

Group submission to  
**Independent Review into the Future Security of the  
National Electricity Market**  
in relation to the National Electricity Objective  
24 February 2017



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## 1. Introduction and summary

The organisations the logos and names of which appear on the first and last pages of this submission are writing in response to the following invitation in the Independent Review's Preliminary Report:

Some stakeholders have suggested that the NEO be amended to include an environmental or emissions reduction objective. The Panel is interested in views on how that would be achieved, including with respect to the specific (statutory) responsibilities of energy market bodies. Keeping in mind the policy role of the Council, the Panel is also interested in the question of whether the AEMA should be similarly or alternatively amended to guide governments on the integration of energy and emissions reduction policy at a national level.<sup>1</sup>

That invitation came after a group letter was sent to the Review on 2 December 2016 from some of the same organisations, discussing the problems flowing from the lack of an environmental objective in the National Electricity Objective (NEO)<sup>2</sup> and suggesting a suite of possible reforms. This submission is essentially a further elaboration on that letter, and covers the following topics:

- The disconnect between the status quo in the NEM and the Review's recognition of the "energy trilemma" (Section 2).
- A critique of the AEMC's interpretation of the current NEO (Section 3).
- Evidence of the problems caused by the current NEO (or market bodies'<sup>3</sup> interpretations thereof) (Section 4).
- A discussion of whether the NEO needs reinterpretation or reform (Section 5).
- A range of options for reform (Section 6).
- The role of the Australian Energy Market Agreement (AEMA). (Section 7).
- Conclusion and next steps (Section 8).
- A more detailed economic argument for the internalisation of climate change costs and decarbonisation targets (Appendix 1).
- Evidence of the successful integration of decarbonisation or more general sustainability objectives in the energy industry regulatory regimes of other jurisdictions (Appendix 2).

To be clear, we are not suggesting that the regulation of the National Electricity Market (NEM) should include direct responsibility for meeting Australia's national or international decarbonisation targets. We consider it is appropriate for mechanisms such as the Renewable Energy Target (RET) and (in the absence of any current federal government mechanism to meet Australia's Paris Agreement goals) a future market mechanism for emissions reduction to be the main vehicles driving the decarbonisation of the stationary energy sector. However, as the Review's Preliminary Report points out:

For both system security and affordability reasons, it is important that governments ensure energy and emissions reduction policies are integrated. The energy system needs to be able to adapt to changes in technology and in supply and demand that are stimulated by emissions reduction policies. Emissions reduction policies that are aligned with the operation of the electricity system will better support efficient investment decisions by consumers and in generation and network assets.<sup>4</sup>

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<sup>1</sup> Dr Alan Finkel et al, Independent Review into the Future Security of the National Electricity Market Preliminary Report,

<sup>2</sup> In this submission "the NEO" should be taken to refer as well to the very similar national gas and energy retail objectives.

<sup>3</sup> By market bodies we mean the AEMC, AER and AEMO.

<sup>4</sup> Dr Alan Finkel et al, Independent Review into the Future Security of the National Electricity Market Preliminary Report, December 2016, 23.

A key step in achieving this integration is to ensure that the NEO explicitly encompasses the decarbonisation policy objectives set by governments. This will help ensure that the reform processes and decisions by market bodies and, as a consequence the investment decisions by market participants in the NEM, should, at the very least, *consider the impact* of these processes and decisions on progress towards decarbonisation. At present, decarbonisation constitutes an externality that is largely ignored by market bodies and market participants. By requiring or at least encouraging market bodies and participants to consider the decarbonisation impacts of their processes and decisions, we hope that they will, at the very least, *not hinder* progress towards energy sector decarbonisation.

Not only would a reformed NEO (which is shorthand for the variety of options considered herein) assist in the decarbonisation dimension of the energy trilemma; it could do so while positively contributing to security and affordability. Once one accepts the inevitability of decarbonisation, the question becomes how to achieve it while maintaining high levels of reliability and affordability.

On the former (reliability), there have now been a number of studies that show how hydro and bioenergy, energy storage, demand management and even the new generation of solar inverters can not only provide reliably dispatchable power to meet changes in demand but can also contribute the ancillary services (voltage, frequency and power factor control) required for grid stability.

On the latter (affordability), numerous major economic studies of climate change mitigation, such as the 2006 Stern Review, have concluded that the cost is lower the sooner action is taken. The challenge of decarbonisation – and the costs if we fail – extend well beyond the lives of even the long-lived electricity assets. Defining the long-term interest of consumers in terms of asset lives or focusing on bill impacts in the next regulatory cycle or two can result in decisions with higher long term costs and deferral of efficient decarbonisation options.

This submission canvasses a range of options for reform but reaches no definitive conclusion as to best way ahead, and looks forward to the Review Panel's response on this matter. However, we caution that failure to reform the NEO at this critical juncture could hasten the "death spiral" of the NEM, as households and businesses concerned about climate change and the financial risks of inaction seek to reduce their dependence on a grid that remains over three-quarters fossil fuelled. This is likely to leave legacy (mostly low income) consumers left to foot the bill for guaranteed network revenues and the networks themselves underutilised and with potentially stranded assets.

## 2. Context

In view of the Review's recognition that the "heart of its task" is to find solutions to "the so-called energy trilemma" (security, affordability and decarbonisation),<sup>5</sup> it may seem self-evident that a regulatory regime that seeks to balance these three objectives is preferable to one that attempts to reconcile two arms of the trilemma while splitting off the third and considering it as an externality to be dealt with through other public policy levers. The International Energy Agency (IEA) recognised this in 2005:

Reliable and affordable supply of electricity is essential for the competitiveness of global industrial product markets and a necessary ingredient in the daily workings of modern societies. At the same time, environmental impacts of energy usage are one of the most difficult global policy challenges. Reliable access to affordable electricity supply with acceptable environmental impacts is only achieved with comprehensive and carefully balanced policy actions to establish the necessary incentive-based framework.<sup>6</sup>

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<sup>5</sup> *Preliminary Report of the Independent Review into the Future Security of the National Electricity Market*, Commonwealth of Australia, 2016, 10.

<sup>6</sup> OECD/IEA, *Lessons from liberalized energy markets*, 2005, 3.

Unfortunately, Australia's energy markets lack any such balanced regulatory framework. Instead we have a liberalised market operating according to the tenets of competition policy on the one hand, and a fractious and highly politicised climate and environmental policy context implemented through discrete mechanisms such as the RET on the other.

The NEO is Section 7 of the NEL:

The objective of this Law is 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.

The exclusion of social or environmental objectives from the NEO was not inevitable. Some state legislation covering networks not yet in private hands includes environmental objectives,<sup>7</sup> and the First Issue of the National Grid Protocol (1992) had one overarching goal:

To encourage the most efficient, economical and environmentally sound development of the electricity industry consistent with key National and State policies and objectives.<sup>8</sup>

Later, in 2001, the Council of Australian Governments agreed on a number of national energy policy objectives, including:

Mitigating local and global environmental impacts, notably greenhouse impacts, of energy production, transformation, supply and use.<sup>9</sup>

The case for the excision of the environment was not publicly made. One commentator called this change a "somewhat remarkable legislative turn of events".<sup>10</sup> The 2004 *Australian Energy Market Agreement*<sup>11</sup> continued to include environmental concerns, but failed to allocate responsibility to any of the NEM's governing bodies.

In recent years there have been repeated calls for better integration of climate policy with energy market regulation. One of the recommendations of the 2012 Senate Select Committee on Electricity Pricing was for the AEMC to "consider how broader environmental considerations could better align with the operation and regulation of the NEM." The need to better integrate energy and climate policy has also been a feature of recent COAG Energy Council (EC) communiqués, although this has not yet led to any specific recommendations for reform.<sup>12</sup>

Other groups frustrated with the high emissions intensity of the national market and the slow pace of change have called for the inclusion of an environmental objective in the NEO. It is a feature of the Australian Greens' climate policy platform. GetUp! and Solar Citizens' 2016 Homegrown Power Plan calls for the NEO to be reworded as follows: "Deliver an affordable, efficient, reliable, safe and fair electricity system that is powered by 100% renewable energy."<sup>13</sup> More recently, a group of

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<sup>7</sup> The *State Owned Corporations Act 1989* (NSW), for example, has a section entitled *Principal objectives of company SOCs*, which states that

(c) where its activities affect the environment, to conduct its operations in compliance with the principles of ecologically sustainable development contained in section 6 (2) of the *Protection of the Environment Administration Act 1991*.

