A description and critique of the National Energy Guarantee

Briefing prepared for the Australian Conservation Foundation

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Executive summary

The Australian Conservation Foundation has asked us to provide a concise expert briefing on the Australian Government's National Energy Guarantee (NEG). Specifically, we are asked to describe and critique the NEG and advise on its likely impact on wholesale and retail markets, coal generation closure, investment in renewables and power system security.

The NEG was introduced after the Government rejected the key recommendation of the Finkel Review to establish a Clean Energy Target. In its place, the NEG imposes an obligation on retailers to ensure that the average emission intensity of the electricity they sell does not exceed a target level. It also obliges retailers to procure "dispatchable" power.

We have many concerns with this approach:

- Firstly, a critical issue hiding in plain sight and not yet widely understood is that establishing retailers' emission intensity will require that they are able to identify which generators produce the electricity that they sell. This means that the existing mandatory spot market – which does not identify which generators are used to supply the electricity that retailers buy from the spot market – will need to be disbanded. Disbanding the spot market and its settlement systems and also terminating financial contracts that are struck relative to the prices in this mandatory spot market will require many years to complete and will result in transition costs in the hundreds of millions of dollars.

- Second we do not believe that the NEG will establish an effective market in emission reduction. The stated purpose of the policy is to not establish a price on emissions. The absence of an emission price, makes it harder for buyers and sellers to find each other and to find prices that they are willing to trade at. The resulting transaction costs and illiquidity undermines operational and investment efficiency. This makes the task of emission reduction more costly than it would be if mechanisms were designed with the intention of ensuring an efficient and transparent market. While customers are the common losers from

this approach, it does nonetheless provide a relative advantage for incumbent vertically integrated producers relative to smaller new entrant generators and retailers.

- Third the implementation of emission intensity obligations on retailers will require a large bureaucracy to account for all electricity produced by generators and sold by retailers and to account for the contracts between generators and retailers, between generators and generators, and between retailers and retailers. It is only with such accounting that the retailers' emission intensity claims can be verified.

- Fourth with respect to the dispatchability obligation, this inserts retailers between the producers of power system services (the generators, flexible load and storage providers) and the consumer of these services (the Australian Energy Market Operator). Contrary to the stated purpose of this obligation, it will undermine power system security by introducing needless complexity and bureaucracy.

We conclude that the NEG is likely to deliver outcomes that will protect coal generators from competition provided by renewables and batteries and will undermine the efficiency of investment in renewable generation capacity. It can be no surprise that there is no evidence in Australia or internationally of an approach similar to the NEG having ever been implemented or even proposed.

Australia's economic and policy institutions have a long history of providing high quality emission reduction advice. This can be seen in the precise taxonomy of emission reduction policy approaches set out in the 1994 Australian Government Cabinet Papers, in the 2006 report of the National Emission Trading Task Force, in the 2007 report of the Prime Ministerial Task Group on Emissions Trading, in the 2008 Garnaut Climate Change Review and in the 2011 Update to the Garnaut Climate Change Review and in the most recent work of the Finkel Review. This begs the question of why an approach as problematic as the NEG has been developed?

There is an obvious explanation: the NEG responds to the Government's demand for an emission reduction approach that does not provide a visible price on emissions. This is

manifest in the emphatic response by the policy's architect, John Pierce, to the suggestion that the NEG would effectively price emissions: "*we are not pricing carbon*"[1].

But this claim is not sustainable. If emissions are to be reduced they will need to be made scarce and this scarcity creates demands and in turn prices. Arrangements such as the NEG that set out to obscure the price, are effectively setting out to make a market that is less efficient and more complex than it otherwise would be.

We were asked to address the question of whether the NEG can be made to work:

- In brief the dispatchability obligation will not ever be meaningfully workable. It should be dropped.

- With respect to the emission intensity obligation, if Government policy changed so as to require the meaningful reduction of emissions and the expansion of renewable generation, an emission intensity obligation on retailers can deliver this. However, it will not do so efficiently and many years of market redevelopment will be needed before it can be implemented. The inefficiencies – which originate in the intention to obscure prices and consequently undermine market efficiency - will grow ever larger as Australia gears up to deliver ever greater emissions reductions from its electricity sector, in response to its international commitments.

