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Discussion Paper

Demand management targets for networks in the National Electricity Market

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Total Environment Centre's National Electricity Market advocacy

Established in 1972 by pioneers of the Australian environmental movement, Total Environment Centre (TEC) is a veteran of more than 100 successful campaigns. For nearly 40 years, we have been working to protect this country's natural and urban environment: flagging the issues; driving debate; supporting community activism; and pushing for better environmental policy and practice.

TEC has been involved in National Electricity Market (NEM) advocacy for eight years, arguing above all for greater utilisation of demand side participation (DSP) — energy conservation and efficiency, demand management (DM) and decentralised generation — to meet Australia's electricity needs. By reforming the NEM we are working to contribute to climate change mitigation and improve other environmental outcomes of Australia's energy sector, while also constraining retail prices and improving the economic efficiency of the NEM — all in the long term interest of consumers, pursuant to the National Electricity Objective (NEO).

TEC is interested in a DM target for the NEM for several reasons, including:

- DM has the capacity to constrain retail prices by constraining network overinvestment or 'gold plating'.
- Under certain circumstances DM may have environmental benefits.[1]
- Network Service Providers (networks) have not taken full advantages of existing DM incentives, and it is questionable whether the reformed incentives currently proposed will be sufficient to spur greater utilisation.

This discussion paper is intended to give an overview of why a DM target may be needed in the NEM and some of the key design issues. However more research is needed into the specific design of a DM target for the NEM.

Executive summary

In view of the infrastructure spending required to meet a small number of hours of peak demand, it is widely acknowledged that managing peak demand is a key challenge facing the NEM. A range of reforms is currently being proposed by the Australian Energy Market Commission (AEMC) and others that are designed to improve peak load management and thereby constrain retail prices. Under certain circumstances, this can also provide environmental benefits. However, there is doubt that the reforms will be successful.

Many of the proposed reforms do not tackle peak demand directly; and there is reason to believe that networks are unlikely to make sufficient use of reformed incentives to substantially increase the amount of DM in the NEM in the absence of a regulatory obligation to do so. DM targets are used to provide this impetus in many jurisdictions around the world, yet the AEMC has dismissed the idea as being too complex and potentially inefficient.[2]

[1] See TEC, *Environmental implications of increasing demand management in the National Electricity Market* (2012).

[2] After a brief discussion, the AEMC concludes: setting a target is "not entirely straightforward… there is no perfect solution". Australian Energy Market Commission, *Power of choice - giving consumers options in the way they use electricity (Draft Report)* (2012) 134. In addition, NERA Consulting and Oakley Greenwood, in their Report for the Energy Savings Initiative Secretariat, also argue against what they call a stand-alone peak savings scheme applying to networks on the grounds that it 'suffers from placing

TEC argues that to reject the idea of DM targets on these grounds is illogical. The first step should be to determine whether a DM target is necessary or advantageous. If so, only if there is no possible straightforward and effective scheme design should the idea be rejected. To the contrary, we have concluded that there is a strong case for a DM target, and that there are examples of simple and effective targets from other jurisdictions.

This discussion paper briefly assesses current reform efforts; addresses the AEMC's concerns with DM targets; and provides an overview of some of the issues involved in designing a simple and effective DM target for the NEM. While it is clear that a simple and effective target is possible, and that such targets are successful in other jurisdictions, there is a need for further research and we provide recommendations as to how DM targets might be progressed.

The peak demand problem

Several factors have contributed to recent rapid price rises in electricity prices across Australia,[3] which are now substantially higher than most other OECD nations.[4] Peak demand drives increased investment in transmission and distribution networks and the charges levied by networks constitute around half of retail bills.[5] Some 20 per cent of investment in the networks is needed for only about 40 hours of peak demand per year: such that a $1500 air conditioner effectively requires $7000 in increased infrastructure investment.[6]

A number of recent processes have shone light on the peak demand problem, including the Productivity Commission review of network regulation,[7] the Senate Inquiry into electricity prices,[8] the AEMC's Power of Choice review[9] and the national Energy Savings Initiative process.[10] All agree that peak demand is a significant problem.

The AER also notes that network investment in the current regulatory cycle is 'running at historically high levels',[11] with transmission and distribution networks spending $7 and $35 billion respectively on network infrastructure over the 5 years to 2015. Network and generation investment is projected to increase by $240 billion by 2030 – all of it eventually paid for by consumers.[12]

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additional compliance burdens on network businesses compared to the inclusion of an incentive within an ESI [Energy Savings Initiative] scheme (see Peak Energy Savings Scheme Design Options: A Report for the Energy Savings Initiative Secretariat 22 March 2012, NERA Economic Consulting and Oakley Greenwood, iv). TEC considers that, with a scheme of the kind suggested herein, the additional regulatory burdens would be very minor compared to the potential savings. However, this paper concentrates on the AEMC's Power of Choice review, as the AEMC is the gatekeeper for regulatory reform in the NEM. Also, there is no guarantee that the proposed national ESI will be implemented, or when, so it cannot be relied on as a superior alternative to a DM target.

[3] Australian Energy Regulator, 'State of the energy market 2011' [2011]. Ross Garnaut, *Transforming the electricity sector* Update (2011).

[4] Ibid.

[5] See, eg, Fact Sheet: Electricity Prices, DRET, August 2012 http://www.ret.gov.au/department/documents/clean-energy-future/electricity-prices-factsheet.pdf.

[6] The Hon Martin Ferguson AM MP, Minister for Resources and Energy, 'Strengthening the foundations for Australia's energy future', Speech to the Committee for the Economic Development of Australia. Melbourne. 13 December 2011.

[7] See Productivity Commission, *Electricity Network Regulatory Frameworks (Volume 2)* (2011) 301–341.

[8] The Senate Select Committee on Electricity Prices, *Reducing energy bills and improving efficiency* (2012) 81–124.

[9] Australian Energy Market Commission, *Power of choice review - giving consumers options in the way they use electricity (Final Report)* (2012) 8–11.

[10] Peak Energy Savings Scheme Design Options: A Report for the Energy Savings Initiative Secretariat 22 March 2012, NERA Economic Consulting and Oakley Greenwood.

