Consumer benefits resulting from the AER's incentive schemes

A report for Energy Networks Australia

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Key findings

Energy Networks Australia (ENA) has asked HoustonKemp to provide an independent estimate of the consumer benefits that have arisen (and are expected to continue to accrue in future) from networks responding to the incentive schemes that form part of the Australian Energy Regulator (AER's) overall regulatory framework.

We have quantified the benefits to consumers generated by networks due to the operation of the following three incentive schemes:

- the Efficiency Benefit Sharing Scheme (EBSS) that encourages networks to lower the cost of operating their network and was developed by the AER in 2007;[1]
- the Capital Expenditure Sharing Scheme (CESS) that incentivises networks to minimise the cost of their network investments and was developed by the AER in 2013 and first applied in 2015/16;[2] and
- the reliability component of the Service Target Performance Incentive Scheme (STPIS) for electricity distribution networks that provides incentives to improve service quality and was developed by the AER in 2007.[3]

With the exception of the STPIS, our assessment has considered electricity distribution and transmission networks and gas distribution networks, for the period from 2006 to 2020. Noting that we have included consumer benefits arising during periods when networks were subject to the similar jurisdictional incentive mechanisms administered by the AER.[4]

Consumers have benefited by at least $13.4bn as a result of the three main AER incentive schemes

Our analysis shows that the **AER's incentive schemes have benefited consumers by delivering lower network prices and improved service quality**. The financial rewards provided to energy networks under the incentive schemes encourages them to improve network services whilst simultaneously lowering the costs of providing these services. The incentive schemes complement other factors impacting incentives, such as the ability of the AER to benchmark an network service provider's (NSP's) base year operating expenditure and undertake ex-post reviews of capital expenditure. The incentive schemes have encouraged networks to innovate and become more productive.

Figure 1 highlights that consumers have benefited by at least $13.4 billion in present value terms (PV, 2020) adopting the 6 per cent discount rate that was used when the schemes were first developed.

[1] AER, *Final decision | Electricity transmission network service providers | Efficiency benefit sharing scheme*, September 2007.

[2] AER, *Capital expenditure incentive guideline for electricity network service providers*, November 2013 and AER, *Final Decision | Ausgrid distribution determination 2015−16 to 2018−19 | Attachment 10 – Capital expenditure sharing scheme*, April 2015, p 8.

[3] AER, *Final decision | Electricity transmission network service providers | Service target performance incentive scheme*, August 2007.

[4] The jurisdictional operating expenditure and reliability incentive mechanisms.

Figure 1: Total consumer benefits of the EBSS, CESS and distribution STPIS (reliability) (PV, 30 June 2020)

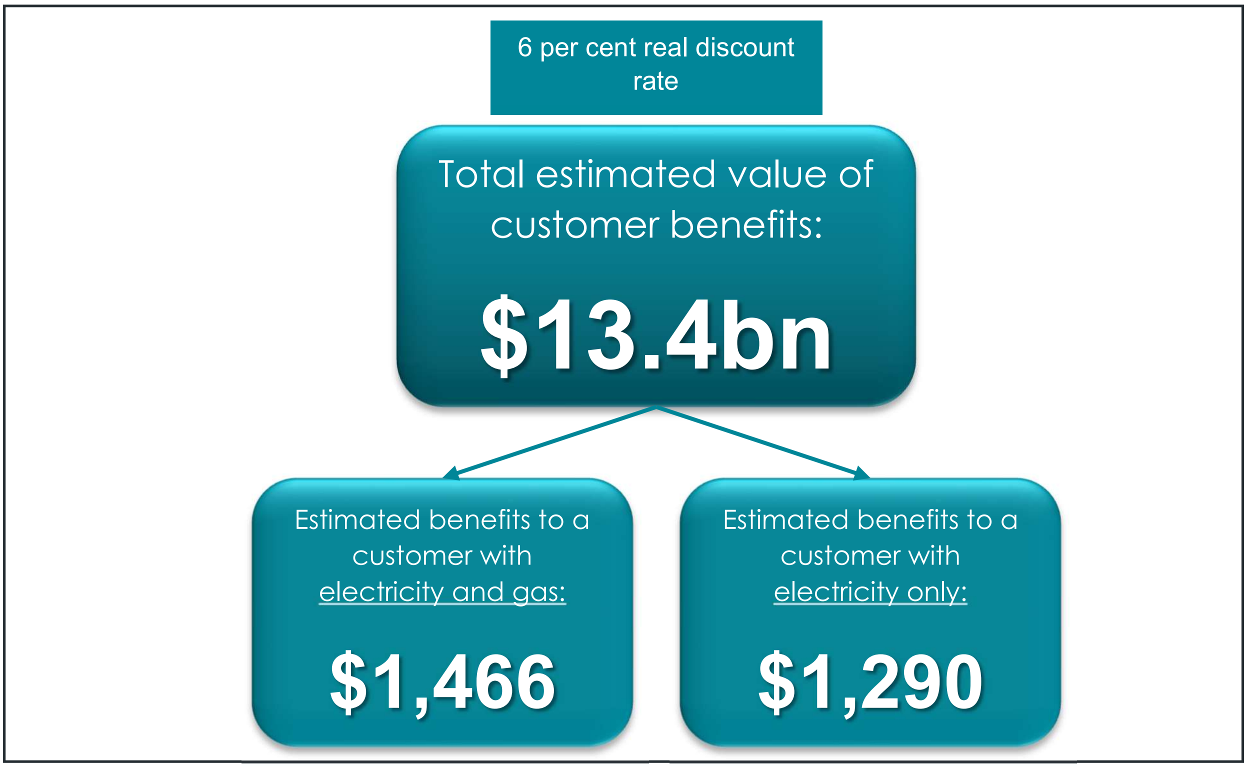


Figure 1 shows our estimate of the consumer share of network expenditure and reliability outperformance over the 2006 to 2020 period, in present value terms (2020) when the network was subject to the AER incentive schemes.

In calculating these consumer benefits, we have assessed the difference between a network's actual capital and operating expenditure and their respective regulatory allowances, as a measure of the extent of cost 'out-performance' that the business has achieved. Consumer benefits and losses have been measured against the network's expenditure allowances as the ex-ante regulatory allowances represent an independent and informed estimate of the network's expected efficient expenditure. We have calculated the implied efficiency gains to consumers that are 'locked-in' by the regulatory framework and the network's actions to date. The benefits from improved reliability have been estimated from a network's change in actual performance.

All estimated consumer benefits (costs), that occur over a number of different years (including into the future where regulated expenditure allowances are lower (higher) than they would otherwise have been), are brought to a common point in time (30 June 2020) using the discount rate.

The $13.4 billion in consumer benefits highlighted in figure 1 represents the net present value (2020) of the gains that consumers have both already received across all three of the incentive schemes, using a real discount rate of 6 per cent, as well as those that are locked-in by the current arrangements and will be enjoyed by consumers in future periods.

Benefits have accrued to consumers from each of the three main incentive schemes

We have also calculated the average benefit per consumer[5] attributable to each of the schemes. This is presented below in figure 2 and figure 3. These figures show that customers have benefited from each of the three incentive schemes, with the EBSS (which has been in place for the longest) delivering the highest share of benefits.

Figure 2: Electricity only consumer benefits per consumer by incentive scheme ($, PV'2020)

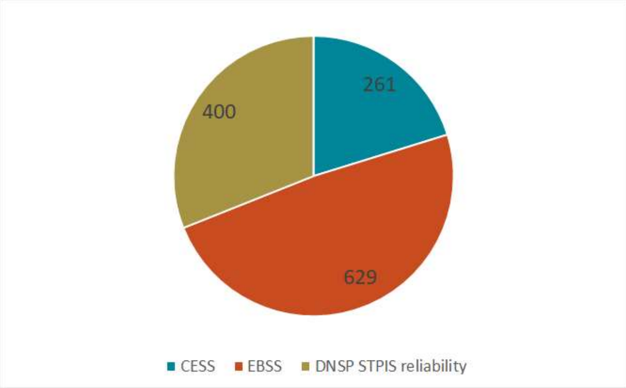
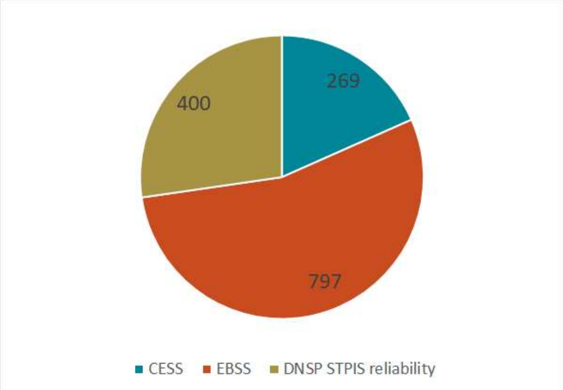


Figure 3: Electricity and gas consumer benefits per consumer by incentive scheme ($, PV'2020)



Note: Assuming a 6 per cent discount rate.

The estimate of consumer benefits increases to $22.3 bn if an industry average discount rate is adopted

The use of a different discount rate will change the estimated present value of benefits. Adopting a discount rate equal to the annual average real WACC for gas and electricity networks (rather than assuming a constant real 6 per cent discount rate), increases the value of consumer benefits to $22.3 billion (PV, 30 June 2020). The principal reason for the higher present value is that the discount rate used for future periods is assumed to equal the average real WACC in the final year of the assessment period (2020) for gas and electricity networks of 3.34 per cent. This lower discount rate increases both the present value of the consumer benefits and the consumers' share of total benefits (which increases to 81 per cent of the total gains). Appendix A2 provides a discussion of the impact on our findings of adopting an industry average real WACC as the discount rate.

In this report we have focused on the present value of consumer benefits using a 6 per cent discount rate, which aligns with the discount rate used by the AER to calculate the sharing of efficiency gains between consumers and networks when first developing the EBSS and CESS.[6]

The majority of benefits accrue to consumers rather than to networks

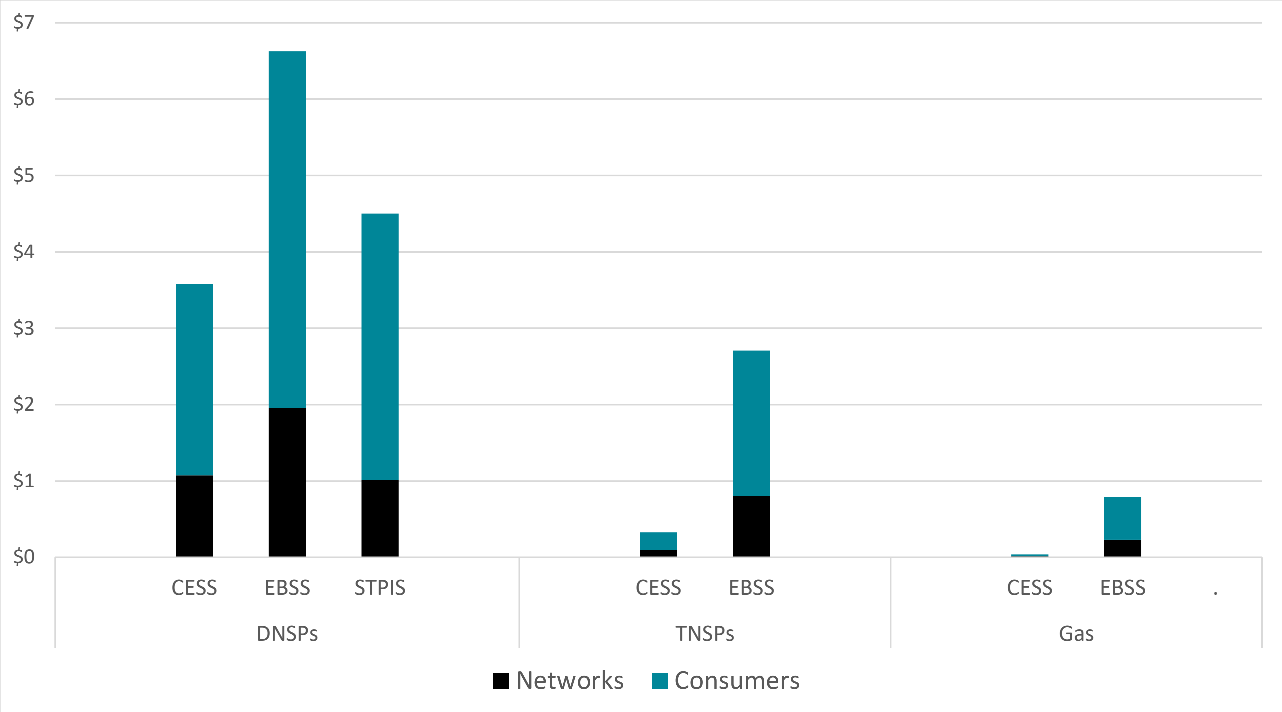
The lower than forecast operating and capital expenditure outcomes by gas and electricity networks and improved distributor reliability that occurred during the operating of the incentive schemes has resulted in substantial efficiency benefits. We have estimated that the present value (2020) of the total efficiency gains resulting from the EBSS, CESS and distribution STPIS (reliability) is $18.6 billion, with consumers retaining 72 per cent of the total benefits ($13.4 billion).