Finally, we were asked if anything good might be said of the NEG. A consequence of arrangements that the NEG envisages is that it will be possible to accurately establish retailers' emission intensity. This will allow customers to give effect to their stated concern about greenhouse gas emissions by selecting a retailer whose emission intensity satisfies their preference. This is not possible now since, with anonymous

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[1] See http://www.smh.com.au/federal-politics/political-news/energy-policy-architect-plays-down-carbon-price-fears-as-malcolm-turnbull-calls-for-end-to-climate-wars-20171019-gz480y.html

supply through the mandatory spot market, it is not possible to objectively measure the emission intensity of electricity supplied by competing retailers.

1 Introduction

The Australian Conservation Foundation asked us to provide a concise briefing on the Australian Government's National Energy Guarantee (NEG) policy. Specifically, we are asked to describe and critique the NEG and advise on its likely impact on wholesale markets, coal generation closure, investment in renewables and power system security.

The NEG that we describe and critique in this report is set out in a letter dated 13 October 2017 marked "Advice" addressed to the Minister of Energy in the Australian Government and signed by all the members of the Energy Security Board (ESB). The Minister presented the advice contained in this letter to the Coalition Party Room on 16 October 2017 and the NEG was announced as a policy by the Australian Government on the 17th of October 2017. Subsequent modelling of the NEG has been undertaken by Frontier Economics and purports to support the claims that the Government made, inter alia, about household electricity bill reductions attributable to the NEG. We do not critique that modelling here and think it should be dismissed out of hand: how can it be plausible to quantify a policy that has not even been specified clearly at a conceptual level?

The essential feature of the NEG is that retailers will be exposed to an emission intensity obligation for the electricity that they sell. They will also face an obligation to procure "dispatchable" generation (i.e. "slow start" and "fast start" capacity). This approach has no precedent in Australia or in other countries.

As we explain in this briefing, the implementation of the NEG will require that the existing wholesale spot market - formally the "National Electricity Market (NEM)" - is abandoned. Forward and futures contracts (which by definition do not specify physical delivery) will also become impossible. Contracts between generators and retailers under the NEG will generally require physical production from identified generating units. [2]

[2] It is possible that standardised financial contracts that by definition do not specify physical delivery will be possible from renewable generators since they all have zero emissions. This is discussed in more detail later.

A large bureaucracy will be needed to enforce compliance with both the emission intensity and dispatchability obligations by gathering and aggregating data on every contract entered into by every retailer for every MWh that they supply.

2 Description

The NEG has two elements:

- An emission-intensity obligation; and
- An obligation to procure "dispatchable" generation.

Emissions intensity obligation

The emissions intensity obligation applies to retailers and requires that the emissions intensity (tonnes of CO_2-equivalent per MWh that retailers sell) does not exceed a (yet to be) defined level. Retailers that consistently fail to comply with the obligation will lose their licence to sell electricity.

The obligation in the NEG for retailers to maintain the emission intensity of the electricity they sell below a target, provides incentives for retailers whose average emission's intensity will otherwise exceed the target, to procure production from generators whose emission intensity is below the target. This creates additional demand for lower emission generation and will lead to relative price differences between lower and higher emission generation.

Of all the various emission reduction and renewable promotion schemes that exist, the NEG is most similar to the RET, but in substance it is fundamentally different. The NEG is similar to the RET in the sense that it places obligations on retailers. In the case of the RET the obligation is to procure to a defined volume of certificates. In the case of the NEG the obligation is to ensure average emission intensity of electricity sold is below a defined level. For the RET the certificates are financial instruments (currencies of a sort) which in the case of the Large scale Generation Certificate is denominated in MWh of production created by an eligible unit. It is this financial instrument which provides a transparent price for the obligation and which retailers, producers and financial intermediaries can trade against.

By contrast under the NEG there is no such tradable instrument: for a retailer to achieve its obligations under the NEG it has to enter into a physical contract with a specific

generator. The price in that transaction is not transparent and unlike LGCs it is not possible to create tradeable financial instruments[3].

In addition, hiding in plain site with the NEG, and not yet widely understood at the time of writing this, is that under the NEG retailers will have to identify the specific sources (i.e. generating units) of the electricity that the retailers sell to their customers. This means that retailers' will invariably need to specify exactly which generating units have been contracted to produce the electricity that they sell. This does not allow for anonymous mandatory power pools – of which the NEM is one. This is because power pools are not able to relate the electricity that generators sell into the pool, to the electricity that retailers buy from the pool.

