Part III

Demand

Chapter 5
Demand

Peak demand

5.1 As discussed in Chapter 3, a significant trend in energy consumption patterns has been the growth of peak demand.

5.2 During the course of the inquiry, peak demand was cited as a key driver of increasing electricity prices and, consequentially, reducing peak demand was identified as a central tenet of any strategy intended to reduce electricity prices.[1] For example, Victorian electricity distribution businesses informed the committee that household electricity consumption has been declining in recent years—a trend set to continue due to 'improving energy efficiency, penetration of rooftop photovoltaic systems, changing consumption patterns in the industrial sector and the response to higher retail electricity prices'.[2] However, these businesses also highlighted that peak consumption has continued to increase 'due largely to increased penetration and use of air conditioning on hot days'.[3]

5.3 Similarly, the Energy Supply Association of Australia (ESAA) demonstrated the relative growth in peak demand in contrast to aggregate demand growth as shown in Figure 5.1.

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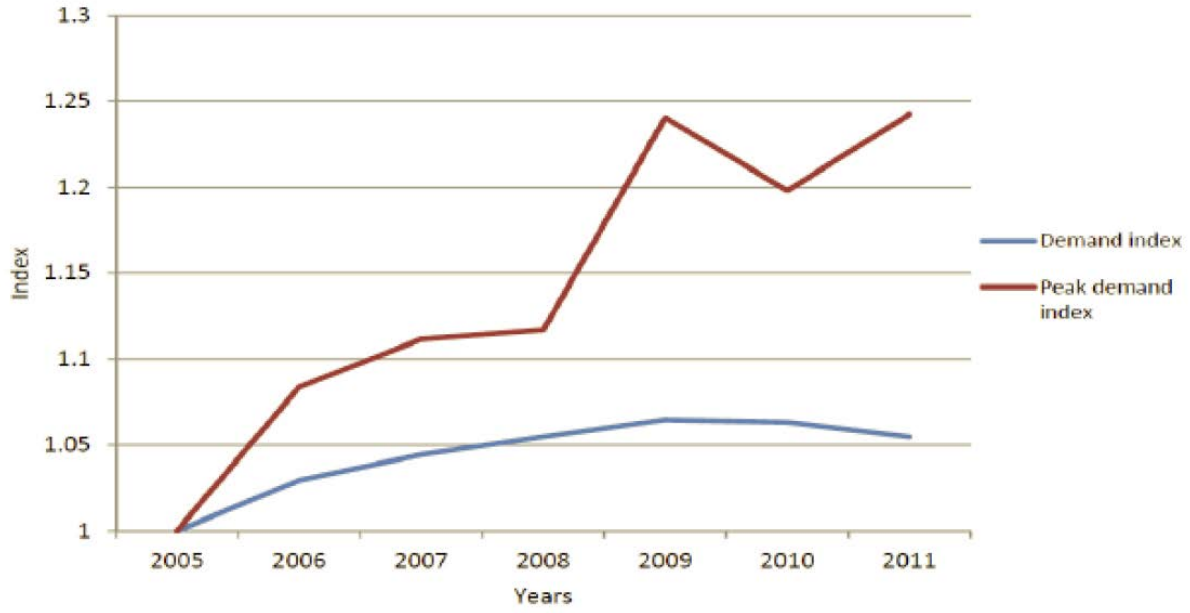
1 See for example Professor Stuart White, Director, Institute for Sustainable Futures, University of Technology Sydney (UTS), *Proof Committee Hansard*, 25 September 2012, p. 26; Dr Ian MacGill, 25 September 2012, p. 31; Mr Peter McIntyre, Chairman, Grid Australia, *Proof Committee Hansard*, 25 September 2012, pp 34 and 35; Dr Peter Burn, Director, Public Policy, Australian Industry Group (Ai Group), *Proof Committee Hansard*, 25 September 2012, p. 42; Mr Andrew Reeves, Chairman, Australian Energy Regulator (AER), *Proof Committee Hansard*, 27 September 2012, p. 1; Mr Nino Ficca, Managing Director, SP AusNet, *Proof Committee Hansard*, 27 September 2012, p. 13 and Ms Catriona Lowe, Co-Chief Executive Officer, Consumer Action Law Centre (CALC), *Proof Committee Hansard*, 27 September 2012.

2 Victorian electricity distribution businesses, *Submission 55*, p. 13.

3 Victorian electricity distribution businesses, *Submission 55*, p. 13.

Figure 5.1: Peak versus aggregate demand growth[4]



5.4 As part of its inquiry into electricity network regulatory frameworks, the Productivity Commission highlighted that driving demand away from peak periods could negate significant infrastructure costs, a key contributor to rising electricity prices:

> Demand-side management aims to reduce network and generation costs by changing the pattern of consumption. It usually intends to shift consumption away from peak demand periods, as these drive marginal generation costs and network augmentation. One of the criticisms made by Garnaut (2011) is that network investment has been used too readily in Australia to meet rising peak demand (notwithstanding static or even falling overall electricity consumption), when demand-side management might have been more efficient.
>
> While estimates vary across jurisdictions, around 25 per cent of retail electricity costs are accounted for by temperature driven peak demand events that occur for less than 40 hours per year (NESI 2011). Trials and case studies of demand-side management identify potential reductions in peak demand usually in the order of 5 to 40 per cent. Evidence on how this impacts network spending is limited, but one Australian study suggests avoidable infrastructure costs of around 5 per cent, simply from delaying capital investment on a project by one year through demand response initiatives (CRA 2004).[5]

5.5 However, as mentioned in Chapter 3, whether peak demand has been rising in recent years is the subject of some debate with some evidence suggesting that over the

4 Energy Supply Association of Australia (ESAA), *Submission 76*, p. 5.

5 Productivity Commission, *Electricity Network Regulation Issues Paper*, 23 February 2012, p. 29.

past four years, both summer and winter peak demand has fallen in the National Electricity Market (NEM) states.[6]

5.6 To address rising peak demand, the Productivity Commission examined potential benefits associated with demand management:

> …because it can:
>
> - avoid an inefficiently high rate of peak demand growth, delaying the need for network augmentation and reducing the size of the peak-specific network investments
> - improve the utilisation (and productivity) of supply side capacity by allowing financial incentives to shift the timing of electricity use and reduce the gap between average and peak consumption—achieving allocative efficiency
> - decrease investment in costly peak-generation and reduce the generation costs by reducing reliance on higher cost peaking supply (open cycle gas turbines)
> - improve competition and reduce the ability of an individual generator to exercise market power in the wholesale market during congestion at peak periods…
> - improve supply reliability, including increasing load shedding options and assisting with the restoration of power after loss
> - reduce volatility in demand (and wholesale prices)
> - allow operational efficiencies for network businesses. Including from advanced meter infrastructure [for example smart meters and smart grids], which enables remote access to consumption data, assists with more timely and less costly disconnection and reconnection, and improves network planning and detection of outages
> - in the short term, provide scope for some consumers to receive reduced electricity bills and, in the longer term, could slow the rate of growth of future electricity bills for all consumers.[7]

5.7 The remaining sections of this chapter explore options for managing demand in the Australian electricity market.

Demand management

5.8 The benefits of demand management are well recognised[8] and there are a variety of ways in which demand management can assist consumers to save energy

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6 Mr Bruce Robertson, Manning Alliance, *Submission 33*.

7 Productivity Commission, *Draft Report: Electricity Networks Regulatory Framework*, October 2012, pp 318–319.

8 See for example Productivity Commission, *Draft Report: Electricity Networks Regulatory* Framework, October 2012 and Australian Energy Market Commission (AEMC), *Power of choice—giving consumers options in the way they use electricity draft report*, 6 September 2012.

and reduce peak demand. A study by Deloitte on behalf of ESAA provided an overview of the benefits from a number of demand management measures as shown in Figure 5.2. In its draft report, the Productivity Commission estimated that 'critical peak pricing would produce savings worth around $100–$250 per household each year'.[9]

Figure 5.2: Total estimated value of gross benefits 2012–13 to 2021–22 (NPV)[10]

Initiative	Low case benefits ($m)	High case benefits ($m)
Time of use pricing	58	193
Critical peak pricing and incentives	385	1,272
Direct load control of air conditioners	200	1,338
Direct load control of pool pumps	188	231
Electric vehicles	60	537
Energy Savings Measures	361	486
Enhanced uptake of Solar PV	300	528
Total gross benefits	**1,551**	**4,585**

Source: Deloitte analysis

5.9 During the course of the inquiry, network businesses, consumer advocacy groups and academics alike recognised the benefits of and role for demand management. Victorian electricity distribution businesses stated:

> While it is early days, demand management will play an increasing role, enabling a reduction in network augmentation costs by reducing the length and extremity of peak demand periods.[11]

5.10 The Consumer Utilities Action Centre (CUAC) saw 'room for demand side participation to increase in the NEM' and was 'broadly supportive of demand side reform to reduce network costs and peak demand'.[12]

9 Productivity Commission, *Draft Report: Electricity Network Regulatory Frameworks*, October 2012, p. 301.

10 ESAA, *Submission 76*, p. 6.

11 Victorian electricity distribution businesses, *Submission 55*, p. 6.

12 Ms Caitlin Whiteman, Research and Policy Advocate, Consumer Utilities Advocacy Centre (CUAC), *Proof Committee Hansard*, 27 September 2012, p. 35.

5.11 Professor Ross Garnaut was also supportive of demand management activities as part of the solution to address the current Australian system that:

> …provides incentives for exacerbating peak demand, because at a time when total demand is falling the only way that the transmission and distribution companies can expand the regulated asset base, and therefore get their guaranteed rate of return over more assets, is by exacerbating peak demand.
>
> In most developed countries efforts are made to diminish peak demand. The curious Australian approach to this—the idiosyncratic Australian approach to this—is one reason why the ratio of peak demand to average demand has been rising quite rapidly in Australia over recent years, when it is falling in much of the rest of the world. Of course it is hugely costly for electricity consumers to have this exacerbation of the peaks.[13]

5.12 The following demand management mechanisms are discussed below:

- cost reflective pricing and smart meters;
- demand side participation in the wholesale market;
- information and consumer empowerment; and
- a range of technological solutions.

Cost reflective pricing and smart meters

5.13 Cost reflective pricing[14] refers to prices which signal the costs of supplying and transporting electricity at different times of the day and / or year to consumers in different locations. Retail prices developed on a cost reflective basis tend to vary by time of day and sometimes by geographical location.[15]

5.14 There is a wide range of cost reflective pricing tariffs including time of use and variations of time of use (such as seasonal time of use); full wholesale price pass through (real time pricing); critical peak pricing; variable peak pricing; peak time rebates and / or incentives; and new forms of network charges that attempt to capture the cost of peak demand (such as capacity based charging).[16]

5.15 In its *Power of Choice* draft report (PoC report), the Australian Energy Market Commission (AEMC) demonstrated the risks and rewards for consumers associated with various tariffs (see Figure 5.3).

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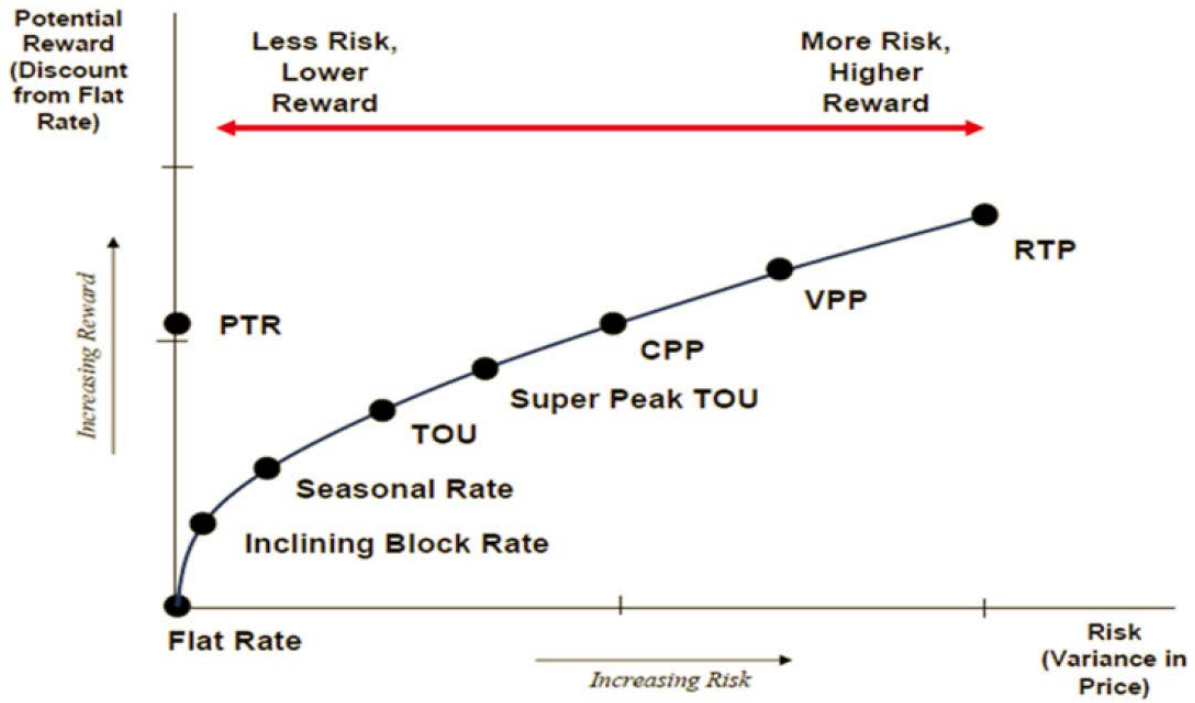
13 Professor Ross Garnaut, *Proof Committee Hansard*, 9 October 2012, p. 3.

