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Facilitating efficient augmentation of transmission networks to connect renewable energy generation: the Australian experience

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ABSTRACT

Australia is heavily dependent on coal for electricity generation. The Renewable Energy Target has spurred growth in the utilization of renewable energy sources, with further growth expected into the future. Australia's strongest renewable energy sources are generally distant from the transmission network in resource 'basins'. Investment is needed to augment the transmission network to enable delivery of electricity from these sources to consumers. Considerable economies of scale flow from anticipating the connection of numerous generators in an area over time and sizing augmentations accordingly.

Following a lengthy rulemaking process, the National Electricity Rules were recently amended by a new rule, designed to facilitate the construction of such efficiently sized augmentations. However, the new rule is more conservative than initially envisaged, making little substantive change to the current frameworks for augmentation and connection.

This paper outlines these frameworks and the rulemaking process and identifies the key debates surrounding the rule change are identified. This paper then provides a detailed analysis of the new rule, concluding that it is defective in a number of respects and is unlikely to result in the efficient and timely augmentation of the network needed to unlock the potential of Australia's strongest renewable energy resources.

1. Introduction

Australia depends heavily on coal to meet its electricity needs. Coal accounts for around 80% of electricity output in the National Electricity Market (NEM), while gas accounts for around 10% (AER, 2010b). Overall, electricity generation accounts for 36% of Australia's total carbon emissions (DCCEE, 2011).[1] As concerns over climate change mount, there is increased movement towards less carbon-intensive methods of electricity generation, including renewable energy, as well as renewed interest in the demand-side of electricity markets.

Australia's Renewable Energy Target (RET)[2] is intended to ensure a transition to renewable energy sources by altering the underlying economics of electricity generation to make renewables more commercially attractive (MCE, 2010; AEMC, 2010c). Furthermore, the recently adopted Clean Energy Future package of legislative reform includes a carbon price that will ultimately transition to a cap-and-trade system (MPCCC, 2010). These measures will provide

Abbreviations: ABARE, Australian Bureau of Agricultural and Resource Economics; AEMC, Australian Energy Market Commission; AEMO, Australian Energy Market Operator; AER, Australian Energy Regulator; AGL, AGL Energy Ltd (previously Australian Gas Light Company); CEC, Clean Energy Council; COAG, Council of Australian Governments; CREZ, Competitive Renewable Energy Zones (Texas); DCCEE, Department of Climate Change and Energy Efficiency; DECC, Department of Energy and Climate Change (UK); DSP, Demand Side Participation; ERCOT, Electricity Reliability Council of Texas; ESAA, Energy Supply Association of Australia; ESOO, Electricity Statement of Opportunities; FERC, Federal Energy Regulatory Commission (US); MCE, Ministerial Council on Energy (now called the Standing Council on Energy and Resources); MEU, Major Energy Users; MPCCC, Multi-Party Climate Change Committee; NEB, National Electricity Board (Canada); NECA, National Electricity Code Administrator (roles and functions now transferred to the AEMC and AER); NERA, National Economic Research Associates; NEB, National Energy Board (Canada); NEL, National Electricity Law; NEMMCO, National Electricity Market Management Company; NEM, National Electricity Market; NEO, National Electricity Objective; NER, National Electricity Rules; NGF, National Generators Forum; NGMC, National Grid Management Council; NSP, Network Service Provider; NTNDP, National Transmission Network Development Plan; OECD, Organisation for Economic Cooperation and Development; OFGEM, Office of the Gas and Electricity Markets; PUC, Public Utilities Commission (Texas); RET, Renewable Energy Target; REMF, Review of Energy Market Frameworks in light of Climate Change Policies; RIIO, Revenue=Incentives+Innovation+Outputs; RIT-T, Regulatory Investment Test for Transmission; RPI-X, Retail Price Index-X; SENEs, Scale Efficient Network Extensions; TNSP, Transmission Network Service Provider; TEC, Total Environment Centre

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[1] This figure is unusually low due to unseasonal flooding which caused coal mine closures and increased hydro generation capacity.

[2] Implemented by the Renewable Energy (Electricity) Act 2000 (Cth) and now divided into a Small Scale Renewable Energy Scheme and the Large Scale Renewable Energy Scheme.

a disincentive to carbon-intensive electricity generation and likely further increase the utilization of renewable energy.

As with all electricity generation, renewable energy power stations must be connected to the transmission network (Network) in order to transmit electricity to the distribution network and to end consumers. Australia's Network has developed alongside the coal industry. As a result, the transmission network is close to coal resources, but distant from the best renewable energy sources. In addition, the present regulatory framework is geared toward infrequent connection requests from large coal-fired power stations, but ill-suited to clustered generation, i.e. the connection of multiple smaller generations in the same area over time.

The Australian Energy Market Commission (AEMC), the rule-making body of the NEM, has developed a rule change to the National Electricity Rules (NER or the Rules)[3] to facilitate the construction of suitably sized extensions to the Network that will accommodate clusters of renewable energy generators in a geographic area over time. Such a rule is intended to enable the exploitation of the economies of scale that flow from building an efficiently sized augmentation, rather than a number of separate augmentations for each generator. Such augmentations have been termed 'Scale Efficient Network Extensions' (SENEs), though some have colorfully referred to them as 'fields of dreams' (ESAA, 2011). The AEMC first suggested a SENEs rule in its Review of Energy Market Frameworks in Light of Climate Change Policies (REMF) (AEMC, 2009; Fig. 1).

On 30 June 2011, the AEMC issued the National Electricity Amendment (Scale Efficient Network Extensions) Rule 2011 (Final Rule), which implemented a very different approach to the concept initially envisaged.

In this paper I will give a brief contextual overview of the electricity market in Australia and discuss the current regulatory regime for the connection to, and augmentation of, the Network. I will identify the inefficiencies that flow from this framework and argue that amendments to the framework are needed.

This paper summarizes the rule change process and identifies the stakeholders and their responses to the proposal. It assesses whether the Final Rule is apt to address the issues facing investment in transmission infrastructure in the context of a changing electricity system. I conclude that the Final Rule is not apt for this purpose.

Two international examples of differing approaches to this problem will be outlined and I will propose a more suitable option for Australia's National Electricity Market. This proposal would grant ownership rights over any infrastructure built to the builder, giving investors certainty that they will be able to secure a return on their investment.

I also suggest that electricity market regulation more broadly needs to become more responsive to environmental and social concerns and that a narrow economic rationalist approach is inadequate to meet the challenges that electricity networks are facing.

Finally, the paper identifies some lessons that can be learned from Australia's experience.

2. Australia's electricity system: context

Australia's network has some unique characteristics. For example, it is very long and thin, stretching 4000 km from the North of the country at Port Douglas in Queensland along the coast and West to Port Lincoln in South Australia. The NEM is one of the world's longest interconnected power systems where electricity is traded across state boundaries.

[3] This article refers to the National Electricity Rules Version 43 (2011).

Australia's electricity system is, in common with many other states, highly liberalized. This liberalization brings with it the delicate balance between market forces and regulatory oversight, and the concomitant difficulties involved in aligning Transmission Network Service Provider (TNSP) incentives and regulation with public good outcomes.

As is also common, Australia's best renewable energy resources are generally far from the Network or load centers. However, even where renewable energy resources are located close to the Network, such as in smaller and denser countries, connecting clusters of renewable energy generation in proximate locations is also challenging because "it is not desirable to establish many connections on a high voltage transmission line, nor is it the most economic outcome overall" (AEMO, 2010a). This is partly due to technical constraints and partly because transmission infrastructure is inherently expensive. Thus the notion that efficiencies can be gained in augmenting the network is also applicable to non-remote generation.

3. Location of the Network and renewable energy resources in Australia

Renewable energy resources, like coal and gas, can be conceptualized as being present in distinct 'basins'. The most powerful winds in Australia blow offshore and on the Eyre Peninsula, 300 km west of Adelaide in South Australia, while the sun shines the strongest in the far northwest of New South Wales and in mid- to north-Queensland (Geoscience Australia and ABARE, 2010).

