ACIL ALLEN CONSULTING

REPORT TO
QUEENSLAND COMPETITION AUTHORITY
2 SEPTEMBER 2019

ADVANCED DIGITAL METERS

ESTIMATING THE POTENTIAL NET BENEFITS

FINAL REPORT

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EXECUTIVE SUMMARY

The Minister for Natural Resources, Mines and Energy is seeking to better understand the benefits associated with the deployment of advanced digital meters and has issued a direction to the Queensland Competition Authority (QCA) seeking the following advice:

- *The potential benefits that may be realised by the various participants in the electricity supply chain.*
- *The extent to which these benefits are currently being realised by these participants.*
- *The barriers, if any, which currently limit potential benefits being passed through to customers and other participants in the electricity supply chain.*[1]

The QCA has engaged ACIL Allen Consulting (ACIL Allen) to assist it in providing advice on the potential net benefits of the deployment of advanced digital meters for customers in the Energex and Ergon Energy distribution zones.

In providing this advice, we must have regard to the retailers' advanced digital metering deployment strategies, including deployments completed by 1 July 2019 and forecast installations to:

- estimate the costs incurred and benefits accrued from using advanced digital meters by various participants within the electricity sector, including but not limited to retailers, distribution and transmission network entities, generators and market administrators
- estimate the costs incurred and benefits accrued from using advanced digital meters by small retail customers in 2018–19 and future years, regardless of whether these customers act to realise the benefits from using advanced digital meters
- estimate the net benefits that advanced digital meters offer over accumulation meters, should there be no barriers to prevent realisation of these benefits
- estimate the net benefits expected to be realised by various participants (including small retail customers) on 30 June 2019, compared to 30 June 2020 and over the period until the expected maximum of advanced digital meter deployment is reached
- identify and assess the barriers for various participants (including small retail customers) to realise the net benefits associated with advanced digital meters and the potential outcomes if the barriers are not addressed
- where possible, provide an annual value of net benefits accrued by each participant (including small retail customers), adjusted for the impacts of barriers to achieving the benefits.

[1] Letter from the Minister to the QCA dated 5 April 2019

Identification of costs and benefits

The costs and benefits associated with installing advanced digital meters in Energex's and Ergon Energy's distribution zones have been assessed over the period to 2049.

The costs and benefits were identified by reference to previous analyses of the costs and benefits of smart meters, including assessments of the costs and benefits of the rollout of smart meters undertaken:

- in 2011 by Deloitte for the Victorian Government[2]
- in 2016 by the UK Government (the Department for Business, Energy & Industrial Strategy).[3]

The broad categories of costs and benefits identified are:

1. the costs to install, operate and maintain the advanced digital meters
2. less the costs that are avoided by installing advanced digital meters – the costs of the conventional meters that would otherwise have been installed and for manually reading these meters
3. benefits that accrue directly to the customer, for example, the difference between the cost of a special meter read that is undertaken manually and the cost of a special meter read that is undertaken remotely
4. benefits that accrue to the network businesses, which would be expected to be passed through to customers over time through the regulatory process
5. benefits that accrue to the retailer, which would be expected to be passed through to customers in a competitive market
6. benefits that accrue to other parties.

The full list of costs and benefits that have been considered are summarised in Table ES 1**,** with an assessment as to whether:

- the benefits that have been identified are realisable
- there are barriers to the realisation of the benefits identified, and therefore whether they are referred to in our analysis as potential benefits.

This assessment is made separately with respect to advanced digital meters installed in Energex's and Ergon Energy's distribution zones.

In summary, the barriers to the realisation of benefits associated with advanced digital meters are:

- Safety – if the regulations[4] are changed to allow remote de-energisation and re-energisation, the costs associated with de-energisation and re-energisation would reduce.
- Real-time data – if the distributors are able to access real-time data, then they would be able to use this data to identify faults more quickly without customers ringing up to report the fault, and to restore supply more quickly and efficiently.
- Cost reflective tariffs – if all customers with an advanced digital meter are on a cost reflective tariff then the benefits associated with shifting energy from peak to off-peak times and for deferring augmentation of the network with a reduction in peak demand, would increase.
- Quality data – if the meters are able to monitor voltage and quality of supply, and the distributors were able to access this data, then the costs associated with investigating complaints about quality of supply would decrease.