14 Also referred to as time variable pricing, time varying pricing and time of use pricing.

15 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 83.

16 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 84.

Figure 5.3: Types of tariffs for cost reflective pricing[17]



5.16 The AEMC also explained the reason for implementing cost reflective pricing:

> A rationale for implementing cost reflective pricing is that by exposing consumers to the costs they impose on network and generation, they can respond in ways to reduce these costs over time. This in turn will reduce energy bills for all consumers in the long run...
>
> [A] survey of domestic and international trials showed that where consumers are exposed to time varying prices, peak demand reductions of up to 30 or 40 per cent could be achieved.[18]

5.17 Cost reflective pricing requires the concomitant installation of advanced metering infrastructure (AMI) or "smart meters". Smart meters are a reasonably new technology that enable consumers to make choices about energy use by providing real-time information on electricity consumption. Unlike traditional accumulation meters, smart meters record electricity usage at regular intervals (for example, every 30 minutes) and, if equipped to do so, can automatically send the data to electricity suppliers via remote communication, thereby eliminating the need for manual meter readings.

5.18 Smart meters also enable the use of in-home displays, dashboards and web portals so that consumers can access detailed information about their electricity

17 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 85.

18 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 85.

consumption. This information can then be used to identify ways to save electricity, reduce energy costs and compare electricity pricing offers from competing providers.[19] In-home displays, dashboards and web portals are discussed in greater detail later in this chapter.

Smart meters in Victoria

5.19 Most Australian consumers have an accumulation meter and not a smart meter. The notable exception to this is Victoria where smart meters have been installed in a state government-mandated roll-out that commenced in 2009. It is expected that all households and small businesses in Victoria will have a smart meter by 2013.[20] From 2013, Victorian consumers will have the option of moving to flexible pricing tariffs, facilitated by smart meters.[21]

5.20 The Victorian smart meter program involves installation of 2.6 million new meters across the state, of which more than 1.2 million have now been installed.[22] Whilst the Victorian smart meter program has resulted in the detection of around 13 000 wiring defects that have been rectified to improve consumer safety, it has also come at a cost to consumers: in 2012, the cost to consumers of the smart meter roll-out was a net increase of $80–$120[23] per consumer.[24]

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19 Department of Primary Industries (DPI) (Victoria), *About Smart Meters*, available: http://www.dpi.vic.gov.au/smart-meters/about-smart-meters (accessed 31 August 2012) and Premier of New South Wales, *Smart Meters – Fact Sheet*, available: http://www.savepower.nsw.gov.au/Portals/0/docs/news/Media07121202.pdf (accessed 3 September 2012).

In Victoria, electricity companies Origin Energy and Jemena have launched smart meter compatible web portals, and United Energy is currently trialling a portal. DPI (Victoria), *Smart Meter web portals launched*, available: http://www.dpi.vic.gov.au/smart-meters/home/latest-news/smart-meter-web-portals-launch (accessed 18 September 2012).

20 DPI (Victoria), *About Smart Meters*, available: http://www.dpi.vic.gov.au/smart-meters/about-smart-meters (accessed 31 August 2012) and Premier of New South Wales, *Smart Meters – Fact Sheet*, available: http://www.savepower.nsw.gov.au/Portals/0/docs/news/Media07121202.pdf (accessed 3 September 2012).

21 The Hon Michael O'Brien MP, 'Greater pricing choice for Victorian energy consumers', media release, 26 September 2012.

22 Energy Safe Victoria, *Safety of Advanced Metering Infrastructure in Victoria*, 31 July 2012, p. 5.

23 Victorian electricity distribution businesses, *Submission 55*, pp 7, 13.

24 In the same way as consumers pay for older accumulation meters and other electricity infrastructure, the cost of supplying, installing and operating a smart meter is charged to the consumer and paid for over time via supply charges (see for example AGL, *Smart meter FAQs*, available: http://www.agl.com.au/home/smart-meters/Pages/smart-meter-faqs.aspx and SP Ausnet, *Questions and Answers—Smart Meter Program*, available: http://www.sp-ausnet.com.au/?id=101010096D44FB3497B84DDCA2579D1001CAD35 (accessed 25 October 2012)).

5.21 Consumer criticism of and resistance to the Victorian smart meter roll-out has been well publicised;[25] the Energy Retailers Association of Australia (ERAA) stated:

> …it became a high-profile issue in Victoria and, in some ways, the way it was done without much consumer involvement, information or consultation, and they got the cost of the meter upfront without getting any of the benefits has poisoned the environment around them. [Smart meters] have a role to play. The major benefits are captured all along the energy value chain but the major benefits from a customer's point of view going forward is a lot greater understanding of data on energy use patterns, and more information means better decision making, remote connection and disconnection.[26]

5.22 As a result of the negative consumer reaction in Victoria, in their submission to the inquiry, Victorian network distribution businesses emphasised the importance of consumer communication around the implementation of smart meters and flexible pricing:

> - Incentives for change through flexible pricing - the Victorian DBs support the Victorian Government's view that introduction of flexible pricing must be undertaken in an orderly way. It will be important to ensure that introduction of flexible pricing is supported by a consumer information campaign and that the pricing structures and their impacts are very clearly explained, particularly to vulnerable consumer groups. We have been working on development of flexible network tariffs which will be introduced consistent with Government policy and appropriate regulation.
> - Consumer education - at this stage, consumer understanding of smart meters and the opportunities they create is limited. Following the Victorian Government's decision in December 2011 to continue with the smart meter rollout, the Government's consumer communication program has developed significantly, including the launch of the recent "Switch On" initiative. We support the Government's increased communication on smart meters, which we believe is critical to benefits delivery and take-up.[27]

Smart Grid, Smart City trial

5.23 In addition to the Victorian smart meter program, there is currently a smart grid trial in Newcastle. The federal government has committed up to $100 million to

25 See for example Mathew Murphy, 'New meter roll-out may leave sweltering consumers smarting', *The Age*, 31 January 2009; Stephen McMahon, 'Power bills and bottom lines to rise under smart metering', *Herald Sun*, 12 November 2009; and Cameron Houston, 'Surge in electric hostility', *Sunday Age*, 14 August 2011.

26 Mr Cameron O'Reilly, Chief Executive Officer, Energy Retailers Association of Australia (ERAA), *Proof Committee Hansard*, 25 September 2012, pp 21–22.

27 Victorian electricity distribution businesses, *Submission 55*, p. 8.

develop the Smart Grid, Smart City trial in the Newcastle region in partnership with the energy sector.[28] The demonstration project:

> …gathers information about the benefits and costs of different smart grid technologies in an Australian setting. Building a smart grid involves transforming the traditional electricity network by adding a chain of new smart technology. It includes smart sensors, new back-end IT systems, smart meters and a communications network. Smart grids provide real time information about the electricity network to make it more efficient and help reduce interruptions, support more renewable energy and gives households greater control over their energy use.[29]

5.24 The Department of Resources, Energy and Tourism (DRET) described the benefits of a smart grid:

> A smart grid works by combining advanced communication, sensing and metering infrastructure with the existing electricity network...
>
> A smart grid can improve the reliability of electricity services for consumers by identifying and resolving faults on the electricity grid, better managing voltage and identifying infrastructure that requires maintenance. Smart grids can also help consumers manage their individual electricity consumption and enable the use of energy efficient 'smart appliances' that can be programmed to run on off-peak power.[30]

5.25 The project commenced in October 2010 and is expected to end in September 2013.[31]

5.26 The committee made a site visit to the Smart Grid, Smart City Centre in Newcastle on 24 October 2012 and was pleased to be able to view this technology and its benefits firsthand.

Cost reflective pricing and smart meters in the NEM

5.27 Submitters and witnesses were broadly supportive of cost reflective pricing, and the installation of smart meters, and acknowledged the benefits for many consumers in reducing both their own electricity bills and the price of electricity.[32]

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28 Ausgrid will be working with consortium partners IBM Australia, GE Energy Australia, Sydney Water and Newcastle City Council.

29 Smart Grid, Smart City, *About Smart Grid, Smart City*, available: available: http://www.smartgridsmartcity.com.au/About-Smart-Grid-Smart-City.aspx (accessed 19 October 2012).

30 Department of Resources, Energy and Tourism (DRET), *Smart Grid, Smart City*, available: http://www.ret.gov.au/energy/energy_programs/smartgrid/Pages/default.aspx, (accessed 18 September 2012).

31 DRET, *Smart Grid, Smart City*, available: http://www.ret.gov.au/energy/energy_programs/smartgrid/Pages/default.aspx, (accessed 18 September 2012).

5.28 Indeed, the Productivity Commission stated:

> A potentially key tool of demand management is the use of electricity prices that vary to reflect the costs of supply at different times. In principle, such approaches should help ensure that peak network capacity is available for high value uses, in part by allowing cheaper non-peak prices for lower value or less time sensitive uses.[33]

5.29 The Productivity Commission continued:

> Although not used extensively to date in Australia to manage electricity demand to households, price signalling appears to the Commission to offer significant scope to do so.
>
> …
>
> Most studies find that Australian consumers do adjust their consumption in response to time-based pricing. For example, across seven Australian pricing trials, the average reductions in peak demand were between 13–40 per cent (Futura 2011). The extent of response by consumers of course depends on the strength of the price signal and consumers' ability to adapt. In particular, when prices are considerably higher during a declared peak event—so-called critical peak pricing—the reduction in peak consumption is generally more than four times that under flatter "time of use" tariffs…[34]

5.30 To facilitate cost reflective pricing, the Productivity Commission recommended establishment of a single set of licence requirements for all NSPs operating in the NEM.[35] The Productivity Commission argued that:

> Such a change would of course have wider benefits—including for the transmission component of the NEM and by assisting the introduction of:
>
> - an NEM-wide reliability framework…
> - a common and efficient approach across jurisdictions to the provision of assistance to vulnerable consumers…[36]

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32 See for example Mr Ric Brazzale, President, REC Agents Association, *Proof Committee Hansard*, 9 October 2012, p. 10; Ms Carolyn Hodge, Senior Policy Officer, Energy and Water Consumers' Advocacy Program, Public Interest Advocacy Centre (PIAC), *Proof Committee Hansard*, 25 September 2012, p. 59; Mr Matt Levey, Head of Campaigns, CHOICE, *Proof Committee Hansard*, 25 September 2012, p. 59; Ms Catriona Lowe, Co-Chief Executive Officer, CALC, *Proof Committee Hansard*, 27 September 2012, p. 33; Mr David Swift, Acting Chief Executive Officer, AEMO, *Proof Committee Hansard*, 27 September 2012, pp 9–10; and Mr Peter Bryant, General Manager, AMI Services, Citipower and Powercor Australia, *Proof Committee Hansard*, 27 September 2012, p. 14.

