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# UNWIRED

## OPTIONS FOR INCREASING NETWORK DEMAND MANAGEMENT IN THE NATIONAL ELECTRICITY MARKET

### A TEC DISCUSSION PAPER

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# 1 TOTAL ENVIRONMENT CENTRE'S NATIONAL ELECTRICITY MARKET CAMPAIGN

Established in **1**972 by pioneers of the Australian environmental movement, Total Environment Centre (TEC) is a veteran of more than **1**00 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 — energy conservation and efficiency, demand management 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).

# 2 INTRODUCTION

The NEM is at a critical juncture in its development. While it has historically provided reliable and affordable electricity, it is becoming clear that it is not adequately prepared for the challenges facing our electricity system. Electricity prices are rising rapidly;[1] consumers are seeking a more environmentally sustainable electricity system;[2] there is a need to manage the rapid deployment of large and small scale renewables; and new technologies are revolutionising the supplier-consumer relationship.

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 such as decentralised generation and demand reduction measures.[3] Yet the NEM has encouraged little demand-side activity to date, even though this can deliver a more reliable, efficient and environmentally sustainable NEM.

It is against this backdrop that the Australian Energy Market Commission (AEMC) initiated the 'Power of Choice' review into demand-side participation (DSP) in the NEM. While stage 2 of the review concluded – incorrectly, in our view — that the current regulatory frameworks do not materially bias against DSP,[4] stage 3 of the review is moving toward implementing real reform to modernise the NEM and increasing the utilisation of DSP.

TEC notes that the objective of this review is:

> *to identify opportunities for consumers to make informed choices about the way they use electricity, and* ***provide incentives for network operators****, retailers and other parties to invest efficiently so that there is increased confidence that demand and supply side options are given equal weight in satisfying the community's demand for energy services.*[5]

DSP is a collective term that includes demand management (DM), energy efficiency (EE) and decentralised or embedded energy (DE). Substantial benefits could accrue from the implementation of a range of DSP and related options for meeting demand, including:

- Energy conservation.

[1] AEMC, 2011. Possible Future Retail Electricity Price Movements: 1 July 2011 to 30 June 2014, Sydney.

[2] Ison, N et al., 2011. The NEM Report Card: How well does the National Electricity Market serve Australia? Prepared by the Institute for Sustainable Futures and the Monash University Faculty of Law for the Total Environment Centre.

[3] Crossley, D., 2011. Demand-Side Participation in the Australian National Electricity Market: A Brief Annotated History, Sydney: Energy Futures.

[4] AEMC, 2010. Review of the role of demand side participation in the National Electricity, Stage 2 (Final Report), Sydney: AEMC.

[5] AEMC, 2011. Review of the role of demand side participation in the National Electricity, Stage 3 (Issues Paper), Sydney: AEMC.

- Decentralised electricity generation.
- Demand response.
- Decentralised energy storage.
- Improvements in the efficiency of buildings, appliances and equipment.
- More responsive, 2-way networks utilising smart grid technologies.

This paper deals with DM, specifically DM activities carried out by transmission and distribution network businesses, the companies responsible for delivering energy to consumers via transmission and distribution networks (Network Service Providers or NSPs). It aims to contribute to the development of focused and practical changes to the NEM by outlining reforms that can be implemented to encourage NSPs to increase their DM activities.

While the Power of Choice review frames increasing Network DM in terms of providing incentives for NSPs, there are other ways to achieve this goal, such as setting DM targets and penalising NSPs for failing to meet these targets. This discussion paper takes a broader approach to Network DM than merely providing incentives.

Further, while it is assumed in the Power of Choice review that increasing DM requires networks to be incentivised, this puts networks in a privileged position as the gatekeepers of DM. By contrast, in this paper we take the view that it is the market itself which should be regulated to encourage more DM, with networks as one party among others that might take advantage of incentives. In other words, with the right regulatory and market signals, if networks are not prepared to substantially increase the amount of DM they undertake, then other parties (such as demand aggregators) should have the opportunity to step into the breach.

## (A) NETWORK DM AND THE NEO

The operation of the NEM, including changes to facilitate more DSP, must be consistent with the National Electricity Objective (NEO):

> *to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to –*
>
> *a) price, quality, safety, reliability, and security of supply of electricity; and*
> *b) the reliability, safety and security of the national electricity system.*[6]

This paper is written primarily from within the context of the existing NEO. Network DM has the potential to reduce electricity prices by deferring or displacing expensive replacement of augmentation of network infrastructure, and to increase the quality, reliability and security of supply of electricity by providing an additional source of readily available electricity network capacity to meet demand.

The NEO currently includes no reference to environmental or social outcomes. This contrasts with other jurisdictions where such goals have been defined more broadly. [7] Nevertheless, the objectives of the Australian Energy Market Agreement (2006) refer to:*"(b) the establishment of a framework for further reform to:*

[6] National Electricity Law, s. 7. The NEL is a Schedule to the National Electricity (South Australia) Act 1996 (SA), passed in South Australia and subsequently adopted in the other NEM jurisdictions through implementing legislation.

[7] E.g. the UK (Department of Energy and Climate Change, 'Electricity Market Reform: Consultation Document' (The Stationery Office, December 2010)), the US (Federal Energy Regulatory Commission, 'About Us' <http://www.ferc.gov/about/about.asp> accessed 15 October 2011) and Canada (National Energy Board, 'Strategic Plan' (2011) available at <http://www.neb-one.gc.ca/clf-nsi/rthnb/whwrndrgvrnnc/strtgcpln-eng.html> accessed 15 October 2011).

*(vi) address greenhouse emissions from the energy sector, in light of the concerns about climate change and the need for a stable long-term framework for investment in energy supplies."*[8]

There have been calls to reform the NEO to include social and environmental criteria.[9] While the remainder of this paper is framed primarily within the context of the existing NEO, increasing DM has environmental implications, so these will also be discussed.