<sup>8</sup> National Grid Management Council, *National Grid Protocol* (First Issue 1992).

<sup>9</sup> Council of Australian Governments, *COAG Energy Policy Details: Towards a National Energy Policy*, 2001.

<sup>10</sup> Rowena Cantley-Smith & Diana Bowman (eds), *Green Power: An Environmental Audit of the National Electricity Market* (2009) 25.

<sup>11</sup> *Australian Energy Market Agreement*, 2004.

<sup>12</sup> Recognising that the current Review was initiated by the COAG EC, and that its 5<sup>th</sup> communiqué (19 August 2016) included: "...the Council agreed to ask officials to include in this advice consideration of the economic and operational impacts of existing state and territory emission reduction policies. The advice will inform the Council's consideration of how to better integrate energy and emissions policy."

<sup>13</sup> GetUp! and Solar Citizens, *Homegrown Power Plan*, Summary, 2016, 6.

prominent Australians commissioned *Our Energy Future*.<sup>14</sup> Among other recommendations it called on the federal government to convene a panel of experts to

Revisit the National Electricity Objective to incorporate a clear goal to accelerate Australia's energy transition towards net zero emissions before 2050, consistent with government policy and international commitments.

We are therefore far from being alone in recognising that the status quo is not working and in calling for reform of the NEO or its interpretation.<sup>15</sup>

### 3. The AEMC and the NEO

The present Chair of the AEMC has repeatedly publicly justified the exclusion of social and environmental objectives from the NEO on the grounds that the NEO is an economic objective, whereas social and environmental outcomes are more appropriately dealt with by other public policy levers. The AEMC recently published a detailed explanation of its interpretation of the NEO, so it provides an appropriate place to critique the AEMC's approach.

The essence of the AEMC's approach is contained in the following statements from *Applying the energy objectives*:

The NEO is an economic concept and is intended to be interpreted as promoting efficiency in the long-term interests of consumers... The result of this governance design choice is that each of the market bodies is an independent decision-maker with clear accountabilities for a particular function, with Governments being appropriately responsible for high-level policy and broader social value judgements. This enables the three market bodies to focus their efforts on the efficient operation of the market in the long-term interests of consumers.<sup>16</sup>

Governments of course are concerned about issues such as affordability as well as a host of other policy objectives relevant to the energy sector including environmental ones. This means that governments may have potentially multiple and conflicting objectives to manage, which results in trade-offs being made between different objectives on behalf of consumers. Therefore, the achievement of such policy objectives is typically associated with a subjective value judgement which typically differs depending on a particular view and may potentially have broad societal impacts; rather than a more narrow, objective assessment based on technical engineering, economic or financial considerations such as those relevant to energy objectives. Governments also have other policy mechanisms available to them such as income measures and environmental regulations to address policy objectives beyond the impacts of the variables listed in the energy objectives.<sup>17</sup>

The AEMC's approach can be summed up as follows: The NEM is an economic market in which environmental objectives are best dealt with as externalities. This is a theoretically tidy approach. However, it is also highly contestable, for the following reasons:

1. Market bodies already deal with conflicting objectives in the NEO – particularly between price and reliability – requiring tradeoffs that consider more than economic outcomes and are therefore subjective, so there is no inherent reason why it cannot cope with one more sub-objective.
2. As Appendix 2 to this submission reveals, numerous other OECD jurisdictions do include decarbonisation or broader sustainability or environmental objectives in their energy market legislation and/or regulations. There is certainly no evidence that the inclusion of such an

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<sup>14</sup> Energy Transition Leadership Forum, *Our Energy Future: A plan to transition Australia to clean energy*, November 2016, 19.

<sup>15</sup> See also Conservation Council SA et al, *The Transition to 100% Renewable Power for Australia: Briefing and Recommendations to the COAG Energy Council*, August 2016.

<sup>16</sup> AEMC, *Applying the energy objectives: a guide for stakeholders*, December 2016, 3.

<sup>17</sup> AEMC, *Applying the energy objectives: a guide for stakeholders*, December 2016, 16.

objective makes it harder to “keep the lights on” or to constrain retail prices any more than has been the case recently in the NEM.

3. The disconnect between climate policy and energy market regulation in Australia over the past decade has been partly responsible for economically inefficient investment, leading to higher wholesale prices and retail bills, and has also hindered the decarbonisation of the NEM.
4. Externalities are no less important than any other cost just because they are difficult to quantify. By refusing to internalise decarbonisation targets, the economic costs of inaction on climate change and the costs of climate change damage and adaptation, the AEMC’s interpretation of the long term interest of consumers is overly simplistic and represents an incomplete interpretation of the concept of dynamic efficiency.<sup>18</sup>

A broader interpretation is also supported by mainstream economic principles and practice (see Appendix 1) under which environmental impacts should not be given less weight simply because the impacts are not (yet) monetarised or as readily observable. The current narrow interpretation of the NEO:

1. Implies that economic objectives exclude environmental impacts and other externalities and that such impacts are not relevant to the long term interests of consumers.
2. Creates a dichotomy between subjective and objective values when there is a gradation of uncertainty in the estimation of various costs and benefits, including those captured by the narrow definition preferred by AEMC.
3. Conflates the objectives and instruments so as to define the objective in terms of the instruments available.

It is correct to say that some inputs/outputs/effects are more difficult to quantify than others. But problems of quantification are not limited to environmental externalities. Efficient costs cannot be directly observed and their estimation requires judgement and is subject to considerable debate and uncertainty – as is illustrated by the dispute over the estimation of efficient costs for the delivery of services by the NSW network businesses and ACTEW-AGL. Similarly, the value of customer reliability – a critical element in assessing the costs and benefits of improving reliability – cannot be observed directly. Technical analysis can inform the exercise of judgement in determining the value of reliability but it is still a subjective assessment based on uncertain information.<sup>20</sup> The narrow definition effectively places either a zero weight on carbon emissions or assigns decarbonisation goals no weight in assessing the performance of the energy markets.

If one puts aside the AEMC’s broad role in providing advice on the performance of the energy markets it could be argued that the current narrow definition of the NEO better matches the policy instruments available to the market bodies. However, defining the objective to suit the tools available runs the risk of pre-empting the solution. The better approach is to pose two separate sequential questions:

1. What are the community’s objectives for the energy sector?
2. How can the available instruments help achieve these objectives?

The Review’s energy trilemma focus succinctly summarises the community’s objectives and the NEO should reflect this. Given this, the answer for the market bodies to the second question is contingent on policies outside their direct control. If there were a carbon market, it would take the primary weight in achieving the decarbonisation objective. But in the absence of this, there is greater scope, and need, for the market bodies to structure the market rules and regulation to contribute to the

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<sup>18</sup> For a more thorough discussion of carbon costs as externalities please see Appendix 1.

<sup>20</sup> See, for example, IPART, Electricity Transmission Reliability Standards, Final Report and Supplementary Final Report, 2016.

achievement of the decarbonisation objectives. These objectives, and the absence of other better policies, cannot be assumed away.

## **4. Evidence of the problems**

Here are some recent examples of the problems caused by either the current NEO or the AEMC's interpretation thereof, or both.

### *4.1 Demand management incentive scheme*

The poor performance of the NEM relative to comparable grids in other countries in relation to demand side participation (what would now be termed DER) prompted the AEMC to initiate its Power of Choice reviews from 2007-2012. While early reports argued, in effect, that the national electricity rules (NER) did not hinder the uptake of demand side participation (DSP),<sup>21</sup> by 2012 the final report not only accepted the problem but went a long way towards suggesting some effective remedies.<sup>22</sup> Among these was reform of the demand management incentive scheme (DMIS). The AEMC went so far as to design draft specifications for a new DMIS, which formed the basis of two rule changes in 2013. However, the final rule will not be implemented by the AER until July 2019, a delay of 6-7 years. This is not an uncommon scenario.

### *4.2 Local generation network credit rule change*

This rule change would have paid dispatchable midscale local generators (such as biomass or geothermal) a credit for the value of their generation to networks in reducing peak demand. In light of modelling (which the rule change proponents considered to be highly flawed) it commissioned, the AEMC essentially rejected the proposal on the basis that it (in contrast to the proponents' own modelling) would not save consumers money even in the long term.

Throughout the process the proponents encouraged the AEMC to look beyond the solution they were proposing to the broader problem identified, in the hope that the AEMC would recognise the principle of local use of the system. In spite of its power to make a "more preferable rule," the AEMC refused to take up the opportunity to consider the merits of the broader concept in light of the shift to a more decentralised energy system, thereby (in the proponents' view) risking accelerating the energy market death spiral as prosumers and larger local generators are inhibited from utilising the local grid by high network charges and instead favour onsite consumption and storage and local microgrids.