The Network that the renewable energy generators must connect to, however, is concentrated on the east and south-east coasts of the country, centered on the coal basins and load centers that necessitated its construction (Geoscience Australia and ABARE, 2010).

4. Scale Efficient Network Extensions

As generation from renewable energy sources increases, there is a need to augment the Network to transmit this additional electricity. The Network will need to be augmented more quickly and on a larger scale than would have been necessary absent the RET (AEMC, 2009). Where a generator wishes to utilize the best renewable energy resources, those furthest from the existing Network, the cost of this augmentation will be high.

As renewable energy sources are concentrated in specific geographic locations, it is expected that numerous generators will seek to develop power stations and connect them to the network in close proximity to each other over time. This is similar to the way in which multiple coal-fired power stations have developed and connected over time in close proximity to coal basins, though the renewable energy facilities will be smaller and more numerous.

There is, however, a 'chicken and egg' problem involved in transmission augmentation for renewable energy. Renewable energy generators are unlikely to develop generation facilities in remote areas unless sufficient transmission capacity exists to ensure a low-cost connection to the Network. On the other hand, interest in investing in infrastructure is likely to be low until it is clear that sufficient generation exists to utilize it and that a return on investment can be secured.

Ideally, generators with an interest in a certain geographic area would cooperate to build necessary network augmentations together. However, the current framework leaves open the possibility for strategic gaming: it incentivizes abstinence from the necessary cooperation and encourages generators to wait until other parties build the infrastructure and subsequently seeking

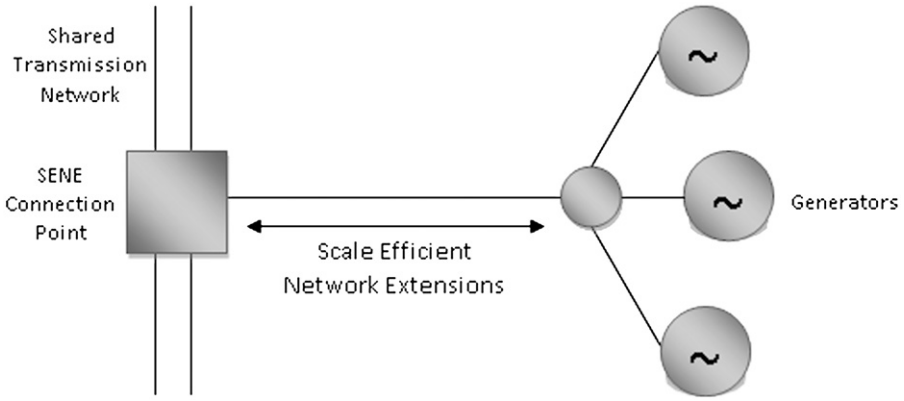

Fig. 1. Schematic diagram of a Scale Efficient Network Extension.
Source: Adapted from AEMC, 2010a.

connection to the Network. This problem, and other difficulties under the current framework, will be discussed below.

The existing regulatory regime for connection to the Network was "developed to support the requirements and characteristics of traditional generation investment" (AEMC, 2010c) and does not account for current and future changes to the generation mix, or provide a mechanism for coordinating the connection of a number of generators in a geographic location over time.

Substantial efficiencies could be gained by anticipating increased generation and connection in a geographic area and augmenting the Network in advance to 'unlock' the renewable energy resources in that area. CitiPower and Powercor Australia identified an instance where coordinating the connection of four generators over a mere 35 km of transmission line would save around $12 million. A case study for the connection of four wind farms on the Eyre Peninsula found that a SENE would reduce a generator's cost to 60–62% of its standalone cost (NERA Economic Consulting, 2010), while Grid Australia considers that a SENE can reduce this figure to 50% of the standalone cost for four generators over 100 km of line (AEMC, 2009).

In its 2010 National Transmission Network Development Plan, the Australian Energy Market Operator (AEMO) identified six broad geographic zones that, under a range of scenarios, would see the installation of five or more new generating units over the next 20 years (AEMO, 2010b).

The AEMC notes that "[c]connecting generators in a way that will minimize expected total system costs will require investment that is more forward looking than has historically been required" (AEMC, 2011). That is, the changing generation mix requires changing the way investment in the Network is managed, including augmentation and connection.

5. The regulatory framework for connection

Before discussing the SENEs rule making process, it is apposite to consider the existing framework to understand its inadequacies and the need for change. This framework remains applicable as the Final Rule adopted by the AEMC does not make any significant changes.

5.1. Regulatory context

The NEM, established by the National Electricity Law (NEL)[4] is the name of Australia's wholesale electricity market and the physical transmission network connecting Queensland, New South Wales, the Australian Capital Territory, Tasmania, Victoria and South Australia. Western Australia and the Northern Territory are not part of the NEM, due to geographic distance (ABARE, 2010), and have their own regulatory regimes: consideration of these regimes is beyond the scope of this paper.

The operation of the NEM is governed by the Rules and four core governing bodies: the Standing Committee on Energy and Resources (previously the Ministerial Council on Energy (MCE)), the AEMC, the AER and the AEMO. These bodies are responsible for market policy, rules, enforcement and physical operation, respectively.

A person that wishes to participate in the NEM must register as a 'Registered Participant' under the NER (s 2) in the category relevant to their intended activity. For example, a person wishing to operate a power plant must register as a 'Generator' (s 2.2), as the Rules state that a person must not own, operate, or control a power plant that is connected to the Network without registering as such (s 2.2.1(a)). Registration as a 'Network Service Provider' (NSP) (s 2.5.1) is necessary for a Registered Participant in the NEM to own and operate the transmission and distribution networks, i.e. the 'poles and wires'. The transmission network is operated by TNSPs and delivers electricity from power stations to local substations, while the distribution network delivers electricity to customers from the substations. Under Section 2.5.1(a) of the NER, a person must not own, operate, or control a part of the Network without registering as a NSP.

5.2. Network planning

The AEMO is Australia's National Transmission Planner and produces advice and forecasting which is intended to guide the long term commercial investment in network infrastructure made by NSPs.

The AEMO produces a number of documents for this purpose. Most importantly, the AEMO produces the National Transmission Network Development Plan (NTNDP) which is the AEMO's outline of an efficient development path for the national transmission network over a 20 year planning horizon under a range of possible scenarios.

During the process of developing its 2010 NTNDP, the AEMO received strong support for the notion that the NTNDP should include information about potential SENEs, even though the SENEs rule change had not been finalized at the time. Ultimately, the AEMO decided that the rule change must be finalized before detailed consideration of SENEs could be justified (AEMO, 2010b). Nonetheless, the AEMO undertook a high-level assessment of regions for potential SENEs.

[4] 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. See e.g. National Electricity (Victoria) Act, 2005(Vic).

Identification of SENEs is not required of the AEMO by the SENEs rule, however, the AEMC has noted that there is merit in the AEMO continuing to identify clusters of generation in future NTNDPs (AEMC, 2011b).

The AEMO produces a yearly Electricity Statement of Opportunities (ESOO), which details the projected adequacy of electricity supplies in the NEM to meet projected demand over the next 10 years.

The AEMO is also responsible for applying the Regulatory Investment Test for Transmission (RIT-T), the test applied to proposed transmission augmentations to identify the investment option that maximizes economic benefits and meets reliability standards.

It is important to note that the AEMO ultimately only has an advisory role as its principal task is to inform the market so that the market can make better decisions on network development. For example, the AEMO states in its 2010 NTNDP it will be "be working with TNSPs and other stakeholders to ensure that the conclusions of the NTNDP are taken into consideration", also noting that planners should "incorporate the findings in their annual planning reviews to enhance the national benefits arising from the NTNDP" (AEMO, 2010b).

