer's retail bill considerably

## Inclining block tariff



## TOU tariff





## Case Study 2: Solar PV in SAPN's network

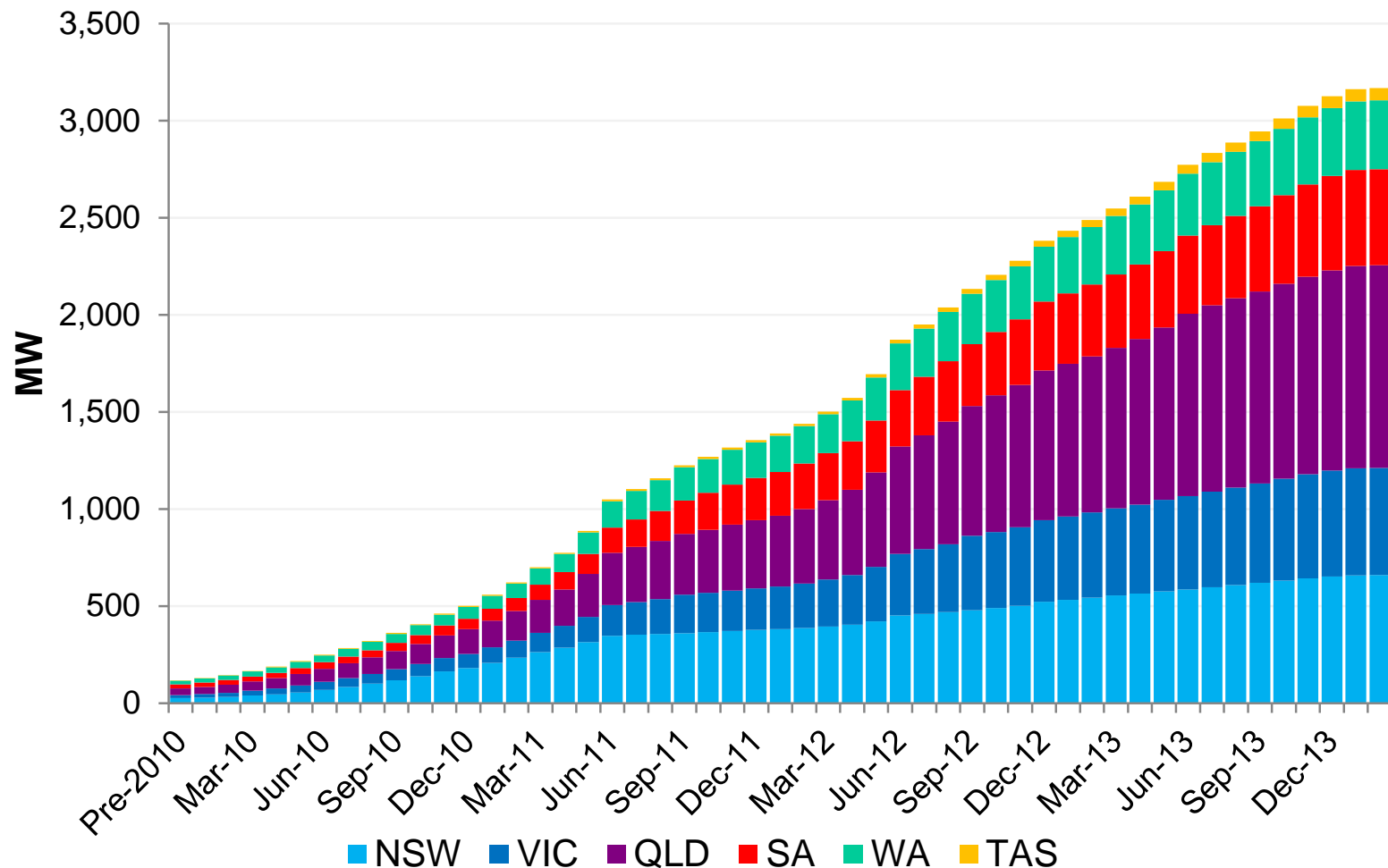


- Assumed PV installation size:
  - 3 kW installation with 5 MWh annual consumption
- Network tariffs
  - Inclining block residential tariff (MRSR)<sup>1</sup>
- Retail tariffs
  - Seasonal inclining block residential tariff (Standing offer of AGL and Origin Energy)

