

Feasibility of export capacity obligations and incentives

AEMC

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FINAL REPORT

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1. EXECUTIVE SUMMARY

In 2019, as part of the Distributed Energy Integration Program (DEIP), the Australian Energy Market Commission (AEMC) asked CEPA to identify access and pricing options that could improve the integration of distributed energy resources (DER) into the electricity system.¹

The AEMC has engaged CEPA to provide further details on the option of setting specific obligations and/ or incentives for distribution network service providers (DNSPs) to optimise, having regard to the National Electricity Objective (NEO), export capacity. The ‘optimal’ level of export capacity, under the NEO, would be at the level that maximises long-term net benefits for consumers. The AEMC has asked us to consider the feasibility of obligation and incentive options.

Below, we summarise our thinking and examples on obligation and incentive options. Note, the AEMC, have only asked us to consider the feasibility of options and it has not asked us to undertake detailed analysis or provide recommendations as to a preferred approach(es),

1.1. OBLIGATION TO OPTIMISE EXPORT CAPACITY

The purpose and potential benefits of introducing an obligation would be to:

- assist the AER in its assessment of DER export related expenditure proposals against the NER; and
- give DNSPs confidence that, if their proposals meet certain criteria, the AER will have the ability to approve them; and
- improve transparency for stakeholders that DNSPs are actively planning for export capacity.

We consider that an obligation ‘rule’ to optimise export capacity can sit along a spectrum that trades off between certainty and flexibility. At one end are broad high-level obligations and at the other are prescriptive obligations. No change to the current NER is also a valid option to consider. These are discussed in turn.

No new obligation

There are already examples of DNSPs proposing expenditure to increase headroom capacity. For example, SA Power Networks, and the Victorian DNSPs. The AER (with some alterations) accepted SA Power Networks’ proposal which had a primary objective of solving voltage and reliability issues. However, there is uncertainty as to how the AER will assess the other, and future, proposals. This is particularly the case when the expenditure proposals’ primary objective is to increase export capacity and not to remedy some existing reliability issues.

While the AER’s determinations will provide clarity on its approach, the fact that there is uncertainty to begin with indicates that changes to the NER would be beneficial in increasing certainty as to how the AER will consider DNSPs’ proposals.

Broad obligation

An explicit obligation could be introduced in the NER for DNSPs to optimise hosting capacity subject to the maximisation of net market benefits. The obligation would not include detailed requirements in the NER itself on the level of export services that the DNSPs should plan the network for or on the type of analysis they should conduct to assess the need for export-related investments.

We consider that the obligation could be expressed along the lines of:

¹ CEPA (2020), *Distributed Energy Resources Integration Program – Access and pricing: Reform options*, April.

Network Service Providers must plan, design, maintain and operate their distribution networks to maximise the present value of the net economic benefit to all those who produce, consume, and transport electricity in the NEM.²

The opex and capex objectives are an example of high-level obligations in the NER. The objectives require that DNSPs meet the expected demand for standard control services (SCS) and maintain quality, reliability and security of supply. DNSPs are required to provide a forecast of opex and capex that they consider are required to achieve these objectives. Once the DNSP has submitted its proposal, it is the AER's responsibility to assess whether this reflects the opex and capex objectives. Another example from Great Britain is the Electricity Distribution Losses Management Obligation. The obligation only refers to ensuring that losses are kept “as low as reasonably practical”, DNSPs are required to record and publish updated information on their strategy to reduce losses.³

Prescriptive obligation

An obligation to optimise hosting capacity could include specific requirements on the level of export services that the DNSPs should plan the network for or on the type of analysis they should conduct to demonstrate that they have met the obligation.

A detailed obligation would provide the AER and the DNSPs with a set of firm criteria for the development and assessment of proposals. Additionally, if the obligation required the DNSP to achieve a measurable target, it would be relatively straightforward to observe whether the obligation had been met.

On the other hand, a detailed obligation would reduce the flexibility for DNSPs to propose expenditure to enhance export capacity and/or it could result in expenditure above/ below an optimal level if the output targets are set incorrectly. A specific output metric that accurately captures the benefits from exports and is not influenced by factors that are outside the DNSPs' control would also need to be established in the NER.

Examples of detailed obligations can be found in Schedule 5.1 of Chapter 5 of the NER, which sets out some of the performance requirements of transmission and distribution network service providers – such as requiring NSPs to achieve average levels of voltage unbalance at all connection points to specified values.

Summary

We do not consider that the current rules provide the certainty or flexibility that alternative options could provide.

The choice between a broad or prescriptive rule depends on whether there are specific outputs that need to be met, and which should be set out in the NER. We consider that introducing a new obligation, whether broad or prescriptive, is feasible, but as we discuss below, consideration needs to be given to how performance against the obligation is measured.

1.2. INCENTIVES

We consider that an obligation can be included in the NER without a specific financial incentive mechanism. This is because the current economic regulatory framework places incentives on DNSPs to undertake prudent and efficient expenditure in providing their regulated services. Therefore, if DNSPs propose expenditure to meet the obligation and the proposal (or a variation of it) is accepted by the AER, then the DNSP has an incentive to

² This is in line with the obligation, based on the RiT-D wording, described in CEPA (2020) as part of Option 3 in the DEIP Access and Pricing report, Section 7.3. Such an obligation could be added to Chapter 5 Part D of the NER, which sets out the DNSPs' planning obligations.

³ The high level obligation replaced a specific incentive scheme that was found to have significant issues around the ability to consistently measure losses. Ofgem also has a “Losses Discretionary” reward fund to incentivise DNSPs to undertake additional actions to better understand and manage electricity losses on their networks.

outperform the allowance. A corollary of the incentive framework is that DNSPs should also be interested in proposing projects with an aim to outperforming.

Outcome/ output targets and reputational incentives could be used to ensure that the services that are funded by consumers are delivered or, at least, service performance is maintained.

However, as demonstrated by the current arrangements in the NEM for other areas such as demand management options, the CESS and EBSS financial incentive arrangements may be insufficient to encourage DNSPs to investigate proposals to optimise export capacity.

Options

Incentive options that could be applied include:

- **Reputational incentive.** This would require the DNSPs, on a regular basis, to furnish and publish metrics on their performance with regard to export capacity. The DNSPs would not receive a financial reward/ penalty for their performance, but the publication of the metrics would improve transparency and comparability of the DNSPs' performance.
- **Mechanistic incentive schemes.** These are STPIS type arrangements that have defined parameters such as the value of customer reliability for exports (VCR-E) and baseline targets (i.e., average of 2kW export per retail customer connection). If the DNSPs can deliver improvements at a cost below they VCR-E then they keep the difference.
- **Allowance mechanisms.** Specific funding arrangements for projects that are associated with improving export capacity. These projects would be assessed on a case-by-case basis. The overall fund could be capped.

The options are not necessarily mutually exclusive; for example, a reputational incentive can work alongside an allowance mechanism. However, a separate reputational incentive may not be needed alongside a mechanistic incentive scheme, and careful consideration would need to be given in relation to the interaction of a mechanistic incentive scheme and a specific allowance.⁴

Each option has different advantages and disadvantages. We summarise some of these in the table below.

Table 1.1: Advantages and disadvantages of different incentive mechanisms

	Advantages	Disadvantages
Reputational incentives	<p>Allows for the development of robust measures of performance without putting revenue at risk.</p> <p>Allows, with suitable controls (and caveats) in place, to compare the performance of DNSPs.</p>	<p>It may not provide a sufficiently strong incentive for DNSPs to improve performance (particularly when there are relatively high costs associated).</p>
Mechanistic incentive schemes	<p>Relatively simple to understand with clear financial penalty/ reward for under-/out-performance.</p> <p>Targets can be set for each DNSP.</p> <p>Does not require assessment of individual projects.</p>	<p>Requires accurate and robust metrics for setting the baseline and VCR-E, and measuring changes in performance and willingness-to-pay.</p> <p>The baseline target may be set too high/ low.</p>

⁴ This is not too different from current arrangements where consideration needs to be given to whether a reliability improvement that affects interruptions is funded in the base allowance. Similarly, if the CESS and EBSS apply then a mechanistic financial payment would need to reflect the sharing rate (i.e., the VCR-E might need to be adjusted).

Advantages		Disadvantages
Allowance mechanisms	<p>Can be tailored for each DNSP's specific circumstances.</p> <p>Flexible to changing consumer/ prosumer demands.</p>	<p>Controls need to be put in place to ensure that DNSPs are not funded for improvement via base expenditure allowances or other incentive mechanisms.</p> <p>Requires a bespoke assessment of the project.</p> <p>Potentially high asymmetric information, this could include around how bespoke outputs are set and measured.</p> <p>Potential interaction with other revenue allowances.</p>

We also note that some mechanisms may work better with different obligation arrangements. For example, if a broad obligation is put in place, without specific targets, then a reputational and/ or allowance mechanism would be preferred.⁵ Where a prescriptive obligation, particularly with 'minimum' requirements, is set a mechanistic scheme may be preferable.