[11] Australian Energy Regulator, 'State of the energy market 2011,' above n 3.

[12] Australian Energy Market Commission, Fact Sheet 2: demand side participation and prices.

Overall demand is now falling[13] due to a combination of factors,[14] but peak demand is rising and will continue do so at a rate of 1.5 per cent annually for the next decade.[15] Approved network spending is yet to reflect this trend towards lower peak as well as total demand, though at least one distribution network (Endeavour Energy) has reportedly promised to keep network price increases to less than CPI for the next seven years.[16]

It is in this context that there has been a renewed focus on DSP, and more specifically DM, to manage load growth and curtail electricity prices.

DM in the NEM

The NEM was intended to be a two-sided market, with electricity needs being met both through traditional centralised generation and supply, and through demand-side initiatives.[17] Yet the NEM has encouraged little demand-side activity to date. Whereas demand side activity represents 4% of peak demand requirements in the Western Australia electricity market and 6% in California, only around 1% of peak demand in the NEM is met with demand side measures.[18] A survey of network DM in the NEM found that in 2010/11 networks saved 51.3 gigawatt hours of electricity during the summer peak, just 0.02% of energy used in that year. The equivalent percentage in the US was 4.4%.[19]

Given the foregoing, it is reasonable to expect that DM should represent 4-6% of peak demand requirements in the NEM. There are wide variations in the amount of DM that networks in the NEM are currently engaged in. There is currently no easy way to compare network DM across the NEM, but Queensland's Energex and Ergon appear to have the most comprehensive initiatives as part of their current revenue determinations.[20]

Will current reform efforts guarantee improved DM outcomes?

Under the current regulatory framework, the purported incentive for increasing DM is that this will reduce or defer investment, thereby reducing capital expenditure. These savings can then be leveraged for other investments or business activities.[21] On the other hand, the regulatory framework is structured so as incentivise capital expenditure. Capex is rolled into a network's Regulated Asset Base (RAB) at the end of each regulatory period. Networks make a regulated profit based on the size of their regulated asset base.

[13] See, e.g., AEMO, 2012 National Electricity Forecasting Report, Chapter 3, Summary.

[14] Lower economic growth; energy efficiency measures; voluntary energy conservation in response to higher prices; milder weather related to the 2010-12 La Nina event; and the boom in rooftop PV systems.

[15] See AEMO 2012 National Electricity Forecasting Report (estimate based on Figure 2-3).

[16] See Simon Benson, *Daily Telegraph*, Big savings flow from freeze on power price, 24 August 2012 http://www.news.com.au/national/big-savings-flow-from-freeze-on-power-price/story-fndo4bst-1226457019735.

[17] David Crossley, *Demand-Side Participation in the Australian National Electricity Market: A Brief Annotated History* (2011).

[18] See Futura Consulting, *Power of choice – giving consumers options in the way they use electricity* (2011).

[19] See Chris Dunstan, Nicole Ghiotto & Katie Ross, *Report on the 2010 Survey of Electricity Network Demand Management in Australia*.

[20] See http://www.energex.com.au/sustainability/rewards-for-air-conditioning-pools-and-hot-water/what-is-peak-demand and http://www.ergon.com.au/energy-conservation/demand-management.

[21] Assuming that the savings made exceed the capex that would have been required for the traditional poles and wires solution that has been displaced.

The AEMC has described the situation as follows:[22]

> *'the nature of economic regulation suggests that DNSPs should have an incentive to seek the lowest cost option to address an identified network constraint… DNSPs may have some incentive to select the lowest cost non-network option... However, we acknowledge that in making this decision, the DNSP will weigh the potential cost saving against the total return on capex it would receive if it constructed the asset itself and included this asset in the RAB.'*

The approach to reform to date has been to try to provide incentives for undertaking DM activities,[23] rather than removing this underlying bias. Recent DM reform efforts generally continue to take this approach and have proposed measures to encourage networks to undertake DM. These are briefly set out below with a short discussion outlining concerns that they might not be sufficient to greatly improve DM outcomes.

Reformed Demand Management Incentive Scheme (RDMIS)

The RDMIS is an incentive scheme that will provide an appropriate return for networks on their investment in DM projects. At the current stage of the discussion, the exact format of a RDMIS is not clear. This is because the AEMC has not mandated how networks should be better incentivised under the scheme, instead providing the AER with certain criteria that a scheme will have to meet and leaving it to them to design the scheme. This makes a detailed assessment of the prospects for success especially hard.

The RDMIS won't only cover peak demand, but demand-side non-network alternatives in general.[24] Thus there is no guarantee that networks will use it to invest in peak DM. Once a scheme is devised, it is likely that the AER will implement more than one iteration before an effective and functioning design is settled on. Given the long lead time of the regulatory process, i.e., 5 year regulatory periods, any failure now to implement a truly effective scheme will hamper DM for years to come.

Experience to date suggests that networks have not responded well to incentives, and this has been a key concern expressed by stakeholders during reform processes. For example, in 2011 Victorian distributors only made use of $1 in every $20 available to them in the form of incentives (around 5%): only three of the five distributors used the incentive. Not only was this in spite of incentives and slow load growth, but also in spite of latent smart meter functionality available in that state, which provides a chance to trial new technology. It is therefore questionable whether the provision of an incentive, in the absence of some form of regulatory obligation, is sufficient to drive better DM outcomes.

Decoupling

There are two reforms proposed by the AEMC that fall under the 'decoupling' header: providing networks with an allowance for revenue foregone as a result of undertaking DM activities instead of traditional capex projects, and the development of a set of ricing principles to guide network tariff structures.

These decoupling measures are largely concerned with lessening the perverse incentives to invest in additional infrastructure which are built into the regulatory framework. These measures should therefore

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[22] Australian Energy Market Commission, *Power of choice - giving consumers options in the way they use electricity (Draft Report)* (2012) 143.

[23] We are addressing network-driven DM only here. Overall, the approach to reform has not focused on networks, but on consumers.