### *4.3 Distribution market model*

In 2016 the COAG EC tasked the AEMC with

...monitoring developments in the energy market, including the increased uptake of distributed energy resources, and providing advice on whether the economic regulatory framework for electricity networks is sufficiently robust and flexible to 'continue to achieve' the NEO in light of these developments.<sup>23</sup>

As part of that project, in December 2016 the AEMC published an Approach paper for the Distribution market model, which it described as "a forward-thinking, strategic piece" of work. However, climate policy rates only a single mention, and only in the context of a variable that may result either in more distributed energy resources (DER) or "more use of grid-scale renewable generation and storage, rather than at consumer premises." In other words, it is just one more source of uncertainty, so the job of the NER is to be "flexible and resilient enough to respond to

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<sup>21</sup> AEMC, Review of Demand-Side Participation in the National Electricity Market Final Report, 2009.

<sup>22</sup> AEMC, Power of Choice Final Report, 2012.

<sup>23</sup> AEMC, Distribution Market Model, Approach paper, December 2016, 26.

whatever the future may bring in a way that is technology neutral, facilitates consumer choice and maximises efficiency.”<sup>24</sup>

Contrast this approach with the CSIRO/Energy Networks Australia Network Transformation Roadmap,<sup>25</sup> published a month earlier. As a logical and inevitable consequence of action on climate change, it envisages a future of zero net emissions by 2050 with incentives for high grid utilisation and lower consumer bills. It also accepted that up to 50% of all electricity would be generated by customers by 2050, with networks paying DER customers over \$2.5 billion per annum for grid support services to incentivise them to stay connected to the grid.

In spite of the Australian government having ratified the Paris Agreement and committed to a 26-28 per cent reduction in emissions by 2030 (admittedly while not yet having a plan to reach that target), and in spite of the alternative government having a 50 per cent renewable energy target by 2030 and a 45 per cent emissions reduction target by 2030, the AEMC continues to speak and act as if anything might happen, so decarbonisation is not an active consideration in developing the grid and regulatory regime of the future. As a result, the Principles of good market design detailed in the Approach paper make no mention of supporting government climate policy. On the other hand, the paper goes into some detail in relation to the technical problems that an increased uptake of distributed energy resources can present for the grid.

In its submission to the Approach paper, the Northern Alliance for Greenhouse Action (NAGA) therefore recommends that

...the proposed AEMC assessment framework recognise the inevitability of a decarbonised electricity supply. Although federal and state climate and renewable energy policies are outside the control of the AEMC, there is bipartisan agreement that Australia increases its emissions reductions ambition over time. Australia is now a signatory to the Paris Agreement, which locks Australia into ratcheting its Nationally Determined Contributions over time. As such, the AEMC should factor into its design an acknowledgement that any future market model needs to work with, not against, efforts to decarbonise. If not, then it will be constantly challenged by parties seeking to work outside or against the rule framework to achieve emissions reductions.<sup>26</sup>

The submission to the same Approach paper from the Eastern Alliance for Greenhouse Action (EAGA) goes to the hub of the problem, arguing that

The paper inquires whether changes to the regulatory framework, distribution system operation and market design more broadly are needed to enable the evolution to proceed in a manner consistent with the National Electricity Objective (NEO). Framing the Approach Paper in this way is inherently problematic as the NEO is no longer appropriate to the current and future Australian energy market. The NEO currently does not recognise the interests of the community at large and confines consumer interests mainly to economic interest.<sup>27</sup>

#### *4.4 Regulated asset bases (RABs)*

Under the current rules, the value of electricity network assets is rolled over with an adjustment upwards for inflation in every five yearly revenue determination by the AER. The RAB cannot be devalued to reflect changing technology and market conditions. In an era of lower overall grid utilisation due to the increasing uptake of DER, this results in networks being entitled to recover similar amount of revenue from lower grid utilisation. This means that the regulated networks do not face technology/decarbonisation risks and do not have an incentive to manage these risks. Furthermore, they have an opportunity to adopt accelerated depreciation to front-end load the

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<sup>24</sup> AEMC, Distribution Market Model, Approach paper, December 2016, ii.

<sup>25</sup> CSIRO and Energy Networks Australia 2016, Electricity Network Transformation Roadmap: Key Concepts Report, i and iv.

<sup>26</sup> Northern Alliance for Greenhouse Action, Submission on AEMC Distribution Market Model Approach Paper, January 2017, 2.

<sup>27</sup> Eastern Alliance for Greenhouse Action, Submission on AEMC Distribution Market Model Approach Paper, January 2017, 2-3.



recovery of asset costs. One option is for the AER to more closely scrutinise the capex decision processes to ensure that these risks are included in the consideration of network options and the value of deferral, lower scale solutions and demand side options are properly recognised. However, the case can also be made that current protection of the RAB from devaluation should be removed as it is not consistent with the long term interest of consumers and economic efficiency, and is a barrier to decarbonisation.<sup>29</sup> Otherwise a decreasing number of legacy consumers, mostly those on low incomes and unable to invest in solar and batteries, will be forced to prop up increasingly uneconomic network businesses.

#### *4.5 Optional Firm Access (OFA)*

The two main recommendations coming out of the AEMC's 2010-2013 Transmission Frameworks Review were:

1. Optional Firm Access (OFA),<sup>30</sup> which would, by allowing generators to buy firm capacity on transmission lines, have delivered an outcome that was punitive to large scale renewables given their more remote locations.
2. Contestability in transmission connections, which would have enabled more efficient connection of large scale renewables.

The 41 TWh RET was legislated when the AEMC decided to invest an estimated \$5 million of taxpayer dollars into developing OFA. Despite this it didn't seem that any stakeholder wanted or understood this reform. Even incumbent coal generators that sought to benefit the most and pushed for OFA through the process walked away at the end of the design due to the massive risks it imposed. It seemed to be that the AEMC was undertaking an academic exercise in economic perfection rather than designing a practical solution for any electricity market. OFA would have hampered efforts to reduce emissions by making the current generation mix harder to shift, and challenged any transition to cleaner energy sources by increasing the costs and risks of deploying new renewable projects. Despite contestability in connections being a tried and tested solution to economic efficiency gains, the AEMC made a call that was entirely inconsistent with meeting the RET efficiently and reducing emissions, wasting three years of the legislated RET timeline in the process.

### **5. Is a broader interpretation of the NEO feasible?**

Objections to the NEO usually focus on the absence of a specific social equity or environmental objective. As one example of how this might help, TransGrid and AusGrid are currently investigating a major project, Powering Sydney's Future, which would replace and/or augment the high voltage power lines supplying the inner city of Sydney. Various options are being considered including remediation, immediate replacement and staged replacement of existing assets, and expressions of interest in non-network options examined. The costs of the options vary, as does the flexibility that the options offer for adapting to change demand patterns and generation and storage options. This flexibility is critical for managing risk and assisting in the achievement of decarbonisation goals. At present, because RABs are protected from write-down the utilities are substantially isolated from these risks. If the NEO explicitly included decarbonisation as an objective the AER would be in a stronger position to ensure that the planning process properly valued the flexibility provided and the extent to which the options supported the decarbonisation goal. The AER could require that the cost benefit evaluation of the options under the regulatory test (RIT-D) include decarbonisation impacts. This could then be reflected in the prices that networks could pay for non-network options that also offered a reduction in carbon emissions. Such incremental changes to investment decisions are likely to have a comparatively small impact on end-user prices but can be an important source of support for the achievement of the decarbonisation objectives.

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<sup>29</sup> See Hugh Grant, Assets or liabilities? The need to apply fair regulatory values to Australia's electricity networks, EUAA, May 2016.

<sup>30</sup> See <http://www.aemc.gov.au/Markets-Reviews-Advice/Optional-Firm-Access,-Design-and-Testing>.

However, the AEMC's *interpretation* of the current NEO could equally be the problem: in particular, its interpretation of the long term interest of consumers. The AEMC does not interpret "long term" in the way most consumers would – that is, over a timespan greater than 5 or 10 years at the minimum, and potentially including future generations. Rather, it is an utility-centric interpretation: "In this context, the long-term does not refer to a particular period of time but rather to when the capital or fixed components used in the provision of energy services can be changed."<sup>32</sup>

This makes sense if the challenges and changes facing the sector are intrinsic to the investment decisions and the interests of future consumers beyond the current investment cycle are independent of the decisions in the current investment cycle. However, the challenge of climate change is a long term problem that will affect consumers of many investment cycles. Delaying action now may possibly reduce costs in the short term and, perhaps, over the current investment cycle but increases the costs to the consumers and the community over the long term. This was the essential conclusion of the Stern and Garnaut reviews, for example. Hence, while the NEL does not define the long term interest of consumers, a focus extending beyond the life of the network assets is more consistent with the time frame of the climate change challenge currently shaping the industry.