## (B) ENVIRONMENTAL COSTS AND BENEFITS OF NETWORK DM

The environmental implications of increasing Network DM are not well understood. It may have some negative consequences, by causing load shifting which could increase reliance on baseload generation capacity, currently provided largely by coal-fired generators.[10] However, over time (i.e., as the carbon price and the Renewable Energy Target work to change the generation mix) it should provide increasingly positive environmental outcomes, as baseload coal and peaking plants are progressively replaced by wind and solar power. These benefits include:

1. Reduced reliance on gas-fired generators to meet peak demand (peaking plants).
2. Spreading the load over the daily demand cycle, thereby facilitating the utilisation of a variety of energy sources including intermittent sources such as wind and solar.
3. Load shedding: i.e., consumers encouraged to shift their load away from peaks tend to use less energy overall, rather than shifting their consumption to a different time.
4. Reduction of localised negative environmental impacts from infrastructure projects, which use finite resources and embodied energy.
5. Reduction of negative health impacts resulting from coal and gas mining and electricity generation.

## (C) NETWORK DM INTERNATIONALLY

International experience with Network DM suggests that it can be a significant contributor to the overall DSP effort, and many jurisdictions have implemented appropriate regulatory reform to facilitate this contribution. The International Energy Agency (IEA) undertook a worldwide survey, identifying 64 Network DM projects from 13 different countries,[11] from the past 15 years, concluding that Network DM can effectively:

- reduce load on electricity networks that can be targeted to relieve specific network constraints; and
- provide a range of additional services, such as reactive supply and voltage control, regulation and frequency response and reserve capacity.

The IEA survey identifies a wide range of activities that are taking place, including: direct load control, demand response, interruptible load agreements, load shifting, power factor correction and smart metering.

[8] At 2.1.

[9] See, e.g. Ison, N et al., 2011. The NEM Report Card: How well does the National Electricity Market serve Australia? Prepared by the Institute for Sustainable Futures and the Monash University Faculty of Law for the Total Environment Centre.

[10] The extent to which this will lead to an increase in emissions depends, among other factors, on the amount of excess energy generated by coal power stations. These generators currently release this excess capacity as steam in order to avoid generating power in off-peak periods for which there may not be a market (and for which they would therefore not be paid). This could create system problems if converted to electricity. This issue is not well understood and requires more research.

[11] Crossley, D., 2008. Worldwide Survey of Network-driven Demand-side Management Projects, Sydney: IEA DSM Programme. See also Crossley, D., 2010. International Best Practice in Using Energy Efficiency and Demand Management to Support Electricity Networks, Sydney: Australian Alliance to Save Energy.

This suggests that there is the potential in Australia to leverage Network DM to improve the overall quality of the NEM.

## 3 INCREASING DEMAND MANAGEMENT ACTIVITY IN THE NEM

Network DM generally centres on the goal of reducing peak demand, and broadly comprise two streams of activity:

1. Local DM activities designed to relieve a specific network constraint at a particular location or time; and
2. Broader DM activities initiated to reduce demand across the network as a whole and to defer or displace demand driven capex in the medium- to long-term.

Transmission and distribution account for around half of the costs of electricity to consumers,[12] and are conducted by regulated monopoly businesses – some government-owned, some privately owned. These businesses can play a crucial role in creating a dynamic DSP sector in Australia through in-house development of DSP programs, purchase of third-party DSP products or facilitating DSP activities, such as the connection of distributed generation.

Distribution Network Service Providers (DNSPs) in particular are well-placed to facilitate the uptake of DSP because they are responsible for investment in the localised network infrastructure that delivers the energy most responsible for costly peak demand and can easily be provided with a strong impetus to increase DSP uptake.

To date, the NEM has not facilitated the use of DSP by NSPs. DSP capacity represents about 1% of peak demand in the NEM, compared to approximately 4% in the Western Australia electricity market, and 6% in California, which has a lengthy history of innovative DSP initiatives and incentives.[13]

A survey of Network DM in the NEM conducted by the Institute for Sustainable Futures found that in 2010/11 Network DM 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%.[14]

## 4 BARRIERS TO NETWORK DM

There are numerous barriers to increased Network DM in the NEM. These have been expounded in various reports produced over the last decade,[15] and include:

- A regulatory framework that is weighted in favour of NSPs making excessive profits through increasing supply. The AER has recently detailed its concerns as a regulator with this framework.[16]
- Reduced profits due to the displacement of capex, which earns a regulated return investment, in contrast to DSP activities which have generally been treated as operating expenditure (opex), which does not earn a regulated return.[17]

[12] See e.g. DCCEE and DRET, 2011. National Energy Savings Initiative Issues Paper, DCCEE and DRET, December 2011 5, Fig. 1.1, p. 5.

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

[14] Dunstan, C., Ghiotto, N. and Ross, K, 2010. Report of the 2010 Survey of Electricity Network Demand Management in Australia, Sydney: Australian Alliance to Save Energy and the Institute for Sustainable Futures, University of Technology, Sydney vi. Note though that the US figure includes contributions by retailers and integrated utilities.

[15] E.g. Roy, R., Nemztow, D. & Mawer, G., 2004. Demand Management and the National Electricity Market, Sydney: Total Environment Centre. Dunstan, C., Ghiotto, N. & Ross, K., Report on the 2010 Survey of Electricity Network Demand Management in Australia, Australian Alliance to Save Energy. Chin, L., 2008. Final Report to Garnaut Climate Change Review: NEM Market Failures and Governance Barriers for New Technologies. Stockton, J., 2009. Role of the NEM in responding to climate change policies, Melbourne: MMA Associates.

[16] See Australian Energy Regulator, 2011. State of the Energy Market 2011, Canberra: Australian Competition and Consumer Commission. For a comparative assessment, see Mountain, B. & Littlechild, S., 2010. Comparing electricity distribution network revenues and costs in New South Wales, Great Britain and Victoria. Energy Policy, 38(10), pp.5770-5782.

