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8th February 2019

Attention: Sara O'Connor

Submission on Report to the Minister for Energy on the Effectiveness of the Wholesale Electricity Market 2017/18, Dated 21 December 2018

To put the things into the perspective, the Wholesale Electricity Market (WEM) in Western Australia (WA) contributes just above 50% of the cost of electricity to consumers in WA, and the remaining less than 50% comes from the network service provider's cost - Western Power in this case. So this WEM review looks into 50% of the electricity bill consumers pay.

The Report to the Minister for Energy on the Effectiveness of the Wholesale Electricity Market 2017/18 - Discussion paper, Economic Regulation Authority, 21 December 2018, [Discussion Paper, 2018] raises three key concerns: increasing aggregate cost of the WEM, uncertainty and risks for future investors, and WEM governance and reform of the electricity supply industry, all of which will be addressed in this submission.

My focus is on the fields of knowledge necessary to understand the underlining causes, drivers and processes that are shaping outcomes of the WEM, and on the required actions which would, in my opinion, lead to the quickest reduction of the price of electricity to WA consumers and a fairer allocation of costs to causers, decision makers and beneficiaries of these decisions.

Of the following five WEM objectives:

1. Promote the economically efficient, safe and reliable production and supply of electricity and electricity-related services in the South West Interconnected System.
2. Encourage competition among generators and retailers in the South West Interconnected System, including by facilitating the efficient entry of new competitors.
3. Avoid discrimination in market against particular energy options and technologies, including sustainable energy options and technologies such as those that make use of renewable resources or reduce overall greenhouse gas emissions.
4. Minimise the long-term cost of electricity supplied to customers from the South West Interconnected System.
5. Encourage the taking of measures to manage the amount of electricity used and when it is used.

I consider the 4th objective to be the most important objective, as it probably led to the decision to restructure the electricity supply industry and establish the WEM. If a situation arises that these objectives conflict each other, then the 4th objective should prevail. In other words, all candidate decisions should be ultimately judged upon its impact on the long-term cost of electricity supplied to customers. This is particularly important, in my opinion, because two negotiating corporations, in pursuit of their commercial interest, are likely to agree to pass the costs of their projects to the third party(ies) or to fail their compliance obligations, unless there is a strong deterrent not to do so. Another example

of unwanted behaviour, in my opinion, would be to deliberately increase the quantity of ancillary services in the WEM, as a favour to and to the financial advantage of the corporation(s) providing these ancillary services and those energy options and technologies which enjoy concessional status and unfair competitive advantage in WA.

The ERA's opinion on the issues raised here would be appreciated. Their resolution early in the consultation process would determine the direction of the report, and, consequently, future recommendations to the Minister. At this stage, it is important to reach a consensus on the desired direction for the WEM and for the industry as a whole.

In that respect, may I respectfully request the first recommendation to the Minister to be to:

- *Set aside a certain percent of the aggregate cost of the WEM to restore funding for public advocacy of consumer rights in the SWIS, for the WACOSS and residential and, perhaps, small business consumers who do not have powerful industry associations to lobby the government on behalf of the interests of their members*

the former energy minister Nahan removed in 2012, in my opinion, in order to silence the voice of the general public in the electricity debate.

Namely, a certain percentage of the NEM turnover (0.015%, I think) has been allocated to the Public Interest Advocacy Centre to support public advocacy in the energy field. Given our state's financial situation, the percentage should be lesser than that in the NEM, in order to exclude eligibility of large users of electricity.

Finally, let me describe the path in front of us by the following:

> "*There is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things.*
> *For the reformer has enemies who profit by the old order of things and only lukewarm defenders in all those who would profit by the new order...."*
>
> Niccolo Machiavelli, "The Prince".

Thank you for this opportunity to comment.

Yours sincerely,

[redacted]

Stephen Davidson
[redacted]

CONTINUED ON SUBMISSION

REPORT TO THE MINISTER FOR ENERGY ON THE EFFECTIVENESS OF THE WHOLESALE ELECTRICITY MARKET 2017/18 – DISCUSSION PAPER, 21 DEC 2018

SUBMISSION BY STEPHEN DAVIDSON

Issue 1 – Input Fuel Costs
Wholesale electricity prices have continued to rise in spite of downward pressure from demand and fuel prices.
Question 1
1. What other factors may be driving up wholesale electricity prices if not demand or fuel costs?

The wording of this issue includes two variables of the conventional economic analysis. It reveals the ERA's thinking and "search space" it considered relevant to resolving the issue of apparently unexplainably increasingly high aggregate cost of the WEM. The ERA's research and analysis has demonstrated the WEM is a far more complex techno-economical system, which cannot be explained through the prism of these two variables. Question 1 was a logical question for the follow-up. In the control system theory terms this could be summarized as that, for the two chosen variables, the WEM pricing system is not observable nor controllable.

The Discussion Paper infers the theoretical basis for this approach was set in: McHugh A, (2008) *Portfolio Short Run Marginal Cost of Electricity Supply in Half Hour Trading Intervals*, Technical Paper, Economic Regulation Authority, Perth, [McHugh, 2008], as per the list of references on pages 72-73 and the assumptions in Section 1.1 Economic Efficiency on page 4 in [McHugh, 2008]:

> "*Under theoretical assumptions that describe a competitive market, efficiency will occur naturally. These assumptions are:*
>
> *1) No market participant has the ability to independently influence the clearing price by virtue of market share or control (i.e. market power);*
>
> *2) There is no strategic behaviour in the market;*
>
> *3) All participants are able to make fully informed decisions;*
>
> 4) *There are no costs or benefits that accrue to third parties (i.e. externalities)*."

The 4th assumption currently does not apply to the SWIS because of the free run of the intermittent generators, hence the economic efficiency as was explained on page 14, Section 3.2 Linkages Between Unit Commitment and Short Run Marginal Cost [SRMC], [McHugh, 2008]:

> "*...A firm operating in a competitive (efficient) market, however, would find the profit maximising level of output occurs where price equals SRMC in each half hour trading interval. This would produce a socially optimal outcome (Footnote 14: Assuming any externalities are internalised through supplementary government policy.)* "

cannot be achieved within the economic domain only, for the reasons illustrated on page 16, *Figure 3.1a - Electricity output over two trading days* and *Figure 1b – Electricity output over five trading intervals*, which are shown below for ease of communication.

Definition of "Free-run".

Free run is to operate independently, without external influence or intervention. In the power system context, free run occurs when a generator, usually intermittent renewable, is allowed to generate as much electricity as its intermittent primary energy source (solar

or wind) allows and when it allows. Process steam driven generators for power generation can be considered intermittent too.

The free run operation increases entropy, which is a measure of disorganization, in the WEM system: instead of focusing only on the mismatch between the predicted and real-time daily load diagram, in order to balance the MW production and consumption in the SWIS at all times, other generators in the system, WEM generators, have to do extra balancing work in order to cover for the additional mismatch caused by unpredictable aggregated MW output from generators having a free run.

That additional mismatch is shown in - *Figure 3.1a - Electricity output over two trading days*, where the top curve represents daily load variation and the bottom curve the aggregate output of intermittent renewable generation. The additional mismatch occurs at any instant in time when these two curves change in the opposite directions (ie. when their first derivatives have the opposite signs): when one curve increases while the other decreases and vice versa. This is increasing WEM cost.

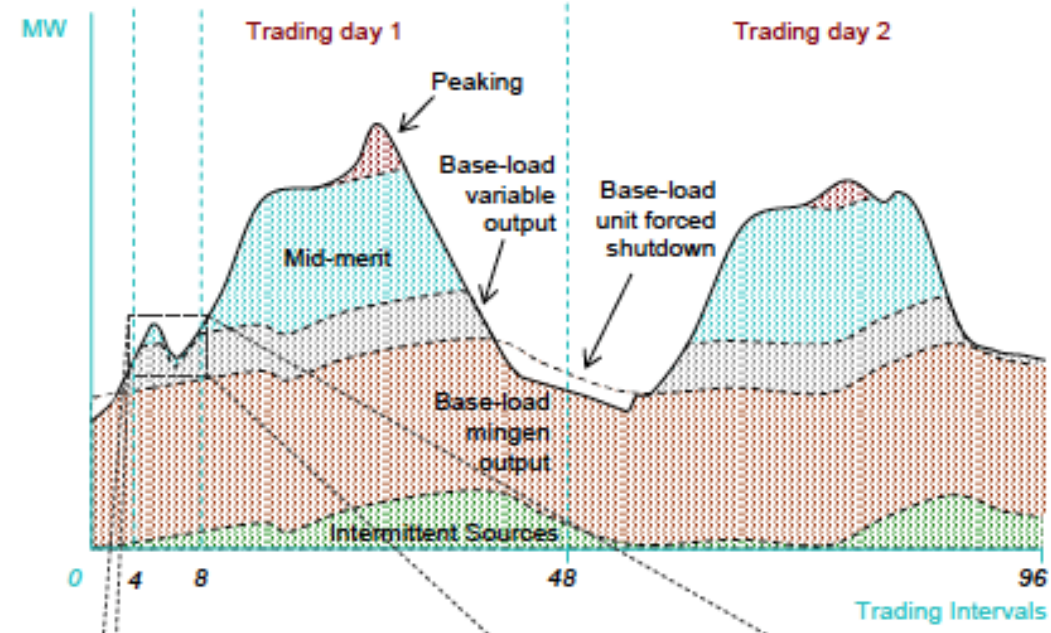

Figure 3.1a – Electricity output over two trading days

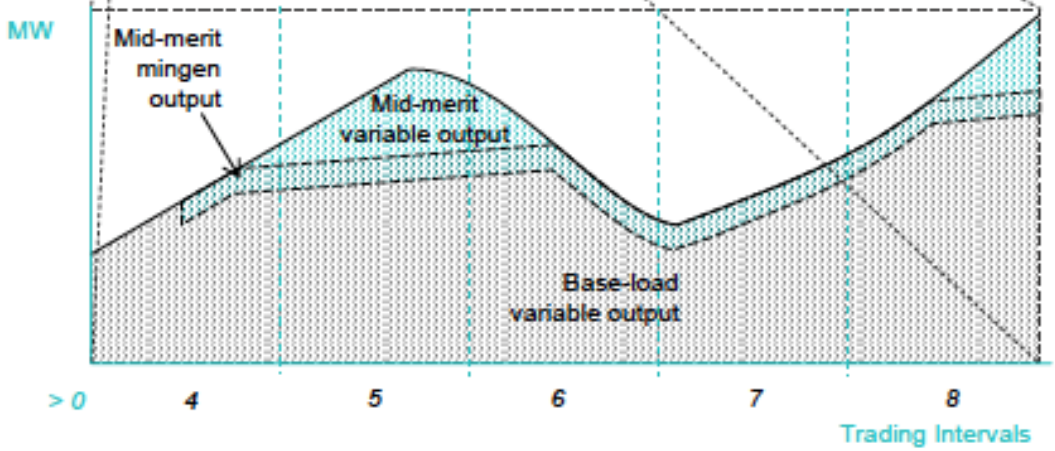

Figure 3.1b – Electricity output over five trading intervals

For example, one such a situation occurs during the 6th trading interval, see Figure 3.1b, when the MW consumption decreases, while the intermittent MW generation increases.

Refer to the 6th interval in figure 3.1B in which intermittent generation increase production while load is decreasing. In order to balance the combination of the load and the intermittent generation operating in free-run the WEM generators reduce their aggregate output more than they would otherwise do.

In other words, it is not a problem when there is a toy elephant in the china store, but a live elephant does a lot of damage in the store, regardless how small and juvenile it is, unless it is put on a leash and reined in.

The problem of increasing WEM prices is an interdisciplinary problem, which has been approached as an economic problem in the Discussion Paper. For this reason, my submission cannot strictly follow the line of questions as they appear in the Discussion Paper.

The nature does not care about well defined boundaries of various established fields, as was explained well in Wiener N., CYBERNETICS or control and communication in the animal and machines, pages 2-3, Introduction, Part I, Original Edition, 1948:

> "*It is these boundary regions of science which offer the richest opportunities for a qualified investigator. They are at the same time the most refractory to the accepted techniques of mass attack and the division of labor. If the difficulty of a physiological problem is mathematical in essence, ten physiologists ignorant of mathematics will get precisely as far as one physiologist ignorant of mathematics, and no further. If a physiologist who knows no mathematics works together with a mathematician who knows no physiology, the one will be unable to state his problem in terms that the other can manipulate, and the second will be unable to put the answers in any form that the first can understand. Dr Rosenblueth has always insisted that a proper exploration of these blank space on the map of science could only be made by a team of scientists, each a specialist in his own field but each possessing a thoroughly sound and trained acquaintance with the fields of his neighbors; all in the habit of working together, of knowing one another's intellectual customs, and of recognising the significance of a colleague's new suggestion before it has taken on a full formal expression. The mathematician need not have the skill to conduct a physiological experiment, but must have the skill to understand one, to criticize one, and to suggest one. The physiologist need not be able to prove a certain mathematical theorem, but he must be able to grasp its physiological significance and tell to the mathematician for what he should look. We had dreamed for years of an institution of independent scientists, working together in one of these backwoods of science, not as subordinates of some great executive officer, but joined by desire, indeed by the spiritual necessity, to understand the region as a whole, and to lend one another the strength of that understanding*".

The complexity of the increasing WEM pricing problem spans across three main established fields: electrical power system engineering, economics and power system technical regulation.

That is explained next, as per the following table of content (TOC)

TOC:

Electrical Power System Engineering Field

A silent feature of power systems is that electricity cannot be stored (in any meaningful quantities) so the balance of MW consumption and generation must be maintained at all times. Any imbalance, depending of its magnitude and location, would result in a frequency deviation from the nominal value of 50Hz and/or disconnection of generators and major transmission lines, the later of which is known as the break up of the power system leading to subsequent blackout of the affected areas.

In order to provide normal functioning of the power system, any change in the connected load in the electrical grid must be followed by a corresponding change in the generator output, for the purpose of maintaining a continuous balance of generation and consumption in the system. In order to carry out this successfully, the generator capacities should be dimensioned to correspond to control requirements. On the other hand, requests for load changes made to individual generating units in the power system depend on the load diagram, the structure of power plants, and the total capacity of the interconnection which operates in parallel with the system. It is necessary to quantify control requirements for aggregate generation, imposed by the bulk power system operation, and to quantify the maneuvering capabilities of the existing generators, compare the two and to suggest the required maneuvering capabilities for new power plants. Publication of the control requirements and maneuvering capabilities would provide a clear signal to investors which generation plant power system needs.

The Discussion Paper is silent on the control requirements of the SWIS power system and ability of the SWIS generation to meet them and the resulting inefficiencies manifested in the negative bids and AEMO's market interventions by declaring the "high risk" operating state.

Economics Field

My take out of the Discussion Paper is that the ERA has been considering the WEM as a self contained economic system, searching for all answers within that system (MW demand, input fuel costs and the average run duration of Synergy's largest generators) and its participants. I illustrate this point by quoting footnote 21 on page 6: "*A portfolio*

generation tranche or bid may reflect part of the output from a single generator or a composite of multiple generators." and last sentence in Section 2.2 Input Fuel Costs: "*The ERA is continuing to research this issue*." In other words, the ERA intends to continue to do so.

