AUSTRALIAN PV INSTITUTE

APVI Submission to the AEMC's Draft Rule Determination: National Electricity Amendment (Distribution Network Pricing Arrangements) Rule 2014

Summary of APVI Response

1. The APVI agrees that network pricing should be efficient and technology neutral.
2. The APVI does not agree with the premise that economically efficient pricing must involve recoupment of past expenditure, particularly where this expenditure was not itself economically efficient. Customers should not be forced to pay for investments they did not choose and do not need.
3. The APVI has serious concerns about some of the background modelling underlying the AEMC Determination. These could have significant impacts on the results and recommendations provided.
4. APVI's own modelling concludes that a demand component added to electricity tariffs provides a fairer price signal to customers than uniform high fixed network components or time of use tariffs.

APVI comments on key recommendations

	Existing rule	Draft rule	APVI comment
Pricing principles			
Network pricing objective	No current objective	Each network tariff should reflect the efficient costs of providing network services to the customers assigned to the tariff	More clarity is needed in the definition of 'efficient'. In addition, alternatives to network services, such as demand management, storage and generation at the point of end-use, may be more efficient than upgrading or maintaining networks. Transparent and competitive processes for these to be considered are needed.
Long run marginal cost	Distribution network service providers (DNSPs) must	DNSPs must base network prices on LRMC	The LRMC of operating networks, once investments have been made, is very low. The costs are sunk and the

	take into account long run marginal cost (LRMC) when setting network prices		asset life is 40 years or so. It would seem that, if the aim is to achieve efficient use of public assets and provide a signal for efficient investment, prices will need to be made up of some component of current costs and some component of likely future costs. Nevertheless, DNSPs should not be allowed to pass on the costs of inappropriate or over-investment, nor should they be allowed to use a high risk borrowing cost, when in fact they operate in a low risk borrowing environment.
Total efficient cost recovery	DNSPs must recover their allowed revenue with minimum distortion to efficient patterns of consumption	The revenue recovered from each network tariff must reflect the DNSP's total efficient costs of serving the consumers assigned to that tariff. DNSPs must recover their allowed revenue in a way that minimises distortions to the price signals for efficient usage provided by LRMC prices	This contradicts the previous statement re LRMC, since it implies recovery of sunk costs as well as masking LRMC signals. As above, DNSPs should not be allowed to recover costs associated with past investments that were not required by customers. This also raises the question as to whether the aim is to recover costs or to provide an economically efficient service.
Consumer impact principles	No specific principle	DNSPs must manage the impact of annual changes in network prices on consumers, eg by transitioning consumers to new network prices over one or more regulatory periods. DNSPs must set network prices which consumers are reasonably capable of understanding, ie consumers are able to relate their usage decisions to the price structure.	The process used to determine prices needs to be transparent and public, if customers are to understand the reasons behind them. Customers should have the right to challenge them. Information must also be provided on means that customers can use to reduce price increases.
Jurisdictional obligation principle	No current principle, but the other pricing principles are not binding	DNSPs may depart from network prices that meet the LRMC and total efficient cost recovery principles to the extent necessary to meet jurisdictional pricing obligations	The overall aims for the electricity sector from all jurisdictions need to be consistent, so that sensible decisions are made for the long term.

Network pricing process			
Process to develop network prices	Network prices are developed by DNSPs and approved by the AER on an annual basis	DNSPs must develop a tariff structure statement (TSS) that sets out their network price structures. The TSS is approved by the AER as part of the regulatory determination process and applies for the five year regulatory control period. Price levels are approved by the AER on an annual basis.	As above, the process used to arrive at the TSS and the annual price structures must be transparent, published and contestable. Opportunities need to be made available for competing options to be considered, particularly where these may result in a lower overall cost outcome for customers.
Consultation	Neither DNSPs nor the AER are required to consult with stakeholders on network price structures.	DNSPs are required to describe how they have consulted with retailers and consumers on the design of network prices and sought to address their concerns. The AER must invite stakeholder submissions on the TSS.	Submissions and consultations are not sufficient. Opportunities need to be available for a competitive market to develop for provision of services. This should be via a transparent process, with options considered by an independent panel.
Timing	No set timeframe by which network prices are to be approved and notified	Binding timeframes are included so that network prices are generally approved at least 6 weeks before they commence, except in the first year of a regulatory period. To allow this to occur, DNSPs must submit their annual pricing proposals earlier: TNSPs (other than those in Victoria) must publish their prices earlier: and the AER must approve their network prices within 30 business days.	Six weeks is not sufficient time for consumers to make considered decisions about changing energy appliances, installing new control systems or implementing energy efficiency measures. For most other public services, price changes are foreshadowed at least several months, if not years ahead, and certainly before the next billing cycle commences.