[2] Deloitte, *Advanced metering infrastructure cost benefit analysis, Final report*, 2 August 2011

[3] Department for Business, Energy & Industrial Strategy, *Smart Meter Roll-out Cost-Benefit Analysis, Part II – Technical Annex*, August 2016

[4] *Electricity Safety Act*, section 220

TABLE ES 1 SUMMARY OF THE COSTS AND BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS

Category	Type of cost / benefit	Description	Energex distribution zone	Ergon Energy distribution zone
Cost	Advanced digital meters	Cost associated with installing, operating and maintaining an advanced digital meter and the costs associated with managing the metering data from that meter	Incurred	Incurred
	IT systems	The incremental costs associated with the IT systems for managing the advanced digital meters and associated metering data	Incurred by each retailer operating in Energex's distribution zone	Incurred
Avoided cost	Meter	The costs that would otherwise be incurred to install a conventional meter: – for new connections – when meters are replaced – when a solar system is installed	Realisable	Realisable
	Manual meter reading	The costs associated with manually reading the meter that are avoided when a meter can be read remotely	Realisable	Realisable
Direct customer benefit	Special meter read	The difference in cost between a special meter read that is undertaken manually when, for example, a customer moves out, and a special meter read that is undertaken remotely[5]	Realisable	Realisable
	Re-energisation after hours	The difference in cost between a re-energisation that is undertaken manually after hours when, for example, a customer moves in, and a re-energisation that is undertaken remotely	Potential – remote re-energisation not permitted under Queensland regulations	Potential – remote re-energisation not permitted under Queensland regulations
	Reduction in energy consumption	Reduction in energy consumption arising from the improved data that is available from advanced digital meters, and the ability for this information to be provided to customers on a more timely basis	Realisable for 5 per cent of customers with advanced digital meters assumed to be on Time of Use (TOU) tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff	Realisable for 0.5 per cent of customers with advanced digital meters assumed to be on TOU tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff
	Shift in energy consumption from peak to off-peak periods	A shift in energy consumption from peak to off-peak times arising from the introduction of more cost reflective tariffs that are enabled by advanced digital meters	Realisable for 5 per cent of customers with advanced digital meters assumed to be on TOU tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff	Realisable for 0.5 per cent of customers with advanced digital meters assumed to be on TOU tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff

[5] In some cases, retailers do not pass on the cost of special meter reads to customers. The benefit would then be realised by the retailers which is then passed through to customers through the operation of the competitive market.

Category	Type of cost / benefit	Description	Energex distribution zone	Ergon Energy distribution zone
	Queries regarding estimated reads	Electricity bills do not need to be estimated with an advanced digital meter installed, which results in a reduction in queries by customers of estimated bills	Realisable	Realisable
	Complaints regarding estimated reads	A reduction in queries by customers of estimated bills results in a reduction in the number of complaints by customers about estimated bills	Realisable	Realisable
	More timely customer transfers	With conventional meters, customer transfers to a different retailer generally occur at the time of the next manual meter read. Customer transfers can occur more quickly when an advanced digital meter is installed as the meter can be read remotely	Realisable	Potentially realisable with effective retail competition in Ergon Energy's distribution zone
	Calls to faults and emergencies line	Over time, customers will be confident that the network business is aware that a fault has occurred based on data from advanced digital meters, and will reduce the number of calls they make to the faults and emergencies line	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
	Earlier fault notification	Network businesses will be able to identify faults more quickly using data from advanced digital meters	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
	Faster restoration of supply	Network businesses will be able to resolve a fault more quickly with information from advanced digital meters on the nature, location and scope of an outage	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
Network benefit	De-energisation	The difference in cost between a de-energisation that is undertaken manually when, for example, a customer moves out, and a de-energisation that is undertaken remotely	Potential – remote de-energisation not practicable initially. Retailers continuing to request manual de-energisation Assumed to be realisable when 60 per cent of meters installed are advanced digital meters	Potential – remote de-energisation not practicable initially. Retailers continuing to request manual de-energisation Assumed to be realisable when 60 per cent of meters installed are advanced digital meters
	Re-energisation during business hours	The difference in cost between a re-energisation that is undertaken manually during business hours when, for example, a customer moves in, and a re-energisation that is undertaken remotely	Potential – remote re-energisation not permitted under Queensland regulations	Potential – remote re-energisation not permitted under Queensland regulations
	Reduction in peak demand	If customers respond to the data from advanced digital meters by reducing their peak demand, then augmentation of the network can be deferred	Realisable for 5 per cent of customers with advanced digital meters assumed to be on TOU tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff	Realisable for 0.5 per cent of customers with advanced digital meters assumed to be on TOU tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff

Category	Type of cost / benefit	Description	Energex distribution zone	Ergon Energy distribution zone
	Improved planning	The data from advanced digital meters will enable network businesses to better plan the network, and reduce the costs associated with asset replacement and connections	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
	Reduced operating costs to fix faults	The network businesses will be able to deploy their workforces more efficiently to restore supply using information from advanced digital meters on the location and scope of outages	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
	Calls to faults and emergencies line	Over time, customers will be confident that the network business is aware that a fault has occurred based on data from advanced digital meters, and will reduce the number of calls that are made to the network businesses' faults and emergencies lines	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
	Avoided cost of investigations into quality	Costs associated with investigating complaints about voltage and quality of supply could be avoided using data available from the advanced digital meter	Potential – if advanced digital meters had the functionality to monitor voltage and quality of supply	Potential – if advanced digital meters had the functionality to monitor voltage and quality of supply
	Reduction in Guaranteed Service Level (GSL) payments	The number of GSL payments made by the distributor could be reduced:		
		– Timely reconnection – by remotely re-energising customers rather than manually re-energising them	Potential – remote re-energisation not permitted under Queensland regulations (but not material)	Potential – remote re-energisation not permitted under Queensland regulations (but not material)
		– On time appointments – by reducing the number of appointments required by remotely interrogating the advanced digital meter	Realisable (not material)	Realisable (not material)
		– Interruption duration – by restoring supply more quickly	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
Retailer benefits	Debt management	With advanced digital meters, retailers will be able to manage debt more efficiently and effectively by issuing smaller bills more frequently that customers are more able to pay on a timely basis, and by more timely interventions where a customer is facing payment difficulties	Realisable	Realisable
	Electricity theft	Advanced digital meters facilitate the more timely identification of potential electricity theft	Realisable	Realisable
	Calls regarding estimated reads	Electricity bills do not need to be estimated when an advanced digital meter is installed, which results in a reduction in the number of calls to the retailer's call centre in relation to estimated bills	Realisable	Realisable

Category	Type of cost / benefit	Description	Energex distribution zone	Ergon Energy distribution zone
	Complaints regarding estimated reads	A reduction in the number of calls in relation to estimated bills results in a reduction in the number of complaints about estimated bills that need to be managed by the retailer	Realisable	Realisable
	Investigations re estimated bills	A reduction in the number of complaints in relation to estimated bills results in a reduction in the number of investigations into estimated bills that need to be managed by the retailer	Potential – if advanced digital meters are required to monitor voltage and quality of supply and Energex has access to this data	Potential – if advanced digital meters are required to monitor voltage and quality of supply and Ergon Energy has access to this data
	Complaints to the Ombudsman re estimated reads	A reduction in the number of estimated bills reduces the number of complaints made to the Ombudsman in relation to estimated bills, which reduces the fees paid by the retailer to the Ombudsman	Realisable	Realisable
	Investigations by Ombudsman into estimated reads	A reduction in the number of complaints made to the Ombudsman in relation to estimated bills reduces the number of investigations undertaken by the Ombudsman into estimated bills, which reduces the fees paid by the retailer to the Ombudsman	Realisable	Realisable
	More timely customer transfers	The direct benefits to customers of more timely customer transfers when an advanced digital meter is installed is a cost to the retailers	Realisable	Potentially realisable with effective retail competition in Ergon Energy's distribution zone
Other benefits	Reduction in peak demand – generation deferral	If customers respond to the data from advanced digital meters by reducing their peak demand, then augmentation of the generation capacity can be deferred	Not material – investments in generation capacity driven more by Government policy than increases in peak demand	Not material – investments in generation capacity driven more by Government policy than increases in peak demand
	Greenhouse gas emissions	If customers respond to the data from advanced digital meters by reducing their electricity consumption, then greenhouse gas emissions are avoided	Realisable – assumes a price on greenhouse gas emissions avoided Potential – increase in greenhouse gas emissions reductions if all customers are on a TOU tariff	Realisable – assumes a price on greenhouse gas emissions avoided Potential – increase in greenhouse gas emissions reductions if all customers are on a TOU tariff

