How the AER will assess the impact of capitalisation differences on our benchmarking

Consultation paper

November 2021

AUSTRALIAN ENERGY REGULATOR

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Amendment record

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Version 1	29 November 2021	50

Overview

The AER publishes benchmarking results each year in a report on the productivity growth and efficiency of distribution network service providers (DNSPs) in the National Electricity Market (NEM). These results enable us to compare, at a high level, how productively efficient DNSPs are at delivering electricity distribution services over time and compared with their peers.

While DNSPs are broadly comparable, they differ on a range of characteristics, such as network size and aspects of their operating environment. The aim is that the benchmarking results should largely reflect differences in DNSPs' efficiency, with all other major sources of differences accounted for in the modelling or by adjusting the benchmarking results for differences in operating environment factors (OEFs). It is therefore important for benchmarking to be carried out on the basis of data that is as consistent and comparable as possible.

Issues to be considered

One possible difference between DNSPs that may impact the comparability of the benchmarking results relates to differences in their capitalisation practices. This includes differences between DNSPs' practices at a point in time and differences over time.

In this consultation paper we use the term capitalisation practices to encompass the following:

- capitalisation policy, i.e. a business's policy and/or specific method of reporting/classification of expenditure as operating expenditure (opex) or capital expenditure (capex), which includes expensing/capitalising overheads
- opex / capital trade-offs, i.e. a business's utilisation of opex versus capital inputs, such as the choice for non-network Information Communication and Technology (ICT) between the use of cloud computing (opex) and in-house equipment (capital inputs).

Through this consultation paper we are commencing a process to examine:

- whether there are material differences in capitalisation practices between DNSPs
- whether these differences have a material impact on the comparability of the data on which the AER's DNSP benchmarking results are based and the benchmarking results
- if there are material impacts on the benchmarking results, what options there are for addressing these impacts, preferred options and the reasons why.

We consider it is important to examine these issues as we draw on the benchmarking results when setting the maximum revenues DNSPs can recover from customers as a part of our revenue determination processes. In particular, when examining the efficiency of a DNSP's opex and whether an efficiency adjustment is required in setting maximum revenues that can be recovered.

We intend to use this process to develop a guidance note that sets out how we will address any material impacts on the benchmarking results of differences in capitalisation practices. The intention is that the guidance note will provide DNSPs with greater certainty about how

we will assess this issue. The proposed process for developing this guidance note is set out below.

Background and further work undertaken

We examined this issue in 2014 when we began to publish the annual benchmarking results. At that time we did not consider there were material differences in capitalisation practices or impacts on the benchmarking results, including in the context of our conservative approach to applying benchmarking.

Since then there have been changes in the capitalisation practices of some DNSPs and future changes are scheduled to occur. Further, over the last few years we have consistently received submissions from DNSPs that differences in capitalisation practices, particularly in light of these changes, are a limitation in our benchmarking results.

We have done some further work to seek to understand how best to measure these differences and their impact on the benchmarking results. We used this work in recent revenue determinations, but considered it was fit for purpose in that context, and a broader examination of the issues was required.

Preliminary views

We have used this further work, and our thinking in the context of the recent revenue determinations, to inform the preliminary views that are presented in this consultation paper. In summary, our preliminary views are that:

- there is sufficient information to form a view that some DNSPs' capitalisation practices are materially different to those of the comparator DNSPs (those who benchmark in the upper quartile of our results).
- differences in capitalisation practices can be considered a material factor in terms of their potential impact on the benchmarking results.
- applying an OEF adjustment to the benchmarking results, based on opex/capital ratios, best meets the principles we are proposing to use to assess the options to address the impacts of these capitalisation differences on the benchmarking results. This is consistent with the approach that we have taken previously, including most recently in the Jemena revenue determination. However, we acknowledge there are issues with this approach as the benchmarking results would not be based on current or future capitalisation policies.

While we have presented these preliminary views, which reflect our positions in previously published materials, we acknowledge that this is a relatively complex issue that will benefit from consultation and engagement. Therefore, this consultation paper asks a series of questions that we are seeking stakeholder feedback on, including whether stakeholders consider these preliminary views are appropriate.

Proposed process to develop a guidance note

This consultation paper commences the process to develop a guidance note and Table 1 sets out our proposed consultation process and indicative timing.

Table 1 Process for developing guidance note and indicative timeline

Key steps	Purpose	Indicative dates
Release consultation paper	Publish the consultation paper and seek submissions	29 November 2021
Submissions on consultation paper	The purpose of this period is to allow adequate consultation to receive views across the industry on matters that should be covered in a final guidance note	4 February 2022
Meet with stakeholders to discuss key issues	In light of submissions organise one-on-one or industry wide meetings as required to discuss key issues	Late February 2022
Draft guidance	Publish draft guidance and seek submissions	Mid-May 2022
Submissions on draft guidance	Opportunity for stakeholders to provide feedback on the proposed draft guidance	Mid-June 2022
Final guidance	Publish final guidance	Mid-August 2022

We welcome comments on the above process, including whether there would be value in potential group workshop sessions or one-on-one meetings.

Question to stakeholders:

- Do you have any comments on our planned process for consultation, including on the timelines?
- Do you have any views at this stage on whether group workshop sessions or one-on-one meetings would be preferable?

How to make a submission

Interested parties are invited to make submissions on this consultation paper by **4 February 2022**. In providing responses, please explain your reasons, including supporting evidence and data analysis where possible.

You do not need to comment on all issues in your feedback and we invite you to respond to the questions that are relevant to you and your circumstances.

We prefer that all submissions are in Microsoft Word or another text readable document format. Any submissions that include data should be provided in Microsoft Excel format. Submissions should be emailed to: AERInquiry@aer.gov.au with the subject heading "Attention: General Manager – Network Expenditure – Submission on the impact of capitalisation on the AER's benchmarking"

Alternatively, submissions can be sent to:

Sebastian Roberts
General Manager
Network Expenditure
Australian Energy Regulator
GPO Box 520
Melbourne VIC 3001

We prefer that all submissions be publicly available to facilitate an informed and transparent consultative process. Submissions will be treated as public documents unless otherwise requested. Parties wishing to submit confidential information should:

- Clearly identify the information or data that is subject to the confidentiality claim and set out the reasons why this information is considered confidential
- Provide a non-confidential version of the submission in a form suitable for publication if applicable.

All non-confidential submissions will be placed on our website. For further information regarding our use and disclosure of information provided to us, see the ACCC/AER Information Policy (October 2008), which is available on our website.

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1 Economic benchmarking and the potential impacts of capitalisation

This section provides background on our economic benchmarking, what capitalisation practices are and why they may impact, materially, on the comparability of the benchmarking results. It also sets out a summary of past stakeholder submissions and our considerations around these issues to date.

1.1 The AER's economic benchmarking

The National Electricity Rules (NER) require the AER to publish benchmarking results in an annual benchmarking report.[1] We report annually on the productivity growth and efficiency of distribution network service providers (DNSPs), individually and for the industry as a whole, in the National Electricity Market (NEM).[2]

Benchmarking broadly refers to the practice of comparing the economic performance of a group of service providers that provide the same service as a means of assessing their relative performance. We use economic benchmarking to measure how productively efficient DNSPs are at delivering electricity distribution services over time and compared with their peers. Where DNSPs become more efficient (minimise inputs for a given level of outputs), customers should benefit through downward pressure on network charges and bills. We draw on this analysis when setting the maximum revenues networks can recover from customers.

While DNSPs are broadly comparable, they differ on a range of characteristics, such as network size and aspects of their operating environment. The aim is that the benchmarking results should largely reflect differences in DNSPs' efficiency, with all other major sources of differences accounted for either directly in the modelling or by adjustments to the benchmarking results for operating environment factor (OEF) differences. It is therefore important for benchmarking to be carried out on the basis of data that is as consistent and comparable as possible.

We benchmark DNSPs' performance by measuring the relationship between inputs used and outputs delivered. We use two types of 'top-down' benchmarking techniques.[3] Firstly, productivity index number (PIN) techniques, which use a mathematical index to measure outputs relative to inputs, enabling comparison of productivity levels and trends over time.

[1] NER, cl 6.27.

[2] We also produce an annual benchmarking report for transmission network service providers. The focus of this consultation is on the impact of capitalisation on our DNSP benchmarking as this is where we have received most feedback, and we draw to a greater extent on our distribution benchmarking in our revenue determinations. However, the issues and considerations are also broadly applicable to our benchmarking of transmission network service providers.

[3] Top-down techniques measure a business's efficiency based on high-level data aggregated to reflect a small number of key outputs and key inputs.

The PIN techniques we use in our benchmarking to measure the productivity performance of individual DNSPs are multilateral total factor productivity (MTFP) and multilateral partial factor productivity (MPFP). The inputs included in the MTFP method are: opex and five types of physical capital assets, while the outputs included are: customer numbers, circuit length, ratcheted maximum demand, energy delivered and reliability (measured by customer minutes off supply as a negative output). The MPFP method is used to undertake partial productivity analysis, separately examining the productivity of operating expenditure (opex) and capital inputs against total output. Secondly, econometric opex cost function models, which focus on the efficiency of opex by estimating opex as a function of outputs and other OEFs. The outputs included are: customer numbers, circuit length, and ratcheted maximum demand. The OEF included in these models is share of lines that are underground.

As DNSPs do not all operate under exactly the same operating environments, we seek to take into account how these differences affect the relative expenditures of DNSPs when acting efficiently. This ensures we are comparing like with like to the greatest extent possible. Our economic benchmarking techniques account for differences in operating environments to a significant degree. For example, by accounting for differences in customer, energy and demand densities and limiting opex to network services costs and activities of DNSPs that are broadly consistent across jurisdictions. In addition, the proportion of distribution lines that are underground is an OEF that is directly included in the econometric opex cost function models. Where our benchmarking models do not directly account for material, exogenous operating environment differences (e.g. in legislative or regulatory obligations, climate and geography) we adjust the benchmarking results to account for these differences where we have been able to quantify these.

We acknowledge that being top-down measures, each benchmarking technique cannot readily incorporate every possible exogenous factor that may affect a DNSP's costs. Therefore, the performance measures are reflective of, but do not precisely represent, the underlying efficiency of DNSPs.

More detail in relation to our benchmarking techniques, the inputs and outputs included in the benchmarking models and how OEFs are incorporated into our benchmarking results can be found in Appendix A. Further detail can also be found in our *2021 Annual Benchmarking Report*.[4]

We apply our benchmarking results as a part of revenue determinations for DNSPs, particularly as a part of making decisions in relation to the efficiency of opex. While we use the results from all of our benchmarking techniques to inform our considerations, we specifically draw on the benchmarking results and the DNSP's efficiency scores[5] from the econometric opex cost function models to assess the efficiency of individual DNSPs' historical opex and base year opex. We do this by comparing the efficiency scores of individual DNSPs from these models against a benchmark comparison score of 0.75,

[4] AER, *Annual Benchmarking Report, Electricity distribution network service providers*, November 2021.

[5] Our benchmarking techniques yield an efficiency score for each DNSP of between 1 and 0, where 1 represents the efficiency frontier and is the best possible efficiency score.

adjusted to account for material OEFs. The benchmark comparison score of 0.75 reflects the upper quartile of possible efficiency scores that can be achieved by DNSPs and we refer to DNSPs with efficiency scores of 0.75 or above as the benchmark comparators.

1.2 What are capitalisation practices?

One possible difference between DNSPs that may impact the benchmarking results relates to their capitalisation practices. In recent revenue determinations, we have used the term capitalisation practices to encompass two broad types of capitalisation practices undertaken by DNSPs:

- capitalisation policy, i.e. a business's policy and/or specific method of reporting/classification of expenditure as opex or capital expenditure (capex), (e.g. expensing/capitalising overheads)
- opex / capital trade-offs, i.e. a business's utilisation of opex versus capital inputs e.g. the choice for non-network Information Communication and Technology (ICT) between the use of cloud computing (opex) versus in-house equipment (capital inputs); demand management (opex) versus augmenting existing circuit length or transformer capacity (capital inputs).

We adopt this terminology in this paper and consider this definition comprehensively covers the capitalisation practices of relevance to this consultation.

DNSPs' capitalisation policies are often incorporated into their respective Cost Allocation Methods (CAMs). Cost allocation is the practice of attributing a regulated business's costs, or allocating shared costs, between distribution service categories and non-regulated business sections. This can include capitalisation policies. We assess DNSPs' CAMs to ensure they are in accordance with the requirements of the National Electricity Law (NEL) and NER, and give effect to and are consistent with the AER's Cost allocation guidelines.[6] Distribution regulatory proposals must comply with an AER-approved CAM.

The issue of capitalisation practice differences between DNSPs can be seen as a sub-set of cost allocation differences more broadly. Cost allocation could theoretically contribute to differences between DNSPs' reported costs in a way that could materially impact the benchmarking results. For example, if, in comparison to other DNSPs, a DNSP allocates significantly more/less corporate overheads to standard control services relative to alternative control services. However, the focus of stakeholder feedback in terms of the impact on our benchmarking has been on capitalisation. As a result, we are not proposing to examine this issue in this consultation.

