

# TARRIFS AND DER

Anna Bruce

**PPA Conference**  
November 2022



**UNSW**  
SYDNEY



**UNSW**  
SYDNEY

## **Dr. Anna Bruce** Associate Professor, UNSW



**Dr Anna Bruce** is an Associate Professor in the School of Photovoltaic and Renewable Energy Engineering and Research Coordinator (Engineering) at the Collaboration on Energy and Environmental Markets at UNSW Sydney, Australia. She leads CEEM's research theme in Distributed energy systems, including 'smart grids' and 'smart' homes, distributed generation and demand-side participation. Her research focuses on modelling, analysis and integration of renewable energy and distributed energy resources into electricity industries; energy access in developing countries; and energy policy and regulation.

### **Presentation Topic:**

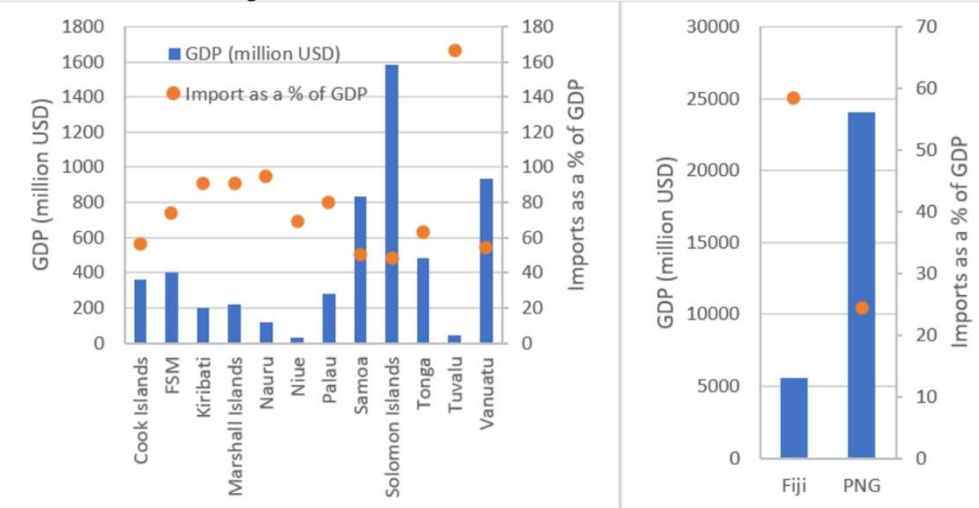
**Tariff and Distributed Energy Resources**

# Tariff Challenges

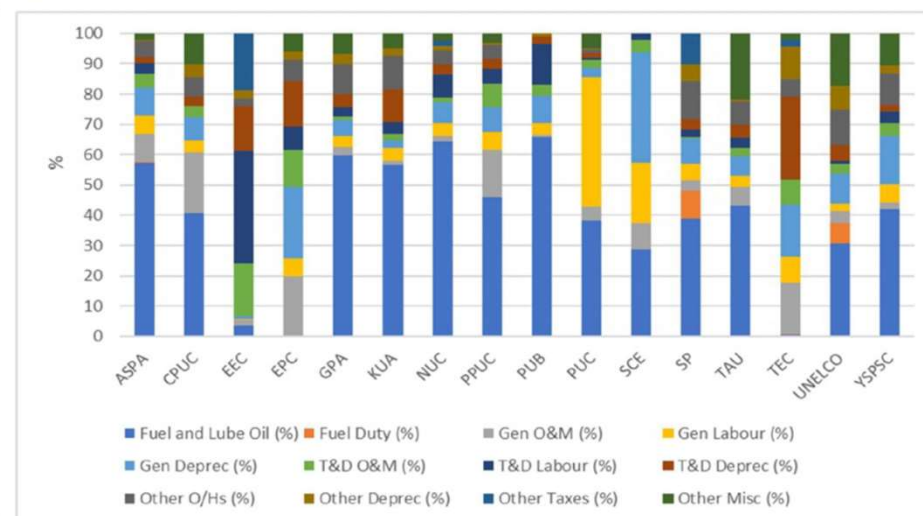
- Electricity is an essential service
- Commercialisation of utilities creates an imperative for cost recovery
- Tariffs should also be designed to incentivise efficient behaviour and investment
- Conflicts between cost-recovery, efficiency and equity