[5] The average benefit per consumer has been calculated by dividing the total benefits by the number of network customers.

[6] See AER, *Better regulation | Capital Expenditure Incentive Guideline for Electricity Network Service Providers | Explanatory statement*, November 2013, p 46; and AER, *Better regulation | Efficiency benefit sharing scheme for Electricity Network Service Providers | Explanatory statement*, November 2013, p 34.

Figure 4 shows the network and consumer shares of the benefits attributable to the AER's incentive schemes for electricity distribution and transmission networks and gas distributors.

Figure 4: Present value of network and consumer benefits ($billion, 2020)



Note: Assuming a 6 per cent discount rate and excluding Power and Water (NT).

Other elements of the regulatory framework also affect incentives

We were also asked by the ENA to provide a summary of other elements of the regulatory framework that affect a network's incentive to either reduce its costs and/or improve service levels. These features are important because a network's behaviour is not exclusively affected by the AER's incentive schemes but is also influenced by:

- the ability of the AER to find that a network's base year operating expenditure is inefficient, which would result in a downward adjustment to the network's future operating expenditure allowance as well as the suspension of the EBSS;
- the capacity for the AER to find recent capital expenditure to be inefficient and disallow the recovery of these costs;
- the inclusion of a productivity factor into the setting of the operating expenditure allowance, where 100 per cent of these efficiency gains (which would be in addition to the gains calculated in this report) are passed through to consumers; and
- the existence of State and Territory minimum reliability standards, that networks are required to meet as part of their licencing obligations.

A network's decision to reduce costs or improve service levels will have regard to the entirety of the regulatory framework, not just the incentive schemes. Consequently, any changes to the incentive schemes should have regard to all the incentives that apply to expenditure and service quality rather than an assessment of the incentive schemes in isolation.

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Figures

1. The role of incentive regulation

Key findings

- The AER's incentive schemes operate in the context of the overall regulatory framework.
- The incentive schemes enhance the overall regulatory framework by ensuring networks have a strengthened and constant incentive to continually lower their costs and improve service performance.
- There are a number of incentive schemes, of which the CESS, EBSS and STPIS are the most material and have generally been in place for the longest period of time.

1.1 Why is it important?

Energy networks underpin the delivery of electricity and gas to the majority of households and businesses in Australia. This report has been prepared at the request of Energy Networks Australia (ENA) which represents electricity transmission and distribution networks as well as gas distribution networks.

The report sets out the incentives on Australian electricity and gas networks and how the Australian Energy Regulator's (AER's) incentive schemes have benefited consumers. Specifically, we have estimated the consumer benefits associated with the operation of the Efficiency Benefit Sharing Scheme (EBSS), the Capital Expenditure Sharing Scheme (CESS) and the reliability component of the distribution Service Target Performance Incentive Scheme (STPIS).

The ENA members operate regulated assets valued at over $110 billion and generate revenues of almost $12.7 billion per annum.[7] However, unlike many industries where competition can be relied on to deliver desirable outcomes, competition is not possible for regulated energy businesses.

For this reason, the AER, building on approaches widely applied internationally and in line with the principles and objectives set out in the National Electricity and Gas Rules, developed its framework of incentive regulation.

This framework seeks to:

- encourage businesses to innovate and deliver value to consumers;
- ensure that efficiency improvements are shared with consumers; and
- provide the AER with valuable information on historical costs, which can inform its decisions on future efficient cost levels.

The incentive regulation framework is similar to those applied by other regulators internationally in that it periodically sets forecast expenditure allowances and maximum revenue allowances for regulated networks. This underlying framework is enhanced by a number of specific incentive schemes.

1.2 Role of incentive schemes within the overall regulatory framework

The AER sets the following for regulated network businesses:

- the forecast level of spending necessary to deliver the services expected by consumers (forecast expenditure allowances);
- the total revenue that can be collected from consumers (maximum revenue allowances); and

[7] AER, *State of the Energy Market 2021.*

- for electricity and some gas networks, an expected level of service quality for each year of the regulatory period.

The setting of a maximum amount of revenues that networks can collect from consumers for a period of time (usually five years) encourages networks to reduce their costs during that period. These lower revealed costs are then used by the AER as the basis for determining expected efficient costs in the subsequent regulatory period. The framework ensures that efficiency improvements are passed through to consumers in the form of lower network charges.

The incentive schemes further encourage networks to reduce costs and improve service levels and also ensure that networks do not favour one form of expenditure, nor cut costs at the expense of inefficient reductions in service quality. Finally, the schemes maintain a constant level of incentives for expenditure and service quality incentives over the regulatory period.

We also observe that a network's incentives to reduce costs and improve service levels are increasingly influenced by customer expectations. For example, the AER's Better Reset Handbook establishes an expectation that a network's regulatory proposal will be developed through meaningful consumer engagement on forecast expenditure and expected service levels.[8]

1.3 Merits of a balanced incentive framework

A balanced incentive framework seeks to replicate the forces that operate in competitive markets, where services are delivered at least cost and with improved service quality, together with ongoing improvements through time.

A balanced incentive framework encourages networks to make decisions that benefit consumers, by:

- ensuring that networks do not favour one form of expenditure (operating or capital) over the other, raising the long term cost to consumers; and
- ensuring that there are sufficient counterbalancing incentives on customer service level outcomes and safeguards against cost reductions occurring to the detriment of efficient service levels.

Cost-plus regulation allows networks to pass through their actual costs (plus a reasonable return on invested capital). However, this has resulted in poor outcomes for consumers, typically leading to higher than necessary costs and/or poor service levels. Incentive regulation avoids the pitfalls of cost-plus regulation.

In assessing the balance of regulatory incentives, it is necessary to have regard to all factors that affect a network's expenditure and service level decisions rather than a narrow examination of the specific incentive schemes only. Chapters 3 to 5 of this report summarise other elements of the wider regulatory framework that affect a network's expenditure and service level decisions.

1.4 The current AER incentive schemes

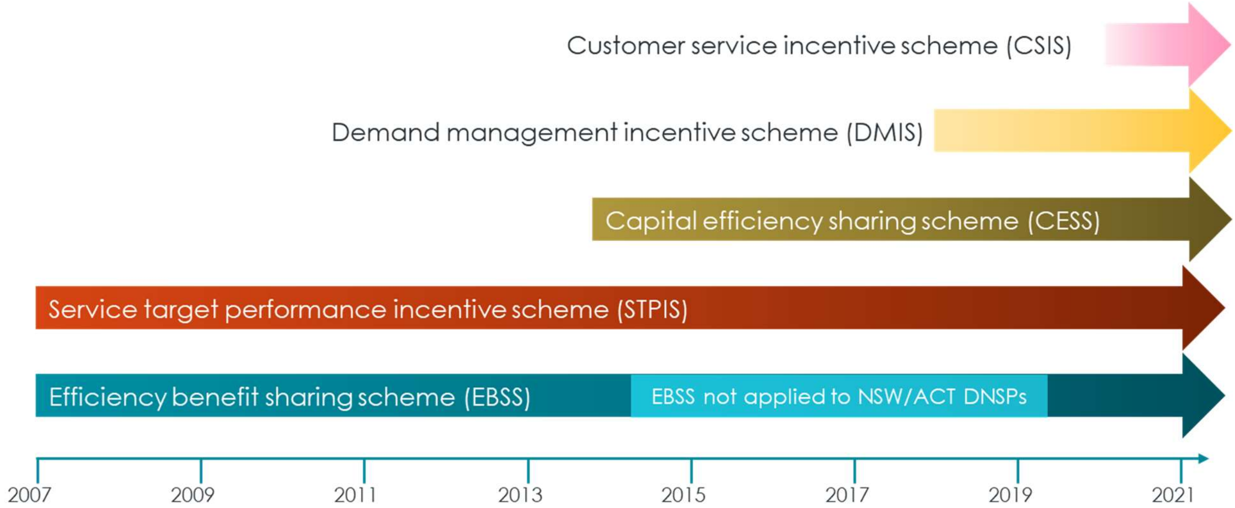
The AER's main incentive schemes are directed toward different aspects of a network's behaviour such as:

- reducing the cost of providing the service;
- improving service levels; and
- having a net positive impact on related markets, such as developing a demand response market and improving the working of the wholesale electricity market.

Figure 1.1 sets out the timeline for the introduction of the AER's main incentive schemes.

[8] AER, *Better reset handbook | Towards consumer centric network proposals*, December 2021.

Figure 1-1: The AER's incentive schemes and timeline of when they were first developed[9]



Note that these schemes did not apply to all networks from the introduction of the scheme. Instead schemes generally applied from the start of the regulatory period following the introduction of the scheme.

1.5 Features of the AER's incentive schemes

The AER's three core incentive schemes (EBSS, CESS and STPIS reliability) all share the following common features.

1.5.1 Symmetrical rewards and penalties

The incentive schemes are symmetric in that the rewards networks receive for reducing their costs or improving consumer service levels mirror the penalties imposed on networks for increasing their costs or reducing consumer service levels.

The importance of symmetric rewards and penalties is that they encourage networks to make efficient trade-offs between different types of expenditure and between service levels and costs.

For example, investing in new technology may result in greater capital costs but also result in operating cost savings. Having symmetrical incentives allows networks to be penalised for incurring higher capital costs but rewarded for their lower operating costs. A balanced incentive scheme would then encourage networks to make this trade-off in way that minimises the total costs to consumers.

Importantly, ensuring balanced incentives in this way requires consideration of all of the incentives under the regulatory framework, and is not a matter of applying the same incentive rate across the different incentive schemes.

1.5.2 Consistent over time

The second feature common to the incentive schemes are that they provide a constant incentive over time. That is, the proportion that a network retains from saving $1 today is the same as it will receive from saving $1 next year.

Because $1 today is more valuable to a network than $1 in the future, the incentive schemes encourage networks to achieve savings or improve service quality as soon as possible.

Consistency in the application of the incentive schemes over time also provides greater assurance to networks as they consider long-term actions.

