Centre for Energy and
Environmental Markets

Working Paper on the proposed Optional Firm Access model for the Australian National Electricity Market

by

Dr Jenny Riesz*, Dr Joel Gilmore, Assoc. Prof Iain MacGill

Centre for Energy and Environmental Markets
University of NSW

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*Corresponding author: Centre for Energy and Environmental Markets,
The University of New South Wales, Sydney, NSW2052, Australia.
Tel.: +61 411 042 502, E-mail: j.riesz@unsw.edu.au

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About CEEM and this discussion paper

The UNSW Centre for Energy and Environmental Markets (CEEM) undertakes interdisciplinary research in the design, analysis and performance monitoring of energy and environmental markets and their associated policy frameworks. CEEM brings together UNSW researchers from the Australian School of Business, the Faculty of Engineering, the Institute of Environmental Studies, and the Faculty of Arts and Social Sciences and the Faculty of Law, working alongside a growing number of international partners. Its research areas include the design of spot, ancillary and forward electricity markets, market-based environmental regulation, the integration of stochastic renewable energy technologies into the electricity network, and the broader policy context in which all these markets operate.

The Australian Energy Market Commission (AEMC) is currently developing an Optional Firm Access (OFA) proposal for transmission within the Australian National Electricity Market (NEM). CEEM welcomes the opportunity to contribute to this important and potentially far-reaching process through this discussion paper.

This paper draws on a range of work by researchers associated with the Centre on facilitating renewable energy integration within the NEM, being undertaken through projects that are funded by partners including CSIRO and the Australian Renewable Energy Agency. It also draws upon more general work exploring the challenges and opportunities for a future low-carbon Australian electricity industry. Relevant papers and presentations, and more details of the Centre can be found at the CEEM website – www.ceem.unsw.edu.au.

This is an area of ongoing work for CEEM and we are actively seeking feedback and comments on this discussion paper, and on related work. The corresponding author for this paper is:

Dr Jenny Riesz
Centre for Energy and Environmental Markets,
The University of New South Wales, Sydney, NSW2052, Australia.
Tel.: +61 411 042 502
E-mail: j.riesz@unsw.edu.au

www.ceem.unsw.edu.au

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Executive Summary

The Optional Firm Access (OFA) model, as proposed by the Australian Energy Market Commission (AEMC) represents potentially the most significant change to the operation of the National Electricity Market (NEM) since its establishment more than a decade ago. The NEM itself is currently facing a range of growing challenges. Key amongst these is the evident need to greatly reduce electricity sector emissions over the next three decades if Australia is to appropriately contribute to global climate change mitigation.

In this discussion paper, the Centre for Energy and Environmental Markets (CEEM) aims to provide some preliminary analysis of the OFA proposal, highlighting areas that may need further consideration, and providing alternative suggestions that may assist in the more detailed AEMC design work progressing at present. This analysis is based upon the proposals provided in the Technical Report published in April 2013 [1]. The AEMC and AEMO have been working to develop these proposals for some time since this document was published, and therefore some of the issues raised in this paper may of course have already been taken into account based upon earlier stakeholder consultation.

Two key areas are addressed in this document:

- Transitional access arrangements (OFA implementation), and
- Firm access pricing methodologies.

We consider these within the context of key NEM objectives including protecting the longer term interests of consumers, and providing competitive neutrality between different electricity generation technologies and between existing and possible new industry participants. These objectives have a key role in facilitating socially beneficial outcomes from competitive market arrangements. Transmission and distribution network access, operation and investment poses particular challenges in this regard due to its inherent natural monopoly characteristics. From the start of micro-economic restructuring of the NEM, the principle of open access and common carriage for networks has been seen as key to supporting dynamic efficiency (including investment, exit and longer-term market transition) [2]. Growing challenges with congestion management and the potential inequity of not charging generators for their use of the Transmission system (TUOS) are both valid reasons for revisiting current arrangements but, if inappropriately implemented, the proposed changes may actually work against the primary objective of effective and efficient competition.

Transitional access arrangements

CEEM identifies the potential for a number of issues with the proposed OFA transitional arrangements:

Barriers to Entry – A competitive disadvantage for new entrants

Under the proposed OFA transition process, incumbent generators are given a significant proportion of their required firm access for free, while new entrant generators will need to purchase any firm access at a price reflecting its value. This creates a clear and significant competitive disadvantage for new entrants.

Treatment of incumbent exit

The treatment of incumbent exit under the proposed arrangements will also have a critical influence on the success of the transition process. With the proposal of sculpted access being retained for the "residual power station economic life" all identified options for managing market exit appear to be problematic.

If the "residual life" of each generator is negotiated prior to OFA start, and generators retain transitional access until that date, this is likely to encourage significant rent seeking behaviour. The allocation process will be complex, challenging, and involve very high stakes. Furthermore, information asymmetry and present energy governance challenges are likely to create the potential for significant windfall gains by the largest and best resourced market participants, disadvantaging smaller participants and hence consumers.

By contrast, if transitional access is retained until the generator retires this creates a significant barrier to exit. Alternatively, if transitional access is retained in perpetuity (allowing generators to sell transitional access upon retirement), incumbents will receive a significant windfall gain, creating an unnecessary wealth transfer from new entrants and consumers.

Inhibiting transition to low carbon supply

Due to the potential for barriers to entry and exit, and the exacerbation of competitive disadvantage for new entrants, the proposed arrangements could actively inhibit the transition to a low carbon electricity system, working in opposition to existing and possible future low carbon policies such as the Renewable Energy Target, carbon pricing and emission reduction funds.

Present modelling studies suggest that many existing generators may still be operating in 2050 under some scenarios, implying that the electricity system might well remain in a state of transition towards implementation of the OFA model for the next thirty-five years to 2050 and beyond. By way of comparison, it is worth noting that the present electricity market has only been in operation for just over a decade, and that this transition timeframe is very long by comparison. It may be prudent to consider reducing the transition period so that full operation of the OFA model can be achieved in a shorter timeframe (such as five to ten years).

Transition arrangements for the introduction of the NEM such as the use of vesting contracts for some large participants provide a possible basis for comparison. There was explicit consideration of the potential impacts of these arrangements on new entry and competition. Indeed, the various State vesting contracts were reviewed by the Australian Competition and Consumer Commission (ACCC) and generally ran for only a few years (see for example [3]).

It appears counterproductive to implement a regulatory change that actively inhibits the smooth operation of present and future policies which will be required to support a managed transition towards low carbon generation. It would be prudent to carefully identify any barriers to exit or entry that may arise from the proposed OFA transition process, and quantify their potential impact on the low carbon transition. If and where it is found that the OFA transition could interfere with the operation of policies such as the Renewable Energy Target, carbon pricing, and other low carbon incentive schemes, it would appear sensible to consider alternatives that work more coherently with the overarching policy framework.

Windfall gains for incumbents

These proposed arrangements are likely to represent a windfall gain for incumbents, providing them with confidence of a level of access beyond that under which they originally made investment decisions. In the present market, a new entrant can connect to the network at any time and freely partake of the present network access available. Access will be shared between new entrants and incumbents, based upon the local constraint equations applying in that area. These arrangements were clearly articulated in the relevant electricity laws and codes under which their investments were made. Thus, any incumbent should have taken into account the potential for new entrants to erode their present level of access at any time.

Rather than reducing perceptions of regulatory risk, this favouring of incumbents, largely operating emissions intensive coal plant, could raise greater regulatory risk for low emissions new entrants, increasing financing costs. This is particularly influential for renewable technologies which are very capital intensive, and therefore strongly affected by the cost of capital.

Gifting publicly owned assets to private companies

It is difficult to see how it is appropriate to freely and preferentially give access to the existing network to incumbent generators, when the network has been originally paid for by consumers; consumers that may well benefit from the increased competition provided by new entrants.