In terms of the factors to be considered, there is no logical reason why the economic interest of consumers should not take account of the costs to consumers of supposed externalities like the costs of climate change mitigation, impacts, adaptation and policy uncertainty or inaction.<sup>33</sup> For instance, while the cost of the RET is internalised via the imposts on retailers, there have now been numerous studies of the costs of delaying action on climate change. These costs will eventually need to be paid by energy consumers, taxpayers and/or utility shareholders, and should be factored in as relevant to the long term interest of consumers, even if they are not directly related to the lifespan of infrastructure.

Consider the considerable costs to the health system (let alone the non-economic impacts to residents) of the Morewell coal mine fire in the La Trobe Valley in 2015. These costs were, are and will for decades be borne by state and federal taxpayers and are not reflected in the cost of brown coal-fired electricity, which continues to be the cheapest form of generation in the NEM. What if the mine and the fire had been in the geographic heart of Melbourne, and millions rather than thousands of people had been affected? Would it still be fair to regard this side effect of coal-fired generation as an externality to the market? How would this be in the long term interest of consumers, whether Melbournians or others?

The AEMC admits that "The long term interests of consumers are unlikely to be promoted in the presence of a market failure."<sup>34</sup> As Nicholas Stern famously remarked in 2006, "Climate change is a result of the greatest market failure the world has seen."<sup>35</sup> The electricity sector is the largest source of carbon emissions in the Australian economy. Why should the electricity industry be able to use the NEO to externalise the real costs associated with the mining, transportation and burning of a dangerous fossil fuel?

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<sup>32</sup> AEMC, Applying the energy objectives: a guide for stakeholders, December 2016, 6.

<sup>33</sup> On the costs of policy uncertainty or delayed action, see: Report of the Task Group on Emissions Trading (2007); Nelson et al (2010): Delayed Carbon Policy Certainty and Electricity Prices in Australia; Frontier Economics (2010): What's the cost of carbon uncertainty?; Deloitte (2011): Electricity Generation Investment Analysis; Sinclair Knight Merz (2011): Impacts on electricity markets of delaying an emission trading scheme; Nelson, T., et. al., (2012), Delayed Carbon Policy Certainty and Electricity Prices in Australia: A Concise Summary of Subsequent Research; and McKibbin (2015): Report 1: 2015: Economic Modelling of International Action Under a New Global Climate Change Agreement, Appendix D.

<sup>34</sup> AEMC, Applying the energy objectives: a guide for stakeholders, December 2016, 13.

<sup>35</sup> "Stern: Climate change a 'market failure': *The Guardian*, 29/11/2007: <https://www.theguardian.com/environment/2007/nov/29/climatechange.carbonemissions>.

In the context of the heatwave and blackouts sweeping eastern Australia at the time of writing, reinterpreting or reforming the NEO could help to ensure that energy security and decarbonisation are not pursued as siloed areas of policy and regulation. The South Australian Government's renewable energy targets and achievements to date are nothing more (and probably still less in view of the urgency to act dictated by climate science) than what is required to respond to the Paris Agreement.<sup>36</sup> Yet its laudable policies were undermined by apparent regulatory failure by AEMO, which does not have support for decarbonisation as part of its mandate.

Meanwhile in NSW, AGL's alleged withdrawal of more supply from the Tomago aluminium smelter than AEMO required during the heatwave on Friday, 10 February to shed load and prevent blackouts may have allowed AGL (which is also a large generator in NSW) to profit massively from selling that energy into the spot market for up to \$14,000/MWh during that time.<sup>37</sup> That situation illustrates a problem that will continue to exist until there is a large amount of grid scale energy storage available, Gentailers can game the market when they are allowed to pursue short term financial gain, exposing consumers to price volatility as well as the intermittency of most current renewable energy generation, rather than being required to act in support of the transition to a higher penetration of renewable energy generation – in this case, by making reliability rather than windfall profits the main consideration.

## 6. Potential solutions

The environment and climate are classical public goods – to the extent that markets fail to account for the costs and benefits associated with activities that have an impact upon them. There is no reason to expect that liberalised markets will voluntarily begin to account for external environmental effects. This will only happen through policy intervention. In theory, it is straightforward to internalise an external environmental cost. The damaging activity can be penalised through a tax that corresponds to the cost such activity inflicts on society. However, environmental costs are very rarely computable in a way that is precise and can be commonly agreed upon. This raises a whole range of issues that will interfere with markets...<sup>38</sup>

Because the current regulatory framework, with its bias towards ensuring the profitability of incumbent market participants, has comprehensively failed to solve the energy trilemma, what follows is a spectrum of potential policy interventions intended to help solve the problems identified. They range from the “softest” and least cumbersome to the “hardest” or most legalistic, with a brief discussion of some of the advantages and disadvantages of each.

6.1 *Change in the AEMC's interpretation of the NEO.* Arguably the NEO does not need reform or even formal reinterpretation. It merely needs the AEMC to take a broader view of

- The long term interest of consumers – to include the costs of climate change mitigation, adaptation, damage and inaction.
- Dynamic efficiency – that is, “having the right mix of resources, to produce the maximum amount for the minimum cost, *over time*”<sup>39</sup> – again, to take a more long term and inclusive approach.

Given the politicisation of carbon policy issues and the AEMC's current interpretation of the NEO, the AEMC may require support for a broader interpretation through this Review or policy statements from the COAG EC (as per below). This would also provide greater confidence for stakeholders that the change in interpretation would be sustained.

<sup>36</sup> That is, inter alia, “holding the increase in the global average temperature to well below 2 °C above pre- industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre- industrial levels”; UNFCCC/CP/2015/L.9/Rev.1.

<sup>37</sup> See AEMO, System Event Report, 10 February 2017, NSW, published 22 February 2017.

<sup>38</sup> OECD/IEA, Lessons from liberalized energy markets, 2005, 163.

<sup>39</sup> For a fuller definition of productive, allocative and dynamic efficiency, see AEMC, Applying the energy objectives: a guide for stakeholders, December 2016, 11-12.

6.2 *A change to the NER* to require market bodies and/or market participants (primarily generators, networks and retailers) to issue carbon impact statements (similar to regulatory impact statements or assessments)<sup>40</sup> in relation to major regulatory or investment decisions. Where the decision would result in an increase in emissions or a delay in implementing other policy mechanisms aimed at decarbonisation (such as the RET or a market mechanism such as an emissions intensity scheme), the body or company would be required to justify its decision as being in the long term interest of consumers.

Unfortunately, since the AEMC makes rule changes and there is no right of appeal to its final determinations, given its current interpretation of the NEO this proposal is unlikely to succeed.

6.3 *Policy direction from the COAG Energy Council*, which, pursuant to S.8(1) of the NEL,

...may issue a statement of policy principles in relation to any matters that are relevant to the exercise and performance by the AEMC of its functions and powers in (a) making a Rule; or (b) conducting a review...

However, S.8(2) states that

Before issuing a statement of policy principles, the MCE must be satisfied that the statement is consistent with the national electricity objective.

The COAG EC would therefore need to convince itself that directing the AEMC to internalise decarbonisation costs in its interpretation of the NEO is consistent with the existing NEO. We suggest that this is feasible in respect of the broader interpretation of either the long term interest of consumers or dynamic efficiency (as per 6.1 above).

What might be the content of such a policy directive? In line with 6.2 above, it could require the AEMC to consider the impacts of its determinations and advice on the broader implementation of the federal government's decarbonisation targets, either in its annual report or (more preferably) in carbon impact statements issued as part of every determination or review report.

A "statement of policy principles" from the COAG EC could also require the AEMC to develop a methodology for including decarbonisation into the assessment framework for its rule change determinations – for instance, by internalising climate change and decarbonisation costs in its calculations of dynamic efficiency.

6.4 *Amending the NEO* to refer to "Total system cost" instead of price as a way of expanding the consideration of economic impacts of reform beyond the narrow and often short term consideration of the price of electricity. Total system cost would allow climate change and decarbonisation costs to be accounted for (for example, in the AEMC's rule change assessment framework) as part of the total system cost rather than externalities.