Performance measures

What has hopefully become apparent from the above discussion is that measuring performance is an important aspect of any obligation and/ or incentive mechanism.

We have considered a range of metrics that could be used to measure DNSPs' performance around export capacity. These are set out at the end of the document in Table 4.1, we have not replicated it here as it is a long list. While we have gathered some industry stakeholders' views, we do not claim that our list is complete.

A set of criteria should be developed to assess the appropriateness of current measures related to export capacity. We consider that these could include that the output(s):

- Is measurable, i.e., that is the measures are appropriate to what is being incentivised, and the results are accurate and consistent over time, and the methodology is transparent and replicable.
- Is not materially influenced by factors outside the DNSP's control, i.e., the DNSP should only be rewarded for its actions, for example, a customer paying for and installing a battery may lead to additional export capacity on their part of the network.
- Is not gameable i.e., the DNSPs should not be provided perverse incentive, for example, slowing down micro-generation connections in areas that are export constrained.

Our research and discussion with stakeholders, indicates that while there is a range of metrics available these currently lack accuracy and robustness. Many of the metrics can vary significantly without intervention from the DNSPs. For example, a period of wet weather could reduce the number of times exporters are constrained off or demand increases during the middle of the day could increase export capacity on that part of the network.

Our current view is that a mechanistic financial incentive scheme is not feasible due to relative immaturity of the measures available. Instead, in the same way the STPIS was introduced, we consider that a period of developing methods to produce robust and comprehensive metrics is required. The outputs from this should be monitored for a number of years to assess and improve their accuracy and robustness.

We consider that reputational incentives and allowance mechanisms are both currently feasible.

⁵ It is plausible to have a broad obligation that specifies that a mechanistic incentive mechanism is set. However, this may increase the prescription past a 'broad obligation' as it requires the incentive to be set.

2. INTRODUCTION

In 2019, as part of the Distributed Energy Integration Program (DEIP), the Australian Energy Market Commission (AEMC) engaged CEPA to provide advice in regard to access and pricing reforms for electricity consumers connected to distribution networks. The AEMC asked CEPA to identify access and pricing options that could improve the integration of distributed energy resources (DER) into the electricity system.⁶

One of the options set out was to set enhanced obligations and/ or incentives for DNSPs to optimise export capacity on their networks. Following the publication of the report, the AEMC has engaged CEPA to further explore this option.

This report discusses which obligations could be added to DNSPs' network planning requirements in the National Electricity Rules (NER) to optimise export capacity, which incentive mechanisms could be used to support these obligations, and which metrics are available to monitor DNSPs' performance in optimising export capacity.

Note, in this report we do not discuss the funding considerations (i.e., recovery of costs from exporters) that might arise from the introduction of explicit requirements for DNSPs to consider optimising export capacity in this report.

All views in this report are our own, however we would like to thank the AEMC, AER, Ausgrid, Energy Networks Australia, and SA Power Networks for engaging with us on this report.

2.1. BACKGROUND

We consider that a requirement for DNSPs to optimise export capacity, when it maximises consumers' net benefits, is in line with the National Electricity Objective (NEO). The NEO as stated in the NEL is:

"to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

- *price, quality, safety and reliability and security of supply of electricity*
- *the reliability, safety and security of the national electricity system."*

The NEO requires DNSPs to consider wider system benefits and costs in their investment and operational decisions and this includes considering increasing export capacity if that is efficient and in the long-term interest of consumers. This requirement is made explicit in the RiT-D requirements set out in the National Electricity Rules (NER).

The NER do not provide any specific guidance – either in the form of obligations or incentives – as to how DNSPs should incorporate export capacity in their general planning.

Clause 5.13 of the NER, which regulates the distribution annual planning process, requires DNSPs to identify network limitations based only on forecast maximum demand. DNSPs are required to have regard to embedded generation only to the extent that this might have an impact on maximum demand.

Text box 1: General planning requirements in the NER

Clause 5.13 of the NER sets out the requirements of the distribution annual planning review:

"...Each Distribution Network Service Provider must, in respect of its network:

- (1) prepare forecasts covering the forward planning period of **maximum demands** for:*
 - (i) sub-transmission lines;*

⁶ CEPA (2020), *Distributed Energy Resources Integration Program – Access and pricing: Reform options*, April.

- (ii) zone substations; and
- (iii) to the extent practicable, primary distribution feeders,
- having regard to:
- (iv) the number of customer connections;
- (v) energy consumption; and
- (vi) estimated total output of known embedded generating units;
- (2) identify, based on the outcomes of the forecasts in subparagraph (1), limitations on its network, including limitations caused by one or more of the following factors:
- (i) forecast load exceeding total capacity;
- (ii) the requirement for asset refurbishment or replacement;
- (iii) the requirement for power system security or reliability improvement;
- (iv) design fault levels being exceeded;
- (v) the requirement for voltage regulation and other aspects of quality of supply to other Network Users; and
- (vi) the requirement to meet any regulatory obligation or requirement...” [Emphasis added].

Maximum demand is defined as “*The highest amount of electrical power delivered, or forecast to be delivered, over a defined period (day, week, month, season or year) either at a connection point, or simultaneously at a defined set of connection points*”.

Sources: NER 5.13.1 (d); NER Part 10 (Glossary).

Until now, the Australian Energy Regulator (AER) has assessed DNSPs’ proposed DER integration expenditure with regard to the opex and capex criteria set out in the NER.⁷ The opex and capex criteria are essentially that the DNSP’s proposed opex and capex should reflect the prudent and efficient costs required to achieve the opex and capex objectives and a realistic expectation of the demand forecast and cost inputs.⁸ The opex and capex objectives set out in the NER are:

- meeting or managing the expected demand for standard control services (SCS) over the regulatory control period;
- complying with regulatory obligations applicable to the provision of SCS; and
- maintaining the quality, reliability and security of supply of SCS, and the reliability, security and safety of the distribution system through the supply of SCS.⁹

SCS include the Common Distribution Service (CDS),¹⁰ which is defined as the bundle of distribution activities used by customers for their use of the shared network. The CDS relates to the conveyance or flow of electricity through the network for consumers and includes activities that relate to maintaining network integrity.¹¹

⁷ AER (2019b), Assessing DER integration expenditure: Consultation paper, November, p. 11.

⁸ NER, 6.5.6(c) and 6.5.7(c).

⁹ NER, 6.5.6(a) and 6.5.7(a).

¹⁰ AER (2018), *Electricity Distribution Service Classification Guideline*, September, Appendix B, p. 1. The AER considers that the relevant criterion for classification as a SCS is the extent the costs of providing the service are directly attributable to the person to whom the service is provided, i.e. when the service is shared by all users of the network, SCS is the appropriate classification.

¹¹ AER (2018), p. 9.

In 2019, the AER considered that the emergence of DER as a driver of network investment required providing additional guidance to DNSPs on the AER's approach to assessing DER-related expenditure. The AER published a consultation paper on this topic, in which it indicates that it is open to considering expenditure relating to greater export capable DER penetration if DNSPs can demonstrate that this is prudent and efficient and benefits customers.¹²

2.2. RECENT DER EXPENDITURE PROPOSALS

South Australian and Victorian DNSPs have proposed expenditure to support increasing DER penetration.

SA Power Networks

SA Power Networks' 2020-25 proposal included \$31.8 million 'LV Management' capex to "*develop new operational systems and business processes to actively manage the integration of rooftop solar PV (rooftop PV), battery storage and virtual power plants (VPPs) into the distribution network*".¹³

SA Power Networks argued that to meet its obligations (e.g. in relation to voltage and quality of supply) it needed to ensure that the ongoing uptake of DER would not create a reliability or security risk.¹⁴ SA Power Networks undertook cost-benefit analysis (CBA) to determine the best solution to the network's identified need among three options: static (zero) export limits, dynamic export limits, and adding network capacity.¹⁵

The CBA indicated that dynamic export limits, supported by investment to improve LV network visibility, provided the best long-term (i.e. to 2035) outcome for all customers, including those without DER.¹⁶ SA Power Networks' CBA followed a RIT-D 'whole of market' approach which values solar exports at the value of forecast generator dispatch costs (which it forecast to be lower than current prices).¹⁷

The AER assessed the proposed LV management capex together with three additional projects which it considered overlapped with DER management expenditure or served to address similar voltage management issues. The AER's draft decision was to allow the whole LV management capex, but to allow lower capex than SA Power Networks had proposed, or no capex at all, for the other three projects. The AER was not entirely satisfied that these projects reflected the capex criteria, as SA Power Networks had not fully recognised the interrelationship between these and the LV management program.¹⁸ In response, SA Power Networks presented a revised proposal for a capex amount closer to the AER's draft decision. This was accepted by the AER.¹⁹

While this decision demonstrates that the AER is able to allow expenditure that promotes DER integration, it is worth noting that in this specific case the expenditure was proposed as a solution to address voltage fluctuations and preserve network reliability. Additional expenditure to improve headroom was approved on the basis that it was net beneficial to consumers. In other words, this decision does not necessarily imply that the current framework supports improvements related to export capacity for DER. We also understand that SA Power Networks engaged

¹² AER (2019b), p. 5.