There are multiple explicit questions addressed to the "market participants" in the Discussion Paper, with one exception on page 2: "*The ERA encourages interested parties to make submissions during the consultation period, providing evidence or practical examples where possible*."

Research Methodology

A principal research methodology used in preparation of this Discussion Paper seems to be "*discussion with market participants*". In my opinion, discussion with parties with vested interests in the outcome is unlikely to achieve the cost reduction in the WEM, because no corporation would advise the regulator on how to reduce their (aggregate) income stream. Quite contrary, individual market participants acting in their commercial interests would convey to the regulator their perception of obstacles to increase their share of the existing market or suggestions on how to increase the overall cost of the WEM market. This is quite clear from the following quote from page 8, Discussion Paper, that some: "*Retailers want to hedge against volatility in the wholesale electricity market spot prices*".

It was unfortunate that the ERA probably did not interview WACOSS or chartered professional engineers working, as volunteers, for residential and small business consumers and charities.

WEM Costs Not Itemized

Why the WEM costs were not itemized and individually analysed in the Discussion Paper, as required in the conventional economic analyses? For example, the Appendix 1 Market Data stated: "*This aggregates the costs of wholesale electricity, capacity, network, ancillary services and carbon, and calculates a unit cost by dividing by the quantity of electricity consumed....*". This aggregation, in my opinion, "muddies the water" and does not allow meaningful analysis. Did the quantity increase or the price charged per unit of the quantity increase? If the quantity increased, then one should investigate why. If the prices increased, then one should investigate who increased their price(s), by how much and why.

Instead, it was reported: "*Wholesale electricity prices in the Wholesale Electricity Market (WEM) have increased by just under 50 per cent in the last six years*." Since the WEM has been operating since 2006 (excluding the preceding few years of the "Top-up and Spill" electricity market), my inference is that the market participants did not complain before 2012. Why was so, one could ask? The likely reason was that the state Electricity Generation Corporation (trading as Verve Energy at the time) was legally required to provide balancing, ancillary and frequency control services for free. If my recollection is correct, the market participants' complaints started immediately after the Balancing Market Commencement Day on 1 July 2012, when Verve stopped providing these services for free. Consequently, in my opinion, it is a deficiency of the economic analysis that the Discussion Paper did not investigate Synergy's (then Verve) dispatch patterns before the Balancing Market Commencement Day of 1 July 2012.

WEM Operation Before 1 July 2012 Not Analysed

I am sure that, during this period 2006 to 30 June 2012 (the Balancing Market Commenced on 1 July 2012), Verve optimized their WEM bids and dispatch to achieve

the true minimum cost (according to economic self-interest hypothesis). Had these 2006-2012 bids and dispatch patterns been investigated and if it was found to be largely identical to those in the period 2012-2018, then would it not be possible, perhaps, to eliminate the suspected Synergy's misuse of its market power as the real cause of increasing WEM prices in 2019?

The economic analysis of Chapter 2 of the Discussion Paper also found out that the Cockburn plant's capacity factor remained unchanged at about 5%. The conventional economic assumptions and the economic model based on these two or three variables (MW demand, input fuel costs and Cockburn plant's capacity factor) could not explain the increasing WEM pricing trends. So, in my opinion, the author(s) of the Discussion Paper jumped to the speculative conclusion that it must be the Synergy's market power.

Speculative Conclusions

Similar speculations from the perspective of an economist and policy maker with limited power system understanding in 2016 resulted in the Minister for Energy directing Synergy to reduce its generation capacity. (Australia, Electricity Corporations Act, Ministerial Direction, 17 November 2016:

http://www.parliament.wa.gov.au/publications/tabledpapers.nsf/displaypaper/3914913c260ae23260b839a74825807400138d6b/$file/tp-4913.pdf)

The ordered reduction did not achieve its objectives, as the passage of time, as an unbiased judge, has shown. This did not stop efforts to fit the WEM reality into the "economic model", this time by using jargon terminology "*pricing discipline on generators*" and "*competitive discipline*". Similarly, the following statement from page 6, Discussion Paper: "*Only when Synergy's market power is curtailed will market participants have confidence that wholesale prices are efficient*" is an opinion presented as fact.

In my opinion, disaggregation of Synergy would not help because it will not change the structure of the generating units nor improve their maneuvering capabilities. It could only increase costs due to more executives, corporate overheads and boards.

2018 Parliamentary Inquiry

The transcript of evidence taken at Perth, 9 May 2018, Session One of the Inquiry Into Microgrids and Associated Technologies in WA, by the Economics and Industry Standing Committee [the Transcript]:

http://www.parliament.wa.gov.au/Parliament/commit.nsf/(Evidence+Lookup+by+Com+ID)/6B9544C17628FBAF4825828F002EEFC2/$file/EISC+20180509-+AEMO-public+hearing-FINAL.pdf

and Questions on Notice [QoN], [Parliamentary Inquiry, 2018]:

http://www.parliament.wa.gov.au/Parliament/commit.nsf/(Evidence+Lookup+by+Com+ID)/6B9544C17628FBAF4825828F002EEFC2/$file/EISC+Questions+on+Notice+and+Further+Information+-+22+June+2018.pdf

show that inappropriately managed mass proliferation of the Distributed Energy Resources (DER) is increasingly becoming a challenge for the AEMO to operate the power system securely and reliably and, more importantly, "*it is starting to impact the efficiencies of running the market*" (see 2nd last paragraph, page 1, the Transcript).

The economic inefficiencies are reflected in the negative bids (of generators originally designed for base load applications, which are now required to cycle and follow the intermediate and peak load), as well as the AEMO declaring emergencies, in the form

of evoking powers granted to it under the "*high risk*" operating state of the SWIS, 10 - 20 times a year, instead of once every 50 or 100 days, the latter of which was rightfully pointed by the Member Mr D.T. Redman.

Known WEM Inefficiencies Not Analysed Nor Quantified

The events referred to in the Parliamentary Inquiry should be called their true name - brownouts. The "*brownout*" affects two domains and commences with the AEMO's (reluctant) proclamation of the "*high risk*" operating state. It has the effect of the "*declaration of the state of emergency*" in the power system (because violations of the security operating constraints had brought the power system on the verge of a blackout) and "*suspension of the economic freedoms to trade*", as the AEMO evokes powers granted to it to "*force trading*" in order to bring back the power system into the "*secure*" operating state. The economic analysis of the Discussion Paper should have investigated these events, their root causes and consequences, as well as quantified the overall cost of these, largely avoidable, inefficiencies.

I stress "*largely avoidable*" because, in my opinion, these would have been avoided, had Western Power prudently used the existing provisions in the Technical Rules to consult with the AEMO (formerly IMO and System Management) and properly exercised own discretion in order to "*Minimise the long term cost of electricity supplied to customers from the South West Interconnected System*"[1] granted to it in the Technical Rules when processing/approving applications for connection to the network to request the adequate generator plant design and performance characteristics in order not to adversely affect other users nor the operation of the SWIS power system and the WEM market, including visibility, control and protection characteristics and settings, max simultaneous MW and MVAr output, the impact on the overall system inertia, fault levels, etc.

Moving forward

The economic analysis of the Discussion Paper offers two areas of opportunities for improvement.

One, to overcome the myth that WEM is all about the energy: "*... it is not all about the energy. We need to provide contingency services and frequency control, and those things add other costs that renewables do not do today, but are actually showing some green shoots that they could provide in the future*" (see page 12, Mr C. Parrotte, 3rd paragraph, the Transcript).

Two, there could be no efficient operation of the power system if the reactive power considerations are ignored in the transmission system and, particularly in the distribution system.

Reactive power considerations

Reactive power - disturbances. The flows of reactive power MVAr have crucial role in maintaining stability during major disturbances, and at all times maintaining the capability of generators in the SWIS to inject the full amount of the reactive power (as required by the Technical Rules) into the power system is essential for avoiding blackouts. Any reduction of this reserve prescribed in the Technical Rules makes the power system less stable and more prone to blackouts.

[1] It is a WEM objective.

Reactive power - losses. The reactive power MVAr is not traded in the WEM, but it has a major impact on losses in the power system and its overall efficiency. The calculation of losses of active power MW due to flows of reactive power through the inductance of transformers and transmission and distribution lines, is the area that offers great opportunity to improve efficiency of operation of the transmission and distribution systems in the SWIS. Nowadays, in my opinion, there is no justification to ignore the losses of active power resulting from the flows of reactive power through the system inductances for the purpose of calculating transmission and distribution load factors. In other words, the AC load flow should be used, instead of decoupled load flow.

Reactive power - losses - transmission system example. I will illustrate this point by referring to the 4th paragraph on page 39, Section 6 Line Losses of [McHugh, 2008] which begins with the statement "*Losses are proportional to the line resistance...".* It was stated in the last sentence of the 2nd last paragraph on page 40, that the calculation method underestimated true losses on the transmission system example by 29%. Note the 29% error on the very simple example of the radial system. One can assume a much higher percentage error in more complicated meshed networks and on real power system. As an Engineers Australia's Chartered Professional Engineer, may I further explain that the calculation failed to include active power losses due to the flows of reactive power through the system inductance(s). This is completely unnecessary, as the exact methods are available.

Transfer of wealth. In practice, that difference is unfairly allocated to distribution system users (as the difference between the total system losses and calculated transmission system losses), and results in the transfer of wealth from residential and small commercial users to the corporations participating in the WEM market.

Reactive power - losses - distribution system example. Distribution system consumers in Australia are generally allowed power factor of 0.8 and above, because household appliances draw reactive power from the grid for their operation. By design, DER can generate reactive power to supply the reactive power drawn by the household appliances. However, that intrinsic capability is not utilised in practice, as most DERs are operated at the unity power factor in Australia. In doing so, most of the time the consumer's power factor falls below the 0.8 threshold and the consumer breaches own Technical Rules compliance obligation. The consequential additional losses are not borne by the causer, instead passed to all network users. By being complicit and indifferent, and sometimes actively encouraging users to do so, in my opinion, Western Power fosters construction of their own network assets that, in this case, producing reactive energy (for example, the power factor correction capacitor banks and reactive power compensators) and pass on the cost to all network users. This is the most expensive and inefficient way to supply the reactive power (and manage power quality) - from the grid side.

Reactive Power – Impact on Loss Factors – T-Price software

The use of T-Price software for calculation of the loss factors should immediately discontinue. I understand this may not be easy, as vested interests are involved.

The T-Price software package relies on the approximate DC load flow. The calculated loss factor errors are enormous, as is shown in [McHugh, 2008].

To put the things into the perspective, we should ask ourselves would we accept an electricity meter that errs 30% or more? If the answer is negative, then for this reason we should immediately discontinue use of T-Price software in Western Australia.

So, are there any alternatives, one might ask? The answer is affirmative – there are many commercially available AC load flow software packages. One of them Western Power has been using for years to conduct power system studies. That software can do everything T-Price does, much more accurately, and many more.

More accurate calculation of the transmission system losses, by discontinuing use of the very inaccurate T-Price software, would foster higher overall efficiency of the WEM market. It would also eliminate the intrinsic unfairness due to the current method of calculating distribution loss factors as the difference between the total system losses (determined by very accurate electricity meter readings) and the significantly "under-calculated" transmission system losses (due to the DC load flow methodology used by the T-Price software).

In addition, Western Power would achieve operational savings by not having to pay for the T-Price software licence nor maintain trained specialists who use that software once a year. They could be assigned to other duties, for example those that require use of the AC load flow software used for power system simulations.

For the reasons explained here, I respectfully propose to immediately discontinue use of the T-Price software for calculation of the loss factors.

Loss Factors – Frequency of Calculations

Loss factors are currently calculated annually for the whole year. This is unnecessarily infrequent interval, leading to unnecessary inaccuracies in the calculated values.

The accuracy of the forecasted load and generation pattern decreases as the forecast time interval increases. More frequent calculation, by itself, would result in more accurate calculation of the loss factors and less preparation time.

Loss factors could be calculated seasonally, monthly, weekly or, even, daily. Please consider this proposal to increase the frequency of loss factor calculation.

Reactive Power - Impact on Metering

Economic efficiency requires to measure and control consumption of the reactive power - both the energy and demand. In Europe customers generally have a free allowance of up to 0.95 power factor, and any excess is charged. In order to facilitate efficient operation and compliance monitoring, future smart meters must be specified to measure the reactive power, both energy (kVArh) and demand (kVAr). Intrinsically they can do that at no additional cost, if specified. Otherwise, the inefficient SWIS power system design and operation would continue indefinitely.

Power System Technical Regulation Field

National Electricity Market (NEM)

NER. Key technical regulation relevant for power system operation role of the Australian Energy Market Operator (AEMO) in the National Electricity Market (NEM) is located in Chapter 5 of the National Electricity Rules (NER), specifying the permissible voltage and frequency variations and generating plant performance requirements requiring ongoing verification.

NER. Key market regulation relevant for the market operator role of the AEMO in the NEM is located in chapters other than chapter 5 of the NER.

It is important that technical requirements of Chapter 5 and market operation requirements of chapters other than Chapter 5 have equal legal status in the NEM, that given to the NER. Consequently, technical and market requirements are equally enforced in the NEM including penalties their violations.
Another important characteristic of the NER is that there is separation of powers of creation, administration and interpretation of the NER in the NEM: body that creates NER does not administer it nor interpret it.

Wholesale Electricity Market (WEM)

Technical Rules. Key technical regulation relevant for power system operation role of the Australian Energy Market Operator (AEMO) in the Wholesale Electricity Market (WEM) in WA and operation of the South West Interconnected System (SWIS) is located in the Technical Rules for the South West Interconnected Network (SWIN). They specify the permissible voltage and frequency variations and generating plant performance requirements requiring ongoing verification[2].

For completeness, the content of the Technical Rules is covered in Chapter 5 of the National Electricity Rules (NER), the relevant state regulation (Distribution Code or ESCoSA requirements) and local transmission and distribution network service provider planning criteria and connection requirements.

Market Rules. Key market regulation relevant for the market operator role of the AEMO in the SWIS is located in the Wholesale Electricity Market Rules (Market Rules), also (WEM Rules). The Market Rules are contemplated in section 123 of the Electricity Industry Act 2004 (Industry Act).

Legal status of Market Rules

Although the Market Rules do not have full legal status of subsidiary legislation under the Industry Act their requirements are strictly enforced, and there is a civil penalty provision for their contravention. For example, section 124(2)(i) of the Industry Act prescribes:
"*for a contravention of a civil penalty provision —*
(i) an amount not exceeding $100 000; and
(ii) in addition a daily amount not exceeding $20 000,
that may, in accordance with the regulations, be demanded from or imposed upon a person who contravenes the provision;"

Another important characteristic of the Market Rules is separation of powers of creation, administration and interpretation of the Market Rules in the WEM; see regulations under the Industry Act. In summary, a body that administers Market Rules does not interpret them, nor has the exclusive right to propose amendments.

Legal status of Technical Rules

The Technical Rules' legal status is inferior to that of the Market Rules; the Industry Act does not contemplate Technical Rules, nor there is any penalty provision for their contravention.

The Electricity Networks Access Code 2004 (Access Code) is a subsidiary legislation under the Industry Act. The Access Code calls for the creation of the Technical Rules.

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[2] Technical Rules: Chapter 2 includes transmission and distribution system performance standards and planning criteria; Chapter 3 connection requirements for generators and loads, and; Chapter 4 mutual rights and obligations.