Alternative transition to OFA: Auctioning

A sensible alternative to gifting the existing shared network to incumbent generators would be to auction it, with generators who wish to purchase firm access doing so in a competitive process. This could be smoothed, if desired, by gradually increasing the level of firm access that is auctioned over time, and by capping the auction price at the LRIC value for each node. Auction revenues could be returned to consumers in the form of reduced TUoS payments over time.

Utilising an auctioning process alleviates all of the above identified issues. Furthermore, auctioning has been identified as strongly preferable to grandfathering in the extensive literature on the establishment of carbon markets, for a wide range of reasons (see for example [4, 5]). Although carbon markets are not perfectly analogous to markets for network access, it appears that there are significant parallels, and that valuable lessons can be drawn from the extensive analysis in this area.

Alternative transition to OFA: Scaled access for new entrants

If a full auction of network access was considered unworkable, then this second alternative transition process could be applied. The amount of access required to provide all market participants with 100% access would be determined, and then scaled downwards to the existing network capacity available. This would then be ramped downwards gradually over time.

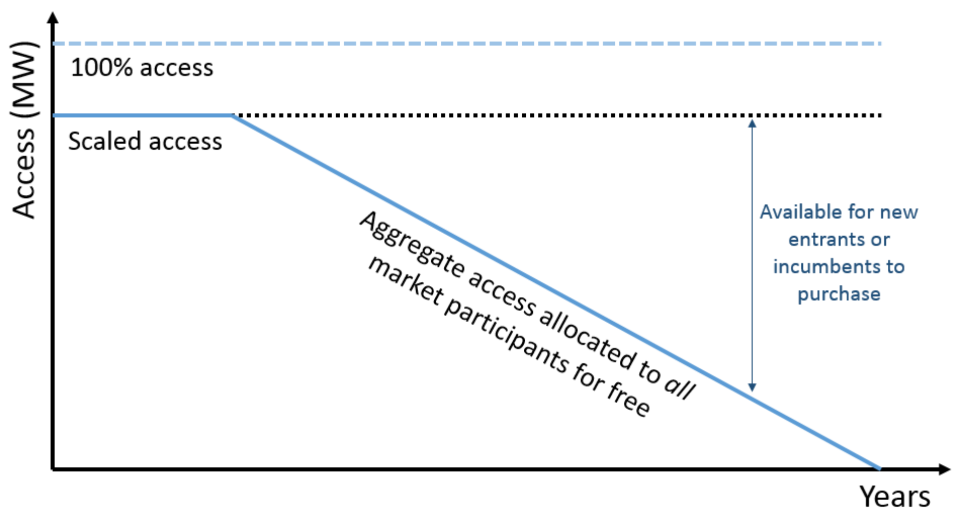
Importantly, access would not be retained at a residual level for any period of time; it would continue to decrease until it reaches zero at some future date, as illustrated in Figure 1. This would be the same date for all market participants, minimising rent seeking behaviour. If a generator retires before that date, they would be allowed to sell their remaining transitional access (reducing over time), thus removing barriers to exit.

Most significantly, under this approach, any new entrant during the transition period would also be allocated transitional access, on an equal footing with incumbents. Incumbents at the relevant network locations would have their transitional access scaled back accordingly, so that the total access allocated at that location reflects the proportion of transitional access available to all market participants at that time.

New entrants and incumbents alike would be able to purchase further access beyond the freely allocated amount if desired. This will be gradually made available to the market over time as the allocation of transitional access decreases.

Over the long term, this approach approximates the level of network access that incumbents could have expected when they invested. Access is provided for free initially, but new entrants can erode this access, as they would in the present system. It could be argued that this approach actually still provides greater certainty of network access over time for incumbents compared with the present system, since the sharing of network access upon the entry of a new entrant will be calculated in a more predictable fashion, rather than being based, potentially, upon the nuances of very small differences in constraint equation coefficients.

Figure 1 - Proposed alternative transitional access methodology



Forecasting challenges in access pricing

Serious challenges are identified in the access pricing process. Forecasting of future demand and generation is highly non trivial at any time, but most especially in the present environment of significant uncertainty. Although this issue also plagues the present RIT-T system, moving to OFA could jeopardise transparency, and may provide locational signals that are highly arbitrary.

The emergence of renewable technologies could create very different network topologies. Given that many of the best renewable resources are remote from existing load centres, nodes with a predominance of generation and minimal local demand may become typical (although it is worth noting that many fossil fuel resources are similarly remote from load centres, but presently have access to significant dedicated transmission infrastructure). The lack of local load growth will mean that flow growth is dominated by anticipated generation connections, which will strongly interact with each other. The queuing process and the treatment of the effect of anticipated generation connections on each other therefore needs detailed consideration.

Next Steps

We look forward to discussing these issues and proposed alternatives further with the AEMC and other potential stakeholders.

Contents

Introduction

The Optional Firm Access (OFA) model, as proposed by the Australian Energy Market Commission (AEMC) in the Transmission Frameworks Review represents potentially the most significant change to the operation of the National Electricity Market (NEM) since its establishment more than a decade ago. Thus, the Centre for Energy and Environmental Markets (CEEM) at the University of New South Wales has considered it an important area of analysis, amongst the many significant changes affecting the Australian energy landscape at present. Our aim has been to provide impartial analysis of the proposal from an academic and multidisciplinary perspective. We hope to highlight areas that may need further consideration, and to provide alternative suggestions that may assist in the more detailed design work progressing at present.

We note that the AEMC is intending to publish a report in August 2014 [6, 7]. That report is intended to consider key issues relating to transitional access and implementation options, as well as issues related to the access pricing methodology. Thus, this paper aims to address aspects of these two significant components where we feel we may be able to contribute constructively to the design process.

This paper is based upon the proposals provided in the Technical Report on the OFA model from the Transmission Frameworks Review, published in April 2013 [1]. We appreciate that the AEMC and AEMO have been working to develop these proposals for some time since this document was published, and look forward to the upcoming series of reports that will provide more detail on these deliberations. Some of the issues raised in this paper may have already been taken into account based upon earlier stakeholder consultation. However, we felt it was important to raise these issues at this stage, so that they can be usefully addressed in the upcoming reports in a timely manner. We look forward to engaging further with the AEMC and AEMO and constructively contributing to the OFA design process.

This paper addresses two aspects of the OFA proposal:

- The transitional access arrangements, relating to the phased implementation of OFA
- The access pricing methodology

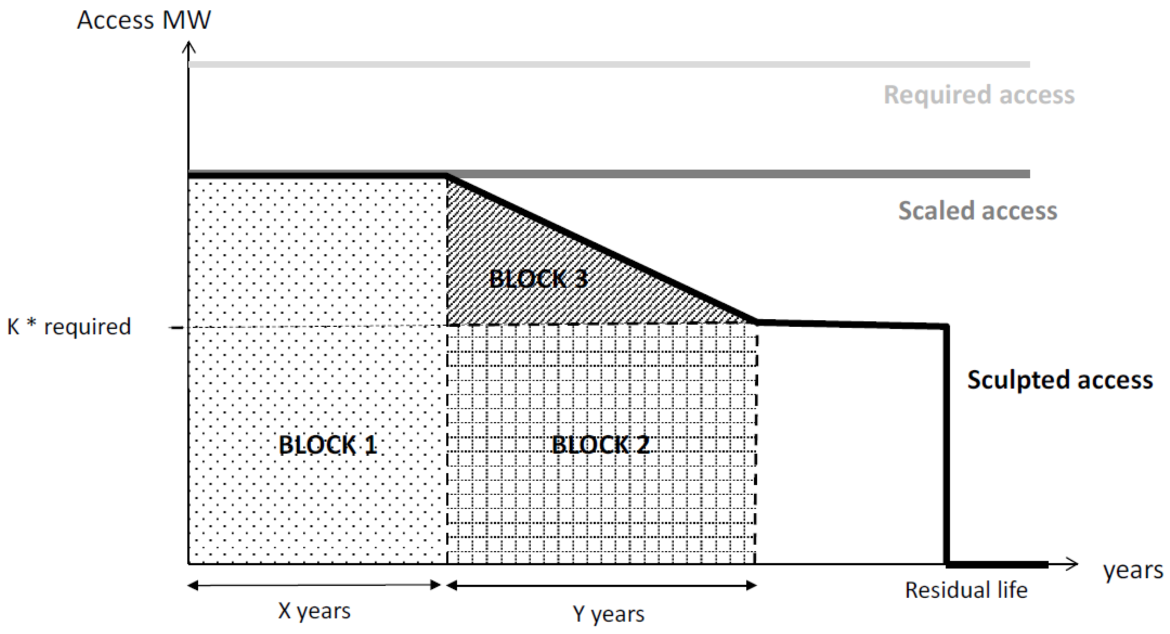
Each is discussed in the following sections. Where possible we have aimed to provide alternative design suggestions that may have the potential to ameliorate the identified issues.