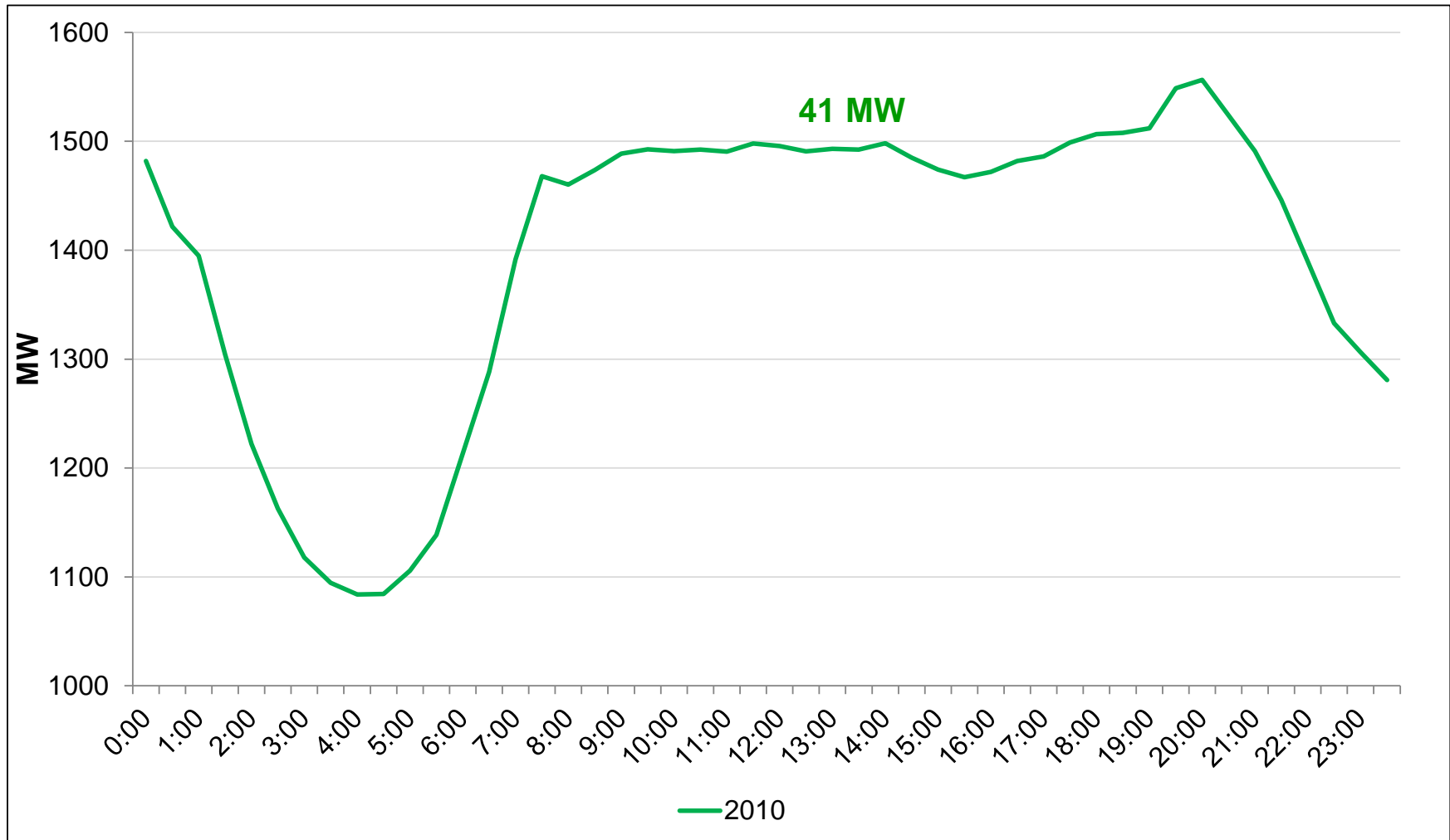


1. Monthly Residential Single Rate

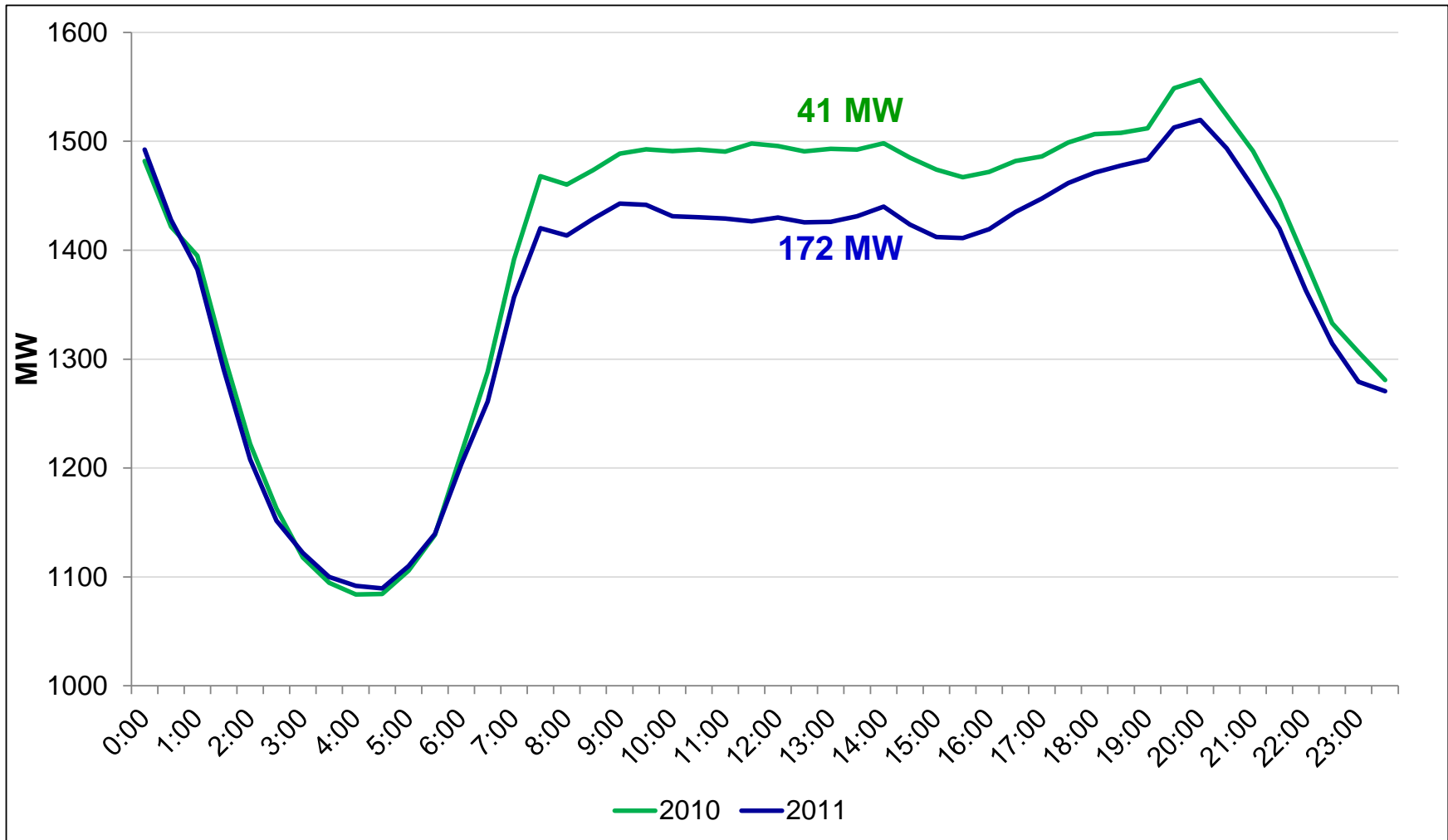
# PV Capacity has increased 25 fold in four years



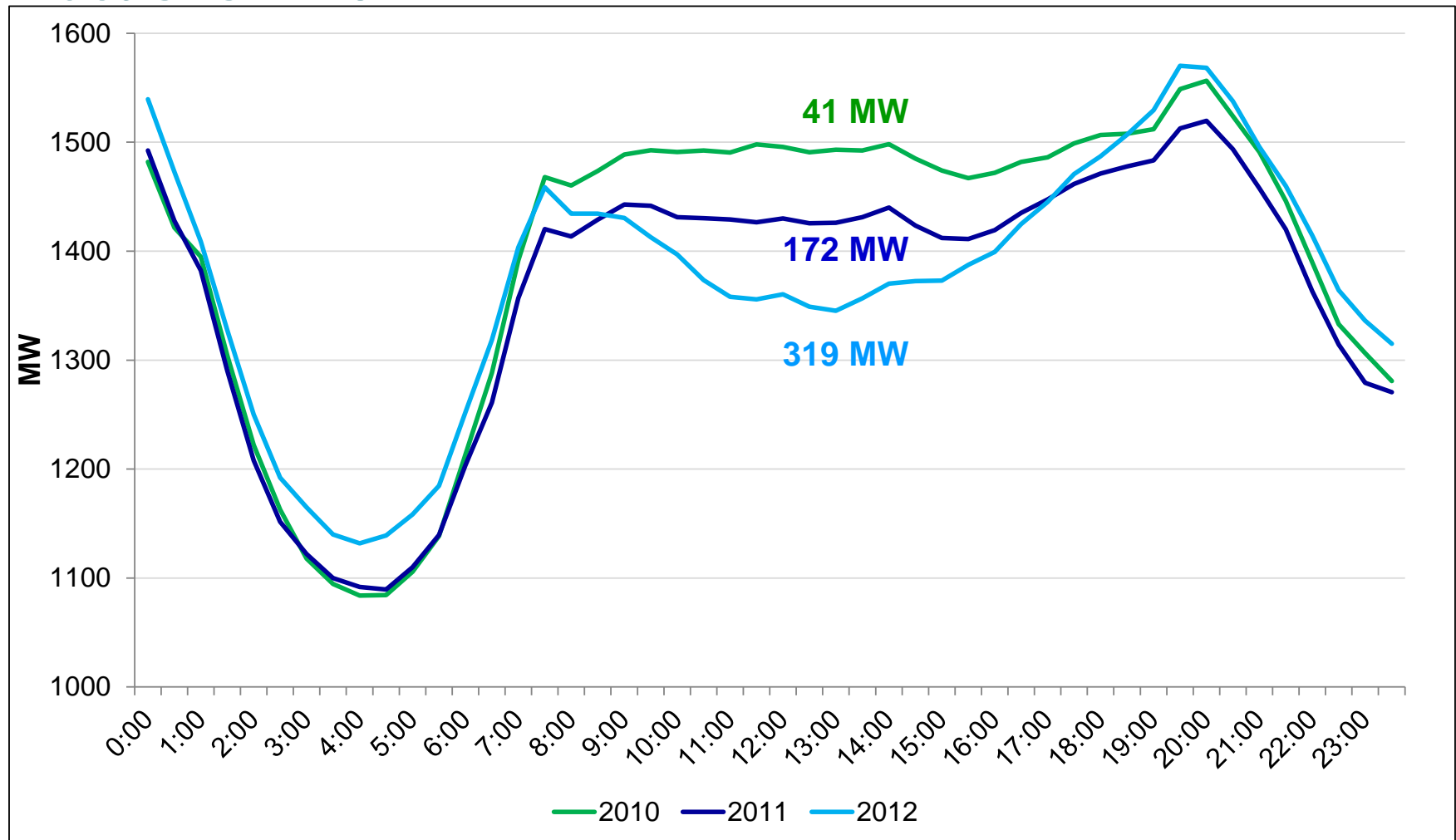
# PVs are changing the load profile in South Australia – 2010