[9] We note that prior to the AER's incentive schemes there were equivalent jurisdictional schemes applying to some networks.

1.6 Estimating consumer benefits

The purpose of this report is to estimate the benefits that consumers have received over the period that the incentive schemes have operated.

To estimate the consumer benefits of the incentive schemes, we have:

- used public data reported to the AER and supplemented with data from the networks' externally audited regulatory information notices (RINs);
- calculated the present value of gains/losses as at 30 June 2020;
- measured consumer benefits and losses against the networks' expenditure allowances to capture the entire value of the benefit, rather than focusing on the incentive rewards included in the network's revenue allowances (which only represent part of the benefit to networks alone);
- estimated consumer benefits and losses associated with improved distribution reliability using the change in the network's actual performance;
- assessed expenditure and service outcomes when the incentive schemes operated within the period 2006 to 2020;
- used a discount rate of either:
  - 6 per cent real discount rate (which was the rate assumed by the AER when it developed the EBSS and CESS); or
  - the annual industry average real rate of return which ranged between 3.34 and 7.02 per cent (with the 2020 rate (3.34 per cent) applied to future periods);
- calculated consumer benefits as the total benefits less the rewards (incentive payments) retained by networks;
- assumed that incremental changes[10] in real operating expenditure are ongoing, with networks retaining any incremental gain (loss) for a period of six years before the gain is passed through to consumers in perpetuity – consistent with the operation of the EBSS;
- consumers retain 70 per cent of any capital expenditure outperformance (underspending of capital expenditure allowance) – consistent with the operation of the CESS which ensures that consumers retain a fixed proportion (in present value terms) of any capital expenditure outperformance; and
- assumed that changes in distribution reliability performance (ie, duration and frequency) are enduring and that networks are rewarded (penalised) for the consumer benefit (cost) of this annual change in reliability for a period of five years (starting from year *t*+2) – consistent with the operation of the STPIS.[11]

Use of expenditure allowances to estimate benefits

Consumer benefits and losses in our analysis have been measured against the NSPs' ex ante expenditure allowances set by the AER, as these represent an independent and informed estimate of the networks' expected efficient expenditure.

We note that the ex-ante expenditure allowances may be above or below the ex-post actual efficient costs of providing energy network services over the regulatory control period, due to a range of factors.

However, any variance between allowances and efficient expenditure is unlikely to change our finding that the incentive schemes deliver material benefits to consumers:

- for example, even if half of the calculated outperformance was assumed to be the result of overstated allowances, the consumer benefits would still be in the order of $6.7 billion (PV, 2020).

Further, the AER's continued expansion and refinement of its expenditure assessment techniques and tools lessens the future likelihood of regulatory expenditure allowances not reflecting an NSP's forecast efficient costs.

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[10] An incremental change is generally calculated as the difference between outperformance (ie, actual cost less allowance) in the current year and outperformance in the immediately preceding year. For example, if a network's actual operating expenditure in year 1 was $2 million below its allowance, and in year 2 it underspends its allowance by $7 million, then the incremental operating gain was $5 million (ie, $7 million in year 2 less $2 million in year 1). In other words, in year 2 the network has incrementally improved its operating expenditure performance by $5 million compared to year 1.

[11] Note the value of improved reliability is calculated using the respective AER estimates of the value of customer reliability (VCR) for different network types (CBD, urban and rural). Further, the split of the VCR we have assumed between

All estimated consumer benefits (costs), that occur over a number of different years (including into the future where regulated expenditure allowances are lower (higher) than they would otherwise have been), are brought to a common point in time (30 June 2020) using the discount rate.

The details of how we have calculated the benefits presented in this report are set out in appendix A.

improvements in frequency and duration reflects the values used in the STPIS incentive rewards.

2. How consumers benefit from incentive regulation

Key findings

- During the period that the AER incentive schemes have functioned, our analysis shows that consumers have benefited from lower network operating costs, lower than expected network investments and improved network reliability.
- Table 2-1 sets out the estimated total benefits associated with the three incentive schemes (EBSS, CESS and electricity distribution reliability STPIS). The incentive schemes have delivered consumer benefits of at least $13.4 billion using the 6 per cent discount rate that the AER applied when it developed the incentive schemes.
- Figure 2-1 and figure 2-2 quantify the average consumer benefits in present value terms (2020) locked-in from each of the AER's incentive schemes. The schemes have generated gains for the average consumer with both an electricity and gas service of $1,466 (using a 6 per cent discount rate). An average consumer with an electricity service only is $1,290 better off (using a 6 per cent discount rate).

Table 2-1 Total benefits attributable to the incentive schemes (PV, 30 June 2020) – 6% discount rate

	Total ($, billions)	Per connection with electricity and gas service ($)
Total	$18.6	$2,032
Networks	$5.2	$565
Consumer	$13.4	$1,466

During the period that the incentive schemes have applied, our analysis shows that consumers have benefited from lower network operating costs, lower than expected network investments and improved network reliability. These outcomes have locked-in substantial gains for consumers, today and in the future, in terms of lower prices and improved network reliability.

While there have been significant long term consumer benefits produced by the incentive schemes, we note that the schemes are generally designed so that networks are rewarded (or penalised) before the benefits (costs) are passed through to consumers. These consumer benefits are locked-in by the regulatory framework and so the full benefits of past outperformance, in terms of lower costs and improved reliability, will be realised by consumers into the future.

This is especially true for reductions in capital expenditure where the benefits to consumers are felt over a long period of time, in the form of lower network asset values feeding into lower network prices.

Figure 2-1 and figure 2-2 quantify the average consumer benefits in present value terms (2020) locked-in from each of the AER's incentive schemes (using a 6 per cent discount rate). The schemes have generated gains for the average consumer with both an electricity and gas service of $1,466 in present value terms (2020). Consumers with an electricity service only are $1,290 better off.

The consumer present value calculation converts all gains (losses) that consumers have and will receive from efficiency gains (losses) in the 2006 to 2020 period to a single point in time (2020).

The following sections provide a breakdown of the consumer benefits associated with the three incentive schemes.

Figure 2-1: Electricity only consumer benefits per consumer by incentive scheme ($, PV'2020)

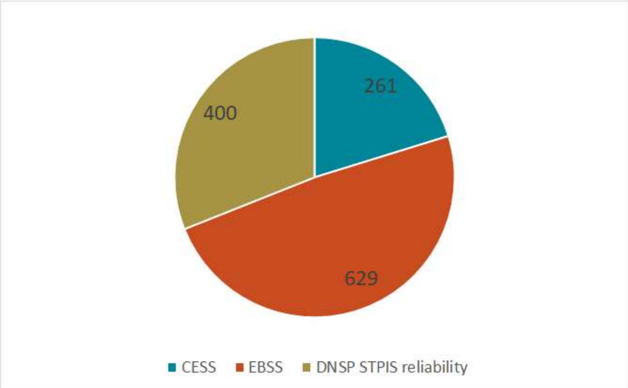
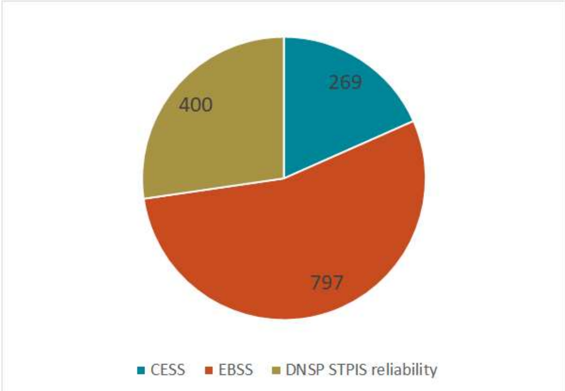


Figure 2-2: Electricity and gas consumer benefits per consumer by incentive scheme ($, PV'2020)



Note: Assuming a 6 per cent discount rate.

2.1 Consumer benefits under the EBSS

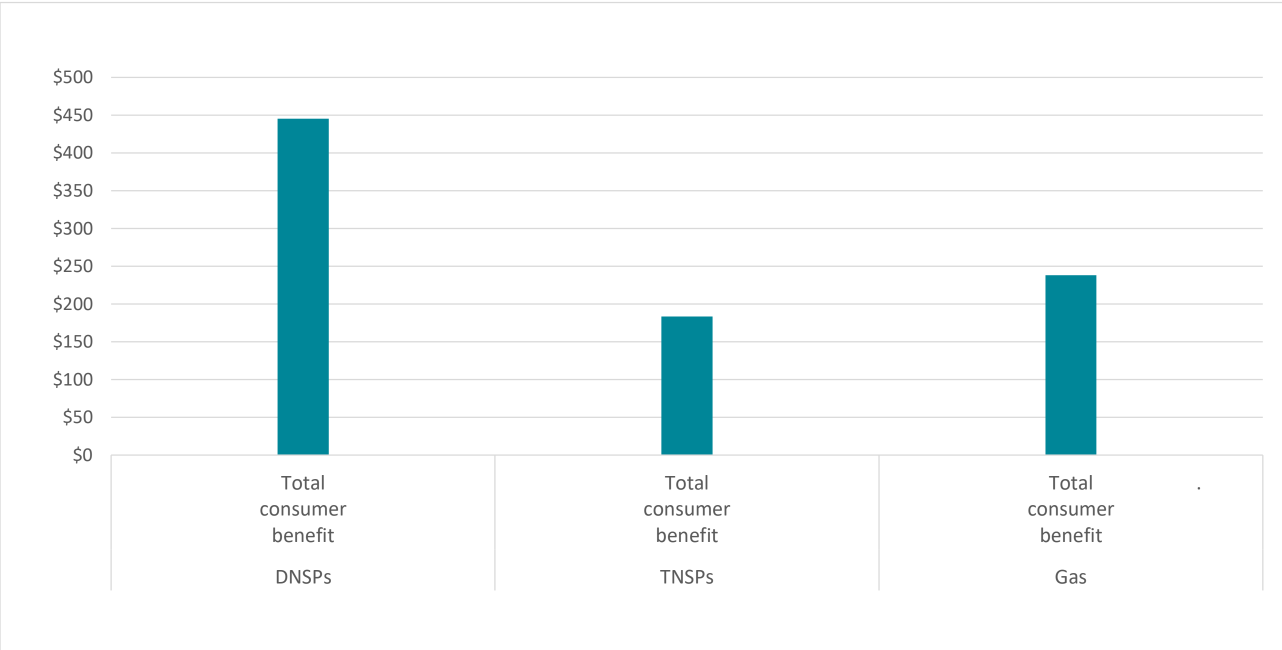
The EBSS, has been applied to both electricity and gas networks since 2006 and has been responsible for the largest share of consumer benefits. At a 6 per cent discount rate, the operating expenditure efficiency gains represent 54 per cent (ie, $797 of the $1,466 per customer gain) of the total consumer benefits received by customers with both an electricity and gas service from the three incentive schemes.

At a 6 per cent discount rate, the EBSS has delivered consumer benefits (present value 2020) of:

- $6.6 billion to electricity-only consumers (70 per cent of the total electricity EBSS gains); and
- a further $0.55 billion to those consumers that also use gas (70 per cent of the total gas EBSS gains);
- representing an average saving per consumer (with both electricity and gas service) of $797, which is equivalent to nearly 7 months of network charges.[12]

Figure 2-3 shows the breakdown of the present value of consumer benefits (per customer) by different network types.

Figure 2-3: Present value (2020) of consumer benefits attributable to the EBSS (per customer)



Note: Assuming a 6 per cent discount rate.