33 Productivity Commission, *Draft Report: Electricity Network Regulatory Framework*, October 2012, p. 321.

34 Productivity Commission, *Draft Report: Electricity Network Regulatory Framework*, October 2012, p. 321.

35 Productivity Commission, *Draft Report: Electricity Network Regulatory Frameworks*, October 2012, p. 399.

5.31 The Productivity Commission subsequently recommended that the Standing Council on Energy and Resources (SCER) initiate a process to establish a uniform set of licence condition for all transmission and distribution network businesses in the NEM, and that these conditions should be included in the National Electricity Rules (NER) and replace current state and territory licence conditions.[37]

5.32 The AEMC has acknowledged, however, that the majority of consumers do not receive this sort of cost reflective pricing. It outlined that:

> A rationale for implementing cost reflective pricing is that by exposing consumers to the costs they impose on network and generation, they can respond in ways to reduce these costs over time. This in turn will reduce energy bills for all consumers in the long run...
>
> [A] survey of domestic and international trials showed that where consumers are exposed to time varying prices, peak demand reductions of up to 30 or 40 per cent could be achieved.[38]

5.33 EnerNOC described cost reflective pricing as 'economically elegant' but offered the following caution:

> The dynamic pricing approach is widely praised as economically elegant, and performs well in some trials, but has not been very successful in practice. The problem appears to be that customers are reluctant to expose themselves to such volatile prices that they may be unable to afford to run their air conditioning when they want it most.
>
> When faced with the risk of very high prices, a very large proportion of customers is likely to opt out of dynamic pricing in favour of flatter price arrangements which protect against volatile prices. Of course, this undermines the objective of dynamic pricing. Mandating that dynamic prices be passed through to customers avoids this issue, but is likely to be a wildly unpopular policy, and could cause serious issues for vulnerable customers.[39]

5.34 Other submitters were also cautious about the implementation of cost reflective pricing and smart meters because of concern about low income and vulnerable consumers' ability to change their pattern (time) of consumption. It was acknowledged that many low income and vulnerable consumers may be unable to shift electricity consumption away from periods of peak demand and that exposing these consumers to cost reflective pricing may result in the perverse outcome where their electricity bills increase. Ms Carolyn Hodge of the Public Interest Advocacy Centre (PIAC) summarised the issue:

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36 Productivity Commission, *Draft Report: Electricity Network Regulatory Frameworks*, October 2012, p. 399.

37 Productivity Commission, *Draft Report: Electricity Network Regulatory Frameworks*, October 2012, p. 401.

38 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 85.

39 EnerNOC, *Submission 50*, p. 5.

> I think we have to take real care to think about the level of capacity that consumers have to change their behaviour. I think there are savvy people who are well-resourced and who can make investments in technology to understand their energy usage and perhaps invest in some low-control technology or log on to web portals and understand pricing messages. There are also people who have a fairly low level of discretionary use. For those people, understanding that there are critical peak pricing times would only serve to heighten their anxiety about electricity prices in the knowledge they are going to have difficulty affording that next bill.[40]

5.35 The Total Environment Centre (TEC) had a similar view:

> We have always supported the continuation of a kind of safety net in the electricity market in the form of regulated tariffs, which should be available to people who might be overly exposed to time-of-use pricing, and we continue to support that. At the same time, we think it is really important that more people who can afford to do so do go onto time-of-use pricing. We agree with the AEMC in its Power of choice draft report that more should be done with time-of-use pricing.[41]

5.36 The AEMC's PoC report flagged 'a lack of metering capability' and a low level of consumer understanding about the relationship between usage and cost as impediments to the implementation of cost reflective pricing.[42] The PoC report suggested that addressing these impediments would 'require a balance between managing consumer impacts and addressing the needs of consumers who would face increased financial difficulties under new pricing structures and strengthening the arrangements for retailers and distributors to set cost reflective pricing'.[43] Consequently, the PoC report recommended:

> a) Focusing only on introducing time varying prices for the network tariff component of consumer bills. Retailers would be free to decide how to include the relevant network tariff into their retail offers; and
>
> b) Segmenting residential and small business consumers into three different consumption bands and applying time varying network tariffs in different ways...[44]

5.37 The PoC report also noted work by SCER examining the business case in different jurisdictions for the implementation of smart meters.[45] SCER found that

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40 Ms Carolyn Hodge, Senior Policy Officer, Energy and Water Consumers' Advocacy Program, PIAC, *Proof Committee Hansard*, 25 September 2012.

41 Dr Mark Byrne, Energy Market Advocate, Total Environment Centre (TEC), *Proof Committee Hansard*, 25 September 2012, p. 49.

42 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 82.

43 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 82.

44 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 82.

industry-led installation of smart meters was 'currently at a low level' but could be expected to increase in the future.[46] SCER identified several impediments to industry-led roll-outs:

- split incentives between the various industry players (given the disaggregation of distribution and retail functions), consumers and society.
- different regulatory treatment of different meter types, which places legal restrictions on contractual options for retailers and customers and encourages distributors to focus on approaches that receive regulatory protection.
- a lack of transparency in metering charges where these are rolled into distribution use-of-system charges, which prevents full comparison of price and service for different metering options and between metering providers.
- a lack of clarity regarding access to meter data and control functions by various industry sectors such as retailers, distributors and aggregators.[47]

5.38 SCER concluded:

> The first issue may be addressed as technology prices come down and businesses are able to make an internal business case or establish appropriate contracts to aggregate benefits across the supply chain, while the later issues are matters to be considered by market institutions and policy-makers, through either rule changes or the development of the AER's regulatory approach to metering and related services. The fourth issue is critical, as it relates to the governance of fundamental meter data and can impact the way industry sectors interact.[48]

5.39 The PoC report proposed a three-tiered model for implementing cost reflective pricing, as shown in Figure 5.4 below. Deliberately, the PoC report did not define the thresholds for each of the consumption bands arguing that these thresholds would likely vary between jurisdictions and over time.[49] With respect to smart meters, the strategy proposed in the PoC report would require band 1 consumers (large consumers) to have a smart meter; band 2 consumers (medium to large consumers) would be deemed to have a smart meter (by virtue of being deemed to be on a time

45 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 44.

46 SCER, *SCER statement on smart meters for small customers: future directions*, 8 June 2012, p. 4.

47 SCER, *SCER statement on smart meters for small customers: future directions*, 8 June 2012, p. 4.

48 SCER, *SCER statement on smart meters for small customers: future directions*, 8 June 2012, p. 4.

49 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 100.

varying network tariff) with the ability to "opt-out"; and band 3 (small consumers) would be deemed to have an accumulation meter (by virtue of being deemed to be on a flat network tariff) with the option to "opt-in". The combined strategy for implementing cost reflective pricing and smart meters, as suggested in the PoC report, is summarised in Table 5.1.

5.40 As raised earlier, the implementation of smart meters in Victoria emphasised the need for appropriate and thorough consumer education and engagement. The importance of this education and engagement was discussed in the PoC report[50] and was re-iterated throughout the inquiry; for example, Victorian distribution network businesses stated:

> Historically, the biggest issue facing the Victorian rollout has been the lack of effective communication of the vision. In any future rollouts a comprehensive communication and education program about smart meters and how to harness them is essential.[51]

5.41 The Consumer Action Law Centre (CALC) also noted the need for consumer education[52] as did CHOICE.[53]

50 AEMC, *Power of choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 95.

51 Mr Peter Bryant, General Manager, AMI Services, Citipower and Powercor Australia, *Proof Committee Hansard*, 27 September 2012, p. 15.

52 Ms Catriona Lowe, Co-Chief Executive Officer, CALC, *Proof Committee Hansard*, 27 September 2012, p. 36.

53 Mr Matt Levey, Head of Campaigns, CHOICE, *Proof Committee Hansard*, 25 September 2012, p. 59.

Figure 5.4: AEMC proposed strategy for implementing cost reflective pricing[54]

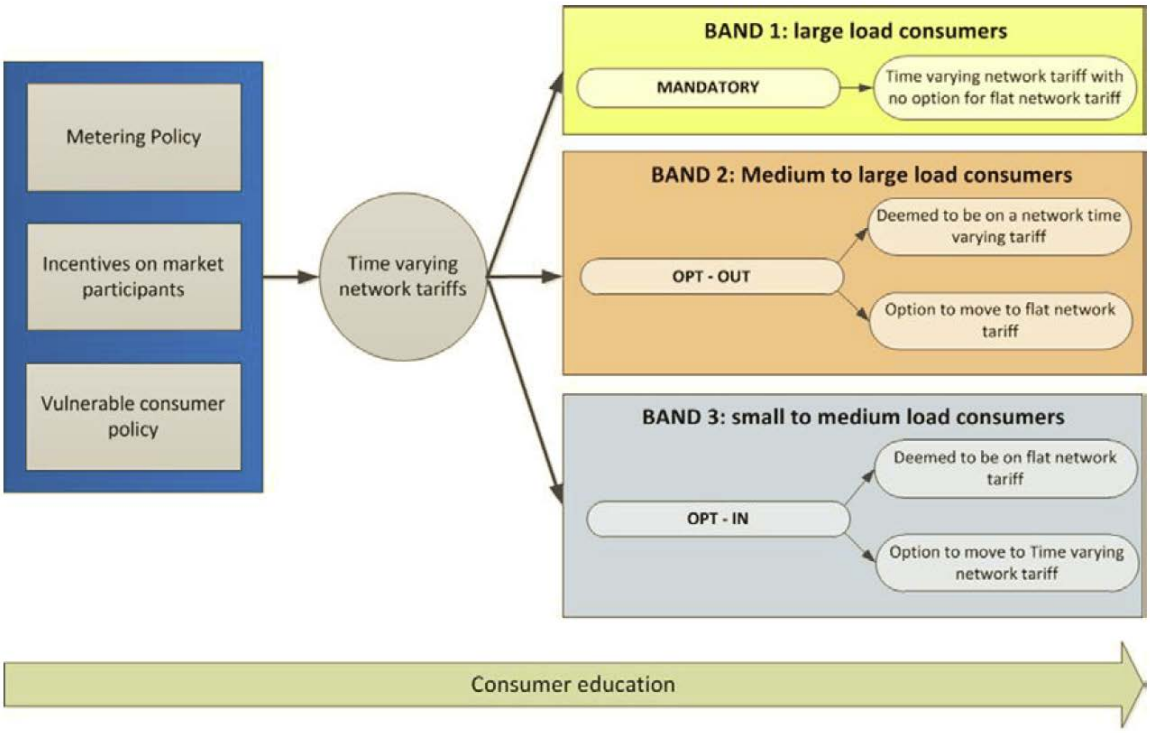


Table 5.1: Model for implementation of cost reflective pricing and smart meters

Band	Consumer	Smart meter	Price tariff
1	Large	Mandatory	Cost reflective network tariff
2	Medium to large	Opt-out	Deemed to be on a cost reflective network tariff (with a smart meter)
			Option to move to a flat network tariff (no smart meter required)
3	Small to medium	Opt-in	Deemed to be on a flat network tariff (no smart meter required)
			Option to move to a cost reflective network tariff (with a smart meter)

Committee comment

5.42 The committee recognises the significant benefits that can be delivered by cost reflective prices and smart meters: given network costs associated with infrastructure to meet increasing peak demand appear to be one of the most significant drivers of recent increases in electricity prices, it seems that cost reflective pricing and

54 AEMC, *Power of choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 92.

smart meters have a role to play in modifying patterns of electricity consumption and reducing peak load.

5.43 To this end, the committee agrees with the recommendations of the PoC report regarding the gradual introduction of cost reflective pricing and smart meters. In this respect, the committee supports the introduction of cost reflective pricing and smart meters as shown in Table 5.1. However, it is the committee's view that any introduction of cost reflective pricing and smart meters must also include explicit consumer protections, in particular for low income and vulnerable consumers. Whilst the three-tiered model goes some way to protecting small to medium consumers, further consumer protections are needed and these are discussed in Chapter 6.

5.44 The committee believes that prior to and during the roll out of cost reflective pricing and smart meters, there must be a comprehensive consumer information and education campaign. As demonstrated by the experience in Victoria, it is essential that consumers understand the costs as well as the short- and long-term benefits associated with cost reflective pricing and smart meters that accrue both to them and to electricity network businesses and retailers: the consumer information campaign must seek to ensure that consumers understand these costs and benefits.

5.45 Noting that the business case for implementing smart meters will likely differ between jurisdictions, meaning that the time and circumstances in which smart meters are implemented will also differ between jurisdictions, the committee recommends that implementation of cost reflective pricing and smart meters occurs in a planned, logical sequence: the committee feels that the way in which the digital television switchover was rolled-out by pre-determined geographic locations warrants consideration as a possible model. Such an approach would assist with planning and allow consumer information and education to be targeted to the needs of consumers in each location.

