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15th March 2019

To Elizabeth Walters

Subject: Application to revoke Technical Rule temporary exemption granted to Western Power for Meadow Springs zone substation

Thank you for the opportunity to provide comment.

I would appreciate your consideration of my submission here.

Kindly refer to

Attachment 1, The Importance and Urgency
Attachment 2, Forensic Engineering Analysis
Attachment 3, Comment on Issue 1
Attachment 4, Comment on Issue 2

Yours sincerely,

[redacted]

Stephen Davidson

Continued on Attachments

Attachment 1 to Submission by Stephen Davidson
The Importance and Urgency

Consultation Topic:
APPLICATION TO REVOKE TECHNICAL RULE TEMPORARY EXEMPTION GRANTED TO WESTERN POWER FOR MEADOW SPRINGS ZONE SUBSTATION– CONSULTATION PAPER, 14 FEB 2019

To put the things into the perspective:

> *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.*

The issues raised in my application and in the Consultation Paper are an example of the flawed engineering resulting in the inefficient investments in WA, the ultimate cost of which is over $1,000,000,000 (one billion dollars). This should be brought to the attention of the Minister and Parliament.

Introduction

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][1]

The [Grattan, 2018] report concluded:

- 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 Australian Competition and Consumer Commission (ACCC) conducted similar investigation into electricity prices in Australia: *Retail Electricity Pricing Inquiry: Restoring electricity affordability and Australia's competitive advantage.* [ACCC, 2018][2].
It confirmed the above and also proposed the asset write down as a remedy.

Both reports, [Grattan, 2018] and [ACCC, 2018], focused on the National Electricity Market (NEM) and did not include Western Australia (WA).

The [Grattan, 2018] report was published in March 2018, which is a year and half after first time I applied to the ERA to review the Meadow Springs exemption and, quite

[1] https://grattan.edu.au/wp-content/uploads/2018/03/903-Down-to-the-wire.pdf
[2] https://www.accc.gov.au/system/files/Retail%20Electricity%20Pricing%20Inquiry—Final%20Report%20June%202018_0.pdf

independently, recommended the same remedial measure - write down of the Regulated Asset Base (RAB).

For other examples of the Western Power's conduct detrimental to the society, refer to the WEM section of the ERA's website[3].
The [Grattan, 2018] report used the "top down" methodology, which contrasts the more accurate "bottom up" methodology used in my application to the ERA (Appendices 1 & 4, Consultation Paper) 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 that the WA Industry Act framework disallows review of decision to change the Technical Rules! Only Western Power can do it, so we are all at the mercy of Western Power!?

Overcoming the Stalemate

That apparent stalemate could be overcome, in the long term, by transferring the Technical Rules into Market Rules or another Ministerial direction to the Electricity Network Corporation to reverse recent changes of the Technical Rules.

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 to a government body. A separate body should interpret the Technical Rules, say AEMO.

About Consultation Paper

The *Application to Revoke Technical Rule Temporary Exemption Granted to Western Power for Meadow Springs Zone Substation* - Consultation paper, Economic Regulation Authority, 14 February 2019, [**Consultation Paper, 2019**] seeks comments from public on two issues:

1. Whether the temporary exemption from compliance with clause 2.5.4(b) of the Technical Rules with respect to capacity requirements at the Meadow Springs zone substation granted to Western Power in July 2015 should be revoked, and;
2. Stakeholder views on the matters raised by Mr Davidson about how the NCR capacity should be determined and the effect on investment decisions,

in response to Mr Davidson's application to review two decisions made by the ERA. See Appendices 1 & 4 of the Consultation Paper.

Decisions 1 and 2

The first decision (**Decision 1**) is the exemption from the Technical Rules for the Meadow Springs zone substation approved by the ERA on 20 July 2015.
The second decision (**Decision 2**) is the amendment to clause 2.5.4(b) of the Technical Rules approved by the ERA on 9 November 2016.

[3] https://www.erawa.com.au/cproot/20146/2/WEM%20Report%202018%20-%20PubSub%20on%20discussion%20paper%20-%20Stephen%20Davidson.pdf

The stated cost of Decision 1, according to the Western Power's Application of 15 May 2015 for Meadow Springs Substation (**MSS**) Exemption, [**MSS Application, 2015**], is $37,000,000. This figure was calculated as the sum of $10,000,000 for the MSS plus $27,000,000 for the Mandurah (**MH**) zone substation. In 2016, the cost to install a new transformer in MH was revised to $30M; see the media statement [4].

The Consultation Paper does not address Decision 2 at all (other than to briefly mention it on pages 5-6), the ultimate cost of which is over $1,000,000,000 (one billion dollars).

That $1,000,000,000 (one billion) is a conservative cost estimate of Decision 2, calculated by assuming the installation of 100 zone transformers (one in each zone substation in the Perth metropolitan area)[5] and $10M cost per one zone transformer[6]. This was explained in more details in my second application to review two decisions dated 14 November 2018 (see Consultation Paper, Appendix 4, page 3, Background, Financial).

Creative Interpretation

Namely, Western Power's creative interpretation of the NCR criterion (in Decision 1 and Decision 2)(Technical Rules 2016) arbitrarily and significantly reduced the zone substation capacity to below that determined by the NCR criterion of the Technical Rules 2007 & 2011.

In addition, when the number of zone transformers exceeds three, the Western Power's creative interpretation of the NCR criterion reduces the capacity to below that determined by the N-1 criterion of the Technical Rules, see Table 1 on page 1 in Attachment 1 of Appendix 1 (James Davidson, 2016, June 3[7]) and Table 1 here.

Devastating Economic Impact of Western Power's Creative Interpretation

The Western Power's creative interpretation of the Technical Rules 2011 is a financially wasteful breach of the Technical Rules 2007 & 2011, which ultimately created the need for at least 100 (one hundred) new, and unnecessary, zone transformers, because the N-1 criterion requires one spare transformer in each zone substation. The NCR criterion requires two spare transformers for the whole Perth metropolitan area. So far, the ERA have not analysed that (Decision 1 and Decision 2) nor have assessed the magnitude of the devastating short-term and long-term economic impact of the two decisions.

Economic Substance versus Linguistics

The complexity of the relevant issues falls in the following three established fields: electric power systems, economy and technical regulation, none of which seem to have been addressed in the Consultation Paper.

The Consultation Paper is largely comprised of cut-and-copy sentences, in my opinion, with little or no added value, because engineering, economic and technical regulatory

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[4] https://westernpower.com.au/community/news-opinion/submissions-sought-on-new-approach-to-power-planning/

[5] Note 63 (sixty-three) zone transformers had been installed from 2006 April 1 to 2018 January 24, see the last three, unnumbered, pages of Appendix 5 (Attachment 3) of the Consultation Paper.

[6] $10M is a very conservative figure, just the transformer purchase cost; compared to $27M - $30M needed to put a new transformer in Mandurah (MH) zone substation.

[7] https://www.erawa.com.au/cproot/14258/2/Steve%20Davidson%20April%202016%20Normal%20Cyclic%20Rating%20Clause%202%205%204%20(002).pdf

issues were not identified nor addressed. Superficial reading of the Consultation Paper could leave impression that the key issue is that of the linguistic or aesthetics, not that of the economic.

It was unexpected that the ERA:

1. Did not justify own decision to disregard the letter of the law, as worded in clause 2.5.4(b) of the TR-2011 (and TR-2007) at the time Decision 1 was made.
2. Chose not to analyse the submission by [James Davidson, 2016, June 3] at the time Decision 2 was made.
3. Did not engage a technical consultant to analyse the substance of James Davidson's submission to the ERA dated 3 June 2016 in Attachment 1 of Appendix 1 of the Consultation Paper, given that the ERA's technical consultant Geoff Brown and Associates (GBA)[8] failed to analyse Mr J.Davidson's submission by saying: "*We have not analysed Mr Davidson's submission in this report*". The ERA could have instructed GBA to analyse Mr J.Davidson's submission or engaged another consultant to do so (who was not involved in Decision 1 and Decision 2) prior to publishing the Consultation Paper.
4. Did not ask Western Power to carry out the economic analysis of the financial effects of the Western Power's creative interpretation of the Technical Rules; or to provide details of any or all that may had been internally conducted in Western Power before or after the application leading to Decision 1 was made.
5. Did not carry out own economic analysis of the financial effects of the Western Power's creative interpretation (also known as the "*interpretation for gold-plating*") of the Technical Rules prior to publishing the Consultation Paper.
6. Did not highlight to the public in the Consultation Paper that the Western Power's creative interpretation of the NCR criterion (in Decision 1 and Decision 2) arbitrarily and significantly reduced the zone substation capacity to below that determined by the NCR criterion of the Technical Rules 2007 & 2011 (as per the data Western Power provided in Appendices 2, 3 and 5). Decision 2 effectively mandated inefficient investments by including the Western Power's creative interpretation of Decision 1 in Technical Rules 2016 (also known as the technical rules for mandatory "*gold-plating of the network*").