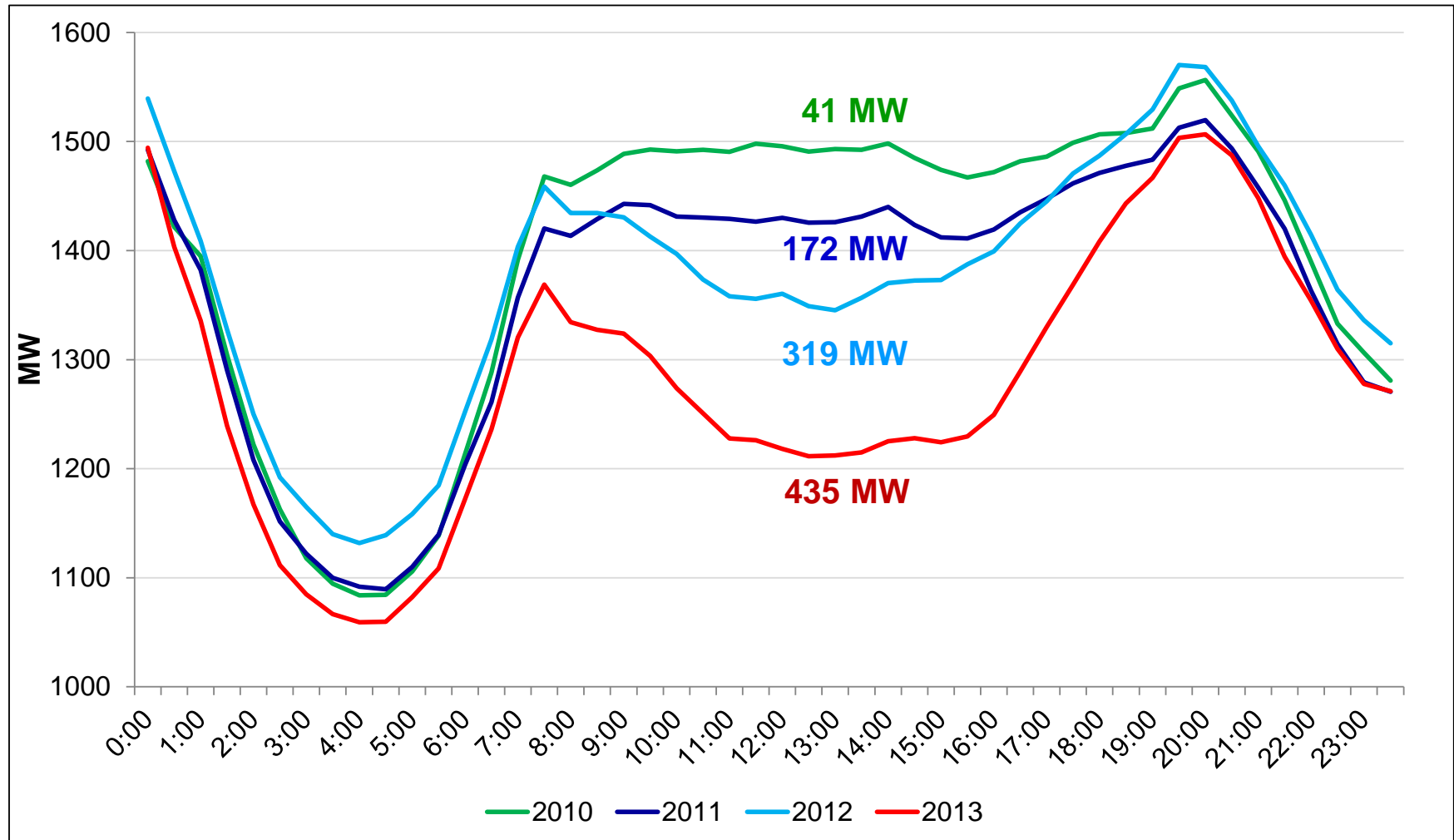
# PVs are changing the load profile in South Australia – 2011



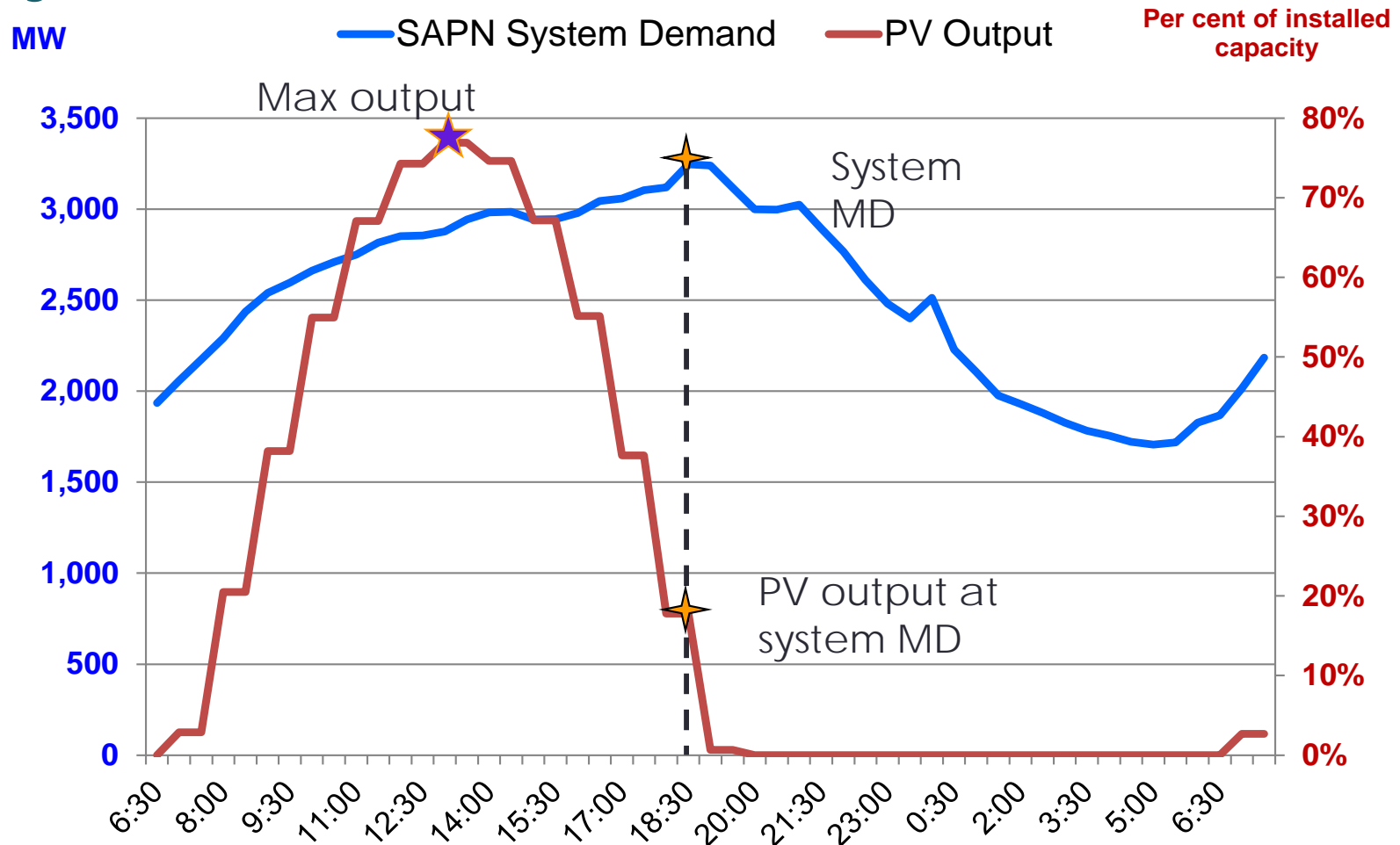
# PVs are changing the load profile in South Australia – 2012