Recommendation 9

5.46 **The committee recommends that SCER agree to introduce cost reflective pricing for electricity in conjunction with smart meters in all jurisdictions in the NEM:**

- **based on the model proposed in the *Power of Choice* draft report comprising three consumption bands for large (band 1), medium to large (band 2) and small to medium (band 3) consumers;**
- **where smart meters are mandated for consumption band 1, opt-out for band 2 and opt-in for band 3; and**
- **accompanied by a comprehensive consumer information and education campaign funded by the Commonwealth, state and territory governments during both the planning and implementation phases.**

Demand side participation in the wholesale market

5.47 The PoC report made a number of recommendations to enhance consumer participation in the wholesale market and ancillary services market, noting that this

would increase competition among network businesses. The PoC report identified certain barriers to this process such as:

- commercial practices;
- current rules;
- the risks of consumers being exposed to the spot price;
- the cost of participation relative to the benefits; and
- the current inability to "unbundle" the sale and supply of electricity provided through a retailer.[55]

5.48 To address these barriers, the PoC report recommended the creation of a demand response mechanism whereby demand side participation in the wholesale market was enabled:

> AEMO pays consumers for the quantity of demand response delivered to the market during the trading interval at the spot price. As a result, consumers participating in the mechanism pocket the difference between the spot price and the retail price (energy component).[56]

5.49 This mechanism rewards consumers for reducing their consumption by a set amount through a payment for "demand resources" analogous to the wholesale spot price. The amount of demand resources payed to a consumer would be calculated as the difference between the consumer's actual metered consumption and their baseline consumption (an estimate of what their consumption would be had they not changed their consumption).[57] The PoC report described the demand mechanism thus:

> Under this mechanism it is necessary for consumers to continue paying their retailer for electricity according to their estimated baseline consumption. Similarly, consumers' retailers are required to pay the wholesale market spot price according to their estimated baseline consumption. This arrangement allows for AEMO to recover enough funds to pay consumers [or an aggregator on their behalf][58] for their demand response at the wholesale price. The total net benefit to consumers of providing the demand response under this mechanism is the spot price

55 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 58.

56 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 60.

57 The AEMC noted that a method would need to be developed to calculate the baseline figure (see pp 60, 66–69).

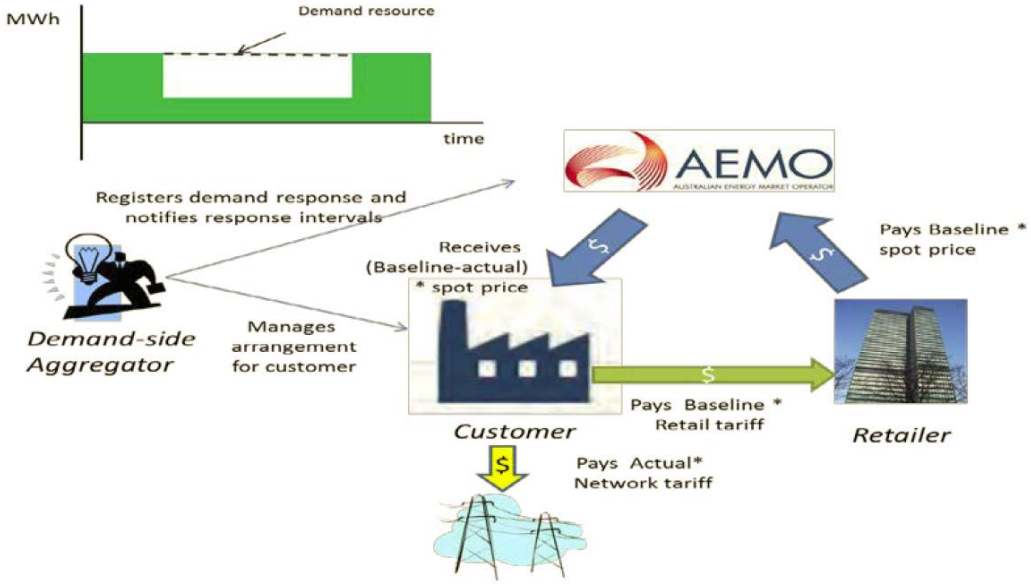
58 The AEMC identified that a new market participant categorised as a sub-category of market generator would be required to facilitate this mechanism. It asserted this was a 'reasonable' categorisation given that demand resources would participate in the wholesale market in an analogous manner to generation.

AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, pp 59 and 71.

minus energy component of the retail price (this excludes the opportunity cost of not consuming).[59]

5.50 The PoC report found that the costs associated with this proposal would be limited to administrative costs as many of the provisions needed for operation of the mechanism are already in place. These costs would arise from the development of new procedures and guidelines for registering demand resources and changes to the settlement process to account for the recovery of funds. The PoC report noted that no major changes to metering procedures would be required.[60]

Figure 5.5: General design of demand response mechanism[61]



5.51 Dr Paul Troughton, Manager of Regulatory Affairs for EnerNOC, described an example of this type of demand side participation in the wholesale market:

> EnerNOC is a demand response company. By demand response we mean paying electricity users for measured reduction in their consumption at times when the grid needs it—when either there is a physical issue or prices are very high. Everywhere around the world that demand response has been allowed to compete in the market, it has proven to be the cheapest way of dealing with critical peaks in demand. This is really what the NEM needs. Peaks are the root of all evil in the NEM at the moment, and they do need to be fixed. The fundamental idea is that it is much cheaper to pay people who are willing to change their behaviour for a few hours in a year to do so than

59 AEMC, *Power of Choice – giving consumers options in the way they use electricity* draft report, 6 September 2012, p. 59.

60 AEMC, *Power of Choice – giving consumers options in the way they use electricity* draft report, 6 September 2012, pp 64–65.

61 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 61.

> it is to build a load of infrastructure that is only going to be used for those few hours in the year. [62]

5.52 The committee also heard from Dr Troughton that commercial and industrial demand response has some significant policy and cost of implementation advantages:

> The interesting thing about looking at commercial and industrial demand response, which is what we do, is that it does not need any subsidy and it does not need a smart meter rollout. It does not need a consumer protection campaign. It does not impact on vulnerable consumers. It is just about reaching out specifically to people who are able and willing to make changes and giving a very pointed incentive to them to do so. [63]

5.53 The committee was informed that the initial design for the NEM focussed on the supply side. Whilst this has been good for security of supply, it has had some negative impacts, including on networks costs, because of the need to predict demand rather than treat demand in a more dynamic way:

> It treats electricity demand as being an unchangeable fact—that you forecast it and it will come—and then it is the purpose of the electricity market to give enough strong incentives for all of the various participants to go out and build the infrastructure needed to meet those forecasts. And that has worked, in that the lights have stayed on, but it is a very expensive way of doing things. If you can move away from this predicting and providing into trying to see whether you can treat that forecast as not being unchangeable, then you can get a more intelligent and cheaper outcome.
>
> We have known about this supply-side bias for a long time, but it has not yet been fixed. There have been lots of reviews and lots of vague recommendations but no actual meaningful action. While that has been going on for the last decade, $16 billion worth of supply-side infrastructure has been built, and that should not have been needed.[64]

5.54 The AER indicated that in its view the next wave of reforms would be at the consumer end:

> We are seeing there—and this is acknowledged through power of choice—that at the customer end customers will make the choice of local generation—that is, solar or other domestic generation—of demand management, of storage as we see in the future electric vehicles coming on to the scene and of grid services. That is a recognition of very significant changes in the electricity market over the medium and longer term.[65]

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62 Dr Paul Troughton, Manager of Regulatory Affairs, EnerNOC Pty Ltd, *Proof Committee Hansard,* 27 September 2012, p. 67.

63 Dr Paul Troughton, Manager of Regulatory Affairs, EnerNOC Pty Ltd, *Proof Committee Hansard,* 27 September 2012, p. 67.

64 Dr Paul Troughton, Manager of Regulatory Affairs, EnerNOC Pty Ltd, *Proof Committee Hansard,* 27 September 2012, p. 67.

65 Mr Andrew Reeves, Chairman, AER, *Proof Committee Hansard,* 27 September 2012, p. 6.

5.55 In EnerNOC's opinion, creating a market for demand side bidding would go some way to addressing increasing peak demand and reduce the need for further network infrastructure:

> …if you address peak demand—the very narrow, sharp peaks in demand—through demand response rather than by building network infrastructure, it is so cost-effective by comparison that you can afford to make it considerably more profitable for the network business so that it is really a no-brainer for them to do it. And, looking at the whole picture, everyone comes out ahead. The total costs are reduced. There is more profit there but much less spent in total, so consumer bills come down. That is what a solution has to look like.[66]

5.56 Such an approach was also strongly supported by the Energy Efficiency Council (EEC),[67] which stated that it 'solves multiple problems':

> First, allowing energy users to sell reductions in energy demand into the market provides a time-of-use price signal to large energy consumers that encourages them to conserve energy during periods when supplying energy is expensive. Currently, very few large energy users face a price signal that reflects the true cost of supply at that time.
>
> …
>
> Second, the price signal for consumers would be set by the generation market. In other words, consumers would only be paid to reduce their demand if it was cheaper than generation. In the short term this would increase competition in the energy market and reduce the wholesale price for electricity, reducing electricity prices for all consumers. In the long term this would reduce the need to build very expensive peaking generators and networks…reducing the growth in electricity prices for all consumers.
>
> Third, these changes would make it easier for third-parties that are experts in reducing peak demand to help consumers to optimise their energy demand patterns. Allowing consumers to sell demand-response into the market provides a clear value for this demand-response, facilitating commercial intermediaries.
>
> Fourth if this market were established it would also enable meaningful volumes of peak reduction to be developed and sold to network companies This would help reduce expenditure on transmission and distribution infrastructure and partially address the split incentive, whereby the benefits of demand-side actions are split between several parties.[68]

Committee comment

5.57 The committee agrees with the proposal for demand side participation in the wholesale market as advocated in the PoC report and supported by various submitters

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66 Dr Paul Troughton, Manager of Regulatory Affairs, EnerNOC Pty Ltd, *Proof Committee Hansard,* 27 September 2012, p. 68.

67 Energy Efficiency Council (EEC), *Submission 75*, p. 11.

68 EEC, *Submission 75*, p. 11.

and witnesses to the inquiry. Offering consumers the opportunity to reduce their peak demand and to be financially rewarded for doing so appears to the committee to be the "carrot" to the "stick" of cost reflective pricing. Further, the committee acknowledges that the costs associated with introducing this new wholesale market participant appear to be low. On that basis, the committee supports the introduction of a demand response mechanism that allows consumers to sell their demand in the wholesale electricity market for the prevailing spot price.

5.58 Where such a mechanism enables third parties to sell demand in the wholesale market on behalf of consumers, these third parties must be accredited, authorised to act on behalf of and required to act in the interests of consumers. The committee proposes that SCER examine incorporating the accreditation and regulation of these third parties offering demand management services in the National Energy Customer Framework (NECF).

5.59 The committee supports the proposal in the AEMC PoC report for consumers or authorised third parties representing consumers to sell their demand in the wholesale electricity market for the prevailing spot price. The committee is also pleased to note that such a mechanism will be in place by 1 July 2014.

Recommendation 10

5.60 **The committee recommends that SCER examine incorporating the accreditation and regulation of third parties offering demand management services in the National Energy Customer Framework (NECF).**

Information and consumer empowerment

5.61 The need for better quality and more readily available information for consumers was cited by various submitters and witnesses and identified by many of these as a way in which demand for electricity could be modified for the benefit of consumers via reductions in demand and electricity prices.[69]

5.62 As Mr Terry McConnell stated:

> …the energy business is incredibly complicated. We have heard before about the acronyms within the energy sector. There are many of them. The problem is this business is technical, it is complicated, and the average punter simply does not understand it fully. What I have pushed for since I started working in the sector is education, education, education. Anything that we can do to improve the education of the consumer, whether they be residential or even the commercial, industrial consumers, will make a

69 See for example CHOICE, *Submission 73*, pp 15–16 ; EEC, *Submission 75*, pp 8–9; Ethnic Communities Council of NSW, *Submission 11*, pp 1 and 3; Mr Terry McConnell, *Proof Committee Hansard*, 3 October 2012, p. 23; Ms Caitlin Whiteman, Research and Policy Advocate, Consumer Utilities Advocacy Centre (CUAC), *Proof Committee Hansard*, 27 September 2012, p. 35; Mr Christopher Zinn, Director, Campaigns, One Big Switch, *Proof Committee Hansard*, 3 October 2012, p. 10; and Professor Ray Wills, Chief Adviser, Sustainable Energy Association of Australia, *Proof Committee Hansard*, 2 October 2012, p. 42.