5.3. Current framework for connection to the Network

Connection to the Network is regulated by Chapter 5 of the NER. The generator first submits an inquiry that outlines the details of the proposed connection to the Network (s 5.3.2). The TNSP then responds and provides information regarding access and plant standards, capacity of the Network, and the program for assessing the connection application (s 5.3.3). A formal application for connection is then made by the generator (s 5.3.4) and the TNSP identifies and studies technical issues.

The TNSP then prepares an offer to connect, which must provide all relevant information to the connection applicant (ss 5.3.5 and 6) and contain the proposed terms and conditions of the connection (s 5.3.6(b)). These include technical matters (s 5.3.6(b)(1)) and the matters specified in Schedule 5.6, such as metering arrangements, charges, and the duration of the agreement.

Connection agreements may include "other technical, commercial, and legal conditions governing works required for the connection or extension to the network which the parties have negotiated and agreed to" (sch 5.6), which provides for commercial negotiation on all aspects of the connection that are not regulated. The connection agreement is finalized when the generator accepts or declines the offer to connect (s 5.3.7).

5.4. Augmentation under the current framework

The above framework, while regulating the connection itself, does not regulate any augmentation of the Network that is required to enable a connection to occur. Specifically, the NER does not require a TNSP to undertake an augmentation to enable a connection (s 5.3.6(k)). Nor does the NER expressly require the generator to fund the augmentation. Any necessary augmentation must be negotiated between the generator and the TNSP under the auspices of the 'catch-all' provision in Schedule 5.6.

Negotiating to augment the Network under this framework could result in either a generator, TNSP, or a third party funding the works. As the NER leave the arrangements to commercial negotiation, it is also possible that these parties could jointly develop a SENE. For example, a State Government could partner with a consortium of Generators and TNSPs to build a SENE.

There is no standard arrangement for augmentation, though TNSPs generally have internal policies (see, for example, AEMO, 2007). Each of the possibilities is briefly outlined below.

5.4.1. Generator pays

In this scenario, the TNSP undertakes the augmentation and the generator provides the funds (a 'funded augmentation' under the NER, ch 10). This is common practice for augmentation. Grid Australia, the representative body of the owners of the Network, states, "[u]nder current arrangements, the cost of any geographical expansion of the network to connect generation is met by the connecting generator" (Grid Australia, 2010). The implicit test for augmentation in this case is essentially whether or not the generator is willing to pay for it (AEMC, 2010c).

Although the generator pays for the physical assets, they are not permitted by the Rules to own or operate them because, as noted previously, a participant in the NEM has to register as a TNSP to own or operate Network assets. It is not practical for a generator to register as a TNSP due to the lengthy and exacting process and commensurate high cost of doing so (AEMO, 2010b). In reality, registration as a TNSP is only practical for the companies that manage large-scale grid infrastructure as their main business: this is true of all companies currently registered as TNSPs in Australia (Alinta Energy, 2011).

Given the foregoing, the norm is for the generator to gift the assets to the TNSP, who then owns and operates them, allowing the generator to connect to the Network. This may seem perverse, but the generator has no other option if they wish to connect to the Network.

5.4.2. TNSP pays

While the general rule is that the generator funds augmentations, if the TNSP considers that it may be beneficial for the network to be augmented beyond the level requested by the generator, it may opt to fund the incremental capacity as a part of the shared network (AEMO, 2007), i.e. the parts of the Network used by all NEM participants according to the charging framework of Chapter 6A of the NER (see 'shared transmission service', NER, ch 10). In such a case, the proposed augmentation must pass the RIT-T (AER, 2010a), which is designed to identify the augmentation option that "maximises the present value of net economic benefit to all those who produce, consume and transport electricity in the market" (NER, s 5.6.5B). The generator still pays for the augmentation works that facilitate its connection, while the TNSP pays for the additional capacity.

5.4.3. Contestable services

The third scenario is contestability. The Rules define this as "a service which is permitted by the laws of the relevant participating jurisdiction to be provided by more than one Transmission Network Service Provider as a contestable service or on a competitive basis" ('contestable service, NER, ch 10). TNSPs and third parties can submit tenders to build Network augmentations and other infrastructure.

While this is an exception to the general practice and does not warrant a detailed discussion here, it is worth briefly noting that Victoria has permitted this process and has invited tenders to connect a wind farm to the 500 kV Moorabool—Heywood transmission line (see National Electricity (Victoria) Act, 2005 (Vic), div 10; NER, ch 8, pt H, NER; Essential Services Commission, 2003; AEMO, 2011c).

6. Problems with the current framework

A number of issues with the current framework prevent it from facilitating the efficient connection of multiple renewable energy generators to the Network over time. These will be discussed presently.

6.1. Lack of incentives for generators to construct SENEs

There is no incentive under the current framework for a generator to augment the Network beyond their own needs in anticipation of other generators seeking to connect in close proximity over time, even where this would result in lower costs to the system overall.

Firstly, the generator must have sufficient funds to construct an augmentation with additional capacity, which, particularly in the case of smaller generators, may alone be an impassable barrier to investment in additional capacity.

Secondly, the anticipated future generation and resultant connections to the Network via the augmentation may not materialize, leaving the generator with costly unused capacity (asset stranding). Grid Australia has called this an "insurmountable hurdle" (Grid Australia, 2010).

Thirdly, a generator may not, perhaps understandably, wish to facilitate the connection of a competitor, and, finally, a generator may be uncomfortable with investing a large sum in assets which they cannot own or control because it is unclear how the costs of building the augmentation might be recouped from subsequent generators, given that it does not own the assets (AEMC, 2010c).

6.2. Ownership rights and recouping costs from subsequent generators

The NER do not provide for economic regulation of generator-funded assets, so there is significant uncertainty as to whether, and how, a generator is able to recoup the costs of building additional Network capacity (AEMC, 2010c). The generator could attempt to negotiate an agreement with the TNSP that the TNSP will seek a proportion of the costs of the augmentation on behalf of the funding generator from any subsequent generator. However, the TNSP, which now owns the assets, has little incentive to negotiate with a subsequent generator, so long as its own costs are covered. At best the original generator/funder might hope to extract a 'reasonable endeavors' obligation from the TNSP, but this is unlikely to instill confidence in a generator that has spent millions of dollars on an augmentation much larger than it needs for its own connection.

This risk of non- or under-recovery of costs is a strong deterrent to building an efficiently sized augmentation and ensures that generators will only build the capacity that they need. When numerous generators develop resources in close proximity, this is likely to result in the inefficient duplication of infrastructure (MCE, 2010).

6.3. Incentives for TNSPs to construct SENEs

Concurrently, there is also little incentive for the TNSP to opt to bear the costs of an incremental augmentation in addition to a generator's requirements. As with generators, TNSPs are concerned about the risk of asset stranding. Without a high degree of certainty that generators will connect via the SENE, TNSPs are unlikely to invest in such costly infrastructure. Without rules in place that ensure cost recovery, a TNSP gains no benefit from building an under-utilized augmentation, but takes on significant risk by doing so.

6.4. Coordination of generators wishing to augment the network

The current framework is also ill suited to coordinating the connection of numerous generators. Grid Australia has "experienced the reluctance of individual [generators] to tie their project delivery to the timelines of third parties" (Grid Australia, 2010), while the AEMC notes that generators can be cautious about providing TNSPs with commercially sensitive information about their intentions (AEMC, 2010c). This means that a generator or TNSP considering building a SENE can find it difficult to gather sufficiently detailed and definite information to justify the cost and risk involved.

Some improvements have been made in this regard by a recent rule change that loosened restrictions on NSPs from releasing information received as part of a connection inquiry or application, allowing NSPs to confidentially share information between applicants for connection in proximate locations (National Electricity Amendment (Confidentiality Provisions for Network Connections), Rule 2009).

However, even with improved information sharing, the current system will still struggle to coordinate connections, because generators may not wish to share information about their intentions with competitors. In any case, it is unlikely that all generators wishing to connect in an area will be ready to do so at the same time, and are unlikely to allow their timetable to be dictated by third parties.