[24] Australian Energy Market Commission, 'Power of choice review - giving consumers options in the way they use electricity (Final Report) 203–4.

help reduce 'gold plating' of the networks, but they do not specifically address peak demand. This is a concern given that a large proportion of capex is due to peak demand.

Minor amendments

The AEMC's recommendations also provide for minor amendments to the NER to clarify that AER can have regard to non-network market benefits when assessing efficiency of expenditure and provide for some flexibility in the annual tariff process to manage potential extra volatility of DM costs.

As with decoupling reforms, these reforms focus on rebalancing the perverse incentives against DM. However, these reforms are minor and would be unlikely to have much impact alone, and do not focus on peak demand.

Is a DM target needed?

While current reforms are undoubtedly a step in the right direction, they do not directly target peak demand and do not guarantee that they will improve DM uptake. In addition, it is also clear that there remain considerable barriers to improving DM uptake:

- The regulatory framework remains weighted in favour of networks making excessive profits through increasing supply.[25]
- A lack of developed capability within networks to develop and implement DM initiatives.
- Cultural barriers and resistance to change: 'To a large extent, one of the major obstacles continues to be a culture which favours traditional 'build' engineering solutions and which pays little more than lip service to alternative options'.[26]
- The lack of social and environmental criteria in the National Electricity Objective, which make consideration of the environmental costs and benefits of greater DM more difficult to assess and include in policy and regulatory processes.[27]

Many of these barriers can only be overcome through experience with DM. For example, the build culture and lack of expertise within networks will not be overcome unless they take the first step and begin to undertake DM projects on a significant scale. Yet experience to date suggests that networks are reluctant, even with incentives and slower-than-projected demand growth providing opportunities to defer network investment.

Broadly speaking, there are two approaches to ensuring that networks take part in an incentive scheme:

1. Provide a particularly lucrative incentive; or
2. Implement targets and concomitant penalties.

[25] See Australian Energy Regulator, 'State of the energy market 2011,' above n 3. For a comparative assessment, see Bruce Mountain & Stephen Littlechild, 'Comparing electricity distribution network revenues and costs in New South Wales , Great Britain and Victoria' (2010) 38(10) *Energy Policy* 5770–5782.

[26] Final Report, 'IPART ESS Cost Effectiveness Analysis Final Report October 2011' [2011] *Analysis*.

[27] Castle, J., 2006. How Should Environmental and Social Policies be Catered for as the Regulatory Framework for Electricity Becomes Increasingly National? Sydney: Total Environment Centre. Wright, G., 2012. Systemic Biases in the NEM: Barriers to Demand-side Participation. Australian Energy Efficiency Summer Study. Sydney: Australian Alliance to Save Energy. This issue was also prominent in the Australian Alliance to Save Energy's stakeholder survey: see Dunstan, C., Ross, K. & Ghiotto, N., Barriers to Demand Management: A Survey of Stakeholder Perceptions, Australian Alliance to Save Energy.

As alluded to above, an 'incentive-only' approach to encouraging networks to undertake less capex and more DM is unlikely to be sufficient to change investment behaviour, unless the incentive offered is so lucrative that networks simply could not afford to ignore it. The AEMC itself notes, 'for such schemes to be fully effective, network businesses still need to be motivated towards DSP in the first place'.[28]

To this end, a target sets expectations and focuses the attention of regulated businesses. Whereas an incentive scheme alone can be ignored or dampened through token efforts, targets can provide a strong signal that DM is an important resource and shift thinking.[29] This signal then paves the way for greater utilisation of incentives, decoupling mechanisms and other complementary programs.

Any one policy alone will have only a limited impact on electricity prices and the environment: what is needed is a reform of the fundamentals of the NEM, and a mix of policies to ensure that networks engage with DM. While recent reform efforts on DM and networks are welcome, more is needed.

Given the foregoing, the ideal structure of regulatory reform in the NEM would be as follows:

1. Reform of the regulation of networks so as to remove perverse incentives to increase sales and disincentives to save energy.
2. **Implementation of a target for DM.**
3. Creation of a mechanism for meeting the DM target that ensures that all DM activities undergo a cost-benefit evaluation.
4. Provision of an incentive that improves, or at the very least does not diminish, the competitive position of the network undertaking DM measures.

DM targets

A DM target aims to overcome the reluctance to undertake DM by providing a target and associated penalties for failure to meet the target. A DM target comprises three core elements:

- The underlying objectives and principles;
- The target itself; and
- The scheme or mechanism by which the target is implemented.

The AEMC's concerns

In the final report of the Power of Choice review, the AEMC has dismissed DM targets on the basis that:

> *there is no perfect solution; that is… no option for setting a target appears to maximise the potential for achieving its aim without running the risk of being gamed, being ineffectual or actually increasing costs, at least in the near term. Network businesses could over invest in DSP through doing DSP for the sake of making the target, without any consideration of the efficiency of the project or its impacts on consumers.*[30]

[28] Directions paper 140

[29] Charles Goldman et al., *Coordination of Energy Efficiency and Demand Response* (2010) 6–2.

[30] Australian Energy Market Commission, 'Power of choice - giving consumers options in the way they use electricity (Draft Report) 33.

and:

> *Such targets may not actually lead to any reduction in capital investments, are very complicated to apply and do not recognise that peak demand growth is not solely within the control of the network business. Also, imposing targets which are external to the incentive regulation framework could lead to conflicting objectives for the businesses and the regulator to manage.*[31]

These comments, from the Power of Choice Draft and Final Reports respectively, represent the only justification given for the complete dismissal of DM targets.

- **Ineffectuality:** the concern that a target will not work seems unfounded given the success of many such targets overseas. In Europe all companies have met their targets, creating a culture where DSP is a normal part of business. France's overall DM target was exceeded by 20% and Denmark's by 25%.[32] In the UK companies have met their targets with 20% less expenditure than projected and in the Flanders region, Belgium, distributors met their targets at 24% less cost than originally budgeted for.[33]

- **Inefficiency:** while in general there is a possibility that targets may be set too high, thus leading to inefficient expenditure, the current level DM is so far below best practice that it is easy to set a target that is above the current level, but remains low compared to an economically efficient level. Furthermore, a target can be designed so as to remove this risk; e.g. by stipulating that the target can be met only through the RDMIS, which would have strong regulatory oversight to ensure efficient spending.