> difference. We need dashboards, in-house home displays, price signals and whatever else—we need to do all of that.[70]

5.63 The complex and technical nature of the electricity market together with barriers to consumers accessing data and information prevent consumers from understanding their electricity consumption, as well as the relationship between this consumption, the wider electricity market and drivers of increasing electricity prices. CHOICE described the combination of 'rapidly rising prices and generally poor information' as 'a "perfect storm" in which consumers find it difficult to navigate an increasingly complex market'.[71]

5.64 CHOICE argued that better information and data made available by advances in technology 'has the potential to empower energy consumers to make more informed decisions, and achieve greater product differentiation in electricity retail'.[72] Further, CHOICE raised the Commonwealth government's 2012–13 Budget proposal for:

> …a scoping study on the establishment of an energy information hub to improve energy information disclosure by retailers and distributors in order to help consumers to better understand and manage their energy use[73]

and recommended fast-tracking this proposal to:

> …enable consumers to identify energy efficiency options. Providing wider access to this consumption data, with appropriate privacy safeguards, would also encourage genuine competition and product differentiation in energy retailing and promote cost-effective distributed generation options.[74]

5.65 CUAC similarly advocated for improved consumer information and support for consumer decision making[75] as did One Big Switch:

> Data is power. The energy usage data that we generate as consumers is incredibly valuable, and we want some of that value to flow back to consumers in terms of the decisions they make.
>
> At present I have seen in some of the retailers' reports around this that they are worried about confusing consumers; they are worried that this data might get out. We would point to examples overseas, in America and in the UK, where this data is becoming more and more freely available. People can make it available under privacy and security arrangements to trusted third parties who will interpret it and give them the information they need in terms of energy efficiency or, it might be, switching to other plans. We believe that getting the data out there is absolutely vital. The retailers—

70 Mr Terry McConnell, *Proof Committee Hansard*, 3 October 2012, p. 23.

71 CHOICE, *Submission 73*, p. 9.

72 CHOICE, *Submission 73*, p. 15.

73 Commonwealth government, *Budget Paper No. 2*, 8 May 2012, p. 263.

74 CHOICE, *Submission 73*, p. 15.

75 Ms Caitlin Whiteman, Research and Policy Advocate, CUAC, *Proof Committee Hansard*, 27 September 2012, p. 35.

> Origin and Energy Australia—are doing various trials around this with web portals or whatever. That is great and that sort of innovation is to be welcomed; but it is also really important that we unlock the creativity of software developers and people who write apps because it is that kind of area which can come up with some great ideas. In America for example there is a Facebook application that can tell you how you compare a benchmark against similar people in terms of the savings you make. That makes a big difference.
>
> It really is about control. People want control. We just did the Big Electricity Switch. We believe people wanted to do something; they felt powerless through far too much of this process. Please give them the opportunity to do something. We believe that they will take it and shake it with all hands.[76]

5.66 In addition to the suggestions to provide consumers with greater direct access to their information and data, the EEC highlighted the role of market intermediaries to 'reduce the impact of information barriers by using economies of scale to develop skills, gather information and perform functions on behalf of multiple consumers'.[77] The EEC argued:

> The structure of the NEM already implicitly accepts that information barriers exist and that market intermediaries have a critical role to address these information barriers. On their own, most energy consumers would find it extremely difficult to secure an affordable and low-risk energy supply by purchasing energy directly from the wholesale market. Retailers have a critical role in securing energy supplies and hedging energy costs on behalf of consumers…Unfortunately, the NEM structure currently impedes consumers engaging third parties to optimise demand, as consumers cannot easily commoditise the value of demand response separately from their overall energy contract. If consumers could commoditise the value of demand-response this would create a revenue stream that third parties could use to cover costs and reward the responsive energy consumers.[78]

5.67 To address the paucity of information available to consumers, the AEMC's PoC report recommended a number of regulatory reforms:

- Changes to the NER to clarify the requirements on a retailer to respond to a consumer's request for access to their energy and metering data.
- New provisions the NER and NECF that require, at a minimum, a retailer is to provide residential and small businesses consumers with information about their electricity consumption load profile (ie timing of use over a period).
- A new rule that would require AEMO to publish market information on representative consumer sector load profiles. Broader market

76 Mr Christopher Zinn, Director, Campaigns, One Big Switch, *Proof Committee Hansard*, 3 October 2012, p. 10.

77 EEC, *Submission 75*, p. 8.

78 EEC, *Submission 75*, pp 8–9.

> information would assist parties to develop products and services and improve the efficiency of the energy services they offer to consumers.[79]

Committee comment

5.68 The committee agrees with those submitters and witnesses who argued for better quality and more readily available information for consumers. Relieving pressure on electricity consumption and prices can only be enhanced by giving consumers access to data and information which subsequently enables them to make more informed decisions about retail electricity offers best suited to their circumstances, as well as understand how they can change their individual pattern of consumption to reduce their electricity costs.

5.69 Therefore, the committee supports calls for the quality and availability of information and data for consumers to be improved.

Other mechanisms to reduce demand

5.70 Mechanisms by which consumers' electricity consumption and bills could be reduced were the subject of much discussion during the course of the inquiry. In particular, submitters and witnesses raised:

- in-home displays, dashboards and web portals;
- direct load control;
- energy efficient appliances and housing; and
- technological advances, such as embedded generation.

5.71 These are discussed in the following sections of this chapter.

5.72 The importance of protecting consumers generally, and low income and vulnerable consumers specifically, was considered in the context of these mechanisms during the course of the inquiry. Some ways in which consumers could be protected were also raised: for example, opt-in cost reflective pricing, a social tariff and the energy efficiency of appliances and housing—together with federal and state and territory government assistance programs—were proposed as components of a possible solution and are discussed elsewhere in this report.

In-home displays, dashboards and web portals

5.73 The committee noted the development of technologies such as in-home displays, dashboards and web portals that potentially give consumers instant and more dynamic access to their energy data (in comparison to that available on their bills). As discussed above, Mr McConnell suggested that '[w]e need dashboards, in-house home displays, price signals and whatever else—we need to do all of that'. [80]

5.74 The ERAA highlighted the introduction of in-home displays in Victoria and the benefits these can offer consumers:

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79 AEMC, *Power of Choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 18.

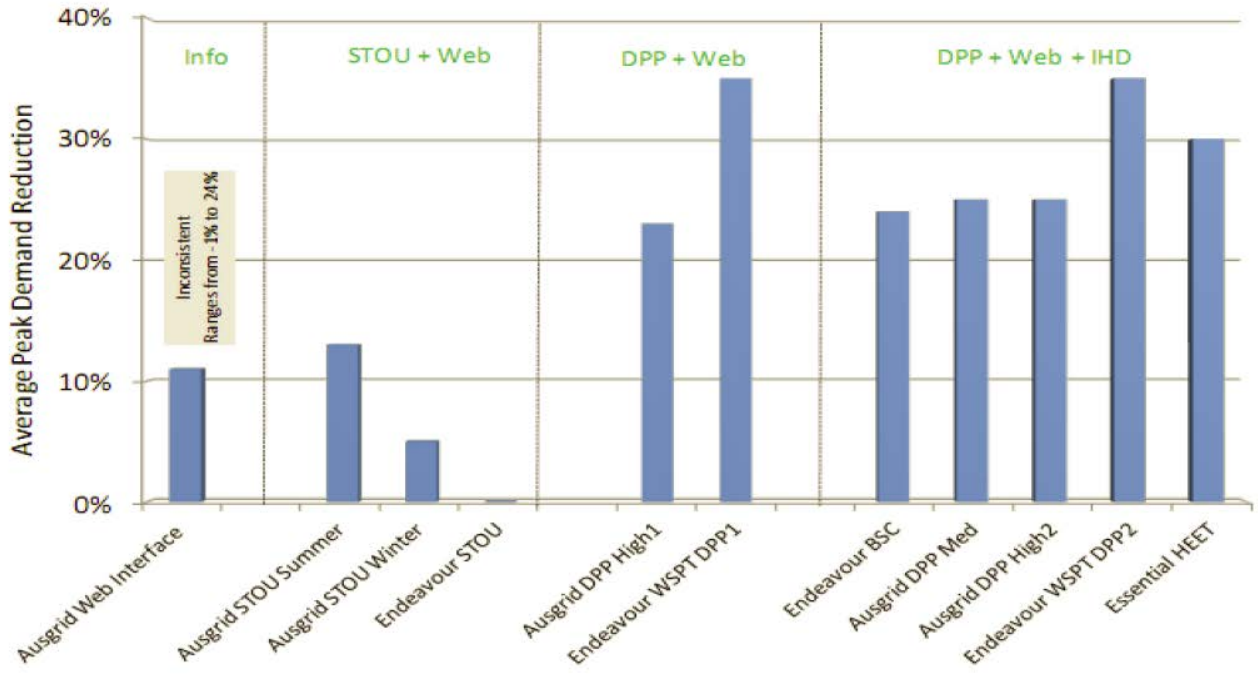
80 Mr Terry McConnell, *Proof Committee Hansard*, 3 October 2012, p. 23.

> In Victoria there are things called "in-home displays" being distributed which help to give information inside about pricing at particular times of the day. I think this whole area of technology, if you see how the digital economy has revolutionised so many industries, puts us on the cusp of the digital industry really changing the range of product offers and options for consumers in the electricity game.[81]

5.75 The PoC report demonstrated the positive impact smart meters together with technology such as in-home displays and web portals can have on reducing peak demand usage (Figure 5.5):

> [The] figure…shows a summary of peak demand reduction results of seasonal time of use (STOU) and dynamic peak pricing (CPP in this case) trials recently conducted by Ausgrid, Endeavour and Essential Energy. It shows that potential impact on peak demand of applying more time varying tariffs in the NEM. It also shows that the impact can be greater where the tariffs are supported through better communication channels (for example, webpages or in home displays (IHDs).[82]

Figure 5.6: Summary of peak demand reduction results from DSP trials in Australia – use of web and in-home displays (IHD)[83]



81 Mr Cameron O'Reilly, Chief Executive Officer, ERAA, *Proof Committee Hansard*, 25 September 2012, p. 25.

82 AEMC, *Power of choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 86.

83 Futura Consulting, 'Investigation of existing and plausible future demand side participation in the electricity market', December 2011, p. 88 from the AEMC, *Power of choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 86.

5.76 However, it was also brought to the committee's attention that implementation of in-home displays and web portals may encounter some complications with the competition principles under the NEL:

> Allowing distributors to offer new contestable services, such as DSP, may be inconsistent with the Competition Principles Agreement's objectives and could create risks for the National Energy Retail Law (NERL). This is of particular concern where distributors provide direct information to consumers about specific products related to energy use such as direct load control, in-home displays, smart appliances and home area networks.[84]

5.77 While advocating the use of smart meters and dashboards, Mr Christopher Zinn from One Big Switch also noted some challenges that need addressing in the implementation of such technologies:

> We would advocate smart metering and dashboarding—first of all, the cost was laid directly to the consumer without any benefit being explained to the consumer, as I understand it. We believe there is a benefit that flows to most consumers through smart metering. In a way you cannot hold back technology. Quite how that is paid for, there are various ways to slice and dice it. In the retailers' submission they have given various scenarios for that. I would not like to think that the fact that there are difficulties in working out how it is going to be paid for is going to hold us back from the bigger impetus that the technology is really going to help. Unless people can measure and understand it, how on earth can they save it?
>
> But I hasten to say you can have all the smart meters and dashboards in the world but you have got to build in some incentives for people to actually use them. One concern would be, and I know in Victoria under various schemes there are various people doorknocking and handing over dashboard style devices to people, how you get people to use devices. How do you make them appreciate that there are real savings and benefits for them from that? It is not always straightforward.[85]

5.78 During its site visit to the Smart Grid, Smart City Centre on 24 October 2012, the committee heard that uptake of in-home displays and web portals by consumers participating in the Smart Grid, Smart City trial had been high. With regard to web portals, the committee was also informed that once the required IT systems had been put in place it was a straightforward process to give consumers access to their consumption data in real time.

Direct load control

5.79 Direct load control describes the capability of an energy provider to control consumers' electricity directly by turning-off or cycling electrical appliances (typically air conditioners and pool pumps). This activity is targeted at moving demand away

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84 AEMC, *Power of choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 39

85 Mr Christopher Zinn, Directors, Campaigns, One Big Switch, *Proof Committee Hansard*, 3 October 2012, p. 15.

from peak periods and is usually applied to residential consumers to ensure an energy provider has enough power to meet demand. Direct load control is typically voluntary, with energy providers offering bill credits to consumers who participate.

5.80 The CALC informed the committee that:

> In our view, there are significant opportunities to be found in other non-price-based solutions that are less dependent on, or indeed work with, consumer behaviour. For example, we strongly believe that demand load control must be considered for appliances such as air conditioners and pool pumps. Demand load control involves arrangements between a supplier and a residential consumer where equipment is installed that allows the supplier to manage an electricity appliance owned by the consumer for a specified amount of time in return for a payment to that consumer. For example, an air conditioner might be cycled off during hot periods for, say, 10 minutes every hour. This is the policy equivalent of putting the alarm clock on the other side of the room. [86]

5.81 CALC also suggested that different approaches may be preferable for appliances with smaller loads:

> For smaller loads relating to appliances such as dishwashers, washing machines and dryers we do believe that educational campaigns can provide an effective and efficient alternative. Simple campaigns calling on consumers to do the right thing are a safe and inexpensive way to reduce consumption or load shift. There are simple messages to be conveyed why households should aim to use dishwashers and washing machines after 10 pm and how they would benefit by doing so. We would note the significant success of the recent Save Water Target 155 campaign here in Victoria. The three metropolitan water retailers have stated that that campaign saved 60 billion litres of water.[87]

5.82 The ESAA voiced its support for direct load control among other approaches to demand management but noted the importance of careful management of these options in the future:

> In terms of demand side management, direct load control, which is the ability of the network to turn down air conditioners and compensate those households through a different pricing arrangement, is a very valuable technology that can make material savings to household bills. We think that there is a very high likelihood of the rise of distributed generation and storage, and not just solar PV but other technologies complementing that, and that process will continue. How we manage that will be crucial to the affordability of energy in the future.[88]

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86 Ms Catriona Lowe, Co-Chief Executive Officer, CALC, *Proof Committee Hansard*, 27 September 2012, p. 34.