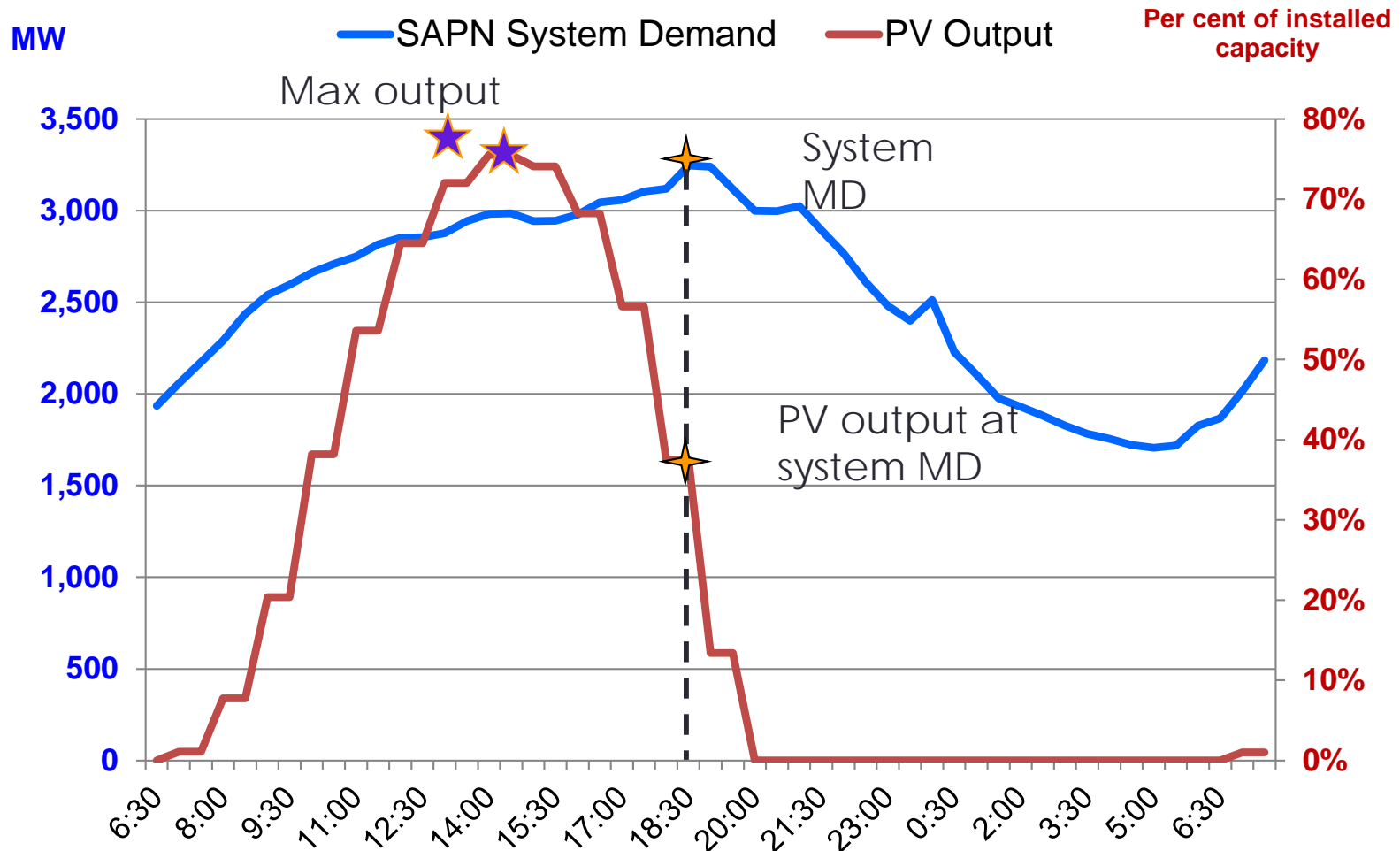
# PVs are changing the load profile in South Australia – 2013



# North-oriented PV output is low during the system max demand



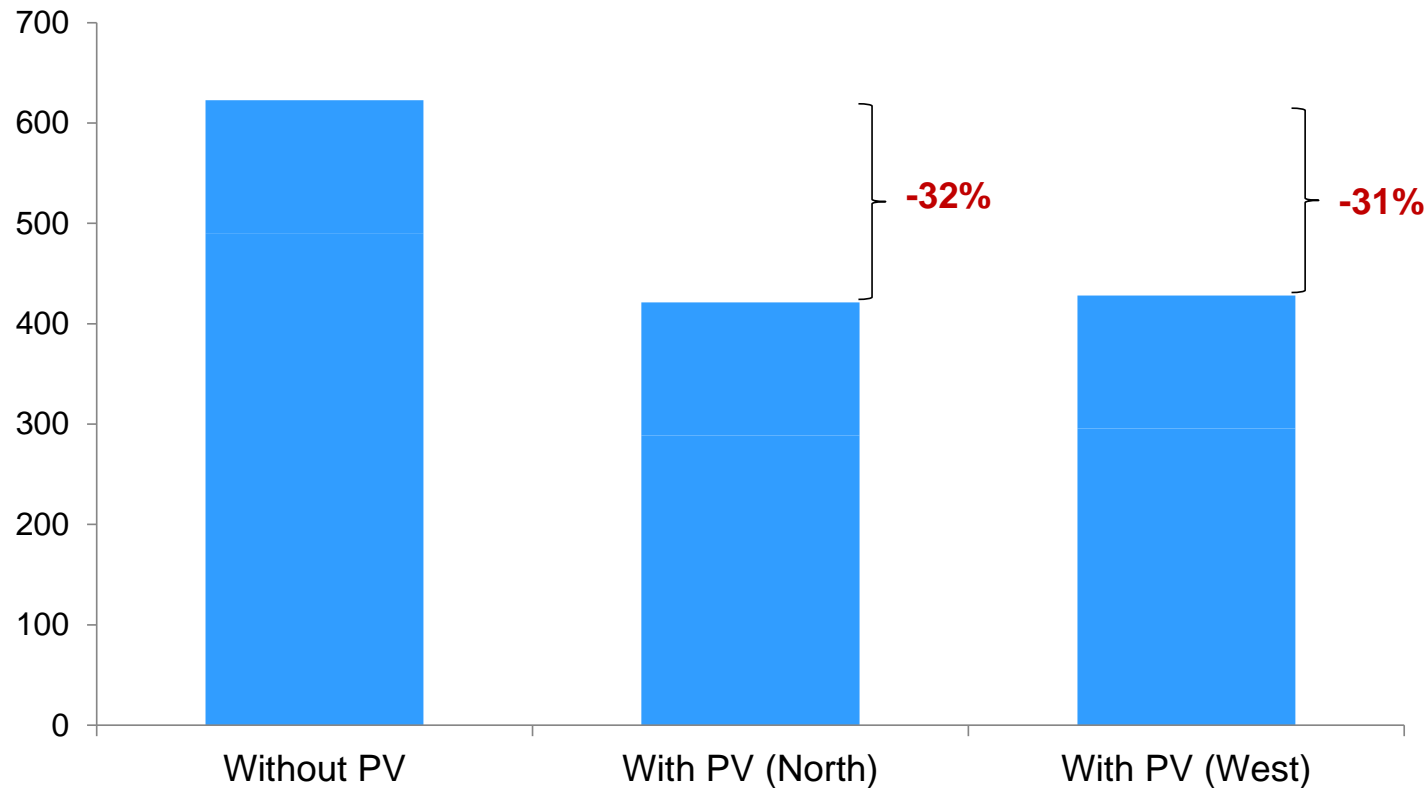
# West-oriented PV output is higher during system max demand