Questions to stakeholders:

- Do you agree with the proposed definition of capitalisation practices? Do you consider this is capturing the range of capitalisation practices that (at least in theory) could be

[6] AER, Cost allocation guideline (distribution) 2008.

influencing the comparability of the benchmarking results? If you consider the range is too narrow or too broad, please provide the definition you consider is appropriate and your reasoning and supporting evidence.

- Do you consider that our focus on capitalisation practice differences instead of cost allocation differences more broadly is appropriate? If not, please provide your reasoning and supporting evidence.

1.3 Why might the potential for variations in DNSPs' capitalisation practices pose a problem for our benchmarking?

Capitalisation practices can (and, as discussed below, do) differ among the DNSPs and change over time. While the scope for differences in DNSPs' capitalisation practices is not unlimited[7], these variations can arise through differing capitalisation policies[8] and/or different opex / capital input mixes adopted by DNSPs in delivering required outputs. Our benchmarking techniques include opex and capital asset inputs separately and also allow for separate benchmarking of the efficiency of opex and capital assets. We recognised at the start of our economic benchmarking program in 2014 that the potential for variations in capitalisation practices between businesses, and over time, could pose two issues for the reliability of benchmarking:

- Cross-DNSP comparability: undermining like-with-like comparability between the businesses at a given point in time of benchmarking
- Time series comparability: potential to further reduce comparability in the benchmarking scores as DNSPs change their capitalisation practices over time.

Cross-DNSP comparability

As discussed above, economic benchmarking relies on like-with-like comparability. This comparability may be compromised to the extent that capitalisation practices differ materially between DNSPs. For constant outputs, using relatively more opex relative to capital will tend to worsen a DNSP's opex benchmarking results, and vice versa. For example, if a DNSP tends to expense rather than capitalise its corporate overheads compared to most other DNSPs, then this would result in a lower opex benchmarking result than otherwise, and make it appear less efficient on opex than it otherwise would. As a result, the manner in which a DNSP classifies and/or utilises inputs as either opex or capital potentially impacts its opex (and capital) benchmarking results.

[7] This is because reported expenditure is prepared in accordance with applicable accounting standards, the DNSP's AER-approved CAM (assessed against our Cost Allocation Guidelines), and the AER's instructions on the various Regulatory Information Notices.

[8] Which can exist both via a DNSP's CAM or outside it.

Time series comparability

Even where DNSPs' capitalisation practices initially are broadly similar, a DNSP changing its capitalisation practices over time could compromise the comparability of its benchmarking scores over time. This is because on changing its capitalisation practices, its benchmarking results would change due to factors unrelated to efficiency. Left unaddressed, given the differences in our approaches to assessing efficient opex and capex, this prospect may also potentially give rise to strategic reactions by DNSPs i.e. it may create the incentive for DNSPs to 'game' the benchmarking via the ability to change their capitalisation practices over time.[9]

Given these factors, it is important for our benchmarking that capitalisation differences are identified and quantified, and, where material, addressed. Failure to account for material differences in how businesses classify and utilise opex and capital between DNSPs could potentially give rise to misleading opex (or capital) efficiency scores.

1.4 How we considered these potential issues when we introduced the benchmarking program

At the outset of our benchmarking program in 2014, we, along with our consultant Economic Insights, recognised and considered these two potential issues. First, we considered that the DNSPs' capitalisation practices applying at that time[10] were broadly consistent.[11] The primary measure of capitalisation practices we had regard to in order to examine this issue was the DNSPs' period-average opex/capex ratios, i.e. opex as a proportion of total expenditure (totex).[12] Rather than focusing on one cost category (e.g. reported allocation of overheads to opex and capex), our view was that the opex/totex ratio captured the net effect of all types of capitalisation practices:

> "This measure will take into account the allocation of overheads between opex and capex, but also other factors such as opex capex trade-offs"[13]

[9] Economic Insights, *Economic Benchmarking Results for the Australian Energy Regulator's 2020 DNSP Annual Benchmarking Report*, 13 October 2020, p. 14.

[10] Including Evoenergy's capitalisation policies under its revised 2014 CAM.

[11] Economic Insights, *Economic Benchmarking Results for the Australian Energy Regulator's 2020 DNSP Annual Benchmarking Report*, 13 October 2020, p. 14.

[12] Noting the mathematical equivalence of opex/capex and opex/totex, where totex is opex plus capex. We use the opex/totex form in this consultation paper. It should be noted that the opex/totex ratio involves taking into account capex, which differs to the capital stock measures incorporated into the benchmarking (see Appendix A for the capital inputs used). We discuss this further in section 3, specifically when examining the advantages of one of the proposed approaches to measuring capitalisation differences.

[13] AER, *Final Decision Ausgrid distribution determination 2015–16 to 2018–19,* Attachment 7 – Operating expenditure, April 2015, p 194.

All else equal, a higher (lower) opex/totex ratio indicates a relatively greater (lesser) overall use of opex relative to capex.

In the application of our benchmarking results to the NSW/ACT 2014-19 revenue determinations, on the basis of the criteria in the box below, we considered whether capitalisation practices were an OEF that should be accounted for in the benchmarking given their potential to influence the benchmarking scores.[14] For material, exogenous and non-duplicative factors, our approach was to make an adjustment to the benchmarking efficiency scores to the level of that materiality. We concluded that capitalisation met the first and third criterion (in box below) for all the NSW/ACT DNSPs, and additionally the second criterion (materiality) for ActewAGL (now Evoenergy).

Criteria for identifying relevant OEFs:

- **Is it outside of the service provider's control?** Where the effect of an OEF is within the control of the service provider's management, adjusting for that factor may mask inefficient investment or expenditure.
- **Is it material?** Where the effect of an OEF is not material, we would generally not provide an adjustment for the factor. Many factors may influence a service provider's ability to convert inputs into outputs.
- **Is it accounted for elsewhere?** Where the effect of an OEF is accounted for elsewhere (e.g. within the benchmarking output measures), it should not be separately included as an OEF. To do so would be to double-count the effect of the OEF.[15]

In relation to the first criterion for identifying OEFs, we characterised capitalisation practices as an exogenous factor in that while it is somewhat under managerial discretion, this factor is unrelated to efficiency. Choices on accounting policies and capital inputs are management decisions, and therefore would not ordinarily be seen as an exogenous OEF. However, because these differences may lead to differences in opex or capital unrelated to efficiency, we considered this factor could be treated as if it was exogenous when assessing them separately.

[14] AER, *Final Decision Ausgrid distribution determination 2015–16 to 2018–19,* Attachment 7 – Operating expenditure, April 2015, pp. 180–183; 193–197.

[15] For example, our models capture the effect of line length on opex by using circuit length as an output variable. In this context, an OEF adjustment for route length would double-count the effect of line length on opex. Another example is that we exclude metering services opex from our opex series for economic benchmarking. In this case, an OEF adjustment for excluding metering services is not needed.

In terms of the third criterion, we considered that capitalisation practices were not sufficiently accounted for elsewhere in our overall benchmarking approach (i.e. directly in any data adjustments, modelling or other OEF adjustments).

On whether capitalisation was a material OEF, we considered this was satisfied if the factor in question created material differences in DNSPs' opex. We treated any OEF that would increase a DNSP's opex by 0.5 per cent or more, relative to benchmark comparators' opex, as material. We chose 0.5 per cent as the materiality threshold because this is the materiality threshold we used in the Economic Benchmarking Regulatory Information Notice (RIN).

We concluded for the NSW DNSPs that:

> "cost allocation [and capitalisation] may affect benchmarking but not significantly," and that capitalisation was not a material OEF (except for Evoenergy) "because the NSW service providers' [opex/totex] ratios were within a similar range of to [sic] the comparison firms' ratios."[16]

We considered that capitalisation was a material OEF for ActewAGL (now Evoenergy), as we found that it was an outlier under its pre-2014 capitalisation policy and expensed materially more of its totex than any other DNSP. Under its revised 2014 capitalisation policy, ActewAGL moved to align with other DNSPs by capitalising more of its overheads. We provided an 8.5 per cent positive OEF adjustment to Evoenergy's benchmarking results (as an OEF adjustment), specifically for its remaining differences in approach to IT and vehicle leasing.[17]

In relation to time series comparability, to minimise the impact of changing capitalisation approaches over time, we 'froze', for benchmarking purposes, the DNSPs' capitalisation policies as incorporated in their CAMs that applied in 2014.[18] Where a DNSP has subsequently changed its capitalisation policies for regulatory reporting purposes, and where this change has a material impact on reported opex, for benchmarking purposes we continue to ask DNSPs to provide network services opex annually as if its 2014 capitalisation policy still applied. Economic Insights explains this procedure and its objective as follows:[19]

> In line with previous practice, all Australian DNSPs' data for all years are based on the [CAMs] that applied in 2014 rather than on more recently revised CAMs. The CAMs applying in 2014 (including [Evoenergy]'s revised CAM) led to opex/capex ratios being broadly consistent across DNSPs. 'Freezing' the CAMs at this point has minimised the

[16] AER, *Final Decision Ausgrid distribution determination 2015–16 to 2018–19, Attachment 7 – Operating expenditure*, April 2015, p. 193.

[17] We calculated this by the increase ($3 million, as a percentage) that its unique operating leases approach to IT and fleet added to its efficient opex forecast. AER, *Final Decision ActewAGL distribution determination 2015–16 to 2018–19, Attachment 7 - Operating expenditure*, April 2015, pp. 191–192.

[18] For convenience, for the remainder of this paper, we shorten "capitalisation policies incorporated under a CAM" to just "capitalisation policies."

[19] Economic Insights, *Economic Benchmarking Results for the Australian Energy Regulator's 2020 DNSP Annual Benchmarking Report*, 13 October 2020, p. 14.

scope for DNSPs to game the benchmarking results by reallocating costs between opex and capex and currently provides the best basis for like–with–like comparisons of overall network services opex in most cases.

1.5 Issues raised since 2014

Over the past few years, we have received submissions from DNSPs and other stakeholders in relation to the implications of capitalisation differences, and ongoing changes, on the benchmarking results and in particular the opex (and capital) efficiency scores. The concern of these submissions is that our approach to considering the impact of capitalisation practices is not adequate. Further, that these differences are leading to differences in benchmarking results that are unrelated to the efficiency of DNSPs and that some DNSPs are advantaged or disadvantaged under our benchmarking due to their capitalisation practices.

Some DNSPs have put forward suggested approaches for how differences in capitalisation practices can be addressed. For example, benchmarking on the basis of a proportion of overheads that is fixed for all DNSPs or on the basis of a common opex/totex ratio for all DNSPs.[20] AusNet Services, Endeavour Energy and SA Power Networks submitted that the AER should apply a consistent approach to capitalisation policies between DNSPs.[21] AusNet Services and Endeavour Energy stated that the AER could apply a fixed capitalisation ratio for every network's overheads and this would equalise the impact of differences in corporate overheads capitalisation.[22]

Ausgrid and AusNet Services both submitted that the transparency of the benchmarking results could be improved by presenting benchmarking results on the basis of different capitalisation approaches. Ausgrid stated that this would provide customers with additional data to assess the underlying efficiency of their energy network provider.

Our initial investigation of these issues was consistent with our initial approach in 2014 and did not result in different conclusions.

[20] For further details on stakeholder submissions, including references, see AER, *Annual Benchmarking Report, Electricity distribution network service providers*, November 2020, pp. 83–85 and AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp, pp. 80–85.

[21] AusNet Services, *Re: Draft AER 2019 Benchmarking Reports*, October 2019, pp. 3–5; Endeavour Energy, *Submission to Draft 2019 Benchmarking Report for Distribution Service Providers*, 9 October 2019, pp. 1–2; SA Power Networks, *Submission to AER on preliminary 2019 economic benchmarking results*, 23 August 2019, p. 2.

[22] Endeavour Energy also stated that "irrespective of how the data is normalised, we consider the adjustment mechanism should not limit a DNSPs [sic] discretion to adopt a capitalisation approach that best aligns with their circumstances and accounting practices. It would also be important for the AER to be clear that differences between the standard rate and a DNSPs [sic] actual rate is a consequence of its normalisation approach rather than an assessment of the efficiency of a particular DNSPs [sic] capitalisation policy." See Endeavour Energy, *Submission to Draft 2019 Benchmarking Report for Distribution Service Providers*, 9 October 2019, p. 2.

1.6 Changes in capitalisation since 2014

In relation to the issue of time series comparability, there have also been changes in capitalisation policies (including via CAM changes) by a number of DNSPs since our first benchmarking report. Changes for CitiPower[23] and Powercor[24] in 2016 and Ergon Energy[25] in 2015, have led to material changes in the costs allocated to network services opex, in particular through greater expensing of overheads. There have also been changes to Ergon Energy and Energex's[26] (combined) and Jemena's[27] capitalisation polices that will apply from regulatory year 2020 and 2021 onwards respectively. Under Jemena's new capitalisation policy it will expense all of its corporate overheads, as per CitiPower and Powercor's revised 2016 capitalisation policy.