¹³ SA Power Networks (2019), *Supporting document 5.18 LV Management Business Case – 2020-2025 Regulatory Proposal*, January, p. 2.

¹⁴ SA Power Networks (2019), p. 8-9.

¹⁵ SA Power Networks (2019), p. 9-10.

¹⁶ SA Power Networks (2019), p. 11.

¹⁷ SA Power Networks (2019), p. 16.

¹⁸ AER (2019a), *SA Power networks Distribution Determination 2020 to 2025: Draft decision – Attachment 5: Capital expenditure*, October, p. 21-23.

¹⁹ AER (2020), *SA Power networks Distribution Determination 2020 to 2025: Final decision – Overview*, p. 31.

with the AER to understand how it would assess the proposal given the lack of guidance or rules for this type of expenditure.

We also note that, although SA Power Networks' proposal is supported by CBA, the allowance for the proposed DER expenditure is not tied to the program achieving a specific or measurable outcome, for example in terms of additional export hosting capacity or reduced curtailment of DER exports.

Victorian DNSPs

DNSPs in Victoria have put forward various proposals to increase export capacity. While some DNSPs (e.g. AusNet Services) have justified their proposals as solutions to voltage issues, others have presented them as options to maximise value from DER (e.g. Jemena)²⁰ or enable solar exports and renewable generation (e.g. Powercor).²¹

- AusNet Services²² examined various approaches to addressing export constraints. The option with the highest net present value (NPV) entails:
 - A 'voltage compliance' program of augmentations targeted at customers who are currently experiencing voltage issues. The program, which entails capex of \$20.6m, would benefit both importers and exporters and reduce export constraints by 13%, without eliminating them completely. AusNet Services notes that, in addition to ensuring compliance with voltage obligations and performance levels set out in the Electricity Distribution Code and in the Australian Standards,²³ the program has an economic justification, as it removes export constraints when it is economically efficient to do so.
 - A 'hosting capacity for DER' program, with capex of \$20.9m, to deal with voltage issues expected to emerge in the 2022-2026 regulatory period. This program is justified more explicitly in terms of enabling additional exports where augmentation is economically efficient.

AusNet Services considers that this expenditure program will increase export headroom by 270GWh per annum by 2026 and that it is prudent and efficient as it appropriately balances cost and service outcomes for customers.

AusNet Services used Victoria's 2019-20 feed-in-tariff (FiT) rate to value the benefits of the program. Benefits valued at the FiT rate are likely to be higher than under SA Power Networks' approach.

- Jemena²⁴ considered various investment options to improve DER integration. Its preferred option includes opex to assess and connect PV installations, some further opex and capex investments to improve LV network visibility, and augmentation costs of less than \$50m (2022 present value). Jemena's CBA uses Victoria's FiT rate to value the long-term benefits of DER integration.²⁵
- Powercor²⁶ is proposing to: enable all its customers to connect solar; enable 5kVA solar systems to be available for export for most of its customers; remove solar constraints where it is economic to do so (i.e.

²⁰ Jemena (2020), *2021-26 Electricity Distribution Price Review Regulatory Proposal – Attachment 05-04 – Future Grid Investment Proposal*, January, p. 6.

²¹ Powercor (2020), *Regulatory proposal: 2021–2026*, January, p. 73.

²² AusNet Services (2020), *Electricity Distribution Price Review 2022-26, Part III*, January, p. 107-110.

²³ Victoria's Electricity Distribution Code, Section 4.2, sets out maximum variations from standard voltage. AS 61000.3.100 (Steady state voltage limits in public electricity systems) requires that 95% of sites must operate within the applicable voltage limits more than 99% of the time.

²⁴ Jemena (2020), p. 15-19.

²⁵ Jemena (2020), p. 12.

²⁶ Powercor (2020), p. 74-76.

where the benefits to customers outweigh the costs); and assist those customers where it is uneconomic to remove constraints to get the most out of their solar. Powercor's proposed capital expenditure for this programme is \$60.7m. The proposal is supported by CBA and customer engagement.

CitiPower and United Energy have also proposed expenditure to improve export capacity.

The AER has not yet issued its draft determinations on the Victorian DNSPs' proposals.²⁷ Therefore, it is still uncertain whether and to what extent the AER will allow their proposed DER integration expenditure. Elements of uncertainty include:

- The AER's assessment of the prudence and efficiency of the proposals, in accordance with the opex and capex criteria.
- The AER's assessment of the CBA methodology underlying the proposals, including for example the use of current FiT rates to value long-term DER benefits.
- Whether the AER will consider the proposals compatible with the opex and capex objectives set out in the NER, particularly when the expenditure has been presented as an option to increase export levels rather than to address voltage or reliability obligations.

²⁷ The AER is expected to publish draft decisions on the Victorian DNSPs' proposals in September 2020.

3. OBLIGATIONS TO OPTIMISE EXPORT CAPACITY

As set out CEPA (2020), in order to encourage the integration of DER, an obligation could be introduced in the NER for DNSPs to optimise hosting capacity.

We consider that the obligation would need to be to optimise against the NEO rather than maximise export capacity, as optimisation would require that net benefits are considered. This would help protect consumers from bearing the costs of excess investment or underutilised assets. The purpose and potential benefits of the obligation would be to:

- assist the AER in its assessment of DER export related expenditure proposals against the NER; and
- give DNSPs confidence that, if their proposals meet certain criteria, the AER will have the ability to approve them;
- improve stakeholders' perceptions that DNSPs are actively planning for export capacity.

We consider that there is a spectrum of options for introducing new DER integration obligations in the NER. At one end of the spectrum, a high level obligation (rule) would be introduced in the NER. At the other end, a highly prescriptive and/ or detailed obligation to include export capacity solutions in network planning could be introduced. Options in between would entail introducing obligations with varying levels of prescription.

The spectrum is characterised by a trade-off between certainty and flexibility. A more prescriptive and detailed obligation would provide firmer guidance to DNSPs on their network planning requirements and greater clarity to the AER on the criteria to assess proposed DER integration investment. However, a prescriptive obligation might reduce the level of flexibility in DNSPs' proposals and in the AER's assessment.

No new obligation is also a valid option. However, as we discuss below, we are not certain that it offers more flexibility or certainty compared to the other options.

The remainder of this section discusses each of the options along the spectrum and provides examples of their application in electricity regulation in Australia and internationally.

We also note that an obligation is not a standalone device, the AER would also need to provide guidance alongside the obligation, including, as already established by the AEMC, some measure of the longer-term value of DER exporters (e.g., the forecast impact the change in export capacity will have on the regional wholesale market prices).

We discuss incentives in Section 4, but we note we consider that regardless of whether specific reputational and/ or financial incentives are introduced, there must be some measure of the changes in the DNSPs' services (including maintain a service that would otherwise deteriorate) from any AER approved expenditure that has the primary objective of improving export capacity (or services to exporters).

3.1. NO NEW OBLIGATION

Changes to the DNSPs' network planning requirements should be considered against the baseline option of maintaining the status quo, i.e. not introducing any new obligation for DNSPs to optimise export capacity.

As discussed in Section 1, the current regulatory framework does not explicitly require DNSPs to invest in DER integration, but does not prevent them doing so either. We consider that export capacity related expenditure that is in the long-term interest of consumers is compatible with the NEO and capable of being approved by the AER, as evidenced by the recent decision to approve SA Power Networks' LV management program.

While the SA Power Networks' decision has shown that the current rules do have flexibility to allow investment in hosting capacity improvements, the LV management program was proposed as a solution to voltage and reliability issues. In other words, SA Power Networks' business case was built on existing obligations, also reflected in the capex objectives, rather than on the benefit of DER export itself – although SA Power Networks' proposal also

includes CBA to support the proposed expenditure. In this sense, the SA Power Networks' decision does not necessarily demonstrate that the current rules are able to fully capture the benefits of DER.