To implement the emissions intensity requirement in the NEG, the existing mandatory spot market will therefore need to be abandoned. In its place arrangements will need to be developed in which retailers enter into physical contracts with producers and in which contracts specify precisely which generating units provide the electricity that those retailers sell to their customers. [4]

The implementation of the NEG will also require that financial swap contracts such as the Base Load, Peak and Cap contracts traded on the ASX will need to be abandoned. This is because these financial contracts do not specify physical delivery from defined sources – they provide price hedges for defined volumes from undefined sources struck against the spot price.

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[3] With the possible exception of zero emission intensity renewable generation whose uniform emission intensity may support standardised financial contracts.

[4] It will be impossible for the vast majority of retailers to construct portfolios of contracts that exactly match the temporally varying demands they face. Some form of balancing market will be needed. We can not see how the emission intensity of purchases from the balancing market can be other than an average value. The volume of retailers' purchases from the balancing market will need to be restricted to a small portion of the total electricity that they sell or their emission intensity will be no better than the average of the balancing market.

Forward contracts such as those currently established bilaterally, or through over-the-counter markets or facilitated by brokers will need to be changed so that the contracts specify exactly which generators are contracted and obviously they will need to be settled directly not with respect to spot prices (since the spot market will no longer exist).

With the unavoidable abandonment of the spot market and its Regional Reference Prices and consequent Inter-Regional Settlement Residues that arise from inter-regional trade, new arrangements will be needed to, somehow, allocate interconnector capacity through physical rather than financial contracts.

To enforce the emissions intensity obligation, the Australian Energy Regulator will need to collect and process information from all generators and all retailers of all electricity produced, contracted and sold. The AER will need to reconcile these accounts so that all production can be allocated to retailers (or self-supplied customers) and after taking account of network losses. This is needed to establish the emission intensity of the electricity provided by each retailer.

Dispatchable generation obligation

The dispatchable generation obligation is an obligation on retailers to procure a certain amount of "dispatchable" generation. We understand the underlying intent here is to require retailers to procure generation that is produced by some form of stored and controllable fuel supply (such as by coal or gas fired generators) or hydro generation with controllable run-of-river or reservoir supply, or from some form of produced but stored electricity (such as from grid-connected or distributed batteries or pumped hydro).

Again there is no precedent in Australia or internationally for placing such "dispatchability" obligation on retailers. The conventional approach in electricity markets is to define power system security as a market externality (it arises as the consequence of the physical and operational characteristics of shared access to a synchronised electrical system that performs according to Ohm and Kirchoff's laws and needs to be operated within tight bounds).

The model used in all electricity markets around the world including in Australia is to place an obligation on power system operators to procure the necessary changes to production needed to ensure power system security. In some cases, such as in the NEM, ancillary markets provide for competition in the supply of services that the power system operators need to balance the power system (such as increasing or decreasing production at specific minimum rates over various time periods with varying levels of notice). In some cases such as in Britain since 1994, the power system operator has been exposed to regulatory incentives to encourage it to manage the externality at least cost to consumers.

3 Critique

Our assessment is developed in our response to the following questions:

1. Will the NEG deliver an efficient market in emission reduction?
2. Will the NEG deliver power system security ?
3. Will the NEG promote competitive wholesale markets ?
4. Will the NEG affect coal generation closure ?
5. Will the NEG promote renewable investment ?
6. Despite its flaws, can the NEG nevertheless be made to work ?

3.1 Will the NEG produce an efficient market in emission reduction?

Markets work well when there are many buyers and sellers, prices are transparent and it is easy to trade (search costs and transaction costs are low). The main policy objective that the NEG is designed to satisfy, as evidenced in John Pierce's statements[5], is to reduce emissions without pricing them. In order words, to develop a market in which prices are obscured or, ideally, not at all visible. A corollary of poor price discovery is inefficient trade. Without a transparent price it is harder for buyers and sellers to find each other and agree mutually acceptable bargains. It is also harder for them to hedge their exposure to future price risks and this undermines their ability to make efficient investment decisions.

Despite the intent of the policy to not price emissions, an emission intensity obligation will nevertheless create a demand for market platforms that will allow buyers and sellers to trade. However a market that requires retailers' emission intensity to be established will require that the dominant contract form is physical, not financial, in

[5] "We are not pricing carbon"

order that the retailers' emission intensity can be established[6]. In this context, a financial contract market for fossil fuel generation will be impossible since the emission intensity of individual fossil fuel plants varies so widely that a standardised financial contract with specified emission intensity can not be established.

Standardised financial contracts for the provision of emission-free generation such as from wind or solar should however be possible. However emission-free production will only account for a small proportion of aggregate supply until much further into the future.