The questions in the Consultation Paper are a simple binary choice:

1. "should the revoke the exemption or not", and;
2. "how the NCR capacity should be determined" [SD: **Option 1:** "The wording of TR-2011 clause 2.5.4(b), or; **Option 2:** " Western Power's creative interpretation"].

As if these two options are technically and economically equal, therefore subject to personal preferences. The binary choice questions in the Consultation Paper could be interpreted as disregard the objectives of the Electricity Industry Act and Access Code, to the effect of that only efficient investments should be allowed.

[8] 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.

James Davidson's submission to the ERA dated 3 June 2016 in Attachment 1 of Appendix 1 of the Consultation Paper showed that the unambiguous, wording of TR-2007 and TR-2011 clause 2.5.4(b) Normal Cyclic Rating (NCR) results in the higher capacity of zone substations than that obtained by applying the Western Power's creative interpretation (see, Table 1). This was further explained in two subsequent submissions to the ERA, see Appendix 1 and Appendix 4 of the Consultation Paper.

If the ERA considered that Appendix 1 and Appendix 4 of the Consultation Paper provides sufficient evidence that the Western Power's creative interpretation results in the inefficient investment, to the effect of that there was no need for the economic analysis to quantify that amount, than that should be explicitly stated in the Consultation Paper.

Otherwise, in my opinion, the ERA cannot absolve itself from the responsibility to economically evaluate options in the submissions (the best place for which, in my opinion, was the Consultation Paper).

In my opinion it would be equally unacceptable for the ERA to expect that someone from the public would do the economic evaluation on behalf of the ERA (i.e. to "outsource" own responsibility to the public consultation process). However, I am prepared to do it upon request.

Economic efficiency

The following are two key relevant criteria for the qualitative economic assessment of the issues raised in the Consultation Paper:

1. Economic efficiency is directly proportional to the numerical value of the NCR capacity (assuming all other factors being equal).
2. It is economically more efficient to defer the construction/expansion than to bring it forward.

Disregard for the Written Law (including for the Technical Rules)

It is my understanding, it is not a good practice for anyone, including for Western Power and the ERA, to disregard the Technical Rules and have some own set of non-transparent rules in lieu of the official Technical Rules, particularly when these are inconsistent with the published Technical Rules, as was the case with Decision 1. Such a practice can be interpreted as the false and misleading conduct, which generally falls under the ACCC jurisdiction.

In 2015 and in 2016 Western Power and the ERA chose to completely disregard the letter of the Technical Rules-2011[9]. In doing so, in my opinion, they put themselves above the written law of the land. This needs to be rectified.

Moving Goalpost

My review of the "new evidence" Western Power provided in Appendix 2 (2017, May 16. EDM #42591455), Appendix 3 (2019, January 24. EDM #47192704; which bears wrong date 24 January 2018) and Appendix 5 (2019, January 24, EDM #47293183; which also bears wrong date 24 January 2018) shows inconsistency between consecutive submissions, so the public is confused as to which Western Power's submission to

[9] For example, see Paragraph 25, page 13, Appendix 4 of the Consultation Paper.

comment on, that of year 2015[10], year 2017 (Appendix 2) or year 2019 (Appendix 3 and Appendix 5)?

Western Power's Inconsistencies not addressed by the ERA

It is unfair to the public that the ERA did not highlight obvious inconsistencies in Western Power submissions in the Consultation Paper. The key inconsistencies relate to the calculated NCR capacities, exaggerated load forecasts and changed historical load data.

In addition, the ERA should have provided guidance to the public on which information provided by Western Power to consider and which to disregard, when these are mutually inconsistent. The ERA could have made such guidance with or without consultation with Western Power.

One way or another, in my opinion, the ERA should not have been a largely passive observer in preparing the Consultation Paper. The behaviour the ERA did not react to is the behaviour the ERA is prepared to accept.

The ERA could have requested a IEAust CPEng signature on the Western Power's submission, who has read the submission and certified its sound engineering content, including that there was no inconsistent data or misleading statements. Otherwise the inconsistent and mutually exclusive Appendices to the Consultation Paper are undermining public confidence in the public consultation process and the ERA's ability to manage it efficiently, as was explained the above.

Inefficient Public Consultation Process

Without that guidance from the ERA, the public has no choice but to comment on all inconsistent and factually incorrect data, exaggerated load forecasts and erroneous conclusions included in the Western Power's documents included in the attachments to the Consultation Paper. This reduces efficiency of the consultation process and offers room for the ERA's future improvement.

Due to the limited time available, I will comment only on the key inconsistencies, misleading data and erroneous conclusions/statements in the Western Power's documents. Others could be provided upon request.

Fixing the Goalpost

In addition, I would not be surprised if Western Power presents some new "crucial facts" in March 2019, in response to the Consultation Paper that support its narrative. The ERA's consideration of any such new facts would be unfair to the public, and would undermine the trust in the public consultation process.

May I therefore respectfully request from the ERA to disregard, for the purpose of this review, if applicable, any new "facts" about the load in the Mandurah load area Western Power may provide in response to the Consultation Paper, i.e. after the public consultation notice was published on 14 February 2019.

Submission on Possible Penalties Not Requested

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

In my opinion, inaccuracy, inconsistency, false representation and exaggeration in the Western Power's "evidence" documented in the Consultation Paper was exposed in this submission. It clearly demonstrates unconscionable conduct, misrepresentation and failing to act in good faith. In my opinion, Western Power's business model has been inherently dishonest and financially detrimental to the society.

The ERA should have requested submission on possible penalties.

The request should have distinguished between possible breaches of the regulatory and corporate obligations.

Attachment 2 to Submission by Stephen Davidson
FORENSIC ENGINEERING ANALYSIS OF WESTERN POWER'S SUBMISSIONS

Consultation Topic:
APPLICATION TO REVOKE TECHNICAL RULE TEMPORARY EXEMPTION GRANTED TO WESTERN POWER FOR MEADOW SPRINGS ZONE SUBSTATION– CONSULTATION PAPER, 14 FEB 2019

TOC:

1. Executive Summary

Central to the request to revoke the ERA's Decisions 1 & 2 is the huge adverse economic impact of Western Power's decision to ignore clause 2.5.4(b) NCR Criterion, TR-2007 & TR-2011, the ultimate cost of which was shown to be over $1,000,000,000 (one billion dollars).

The economic impact was not discussed in the Consultation Paper, so two key relevant criteria for the qualitative economic assessment of the issues raised in the Consultation Paper were identified: *a)* economic efficiency is directly proportional to the numerical value of the NCR capacity (assuming all other factors being equal), and; *b)* it is economically more efficient to defer the construction / expansion than to bring it forward. These enable decision making without qualitative economic assessment.

The Consultation Paper failed to identify inconsistencies of the calculated values of the NCR capacities, exaggerated load forecasts and changed historical load data. This required to carry out the *Forensic Engineering Analysis of Western Power's Submissions*. For completeness, all other documents about the Mandurah Load Area available on the Western Power's website were also analysed: the annual planning reports and [10].

It was shown that the Western Power's creative interpretation of the NCR criterion (the basis for Decisions 1 & 2) arbitrarily and significantly reduced the zone substation capacity to below that determined by the NCR criterion of the Technical Rules 2007 & 2011, therefore leading in inefficient investments. See Table 1. This provides sufficient evidence to revoke Decision 2 (which mandated the "*gold-plating of the network*" in Technical Rules 2016, at the ultimate cost of $1,000,000,000).

Regarding Decision 1, the above is necessary, but not sufficient evidence to revoke it; as the potential breach (hence the need for Decision 1) can occur only if the load exceeds the NCR capacity assigned as per the TR-2007 & TR-2011.