1.7 Our response to recent submissions and developments

More recently we have made some progress in examining and responding to these concerns and the implications, which we discussed and applied in our *2020 Annual Benchmarking Report*[28] and the final decision for Jemena's 2021-26 revenue determination.[29]

In both contexts we re-examined the way we can measure the differences in capitalisation practices to understand whether the benchmarking results are being impacted. We saw practical merit in using opex/capital ratios as a high level gauge of the net effect of capitalisation practices on benchmarking. We used opex/totex ratios first employed in our NSW/ACT 2014-19 decisions and also included two further measures that capture the opex/capital mix, namely opex cost-to-total cost and opex input-to-total inputs. While we considered these measures useful as high level gauges of capitalisation practices, we also recognised that each of these measures has limitations. These are set out and discussed in section 3.

In the *2020 Annual Benchmarking Report*, our preliminary conclusion was that capitalisation practices were not likely to be having a sizeable impact on efficiency results for most

[23] https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/cost-allocation-method/citipower-cost-allocation-method-2016

[24] https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/cost-allocation-method/powercor-cost-allocation-method-2016

[25] https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/cost-allocation-method/ergon-energy-cost-allocation-method-2018

[26] https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/cost-allocation-method/ergon-energy-cost-allocation-method-2018

[27] https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/cost-allocation-method/jemena-cost-allocation-method-2019

[28] AER, *Annual Benchmarking Report, Electricity distribution network service providers*, November 2020, p. 53–54, 82–96.

[29] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 30–35, 80–85.

DNSPs.[30] We assessed the impact by comparing the opex/totex ratio of non-comparator DNSPs to the customer number-weighted comparator average opex/totex ratio. This calculation method was to be consistent with our standard OEF adjustment calculation method of calculating the percentage impact of the OEF on a DNSP's efficient opex relative to that for the comparator-average (see Appendix A). We noted that for most of the ratio measures analysed, the differences between the comparator DNSPs and most of the DNSPs was within 5–7 percentage points. We noted, however, that further work was needed on how to specify a more precise materiality threshold.

Based on our further review of a range of qualitative and quantitative evidence, for the Jemena 2021-26 revenue determination final decision we considered that there was sufficient evidence of capitalisation practices being materially different between Jemena and the comparator DNSPs. We included an OEF adjustment to Jemena's benchmarking scores in recognition of this material difference.[31] Consistent with past decisions, we characterised capitalisation practices as an OEF in that while it is somewhat under managerial discretion, this factor is unrelated to efficiency. In addition, we did not consider that capitalisation practices are sufficiently accounted for elsewhere (i.e. in the data, modelling or other OEF adjustments). In the specific case of Jemena, we considered that there was a material difference between Jemena's and the comparator DNSPs' capitalisation practices, and that that these differences had a material impact on its opex benchmarking scores. We formed this view with particular regard to:

- The sensitivity of reported opex and associated opex benchmarking results for many DNSPs under alternative capitalisation policies, i.e. those contained in DNSPs' current CAMs
- Jemena's opex/capital ratios relative to the comparator DNSPs, and a further assessment of the advantages and disadvantages of the three types of ratio we had identified.

To determine the OEF adjustment we used two of the opex/capital ratios (opex/totex and opex/total cost) but noted that the magnitude of our adjustment, and our final decision, did not change using an alternative method incorporating a third ratio (opex/total inputs). We considered this approach fit for purpose in the context of Jemena's circumstances and for that decision. However, we noted the optimal method of identifying and adjusting for material difference in capitalisation between DNSPs was an area of ongoing work.

In relation to the issue of time series comparability, we have continued to conduct benchmarking on the basis of opex under the capitalisation policies applying in 2014 .

[30] AER, *Annual Benchmarking Report, Electricity distribution network service providers*, November 2020, p. 54.

[31] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 32–35.

2 This consultation

This section outlines why we are consulting on the impact of capitalisation practices on benchmarking now and the focus of our consultation.

2.1 Why are we further consulting now?

We stated in the *2020 Annual Benchmarking Report* that over the next 12 months we intended to further extend and consult on the potential impact of capitalisation practices differences on our benchmarking.

We consider it is important to progress this issue given the potential impact on benchmarking, including the econometric opex cost functions models that are used in revenue determinations to inform our consideration of efficient opex in the base year. The next set of distribution revenue determination proposals are due in January 2023[32], with pre-engagement likely in 2022.

Our view is that further refining our benchmarking approach, for example potentially raising the benchmark comparator point that we use for our base opex efficiency assessment, cannot occur until we have considered the potential impact of capitalisation.[33] Many stakeholders have also noted their support of further work and consultation to investigate the impact of different cost allocation/capitalisation approaches on benchmarking.[34]

2.2 The focus of this consultation

Consistent with our previous views, we continue to consider that differences in capitalisation practices between DNSPs is a factor unrelated to efficiency and that may not be sufficiently accounted for under our benchmarking approach. In principle, therefore, it is a factor that could impact the like-with-like comparability of our benchmarking. The questions for this consultation are whether these differences are having a material impact on our benchmarking results, and if so, how this should be addressed.

This reflects that we continue to observe some degree of variation among DNSPs in their capitalisation practices. We also expect that DNSPs' capitalisation practices may continue to change over time.

We therefore consider that the key issues of comparability between DNSPs and over time remain worthy of further investigation and consultation. We will examine the following key questions in this consultation:

[32] These are for the DNSPs that are in NSW and the ACT.

[33] See AER, *Annual Benchmarking Report, Electricity distribution networks service providers,* November 2021, pp. 53–61.

[34] See AER, *Annual Benchmarking Report, Electricity distribution network service providers,* November 2021, pp. 6–8.

- Is there a problem posed by capitalisation differences between DNSPs and over time on the comparability of our benchmarking? We break this down into the following questions:
  - Are there material differences in capitalisation practices between DNSPs that drive material differences in opex, and if so, how material are these differences?
  - Are these differences having a material impact on the benchmarking results?
- If so, how might this problem be addressed? That is:
  - Where there are material impacts on the benchmarking results, how should these be taken into account in the benchmarking or otherwise addressed?

The first two sub-questions are discussed in section 3, and the third sub-question is discussed in section 4. Throughout the discussion we pose a range of questions to understand stakeholders' views.

3 Assessing the materiality of the impact of capitalisation practices on our benchmarking

This section considers whether differences in capitalisation practices are having a material impact on the benchmarking results. In particular, it considers the questions of:

- Are there differences in capitalisation practices between DNSPs that drive material differences in DNSPs' opex,[35] and if so, how material are these differences?
- Are these differences having a material impact on the comparability of the benchmarking results?

We consider whether there are material differences in capitalisation practices that are driving material differences in opex prior to considering their impact on the benchmarking results. This is to provide greater transparency on the materiality of the underlying factor (differences in capitalisation practices) that is driving the impact on the benchmarking results.

In summary, consistent with the analysis we presented in our Jemena 2021–26 revenue determination final decision, our current view is that some DNSPs' capitalisation practices are materially different to comparator-average practices and that these differences materially impact on DNSPs' opex. Further, that this is having a material impact on the comparability of the benchmarking results.

3.1 How material are the differences in capitalisation practices between DNSPs

As noted in section 1, while the scope for differences in DNSPs' capitalisation practices is not unlimited, differences in capitalisation practices between DNSPs are allowed under the NER. There is a degree of flexibility under the NER and our cost allocation guidelines for DNSPs to adopt differing capitalisation policies, particularly with respect to overheads and other cost categories. We have observed differences between DNSPs and changes over time. For example, based on our examination of DNSPs' CAMs when assessing proposed revisions for approval, some DNSPs (e.g. CitiPower, Powercor, Ergon Energy, and Jemena from 1 January 2021) have changed their capitalisation policies to expense more (or all) corporate overheads. In addition, DNSPs may adopt somewhat different opex/capital input mixes in delivering required outputs, which would occur as a result of their response to ongoing changes such as input prices, industry trends and management approaches and decisions.

[35] In terms of the impact on benchmarking scores, the focus of this paper is on the opex rather than capital benchmarking. This is because we have two sets of benchmarking models for opex (opex econometrics and opex MPFP) against one (capital MPFP) for capital. In addition, for our expenditure efficiency assessments in resets, we rely significantly more on our opex benchmarking tools than our capital benchmarking tools. However, the analysis and findings that we make in this paper to the opex benchmarking side broadly apply in principle to our capital benchmarking.

For example, for ICT solutions, we have observed some DNSPs are increasingly opting for cloud solutions (opex) over investing in ICT assets (capital inputs).

While it is apparent that there are differences between DNSPs in their capitalisation practices, there is a question of how material these differences are quantitatively. This question of materiality gives rise to the methodological questions of:

- How the size of these differences can be measured/quantified
- What is the threshold beyond which these differences can be considered material?

We set out below how we have previously quantified these differences and seek stakeholder views on these, and any other methods, considered appropriate to quantify these differences. In summary, our current view is that:

- Opex/capital ratios, including the types we present below, are a useful high-level gauge of differences in capitalisation practices
- That a difference in capitalisation practices which increases or decreases a DNSP's opex by greater than 0.5 per cent relative to the comparator average can be considered material. This is to be consistent with our previously stated view of what is considered a material OEF[36]
- On the basis of opex/capital ratios and under this threshold of materiality, we consider there are material differences in capitalisation practices among the DNSPs. Some DNSPs' opex/capital ratios depart more than others' relative to benchmark comparator as a result of their capitalisation practices.

The primary method for measurement of capitalisation differences that we have used in past decisions is various forms of opex/capital ratios. These provide a high-level view of the relative capitalisation differences across DNSPs in terms of opex to various measures of capital.

Our current thinking is that the value of opex/capital ratios lies in their being able to capture net capitalisation practices, irrespective of specific sources; e.g. capitalisation/expensing of overheads, opex/capital trade-offs. All else equal, a higher (lower) opex/capital ratio indicates a relatively greater (lesser) use of opex relative to capital inputs. We consider that high level measures at the total level are better than partial measures that have previously been put forward by stakeholders. These partial measures focus on comparing the DNSPs on one particular category of opex, such as the proportion of total corporate overheads that is expensed versus capitalised. While partial measures provide information on important sources of differences between the DNSPs, our concern is that these only account for differences in some categories of opex or capex, and miss other potentially important sources of differences. For example, even under the same capitalisation policy regarding allocation of overheads to opex or capex, some degree of divergence in opex/capex would still be observed due to differing opex/capex trade-offs.

[36] AER, *Final Decision, Ausgrid distribution determination 2015–16 to 2018–19, Attachment 7 – Operating expenditure*, April 2015, p.180.

In recent decisions, we have identified three particular types of opex/capital ratio, which draw on three different ways to measure a business's factor inputs:

- **opex/totex**,[37] where totex is opex + capex, which is an expenditure-based measure
- **opex/total cost**, where total costs is opex + capital costs (the latter measured by the annual user cost of capital),[38] which is a cost-based measure
- **opex/total inputs**, where total inputs reflects opex + capital input quantity, which uses the benchmarking inputs as discussed in Section 1.1 and appendix A. This is a physical quantity-based measure.[39]

We present these ratios below for each DNSP for the 2006–19 period, which illustrate the relative differences. We also set out our current thinking on the advantages and disadvantages of each ratio as high-level gauges of DNSPs' capitalisation practices. As each of the opex/capital ratios has advantages and disadvantages, we propose to consider each of these in informing the impact of capitalisation on our benchmarking.

Consistent with the opex series currently used for economic benchmarking, this analysis uses opex under the 2014 capitalisation policies for those DNSPs which have changed theirs. This reflects, as outlined in section 1, that for the purposes of benchmarking we have frozen capitalisation policies that applied in 2014. We have also explored below the implications of using opex based on current capitalisation policies. We find that capitalisation differences as measured by opex/capital ratios are of a broadly similar magnitude under either set of capitalisation policies.

Opex/totex

The average opex/totex ratio for each DNSP is shown in Figure 1 for the 2006–19 period. The blue line in Figure 1 shows the customer-weighted average opex/totex ratio over this period of the benchmark comparator DNSPs[40], which is 41.8 per cent.