87 Ms Catriona Lowe, Co-Chief Executive Officer, CALC, *Proof Committee Hansard*, 27 September 2012, p. 34.

88 Mr Matthew Warren, Chief Executive Officer, ESAA, *Proof Committee Hansard*, 27 September 2012, p. 44.

Direct load control trials

5.83 A number of network businesses are currently exploring direct load control devices. For example, South Australian distributor SA Power Networks is conducting a trial of direct load control devices in air conditioners which turn off the compressor but not the fan to ensure comfort is maintained.[89] Consumers in this trial are given payment in return for giving the SA Power Networks authority to limit their use of air conditioners at certain times during the summer.[90] To date, the trial suggests a 19–35 per cent reduction in peak load.[91]

5.84 Queensland distributor Energex is also running trials offering residential consumers an incentive payment in return for installing an energy management device in pool pumps, air conditioners and hot water units.[92]

5.85 The committee also notes that a trial of direct load control air conditioners in Perth showed that reductions in peak demand of 20 per cent were achievable through cycling air conditioners.[93]

Energy efficiency

5.86 Using energy more efficiently can reduce consumers' electricity consumption, subsequently reducing overall demand and placing downward pressure on electricity prices. Improvements in energy efficiency are often considered to be the "low hanging fruit" of electricity consumption and emission reduction efforts, as they are arguably

89 SA Power Networks (previously the Electricity Trust of South Australia – ETSA Utilities) is the operator of the South Australian electricity distribution network. ETSA Utilities changed its name to SA Power Networks effective 3 September 2012.

90 AEMC, *Power of choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, pp 117–118.

91 'South Australia has the "peakiest" electricity demand of any state in Australia, and a peak demand that is among the worst in the world.' This is mainly attributed to the use of air conditioning in more than 90 per cent of SA homes. In 2005, the Essential Services Commission of SA delegated a $20.4 million budget to SA Power Networks to conduct a five-year demand management research and development project which includes the direct load control trial.

SA Power Networks, *Demand management*, http://www.sapowernetworks.com.au/centric/industry/our_network/demand_management.jsp, (accessed 17 September 2012).

92 AEMC, *Power of choice – giving consumers options in the way they use electricity draft report*, 6 September 2012, p. 118.

Energex, *Rewards for air-conditioning, pools and hot water*, http://www.energex.com.au/sustainability/sustainability-rewards-programs, (accessed 17 September 2012).

93 ESAA, *Submission 76*, p. 10.

the easiest, simplest and most cost efficient ways of doing so.[94] For example, in 2007 the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) estimated that 55 per cent of Australia's emission reduction target to 2050 could be met through energy efficiency improvements.[95]

5.87 The positive contribution of energy efficiency was supported by submitters to the inquiry:

> Energy efficiency is the low hanging fruit in the price rise challenge. Indeed, energy experts worldwide agree that it is by far the best option of cheaply reducing emissions and dealing with rising bills[96]

5.88 And:

> Energy efficiency has a downward impact on electricity prices in two ways. First it defers the need to invest in new generation and network capacity. Second it has a downward impact on wholesale electricity prices due to a reduction in demand. Energy efficiency is also likely to lead to a reduction in peak demand.[97]

5.89 ESAA flagged that further reductions in electricity consumption can still be derived from improvements in energy efficiency but voiced:

> One of the frustrations we have is that the perception of energy efficiency is things like low-energy light bulbs and televisions which are relatively second- or third-order ways to save energy. Frankly, the cost of the related systems—whether Foxtel or other things—is far more substantial than the energy used to run those appliances. By contrast where you really do want to focus households' attention is on energy savings in heating air and water—so, heaters, air conditioners and hot-water systems. With the current increases in energy bills, households almost invariably benefit from going to our five-star solar hot-water system or a gas five-star system and spending a bit extra to get the payback a lot quicker. It is the same with buying much more efficient heating and cooling for their houses, whether they rent or own, by spending more on an air conditioner if they can afford to. We are trying to change that focus from being on things that are symbolic and small rather than things that actually make a material difference. It will become an issue that the upfront capital cost of more efficient technologies by definition tends to be more expensive and it at

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94 A. Talberg and I. McCluskey, *Bills Digest No.4 2012-13: Greenhouse and Energy Minimum Standards Bill 2012*, 14 August 2012, p. 4, http://parlinfo.aph.gov.au/parlInfo/download/legislation/billsdgs/1847699/upload_binary/1847699.pdf (accessed 14 September 2012).

95 Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), *Technology: Toward a low emissions future*, ABARES Research Report 07.16, ABARES, Canberra, September 2007, p. 7, http://adl.brs.gov.au/data/warehouse/pe_abare99001392/rr07_16_low_emissions.indd.pdf (accessed 14 September 2012).

96 ACT Greens, *Submission 1*, pp 1–2.

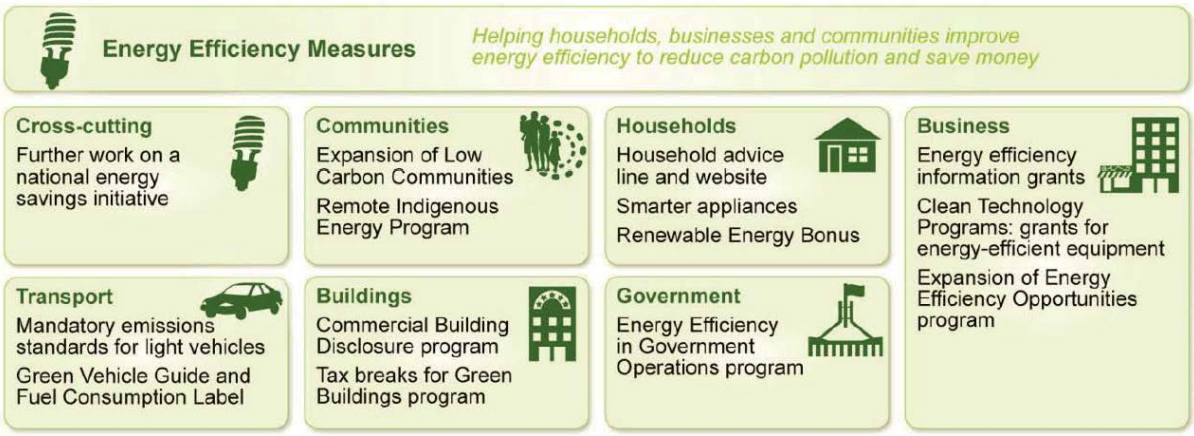
97 ClimateWorks Australia, *Submission 20*, p. 1.

least explains what the payback is and why it is still a prudent investment. It may be that from work on this issue, it will drop out how we can trigger that smarter purchase.[98]

5.90 The Commonwealth and state and territory governments currently have various strategies in place to assist consumers to improve their energy efficiency. Some of these programs are discussed below.

5.91 As part of its climate change plan, the Commonwealth government noted that 'increased energy efficiency will have multiple benefits: lowering carbon pollution, improving energy security, and helping households and businesses cope with rising energy prices'.[99] Figure 5.7 provides an overview of government energy efficiency measures.

Figure 5.7: Overview of government energy efficiency measures[100]



Greenhouse and Energy Minimum Standards

5.92 The Greenhouse and Energy Minimum Standards came into effect on 1 October 2012.[101]

5.93 The framework, developed jointly with New Zealand and Australian states and territories, delivers consistent information and energy standards to consumers by

98 Mr Matthew Warren, Chief Executive Officer, ESAA, *Proof Committee Hansard*, 27 September 2012, pp 49–50.

99 Commonwealth government, *Securing a clean energy future: The Australian government's climate change plan*, Canberra, 2011, available: http://www.cleanenergyfuture.gov.au/wp-content/uploads/2012/06/CleanEnergyPlan-20120628-3.pdf (accessed 14 September 2012), p. 80.

100 Commonwealth government, *Securing a clean energy future: The Australian government's climate change plan*, Canberra, 2011, available: http://www.cleanenergyfuture.gov.au/wp-content/uploads/2012/06/CleanEnergyPlan-20120628-3.pdf (accessed 14 September 2012), p. 80.

101 Greenhouse and Energy Minimum Standards Bill 2012, section 2.

combining all state and territory regulations into one framework, overseen by a single national regulator.[102]

National Energy Savings Initiative

5.94 In October 2010, the Prime Minister's Task Group on Energy called for 'the introduction of a transitional energy savings initiative to replace existing and planned state energy efficiency schemes, subject to detailed consultation on its design'. The Commonwealth government agreed to undertake detailed policy analysis and economic modelling to 'expedite the development of a national energy savings initiative' (ESI) in consultation with the public and industry.[103]

5.95 In line with this commitment, the government established an ESI Working Group comprising officials from the Department of Climate Change and Energy Efficiency (DCCEE) and the DRET. The working group is assisted by an advisory group comprising state and territory government officials and representatives from industry, energy, community and environmental groups.

5.96 The ESI Working Group is currently examining the costs and benefits of a national ESI and intends to release a draft Regulation Impact Statement for consultation in the second half of 2012. Following this, the ESI Working Group will present final recommendations to the government.[104]

Energy efficiency programs

5.97 In addition to the ESI working group, there a number of government energy efficiency programs on a national level currently underway. These include the:

- Energy Efficiency Opportunities (EEO) program – encourages large energy-using businesses to improve their energy efficiency by requiring them to identify, evaluate and report publicly on cost effective energy savings opportunities. Participation in the program is mandatory for corporations that use more than 0.5 petajoules (PJ) of energy per year (equivalent to the energy used by 10 000 households);[105] there are more than 220 corporations (incorporating around 1200 subsidiaries) registered for the program

102 The Hon Mark Dreyfus QC MP, Parliamentary Secretary for Climate Change and Energy Efficiency, 'New Australian Energy Efficiency Framework forecast to save $5.2 billion in 2020 for households and business', Media release MD 12/44, 13 September 2012, available: http://www.climatechange.gov.au/~/media/Files/minister/dreyfus/2012/media/Dreyfus-MediaRelease-12-44.pdf, (accessed 17 September 2012).

103 Commonwealth government, *Securing a clean energy future: The Australian government's climate change plan*, Canberra, 2011, pp 80–81, http://www.cleanenergyfuture.gov.au/wp-content/uploads/2012/06/CleanEnergyPlan-20120628-3.pdf (accessed 14 September 2012).

104 DRET, *National Energy Savings Initiative*, available: http://www.ret.gov.au/energy/efficiency/savings/Pages/nesi-index.aspx, (accessed 17 September 2012).

105 This would equate to using more that $3–4 million for gas, $6–11 million for electricity or $18–21 million for diesel fuel.

(representing more than 60 per cent of the total amount of energy used by businesses, and around 45 per cent of all energy used in Australia).[106]

- Energy Efficiency Information Grant – $40 million over four years allocated to industry and not-for-profit associations to assist them to provide information on the smartest ways for small to medium sized enterprises to reduce energy costs.[107]
- Community Energy Efficiency Program – over $42 million in matching funding distributed to 63 local councils and non-profit organisations to undertake energy efficiency upgrades and retrofits to buildings, facilities and lighting.[108]
- Low Income Energy Efficiency Program – to provide grants to government, business and community organisations to trial approaches to improve the energy efficiency of low income households.[109]

State based energy efficiency schemes

5.98 There is a range of state energy efficiency policies encompassing a variety of initiatives, including:

- the provision of information to consumers;
- regulation of minimum standards;
- rebates and grants and the use of state based targets.

5.99 State schemes that offer incentives to adopt energy saving measures these include the:[110]

- Energy Savings Scheme (ESS) in NSW;[111]

106 DRET, *Energy Efficiencies Opportunities: About the program*, available: http://www.ret.gov.au/energy/efficiency/eeo/about/Pages/default.aspx, (accessed 17 September 2012).