Breaches of the Technical Rules are not legally sanctioned nor included in the list of punishable offences in the Electricity Industry (Access Code Enforcement) Regulations 2005.

Further, Western Power's transmission and distribution licenses do not explicitly require compliance with the Technical Rules and Access Code, and, more importantly, there are no penalties for non-compliance with the Technical Rules within the licence framework under the Industry Act.

Consequently, in practice and in my opinion, the requirements of the Technical Rules have been loosely enforced, if at all. Yet, these impact about 75% of the electricity cost consumers pay!

Opportunity to breach Technical Rules and not being fined could be tempting for stakeholders whose commercial and other interests or the bottom line may profit from it.

This also applies to Western Power, as the creator of the Technical Rules, its enforcer, administrator, interpreter and sole owner with the exclusive right to propose any amendments.

The effective lack of decision review mechanism regarding the Technical Rules is dismaying, as this document, directly or indirectly, accounts for about 75% of the total electricity bill consumers pay.

Further, the Energy Review Board (Board) has no jurisdiction to review Technical Rules related decisions too, see section 130 of the Industry Act. Nor any other state body has! All decisions should be legally reviewable, in my opinion.

The Board has jurisdiction to review inefficient capital and operations expenditures (CAPEX & OPEX) under section 130(2)(k) of the Industry Act: "*a decision by the Authority to approve or not to approve an arrangement lodged under section 104(2)(c)*;"

In other words, every 4 to 7 years there is a 14 days window of opportunity to apply to the Board regarding inefficient investment when these are part of the newly approved access arrangement[3]. Technical Rules are not part of the Access Arrangement, hence the Board's jurisdiction under s 130(2)(k) over inefficient investment underpinned by the Technical Rules is yet to be tested in the "court of the Board". An alternative recourse for individual consumers could be a class action by a specialist class action firm.

AEMO Helpless Observer - Dire Consequences

The AEMO's largely helpless position to do very little, or practically nothing, to prevent the runaway train of consequences of imprudent decisions others made but to try to put out the fires others created is well illustrated in the AEMO's submission to the parliamentary Inquiry to the Question on Notice No. 2: FUNCTIONAL BOUNDARY – AEMO AND WESTERN POWER (Parliamentary Inquiry, 2018), (QoN), page 8:

> *"The development of amendments to the Technical Rules and the WEM Rules must be concurrent to accommodate linkages between the two documents:*
> *….*
> - *To transfer the accountability to generator connection standards and transmission grid performance standards, and for compliance monitoring of those standards, to AEMO."*

[3] The next approval date is 28 February 2019 for AA4.

I share the AEMO's concerns and proposal (which does not go far enough, in my opinion) and wish to provide the following supporting examples, as requested in the Discussion Paper.

Example 1 – Misuse of power

I will illustrate how that exorbitant power can be misused, costing taxpayers a staggering amount of money. In December 2016, pursuant section 12.45 of the Access Code, I applied first time to the ERA to review its decision to grant exemption to Western Power for the Meadow Springs zone substation that was subsequently used as "*justification*" to change clause 2.5.4 of the Technical Rules. On 20 November 2018, the ERA advised to the effect of they were powerless to review or revoke a past approval of amendments to the Technical Rules or to propose further amendments to the Technical Rules (because this has been the exclusive right of Western Power).
The exemption for Meadow Springs and Mandurah zone substations effectively authorised $27M of unnecessary spending, whereas the ultimate cost of the subsequent amendment of the Technical Rules will be over $1,000,000,000 (one billion dollars) of unnecessary spending.
In other words, that amendment, now in force, now mandates "gold plating" of zone substations. For details, please refer to Attachment 1, - Steve Davidson
second submission to the ERA dated 14 November 2018.

Examples 2 & 3 – Exemption No. 1 by Western Power

Examples 2 and 3 illustrate how Western Power exercised power to grant exemptions to "the big end of the town" and its consequential impact on the rising prices of electricity, including the WEM price.

The lists of exemptions from compliance with the Technical Rules granted by Western Power can be accessed from:

https://www.erawa.com.au/electricity/electricity-access/western-power-network/technical-rules/exemptions-approved-by-western-power

Example 2 – Exemption No. 1 – Buy-out of the Shortfall Capability Reactive Power

Let's examine the first exemption granted under the Industry Act.

The exemption No.1 was granted on 16 January 2008 to Newgen Neerabup, regarding the shortfall of the reactive power capability, pursuant to clause 3.3.3.1(d), TR-2007[4], which allows buy-out of the shortfall capability in exchange for the financial contribution[5].

[4] In Technical Rules 2011, this clause was renumbered as clause 3.3.3.1(e), and explanatory box/text of Footnote 5 here included.

[5] The buy-out was intended to facilitate flexibility in design by assisting proponents to connect generating units that, of themselves, are not capable of meeting the reactive power generation requirements specified in clause 3.3.3.1 through providing for the shortfall to be made up through some other means such as static VAr compensators, static synchronous compensators, inverters, thyristor switched capacitor banks and thyristor switched reactors.

No.	Date of Exemption	To whom Exemption was granted	Clause to which the Exemption has been granted	Concise Details of the Exemption (including reason for granting the exemption)
1	16 January 2008	Newgen Neerabup Unit 1	3.3.3.1(a)	Modified reactive capability: 0.8 Lagging 101.3 MVAr 0.9 Leading 68.5 MVAr Basis: Financial contribution of $4.07M for the shortfall capability, pursuant to clause 3.3.3.1(d).

Table 1 *– The list of exemptions dated 8 December 2008. DMS document #5203971v1*.

Newgen Neerabup power station is comprised of two units, Unit 1 and Unit 2.

The reported reactive power capability in Table 1 pertains to a single generator unit.

The information in Table 1 shows that Newgen Neerabup was due the reactive shortfall capability buy-out of $4,070,000 for Unit 1 and leads us to believe Newgen Neerabup paid that amount to Western Power. There is no need to go into details on how this amount was calculated.

No	Date of Exemption	To whom Exemption was granted	Clause to which Exemption has been granted	Concise details of the Exemption (including reason for granting the exemption)
1	16 January 2008	Newgen Neerabup Unit 1	3.3.3.1(a) (Technical Rules 26 April 2007)	Modified reactive power capability: 0.8 Lagging 101.3 MVAr 0.9 Leading 68.5 MVAr Basis: Financial contribution for the shortfall in reactive power capability, pursuant to clause 3.3.3.1(d).

Table 2 *– The list of exemptions dated 29 September 2011. DMS document #5203971v2*.

Nearly three years later in 2011, the financial reporting information changed, see Table 2; to the effect of that Newgen Neerabup had paid to Western Power the unspecified amount of the financial contribution, for the reactive shortfall capability buy-out for Unit 1!? This raises three questions. One; why the amount allegedly paid changed? Two; Did Western Power, indeed, charge Newgen Neerabup the full amount of $4,070,000 for Unit 1? Three; If not $4,070,000, then how much Western Power did charge Newgen Power for the shortfall for Unit 1? This apparent inconsistency between Table 1 and Table 2 is even more confusing, given that the shortfall quantity did not change?

No	Date exemption granted	Exemption granted to:	Applicable clause(s)	Exemption timing	Exemption details
Version: 2007 Technical Rules					
1	16-Jan-08	Neerabup (two generating units - Units G11 and G12)	3.3.3.1(a)	Ongoing	***Modified reactive power capability:*** 0.8 Lagging 101.3 MVAr 0.9 Leading 68.5 MVAr ***Basis:*** Financial contribution for the shortfall in reactive power capability, pursuant to clause 3.3.3.1(d).

Table 3 *– The list of exemptions dated 20 June 2016. Document number not shown.*

In 2016, five years later the reported financial information was changed again, see Table 3. This time to the effect of that the unspecified amount of the financial contribution Newgen Neerabup paid to Western Power included that for Unit 1 and Unit 2 too!? This raises further questions. One; why the number of generator units changed, from one to two? The AEMO capacity credit data shows there was no increase in the power station capacity. Two did Newgen Neerabup pay additional contribution for Unit 2 in the period between which the two lists of exemptions were published (from 29 September 2011 to 20 June 2016)? Three, if not, how the initially reported amount of $4,070,000 was calculated?

For Unit 1 only? Four, If not for Unit 2, then why Western Power did not charge Newgen Neerabup financial contribution for the reactive shortfall capability buy-out for Unit 2?

Example 3 – De-rating Explained

Western Power has been using the high ambient temperature chart based on the maximum temperature that has the probability of exceedance of 1% for equipment de-rating during peak demand periods. This provides an additional locational signal that the same plant would have higher MW rating if located in cooler regions.

The Australian Bureau of Meteorology (BOM) updated the SWIS temperature chart in 2011, that was immediately included in the Technical Rules 2011, as new clause 3.3.3.1(a), with the remaining clauses re-numbered. The temperature chart is shown in Figure 1 below for completeness. The chart depicts the climate in WA, and illustrates how ambient temperatures increase from its south-west tip towards north-east inlands.

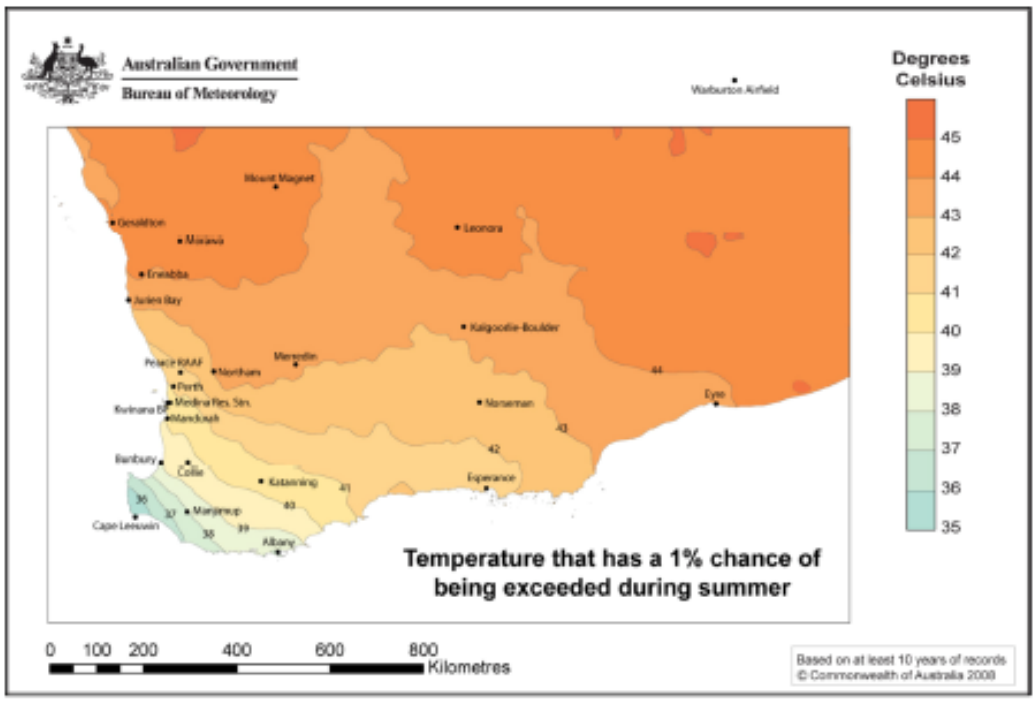

Figure 1 *– WA Temperature chart of clause 3.3.3.1(a), TR-2011 onwards.*

Similarly, in order to account for the de-rating due to high ambient temperatures, for the purpose of capacity credits the WEM Rules stipulate the alternator MW rating at 41degC. This accounts for an efficiency loss at high temperatures, which are typical during peak demand periods.

Figure 1 shows that 41degC applies to the Perth Metro region. The application of the 41degC rule slightly advantages generators located North of Perth, and, similarly, slightly disadvantages generators located South of Perth. It does not provide the locational signal.

The adoption of the WA temperature chart in the WEM Rules, in lieu of the flat 41degC rule, would be consistent with the WEM objectives, and it would provide the long-term benefit.

Example 3 – Exemption No. 1 – Impact of the WEM prices via Capacity Credits

The capacity credits is a category of the WEM costs paid to generators proportionally to their MW rating. The capacity credits were introduced, I understand, in response to the UK electricity market experience, to disincentive generators from withholding the available capacity in order to manipulate the prices.

The maximum MW power output in the Technical Rules, explicitly requires the ability of the generator to simultaneously deliver to the power system the full amount of the reactive power under all allowable operating conditions.

The required reactive capability in the Technical Rules is expressed as a product of the MW rating (delivered to the power system on the network side of the connection point) and a dimensionless factor. There are two factors; the factor of 0.75 for the reactive power injection (corresponding to the 0.8 power factor), and factor of 0.484 for the reactive absorption (corresponding to the 0.9 power factor).

The AEMO's list of Capacity Credits shows that Newgen Neerabup power station was granted 300.6MW, which means that each of its two units (Unit 1 and Unit 2) was has the capacity credits for 150.3MW (calculated as 300.6 / 2 = 150.3MW). This MW rating would require 150.3 x 0.75 = 112.725 MVAr injection and 150.3 x 0.484 = 72.7452 MVAr absorption capacity[6]. The actual reactive capacity of Newgen Neerabup Units 1 & 2, from the list of exemptions of Example 2 is 101.3MVAr and 68.5MVAr respectively. This shows that the Newgen Neerabup is receiving roughly 10% more in the capacity credits than it should. The actual MW for the capacity credit allowance could be calculated as min{101.3/0.75, 68.5/0.484} = min{135.07, 141.53} = 135.07MW per unit or 270.13MW for the whole power station, not 300.6MW. The difference is 30.47MW (calculated as 300.6 – 270.13 = 30.47MW), or about 10%.

The above 10% capacity credit overcharge is, in my opinion, typical for many transmission generators.

Distribution system connected generators. In my opinion, that overcharge is much higher for generators connected to the distribution system because typically they are connected to the distribution system by the fixed-tap step-up transformers. They can supply the local load, if there is any, but cannot inject own rated power into the network, as required in the Technical Rules. I would like to be wrong, but I doubt so. This requires technical audit and verification of all distributed connected generators with assigned capacity credits, starting with the four highest rated, 9.9MW Tesla generators.

The average reserve capacity cost per MW for the period from 2005-06 to 2019-20 was $131,402 per MW (see the last column http://www.aemo.com.au/Electricity/Wholesale-Electricity-Market-WEM/Reserve-capacity-mechanism/Benchmark-Reserve-Capacity-Price).

The total quantity of assigned capacity credits for 2019-20 in the WEM is 4,888 MW. Let's assume, which is not unreasonable (given the self-interest hypothesis), that our findings for Newgen Neerabup could be generalised to all generators in the WEM. Then, 10% of 4,888MW or 489MW capacity credits have been unjustly claimed.

The average annual cost of those apparently unjustly assigned capacity credits could be calculated as 489MW x $131,402 per MW = $64,254,600 or just over $64,000,000 each year.

[6] Assuming the step-up transformer(s) have the sufficient capacity, impedance and tapping range to deliver it to the grid.