SOURCE: ACIL ALLEN ASSESSMENT

Assumptions

A range of assumptions were made to quantify the costs and benefits associated with installing advanced digital meters. These assumptions were sourced from:

- an Information Request that was sent to retailers operating in Queensland
- publicly available information, including the Regulatory Information Notices submitted to the Australian Energy Regulator (AER) by Energex and Ergon Energy, their regulatory proposals for the 2020-25 regulatory period, and approved price lists
- a 2011 study for the Victorian Government on the costs and benefits of smart meters
- a 2016 study by the UK Government (the Department for Business, Energy & Industrial Strategy) on the costs and benefits of smart meters
- our analysis.

Net benefits associated with advanced digital meters – 2019 and 2020

The net benefits associated with installing advanced digital meters in 2019 and 2020, for customers in Energex's and Ergon Energy's distribution zones, are set out in Table ES 2 and illustrated in Figure ES 1.

The net realisable benefits are estimated to be negative in Energex's distribution zone in 2019 and 2020, and positive in Ergon Energy's distribution zone. The net realisable benefits are higher in Ergon Energy's distribution zone than in Energex's distribution zone largely because:

1. The net costs associated with installing advanced digital meters are relatively lower in Ergon Energy's distribution zone as it is assumed that none are installed based on retailer / customer choice. The incremental costs associated with meters installed by retailer / customer choice are higher than for meters installed on a new and replacement basis or where a solar system is installed.
2. The IT costs in Energex's distribution zone are higher, particularly in 2019. In 2019, one of the retailers in Energex's distribution zone has allocated substantial IT costs to Queensland associated with the Power of Choice and five minute settlement rule changes. Additionally, there are more retailers operating in Energex's distribution zone, each of which incurs its own IT costs.

If the potential additional benefits are also considered then the net benefits in Energex's distribution zone are negative in 2019, largely due to the high IT costs in 2019, and positive in 2020.

The realisable benefits represent 64 per cent of the total benefits in Energex's distribution zone and 65 per cent of the total benefits in Ergon Energy's distribution zone in 2019.

The most significant realisable benefit in 2019 is the avoided costs of installing conventional meters and manually reading these meters. These costs would otherwise be incurred by distributors or Metering Coordinators and passed through to customers.

The most significant potential benefits in 2019 are the shift in energy consumption from peak to off-peak times and the deferral of augmentation expenditure with the reduction of peak demand, if all customers with advanced digital meters were on TOU tariffs.[6] There are also significant potential benefits if customers could be remotely de-energised or re-energised.

[6] We have included the average change in energy consumption by customers – there would be some customers that change their energy consumption by more than the average assumed and some that would change their energy consumption by less than the average assumed.