6.5 *Amending the NEO* to including a decarbonisation or broader environmental sub-objective or variable, so that it would now read:

The objective of this Law is 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; and

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<sup>40</sup> "A Regulatory Impacts Statement (RIS) is a rigorous process for analysing the most feasible (efficient and effective) options available, including the possibility of regulation, to produce the greatest net benefit to society, while simultaneously meeting the needs of government"; ACT Treasury, *Best Practice Guide for Preparing Regulatory Impact Statements*, 2003, 3.

(c) Australia's national and international carbon pollution reduction targets and commitments.<sup>41</sup>

OR

(c) The environmental consequences of energy supply and consumption, including reducing carbon pollution, considering land use and biodiversity impacts, and encouraging energy efficiency and demand management.

6.6 Options 4 and 5 both suffer from the need (the way the COAG EC works at present) to achieve consensus among ministers about the nature of the proposed reform, and then to progress the legislative change through the various parliaments, starting with South Australia. Given the decade-long political battle over climate policy in Australia, especially at the federal level, consensus among state and territory ministers on this front appears unlikely at the present time. Option 4 is more likely to achieve consensus than Option 5, though, as it is not explicitly linked to a climate policy objective. It is likely that any policy direction from the COAG EC would need to be watered down to achieve consensus, but even that would be preferable in the short term to the status quo. An advantage of changing the NEO through the COAG EC is that it provides greater certainty for the future by making it harder to reverse.

6.7 *Amending jurisdictional electricity system legislation.* At the time of writing the South Australian Government is threatening “radical action” to reclaim control of its electricity system, given the apparent failure of AEMO to ensure adequate generation was dispatchable to meet very high demand on the afternoon on 8 February 2017.

Considered within the context of the still “half-pregnant” nature of the so-called “national” market, with some state governments still owning networks and licencing them and retailers, and Victoria not adopting the retail rules, this option is not as unlikely as it may at first appear. While the added complexity makes this a less desirable option than a national approach, as a last resort it may be feasible for state and territory governments seeking to support their climate and renewable energy policies and targets to force decarbonisation considerations of some kind (targets, RISs or broad objectives) onto market participants operating within their jurisdictions. This could involve:

- Introducing state legislation that cuts across the NEM (eg, to mandate dispatch to ensure reliability).
- State governments getting (back) into the business of energy generation and/or storage.
- States withdrawing from the NEM altogether – a less risky option in the future when large scale energy storage could overcome the need for interconnectors.

In view of the need for decarbonisation to occur quickly at a national level, jurisdictional responses would be less than ideal; they are understandable and even necessary, though, where national leadership is lacking.

## 7. Australian Energy Market Agreement

The 2004 AEMA, unlike the NEO, directly addresses greenhouse emissions. One of its objectives is to 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.<sup>42</sup>

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<sup>41</sup> Noting that our targets don’t fully account for Australia’s Paris Agreement commitments such as keeping global warming below 2 degrees and pursuing limit of 1.5 degrees.

<sup>42</sup> AEMA, 2004, 2.1(b)(6).

However, the AEMA was “not intended to give rise to legal obligations among the Parties”,<sup>43</sup> and the Ministerial Council on Energy (MCE) and its successor bodies including the current COAG EC appear to have taken little interest in the alignment of climate policy and energy market regulation, at least until recent communiqués and even then only in general terms.

The AEMA also recognises the right of state governments to

...implement and/or maintain (whether through legislation, regulation, administrative initiatives or otherwise) policies relating to environmental (including greenhouse), energy efficiency (including demand management) and planning issues...<sup>44</sup>

In practice this appears to have been taken as a rationale for largely leaving such matters to state governments.

Finally, in spite of the original MCE report to COAG recommending that

The MCE [should] work closely with the COAG High Level Group on Greenhouse to address greenhouse gas emissions from the energy sector on a national basis...<sup>45</sup>

this appears not to have happened.

As it stands, the AEMA is a toothless tiger. It needs to be reworked and given teeth – perhaps by becoming binding on COAG Energy Council members; alternately by COAG EC decisions requiring only a two-thirds majority – for what the Review calls NEM 2.0. Given its currently non-binding nature, though, and its disconnect from the NER, it is no substitute for a reformed NEO. Still, the Panel could encourage the COAG EC to consider how the greenhouse objective in the AEMA could be implemented within the NER as well as through external policy levers.

## 8. Conclusion and next steps

As recent events have made clear, having failed to provide reliable or affordable, let alone low carbon, power, the NEM is in deep trouble. The failure of the regulatory framework to internalise the environmental consequences of investment and operational decisions is central to the market’s failure to respond to extreme weather events in a way that supports decarbonisation while also ensuring high levels of reliability and affordability.

Turning to potential solutions, in the long term, having a NEO that explicitly recognises the energy trilemma makes sense. In the short term, policy direction from the COAG EC directing the AEMC to reinterpret the long term interest of consumers to align its decisions with government decarbonisation targets and to internalise the costs of climate change mitigation, adaptation, damage and inaction appears to be the most feasible way forward.

The NEO is not the only aspect of the NEM that is not working, and there is a strong case for going back to the drawing board and asking the obvious question, “What would the rules and the market look like if we were designing them today for a high-DER and zero carbon future?” In the interim, reforming or reinterpreting the NEO will go a long way towards managing the energy trilemma in the pursuit of a safe climate in the long term interest of consumers. We welcome any opportunity to work with the Panel to further develop any of the options for reform raised herein.

For further information please contact Mark Byrne, Energy Market Advocate, Total Environment Centre: [markb@tec.org.au](mailto:markb@tec.org.au), 0403070442, on behalf of:

Alternative Technology Association

Australian Conservation Foundation

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<sup>43</sup> AEMA, 2004, 1.5(a).

<sup>44</sup> AEMA, 2004, 1.5(a).

<sup>45</sup> AEMA, 2004, Annexure 1.

City of Sydney  
Central Victorian Greenhouse Alliance  
ClimateWorks Australia  
Goulburn Broken Greenhouse Alliance  
Greenpeace AustraliaPacific  
Low Carbon Living Cooperative Research Centre  
Nature Conservation Council of NSW  
Northern Alliance for Greenhouse Action  
Queensland Conservation Council  
Sustainable Living Tasmania  
Total Environment Centre

## APPENDIX 1

### Economic principles and the interpretation of the NEO

#### Should externalities be included in considering economic efficiency?

While there is a common view that economics supports the exclusion of environmental values this is not the case. It has been accepted since the work of Professor Arthur Pigou that externalities, such as impacts on the environment, should be included in economic analysis and that there is a case based on economic welfare maximisation for government policies to address these. Ecological economics and some strands of Post-Keynesian economics argue that mainstream economics does not properly understand the dynamics that make the problem of addressing environmental issues more important and difficult.<sup>46</sup> On the other side, so to speak, Prof Coase argued that, in well-functioning markets with clear property rights, externalities or market failures would in fact be valued and monetised through the market. This does not dispute the existence and importance of the phenomena, such as environmental impacts on third parties, or suggest that such impacts are outside the domain of economics. Rather, the issue in dispute is whether, in theory, the market or the government can best solve the problem

#### *Definition of economic efficiency*

For economists, economic efficiency requires that resources are used to maximise the value obtained from the use of resources so as to maximise community welfare. This is not a single period maximisation; it encompasses the maximisation of welfare over time. It covers both the efficiency of production of commodities (i.e., resources of labour, capital, land and other natural resources should be used in the most efficient manner reflective of their costs) and efficiency of consumption of goods (i.e., the pattern of consumption of goods should reflect the value of the resources consumed in their production and the value to consumers of their consumption of the goods).

#### *Externalities and economic efficiency*

Pigou is credited with introducing the concept of externalities in *The Economics of Welfare*, published in 1920. He noted that social marginal product may vary from private marginal product, possibly due to externalities whereby:

...the essence of the matter is that one person A, in the course of rendering some service, for which payment is made, to a second person B, incidentally also renders services or disservices to other persons (not producers of like services), of such a sort that payment cannot be exacted from the benefited parties or compensation enforced on behalf of the injured parties.<sup>47</sup>

Pigou noted that the existence of such externalities may justify government interventions – through, for example, a Pigovian tax – so that these externalities are taken into account in decision-making in order to maximise consumer welfare. However, Pigou also noted that such interventions should be used selectively.<sup>48</sup>

Professor Coase took issue not with the possibility of externalities and the wedge they may drive between market outcomes and economic efficiency or welfare optimisation but with the remedy for this. He argued that if property rights were well-defined and transactions costs eliminated the externalities would not be external but would be reflected in market outcomes.