In conclusion, failures of Western Power to assign the MW plant ratings in the access contracts based on the actual Declared Sent Out capacity (DSOC) that could be delivered to the grid (on the high voltage side of the step-up transformers), under conditions specified in the Technical Rules (the MW injection simultaneous with the injection or absorption of the reactive power under all permissible voltage operating conditions, and the maximum ambient temperatures) and of the AEMO to critically review those MW plant ratings from the access contracts when assigning the capacity credits, has been unnecessary adding about $64,000,000 annually to the cost of the WEM. This needs to be rectified.

Example 4 – Exemption Nos. 14, 15, 20 & 31 – Impact of the WEM prices via Capacity Credits

Reference is made to the numbered list of exemptions published on or about 30 June 2016 on the ERA website. Exemptions Nos. 14, 15, 20 & 31 relate to the damping clauses 2.2.8 and Table 3.1, clause 3.3.4.5. The latter specifies the settlement time of the voltage control system.

It appears that the damping requirements were either reduced (exemption No.14) or un-transparently completely waived (because no compliance threshold was stated)(exemptions Nos. 15, 20 & 31) with the unacceptable explanation to the effect of "realistic performance of the plant".

Had Western Power investigated the damping at the lower MW outputs than the maximum one, it is likely that the damping and settlement time would meet the requirements of the Technical Rules. The capacity credit should then be given for that lesser than the maximum MW output, for which the Technical rules requirements are met. It is not possible to quantify that MW output in generic terms, however, I would be surprised if the capacity credit reduction would be lesser than than 10-20% of the values AEMO respectively assigned to Muja D, Kwinana HEGT, Kwinana Donaldson Road and Newgen Kwinana based on the Western Power's assessment.

Further, my FOI request showed that Western Power has no procedure, nor criteria for the assessment and its acceptable methodology, hence it is possible that different standards were applied to different applicants, as indicated by comparison of the wording of exemption No. 14 and exemption Nos. 15, 20 & 31.

These findings further support the AEMO's proposal to transfer the related Technical Rules functions away from Western Power to the AEMO.

Example 5 – Exemption Nos. 3, 21, 22, 32, 33 & 34 – Impact of the WEM prices by Increasing the Quantity of Services

Reference is made to the numbered list of exemptions published on or about 30 June 2016 on the ERA website. Exemptions Nos. *3, 21, 22, 32, 33 & 34* relate to the MW response clauses 3.3.3.4.4 and 3.3.3.5. Equal participation of all generators in the SWIS is crucial for economical, secure and reliable operation of the WEM and the SWIS. The aggregate shortfall of the MW response, <u>not</u> provided by these generators, as well as other generators who were subsequently granted similar exemptions in the unnumbered list of exemptions published on the ERA website on or about 20 November 2017 (the latest list) is increasing the control duty on the remaining generators operating at the time. When these are unable to make up for the slack, power system security and stability erodes, and the AEMO has no other choice but to proclaim the "high risk" operating state.

By applying the “causer pays” principle, the responsible parities should bear the cost of invoking out-of-merit-order generators they caused. The current practice to make all customers pay for these costs is wrong, as it financially awards the selfish behaviour and encourages its repetition.

This causer pays remedy for the shortfall of the MW control response should be implemented ASAP, but no latter than at the termination of the periodic review of the access contracts with the generators granted permanent exemptions, assuming there is no quicker legal way.

In addition, the capacity credits of these MW response non-compliant generators should be reduced to that MW output, for which they can comply with the MW response requirements of the Technical Rules. The implementation of this measure would be fair and consistent with the WEM objectives, including that to reduce the long-term cost of electricity to customers supplied from the SWIS.

Generators who choose to disable the dead-band on their governors, would receive zero capacity credits payment.

In conclusion, we need WEM and other rules that financially penalize bad (typically selfish) behaviour that adversely affects others and rules that financially reward those who do more than their fair share of the MW/frequency and voltage/reactive power control duties in order reduce the long-term cost of electricity to customers supplied from the SWIS and pro-actively take actions to achieve the ultimate objective to indefinitely keep the SWIS in the safe and secure operating state.

Individuals and Corporations

The Industry Act allows large corporations to negotiate with their Network Service Providers, and disallows small users to do so. Small users have no say or choice to negotiate a better deal from market participants. There is no mechanism for users to seek recovery of unfair costs. This is wrong and needs to be changed.

Further, an individual who is unsatisfied with unfairly high electricity prices cannot apply to the Board because an individual is not a person "adversely affected" by the decision within section 130(3) of the Industry Act. This is unfair and needs to be changed.

In conclusion, it is unfair the whole state to be at the mercy of the Electricity Network Corporation. In other words, even if proved the corporation tricked the regulator to approve the inefficient Meadow Springs investment and by doing so "unlawfully took $27M from WA public", the corporation has the right to decide whether or not to return that money. Any member of the public would be jailed for 20 years if the reverse occurred. It is unfair that corporations in Australia have the rights of individuals, like free speech, individuals do not have the rights granted to corporations – like no jail time for the alleged (see Attachment 1)(and yet uninvestigated) trickery for which an individual would face 20 years in prison. This needs to be changed.

2018 Grattan Institute Report - Overinvestments in the NEM

Over investment in the electricity network is not unique in Western Australia. For proof, see:
https://grattan.edu.au/publications/reports/

Tony Wood, David Blowers and Kate Griffiths, "Down To The Wire: A Sustainable Electricity Network For Australia", Grattan Institute Report, 25 March 2018. [Grattan, 2018][7]

This report is focused on the Eastern seaboard states that are part of the National Energy Market (NEM) and says:

- We estimate that up to 20 billion dollars in investment in power networks was excessive ...
- The main cause of over-investment were regulatory incentives ... and excessive reliability standards
- It is recommended to write down of the Regulated Asset Base (RAB) of over 9 billion dollars...
- Reducing the value of these assets will reduce bills for electricity consumers at the expense of future revenue for state governments.

The report was published in March 2018, which is a year and half after first time I applied to the ERA to review its Meadow Springs exemption of Appendix 1 and, quite independently, recommended the same remedial measure - write down of the Regulated Asset Base (RAB).

The [Grattan, 2018] report used the "top down" methodology, which contrasts the more accurate "bottom up" methodology used in my application to the ERA allowed by the regulatory framework in WA. Both methodologies could be seen as two perspectives of the same problem.

In contrast to the "excessive reliability standards in the NEM" referred to in [Grattan, 2018] report, the planning criteria of the Technical Rules were not excessive and over-investments occurred because Western Power have not been abiding by its own planning criteria and the ERA failed to do its duty by allowing it to occur. In other words, the ERA failed in its obligation to act in the long term interest of consumers and it appears our Industry Act framework disallows review of this decision!? This stalemate could be overcome by transferring the Technical Rules into Market Rules or another Ministerial direction. A parliamentary inquiry focused on WA, similar in scope and complementary to the [Grattan, 2018] report, could, and in my opinion would, provide further justification that the responsibility for the transmission and distribution network planning criteria should be transferred away from the Electricity Network Corporation.

Bad Taxation Policy

The networks are an important source of income to state governments. The sadness of this arrangement is that gold-plating is purely for the purpose of providing income to the owning governments. This is a wasteful way to raise money and bad taxation policy. Much better to just levy sales without building assets in order to tax them.

Further to [Grattan, 2018] report, the second recent high profile investigation into electricity prices in Australia was conducted by Australian Competition and Consumer Commission. (2018, March). *Retail Electricity Pricing Inquiry: Restoring electricity affordability and Australia's competitive advantage.* [ACCC, 2018][8].
It confirmed the above and proposed the asset write down as a remedy. Both focused on the National Electricity Market (NEM) and did not include Western Australia (WA).

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[7] https://grattan.edu.au/wp-content/uploads/2018/03/903-Down-to-the-wire.pdf

[8] https://www.accc.gov.au/system/files/Retail%20Electricity%20Pricing%20Inquiry—Final%20Report%20June%202018_0.pdf

However, the situation is no different in WA where the same findings and conclusions apply too, as evidenced by Examples 1 to 5 here and Appendix 1.

Other examples are not included in this submission, as their primary adverse impact is through the RAB, not through the WEM.

Mandatory MW Response, Droop and Other Controls of Generators

Further, Technical Rules mandate ongoing generator performance requirements, one of which is the "droop" control action (also known as the primary frequency regulation). The droop and other control action requirements in the Technical Rules were coordinated with those of the UK Grid Code and other European technical jurisdictions at the time, I understand.
If functional, these MW control actions help to arrest the frequency decline following a sudden loss of generation capacity and its unhindered (for example by not increasing the dead band) ongoing functioning verification by regular (annual) testing is essential for maintaining security and reliability of the power system. In contrast to the good industry practice in the NEM, UK and Europe of regular testing of the MW response of generators (and other ongoing performance requirements), I am not aware that Western Power have tested and documented the ongoing performance requirements for WEM generators, let alone for all generators, as has been required by the Technical Rules.

Droop MW Response. The primary frequency response is essential for security and arresting the frequency decline following major disturbances and generators. It was not mandated is in the NER. However there is anecdotal evidence, after the NEM commenced its operation, operators of the conventional power plants in Victoria and South Australia (unsure about other states at the time of writing) did not disable the droop control loop on their generators, so they continued to provide stabilising effect for MW and frequency transients. The gradual retirement of those plants in Victoria and South Australia and subsequent overall reduction of the droop control action provided by the aggregate generation in the NEM has been contributing to many incidents, including blackouts in the NEM.

For secure and efficient SWIS operation, it is essential to effectively enforce equal droop action on all generators. For fairness among market participants, WEM and non-WEM generators who fail to provide the full droop response, should be charged for the shortfall in their MW droop response. The market financial mechanism should ensure that the proceeds are apportioned and paid to generators whose MW droop response exceeded the minimum mandated by the Technical Rules (that corresponds to the 4% droop and the dead band). In case that in one trading interval the aggregate MW droop response from all generators was not achieved, the unused financial incentive should be transferred to the next trading interval (aka WA Lottery premiums). Implementation of this proposed measure, including financial enforcement of the droop control action, would increase the power system security and reduce the number of brownouts in the SWIS and the aggregate WEM price to the extent these have been unreasonably increased due to non-compliance of generators with their droop control obligations.

Inertial response. The inertial response of generators reduces the initial frequency decline and has beneficial impact on power system security. Since 2005 (I think), renewable energy generators in Ontario, Canada, were required to embed the synthetic inertia into their plant design, and to activate in 2010. In 2007, a discretionary power was granted to Western Power in the Technical Rules, which mirrored that world leading practice of Ontario Hydro at the time, I understand.

The inference of my FOI findings that Western Power has no procedures for own compliance with the Technical Rules and exercising discretion granted to it by the Technical Rules, nor has the standard Scope of Work (SOW) on what needs to be checked when conducting power system studies for applications for access to the SWIN, is that Western Power have probably never conducted a comprehensive power system study that assessed the aggregate impact on the system and market operation.

The above explains well numerous answers AEMO (C.Pattotte, D.Sharafi & N.Kostecki) gave to the [Parliamentary Inquiry, 2018] in the Transcript and Questions on Notice [QoN].
For example, QoN, page 2, Q1
"*This could replace the current arrangement of consumer assets being operated independently, with the power system being managed to mitigate the real-time impact of consumer assets on the power system. This can result in higher system costs which may then be passed on to all consumers*.";
QoN, page 6, Q2:

- "*Where obligations are unclear or unallocated, the result can be uncertainty regarding how and when parties must coordinate to deal with operational matters (particularly those affecting the transmission system and distribution system simultaneously) and the longer term needs of the SWIS*.";
- "*The current regulatory regime may be characterised as fragmented, complicated and uncoordinated*...";
- "*Revision to the frameworks for exemptions, performance standards, non-compliance and power system stability co-ordination require consequential changes to account for the power operation function transferring to AEMO from Western Power in 2016*";
- "*AEMO is now subject to requirements imposed by the Technical Rules, but has no means to propose a change to that instrument*";

page 7:

- "*It is not clear which party is responsible for managing various matters on the distribution network that can ultimately effect the secure operation and reliability of the power system*";
- "*Not all operational scenarios are adequately addressed with regard to ensuring reliability of supply (Footnote: Such as resolution of a reliability of supply issue that can arise despite both parties are fulfilling their obligations under the Technical Rules and WEM Rules, ie Eastern Goldfields islanding event)*";
- "*Western Power is fully responsible for generator connection, generator connection standards even though the outcomes of these responsibilities directly affect AEMO in the performance of its functions*."

Had Western Power exercised own rights and obligations, under the Technical Rules and good industry practice for the long term benefit of the society, and took a holistic view of the SWIS and long term interests of all consumers, except when creating 2007 and 2011 Technical Rules (and probably unsuccessful efforts of the few who tried to implement them in practice), then, in my opinion, there would have been no need for the parliamentary inquiry in 2018 and, otherwise avoidable, high electricity prices that have been adversely affecting living standards and industry competitiveness in WA, and contributed to the loss of the AAA credit rating of the state.

A very expensive alternative to the inertial response and, effectively no cost, droop action has been recently tried in South Australia - large battery storage units.
Reference to the large battery storage units in the Discussion Paper is concerning, as this should be considered as the (desperate) measure of the last resort, only after all economically more efficient measures were exhausted.

High Risk State

In addition, the current WEM Rules do not differentiate between "high risk" state due to brownouts (AEMO's preventive action, before the load was lost) and after the emergency (when AEMO is the is restoring the supply to loads and recovering SWIS after an emergency). Differentiation between these two states would allow more substantial reporting of the power system operation. Hence, it a suggestion to be considered for market development.

Mandatory Consultations with AEMO

There are numerous discretionary provisions in the Technical Rules and mandatory provisions for Western Power to consult with the AEMO (formerly IMO and System Management) on issues that may affect market and system operation.

Italian Blackout 2003 & UCTE Blackout 2006. These provisions were included in the Technical Rules, I understand, after learning lessons from blackouts across the globe, including the largest European blackout in 2006, and recommendations of the UCTE 2006 Blackout Investigation Report. It would be useful to find out why Western Power did not implement in practice these clauses?

Concessions for Renewables

The Technical Rules 2007 and 2011 included provisions to orderly manage penetration of renewable energy sources in WA. Some of these were either removed from two versions of the Technical Rules 2016 or have never been implemented. Details could be provided upon request.

In 2007, in order to facilitate increasing penetration, renewable energy generation was granted concessional status in Technical Rules 2007 (unlike in the NER). The essence of these provisions was understanding that renewable energy generation will gradually increase its role in controlling load variations proportionally to its relative size of the aggregate generation, including the explicit qualification "… *it is assumed that the full rated capacity of the inverter is capable of being exported to the distribution system."* The Parliamentary Inquiry provided ample of evidence that these concessions should be revoked.

Consequences of Technical Rules Non-Compliance

- Losing multiple power stations for a single fault
- Increased risk of widespread customer disconnection
- Restrictions on the development of renewable energy
- Reduced quality of electricity supply to customers
- Substantial increase in WEM operating costs for holding additional spinning reserve and increased need for the quantity of balancing and ancillary services.

FOI on Western Power's Technical Rules Compliance

My recent FOI request revealed that Western Power has no internal procedure for own compliance with the Technical Rules nor their administration and interpretation. However, the Technical Rules determine approximately 50% of the WEM costs and 100% of all network capital expenditures, whereas enforcement of the generator performance requirements safeguards against power brownouts and blackouts.

Non-compliance with the Technical Rules and Western Power's failures to exercise own discretion granted to it under the Technical Rules regarding short term and long term impact on power system and market operation, as evidenced by the AEMO submission to the Parliamentary Inquiry, is one of the reasons for increasing WEM costs.