Western Power's annual planning reports show that there has been no need for Decision 1; as the historical load has not exceeded the assigned NCR capacity of zone substations in the Mandurah Load Area. The same conclusion applies for the Mandurah Load Area as whole; namely, the large distribution transfer capacity (DTC) allows transfer of loads between the zone substations, so no individual substation has exceeded own NCR capacity.

Western Power's submissions are inconsistent with the annual planning reports!

The *Forensic Engineering Analysis of Western Power's Submissions* showed that in 2015 [4], 2016 [10], 2017 [5] and 2019 [6], [7], [8] & [9], other than lowering the NCR ratings, Western Power did two wrong things in order to justify, otherwise unjustifiable, installation of the 3rd transformer in the Meadow Springs (MSS) substation: *a)* assumed unrealistically exaggerated annual load growth, and *b)* retroactively changed (back in time) the historical load to an "inflated" number greater than the NCR rating, for example in [4] MSS, 2015: 51MVA to 69MVA, etc. The exaggerated annual load forecasts were in the two digit range; for example 35% in [4], 31%, 25% & 18% in [6] & [8]. Not needed to say that these forecasts have never eventuated.

After being challenged in 2017 by the ERA regarding Decision 1, in the period from 2017 to 2018, in my opinion in a desperate attempt to justify, otherwise unjustifiable, Decision 1, Western Power unconscionably (and unnecessary) transferred two digit amount load from MH to MSS, in order to cause the MSS to be loaded above its NCR rating. See Table 2, rows for 2017 & 2018.

On one occasion, Western Power apparently forgot or chose to forget to switch on power factor correction capacitors, in order to "cause" the load on the MSS substation to breach its NCR rating, or failed to enforce the power factor of loads supplied from MSS substation to be within the permissible range. Any such a breach does not justify the installation of the 3rd transformer in MSS, as is much more cost efficient to correct the power factor.

After being challenged again in late 2018 by the ERA regarding Decision 1, Western Power again exaggerated the annual load forecast for 2019 in [6] & [8] by 31% for MSS, 25% for MH and 18% for the Mandurah Load Area as a whole (see Table 2). That forecast probably included misuse of the DTC to unnecessary shift the load from the neighboring load areas onto the MSS and MH substations, because their average annual load growth of 28% (the average of 31 + 25) is greater than 18% load growth for the Mandurah Load Area as a whole. That misleading load forecast does not justify the need for Decision 1, as simple re-balancing of loads by off-loading MSS substation would defer any need for the new transformer in the Mandurah Load Area.

Further, the latest Western Power's exaggerated 10% POE load forecast for the Mandurah Load Area (MH + MSS) of 158MW for year 2020 of Appendix 5 [8] also shows no need for reinforcement in that area for at least two more years, because the NCR capacity of the Mandurah Load Area (as a whole) is 161MVA, see Table 1.

The three more realistic forecasts for load growth in the Mandurah Load Area, than that of Appendix 5 [8], showed that no new zone transformers will be needed in the next 7, 10 and 15 years. The respective assumed annual load growth rates were 3.8MW (the average annual rate from the 10% POE curve from 2018 to 2028 of [8]), 3MW (the average of 2MW and 3.8MW rounded up), and 2MW (the historical growth rate from 2017 to 2018).

If we take the medium forecast as a basis, there would be no need for installation of the 3rd transformer in Meadow Springs (MSS) substation, nor any other zone substation in the Mandurah Load Area for the next 10 years, or at least until year 2028. This requires prudent distribution network operation; including full utilisation of the existing power factor correction capacitors and distribution load transfer capacity (DTC) in the Mandurah Load Area.

That does not require utilizing the existing DTC capability between the substations in the Mandurah Load Area and substations in the geographically adjacent load areas, however its utilisation would further defer the need for zone transformer capacity expansion in the Mandurah Load Area. Further, increasing the existing DTC capability between the substations in the Mandurah Load Area and substations in the neighboring load areas can only further defer the need for the zone transformer capacity expansion (hence for Decision 1) beyond the next 10 years, further justifying revocation of Decision 1.

Follow-up work required. Any future proposal for zone transformer capacity reinforcement in the Mandurah Load Area, after year 2028, should also be assessed against much cheaper alternatives to first: *a)* enforce compliance of loads with the Technical Rules, particularly with the power factor requirements (at all times, and including compliance of loads with embedded generation located behind the meter); *b)* switch on the existing power factor correction capacitors; *c)* install more power factor correction capacitor banks, and; *d)* fully utilize, and if needed further increase, the DTC transfer capacity between the zone substations (within the Mandurah Load Area and outside of it). Consequently, the business cases for all 63 zone transformer capacity expansions from 2006, reported in [9], should be reviewed against these cheaper alternatives. If these cheaper alternatives were not investigated / reported in the relevant business case, then the cost of that project should be removed from the Western Power's Regulated Asset Base (RAB).

2. Inconsistently Calculated NCR Capacities by Western Power

Western Power have been inconsistently calculating the NCR capacities. Those reported to the ERA are shown in Table 1 below.

Table 1 *– Inconsistencies in NCR capacities.*

Row No.	**Source Document**		**NCR Capacities – Calculated values**		
	Date	Document	**Mandurah Load Area (MH + MSS)** Transformers: {32.12, 32.12, 37.11, 38.64,35.51} MVA	**Mandurah (MH)** Transformers: {32.12,32.12, 37.11} MVA	**Meadow Springs (MSS)** Transformers: {38.64, 35.51} MVA
1	2007	[1] TR-2007	160.95MVA	88.33MVA	62.14MVA
2	2011	[2] TR-2011	160.95MVA	88.33MVA	62.14MVA
3	tba	[3],p.98-101	109.12MVA	76.01MVA	55.61MVA
4	15/5/2015	[4]	131.5MVA	75.9MVA	55.6MVA
5	16/5/2017	[5]	150.4MVA	88.32MVA	62.1MVA
6	24/1/2019	[6]	150.4MVA	88.32MVA	62.1MVA
7	3/6/2016	[10]	125.0MVA	72.2MVA	52.8MVA

NOTE: List of documents referred to:

[1] Technical Rules 2007, clause 2.5.4(b).

[2] Technical Rules 2011, clause 2.5.4(b).

[3] Transmission Planning Guidelines, pages 98-101, DM #8494654.

[4] Western Power's Original Request for Exemption dated 15 May 2015, DM#12947998.

[5] Appendix 2 of 16/5/2017: Cover Letter (16/5/2017, EDM #42591455), and; Attachment 1 – Purported Revised Request for Exemption (30/4/2015, EDM #12633462).

[6] Appendix 3 of 24/1/2019 (wrong date shown, 24/1/2018), EDM #47192704, Attachment - MH+MSS, MH, MSS Load History 2011 – 2018.

[7] Appendix 5 of 24/1/2019 (wrong date shown, 24/1/2018), EDM #47293183, Attachment 1 – NCR substations.

[8] Appendix 5 of 24/1/2019 (wrong date shown, 24/1/2018), EDM #47293183, Attachment 2 – Zone SS Load History 2018 + Load forecast 2019 – 2025.

[9] Appendix 5 of 24/1/2019 (wrong date shown, 24/1/2018), EDM #47293183, Attachment 3 – Txs installed after 2006.

[10] *Mandurah Load Area, Non-Network Options Report (NNOR)*, Project Number T0417971 / N0421678, Rev.1, May 2016. (pdf-version-of-dm13874165-13868073)(Published on the Western Power's website on or about 3 June 2016).

The calculated NCR capacity values of clause 2.5.4(b) of the Technical Rules 2007 and 2011 are shown in rows 1 and 2. These are the same. The values in row 3 were calculated by using Western Power's creative interpretation, which was documented on pages 98-101 of [3] (and included later in TR-2016 by Decision 2).

Comparison of the NCR capacities Western Power submitted to the ERA and public in rows 4 to 7, with their respective values in rows 1 to 3 shows that some of the former were neither calculated as per clause 2.5.4(b) of the TR-2007 and TR-2011, nor the method Western Power illustrated on pages 98-101 of [3].

For example, it was stated on page 20 in [10] that the NCR calculation method of clause 2.5.4(b) of TR-2011 was used, however the calculated NCR capacity values were quite

different: compare the respective values in Row No.1 and Row No. 7 of Table 1. That misleading conduct is unprofessional and unacceptable. In my opinion, the different values could be explained by manipulation of the numbers to suit the narrative of the agenda at the time.