6.5. Increased cost to customers

The inability of the current framework to incentivize and coordinate SENEs is likely to increase costs to end consumers through the inefficient duplication of assets and the pass-through cost from generators burdened by stranded assets. The MCE notes that the cost impact on customers from such inefficiencies may be large, given the efficiencies that could be gained by better coordinating augmentation and connection (MCE, 2010).

7. The SENEs rule process

The process for promulgating a SENEs rule in Australia began in August 2008, with the MCE requesting that the AEMC investigate the effects of the RET and the proposed Carbon Pollution Reduction Scheme, a cap-and-trade system that was ultimately not adopted,[5] on the frameworks for energy market regulation. The AEMC published the REMF, which included a SENEs rule proposal, in September 2009. The MCE then asked the AEMC to progress the proposal. The AEMC produced a Consultation Paper in April 2010, an Options Paper in September 2010, a Draft Rule in March 2011 and, finally, the SENEs Rule, which took effect on 1 July 2011. Throughout the rule change process, the AEMC consulted with stakeholders, whose submissions and contributions are useful sources of information and indicators of industry support for different proposals.

7.1. Review of Energy Market Frameworks

As part of the REMF, the AEMC identified the need for SENEs in light of a projected increase in renewable generation, and set out a proposal for a SENEs rule (AEMC, 2009) (REMF Proposal).

The REMF Proposal sought to encourage construction of new transmission infrastructure based on predicted renewable energy generation in a given location. Under the REMF proposal, generators would be charged for the use of the infrastructure based on how much electricity they transmit through the connection. Customers would underwrite the cost of the asset until the forecasted generation materializes.

The basic framework is that the AEMC would identify possible areas for future growth as part of the NTNDP, and NSPs would

[5] The Clean Energy Future Package, discussed below, was subsequently passed.

formulate indicative plans for potential connection options in those areas. Following connection applications by generators, a detailed planning process would be conducted by NSPs, identifying and consulting on the optimum size of the augmentation based on forecasted renewable energy generation in the area, which would be independently verified by the AEMC.

The SENE would then be constructed and generators connecting to the Network via the SENE would pay for their usage. If generation does not materialize or is lower than predicted, customers pay for the shortfall, but customers would benefit from the savings made if generation connects early. As long as generation connects as expected, customers would effectively be paid back over the life of the asset (MCE, 2010).

The AEMC noted that at this stage stakeholders generally felt that changes to the NER were warranted by the challenges the electricity system faces, and that the 'high level policy' was "generally considered appropriate" (AEMC, 2010c).

7.2. MCE rule change request

The MCE then signified its intention to formally request a rule change (MCE, 2009), which it subsequently did in February 2010 (MCE, 2010). The request sets the REMF proposal as the starting point for the rule change, along with some specific additional elements outlined in its response to the REMF which are set out below.

The MCEs first concern was that shared network assets are subject to the RIT-T test, which ensures that any proposed augmentation will deliver benefits to customers, but SENEs would not be part of the shared network and therefore not subject to the same level of economic regulation. Generators and NSPs could propose unrealistically large augmentations, as no test for efficiency must be passed. This would place a high risk of stranded assets on customers. The MCE requested that a SENEs rule would provide generators and NSPs with an incentive to develop accurately sized proposals.

The MCE agreed with the AEMC that the AER should be given powers to veto a SENE proposal where it considers that it will not deliver efficient outcomes based on customer needs. In support of these powers, the MCE requested that a SENEs rule must require the AER to engage with those affected by a SENE proposal to ensure that it possesses all relevant information regarding the risks that consumers would assume under a SENE proposal and provide a mechanism for these risks to be communicated.

7.3. The consultation paper

The AEMC's initial consultation paper delivered a more detailed version of the REMF proposal. In contrast to the initial support for the REMF proposal, the AEMC found that support was now "tempered by the complex nature of the proposed Rule" (AEMC, 2011). The initial submissions made to the AEMC's consultation set the tone for the entire rule change process, with the key themes that have prevailed throughout the process emerging at this stage. Opponents of the rule change questioned the need for a new rule and expressed concerned at placing risk on customers. Proponents of the rule however maintained that SENEs would not be built in the absence of such a rule.

7.4. The Options Paper

The Options Paper suggested five options for a SENEs rule, all broadly based on the original REMF proposal that the MCE requested be used as the initial model.

The first two options most closely resemble the REMF proposal, in that they involve the AEMO identifying renewable energy zones and NSPs providing augmentation options for those zones. Generators would pay a proportional average cost, with customers underwriting the risk of asset stranding. These options are differentiated by their access arrangements.

The remaining three options have elements in common with the current framework in that a generator connection inquiry triggers the augmentation process, however, under these options, the SENE would be classified as a part of the shared network, rather than a non-regulated service (as funded augmentations are at present). This would mean that access to the SENE would be regulated as it is for the rest of the network under the NER (ch 5).

In options 3 and 4 the first generator pays the standalone cost and the RIT-T is applied to incremental capacity. Customers underwrite the asset stranding risk for the additional capacity. These two options differ in how these charges are reduced over time: in option 3 the charges to the generator decrease as more generators connect, whereas in option 4 both the cost to generators and the cost to customers decrease (see AEMC (2010c) for a useful graphical representation of these charging structures).

Option 5 would have introduced a new classification for SENEs in the NER, whereby generators would be charged their proportional average cost and the RIT-T would be applied to the whole proposal.

In all 5 proposals the AER would have certain powers of regulatory oversight. In options 1 and 2 the AER would have a veto power while in options 3–5, where the process is generator-initiated, the AER would review the applications. In all options the AEMO would review generation forecasts, providing a second layer of oversight.

There was a strong and varied response to the Options Paper. Opinions again differed as to which of the options achieved the best balance between capacity and asset stranding, and whether risk should be borne by generators or customers (AEMC, 2011).[6]

7.5. Summary of stakeholders

Before considering the Draft Rule, it is apposite to summarize the response of the numerous stakeholders to the Options Paper proposals. This illustrates the difficulties the AEMC faced in meeting the needs of all stakeholders and also partly explains why the Draft and Final Rules deviated from the proposals of the Options Paper. The following table summarizes the stakeholders, their role in the NEM and their concerns. Those stakeholders with strong opinions regarding the SENEs proposal are categorized as either for or against the proposals, while those holding other concerns and not expressing a strong sentiment either way are categorized separately. Each generator did not necessarily express the concerns noted below, but represent a cross-section of concerns from each group of stakeholders (Table 1).

The table above sheds light on the possible motivations of the stakeholders. While all stakeholders made objective arguments to justify their position, some clear trends emerge. Those stakeholders that were against the SENEs options included companies that benefit under the current arrangements, such as large coal generators, retailers (because the proposed options would place more risks on their customers) and large energy users that benefit most from cheap electricity and would face a higher proportion of the risk to consumers under the proposed options.

On the other hand, those in favor of the rule included generators that focus mainly on renewables and renewable energy organizations seeking to encourage the utilization of renewable energy.

[6] AEMC, 'National Electricity Amendment (Scale Efficient Network Extensions) Rule 2011' (Draft Rule Determination, 10 March 2011) iv.