I share the AEMO's concerns, to the effect that maintaining this status quo would be a disaster waiting to happen, and support the AEMO's proposal to transfer the Technical Rules into the Market Rules.

For these reasons, I propose the investigation similar to that of [Grattan, 2018] report, be conducted in WA and its findings and recommendations be applied to Western Power: to the effect of reduction of the RAB and compensation for increased WEM and other costs its Technical Rules non-compliant, and apparently negligent, conduct have caused to stakeholders, market participants and consumers of electricity.

Issue 2 – Adverse Cost Impact of Renewables
As the penetration of renewable energy behind the meter increases, it is altering the load profile serviced by generators in the WEM. This alteration has the potential to increase costs.
Question 2
2. Do market participants consider generators are changing their bids into the balancing market to recover higher start-up and shut down costs over shorter run times?

The complexity of the increasing WEM pricing problem spans across three main established fields: electrical power system engineering, economics and power system technical regulation.

Refer to the description of three relevant fields under Question 1:

Formulation of the Issue 2 is not straightforward, renewable energy behind the meter (as well as renewable energy in front of the meter) is increasing costs. I recall a report written about 10 years ago by, then, System Management, saying that SWIS has the capacity to absorb, with no adverse cost implication about 15% of the load at any time. That threshold, I understand is now largely exceeded. According to the AEMO testimony to the [Parliamentary Inquiry, 2018], there are about 1,000MW of the renewable capacity in the SWIS, increasing at the rate of about 180MW per year. The Discussion Paper uses the figure of 134MW per year, which is the same order of magnitude.

I will illustrate this point by the following extract from an earlier presentation

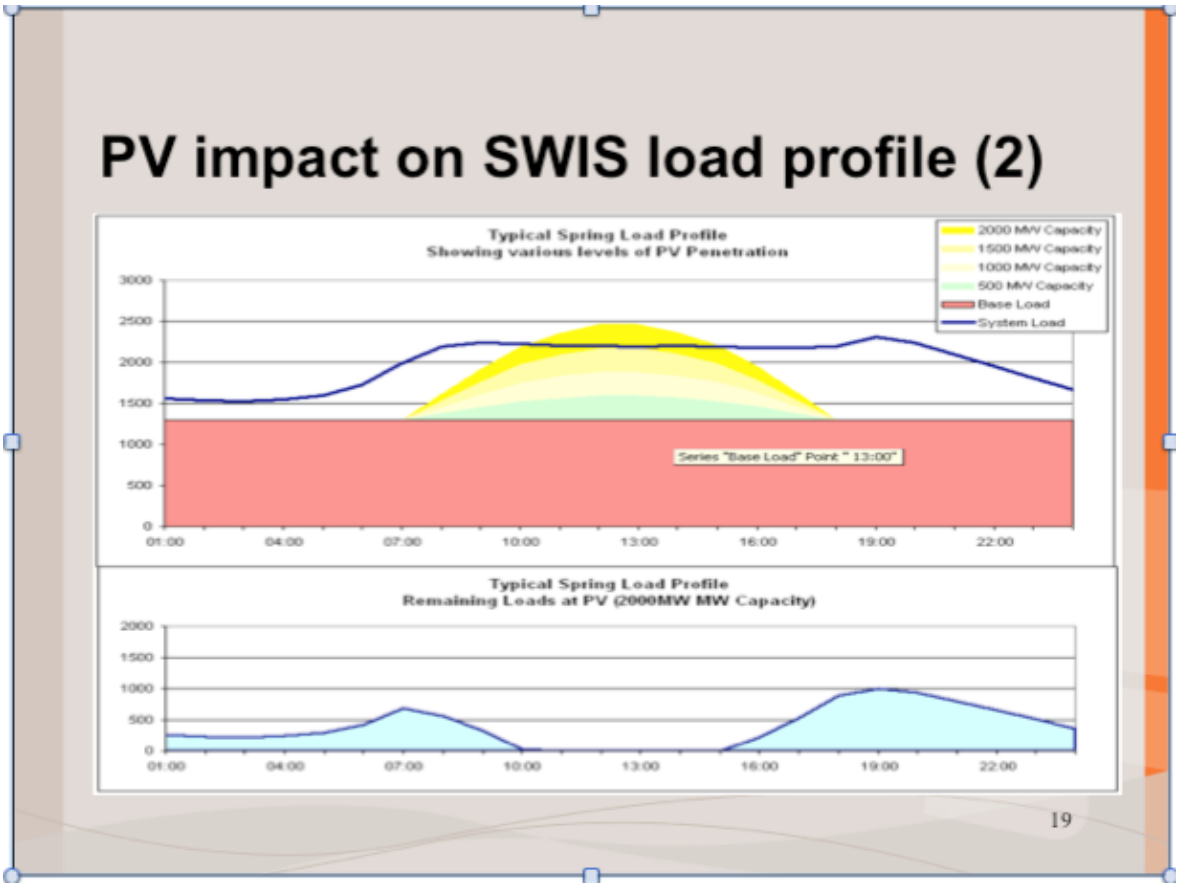

Figure 2 *– PV impact on the SWIS load profile.*

The chart of Figure 2 could be explained as follows:

- The unconstrained solar power cuts into the base load part of the system load diagram.
- This means that base load generators would be allocated the load following duty to cover the increasingly variable part of the load diagram (due to solar PV generation).
- Also, generators that covered the variable part of the load diagram would be required to go cycling and disconnect from the power system for parts of the day (similar to peak load generation).
- An increased quantity of the ancillary services would probably be required.
- The question is will the existing generation be able to provide that increased control duty (ancillary services)?

The AEMO's submission to the [Parliamentary Inquiry, 2018] indirectly answered two questions raised:

- The quantity of ancillary services increased, and
- The existing generation is just able to keep the system together, however only through the AEMO's intervention via the "high risk" state, and not for long.

That warning was not heeded.

Question 2:
No comment.

Issue 3 – Market Power
The WEM is highly concentrated. Synergy is dominant through its own generation plant and power purchase agreements with other generators. There is insufficient competitive discipline on Synergy to keep wholesale prices down. Infra-marginal generators, which are dispatched with bids below the balancing price, benefit from these higher balancing prices.

Question 3
3. Is the market applying sufficient pricing discipline on generators in light of the high level of concentration in the WEM?

No comment.

Issue 3 – Market Power
The WEM is highly concentrated. Synergy is dominant through its own generation plant and power purchase agreements with other generators. There is insufficient competitive discipline on Synergy to keep wholesale prices down.
Infra-marginal generators, which are dispatched with bids below the balancing price, benefit from these higher balancing prices.

Question 4
4. Aside from disaggregation, what other measures could improve competitive discipline in the WEM? How would these measures work?

In my opinion, disaggregation of Synergy would not help because it will not change the structure of the generating units nor improve their maneuvering capabilities. It could only increase costs due to more executives, corporate overheads and boards.

Issues 1, 2 & 3 – Conclusion
The ERA's analysis suggests that neither demand nor fuel prices are driving wholesale prices higher. Increased penetration of intermittent generation, particularly behind-the-meter, is dampening network demand during the middle of the day. However, analysis of Synergy's largest generators shows that this has not yet begun to shorten generator average run duration; or, at least, not to the point where it needs to substantially increase bids to recover start-up and shut down costs over shorter run times.

Question 5
5. What other factors should the ERA consider that may underlie wholesale price increases in the WEM?

The complexity of the increasing WEM pricing problem spans across three main established fields: electrical power system engineering, economics and power system technical regulation. Refer to the description of three relevant fields under Question 1.

- Do the WEM cost breakdown first.
- Then analyse did the quantity increase or the cost per unit.
- One should make a clear distinction between the true load and that presented to the power system after subtracting the local renewable energy generation (for example, local PVs), as illustrated in Figure 2 here. The latter is much more "curvy" increasing the need for the quantity of the MW control services, therefore increasing the cost of the WEM.

- The bids should be allowed (and mandated) to provide the droop governor action, in order to reduce the quantity of ancillary services. Financial disincentives for the underperformance should be developed.

- To facilitate the growth in renewable energy generation and ensure that barriers for local or overall developments are not introduced, it is necessary that renewable energy technology can broadly provide similar level of functional performance to existing generating plant.

- The existing generating plant must provide the level of functional performance required in the Technical Rules. Those who cannot do or choose not to do so should pay other generating plant to do their share of the functional performance.

- Other supporting mechanisms across the three fields should be put in place in order to encourage "good" behaviour and discourage "bad" behaviour from the perspective of minimising the long-term cost of electricity to consumers and other WEM objectives.

The implementation of these measure could internalize externalities through supplementary government policy.

Issue 4 – Future Risks and the Investment Environment
The future investment environment in the WEM may not be conducive to continued third-party investment. This may leave the State Government responsible for funding or underwriting future generation investments.

Question 6
6. Are market participants satisfied that innovation trials are sufficiently open to participation from entities independent of government?

If much of the scheduled generation capacity in the WEM is approaching the end of life, it is an opportunity.

As explained, the Synergy's dominance is not the true cause of the increasing WEM prices. An investigation into the Synergy's bids prior to 1 July 2012 could dispel that myth (or confirm it), as explained in the Economics Field section under Question 1.

Regarding: "*Consumers with their own generation (and storage) have more control over their electricity bills. This reduces demand on the network, which can delay network augmentation."*

The 2nd sentence is an opinion presented as fact.

Refer to Figure 3 that shows that PV solar systems do not reduce peak load, and do not delay network augmentation.

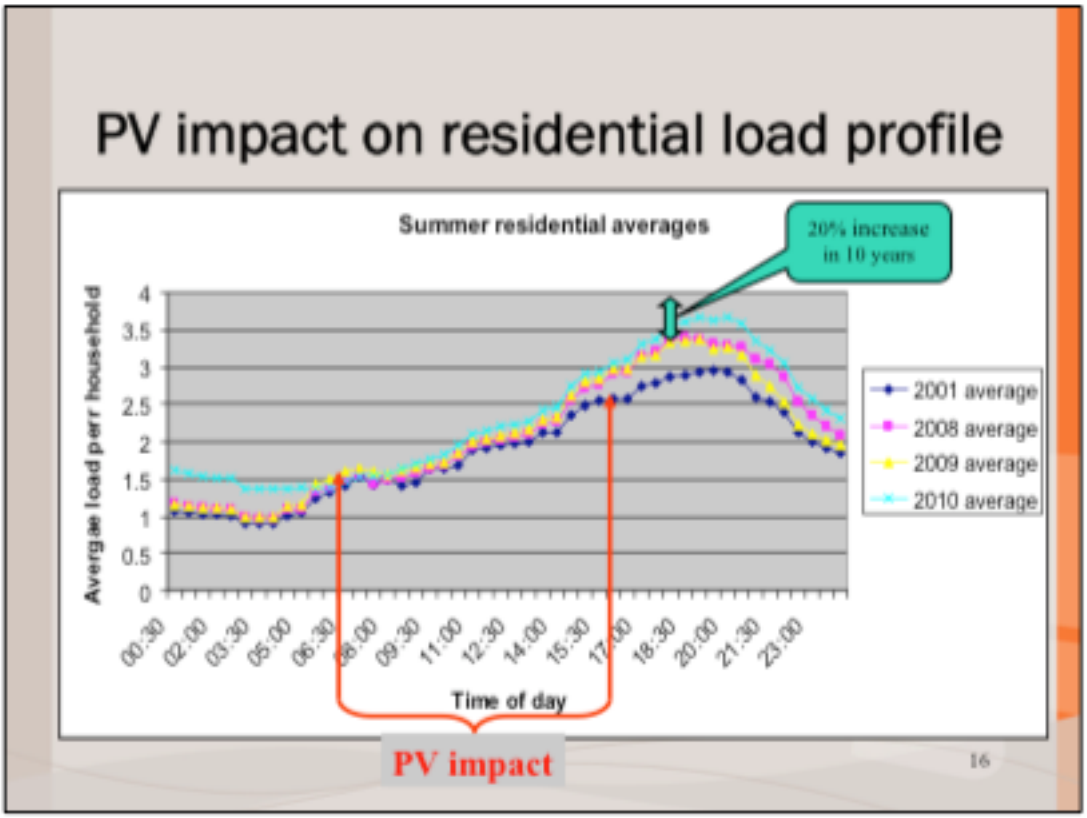

Figure 3 *– Solar PV systems DO NOT reduce peak load.*

The chart of Figure 2 could be explained as follows:

- An important finding is that solar PV systems DO NOT reduce peak load.
- Moreover, the net feeding tariff can actually increase the peak load, by providing (strong) commercial incentive to move discretionary daytime electricity consumption to after the sunset …
- … lost revenue otherwise ...
- The impact of the tariff on the human behaviour needs to be understood better.

Regarding: "*Currently, there is publicly-available information on rooftop PV, but it is limited to aggregated information, by postcode, on PV systems installed behind the meter*."

All PV applicants must seek Western Power's permission; Western Power has the list, street by street, number by number; The Western Power's list should be used. In my opinion, it would be negligent from Western Power not to maintain the updated the list, in which case the cost of its re-creation/update should be borne by Western Power and excluded from the regulated income stream.

Regarding: "*To generate more accurate demand forecasts, comprehensive and more frequent data will be needed on how PV systems, and increasingly on how storage systems, affect demand*."

We already know the impact of PV systems upon the shape of the load curve of the SWIS; see Figure 2 here.
We should set the performance requirements for batteries, not investigate it.

Regarding: "This was recognised in the 2017 *Independent Review into the Future Security of the National Electricity Market (commonly known as the Finkel report) " (Finkel A., Moses*

K., Munro C., Effeney T., O'Kane M., (2017) Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future, Commonwealth of Australia, Canberra, p58-59).. This review recognised the importance of "a clear need for greater visibility of [distributed energy resources]". One of the recommendations from the review was to "develop a data collection framework …to provide static and real-time data for all forms of distributed energy resources"

One of recommendations of the UCTE 2006 Blackout Report concerned the distributed energy resources (DER) connected to the distribution system, to the effect of: "*The DNSP must provide to the TNSP information on the aggregate amount of the DER within less than one minute delay*".

The effect of that recommendation was embedded in the Technical Rules as a discretion granted to Western Power. I am unsure if it was used and when.

Further, I recall Western Power's technical presentation on connection requirements for embedded generation scheduled for early 2015 being cancelled in the last moment by Engineers Australia.

My FOI request revealed that Western Power has no documented procedures for ensuring own compliance with the Technical Rules, nor that for exercising discretion granted to it under the Technical Rules.

Instead being responsible, Western Power effectively engaged in non-compliance with the Technical Rules on the industrial scale. For example, refer to the "General Notifications" in the recent lists of exemptions Western Power granted to applicants, for example, the latest list published on or about 19 November 2018:
https://www.erawa.com.au/cproot/19866/2/November%202018%20-%20Technical%20Rules%20Customer%20Exemptions%20(Current)%20register.PDF

In the last column, for exemptions for different clauses it says: "*A separate list of exemption recipients is maintained*"!?

In other words, there are hundreds of exemptions Western Power granted to applicants, separate lists of which should be "available upon request". This defeats the purpose of making the list of exemptions public.

That conduct makes a mockery of the Technical Rules and increases the WEM cost.