The consequence of poor price discovery and limited ability to hedge price risk is less efficient trade. There will be a proliferation of bilateral, non-standard contracts with bespoke products and terms. This can be expected to dramatically increase the effort and time the retailers needed to invest in order to procure the energy that those retailers then sell to their customers. This undermines the price transparency and tradability attributable to the standardised contract forms that are widely used now.

Even buyers and sellers that manage to find each other in a world of bilateral physical contracts will find trade more difficult since buyers will require lower prices and sellers higher in order to compensate them for risks that they can not effectively manage.

Search costs and transaction costs undermine efficiency. The impact of this is not just lower operational efficiency (opportunities to dispatch the least expensive generation are missed). Investment will also be less efficient: more money will be needed to deliver the same quantum of new investment than if the market functioned effectively.

The loss is to retailers and producers and ultimately to consumers. New entrant generators and retailers who are not vertically integrated and so rely more heavily on contracts to procure the electricity they sell, will lose disproportionately more than the vertically integrated retailers who can meet most or all of their customers;' needs

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[6] You have to be able to trace the origin of the electricity that you sell in order to establish the emission intensity of your sales.

without contracting. Smaller retailer and new entrant generators may battle to survive as they will not have the human or financial resources to engage effectively in an opaque and complex market.

The ultimate cost of this inefficiency is borne by consumers in the form of higher electricity prices, in emission reductions that are more expensive and in a less secure power system.

3.2 Will the NEG deliver power system security ?

Power system security in the NEM is the accountability of the power system operator, the Australian Energy Market Operator. Making the power system operator accountable for the security of the power system is the universal norm: it alone has the information needed to do this.

The NEG proposes to make retailers individually and collectively liable for power system security by requiring them to buy "slow start" and "fast start" generation. This is a change from the existing situation where AEMO procures such services directly from generators (occasionally) or (mainly) through frequency control ancillary services markets where generators compete to meet demand that AEMO determines.

The implementation of the NEG's dispatchability obligation will therefore require AEMO to procure the slow and fast start services it needs, not from the producers of such services – batteries, flexible demand and generators – but from retailers who in turn are required to procure such capacity.

In effect the NEG imposes another layer of market participant – the retailers – between the producers of power system services (generators, batteries and flexible demand) and the customer of those power system services (AEMO). This serves no useful purpose. To the contrary, it will massively increase complexity and undermine AEMO's ability to efficiently procure the services it needs to operate the power system. AEMO should be buying these services directly from the entities that supply them, not from passive intermediaries who themselves have no expertise (or interest) in procuring the most

efficient or effective forms of "slow start" and "fast start" capacity. It can be no surprise that this approach has no precedent in any power system anywhere, ever.

The challenges of ensuring supply continuity in the context of increasing market penetration of intermittent renewables are complex and uncertain. Technology developments in batteries and in unlocking price-responsive demand are moving incredibly quickly.

The appropriate future arrangements are uncertain and there is now an extensive contemporary academic and practitioner literature[7] on the issues. The Finkel Review suggested a potential obligation on new entrant renewable generators to firm their supply. There is increasing evidence that this approach is being adopted around the world. Professor Helm's recent "Cost of Energy" Review[8] suggested an "equivalent firm access" arrangement. This too merits careful further consideration. Unlike the NEG, Finkel and Helm's ideas and also the other academic and practitioner literature correctly focusses on producers/batteries and flexible loaded rather than on retailers.

3.3 Will the NEG promote competitive markets ?

The NEG will have a seriously detrimental effect on the competitiveness of wholesale and retail electricity markets:

- Firstly, as described it drastically reduces the scope for price risk management through financial instruments. These instruments in the NEM, as in other commodity markets, trade in volumes that are several times greater than the underlying physical volumes. Financial market participants that currently play a critically important role in pricing and managing risk, can not exist under the NEG. This will significantly undermine the competitiveness particularly of new

[7] BOLLINO, C. A. & MADLENER, R. 2016. High shares of renewable energy sources and electricity market reform: Special Issue 2. *The Energy Journal,* 37.

[8] See for example HELM, D. 2017. Cost of Energy Review. London.

entrant retailers who do not own or control the production that they sell (and so will depend on contracts more than the vertically integrated participants).