Detailed Response

1. The APVI agrees that network pricing should be efficient and technology neutral

The APVI questions the premise, which is implied in AEMC's subsequent discussion, that networks should have the right to recoup costs associated with past expenditure, whether or not these were themselves efficient, technology neutral or required by customers.

The APVI is also concerned with AEMC's suggested approach of providing only very broad guidance to network operators. Unless clearer guidance is provided in the definition of 'efficient pricing', it is likely that tariffs will be put in place that aren't particularly effective at reducing peak demand, but are effective at increasing income for network operators and possibly also retailers. A Time-of-Use tariff would be a

good example of this effect. In addition, unless transparent and competitive frameworks are put into place, it is also possible that tariffs will be designed to undermine possible competitors such as PV and energy efficiency, even if these provide the most cost efficient outcomes.

There is a need for a parallel process to be put in place to assess how network service providers interpret the determination – in particular, how they propose to make their tariffs efficient. Given the importance of the internal structure of tariffs to the costs faced, not only by people on those tariffs, but on other customers and competing technologies, we recommend that this process be transparent, public and contestable.

2. **The recommendation that Long Run Marginal Cost (LRMC) be used as the basis for prices raises some issues:**

With short lived assets or with high growth rates, economically efficient pricing is the LRMC, based on new/replacement build. With very long lived assets that don't need replacing or augmenting anytime soon (which could describe networks in the NEM after recent upgrades of >$50B), economically efficient pricing should actually be based on marginal operating costs, which are very low for networks. This is because money has already been spent and so the aim is to get optimal use of the asset, which in turn is achieved by pricing on the margin. In practice, a combination of spot and future prices is needed – spot prices reflect the current marginal cost/benefit and future prices reflect how decisions now will impact on economically efficient investment.

It is not clear from the AEMC Determination whether the aim is for economically efficient pricing, or prices based on cost recovery. The AEMC appears to be putting this decision in the hands of the networks.

3. **APVI's own modelling supports the use of a demand component in tariffs, as the fairest way of signaling costs to consumers.**

This is supported by the Brattle Group report, but not reflected in the NERA modelling, or the AEMC discussions.

4. **The APVI has serious concerns about some of the modelling underlying the AEMC Determination**.

Major flaws are discussed below which could have significant impacts on the results and recommendations provided.

Discussion of the NERA modelling

The NERA modelling follows the more detailed modelling made publicly available a year ago by the APVI, and sent to the AEMC.[1] However, there appear to be some aspects of the NERA modelling that could have been improved. The main problems are summarised below and, because of the importance of NERA's modelling to the AEMC's position and findings, there is a concern that miss-leading conclusions could have been reached.

Regulatory environment

The NERA modelling does not seem to take into account whether the Distribution Network Service Provider (DNSP) is regulated under a revenue cap or a weighted average price cap (WAPC). **This is a significant simplification and likely to lead to incorrect conclusions.**

[1] We have since refined and expanded that work focussing on A/C and PV, using two separate datasets and sensitivity analysis of a number of variables, and submitted it to an international journal. This work is available on request. The original work is available here - http://apvi.org.au/impacts-of-pv-other-technologies-and-tariffs-on-consumer-costs/

Under revenue cap regulation, which is the case for all Transmission Network Service Providers (TNSPs) in the Australian NEM, the revenue they are allowed to collect in any one year is capped, and an O&U process means that any over (or under) recovery of network costs in a given year (including interest impacts), must be paid back (or recovered) in the following years through altered tariffs. The revenue cap may be on a CPI-X basis, meaning, in this case, that the revenue cap in the next year must be adjusted each year for inflation (according to the Consumer Price Index) and reduced by any expected efficiency savings.

Currently, DNSPs in all jurisdictions except Qld are regulated under a WAPC, and so revenue changes are not passed on to customers in the form of altered tariffs.[2] For example, both A/C and EVs significantly increase electricity sales, and under a WAPC this increased revenue is retained by the DNSP. Photovoltaics (PV) decreases electricity sales and this results in losses for DNSPs that cannot be passed on to customers. This is precisely the reason that DNSPs have not opposed the widespread use of A/Cs (now at over 70% of households),[3] but are opposing the use of PV (even now at less than 20% of households).

Thus, in all jurisdictions except Qld, the **costs that NERA Consulting calculated for households that currently do not own PV systems are actually incurred by the DNSPs, not by the households**. Hence PV has not increased other customer costs. NERA's cost calculations were transferred directly through to the draft Determination by the AEMC. **It is a major concern that the AEMC seems unaware of the different consequences of the regulatory environment under which DNSPs operate**.