# Cost Recovery Challenge in PICTs

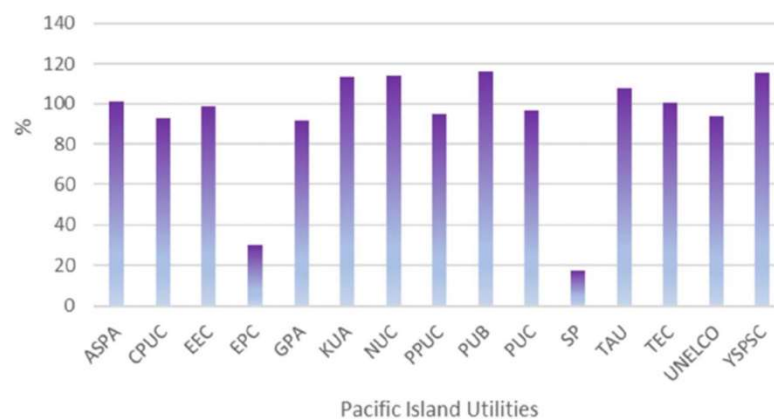
Ravita Prasad (2021) International Science Council Blog



PPA Benchmarking 2021  
Figure 5.7.4: Utility Cost Breakdown 2020



Operating Ratio 2020

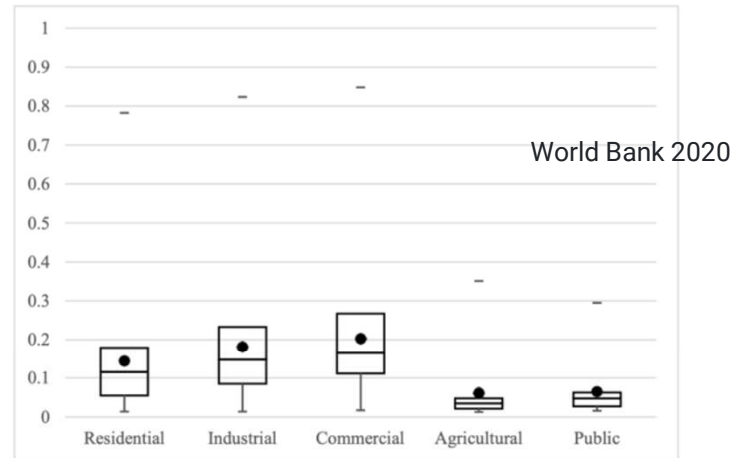


PPA Benchmarking 2021



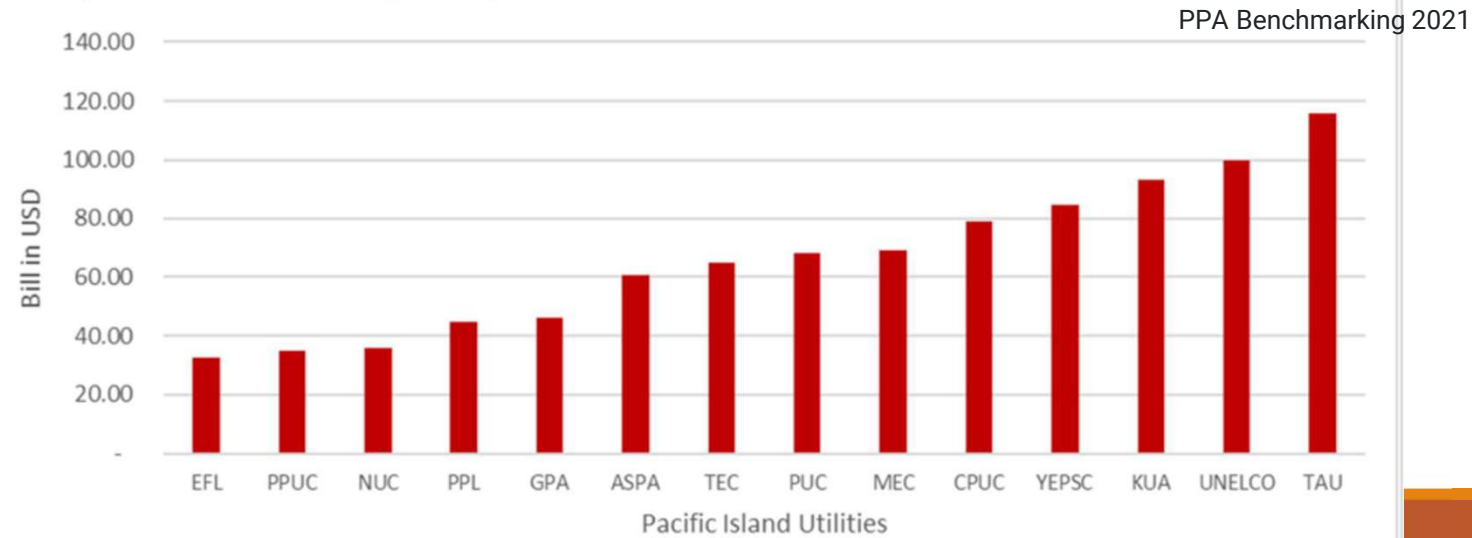
Collaboration on Energy and Environmental Markets