- **Increasing costs:** costs to consumers will only be increased by a DM target if DM expenditure is inefficient, which it should not be under a properly designed scheme. In any case, the risk of some increased cost during the transition to a more demand-side focused NEM must be contrasted with the current situation; huge costs to consumers as a result of highly inefficient investment in poles and wires. DM is a cost-effective and proven resource that will benefit consumers both in the short- and long-term and the small risk of some increased costs is no reason for moving slowly toward this goal.

- **Complexity:** the blanket assumption that DM targets are too complex shows a lack of engagement with the idea. Firstly, there is a wide range of target designs that have been proven overseas. These designs vary in complexity and a target design can be both simple and complex. Secondly, regulation of networks is a complex undertaking in general. Regulators already apply a range of complex factors in the regulatory process; there is no reason to believe that a well-designed DM target could not be implemented effectively.

- **Conflicting objectives:** the AEMC has consistently resisted any attempt to move the NEM beyond an energy only market operating in a restrictive economic rationalist paradigm, driven by incentive regulation. Here this resistance manifests as a concern that a DM target would be a 'conflicting objective' which would place too great a regulatory burden on networks and the regulator. This concern is misplaced on a number of levels. Firstly, a DM target is not a conflicting objective but a complementary measure to the stated goal of better dealing with peak demand. Secondly, networks would simply factor in an 'external' target into their decision making, alongside many other complex inputs produced by the regulatory framework. The regulator would have no

[31] Australian Energy Market Commission, 'Power of choice review - giving consumers options in the way they use electricity (Final Report) 198–9.

[32] Eoin Lees, *European and South American Experience of White Certificates* (2010) 13.

[33] Ibid 13.

conflicting objective as it would simply have to assess whether the target was met and apply the relevant penalties where necessary. Thirdly, the target need not be external; it could simply be made part of the incentive regulation framework, mandating that the networks actually use the incentive in order to overcome the initial hurdle. Finally, the AEMC provides no explanation as to why networks and the regulator would be incapable of balancing more than one objective.

- **Gaming:** given that networks have gamed the revenue setting process, the AEMC's concern here is both warranted and ironic. This is not, however, an insurmountable problem. As discussed above in relation to other concerns: some risk of initial overinvestment may be worth taking; the target can set so as to assure that overinvestment is not incentivised; and the regulator would have strong oversight via the RDMIS, in contrast to the weak powers the regulator has in the revenue setting process. Gaming is not a concern discussed in detail in the literature regarding DM targets, which suggests it is a non-issue in comparison to other more important aspects of scheme design.

The justifications given for rejecting the idea of a DM target are extremely limited and, crucially, do not discuss the fact that such targets are common in other jurisdictions, and even in other aspects of network regulation (e.g. reliability standards).

The AEMC has assumed that its proposed changes to incentives will materially increase DM in the absence of a target, though it has not commissioned or conducted research that would enable the necessary testing of this assumption. At the same time it has rejected DM targets as being in the 'too hard basket', even though the idea has not been afforded detailed consideration.

The AEMC is correct that setting an appropriate DM target and designing a mechanism for its implementation is not necessarily straightforward, but it is also correct in acknowledging that any incentive is likely to be underutilised unless there is an impetus to undertake DM in the first place. Considerable international experience suggests that such a DM target can provide this impetus simply and at low cost.

Setting a target

Targets, for example, could be:

1. based on:
    a. forecast or historical demand;
    b. a proportion of network wide peaks (e.g. 5% of forecast maximum demand);
    c. measured, weather-corrected peak demand within the distributor's service area;
    d. peak growth – a percentage of the forecast increase in maximum demand;
    e. Weather-corrected top-end system load factor - focussing on the 100 to 200 hours of highest peak demand;
    f. a per capita reduction in peak demand;
    g. network load factor;
    h. ratio between peak/average demand
    i. minimum spend – simply set a target for the amount to be spent by the distribution business on DM;
    j. emissions reduction.
2. applied to:
    a. all or part of a network, allowing the business to choose the areas for most effective deployment/of highest constraint; or
    b. retailers.
3. set annually or in line with five yearly regulatory reviews; and
4. be derived from detailed independent modelling taking into account:

a. projected peak demand increases;
b. projected average demand increases; and
c. areas of constraint on transmission and distribution networks.

Potential mechanisms for implementing a DM target in the NEM

The following is a summary of mechanisms that could be used to implement a DM target in the NEM.

- **DM plans overseen by the AER:** networks would be required to submit a plan on a regular basis to the AER, detailing how they intend to meet their DM target for that period. This would provide regulatory oversight by ensuring that all DM activities have been approved by the regulator. For additional assurance, the plans could also be verified by a third party. Such plans are a common part of DM target schemes worldwide.
- **Mandated peak demand reductions through the DMEGCIS**: The AER would oversee an obligation for networks to meet the target through DM undertaken in pursuance of the RDMIS. This would provide regulatory oversight to ensure that spending is genuine and efficient and ensure that networks utilise the incentive mechanism. The target would be set below the efficient level, so that it is clearly achievable. The RDMIS should encourage networks to engage in an efficient level of DM, but the target acts as a 'backstop' to ensure that they do not ignore it altogether.
- **A peak demand reduction fund:** a national peak reduction target would be set and allocated between networks. An independent body[34] would oversee a tender process for peak demand reduction projects proposed by networks and third-parties, meaning that networks would compete directly against other providers. A price-cap based on the value of network augmentation could provide a safeguard against inefficient investment. A similar proposal was made by IPART in 2002.[35]
- **Complementary incentive:** a specific Peak Demand Performance Incentive could be provided to reward networks for improvements in managing peak demand on their network. This could be applied as a factor in the building block revenue setting process. The incentive could be structured so as to provide an additional incentive for not only meeting a minimum level of DM, but also approaching an efficient level.
- **White certificate scheme:** white certificate schemes are used worldwide and have been investigated extensively by the International Energy Agency's Implementing Agreement on Demand-Side Management.[36] A national peak demand white certificate scheme would allow NEM participants to create peak demand reduction certificates, verified and registered by an independent regulator. Networks would then surrender certificates equivalent to their target. The penalty rate effectively caps the price of certificates. Consideration would need to be given to how a penalty based scheme would work effectively in a regulated monopoly environment where networks costs are passed through.[37]

[34] The Australian Energy Market Organisation, the AER or the Clean Energy Regulator.