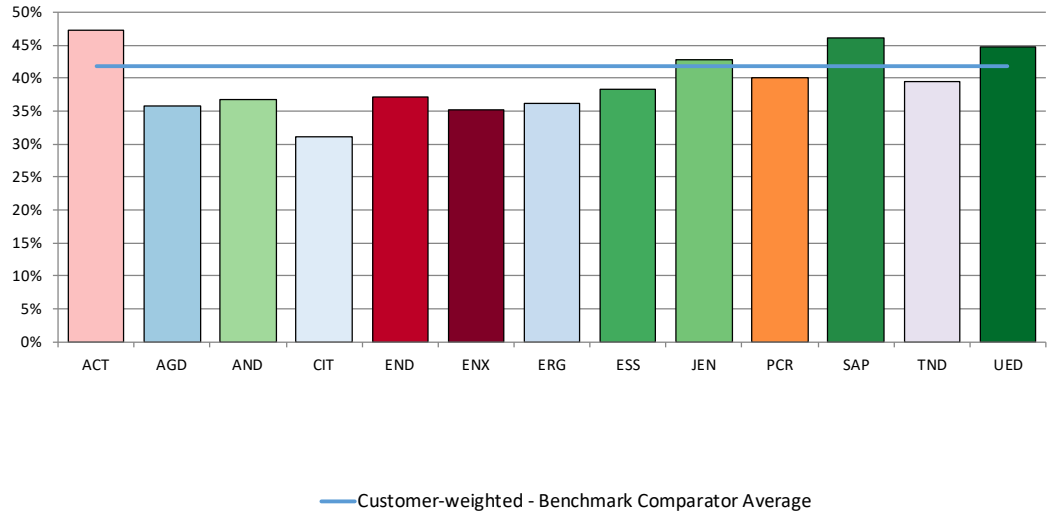
[37] AER, *Final Decision, Ausgrid distribution determination 2015–16 to 2018–19, Attachment 7 – Operating expenditure*, April 2015, p.180; AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 30–35; AER, *Final Decision AusNet distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 29–34.

[38] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 30–35; AER, *Final Decision AusNet distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 29–34. The annual user cost of capital (AUC) is the return on capital, the return of capital and the benchmark tax liability, all calculated in a broadly similar way to that used in forming the building blocks revenue requirement.

[39] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 30–35; AER, *Final Decision AusNet distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 29–34.

[40] These are the DNSPs with a model-average efficiency score from our opex econometric cost function models over our benchmark comparator point of 0.75. For the 2006-19 benchmarking period, these were Powercor, SA Power Networks, CitiPower, TasNetworks, and United Energy.

Figure 1 Opex to totex ratios for distribution businesses, 2006–19[41]



Source: Economic Benchmarking RINs, all DNSPs; AER analysis.

As noted in section 1, the threshold we used in the NSW/ACT 2014 decisions for determining whether an exogenous factor is materially impacting opex is that it increases or decreases a DNSP's opex by 0.5 per cent or more relative to the comparators. Our current view is that this materiality threshold remains appropriate. We observe a degree of variation in DNSPs' opex/totex ratios both above and below the comparator average. In particular, we observe that nine of the 13 DNSPs have an opex/totex ratio of around 3.5 percentage points, or 7 per cent, or more above or below the comparator-average ratio. This means that their capitalisation practices drive opex to a level that is more than 7 per cent above or below what would be if they had the comparator-average capitalisation practices, else being equal. This exceeds our materiality threshold of 0.5 per cent. On this basis, we consider that for many DNSPs, capitalisation practices are a factor unrelated to efficiency that is driving a material difference in opex.

We also note the relatively wide difference of 16.2 percentage points between the highest opex/totex ratio (Evoenergy, 47.3 per cent) and lowest (31.1 per cent, CitiPower, noting that CitiPower appears to be an outlier).

A key advantage of the opex/totex ratio is that it captures important dollar-for-dollar swings between opex and capex over the benchmarking period, such as capitalisation/expensing decisions on overheads. Economic Insights explained why the opex/totex ratio is a useful measure, particularly compared with a more partial measure:[42]

[41] Consistent with the opex series used for economic benchmarking, this chart uses 2014capitalisation policies-backcast opex for those DNSPs which have since changed their capitalisation policies.

[42] Economic Insights, *Response to Consultants' Reports on Economic Benchmarking of Electricity DNSPs,* 22 April 2015, p. 52.

> [P]roviding adjustments for differences in capitalisation practices in only certain categories is likely to bias opex forecasts. This is because a DNSP is likely to only identify differences in practice that provide it with a cost disadvantage, therefore increasing its operating environment factor adjustment. A better method, in our view, is to examine the opex to totex ratio at the overall level. This accounts for differences in opex/capex trade-offs and differences in accounting policies.

However, some stakeholders have submitted that the opex/totex ratio can be subject to undue volatility. This is because while opex is relatively constant over time, capex (the measure of capital inputs in this ratio) by nature fluctuates from year to year. We have previously noted that this volatility might be muted given the ratio is calculated as an average over a relatively long period.[43]

Relevantly, Jemena raised in its submission to its final revenue determination a number of concerns with the opex/totex ratio. This was in a context where the AER would solely rely on this ratio as a means to derive an OEF adjustment for capitalisation. Jemena argued that the opex/totex ratio provides little insight into differences in capitalisation practices across DNSPs.[44] It considered that, while the opex/totex ratio captures capitalisation practices, it also captures differences unrelated to the opex efficiency assessment, which makes it unsuitable for assessing opex efficiency.[45] These include different asset replacement cycles, asset age profiles, capital contribution levels, levels of efficiency between opex and capex and augmentation and safety requirements. Jemena argued that without adjustment for these factors, the ratio cannot provide meaningful insight into the specific question of whether the businesses capitalisation practices impact opex benchmarking results. Jemena noted that for this reason, its consultant CEPA recommended the AER separately analyse capitalisation policy and opex/capex trade-off differences, noting that accounting treatment is largely independent of opex/capex trade-offs and other differences in capex drivers that require a separate assessment of capex.

In relation to other comments on the opex/totex ratio, Jemena's People's Panel suggested that in using the opex/totex ratio the AER should exclude capex differences that are irrelevant in the assessment of opex benchmarking.[46]

Ausgrid submitted in the context of Jemena's 2021–26 revenue determination final decision that the comparison point for Jemena's opex/totex ratio should be the frontier DNSP's (Powercor's) opex/totex ratio.[47] Ausgrid argued that the AER's use of the customer weighted comparator average opex/totex ratio as the comparison point for Jemena's ratio is not a valid

[43] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, p. 71.

[44] Jemena, *Revised Regulatory Proposal – 2021–26 – Att 05–01 Operating expenditure,* December 2020, p. 8.

[45] Jemena, *Revised Regulatory Proposal – 2021–26 – Att 05–01 Operating expenditure,* December 2020, p. 8.

[46] Jemena's People's Panel, *Submission on the Victorian EDPR Revised Proposal and draft decision 2021–26,* January 2021, p. 71.

[47] Ausgrid, *Submission on the Victorian EDPR Revised Proposal and draft decision 2021–26,* January 2021, pp. 4, 7.

comparison point since a weighted average of multiple firms does not reflect how efficiency scores are calculated in the AER's benchmarking models.

In relation to Jemena's and other stakeholders' specific concerns, we have previously noted:

- In relation to replacement cycles and asset age, we consider that this factor can potentially be an additional OEF.[48] However, consistent with our finding in 2015, our preliminary analysis reviewing asset age profiles in 2020 across the DNPSs indicated that asset age was not likely to be a source of material differences in opex.
- In relation to capital contributions, the opex/totex ratio that we calculate incorporates net capex rather than gross capex, i.e. it is capex net of capital contributions. We stated that we intended to explore the issue of whether they should be included or not in the opex/totex ratio.[49]
- We agreed that the efficiency or inefficiency of past capex could also potentially influence the opex/totex ratio. To the extent that actual capex is inefficient and that this inefficiency is greater (lesser) than opex inefficiency, the actual opex/totex ratio will be understated (overstated) compared to if opex and capex inefficiencies are the same. (Where the actual opex/totex ratio is then incorporated in an OEF adjustment, this will tend to overstate (understate) the required OEF adjustment.) In the Jemena decision we stated that we intended to further explore the issue.[50]
- In relation to augmentation and safety requirements, Jemena did not provide any evidence to support this general claim. However, we noted that as the comparator DNSPs are mostly Victorian, and hence with similar augmentation and safety requirements, we did not expect this to be a material source of difference between Jemena and the comparators.[51]

In relation to Jemena's consultant CEPA's submission that AER separately analyse capitalisation policy and opex/capex trade-off differences, our current view is that this would be a complicated exercise. Further, we do not consider it necessary given the ability of the opex/capital ratios to provide a high-level gauge of the range of capitalisation practices undertaken by DNSPs.

In relation to Ausgrid's concern, we have previously stated that we use 0.75 rather than 1.0 (or the frontier DNSP) as the comparison point, which provides the current cut-off point for DNSPs to be compared to on capitalisation practices. This is to be consistent with our

[48] AER, *Final Decision, Ausgrid distribution determination 2015–16 to 2018–19, Attachment 7 – Operating expenditure*, April 2015, pp. 251–255.

[49] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 84–85.

[50] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, p. 85.

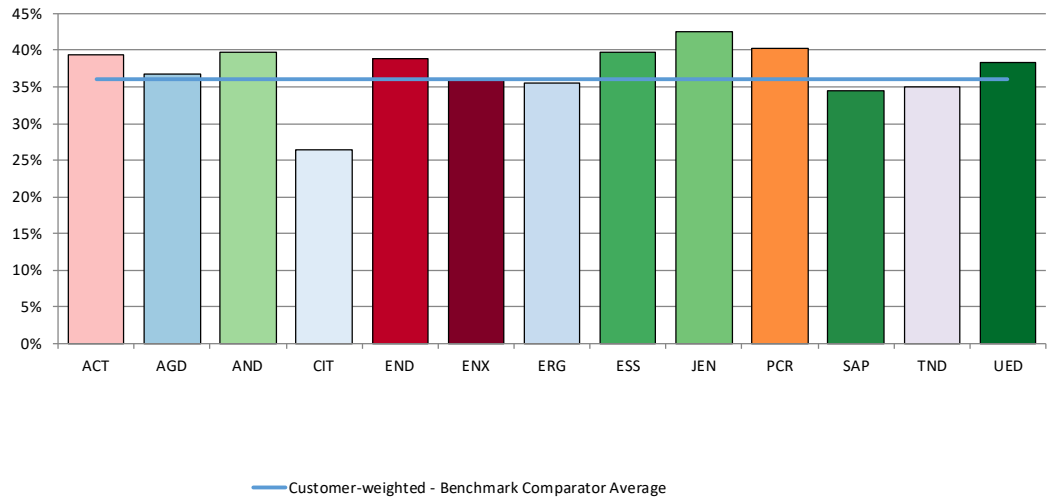
[51] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, p. 85.

standard approach to OEF adjustment calculation. We discuss this further below in Section 4.

Opex/total cost

The opex/total cost ratio is a cost-based measure, where total costs is opex + capital costs (the latter measured by the annual user cost of capital). The average opex/total cost ratio for each DNSP is shown in Figure 2 for the 2006–19 period. The blue line in Figure 2 also shows the customer-weighted average opex/total cost ratio over this period of the benchmark comparator DNSPs, which is 36.0 per cent.

Figure 2 Opex to total cost ratios for distribution businesses, 2006–19[52]



Source: Economic Benchmarking RINs, all distribution businesses; AER analysis.

Similar to the opex/totex ratio, Figure 2 shows there is a degree of variation in opex/total cost ratios among the DNSPs. We observe that six of the 13 DNSPs have an opex/total cost ratio of around 7 per cent or more above or below the comparator-average ratio. As is the case for the opex/totex ratio, we consider that impacts on opex of this magnitude can be characterised as material. We also note the relatively wide difference of 16.0 per cent between the highest opex/total cost ratio (Jemena, 42.5 per cent), and lowest (26.4 per cent, CitiPower, noting that CitiPower appears to be an outlier).

Our current thinking is that an advantage of the opex/total cost ratio over the opex/totex ratio is that it is more theoretically consistent with the cost-based rather than expenditure-based approach to benchmarking.[53] This is because the annual user cost of capital used as the

[52] Consistent with the opex series used for economic benchmarking, this chart use 2014 capitalisation policies-backcast opex for those DNSPs which have since changed their capitalisation policies.

[53] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, p. 73.

capital cost element in the opex/total cost ratio is based on a stock measure for the capital input,[54] rather than the flow-based measure (capex) used in the opex/totex ratio. This usefully supplements the above flow-based measure (i.e. opex/totex).

Another advantage of the opex/total cost ratio is that our opex benchmarking models might not sufficiently capture DNSPs with outlying capitalisation practices. While capital inputs are not included as an explanatory variable in our econometric opex cost function models, they are largely captured de facto due to the high degree of collinearity between capital inputs and the output variables. However, this holds for DNSPs that have an average capital intensity (capital inputs relative to opex) in the data sample. We consider that for DNSPs with materially different capitalisation practices, the likely impact of capitalisation differences may not be sufficiently captured in the econometric models. For such DNSPs the opex/total cost ratio reflects these differences.

Against these advantages, the annual user cost of capital is an imperfect measure of capital inputs, due to potential inconsistencies among the DNSPs in approaches to (initial) regulatory asset base valuation.