**Figure 3. Range of electricity tariffs by customer class (US\$/kWh)**

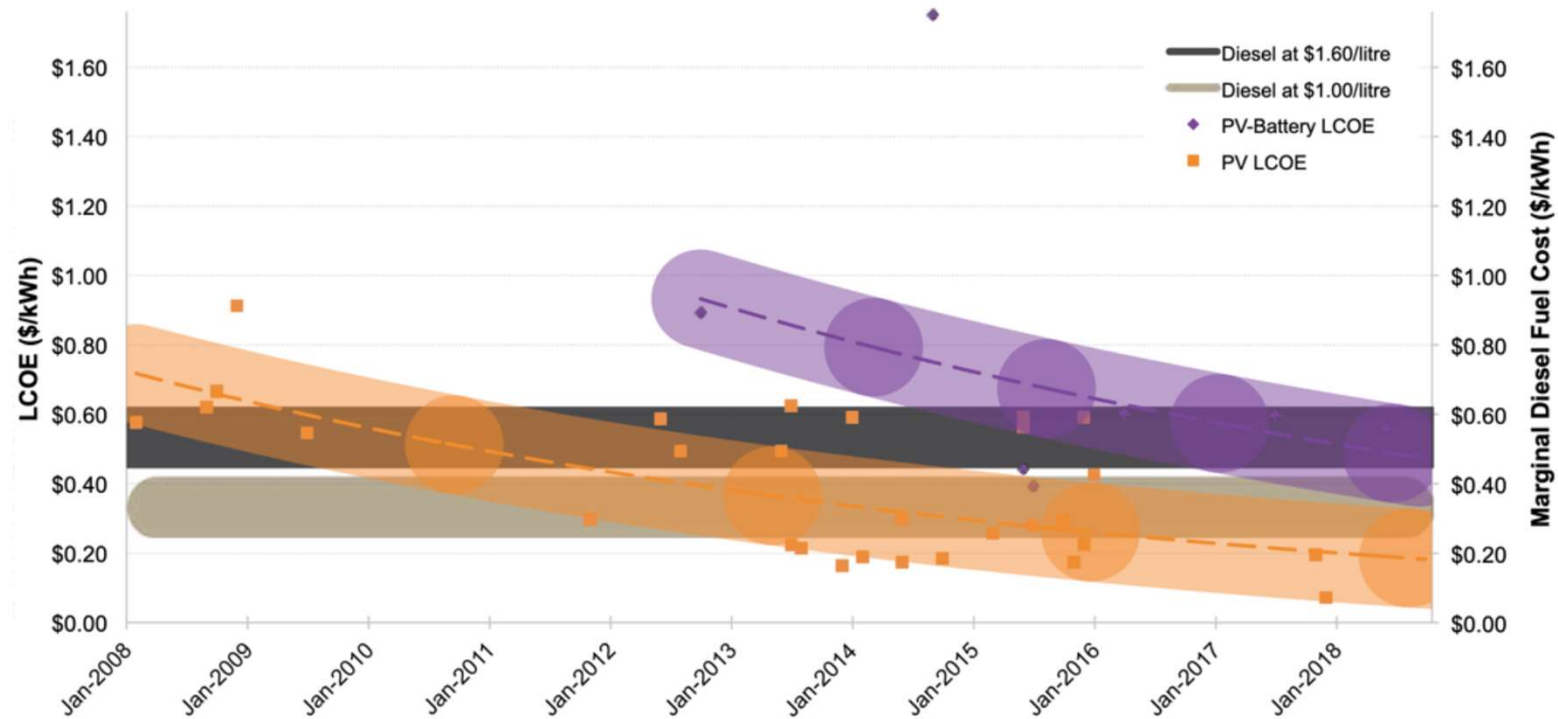


*Figure notes:* Bottom whisker cap = minimum; bottom box margin = 1<sup>st</sup> quartile; mid box bar = median; top box margin = 3<sup>rd</sup> quartile; top whisker cap = maximum.