[35] Independent Pricing and Regulatory Tribunal of New South Wales, *Inquiry into the Role of Demand Management and Other Options in the Provision of Energy Services (Final Report)* (2002) iii.

[36] Antonio Capozza et al., *Market Mechanisms for White Certificates Trading: Based on National and International Studies and Experiences (International Energy Agency Implementing Agreement on Demand-Side Management Technologies and Programmes Task XIV Final Report)*.

[37] National Consumers Roundtable on Energy, *Policy briefing notes for Minister for Resources and Energy , the Hon. Martin Ferguson AM MP* (2011).

A simple and effective DM target for the NEM: an example

While it is not our intention to provide a detailed description or analysis of target designs here, a brief example will suffice to demonstrate that a simple and effective target can be implemented in the NEM.

This example target would broadly comprise three key features, drawn from international experience and tailored to the current needs of the NEM:

1. **An expenditure target**
   The target would simply be set at 1% of the network's annual expenditure. This target could be increased each year until it is approaching an economically efficient level of DM investment, for example increasing to 5% over 5-10 years.

2. **The RDMIS**
   The type of eligible activity for meeting the target will be bounded by the existing RDMIS: the network would be free to undertake any activity under the RDMIS that pertains to peak demand reduction. This would ensure that reductions are genuine and economically efficient.

3. **Annual peak DM plans**
   The network would be required to deliver an annual plan to the regulator detailing how this expenditure will be used. This focuses the attention of networks and ensures that expenditure is made in a structured manner.

Key design issues

The overview provided by this discussion paper provides insight into some key issues that need to be considered when designing and implementing a peak demand reduction target

- **Objectives/Principles:** there is a range of objectives or principles that a DM target can be tailored to meet. It is best to keep the policy objectives of a scheme simple, clear, and focussed. Generally the focus is on achieving energy savings, but a number of other secondary objectives are often present, including:
  - Distribution of benefits
  - Reducing consumption
  - Reducing greenhouse emissions
  - Broad policy design choices such as whether the scheme is a market mechanism or has provision for tradability between obligated entities
  - Consumer protection and/or involvement of low-income consumers
- **Target:** the level of the target will be set according to the overall policy objectives. The goal is to strike a balance between making progress in increasing utilisation in DM, any cost to consumers, and the practicality of increasing DM, i.e. what is the available DM resource.
- **Scope and type of allowed DM resources:** It is likely to be best to keep the allowable activities as broad as possible to afford the network maximum flexibility in terms of how they meet the target. Any measure is acceptable provided that the energy savings can be verified, however, it may be necessary to restrict activities to those focusing on peak DM, or to easily-verified activities.
- **Overarching and long-term policy vision:** experience suggests that targets work best in the context of a supportive and forward-thinking regulatory framework that is broadly supportive of DSP. A

target itself is part of instilling this thinking, but must be supported by strong regulatory reform and incentives.

- **Methodologies:** there are many choices to be made regarding the methodologies used in implementing the target, for example those used to estimate and verify peak demand impacts and demonstrate capability to reduce peak demand and/or actual peak load.
- **Net vs. gross:** whether the DM activities undertaken must be additional to the savings that would have occurred anyway (see discussion of Pennsylvania in Appendix 1).
- **Complexity/simplicity:** a broad policy design choice is the level of complexity in the scheme. Certain target designs, such as those using forecasts and weather-corrected demand, may be more complex to implement than a simple spending obligation. Likewise the creation of a white certificate scheme will be more complicated than requiring that targets be met within existing network regulatory mechanisms and incentives.

Recommendations

1. Further research is required into:
    a. The likelihood of success of the AEMC's proposed DSP reforms in increasing network DM.
    b. How a target might be set for the NEM.
    c. At what level a target must be set to spur investment without encouraging overinvestment.
    d. Whether a target could simply complement existing incentives, or whether the establishment of a separate mechanism for compliance would be preferable.
2. A detailed study of overseas DM target schemes is required to determine what has been successful and whether there is a 'best practice' approach. A wealth of literature is already available on this topic and Australia could draw on this experience (see select bibliography).

Appendix 1: Selected overseas examples

Ontario Electricity Conservation and DM Target

In 2010 the Ontario Energy Board (OEB) issued a regulation which required all distributors to achieve Conservation and DM (CDM) targets over a 2011-2014 time frame. These targets form part of the licence of the 81 distributors. In total, the targets are as follows:[38]

- 2014 Net Annual Peak Demand Savings Target (MW): 1,330.04
- 2011-2014 Net Cumulative Energy Savings Target (GWh): 5,999.970

The CDM Code sets out the obligations and requirements which distributors must comply with in order to achieve their CDM targets. Distributors were required to submit a CDM strategy by November 1, 2010which outlined its four-year plan to meet its targets, including milestones and descriptions of all programs to be offered.[39]

Programs must be determined to be cost effective, unless they are pilots, educational programs or programs aimed at low-income consumers. There are no spending restrictions, but the OEB will assess the reasonableness of proposed budgets. A distributor can freely reallocate funds, but must apply for reallocation where the funds exceed 30 per cent of an approved budget of a program.

The Code also provides for a performance incentive mechanism: a tiered performance incentive for distributors meeting 80 per cent of their target, up to 150 per cent of their target. A distributor can begin receiving incentives once it has reached 80 per cent of both its peak demand reduction and electricity savings targets.