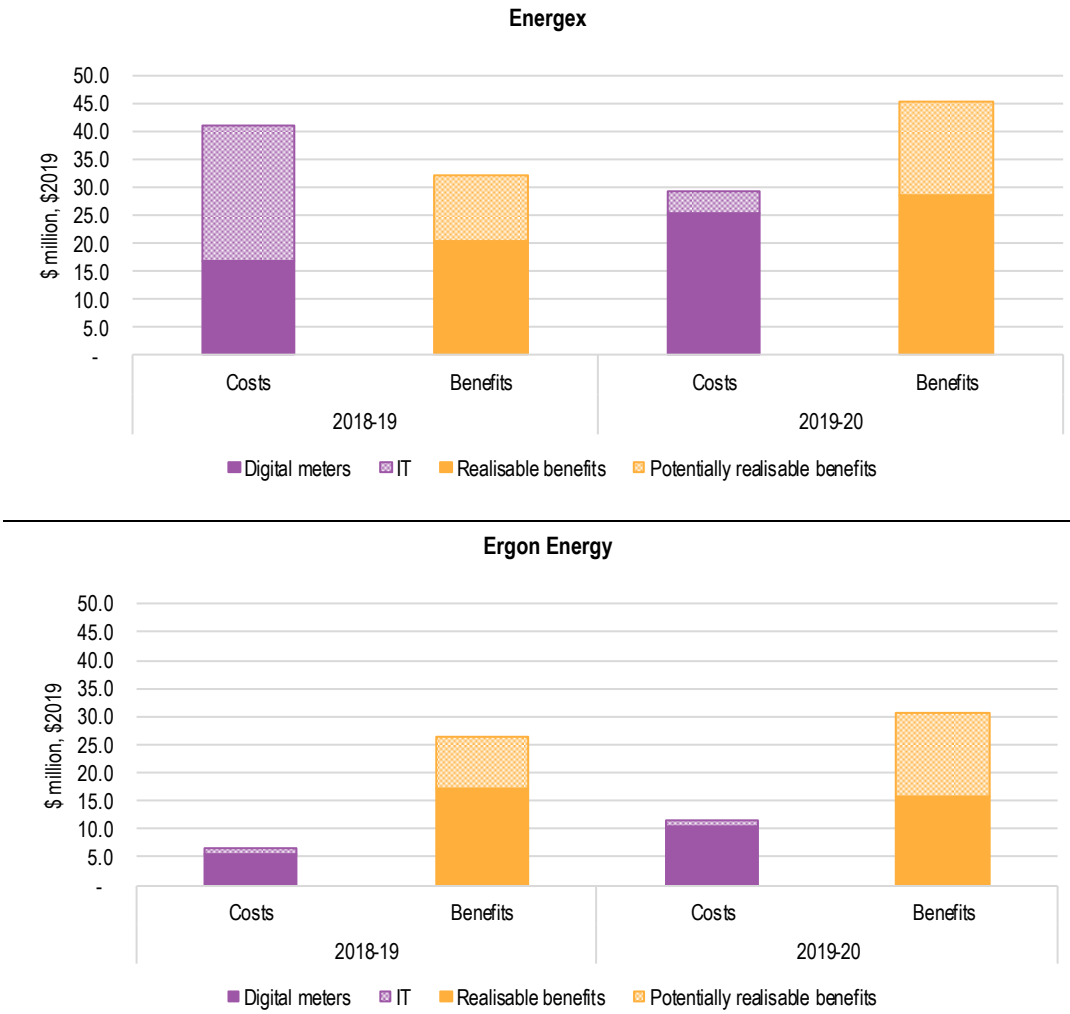
TABLE ES 2 NET BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, 2019 AND 2020, $ MILLION

	Energex		Ergon Energy	
	2019	2020	2019	2020
Advanced digital meters	17.0	25.4	5.4	10.3
IT costs	24.0	3.9	1.2	1.2
Total costs	***41.0***	***29.3***	***6.6***	***13.8***
Realisable benefits	20.5	28.6	17.1	15.9
Net realisable benefits	**(20.5)**	**(0.7)**	**10.5**	**4.4**
Potential additional benefits	11.7	16.7	9.4	14.6
Net potential benefits	**(8.8)**	**16.0**	**19.9**	**19.0**

Note: Totals may not add due to rounding

SOURCE: ACIL ALLEN MODELLING

FIGURE ES 1 NET BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, 2019 AND 2020



SOURCE: ACIL ALLEN MODELLING

Net benefits associated with advanced digital meters to 2049

The net benefits associated with installing advanced digital meters, to 2049 in Net Present Value (NPV) terms, for customers in Energex's and Ergon Energy's distribution zones, are set out in Table ES 3 and illustrated in Figure ES 2.

TABLE ES 3 NET BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, NPV TO 2049, $ MILLION

	Energex	Ergon Energy
Advanced digital meters	2,022.8	935.1
IT costs	137.5	22.0
Total costs	***2,160.4***	***957.1***
Realisable benefits	1,079.2	849.7
Net realisable benefits	**(1,081.2)**	**(107.3)**
Potential additional benefits	874.9	820.9
Net potential benefits	**(206.3)**	**713.6**

Note: Totals may not add due to rounding

SOURCE: ACIL ALLEN MODELLING

The net realisable benefits in Energex's and Ergon Energy's distribution zones are negative to 2049 in NPV terms. The net potential benefits are negative in Energex's distribution zone and positive in Ergon Energy's distribution zone to 2049 in NPV terms.