Note that any financial benefits that PV systems provide by reducing demand peaks and therefore network augmentation costs (primarily driven by A/Cs), are passed on to customers who do not own them. This is because they reduce the DNSPs Regulated Asset Base, which is used to set their Maximum Allowable Revenue.

Thus, **in all jurisdictions except Qld, the net impact of PV systems has been to reduce the electricity bills of all households, including those who do not own them**. The publicity around the NERA report and this AEMC determination completely distorts this conclusion and could be seen as miss-leading the public.

Transmission networks

The modelling does not seem to take into account the impacts of peak load increases or decreases on transmission networks. All the values used for the LRMC of networks due to changes in demand peaks only include values for distribution networks. Given the close correlation between PV output and the demand profile of transmission networks, as well as A/Cs contribution to the transmission network demand on peak days, this is a significant omission – and resulted in PV's benefits being underestimated and A/C costs being underestimated. Values for the LRMC of transmission networks (as well as

[2] In April 2014, the AER indicated that revenue cap regulation would apply to NSW in its next full network determination (as of 1 July 2015), whereas an average revenue cap would apply to the Australian Capital Territory (ACT) (although it was likely that the ACT could move to revenue cap regulation in the future).

[3] A/C's also drive the need for network augmentation, which increases the DNSPs Regulated Asset Base, which also increases their Maximum Allowable Revenue.

distribution networks) are publicly available from both the Productivity Commission[4] and from work for the Energy Supply Association of Australia.[5]

It is also disturbing to see that system peaks have been used to assess impacts on distribution networks. These peaks are often very different and **it is not accurate to assess distribution network impacts based on overall system peaks**. In addition, when assessing load impacts, the **modelling does not appear to have taken account of the impact of PV in reducing load** across networks. Given that over 1 GW of PV is now installed in the NEM, this oversight is significant and calls for a re-calculation of results.

As explained in previous work by the APVI, the internal structure of tariffs can have a significant impact on the financial outcomes of TNSPs, DNSPs and customers. As shown in Table I, as the customer's electricity use increases, their marginal network payments shift from being to DNSPs to TNSPs, and so changes in both DUOS and TUOS tariffs will have significantly different impacts on different customers, depending on their quarterly electricity use. Similarly, changes in their electricity use will have very different impacts on the income received by TNSPs and DNSPs. **None of these effects have been incorporated into NERA's modelling.**

Table I. Components of EnergyAustralia's Regulated 'Domestic All Time' Tariff for 2013/14 (excl. GST)

	Transmission[a]	Distribution[a, b]	Network Total[a]	Retail component [c]	Final tariff [d]
Daily charge (AUDc/day) [e]	0.0	38.95	38.95	32.05	71.0
1,000 kWh/quarter (AUDc/kWh) [f]	0.237	12.678	12.915	11.985	24.9
1,000 to 2,000 kWh/quarter (AUDc/kWh)	13.7011	1.6739	15.375	11.005	26.38
> 2,000 kWh/quarter (AUDc/kWh)	19.0104	0.4646	19.475	9.005	28.48

a) All the network charges are from Ausgrid's Network Pricing Proposal for the Financial Year Ending June 2014.
b) This includes the Climate Change Fund component of 0.4646c/kWh.
c) The Retail component values were obtained by subtracting the Network Total Values from the Final Retail values and include generation costs.
d) The values in this column are from EnergyAustralia's 'Domestic All Time' tariff from their Residential Customer Price List, Regulated Retail Tariffs, Effective from 1 July 2013.
e) The distribution component is called the Standing Charge, the retailer component is called the Fixed R value, and together they make up the Service Availability Charge as seen by the customer.
f) The Transmission c/kWh charges are called Transmission Use of System (TUOS) charges and the Distribution c/kWh charges are called Distribution Use of System (DUOS) charges.

[4] PC, 2013a, 'Electricity Network Regulatory Frameworks', Vol 2, Productivity Commission Inquiry Report, No. 62, 9 April 2013.

[5] Deloitte, 2012, 'Analysis of initiatives to lower peak demand, Final Report', part of the Energy Supply Association of Australia's submission to the Productivity Commission's Electricity Network Regulation Issues paper, April 2012.

Tariffs

Given that one of the aims of this Draft Rule Determination is to achieve cost-reflective pricing, it is surprising that no tariffs with a demand charge component were used in the modelling. This has been shown by APVI modelling to provide the fairest means of allocating cost to the customers causing it. It is already used for non-residential customers, for this reason.