1 Transitional Access Arrangements

1.1 Proposed transitional arrangements

The AEMC's Technical Report indicates that the intention is to allocate the whole firm capacity of the existing network to incumbent generators at the onset of the OFA model. This is then to be sculpted back over a period of time to some lower level, which existing generators would then retain for their "residual economic life". It is understood that in discussions with some stakeholders the AEMC indicated that sculpted access would be reduced to around 70-80% of its original level, which is consistent with the scale suggested in Figure 9.2 in the Technical Report, reproduced in Figure 2 below.

Figure 2 – Sculpting of transitional access for a Power Station (reproduced from [1])



The stated objectives of the transition process are [1, p. 64]:

- To mitigate any sudden changes to prices or margins for market participants (generators and retailers) on commencement of the OFA regime;
- To encourage and permit generators – existing and new – to acquire and hold the levels of firm access that they would choose to pay for;
- To give time for generators and Transmission Network Service Providers (TNSPs) to develop their internal capabilities to operate new or changed processes in the OFA regime without incurring undue operational or financial risks during the learning period; and

- To prevent abrupt changes in aggregate levels of agreed access that could create dysfunctional behaviour or outcomes in access procurement or pricing.

A number of potential issues with these proposed arrangements are identified:

1. These proposed arrangements could pose a significant barrier to entry, representing an externally imposed regulatory disadvantage for new entrants.
2. The treatment of incumbent exit under the proposed arrangements will have a critical influence on the success of the transition process. With the proposal of sculpted access being retained for the "residual power station economic life" all possible options for managing market exit appear to be problematic.
3. Due to the potential for barriers to entry and exit, and the exacerbation of competitive disadvantage for new entrants, the proposed arrangements could actively inhibit the transition to a low carbon electricity system, working in opposition to policies such as the Renewable Energy Target and carbon pricing.
4. These proposed arrangements are likely to represent a windfall gain for incumbents, providing them with confidence of a level of access beyond that under which they originally made investment decisions. Rather than reducing perceptions of regulatory risk, this favouring of emissions intensive incumbents could increase perceptions of regulatory risk for low emissions new entrants, increasing financing costs.
5. Arguably, it is not philosophically appropriate to "gift" access to the existing network to incumbent generators, when the network has been originally paid for by consumers.

Each of these is discussed in more detail below, and several possible alternative transition processes proposed in sections 1.7 and 1.8 which may feasibly eliminate these concerns.

1.2 Barrier to entry – competitive disadvantage for new entrants

Under the proposed OFA transition process, incumbent generators are given a significant proportion of their required firm access for free, while new entrant generators will need to purchase any firm access at a price reflecting its value. This creates a clear competitive disadvantage for new entrants.

Some access on the existing network will become available over time due to the proposed sculpting process. However, new entrants will need to compete with incumbents for the purchase of this limited quantity of existing access, such that the price could be expected to rise to its perceived market value, or to the cost of developing new access (through transmission augmentation). These costs could be significant, meaning that the competitive disadvantage for new entrants would be significant. If new entrants elect to not purchase firm access they will be exposed to the payment of compensation whenever constraints bind, reducing revenue. They also may experience increased difficulty in supporting contracts and securing financing, due to the reduction in revenue certainty created by the lack of firm access.

By contrast, incumbents will be allocated access for free, and therefore paid compensation based upon that access whenever constraints bind. They will also have increased revenue certainty to support contracting (beyond the levels of certainty they enjoy at present).

The clear competitive disadvantage created by this process is likely to inhibit the transition to low carbon generation alternatives, as outlined in section 1.4.

Given growing awareness about climate change and the likelihood of increasingly stringent policies to reduce emissions, most new entrants from this time are expected to be low carbon and renewable generation alternatives. Therefore, the introduction of a barrier to entry at this time could be argued to undermine the principle of technology neutrality.

Two possible alternative process which avoid this issue are outlined in sections 1.7 and 1.8.

1.3 Treatment of incumbent exit

The treatment of incumbent exit will be a key factor in determining outcomes of the OFA transition process. Three possible options are identified:

Option 1: "Residual life" negotiated for each generator at OFA start

Under this approach, the "residual Life" remaining for each generator would be negotiated and decided individually with each market participant prior to implementation of OFA. Generators would retain access for this period of time, but could retire and sell their transitional access prior to that date if desired.

Issues:

This approach is likely to encourage significant rent seeking behaviour. Transitional access has significant value, so market participants will have a substantial incentive to use whatever strategies possible to convince the regulatory body managing the allocation of transitional access that their generator will remain in the market for as long as possible. The largest organisations are likely to be able to most effectively engage in this rent seeking behaviour, and are therefore likely to benefit the most. Smaller organisations are likely to have far less resources and are therefore likely to be disadvantaged in this process.

Furthermore, information asymmetry creates high potential for windfall gains by incumbents, particularly during this period of significant uncertainty over future electricity market developments. The present political disinclination towards policies commensurate with serious greenhouse emissions reductions is likely to cast doubt on the potential for such policies in future. However, the climate science is clear and rapid transition in response to growing urgency is highly likely at some point in the coming decades [8]. The current political climate therefore exacerbates the potential for windfall gains by emissions intensive generators by creating a false perception of a prolonged (or non-existent) transition to low emissions.

The allocation process will be complex, challenging, and involve very high stakes. For example, it is proposed that market participants will be allocated transitional access based upon classification into one of six categories: baseload, mid-merit, peaking, intermittent, MNSP and Interconnector [1, p. 65]. Each will get a different initial access allocation in peak and off-peak times varying from zero to the generator's capacity. The past behaviour of many units will not clearly place them in one category or the other; for example, many large coal-fired units were originally intended as baseload plant, but given the present market oversupply have been operating in a mode that could be more accurately described as mid-merit or peaking. Thus, even this seemingly simple step is anticipated to be the source of heated debate and dispute.

Option 2: Transitional access retained until generator retires

Under this approach, each generator would retain transitional access until they actually retire. At this point residual access would be surrendered. Transitional access could not be transferred to another generator in the market participant's portfolio, or sold to another market participant, beyond the retirement date of the original generator.

Issues:

This approach creates a clear barrier to exit. If generators cannot retain valuable transitional access beyond retirement, closure and replacement of unprofitable assets is likely to be inhibited.

This also has broader policy implications. For example, the present Government (or a future Government) may consider the re-introduction of a "Direct Action" policy similar to the "Contracts for Closure" mechanism, aiming to directly pay compensation for early closure of emissions intensive generation assets. CEEM has previously published on the potential for a mechanism of this nature to exacerbate barriers to exit [9]. By gifting free access to incumbents, OFA has the potential to further inhibit the effectiveness of such a policy. During the negotiation of the fee that would be required to compensate for early closure, generators are likely to take into account the value of any firm access, and add this to the necessary compensation. This would make such a mechanism more expensive for the Government to implement.