[12] HoustonKemp calculation of the 2020 average annual network costs for an electricity and gas consumer was $1,390, using data from the AER, *State of the Energy Market 2021.*

2.2 Consumer benefits under the CESS

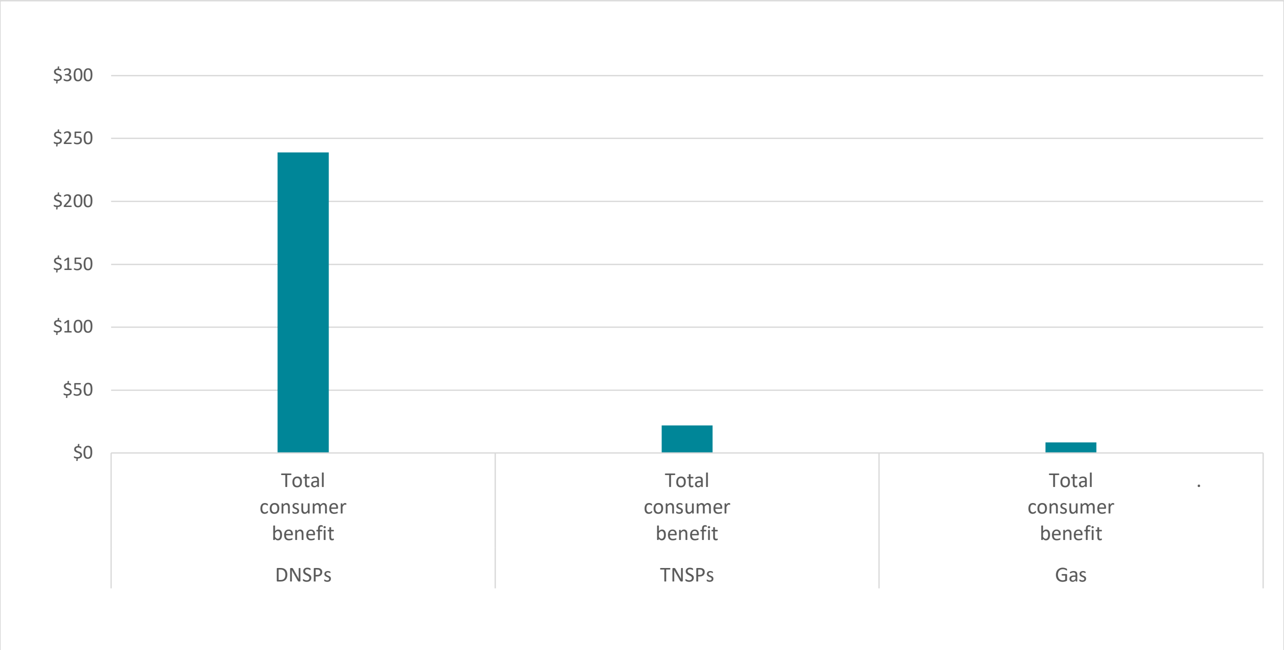
The CESS is a new mechanism that was developed by the AER in 2013 and first applied in 2015/16.[13] Our analysis shows that during that period networks have delivered substantial consumer benefits by limiting their network investments whilst generally maintaining or improving network reliability.

At a 6 per cent discount rate, the capital expenditure efficiency gains represent 18 per cent (ie, $269 of the $1,466 per customer gains) of the total consumer benefits for customers with both an electricity and gas from the three incentive schemes.

At a 6 per cent discount rate, the CESS has delivered consumer benefits (present value 2020) of:

- $2.7 billion to electricity-only consumers (70 per cent of the total electricity CESS gains);
- $28 million to consumers that receive a gas service (70 per cent of the total gas CESS gains); and
- on an average per customer basis, $269 for customers with both an electricity and gas service, which is equivalent to just over 2 months of network charges.[14]

Figure 2-4: Present value (2020) of consumer benefits attributable to CESS (per customer)



Note: Assuming a 6 per cent discount rate.

[13] Note that some distributors operated on a calendar year (2016) while other networks operate on a financial year (2015/16)

[14] HoustonKemp calculation of the 2020 average annual network charges was $1,390, using data from the AER, *State of the Energy Market 2021*.

2.3 Consumer benefits under the STPIS

Distributors that improve network reliability are rewarded, in the short term, by STPIS payments to ensure that networks continue to invest in reliability improvements that consumers value. However, the STPIS incentives are calibrated to be equal to the value to consumers of the improved reliability. It follows that in the short term the cost to consumers of a sustained improvement in reliability (ie, the STPIS reward) is equal to the value consumers place on improved network reliability.

We have presented the consumer benefits of improvements in the reliability of electricity distributors, since these gains can be quantified using the AER's estimates of the value that customers place on network reliability.[15]

At a 6 per cent discount rate, improvements in network reliability represent 27 per cent (ie, $400 of the $1,466 per customer gains) of the quantified consumer benefits from the AER's incentive schemes. Figure 2-5 highlights significant improvement in both duration and frequency of customer interruptions (SAIDI and SAIFI) on a NEM-wide basis, including:

- a 17.8 per cent reduction in minutes off supply (SAIDI) in 2020 compared to 2006; and
- a 38.3 per cent reduction in the number of service interruptions (SAIFI) in 2020 compared to 2006.

Transmission reliability

The transmission STPIS does not have an explicit link to the consumer value of reliability like the distribution STPIS and so we have not included the impact to consumers of changes in transmission reliability.

However, transmission networks have made material improvements in some aspects of reliability, such as the number of loss of supply events. Figure A shows that on a five year moving average this metric has improved by 54 per cent in 2019 compared to 2010.

Figure A: Transmission loss of supply events

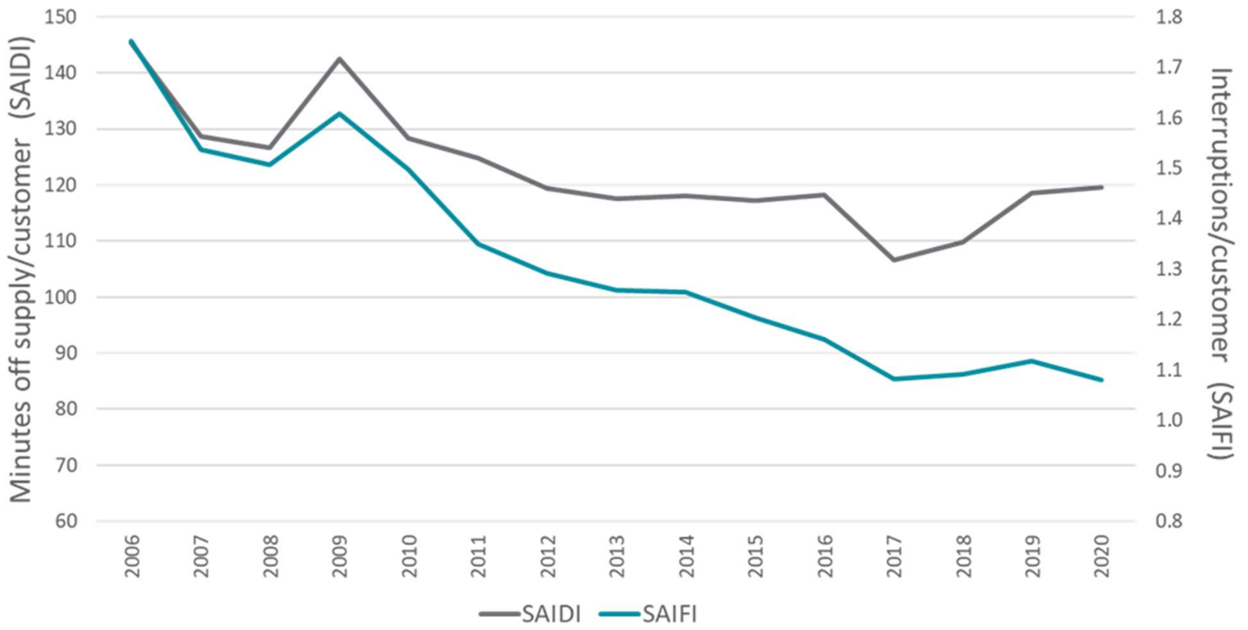
Source: AER TNSP performance report 2021

At a 6 per cent discount rate, the STPIS distribution reliability component has delivered consumer benefits (present value 2020) from:

- improvements in the number of service interruptions of $3.1 billion (78 per cent of the total STPIS reliability (frequency) gains); and
- reductions in the average minutes off supply of $0.4 billion (78 per cent of the total STPIS reliability (duration) gains).

[15] Clause 3.2.2 of the AER, *Electricity distribution network service providers | Service target performance incentive scheme | Version 2.0*, November 2018.

Figure 2-5: Electricity distribution SAIDI and SAIFI trends



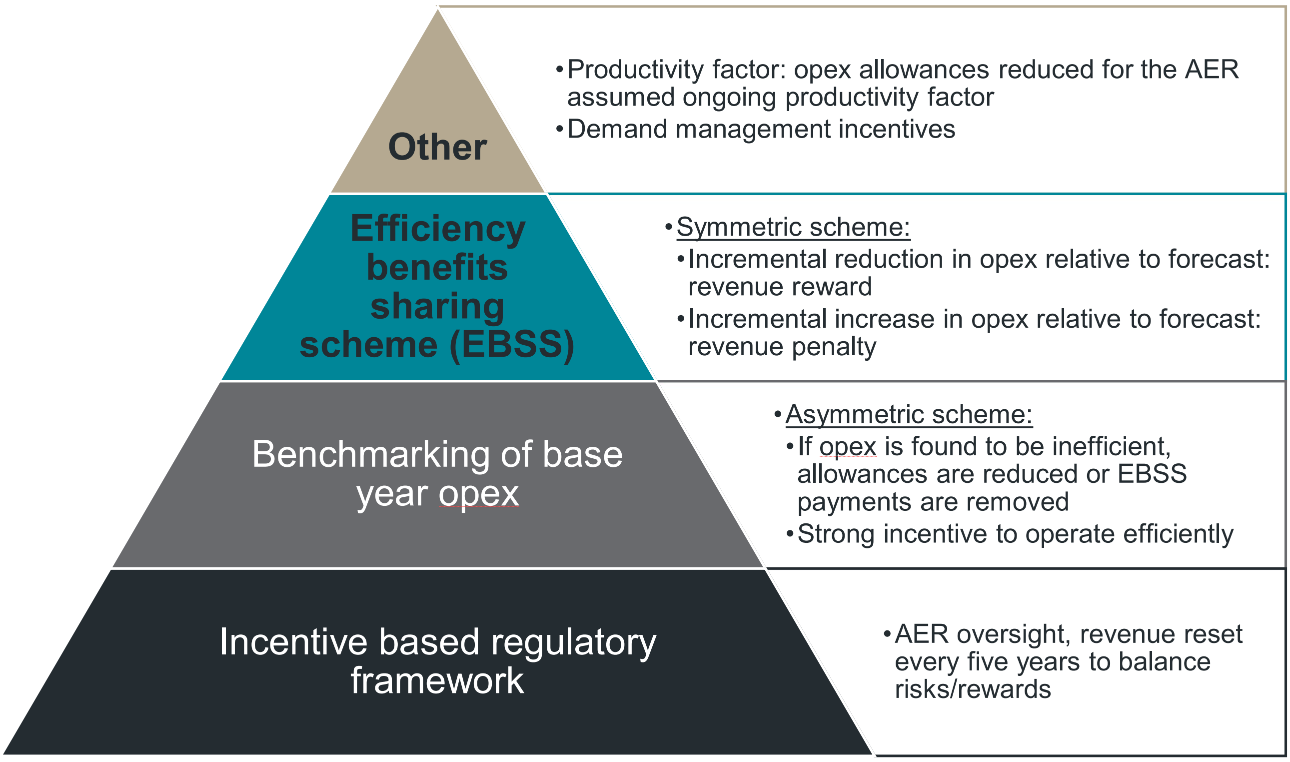
Source: HoustonKemp analysis of AER 2021 DNSP operational performance data.