Table 1

Stakeholder	Type of stakeholder	Notes	Concerns regarding SENEs options
Against the Options Paper proposals			
AGL Energy	Retailer Interests in generation	Australia's largest retailer Interests primarily in gas and renewables	• No market failure identified • Customers should not be made to bear risks that they cannot manage • Only market-based solutions are acceptable: SENEs introduces an unacceptable element of central planning • The economies of scale available are overstated • SENEs proposal too complex
Alinta Energy	Generator Retailer	Predominantly gas and coal	
Energy Australia	Retailer		
International Power	Generator	Australia's largest private generator Coal	
Loy Yang Marketing Management Company	Generator	Owns and operates the 2200 MW Loy Yang power station and adjacent coal mine Burns 60,000 t of brown coal per day	
Macquarie Generation	Generator	Government-owned Predominantly coal	
Major Energy Users Inc.	Representative body	Comprises 20 major energy using companies	
Nyrstar	Consumer	World's largest zinc metal producer and one of the world's largest primary lead smelting and refining companies	
In favor of the Options Paper proposals			
Citipower	DNSP		• Current framework does not allow for cost recovery on investment • Risk of asset stranding has been overstated • NEO should be changed to allow for broader social and environmental concerns
Clean Energy Council	Representative body		
Geodynamics	Generator	Geothermal Seeking to develop remote geothermal resources	
Government of South Australia	State Government		
Green Grid Forum (GGF)	Consortium	Green Grid is an initiative commissioned by RenewablesSA to unlock investment in renewables in South Australia GGF comprises 4 NEM participants and the Government of South Australia	
Infigen Energy	Generator	Has interests in 24 wind farms	
Origin Energy	Generator	Largest owner and developer of gas-fired power generation in Australia.	
	Retailer	Owns 1 wind farm and is seeking to develop its renewables portfolio.	
Pacific Hydro	Generator	Predominantly hydro and wind. Seeking to develop further hydro, wind, solar and geothermal power projects.	
TRUenergy	Retailer		
Vestas	Wind turbine manufacturer	Largest manufacturer of wind turbines in the world	
Undecided or neutral			
Energy Networks Association	Representative body	Represents DNSPs	These stakeholders did not express a strong opinion on the necessity of SENEs, but instead expressed a range of concerns regarding specific elements of the proposals or relating to the evidence presented to justify SENEs or particular options.
Energex	Retailer	Government-owned	
Ergon	Retailer DNSP		
ESAA	Representative body	Represents retailers	
Grid Australia	Representative body	Represents TNSPs	
Hydro Tasmania	Generator	Hydro and wind	
Integral Energy	Retailer DNSP		
National Generators Forum	Representative body	Represents generators Members comprise 60% of Australia's installed generation capacity	
SP Ausnet	TNSP		
United Energy Distribution	DNSP		

The middle category, undecided or neutral stakeholders, includes a diverse range of interests and concerns. For example, the National Generators Forum (NGF) was not yet convinced that SENEs were required, but also nominated its preferred option. The NGF thought that the problems with the electricity framework were much broader than covered by the SENEs proposal and that the necessary investment would not take place under this rule change alone. On the other hand, the Energy Networks Association did not doubt that there was a market failure, but simply argued that more work needed to be done to identify options that were less complex and could be implemented by amending existing frameworks.

7.6. The Draft Rule

Following the Options Paper, the AEMC devised a new proposal (AEMC, 2011) that attempted to navigate the concerns of all stakeholders. The Draft Rule was a significant departure from all other options considered. In contrast to the relative complexity of the other proposals, the Draft Rule simply provided for a person to request that a TNSP undertake a study for a SENE. The TNSP would then undertake and publish a study to consider the options for a SENE in that area, funded by the interested person(s). Following the study, the negotiation and construction of the augmentation would be regulated by the existing framework detailed above.

8. The Final Rule

The AEMC ultimately decided to adopt the Draft Rule as the Final Rule. Before assessing the Final Rule, it is worth noting that it is, despite representing a considerably scaled-back framework, just as divisive as the previous proposals. A cursory glance at the 21 submissions to the AEMC shows that 11 were against the rule,[7] 5 were in favor,[8] and 3 were for it in principle, but held some reservations.[9] Two submissions continued to doubt the need for the rule at all.[10] This suggests stakeholders were not in agreement and, more specifically, were generally not in favor of the Final Rule.

The AEMC noted that many submissions suggested that the AEMC should not promulgate the Draft Rule and should consult with the MCE, informing it of the difficulties experienced in navigating the numerous considerations, and seek further guidance on how to proceed (AEMC, 2011). At the very least the AEMC could have extended the time period for the process, either by announcing another extension of the current process (NEL, s 107), or by incorporating SENEs into the more general transmission frameworks review that is currently in progress (AEMC, 2010b).

The AEMC did not, however, conduct further investigations, but instead adopted the Draft Rule as the Final Rule.

8.1. The AEMC's reasoning

The AEMC has stated three core reasons for promulgating the Final Rule rather than one of the more comprehensive options originally under consideration.

Overall, the AEMC decided that its rule would better contribute to meeting the NEO than the original options (AEMC, 2011b). In making this conclusion, the AEMC relied upon three main lines of argument which had been put forward throughout the process by opponents of the rule. In the AEMC's opinion, the Final Rule:

- more efficiently allocates the asset stranding risk to those best able and willing to manage that risk, i.e. from customers to investors;
- is less complex than the arrangements initially proposed; and
- maintains a market based approach, thereby promoting competition in funding and avoiding potentially superfluous work being undertaken by the AEMO and TNSPs.

[7] Brookfield Infrastructure Group; Clean Energy Council; Conservation Council of South Australia; Government of SA; Infigen Energy; International Power; Origin Energy; Pacific Hydro; Renewables SA; TRUenergy; Vestas.

[8] AGL; Ausgrid; AER; Grid Australia; Nyrstar.

[9] AEMO; National Generators Forum; Private Individual.

[10] Alinta Energy; Major Energy Users.

8.2. A change of direction

The Final Rule is quite different from that envisaged by the MCE, which requested that a rule for SENEs be modeled on the widely approved proposal in the REMF, with some changes. The Clean Energy Council (CEC) stated that it is "inappropriate for the AEMC to have made this decision without reference to the MCE" (CEC, 2011). Law firm Allens Arthur Robinson described it as "considerably more conservative" than the previously considered options (Collyer and Green, 2011), while Origin Energy stated in its submission that the Draft Rule "essentially upholds the status quo" (Origin Energy, 2011) and makes little change to the substantive framework.

The AEMC rightly notes that it is empowered by section 91A of the NEL to make a rule that is different from a proposed rule (AEMC, 2011). Nonetheless, given stakeholder concern that the Draft Rule was inadequate, it would have been advisable for the AEMC to seek further guidance, particularly given that the rule change was proposed by the MCE, the body in charge of steering the policy of the NEM.

8.3. Does the Final Rule cure the defects of the current framework?

Regardless of the divided opinion of stakeholders, the most important question to ask is whether this rule change actually cures the defects in the present framework and whether it is likely to increase investment in the transmission infrastructure needed to connect greater levels of renewable generation.

8.3.1. Does the Final Rule provide an incentive for generators to construct SENEs?

The Final Rule provides little certainty for investment beyond that already provided by the NER. The decision of the AEMC to allocate risk and cost to generators or investors, rather than consumers as the MCE had envisaged, means that the high costs of augmentation will continue to act as a deterrent to investment.

The Final Rule does not change the underlying reason for under-investment: a generator that can afford to build a dedicated augmentation for their project is highly unlikely to risk significant additional capital by building a larger connection (which would help their competitors if successful, and cost them if not).

The Final Rule seems to assume that a study alone will guarantee investment and coordination of connections. Australia's largest owner of wind farms states that "this is a heroic assumption" and that the most likely outcome of the Final Rule is that no SENEs will be constructed (Infigen, 2011).

8.3.2. Does the Final Rule enable the first mover to recoup their costs?

The position of a party that constructs a SENE, as against another party that subsequently connects to the Network via that SENE, is unaffected by the Final Rule. Negotiations for connection of the third party to the Network via the privately constructed SENE will continue to take place under the existing framework, which does not cover this situation (AEMC, 2011).

The AEMO, in its submission on the Draft Rule, stated that investments in SENEs are unlikely "unless a potential investor has reasonable certainty that it has a transport right to offer to a connecting generator" (AEMO, 2011). The NGF, representing 95% of the sales of electricity to the NEM, stated that the lack of control over the SENE, and the need to become a TNSP in order to gain control over it, means that generators are unlikely to build SENEs (NGF, 2011).

8.3.3. Will the Final Rule improve the coordination of connections?

There is some potential for the Final Rule to increase the chances of numerous generators coordinating their connections and building the SENE together, as a study of an area may provide some certainty as to the likelihood of future demand for use of the proposed SENE.