- A lack of developed capability within NSPs to develop and implement DM initiatives. For example, NSPs may lack the necessary institutional knowledge or experienced staff.
- Poor coordination between government departments and regulatory bodies, and between state and federal level. Different agencies have differing responsibilities and priorities in relation to DSP, and a lack of coordination is perceived to hamper DM policy efforts.[18]
- Cultural barriers and resistance to change. In 2002, IPART, the NSW regulator stated: "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".[19]
- The lack of social and environmental criteria in the NEO, which make consideration of the environmental costs and benefits of greater DM more difficult to assess and include in policy and regulatory processes.[20]
- The disaggregated nature of the NEM means that NSPs may not reap the benefits of their DSP expenditure, i.e. the electricity market consists of a number of different participants, so the NSP itself only receives part of the benefit of its Network DM activities.
- The small-scale and localised nature of many existing DM schemes.

# 5 CURRENT NETWORK DM MECHANISMS IN THE NEM

Network DM is already incorporated into the NEM to some extent in three ways. Firstly, there is the purported incentive to use DM to make capex savings. Secondly, provisions in the National Electricity Rules (NER) require NSPs to undertake certain reports and activities in relation to Network DSP. Secondly, there are some other Network DM initiatives and programs in operation.

## (A) REGULATORY INCENTIVE TO UNDERTAKE NETWORK DM

The purported incentive for NSPs to undertake DM programs in the current regulatory context is that they will reduce or defer their capex, making savings that can be leveraged for other investments or business activities.[21] However, as the AEMC recently noted:[22]

> *Given the way the current arrangements spread the costs of network investment over the lifetime of the asset, it is possible that such cost savings from deferring or avoiding network augmentation may not be*

[17] This issue has been widely accepted in the submissions to the Power of Choice Directions Paper and in numerous reports. See, e.g., Headberry Partners & Bob Lim & Co, 2008. Does Current Electricity Network Regulation Actively Minimise Demand Side Responsiveness in the NEM?, Sydney: Total Environment Centre. Available at: http://www.advocacypanel.com.au/documents/Applic280.pdf.

[18] In a stakeholder survey, the lack of coordination was the most identified barrier to improved DSP. See Dunstan, C., Ross, K. & Ghiotto, N., Barriers to Demand Management: A Survey of Stakeholder Perceptions, Australian Alliance to Save Energy.

[19] IPART, 2002. Inquiry into the Role of Demand Management and Other Options in the Provision of Energy Services, Final Report.

[20] 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.

[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.

[22] AEMC, 2012. Demand Side Participation and Profit Incentives for Distribution Network Businesses (Power of Choice Review, Supplementary Paper) 24.

*sufficient to fund DSP projects in the interim before the next regulatory reset, even if the total costs of the DSP project are cheaper than the network augmentation.*

*This will be true when a DSP project involves capital expenditure on assets which have a shorter asset life than the network asset. In addition, a network business will need to consider how such expenditure would be treated at the next regulatory determination. For distribution businesses, there is no guarantee that expenditure on DSP projects will be approved. Also, in the majority of cases, DSP only defers capital expenditure, and does not completely remove its need. This creates additional risk for businesses in having to re-justify the need for that capital expenditure project to the regulator at the next regulatory reset, and hence it may be reluctant to do so.*

## (B) NETWORK DM IN THE NATIONAL ELECTRICITY RULES

Network DM features to a very limited extent in the current National Electricity Rules (NER), which contain the following provisions:

- NSPs must periodically analyse the expected future operation of its network, taking demand side developments into account.[23]
- TNSPs must publish an Annual Planning Report. In the report, the TNSP must outline the non-network alternatives that it considered for all proposed network augmentations. The same applies to all proposed asset replacement. [24]
- When assessing options for network investment under the Regulatory Investment Test for Transmission (RIT-T), a TNSP cannot be biased against demand-side solutions.[25] There is currently a parallel test in development for distribution network investment which would place the same obligation on DNSPs.
- TNSPs must publish a project specification consultation report when proposing network investment. This report must include a description of all credible options for meeting the need for capacity in the transmission system, including Network DM. [26]
- The AER must take into account the extent to which a TNSP has implemented non-network alternatives when assessing a TNSP's proposed operating expenditure as part of the economic regulation process. [27]

## (C) EXISTING NETWORK DM PROGRAMS IN THE NEM

### DSP UNDER THE RIT

The Regulatory Investment Test for Transmission (RIT-T)[28] requires a TNSP to consider utilising DM to meet growth in peak demand. The funding for this DM activity is taken from the TNSP's existing revenue stream.

[23] 5.6.2(a) and (b)(4).

[24] 5.6.2A(4)(vi) and (6)(iv).

[25] 5.6.5A(3)(v).

[26] 5.6.6(c)(5).

[27] 6A.6.6(e)(12).

[28] The RIT-T process aims to ensure that a proposed option for network investment is the most economic option that will meet demand, conform to reliability standards and deliver broader benefits to the market. The RIT-T involves a consultation process applying to proposed developments with credible options costing $5 million or more. The RIT-T requires an assessment of the costs of identified solution options as well as the benefits to the NEM.

The RIT has not catalysed large-scale investment in Network DM. TNSPs consider the RIT to be a regulatory obligation, rather than an opportunity to profit from DM activities. We are not aware of any network infrastructure proposals that have been abandoned in favour of DM or other DSP projects as a result of undertaking the RIT-T.

The RIT-T does not require or allow the AER to actually analyse and approve projects subject to the investment test: it merely considers any objections made during the RIT-T process if they are made within the specified period. This means that the RIT-T places no obligation on a TNSP to implement Network DM projects.

The AEMC is currently finalising a parallel Regulatory Investment Test for Distribution (RIT-D) which would, in theory, similarly require Network DM options to be considered by an NSP for meeting localised capacity constraints on their network.

## DEMAND MANAGEMENT AND EMBEDDED GENERATION CONNECTION INCENTIVE SCHEME

The Demand Management and Embedded Generation Incentive Scheme (DMEGCIS) is the successor to the Demand Management Incentive Scheme (DMIS).[29] The scheme provides for:

- a Demand Management Innovation Allowance - an ex ante payment to DNSPs to be spent on prescribed activities on a use-it-or-lose-it basis; and
- recovery of foregone revenue as a result of Network DM initiatives.