3. Incentives to reduce consumer costs by lowering network operating expenditure

Key findings

- The inclusion of a positive productivity factor in setting the regulatory allowance for operating expenditure guarantees that consumers receive 100 per cent of the expected improvement in productivity over the regulatory period.
- The EBSS ensures that consumers also retain 70 per cent of the benefits associated with reductions in operating expenditure over and above that from expected productivity improvements (using a 6 per cent discount rate).
- The ability of the AER to find base year operating expenditure as inefficient creates an additional incentive for networks to minimise operating expenditure.

Figure 3-1: Factors affecting operating expenditure incentives



The cost to finance, build, operate and maintain regulated networks represents approximately a third of the price paid by consumers for energy network services.[16]

Incentives in the regulatory framework encourage networks to constantly strive to lower their operating costs, with these cost savings being passed through to consumers through lower future operating costs.

This section outlines the primary incentives within the regulatory framework for networks to minimise operating costs.

Efficient forecast operating expenditure

The price paid by consumers for energy network services includes an allowance for the network's forecast operating expenditure. The expenditure allowance reflects the AER's expected efficient costs to operate and maintain the regulated network over the regulatory period, and has recently included a productivity factor (discussed later in this section).

Other than in exceptional circumstances, this allowance is then fixed for the regulatory period, normally five years.

Networks have an incentive to lower their actual operating expenditure to outperform their fixed operating expenditure allowance.

The AER then uses the lower revealed operating expenditure to reset the allowance in future regulatory periods, which then results in lower network charges for consumers.

The efficiency of base year operating expenditure

The operating expenditure allowance in the forthcoming regulatory period is generally built from a network's observed expenditure in a 'base' year, normally the second last year of a regulatory period.

However, the AER does not unquestioningly accept that the network's actual expenditure is efficient.

The AER uses a range of tools to assess whether base year operating expenditure is efficient including:

- benchmarking of the costs of similar networks;
- trends in the network's own performance over time; and
- use of independent experts to examine aspects of a network's base year performance.

Therefore, the approved operating expenditure allowance reflects the AER's forecast of efficient operating costs.

A finding that base year operating expenditure is inefficient is at the discretion of the AER and can occur even when a network is outperforming its operating expenditure allowance. Where base year expenditure is found to be inefficient, the AER will adopt a value that is below the network's actual operating costs.

Networks must then reduce their expenditure to the new lower allowance, with the benefits of this efficiency improvement fully passed through to consumers. Further, networks are financially penalised if they are unable to reduce their costs to match this more challenging expenditure allowance, without the benefit of sharing these higher than allowance operating expenditure with consumers through the incentive schemes.

A further consequence of base year expenditure being found to be inefficient is that the specific incentive scheme applying to operating expenditure (the EBSS) may not be applied by the AER in the following regulatory period.[17] Consequently, the network bears 100 per cent of the cost of adapting to the new lower operating expenditure allowance.

The possibility of a base year adjustment creates an additional incentive for networks to reduce their operating expenditure over time, and so reduces future network prices for consumers.

Efficiency benefit sharing scheme

The EBSS increases and improves the incentives provided by the underlying regulatory framework.

[16] HoustonKemp calculation from data in AER, *State of the Energy Market 2021*, Figure 3.5 at p 134.

[17] This happed to a number of electricity distributors in NSW/ACT in the 2014-19 period.

The incentive rewards (or penalties) paid under the EBSS ensure that networks retain the benefits of any incremental improvements in operating expenditure (or cost of any deterioration) for a period of 6 years before that benefit (or cost) is permanently passed through to consumers.

The incremental change in operating expenditure is the difference between:[18]

- the relative position of the NSP's actual operating expenditure to its allowance in a given year; and
- the relative position of the NSP's actual operating expenditure to its allowance in the immediately preceding year.

Further, because the EBSS ensures that any reward (or penalty) is retained by the NSP for a period of 6 years, the incentive rate is the same in each year of the regulatory period. This improves the integrity of the incentives by *removing* the incentive to:

- defer productivity improvements to years when networks retain the gains for the longest period of time; and
- increase operating expenditure in the later years of the regulatory period to achieve a higher allowance in the following period.

Consequently, the EBSS ensures that:

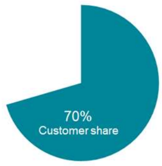
- consumers retain the majority of the incremental improvements in operating expenditure; and
- networks are encouraged to continually drive the efficient operating expenditure level lower, which reduces future network prices for consumers.

Figure 3-2 highlights that the sharing ratio of the EBSS changes depends on the discount rate used to calculate the present value of the future benefits of the improvement (or deterioration) in performance.

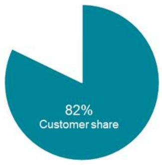
When the discount rate falls, the present value of future benefits (costs) increases. This both increases the value of ongoing cost reductions as well as increasing the share retained by consumers.

Figure 3-2 also shows that at the 2020 industry average real rate of return, the share of operating efficiency gains retained by consumers has increased from 70 per cent to 82 per cent.

Figure 3-2: Share of EBSS benefits to consumers



When the EBSS was developed (2008) the real discount rate was assumed to be 6 per cent, and so consumers retained 70 per cent of the present value of all operating cost underspends.



With the fall in the real WACC[19] the consumer's share of operating cost efficiency savings has increased to 82 per cent*

** Based on the 2020 average industry real WACC of 3.34 per cent.*

Productivity factor

A positive productivity factor has been incorporated into the operating expenditure allowances of some transmission networks since 2015.[20] The AER has also included a productivity factor of 0.5 per cent per annum in its forecast of operating expenditure for distribution networks since 2019.[21]

The implication of a positive productivity factor is to lower the operating expenditure allowance for a network. Consequently, consumers receive 100 per cent of these anticipated operating expenditure productivity improvements.

[18] For example, if an NSP's actual operating expenditure is $3 million below its allowance in 2019 and was only $1 million below its allowance in 2018, the incremental change in operating expenditure in 2019 is a $2 million improvement in performance. Further, if in 2020 the NSP's actual operating expenditure matches its allowance, the incremental change in operating expenditure would be a -$3 million deterioration in performance.

[19] Weighted average cost of capital (WACC) is the rate of return that the regulator has determined that energy networks should earn on their regulated asset base (RAB).

[20] AER, Final decision, *TransGrid transmission determination 2015−16 to 2017−18 | Attachment 7*, April 2015, p 85.

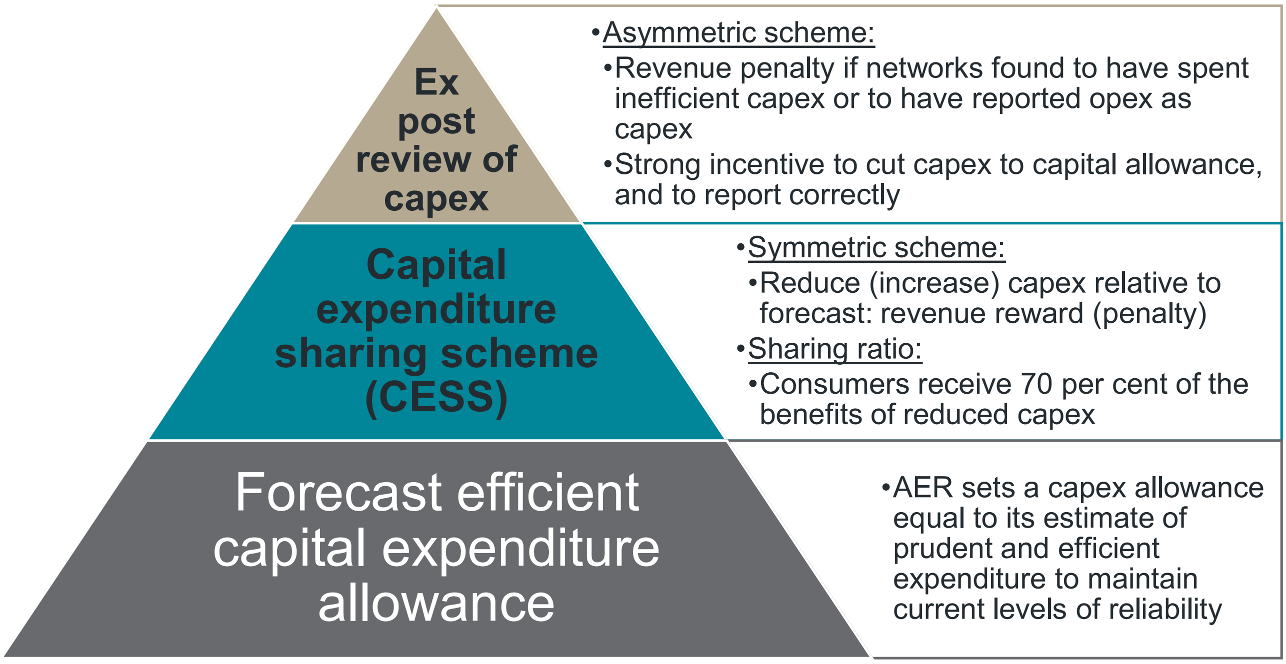
[21] AER, *Final decision paper, Forecasting productivity growth for electricity distributors*, March 2019, p 9.

4. Incentives to reduce consumer costs by efficiently investing in their networks

Key findings

- Consumers receive a fixed share (70 per cent) of any capital expenditure efficiencies under the CESS incentive scheme.
- The AER identifies and adjusts rewards (penalties) for capital expenditure that has been deferred by the network.
- The AER, in certain circumstances, can also identify recent capital expenditure that it considers is not efficient and then disallow the recovery of this expenditure.

Figure 4-1 Factors affecting capital expenditure incentives



The transportation of electricity and gas is capital intensive. Networks must recover the cost of these investments from consumers over the useful life of the assets, with most investments recovered over a 40+ year period.

Consequently, the benefits of lower than forecast capital expenditure have a small but ongoing impact on consumer prices. However, ongoing reductions in the amount of capital invested have the capacity to significantly improve consumer affordability given that capital costs represent nearly two thirds of networks' costs.[22]

This section outlines the primary incentives within the regulatory framework for networks to minimise capital costs.

[22] See AER, *State of the Energy Market 2021*.

Efficient forecast capital expenditure

The price paid by consumers for energy network services over a regulatory period includes a capital expenditure allowance. The expenditure allowance reflects the AER's view of the expected efficient costs to replace existing assets and augment the network for expected future growth over the period.

The AER uses a range of tools to assess whether the proposed capital expenditure is efficient, including past performance, statistical tools and independent experts. The AER's method for forecasting capital expenditure has been enhanced over time with the development and publication of a range of guidance notes and guidelines, including (but not limited to) the:

- Better Reset Handbook, December 2021;
- assessing distributed energy resources integration expenditure guidance note (Draft), July 2021;
- repex model outline for electricity distribution determinations, February 2020;
- capital expenditure assessment outline for electricity distribution determinations, February 2020;
- non-network ICT capital expenditure assessment approach, November 2019; and
- industry practice application note for asset replacement planning, January 2019.

However, these enhancements will only be applied to a network's subsequent regulatory reset. Consequently, the full impact of these enhancements are yet to be realised, and will be borne out in future periods.