The need to accommodate increasing DER penetration has emerged only recently in DNSPs' proposals and in most cases (e.g. the most recent Victorian DNSPs' proposals) the AER has not yet issued its determinations in this respect. Therefore, some uncertainty remains around how the AER would assess expenditure that aims at optimising export capacity when this is not directly linked to the opex and capex objectives, even when it is supported by CBA and/ or customer engagement.

While the AER's determinations will provide clarity on its approach, the fact that there is uncertainty to begin with indicates that changes to the NER are required.

3.2. BROAD (HIGH-LEVEL) REQUIREMENT TO OPTIMISE EXPORT CAPACITY

An explicit obligation could be introduced in the NER for DNSPs to optimise hosting capacity. The obligation could be formulated as a high-level requirement to enable exports and/ or to consider network planning solutions based on improving export headroom, subject to the maximisation of net market benefits. Such an obligation would not include detailed requirements in the NER itself on the level of export services that the DNSPs should plan the network for or on the type of analysis they should conduct to assess the need for export-related investments.

The high-level principles underlying the RIT-D might be a good starting point for this type of obligation. For example, the obligations for the RIT-D state:

*“The purpose of the regulatory investment test for distribution is to identify the credible option that maximises the present value of the net economic benefit to all those who produce, consume and transport electricity in the National Electricity Market (the preferred option). For the avoidance of doubt, a preferred option may, in the relevant circumstances, have a negative net economic benefit (that is, a net economic cost) where the identified need is for reliability corrective action”.*²⁸

The obligation to optimise export capacity could be formulated along these lines, for example: *“Network Service Providers must plan, design, maintain and operate their distribution networks to maximise the present value of the net economic benefit to all those who produce, consume, and transport electricity in the NEM”*. This is in line with the obligation described by CEPA as part of Option 3 in the DEIP Access and Pricing report.²⁹ Such an obligation could be added to Chapter 5 Part D of the NER, which sets out the DNSPs' planning obligations.

The obligation would not entail the same level of detailed analysis as the RIT-D. However, it would have to define a set of high-level principles around optimisation, including for example which market participants and types of benefits are within scope when evaluating net benefits. For example, should the feed-in-tariff payments, where they are higher than the wholesale market price, be taken into account in the cost benefit analysis.

With this type of obligation, the rules may not need to require a specific measure for assessing compliance. Rather, DNSPs would be required to demonstrate to the AER that they have met the obligation by giving adequate consideration to export capacity in their proposals.

The opex and capex objectives are an example of high-level obligations in the NER. The objectives require that DNSPs meet the expected demand for SCS and maintain quality, reliability and security of supply. DNSPs are required to provide a forecast of opex and capex that they consider are required to achieve these objectives. Once

²⁸ NER 5.17.1(b).

²⁹ CEPA (2020), Section 7.3.

the DNSP has submitted its proposal, it is the AER’s responsibility to assess whether this reasonably reflects the opex and capex objectives.³⁰

Another example of high-level requirements from Great Britain is the Electricity Distribution Losses Management Obligation, described in Text box 2. While the obligation only refers to ensuring that losses are kept “as low as reasonably practical”, Distribution Network Operators (DNOs) are required to record and publish updated information on their strategy to reduce losses, which should provide a reputational incentive to meet the obligation.³¹

Text box 2: Great Britain – Electricity Distribution Losses Management Obligation

In Great Britain, standard licence conditions require each DNO to:

“design, build, and operate its Distribution System in a manner that can reasonably be expected to ensure that Distribution Losses are as low as reasonably practicable”.

DNOs are required to maintain a Distribution Losses Strategy i.e. a document that sets out the DNO’s plan to ensure that distribution losses are kept reasonably low, based on up-to-date CBA.

In designing, building, and operating its network, the DNO must act in accordance with the Strategy, having regard to: the distribution losses of new assets; whether and when assets should be replaced or repaired; the operation of the distribution system under normal conditions; and any relevant legislation that may impact on the DNO’s investment decisions.

DNOs are required to publish on their websites:

- an up-to-date version of its Distribution Losses Strategy;
- a record of any modifications to the Strategy, including explanations of the reasons for and effects of the modifications; and
- information on actions undertaken to manage distribution losses.

Source: Electricity Act 1989 - Standard conditions of the Electricity Distribution Licence, Condition 49.

A high-level obligation to optimise export capacity would introduce an explicit requirement for DNSPs to consider network planning solutions based on DER integration which is currently absent from the NER. Therefore, it is likely to provide greater certainty than the status quo on the assessment of DER-related expenditure, while maintaining a relatively high degree of flexibility both in the DNSPs planning and in the AER’s assessment. However, flexibility might make the AER’s decisions more challenging and reduce their predictability, particularly where there is no established measure of export headroom.

3.3. PRESCRIPTIVE OBLIGATION TO OPTIMISE EXPORT CAPACITY

An obligation to optimise hosting capacity could include specific requirements on the level of export services that the DNSPs should plan the network for or on the type of analysis they should conduct to demonstrate that they have met the obligation.

Examples of detailed obligations can be found in Schedule 5.1 of Chapter 5 of the NER, which sets out some of the performance requirements of transmission and distribution network service providers (NSPs).

³⁰ NER, 6.5.6 and 6.5.7.

³¹ The high-level obligation replaced a specific incentive scheme that was found to have significant issues around the ability to consistently measure losses. Ofgem also has a “Losses Discretionary” reward fund to incentivise DNSPs to undertake additional actions to better understand and manage electricity losses on their networks.

Text box 3: NER Schedule 5.1 – Examples of detailed performance requirements

Voltage fluctuations

In relation to voltage fluctuations, NSPs must use ‘reasonable endeavours’ to ensure that power-frequency voltage fluctuates less than the compatibility levels set out in the Australian Standard AS/NZS 61000.3.7:2001 for all supply points to customers supplied from their networks.³²

Voltage unbalance

NSPs must achieve average levels of voltage unbalance at all connection points that are equal to or less than the values defined in Table S5.1a.1 of the NER. Table S5.1a.1 sets out maximum negative sequence voltage, under general conditions and during credible contingency events, for different levels of nominal kV supply.³³

Source: NER, Schedules 5.1a and 5.1.

Obligations such as those described in Text box 3 are based on a metric and a clearly identified target against which the NSPs’ performance can be measured.

Another example from the NEM are the system strength requirements for TNSPs introduced with the 2017 rule change on managing power system fault levels and incorporated in Section 5.20C.3 of the NER. These are described in Text box 4.

Text box 4: TNSPs’ system strength requirements

Under the new system strength requirements, the Australian Energy Market Operator (AEMO) determines the minimum system strength required in each NEM region, specified in terms of the minimum three phase fault level to be maintained at certain fault level nodes.³⁴

If AEMO assesses that there is, or is likely to be, a fault level shortfall, it is required to give notice (not less than 12 months, unless otherwise agreed) to the relevant TNSP specifying the extent of the shortfall and the date by which the TNSP must provide system strength services to address it.³⁵

The TNSP must use reasonable endeavours to make system strength services available to AEMO in accordance with the specification in the notice. The TNSP is required to identify and implement the least-cost option or combination of options to meet the obligation to provide fault levels. Options available to the TNSP include:

- installing synchronous condensers, or other equipment that can provide a fault current contribution;
- contracting with synchronous generators, or other parties that can provide a fault current contribution; and
- re-enforcing or upgrading existing network elements.

The TNSP is entitled to a revenue allowance for forecast opex and/ or capex for its efficient costs of meeting the requirement. The determination of a fault level shortfall during the course of a regulatory control period constitutes a pass through event.³⁶

Source: AEMC (2017)

The detailed principles of the RIT-D set out in Section 5.17 of the NER can be regarded as another example of a prescriptive approach to network planning. Clause 5.17.2 requires the AER to publish application guidelines for the RIT-D, which provide detailed guidance on the operation of the RIT-D covering for example the valuation of costs

³² NER S5.1.5.

³³ NER, S5.1a.7 and S5.1.7.

³⁴ AEMC (2017), *Rule Determination: National Electricity Amendment (Managing power system fault levels) Rule 2017*, September, p. 33.

³⁵ AEMC (2017), , p. iii-iv.

³⁶ AEMC (2017), p. 47-49.

and specific classes of market benefits, how to treat different scenarios, and how to deal with uncertainty.³⁷ However, an obligation to conduct specific analysis on the need for export-related investment would not necessarily require a metric to measure the hosting capacity enhancement delivered by the DNSP.

A detailed obligation would provide the AER and the DNSPs with a set of firm criteria for the development and assessment of proposals. Additionally, if the obligation required the DNSP to achieve a measurable target, it would be relatively straightforward to observe whether the obligation had been met. .