The current position is as summarised by Arrow et al as follows. Underpricing of natural resources can arise from imperfect property rights, transaction costs and the existence of externalities.

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<sup>46</sup> N Perry, "Environmental Economics and Policy", in G C Harcourt and P Kriesler, *The Oxford Handbook of Post-Keynesian Economics*, Vol 2, 2013, 391-411.

<sup>47</sup> A C Pigou, *The Economics of Welfare*, section 10, chapter 9.

<sup>48</sup> A C Pigou, *Income Revisited*, Macmillan, 1955, 59-60.



Through regulation, taxation, or better-defined property rights,

...public policy can help price of natural and environmental resources better approximate their social costs. These policies can help prevent excessive resource depletion and promote higher genuine investment. Such policies are justified on efficiency grounds...<sup>49</sup>

*Is this view reflected in the practice of public policy?*

The principles set out above underpin cost-benefit analysis, which is perhaps the economic tool of analysis most widely used in public policy analysis. Academic guides to public policy analysis emphasise the importance of quantifying and including externalities in the evaluation of policies, programs and investments.<sup>50</sup> This principle is also reflected in the guides prepared for/by governments for economic evaluations. For example the HM Treasury guide to economic evaluation states that

Wider social and environmental costs and benefits for which there is no market price also need to be brought into any assessment. They will often be more difficult to assess but are often important and should not be ignored simply because they cannot easily be costed.<sup>51</sup>

*Is incorporation of externalities sufficient?*

Mainstream economics supports the view that incorporation of externalities in decision-making and/or pricing is necessary for economic efficiency. However, there is a long tradition of economists who argue that this is insufficient to address the broader effects of growth, technological change and resources use on society.<sup>52</sup> While not disagreeing with the importance of externalities ecological economics and Post-Keynesian economists also argue that this is insufficient. Those that seek a closer consideration of ethics (or moral philosophy) and economics, such as Hausman, also point to the economics attempts to tip-toe around its underlying ethical judgements weakens its capacity to consider the intergenerational issues.<sup>53</sup> It is not necessary for present purposes to examine these challenges to mainstream economics, it is sufficient to recognise that they exist.

**In summary: there is an ongoing debate as to whether it is sufficient, but it is generally accepted by economists that externalities *should* be incorporated in decision-making and/or prices. This is reflected in the widely-used basic principles of economic analysis and economic tools for public policy analysis.**

*A Recent Example*

An example of current mainstream economic approaches to welfare optimisation, sustainability and the incorporation of externalities is provided by Kenneth Arrow et al in “Are We Consuming Too Much?”<sup>54</sup> Each of the authors is highly respected academic and the lead author was the youngest person to receive the Nobel Prize for Economics and a leading economic theoretician, particularly in microeconomic theory and growth. In examining this question the paper notes that:

1. Failure to incorporate externalities can result in underpricing of natural resources and the pricing of consumer goods below social costs. (157)

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<sup>49</sup> Kenneth Arrow, Partha Dasgupta, Lawrence Goulder, Gretchen Daily, Paul Ehrlich, Geoffrey Heal, Simon Levin, Karl-Goran Maler, Stephen Schneider, David Starrett, and Brian Walker, “Are We Consuming Too Much?”, *Journal of Economic Perspectives*, Vol 8, No 3 Summer 2004, 168-169.

<sup>50</sup> See for example D W Pearce, *Cost-Benefit Analysis*, Macmillan, 1971, 51-59; A J Dasgupta and D W Pearce, *Cost-Benefit Analysis: Theory and Practice*, Macmillan, 1972, 44-50, 118-135.

<sup>51</sup> HM Treasury, *The Green Book: Appraisal and Evaluation in Central Government*, 2011, 19, 57-68. See also “Annex 4: Economic Assessment of Environmental Impacts” in NSW Treasury, *NSW Guidelines for Economic Appraisal*, TPP 07-05, 2007.

<sup>52</sup> To cite just a few examples: E J Mishan, *The Costs of Economic Growth*, 1971; Clive Hamilton, *Growth Fetish*, 2003; R Skidelsky and E Skidelsky, *How Much is Enough?*, 2012.

<sup>53</sup> For example, D Hausman and Michael McPherson, *Economic Analysis and Moral Philosophy*, Cambridge UP, 1996.

<sup>54</sup> Arrow et al, 147-172.

2. When there are incomplete markets and environmental externalities consumption [and intertemporal welfare] will not be optimised. (150)
3. Social cost-benefit analysis [which quantifies externalities and includes these together with other costs and benefits] can judge whether a reform increases intertemporal social well-being. (150)
4. “Standard policy remedies for improving economic efficiency – like establishing property rights, addressing externalities, and so forth – do not guarantee sustainability”. (154-155)

**In summary: mainstream economics requires the inclusion of externalities in decision-making if social well-being is to be optimised, but that is not sufficient to assure sustainability.**

*Does the segmentation of efficiency into productive, allocative and dynamic efficiency still apply?*

The inclusion of externalities is not inconsistent with the segmentation of efficiency into productive, allocative and dynamic efficiency adopted by the AEMC and others. Indeed, it is also a useful means of considering how externalities, or the failure to take externalities into account, can affect efficiency. Part of productive efficiency is ensuring the right mix of generation, but the “right mix” of generation needs to reflect carbon emissions. Allocative efficiency includes choices to take up energy efficiency opportunities. In the absence of other policy instruments, if prices of electricity do not reflect externalities consumers will under consume energy efficiency and over-consume reticulated electricity. A critical part of the dynamic efficiency for the sector will be the efficient adaptation to decarbonisation objectives (current and prospective).

*Should ‘long-term’ for the consideration of consumer benefits be constrained to asset lives?*

In the standard theory of the firm, the long term is defined as the period in which all inputs can be changed. As assets are the inputs with the longest lives this is commonly taken to mean that for the firm the long term is the life of its assets.

However, this definition does not carry-over to welfare analysis. Cost-benefit analysis is the most common practical application of welfare economics. While it is common to compress the evaluation period to a fixed period, such as 20 years, good practice requires the inclusion of residual values for costs and benefits extending beyond the project period. At the discount rates commonly used for project evaluations benefits and costs in the very long term are heavily discounted and typically have little impact on the evaluation but this does not mean that they are ignored in theory or practice.

Given the very long term nature of the damages caused and the emissions reduction and damage remediation responses, climate change is the prime example of a problem requiring a very long term analysis and assessment. The major reviews, such as Stern and Garnaut, used very low discount rates (social time preference rate). While consistent with economic and ethical views of intergenerational equity, especially those of earlier economists such as Pigou and Ramsey, the low discount rates were controversial. However, while views on discount rates vary, the theory of intertemporal welfare maximisation does not provide a basis for linking the period over which benefits to consumers are considered to the asset lives unless the benefits assessed are discrete, linked directly to the life of the asset being considered, and do not impact on benefits and costs in future periods.

***In summary: economic theory and practice does not support the linking of the consideration of the interests of consumers to asset lives.***

## APPENDIX 2

### Environmental objectives in other energy market regulatory regimes

#### New York

In the State of New York the state's energy policy is made explicit at article 3 of the *Energy Law*.

Article 3-101 outlines the following high level objectives:

...to obtain and maintain an adequate and continuous supply of safe, dependable and economical energy for the people of the state and **to accelerate development and use within the state of renewable energy sources**, all in order to promote the state's economic growth, to create employment within the state, **to protect its environmental values and agricultural heritage, to husband its resources for future generations**, and to promote the health and welfare of its people.. (emphasis added)

The policy is detailed in a further 5 points with specific references to prudent development and wise use of natural resources, encouraging energy conservation and to encouraging performance standards for energy efficiency across all sectors.