The scheme is administered by the Australian Energy Regulator (AER), simple to apply and easily understood. However, the amount available to DNSPs is very small and has been insufficient to fund any significant Network DM activities beyond early stage trials. Indeed, the scheme was not intended to fund substantial Network DM activity.

The DMRGIS is not truly an incentive scheme because the NSP does not currently receive a portion of the broader system-wide benefits that are generated by their DSP initiatives. As a result, DSP activities that may deliver long-term, system-wide benefits are not proceeding where they do not also deliver a benefit to the NSP (by deferring capital expenditure or maintaining reliability) in the current regulatory period because the NSP is unable to make a sufficient business case without the latter.

The AER proposes to not increase the DMEGCIS for NSW and ACT during the 2014-2019 regulatory period as it has not been used to the full during the current period. This demonstrates that utilisation of the mechanism has been low, at least in these jurisdictions. The AER could, however, have chosen to make the scheme more attractive to networks so that it is utilised more frequently.

## DM ACTIVITIES WITHIN THE REVENUE SETTING PROCESS

An emerging method for funding Network DM has been innovatively pioneered by Energex, a Queensland DNSP. As part of its most recent regulatory proposal, Energex inserted a 5 year DM plan as part of its requested opex. The projects it proposes cover a wide range of activities, from a short-term “summer readiness” program to long term investments in capability development

In response, the AER approved both opex and capex allowances much higher than had previously been incorporated in a DNSP revenue determination in order that Energex can undertake its proposed Network DM activities during the period.

Energex valued its Network DM based on the deemed long-term and system-wide benefits. The AER accepted this as a basis for approving Energex’s proposed plan. In doing this, the AER has implicitly allowed Energex to secure a

[29] This will not significantly change the nature or effect of the scheme. The change in name reflects a recent AEMC rule change requiring the inclusion of embedded generation. Consequential amendments are required throughout to provide certainty regarding this inclusion. The AER will also discontinue the application of the D-factor scheme in the next regulatory control period, subject to the exception that expenditure on initiative implemented in the last two years of the current period will be recoverable in the first two years of the next period.

portion of these projected long-term and upstream benefits. In other words, the AER has provided a financial incentive for undertaking Network DM, based on the deemed benefits that the Network DM programs will bring to the system as a whole.

Taking this approach, Energex is still able to undertake localised DM under the RIT process, but is able also to develop broader DM capacity. The approach provides a high level of certainty within the given regulatory period, but there is a risk that AER will not approve similar programs in future.

### NSW D-FACTOR

The New South Wales D-factor is an incentive mechanism tied to the RIT process. It is aimed at deferring area-specific augmentations to the network by increasing revenues in the absence of capex and thereby overcoming risk and revenue loss. The D-factor has led to increased Network DM options in NSW, but it is limited in scope as it is location-specific. The process is also complex for both DNSPs and regulators, and the practical outcomes have been small. The AER is proposing to abolish the D-factor in the current NSW revenue reset process.

Nonetheless, a report commissioned for TEC concluded that "the available evidence indicates that, compared to past NSW and current interstate practice, the D-factor has been successful in stimulating greater consideration and implementation of DM by NSW Distributors".[30] Therefore, while the mechanism is an effective model, it would require reform to drastically scale-up its contribution to spurring DM investment.

In the 2014-19 revenue reset process for NSW and ACT networks the AER is proposing to abolish the D-factor on the grounds that its function should be performed by the amended demand management and embedded generation connection incentive scheme (DMEGCIS).[31]

## 6 PRINCIPLES

The operation of the NEM, both in relation to Network DM and more generally, should be guided by overarching principles that are consistent with the NEO, the AEMA, and the original objectives of creating the NEM. Elucidating these principles should provide a logical basis on which particular DM incentives and other measures can be assessed.

The regulation of monopoly network businesses is a significant issue in this development, and the most important outstanding area for reform. Garnaut succinctly states that:

> *The goal of network regulation is to restrict the ability of network providers to extract monopoly rents, while maintaining appropriate incentives for meeting demand for services, efficiency, reliability and innovation. The ideal is for the regulated network provider to behave as if it were a player in a competitive industry. This is easier said than done.*[32]

### (A) PRINCIPLES GUIDING THE REGULATION OF NSPS AND THE DEVELOPMENT OF THE NEM

### BENEFITS TO CONSUMERS

The NEO specifies the criteria to be applied in pursuing "the long term interest of consumers". Any measures to increase DM should result in lower prices or other benefits to consumers.A Level Playing Field

[30] Institute for Sustainable Futures & Regulatory Assistance Project, 2008. Win, Win, Win: Regulating Electricity Distribution Networks for Reliability, Consumers and the Environment, Sydney: Total Environment Centre.

[31] AER, Framework and approach paper, Ausgrid, Endeavour Energy and Essential Energy Regulatory control period commencing 1 July 2014, June 2012.

[32] Garnaut, R., 2011. Transforming the electricity sector, Canberra.

The NEM was always intended to be a two-sided market, where supply- and demand-side options for meeting demand were on equal footing.[33] However, this has not been the case to date, and supply-side options are heavily biased.[34] When an NSP is faced with a network constraint, there should be no bias built into the regulatory framework as to whether this constraint will be addressed with poles and wires or with DM or other DSP projects.

## COMPETITION

The fundamental principle driving electricity market reform across the world has been efficient and effective competition, in line with the prevailing economic ideology of neoliberalism, or economic rationalism. While some jurisdictions are now moderating their fervency for this ideology as applied to electricity networks,[35] competition remains a driving force in Australian electricity regulation. However, competition in the NEM is defective because NSPs are monopolies, backed by a regulatory framework that has delivered excessive profits and increased electricity prices for consumers.[36] Without the challenge provided by competition, NSPs have become inefficient and uncreative in their provision of electricity services.