On the other hand, a detailed obligation would reduce the flexibility for DNSPs to propose expenditure to enhance export capacity and/or it could result in expenditure above/ below an optimal level if the output targets are set incorrectly. A specific output metric that accurately captures the benefits from exports and is not influenced by factors that are outside the DNSPs' control would also need to be established in the NER.

³⁷ AER (2018), *Regulatory investment test for distribution: Application guidelines*, December.

4. INCENTIVES

An incentive mechanism could also be considered to support an obligation to optimise export capacity. This would introduce either reputational or financial rewards (penalties) linked to the DNSPs' performance against the obligation. We first consider whether an incentive is necessary in the context of an obligation, before turning to potential options for an incentive mechanism.

4.1. IS AN INCENTIVE REQUIRED/ APPROPRIATE?

The current economic regulatory framework places incentives on DNSPs to undertake prudent and efficient expenditure in providing their regulated services. Efficient expenditure is assessed through the AER's revenue determinations. Under the operating cost efficiency benefit sharing scheme (EBSS) and capital expenditure sharing scheme (CESS), outperformance (or underperformance) is partially shared with customers, incentivising networks to make efficiency gains. That is, if a DNSP can deliver the regulated services at a lower cost than its revenue allowance, it is incentivised to do so. Therefore, the existing framework already provides incentives for DNSPs to propose new expenditure, including in relation to DER integration. To ensure that expenditure is not reduced at the expense of network performance, a service target performance incentive scheme (STPIS) is in place to balance the EBSS and CESS.³⁸

For example, now that the AER has approved expenditure SA Power Networks for its LV Management project, SA Power Networks now has an incentive to outperform this allowance as it retains approximately 30% of any underspend.

The obligations discussed in section 3 would require DNSPs to consider export capacity as part of their planning, in line with the long-term interests of consumers. As noted in section 3, we consider that even without an incentive mechanism, it is still important to establish output measures to assess whether DNSPs deliver against their proposals to meet an export capacity obligation. We therefore need to consider whether an explicit incentive mechanism – in addition to the incentives DNSPs already face through the EBSS, CESS and STPIS – is also required to achieve the desired outcomes. Currently, the NER provide examples of both standalone obligations, that are not supported by specific incentives, and cases where explicit incentives have been introduced to better achieve the NEO. We consider the implications from these examples below.

4.1.1. Standalone obligations

As noted in section 3.3, the NER contain specific obligations for NSPs in relation to voltage and system strength. These obligations are not supported or complemented by incentive mechanisms that explicitly relate to voltage or system strength. Rather, NSPs are required to comply with the obligations and the economic regulatory framework providing incentives for the networks to meet these obligations efficiently. We note that to the extent that not meeting the voltage and/or system strength obligations leads to supply interruptions or damage to a customer's property, the DNSPs also (indirectly) face incentives linked to the reliability component of the STPIS and/or jurisdictional GSL schemes.

The AEMC's 2017 *Managing power system fault levels* rule change determination provides an illustration of how these obligations are supported by the broader regulatory framework. In this determination, the AEMC decided to place an obligation on TNSPs to maintain system strength, by providing system strength services in line with specifications set by AEMO. This determination addressed that previously, the NER did not place a clear obligation

³⁸ In addition, DNSPs are subject to jurisdictional guaranteed service level (GSL) schemes, which cover service parameters not included in the STPIS.

on any party to maintain system strength above a minimum level.³⁹ In deciding to allocate responsibility for maintaining system strength to TNSPs, the AEMC noted that:⁴⁰

“TNSPs have a holistic perspective of their networks and are best placed to manage the risks associated with this obligation. In addition the existing incentive based economic regulatory framework will provide an incentive for the TNSP to assess the least-cost approach to meeting the obligation with oversight by the Australian Energy Regulator (AER).”

A key feature of the system strength obligation is that it requires TNSPs to provide system strength services on instruction by AEMO, in line with their specifications. Therefore, the standard that the TNSP is required to meet is clearly defined and it will be evident if the TNSP has not met AEMO’s requirements (although it has choices in relation to how these are met). Accordingly, given the precise nature of the obligation and the existing regulatory incentives for efficient expenditure and reliability, there is no obvious requirement for an additional incentive mechanism.

4.1.2. Explicit incentive schemes

One example of an explicit incentive mechanism is the **demand management incentive scheme (DMIS)** that was introduced for DNSPs. The intention of the DMIS was to encourage DNSPs to undertake demand management projects, where this allowed them to provide regulated services at a lower cost compared to traditional investment alternatives. In its 2015 determination on amendments to the DMIS, the AEMC noted that:

“This rule is intended to complement existing opportunities for businesses to consider non-network options, including through their revenue allowance and the regulatory investment test for distribution project assessment process.”⁴¹

While acknowledging this broader incentive framework, the AEMC noted that an additional incentive scheme was justified to address cases where *“the incentives... are not working as intended, resulting in bias against pursuing efficient non-network options”*.⁴² That is, the intent of the DMIS is to correct a (perceived) bias against non-network options for providing network services.

More recently, the AEMC has considered a rule change proposal to extend the DMIS to TNSPs. In this case, the AEMC determined that this would not be in the long-term interests of consumers because the RIT-T process already requires TNSPs to consider and consult on non-network options to meeting the identified need.⁴³ As transmission investment is generally ‘lumpier’ than distribution, the AEMC anticipated that a higher proportion of transmission projects would be required to go through the RIT process. Accordingly, the AEMC was concerned that the DMIS would provide incentive payments for non-network options that TNSPs would already have been required to adopt through a RIT-T.⁴⁴

Another recent example of an explicit incentive mechanism is the new customer service incentive scheme (CSIS) currently being considered by the AER. As part of the AusNet Services New Reg trial, AusNet Services and the Customer Forum have negotiated a proposed customer service incentive scheme, which AusNet Services has included in its regulatory proposal to the AER. In response to this development, the AER is consulting on whether to make a new incentive scheme for customer service. The scheme would reward (penalise) DNSPs for improvements

³⁹ AEMC (2017), *Managing power system fault levels: Rule Determination*, September.

⁴⁰ AEMC (2017), page iii.

⁴¹ AEMC (2015), *Demand Management Incentive Scheme: Rule Determination*, August, page i.

⁴² AEMC (2015), page ii.

⁴³ AEMC (2019), *DMIS and innovation allowance for TNSPs: Rules Determination*, December, page 26.

⁴⁴ AEMC (2019), page i.

(deteriorations) in customer service. The draft Customer Service Incentive Scheme (CSIS) published by the AER in December 2019 sets out a proposal that would allow the DNSPs to develop bespoke incentive arrangements, in consultation with their customers.⁴⁵ The AER would then assess the scheme against its principles. The objective of the flexible design is to better align DNSPs' incentives with their customers' preferences, in comparison with the more prescriptive approach adopted by the STPIS.

4.1.3. Implications for an export capacity incentive

These examples indicate that the introduction of an explicit incentive mechanism, that supports an obligation, might be appropriate in cases where:

1. Efficient expenditure decisions are not otherwise (sufficiently) incentivised through the economic regulatory framework.
2. The obligation cannot be precisely defined and compliance with the obligation cannot be clearly assessed.
3. Specific service standards that are valued by customers are not already captured within the STPIS and/or jurisdictional standards.

The third scenario, currently, would not appear to be relevant in the case of export capacity. This is because the current open access regime does not impose any requirement for DNSPs to provide a certain level of export access or an export access service level. Further, the inability to levy DUoS charges on exports removes the ability to allocate costs more directly to system users who create costs associated with improved export capacity.

The first two scenarios appear more relevant to consideration of an incentive mechanism linked to export capacity. For example, it may be the case that many expenditure projects that could potentially increase export capacity (and also have a positive market-wide net benefit) might fall below the RIT-D threshold. This could mean that, even with an obligation of the type discussed in section 3, the AER might not be able to closely scrutinise how well the obligation is being met. This may be problematic if, as has been suggested through the DEIP working group, some DNSPs might not fully consider options to increase export headroom, even where these create net benefits for consumers. In this context, the function of an incentive mechanism would therefore be to encourage DNSPs to consider such projects.⁴⁶

In the following section, we consider options around the type of incentive mechanism that could potentially be adopted.

4.2. TYPE OF INCENTIVE

As noted in the preceding section, the purpose of an incentive mechanism would be to encourage DNSPs to consider options to increase export headroom, where these create net benefits for consumers. Therefore, an incentive mechanism would necessarily need to establish a clear link between how performance is measured, the value created by improved performance (or lost through deteriorating performance) and the rewards (or penalties) available to the DNSPs.