2.1 Unconscionable Conduct

Western Power's inconsistent calculation of the NCR capacities of Table 1 could be interpreted as false and misleading representation or unconscionable conduct, which, I understand, may fall under the ACCC jurisdiction.

May I therefore respectfully request the ERA to consider taking an appropriate action against Western Power in respect of that conduct; for example to take an action within its powers, if the ERA does not condone such a conduct, or refer it to the ACCC. Even a symbolic action, such as bringing the actions of the Western Power's regulatory compliance team to the Western Power's corporate compliance team would be better than taking no action, as the conduct one does not react to is the conduct one is prepared to accept.

3. Historic and Forecasted Load Provided by Western Power

Refer to Table 2 below for the latest load data: historic load data from 2008 to 2018; the latest load forecast from 2019 to 2028.

***Table 2** – Historic and Latest Forecasted Load.*

Year	Date	Source	**Mandurah Load Area (MH + MSS)**	**Mandurah (MH)**	**Meadow Springs (MSS)**
2008	16/5/2017	[5]	110MVA	77MVA	36MVA
2009	16/5/2017	[5]	111MVA	73MVA	38MVA
2010	16/5/2017	[5]	115MVA	78MVA	37MVA
2011	16/5/2017 24/1/2019	[5], [6]	124MVA, 124MW	80MVA, 80MW	44MVA, 44MW
2012	16/5/2017 24/1/2019	[5], [6]	122MVA, 122MW	81MVA, 81MW	41MVA, 41MW
2013	16/5/2017 24/1/2019	[5], [6]	128MVA, 128MW	78MVA, 78MW	50MVA, 50MW
2014	16/5/2017 24/1/2019	[5], [6]	129MVA, 129MW	72MVA, 72MW	57MVA, 57MW
2015	16/5/2017 24/1/2019	[5], [6]	121MVA, 121MW	70MVA, 70MW	51MVA, 51MW
2016	24/1/2019	[6]	146MW	84MW	62MW
2017	24/1/2019	[6]	129MW	82MW	47MW
2018	24/1/2019	[6], [8]	131MW	63MW	58MW
2019	24/1/2019	[6], [8]	n/a (~ 155)MW (+18% increase)!	79.05MW +25% increase!!	75.89MW (+31% increase)!!!
2020	24/1/2019	[6], [8]	n/a (~ 155)MW	78.44MW	79.81MW
2021	24/1/2019	[6], [8]	n/a (~ 163)MW	79.13MW	82.60MW
2022	24/1/2019	[6], [8]	n/a (~165)MW	78.88MW	84.24MW
2023	24/1/2019	[6], [8]	n/a (~165)MW	78.45MW	85.67MW
2024	24/1/2019	[6], [8]	n/a (~165)MW	78.30MW	87.11MW
2025	24/1/2019	[6], [8]	n/a (~166)MW	78.16MW	88.39MW
2016	24/1/2019	[8]	n/a (~168)MW	78.83MW	89.55MW
2027	24/1/2019	[8]	n/a (~169)MW	77.91MW	90.61MW
2028	24/1/2019	[8]	n/a (~169)MW	77.91MW	91.59MW

NOTE: List of documents referred to:

[1] Technical Rules 2007, clause 2.5.4(b).

[2] Technical Rules 2011, clause 2.5.4(b).

[3] Transmission Planning Guidelines, pages 98-101, DM #8494654.

[4] Western Power's Original Request for Exemption dated 15 May 2015, DM#12947998.

[5] Appendix 2 of 16/5/2017: Cover Letter (16/5/2017, EDM #42591455), and; Attachment 1 – Purported Revised Request for Exemption (30/4/2015, EDM #12633462).

[6] Appendix 3 of 24/1/2019 (wrong date shown, 24/1/2018), EDM #47192704, Attachment - MH+MSS, MH, MSS Load History 2011 – 2018.

[7] Appendix 5 of 24/1/2019 (wrong date shown, 24/1/2018), EDM #47293183, Attachment 1 – NCR substations.

[8] Appendix 5 of 24/1/2019 (wrong date shown, 24/1/2018), EDM #47293183, Attachment 2 – Zone SS Load History 2018 + Load forecast 2019 – 2025.

[9] Appendix 5 of 24/1/2019 (wrong date shown, 24/1/2018), EDM #47293183, Attachment 3 – Txs installed after 2006.

[10] *Mandurah Load Area, Non-Network Options Report (NNOR)*, Project Number T0417971 / N0421678, Rev.1, May 2016. (pdf-version-of-dm13874165-13868073)(Published on the Western Power's website on or about 3 June 2016).

4. Historic Load Data Analysis

The historical load data from 2008 to 2018 is shown in Table 2.

These 2018 historical loads were within the respective NCR capacities of Table 1, Row 2 (TR-2011) of 160.95MVA (Mandurah Load Area), 88.33MVA (MH) and 62.14MVA (MSS).

Table 2 shows that the true NCR capacities (those of TR-2007 and TR-2011) of substations in the Mandurah load area have not been exceeded so far. Hence, there has been no need for the exemption - Decision 1.

5. Load Forecasts Data Analysis

5.1 Load Forecasts in Western Power's Annual Planning Reports

Western Power's Annual Planning Reports are produced annually. They give the five-year outlook for each load area, including for the Mandurah Load Area. Before 2011, Mandurah Load Area was not reported separately, as was a part of the Kwinana Load Area. Two transformer upgrades in zone substations in the Mandurah Load Area occurred in 2009, therefore ensuring the zone substations in 2010 were loaded below their NCR capacities. The number of transformers remained unchanged since.

In 2011, the Annual Planning Report for 2011 forecasted the NCR capacity of Mandurah (MH) Substation and Waikiki (WAI) Substation in the Mandurah Load Area would be exceeded within a five-year outlook.

In 2012, the Annual Planning Report for 2012 forecasted the NCR capacity of Mandurah (MH) Substation, Meadow Springs (MSS) Substation and Waikiki (WAI) Substation in the Mandurah Load Area would be exceeded within a five-year outlook (due to the extension of the Kwinana Freeway and South West Metropolitan railway).

In 2013, the Annual Planning Report for 2013 forecasted the NCR capacity of Mandurah (MH) Substation and Meadow Springs (MSS) Substation in the Mandurah Load Area would be exceeded within a five-year outlook.

In 2015, the Annual Planning Report for 2014/15 forecasted the NCR capacity of Mandurah (MH) Substation and Meadow Springs (MSS) Substation in the Mandurah Load Area would be exceeded within a five-year outlook.

In 2016, the Annual Planning Report for 2015/16 forecasted the NCR capacity of Mandurah (MH) Substation and Meadow Springs (MSS) Substation in the Mandurah Load Area would be exceeded within a five-year outlook.

In 2017, the Annual Planning Report for 2017 forecasted the NCR capacity of Mandurah (MH) Substation and Meadow Springs (MSS) Substation in the Mandurah Load Area would be exceeded within a five-year outlook.

From 2012 to 2017, all Annual Planning Reports forecasted the NCR capacity of zone substation in the Mandurah Load Area would be exceeded in the next five years.

In other words, all Annual Planning Reports from 2011 to 2017 reported that the NCR capacity of Meadow Springs (MSS) zone substation, as well as that of any other substation in the Mandurah load area, had not been exceeded (at the time of publication). Hence the exemption of Decision 1 has not been needed so far.

5.2 15 May 2015
Changed History & Exaggerated Load Forecast in Western Power's 2015 Exemption Request to the ERA [4]

Refer to two load points for year 2015 in Figure 4 of [4].

On 15 May 2015 in [4], see Figure 4 on page 7, Western Power reported 51MVA was the maximum, recorded load of Meadow Springs (MSS) zone substation in year 2015. Note that the SWIS peak load in 2015 occurred on 5 January 2015, which was over four months before Western Power applied in [4] to the ERA for exemption for Meadow Springs Substation.

Changed History. Since the recorded MSS peak load of 51MVA could not support the narrative that the exemption was required, in my opinion, Western Power ignored 51MVA and, instead, replaced it with its "exaggerated load forecast (back in time)" of 69MVA – the value that could support the Western Power narrative at the time. In doing so, Western Power "changed history", in a manner similar to that described in the famous George Orwell's novel "1984".

Exaggerated Load Forecast. On 15 May 2015 in [4], see Figure 4 on page 7, Western Power "forecasted" the load growth would exceed the (erroneously calculated at the time as only 55.6MVA) NCR capacity of the Meadow Springs Substation (MSS) in summer 2015/16.