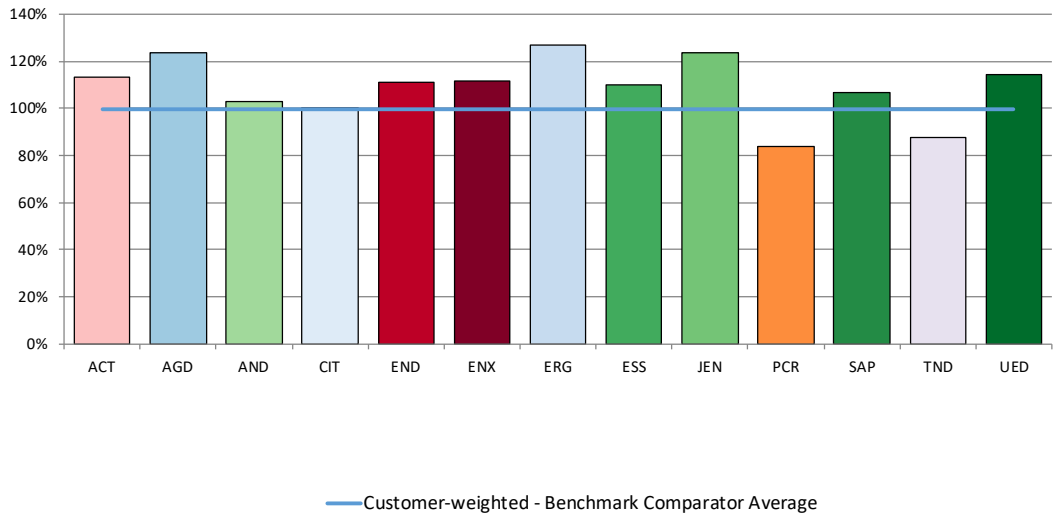
Opex/total inputs

The opex/total inputs ratio is a physical quantity-based measure, where total inputs reflects opex + capital input quantity, which uses the benchmarking inputs as discussed in Section 1.1 and appendix A. The average opex/total inputs ratio for each DNSP is shown in Figure 3 for the 2006–19 period. The blue line in Figure 3 also shows the customer-weighted average opex/total inputs cost ratio over this period of the benchmark comparator DNSPs, which is 99.7 per cent.[55]

[54] This assumes that the periodic flow of capital services is in proportion to the capital stock in place.

[55] As a ratio of two indexes rather than of absolute levels, the opex/total input ratios in themselves do not resemble those for the opex/totex or opex/total cost forms of the ratio.

Figure 3 Opex to total inputs ratios for distribution businesses, 2006–19[56]



Source: Economic Benchmarking RINs, all distribution businesses; Economic Insights, Files for 2020 DNSP Economic

Figure 3 shows there is a degree of variation in opex/total inputs among the DNSPs. We observe that 11 of the 13 DNSPs have an opex/total inputs ratio of 7 per cent or more above or below the comparator-average ratio. As is the case for the opex/totex and opex/total cost ratios, we consider that impacts on opex of this magnitude can be characterised as material.

The opex/total inputs ratio uses the opex and capital input quantity indexes from the index number-based MTFP analysis to construct an index that reflects the ratio of opex to total inputs.[57] As a quantity based measure, we consider it reduces some of the issues set out above in relation to the dollar-based measures (particularly in relation to asset valuation), as quantity measures do not directly rely on valuation which can involve a degree of subjectivity.[58]

However, the capital input quantity constructed may be relatively insensitive to changes in capitalisation policy, since these changes would not directly translate to a change in the capital input quantity measured. This is because capitalisation policy differences more directly impact reported opex and capex rather than the capital stock measured in terms of total line, cable and transformer capacities.

[56] Consistent with the opex series used for economic benchmarking, this chart uses 2014 capitalisation policy-backcast opex for those DNSPs which have since changed their allocation methods.

[57] For each DNSP, MTFP for each year over the 2006–2019 period is divided by opex MPFP for each year over that period. This gives the ratio of Opex/total inputs, since MTFP = Outputs/Total inputs, and Opex MPFP = Outputs/Opex.

[58] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, p. 74.

Question to stakeholders

- What are your views on the use of the three ratios set out above to measure capitalisation differences between DNSPs?
- What are your views about the advantages and disadvantages of each of the opex/capital ratios?
- Do you consider that one or more of these ratios is more appropriate?
- Do you have any other suggestions as to how we can review and measure the differences in capitalisation practices between DNSPs?
- Do you have any views about the proposed framework for using these ratios to determine that the differences as a result of capitalisation are material i.e. where the difference in capitalisation leads to an opex difference that is greater than 0.5 per cent?

3.2 Are these differences having a material impact on the benchmarking results?

Given our current view that there are material differences in capitalisation for at least some DNSPs based on measures such as those above, the question turns to establishing that these differences are having a material impact on our benchmarking scores.

Our current view is that the differences in capitalisation practices that we observe may be a material factor in terms of the potential impact on the benchmarking results, specifically on the DNSP efficiency scores from the opex econometric cost function models. The degree of impact on any one particular DNSP's efficiency scores will primarily depend on how divergent that DNSP's capitalisation practices are relative to the benchmark comparator DNSPs.

Drawing on recent decisions, we have identified the following approaches to measuring the materiality of the impact of capitalisation differences on the DNSPs' benchmarking scores:

- Consideration of a particular DNSP's opex/capital ratios relative to the benchmark comparators' opex/capital ratios, in the context of the impact on its opex and, in turn, its opex benchmarking efficiency score[59]

[59] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 32–34.

- Consideration of the sensitivity of reported opex and associated opex benchmarking scores under an alternative (e.g. current) set of capitalisation policies compared to using the 2014 capitalisation policies.[60]

In past decisions, we have used these methods in a complementary way.[61]

In relation to opex/capital ratios, based on our analysis in past decisions and current thinking, we consider many DNSPs' opex/capital ratios diverge materially from the comparator-average ratio, indicating that these DSNPs' opex is materially different as a result of their capitalisation practices. Given that the level of opex, in turn, has a material impact on a DNSP's opex benchmarking scores, it follows that a materially different mix of opex and capital is likely to indicate a material impact on its opex benchmarking scores. In our final determination for Jemena, we noted that its level of opex was higher than otherwise due to its capitalisation practices, as indicated by its opex/capital ratios being above the comparator average ratios.[62] As discussed in section 4.1, we applied an OEF adjustment to account for these differences.

We have also explored a quantitative approach to illustrating the materiality of the impact of a DNSP's opex/capital ratio relative to the comparator-average on the benchmarking results. This is a sensitivity analysis on the opex econometric cost function benchmarking results and efficiency scores for the period 2006–19. It involves applying the comparator-average opex/capital ratio to each DNSP's opex one at a time prior to modelling, holding all else constant, and then iterating this process for all DNSPs. By not updating all the DNSPs' opex with the comparator-average opex/capital ratio simultaneously, this isolates the impact on a DNSP's efficiency score resulting from its distinct capitalisation practices and avoids the additional impact of a shift in the frontier that results from a change in benchmark comparator opex (as illustrated in our sensitivity analysis using DNSPs' current capitalisation policies below).

The results of this analysis are shown in Table 2. In this table we have also presented the percentage difference to the benchmark comparator-averages for each DNSP for the opex/totex and opex/total cost ratios (columns 2 and 4). The impact of applying the comparator-average opex/totex and opex/total cost ratios respectively on each DNSP's model-average efficiency score, expressed as a percentage difference to the official model-average efficiency score, is also shown (column 3 and 5).

[60] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 32–33.

[61] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 32–34.

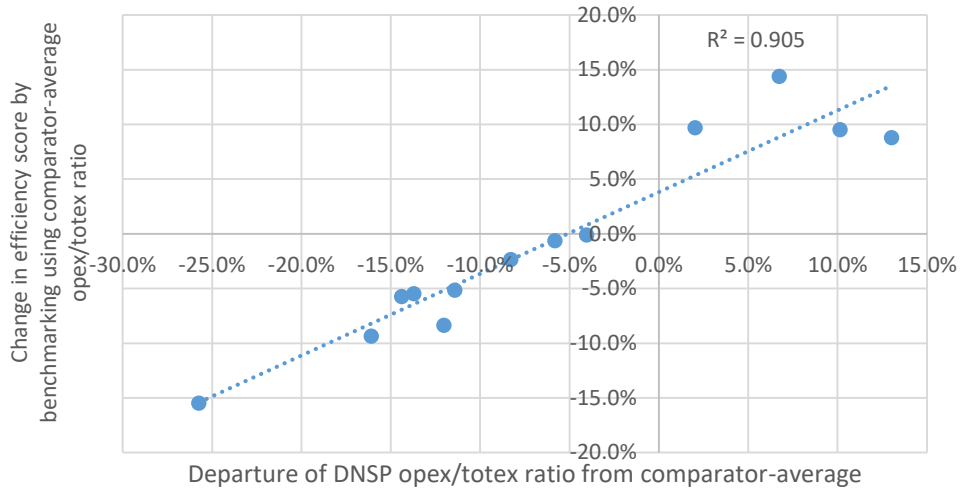
[62] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, p. 32–34.

Table 2 Impact of applying the comparator-average opex/totex and opex/total cost ratios on each DNSP's model-average efficiency score

DNSP	Departure of DNSP opex/totex ratio from comparator-average	Change in efficiency score by benchmarking using comparator-average opex/totex ratio	Departure of DNSP opex/total cost ratio from comparator-average	Change in efficiency score by benchmarking using comparator-average opex/total cost ratio
ACT	13.0%	4.6%	9.2%	3.7%
AGD	-14.4%	-7.3%	2.2%	-2.8%
CIT	-25.7%	-23.8%	-26.7%	-24.4%
END	-11.3%	-7.9%	7.8%	0.9%
ENX	-16.1%	-11.3%	0.3%	-3.0%
ERG	-13.7%	-8.2%	-1.1%	-1.9%
ESS	-8.2%	-4.7%	10.6%	3.0%
JEN	2.0%	3.6%	18.1%	7.6%
PCR	-3.9%	0.0%	11.9%	-0.7%
SAP	10.2%	6.7%	-4.4%	-1.6%
AND	-12.1%	-8.7%	10.6%	3.2%
TND	-5.8%	-4.9%	-2.8%	-3.1%
UED	6.8%	7.3%	6.7%	4.3%

We would expect the relationship would be positive between the impact on the efficiency scores and the extent of capitalisation difference (as measured by the departure from the comparator average opex/capital ratios). For example, the higher a DNSP's opex due to its capitalisation practices, the likely greater is the improvement in its opex efficiency score when benchmarking on the basis of applying the comparator-average opex/totex ratio to its opex series. The vice-versa also applies. This positive relationship, shown for the opex/totex ratio, can be observed in Figure 4. We find a similar relationship for the opex/total cost ratio.

Figure 4 Relationship between the extent of DNSPs' capitalisation differences (as measured by the departure from the comparator average opex/totex ratios) and the impact on the efficiency scores

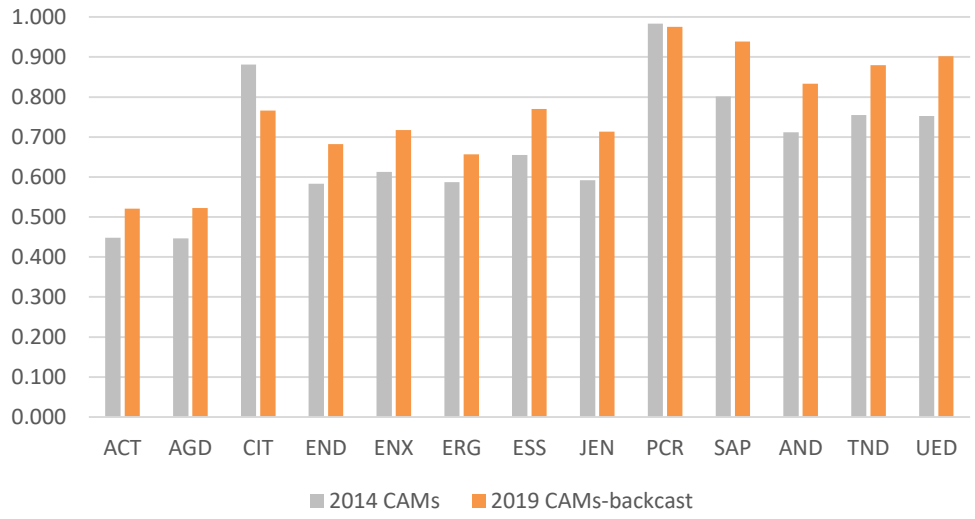


Source: Economic Benchmarking RINs; AER analysis.

As shown in the figure, we find a high correlation (measured by the correlation coefficient, R^2) between the opex/totex ratio divergence and the impact on the efficiency score.

In relation to the second approach, our recent modelling indicates that reported opex and the opex benchmarking scores are sensitive to the set of capitalisation policies in place. This is an expected result and is the basis for our approach of freezing the capitalisation policies for benchmarking purposes. In the Jemena final decision, to explore this question, we recast the historical opex series on the basis of DNSPs' current capitalisation policies (backcast to 2006) and ran our econometric opex cost models using this series (instead of the frozen 2014 capitalisation policies opex series). The results of this analysis are shown Figure 5.

Figure 5 Comparison of 2014-capitalisation versus current capitalisation benchmarking model-average scores



Source: Economic Benchmarking RINs; AER analysis.