We consider that there are at least three broad options that could be considered:

- **Mechanistic incentive schemes.** These are STPIS type arrangements that have defined parameters such as the value of customer reliability for exports (VCR-E) and baseline targets (i.e., average of 2kW export per

⁴⁵ AER (2019), *Draft Customer Service Incentive Scheme – Explanatory statement*, December.

⁴⁶ We note that it is not clear whether DNSPs are failing to consider the net benefits from improving export capacity. It has only been the rapid increase in solar PV penetration that has highlighted issues with available export capacity. The most recent rounds of price reviews for DNSPs have indicated that they are actively considering this issue.

retail customer connection). If the DNSPs can deliver improvements at a cost below they VCR-E then they keep the difference. The incentive could be either common to all DNSPs or bespoke.

- **Allowance mechanisms.** Specific funding arrangements for projects that are associated with improving export capacity. These projects would be assessed on a case-by-case basis. The overall fund could be capped. Again, the allowance could be either common or bespoke.
- **Reputational incentive.** This would require the DNSPs, on a regular basis, to furnish and publish metrics on their performance with regard to export capacity. The DNSPs would not receive a financial reward/penalty for their performance, but the publication of the metrics would improve transparency and comparability of the DNSPs' performance. This would be in addition to any information that DNSPs would be required to provide to the AER to demonstrate that they have achieved their stated outputs (see section 3).

We first discuss each option in turn, before considering whether these options could potentially be implemented through existing mechanisms available under the NER.

Consideration of these options is also linked to how the export capacity obligation is expressed. As discussed in section 3, there is a spectrum of options for an obligation, ranging from broad to prescriptive. Particular types of obligations may be best supported by different types of incentive mechanisms. The interactions between the form of obligation and the incentive mechanism would need to be carefully considered as part of the detailed design process. For example:

- A **prescriptive obligation** (i.e. that states the export services that DNSPs should plan to meet, or the specific type of analysis they should conduct to demonstrate compliance with the obligation) could be better supported by a **mechanistic incentive scheme**. For example, a prescriptive obligation might set a minimum level of export capacity that DNSPs must provide to all customers. In this context, a mechanistic incentive scheme could be linked to improvements in export capacity above that minimum level (to the extent that customer willingness to pay for these improvements could be demonstrated). In contrast, in the context of a highly prescriptive obligation, an allowance approach and/or reputational incentive might not contribute substantially to meeting the desired outcome.
- A **broad obligation** (i.e., a high-level requirement to enable exports and/or consider options to improve export headroom, subject to a net market benefits test) might align well with either an **allowance** approach or a **reputational incentive**. For example, while it may be plausible to set a mechanistic incentive scheme alongside a broad obligation, this may have the effect of making the obligation more prescriptive in nature (as a baseline performance level would need to be set for the purpose of the incentive mechanism).

4.2.1. Mechanistic incentive scheme

This option would establish an incentive mechanism that would apply a financial reward or penalty, based on a DNSP's performance in relation to a baseline level of export capacity. This would be similar to the application of the STPIS.

Under the reliability component of the STPIS, DNSPs are rewarded (penalised) when they exceed (fail to meet) network-wide reliability targets. Reliability is measured in relation to the System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI). Targets are typically based on recent historical levels and amended for each DNSP as part of the revenue determination process. Accordingly, the performance level required to receive an incentive payment increases over time. The STPIS incentive rates determine how much performance above (below) reliability targets is rewarded (penalised), linked to the value that customers place on reliability.

Establishing a similar approach for export capacity might therefore involve establishing a value of customer *exports*. This would then be applied to calculate an incentive rate that would reward DNSPs for increasing export capacity above an established baseline (where there are export constraints), or penalise them for allowing export capacity to

fall below the baseline (resulting in a higher level of constraints). Key challenges associated with this approach relate to:

- **Setting an appropriate value for customer exports.** Under the reliability component of the STIPS, the incentive rate is linked to the value of customer reliability. The value of customer reliability provides an indication of customers' willingness to pay for improved reliability. In the case of estimating willingness to pay for improved export capacity, a distinction needs to be made between the benefits to exporters and the benefits to consumers more generally. As DNSPs are not able to levy DUOS charges for providing an export service. Therefore, it would not be appropriate to focus on *exporters'* willingness to pay for increased headroom, as they cannot be charged for improvements in export service performance. Rather, the value of customer exports would need to consider the value to those who pay DUOS charges, being consumers overall. Accordingly, the estimate of value would be linked to reductions in the wholesale energy price resulting from increased exports.
- **Setting a baseline performance level.** As we discuss further in section 4.3, one challenge associated with measuring network-wide performance in relation to export capacity relates to the level of visibility around the extent of current constraints. Therefore, setting an appropriate baseline, that is consistent with the service level funded by allowed revenues, may be challenging at this point in time. If export capacity already exists, networks should not receive an incentive payment to 'increase' it.
- **Identifying improvements that have already been funded.** Related to the point on baseline performance, we also note that consideration may need to be given to how specific costs are allocated, depending on the measure used. For example, the installation of a grid side battery (which provides services to the DNSP) may help a DNSPs alleviate constraints at peak demand times, but it may also assist in reducing export constraints during the middle of the day. In this situation, the DNSP could potentially receive an explicit allowance for installing the battery, but also be rewarded under an incentive mechanism for improving export capacity. Therefore, a challenge for setting a mechanistic incentive scheme is identifying improvements in export capacity that are already funded through another part of the revenue determination.

We note that a mechanistic incentive scheme does not necessarily need to be symmetrical. For example, a penalty only mechanism could be used if improvements were explicitly funded, or if it were considered that improvements above a certain level were not valued by customers.

A mechanistic incentive scheme of this kind could be **common to all DNSPs** (i.e. like the STPIS), or there could be an option to introduce **bespoke** incentive mechanisms (i.e. more like the proposed CSIS):

- **Common scheme.** This would mean that the same overarching incentive regime would apply for all DNSPs. That is, there would be a common approach to setting the elements of the mechanism, such as the incentive rate and how performance is measured. The baseline or target performance level could still be specific to each DNSP, as is the case for the STPIS.
- **Bespoke scheme.** A bespoke approach would operate more like the CSIS (see section 4.1.1), in that DNSPs would have the option to propose a mechanistic incentive scheme as part of their revenue determination process. For example, this might allow DNSPs to propose an incentive payment that would be linked to measured increases in export capacity above a baseline level. In the event that the proposed improvement was not delivered, the incentive payment would be reduced (or forgone entirely). Penalties might also apply for a deterioration in performance. As is the case for the CSIS, the NER and/or AER guidelines could potentially set out principles or other requirements that the mechanism would need to satisfy. For example, in order to ensure that achieving the stated outputs would deliver a net benefit to consumers, the proposal might need to be supported by cost-benefit analysis.

As with a common scheme, a bespoke approach would also rely on the ability to establish robust performance measures, as well as the value of customer exports. However, for a bespoke mechanism, this may be somewhat more tractable than in the case of a common incentive. This is because a bespoke

approach would provide DNSPs with the flexibility to propose a mechanism where adequate data is available to support it.

A further advantage of a bespoke incentive mechanism is that it would give the DNSPs flexibility to agree an incentive mechanism that is aligned with the specific priorities of their customers. This is one reason for the principles-based approach adopted by the AER in the proposed CSIS mechanism.⁴⁷

An additional question related to a mechanistic incentive scheme is whether it would be linked to **overall performance** across the network, or instead to **specific customers**. The reliability component of the STPIS provides an example of an incentive linked to average performance across the whole network. Alternatively, the incentive could potentially be linked to particular customers or programs. For example, in the NEM and other jurisdictions, regulators have taken the approach of linking incentives to service improvements for worst served customers.

One instance of this was the Service Incentive Scheme previously applied by ESCOSA to SA Power Networks over 2005 – 2010, which included performance for worst served customers as the main parameter.⁴⁸ Worst served customer approaches aim to address that average performance measures may mask very poor service levels for particular customers. In the context of electricity consumption being considered an essential service, it may be acceptable for all customers to fund service improvements for worst served groups. However, we consider that this logic is unlikely to be applicable in the context of export constraints, where the number of customers that are materially affected by export constraints may be relatively small, and the right to export at a particular level is not recognised as an essential service. Further, it may be challenging to establish that increasing capacity for the most constrained exporters would necessarily lead to net system wide benefits.

4.2.2. Allowance mechanism

This approach would establish an allowance for expenditure to improve export capacity available as part of the revenue determination. DNSPs would then have to demonstrate that projects comply with certain criteria in order to retain this funding.