Question 6:
I am unaware of the industry trials, nor have been given an opportunity to take part in any. I found out about two trials from the AEMO's submission to the [Parliamentary Inquiry, 2018].

Since these do not seem to be open to public and market participants are not registered research establishments, the cost of these trials should not be born by consumers of electricity. These should be funded from unregulated income of the regulated electricity corporations and WEM market participants, as well as, perhaps, from dedicated research funds by federal and/or state governments.

The apparent lack of the business cases for the trials is of concern. This concern is compounded by the financial failure of Carnegie Energy and its solar subsidiary Energy Made Clean that was involved in the Kalbarri trial with Western Power. Both companies unfavourably appeared in the news headlines ("*The Carnegie share price has plummeted after the company posted big losses*", "*Carnegie was selling a majority stake in its solar*

microgrid company, Energy Made Clean (EMC), at a 75 per cent loss.", 22 September 2018, ABC News Online[9]), which could be interpreted that Western Power wasted money that was approved by the ERA. At the time of writing this submission, the Carnegie Clean Energy Ltd. ASX: CCE stock price is firmly at "AUD 0.00". This practice of the ERA approving research trial funds should discontinue, as it also increases the cost of the WEM and is inconsistent with the WEM objectives, including with the objective of minimising the long term cost of electricity for consumers.

If electricity corporations, or the ERA, want to gamble, they should do that with their own money, not with the money of their electricity customers.

May I therefore propose, that the money previously approved for the trials (Perenjorri and Kalbarri and, perhaps, other six locations) be reversed and taken off the regulated income of the Electricity Network Corporation. The same applies to the Synergy's Alkimos solar city project experiment.

Reference to other 58 potential trial sites in the Western Power's submission to the Parliamentary Inquiry is of grave concern and should not be approved by the ERA as a regulated expenditure. Again, Western Power and their managers can gamble with their own money, but not with the money of consumers of electricity.

In that respect, recently published findings of the Banking Royal Commission, compounded by the ineffective regulation and "customer friendly" regulators may also become applicable to the electricity supply industry in the WA.

Finally, microgrids have negligible impact on the WEM (because they are micro consumers), hence no reference to microgrids should have been included in the WEM Discussion Paper. Their inclusion demonstrates lack of understanding of the core technical issues. Microgrids are a local issue, whereas the WEM is concerned with the power system wide issues.

Issue 4 – Future Risks and the Investment Environment
The future investment environment in the WEM may not be conducive to continued third-party investment. This may leave the State Government responsible for funding or underwriting future generation investments.
Question 7
7. To what extent do market participants rely on, or derive benefit from, the electricity statements of opportunity in planning and investment decisions?

No comment.

Issue 4 – Future Risks and the Investment Environment
The future investment environment in the WEM may not be conducive to continued third-party investment. This may leave the State Government responsible for funding or underwriting future generation investments.
Question 8
8. Should market participants signal intended or probable plant retirements at least three years in advance, as has been suggested in the National Electricity Market; or, should the market operator undertake its own analysis of the probable plant exit dates?

The market operator should not be involved in forecasting retirement of plants, as it does not have access to the relevant information, typically commercially sensitive hence unavailable.

[9] https://www.abc.net.au/news/2018-09-22/power-company-carnegie-energy-hit-by-wave-of-discontent/10289772

Issue 4 – Future Risks and the Investment Environment
The future investment environment in the WEM may not be conducive to continued third-party investment. This may leave the State Government responsible for funding or underwriting future generation investments.

Question 9
9. If not advanced notice of plant retirements, what other mechanisms could be used to signal investment opportunities and improve the operation of the capacity mechanism?

Three years advance notification before retirement is better than having no notification.

However, that information is insufficient for specification of the future power plant. Central to the WEM difficulty and its global resolution is optimum selection for the plant performance specification. This assignment requires knowledge of the role of the future power plant in the power system.

It is necessary to quantify control requirements for aggregate generation, imposed by the bulk power system operation, and to quantify the maneuvering capabilities of the existing generators, compare the two and to suggest the required maneuvering capabilities for new power plants. Publication of the control requirements and maneuvering capabilities would provide a clear signal to investors which generation plant power system needs. The AEMO should be ultimately responsible for that work.

Issue 4 – Future Risks and the Investment Environment
The future investment environment in the WEM may not be conducive to continued third-party investment. This may leave the State Government responsible for funding or underwriting future generation investments.

Question 10
10. To what extent do policy uncertainty and behind-the-meter changes in generation and storage influence decisions to develop projects in the WEM?

The problem is not so simple as the question suggests. There are many variables and many solutions. One such a combination of the values of the variables is defining the present state of the WEM. Unfortunately, it is an unwanted state. However, its existence was clearly anticipated in 2011. It results from easy but ultimately wrong decisions, which have adverse long-term consequences.

By not prudently exercising own discretionary rights under the Technical Rules, including the right to grant exemptions and obligation to consult with the AEMO (then the IMO and System Management), Western Power has demonstrated track record of regulatory and technical non-competence. It has been the key source of problems and cannot be part of the solution, in my opinion. I wish I was wrong, but I trust this is true.

We should set the performance requirements for batteries, not investigate what they might do. The role of the technical regulator is to listen, but also to lead stakeholders. It does not seem to be a good practice to let the stakeholders choose the regulation and pick what they like and discard what they do not like.

We should have timely implemented adequate performance requirements for PVs, not let them have a free run and adversely impact the WEM.

Issue 4 – Future Risks and the Investment Environment

The future investment environment in the WEM may not be conducive to continued third-party investment. This may leave the State Government responsible for funding or underwriting future generation investments.

Question 11

11. Do market participants consider the investment environment in the WEM is challenging? If so, why?

In my opinion, they are confused believing that WEM is all about the energy. They now know that is not quite right, however they are yet unable to articulate what is right. The electrical engineering profession needs to articulate that for them.

To be specific, we need to explain what Mr C. Parrotte meant by saying:

> "*... it is not all about the energy. We need to provide contingency services and frequency control, and those things add other costs that renewables do not do today, but are actually showing some green shoots that they could provide in the future*"
>
> (see page 12, 3rd paragraph, the Transcript).

so that they can understand it.

Issue 4 – Future Risks and the Investment Environment

The future investment environment in the WEM may not be conducive to continued third-party investment. This may leave the State Government responsible for funding or underwriting future generation investments.

Question 12

12. Do market participants consider the investment environment in the WEM will improve or worsen over the short to medium term? If so, what factors will drive this change?

No comment.

Issue 4 – Future Risks and the Investment Environment

The future investment environment in the WEM may not be conducive to continued third-party investment. This may leave the State Government responsible for funding or underwriting future generation investments.

Question 13

13. What is the likelihood that the State Government will need to invest to replace generation assets?

It would be a certainty if we continue with the “business as usual”: making easy decisions, kicking the can down the road and outsourcing “thinking” to someone else.

Technically and regulatory it was known in 2007 and in 2011.

If we implement that knowledge in practice now, the State Government would not need to replace generation assets.

The AEMO said in their submission to the parliamentary Inquiry, to the effect of, that we have two more years, or so, before blackouts start occurring.

That was predictable since 2007 and 2011. The momentum was lost and the “business as usual” in the form of pleasing customers have prevailed since.

The question is would those who brought us in this situation be able to take us out?

We need to think beyond the box. For example, the gain sharing mechanism should not be limited to the Electricity Network Corporation only. In order to mobilize the collective knowledge of the state, a new scheme, similar to the gain sharing mechanism should be open to individuals and administered by a non-corporate entity. This would create the efficiency drive, provided that the proponents would be allowed to share a gain.

Issue 4 – Future Risks and the Investment Environment
The future investment environment in the WEM may not be conducive to continued third-party investment. This may leave the State Government responsible for funding or underwriting future generation investments.
Question 14
14. What could organisations such as the ERA, AEMO, Western Power and the State Government reasonably do to improve the investment environment?

Policy / Ministerial Directions

- Confirm the minimization of the long term cost of electricity supplied to customers from the South West Interconnected System to be the overarching objective which must be considered when decision making and exercising own discretion under the Industry Act.

- Confirm understanding that the runaway train of increasing control requirements and decreasing MW maneuvering capability of the aggregate generation in the SWIS needs to be reined in. Otherwise, more financial pain will be experienced, before blackouts commence occurring.

- Confirm understanding of the need for an investigation similar to that of [Grattan, 2018] report to be conducted in WA and its findings and recommendations to be applied to the Electricity Corporations.

- Confirm willingness to re-instate funding for public advocacy the former energy minister Nahan removed (in 2012, I think), in my opinion in order to silence public and its contribution to the energy debate.

- Confirm willingness to implement the “causer pays” principle, so the responsible parities should bear the cost of invoking out-of-merit-order generators they caused.

  The current practice to make all customers pay for these costs is wrong, as it financially awards the selfish behaviour and encourages its repetition.

- Ministerial order is proposed for the AEMO (with the help of the Electricity Network Corporation, in the transitional period) to quantify the control requirements for aggregate generation, imposed by the bulk power system operation, and to quantify the maneuvering capabilities of the existing generators, compare the two and to suggest the required maneuvering capabilities for new power plants.

  Publication of the control requirements and maneuvering capabilities would provide a clear signal to investors which characteristic of the future generation plants the SWIS power system requires.

Legislation

- Legislate transfer of responsibility for the Technical Rules from the Electricity Network Corporation to the AEMO and include the relevant section of the Technical Rules to the Market Rules.

- Legislate transfer of responsibility for the remaining parts of the Technical Rules (planning criteria and network performance requirements) from the Electricity Network Corporation to a government agency.

- Legislate that a body that interprets the planning criteria and networks planning requirements and assesses the compliance to be either the AEMO or some other government body which did not create them.

- Legislate the minimization of the long term cost of electricity supplied to customers from the South West Interconnected System to be the overarching objective which must be considered when decision making and exercising own discretion under the Industry Act, unless the decision maker provides justification otherwise.

- Legislate a decision review mechanism that would apply to all decisions made under the Industry Act, Access Code, Technical Rules, Market Rules, etc. .

- Legislate a decision revision mechanism that would not discriminate individuals over corporations, ie that would grant equal rights to individuals and corporations. Namely, the individuals should have the right to apply for the review of a decision of others that, the individual believes, adversely affects the price of electricity he is required to pay. The onus of proof should be on the applicant.

- Legislate setting aside a certain percent of the aggregate cost of the WEM to restore funding for public advocacy of consumer rights in the SWIS, for the WACOSS and residential and, perhaps, small business consumers who do not have powerful industry associations to lobby the government on behalf of the interests of their members.

- Include breaches of the Technical Rules in the list of punishable offenses under the Access Code/Industry Act?

- Include a civil penalty provisions for contraventions of the Technical Rules (and Market Rules).

- Include a daily penalty provision for contravention of the Market Rules and Technical Rules from the date of contravention (not from the date the corporation failed the order to comply (after the deadline for compliance expired).

- Introduce the $-value threshold or a similar threshold, above which a criminal penalty applies for contraventions of the Technical Rules and Market Rules.

- Remove immunity from prosecution for regulatory actions under the Industry Act, for all parties except for the AEMO and its officers performing power system and market operation functions and the Electricity Network Corporation and its officers performing network operation functions (the latter work in real-time and must be allowed to focus on making the best decisions under the limited information available at the time, without the second thoughts and fear of subsequent liability; the internal operations review procedures should suffice).

Legislate causer pays principle for the regulatory conduct – liability for own decisions (not made in performing functions related to real-time operation of the networks, market and power system). Confirm willingness to implement the "causer pays" principle, so the responsible parities should bear the cost of invoking out-of-merit-order generators they caused.

-

- Legislate the incentive mechanism for unaffiliated parties, including individuals, (say 1%) of the savings, if their proposal/reporting of the corporate non-compliance could significantly reduce the overall cost of electricity to 3rd party users of electricity. In other words, the gain sharing mechanisms should not be the exclusive right of the network licensees (who have vested interest to reduce their performance obligations in their submissions to the ERA, some say, in order to latter claim the performance bonuses).

  Justification. In order to mobilize the collective knowledge of the state, a new scheme, similar to the gain sharing mechanism should be open to individuals and administered by a non-corporate entity. This would create the efficiency drive, provided that the proponents would be allowed to share a gain.

- Legislate mandatory transparency of the Electricity Network Corporation in respect of the newly approved/mandatory periodically reviewed existing connections in terms of the Technical Rules exemptions, single line diagrams and classification of assets into shared and connection assets. This legislation would enable the public, including journalists, access to the relevant technical and regulatory information to decide if the case exists or not to lodge a gain sharing application (under new legislation proposed here).

- Legislate appointment a Chief Engineer for the state of WA (as the ACT and Victoria recently did, at the initiative of the Engineers Australia), in order to give major projects better engineering scrutiny.

- Legislate professional engineering in WA to be a licensed profession (as is in Queensland), so 'bad apples consulting outside of their area of expertise' could be deregistered.

- Legislate mandatory CPEng signatures for all regulatory submissions, including those the ERA makes.

  Any submissions, that do not include the engineering content or may not impact electrical engineering field of the WEM and SWIS operation, operational planning, power system and plant performance requirements, medium and long term planning, asset management over the equipment life-span, security, reliability and economic efficiency over the short and long term, should have a signed CPEng statement to that effect.

  Economic Regulation Authority

- Establish a body to monitor the regulator – ERA and report to the minister twice a year (similarly to the Banking Royal Commission recommendation).

- Amend the legislation to the effect of the ERA to be obliged to publish notification about all submissions it received (not only those it chose to consider), including those it received and chose not to consider (either because they were late submissions or because of their content). This would not change the ERA's

existing discretionary rights, it would only increase the transparency, enable scrutiny and foster timely resolution of the issues raised.

Electricity Corporations

- Legislate decision making obligation of the Electricity Corporations to consider options that: *Minimize the long term cost of electricity supplied to customers from the South West Interconnected System.*

- Legislate decision making obligation of the Electricity Network Corporation to consider the "lowest cost option, even if the new asset would be located on the customer side of the connection point and it would not be included in the Electricity Network Corporation's RAB.

- Legislate decision making obligation of the Electricity Network Corporation for building a shared asset to connect the access applicant to be the measure of the last resort; to be implemented only after considering all other options, including the request for the access applicant to gift the required asset to the Electricity Network Corporation.
    - Legislate obligation of any subsequent users of that asset to reimburse the original user who paid for it.

  The rationale and objective is NOT to transfer the costs to all network users. Decision makers and beneficiaries of those decisions, not the general public through tariffs, should pay the new assets.

- Legislate decision making obligation of the Electricity Network Corporation to request/accept access applicant's offer to gift to it the asset the creation of which is needed for the Technical Rules compliant connection of the access applicant, regardless of whether, after the construction, the asset may or may not be located on the network side of the connection point.

- Mandate the access applicant's obligation to offer to gift to the Electricity Network Corporation the asset the creation of which is needed for connection of the access applicant, even that, after the construction, the asset may or may not be located on the network side of the connection point.

Reviews

- I propose the investigation similar to that of [Grattan, 2018] report, be conducted in WA and its findings and recommendations be applied to the Electricity Network Corporation and, where applicable, Electricity Retail and Generation Corporation: to the effect of reduction of the RAB and compensation for increased WEM and other costs its Technical Rules non-compliant, and apparently negligent, conduct have caused to stakeholders, market participants and consumers of electricity.