**Monthly Bill for a Residential Customer @ 200 kwh per month**



**Figure 7: Estimated \$/kWh LCOE of Pacific PV projects and PV-battery projects compared to the marginal diesel fuel cost of generation**



PPA Benchmarking 2021



Collaboration on Energy and  
Environmental Markets

COUNTRY	FISCAL INCENTIVES	FEED-IN TARIFF	NET- METERING/ BILLING
<b>Fiji</b>	 <ul style="list-style-type: none"> <li>• 10-year tax holiday for RE developers</li> <li>• No import duty on RE equipment</li> <li>• Financial grants and direct investment for RE development from Fiji Development Bank</li> <li>• Requirement for commercial banks to loan 2% of portfolio to RE projects</li> <li>• Subsidized borrowing and grant funding through Reserve Bank of Fiji</li> </ul>	Under development (23)	Under development (24)
<b>Kiribati</b>	 <ul style="list-style-type: none"> <li>• Government-funded RE projects are exempt from import duty</li> <li>• Development partners have provided direct grants for RE development</li> </ul>	No	No
<b>Marshall Islands</b>	 <ul style="list-style-type: none"> <li>• Equipment for RE generation is exempt from import duty</li> <li>• Development partners have provided direct grants for RE development</li> </ul>	No	No
<b>Micronesia, Federated States</b>	 <ul style="list-style-type: none"> <li>• Interest-free loans have been provided to the utility</li> <li>• Financial grants have been offered for RE development</li> </ul>	Yes	No
<b>Nauru</b>	 <ul style="list-style-type: none"> <li>• Development partners have provided direct grants for RE development</li> </ul>	Yes	No
<b>Palau</b>	 <ul style="list-style-type: none"> <li>• Equipment for RE generation is exempt from import duty</li> <li>• Subsidized loans and grants have been provided for RE development</li> </ul>	Yes	Yes
<b>Papua New Guinea</b>	 <ul style="list-style-type: none"> <li>• Development partners have provided direct grants for RE development</li> <li>• 10-year tax holiday in free-trade zones</li> <li>• Import duty exemption on RE equipment</li> </ul>	No	Yes
<b>Samoa</b>	 <ul style="list-style-type: none"> <li>• Equipment for RE generation is exempt from import duty</li> <li>• Development partners have provided direct grants for RE development</li> </ul>	Yes	No
<b>Solomon Islands</b>	 <ul style="list-style-type: none"> <li>• Equipment for RE generation subject to 10% import tax can apply for exemption</li> <li>• Development partners have provided direct grants for RE development</li> </ul>	No	No
<b>Tonga</b>	 <ul style="list-style-type: none"> <li>• Equipment for RE generation is exempt from import duty</li> <li>• Equipment for RE generation is exempt from consumption tax</li> <li>• Development partners have provided direct grants for RE development</li> </ul>	Yes	Yes
<b>Tuvalu</b>	 <ul style="list-style-type: none"> <li>• The utility receives a grant from the government</li> <li>• Development partners have provided direct grants for RE development</li> </ul>	No	No
<b>Vanuatu</b>	 <ul style="list-style-type: none"> <li>• Equipment for RE generation is subject to lower tiers of import duties</li> <li>• Development partners have provided direct grants for RE development</li> </ul>	Yes <sup>(25)</sup>	Yes

IFC 2021



# DER Opportunities Tariff Challenges

## Opportunities

- Consumer investment in low-cost capacity
- Increase RE percentage
- Reduce network peak demand investment
- Voltage, reactive power support through inverters

## Challenges

- Revenue loss
- Challenges and costs of integrating DER (V management, phase unbalance, minimum demand/reserves)
- Equity for non-solar customers