Networks have an incentive to lower their actual capital expenditure by either delivering capex projects and programs at lower cost or by efficiently deferring expenditure to outperform their fixed allowance. However, in the absence of the CESS these incentives diminish over the regulatory period.

Outperformance means that networks have invested less capital than forecast. At the end of the regulatory period the regulatory asset base (RAB) is rolled forward for actual capital expenditure so that the benefits of lower than anticipated capital expenditure are passed through to consumers and reflected in lower network prices in subsequent regulatory periods.

Capital expenditure sharing scheme

The CESS was developed as part of the AER's 2013 Better Regulation program, with it applying to most electricity networks in 2015/16 or 2016. The CESS has been applied to Victorian gas networks since 2018.

The CESS remedied the issue with the regulatory framework that capital incentives reduced in each year of the regulatory period.[23]

The CESS removed this bias by ensuring that the network retains a fixed 30 per cent of any capital expenditure under- or over-spend. The CESS explicitly calculates the CESS carryover amount for the following regulatory period that:

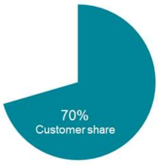
- ensures that the network retains the targeted sharing ratio in present value terms;
- includes the expected increase in future capital expenditure due to the deferment of capital expenditure from the current period; and
- has regard to any financial benefits (costs) received by the network in the current period.

As seen in figure 4-2, the CESS sharing ratio is not affected by changes in the discount rate and is designed to guarantee that consumers receive (or bear) 70 per cent of any under or overspend.

[23] Pre-CESS, networks' rewards were strongest in the first year of the regulatory period, whilst in the final year there were no rewards or penalties for networks under/overspending their capital expenditure allowances.

Figure 4-2: Share of CESS benefits to consumers

With a 6 per cent real discount rate the CESS ensures that consumers retain 70 per cent of the present value of all capital cost underspends.



Unlike the EBSS, a fall in the real WACC does not change the consumer's share of capital cost underspends, which remains at 70 per cent.

The AER also has the ability to identify and adjust rewards (penalties) for any capital expenditure that has been deferred by the network. Where expenditure is identified as being deferred the CESS benefit is equal to the time value of the deferment (rather than the avoidance of the expenditure).[24]

Additional AER review powers - capital expenditure

The AER can, at the end of a regulatory period, review a network's actual capital expenditure. This is a mechanism for the regulator to, in specific circumstances, identify capital expenditure over the preceding period above the efficient level, and to disallow the recovery of this excess expenditure.

The ex-post review allows the AER to remove inefficient capital expenditure so that it is not rolled into the RAB – or the amount that the network can recover – at the end of a regulatory period.

An ex-post adjustment operates as an additional potential penalty where networks bear 100 per cent of the cost of any inefficient expenditure. An ex-post review can only impose a penalty on the network, unlike the CESS which both rewards and penalises networks.

While these powers can have a impact on a network's incentives to invest, the circumstances that would allow the AER to apply these provisions have not arisen to date.

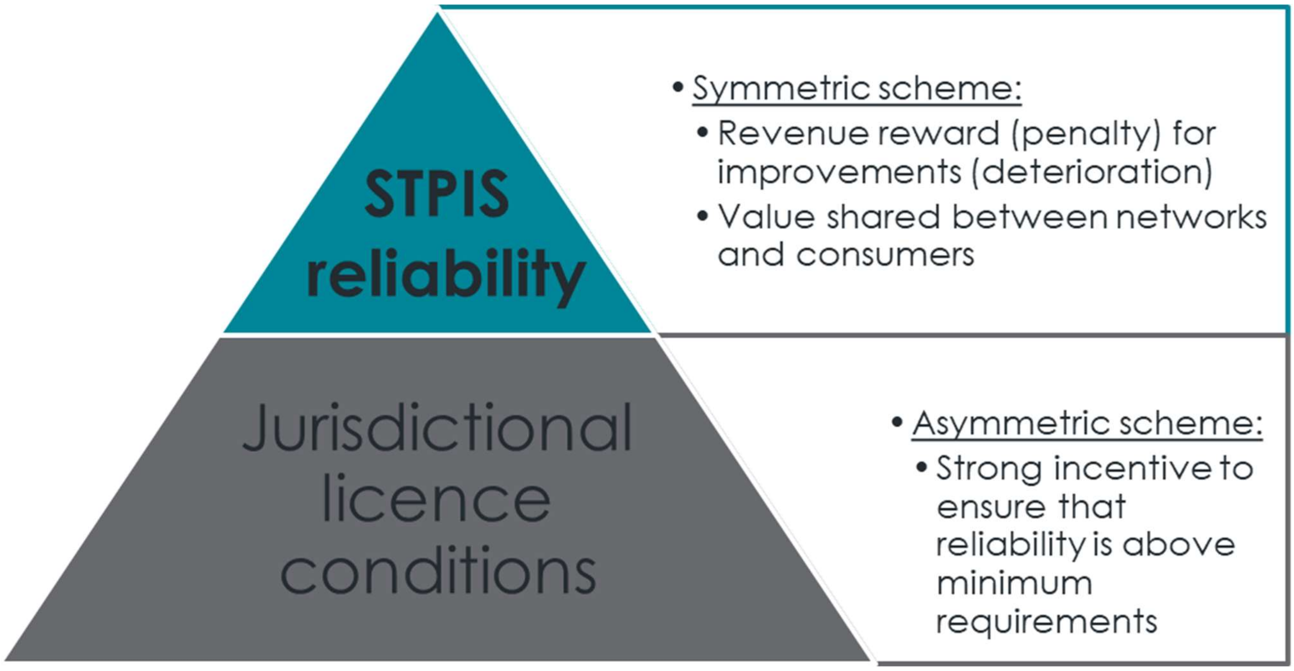
[24] For example, if the rate of return is 5 per cent, and the network is able to defer $1 million in capital expenditure for one year then the CESS benefit is $50,000 (ie, 5% of $1 million). This CESS benefit would then be shared between consumers ($35,000 or 70% of the total benefit) and the network ($15,000 or 30% of the total benefit).

5. Incentives to improve reliability of network services to consumers

Key findings

- The STPIS provides short term financial rewards to the distributor for improvements in network reliability.
- The rewards allowed under the reliability components of the STPIS match the value consumers place on improved network reliability.
- Consumers retain 78 per cent of the benefits of improved reliability, using a 6 per cent discount rate.

Figure 5-1: Factors affecting network service quality incentives



Consumers benefit from improvements, and are harmed by deteriorations, in the quality of network services. Service quality incentives aim to ensure that networks deliver optimal service levels by:

- incentivising networks not to reduce expenditure at the expense of inefficient reduction in service quality; and
- encouraging networks to improve service levels over time where it is cost effective to do so.

In a competitive market, firms must successfully balance service quality and cost efficiency to increase sales and profitability. The AER's incentive framework seeks to replicate these twin objectives.

While service quality has multiple facets, the primary service quality for electricity distribution networks is network reliability.

This section outlines the primary incentives within the regulatory framework for networks to improve network reliability.

Jurisdictional licence conditions

Networks are required to obtain an operating licence which details the requirements they must meet in order to operate a network in a state or territory.

Licences normally specify a minimum level of reliability and can potentially cover:

- overall minimum feeder reliability standards;
- a reliability standard for different distribution feeders, ie, urban, rural or remote lines;
- direct connection for larger consumers not covered by the STPIS; and
- consumer service standards.

These jurisdictional minimum service levels are generally designed to complement the AER STPIS framework.

Service target performance incentive scheme - reliability

The STPIS incentive scheme was introduced in 2007 for electricity transmission networks, with the distribution scheme introduced in 2008, which continued to incentivise reliability improvements established by jurisdictional incentive mechanisms. There is no equivalent scheme for gas networks, however, the gas CESS includes a component that reduces rewards if service quality falls.

The STPIS incentivises networks to maintain and improve service performance by:

- rewarding networks that improve network reliability; and
- penalising networks for deterioration in network reliability.

These rewards are calibrated so that the increase in network costs matches the value, estimated by the AER, that consumers place on improved reliability.

The STPIS applies to unplanned outages, so it excludes planned outages as well as extreme weather events. However, outages caused by storms are generally included since networks have some ability to partially mitigate the impacts of these events.[25]

The STPIS reliability component for distributors has three reliability measures which networks are incentivised to minimise:

- the annual duration of minutes off supply;
- the annual number of interruptions; and
- for some networks, the annual number of momentary interruptions.

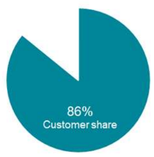
When a network is able to outperform its reliability targets, it is rewarded. However, in subsequent regulatory control periods these targets are reset to reflect the network's improved reliability and so consumers receive a higher level of reliability without incurring the cost of any additional STPIS rewards.

In this scenario consumers immediately benefit from the improved reliability. The STPIS rewards the network for the improvement in network reliability (with a two-year delay); however, the increase in network costs is calibrated to match the value that consumers place on improved reliability.

Figure 5-2 shows the share of reliability improvements that consumers retain.

Figure 5-2: Share of STPIS reliability benefits to consumers

With a 6 per cent real discount rate the STPIS reliability measures ensure that consumers retain 78 per cent of the present value of reliability improvements.



Like the EBSS, a fall in the real WACC increases the consumer's share of reliability improvements to 85 per cent*

** Based on the 2020 average industry real WACC of 3.34 per cent*

[25] Noting that major event days (MEDs) are excluded from the STPIS.

6. Conclusion

The AER's incentive schemes are designed to encourage energy networks to both improve network services whilst simultaneously lowering the costs of providing these services. The schemes also ensure that the majority of benefits from these gains are passed through to consumers.

In this report we have quantified the benefits to consumers attributable to the following three incentive schemes:

- the EBSS that encourages network to lower the cost of operating their network;
- the CESS that incentivises networks to minimise the cost of their network investments; and
- the reliability component of the STPIS for distribution networks that ensures that cost reductions are not at the expense of inefficient reductions in service quality to consumers.

Our analysis estimates that since the introduction of the incentive schemes the average consumer with both an electricity and gas service is at least $1,466 better off in present value terms (2020). Consumers with an electricity-only service are $1,290 better off. Both estimates assume a 6 per cent discount rate.

The estimated consumer benefits rise when a lower annual average industry real WACC is used. Consumers with both an electricity and gas service are $2,448 better off assuming this lower WACC, and consumers with an electricity-only service are $2,168 better off.

We find that the largest source of consumer benefits was associated with networks reducing the cost of operating and maintaining their networks. For electricity and gas customers the consumer benefits in present value terms (2020) were estimated to be $7.1 billion, or 70 per cent of the total operating expenditure gains (assuming a 6 per cent discount rate).[26]

We estimated that the consumer benefits of the CESS had a present value (2020) of at least $2.8 billion which was 70 per cent of the total benefits of lower than forecast capital expenditure (assuming a 6 per cent discount rate).[27]

We estimated that the consumer benefits from the distribution reliability STPIS was $3.5 billion in present value (2020) terms, with consumers receiving 78 per cent of the total benefits from reliability improvements (assuming a 6 per cent discount rate).[28]

Incentive schemes are one of many factors in the regulatory framework that influence the strength of incentives on networks. In assessing whether incentives are balanced, it is necessary to have regard to all factors rather than a narrow examination of only the sharing ratios of the specific incentive schemes.

Further, we note that efficiency improvements will generally require networks to commit significant upfront costs while the benefits may take a number of years to be fully realised. Consequently, networks require a stable and predictable framework that provides confidence that the rewards anticipated from investments in business improvement will be realised.