However, the study only provides more information for generators which, while somewhat helpful in itself, will not solve the problems noted previously, including generators not wishing to tie their schedule to others' projects or help a competitor.

Origin Energy notes that the reality is that "potential generators are unlikely to be in a position to achieve simultaneous financial close, let alone come to a decision on the required transmission infrastructure" (Origin Energy, 2011). Thus it seems that, without some provision for future connection of generators, a SENE is unlikely to be built.

8.3.4. Does the Final Rule provide an incentive for TNSPs to construct SENEs?

The Final Rule makes no significant change to the position of a TNSP under the current framework. As with generators, the TNSP will possibly have better information upon which to base their investment decisions, however, the Final Rule will not remove all barriers to information sharing and cooperation that currently exist. Further, a TNSP is guaranteed a return on investment in regulated assets under Chapter 6A of the NER and so is unlikely to risk its capital on an unregulated asset with no such guarantee.

8.3.5. Will the Final Rule reduce costs to consumers?

It is unlikely that SENEs will be progressed by this rule, given that it does not remove the barriers that exist in the current framework or incentivize generators or TNSPs. It is probable that generators will continue to build only sufficient infrastructure to connect their projects to the Network, at a significant cost overall, compared to the cost resulting from an augmentation shared between two or more generators. This additional cost caused by the loss of economies of scale will be passed on to consumers, who will ultimately pay more for their electricity as Australia transitions to renewables.

8.4. Addressing the arguments made in favor of the final rule

8.4.1. Removes burden of risk from customers

A common theme throughout the process was whether it is acceptable to require customers to bear the risk of asset stranding through an increase in charges. Proponents of the Final Rule state that consumers should not be required to underwrite SENEs as they do not receive any share of the profits, should they materialize: the common refrain has been that a rule should not "privatise profits and socialise losses" (AGL, 2011). To be sure, there is an argument that risk should be placed on those best placed to manage it, and this is not the customer.

However, the MCE request specifically recognized that customers could expect to benefit from SENEs, due to less infrastructure duplication, the lower cost of meeting the RET, and the increase in renewable energy generation into the future (MCE, 2010). Customers would also benefit from the broader social good of increased renewable energy generation and lower emissions. In addition, the cost of asset stranding could be very damaging to a generator, but the individual impact is lessened when it is dispersed between numerous customers.

The MCE made it very clear that some risk to customers is necessary and acceptable. In their rule change request they stated that "[c]ustomers will be exposed to some of the costs of the SENE if generators arrive late or do not materialise, but will receive payments if generators arrive early or in excess of forecasts… customers will initially fund some spare capacity but will be repaid over time" (MCE, 2010). As the CEC suggests, if the AEMC was concerned about this issue, further guidance should have been sought.

Finally, the fact that customers would be protected somewhat by the regulatory oversight of the AER and the AEMO under the previous options has been overlooked in the submissions. Thus, while the burden of the risk would have been placed upon customers, they would have had the benefit of regulatory protection; generators will not have this protection under the Final Rule if they choose to underwrite the risk of stranded assets.

8.4.2. Removes complexity

While it is undoubtedly true that the Final Rule is less complex than even the earliest SENEs proposal in the REMF, it also does not serve its purpose. Although a number of stakeholders seem to suggest that the complexity of a rule is alone enough to abandon it, a rule that successfully balances all interests will very likely be complex. This is no reason to not attempt to balance these interests at all.

The AEMC itself warned against making piecemeal changes to the NER (AEMC, 2011), yet the Final Rule itself is a perfect example of piecemeal change. Finally, the MCE did not feel it necessary to even consider the issue of complexity (MCE, 2010), instead choosing to focus on the substantive issues, yet the AEMC has attached great significance to the issue, considering it at length (AEMC, 2011).

8.4.3. Market based approach

The third reason given by the AEMC for the Final Rule, as outlined above, is that a market based approach is preferable. This sentiment pervades NEM rule and policy making, and policy making in Australia more generally (see Pusey, 1991; Quiggin, 1997; Edwards, 2007). This rule change process is a perfect example of the difficulties of integrating non-economic considerations into an economic rationalist[11] framework.

Adherence to an economic rationalist approach has long been seen as problematic by many participants in the NEM, particularly in relation to the NEO, which does not include any objective relating to social or environmental considerations. This is discussed further below.

8.5. The Final Rule: hard cases make bad law

In relation to the courts, it is often said that 'hard cases make bad law'. This well-worn aphorism appears to hold true for the incorporation of SENEs into the NER. The issue is a difficult one, with numerous interests, opportunities and risks to be identified, considered and balanced.

A process that started out with a clear mandate and a broad consensus has culminated in a rule that has strayed from its mandate and maintained a divided opinion amongst stakeholders. It is true that the AEMC initially met with broad support that later dissipated in light of the difficulty of pinning down the finer details. Yet these complexities cannot be side-stepped if Australia is going to bring more renewable energy generation into its energy mix and reduce its reliance on carbon-intensive electricity generation.

It is submitted that upon receiving such a mixed reaction to the drastic change in direction introduced by the Draft Rule, the AEMC should have sought further guidance, delayed the process, or considered different options that could have better negotiated

[11] Termed 'economic liberalism' or 'neoliberalism' in other jurisdictions.

the concerns of stakeholders and addressed the issues with current framework. Yet while the AEMC acknowledged the difficulties in balancing all stakeholder interests throughout the consultation process, it ultimately decided to implement a divisive rule that did not receive majority support and does not appear to solve the targeted problem.

Preferably, the discussion should have returned to the REMF proposal, which was generally recognized as being sound in principle by: the AEMC in the REMF; the MCE in their original rule change request; and the majority of stakeholders who were either in favor of the proposal or only had specific concerns with certain elements of the options proposed.

The AEMC should have reconsidered all options, acknowledging that some risk to consumers is necessary to break the deadlock over who should invest in SENEs and to ensure that transmission capacity is built in a timely and efficient manner.[12] The AEMC should have acknowledged that no rule will ever gain the support of all stakeholders, but that the benchmark for whether a rule is appropriate is whether it fixes the issue at hand and meets the NEO.

9. Alternative options

This section of the paper suggests alternatives to the Final Rule adopted by the AEMC.

Rules to facilitate network augmentation can be separated into two categories (Hogan et al., 2010; Rosellón and Weigt, 2010; Hope, 2011). The first is the 'Merchant Approach'. This is where a TNSP is allocated long-term transmission rights over the SENE. The second is termed the 'Incentive Regulation Approach', whereby incentives are provided through the regulatory system for a TNSP to augment the network expansion by making it face "the entire social costs of network constraints and congestion" (Hope, 2011).

Hope notes that, in general, the US has preferred to utilize the Merchant Approach, while Europe has tended towards the Incentive Regulation Approach.

9.1. International examples

While a detailed overview of similar rule change processes and policies from other jurisdiction would be of interest, this is beyond the scope of this paper. Nonetheless, two examples of regulatory options, one from each of the categories above, are outlined below as an illustration of alternative options.

9.1.1. Texas Competitive Renewable Energy Zones

The Competitive Renewable Energy Zones (CREZ) scheme implemented in Texas is an example of the Merchant Approach and is somewhat similar to the original SENEs proposals in Australia. The CREZ scheme also narrowly targets the specific problem of immature transmission infrastructure in high wind energy zones.

The Texas Legislature passed Senate Bill 7 in 1999, which enabled it to establish a renewable electricity target. This target was initially set at 2000 MW of capacity by 2009, which was subsequently increased to nearly 6000 MW by 2015 by Senate Bill 20 (SB20) in 2005.

SB20 also established the CREZ scheme. Under CREZ, the Electric Reliability Council of Texas (ERCOT), the operator of the electricity transmission network, was designated to collect wind data and identify suitable CREZs based on transmission cost calculations for each zone. In 2006 ERCOT published a comprehensive report for this purpose (ERCOT, 2006). The Texas Public Utilities Commission (PUC), Texas' regulator, is empowered by SB20 to: designate CREZs; develop a transmission plan; and formally order TNSPs to construct new transmission lines. The PUC evaluated the potential of 25 areas in the state, and designated eight areas as CREZs. The PUC made its decision in early 2009 (PUC, 2009) as to which entities will build which transmission facilities.