The *Energy Law* also creates a requirement that "every agency of the state shall conduct its affairs so as to conform to the state energy policy expressed in this chapter." (The Energy Law, Article 3-103)

The *Energy Law* also establishes a planning board supported by regional planning committees to develop and adopt a state energy plan. The board is comprised of, among others, the Chair of the Public Service Commission (the economic Regulator) as well as the Commissioner for Economic Development, Commissioner for the Environment and the president of the New York state Energy Research and Development Authority (a body charged with developing and implementing new energy technologies consistent with economic, social and environmental objectives). Article 6 provides specifications for the content of the plan which includes projected greenhouse gas emissions and an assessment of current energy policies and programs, and their contributions to achieving long-range energy planning objectives. (Energy Law, Article 6-102, 6-104)

The State energy regulator has wide ranging powers in relation to electricity and gas corporations including rate setting under the *Public Service Law*. While required to confirm to the State Energy policy objectives, The *Public Service Law* also requires that in exercising its powers and duties the Commission:

encourage all persons and corporations subject to its jurisdiction to formulate and carry out long-range programs, individually or cooperatively, for the performance of their public service responsibilities with economy, efficiency, and care for the public safety, **the preservation of environmental values and the conservation of natural resources**. (emphasis added) (Public Service Law, Article 1, s 5.2)

At Article 4, s.66-c the *Public Service Law* declares state policy to include the conservation of energy. The Act declares that the public interest will be served by encouraging, at rates just and reasonable,

...the development of alternate energy production facilities, co-generation facilities and small hydro facilities in order to conserve our finite and expensive energy resources and to provide for their most efficient utilization.

The Commission is required to

encourage the participation of utilities in co-generation, small hydro and alternate energy production facilities either directly or through subsidiaries facility.

NY State is also in the early phases of a significant effort to achieve even greater alignment between the market and regulatory landscape and NY policy energy policy objectives for reliable and

affordable energy while protecting the environment.<sup>55</sup>

The PSC website explains:

The REV initiative will lead to regulatory changes that promote more efficient use of energy, deeper penetration of renewable energy resources such as wind and solar, wider deployment of “distributed” energy resources, such as micro grids, roof-top solar and other on-site power supplies, and storage. It will also promote markets to achieve greater use of advanced energy management products to enhance demand elasticity and efficiencies. These changes, in turn, will empower customers by allowing them more choice in how they manage and consume electric energy.

One recent milestone under the REV has been the finalization of an “Order adopting a ratemaking and utility revenue model policy framework’. The Order sets out a framework for decisions of the regulator on electricity rate making cases. The framework provides incentive mechanisms (earnings adjustment mechanisms) to encourage peak demand reduction and energy efficiency measures (as two of five priorities) while creating a pathway for energy businesses to earn revenue through delivery of ‘market platform services’ intended to unlock system value, encourage innovation, and provide a sustainable source of utility revenues into the future.

## California

California Energy Commission (CEC) is the state’s primary energy policy and planning agency. The Warren-Alquist State Energy Resources Conservation and Development Act (Warren-Alquist Act) gives authority to the CEC and provides significant guidance on the state’s environmental objectives and substantive Energy Policy. For example at s25000.1a the legislation declares that a

principal goal of electric and natural gas utilities' resource planning and investment shall be to minimize the cost to society of the reliable energy services that are provided by natural gas and electricity, and to improve the environment and to encourage the diversity of energy sources through improvements in energy efficiency and development of renewable energy resources, such as wind, solar, and geothermal energy. (Warren-Alquist Act, s 25000.1a)

Importantly the Act explicitly requires the Commission to include an environmental value when calculating the cost effectiveness of energy resources including conservation and load management options.

These goals and requirements are mirrored in the legislation guiding the state’s economic regulator, the Public Utilities Commission (CPUC), at Section 701.1 of the Public Utilities Code.

The Public Utilities Commission (CPUC) is the state’s economic regulator. It describes its role as

...protecting consumers and ensuring the provision of safe, reliable utility service and infrastructure at reasonable rates, **with a commitment to environmental enhancement** and a healthy California economy. (emphasis added)<sup>56</sup>

The energy work responsibilities of the CPUC are primarily derived from the California State Constitution, and the Public Utilities Code (PUC). In 2015 significant environmental objectives were included in the PUC following adoption of *The Clean Energy and Pollution Reduction Act* (also known as SB350). SB 350 increased the existing legislative targets for renewable energy from 33% by 2020 to 50% by the end of 2030. To meet the state’s clean energy and pollution reduction objectives Article 17.400 requires the commission to:

- (a) Take into account the use of distributed generation to the extent that it provides economic and environmental benefits...
- (b) Take into account the opportunities to decrease costs and increase benefits, including pollution

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<sup>55</sup> "Reforming The Energy Vision: What It Means To Energy Consumers" (Presentation slides). Public Service Commission, February 2015.

<sup>56</sup> "Welcome To The California Public Utilities Commission": <http://www.cpuc.ca.gov>.

- reduction and grid integration, using renewable and non-renewable technologies with zero or lowest feasible emissions of greenhouse gases...
- (c) Where feasible, authorize procurement of resources to provide grid reliability services that minimize reliance on system power and fossil fuel resources and... increase the use of large- and small-scale energy storage with a variety of technologies, targeted energy efficiency, demand response ..or other renewable and nonrenewable technologies with zero or lowest feasible emissions of greenhouse gases...
  - (d) (1) Review technology incentive, research, development, deployment, and market facilitation programs ... and make recommendations to advance state clean energy and pollution reduction objectives ... (Public Utilities Code, Article 17 s 400)

SB 350 also required the CPUC to establish an Integrated Resource Planning (IRP) process by which all electric utilities will plan to build a clean grid while maintaining reliability and keeping electricity bills low.

## United Kingdom

In the UK the *Electricity Act* 1989 defines the principal objective of the Secretary of State and the Gas and Electricity Markets Authority (the UK energy regulator) in carrying out their functions under the act as protecting the interest of consumers. (S. 3A (1)). Further, both should carry out their functions in a manner which is best calculated:

- (a) to promote efficiency and economy on the part of persons authorised by licences or exemptions to transmit, distribute or supply electricity and the efficient use of electricity conveyed by distribution systems;
- (b) to protect the public from dangers arising from the generation, transmission, distribution or supply of electricity; and
- (c) to secure a diverse and viable long-term energy supply,

and shall, in carrying out those functions, **have regard to the effect on the environment** of activities connected with the generation, transmission, distribution or supply of electricity.(s. 3A(5), emphasis added)

GEMA is the governing body of Ofgem, the UK regulator. Ofgem has clarified that the interests of consumers should be been interpreted to include both existing and future consumers, while their interests are to be taken as a whole, including their interests in the reduction of greenhouse gases.<sup>57</sup>

3B (1) of the Electricity Act, and 4 AB (4 ) of the Gas Act also provide that the Secretary of State can issue guidance to the regulatory towards the attainment of any social or environmental policies set out or referred to in the guidance. The most recent guidance<sup>59</sup> provided outlines the government's key social and environmental energy goals to increase the levels of renewable electricity, reduce greenhouse gas emissions in line with carbon budgets, eliminate fuel poverty as far as reasonably practical and reduce energy consumption.

The guidance on environmental issues is extensive and specific. It requires the authority to have regard to the need for sustainable development and to exercise its duties and powers in the manner best calculated to support this goal. It recognises that network development is key to achieving the transition to a lower carbon energy system while maintaining security of supply and it requires the authority to ensure that industry governance, charging or other regulatory arrangements, will provide improved access to the electricity networks for new generation, including renewable, nuclear and other low carbon forms of generation, and better resilience within networks to adapted to changes arising from climate change. The Authority is required to identify any aspects of the regulatory framework which could act as an undue barrier to meeting the 2020 EU renewable

<sup>57</sup> Powers and Duties of GEMA, Ofgem website, Retrieved 10 February 2017 at <https://www.ofgem.gov.uk/publications-and-updates/powers-and-duties-gema>

<sup>59</sup> <https://www.ofgem.gov.uk/ofgem-publications/74203/file37517.pdf>

energy targets and pursue the necessary changes to that framework.

The Authority is also required to look for opportunities, within its role and the scope of its powers, to facilitate the transition to a low carbon gas and electricity system in Great Britain; to help secure energy efficiency targets set by Government, remove unnecessary regulatory and market barriers to the economic deployment of distributed energy technologies; play a key role in the provision of smart metering to ensure that the full benefits of smart metering are realised; and to enable investment in technology and innovation and work effectively with others to promote the research and development, demonstration and trialling, of new approaches that would deliver carbon emission reductions.

Ofgem reports annual to the Secretary of State outlining its actions in response to the Social and Economic Guidance. Among a range of initiatives and approaches designed to promote sustainability, the most recent report focuses on the RIIO (Revenue = Incentives + Innovation + Outputs) price control system for regulating electricity and gas networks which provides various incentives and reporting requirements for networks to monitor their emissions and encourage reduction in greenhouse gas emissions.

The RIIO model for sustainable network regulation was introduced by Ofgem to run from 2013 to 2021. The new model was introduced to foster greater innovation and investment by the industry in light of climate policy demands and aging infrastructure.