Magnitude of the exaggeration. The exaggerated MSS load forecast, in Figure 4 on page 7 of [4], assumed the load would suddenly grow by 35% in less than one year (from 15 May 2015 to 31 December 2015): from 51MVA (reported in [5] and [6]) to 69MVA. Afterwards to 73MVA (by 31 December 2016), etc.

The forecasted 35% step load increase was another unrealistic exaggeration (even if one accounts for the alleged 6MA load transfer from MSS to WAI, which, if true, would be the good engineering action to defer costly zone substation reinforcement). As expected, that load forecast did not materialize, and the respective historical 2017 and 2018 MSS loads, reported in [6] and [8], were 47MW and 58MW.

Mandurah Load Area and Mandurah (MH) Substation. Figure 2 and Figure 3 of [4] show that the same "changed history" or "back in time forecast" action was also conducted for the Mandurah Load Area as a whole and Mandurah (MH) zone substation. Again, the historical records were replaced by "exaggerated reversed load forecasts"; the latter of which were used to support the narrative of the need for the exemption.

Finally, Figure 3 of [4] shows that the load on the Mandurah (MH) zone substation had been "exceeding" its "NCR capacity" (erroneously calculated at the time as 75.9MVA) from 2009 to 2014. This is: a) inconsistent with the information published in the Western Power's Annual Planning Reports at the time, and b) it raises two issues. One, why Western Power did not request exemption for MH in 2009, 2010, 2011, 2012, 2013 or 2014? Two, why the ERA and its consultant failed to notice in 2015 that, purported non-compliance of the MH zone substation from 2009 to 2014, when they assessed the Western Power's request for exemption fro MSS of [4] ?

5.3 3 June 2016
Repeated Changed History & Repeated Exaggerated Load Forecast in Western Power's 2016 Non-Network Options Report (NNOR) for Mandurah Load Area [10]

In June 2016, in the widely circulated report [10][11], publicly seeking expressions of interest, published on the Western Power's website on or about 3 June 2016, Western Power again replaced the historic load data with own "back in time exaggerated forecast" load data for Meadow Springs (MSS) and Mandurah (MH) substations and the Mandurah Load Area as a whole (see Figures 4, 5 & 6) for years 2015 and 2016; to the effect of that, the load on the MSS substation had been "exceeding" its "NCR capacity" (erroneously calculated again, this time as only 52.8MVA) from 2015 and 2016. See Figure 5 on page 16.

The load forecast reported in Figure 5 of [10] was so exaggerated that the installation of the 3rd transformer, rated 33MVA, in MSS substation in year 2017 was inadequate. The exaggeration was needed in order to support the new narrative at the time that a new zone substation with new supersized transformers, rated 66MVA, was needed. This narrative also required to further erroneously reduce the NCR capacity of the MH substation to just 72.2MVA, and that of the Mandurah Load Area as a whole to 125.0MVA (refer to row 7 in Table 1), whilst quoting clause 2.5.4(b) of TR-2011 as the method of calculation. See Section 4.2 Technical Rules on page 20 of [10].

That unprofessional conduct of Western Power, in my opinion, was deliberately misleading; or, incompetent at best.

5.4 16 May 2017
Repeated Changed History & Repeated Exaggerated Load Forecast in Western Power's 2017 Purported Revised Exemption Request to the ERA [5]

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[11] *Mandurah Load Area, Non-Network Options Report (NNOR)*, Project Number T0417971 / N0421678, Rev.1, May 2016]. (pdf-version-of-dm13874165-13868073).

The essence of the Western Power's 16 May 2017 communication to the ERA, in the cover letter of [5] could be summarised to the effect of "*It does not matter now how we calculate the NCR capacity of zone substations, because the MSS substation was marginally overloaded in 2015 and 2016 to 63.36MVA regardless of the NCR calculation method".*

However, the Attachment 1 of [5] – the Purported Revised Exemption Request to the ERA demonstrates otherwise.

Attachment 1 of [5] looks like a doctored document made to look like a marked-up copy of [4]. For proof, refer to Figure 4 in [4] and [5]; the former has the MSS NCR capacity line drawn at 55.6MVA, whereas the latter at 62.1MVA. Figure 3 in [5] is doctored too, as the NCR capacity of the MH substation was changed to 88.2MVA (from 75.9MVA in [4]).

The load forecast curve in [5] is the same as that in [4] (unchanged and not updated), unrealistic and exaggerated as explained the above, in comments to [4].

The historical measurement of the 2015 peak load of the MSS substation in Figure 4 of [5] did not support the narrative for exemption, so it had to be disregarded and, instead, *"back forecasted"* to the values that would support the narrative that the NCR capacity was exceeded, both in 2015 and 2016. Refer to the "10% POE" curve in Figure 4 in [5], which is the same as the corresponding curve in Figure 4 in [4].

In the right-hand margin on page 7 of [5], the purported tracked copy mark-up changes of the original application [4], recorded as "**Comment [SR3]:**", Western Power reported:

> "*Meadow Springs Substation actual peak load for the FY 2015/16 was 63.63MVA. The Substation would have been non-compliant notwithstanding the calculation methodology employed*."

That comment is misleading, as the TR-2011 (and TR-2007) NCR capacity of the MSS was NOT exceeded. So is the argument to that effect in the cover letter of [5], for several reasons.

One. The value of 63.36MVA stems from the exaggerated 2014 load forecast from year 2015 onwards in [4], and then uncritically repeated in Attachment 1 of [5]. It is therefore unlikely the measured MVA load of the MSS substation. For proof, refer to the Western Power's Annual Planning Reports 2015, 2016 and 2017, which show that no NCR rating of substations in the Mandurah Load Area had been exceeded at the time of their respective publication in 2015, 2016 and 2017.

The value of "63.63MVA" on page 7 of [5] is inconsistent with the information on the next (unnumbered) page on the same document [5] the 2015 historical MSS peak load of "51MVA" on Figure 4 in [5].

Further, the value of "63.63MVA" is also inconsistent with the 2015 historical MSS peak load of "51MVA" on Figure 4 in [4]. In addition, the MSS peak load for 2015 of Table 2 of "51MW", that was reported in 2019 in [5] and [6]. The "51MW" of [5] and [6] matches well "51MVA" of Figure 4 in [4], given that Western Power more often than not makes no distinction between the apparent power (MVA) and real power (MW).

The MSS historical loads reported in Table 1 for 2017 (47MW) and 2018 (58MW), taken from [6] & [8], also show that loading of the MSS substation in 2016 could not had exceeded its correct TR-2011 NCR rating of 62.14MVA.

Two. Let's assume for a moment that the 63.36MVA was the measured load of the MSS substation in 2016; if so then that number would not be relevant for the conclusion, because there are capacitor banks in the MSS to fully compensate the reactive power demand on the 22kV side. See Figure 3 – MSS Zone Substation Single Line Diagram on page 12 of [10]. If someone in Western Power forgot or chose to forget to switch on the reactive power compensation, then this is not justification to, unnecessary, install the 3rd transformer in Meadow Springs (MSS) substation.

If the reactive compensation was activated in sufficient quantity in 2016, then, by assuming the maximum permissible load power factor of 0.8, than the true 2016 maximum load of MSS would be comparable to that of the previous year 2015 reported in [5] & [6]: as 0.8 x 63.63MVA = 50.69MW ~ 51MW; as well as to 47MW in year 2017, reported in [6] & [8].

If the reactive power compensation was on and the load was 63.36MVA (after compensation), then it would not be the reason to unnecessary install the 3rd transformer in MSS, because the true cause would be failure of Western Power to enforce compliance with the power factor requirements of loads, which could be inexpensively resolved otherwise, and without installation of the 3rd transformer in MSS.

In summary, on 16 May 2017, in "**Comment [SR3]:**" in [4] and in the cover letter dated 16 May 2017, EDM #42591455, Western Power attempted to deceive the ERA and public that the MSS exceeded its NCR rating, probably with the ultimate objective of justifying earlier, otherwise unjustifiable, decisions to: a) expand the MSS substation, b) apply for Decision 1, and c) apply for Decision 2. For ease of reference, I repeat here the deceitful sentence from the cover letter:

> "*Whilst acknowledging that the accuracy of compliance value is important in estimating the time of expected/forecast non-compliance, the impact of the compliance value correction does not materially alter the requirement for an exemption, as the actual peak loading at Meadow Springs Substation for the FY 20165/16(63.63MVA) exceeded the revised compliance value (62.1MVA).*"

In conclusion, one way or another, the exemption for MSS zone substation has not been required at all.