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[26] At the lower average industry real WACC the consumer gains in present value (2020) terms were estimated to be $13 billion which was 82 per cent of the total gain from lower than expected operating costs.

[27] At the lower average industry real WACC the consumer gains in present value (2020) terms were estimated to be $2.6 billion which was 70 per cent of the total gain from lower than expected capital expenditure.

[28] At the lower average industry real WACC the consumer gains in present value (2020) terms were estimated to be $6.6 billion which was 85 per cent of the total value of improved distribution reliability.

A1. Appendix Methodology for quantifying incentive scheme benefits

A1.1 Measurement of efficiency gains with respect to AER expenditure allowances

Expenditure efficiency gains have been measured by comparing actual outturn expenditure against the operating and capital ex-ante allowances independently determined by the AER.

The AER's expenditure allowances represent an independent and informed estimate of the networks' expected efficient expenditure;

- any ex-ante expenditure allowances inevitably involve a degree of uncertainty as to how future events will unfold (such as unexpected growth in customer connections, unforeseen changes in demand and unanticipated changes in the physical condition of assets);
- actual efficient costs may therefore be either above or below that forecast by the AER at the start of the regulatory period; however
- the AER has a range of assessment tools to help it determine the appropriate allowance and is required to set its best estimate of the NSP's efficient costs over the regulatory control period, further the AER is continually refining and enhancing its expenditure assessment tools with the full impact of the recent reforms to be borne out in future resets.[29]

The adoption of the AER's expenditure allowances as the yardstick against which efficiency gains are measured in our analysis is unlikely to materially impact the conclusion that the incentive schemes have led to material gains for consumers.

For example, even if the AER's expenditure allowances were assumed to systematically overstate the efficient costs of networks, and half of the outperformance is assumed to be the result of overstated allowances, the consumer benefits (assuming a 6 per cent discount rate) would still be in the order of $6.7 billion (PV, 2020).

A1.2 Discount rates

For each incentive scheme, we have calculated the benefits to consumers using a:

- real WACC of:
  - a constant 6 per cent real discount rate; and
  - an industry average of the real vanilla WACC applying each year across electricity transmission, electricity distribution and gas distribution, as reported in each PTRM/RFM; or
- nominal WACC of:
  - a constant 6 per cent real discount rate, converted to a nominal rate by Dec-Dec CPI; and
  - the industry average real rate, converted to a nominal rate by Dec-Dec CPI.

We have calculated the net present value of benefits as at 30 June 2020.

[29] See clauses 6.5.6(a), 6.5.7(a), 6A.6.6(a) and 6A.6.7(a) of the National Electricity Rules, and clauses 79 and 91 of the National Gas Rules.

A1.3 CESS

Data:

We have relied on capital expenditure underspends and deferments reported in final decision CESS models for each business. For years in which CESS models were not available, actual and forecast allowance capital expenditure data was sourced from the AER's 2021 operational performance report.[30]

Customer numbers for the CESS, EBSS and STPIS calculations were sourced from ENA from RIN data and supplemented by RIN data where necessary.[31]

Methodology:

The steps used to calculate the benefits from the CESS were as follows:

- input total from the NSP CESS models including:
  - net nominal underspend/overspend per year (including ½ year WACC);
  - deferment (as a negative (overspend) value); and
  - NPV of the underspend/overspend at a given point in time;
- for years where data was not available from the NSP's CESS model we have inputted RIN data of the inflation adjusted capital expenditure allowance and actual capital expenditure;
- use 30 per cent sharing ratio to determine allocation to NSPs and consumers each year;
- calculate the net present value as at 30 June 2020 of total, consumer and NSP benefits using the nominal discount rate:
  - for the industry discount rate, NPV of underspend reported in the CESS model adjusted to 30 June 2020 plus the present value of any under(overspend) from the RINs in years that the CESS model did not apply; and
  - for the 6 per cent constant discount rate,
    - multiply each year's benefits by the appropriate discount factor, adjusting for a half year WACC; and
    - sum the benefits from each year; and
- calculate per customer values for total, NSP and consumer benefits (divide by appropriate customer numbers).

A1.4 EBSS

Data:

We have relied on forecast operating expenditure allowance for EBSS purposes and actual operating expenditure for EBSS purposes reported in final decision EBSS models as the primary source of data.

In the most recent years where EBSS models were not available for a given business, we have drawn actual operating expenditure from economic benchmarking RINs (or annual RINs for gas businesses) and forecast operating expenditure allowance from the most recent final decision operating expenditure model for the business. When collecting data from operating expenditure models and RINs, we have accounted for the relevant operating expenditure categories excluded from EBSS calculations for each business, based on the

[30] AER, *Electricity network performance report 2021*, 22 September 2021, financial performance data spreadsheets.

[31] ENA, ENA Model – Rewarding Performance – Incentive analysis and Table 3.4.2 of the DNSP annual economic benchmarking RIN.

most recent final decision or EBSS model for that business, to ensure consistency with the EBSS model data.[32]

These forecast and actual operating expenditure data were used to calculate the incremental operating expenditure efficiency gains made by a business each year, as described under 'methodology' below.

In earlier regulatory periods where EBSS models were not published by the AER, we calculated incremental efficiency gains directly from EBSS revenue increments or carryover amounts reported in final decision PTRMs. For example, the incremental gain for a business in 2010 can be calculated as the difference between the carryover amount in 2015 and 2016, adjusted for inflation.

Where the required PTRM data was unavailable or unsuitable (in particular, for TransGrid from 2006 – 2009 and the Victorian DNSPs from 2006 – 2008), we have drawn on regulatory decisions to collect data on actual and forecast operating expenditure for EBSS purposes.

<u>Methodology:</u>

The steps used to calculate the benefits from the EBSS were as follows:

- calculate the present value of a $1 incremental gain/loss in each year, in particular:
  - the present value to a network of a $1 incremental gain/loss for the first six years;
  - the total present value of a $1 incremental gain/loss calculated as the sum of:
    - the present value of $1 gain/loss in each year of the 2006-20 period; and
    - the present value of a $1 per annum gain/loss for the post-2020 period ; and
  - the present value of benefits to consumers = total benefits – NSP benefit;
- convert all input data for calculating incremental operating expenditure efficiency gains (ie, actuals, forecasts and PTRM increments) to real $2020;
- use forecast and actual operating expenditure for EBSS purposes to calculate the incremental efficiency gains for each business each year, ie;
  - where year t is the first year of a regulatory period, cumulative gain in year t ; or
  - for all other years, cumulative gain in year t ;
- sum the incremental gains for each year NEM-wide to assess total patterns;
- when the EBSS applies, multiply the incremental gains by the NSP and consumer benefits per dollar to obtain total NSP and consumer benefits in real 2020 terms;
- bring the values forward to NPV as at June 2020, using the real discount rate; and
- sum the values across years and divide by customer numbers to obtain total, NSP, and customer benefits.

[32] Exclusions included (but were not limited to) debt raising costs, network support costs, demand management expenditure and guaranteed service level (GSL) payments. EBSS operating expenditure exclusions varied from business to business.

A1.5 STPIS reliability (DNSP only)

Data:

We have relied on the AER's 2021 DNSP operational performance report for SAIDI and SAIFI performance data (ie, minutes off supply and number of interruptions for each business each year from 2006-2020).[33] This data is used to calculate the change in the annual duration and frequency of interruptions for an average customer.

The AER's 2021 DNSP operational performance report was also used as the source of energy delivered by each distribution network for each year from 2006-2020.[34] This data was used to calculate the average energy delivered per minute.

We have used the following data to estimate the value of changes in SAIDI and SAIFI:

- the AER's STPIS guidelines for appropriate SAIDI and SAIFI VCR values. VCR values that reflect the new SAIDI/SAIFI weightings were used for NSW, ACT and Tas DNSPs in 2020 for their new regulatory period; and
- to account for the different VCR values attributed to different network segments (CBD, urban and other) we have used customer number breakdowns for each network type sourced from ENA (which was sourced from the RINs) and supplemented by RIN data where necessary.[35]

This data was used to value changes in network reliability:

- the SAIDI portion of the VCR (weighted by network segment customer numbers) was used to attribute a value for the change in energy delivered due to changes in network SAIDI; and
- the SAIFI portion of the VCR (weighted by network segment customer numbers) was used to attribute a value for the change in energy delivered due to changes in network SAIFI (together with the assumption that of the average length of a network interruption).

Apportioning the VCR to a network's SAIDI and SAIFI performance mitigates the risk of any double counting of the benefits from the reduction in the duration of interruptions.

We have adopted this approach as it is consistent with the method used to calculate DNSP rewards and penalties under the distribution STPIS reliability component. Other approaches to valuing changes in network reliability could be adopted that more directly estimate the value consumers place on changes in SAIFI. However, this requires estimates of the value customers place on outage frequency, which to our knowledge do not exist for Australian consumers and is likely to be dependent on when outages are assumed to occur, ie, during peak or off-peak periods, and whether it occurs in the summer or winter.

Methodology:

At a high level we have calculated consumer gains from improvements in actual annual distribution network reliability (duration and frequency) from one year to the next. The steps used to calculate the benefits from the distribution STPIS reliability component were as follows:

- calculate the present value of $1 perpetual improvement in annual actual reliability gain/loss for each year, in total, to a DNSP and to consumers;
- calculate gross consumer benefits from SAIDI;
- separately, calculate gross consumer benefits from SAIFI; and

[33] AER, *Electricity network performance report 2021*, 22 September 2021, financial performance data spreadsheets.

[34] AER, *Electricity network performance report 2021*, 22 September 2021, financial performance data spreadsheets.

[35] ENA, ENA Model – Rewarding Performance – Incentive analysis and Table 3.4.2 of the DNSP annual economic benchmarking RIN.

- calculate the net present value of SAIDI and SAIFI benefits to consumers, DNSPs & total (all gains/losses converted to 30 June 2020 present value terms (using real discount rate)).

The more detailed steps for calculating the present value of a perpetual change in reliability were:

- calculate the present value of $1 incremental gain/loss in each year, in particular;
  - the present value to a network of a $1 gain/loss for years 3-7;
  - the total present value of a $1 incremental gain/loss calculated as the sum of:
    - the present value of $1 gain/loss in each year of the 2006-20 period; and
    - the present value of a $1 per annum gain/loss for the post-2020 period ; and
  - the present value of benefits to consumers = total benefits – NSP benefit.

The more detailed steps used to calculate the benefits from SAIDI were:

- For each network, each year, calculate:
  - (A) energy delivered per minute per customer;
  - (B) annual incremental change in outage minutes per customer;
  - (C) incremental energy delivered per customer = A * B; and
  - (D) value of incremental energy delivered = C * weighted average VCR, where
    - weighted average VCR[36] = CBD customers * CBD VCR + urban customers * urban VCR + other customers * other VCR.

The more detailed steps used to calculate the benefits from SAIFI were:

- For each network, each year, calculate:
  - (A) energy delivered per minute per customer;
  - (B) annual incremental change in interruptions per customer;
  - (C) assumed length of interruption = SAIDI/SAIFI;
  - (D) incremental energy delivered = A * B * C; and
  - (E) value of incremental energy delivered = D * weighted average VCR, where
    - weighted average VCR = CBD customers * CBD VCR + urban customers * urban VCR + other customers * other VCR.

[36] VCR values for each network type taken from clause 3.2.2 of the AER, Electricity distribution network service providers | Service target performance incentive scheme | Version 2.0, November 2018.