## FREE MARKETS VERSUS REGULATION

The goal of freeing up markets has been the bulwark of electricity deregulation. Pursuant to this principle, there is little in the way of obligations placed on NSPs regarding the way they deliver electricity to consumers, i.e. whether they increase supply, or use Network DM to reduce demand. In theory this allows NSPs to select the most efficient and effective option. However, absent competition, this free reign has allowed NSPs in the NEM to consistently choose costly infrastructure investment as the primary method for meeting capacity constraints and economic efficiency has not resulted.

## INCENTIVES

In contrast to obligations, incentives can preserve the free market nature of electricity regulation, whilst providing a further profit motive to meet necessary social goals. The market as a whole must be incentivised to increase Network DM activity. NSPs should not have a monopoly on DM, and Incentivising all participants, including third party DSP providers, would ensure effective competition and deliver greater DSP capacity to the market.

## POLICY CONSISTENCY

Changes to the regulation or operation of the NEM, whether to encourage more DM or for other purposes, should not occur in isolation of other government policies. For instance, some regulators have recently complained about

[33] Crossley, D., 2011. Demand-Side Participation in the Australian National Electricity Market: A Brief Annotated History, Sydney: Energy Futures.

[34] This is widely recognised in the submissions to the Power of Choice discussion paper (2011) (?), particularly in relation to the model of economic regulation of NSPs, whereby profit is earned based on capex. The Prime Minister's Task Group on Energy Efficiency noted that a quarter of the submissions it received specifically commented that the NEM is "excessively supply-side focused", and that it "fails to effectively balance the incentives and obligations for supply and demand solutions". Prime Minister's Task Group on Energy Efficiency, 2012. Report of the Prime Minister's Task Group on Energy Efficiency, Canberra 166.

[35] The UK, for example, in a recent review of its market regulation, has increased the level of regulation in order to meet a coming shortfall in capacity that is unlikely to be met by the market operating alone. RWE notes that this is a "significant increase in political and regulatory intervention in generation (and retail) and a move away from the existing competitive market and toward a more regulated market". RWE, 2012. Electricity Market Reform Technical Update, Memorandum submitted by RWE (EMRT 07). Available at http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenergy/writev/emrt/emrt07.htm.

[36] Competition in the NEM is also defective because some participants in the NEM remain government-owned, and regulation has not yet been fully harmonised between NEM jurisdictions.

the carbon price distorting the market,[37] but do not factor in the subsidies and other economic advantages currently enjoyed by fossil fuels, or the long term costs of failing to mitigate and adapt to climate change.

### REDUCED COMPLEXITY

In spite of one of the Objectives of the AEMA being to "streamline and improve the quality of economic regulation across energy markets to lower the cost and complexity of regulation facing investors, enhance regulatory certainty, and lower barriers to competition",[38] the National Electricity Rules (NER) represent a highly complex regulatory framework, the understanding of which requires specialised economic and engineering expertise. It is therefore important for any changes to increase DM be done in a manner that wherever possible does not add another layer of complexity, making it even harder for consumer advocates, with their very limited resources, to engage with.

### TRANSPARENCY AND ACCOUNTABILITY

Networks should be required to publish annual plain English data on their efforts, both mandated and voluntary, to increase the uptake of DM in the NEM.

### ENVIRONMENTAL SUSTAINABILITY

Consistent with Objective 2.1(b)(vi) of the AEMA, the views of stakeholders surveyed for the TEC NEM Report Card (2011) and numerous submissions to NEM regulatory processes, changes to the Rules to incentivise more DM should consider environmental impacts, in particular greenhouse emissions and intensity. This is consistent with the overall objective of the NEO – i.e., the long term interest of consumers: in this case, a safe climate.

## (B) SPECIFIC PRINCIPLES FOR DESIGNING INCENTIVES

The following principles should guide the design of any incentive scheme related to Network DM.

1. In order to send efficient investment signals to NSPs, revenue must be decoupled from energy throughput.
2. Any incentives must make investment in cost effective DSP at least as profitable for NSPs as investment in poles and wires.
3. Incentive schemes must allow networks to monetise the value of the investment over a longer period than just a single regulatory period.
4. Networks should be required to demonstrate, through a publicly accessible process such as an investment test, that all cost effective DM options have been explored before undertaking capital expenditure in network assets.
5. Incentive schemes should include realistic targets for DM, with penalties applying where NSPs fail to meet their target and rewards for exceeding the target. As cost effective measures to address peak demand are location specific, it is important that as part of any such scheme the businesses are allowed to – if not required to – choose the actions that provide the most efficient investment.

[37] See e.g. The impact of green schemes on regulated electricity retail prices from 1 July 2012, IPART Fact Sheet, April 2012, esp. p. 5; also John Pierce, The Australian NEM: Choosing a new future: address to World Energy Forum 13-16 May 2012 Quebec City, Canada, available at http://www.aemc.gov.au/news/announcements/aemc-chairman-address-to-world-energy-forum-in-quebec-city-canada.html.

[38] AEMA (2006), 2.1(b)(ii)

6. Regulators should assess and apportion the economic benefits of DM across the supply chain.

# 7 ALTERNATIVES PROPOSED BY THE DSP3 REVIEW

A range of options for incentivising Network DM have been proposed. We consider here proposals falling into two categories: extension of existing Network DM incentive programs and proposals for new initiatives.

## (A) EXTENSION OF EXISTING DM INCENTIVES

### CURRENT REGULATORY PROCESS WITH DEEMED EXTERNAL VALUES

The Energex approach, discussed above, has led to a significant level of funding being approved to pursue Network DM projects in Queensland. As noted, Energex was able to calculate value for upstream benefits, which it used to justify the DM programs to the AER. However, DNSPs attempting to implement this approach will face scrutiny of the calculated value of benefits attributed to other sectors of the market. This could become a complex, costly, and time-consuming issue.

It is possible for the value of upstream benefits to be calculated independently. Such an independent valuation would likely be beneficial to all participants in the NEM. It would limit the extent of review that the AER would have to undertake, with the AER focusing on the DNSP business case itself, rather than having to engage in a debate about the appropriate values of non-DNSP benefits. Valuation of upstream benefits could be undertaken by an independent party and be reviewed periodically, in much the same way that the Weighted Average Cost of Capital is reviewed by the AER.