The tariff that came closest to having a demand charge was the 'sharp peak TOU tariff'. However, as with all time-of-use (TOU) tariffs, it is volume based (it increases DNSP revenue if demand increases during peak periods, but doesn't have a particular emphasis on the annual peak. **What is needed is a tariff that includes a capacity-based component (based on the annual demand peak). Its exclusion needs to be explained and rectified before decisions are made on new tariff structures.** It is entirely possible for the 'sharp peak TOU tariff' to significantly penalise a load with a regular, moderately high peak (for example, an electric vehicle), and to provide a relatively minor price signal to an A/C that is used only on the hottest days of the year, but then generates that household's highest annual load peak.

In the work that APVI provided to the AEMC, as well as in subsequent work, a demand-charge based tariff has consistently provided the most effective price signal for owners of all the technologies assessed by the AEMC, and has resulted in lowest costs for customers not taking up that technology. We note that the submission by Ellipson, which found that TOU tariffs had a smaller impact on customers, was based on tariffs that did not include a retailer component, only a network component. **This is a significant omission because the retail component can be a very large component of the final bill** received by customers (Table II). This higher retail component is justified based on the assumption that increased demand during the peak period will increase wholesale purchase costs. However, given the decrease in wholesale spot prices in recent years, driven by decreasing demand, it is arguable that retailers do not require increased revenue from TOU tariffs.

Given the importance of the internal structure of tariffs to the costs faced not only by people on those tariffs, but on other customers, we recommend that NSPs should make their calculations publicly available. While they may not be particularly useful for the average householder, they can be used by people who act on their behalf.

Table II. Components of EnergyAustralia's 'PowerSmart Home' TOU Tariff for 2013/14 (excl. GST)

	Transmission	Distribution[a]	Network Total[b]	Retail component[c]	Final tariff[d]
Daily charge (AUDc/day)	0	51.25	51.25	28	79.25
Low, 10pm to 7am (AUDc /kWh)	0.1815	2.4425	2.624	9.346	11.97
Shoulder, 7am to 2pm and 8pm to 10pm, working weekdays, 7am to 10pm at other times (AUDc /kWh)	0.5846	4.5608	5.1454	14.7146	19.86
Peak, 2pm to 8pm, working weekdays (AUDc /kWh)	11.1295	15.008	26.1375	21.6325	47.77

a) This includes the Climate Change Fund component.
b) All the network charges are from Ausgrid's Network Pricing Proposal for the Financial Year Ending June 2014.
c) The values in this column were obtained by subtracting the network values from the final retail values
d) The values in this column are from EnergyAustralia's 'PowerSmart Home' tariff from their Residential Customer Price List, Regulated Retail Tariffs, Effective from 1 July 2013.

Data

NERA's PV system case study makes various assumptions based on their claim that PV data were not available. Such data have been available for 300 randomly selected houses from Ausgrid for some time.[6]. Other data can be readily obtained from PVOutput.org and from the APVI PV Map (http://pv-map.apvi.org.au/), and also from other utilities on request. **Using modelled rather than real PV output data can provide miss-leading results**, because the wide range of PV orientations will not be reflected. From previous experience we have found that real data can vary significantly from modelled data (which make a number of assumptions that generally overestimate PV output).[7] Such real data can be readily converted to, for example, data for west-facing PV systems using established models.

It is particularly important when modelling the impact of new tariff structures that real data are used since these highlight how the effects vary for different houses because of their very different load patterns and non-optimal PV placement (most customers simply use their existing roof orientation and angle, not the optimal tilt and orientation for their location).

Another source of potentially miss-leading results comes from NERA's choice to average the customer load data set, rather than using it to show the large range of results likely across different households. This may provide for a simpler model and a simpler answer, but masks the reality of complex customer load and PV output profiles and limits the ability to design efficient tariffs. **It is unacceptable when suggesting large changes to tariff structures for simplistic models to be used**.

NERA's A/C load data were based on an assumed response to temperature changes. As detailed in the APVI's original modelling work, houses with and without A/C can readily be separated based on visual inspection of their loads during the summer peaks. The approach taken by NERA assumed that "…all increases in load due to increases in temperature are due to air conditioners". The end result, as shown in their Figure 3.1, was that their assumed 5kW A/C increased the household's annual demand peak by only about 16%, which implies that their total peak load was over 25kW – which is very high. From their methodology it is unclear how this could have affected their results, but again **this approach to A/C modelling illustrates a lazy approach which could provide miss-leading results**.