Given the current capitalisation policies basis incorporates a change in capitalisation policy for three DNSPs (Powercor, CitiPower, and Ergon Energy), this analysis provides an insight into the impact of varying capitalisation practices on opex and opex benchmarking scores. We observe a significant change in the efficiency scores of all DNSPs, other than Powercor, which remains the frontier firm with a slightly reduced score but close to 1.0. In particular, we observe that 11 of the 13 DNSPs have an improved efficiency score, of between 7 and 15 percentage points, under the current capitalisation policies compared to the 2014 capitalisation policies basis on which we currently undertake our benchmarking. We note that CitiPower is the only DNSP (other than frontier Powercor) showing a reduction in its model-average score. This result would likely reflect CitiPower's relatively low expensing practices under its 2014 capitalisation policy, as indicated by its NEM-low opex/capital ratios.

We discuss the issues with relying on the current capitalisation policies efficiency scores to complement or replace the 2014 capitalisation policies scores, or for deriving an OEF adjustment, in section 4. However, for the purposes of illustrating the impact of capitalisation, we consider the material change in the benchmarking efficiency scores of most DNSPs indicates their sensitivity to capitalisation change and/or differences relative to the benchmark comparator DNSPs.

Questions to stakeholders

- What are your views on the approaches presented in this section for determining the impact of capitalisation differences on the benchmarking results?
- Do you consider there are other approaches that could be used to determine the impact of capitalisation differences on the benchmarking results?

4 Possible options for addressing material differences

Where the measures we identify indicate that there are differences in capitalisation practices between the DNSPs that materially impact on the benchmarking results, it raises the question of how best to address these differences. This section considers possible options.

Drawing on our analysis, previous approaches and stakeholder feedback, we consider there may be several possible options, including:

1) Applying an OEF adjustment to the impacted DNSPs' efficiency scores under our current benchmarking approach (based on frozen 2014 capitalisation policies) to reflect material departures from benchmark comparators' capitalisation practices. Within this option are adjustments which could reflect different combinations of particular types of opex/capital ratio, including:
    a) Using the opex/totex and opex/total cost ratios, with a weight of 0.5 to each. This is the approach we recently adopted in the Jemena final determination.[63]
    b) In addition to the opex/totex and opex/total cost ratios, incorporating the opex/total inputs ratio, with weights of 0.5, 0.25 and 0.25, respectively.
2) Adding an explanatory variable to the econometric opex cost function benchmarking models that directly captures capitalisation practices.
3) Benchmarking on the basis of DNSPs' current capitalisation policies (incorporating their most recent capitalisation policy) and backcasting to historic years, to complement or substitute our current approach of backcasting opex for benchmarking based on DNSPs' 2014 capitalisation policies. There are two broad approaches under this option:
    a) Applying an OEF adjustment to the benchmarking efficiency scores under our current benchmarking approach based on a comparison of the current capitalisation policies efficiency scores to the 2014 capitalisation policies efficiency scores.
    b) Using the current capitalisation policies benchmarking efficiency scores directly, in turn with or without a post-modelling OEF adjustment for remaining capitalisation differences.
4) Obtaining benchmarking efficiency scores on the basis of a common opex/capital ratio, such as the benchmark comparator-average, applied to all businesses' opex.
5) Obtaining benchmarking efficiency scores on the basis of applying a fixed proportion of total overheads in the opex series for benchmarking purposes.
6) Developing and introducing a common capitalisation policy for benchmarking purposes.

We briefly discuss each of these options below, including our initial thoughts around potential advantages and disadvantages of these options. We have done this taking into account the

63 AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021.

assessment principles set out in our Expenditure Forecast Assessment Guidelines. These are as follows:[64]

- Validity and fitness for purpose
  - reasonably reflects the material differences, e.g. in capitalisation between DNSPs, and takes into account any issues with the estimation of these differences
  - does not create any perverse incentives for businesses to change their capitalisation policies or opex / capex mix in response to its benchmarking results
  - the extent to which it is consistent with our other assessment approaches e.g. for capex.[65]
- Accuracy and reliability: reflects / takes into account the most recent data and practices, and produces unbiased and consistent results
- Robustness: remains valid under different assumptions and conditions and is stable over time.
- Transparency: is based on a transparent methodology that can be replicated by stakeholders.
- Parsimony: we will typically prefer a simpler technique (or one with fewer free parameters) over more complex techniques.

While all of these principles are important, robustness is something that we consider needs to be closely examined in determining a preferred option. This is because as discussed in section 1 and 3, there are currently three DNSPs who have updated their capitalisation practices (CitiPower, Powercor and Ergon Energy). Other DNSPs are also set to change their capitalisation practices (Energex, Ergon Energy and Jemena) and there may be further changes in the future. Therefore, a key question raised under this assessment principle is whether and to what extent the proposed options will continue to address concerns around the comparability of the benchmarking results if there are future changes in capitalisation practices.

In light of these considerations, our current preference is option 1. This is the approach we adopted and applied in our Jemena 2021-26 revenue determination, and reflects our current view that capitalisation practices are a material OEF that is unrelated to efficiency and is not sufficiently accounted for otherwise in our benchmarking. We consider this approach addresses the identified problem (capitalisation differences materially impacting on benchmarking scores). We also consider that it is a valid and fit for purpose measure, in that it involves numerical adjustment to the benchmarking efficiency scores, consistent with our approach to other OEFs, and provides for continuity in our benchmarking approach. We

[64] AER, Expenditure Forecast Assessment Guideline for Electricity Distribution, November 2013, pp 15–16.

[65] This is an issue that we will need to take account of under any of the approaches put forward above, and so these approaches are not differentiated against this principle. For example, where we adopt our currently preferred approach (Option 1), it will be important to ensure that our assessment of a DNSP's capex efficiency takes account of any adjustment we make for capitalisation practices in the application of our benchmarking to assessing its opex efficiency.

consider the other options offer only a partial solution, are less accurate and reliable, and/or less fit for purpose. However, we acknowledge that this approach is imperfect, particularly as its robustness and accuracy is not clear given it continues the divergence between actual opex (based on current capitalisation policies) and opex for benchmarking purposes (based on 2014 capitalisation policies.

We summarise our initial assessment of each of these options against the identified principles in Table 3, with more of the circle being shaded indicating the option better meets the principle.

Table 3 Summary initial assessment of options to address capitalisation differences against the identified principles

Option / Principle	Validity /Fitness for purpose	Accuracy/ reliability	Robustness	Transparency	Parsimony
1. OEF adjustment	◕	◐	◐	◕	◕
2. Adding an explanatory variable	○	○	○	○	○
3. Using current capitalisation policies	◐	◐	◐	◕	◕
4. Benchmarking with a common opex/capital ratio	◐	◔	◐	◕	◕
5. Benchmarking with a fixed proportion of total overheads	◔	◔	◐	◐	◕
6. Common capitalisation policy	◐	◔	◕	◐	○

We seek stakeholder views on the relative merits of these options and the advantages and disadvantages outlined below. We also invite stakeholders to put forward any additional options that they consider may better address capitalisation differences that have a material impact on the benchmarking results. Relevant questions in this regard are set out at the end of this section.

4.1 Applying an OEF adjustment for capitalisation using opex/capital ratios

This option treats capitalisation practice differences as an OEF. Consistent with our broader approach to OEFs, this involves making an OEF adjustment to the efficiency scores[66] to account for a DNSP's capitalisation practices being materially different to the benchmark comparator DNSPs'. We draw on the opex/capital ratios to inform the size of the adjustment. Specifically, the adjustment is based on the percentage divergence of the DNSP's opex/capital ratio relative to the comparator-average ratio. We discuss our preferred specific approach to the ratio below.

Applying an OEF adjustment is consistent with our general approach of adjusting benchmarking scores for material and exogenous factors not otherwise accounted for in our benchmarking approach. We consider it harnesses the feature of opex/capital ratios discussed in section 3 of being agnostic to the source of capitalisation practices differences. That is, the adjustment accounts for capitalisation differences that are due to either/both capitalisation policy and/or opex/capital trade-offs. We consider this is appropriate based on our view that neither source of capitalisation difference is efficiency-related.

It is also consistent with our historical approaches (for Jemena in the 2021-26 revenue determination and Evoenergy in its 2015 revenue determination[67]). We consider it is valid and fit for purpose particularly as we are likely to have the data to implement such an OEF. It is also transparent and a relatively simple technique.

This option would involve continuing to benchmark on the basis of the 2014 capitalisation policies. A key advantage of this is that it would continue to anticipate and respond to any incentive of DNSPs to shift expenditure between opex and capex as a means of improving their benchmarking performance (i.e. changing their capitalisation policies will not improve their efficiency scores if their capitalisation policies are frozen for benchmarking purposes.) The continued use of the 2014 capitalisation policies for benchmarking also has a relative advantage over the use of the current capitalisation policies as there is less chance that the 2014 capitalisation policies would have been conditioned by gaming incentives, as discussed

[66] We adjust the benchmark comparison point (currently 0.75) upwards for negative OEFs, downwards for positive OEFs.

[67] Our opex decision provided an 8.5% adjustment to Evoenergy's benchmarking results (as an OEF adjustment) to reflect its unique capitalisation policy, specifically in relation to its approach to IT and vehicle leasing. We calculated this by the increase ($3 million, as a percentage) that its unique operating leases approach to IT and fleet added to its efficient opex forecast. Evoenergy subsequently amended its CAM, effective on 1 July 2014, which brought it more in line with other DNSPs' capitalisation policy, which we subsequently incorporated into our benchmarking. See AER, *Final Decision ActewAGL distribution determination 2015–16 to 2018–19, Attachment 7 - Operating expenditure*, April 2015, p. 191.

in section 1.4. As explained by Economic Insights at the time the DNSPs' capitalisation policies first started changing since the commencement of our benchmarking:[68]

> To reduce the scope for potential gaming of both reporting and price resets, Economic Insights recommends the AER require all DNSPs to report Economic Benchmarking RIN data on the basis of the CAMs in place for the initial Economic Benchmarking RINs.

Another advantage of this option is that the continued use of the 2014 capitalisation policies provides for continuity of benchmarking scores since the start of our benchmarking.

However, we consider that there are potential downsides with this option that relate to its robustness and accuracy. In particular, that it would mean a growing divergence between the capitalisation policies used for setting opex allowances and the capitalisation policies used to assess the efficiency of opex via the benchmarking. Similarly, the 2014 capitalisation policies are not reflective of the DNSPs' current corporate structures and updated cost allocation methods. In addition, by the continued use of the frozen 2014 capitalisation policies for benchmarking purposes, the potential concern is that DNSPs may change their capitalisation policies in response to their benchmarking performance.

A related question is how to assess the efficiency of the component of reported opex that is not caught under our benchmarking. For example, if a DNSP expenses a greater proportion of overheads under a revised capitalisation policy, these are not captured in our benchmarking yet we need to assess their efficiency in a reset. Another potential issue with continuing with the frozen 2014 capitalisation policies is the quality of the opex series, specifically whether it is subject to the same level of quality assurance (e.g. external audit) as the opex series under the capitalisation policies that underpin reported opex.

In relation to how to derive the OEF adjustment, in the Jemena 2021-26 revenue determination final decision we drew on two opex/capital ratios (opex/totex and opex/total cost). The adjustment was based on the percentage divergence of Jemena's opex/totex and opex/total cost ratios relative to the respective comparator-average ratios, with a weighting of 0.5 applied to each of these ratios. More specifically, we calculated the OEF adjustment by taking the midpoint of the percentage differences between Jemena's opex/totex and opex/total cost ratios and the respective customer-weighted comparator-average ratios (all measured as average ratios over the relevant benchmarking period). We considered that this calculation method was consistent with our standard OEF adjustment calculation method of calculating the percentage impact of the OEF on a DNSP's opex relative to the comparator-average.

This approach of using two ratios recognised that each has advantages and disadvantages, as discussed in the section 3. Jemena submitted in the context of its revenue determination that as there are limitations to all three ratios, it is more appropriate to at least take the

[68] Economic Insights, *DNSP MTFP and Opex Cost Function Results, Memorandum prepared by Denis Lawrence, Tim Coelli and John Kain for the Australian Energy Regulator*, Eden, 13 November 2015, p. 2.

average of all three ratios in determining a capitalisation OEF.[69] However, we did not incorporate the opex/total inputs ratio. While a useful gauge of capitalisation practices, we consider that, as an index-based measure, the opex/total inputs ratio may be problematic if used in quantification of any OEF adjustment. This is because the ratio is an index, comprised of two indexes (opex inputs and total inputs) rather than direct observations, as is the case for the opex/totex and opex/total cost ratios. Multi-lateral indexes of this type are designed with a focus on preserving comparability of productivity levels across all businesses and over time. This is enabled by doing all comparisons through the sample average (e.g. average opex across all businesses and years), rather than directly between pairs of observations (e.g. between two DNSPs in the same year). This property (to preserve transitivity at a cost of characteristicity) ensures multi-lateral comparability,[70] but may limit its usefulness in deriving an OEF adjustment for capitalisation where we are comparing bi-laterally (i.e. one DNSP ratio against the comparator-average ratio). Furthermore, our capital input measure used to form the total input index is insensitive to capitalisation policy change.