Option 3: Transitional access retained in perpetuity

Under this approach, generators would be allocated transitional access which never expires. Upon retirement of the generator, the market participant would be able to transfer this transitional access to another generator in their portfolio, or sell the access to another market participant at a mutually negotiated price.

Issues:

This approach constitutes a significant windfall gain for incumbents. Incumbents would be given a large quantity of firm access with significant value, which they did not have or expect when they invested in those assets. This creates an unnecessary wealth transfer from consumers (who paid for the network originally through Transmission Use of System (TUoS) charges) to incumbent generators.

No good options

None of these options is appealing; all are exposed to significant problems. Two alternative approaches which avoid these issues are outlined below in Sections 1.7 and 1.8.

1.4 Inhibiting the low carbon transition

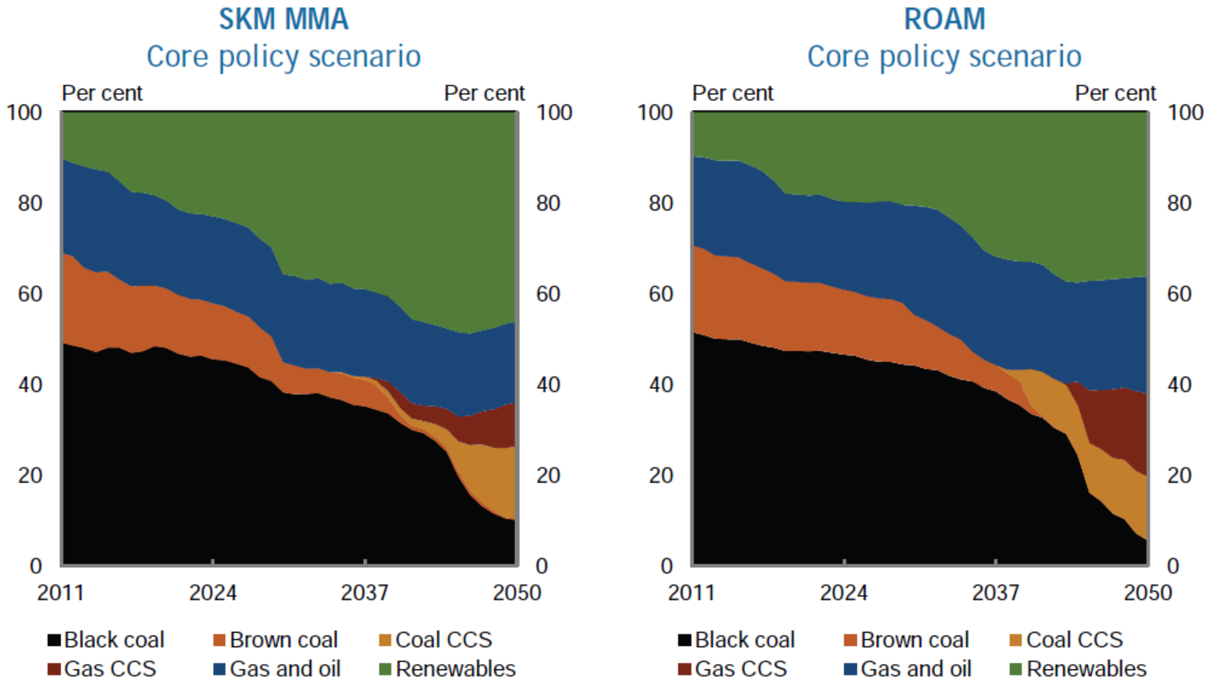
Issues related to barriers to entry and exit will be particularly important over the coming decades, in light of the necessary rapid transition towards lower carbon electricity sources.

We note that the Climate Change Authority has recommended Australia pursue a goal of a -19% reduction in greenhouse emissions by 2020, a -40 to -60% reduction by 2030, and achieve close to zero greenhouse emissions in the period 2040 to 2050 [10]. Given the significant challenges likely to be associated with emissions reductions in many sectors (such as aviation, agriculture, industrial processes, and so on), the electricity sector is likely to provide many of the easiest and most commercially viable opportunities to reduce greenhouse emissions rapidly. Therefore, if these goals are to be achieved the electricity sector could be expected to transition more rapidly, allowing space for more challenging sectors to follow later.

The highly emissions intensive nature of the existing electricity generation fleet will mean that achieving the rapid emissions reductions necessary will require closure and replacement of the majority of existing generation assets over the period 2015 to 2040 (if not earlier).

We note that the proposed OFA transition arrangements have the potential to significantly affect the move to lower carbon generation, given that transitional access is proposed to apply for "residual power station economic life". This implies that the electricity market will remain in transition towards OFA until all existing generation assets have retired (or were intending to retire). Present modelling studies indicate that many existing generators may still be operating in 2050, implying that the electricity system will remain in a state of transition towards implementation of the OFA model for the next thirty-five years to 2050 and beyond, as illustrated in Figure 3 for example. By way of comparison, it is worth noting that the present electricity market has only been in operation for just over a decade, and that this transition timeframe is very long by comparison.

Figure 3 – Treasury "Strong Growth, Low Pollution" modelling outcomes [11]



It may be prudent to consider reducing the transition period so that full operation of the OFA model can be achieved in a shorter timeframe (such as five to ten years). This would also help to alleviate concerns around barriers to entry and exit created by the OFA transition process, since any impacts would affect the operation of electricity market for a reduced period of time.

Regardless, it appears counterproductive to implement a regulatory change that actively inhibits the smooth operation of present and future policies which will be required to support a managed transition towards low carbon generation. It would be prudent to carefully identify any barriers to exit or entry that may arise from the proposed OFA transition process, and quantify their potential impact on the low carbon transition. Where it is found that the OFA transition could interfere with the operation of policies such as the Renewable Energy Target, carbon pricing, and other low carbon incentive schemes, it would appear sensible to consider alternatives that work more coherently with the overarching policy framework.

Transition arrangements for the introduction of the NEM such as the use of vesting contracts for some large participants provide a possible basis for comparison. There was explicit consideration of the potential impacts of these arrangements on new entry and competition. Indeed, the various State vesting contracts were reviewed by the Australian Competition and Consumer Commission (ACCC) and generally ran for only a few years (see for example [3]).

The creation of competitive disadvantages for new entrants, barriers to entry and barriers to exit means that these support policies will need to work harder, and be perpetuated for a longer period of time. New entrants that are supported by these schemes will need increased support to overcome the increased barriers. For example, the shortfall charge in the Renewable Energy Target will need to be increased, and the level of carbon price required to produce change will be elevated. This will have deep and complex consequences for the way in which these policies affect other economic sectors which are reliant upon electricity, exposed to carbon pricing or liable to purchase renewable energy certificates. An alternative approach that avoids barriers to entry and exit, minimises competitive disadvantages for new entrants, and works coherently with these policies could minimise these interactions and impacts on other economic sectors.

The value of the existing network

Some might argue that since most new entrants are likely to be renewables, and most renewables have resources remote from the present grid, there is little issue with giving access to the existing network to incumbents. Under this argument, renewables are likely to require new network assets to be constructed, so the gifting of existing network asset access to incumbents does not affect the development of renewable generation.

However, this is unlikely to be true for all renewable generators, and certainly not true for all new entrants. Solar photovoltaics, for example, is likely to be a significant technology in future grids, and has much more flexibility in siting than wind generation does. Much solar photovoltaics could potentially locate on the present transmission network, if access is allowed. This would help to avoid stranding of network assets as existing generators retire. Similarly, there is likely to be substantial investment in peaking gas generation to complement investment in variable renewables, which will benefit from access to the existing network. Ensuring that these new entrants can gain access to the existing network on an equal footing with incumbents is extremely important for minimising costs of the low carbon transition.

1.5 Windfall gains and regulatory risk perceptions

Incumbents made an investment in their assets on the basis of a certain expectation of future network access, based upon the regulatory environment at the time. Regulatory changes that disadvantage incumbents can threaten future interest in investment, since they may create a perception of an environment with high regulatory risk. To avoid this effect, the transition process should ensure that incumbents continue to have access to the amount of network capacity that they expected when they made investment decisions.