## Denmark

In Denmark the 1976 *Electricity Supply Act* provides the framework for the control of the electricity sector. In 1994 amendments, the environmentally sound development of electricity supply was included as the main objective of the Act. Under the same Act the Minister has powers to impose obligations on utilities to take measures pertaining to fuel use, energy efficiency and renewable energy development.

Part 1 of the Act states:

- 1) The objective of the Act is to ensure that the electricity supply of the country is organised and implemented in accordance with consideration for security of supply, the national economy, **the environment** and consumer protection.
- 2) In accordance with the purposes mentioned in (1), the Act is to promote in particular **sustainable energy application, including by energy savings and the use of CHP, renewable and environmentally benign energy sources**, while also ensuring efficient use of financial resources. (emphasis added)

Denmark is recognised as a world leader in the transformation to a low carbon and renewable energy future. The oil crisis in the early 1970s saw Denmark shift from reliance on oil to coal, and then to expanding the mix of renewable energy.<sup>60</sup> Since the 1980s Denmark has seen economic growth of over 70 % with no corresponding increase in energy consumption and a significant decline in GHG emissions.<sup>61</sup> The Danish "Energy Strategy 2050" outlines an aim to be fully independent of fossil fuels by 2050, supported by a plan to increase the share of electricity production from wind to 50% by 2020, and to 84% in 2035.<sup>62</sup> Currently 20% of Denmark's energy consumption is met by renewable sources.<sup>63</sup>

In a paper comparing the UK and Danish systems, Lockwood explains the institutional arrangements

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<sup>60</sup> *Denmark – Regulatory Reform in Electricity*, Organisation for Economic Cooperation and Development 1999, Retrieved 12 February at <http://www.oecd.org/regreform/sectors/2497351.pdf>.

<sup>61</sup> *The Danish example – the way to an energy efficient and energy friendly economy*, Energi Styrelsen 2009, Retrieved 12 February at [http://old.efkm.dk/files/billeder/the\\_danish\\_example\\_the\\_way\\_to\\_an\\_energy\\_efficient\\_and\\_energy\\_friendly\\_economy.pdf](http://old.efkm.dk/files/billeder/the_danish_example_the_way_to_an_energy_efficient_and_energy_friendly_economy.pdf).

<sup>62</sup> *State of Green: the Political Framework*, Stateofgreen.com 2017, Retrieved 12 February at <https://stateofgreen.com/en/profiles/state-of-green/solutions/state-of-green-the-political-framework>.

<sup>63</sup> *Green Living*, Denmark.Dk, Retrieved 12 February at <http://denmark.dk/en/green-living>.

for policy-making and regulation that have produced Denmark's environmental achievements to date. He concludes that more decisions are taken in the political sphere in Denmark than in Britain, resulting in a more directive system where trade-offs are resolved before policy and regulation reach implementing bodies. As a result there is "no need for a regulator to devise complex incentive schemes designed to overcome information asymmetries and drive appropriate behaviour by a privately owned system operator whose primary allegiance is to shareholders."<sup>64</sup>

Major changes to policy in the energy sector go through a political process which will often involve extensive negotiations between political parties. An example of this is the 2012 Energy Agreement, which sets high-level targets for greenhouse gas emissions, renewable energy and energy efficiency to 2020 and 2050, but also includes specific policies and roadmaps for action. This framework is explicitly described as a 'political agreement', and was negotiated and agreed across all but one of the eight parties represented in the Danish Parliament.

The Danish Energy Regulatory Authority (DERA) is an independent economic regulator with a narrow brief of implementing the law on regulation. Lockwood notes that DERA does not have the wider institutional power of Ofgem. For example it does not make policy, including changes to the regulatory regime, and it has no environmental brief. However, he notes that as overall Danish policy aims for a transformation of the system in an environmentally-friendly direction, DERA plays the specific role not of blocking this transformation, but rather, ensuring that it is done in a cost effective manner.<sup>65</sup>

This alignment is exemplified in the foreword to a 2012 annual report by DERA when it notes the relevance to the 2012 Energy Agreement:

This agreement has set the political framework for the energy sector for the years to come. It provides customers, energy companies and investors, as well as an authority such as DERA, with a clear vision for the long term goals that a majority of the parties in the Danish Parliament wish to pursue.<sup>66</sup>

Other actors in the energy environment include the Danish Energy Agency, which is a policy making body within the Ministry for Climate, Energy and Buildings; and Energinet.dk, the system operator of the main gas and electricity transmission systems. Energinet.dk has a key role in supporting the state environmental objectives and produces an Environmental Report on the impacts from electricity and Combined Heat and Power (CHP) generation each year. That is, even the system operator has an overtly environmental focus – proclaiming that "We aim to create the world's best energy system based on renewable energy"<sup>67</sup> – apparently without this compromising its operational effectiveness.

## Germany

Germany's *Energy Industry Act* (Energiewirtschaftsgesetz), under which electricity and gas networks are regulated, declares the reliability of supply, fair pricing and environmental protection as the objectives of the Act. The Federal Network Agency (Bundesnetzagentur) is tasked with regulating Germany's electricity and gas markets under this Act. Utilities with less than 100,000 customers in only one federal state are regulated by state regulatory offices.

The *Energy Industry Act* is one of many energy related acts that give effect to Germany's energy and environment policy. Renewable energy sources are privileged under the *Renewable Energy Act* 2000 and the *Combined Heat and Power Act* 2000. Under section 3 of the *Renewable Energy Act*, grid owners must access energy suppliers producing energy from renewable sources at certain minimum

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<sup>64</sup> Lockwood, M. (2015). *The Danish System of electricity policy-making and regulation*. Retrieved 9 February 2017, from <http://projects.exeter.ac.uk/igov/wp-content/uploads/2015/06/ML-Danish-model-of-regulation.pdf>

<sup>65</sup> Ibid.

<sup>66</sup> Danish Energy Regulatory Authority, *Results and Challenges 2012*, retrieved 14 February 2017 from [http://old.efkm.dk/files/dokumenter/side/results\\_and\\_challenges2012\\_web.pdf](http://old.efkm.dk/files/dokumenter/side/results_and_challenges2012_web.pdf)

<sup>67</sup> <http://www.energinet.dk/EN/KLIMA-OG-MILJOE/Sider/default.aspx>, retrieved 16 February.

rates provided for in sections 4 - 8. The Federal Ministry for Economic Affairs and Energy reports that almost one third of Germany's electricity comes from wind, solar and biomass, making renewables the number-one source of electricity.<sup>68</sup> Other key legislation includes the *Energy and Climate Protection Act* and the *Energy Services Act*.

In 2010 the German government adopted the Energy Concept, a comprehensive strategy for a long-term integrated energy pathway to 2050. Then, following the Fukushima nuclear accident in March 2011, Germany decided to accelerate the phase-out of nuclear power starting with the closure of eight of the oldest plants. This decision ensured renewable energy would be the cornerstone of the future energy supply and it resulted in the adoption of a suite of new policy measures commonly known as the *Energiewende* (the "Energy Transition"). *Energiewende* has targets including greenhouse gas reductions of 80–95% by 2050 (relative to 1990) and a renewable energy target of 60% by 2050.<sup>69</sup> These ambitious targets go further than the requirements of European legislation and the national policies of many other European states and have resulted in a huge expansion of renewables, particularly wind power in Germany.

More recently the German parliament passed three pieces of legislation concerning the further development of the electricity market, the "digitisation" of the energy transition, and the revision of the *Renewable Energy Sources Act*.<sup>70</sup> This has brought the various strands of the energy transition (the energy market, energy efficiency, grids, etc.) together under a consistent framework, where previously each were treated as separate elements. An overarching framework for measuring the achievement of objectives and targets for the energy transition have been set. Objectives include deploying low cost solutions and optimal system integration for renewables to ensure that energy remains affordable for consumers.

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<sup>68</sup> *The Energy Transition Is Making Progress*. Federal Ministry for Economic Affairs and Energy, <http://www.bmwi.de/Redaktion/EN/Dossier/energy-transition.html> retrieved 13 February 2017.

<sup>69</sup> *The Federal Government's energy concept of 2010 and the transformation of the energy system of 2011* (PDF) Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU). October 2011, Retrieved 14 February 2017 at [http://www.germany.info/contentblob/3043402/Daten/3903429/BMUBMWi\\_Energy\\_Concept\\_DD.pdf](http://www.germany.info/contentblob/3043402/Daten/3903429/BMUBMWi_Energy_Concept_DD.pdf).

<sup>70</sup> *The Energy Transition is Making Progress*. Op.cit.