- Failures of the Electricity Network Corporation to assign the MW plant ratings in the access contracts based on the actual Declared Sent Out capacity (DSOC) that could be delivered to the grid (on the high voltage side of the step-up transformers), under conditions specified in the Technical Rules (the MW injection simultaneous with the injection or absorption of the reactive power under all permissible voltage operating conditions, and the maximum ambient temperatures) and of the AEMO to critically review those MW plant ratings from the access contracts when assigning the capacity credits, has been unnecessary adding

about $64,000,000 annually to the cost of the WEM. This needs to be reviewed and rectified.

For example, generators who choose to disable the dead-band on their governors, should receive zero capacity credits payment.

- Investigate and quantify financial consequences to 3rd party electricity users of the decisions the Electricity Network Corporation made in granting exemptions from compliance with the requirements of the Technical Rules (ie decisions not to enforce compliance with the requirements of the Technical Rules) to access applicants and existing users of the network.
    - Quantify the OPEX and CAPEX it caused and reverse the relevant decisions to allow them to be included in the OPEX, CAPEX and the RAB.
    - Quantify the respective WEM losses and those experienced by other network users, for example, by unnecessary constraining the transfer capacity of the 220kV transmission line to the Eastern Gold Fields (EGF) to 155MW (as inferred by the AEMO submission to the Parliamentary Inquiry, regarding the inadequate EGF simulations).

  A parliamentary inquiry focused on WA, similar in scope and complementary to the [Grattan, 2018] report and the investigations proposed here, could, and in my opinion would, provide further justification that the responsibility for the transmission and distribution network planning criteria should be transferred away from the Electricity Network Corporation.

Specific

- The use of T-Price software for calculation of the loss factors should immediately discontinue.

- The full AC load flow method for the loss factor calculation should be mandated, effective immediately.

- It is proposed to increase of the frequency of loss factor calculation, from once a year to seasonally, monthly, weekly or, even, daily.

- It is proposed to adopt the WA temperature chart in the WEM Rules, in lieu of the flat 41degC rule, as is consistent with the WEM objectives, and would provide the long-term locational signal for investors on how to maximize the MW output from the intended plant.

Issue 5 – Market Administration, Governance and Reform
The future investment environment in the WEM may not be conducive to continued third-party investment. This may leave the State Government responsible for funding or underwriting future generation investments.

Question 15
15. Do market participants consider that market operation, administration and development expenditure is delivering the benefits anticipated? If not, is the market and its electricity consumers failing to secure the benefits because of structure, governance, lack of competition, or scale?

No comment.

Attachment 1:

IN THE ECONOMIC REGULATION AUTHORITY WESTERN AUSTRALIAN

No of 2018

Re: Application for review of the decision by the Economic Regulation Authority for:

(a) exemption from compliance with the Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion dated 15 May 2015, and;
(b) amendment to the Technical Rules submitted in April 2016 and titled "Normal Cyclic Rating (NCR) Criterion".

Application by:

STEPHEN DAVIDSON Applicant

APPLICATION FOR REVIEW

Date of document: 14 November 2018

Prepared by:

Stephen Davidson
[redacted]
[redacted]
Tel.: [redacted]
Email: [redacted]

Pursuant to Section 12.45 of the *Electricity Networks Access Code 2004* (**the Code**) the Applicant applies for review of the decision (**Decision 1**) made in July 2015 by the Economic Regulation Authority (**Authority**) and placed on the public register kept by the Code Registrar under the Code on or about 20 July 2015 whereby the Authority approved the exemption from compliance with the Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion submitted by Western Power Corporation on 15 May 2015 under section 12.40 of the Code – approving for Western Power to be exempt from compliance with clause 2.5.4(b) of the Technical Rules at the Meadow Springs Zone Substation, and (related);

In accordance with clauses 28(1)(a)&(b) of the *Economic Regulation Authority Act 2003* (**the ERA Act**), and consequently to Section 12.45 of the *Electricity Networks Access Code 2004* (**the Code**) as applied to the Decision 1, the Applicant applies for review of the decision (**Decision 2**) made in November 2016 by the Economic Regulation Authority (**Authority**) and placed on the public register kept by the Code Registrar under the Code on or about 9 November 2016 whereby the Authority approved the proposed revised wording of the Normal Cyclic Rating (**NCR**) criterion submitted by Western Power Corporation on 1 April 2016 under section 12.50 of the Code – changing the wording of the Normal Cycling Rating criterion which outlines the permissible level of power loss following the unplanned loss of a supply transformer at a substation.

The application seeks the following final orders: -

1. The Decision 1 and Decision 2 (**Decisions**) of the Authority be set aside or varied to give effect to the matters asserted in the grounds for this application.
2. Further or alternatively the Authority to draft and approve the original wording of the Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion to give effect to the matters asserted in this application.
3. Further or alternatively, the Authority to establish the total amount and timing of the Capital Expenditures (**CAPEX**) Western Power spent since the commencement of the first Access Arrangement, on zone substations by not applying the original wording of the Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion. This includes expenditures on Meadow Springs and, if applicable, Mandurah zone substations mentioned in Decision 1, the aggregate cost of which was estimated to be $37M (10+27).
4. Further or alternatively, the Authority to remove from the Regulated Asset Base (**RAB**) the CAPEX amount(s) of Item 3 here to give effect to the matters asserted in the grounds for this application.
5. Further or alternatively, the Authority to make the adjustments consequential to any order under Item 4 here, for Western Power to effectively pay back for any returns it received from inclusion of the CAPEX of Item 3 into the RAB to give effect to the matters asserted in the grounds for this application.
6. Further or alternatively, the Authority to investigate whether the actions of Western Power and the Authority asserted in the grounds for this application amount to just a coincidence, cooperation or collusion, as well as what was the motive and intent.
7. The Authority restores the Archive section of the Technical Rules on its website, with all previously published versions of the Technical Rules made available (including two uncorrected versions).
8. The Authority publishes this submission on the Authority's website (for transparency) without any delay.
9. Such further or other orders as may be appropriate.

The grounds for this application are annexed.

Applicant

[redacted]

GROUNDS

The two Decisions are interrelated as Decision 2 was largely made by relying on Decision 1. Both Decisions comprise one whole, as is described below.

Background

Technical

The fundamental engineering problem of concern in Technical Rules clause 2.5.4(b) is how much load is permissible to be lost (following the unplanned outage of a single transformer), before a decision is made to install a new transformer in the zone substation.

Financial

The cost of installing a new transformer in the zone substation varies between $10M and $27M. There are about one hundred zone substations in the Perth metropolitan area, each of which typically have two or three transformers. This illustrates the multi billion dollars significance of clause 2.5.4(b) in terms of CAPEX allocation; it articulates the rationale for having just two spare transformers for the Perth metropolitan area rather than, ultimately, one hundred and two spare transformers (one in each of one hundred zone substations plus two rapid response spare transformers required under the NCR criterion).

Societal

The issue raised here is important and urgent. It is important because it adversely affects Western Australian industrial competitiveness and consumer welfare, which is job and living standards. It is urgent because the current Access Arrangement expired on 30 June 2017, the regulatory financial adjustments are made effective on that day as part of the Authority's approval of the next 'Access Arrangement 4' (**AA4**), the process of which is ongoing at the time of writing this Application.

Decision 2 - Amendment to change wording of Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion

1. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving amendment to the Technical Rules dated 31 March 2016,

submitted to the Authority on 1 April 2016 and titled “Normal cyclic rating (NCR) amendment” by substantially relying on the inappropriate, for the purpose of changing the Technical Rules, assertion by Western Power that the existing wording of clause 2.5.4(b) was ambiguous whereas the (original) wording of clause 2.5.4(b) was unambiguous and did not allow the room for different interpretations.

For completeness, the whole (original) clause 2.5.4 Zone Substations is quoted next, inclusive of the explanatory box[1]:

*“**2.5.4 Zone Substations***

2.5.4(a) The 1% Risk Criterion

The 1% risk criterion permits the loss of a supply to that portion of a substation’s peak load that is demanded up to 1% time in a year (87 hours) following the unplanned outage of a supply transformer in that substation.

2.5.4(b) Normal Cyclic Rating (NCR) Criterion

(1) The NCR risk criterion permits the loss of a portion of power transfer capacity at a substation following the unplanned loss of a supply transformer within that substation.

(2) The portion of the power transfer capacity that may be lost is the lesser of:

(A) 75% of the power transfer capacity of the smallest supply transformer within the substation; and

(B) 90% of the power transfer capacity of the rapid response spare supply transformer.”

“*Relationship between 1% Risk criterion and NCR criterion is explained below:*

1. *Zone substations* require special consideration as they form the boundary between the *transmission system* and the *distribution system*. The 1% Risk Criterion and NCR Criterion permit higher *supply transformer* utilisation than that permitted by the N-1 criterion, but lower than that permitted by the N-0 criterion.
2. The 1% Risk and NCR criteria are based on sharing a common spare *supply transformer* among a population of *supply transformer*s across a number of *zone substations* within a geographically confined area.

[1] Western Power, “*Technical Rules*”, Approved by Economic Regulation Authority, effective from 23 December 2011, p.27, explanatory box, end clause 2.5.4.

A trade off is the risk of limited *load shedding* for as long as it takes to deploy and install a spare *supply transformer*. The acceptance of this risk determines the application of these two criteria."

The regulatory precision of clause 2.5.4 Zone Substations is noted, sharp and clear thoughts and words focused on substance. For example, the explanatory box complements the wording of the clause, by outlining its rationale and puts it into the perspective of the other two planning criteria ("N-0" and "N-1"). For these reasons, the actual wording of clause 2.5.4 and the explanatory box comprise one whole and must be interpreted as a whole, which the Authority failed to do (Western Power too).

2. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving amendment to the Technical Rules dated 31 March 2016, submitted to the Authority on 1 April 2016 and titled "Normal cyclic rating (NCR) amendment" by substantially relying on the inappropriate, for the purpose of changing the Technical Rules, assertion by Western Power that the purpose of the amendment was (only) to:

> *"Modify the clause to remove ambiguity in the interpretation of the normal cycling rating (NCR) planning criteria[2]."*

whereas the following amended wording of clause 2.5.4(b), as published by the Authority[3] substantially changed its content and substance:

> *"**2.5.4 Zone Substations***
>
> ***2.5.4(a) The 1% Risk Criterion***
>
> *The 1% risk criterion permits the loss of a supply to that portion of a substation's peak load that is demanded up to 1% time in a year (87 hours) following the unplanned outage of a supply transformer in that substation.*
>
> ***2.5.4(b) Normal Cyclic Rating (NCR) Criterion***
>
> *(1) The NCR risk criterion permits the loss of a portion of power transfer capacity at a substation following the unplanned loss of a supply transformer within that substation*.

[2] Western Power, "*Submission to the Economic Regulation Authority for amendments to the Technical Rules, 2016 Part B*", Submission for Economic Regulation Authority, 31 March 2016, p.5, Table 1.

[3] Economic Regulation Authority, "*Western Power's Proposed Amendments to the Technical Rules Submitted April 2016*", Final Decision, November 2016, p.7, Table 1, right column.

(2) The maximum power transfer at an NCR substation is 75% of the power transfer capacity of the substation, except that the total power transfer capacity lost shall not exceed 90% of the power transfer capacity of the rapid response spare capacity transformer."

in a manner that *considerably reduced the power transfer capacity of the NCR substations, by effectively mandating lower utilisation of power supply transformers than that permitted by the N-1 criterion*. This reduction of the power transfer capacity has a significant adverse economic effect on Western Australia, of the order of hundreds of millions of dollars. For example, see Item 12 here.

3. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving amendment to the Technical Rules dated 31 March 2016, submitted to the Authority on 1 April 2016 and titled "Normal cyclic rating (NCR) amendment" by not considering neither the (original) wording of clause 2.5.4(b) (see Item 1 here) nor the following extract from the explanatory box at the end of clause 2.5.4 (see Item 1 here) of the Technical Rules which could be interpreted as explaining the intent of clause 2.5.4, including that of clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion:

> "The 1% Risk Criterion and NCR Criterion permit higher *supply transformer* utilisation than that permitted by the N-1 criterion, but lower than that permitted by the N-0 criterion."

In the Applicant's opinion, this quote explains the essence of clause 2.5.4, including that of clause 2.5.4(b).

4. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving amendment to the Technical Rules dated 31 March 2016, submitted to the Authority on 1 April 2016 and titled "Normal cyclic rating (NCR) amendment" by substantially relying on the inappropriate, for the purpose of changing the Technical Rules, whereas the Authority's Decision 1, quoted in Item 2 here created an inconsistency between the wording of (amended) clause 2.5.4(b) and the (unamended) wording of the explanatory box at the end of clause 2.5.4, in particular with respect the quote in Item 3 here.

5. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in

approving amendment to the Technical Rules dated 31 March 2016, submitted to the Authority on 1 April 2016 and titled “Normal cyclic rating (NCR) amendment” by substantially relying on the inappropriate, for the purpose of changing the Technical Rules, assertion by Western Power that the existing wording had been critically reviewed earlier:

> “*The preparation of the recent submission for a Technical Rules exemption for Meadow Springs [Zone Substation] works led to closer scrutiny of the NCR criterion clause in the Rules.*[4]”

Reference to section on Decision 1 below shows that no scrutiny was applied neither by Western Power nor the Authority.

6. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving amendment to the Technical Rules dated 31 March 2016, submitted to the Authority on 1 April 2016 and titled “Normal cyclic rating (NCR) amendment” by substantially relying on the inappropriate, for the purpose of changing the Technical Rules, assertion by Western Power that the existing wording had been critically reviewed earlier by the Authority:

> “*On the basis of the … feedback from the Authority’s technical consultant a more practicable wording for this Rule is being proposed.*[5]”

In other words, Western Power’s substantial argument for changing the rule was the Authority’s advise (by the Authority’s technical consultant) to do so. This could be interpreted as the circular argument.

7. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving amendment to the Technical Rules dated 31 March 2016, submitted to the Authority on 1 April 2016 and titled “Normal cyclic rating (NCR) amendment” by substantially relying, without own independent verification, incorrect assertion by Western Power describing the benefit of the proposed amendment as:

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[4] Western Power, “*Submission to the Economic Regulation Authority for amendments to the Technical Rules, 2016, Part B*”, Submission for Economic Regulation Authority, 31 March 2016, p.7, Table 3.1.

[5] Western Power, “*Submission to the Economic Regulation Authority for amendments to the Technical Rules, 2016, Part B*”, Submission for Economic Regulation Authority, 31 March 2016, p.7, Table 3.1, row labeled 2.

"*Defer investment by increasing the loading [SD: of transformers in zone substations].*[6]"

That is explicitly stated in the Authority's Issues Paper[7]:

"*Western Power considers that its proposed amendment will deliver economic benefits to users because it will allow for the deferral of investment that would otherwise have been made in order to ensure compliance with limits which can be safely breached with the employment of efficient risk mitigation methods. Western Power proposes to employ the use of Rapid Response Spare Supply Transformers to mitigate the risks associated with amending the NCR risk criterion. Western Power points to the Authority's determination on the Meadow Springs Substation exemption proposal, which was approved by the Authority …"*

8. Further, the proposed amendment to amend clause 2.5.4(b) Normal Cyclic Raring (NCR) Clause submitted by Western Power in April 2016 was not in good faith and was misleading because the full sentence of the Western Power's argument of Item 7 here reads:

"*Defer investment by increasing the loading against otherwise deterministic compliance limits, but limiting risk in cases where those limits are breached for short periods of time by deploying more efficient mitigation methods".*

whereas, no comparison (technical nor economic) was made between the allowable zone substation loading under the (original) clause 2.5.4(b) and (then proposed, amended) clause 2.5.4(b) to support the purported benefit.