However, allocation of transitional access under the proposed methodology is likely to exceed the level of network access that incumbents should have expected upon investment. In the present market, a new entrant can connect to the network at any time and freely partake of the present network access available. Access will be shared between new entrants and incumbents, based upon the local constraint equations applying in that area. Thus, any incumbent should have taken into account the potential for new entrants to erode their present level of access at any time.

Therefore, these proposed arrangements are likely to represent a windfall gain for incumbents, providing them with confidence of a level of access *beyond* that under which they originally made investment decisions. Upon being granted transitional access they will have dramatically increased certainty about future network access, providing greater revenue certainty and an increased ability to support contracts. This windfall gain will come at the expense of new entrants, who will be "locked out" of the network.

Furthermore, the perception of regulatory risk is a complex issue. It could be argued that making regulatory changes that benefit emissions intensive incumbents, while disadvantaging low emissions new entrants will create the perception of a Government and regulatory bodies that are interested in maintaining the status quo. This may encourage investors seeking to install further emissions intensive generation, while discouraging low emissions new entrants. This could increase financing costs for low emissions new entrants, while reducing financing costs for emissions intensive plant. By contrast, a regulatory change that works in the opposite way (benefiting low emissions new entrants) could have the opposite effect, decreasing financing costs of low emissions alternatives. This is particularly influential for renewable technologies which are very capital intensive, and therefore strongly affected by the cost of capital.

Given the necessary low carbon shift over coming decades, it therefore appears most important to consider the effects of any regulatory change on perceptions of risk *specifically for low emissions alternatives*. Impacts on emissions intensive incumbents are likely to be considered less important by investors, where the Government has demonstrated a strong commitment to supporting low emissions generation.

1.6 Free allocation of the existing shared network

The present network has been paid for by consumers, through Transmission Use of System (TUoS) charges. Thus, it could be argued that consumers "own" the transmission network. The proposed OFA transition process would see the majority of the access to this network "gifted" to incumbents, many of whom are privately owned companies. It could be argued that this constitutes a form of privatisation of a publicly owned asset, with private companies being given access for free (no revenue is raised and returned to consumers in return for the sale of guaranteed access to this asset). This is philosophically problematic, particularly when the majority of existing access is being given away for free for an extended period of time (ie. The residual life of incumbents).

Based upon the description in the Technical Report, it is understood that TUoS charges for customers would not change upon the introduction of OFA. This would mean that customers would continue to pay for the existing network (and any future reliability augmentations), while a select group of incumbents have been given a high degree of confidence of access to the network.

1.7 Alternative 1 - Auction the existing shared network

A sensible alternative to gifting the existing shared network to incumbent generators would be to auction it, with generators who wish to purchase firm access doing so in a competitive process.

The auction could be progressively implemented over an extended period of time (such as 10 years), with increasing proportions of network access auctioned over time. This would smooth the entry of OFA, allowing improved price discovery. Price caps could also be introduced to limit risk and price volatility; for example, the auction price could be capped at the LRIC value for each node.

Progressive auctioning over an extended period of time could be very important to ensure that new entrants have equal opportunity to purchase access; if the full existing capacity is auctioned in one step with very long contract durations (eg. 20-30 years), new entrants could be effectively locked out, and the access price achieved at auction could be much lower than the true value of that access. The importance of contract durations is discussed further in section 2.1.

Auction revenues could be returned to consumers in the form of reduced TUoS payments over time.

An auction process has the following benefits over the free allocation method previously proposed:

- Barriers to entry and exit are removed, and rent seeking behaviour should be minimized.
- The competitive disadvantage for new entrants is removed; incumbents and new entrants are able to compete on a level footing for the purchase of firm access
- Windfall gains to incumbents are removed
- Consumers are repaid for the sale of network access

Parallels with carbon market design

The extensive literature on the establishment of carbon markets could be of relevance here. Learnings from the European Union Emissions Trading Scheme (EU ETS) and others have strongly suggested that free allocation of permits is problematic, and well-designed carbon schemes will instead auction the majority of permits.

Extensive analysis and accumulated evidence on the establishment of carbon pricing mechanisms suggests that free allowance allocation distorts the carbon price signal for efficient investment, operation and consumption choices [12]. Grandfathering arrangements in carbon markets have been found to skew permit holdings towards high emitters, and the opportunity costs of "free" permits are found to be fully "passed through" in the market, creating high windfall profits for incumbents [13]. Furthermore, free allowance allocation distributes public assets to the operators of installations, which are often financially strong companies. These companies are not required to use the income either for investment and innovation, or for any other activity that benefits the country that issues the allowances [12]. In carbon pricing schemes, free allocation of allowances has been found to trigger public opposition to windfall profits, as illustrated in the 2006 debates in Germany, the Netherlands, UK, Spain and Scandinavia [12].

By contrast, auctioning creates a robust policy framework, and ensures efficient corporate and private decisions that contribute to the most economical response [12]. Auctioning is preferred to grandfathering because it allows reduced tax distortions, provides more flexibility in distribution of costs, provides greater incentives for innovation, and reduces the need for politically contentious arguments over the allocation of rents [14].

Auctions promote allocative efficiency, and encourage efficient price discovery [15]. They also create a clear and transparent market framework for innovation and investment, and create government revenue to support innovation, cooperation, tax reductions and to address economic hardship of high energy prices for poor households. Auctioning encourages more efficient allocation of permits (avoiding skewing towards high emitters), and generates higher consumer surplus [13]. Moreover, auctions eliminate the large "windfall profits" that are observed with free, grandfathered permit allocations [13].

For these reasons, the EU ETS is moving towards full auctioning of permits in later phases. Learning from the EU experience, the Australian carbon pricing mechanism was designed to limit free allocation of permits as much as possible, limiting it to specific industries that are vulnerable to carbon leakage and international trade exposure. Grandfathering was limited. If this was considered politically acceptable in the arena of carbon pricing in Australia, it would appear worth pursuing in the implementation of OFA.

Although carbon markets are not perfectly analogous to markets for network access, it appears that there are significant parallels, and that valuable lessons can be drawn from the extensive analysis in this area. Regina Betz (a senior researcher with CEEM) has a large body of experience and publications in this area which may prove useful during the OFA design process, particularly around the design of effective auctions.

1.8 Alternative 2 – Scaled transitional access for new entrants

If a full auction of network access was considered unworkable, then this second alternative transition process could be applied.

This approach would initially mirror the originally proposed method. The amount of access required to provide all market participants with 100% access would be determined, and then scaled downwards to the existing network capacity available. This would then be ramped downwards gradually over time.

Importantly, access would not be retained at a residual level for any period of time; it would continue to decrease until it reaches zero at some future date, as illustrated in Figure 4. This would be the same date for all market participants, minimising rent seeking behaviour. If a generator retires before that date, they would be allowed to sell their remaining transitional access (reducing over time), thus removing barriers to exit.

Most significantly, under this approach, ***any new entrant during the transition period would also be allocated transitional access***, on an equal footing with incumbents.