IFC 2021



Collaboration on Energy and  
Environmental Markets

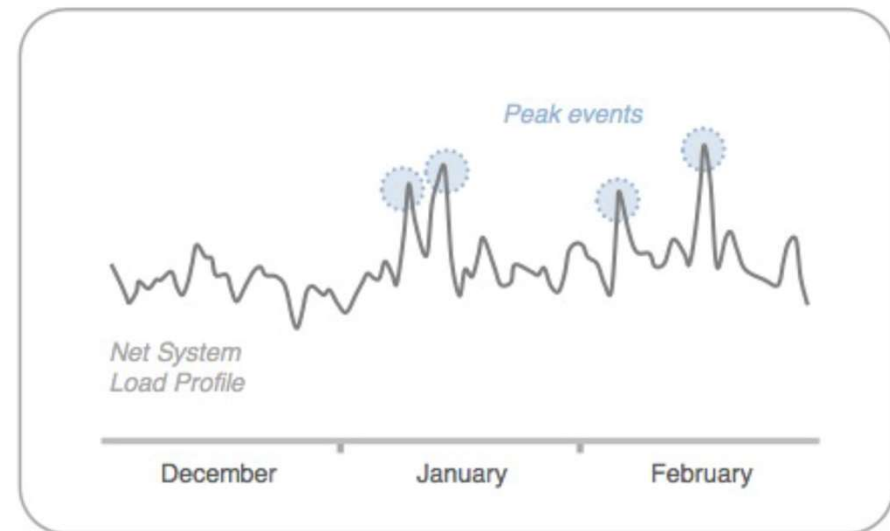
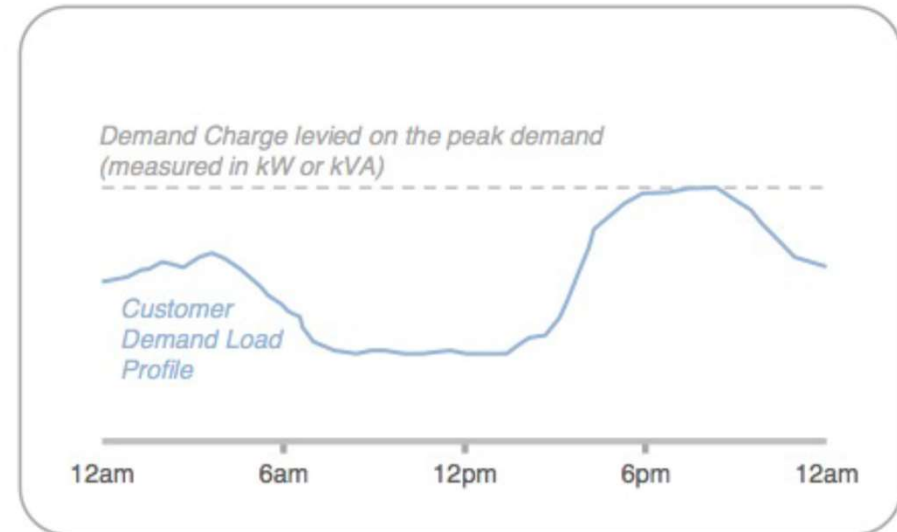
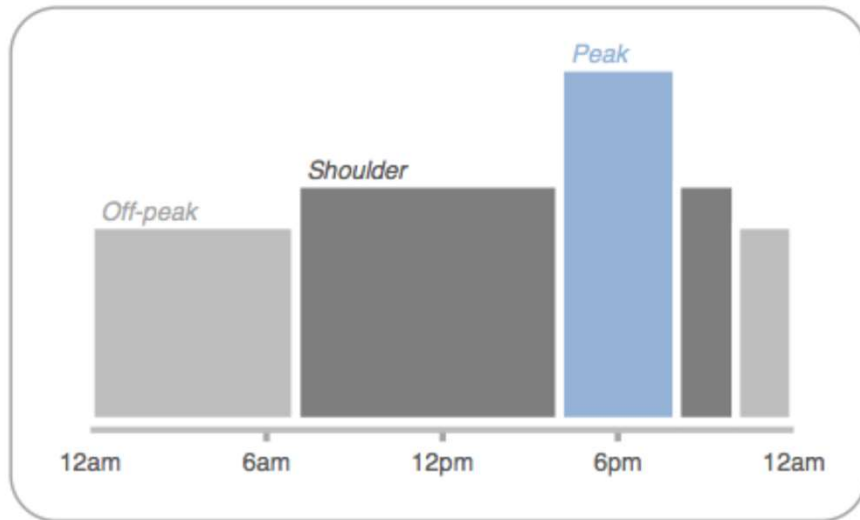
8