5.5 24 January 2019
Exaggerated Load Forecast in Western Power's 2019 Reply to the ERA [6] to [9]

Western Power's 24 January 2019 communication [6], [7], [8] & [9] to the ERA bears the wrong 2018 date, which is evident from the 1st paragraph of the two cover letters.

[6] is given as Appendix 3 of the Consultation paper. [7], [8] & [9] are respectively given as Attachments 1, 2 & 3 of Appendix 5 of the Consultation Paper.

The loads are given in MW units, unlike in the previous communication in which the loads were expressed in MVA units. The unchanged numerical load values in Table 1 show that Western Power often makes no distinction between the apparent power (MVA) and real power (MW).

Row Year 2018 of Table 2, sourced from [8], shows the respective 2018 historical loads for Mandurah Load Area (MH + MSS) 131 MW, Mandurah (MH) substation 83MW, and Meadow Springs (MSS) substation 58MW.

These 2018 historical loads were within the respective NCR capacities of Table 1, Row 2 (TR-2011) of 160.95MVA (Mandurah Load Area), 88.33MVA (MH) and 62.14MVA (MSS).

Comparison with the 2017 loads of Table 2, sourced from [6], shows, apparent significant deliberate load transfer to MSS: 19MW load reduction of the Mandurah (MH) substation (from 82MW to 63MW) and 11MW load transfer to Meadow Springs (MSS) substation (from 47MW to 58MW). That deliberate load transfer cannot justify unnecessary 3rd transformer reinforcement of MSS substation.

From 2017 to 2018, the load in the Mandurah Load Area increased just 2MW, from 129MW in 2017 to 131MW in 2018. Either MSS or MS substation could have accommodated the 2MW load increase, without exceeding own NCR capacity and without the load transfers.

In conclusion, references [5], [6] & [8] did not state the NCR capacity of Meadow Springs (MSS) zone substation, nor that of any other substation in the Mandurah load area, had been exceeded at any time up to and including year 2018. Hence, the exemption for Meadow Springs (MSS) substation has not been needed at all.

The exaggerated load forecast of [8] anticipates unrealistically high 31% annual load growth for the MSS (from 58.0MW in 2018 to 75.81MW in 2019). At the same time the same load forecast of [8] stipulates further off-loading of Mandurah (MH) substation, from 83MW in 2018 to 79MW in 2019 and transfer of that load to Meadow Springs (MSS) substation. That is unreasonable and unrealistic, in my opinion, and has the purpose of justifying, otherwise unjustifiable, the need for exemption and, otherwise unnecessary, costly addition of the 3rd transformer in Meadow Springs (MSS) substation.

The exaggerated load forecast of [8] anticipates unrealistically high 18% annual load growth (24MW) for the Mandurah Load Area as a whole. That is unreasonable and unrealistic, in my opinion, and has the purpose of justifying, otherwise unjustifiable, the need for exemption and, otherwise unnecessary, and costly addition of the 3rd transformer in Meadow Springs (MSS) substation.

6. Western Power's Inconsistencies in Purported Breaches of the NCR Capacity

It can be said the NCR capacity limit is breached when the load exceeds the NCR capacity. A synonym for the 'breach" could be "non-compliance". The term breach is more appropriate for the context, as it signals the instant in time that justifies zone substation reinforcement (or construction of a new one).

Central for the context of the Consultation Paper is the instant in time when the breach occurs. Any reduction of the numerical value of the NCR capacity (below that stipulated in TR-2007 & TR-2011) or increasing the load would bring forward the instant in time when the breach occurred or is expected to occur.

Correct calculation of the NCR capacity (as per TR-2011) is the main critical factor for timing of the breach.

Economic Efficiency Rule 1. Economic efficiency is directly proportional to the numerical value of the NCR capacity (assuming all other factors being equal).

Economic Efficiency Rule 2. It is economically more efficient to defer the construction / expansion than to bring it forward.

In contrast to all Western Power's Annual Planning Reports from 2010 to 2018 that state no zone substation in the Mandurah Load Area exceeded its NCR rating, references [4] to [10] state otherwise. The issue NCR breaches became public on 15 May 2015 in [4], in the Western Power's Original Exemption Request the ERA, however key forecast data was not disclosed to the public at that time.

We will illustrate here how Western Power has been manipulating both critical factors (NCR capacity and load) in order to justify, otherwise unjustifiable, investments in zone substations in the Mandurah Load Area in [4], [5], [8] and [10].

On 15 May 2015 in [4], Western Power: *a)* erroneously calculated the NCR capacity to be a value (of 55.6MVA for MSS) lesser than that stipulated by the TR-2011 (62.1MVA); *b)* disregarded the historical peak load for year 2015 of 51MVA that showed no breach (as 51<55.6), and; *c)* exaggerated the load forecast for the beginning (not reminder) of that year 2015 (to 69MW, which is 35% annual growth). That resulted in the wrong prediction that the MSS breach had already occurred in 2015 or will occur in 2015, but definitely in summer 2015/16.

In [4], Western Power changed history of loading of the MSS substation for year 2015, in a manner similar to that described in the famous George Orwell's novel "1984", in my opinion, in order to create "new facts" that would support the narrative of the need for exemption (Decision 1), with the ultimate objective to obtain Decision 2 (which mandated inefficient investments and gold-plating of the network).

On 3 June 2016 in [10], Western Power's agenda was more ambitious: to install more transformers in more zone substations. For this new purpose, the "facts created" one year earlier in [4] did not suffice. So Western Power embarked to further reduce the NCR capacities (for example, to 52.8MVA for MSS); further change history of loading of the MSS substation for years 2015 & 2016, and; further exaggerate the load forecast for the Mandurah Load Area. The outcome was the "new data set" that "proved" that installation of the 3rd transformer in MSS substation was insufficient to alleviate "shortfall in the transformer capacity" in the Mandurah Load Area, and that two new "supersized" transformers, rated 66MVA each, were required, located in the new substation site.

On 3 June 2016 [10] reference was made to the exemption request [4] and Decision 1, as expected. However, something unexpected was also included in [10], that was completely unnecessary: in Section 4.2 Technical Rules, clause 2.5.4(b) from TR-2011 was quoted, misleading the public that Western Power used TR-2011 to calculate the NCR capacity in [10]. This unnecessary inconsistency can be interpreted as an effort to silence some internal Western Power's stakeholders, who new that that the method of NCR calculation of [3] leads to inefficient investments and gold plating of the network. This further implies that this issue of inadequacy of [3] had been discussed in Western Power. If so, then what were the arguments of the opposing sides? Western Power's silence on this issue in [5] to [9], could be interpreted that all the time they knew they were on the wrong side of the argument. This needs to be investigated further, in order to ascertain the extent of any possible Western Power's false representation and failures to act in good faith.

On 16 May 2017 in [5], Western Power did not try to justify that the method of NCR calculation of [3] was correct; abandoned own method of NCR calculation of [3] and embraced that of TR-2011. Instead, Western Power retained its position that the original exemption was justified, and embarked on "new data creation" that "proved" that the installation of the 3rd transformer in MSS substation was still needed; despite the exaggerated load forecasted in [4] for year 2015 did not eventuate (the MSS load remained at 51MVA). So on 16 May 2917 Western Power submitted that the year 2016

load of 63.36MVA of MSS substation marginally exceeded its TR-2011 NCR capacity (of 62.24MVA). The Western Power's Annual planning Report for year 2016 says otherwise – no NCR capacity breaches in Mandurah Load Area were recorded in 2016; however this finding did not fit in the Western Power's narrative, so Western Power ignored it.

From the engineering perspective the 63.36MVA loading is not proof of the breach, just smoke and mirrors wording to give false impression that the breach occurred (even it did not occur). Here is why. Even if that load value was recorded in 2016, that value of 63.36MVA would not be relevant for the conclusion (that the breach occurred), because the power factor correction capacitors banks installed in MSS substation should be able to compensate the reactive power drawn by the loads, to the effect of the transformers being loaded 50.7MW in 2016 (calculated as 0.8 x 63.36 = 50.7). This is the sole purpose of installation of power factor correction capacitors in zone substations, including in Meadow Spring (MSS) substation – to defer the transformer expansion by reducing the numerical value of "MVA" to the numerical value of "MW". This is explained in more details in section on Load Forecast Data Analysis. In my opinion, submission [5] and 63.36MVA was the smoke and mirrors at best; aimed at defending otherwise indefensible, decision to install the 3rd transformer in Meadow Springs (MSS) substation.