A2. Impact of using an industry average real WACC discount rate

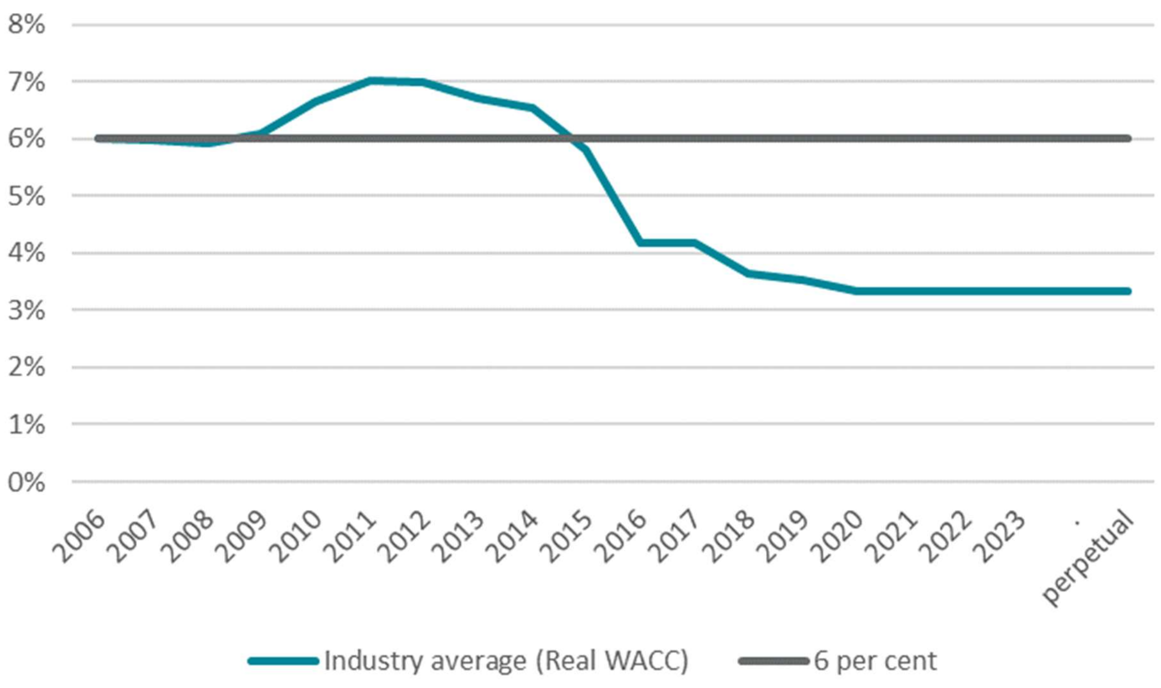
The impact of changes in network expenditure efficiency or network reliability will have an impact on consumers over a number of different years. To allow for a meaningful assessment of these annual impacts we have converted all values to a common point in time (30 June 2020) using a discount rate.

In this report we have focused on the present value of consumer benefits using a 6 per cent discount rate, which aligns with the discount rate used by the AER to calculate the sharing of efficiency gains between consumers and networks when developing the EBSS and CESS.[37]

However, an alternative to assuming a 6 per cent discount rate would be to use a value that corresponds to the opportunity cost of capital for the electricity and gas network sector. We have estimated this value using the average real weighted average cost of capital (real WACC) as determined by the AER. Further, we have assumed that in future years the average industry real WACC is unchanged from the last period observed (ie, 2020).[38]

Figure A 1, sets out over time the two alternative discount rates.

Figure A 1: Alternative discount rates



The discount rate has a material impact on the estimated consumer benefits from both the EBSS and STPIS, since both these schemes assume that consumers retain in the long term any efficiency gains (losses) made

[37] See AER, *Better regulation | Capital Expenditure Incentive Guideline for Electricity Network Service Providers | Explanatory statement*, November 2013, p 46. AER, *Better regulation | Efficiency benefit sharing scheme for Electricity Network Service Providers | Explanatory statement*, November 2013, p 34.

[38] The adoption of that the future WACC is equal to the last observed rate is consistent with recent observations contain the most up to date market information of future market conditions.

by networks. As a consequence, the assumption that the industry average real WACC is substantially below 6 per cent in future periods increases the value of any future consumer benefits.[39]

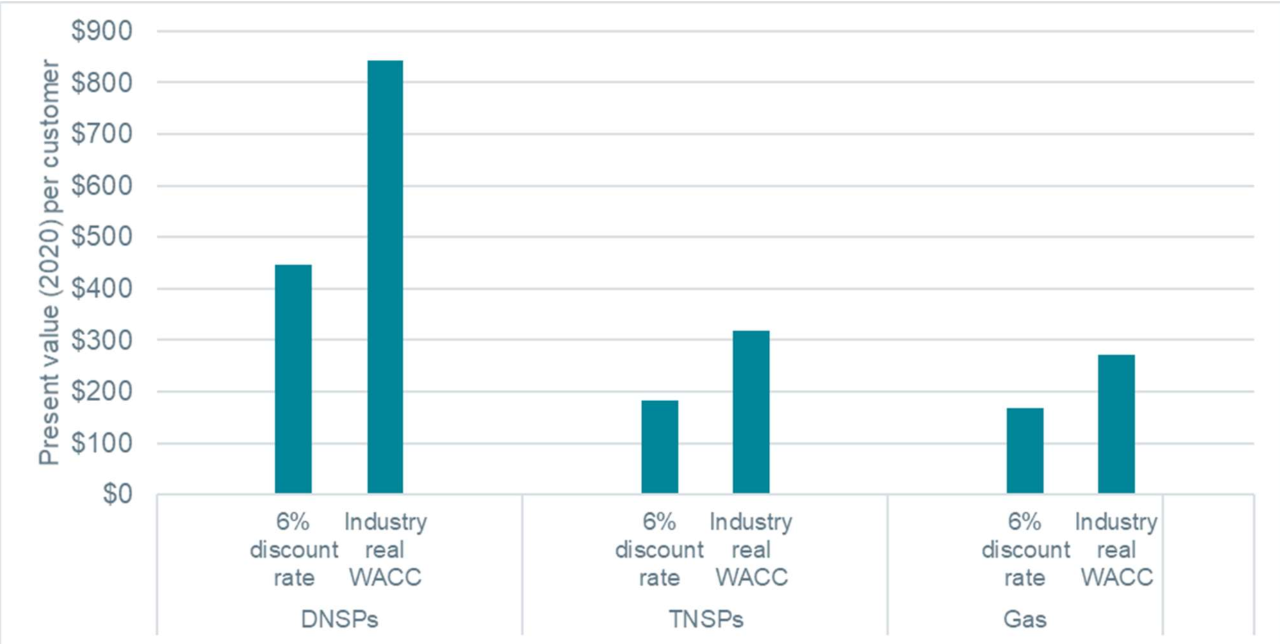
Using the average industry discount rate increases the present value (2020) of total consumer benefits from $13.4 billion (using a 6 per cent discount rate) to $22.3 billion.

On a 'per consumer' basis, adopting the lower average industry real WACC results in the estimated consumer benefits generated by the AER's incentive schemes increasing to $2,448 for an electricity and gas customer. Consumers with an electricity-only service would be $2,168 better off.

This is primarily due to higher consumer benefits from the EBSS, with the present value of estimated consumer benefits (2020) increasing to $12.1 billion (electricity and gas) from $6.6 billion using a 6 per cent real discount rate. Further, using the average industry discount rate results in consumers retaining over 80 per cent of the total operating expenditure gains.

Figure A 2 shows the breakdown of the present value of the EBSS consumer benefits (per customer) by different network types using the two different discount rates.

Figure A 2: Present value (2020) of consumer benefits attributable to the EBSS (per customer)



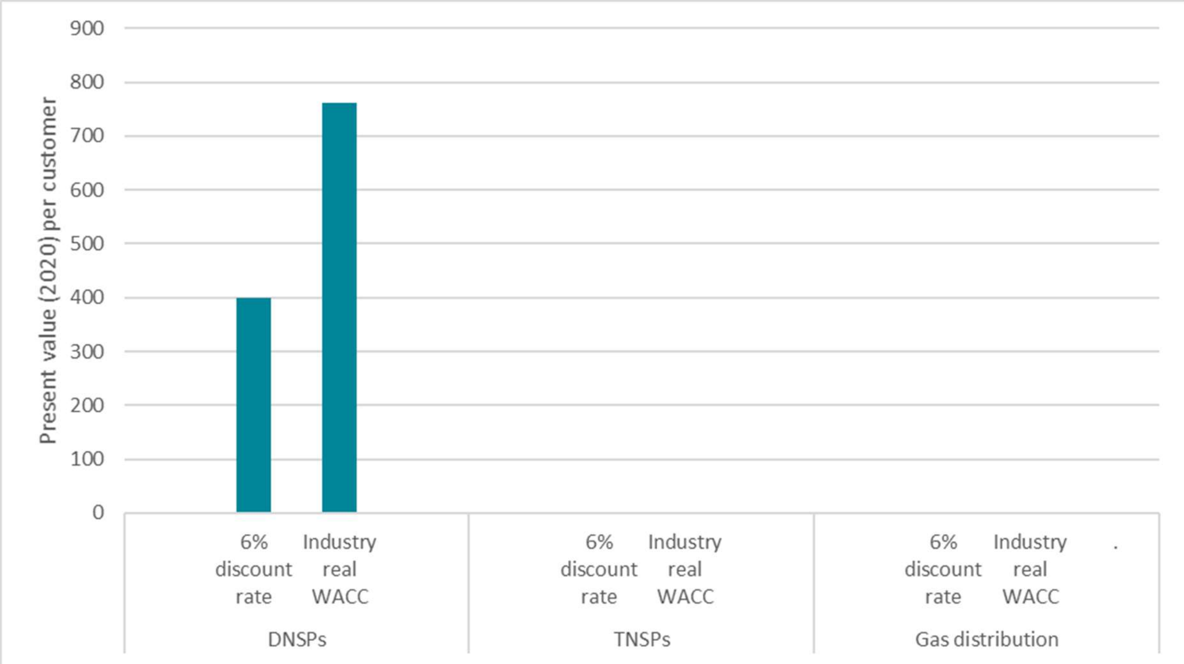
The impact of using a lower average industry real WACC on the present value (2020) of the improvements in electricity distribution reliability to consumers is that:

- the value of the reduced number of service interruptions to consumers increases from $3.1 billion (using 6 per cent) to $5.8 billion, and increases the proportion of the gains retained by consumers from 78 per cent to 85 per cent; and
- consumer value from a lower number of minutes off supply increases from $0.4 billion to $0.75 billion, and the proportion of the gains retained by consumers increases from 78 per cent to 84 per cent.

[39] For example, a $100 consumer gain in 2030 has a present value as at 2020 (ie, a gain 10 years in the future) of $55.84 using a 6 per cent discount rate. However, using a 3.34 per cent discount rate that $100 in consumer gains in 2030 has a present value of $72.00. In other words, adopting the lower discount rate results in a 29 per cent increase in the present value of the $100 consumer gain in 2030.

Figure A 3 shows the net present value of the consumer benefits of improvements in distribution reliability.

Figure A 3: Present value (2020) of consumer benefits attributable to distribution reliability STPIS (per customer)



The use of the average industry real WACC does not materially change the estimated consumer benefits delivered by the CESS.[40] This is because the CESS, unlike the EBSS and STPIS, does not involve networks retaining benefits for a fixed period of time. Instead, the CESS rewards are explicitly calculated to ensure the networks receive a fixed sharing ratio.

[40] The present value (2020) of the consumer gains attributable to the CESS (electricity and gas) using the industry average real rate of return, is $2.6 billion which is $155 million lower than using a 6 per cent real discount rate.

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