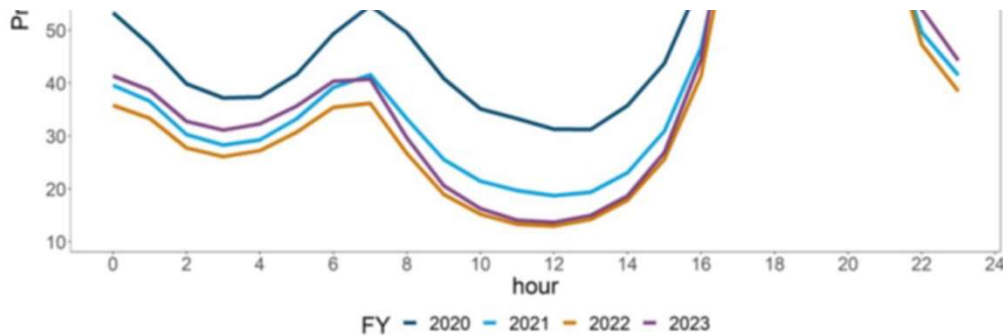




## Australian Experience

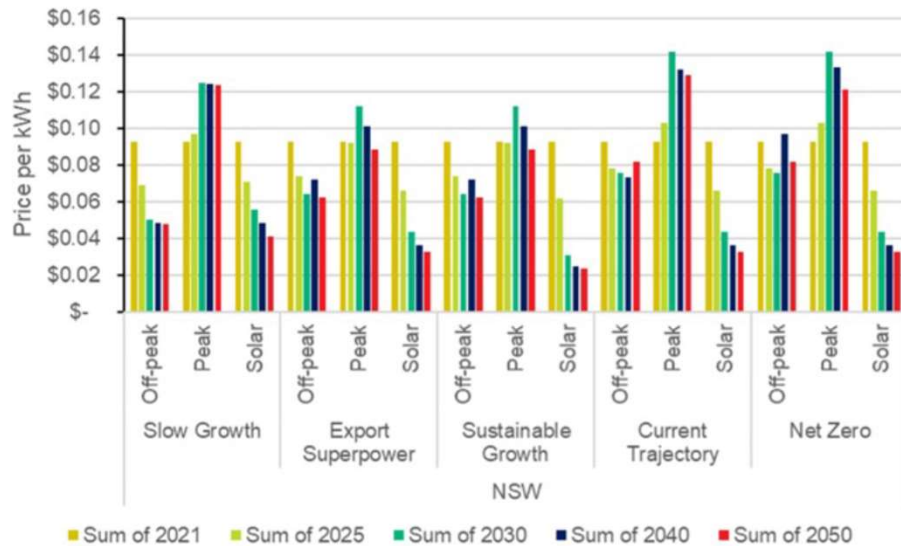
- Initial focus on peak demand
- Utilities concern around PV-related revenue loss
- Balancing revenue certainty, incentives, equity challenging
- Consumer appetite for complex tariffs limited
- Large cross subsidies remain necessary for remote customers





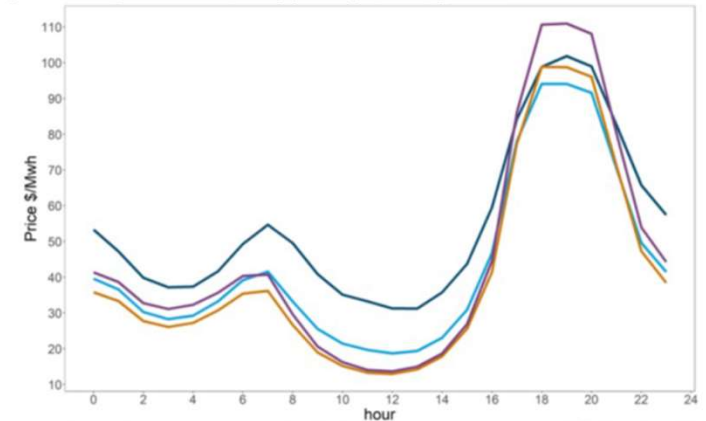
## Green Energy Markets for 2021 ISP

Figure 4-10 Assumed wholesale energy costs by time interval for NSW (and NEM from 2030) (excl GST)