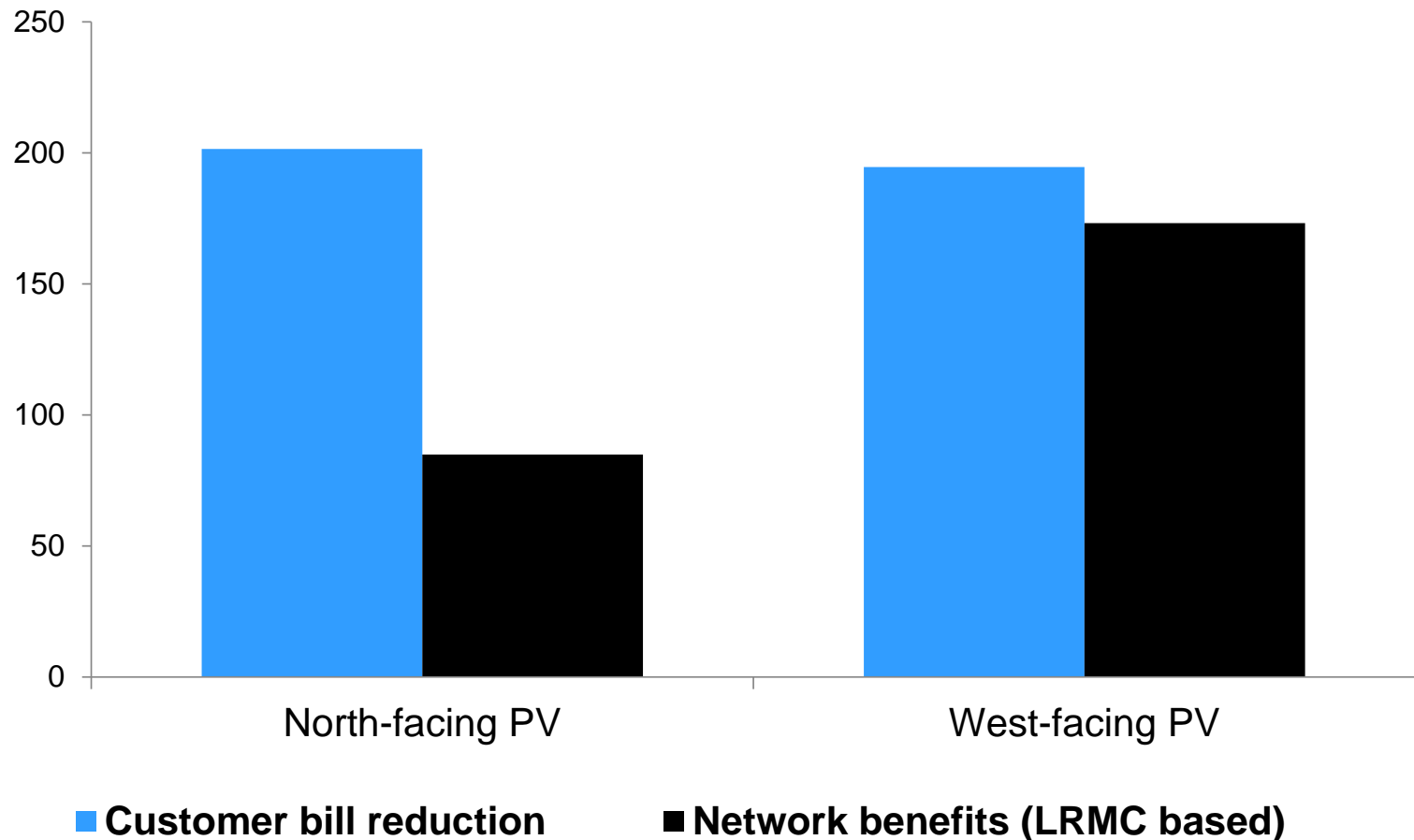
# Under standard tariffs, PV systems reduce a customer's DUOS bill