Lessons learned from the OEB CDM program include:

- Improving **cooperation**. The OEB was specifically mandated to encourage coordination between distributors and other entities. However, a distributor must demonstrate that it was central to receive full attribution. Centrality is established if the distributor's budgetary contribution is greater than 50 per cent of total cost.[40] This requirement is considered onerous by distributors and may lead to duplication rather than cooperation.[41]

- Allow **implementation flexibility**. In the case of the OEB CDM program, there appears to be a specific problem in that distributors are not able to undertake programs that duplicate those undertaken in pursuit of a previous scheme under the auspices of the Ontario Power Authority. Distributors

[38] Ontario Energy Board, EB-2010-02 'In the matter of the Ontario Energy Board Act, 1998, S.O. 1998, c.15 (Schedule B) (2010) Appendix A.

[39] ECO Issues, 'Conservation and Demand Management Code and Targets for Electricity Distributors' http://www.ecoissues.ca/index.php/Conservation_and_Demand_Management_Code_and_Targets_for_Electricity_Distributors

[40] Or if it can otherwise show that it initiated the partnership, program or implementation of the program.

[41] ECO Issues, 'Conservation and Demand Management Code and Targets for Electricity Distributors' http://www.ecoissues.ca/index.php/Conservation_and_Demand_Management_Code_and_Targets_for_Electricity_Distributors.

- Providing a **long-term policy framework**. As the CDM program has no planned life beyond December 31, 2014, distributors will 'likely ramp down their programs before 2014 to ensure all savings achieved are credited towards their targets'.[42]

United States

22 US States have implemented Energy Efficiency Resource Standards (EERS), while 9 have Efficiency Goals (EG). In terms of peak reduction specifically, 15 states and one power authority have implemented peak reduction targets within their EERS or EG, or award additional certificates for peak reductions.[43] Targets for peak demand are as follows:[44]

- California: reduce peak 1,537 MW, 2010-12
- Colorado: reduce peak 5% by 2018
- Delaware: peak 15% from 2007 by 2015
- Florida: 3.5% summer and winter peak reductions by 2019
- Maine: 100 MW peak by 2013
- Maryland: reduction of 15% per capita by 2015
- Pennsylvania: 4.5% peak by 2013
- Texas: 0.4% winter and summer peaks beginning 2013
- Vermont: summer and winter peak reduction targets

Such targets have generally been successful:

> *Many states have begun to recognize the highly cost-effective nature of efficiency programs, and in response have been aggressively increasing their spending and savings targets. Currently, leading states are achieving annual savings of 2% or more.*[45]
>
> *The experience of Pennsylvania, as impressive as it is for a state not generally regarded as a front-runner in energy efficiency, is not unique. Similar mandatory goals in other states, including Texas, have also produced impressive results that did not seem achievable or cost-effective. One can generally assume that 1%, and higher, reductions in annual electricity consumption are doable and cost-effective. Why they are not being tried — and mandated — more broadly and more aggressively is the real puzzle.*[46]

Pennsylvania

Act 129 requires distributors with 100,000 or more customers to reduce load by 1% by May 31, 2011 and reduce peak demand during the 100 hours of highest use by 4.5% by May 31, 2013, measured against a June 1, 2007 to May 31, 2008 baseline.[47] Distributors have to develop and file an energy efficiency and conservation plan with the PUC for approval. A penalty of $1-20 million applies for failure to achieve peak

[42] Ibid.

[43] Federal Energy Regulatory Commission, 'Renewable Power & Energy Efficiency: Energy Efficiency Resource Standards (EERS) and Goals' (2011).

[44] Ibid.

[45] Optimal Energy, *Pennsylvania 2013 – 2018 Energy Efficiency Goals* (2013).

[46] Menlo Energy Economics, Pennsylvania Finds the Ultimate Bottomless Well, http://www.menloenergy.com/?p=440.

[47] Shane Rooney, 'Act 129 of 2008: Overview and Implementation' in *MADRI Steering Committee Meeting* (2009).

targets, which is not recoverable from ratepayers.[48] The target must be accomplished spending no more than 2% of the utilities' revenue per year (based on 2006 revenue).

While the peak target has not yet concluded, the scheme overall has been successful, lowering the state's load by 2,073 GWh (41% higher than the goal). This has generated $278 million in annual savings for consumers, $2.3 billion over the expected lifetime of the scheme, for an upfront cost of $281 million. This equates to approximately $8 in ratepayer savings for every dollar spent on the scheme. This is a levelised cost of 1.6 cents/kWh compared to around 10 cents/kWh for from conventional coal-fired generation. The scheme will also create 4,000 jobs and reduce emissions by 23 million tons CO2e.[49]

The 2% spending cap, designed to protect customers, actually limits the benefits available:

> *The 2% budget cap represents an artificial limit on the benefits that efficiency can bring to Pennsylvania ratepayers. While it is understood that the intention of the cap was to protect customers from increased costs, the fact is that energy efficiency can be procured well below the cost of new supply-side resources and helps lower ratepayer bills.*[50]

Some useful lessons have been learned from PA's experience:

- Allow for a broad range of factors to be included in any **cost-effectiveness test**. All plans submitted to the PUC must pass such a test, however PA does not include non-resource benefits in its assessments. I.e. those benefits not directly related to electricity consumption, e.g. water savings from an energy efficient washing machine or emissions reductions from direct load control. Other states allow these benefits to be considered (see appendix).[51]
- Do not apply a **spending cap**: this 'acts as a severe limitation on the amount of efficiency allowed and represents significant forgone economic, environmental, and health benefits'.[52] Furthermore, if does not increase from the base year in line with inflation, the incentive to invest in DM reduces over time.
- **Decoupling and performance incentives** should be used alongside an uncapped DM scheme.[53]
- Set **targets based on net rather than gross savings**: gross savings targets create a perverse incentive for focusing on promoting technologies that are already being widely adopted in the marketplace (e.g. efficient light bulbs) and therefore have high freerider rates. I.e. These technologies save a lot of energy and are cheap, but they would have been installed anyway. The perverse incentive is even stronger where there is no decoupling or lost revenue recovery because freeriding also avoids losing revenue.[54]
- Allow **implementation flexibility**. PUC have limited the ability to switch funds between programs within the same customer class, eliminate underperforming measures, change the rebate levels for a measure and change measure eligibility conditions. The ability to respond to changing market conditions and learn from program experience without lengthy regulatory review would improve the scheme.[55]

[48] Ibid.