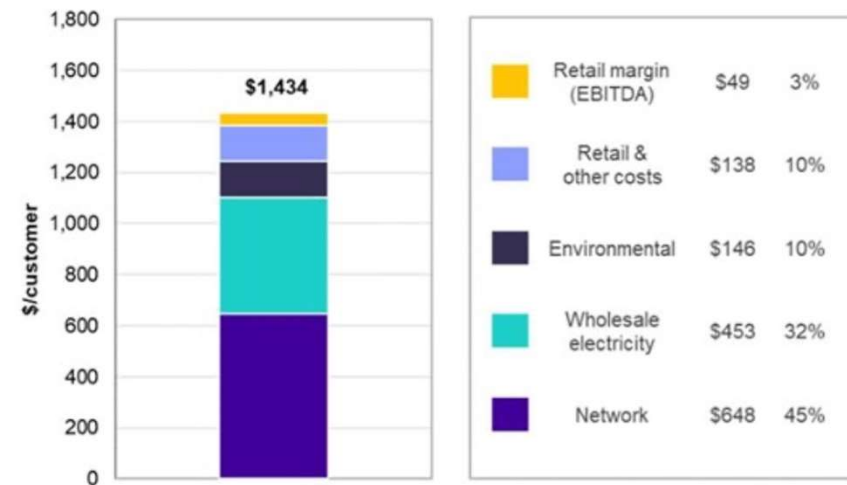


Note: A large part of the change in prices between 2021 and 2030 of each time period is to do with the removal of smearing of costs in small consumer retail prices across time periods rather than underlying changes in wholesale energy costs during the hours covered by the Off-Peak, Solar and Peak periods.

Figure 4-9 Average wholesale electricity prices by hour of day in QLD

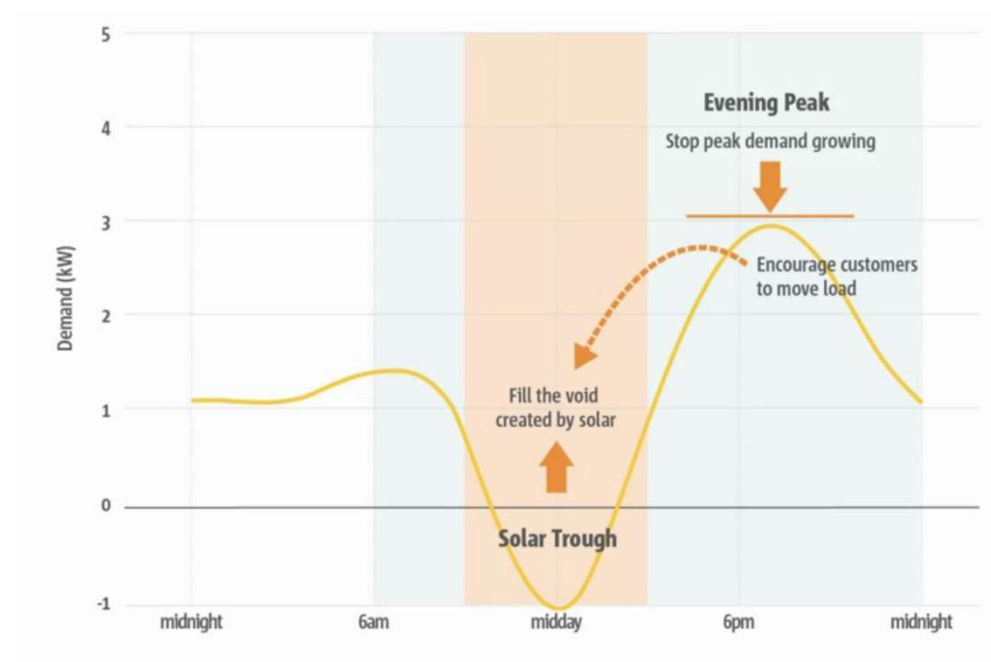


Cost components for the average residential customer across the NEM in 2020–21, real \$2020–21, excluding GST



Source: ACCC analysis based on retailers' data.