9. In addition, the proposed amendment to amend clause 2.5.4(b) Normal Cyclic Raring (NCR) Clause submitted by Western Power in April 2016 was not in good faith and was misleading because the argument of Item 7 and Item 8 here was inconsistent with the other arguments presented by Western Power, and endorsed by the Authority, to the effect of, that the rule 2.5.4(b) was not being changed, just clarified. For example, see Issue 2 here.

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[6] Western Power, "*Submission to the Economic Regulation Authority for amendments to the Technical Rules, 2016, Part B*", Submission for Economic Regulation Authority, 31 March 2016, p.8, Table 3.1 (continued from p.7), row labeled 4.

[7] Economic Regulation Authority, "*Proposed Amendments to the Technical Rules Submitted by Western Power (April 2016)*", Issues Paper, 2 May 2016, p.5, text under Table 1.

10. In addition, the proposed amendment to amend clause 2.5.4(b) Normal Cyclic Raring (NCR) Clause submitted by Western Power in April 2016 was not in good faith and was misleading as the argument[8]:

> "*There is no equivalent clause in the NER because rapid response spare supply transformers are not used in the same way outside of Western Australia".*

was inconsistent with past Technical Rules presentations by Western Power: emphasized that the network service providers own planning criteria are part of the Technical Rules, but not part of the NER. For example, at the System Restart Forum in Perth on 25 February 2015, titled "Technical Rules".

11. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving for amendment to the Technical Rules dated 31 March 2016 and titled "Normal cyclic rating (NCR) amendment" when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the Authority uncritically accepted the claims of Items 1 to 10 here as a fait accompli without verifying them.

12. One public submission investigated Western Power's claim of Item 7 here. The comparison of the wording (original and of the proposed amendment) demonstrated that the opposite is true – the proposed amendment had detrimental effect on the investment by unreasonably reducing the permitted supply transformer loading in zone substations and its implementation leads to premature, unnecessary and economically inefficient investments.[9]
The reduction in permitted transformer loading was so excessive that the quote of Item 3 here no longer applies, because the resulting utilisation fell below that permitted under the "N-1" criterion.
The "N-1" criterion requires one spare transformer in each zone substation. In laymen's terms and referring to the 2nd sentence of the Financial Background section here, Decision 1 effectively requires (the ultimate long term effect of), not two, but, at least, 'one hundred and two' spare transformers in the Perth metropolitan area. The latter would be very inefficient use of the capital, relative to the former, hence this Application to the Authority for review.

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[8] Western Power, "*Submission to the Economic Regulation Authority for amendments to the Technical Rules, 2016, Part B*", Submission for Economic Regulation Authority, 31 March 2016, p.8, Table 3.1 (continued from p.7), row labeled 5.

[9] James Davidson, "*Proposed Amendments to Western Power's Technical Rules submitted April 2016*", Submission for Economic Regulation Authority, 3 June 2016.

13. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving for amendment to the Technical Rules dated 31 March 2016 and titled "Normal cyclic rating (NCR) amendment" when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the Authority failed to consider the content of the public submission referred to in Item 12 here, as is explained in Items 14 to 17 here.

14. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving for amendment to the Technical Rules dated 31 March 2016 and titled "Normal cyclic rating (NCR) amendment" when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the Authority uncritically accepted the opinion of the Authority's technical consultant Geoff Brown and Associates (**GBA**)[10] that:

> "*We have not analysed Mr Davidson's submission in this report and do not agree with his interpretation of the "NCR now". The intent of the proposed change is to clarify the existing requirement, rather than to change it as suggested by Mr Davidson*."

The Applicant respectfully requests that the public submission referred to in Item 12 here, by James Davidson, be analysed on its merit.

15. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving for amendment to the Technical Rules dated 31 March 2016 and titled "Normal cyclic rating (NCR) amendment" when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the Authority uncritically accepted the opinion of the Authority's technical consultant GBA of Item 14 here whereas the argument was intrinsically flawed in respect of what is the starting point, as explained in Item 16 here.

16. Namely, the flaw in the Authority's (GBA's) argument is its assumption that the Western Power's proposal is the starting point, not the wording of the Technical Rules. This is in contrast to the Applicant's understanding that the starting point in any regulation and legislation is its current wording and the onus of proof lies with the party wanting to change it.

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[10] Geoff Brown & Associates: "*Review of Western Power's Application for Technical Rules Amendments*", Final Report for Economic Regulation Authority, 31 August 2016, p.12, 3rd last paragraph.

It is not reasonable to exempt any argument from (economic) scrutiny, hence the Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving for amendment to the Technical Rules dated 31 March 2016 and titled "Normal cyclic rating (NCR) amendment" when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the Authority uncritically rejected to scrutinize the proposal to change clause 2.5.4(b) of the Technical Rules (despite the evidence of its flaws), as well as inconsistent with the Authority's own obligations under clauses 28(1)(a)&(b) of the ERA Act.

17. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving for amendment to the Technical Rules dated 31 March 2016 and titled "Normal cyclic rating (NCR) amendment" when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the Authority uncritically accepted the opinion of the Authority's technical consultant GBA that:

> *"… there is no change to the existing requirement.*[11] "
> *"… advice from GBA that there is no actual change to the existing requirements and that all that the change relates purely to a clarification of the NCR requirement in the Technical Rules.*[12]"

18. In addition, both the above statements are inconsistent with the Western Power's assertion of Item 7 here. Hence the arguments presented in support of the Decision 2, see in Item 7 and Item 17 here, are mutually exclusive.

19. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving the exemption from compliance with Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the Authority uncritically accepted explanation that the purpose of the proposed amendment was to increase the power transfer capacity, without providing neither specific examples nor the aggregate net financial benefit.

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[11] Economic Regulation Authority, "*Western Power's Proposed Amendments to the Technical Rules Submitted April 2016 – Final Decision*", November 2016, p.10, Item 37.

[12] Economic Regulation Authority, "*Western Power's Proposed Amendments to the Technical Rules Submitted April 2016 – Final Decision*", November 2016, p.11, Item 39.

That was unexpected, given that the Technical Rules largely determine Western Power's Capital Expenditures (**CAPEX**) and the aggregate financial impact of a single rule change in the Technical Rules can be hundreds of millions of dollars of expenditures. These amounts are well in excess of the Regulatory Test threshold for a single project of $30M for the transmission system and $5M for the distribution system.

One would expect at least the same level of the techno-economic scrutiny from the Authority for proposals to change the Technical Rules as that for the Regulatory Test.

Decision 1 – Meadow Springs Zone Substation Exemption

20. On 15 May 2015, Western Power submitted to the Authority the request for exemption from compliance with the requirements of Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion for Meadow Springs Zone Substation.[13]
21. It shows the cost of installing a new transformer in the zone substation is very high and that it can vary between $10M and $27M, respectively for Meadow Springs and Mandurah zone substations.
22. Western Power's own interpretation of the NCR criterion of clause 2.5.4(b) cannot be ascertained from the information publicly available in the request of Item 20, as two documents referred to in the request were not made public.
23. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving the exemption from compliance with Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the Authority uncritically accepted the opinion of the Authority's technical consultant who erred in his understanding of the (original) wording of clause 2.5.4(b) when describing it as:

> "*The wording of this clause is unfortunate as it does not convey the intended meaning. The intent is to specify the*

[13] Western Power, "*Exemption Request – Meadow Springs Zone Substation*", Submission for Economic Regulation Authority, 15 May 2015.

allowable power transfer through the substation under normal operating conditions[14],…"

whereas: *a)* the claim was inconsistent with wording of clause 2.5.4(b) for the reasons explained in Item 1 here, and *b)* as no evidence was provided in support of this claim.

24. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving the exemption from compliance with Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the Authority uncritically accepted the opinion of the Authority's technical consultant who reported to the public Western Power's interpretation of clause 2.5.4(b) (see Item 1 here) as:

"*As interpreted by Western Power, this is determined by the total installed power transfer capacity rather than the capacity of the smallest supply transformer*[15] …"

25. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving the exemption from compliance with Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the Authority uncritically accepted the following decision of the Authority's technical consultant:

"*For the purpose of this review we have used Western Power's interpretation of the clause [clause 2.5.4(b)]*[16],…"

26. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving the exemption from compliance with Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the

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14 Geoff Brown & Associates: "*Review of Western Power's Application for a Technical Rules Exemption for Meadow Springs Zone Substation*", Final Report for Economic Regulation Authority, 20 July 2015, p.6, 2nd last paragraph, first two sentences.

15 Geoff Brown & Associates: "*Review of Western Power's Application for a Technical Rules Exemption for Meadow Springs Zone Substation*", Final Report for Economic Regulation Authority, 20 July 2015, 2nd last paragraph, 3rd sentence.

16 Geoff Brown & Associates: "*Review of Western Power's Application for a Technical Rules Exemption for Meadow Springs Zone Substation*", Final Report for Economic Regulation Authority, 20 July 2015, 2nd last paragraph, beginning.

Authority uncritically accepted the following recommendation of the Authority's technical consultant:

> "… *but we recommend that the wording be revised in the next revision of the [Technical] Rules so that it actually convey the intended meaning.*[17] …"

27. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving the exemption from compliance with Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code in that the Authority uncritically accepted the Western Power's interpretation of clause 2.5.4(b) (see Item 1 here), which the Authority's technical consultant reported to the public as:

> "*Western Power interprets clause 2.5.4(b) of the Technical Rules as requiring that at all times the power transfer through a substation under normal operating conditions must not exceed 75% of the transformer NCR of all installed transformers.*[18] …"

28. In addition, the request for exemption submitted by Western Power on 15 May 2015 did not appear to had been in good faith nor the appropriate use of the exemption, as explained in the public submission by Community Electricity:

> *"We note that the expected non-compliance is expected to commence in the current financial year … the inference that Western Power intends to proceed with or without the exemption [to install a new transformer in Meadow Springs zone substation]. If this is the case, we consider that this is not an appropriate use of an exemption and we do not support it.*[19] …"

The Applicant shares the above concern.

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[17] Geoff Brown & Associates: "*Review of Western Power's Application for a Technical Rules Exemption for Meadow Springs Zone Substation*", Final Report for Economic Regulation Authority, 20 July 2015, 2nd last paragraph, beginning.

[18] Geoff Brown & Associates: "*Review of Western Power's Application for a Technical Rules Exemption for Meadow Springs Zone Substation*", Final Report for Economic Regulation Authority, 20 July 2015, p.3, 1st paragraph, 1st sentence.

[19] Community Electricity: "*Application for exemption from certain requiremments of the Technical Rules submitted by Western Power – Meadow Springs substation*", Submission in Response to ERA Public Consultation, 20 July 2015, p.1, 2nd last paragraph, extract.

29. Further to the concern of Issue 28 here, the request for exemption may also had other purposes that were not publicly stated and which may not be consistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code, which should be investigated – the motive and intent. The Applicant wonders if the said discrepancy was discussed in Western Power and, if so, what arguments were presented?

The Applicant's Earlier Request to the Authority to reconsider Decision 1 – Meadow Springs Zone Substation Exemption

30. On 16 December 2016, pursuant to section 12.45 of the Access Code 2004, the Applicant applied to the Authority for its Decision 1 - "*Determination on Application for exemption from certain requirements of the Technical Rules 2011, submitted by Western Power, Meadow Springs Zone Substation Exemption*" dated July 2015, that was published on the Authority's web site, in respect of the covered network under section 12.41 to be revoked.[20]
31. The Authority erred in its finding of facts or the exercise of its discretion was incorrect or was unreasonable having regard to all the circumstances in approving the exemption from compliance with Technical Rules clause 2.5.4(b) Normal Cyclic Rating (NCR) Criterion when this is inconsistent with the objectives and sections 12.1, 12.2 and 12.3 of the Code whereby the Authority have made no decision in respect of the application of Issue 30 here after nearly two years have elapsed since the application was made.
32. For these reasons, the Applicant considers that the Authority failed its obligation, under section 12.45 of the Access Code, to advise the Applicant of the Authority's determination in relation to the Application of Item 30 here within a reasonable time.
33. To be fair, there was limited incidental email correspondence with the Authority in respect of the Application of Item 30 here and another related issue (concerning section 12.53 of the Access Code), which, according to the information available to the Applicant, have not been placed on the public record nor addressed by the Authority, for nearly two years.

[20] Steve Davidson, "*Exemption Request – Meadow Springs Zone Substation*", Submission for Economic Regulation Authority, 16 December 2016.

34. In order to ease correspondence (and in case the correspondence was lost, for example due to personnel changes) the Applicant provides the email correspondence of Item 33 here, as follows:
Attachment 1 – Request for review dated 14 December 2016.
Attachment 2 – Correspondence to the Authority after 14 December 2016.
Attachment 3 – Correspondence from the Authority after 14 December 2016.

35. The Applicant respectfully requests that the Authority restores the Archive section of the Technical Rules, with all previously published versions of the Technical Rules, including the "uncorrected versions", as per the Authority's email (Elizabeth Walters) of 7 April 2017: "*In light of your inquiry the ERA will add the two uncorrected versions to the archive for completeness*".

APPENDICES

Request for Review dated 14 December 2016

App. No.	Date	Author	Type	Attachments
#1	14 Dec 2016	Stephen Davidson	Letter, On-line 6:28 pm	Yes, one:
#1A			Attachment 1	James Davidson submission to the ERA of 3 June 2016

Correspondence to the ERAWA after 14 December 2016

List of emails (dates):

App. No.	Date	Author	Type	Email trail / Attachments
#2	20 Feb 2017	S Davidson	Email, 5:18 pm	Yes / No
#3	22 Feb 2017	S Davidson	Email, 10:24 pm	Yes / No
#4	1 Mar 2017	S Davidson	Email, 3:27 pm	Yes / No
#5	6 Mar 2017	S Davidson	Email, 2:48pm	Yes / Yes
#6	21 Mar 2017	S Davidson	Email, 11:16 am	Yes / No
#7	4 April 2017	S Davidson	Email, 11:43 am	Yes / Yes

Correspondence from ERAWA after 14 December 2016

List of emails (dates):

App. No.	Date	Author	Type	Email trail / Attachments
#8	16 Dec 2016	E Walters	Email, 10:43 am	Yes / No
#9	21 Feb 2017	E Walters	Email, 9.15 am	Yes / No
#10	24 Feb 2017	E Walters	Email, 1:22 pm	Yes / No
#11	2 Mar 2017	E Walters	Email, 10:10 am	Yes / No
#12	7 Mar 2017	E Walters	Email, 4:04 pm	Yes / No
#13	27 Mar 2017	E Walters	Email, 10:24 am	Yes / No
#14	7 April 2017	E Walters	Email, 4.01 pm	Yes / No
#15	25 May 2017	E Walters	Email, 2:13 pm	Yes / No
#16	13 Jun 2017	E Walters	Email, 10:55 am	Yes / No