Batteries

NERA's report says that their modelled battery electricity is used during the household's peak demand period. However from Figures 3.20 and 3.22 this is clearly not the case. Instead, the battery electricity is used as soon as the PV system stops exporting to the grid. This means that **their results don't reflect the efficient use of the battery to minimise the household's peak demand**, including their contribution to their network's annual peak. Their modelling thus underestimates the degree to which the use of a battery can reduce the owner's electricity bill as well as the electricity bills of others (by reducing the need for network augmentation).

They state that "Given the ability of battery storage to react to prices in real time, a static set of prices will never provide an efficient incentive to consumers; rather a framework for the calculation of prices needs to be developed.", and "Given the potential for perverse outcomes with the large scale use of battery storage a potential solution to the question of efficiency may only be reached through some form of regulated or centralized approach to battery operation".

[6] See http://www.ausgrid.com.au/Common/About-us/Sharing-information/Data-to-share/Solar-household-data.aspx#.VCTaS80aXS-

[7] Generally related to orientation and shading.

Neither of these statements is correct. The efficient use of a battery to minimise the household's annual peak only requires a tariff with a demand charge-based component. Only a TOU tariff would require additional measures to avoid 'gaming' by charging the battery at times of low price and discharging at times of high price – and the only measure required in that case would be either i) that the battery cannot be charged from the grid, or ii) if the battery can be charged from the grid then it is not allowed to increase the household's total demand above a set point.

Attachment A: Background on the APVI

The APVI is an association of companies, government agencies, individuals, universities and research institutions with an interest in solar photovoltaic electricity. In addition to Australian activities, we provide the structure through which Australia participates in the International Energy Agency (IEA) PVPS (Photovoltaic Power Systems) and SHC (Solar Heating and Cooling) programmes, which in turn are made up of a number of activities concerning PV and solar system performance and implementation. Further information is available from www.apvi.org.au.

APVI Objective

The objective of the APVI is to support the increased development and use of PV via research, analysis and information.

APVI membership provides:

Information

- Australian PV data and information
- Standards impacting on PV applications
- Up to date information on new PV developments around the world (research, product development, policy, marketing strategies) as well as issues arising
- Access to PV sites and PV data from around the world
- International experiences with strategies, standards, technologies and policies

Networking

- Opportunity to participate in Australian and international projects, with associated shared knowledge and understanding
- Access to Australian and international PV networks (PV industry, government, researchers) which can be invaluable in business, research or policy development or information exchange generally
- Opportunity to meet regularly and discuss specific issues which are of local, as well as international interest. This provides opportunities for joint work, reduces duplication of effort and keeps everyone up to date on current issues.

Marketing Australian Products and Expertise

- Opportunities for Australian input (and hence influence on) PV guidelines and standards development. This ensures both that Australian products are not excluded from international markets and that Australian product developers are aware of likely international guidelines.
- Using the information and networks detailed above to promote Australian products and expertise.
- Working with international network partners to further develop products and services.
- Using the network to enter into new markets and open new business opportunities in Australia.

The International Energy Agency Programmes

PV Power Systems (IEA PVPS)

- **Mission:** *To enhance the international collaborative efforts which facilitate the role of photovoltaic solar energy as a cornerstone in the transition to sustainable energy systems*
- **Focus** (26 countries, 5 associates)
    - PV technology development
    - Competitive PV markets
    - Environmentally & economically sustainable PV industry
    - Policy recommendations and strategies
    - Neutral and unbiased information

Australia currently participates in:

PVPS Task 1: Information Dissemination

PVPS Task 13: PV System Performance

PVPS Task 14: High Penetration PV in Electricity Grids.

Solar Heating & Cooling (IEA SHC)

- **Mission:** *International collaboration to fulfil the vision of solar thermal energy meeting 50% of low temperature heating and cooling demand by 2050*
- **Focus** (21 countries, 2 associates)
    - Components
    - Systems
    - Integration into energy system
    - Design and planning tools
    - Training and capacity building

Current Australian participation:

- SHC Task 51 – PV in Urban Environments
- SHC Task 48 – Quality Assurance Support Measures for Solar Cooling Systems
- SHC Task 47 – Solar renovation of non-residential buildings
- SHC Task 46 - Solar Resource Assessment and Forecasting
- SHC Task 43 - Solar Rating & Certification Procedures
- SHC Task 42 - Compact Thermal Energy Storage
- SHC Task 40 - Net Zero Energy Solar Buildings

For further information on the Australian PV Association visit: **www.apvi.org.au**

For further information on the IEA PVPS Programmes visit **www.iea-pvps.org** **and** **www.iea-shc.org**