The CREZ scheme is interesting in that it is a highly prescriptive, top-down approach, somewhat unusual in the context of liberalized energy markets. However, as the AEMC's failure to implement an adequate rule shows, a break from the traditional modes of regulation may be necessary to ensure that the 'chicken and egg' problem of not having sufficient transmission capacity to develop renewable resources does not hinder the transition to renewables.

9.1.2. United Kingdom TNSP regulation

The UK's regulator, the Office of the Gas and Electricity Markets (Ofgem), has recently completed a review of the economic regulation of TNSPs. The UK has decided to take a broader approach to the challenges facing electricity networks by completely overhauling the way it regulates transmission companies. This reform is much wider than the specific rule changes proposed in Australia and Texas' CREZ system because it does not aim to fix a specific problem, but instead aims to make the entire regulatory framework more porous to environmental goals.

Ofgem will build on the traditional method of regulation, whereby TNSPs are permitted to make a profit that is in line with the Retail Price Index[13] plus a payment for any efficiency savings, the so-called 'x-factor' (RPI-X). The UK will adopt what Ofgem terms the RIIO model for network regulation: Revenue = Incentives + Innovation + Outputs. In short, the RIIO model for regulation intends to reframe the role of TNSPSs, transitioning them away from passivity and encouraging them to "step up and meet the challenges of delivering a low-carbon, sustainable energy sector" (Nixon, 2010). RIIO aims to "put sustainability alongside consumers at the heart of what network companies do" (Nixon, 2010).

RIIO includes rewards for TNSPs that innovate, incentives to encourage long term planning and efficiency, longer price control periods and a fund for innovation (Ofgem, 2010).

Such overarching changes to electricity regulatory frameworks are encouraging as they have the potential to cause a paradigm shift in the mindset of TNSPs, regulators and rule makers. However, it seems that any such broad changes are not likely to be considered in Australia in the near future. While the AEMC recently considered Total Factor Productivity regulation and is currently considering tightening the rules regarding the economic regulation of TNSPs, far reaching reforms like those taking place in the UK have not yet been discussed.

Despite such changes being unlikely in Australia, there is much to commend to this approach. Most importantly, the RIIO model bypasses the sort of 'piecemeal' rulemaking that the AEMC is keen to avoid and reconfigures the entire system towards better meeting environmental goals while also serving the economic interests of customers.

The implementation and operation of the RIIO model is of great interest and warrants further monitoring, analysis and discussion as it progresses. In particular, it will be interesting to see whether the

[12] These risks to consumers should be offset by complementary measures, discussed below in the 'lesson learned' section.

[13] In other jurisdictions this is called the Consumer Price Index (CPI).

RIIO model of network regulation will result in more efficient connection of clusters of generation in high renewable energy resource areas, or whether the innovation that RIIO spurs is in other areas, such as smart grids and demand side participation (DSP).

9.2. A preferable option for the NEM: ownership rights

Granting ownership rights over SENEs would be the best option for the NEM. The main problem with the current regulatory framework is that, while the framework for economic regulation of TNSPs has generally ensured investment in traditional infrastructure expansion in Australia, there is no certainty for a developer of a SENE that they will recoup their investment.

Ownership of the augmentation was identified as an issue by both those in favor and those against the Final Rule. While this paper is broadly critical of the economic rationalist approach and the deference of the AEMC to economic efficiency, it is submitted that taking the Merchant Approach would encourage investment without regulatory intervention, thus striking a balance between the economic rationalist mindset of the NEM and the need to spur investment in infrastructure that will support renewable energy generation. This approach would come with no additional risk to consumers and would remove the problem of coordination, as a funding generator would not need to coordinate with, or be tied to, others' schedules. Furthermore, this reform would not drastically increase the complexity of the framework, a key concern of the AEMC and some stakeholders.

The AEMC still has the option of considering a rule change that would allocate property rights to the funder of a SENE, and this should be given further consideration. As any party can propose a rule change, stakeholders that advocated this approach would be well advised to make their case to the AEMC in the form of a formal rule proposal.

9.3. Reform of the National Electricity Objective (NEO)

It has been argued above that the Final Rule does not accord with economic efficiency as it will not increase the timely building of efficiently sized and located infrastructure, and this will cost consumers in the long term. However, regardless of whether the Final Rule would be likely to increase economic efficiency, it is submitted that the range of considerations should not be so narrow.

The NEO is the guiding principle of the NEM: all NEM rules must be made in accordance with the NEO (NEL, s.32). The NEO, as it currently stands, is to ensure (NEL, s.7):

> *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.*

Although precursors to the NEO included consideration of the environment (NGMC, 1992; COAG, 2001; MCE, 2001), the existing NEO does not explicitly include any such reference. This appears to have been an unfortunate oversight: the Australian Energy Market Agreement (2004)[14] mentioned environmental concerns, but did not allocate this responsibility to any of the NEM's governing bodies. The current NEO was passed in 2005[15] without an environmental component.

A broader recommendation to improve Australia's electricity frameworks would therefore be to reconsider the NEO. The NEO does not allow the consideration of anything other than efficiency in the interest of the customer in the rule making process (NEL, s 88(1)). Arguably this makes the scope of NER reform very limited because policies that are important for environmental, social, or energy security reasons, or any other reason, cannot be articulated in furtherance of the rule making process.

This is problematic in the current context, because SENEs have the potential to deliver much wider benefits that efficiency alone. For example, SENEs would enable large-scale Concentrating Solar Power plants to be connected in remote areas where space is not at a premium. Likewise, the building of wind farms far from densely inhabited areas could reduce the opposition to 'blight' experienced in less remote areas. Many stakeholders have, rather short-sightedly, focused only on the ability of the NEM to meet the RET, but looking beyond the RET to the future of renewable energy generation reveals further possible benefits of SENEs. For example, SENEs could also facilitate the connection of geothermal energy sources, which have the potential to provide baseload renewable energy generation capacity. Under the current NEO, these benefits are not legitimate considerations for the AEMC when assessing a rule change proposal.

The staunchly economic rationalist objective of the NEM has long been a concern for consumer and environmental groups, which have consistently argued that the "long term interests of consumers" contemplated by the NEO go beyond simple economic efficiency and that these broader interests should be reflected in the regulatory framework. For example, in 2007 a large coalition of consumer and environmental organizations called for the NEO to contain environmental and social objectives (TEC et al., 2007).

Such a change would fundamentally realign the NEM. In a market driven by an economic rationalist mindset, such reform would undoubtedly be a great political challenge. Nonetheless, the process for considering changes to the Rules, such as the proposal for a comprehensive SENEs rule, would be more holistic if considerations other than economic efficiency could be taken into account.

Reconsidering the NEO in detail is both beyond the ambit of the AEMC and the scope of this paper. However, it is an important area for discussion that should be a focus of future efforts to better harmonize the NEM with broader social and environmental policy considerations.

Indeed, environmental objectives feature in policy statements similar to Australia's NEO in other OECD countries, such as the UK (DECC, 2010), the US (FERC 2011) and Canada (NEB, 2011).

10. Lessons learned

A number of important lessons can be learned from Australia's attempt to implement a rule to more efficiently manage and size network extensions to accommodate clustered renewable energy generation.

Firstly, the SENEs rule process is a classic example of the difficulties in striking a balance between market forces and regulation in liberalized electricity systems. A common theme in submissions and in the AEMC's reasoning is that any intervention or centralized planning in a liberalized electricity market is a step back from years of progress toward complete deregulation and deference to market

[14] An agreement between the States involved in the NEM regarding the structure of the NEM.