\$ per annum

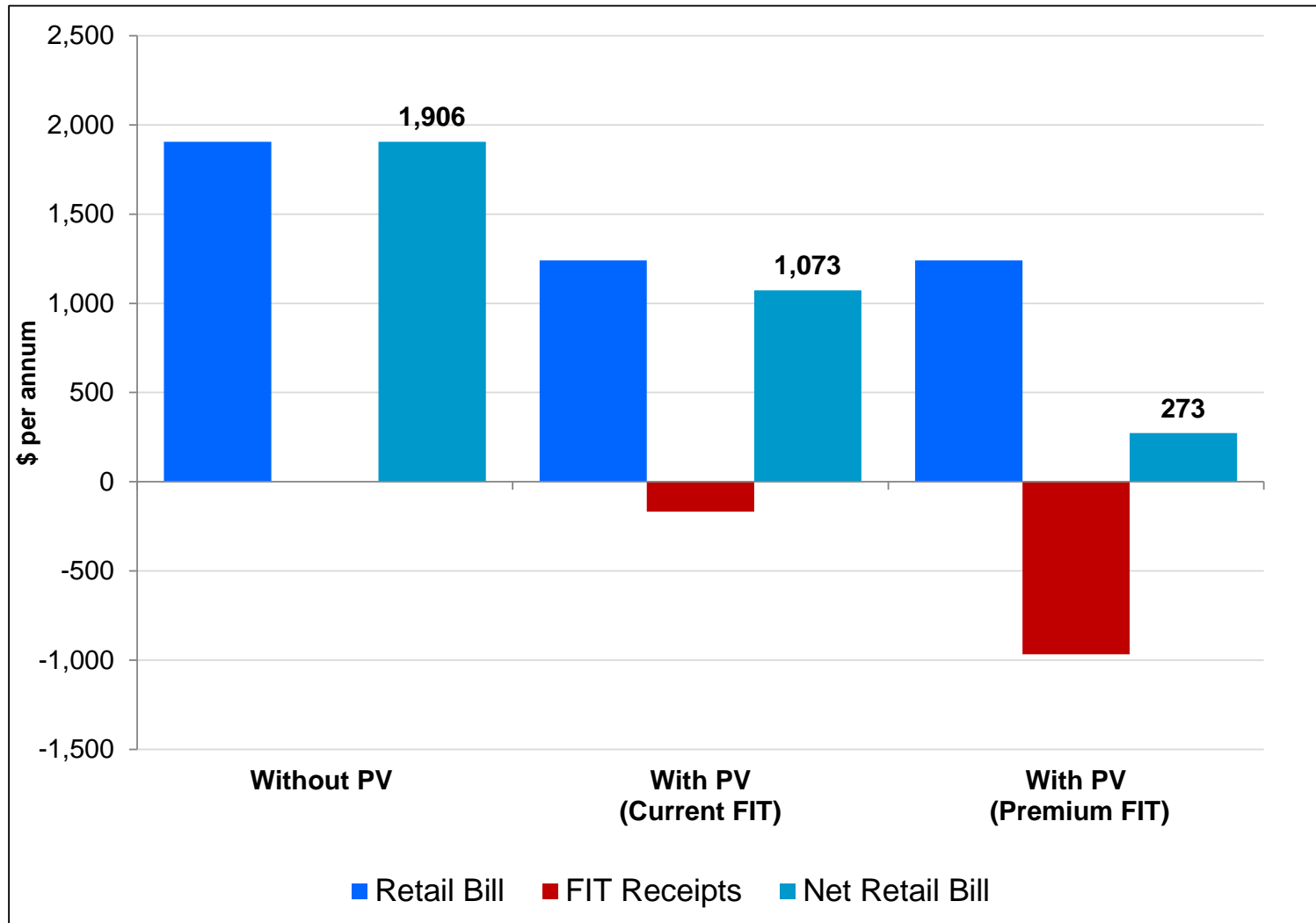


# Customer bill reductions from PVs exceed the network benefits

\$ per annum



# PVs provide considerable retail bill reductions



## Case Study 3: Batteries + PV in the Energex network



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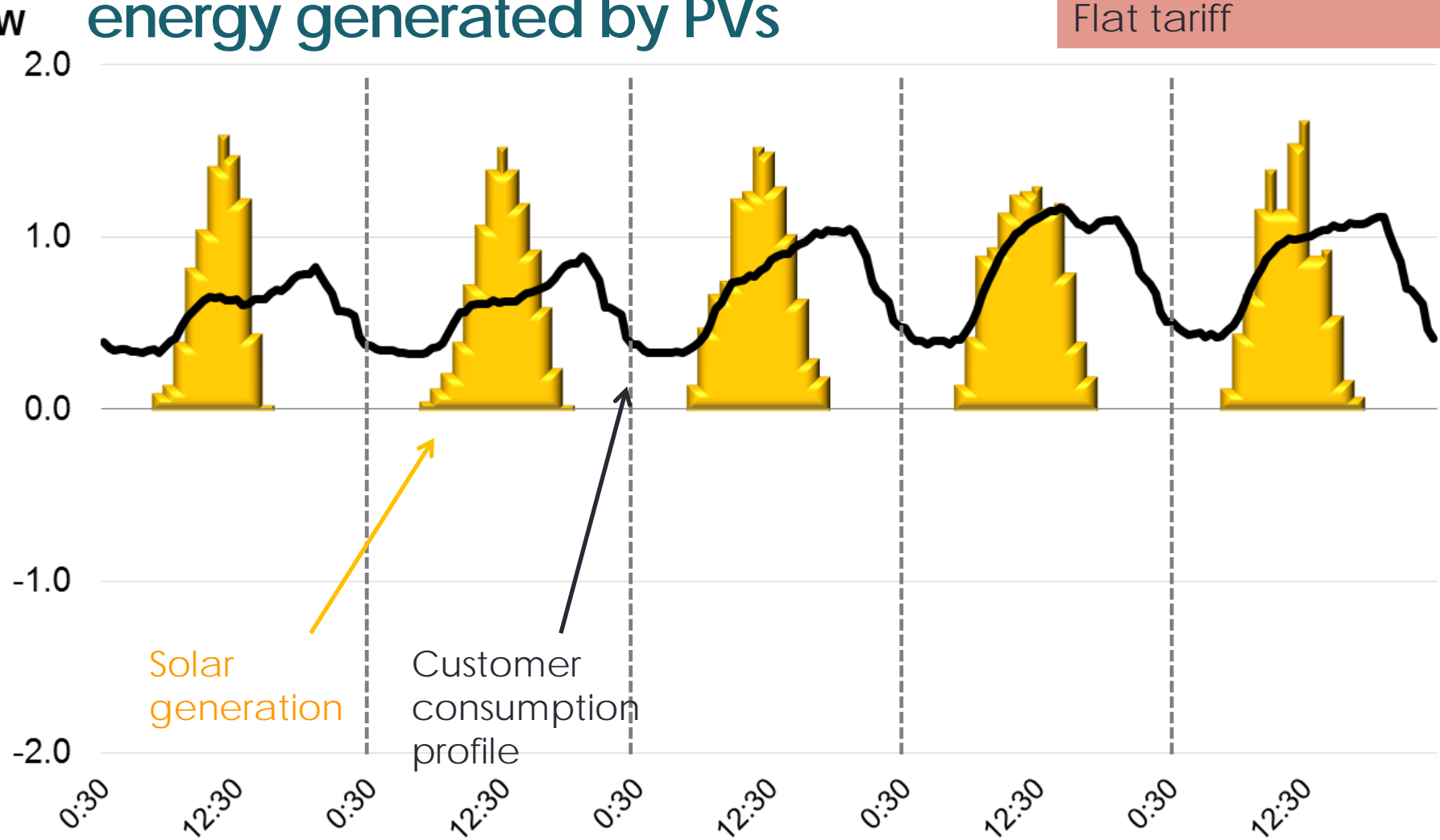


- Assumed a relatively small system:
  - 2.5kW PV system with 4kWh of battery storage
- Network tariff
  - Residential flat tariffs (8400 – DUOS)
- Retail tariffs
  - Residential flat tariff (regulated )<sup>1</sup>