Instead of admitting own (costly) wrongdoing to the detriment of the WA society, Western Power had been changing own arguments in each subsequent submission, as is further illustrated next.

On 24 January 2019 in [6] & [8] (note that the cover letters in [6] & [8] show wrong date 24/1/2018), in contrast to earlier submissions [4], [5] & [10], all loads in [6], [8] were given in "MW" units. The numerical load values in Table 2 remained unchanged, despite of the change of the units (from MVA to MW), leading to a conclusion that Western Power interchangeably uses apparent power (MVA) and real power (MW).

Comparison of the NCR capacity of Table 1 and historical load values for year 2018 of Table 2 and show there was sufficient NCR capacity in the Mandurah Load Area.

That reality did not suit Western Power's intention to install the 3rd transformer in MSS substation, this time in year 2019, see [6] & [9].

So, in order to justify, otherwise unjustifiable, installation of the 3rd transformer in the Mandurah Load Area, Western Power embarked again on creation of the "new facts" that would support the narrative for the 3rd transformer in MSS. This time the sole focus was on the loads, as Western Power apparently gave up attempts to argue for the NCR calculation of [3] that became part of TR-2016 by Decision 2.

In [6] & [8], Western Power did four things to create "new facts":

One; retroactively disregarded the historical MSS peak load for year 2018 of 58MW that that showed no breach (as 58 < 62.14).

Two; retroactively exaggerated the "load forecast" for the previous year 2018 in Figure 3 of [6] to about 64MW (in order to "create" the "breach" in 2018, as 64 > 62.14)(Note: this was not shown in [8], where the load forecast commences from year 2019).

Three; exaggerated the annual (2018 to 2019) load forecast for year 2019 for the Mandurah Load Area: 31% for MSS substation (calculated as 75.89/58), 25% MH substation (calculated as 79.05/63), and 18% for the Mandurah Load Area as a whole (calculated as 155/131).

Namely, after being challenged again by the ERA in late 2018 regarding Decision 1, Western Power exaggerated the annual load forecast again, in [6] & [8] for 2019 by 31%

for MSS, 25% for MH and 18% for the Mandurah Load Area as a whole. This forecast probably included misuse of the DTC to shift the load from the neighboring load areas onto MSS and MH substations, because the average of 31 + 25 is greater than 18% load growth for the Mandurah Load Area as a whole.

Four; before that, from 2017 to 2018, Western Power offloaded MH substation by 19MW (calculated as 82 – 63), and unnecessary loaded MSS substation by 11MW (calculated as 58 – 74), in my opinion in desperate, but unsuccessful, attempt to justify, otherwise unjustifiable, installation of the 3rd transformer in MSS substation in 2019. From the engineering perspective, the purpose of load transfers between zone substations is to off-load the highest loaded zone substation, so it does not breach its NCR capacity. In this case, Western Power did the opposite, deliberately loaded Meadow Springs (MSS) substation, in order to artificially cause it to breach the NCR rating (62.14MVA, as per TR-2011), with the ultimate objective to justify, otherwise unnecessary, installation of the 3rd transformer in Meadow Springs (MSS) substation. Clearly, this is yet another example of the Western Power's unethical conduct and apparent misuse of power.

These 2019 actions of [6] & [8] were similar to those in 2015 [4], 2016 [10] and 2017 [5]. Together, they demonstrate persistent and repeated attempts to lead the ERA and the public into understanding that there is nothing to worry about, whilst exercising and promoting inefficient spending and gold-plating of the network to the detriment of the society.

7. More Realistic Estimate of the Future Timing of 3rd Transformer in MSS

7.1 Methodology

There is sufficient Distribution 22kV Feeder Load Transfer Capacity (**DTC**) between MSS and MH and between MSS and Waikiki (**WAI**) NCR zone substations that allows the Mandurah Load Area (MH + MSS) to considered simultaneously and rated as per the aggregate number of transformers in the MH and MSS zone substations (3 + 2 = 5), see Table 1, column "Mandurah Load Area (MSS + MH)". This is further explained, as follows:

7.1.1 DTC History From 2012 to 2016

Western Power's original application for exemption dated 15 May 2015[12], DM#12947998, shows unnecessary distribution network expenditures were made in the period from 2012 to 2014/15 to transfer load from Mandurah (MH) to Meadow Springs (MSS) zone substation, due to Western Power's non-compliance with the TR-2011, resulting from its creative interpretation of clause 2.5.4(b) which erroneously assigned economically inefficient ratings to the MH and MSS zone substations (and the Mandurah Load Area as a whole).

That is qualitatively described on page 5, Section Mandurah Load Area (MH + MSS); and qualitatively illustrated in Figures 3 and 4, on the respective pages 6 and 7. From 2012 to 2016 about 16MVA of load was transferred away from MH, and mostly to MSS, so the MSS load, in this period, increased from 41MVA in 2012 to 57MVA in 2014.

At the same time, from 2012 to 2016, the MH load decreased from 81MVA to 70MVA.

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

In early 2015, about 6MVA of load was transferred away from MSS to Waikiki (**WAI**) zone substation, resulting in the reduction of the MSS peak load to 51MVA in 2016.

This shows that about 20 MVA of load could be transferred to and from the MSS substation via the DTC transfers. The DTC transfers allow deferral of the transformer reinforcement of the MSS substation.

7.2 Mandurah Load Area (MH + MSS) as a Whole

Even the latest Western Power's exaggerated 10% POE load forecast for the Mandurah Load Area (MH + MSS) of 158MW for year 2020 of Appendix 5 shows no need for reinforcement in that area for at least two more years, because the NCR capacity of the Mandurah Load Area (as a whole) is 161MVA, see Table 1.

That conclusion applies despite unrealistically high load forecast for year 2019 of nearly 18% annual increase from year 2018 to year 2019 of Appendix 5; 31% annual load increase for Meadow Springs (MSS) substation and 25% load increase for Mandurah (MH) substation, see Table 2.

7.3 Three More Realistic Load Forecasts

At the 2MW annual load increase rate (that is the historical rate from 2017 to 2018) in the Mandurah Load Area, it may take 15 more years before the current (in year 2018) 131MW load in the Mandurah Load Area reaches its NCR capacity of 161MVA.

Similarly, at the 3.8MW annual load increase rate (that is the average annual rate of the 10% POE load forecast for the Mandurah Load Area from 2018 to 2028 in [8]) in the Mandurah Load Area, it may take 7 more years before the current (in year 2018) 131MW load in the Mandurah Load Area reaches its NCR capacity of 161MVA.

However, at the 3MW annual load increase rate (that is the average of 2MW and 3.8MW, rounded up to the nearest whole number) in the Mandurah Load Area, it may take 10 or more years before the current (in year 2018) 131MW load in the Mandurah Load Area reaches its NCR capacity of 161MVA.

7.4 Meadow Springs (MSS) Substation and Mandurah (MH) Substation, Individually

The magnitude of the DTC of MH and MSS zone substation allows fine tuning of loads which could be supplied from each zone substation, and, if necessary adjusting load sharing between them, in order that the individual NCR ratings are not exceeded. This DTC flexibility eliminated the need to overload all zone substations in the Mandurah Load Area above their respective NCR ratings, therefore eliminated the need for the exemption in year 2015 (Decision 1), as well as in years 2016, 2017, 2018 and 2019; as well as in the foreseeable future, as long as the aggregate load in the Mandurah Load Area (on all three zone substations: MSS, MH and WAI) is within the NCR capacity of the Mandurah Load Area as a whole of Table 1. The duration of that "foreseeable future" depends on which load forecast we use.

Utilizing the existing DTC capability between the substations in the Mandurah Load Area and substations in the geographically adjacent load areas can further extend that period of "foreseeable future", however this extension is beyond the scope of this submission.

7.5 Conclusion

The three more realistic forecasts for load growth in the Mandurah Load Area showed that no new zone transformers will be needed in the next 7, 10 and 15 years.