A deemed value of upstream benefits would streamline the assessment of DM options for NSPs and regulators and would likely lead to more DSP projects being undertaken. NSPs could plan DM projects for inclusion in its regulatory proposal with confidence and certainty that costs will be recovered through the usual building block process.

Despite the potential benefits however, this approach would provide a like-for-like cost recovery, rather than an incentive payment. As NSPs favour known, quantifiable and reliable supply-side investment, formalising the Energex approach may not be sufficient to greatly increase Network DM in the absence of broader reform.

### DEEMED EXTERNAL VALUES APPROACH WITH AN INCENTIVE PAYMENT

A possible modification to the Energex approach is to provide a share of the deemed system-wide benefits of Network DM to the NSP as an incentive payment. This would augment the Energex approach, overcoming the inherent biases against Network DM. As long as the system-wide benefits are greater than the costs of the project, the project will be efficient and will deliver overall benefits to the NEM.

Estimation and provision of deemed values to be used for upstream benefits of DSP actions would simplify and add certainty to the use of this mechanism, which could be expected to increase its use and therefore its effectiveness. Inclusion of fixed benefit sharing would also simplify the use of this mechanism and could improve its attractiveness to the DNSP, and thereby its effectiveness. Provision of an appropriate business incentive could also improve the allocative and dynamic efficiency of the mechanism.

### SIMPLIFIED D-FACTOR TYPE INCORPORATING DEEMED VALUE OF SYSTEM-WIDE BENEFIT

The D-factor as it is currently formulated also provides one-for-one cost recovery, and so does not consider the broader benefits that Network DM can bring to the NEM: it is limited in its scope to being focused on network costs and benefits only. The mechanism is also complex and involves significant overheads in calculation and review for each project.

A proposed simplified D-factor is similar to the approach above, but provides for the deemed value payment to be applied within regulatory periods. The AER would be responsible for determining the deemed value for the system-wide benefits of Network DM and a fixed share of those benefits could be claimable by the NSP for verified projects

This mechanism would be paid under similar recovery provisions as the current approach, but removes the need for assessment of avoided distribution costs or review of efficiency of project costs; these would no longer be part of the mechanism. Instead, the incentive component would be determined according to the deemed value of system-wide benefits.[39]

This mechanism would mean that internal benefits to the NSP are added to its share of external benefits. This would make a broader range of DM options cost effective and would allow NSP to justify implementing longer term programs where the main benefits are external and the internal benefits are longer term or otherwise difficult to quantify for the purposes of claiming the incentive.

### EXTENSION OF DMEGCIS

Good quality research into Network DM that is of sufficient scale is costly to NSPs, and is therefore unlikely to occur in the currently regulatory environment unless there is targeted innovation funding for this purpose. NSPs that pursue innovative DM programs despite the framework take significant risks as there is uncertainty as to how the regulator will approach projects, as discussed above.

The main issue with the DMIS as it stands is the relatively small amount of funds available to NSPs that seek to utilise the mechanism, and the incentive payment does not provide the NSP with a payment for the system-wide benefits resulting from their innovations.

A simple and effective change to the mechanism would be to upgrade the fund from a small one aiming at innovation to a more substantial fund aimed at scaling up such exploratory Network DM efforts by funding larger-scale and more wide-ranging programs. In addition the DMIS should be extended to included payment for deemed external values, as suggested above in relation to the economic regulation process and the D-factor mechanism.

UK regulator Ofgem has introduced an innovation fund where network operators bid for portions of £250m of innovation funding over a regulatory period. This was introduced after review of the regulatory framework found that the framework did not support expenditure on innovation and as a consequence may have inhibited innovation.

## (B) NEW MECHANISMS/REFORMS

### NETWORK DM TARGETS

Network DM targets are both simple to implement, by comparison to the more complex options discussed here, and would allow NSPs flexibility in meeting the needed increase in DM utilisation, in the absence of more comprehensive and fundamental regulatory reform.

Such targets would be aimed at reducing costly peak demand and would allow policymakers a high degree of flexibility, as they can be set and reached in a number of different ways. The target itself could be based on measuring a reduction in peak demand, compared with forecast or historical demand. The target may also be set as a proportion of network wide peaks or the annual growth in peak demand. Targets could be applied to all or part of a network: an average could apply to a network with the business then choosing the areas most viable for the effective deployment of DSP.

[39] The current incentive under the D-factor mechanism is equal to project implementation costs capped by the avoided distribution costs.

In terms of ensuring compliance with a DM target, a certificate scheme could requirement NSPs to develop the DM opportunities available to them. There is a high level of flexibility in designing such a scheme: in addition to NSPs, distributed generation, retailers and other accredited third parties, such as third part aggregator companies, could also be provided certificates for undertaking DSP activities. These activities could be verified and registered by an independent regulator. An NSP can then choose the most cost effective manner of reaching their target from a range of options.

NSPs would be required to surrender certificates equivalent to their target or be subject to a penalty. The penalty rate effectively places a cap on the price of certificates because an NSP will only buy certificates where the cost is lower than the cost of the penalty they would face for not meeting their target.

Such certificate schemes are commonplace in the energy sector, and would therefore be simple to design and implement. The nationwide Renewable Energy Target in Australia is an excellent of example of how such a scheme can work effectively. Such a scheme could 'kick-start' the market for DM, and deliver results that piecemeal regulatory reform has to date been unable to provide, while also allowing the market to deliver least cost DSP opportunities with little regulatory oversight.

A reasonable target would be for NSPs to be required to meet 1 per cent per annum of their energy throughput with Network DM measures, with this subsequently increasing by a further 1 per cent per annum, subject to periodic review.

## NETWORK DM INVESTMENT OBLIGATION

One simple method for ensuring that NSPs invest in DSP is to require them to expend a certain amount of their approved capex allowance on DSP. This would be implemented in conjunction with targets, and with clarification to how the AER will treat Network DM expenditure in order to ensure that it is rolled into the NSPs RAB, in the same way that equivalent capex would be. Such an obligation, while perhaps heavy-handed in comparison to other options for reform, would definitively ensure that NSPs invest in a minimum level of DSP, thus building capacity and addressing a culture that favours supply-side solutions.