107 DCCEE, *Energy Efficiency Information Grants Program Factsheet*, available: http://www.climatechange.gov.au/government/initiatives/energy-efficiency-information-grants/factsheet.aspx, (accessed 17 September 2012).

108 DCCEE, *Community Energy Efficiency Program*, available: http://www.climatechange.gov.au/government/initiatives/ceep.aspx, (accessed 17 September 2012).

109 DCCEE, *Low Income Energy Efficiency Program*, available: http://www.climatechange.gov.au/government/initiatives/lieep.aspx, (accessed 17 September 2012).

110 Clean Energy Council (CEC), *Energy Efficiency*, available: http://www.cleanenergycouncil.org.au/technologies/energyefficiency.html, (accessed 17 September 2012).

- Residential Energy Efficiency Scheme (REES) in South Australia;[112]
- Victorian Energy Efficiency Target (VEET) scheme;[113] and
- the ACT will commence a scheme in 2013.[114]

Committee comment

5.100 The committee shares the enthusiasm voiced about energy efficiency and its role in reducing consumption of electricity during the course of the inquiry. The committee supports the federal and state and territory governments' ongoing commitments to improving energy efficiency via the Greenhouse and Energy Minimum Standards (GEMS), energy savings initiatives and a range of energy efficiency programs and grants.

Embedded generation

5.101 The role of embedded generation[115] such as co- and tri-generation was discussed during the course of the inquiry.

5.102 Co-generation is the simultaneous production of electrical energy and thermal energy, and is also referred to as combined heat and power. Tri-generation is the simultaneous production of electrical energy, thermal energy and cooling.[116]

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111 The ESS assists households and businesses to reduce electricity consumption and electricity costs using energy savings certificates as the 'currency' for the scheme. Households are assisted through Accredited Certificate Providers offering equipment to householders at a reduced cost; the savings are then transferred from the householder to the business which then creates energy savings certificates. Businesses can benefit when they invest in better technology to reduce their energy use as electricity retailers are required by law to then issue the business with energy savings certificates.

Energy Savings Scheme, *Overview of the scheme*, http://www.ess.nsw.gov.au/Overview_of_the_scheme, (accessed 17 September 2012).

112 REES commenced on 1 January 2009 and requires retailers with over 5000 electricity or gas residential customers to provide incentives to households to lower their energy bills through reduced energy consumption. REES allows for a number of low-income households to have access to energy audits, other incentives include the installation of Compact Flourescent Lamps and ceiling insulation.

Essential Services Commission of South Australia, *Residential Energy Efficiency Scheme*, http://www.escosa.sa.gov.au/consumer-information/residential-energy-efficiency-scheme.aspx, (accessed 17 September 2012).

113 VEET commenced on 1 January 2009 under the Victorian Energy Efficiency Target Act 2007. Under the scheme, accredited businesses can offer discounts and special offers on selected energy savings products at homes and businesses. Prescribed activities in the scheme include installation of high efficiency hot water systems, air heater/coolers, lighting, draught proofing, window treatments and purchase of efficiency appliances.

Essential Services Commission, *Victorian Energy Efficiency Target*, https://www.veet.vic.gov.au/Public/Public.aspx?id=Home, (accessed 17 September 2012).

114 DRET, *Submission 61*, p. 33.

115 Also known as distributed or decentralised generation.

5.103 Co-generation and tri-generation can use a variety of fuels however the majority of co-generation and tri-generation facilities in Australia use natural gas due to its availability, cost and greenhouse intensity. Co-generation and tri-generation is most attractive at sites with a large heating or cooling load, and can produce energy with a third of the emissions associated with coal-fired power.[117]

5.104 Embedded generation, such as co- and tri-generation, also has the ability to reduce electricity prices because electricity does not have to be transmitted over long distances along expensive infrastructure. The EEC highlighted that:

> The value of cogeneration is when it is being supplied and where it is being supplied. It is very expensive to transmit electricity, but you are often just transmitting it next door at a very low cost….At the moment there is not a good way to capture the value. You are often paying a very inflated distribution use of system charge, which does not reflect that you are carrying it only this far as opposed to all the way from Hunter Valley or Playford B, or wherever you are bringing the electricity from.[118]

5.105 The Clean Energy Council (CEC) described co-generation and tri-generation as providing distributed power generation at or near the point of consumption which lessens the need for expansion of the grid: 'This reduces transmission losses, stabilises the electricity grid and lessens the impact of rising electricity prices'.[119]

5.106 The simultaneous generation of electrical and thermal energy provides greater energy efficiency than systems providing power and heat separately:

> Less fuel is required to produce a given amount of energy because the conversion and transmission losses associated with the separate production of power and heat are avoided. This reduces the demand and costs associated with providing power and heat to a facility.[120]

5.107 Australia has a number of sites operating co- and tri-generation facilities, with hospitals being a good example where co-generation can offer additional benefits like improving the security of electricity supply.[121]

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116 Clean Energy Council (CEC), available: http://www.cleanenergycouncil.org.au/technologies/cogeneration.html (accessed 16 October 2012).

117 CEC, available: http://www.cleanenergycouncil.org.au/technologies/cogeneration.html (accessed 16 October 2012).

118 Mr Robert Murray-Leach, Chief Executive Officer, Energy Efficiency Council (EEC), *Proof Committee Hansard*, 27 September 2012, p. 63.

119 CEC, available: http://www.cleanenergycouncil.org.au/technologies/cogeneration.html (accessed 16 October 2012).

120 CEC, available: http://www.cleanenergycouncil.org.au/technologies/cogeneration.html (accessed 16 October 2012).

121 Department of Primary Industries (DPI) (Victoria), available: http://www.dpi.vic.gov.au/energy/sustainable-energy/low-emissions-coal-and-gas/cogeneration (accessed 16 October 2012).

5.108 Low Carbon Australia advised the committee that because there are different regulatory arrangements in each state and territory, each project for co- or tri-generation must be dealt with on a case-by-case basis:

> …every single case really involves quite a complex regulatory set of approvals for every proponent, which does act as a detractor for a number of the operators. It is the same for any of the large manufacturing plants that are putting in biogas operations, for instance. These approvals really do need to be streamlined, but we have not documented individual cases; we just know that it adds significantly to the cost and also to the project time lines around getting approvals to install and connect, let alone actually being able to feed back into the grid.[122]

5.109 The Energy Efficiency Council (EEC) also raised some issues connected with co- and tri-generation:

> Any embedded generation in a building that runs in parallel with the grid—so it is contributing electrons to the building while the grid is contributing at the same time—can technically export. The equipment that is in place can physically send electrons out of the building for the betterment of the outside world. There are a couple of locations in Australia where the network company has prohibited an on-site generator from running in parallel, for a number of reasons. So we have sites where engines run and supply specific load in the building. There would need to be technical equipment put in to allow them to export, and some agreement with the network company, but the vast majority of the embedded generators in green buildings, as a generic term, would be synchronised with the grid.[123]

5.110 The problem was described as being '…a situation where, if you have energy in a building and it is exporting into the market, the money you are likely to get back from your retailer for the electricity that you export does not cover the cost of you generating it, even though it is probably being used in the building or next door at a much higher rate'.[124]

5.111 The EEC further highlighted some of the barriers to uptake of embedded generation. According to the EEC:

> …the NEM was designed around the ongoing operation of an electricity system that predominantly consisted of large generators in a small number of regions and extensive transmission and distribution networks. As such, the rules, regulations and technology that are in place have created many anticipated and unanticipated barriers to the uptake of distributed generation.[125]

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122 Margaret McDonald, Low Carbon Australia, *Proof Committee Hansard,* 9 October 2012, p. 19.

123 Mr Robert Murray-Leach, Chief Executive Officer, EEC, *Proof Committee Hansard*, 27 September 2012, p. 63.

124 Mr Robert Murray-Leach, Chief Executive Officer, EEC, *Proof Committee Hansard*, 27 September 2012, p. 63.

125 EEC, *Submission, 75*, p. 18.

5.112 The committee understands that as soon as the generating organisation exports the electricity, it becomes very expensive to do so.[126] The EEC described the current system as 'a very expensive and inappropriate way to integrate that generation into the network'[127] and alerted the committee to the systemic disadvantage to the 'first-mover' who initiated the first connection to the distribution network:

> …with cogeneration if you are the first unit into an area there is a cost to augment the network, but for the three or four who come after you it is free—there are no augmentation costs. And then it goes again, and the next person has to pay a huge fee. It is a completely inappropriate system that was not set up for distributed generation…[128]

5.113 The CEC believed that connecting to the network was a significant impediment and alleged that transmission businesses block access to new entrants.[129] The CEC acknowledged that the AEMC had 'recognised it is a problem' and as a result was conducting the Transmission Frameworks Review.[130] Mr Russell Marsh, Director of Policy at the CEC, stated:

> One of the things we say is that a lot of the time the generators—the guys who are trying to put in the renewable energy plant—are effectively negotiating with one hand tied behind their backs because they do not have access to information that the transmission companies have. Whilst the transmission companies and the regulator will insist that it is a level playing field, if you talk to some of the developers one of the biggest problems they have is that transmission companies—and it is the same in the distribution network—have all the data as to the process, what the benefits or otherwise are and what the cost of the connection would be. It is very difficult for the developer to get access to that information, so they are not able to have a negotiation with the transmission operator or the distribution operator on what they would call a fair basis because they effectively have one hand tied behind their back.
>
> As you know, the transmission framework review is going on, and one of the things that is looking at is how to improve the connections process. To the credit of the AEMC, they have recognised it is a problem. We have some concerns as to some of the proposals they are putting forward to try to solve that. We are not sure that their proposals at the moment solve the

126 Mr Robert Murray-Leach, Chief Executive Officer, EEC, *Proof Committee Hansard*, 27 September 2012, p. 63.

127 Mr Robert Murray-Leach, Chief Executive Officer, EEC, *Proof Committee Hansard*, 27 September 2012, p. 63.

128 Mr Robert Murray-Leach, Energy Efficiency Council, *Proof Committee Hansard*, 27 September 2012, p. 63.

129 Mr Russell Marsh, Director of Policy, CEC, *Proof Committee Hansard*, 27 September 2012, p. 52.

130 AEMC, *Market Reviews: Transmission Frameworks Review*, available: http://www.aemc.gov.au/market-reviews/open/transmission-frameworks-review.html (accessed 29 October 2012).

> problem that has been identified but it is clear that they have identified that there is an issue around the connection process, particularly for renewable energy technologies. We are working quite closely with them to try to understand a bit more about the proposals have come up with quite recently, and why we do not think that they necessarily do the job that the AEMC think they are. Hopefully, as the transition framework review process moves forward we may get some clarity and some improvement in that process.[131]

5.114 In order to try to fix some of these problems, the committee heard that a major review of the current model was required, including a review of the revenue model that currently operates.[132]

5.115 The EEC called for 'barriers to distributed generation, including access and cost sharing arrangements' to be addressed[133] and argued that:

> Removing the barriers to DG distributed generation would contribute to many of the NEO's goals. For example, appropriately sited, sized and managed distributed generation can:
>
> - Reduce electricity prices by avoiding or deferring investment in supply-side infrastructure; and/or
> - Improve safety in regional areas by obviating for the need for long-distance distribution systems that create bushfire and other safety hazards.[134]

5.116 The EEC went on to recommend:

- a long term process to set up systems to ensure distributed generators can secure a fair return for the value of embedded generation;
- streamlining and regulating the process for connecting co-generation to the grid; and
- targeted support for innovative applications of embedded generation.[135]

5.117 In addition, the EEC was eager to ensure that embedded generators are supported and provided incentives to reduce network investment. To achieve this, the EEC put forward two proposals: a requirement for network businesses 'to provide robust and timely data on upcoming network constraints and the value of deferral'[136]

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131 Mr Russell Marsh, Director of Policy, CEC, *Proof Committee Hansard*, 27 September 2012, pp 52–53.

132 Mr Robert Murray-Leach, Chief Executive Officer, EEC, *Proof Committee Hansard*, 27 September 2012, p. 65.

133 EEC, *Submission 75*, p. 2.

134 EEC, *Submission 75*, Attachment 1, p. 6.

135 EEC, *Submission 75*, Attachment 1, p. 2.

136 EEC, *Submission 75*, pp 14–15.

and '…a transparent, location-specific network support payment [to embedded generators] where they reduce or defer expenditure on the grid'.[137]

Residential and other solar programs

5.118 The committee received information about residential and other solar programs and wants to draw attention to several key points as they relate to electricity prices.