[15] As an amendment to the National Electricity (South Australia) Act 1996. See 〈http://www.legislation.sa.gov.au/LZ/C/A/NATIONAL%20ELECTRICITY%20(SOUTH%20AUSTRALIA)%20ACT%201996/2007.12.31/1996.44.UN.PDF〉 for the 2005 amended version of the Act.

forces. On the other hand, many have argued that this purely economic rationalist approach is too narrow and excludes legitimate and necessary considerations. In an era of climate change and environmental consciousness, coupled with significant changes to law and policy in other areas, the focus of electricity regulation on pure economic efficiency has to be expanded to ensure that it does not inhibit a smooth transition to a decarbonized economy.

A related issue is the difficulty of ensuring rational infrastructure and resource development in a liberalized electricity market. In such markets, various companies and interest groups have diverse goals and drivers and strategic gaming can take place, stunting the efficient growth of the Network that is needed to effectively meet changing patterns of generation investment. While regulation of this development may be seen ideologically as problematic, the SENEs rule change process in Australia suggests that regulatory intervention may be necessary in some cases where an identified market failure is likely to cost consumers in the long-term and inhibit the ability of a state to meet its environmental aims and obligations.

Secondly, the experience with SENEs in Australia suggests that implementing such rules is unlikely to be an easy process and that regulators and rule makers should not shy away from this complexity, but embrace it as an inevitable and necessary part of the process for creating effective rules. Ultimately the AEMC did shy away from this complexity, resulting in a rule that seems unlikely to solve the problem that it was designed to fix.

Thirdly, the SENEs process highlights the difficulties of deciding where risk should lie. Australia has historically had very low electricity prices that have increased markedly in recent years as a result of increasing infrastructure costs. In this context, it is politically unpopular to suggest that customers should bear the risk of asset stranding in developing renewable energy resources. On the other hand, if some increase is necessary in order to ensure that renewable energy generation is supported, then a holistic approach should be taken to ensure that costs to consumers can be reduced in other ways to offset any new costs.

For example, Australia's NEM has been very poor to date at encouraging DSP.[16] An increase in DSP could help to offset the additional risk borne by consumers for SENEs. Similarly, the broader review of electricity regulation in the UK is an example of how TNSPs can be regulated in such a way as to more actively involve them in innovative network development.

Overall, SENEs are one part of a much larger puzzle. That puzzle is how to transition from large-scale fossil fuel-driven electricity networks to smaller scale base load renewables, distributed generation and increased DSP and energy efficiency. Large-scale renewables are likely to play a significant part in this transition in the near future, and the Australian experience with the SENEs rule change suggests that this transition is likely to be vexed by difficult questions, diverse interest groups and opinions, and a struggle between market-driven liberalization and the need for stronger, environmentally-guided regulation.

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[16] Note that the AEMC is currently undertaking a major review of DSP in the NEM. See AEMC, 'Power of Choice Stage 3 DSP Review' available at http://www.aemc.gov.au/Market-Reviews/Open/Stage-3-Demand-Side-Participation-Review-Facilitating-consumer-choices-and-energy-efficiency.html.

References

AEMC, 2009. Final Report: Review of Energy Market Frameworks in light of Climate Change Policies.
AEMC, 2010a. Consultation Paper: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2010.
AEMC, 2010b. Notice under National Electricity Law.
AEMC, 2010c. Options Paper: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2010.
AEMC, 2011. Draft Rule Determination: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2011.
AEMC, 2011b. Rule Determination: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2011.
AEMO, 2007. Victorian Electricity Transmission Network Connection Augmentation (Guidelines No 2).
AEMO, 2010a. Connecting Generation Clusters to the Victorian Electricity Transmission Network: A Technical Perspective.
AEMO, 2010b. NEM Network Service Provider Registration (Guide, 1 December 2010).
AEMO, 2011. Submission to Draft Rule Determination: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2011, 5 March 2011.
AEMO, 2011c. Upcoming Tender Opportunity to Build Own and Operate a Terminal Station. AEMO 〈http://www.aemo.com.au/corporate/tenders_op.html〉.
AER, 2010a. Final Regulatory Investment Test for Transmission.
AER, 2010b. The State of the Energy Market 2010.
AGL, 2011. Submission to Draft Rule Determination: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2011.
Alinta Energy, 2011. Submission to Draft Rule Determination: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2011.
Australian Energy Market Commission Establishment Act. 2004. (SA).
CEC, 2011. Submission to Draft Rule Determination: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2011.
COAG, 2001. Energy Policy Details (8 June 2001).
Collyer, A., Green, F., 2011. Focus: Not-So-Dramatic SENEs—Draft Rule on Scale Efficient Network Extensions Issued, AAR. 〈http://www.aar.com.au/pubs/cc/foccmay11.htm〉.
DECC, 2010. Electricity Market Reform: Consultation Document. The Stationery Office. December 2010.
Department of Climate Change and Energy Efficiency, 2011. Australian National Greenhouse Gas Accounts: National Greenhouse Gas Inventory Accounting for the Kyoto Target December Quarter 2010.
Edwards, L., 2007. How to Argue with an Economist: Reopening Political Debate in Australia, 2nd ed. Cambridge University Press.
ERCOT, 2006. Analysis of Transmission Alternatives for Competitive Renewable Energy Zones in Texas.
ESAA, 2011. Member Briefing, Sydney, 2 June 2011.
Essential Services Commission, 2003. Issues Paper: Electricity Transmission Augmentation Guidelines: Competition in the Provision of Transmission Augmentation Services.
FERC, 2011. 'About Us' 〈http://www.ferc.gov/about/about.asp〉 (accessed 15 October 2011).
Geoscience Australia and ABARE, 2010. Australian Energy Resource Assessment.
Grid Australia, 2010. Submission to Consultation Paper: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2010.
Hogan, W., Rosellón, J., Vogelsang, I., 2010. Toward a Combined Merchant—Regulatory Mechanism for Electricity Transmission Expansion. DIW Berlin Discussion Paper No. 1025.
Hope, E., 2011. Transmission network investment and regulation. International Energy.
Infigen Energy, 2011. Submission to Draft Rule Determination: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2011.
MCE, 2001. Communiqué (Melbourne, 7 December 2001).
MCE, 2009. Response to Australian Energy Market Commission's Final Report.
MCE, 2010. Rule Change Request from the MCE to the AEMC, 15 February 2010.
MPCCC, 2010. Carbon Price Mechanism.
National Electricity (Victoria) Act 2005 (Vic).
National Electricity Amendment (Confidentiality Provisions for Network Connections) Rule 2009.
National Electricity Rules Version 43 2011.
NEB, 2011. 'Strategic Plan' 〈http://www.neb-one.gc.ca/clf-nsi/rthnb/whwrndrgvrnnc/strtgcpln-eng.html〉 (accessed 15 October 2011).
NERA Economic Consulting, 2010. Case Study of the Network Extension (2010).
NGF, 2011. Submission to Draft Rule Determination: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2011.
NGMC, 1992. National Grid Protocol (First Issue).
Nixon, H., 2010. Its Name is RIIO: A New Model for Regulating Britain's Energy Networks Oxera.
Ofgem., 2010. RIIO — A New Way to Regulate Energy Networks. Factsheet 93. Ofgem. Available at 〈http://www.ofgem.gov.uk/Media/FactSheets/Documents1/re-wiringbritainfs.pdf〉.
Origin Energy, 2011. Submission to Draft Rule Determination: National Electricity Amendment (Scale Efficient Network Extensions) Rule 2011.
PUC, 2009. Order 33672, Commission Staff's Petition for Designation of Competitive Renewable Energy Zones.

Pusey, M., 1991. Economic Rationalism in Canberra: A Nation Building State Changes its Mind. Cambridge University Press.
Quiggin, J., 1997. Economic rationalism. Crossings 2 (1), 3–12.
Renewable Energy (Electricity) Act 2000 (Cth).
Rosellón, J., Weigt, H., 2010. A dynamic incentive mechanism for transmission expansion in electricity networks—theory, modeling and application. The Energy Journal.
TEC, et al., 2007. Power for the People Declaration.