If we take the medium forecast as a basis, there would be no need for installation of the 3rd transformer in Meadow Springs (MSS) substation, nor any other in the Mandurah Load Area for the next 10 years, or at least 2028. This requires prudent distribution network operation; including full utilisation of the existing power factor correction capacitors and distribution load transfer capacity (DTC) in the Mandurah Load Area.

That does not require utilizing the existing DTC capability between the substations in the Mandurah Load Area and substations in the geographically adjacent load areas, however its utilisation would further defer the need for zone transformer capacity expansion in the Mandurah Load Area. In addition, increasing the existing DTC capability between the substations in the Mandurah Load Area and substations in the neighboring load areas may further extend defer the need for the zone transformer capacity expansion (hence for Decision 1).

In conclusion, any future proposal for zone transformer capacity reinforcement in the Mandurah Load Area, after year 2028, should also be assessed against much cheaper options for Western Power (and all users of electricity) to first: *a)* enforce compliance of loads with the Technical Rules, particularly with the power factor requirements (at all times, and including compliance of loads with embedded generation located behind the meter); *b)* install more power factor correction capacitor banks, and; *c)* increase the DTC transfer capacity between the zone substations (within the Mandurah Load Area and outside of it).

Attachment 3 to Submission by Stephen Davidson
Comment on Issue 1

Consultation Topic:
APPLICATION TO REVOKE TECHNICAL RULE TEMPORARY EXEMPTION GRANTED TO WESTERN POWER FOR MEADOW SPRINGS ZONE SUBSTATION– CONSULTATION PAPER, 14 FEB 2019

Issue 1 –
The ERA is seeking comment from interested parties on whether the temporary exemption from compliance with clause 2.5.4(b) of the Technical Rules with respect to capacity requirements at the Meadow Springs zone substation granted to Western Power in July 2015 should be revoked.

The Consultation Paper failed to identify inconsistencies of the calculated values of the NCR capacities, exaggerated load forecasts and changed historical load data. This required to carry out the *Forensic Engineering Analysis of Western Power's Submissions*. For completeness, all other documents about the Mandurah Load Area available on the Western Power's website were also analysed: the annual planning reports and [10].

Western Power's annual planning reports show that there has been no need for Decision 1; as the historical load has not exceeded the assigned NCR capacity of zone substations in the Mandurah Load Area. The same conclusion applies for the Mandurah Load Area as whole; namely, the large distribution transfer capacity (DTC) allows transfer of loads between the zone substations, so no individual substation has exceeded own NCR capacity.

Western Power's submissions are inconsistent with the annual planning reports!

The *Forensic Engineering Analysis of Western Power's Submissions* showed that in 2015 [4], 2016 [10], 2017 [5] and 2019 [6], [7], [8] & [9], other than lowering the NCR ratings, Western Power did two wrong things in order to justify, otherwise unjustifiable, installation of the 3rd transformer in the Meadow Springs (MSS) substation: *a)* assumed unrealistically exaggerated annual load growth, and *b)* retroactively changed (back in time) the historical load to an "inflated" number greater than the NCR rating, for example in [4] MSS, 2015: 51MVA to 69MVA, etc. The exaggerated annual load forecasts were in the two digit range; for example 35% in [4], 31%, 25% & 18% in [6] & [8]. Not needed to say that these forecasts have never eventuated.

After being challenged in 2017 by the ERA regarding Decision 1, in the period from 2017 to 2018, in my opinion in a desperate attempt to justify, otherwise unjustifiable, Decision 1, Western Power unconscionably (and unnecessary) transferred two digit amount load from MH to MSS, in order to cause the MSS to be loaded above its NCR rating. See Table 2, rows for 2017 & 2018.

On one occasion, Western Power apparently forgot or chose to forget to switch on power factor correction capacitors, in order to "cause" the load on the MSS substation to breach its NCR rating, or failed to enforce the power factor of loads supplied from MSS substation to be within the permissible range. Any such a breach does not justify the installation of the 3rd transformer in MSS, as is much more cost efficient to correct the power factor.

After being challenged again in late 2018 by the ERA regarding Decision 1, Western Power again exaggerated the annual load forecast for 2019 in [6] & [8] by 31% for MSS,

25% for MH and 18% for the Mandurah Load Area as a whole (see Table 2). That forecast probably included misuse of the DTC to unnecessary shift the load from the neighboring load areas onto the MSS and MH substations, because their average annual load growth of 28% (the average of 31 + 25) is greater than 18% load growth for the Mandurah Load Area as a whole. That misleading load forecast does not justify the need for Decision 1, as simple re-balancing of loads by off-loading MSS substation would defer any need for the new transformer in the Mandurah Load Area.

Further, the latest Western Power's exaggerated 10% POE load forecast for the Mandurah Load Area (MH + MSS) of 158MW for year 2020 of Appendix 5 [8] also shows no need for reinforcement in that area for at least two more years, because the NCR capacity of the Mandurah Load Area (as a whole) is 161MVA, see Table 1.

The three more realistic forecasts for load growth in the Mandurah Load Area, than that of Appendix 5 [8], showed that no new zone transformers will be needed in the next 7, 10 and 15 years. The respective assumed annual load growth rates were 3.8MW (the average annual rate from the 10% POE curve from 2018 to 2028 of [8]), 3MW (the average of 2MW and 3.8MW rounded up), and 2MW (the historical growth rate from 2017 to 2018).

If we take the medium forecast as a basis, there would be no need for installation of the 3rd transformer in Meadow Springs (MSS) substation, nor any other zone substation in the Mandurah Load Area for the next 10 years, or at least until year 2028. This requires prudent distribution network operation; including full utilisation of the existing power factor correction capacitors and distribution load transfer capacity (DTC) in the Mandurah Load Area.

That does not require utilizing the existing DTC capability between the substations in the Mandurah Load Area and substations in the geographically adjacent load areas, however its utilisation would further defer the need for zone transformer capacity expansion in the Mandurah Load Area. Further, increasing the existing DTC capability between the substations in the Mandurah Load Area and substations in the neighboring load areas can only further defer the need for the zone transformer capacity expansion (hence for Decision 1) beyond the next 10 years, further justifying revocation of Decision 1.

Follow-up work required. Any future proposal for zone transformer capacity reinforcement in the Mandurah Load Area, after year 2028, should also be assessed against much cheaper alternatives to first: *a)* enforce compliance of loads with the Technical Rules, particularly with the power factor requirements (at all times, and including compliance of loads with embedded generation located behind the meter); *b)* switch on the existing power factor correction capacitors; *c)* install more power factor correction capacitor banks, and; *d)* fully utilize, and if needed further increase, the DTC transfer capacity between the zone substations (within the Mandurah Load Area and outside of it). Consequently, the business cases for all 63 zone transformer capacity expansions from 2006, reported in [9], should be reviewed against these cheaper alternatives. If these cheaper alternatives were not investigated / reported in the relevant business case, then the cost of that project should be removed from the Western Power's Regulated Asset Base (RAB).

Attachment 4 to Submission by Stephen Davidson
Comment on Issue 2

Consultation Topic:
APPLICATION TO REVOKE TECHNICAL RULE TEMPORARY EXEMPTION GRANTED TO WESTERN POWER FOR MEADOW SPRINGS ZONE SUBSTATION– CONSULTATION PAPER, 14 FEB 2019

Issue 2 – What should be the NCR
The ERA is seeking stakeholder views on the matters raised by Mr Davidson about how the NCR capacity should be determined and the effect on investment decisions.

The economic impact was not discussed in the Consultation Paper, so two key relevant criteria for the qualitative economic assessment of the issues raised in the Consultation Paper were identified: *a)* economic efficiency is directly proportional to the numerical value of the NCR capacity (assuming all other factors being equal), and; *b)* it is economically more efficient to defer the construction / expansion than to bring it forward. These enable decision making without qualitative economic assessment.

It was shown that the Western Power's creative interpretation of the NCR criterion (the basis for Decisions 1 & 2) arbitrarily and significantly reduced the zone substation capacity to below that determined by the NCR criterion of the Technical Rules 2007 & 2011, therefore leading in inefficient investments. See Table 1. This provides sufficient evidence to revoke Decision 2 (which mandated the "*gold-plating of the network*" in Technical Rules 2016, at the ultimate cost of $1,000,000,000).

The respective differences between the NCR capacities (TR-2011 and Western Power's creative interpretation adopted in TR-2016) are a rough measure of the economic and technical inefficiencies caused by Western Power's non-compliance with the Technical Rules 2011. These are shown in Table 1.