To date, the NER have only imposed obligations to undertake assessments of DSP potential. This has not been effective because it does not overcome the barriers to DSP. These assessments are easily ignored or otherwise subverted, particularly in the context of a generally unsupportive regulatory environment.

A range of options for determining the amount to be invested exist. For example, NSPs could be required to:

- Offset a certain percentage of its capex allowance spent on network augmentation driven by peak demand growth using DSP; or
- Directly invest or purchase DSP each year equivalent to an appropriate percentage of its capex.

## PEAK DEMAND PERFORMANCE INCENTIVE

A Peak Demand Performance Incentive would be an incentive mechanism that rewards NSP's for improvements in managing peak demand on their networks. Such a scheme could be applied as a factor in the revenue determination process, in much the same way the D-factor and other incentive mechanisms currently apply.

The NSPs performance would be compared to an independently observable factor, such as peak growth or changes in the load profile on the network. NSPs would then undertake DM projects to lower peak demand and improve load shape, claiming an incentive payment based on their performance each year.

Much like other programs, the AER would be responsible for establishing key parameters at the outset, specify how performance and the comparison values will be measured, establish the values to apply to the incentive, and

develop reporting and assessment guidelines. Each year the NSP would submit their incentive claims and the AER would review the supporting documentation before approving adjustments to the NSPs revenues.

The value of the incentive should consider the full range of system-wide and localised benefits that are delivered. This would ensure that the incentive is sufficiently large enough to encourage uptake, while also delivering benefits to consumers.

## CREATION OF A NEW MARKET FOR PEAK DEMAND REDUCTIONS

A significant option for reform is to create a whole new DM market for purchasing reductions in peak demand. NSPs could bid into this market, but so could other parties, meaning that NSPs would be in direct competition with other providers of DM capacity.

Such a market would be based not on peak demand response, but on network constraints. Network constraints are localised and the cost of traditional network augmentations differ by, so a price and target would be set for reductions in demand by each network node. The AER could set prices based on a benchmark of what augmenting the network capacity would cost. The NSP would be able to bid for the DM opportunity if it chooses, but the best offer should be selected.

NSPs could either develop their in-house DM capacity so as to effectively compete in the market, or they may choose to continue to pursue he traditional supply-side approach to network constraints and augment the networks to cope with any demand growth. In any case, the market would result in a drop in demand growth and therefore so would network expenditure, over time.

## REFORMING RELIABILITY STANDARDS

There are two issues with reliability standards in the NEM. The first is that they could be considered excessive, and the second is that they bias against Network DM options.

The reliability standards of the NEM have likely led to unnecessarily large expenditures on poles and wires as they require significant investment to ensure uninterrupted supply at times of peak demand.[40] It is questionable whether customers wish to have uninterrupted service at a high cost, as opposed to a slightly less reliable service at a lower cost.

Secondly, aside from inherently excessive standards, NSPs may be reluctant to deploy DSP projects in case they affect reliability, as this would incur a penalty under the AER's Service Target Performance Incentive Scheme (STPIS). Yet the AER has suggested that only small and very limited exemptions to the STPIS penalties should be allowed for those undertaking DM activities. As the performance of a Network DM program provided by a party other than a NSP is not under the control of the NSP, the NSP should not be held liable under the STPIS.

In any case, Network DM programs could increase reliability at times of peak demand, at a lower cost than investment in infrastructure. However, the immaturity of Network DM in Australia limits the willingness of NSPs to try innovative methods for ensuring reliability with as Network DM has typically been treated as a potential threat to reliability. Network DM programs could be configured with the primary aim of increasing reliability at times of peak demand, rather than solely focusing on price reduction. As such, including reliability as a facet of an incentive scheme has the potential to combat the institutionalised belief that costly infrastructure is the best way to ensure reliability.

The AEMC must investigate the preferences of consumers in this area in order to ensure that the very high reliability standards currently mandated are truly in the long-term interests of consumers. Assuming consumers would rather have a more pragmatic balance between reliability and price, these standards must be relaxed. In

[40] Garnaut, R., 2011. Transforming the electricity sector, Canberra.

conjunction with this, the burden for STPIS should either be transferred to a DSP provider, or spread amongst parties.

## 8 CONTROL MECHANISMS: REVENUE VERSUS PRICE CAPS

As monopoly businesses, NSPs' revenues are independently regulated by the AER. The AER takes a 'building block' approach to calculating revenue needs over five year regulatory periods. The building blocks primarily comprise forecast capex and opex needs, based *inter alia* on: total and peak demand forecasts;[41] the cost of borrowing money (weighted average cost of capital or WACC); depreciation; and income tax payments.

The AER can then utilise two main 'control mechanisms' to allow for revenue generation. It can either cap the total revenue to be earned by each NSP (maximum allowable revenue or MAR), or cap the average price paid by customers for its services for each year in the period (via a weighted average price cap or WAPC).[42]

Whichever is chosen,

> *The control mechanism for standard control services must be in the form of CPI – X, or some incentive based variant. Under the CPI – X form, prices or allowed revenues are adjusted annually for inflation (CPI) less an adjustment factor 'X'. The X factor represents the change in real prices or revenues each year, so the DNSP can recover the costs that it expects to incur over the regulatory control period.43*

With **revenue caps** the revenue requirement is locked in annually for five years:

> *The DNSP is then bound to recover revenue equal to or less than the MAR. It complies with this constraint by forecasting sales for the next regulatory year and setting prices such that the expected revenue is equal to or less than the MAR. At the end of each regulatory year the DNSP reports its actual revenues to the regulator. Differences between the actual revenue recovered and the MAR are then accounted for in future years. This operation occurs through an "overs and unders" account, whereby any over-recovery (under-recovery) is deducted (added) from the MAR in future years.44*