1. Tariff 11 as set by the Queensland Government.

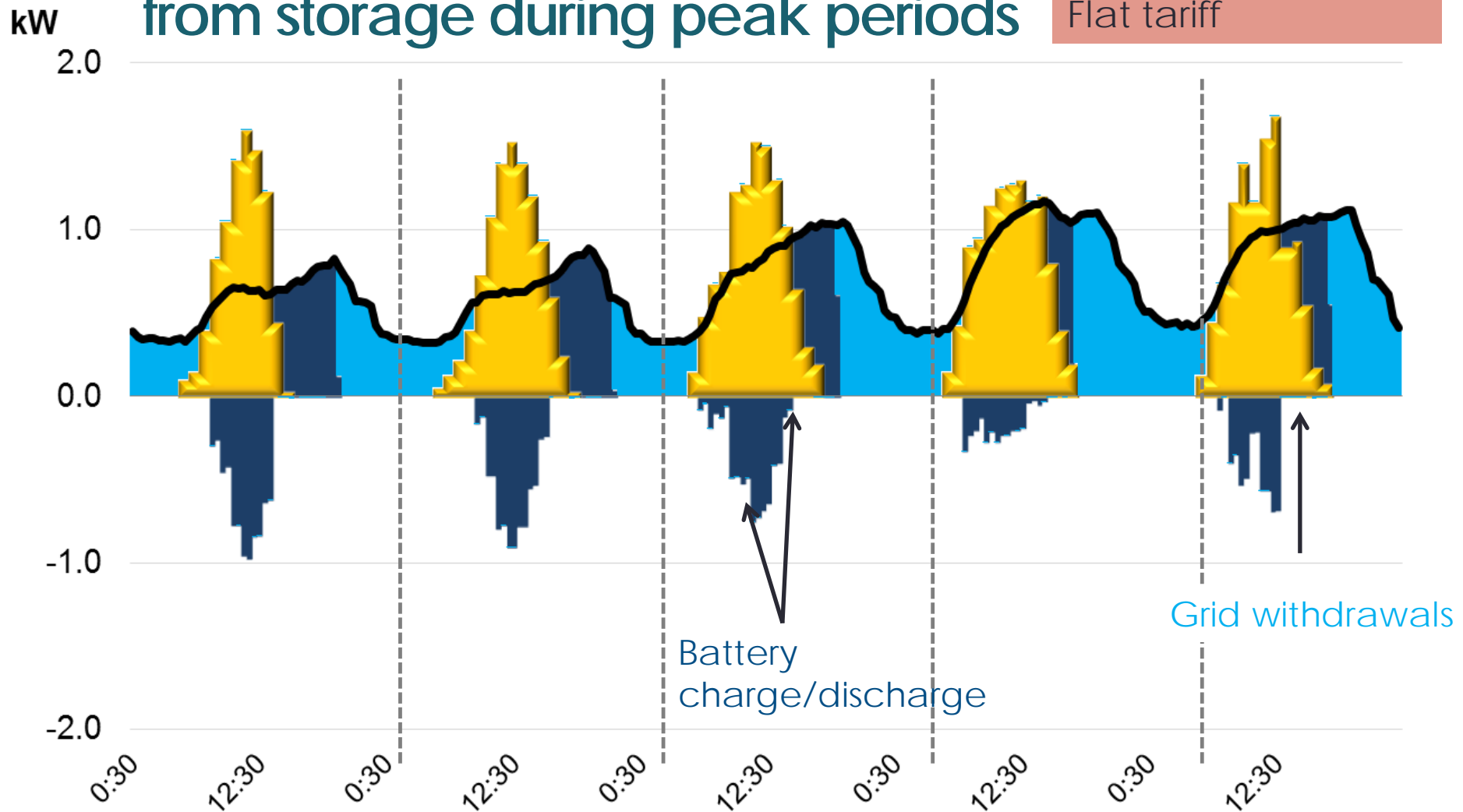
# Batteries allow consumers to store excess energy generated by PVs