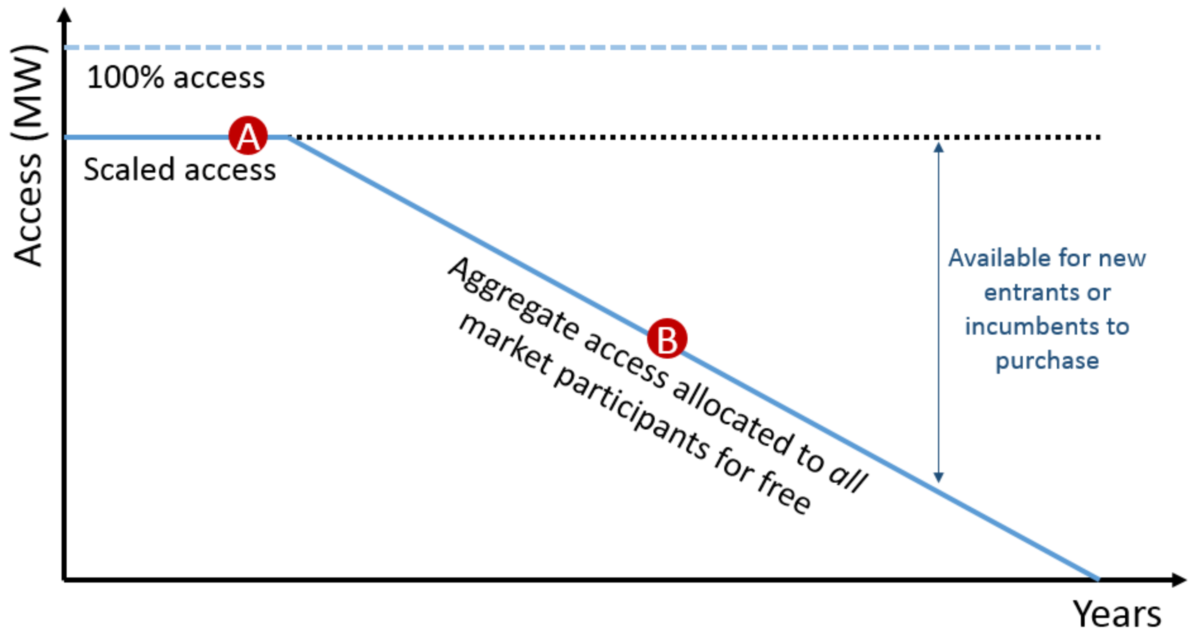
Incumbents at the relevant network locations would have their transitional access scaled back accordingly, so that the total access allocated at that location reflects the proportion of transitional access available to all market participants at that time.

For example, if a new entrant enters the market at point A (shown in Figure 4), the proportion of scaled access available to every market participant at the relevant location would be scaled downwards (in a manner analogous to the original scaling process), such that the new entrant receives the same amount of firm access as if they had been present in the market from the beginning.

Similarly, if a new entrant enters the market at point B (shown in Figure 4), they would be allocated the same proportion of free transitional access as all other market participants at that location at that time, and all incumbents at that location would have their access scaled downwards so that the total allocation of transitional access remains at ~50% of the total existing access for the network (in this example).

New entrants and incumbents alike would be able to purchase further access beyond the freely allocated amount if desired. This will be gradually made available to the market over time as the allocation of transitional access decreases.

Figure 4 – Alternative Transition Process – Scaled access for new entrants



Over the long term, this approach approximates the level of network access that incumbents could have expected when they invested. Access is provided for free initially, but new entrants can erode this access, as they would in the present system. It could be argued that this approach actually still provides greater certainty of network access over time for incumbents compared with the present system, since the sharing of network access upon the entry of a new entrant will be calculated in a more predictable fashion, rather than based upon the nuances of very small differences in constraint equation coefficients.

This approach removes or minimises the issues described earlier, including:

- Removing barriers to entry and exit
- Minimising incentives for rent seeking behaviour
- Removing the competitive disadvantage for new entrants
- Minimising windfall gains for incumbents

We look forward to discussing this proposal further with the AEMC.

2 Forecasting challenges in access pricing

The Technical Report [1] proposes a Long Run Incremental Costing (LRIC) methodology for pricing of firm access. Under this methodology, future network expansion to meet anticipated flow growth (caused by changes in demand or generation) would be taken into account, such that the cost of firm access would be based upon the cost of bringing forward network investment. This is illustrated in Figure 6.1 and 6.2 of the Technical Report, reproduced below as Figure 5 and Figure 6. This approach produces a smoothing of the access charge depending upon the frequency with which a network element would be augmented, as illustrated in Figure 6.3 of the Technical report, reproduced below as Figure 7. Network elements with a long investment cycle (low flow growth relative to lumpiness) will experience network pricing closer to deep connection charges. Network elements with a short investment cycle (high flow growth relative to lumpiness) will experience a firm access price closer to long run marginal costs (LRMC).

Figure 5 - Element baseline expansion model [1, p. 38]

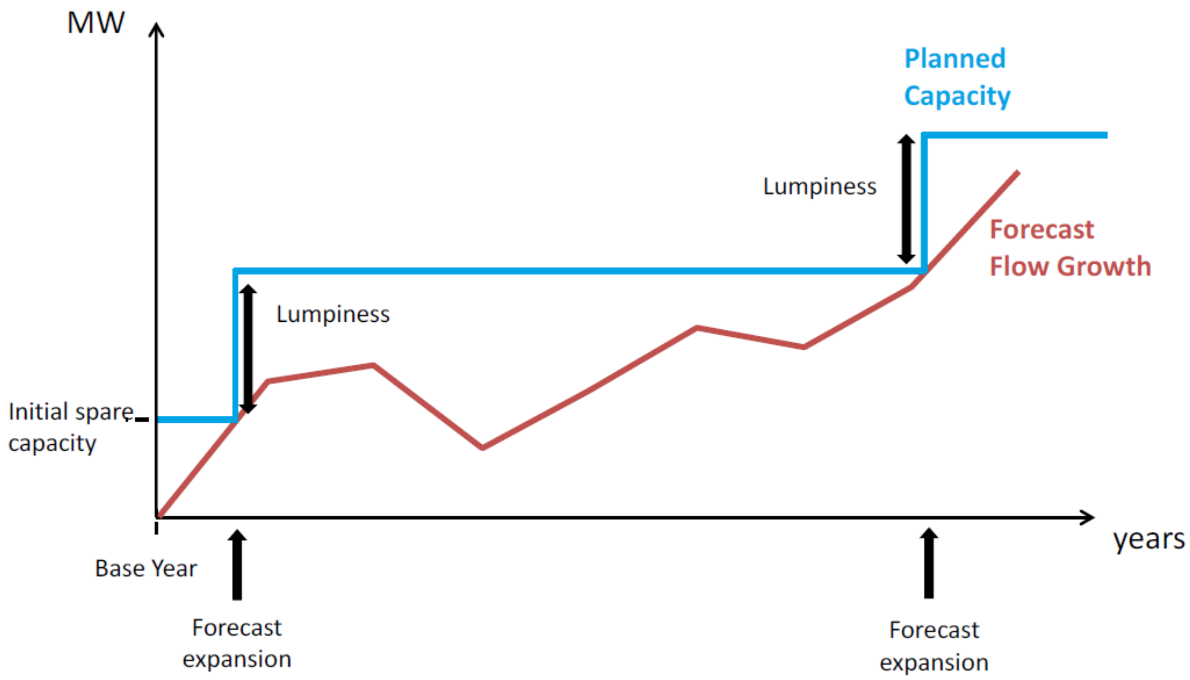


Figure 6 – Element adjusted expansion model [1, p. 38]