This would be different from the DNSPs' 'standard' opex or capex allowance, in that it would provide flexibility for projects to be proposed over the course of the price control, rather than being specified upfront. This could operate in a similar way to the existing Demand Management Innovation Allowance Mechanism (DMIAM). Applied in the context of export capacity, this might involve:

- A maximum allowance amount being set up front.
- During the course of the regulatory period, DNSPs would submit compliance reports for capex and/or opex projects funded by the mechanism, up to the maximum allowance amount. To be eligible, projects would need to meet certain pre-determined criteria. To the extent that the DNSP did not submit enough eligible projects to fully utilise the allowance, the un-utilised portion could be returned to consumers.
- In order to counter-balance the effects of the CESS and EBSS, bespoke outputs could also be established to measure delivery of the outputs that these projects are intended to achieve. For example, a DNSP might propose expenditure to implement a dynamic export limit approach, with the stated output being to reduce the extent to which exports in a particular part of the network are constrained. In the event that the DNSP did not achieve this output, the AER could have the ability to clawback some component of the allowance.

As with the mechanistic incentive scheme discussed in section 4.2.1, such an allowance could be common to all DNSPs (i.e. the method for determining the maximum allowance and eligibility criteria would be the same for all

⁴⁷ AER (2019).

⁴⁸ ESCOSA (2019), *SA Power Networks reliability standards review: Final decision*, January, page 6.

network companies). Alternatively, the allowance could be proposed by individual DNSPs on a bespoke basis (i.e. there would be a common framework establishing the objectives of the allowance, but DNSPs could potentially have greater flexibility to propose different elements, such as the allowance amount and compliance arrangements).

As with the mechanistic incentive scheme, this approach would also involve challenges in relation to establishing robust output measures, as well as estimating the net benefits resulting from increased export headroom. However, these may be more tractable in the case of an allowance approach, as DNSPs would only be able to submit projects to utilise the allowance where compliance with eligibility requirements and/or achievement of outputs could be demonstrated.

4.2.3. Reputational incentives

An alternative, or complementary, approach to a mechanistic incentive scheme or allowance would be to require DNSPs to publish statistics on their performance related to export capacity. For example, this could include information on the number of customers who are export constrained, and the magnitude and frequency of constraints. There would be no financial incentive attached to these performance metrics.

Publication of this information would allow scrutiny of the DNSPs' performance over time, increasing transparency in relation to the DNSPs' performance with regard to export capacity. This may support the AER's consideration of whether DNSPs had conducted their planning in line with the obligation discussed in section 3.2 (for example, by providing a basis for querying how options to alleviate reported constraints had been considered).

This approach recognises that it currently may not be feasible to establish output metrics that are robust enough to underpin a financial incentive. By increasing experience with and understanding of the reported data over time, it may be possible to transition from a reporting requirement to a financial incentive later. If the information gathered through the reporting requirement will later be used as the basis for a financial incentive (for example, to establish a baseline performance level), the accuracy and completeness of the data would need to be verified.

In order to place appropriate reputational incentives on the DNSPs, careful consideration would still be required in relation to the data that is collected, and how it is presented and interpreted. For example, it may initially need to be recognised that movements in the data could result as measurement practices change, rather than necessarily being due to actions undertaken by the DNSPs.

4.2.4. What is allowed under the current rules?

Some of the options that we discuss above could potentially be implemented through the SSIS mechanism, in line with the requirements outlined in Text box 5 below. Alternatively, changes to the NER might be required

Text box 5: Small scale incentive scheme

The NER currently allow the AER to introduce incentive schemes up to a certain value threshold, through the small scale incentive scheme (SSIS) mechanism.⁴⁹

The SSIS framework specifies that the aggregate reward or penalty may not exceed 0.5% of the DNSP's annual revenue requirement (or up to 1%, which the agreement of the DNSP). A SSIS may also involve the DNSPs participating in a 'paper trial', with no revenue at risk. In addition, the SSIS may only apply for a maximum of two regulatory control periods.

The NER require the AER to have regard to the following matters when developing and applying a SSIS:

1. DNSPs should be rewarded or penalised for efficiency gains or losses in respect of their distribution systems;

⁴⁹ NER 6.6.4.

2. the rewards and penalties should be commensurate with the efficiency gains or efficiency losses in respect of a distribution system, but a reward for efficiency gains need not correspond in amount to a penalty for efficiency losses;
3. the benefits to consumers that are likely to result from efficiency gains should warrant the rewards provided under the scheme, and the detriments to consumers that are likely to result from efficiency losses should warrant the penalties provided under the scheme;
4. the interaction of the scheme with other incentives that DNSPs may have under the NER; and
5. (5) the capital expenditure objectives and the operating expenditure objectives.

The NER require the AER to develop a SSIS in accordance with the distribution consultation procedures.⁵⁰ This means that the AER must publish and consult on a draft scheme and explanatory statement.⁵¹ As noted above, the AER is currently undertaking such a consultation in relation to the CSIS that was proposed through the New Reg trial.

Source: NER 6.6.4

In assessing the feasibility of an export capacity obligation allowance and/or incentive mechanism, we have not undertaken a detailed review of the existing NER and NEL provisions that could either support this, or that might require amendment. However, based on an initial scan, we have identified the following considerations for each of the three options:

- **Mechanistic incentive scheme.** This could potentially be established through the SSIS arrangements outlined above. An alternative option would be to establish this as a component of the STPIS. The STPIS requirements set out in the NER indicate that this flexibility may exist, as the NER refer broadly to “*an incentive scheme or schemes (service target performance incentive scheme) to provide incentives (which may include targets) for Distribution Network Service Providers to maintain and improve performance*”.⁵² The NER require the AER to follow the distribution consultation procedures in amending the STPIS and also require the AER to have regard to certain matters. Finally, this could also be established in the rules as a separate incentive mechanism.
- **Allowance mechanism.** The NER specify that the DMIAM applies to demand management projects that “*have the potential to deliver ongoing reductions in demand or peak demand*”.⁵³ This indicates that the DMIAM itself could not be adapted (outside a rule change process) to incorporate export headroom. We also note that in the context of the AusNet Services New Reg trial, the AER has indicated that under the NER it would not be able to provide a general opex allowance for innovation that is not linked to specific projects.⁵⁴ Therefore, an allowance of the type described above may require changes to the NER. We note however that DNSPs would not be precluded from proposing expenditure for specific projects as part of their opex or capex allowance in order to meet an export capacity obligation.
- **Reputational incentive.** The NEL establish powers (and requirements) for the AER in relation to general regulatory information orders and notices.⁵⁵ Consideration would need to be given as to what additions to the NER (if any) would be required alongside this to implement the reputational incentive reporting arrangements.

⁵⁰ These are set out in NER 6.16 (Chapter 6, Part G).

⁵¹ AER (2019), *AusNet trial – AER staff guidance note 9*, page 13.

⁵² NER 6.6.2(a)

⁵³ NER 6.6.3A(c)(2)(i)

⁵⁴ AER (2019), page 20.

⁵⁵ NEL Division 4 – Regulatory information notices and general regulatory information orders.

4.2.5. Design considerations

If an incentive mechanism is considered to lead to better consumer outcomes, it needs to satisfy the following criteria:

- **Measurable output (and the methodology can be validated).** This requires that achievement of the output is substantially within the control of the DNSP. Further, it is necessary to establish a baseline or neutral performance level (i.e. the performance level that is funded by allowed revenues).
- **Consistent with other incentive arrangements.** That is, the desired outcome is not already encourage through existing incentive arrangements.
- **Transparent,** in that it is understood what the output is, and it can be independently verified.
- **Proportionate.** That is, the financial reward/ penalty available to the DNSP should reflect the benefit/ loss from changes in the outputs. In relation to the reliability component of the S, the

We consider that of these criteria, a key ‘threshold’ issue for an export capacity incentive scheme is the ability to establish robust, measurable outputs. The following section focusses on this question.

4.3. OUTPUT MEASURES

A financial incentive must be set against an output(s) that:

- Is measurable, i.e., that is the measures are appropriate to what is being incentivised, and the results are accurate and consistent over time, and the methodology is transparent and replicable.
- Is not materially influenced by factors outside the DNSP’s control, i.e., the DNSP should only be rewarded for its actions, for example, a customer paying for and installing a battery may lead to additional export capacity on their part of the network.
- Is not gameable i.e., the DNSPs should not be provided perverse incentive, for example, slowing down micro-generation connections in areas that are export constrained.

The appropriateness and feasibility of a financial incentive largely depends on whether a robust metric is available to assess how DNSPs have performed. An example of the challenges associated with establish a reliable performance metric is provided in Text box 6.

Text box 6: Ofgem’s Losses Incentive Mechanism

To encourage distribution network operators (DNOs) to manage losses on their network efficiently, Ofgem introduced a financial losses incentive mechanism as part of the third electricity distribution price control (DPCR3).