In the Jemena 2021–26 revenue determination final decision, we did note a possible alternative method that could incorporate the opex/total inputs ratio, whereby an OEF adjustment method could be based on the weighted average of the opex/totex (0.5 weight), opex/total cost (0.25) and opex/total inputs (0.25) ratios. We put forward this particular weighting to reflect that the opex/total cost and opex/total inputs ratios both incorporate a measure of the capital stock, set against the opex/totex ratio which is expenditure-based.

As noted in section 3, in the Jemena 2021–26 revenue determination final decision we also considered Jemena's concern that other factors may be influencing the opex/totex ratio that are not related to the opex/capex mix, such as capital contributions, meaning that the opex/totex ratio was not a reliable measure.[71] We noted that while this ratio will pick up some 'noise' (some degree of fluctuation that might generally cancel out), we consider that these concerns do not invalidate the use of this ratio as a high level gauge of capitalisation practices, particularly when used in combination with other ratios.[72]

4.2 Adding an explanatory variable to the econometric benchmarking models that directly captures capitalisation practices

Incorporating capitalisation practices, e.g. via a capital input variable, as an explanatory variable in the opex benchmarking models has theoretical appeal. However, as explained by

[69] Jemena*, Revised Regulatory Proposal – 2021–26 – Att 05–01 Operating expenditure,* December 2020, p. 11.

[70] Transitivity states that direct comparisons between two observations should be the same as indirect comparisons via an intermediate observation. Characteristicity requires that when comparing two observations, the index should use sufficient information relating to just those two observations.

[71] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, pp. 83–85.

[72] AER, *Final Decision Jemena distribution determination 2021–26,* Attachment 6 – Operating expenditure, April 2021, p. 71.

Economic Insights, to date this has not been feasible in the opex econometric models, due to the lack of comparable capital data available for the DNSPs from one of the overseas jurisdictions (Ontario).[73] To this end, it is not clear that this option would meet any of the assessment principles in a practical sense.

4.3 Benchmarking on the basis of DNSPs' current capitalisation policies

Another option is to modify our benchmarking by using information based on the DNSPs' current capitalisation policies. We consider there are two variants under this option:

- Applying an OEF adjustment to the benchmarking efficiency scores under our current benchmarking approach based on a comparison of the current capitalisation policies efficiency scores to the 2014 capitalisation policies efficiency scores.
- Using the current capitalisation policies benchmarking efficiency scores directly, in turn with or without a post-modelling OEF adjustment for remaining capitalisation differences.

This section and the discussion below broadly applies to either variant, and discusses specific points on each as appropriate.

Drawing on the current capitalisation policies for our benchmarking would potentially mean benchmarking better reflects DNSPs' current operations and corporate structures and may be seen as more accurate and reliable. We recognise the view of some stakeholders that conducting benchmarking on this basis leads to different relative benchmarking efficiency scores.

This approach may provide for benchmarking costs that are more reflective of the basis on which costs are currently reported. However, it may eventually face the same issue as our current approach, as DNSPs' capitalisation practices continue to change over time. In that sense it is not clear how robust this approach would be.

We also consider that this option could open up the risk of future capitalisation practices being conditioned by gaming incentives (whereby DNSPs may anticipate a further re-freeze of capitalisation policies in future). Therefore, over time it may reduce its validity and accuracy / reliability.

As indicated in the sensitivity modelling presented in section 3.2, a move to using current capitalisation policies in place of the frozen 2014 capitalisation policies for our benchmarking (the second variant) would mean that the new benchmarking results would not be comparable to the benchmarking results in historical annual benchmarking reports. The resultant time series discontinuity in the efficiency scores, and the greater difficulties to accurately backcast the data, as opposed to recasting more recent data, would also be relevant issues to consider.

[73] Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure for NSW and ACT Electricity DNSPs*, 17 November 2014, p. 32.

We also note that the issue of capitalisation practices differences between DNSPs does not get resolved under this option. , raising issues around how valid and fit for purpose it may be. This is because it would still need to take into account to what extent a DNSP's capitalisation practices differ from the new benchmark comparators (when benchmarking using the opex series under the current set of capitalisation policies). This means a fresh analysis of the difference between the DNSP in question and the benchmark comparators would be required, as a means to inform a post-modelling OEF adjustment as put forward in section 4.1. To illustrate the need for this, we found that under the current capitalisation policies, the opex/capital ratios exhibited a similar degree of variation as those under the 2014 capitalisation policies. For example, under the 2014 capitalisation policies, nine of the 13 DNSPs had an opex/totex ratio of around 3.5 percentage points or more above or below the comparator-average ratio, while under the current capitalisation policies, this figure is 7 of 13 DNSPs.

The second variant under this option was Jemena's preferred option in its revised proposal. It submitted that its opex econometric cost function efficiency scores when benchmarking on the basis of current capitalisation policies are significantly different to, and considerably higher (around 15–17 per cent) than, the *2020 Annual Benchmarking Report* scores (based on the 'frozen' 2014 capitalisation policies).[74] Jemena argued that this difference represents the impact of capitalisation on benchmarking. It considered using the current capitalisation policies for benchmarking better reflects the cost structure of businesses over the next regulatory control period. Further, that given the AER's credible commitment to continually undertake benchmarking based on the 2014 capitalisation policies, the DNSPs' current capitalisation policies could be used for benchmarking without concern of bias or gaming.[75] However, where the AER continued to rely on the 2014 capitalisation policies results, Jemena proposed to use the difference in its efficiency scores under the current capitalisation policies benchmarking (15–17 per cent) as an OEF adjustment for capitalisation (the first variant).[76]

Jemena's People's Panel also submitted that the AER should consider benchmarking on the basis of the current capitalisation policies.[77]

As noted in section 3, we share Jemena and other stakeholders' views that the sensitivity of the benchmarking efficiency scores to the capitalisation policy suggests a degree of materiality in the impact on the benchmarking scores. However, particularly where the frontier DNSP adopts a capitalisation policy of greater expensing of overheads, this has the effect of improving the efficiency scores for all other DNSPs, since the econometric models would measure their efficiency against a frontier that has shifted downwards. This narrows

[74] Jemena*, Revised Regulatory Proposal – 2021–26 – Att 05–01 Operating expenditure,* December 2020, p. 7.

[75] Jemena, *Revised Regulatory Proposal – 2021–26 – Att 05–01 Operating expenditure,* December 2020, p. 13.

[76] Jemena, *Revised Regulatory Proposal – 2021–26 – Att 05–01 Operating expenditure,* December 2020, p. 14.

[77] Jemena's People's Panel, *Submission on the Victorian EDPR Revised Proposal and draft decision 2021–26,* January 2021, p. 5.

the gap between the benchmark comparators and other DNSPs, and raises the question of whether the benchmark comparison point of 0.75 should be increased. As an example to indicate this sensitivity, while Jemena's opex is the same under the 2014 and current capitalisation policies (as it has not yet changed its capitalisation policies), Jemena's opex efficiency score under the current capitalisation policies is 15–20 per cent higher than under the 2014 capitalisation policies.[78] This change in Jemena's score reflects the increase in the benchmark comparator's opex and particularly that of Powercor under its current capitalisation policies. We note Powercor remains the frontier DNSP, despite its average opex over the 2006–19 period being 19 per cent higher when applying its current capitalisation policy compared to its 2014 capitalisation policy.

A further concern we have under either variant of this approach, is that the capitalisation practices under the current capitalisation policies may reflect some degree of endogenous response to our benchmarking approach. That is, the capitalisation policies under the current capitalisation policies may reflect a response to our benchmarking approach rather than only updates to cost allocation and categorisation or corporate structures. It is therefore not clear how valid and fit for purpose this approach would be.

4.4 Obtaining efficiency scores on the basis of a common opex/capital ratio applied to all businesses

This approach involves benchmarking using opex for each DNSP that is amended to achieve a common opex/capital ratio across all DNSPs. For example, in its revised proposal Jemena proposed using opex obtained by applying the average opex/totex ratio of the benchmark comparators.[79] In practice, one approach to this can be seen in section 3.2 where the benchmark comparator-average opex/capex ratio is applied to each DNSP's opex one at a time prior to modelling, holding all else constant and then iterating this for all DNSPs.

Jemena argued that the material improvement in its efficiency score (6–7 per cent) under its application of this approach was further evidence that its efficiency score is adversely impacted by capitalisation differences. Jemena submitted that the advantage of this approach is it removed the need for a capitalisation OEF adjustment as the common opex/totex ratio means capitalisation for all businesses is on a comparable basis.[80] Jemena's

[78] This is consistent with the modelling put forward by Jemena in its revised proposal, noting that we have excluded from our calculation the models that did not satisfy the monotonicity requirement. Jemena, *Revised Regulatory Proposal – 2021–26 – Att 05–01 Operating expenditure,* December 2020, p. 13.

[79] Jemena*, 2021–26 Electricity Distribution Price Review Regulatory Proposal – Attachment 06–01 Standard Control Services – Operating Expenditure – Public*, 24 February 2020, p. 11; Jemena, *Information request 043*, 15 July 2020, p. 2; Jemena, *Revised Regulatory Proposal – 2021–26 – Att 05–01 Operating expenditure,* December 2020, pp. 6–15.

[80] Jemena, *Revised Regulatory Proposal – 2021–26 – Att 05–01 Operating expenditure*, December 2020, p. 11–12.

People's Panel also submitted that the AER should consider benchmarking based on a normalised constant opex/totex ratio.[81]

Our view in the 2021–26 revenue determination final decision for Jemena was that benchmarking on the basis of a common opex/totex ratio was a useful cross-check of the benchmarking under the 2014 capitalisation policies, adjusted for a capitalisation OEF. The increase in Jemena's benchmarking efficiency score under this approach, replicated in our modelling, was consistent with the positive OEF we applied to its benchmarking efficiency scores using the 2014 capitalisation policies, as explained in section 4.1. Our modelling results in section 3.2 show that DNSPs' change in efficiency scores from benchmarking under 2014 capitalisation policies to benchmarking under a benchmark comparator-average opex/totex ratio strongly correlates with their opex/totex convergence from the comparator-average.

Our current view remains as in the Jemena 2021–26 revenue determination final decision, that while this approach would impose a form of uniformity of capitalisation practices between DNSPs, it would not be reflective of DNSPs' actual costs or capitalisation practices and may be an artificial construct that does not accurately reflect how a DNSP conducts its business. Therefore, while providing a measure of transparency about capitalisation practices, we have some concerns about how valid, fit for purpose and accurate this approach would be.

4.5 Benchmarking on the basis of a fixed proportion of overheads

We note AusNet and Endeavour Energy's past submissions proposed that we benchmark on the basis of a fixed capitalisation of corporate overheads to each network.[82] AusNet and Endeavour Energy stated that the AER could apply a fixed capitalisation ratio for every DNSP's corporate overheads totex, and submitted this would equalise the impact of differences in corporate overheads capitalisation. Our current view remains as in the Jemena 2021–26 revenue determination final decision, that while this approach would impose a form of uniformity over corporate overhead cost allocation methods between DNSPs, it would not be reflective of DNSPs' actual costs or capitalisation practices and may be an artificial construct that does not accurately reflect how it conducts its business. It would also not adequately account for differences in the allocation/classification of other costs between DNSPs, such as direct costs and network overheads. It would also not account for opex/capex trade-offs. Therefore, while providing transparency about the fixed capitalisation of corporate overheads, we have some concerns about how valid, fit for purpose and accurate this approach would be.

[81] Jemena's People's Panel, *Submission on the Victorian EDPR Revised Proposal and draft decision 2021–26,* January 2021, p. 5.

[82] AusNet, *Submission on the AER's 2018 draft benchmarking report*, 17 October 2018, pp. 1–2; Endeavour Energy, *Submission on the AER's 2019 draft benchmarking report*, 9 October 2019, p. 1–2.

4.6 Introducing a common capitalisation policy for benchmarking

The introduction of a common capitalisation policy for benchmarking would likely involve a process of detailed design, development and implementation, and considerable stakeholder consultation. We consider this option may have some benefits in terms of driving convergence of capitalisation (and cost allocation) approaches for benchmarking and providing transparency about the common approach. However, we would need to weigh that up in the context of the materiality of current capitalisation differences, and their impacts on the benchmarking results, and the likely complexity and resource-intensiveness of the exercise for the AER and stakeholders. In that sense it may not be fit for purpose or the simplest technique that could be used to address the issue at hand. We also note that differing opex/capital trade-offs among the DNSPs, reflecting different management decisions about how to deliver services, would remain under a common capitalisation policy approach and so not all material differences would be addressed. In addition, it is not clear to what extent a common capitalisation policy approach would be reflective of a DNSP's corporate structure and practices and may be a regulatory construct that does not accurately reflect how it conducts its business.