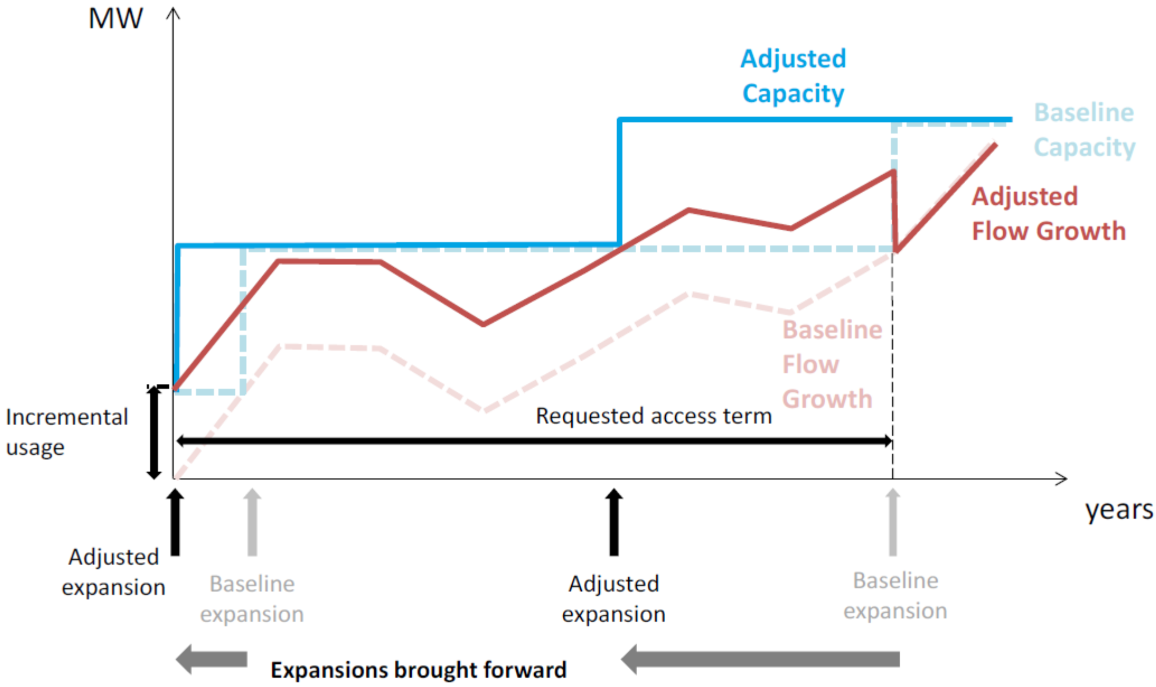
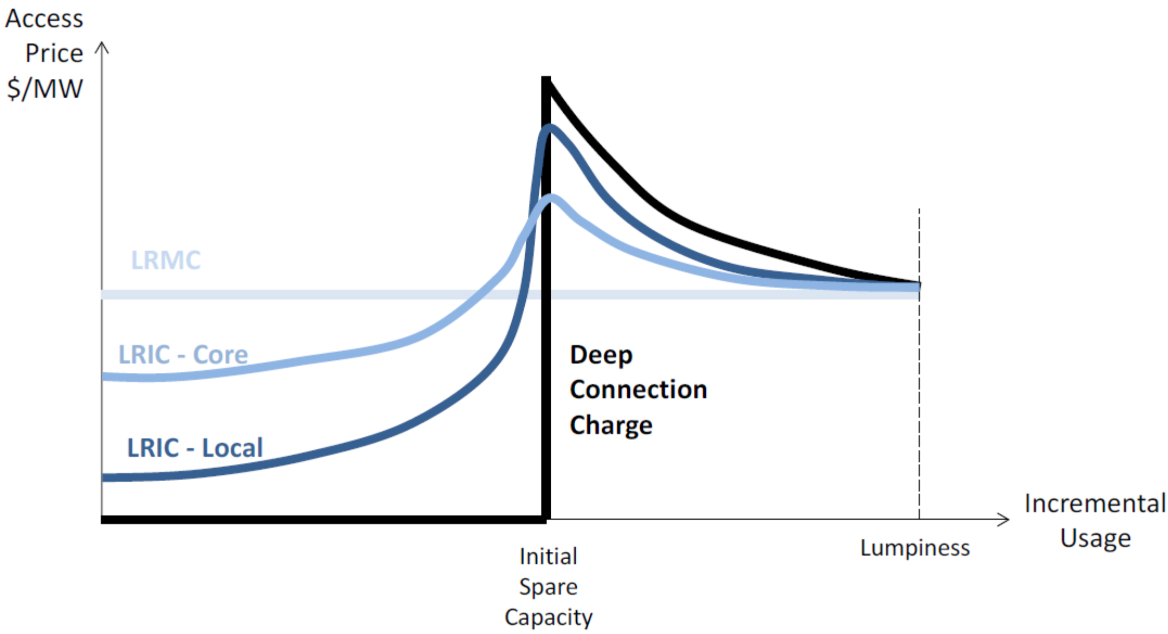


Figure 7 – Comparison of Long Run Marginal Cost (LRMC), Long Run Incremental Cost (LRIC) and Deep Connection access charges



Challenges in forecasting

This methodology for determining access charges will be strongly affected by forecasts of future flow growth, depending upon demand growth assumptions, and assumptions around future generation development.

As the Technical Report points out, the impact of long-term forecast errors will be mitigated by an appropriate discount rate [1]. However, even short-term forecasts (less than five years) have recently been highly inaccurate. For example, five years ago, the AEMO National Transmission Statement was predicting 4 GW of new thermal capacity across the NEM by 2020 [16]; this now appears highly unlikely to occur. This change is due to several factors including likely repeal of carbon pricing in mid-2014[1], higher than previously forecast gas prices due to expansion of the Liquefied Natural Gas export industry and, most significantly, rapid uptake of embedded generation (rooftop photovoltaics) and demand-side reductions (solar hot water systems and other energy efficiency measures). Similarly, the AEMO central demand forecasts have been revised downward each year.

This raises significant doubts as to the ability of any centralised body to send accurate price signals to generators through firm access charging, and risks locking the system out of optimal futures. For example, forecasting significant new generation and load growth will mean regular transmission upgrades and hence firm access charges approaching long run marginal cost (LRMC). If demand growth continues to decline, however, those access charges are likely to be overstated and the generators will need to continue to pay excessive fees. Although this might benefit TNSPs by providing an ongoing and guaranteed revenue stream, this is not beneficial to the system at large and is likely to ultimately increase costs to consumers.

These same problems are already present in the RIT-T process, where TNSPs must attempt to accurately forecast future cost savings under a range of scenarios. Nevertheless, passing a major upgrade through a RIT-T is considered a non-trivial exercise, and requires robust benefits to be demonstrated in a transparent and public way. It is unclear that the same would hold for firm access charging. Although it is similarly unclear whether the market is better able to make generation decisions, decentralised planning allows for a more diverse range of views on the future, with appropriate investment decisions for each one. As such, OFA could represent an undesirable move towards a more centralised planning approach, with a reduction in transparency.

LRIC applied to renewable development

Given the anticipated shift towards the development of low emissions generation technologies, the electricity market is likely to be at the cusp of a significant change. It is therefore prudent to carefully consider how methodologies such as LRIC may apply in the specific case of widespread renewable development.

Renewable technologies differ from conventional generating technologies in a number of ways. Of relevance to this discussion, in many cases the best renewable resources are remote from demand centres[2]. This could lead to network topographies featuring nodes that primarily connect generators with minimal local demand. In this situation, forecast flow growth and therefore the development of network constraints

[1] The 2009 NTS assumed the CPRS rather than the Clean Energy Futures legislation, but the outcome would have been similar long-term.

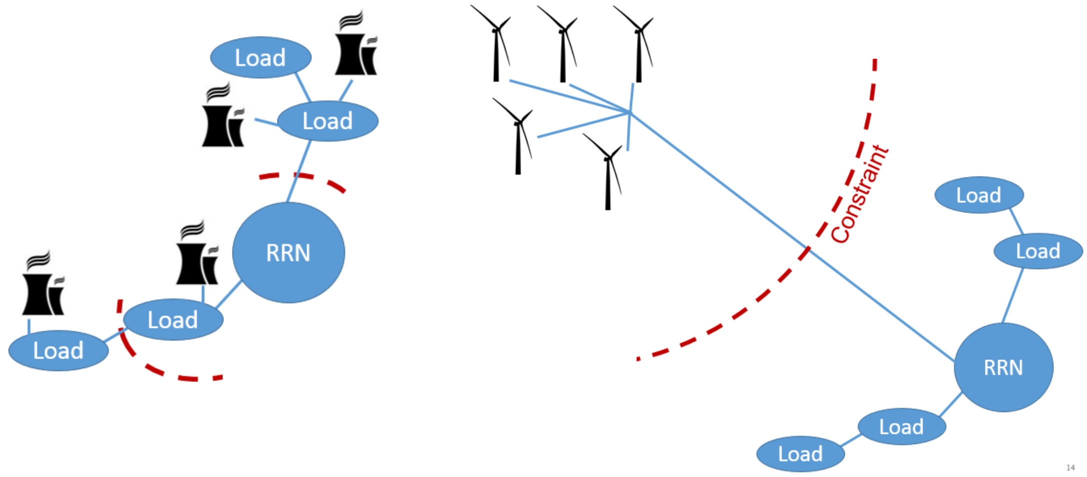
[2] It is worth noting that many fossil fuel resources are similarly located remote from load centres. However, the power stations at these locations generally have access to existing transmission infrastructure, whereas new entrants at other locations do not.

would be driven more by local generation growth than by load growth. This potential difference in future networks is illustrated in Figure 8.