- Second, the NEG will provide a competitive advantage to the dominant incumbent retailers who already control the majority of generation capacity in the NEM. This is because new entrant retailers will have no choice but to contract with the incumbent generator/retailers for their physical supply. This will provide those incumbents with information advantages on the trading position of their new entrant competitors.
- Third, the NEG will discourage merchant generation. In the NEM currently, merchant generation entry (i.e. generators that do not hedge their price exposures though long-term off-take contracts) is possible and increasingly common. The merchant generators can accept full exposure to spot prices or hedge price risks with swaps typically up to two years ahead. With the NEG, merchant generators lose the opportunity to sell at the spot price (the spot market will cease to exist) and will instead be required to enter into physical supply contracts with retailers. Narrowing potential markets in this way provides a competitive advantage to retailers relative to generators, particularly relative to incumbent retailers who benefit from vertical integration, as discussed.

3.4 Will the NEG affect coal generation closure ?

The Australian Government has made clear its intention to promote the longevity of existing coal generators particularly those at risk of closure in the short to medium term (for example Liddell) and it has lamented the recent closures of coal generators in South Australia and Victoria. While the NEG will not *necessarily* affect coal generation closure, through the "dispatchability" obligation, the NEG provides a mechanism for the protection of coal generator revenues in light of the competitive threat arising from new entrant renewable generators.

While the NEG will not *necessarily* delay coal generation closure relative to "business as usual", it would be naïve to be blind to the Government's policy to prevent the closure of existing coal generation, when assessing the NEG. Indeed a plausible explanation for the dispatchable generation obligation is to secure the market for coal generators by

securing a regulated income stream in the form of mandatory obligations on retailers to procure slow and fast start capacity from them.

3.5 Will the NEG promote renewable investment ?

The Government's modelling of the NEG shows that it will substantially reduce the rate of grid-connected renewable generation expansion relative to recent trends. However, investment in renewable generation will accelerate, even with a market as envisaged under the NEG, if more more demanding emission intensity targets are established. But a tougher emission reduction policy can be expected to promote renewable investment irrespective of the policy approach adopted. The relevant question is whether, even if tougher emission targets were adopted, the NEG would deliver renewable capacity efficiently: in other words, for the same quantum of investment would more capacity be developed under the NEG than alternative policy approaches? The answer to this question as explained earlier, is surely not. The NEG sets out to deliver an inefficient and opaque market that hides emission prices. This will undermine competition in wholesale and retail markets and by definition this reduces investment efficiency.

3.6 Can the NEG nevertheless be made to work?

We are asked to address the question of whether and if so how, the NEG can be made to work.

We do not believe that the dispatchability obligation can be made to work. It adds cost, bureaucracy and complexity and reduces power system security by adding passive intermediaries (retailers) between producers (generator, flexible load and batteries) and the consumer (AEMO).

With respect to the emission intensity obligation, a mandatory spot market (a pool) as exists now can not continue to exist as long as retailers are exposed to an emission intensity obligation under the NEG. As discussed, under the NEG retailers will need to enter physical contracts that specify the emission intensity of the generation that they

buy. We see a very limited role for financial contracts in this new arrangement (as explained earlier they are likely to be limited to production from zero emission generation for which standardised contracts can be developed).

Ultimately this arrangement is workable (voluntary markets are common in other countries indeed the mandatory market in Australia is somewhat unusual) but it will take many years to transition to a voluntary market with the necessary organised balancing market and it will inevitably give rise to large transition costs as existing institutions need to be dismantled and new ones established[9].

We also think large costs in enforcement are unavoidable: as long as retailers need to establish the emission intensity of their sales, the AER will need to develop a system of accounts that tracks all contracts between all grid-dispatched generators and all retailers (and between generators and generators or retailers and retailers) and relates production to sales so that the retailers' claim of their emission intensity can be verified. Again this is do-able but it will be very expensive and it too will take many years to develop.

With respect to the question of whether it is possible to improve the efficiency of the market for emission reductions, we hold limited hope that efficient arrangements can be developed. The NEG sets out to impede price discovery. The prices and risk management mechanisms that will evolve under this policy will develop in spite of, not because of, the policy. There will surely be limited scope for financial contracts – these will be limited to zero emission sources for which standard contract forms might arise.

While both retailers and producers (and ultimately consumers) lose under this arrangement, the new entrant generators and retailers and those that are not vertically integrated will lose disproportionately more relative to the incumbent vertically

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[9] The choice between a mandatory market as in the NEM or in Texas, or voluntary markets with balancing mechanisms (as generally elsewhere) is a complex choice. It should be considered on its merits rather than being forced as a consequence of an emission reduction approach. A dog should wag its tail not the other way around.

integrated generator/retailers who through their ability to supply their customers from production they own and control have less need for contracts with independent generators.