Questions to stakeholders

- What are your views about the assessment principles we have used to examine these options? Are there other factors that you consider we should take into account as a part of our assessment?
- What are your views about the options we have identified for addressing the impact of material capitalisation differences on our benchmarking? Are other options that should be considered?
- What are your views about the advantages and disadvantages identified for each of these options and how the assessment principles are considered? Do you consider there are further issues that should also be taken into account, and if so, what are they and why are they relevant?
- Do you agree or disagree with our preferred option of applying an OEF adjustment informed by opex/capital ratios? Please provide arguments to support your view. Do you agree with our view that this approach is appropriately agnostic on the source of capitalisation practices differences between capitalisation policy and opex/capital trade-offs? If not, please provide reasons why you consider that there should be differential treatment of these two sources of capitalisation practices.
- Do you have a different preferred approach? Please outline what this is and provide supporting arguments about why this is considered to better address the material impacts of capitalisation differences on the benchmarking results.
- Assuming for present purposes that we adopt our preferred approach (Option 1), what are your views on which ratios should be used to drive the OEF adjustment?

Glossary

Term	Description
Efficiency	A Distribution Network Service Provider's (DNSP) benchmarking results relative to other DNSPs reflect that network's relative efficiency, specifically their cost efficiency. DNSPs are cost efficient when they produce services at least possible cost given their operating environments and prevailing input prices.
Inputs	Inputs are the resources DNSPs use to provide services. The inputs our benchmarking models include are operating expenditure and physical measures of capital assets.
LSE	Least squares econometrics. LSE is an econometric modelling technique that uses 'line of best fit' statistical regression methods to estimate the relationship between inputs and outputs. Because they are statistical models, LSE operating cost function models with firm dummies allow for economies and diseconomies of scale and can distinguish between random variations in the data and systematic differences between DNSPs.
MPFP	Multilateral partial factor productivity. MPFP is a PIN technique that measures the relationship between total output and one input. It allows partial productivity levels as well as growth rates to be compared.
MTFP	Multilateral total factor productivity. MTFP is a PIN technique that measures the relationship between total output and total input. It allows total productivity levels as well as growth rates to be compared between businesses. In the 2021 annual benchmarking report, we also apply the method to time-series TFP analysis at the industry and State level and for individual DNSP to better capture large customer minutes off supply changes.
Network services opex	Operating expenditure (opex) for network services. It excludes expenditure associated with metering, customer connections, street lighting, ancillary services and solar feed-in tariff payments.
OEFs	Operating environment factors (OEFs) are factors beyond a DNSP's control that can affect its costs and benchmarking performance.
Outputs	Outputs are quantitative or qualitative measures that represent the services DNSPs provide.
PIN	Productivity index number. PIN techniques measure aggregated outputs relative to aggregated inputs using a mathematical index.
PPI	Partial performance indicator. PPIs are simple techniques that measure the relationship between one input and one output.
Ratcheted maximum demand	Ratcheted maximum demand is the highest value of maximum demand for each DNSP, observed in the time period up to the year in question. It recognises capacity that has been used to satisfy demand and gives the DNSP credit for this capacity in subsequent years, even though annual maximum demand may be lower in subsequent years.
SFA	Stochastic frontier analysis. SFA is an econometric modelling technique that uses advanced statistical methods to estimate the frontier relationship between inputs and outputs. SFA models allow for economies and diseconomies of scale and directly estimate efficiency for each DNSP relative to the estimated best practice frontier.
TFP	Total factor productivity is a PIN technique that measures the relationship between total output and total input over time. It allows total productivity changes over time or growth rates to be compared across networks. This method was used in previous annual benchmarking reports (up to 2019) to examine productivity change over time at the DNSP level and the industry level.

Appendix A – Our benchmarking approach

Benchmarking techniques

Our benchmarking techniques measure the productivity and efficiency of businesses over time by measuring the relationship between the inputs used and the outputs delivered. Where a business is able to deliver more outputs for a given level of inputs, this reflects an increase in its productivity.

We use two types of 'top-down' benchmarking techniques:

1) **PIN**. These techniques use a mathematical index to measure the relationship between multiple outputs and inputs, enabling comparison of productivity levels and trends over time.
   - **a)** TFP relates total inputs to total outputs and provides a measure of overall productivity growth for a single entity (a network or the whole industry). It allows total productivity growth rates to be compared across networks but does not allow productivity levels to be compared across networks. It can be used to decompose productivity change into its constituent input and output parts.
   - **b)** MTFP relates total inputs (opex and capital) to total outputs and can provide a measure of overall network efficiency. It allows total productivity levels to be compared between networks and over time,[83] when it is applied to combined time-series, cross-section (or 'panel') data. Our productivity indicators are stock-based rather than flow-based measures. That is, capital quantity measures included in the MTFP/MPFP framework are measures of their annual contribution to production, and so the appropriate capital cost measure included is the annual cost of capital, not the flow component (capex).
   - **c)** MPFP is a partial efficiency measure, which uses the same output specification as MTFP but separately examines the productivity of opex and capital inputs against total output.
2) **Econometric opex cost function models.** These model the relationship between opex (as the input) and outputs, and so measure opex efficiency. The report presents two types of econometric opex models —Least Squares Econometrics (LSE) and Stochastic Frontier Analysis (SFA) – and uses two types of functional form for each model – Cobb-Douglas and Translog.

   For the econometric models, two alternative methods of identifying firm-specific inefficiency are used. One method, LSE, uses a variant of ordinary least squares (OLS)

[83] There may be minor differences in MTFP and TFP growth rates for a particular firm due to differences in the calculations.

regression, incorporating dummy variables for 12 of the 13 Australian DNSPs.[84] The estimated coefficients with these DNSP-specific dummy variables are then transformed as measures of comparative inefficiency among these DNSPs. The other method uses stochastic frontier analysis (SFA) that assumes an inefficiency term (in truncated normal distributed) in addition to the random error term. In the SFA models opex efficiency scores are estimated relative to the estimated frontier.

Benchmarking inputs and outputs

Benchmarking inputs include a mix of the infrastructure assets needed to distribute electricity to customers and the network opex to run and maintain the network. DNSPs primarily exist to provide customers with access to a safe and reliable supply of electricity and a range of outputs have been selected to reflect this goal.[85]

Inputs:

- Five types of physical capital assets DNSPs invest in to replace, upgrade or expand their networks. Capital stock (assets) is the physical assets DNSPs invest in to replace, upgrade or expand their networks. Electricity distribution assets provide useful service over a number of years or even several decades. We split capital into:
  - overhead distribution (below 33kV) lines
  - overhead sub-transmission (33kV and above) lines
  - underground distribution cables (below 33kV)
  - underground sub-transmission (33kV and above) cables
  - transformers and other capital
- Operating expenditure (opex) is expenditure needed to operate and maintain a network. Opex is an immediate input into providing services and is fully consumed within the reporting year.

Outputs:

- Customer numbers. The number of customers is a measure of the scale of the DNSP and the services a DNSP must provide. We measure the number of customers as the

[84] That is, one DNSP is treated as the 'base' and the estimated coefficients on the dummy variables for other Australian DNSPs represent their systematic variation against the base. Overseas DNSPs do not have individual dummy variables, but rather a dummy variable for each country (with Australia as the 'base country', and hence with no such dummy variable). It is immaterial which DNSP is chosen as the base since comparative efficiency measures are subsequently scaled against the DNSP with greatest efficiency.

[85] The 17 November 2014 Economic Insights details the input and output weights applied to constructing the productivity index numbers. The 9 November 2018 Economic Insights report contains further information on the updated output weights, while the 13 October 2020 Economic Insights report contains detail on a correction to these weights due to a coding error. See Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure for NSW and ACT Electricity DNSPs*, 17 November 2014, pp.12–14; Economic Insights, *Economic Benchmarking Results for the Australian Energy Regulator's 2018 DNSP Benchmarking Report*, 9 November 2018, p. 1–3; Economic Insights, *Economic Benchmarking Results for the Australian Energy Regulator's 2020 DNSP Annual Benchmarking Report*, 13 October 2020, pp. 2–6.

number of active connections on a network, represented by each energised national metering identifier.

- Circuit length. This reflects the distances over which DNSPs deliver electricity to their customers.
- Ratcheted maximum demand (RMD). DNSPs endeavour to meet the demand for energy from their customers when that demand is greatest. This means that they must build and operate their networks with sufficient capacity to meet the expected peak demand for electricity.[86]
- Energy delivered (MWh). Energy throughput is a measure of the amount of electricity that DNSPs deliver to their customers. This output is included only in the PIN models, not in the econometric models.
- Reliability (Minutes off-supply). Reliability measures the extent to which networks are able to maintain a continuous supply of electricity. Minutes off-supply enters as a negative output and is weighted by the value of consumer reliability. **This output is included only in the PIN models, not in the econometric models.**

The November 2014 Economic Insights provides further detail on the rationale for the choice of these inputs and outputs.[87]

Benchmarking operating environment factors (OEFs)

DNSPs do not all operate under exactly the same operating environments. When undertaking a benchmarking exercise, it is desirable to take into account how OEFs can affect the relative expenditures of each service provider when acting efficiently. This ensures we are comparing like-with-like to the greatest extent possible. By considering these operating conditions, it also helps us determine the extent to which differences in measured performance are affected by exogenous factors outside the control of each business.

Our economic benchmarking techniques account for differences in operating environments to a significant degree. In particular:

- The benchmarking models (excluding partial performance indicators) account for differences in customer, energy and demand densities through the combined effect of the customer numbers, network length, energy throughput and ratcheted peak demand output variables. These are material sources of differences in operating costs between networks.

[86] The economic benchmarking techniques use 'ratcheted' maximum demand as an output rather than observed maximum demand. Ratcheted maximum demand is the highest value of peak demand observed in the time period up to the year in question for each DNSP. It recognises capacity that has been used to satisfy demand and gives the DNSP credit for this capacity in subsequent years, even though annual maximum demand may be lower in subsequent years.

[87] Economic Insights, *Economic Benchmarking Assessment of Operating Expenditure for NSW and ACT Electricity DNSPs*, 17 November 2014, pp.12–14.

- The opex cost function econometric models also include a variable for the proportion of power lines that are underground. DNSPs with more underground cables will, all else equal, face less maintenance and vegetation management costs and fewer outages.
- The opex and the Regulatory Asset Base-related data included in the benchmarking is limited to the network service activities of DNSPs. This excludes costs related to metering, connections, street lighting and other negotiated services, which can differ across jurisdictions or are outside the scope of regulation and helps us compare networks on a similar basis.
- The capital inputs for MTFP and capital MPFP exclude sub-transmission transformer assets that are involved in the first stage of two-stage transformation from high voltage to distribution voltage, for those DNSPs that have two stages of transformation. These are mostly present in NSW, QLD and SA, and removing them better enables like-for-like comparisons.

However, our benchmarking models do not directly account for differences in legislative or regulatory obligations, climate and geography. These may materially affect the operating costs in different jurisdictions and hence may have an impact on our measures of the relative efficiency of each DNSP in the NEM. As a result, we, and the consultants we engaged to provide us advice on further developing OEF assessment in 2017, Sapere-Merz, used the following criteria to identify relevant OEFs.[88]

Criteria for identifying relevant OEFs

- **Is it outside of the service provider's control?** Where the effect of an OEF is within the control of the service provider's management, adjusting for that factor may mask inefficient investment or expenditure.
- **Is it material?** Where the effect of an OEF is not material, we would generally not provide an adjustment for the factor. Many factors may influence a service provider's ability to convert inputs into outputs.
- **Is it accounted for elsewhere?** Where the effect of an OEF is accounted for elsewhere (e.g. within the benchmarking output measures), it should not be separately included as an OEF. To do so would be to double-count the effect of the OEF.

We adjust the benchmark comparison point for material differences in OEFs between the business and the benchmark comparators that are not already captured in the modelling. The benchmark comparators are those DNSPs that have an econometric model-average efficiency score above the 0.75 benchmark comparison score. (For both the 2006–19 and

[88] In 2017, we engaged Sapere Research Group and Merz Consulting ('Sapere-Merz') to provide us with advice on material OEFs driving differences in estimated productivity and operating efficiency between DNSPs in the NEM. See its final report Sapere Research Group and Merz Consulting, *Independent review of Operating Environment actors used to adjust efficient operating expenditure for economic benchmarking*, August 2018.

2012–19 benchmarking periods, there are five businesses with average efficiency score at or above 0.75, namely Powercor, CitiPower, United Energy, SA Power Networks and TasNetworks). To calculate the adjustment for an OEF for a particular DNSP, the incremental opex of that factor as a percentage of (efficient) opex are compared with the customer-weighted average for the comparator DNSPs. Where this difference is positive (negative), indicating a relative cost disadvantage (advantage) for that DNSP, this results in a positive (negative) OEF adjustment. We apply the OEF adjustment to the 0.75 benchmark comparison point (upwards for negative OEFs, downwards for positive OEFs), to account for potential opex differences due to material OEFs between the business and the benchmark comparison businesses. This adjusted comparison point is then compared to the business's efficiency score (from the benchmarking models) to see whether the DNSP under consideration is materially inefficient or not.