Figure 8 – Network topologies

Topology A:
Flow growth driven primarily by demand growth

Topology B:
Flow growth driven primarily by generation growth



This alternative network topology (Topology B) has important implications for the LRIC methodology. Consider the calculation of the firm access charge at the node where the wind farms in Topology B are connected. In this case, the calculation of forecast flow growth will depend entirely upon assumptions on the entry of new generators. These new entrant decisions will be strongly affected by the entry of other generators, and the available network capacity.

Renewable technologies typically have high flexibility around their installed capacity. Therefore, when developing a project on a constrained connection point renewable developers are likely to size projects to the current spare transmission capacity. This is true under the current system (where a network upgrade is not guaranteed) as well as under the proposed OFA model. However, under the OFA model access prices escalate as the available spare network capacity approaches full utilisation. This is especially true in situations where flow growth could be expected to be low compared to the lumpiness of network investment, such that access charges are likely to be similar to deep connection costs ("LRIC – Local" in Figure 7). In this scenario, the installed generation capacity could be expected to be optimised to a level somewhat below the available existing network capacity.

This will mean that when TNSPs are calculating the "brought forward" upgrade costs, they will need to consider that the construction of one project will defer (or eliminate) subsequent projects.

For example, assume that there is 100 MW spare capacity at the wind farm node in Topology B. Two developers express serious interest in installing a 100 MW wind farm at this location. Should the calculation of forecast flow growth include both generators entering? In reality, assuming that network upgrades are expensive, the entry of the first will "lock out" the second.

If the TNSP takes this "lock out" effect into account, access pricing is likely to be very similar to deep connection charging (no further generation investment is expected once the network is fully utilised, so the anticipated flow growth is zero, and the access price is zero up to the point where upgrade is required). The first generator to apply would therefore receive an excellent deal on their access, locking future competing projects out of the area. The price they are paying for firm access does not represent the true opportunity cost for the system if subsequent generation might have a lower cost.

If the TNSP does not take the "lock out" effect into account, they might assume that both generators would enter, and calculate LRIC costs on that basis. However, this would not be representative of the future that is actually expected to occur, and therefore may not represent a meaningful pricing methodology.

Queuing issues

Even in the case where the access cost for relieving a constraint would not be prohibitive to generation (such that future network investment might be expected at some point, and access pricing is not entirely like deep connection charging) there will likely be a first mover advantage. The first generator to apply will benefit from lower access costs. This raises questions of how queuing should be handled, for example: how long after an application is first made should the generator's place in the queue be held? Queuing issues have been identified as a source of inefficiency in the WEM [17]. There may also be questions around confidentiality: ideally, other inquiries or applications should be used to update the TNSP forecast of transmission flow timelines, minimising the benefits to the first mover generator if competing projects are treated as realistic options to be installed in the near-term.

Reviewing forecast flows in light of applications

These issues are related to the problem of reviewing forecast flows in light of an application itself, and demonstrate that it is not likely to be trivial or appropriate to "simply" add the incremental network usage of a new generation project to the baseline flow growth (as stated in the Technical Report [1, p. 38]). For example, if a wind farm applies to connect to a node where the TNSP has forecast that a wind farm might connect in future, should the TNSP assume that this application is that hypothetical future wind farm? It may be brought forward in time compared to the TNSP's original forecast. If this were the case, it appears that the adjusted flow growth should return to the original forecast flow growth after a period of time (from when that wind farm was originally assumed to connect).

This appears to be a significant issue with the proposed LRIC methodology, which becomes particularly apparent when nodes with zero demand growth but anticipated generation growth are considered. We look forward to discussing this with the AEMC and clarifying how these situations might be addressed.

Negative demand growth

In addition to considering the application of OFA at nodes with zero demand growth, it may also be instructive to consider access pricing calculations at nodes with negative demand growth, since this appears to be increasingly a feature of the present and future market. This may have interesting implications for the LRIC methodology.

For example, declining demand at a node that is dominated by generation could exacerbate constraints, and therefore create the need for increasing network investment to support existing firm access contracts. If transitional access has been given for free to incumbents, would TNSPs need to fund the cost of supplying this additional augmentation? Would this be drawn from TNSP revenue paid by consumers? This may also be an issue if TNSPs did not foresee declining demand at the time when firm access charges were negotiated.

Alternatively, if demand is declining at the Regional Reference Node, this may progressively alleviate network congestion. This could eventually mean that firm access has very little value (since constraints rarely bind). If this was not foreseen at the time when firm access prices were negotiated, generators may agree to pay significantly more for firm access than it is worth.

If this scenario were considered feasible, TNSPs may see the sale of firm access as an effective hedge against stranding of network assets. Firm access contracts would provide a more certain revenue stream for TNSPs, while TUoS payments would be declining due to falling demand.

Further analysis of specific cases involving declining demand appears warranted, given the recent trends in this direction, and the increasing awareness that this may continue.

2.1 Possible solutions

Auctioning

Some of these issues could be addressed through a more open process, perhaps including explicit auctioning of near- or long-term capacity.

Contract durations

The duration of firm access contracts appears to be of significant importance. Longer term contracts provide longer term certainty for generators and TNSPs. However, shorter term contracts would allow for the value of firm access to be reassessed under the prevailing (and updated) market conditions at regular intervals. A compromise would be needed here between the value in long-term certainty for generators, and the “options value” of more regular updates.

A term of 10 to 15 years may be appropriate, given that power purchase agreements (PPAs) of this duration are currently accepted by financiers as providing sufficient project certainty. While a longer timeframe has the potential to reduce costs of capital, the effects of discounting and the significant other uncertainties facing the sector (consisting predominantly of renewables) may limit its influence.

3 Conclusions

This paper summarises a number of issues identified with the proposed OFA implementation process, including the creation of new barriers to exit and entry, the exacerbation of competitive disadvantages for new entrants, and windfall profits for incumbents. Given the very long timeframe proposed for the OFA transition (extending throughout the presently anticipated economic lifetime of all incumbents), these effects could last for decades and could seriously inhibit the necessary transition to a low carbon supply system. Coherence within the broader framework of policies designed to reduce greenhouse emissions across the economy should be carefully considered.

Two alternative transition processes are proposed which alleviate these identified issues. Firstly, full auctioning of permits avoids grandfathering and is well supported by extensive analysis in the carbon market design arena. Alternatively, transitional access granted to incumbents could be gradually reduced to zero over a period of time (such as ten years), with new entrants being granted the same level of free access as they enter (by proportionate scaling down of incumbent access at that location). This would closely resemble the present level of access certainty that incumbents experience, since in the present system they can be displaced by new entrants at any time.

Finally, serious challenges are identified in the access pricing process. Forecasting of future demand and generation is highly non trivial at any time, but most especially in the present environment of significant uncertainty. Although this issue also plagues the present RIT-T system, moving to OFA could jeopardise transparency, and may provide locational signals that are highly arbitrary.

We look forward to working constructively with the AEMC on these issues, to ultimately contribute towards creating a superior electricity market system for the NEM.

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