[49] Optimal Energy, 'Pennsylvania 2013 – 2018 Energy Efficiency Goals' above n 45, 2.

[50] Ibid 32.

[51] Ibid 5.

[52] Ibid.

[53] Ibid 32-34.

[54] Ibid 35

[55] Ibid

- Discourage pursuit of **cheapest savings**. The focus on gross savings rather than net savings as well as the fairly cheap savings needed to achieve the goals may require utilities to limit their efforts to only the very least expensive efficiency opportunities, missing out on higher cost opportunities with longer-term potentials.

California

The California PUC set broad annual and cumulative energy efficiency savings goals through 2013, while the state's Energy Action Plan[56] identified reduction of per capita energy use as one of six sets of critically important actions. This has been translated into explicit, numerical goals for electricity networks. The initial period (2004-2013) was designed to meet 55% to 59% of the networks incremental electric energy needs:[57] an average of 489MW each year.[58] Interim targets adopted for the period 2012-2020 average 505MW/year.[59]

In May 2008 TEC held a forum for non-government consumer advocates on economic regulation of networks with a focus on DM.[60] Michael Peevey of the California PUC took part in the forum and highlighted the vast differences between the approaches of Californian and Australia's National Electricity Market regulators. Most striking is that PUC-regulated utilities must procure resources to serve demand according to the following loading order:[61]

- Energy Efficiency & Conservation
- Demand Response
- Renewable Resources & Distributed Generation
- Clean Conventional Generation

The target, coupled with the loading order, gives concrete goals that must be met and preference to efficiency, rather than making marginal adjustments that fail to counter perverse incentives for networks to expand their asset bases in order to earn a return on investments.

Given the 'all of the above' nature of California's energy efficiency policy, it is difficult to isolate the impact of peak targets alone. Overall, per capita electricity use in California has remained flat since the 1970s and the focus on efficiency has produced huge savings for consumers: even though electricity prices are high Californian consumers pay lower electricity bills overall because they use much less electricity. Savings of $56 billion from 1972-2006 have enabled consumers to direct this money to other goods and services, creating about 1.5 million jobs.[62]

[56] Adopted by the PUC, the California Energy Commission (CEC) and the California Consumer Power and Conservation Financing Authority.

[57] Public Utilities Commission of the State of California, 'Decision Adopting Interim Energy Efficiency Savings Goals for 2012 through 2020, and Defining Energy Efficiency Savings Goals for 2009 through 2011' (2012).

[58] Ibid 5.

[59] Ibid 22.

[60] Total Environment Centre (2008) Forum on Price Caps, Revenue Caps and Total Factor Productivity –Which is best for demand management and the long term interests of consumers?

[61] Brian Turner, 'California Energy Programs and the Electric System' in *EPA State Climate and Energy Technical Forum* (2011).

[62] David Roland-Holst, *Energy Efficiency, Innovation, and Job Creation in California* (2008).

Efforts to reduce peak demand have resulted in the pre-emption of around 24 large-scale (500MW) power plants.[63] During its 2001 energy crisis, California reduced peak demand by an average of 8 per cent, which helped the state avert 50 to 160 hours of rolling blackouts.[64]

Texas

In 1999 Texas mandated that at least 10% of a utility annual demand growth be met through energy efficiency programs. Due to the success of the programs, the targets were subsequently increased in 2007: currently the target requires utilities to meet 20% of their growth in demand through energy efficiency programs.[65] The latest update to the target was passed in 2011[66] and starting in 2013, requires utilities to achieve overall demand reductions equivalent to 30% of the utility's annual growth. However, if this target is equal to or greater than 0.4% of the utility's peak demand, the target metric of 30% of load growth changes to 0.4% of summer weather-adjusted peak demand.

Utilities are required to administer programs to meet the mandated targets. Programs are implemented through retailers or third party service providers and are designed to reduce system peak demand, energy consumption, or energy costs. Programs must be made available to all customers, in all customer classes.

The PUC may impose an administrative penalty or other sanction if the utility fails to meet its target. Factors, to the extent they are outside of the utility's control, that may be considered in determining whether to impose a sanction for the utility's failure to meet the goal include:[67]

1. the level of demand by retail electric providers and energy efficiency service providers for program incentive funds made available by the utility through its programs;
2. changes in building energy codes; and
3. changes in government-imposed appliance or equipment efficiency standards.

Since 1999, Texas' efficiency programs have reduced demand by 1,365 MW.[68]

Maryland

In 2008 Maryland set a state-wide goal of reducing per capita electricity consumption and peak demand by 15% based on a 2007 baseline by 2015. Legislation[69] requires the Maryland Public Service Commission (PSC) to require that utilities achieve a 5% per capita consumption reduction by 2011 and 10% by 2015, with the remainder of the overall 15% goal to be accomplished independently of the utilities through other means. However, utilities are responsible for the entire 15% peak demand reduction target.

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[63] California Public Utilities Commission California Energy Commission, 'Energy Efficiency: California's Highest- Priority Resource.'

[64] Ibid. See also Charles A Goldman, Joseph H Eto & Galen L Barbose, *California Customer Load Reductions during the Electricity Crisis: Did they Help to Keep the Lights On?* (2002).

[65] See EUMMOT, 'Texas Energy Efficiency' http://www.texasefficiency.com/index.php/about/energy-efficiency-rule.

[66] Texas Bill SB 1125 *Relating to energy efficiency goals and programs, public information regarding energy efficiency programs, and the participation of loads in certain energy markets*. See http://www.capitol.state.tx.us/BillLookup/History.aspx?LegSess=82R&Bill=SB1125

[67] PUC Rules, Chapter 25: Substantive Rules Applicable to Electric Service Providers. See http://www.puc.texas.gov/agency/rulesnlaws/subrules/electric/25.181/25.181.pdf.