## Network Tariffs: Solar Sponge Tariff



**Table 17.8:** Residential tariffs 2020-21 NUoS Forecast

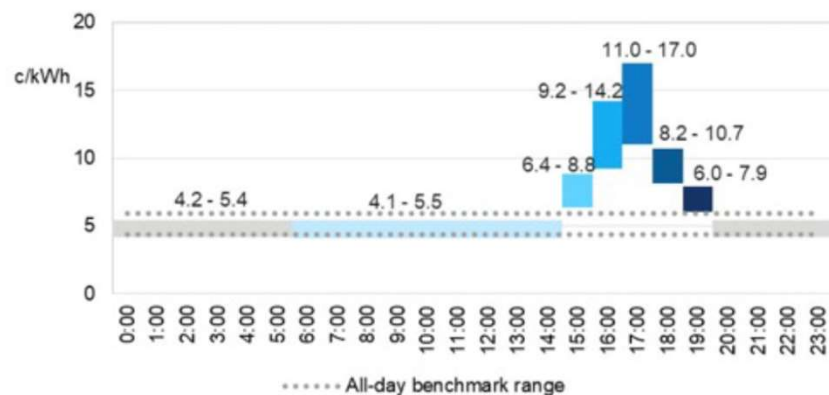
Residential tariff	Tariff structure	Metering	\$pa	\$/kW pa	c/kWh			
			Supply charge	Peak demand charge	Peak usage charge	Off-peak usage charge	Solar sponge usage charge	Usage charge
Residential – Single rate	Supply charge + flat usage rate	Accumulation meter (Type 6)	166	-	-	-	-	14.4
Residential – ToU	Supply charge + peak, an off-peak and solar sponge usage rates	Interval meter, either: - remotely read (Type 4); or - manually read (Type 5).	166	-	18.0	7.2	3.6	-
Residential – Prosumer	Supply charge + ToU +	Remotely read interval meter	166	* 110	10.2	4.1	2.0	-

# Modern FiTs Reflect the Value of PV

## What is the Value of PV?

- To date, Australian FiTs have reflected energy value (avoided purchase of energy from the wholesale market by retailer) + avoided energy losses
- Network value/costs?

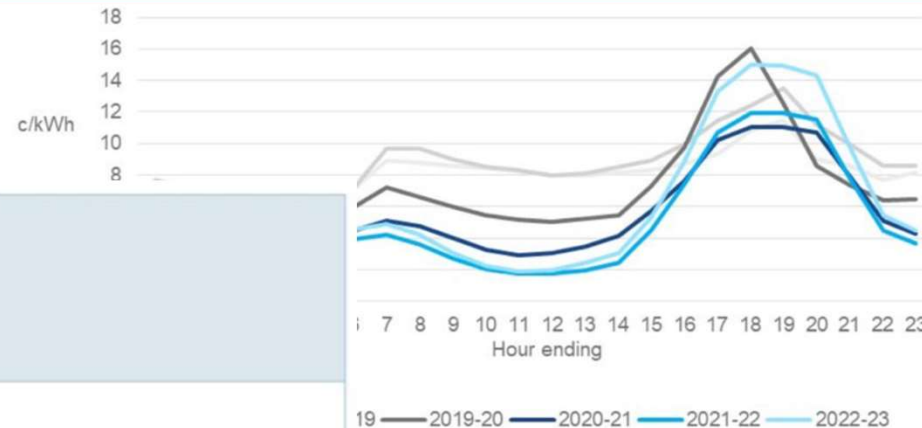
**Figure 2 Draft time-dependent feed-in tariffs (c/kWh)**



Data source: IPART calculations.

	5.2	7.1	5.0	6.9
--	-----	-----	-----	-----

**Figure 6 Wholesale price by time of day**



### Early Evening

Weekdays: 3pm-9pm

Weekends: n/a

AEMO, AEMC, Residential Electricity Price Trends 2020 Final Report, 21



# Flexible solar export trial set to soak up savings for South Australians

Posted by [Kelseigh Wrigley](#) 15/09/2021

A new trial will allow solar customers in South Australia to export more power into the state's grid.

The 'world-leading trial' will introduce a new flexible solar export option for customers that'll enable households to maximise their exports while reducing congestion on the electricity grid.

"Until now, the problem has been that in order to manage voltage and stability issues that occur only some of the time, networks around the country have had to impose exports limits that apply all the time."

Through this trial, SAPN will begin offering small-scale solar customers either a reduced fixed export rate of 1.5 [kilowatts \(kW\)](#) or a flexible export option that allows up to 10kW of power to be sent back into the grid at least 98 per cent of the time.



## Conclusions

- Tariff design is extremely challenging due to long-term investments in shared network assets with location and time-specific costs
- Efficiency often conflicts with simplicity, predictability and equity requirements ... tariffs as a social construct
- Opportunity to reduce costs and achieve goals with RE and DER
- Efficient tariff design can evolve with resource mix. Solar soak tariffs, solar export tariffs, ToU FiTs might better incentivise DER? Flexible exports allow networks control.
- Utilities and policymakers must bring consumers on the journey.
- New business models (aggregators, sharing models) may be needed to interface with customers.