Flat tariff



# Excess energy can then be extracted from storage during peak periods

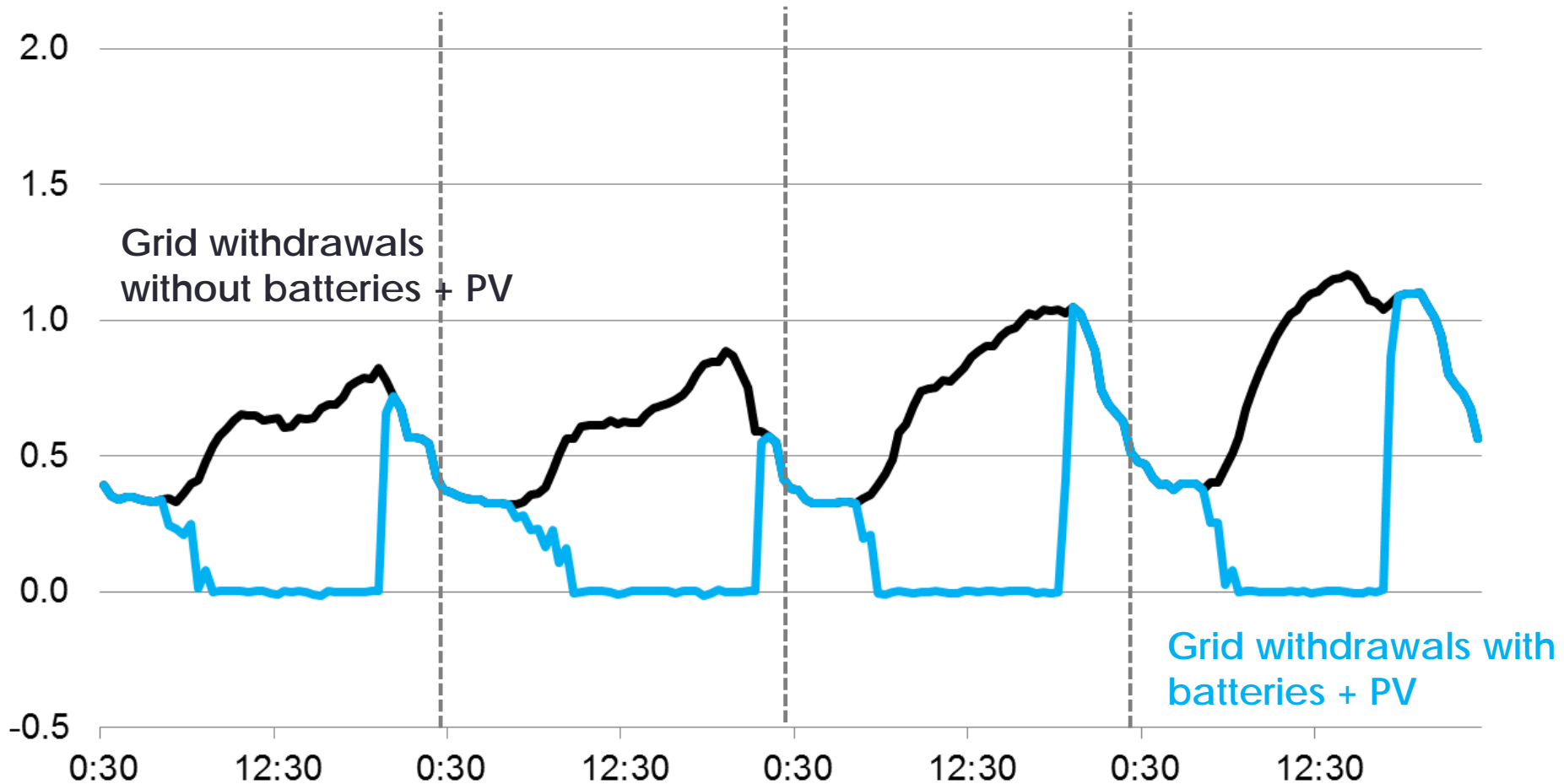
Flat tariff



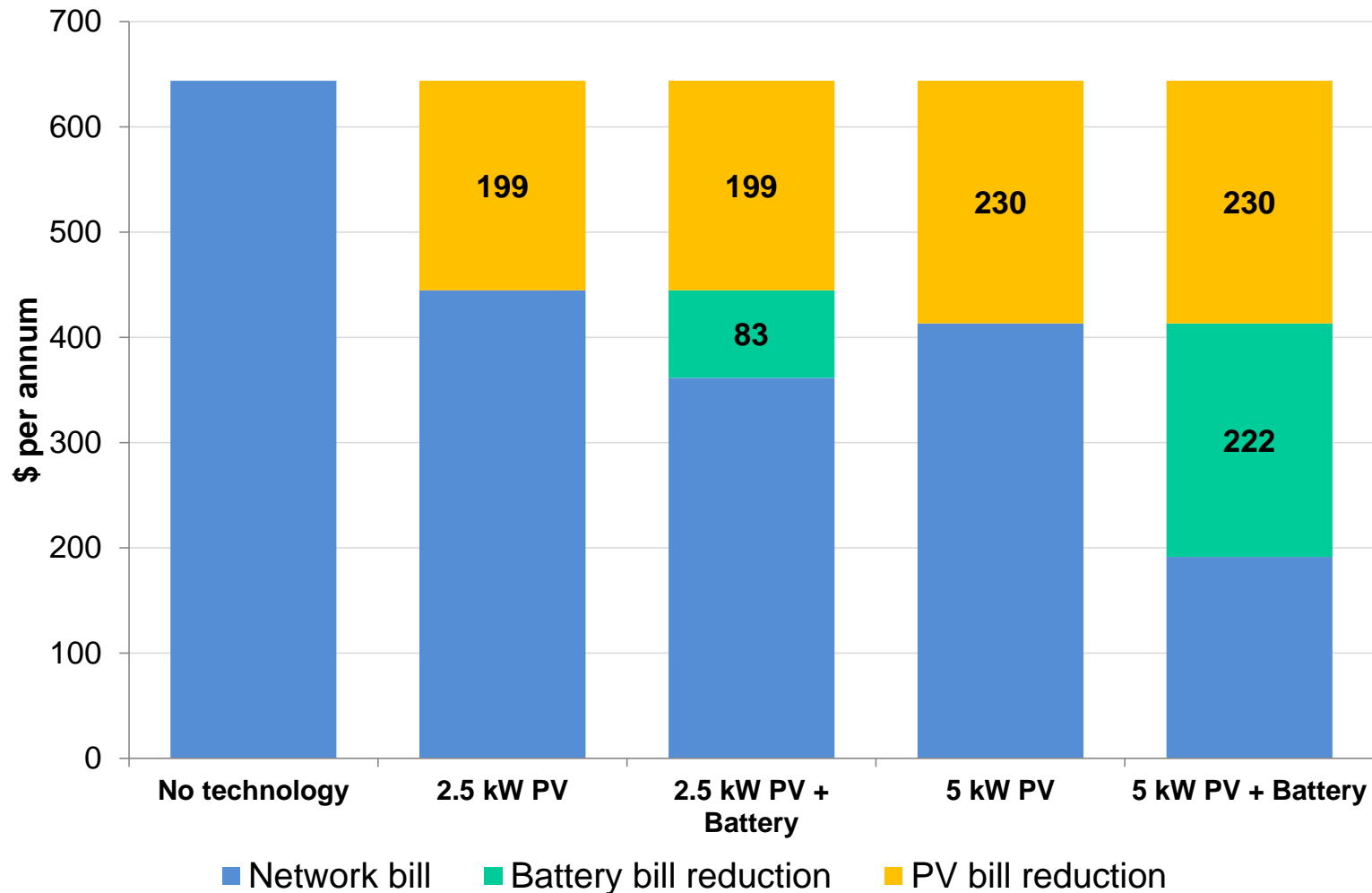
# Batteries can reduce peak demand

kW

Flat tariff

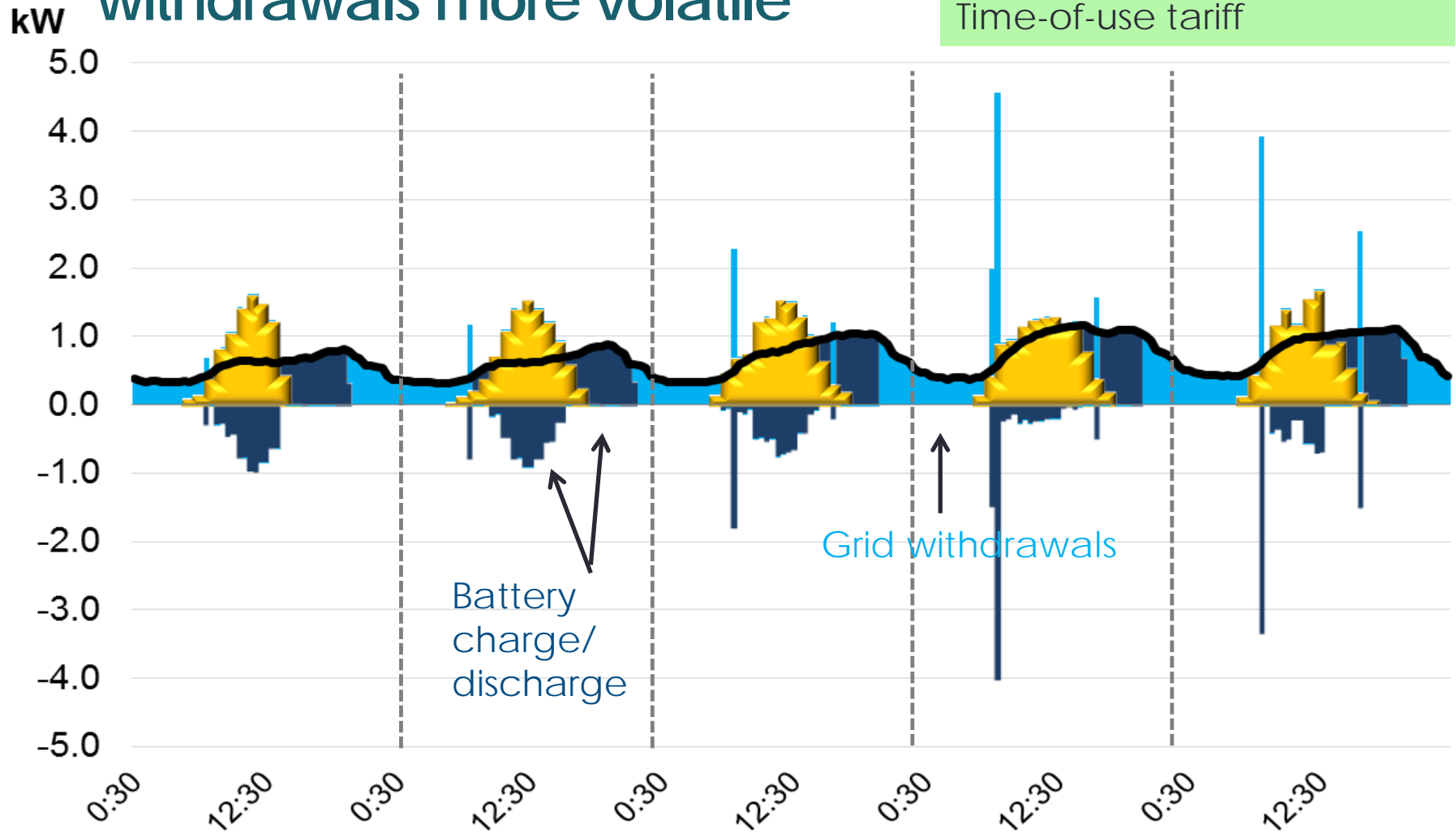


## Batteries and PV systems provide considerable network bill reductions





# Batteries have the potential to make withdrawals more volatile





# Batteries have the potential to make withdrawals more volatile