[68] EUMMOT, Texas Energy Efficiency, Energy Efficiency Accomplishments Report http://www.texasefficiency.com/index.php/publications/reports.

[69] The EmPOWER Maryland Energy Efficiency Act of 2008.

Utilities are required to consult with the Maryland Energy Administration (MEA) on program design and implementation and must submit plans for achieving the reductions to the PS. Both occur every three years. The PSC evaluates the plans based on cost-effectiveness, rate impacts for each ratepayer class, job impacts, and environmental impacts.

In March 2011 the Maryland Public Service Commission (PSC) issued a report detailing progress made towards the targets through 2010.[70] The report indicates although 'although each utility has seen marked improvement in participation quarter over quarter, energy savings and demand reductions remain considerably lower than targeted in the utilities plans, and even more modest against the EmPower Maryland 2011 and 2015 goals'.[71] This appears to have been in part due to the immature nature of the program: not all utilities' plans were fully operational during the reporting period and consumer participation was low in nascent programs. In addition, a hot summer and cold winter affected peak demand. However, utilities forecasted that they will easily meet their peak demand reduction goals for 2011.[72]

By 2011 the state was on track to meet its peak reduction target, having achieved and 61 per cent of the 2015 goal.[73]

UK

The UK Energy Efficiency Obligations[74] is a white certificate scheme that has been in place since 1994. Though not targeted specifically at peak demand, it is estimated that in the UK this has resulted in a 0.8 GWe reduction in peak demand.[75] This scheme has been in place during the transition from fourteen regional monopolies to a liberalised market with six major suppliers. Since 2002, the Government has set the size of the obligation, which is intended to approximately double energy efficiency activity. This scheme is primarily an environmental policy to tackle emissions and is intended to stimulate greater investment in energy efficiency measures in households.

Suppliers are required to achieve targets for EE improvements in the residential sector, specified in terms of lifetime CO2 savings (In the 3 year period to the end of April 2011 this was lifetime CO2 savings of 185 MtCO2). In addition, there is a social equity aspect to the target in that suppliers must achieve at least 40% of their energy savings in low income households. There is no prescription regarding how these improvements must be obtained.

Italy

Italy has had a White Certificate scheme since 2005. The obligations apply to all companies distributing to more than 50,000 customers, covering 14 electricity distributors.[76] Like the UK, Italy's scheme is primarily

[70] Public Service Commission of Maryland, *The EmPower Maryland Energy Efficiency Act Standard Report of 2011* (2011).

[71] Ibid 1.

[72] Ibid 4.

[73] Governor O'Malley's 15 Strategic Policy Goals: 9. Reduce Per Capita Electricity Consumption in Maryland by 15% by 2015, http://www.statestat.maryland.gov/GDUconservation.asp.

[74] Originally called the Energy Efficiency Commitment; now called the Carbon Emissions Reduction Target.

[75] Lees, 'European and South American Experience of White Certificates,' above n 32

[76] Ibid 35.

motivated by emission reduction goals, though it was also intended to encourage development of an energy services market.[77]

The target is based on the distributor's market share and is expressed as a saving in primary energy consumption in tons of oil equivalent (toe). A White Certificate (one toe) is equivalent to the average annual electricity consumption of between 1-2 households. Also like the UK, Italy's overall target is expressed as a reduction in emissions.

There is no prescription on how distributors should attain their targets, though an illustrative list is provided, which includes supply options. Although distributors are allowed to carry out energy efficiency measures and subsequently monitor them to determine the energy savings, nearly all projects have been based on ex-ante energy saving estimates.

Estimates for peak demand reduction range from <0.3[78] to 0.6 GWe.[79]

Brazil

In Brazil, 1% of the annual net revenues of the distribution networks must be invested in energy efficiency and R&D programs. These funds are collected from customers in the form of a wire charge and do not affect a utility's profits.[80] While there has been little problem with implementing this system, no effort has been made to remove the underlying perverse incentives for capex (similar to the situation in the NEM), and most utilities consistently choose to invest in energy efficiency programs which do not affect their revenues.[81]

Nonetheless, between 1998-2002 Brazil's scheme resulted in about 0.5 GWe of peak demand reduction.[82]

Other jurisdictions

Many other jurisdictions have implemented DM targets or similar initiatives that have not been discussed above. These include:

- Belgium (Flanders and Wallonia regions)
- Denmark
- France
- Thailand
- US states:
    - Arizona
    - Colorado
    - Florida

[77] Ibid 35.

[78] Ibid 42.

[79] Nick Eyre & Marcella Pavan, 'Energy company obligations to save energy in Italy, the UK and France: what have we learnt ?' in *ECEEE 2009 Summer Study* (2009) 429–439.

[80] Gilberto M Jannuzzi, *Incentives and disincentives for Utility driven DSM in Brazil* (2008) 3.

[81] Ibid 7–8.

[82] Lees, 'European and South American Experience of White Certificates,' above n 32, 29.

- Illinois
- Maine
- Maryland
- Ohio
- Pennsylvania
- Vermont
- Wisconsin

Appendix 2: Support for a DM target

Given the foregoing, there has been increasing interest in the DM target concept has garnered broad support across the spectrum of industry and consumer and environmental groups, including:

- Alternative Technology Association[83]
- Australian Industry Group[84]
- Brotherhood of St Lawrence[85]
- Choice[86]
- Clean Energy Council[87]
- Energy Efficiency Council[88]
- EnerNOC[89]
- The Greens[90]
- Institute for Sustainable Futures[91]
- Total Environment Centre

[83] Submission to Productivity Commission *Electricity Network Regulatory Frameworks* (2012).

[84] Australian Industry Group et al., *A Plan for Affordable Energy* (2012).

[85] Ibid.

[86] Ibid.

[87] Submission to Productivity Commission *Electricity Network Regulatory Frameworks* (2012).

[88] Ibid.

[89] Submission to Productivity Commission *Electricity Network Regulatory Frameworks* (2012).

[90] Additional comments to Productivity Commission *Electricity Network Regulatory Frameworks* (2012).

[91] Chris Reidy et al., 'The Australian Decentralised Energy Roadmap' , 91–2.