5.119 As noted in Chapter 3, there are differing views about the impact of residential solar PV systems on the cost of electricity. Some of the generous feed-in-tariffs (FiTs) in the early state and territory programs may have contributed to price increases, but more recent arrangements, together with a potential reduction in demand and the potential savings on networks costs may lessen the price impacts of residential solar PV and even lead to savings:

> It is important to make a distinction with feed-in tariffs. Most governments had premium feed-in tariffs in place up until early this year or last year, and they gave consumers who installed solar panels a greater subsidy, if you like, than the inherent value of that energy onto the market. Those consumers received money for that, and that resulted in rises in other consumers' bills. Those rises are now locked in. Those consumers are now assured of their income, and since then all of those governments have removed premium feed-in tariffs. Now the feed-in tariffs that are on offer are at a lower rate. The rate that the feed-in tariffs are offered at now is in most cases less than the benefit that is produced by those solar panels—in other words, the benefit of solar panels in terms of the value of distributed energy, the wholesale market value, the reduced losses in the network, the downward pressure on wholesale prices and so on.[138]
>
> Particularly within Australia, we are seeing falling domestic and commercial consumption because of self-generation through electricity from solar panels. We are seeing improved energy management systems in businesses and households that are reducing consumption as well.
>
> One of the decisions we are making right at the moment is more investment in poles and wires at a time when electricity consumption is falling, and that electricity consumption is falling at least in good part because of distributor generation from solar that is reducing the impact or the likely impact of need for more poles and wires into the future.[139]

5.120 The Alternative Technology Association (ATA) held a similar view, informing the committee of some interesting developments in South Australia:

> AEMO has concluded that rooftop solar in South Australia contributes significantly towards meeting peak demand.

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137 EEC, *Submission 75*, Attachment 1, p. 4.

138 Mr Craig Memery, Senor Energy Advocate, Alternative Technology Association of Australia (ATA), *Proof Committee Hansard*, 3 October 2012, p. 6.

139 Professor Raymond Wills, Chief Adviser, Sustainable Energy Association of Australia, *Proof Committee Hansard*, 2 October 2012, p. 36.

> As is well known, energy efficiency, such as the South Australian energy efficiency scheme, both reduces wholesale energy prices and is cheaper than network investment as a cost passed through to all consumers. The prevalence of increasing levels of energy efficiency, solar PV and wind power in South Australia have resulted in only yesterday a draft decision by the South Australian regulator to reduce the regulated tariff by 8.1 per cent in response purely to price reductions at the wholesale level.[140]

5.121 It was suggested that some of the new arrangements for installing and connecting solar panels are much simpler for households:

> Our view is that, with the rapidly reducing price of solar panels, many of the schemes that are being promoted to offer subsidies directly to a household can be simply delivered by installing solar panels in those households and, in some cases, delivering a third or a half of their energy for free once those solar panels are in place, and offering some certainty in supply that does not rely on direct supply from a retailer in that context.[141]

5.122 Professor Ray Wills of the Sustainable Energy Association of Australia also explained how solar panels could assist vulnerable consumers and family's in remote areas:

> We have not done any technical modelling of it but certainly in terms of the concept we have discussed it widely, and I guess the key example is that, in today's market, a one kilowatt system, which could potentially produce 20 per cent of a household's electricity, would cost a little more than $1,000 in the current market. If you take that to a slightly bigger system to supply more of that particular customer's needs, 1½ or two kilowatts, then you may be able to source that en masse for in the range of $1,500 to $2,000. To offer a tangible example of that, currently in the debate within the Western Australian market, the opposition leader has suggested the sum of $200 million might be required to help families in the bush to meet payments on electricity so that we keep the price of electricity in the bush the same as that in the city, while still relieving the city customers of that payment that currently is a cross-subsidy through community service obligation payments. That sum of $200 million is about 100,000 households in the bush. That means that you could put solar panels on every one of those houses for around $200 million.[142]

5.123 Mr Ric Brazzale from the REC Agents Association was equally positive about the prospects of solar PV generation supplying electricity during periods of peak demand in the late afternoon in NSW.[143] However, the committee remains mindful of

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140 Mr Damien Moyse, Projects and Policy Manager, ATA, *Proof Committee Hansard*, 3 October 2012, p. 2.

141 Professor Raymond Wills, Chief Adviser, Sustainable Energy Association of Australia, *Proof Committee Hansard*, 2 October 2012, p. 37.

142 Professor Raymond Wills, Chief Adviser, Sustainable Energy Association of Australia, *Proof Committee Hansard*, 2 October 2012, p. 37.

143 Mr Ricardo Brazzale, President, REC Agents Association, *Proof Committee Hansard*, 9 October 2012, p. 22.

the limitations of solar systems in relation to meeting residential peak demand, even when new storage technologies are deployed, as explained by Mr McConnell:

> [I]n South-East Queensland, if you look at generation here—we heard figures before about South Australia—solar particularly does not really lend itself to mitigating peak demand. The peak demand in Queensland and South-East Queensland is between four and 8 pm. At seven or eight o'clock at night, solar does not work.
>
> I am happy to talk a little bit about storage, because there are a lot of things happening in that area in terms of solar storage. For example, the University of Queensland have 1.2 megawatts of solar PV on the roof at St Lucia.
>
> It is wonderful. Professor Paul Meredith and we worked collaboratively together on that at the time. They were looking for some assistance from us, and I was involved with those discussions. I said: 'Paul, thanks very much but no, because solar is not going to impact on peak demand. But, if you then decide to put some battery storage in, yes, we would work with you.' To make a long story short, they did. They have put in, I think, about 400 kilowatts of battery storage. It is prohibitively expensive, and that is the problem. Storage is going to have an impact on networks going forward. That is a fact of life. The problem is that we have to learn about what storage does to the network and what the most cost-effective type of storage to use is, because at this stage it is still very expensive to install. That 400 kilowatts was, I think, about $2½ million or $3 million. So storage is going to make a difference.[144]

5.124 The committee also noted the need to potentially redesign electricity networks, to better cope with embedded generation systems, such as solar PV:

> But, when you get to larger embedded generation, technical issues arise because the system is not designed to just automatically take it—you just cannot put a large embedded generator anywhere in the system and expect it to work. So it becomes a case-by-case issue and I am sure we can improve and get faster and more responsive at that. The AEMC's *Power of choice* paper again goes to trying to help enable the frameworks and promote these things more widely, because this is a part of our new business. We recognise that it needs to be a part of our business going forward, but we have to get better at it.[145]

Committee comment

5.125 The committee recognises the positive contribution that embedded generation can have on reducing electricity consumption with equally positive flow-on effects for the environment. The committee was particularly heartened by the current research activity in this area, as demonstrated to the committee at its site visit to the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Energy Centre on 24 October 2012: for example, the direct injection coal engine, renewable

144 Mr Terry McConnell, *Proof Committee Hansard*, 3 October 2012, p. 22.

145 Mr Hugh Gleeson, Chief Executive Officer, United Energy, *Proof Committee Hansard*, 9 October 2012, p. 18.

energy integration systems and solar cooling. The committee hopes that mainstream residential and commercial application of these projects will be a reality in the near future.

5.126 The committee is sympathetic to the concerns raised during the course of the inquiry about impediments to embedded generation, including solar PV, associated with network design, connection and costs, and payments for energy generated and fed into the grid (that is, feed in tariffs). However, the committee also notes that the impacts of embedded generation on the electricity network and centralised generation need to be better understood: both CSIRO and the Smart Grid, Smart City trial are examining these impacts and the committee is supportive of this.

5.127 As the interaction between embedded and centralised generation are better understood, and given the positive impacts of embedded generation, it is the committee's view that barriers to its wider implementation—both residentially and commercially—should be removed.

5.128 Similarly, consideration should be given to standardising embedded generation connection processes across jurisdictions in the NEM. The committee therefore recommends that SCER examine current barriers to embedded generation, particularly those related to network design, connection and costs, and FiT payments. The committee also recommends that SCER consider standardising connection processes for embedded generation in the NEM, including a standard connection protocol and licencing regime for embedded generation. In the committee's opinion, relevant state and territory energy ombudsmen and / or tribunals should also be empowered to intervene where embedded generators and NSPs are unable to resolve matters associated with connecting these generators to the grid.

5.129 The committee is also receptive to the EEC's proposals to support and offer incentives to embedded generators where they reduce network investment: that is, the release of annual maps of network constraints and their value, and location-specific network payments to embedded generators. The committee therefore recommends that SCER direct the AEMC to develop rule changes to implement these two proposals.

Recommendation 11

5.130 **The committee recommends that SCER:**

- **examine current barriers to embedded generation, particularly those related to network design, connection and costs, as well as FiT payments;**
- **empower relevant state and territory ombudsmen and / or tribunals to intervene where embedded generators and NSPs are unable to resolve disputes;**
- **standardise connection processes for embedded generation in the NEM and include a requirement for a standard connection protocol and licencing regime for embedded generation within the NEM;**
- **direct the AEMC to develop a rule change requiring the release of annual maps of network constraints and their value by network businesses; and**

- **direct the AEMC to develop a rule change to establish a default system of location-specific network support payments for embedded generation.**

5.131 More broadly—and as discussed by the EEC—the committee recognises the cost-savings that can be derived where electricity is generated closer to the point of consumption by reducing the need for expensive transmission infrastructure. For this reason, the committee recommends that the AEMC implement changes to the regulatory framework so that network charges for embedded generators reflect the cost of using only the relevant section of the network and provide incentives for generators to build in locations where the costs associated with transmission are reduced.

Recommendation 12

5.132 **The committee recommends that SCER direct the AEMC to:**

- **review the NER so that network charges for embedded generators reflect the cost of using only the relevant section of the network; and**
- **implement changes to the regulatory framework in order to provide incentives for generators to build in locations where the costs associated with transmission are reduced.**

5.133 Similarly, the committee is sympathetic to the concerns raised by the CEC regarding negotiations between generators and transmission businesses: the committee agrees that all generators, irrespective of the source of generation, should be able to negotiate on a 'fair basis'.[146] To address this concern, the committee recommends that the AEMC investigate ways to introduce greater transparency in negotiations between transmission businesses and all generators.

Recommendation 13

5.134 **The committee recommends that the AEMC investigate ways in which greater transparency can be introduced in negotiations between transmission businesses and generators.**

Other strategies to support business and industry

5.135 The committee heard from CSIRO's Energy Transformed Flagship that it is employing a range of strategies to be able to offer solutions for business and industry to reduce their electricity use:

> …we have developed a retrofit technology for commercial buildings that can reduce overall energy consumption of commercial buildings and we have demonstrated in trials between 10 and 20 per cent and a peak demand reduction of up to 30 per cent.[147]

146 Mr Russell Marsh, Director of Policy, CEC, *Proof Committee Hansard*, 27 September 2012, p. 52.

147 Dr Alex Wonhas, Director, Energy Transformed Flagship, Commonwealth Scientific and Industrial Research Organisation (CSIRO), *Proof Committee Hansard*, 9 October 2012, p. 46.

5.136 In addition, CSIRO is undertaking research to understand energy flows in buildings with a view to improving building design to reduce electricity consumption, and removing barriers to co- and tri-generation plants that can be installed in the base of a building. CSIRO advised that they had rolled out one of the first tri-generation systems in Australia, using a heat driven cooling technology.[148]

5.137 CSIRO also provided advice in relation to commercial office buildings where air conditioning is typically 60 per cent of energy use. CSIRO has developed technology to reduce 30 per cent of energy in air conditioning. In a more industrial setting, CSIRO is also working on 'optimal refrigeration control, which helps everyone in the cold chain, from people with large-scale apple storage through to supermarkets.'[149]

5.138 CSIRO provided a specific example of a project at Castlemaine involving a small goods manufacturer, a large motor company, a hospital and a couple of other very traditional industrial-style businesses to assist them understand how to reduce peak demand and how that may affect their business operations.[150]

5.139 The committee was told by the Australian Chamber of Commerce and Industry (ACCI) of the importance of the price of energy on the Australian economy:

> …low-cost energy is an important source of comparative advantage for the Australian economy. Access to efficient, reliable energy underpins the international competitiveness of industry, and the efficient supply of energy is a key factor underlying a high-wage, high-productivity economy.[151]

148 Dr Glenn Platt, Theme Leader, Local Energy Systems, Energy Transformed Flagship, CSIRO, *Proof Committee Hansard,* 9 October 2012, p. 47.

149 Dr Glenn Platt, Theme Leader, Local Energy Systems, Energy Transformed Flagship, CSIRO, *Proof Committee Hansard,* 9 October 2012, p. 47.

150 Dr Glenn Platt, Theme Leader, Local Energy Systems, Energy Transformed Flagship, CSIRO, *Proof Committee Hansard,* 9 October 2012, p. 48.

151 Mr Greg Evans, Director of Economics, Australian Chamber of Commerce and Industry (ACCI), *Proof Committee Hansard,* 9 October 2012, p. 54.