Ofgem had initially developed the incentive mechanism with the expectation that losses are equal to the difference between energy injected into and withdrawn from the distribution network. However, in practice a number of problems emerged with the settlement data used to assess the DNOs’ performance. These issues made it difficult to establish whether the DNOs were actually taking effective action to reduce losses, undermining the premise of the incentive.

In light of these issues, Ofgem replaced the financial incentive mechanism with a four-part losses reduction mechanism comprised of: licence obligations (requiring the DNOs to have a strategy to ensure losses are as low as reasonably practicable); the ability to include loss reduction expenditure in business plans; annual reporting requirements; and a discretionary reward.

Source: Ofgem (2012), Decision not to activate the Losses Incentive Mechanism in the Fifth Distribution Price Control, November; Ofgem (2019), Losses Discretionary Reward Guidance Document, September.

Table 3.1 sets out a range of metrics that could potentially be used to underpin an incentive mechanism (whether financial or reputational). The metrics are not mutually exclusive and multiple metrics could be used to build up a

picture of how DNSPs are performing in relation to providing export capacity. In developing these metrics, we have considered the data that could be obtained (or obtained in future) from:

- connection agreements;
- smart meters;
- inverters (with communication modules); and/or
- SCADA.

We have also considered the data collected in the DER register and the associated information guidelines published by AEMO.

As noted in section 4.2.4, in addition to establishing ways to measure the outputs achieved by the DNSPs, a financial incentive mechanism would also require a link to be established between the level of reward/penalty and the measured change in performance (i.e. through some measure of the value of increased exports). In developing the metrics outlined below, we have not explicitly considered ways that the value of exports could be assessed and/or combined with these metrics to establish an appropriate incentive rate.

Finally, we note that there are various options in relation to the frequency and timing of reporting. For example, these metrics could be reported monthly (with a lag) or annually. There could also be adjustments made for weather conditions, i.e., measure of sunshine hours and/ or temperature. However, while more complex measures may provide more accurate estimates, the need to adopt specific methodologies may reduce the transparency and robustness of these measures.

Whether the measures need to be more disaggregated with regard to location also needs to be considered. This is because there may be varying levels of export capacity available in different parts of the DNSPs' networks.

We note, if exports were charged for then measures of how the extent to which they receive their contracted capacity (as set out in their connection agreement), number of interruptions (times constrained off) and length of these interruptions would need to be considered.

Table 4.1: Initial thoughts on metrics to monitor export headroom

Metric	Further details	Reason
Number of connections	Can be broken down by voltage levels (e.g., LV, HV, EHV).	Provides a reference point for changes in the proportion of connectees with export capabilities.
Number of micro-generation (MG) connections (up to 10kW single phase or 20kW 3 phase)	Can be broken down by LV and HV levels.	Provides a measure of MG demand for export capacity on the DNSP's network.
Maximum generation capacity of MG contracts (MW)	Sum of MG capacity (MW). This could be the 'approved capacity' specified by the DER Register guidelines.	Provides an indication of the maximum possible distributed generation capacity associated with MG.
Forecast MG connections' generation	Micro-generation capacity (MW) multiplied by technology rating factors and forecast output based on DNSP area specific methodology.	Provides an indication of expected generation that can be compared with measured net exports. An average gross to net factor would need to be applied (to account for self-consumption).
Number of embedded generation (EG) connections	Can be broken down by LV, HV, EHV levels.	Provides a measure of the demand for exports on the DNSP's network related to EG contracts.
Maximum generation capacity of EG contracts (MW)	Sum of connection EG capacity (MW)	Provides an indication of the maximum possible distributed generation capacity which is associated with EG.
Forecast EG connections' generation	Micro-generation capacity (MW) multiplied by technology rating factors and forecast output based on DNSP area specific methodology.	Provides an indication of expected generation that can be compared with measured net exports. An average gross to net factor would need to be applied.
Maximum export allowed	Sum of agreed export limits. Split by contact type – MG or EG. Broken down by device type - fossil, hydro, wind, solar PV, renewable/biomass/waste, geothermal, storage, and other (as per the DER Register guidelines). This could be the 'export limitation' as specified by the DER Register guidelines.	Provides an indication of the maximum possible distributed export capacity. Split by technology type to provide an indication of the 'flexibility' of the generation and how this might impact headroom. The information on technology type could also be used to determine the DER's daily/ monthly expected output. Inverter data could also provide this information.
Proportion of generation connectees with advanced/ smart meters	Split by contact type – MG or EG.	Provides an indication of whether exports by time of day can be measured.

Metric	Further details	Reason
Number of connections with compliant inverters	Split by contact type – MG or EG. Number of inverters that are AS/NZS 4777 standard compliant.	Provides an indication of the proportion of inverters with (the required) ‘smart’ response capabilities.
Proportion of generation connections with inverters with communication capabilities	Split by contact type – MG or EG. Number of inverters that can provide logging information remotely divided by number of systems with inverters.	Provides an indication of the proportion of inverters that DNSPs can get information about interruptions from.
Measured net exports (MWh)	Split by contact type – MG or EG. Split by time of day. Source: Advanced/ smart meters; inverters	An indication of the overall net exports on a DNSPs network. Provides information on the differences between installed capacity and net exports (i.e., self-consumption).
Number of times export connections fully constrained	Split by contact type – MG or EG. Split by voltage. By time of day. Count of the number of ‘interruptions’ exporters’ suffer.	A measure of total interruptions to exports experienced by exporters.
Average number of times constrained off	Split by contact type – MG or EG. Split by voltage. By time of day. Count of the number of interruptions divided by the	An average measure of interruptions per export customer. This provides a measure that is close to the SAIFI measure used in STIPIS.
Number of times connections throttled	Number of times exporters capacity reduced via DNSPs’ intervention.	Exporters can have the export dynamically reduced rather than being interrupted entirely. This metric needs to be considered alongside interruptions.
Number of worst served customers	Number of customers that have been constrained off, from exporting, more than XX times in a month.	Provide a measure for customer that receive (relatively) very poor service. Although it does not account for those that have a zero export limit.
Average connection export capacity	Split by contact type – MG or EG. Sum of connection capacity divided by the number of connections.	A measure that takes account of those that are export limited. This can be compared to installed capacity to provide an indication of the extent to which export capacity is constrained by the DNSPs requirements.
Average measured net exports	Split by contact type – MG or EG. Measured exports (MWh) divided by number of export connections.	This provides an indication of the average amount exporters’ are able to export. Can be compared to expected generation adjusted for self-consumption estimates.

Metric	Further details	Reason
Other		
<p>Available hosting capacity (ENEA Consulting approach)⁵⁶</p>	<p>The approach relies on the combination of three measures to provide an estimate of the hosting capacity of different LV networks.</p> <ol style="list-style-type: none"> 1. The PV penetration level when power quality issues first arise (or thermal limits are first breached, whichever happens first). PV penetration level is the percentage of the reference theoretical maximum penetration level (kW). The reference maximum PV penetration level (in kW) is reached when every residential, commercial, and industrial (C&I) customer on an LV network has a 5 kW and 25 kW PV system installed respectively. 2. The average number of hours per day spent in breach of power quality limits as PV penetration increases. 3. The rise of the annual maximum voltage level as PV penetration increases.⁵⁷ 	<p>This is a synthetic measure of hosting capacity proposed by ENEA Consulting. ENEA Consulting developed 10 representative LV networks (to represent CitiPower's and Powercor's 80,000 LV networks).</p>

⁵⁶ ENEA Consulting (2020), *Future grid for distributed energy*, June.

⁵⁷ ENEA Consulting (2020), page 19.

We note that there are currently limitations with the data sources, for example, outside of Victoria, there are still a considerable proportion of connectees (>50%) without smart meters⁵⁸ and there are limited numbers of inverters with communications modules. We also note that there are no communications standards for inverters. While some of these limitations may be able to be dealt with through statistical analysis, this will reduce the accuracy of the metrics.

In addition, industry sources that we have spoken with have indicated that not all the data in the DER register is accurate. This is due to the connections process and installers' practices. For example, an application can be made for a 6kW system and this is what is in the register, but if there is insufficient room for the panel a smaller system may be installed.

Therefore, while there are existing metrics that on the surface could be used, in combination, to set some form of output measure for export headroom, we do not think that these are sufficiently accurate or robust enough to set a financial incentive against. In other words, while each of the measures, and combination of measures, need to be considered against the criteria set out at the start of this section at this stage it is not clear that any of the metrics we have set out in the table above would pass the first criterion set out in Section 4.2.4.

⁵⁸ AER, *State of the Energy Market 2020*, July, page 131.



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