If a network makes more revenue than the cap one year, it must forfeit the additional revenue in future years, and vice versa. Revenue caps are therefore difficult for networks to game.[45]

Also known as tariff basket controls, weighted average **price caps** involve the AER

> *…cap[ping] the average increase in prices from one year to the next. Under this control mechanism, prices for different services may adjust each year by different amounts—for example, some prices may rise while others may fall, subject to the WAPC. A weighted average is used to reflect that services may be sold in different quantities. So, a small increase in the price of a popular service would need to be offset by a large*

[41] The demand forecasting in AER determinations is developed in a similar process to the rest of the AER determinations. That is, the business puts forward a proposed demand forecast and the AER then assesses the forecast and can either approve the forecast or make changes to it (subject to appeal to the tribunal). In the AER's assessment it will typically hire a specialist consultant and in areas where AEMO demand forecasts are relevant it liaises with AEMO (AEMO forecasts tend to be at a higher level than the specifics included in a determination): AER, pers. comm.

[42] This is aside from control mechanisms for particular services such as public lighting, and options such as hybrid mechanisms.

[43] AER, Matters relevant to the framework and approach, ACT and NSW DNSPs 2014–2019: Control mechanisms for standard control electricity distribution services in the ACT and NSW, April 2012, p. 4.

[44] Ibid.

[45] "…under a revenue cap, a DNSP has little incentive to set prices in a manner that aims to maximise revenue recovery"; ibid, p. 6.

*decrease in the price of an infrequently provided service. The DNSP complies with this constraint by setting prices so the change in the weighted average price is equal to or less than the CPI – X cap.46*

Under a price cap the AER divides revenue requirements each year by the projected units of sales to determine a price. A price cap requires a 5 year forecast of demand. The price is set on an annual basis; but unlike a revenue cap, once it is set it cannot be compensated for the following year, so the networks get to either keep the profit they have made when demand is higher than anticipated, or are forced to bear the losses when the reverse occurs. A price cap therefore provides networks with a significant opportunity to game the market. The AER notes that in Victoria (which has a price cap), in the period 2006-10

*…the Victorian DNSPs recovered revenue substantially above forecast throughout the period, averaging a recovery of 8.28 per cent above forecast annually (a total over recovery of $568 million (real $2010) over the period). This demonstrates the large fluctuations in revenue that can occur under a WAPC as a result of variations from forecast demand and prices.*

*The AER considers that during the regulatory control period DNSPs were able to make windfall gains by increasing the price (above the general increase specified in the WAPC) of components of particular services experiencing sales growth above its forecast.*[47]

The main issue for consumers is which control mechanism is most likely to act as a constraint on retail prices. The building block approach ensures that, in the long run, regardless of the control mechanism, networks have a strong incentive to encourage higher peak and/or total energy consumption, in order to maximise revenue.

In the short run, under a revenue cap when demand is increasing, revenue remains constant. Networks therefore have an incentive to encourage energy saving measures (energy conservation, demand management and energy efficiency) in order to reduce costs, thereby increasing profits. Where a price cap is in place, on the other hand, when demand is increasing networks will increase their revenue by encouraging more consumption. This is the case in Queensland, where Ergon and Energex have conducted significantly more DM activity under a revenue cap than DNSPs in jurisdictions with price caps, such as NSW and Victoria.

Where peak and/or total demand are flat or falling, under a revenue cap, network revenue remains constant, so networks have an incentive to encourage more energy saving measures, as any further decreases in costs result in increases in profits. The downside for consumers is that if demand proves to be lower than forecast for much of the 5 year determination period, the networks get a windfall profit, since their revenue was determined by the original forecast.[48] Where demand is flat or falling, price caps do not encourage more energy saving measures, since the networks have an incentive to encourage more consumption so that their revenue falls as little as possible.

For these reasons, the AER currently favours a revenue cap for NSW and ACT for the 2014-19 revenue reset period,[49] but this is being opposed by all the (government-owned) NSPs. The AER's preference is in line with to a report commission by the TEC in 2008,[50] which argued that a revenue cap is the "least worst" option for increasing Network DM.

[46] Ibid, p. 5.

[47] AER, Framework and approach paper, Ausgrid, Endeavour Energy and Essential Energy, Regulatory control period commencing 1 July 2014, June 2012, p 128.

[48] The AER argues that differences between forecast and actual demand should not greatly affect network revenue as most of their costs are fixed (pers. corr.).

[49] See AER, Framework and approach paper, Ausgrid, Endeavour Energy and Essential Energy, Regulatory control period commencing 1 July 2014, June 2012, e.g. p ix.

[50] Headberry and Partners & Bob Lim, & Co, 2008. Does Current Electricity Network Regulation Actively Minimise Demand Side Responsiveness in the NEM? TEC, Sydney: Total Environment Centre. Available at: http://www.advocacypanel.com.au/documents/Applic280.pdf.

TEC favours the application of revenue caps to NSW and ACT networks, with significant reservations. In the long term it is important for regulators to find ways to decouple energy throughput from revenue. Electricity regulators around the world are still struggling with this problem, and TEC recommends that the AER consider a combination of a revenue cap with much more significant DSP incentives.

## 9 THE WAY FORWARD

The Power of Choice review comes at an opportune time, with the confluence of rising prices, technological change and environmental policies making the need for increased DM and other forms of DSP an urgent one. Since TEC and other consumer advocates lack the resources of the networks and regulators to initiate and respond to highly complex reform proposals, we regard the application of the principles outlined above as paramount to ensuring that DM options are efficient, effective, and operate in the best interests of consumers and the market.

For instance, an ambitious target could be coupled with a modest investment obligation. Penalties should be applied to NSPs that fail to meet their targets, while an incentive scheme or decoupling mechanism accounting for deemed external benefits could provide a profit motive and improve the business case for DM. Creating a new market in parallel to these initiatives could provide the competition that is necessary for NSPs to act in a more efficient manner.

TEC expects to be more specific in its proposals and responses as the reform process continues, and invites other advocates and regulators to respond to this discussion paper.

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