The realisable benefits represent 55 per cent of the total benefits in Energex's distribution zone and 51 per cent of the total benefits in Ergon Energy's distribution zone to 2049 in NPV terms.

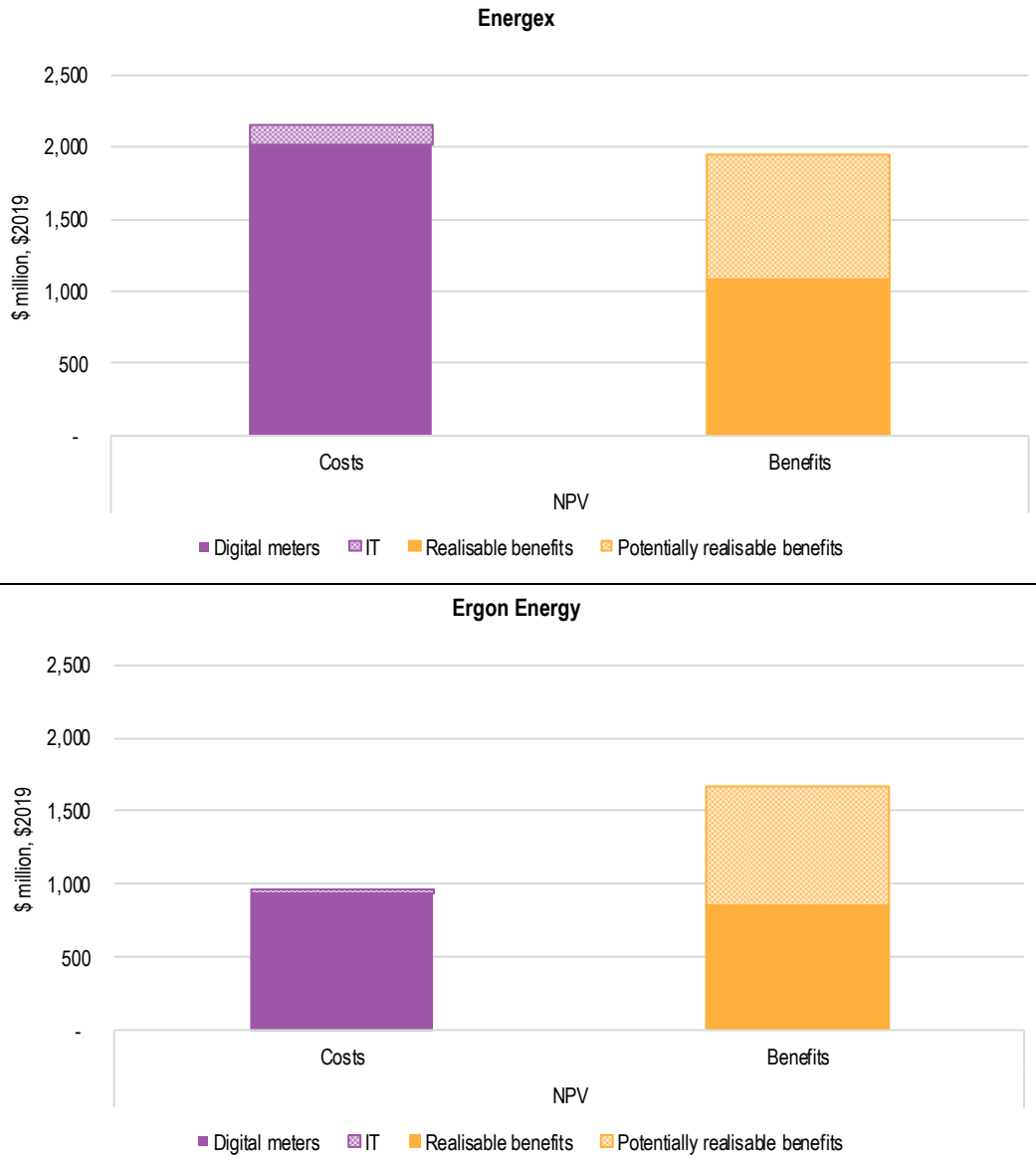
The most significant realisable benefit to 2049 is the avoided costs of installing conventional meters and manually reading these meters. These costs would otherwise be incurred by the distributors or Metering Coordinators and passed through to customers. To 2049, the most significant other realisable benefits are the avoided cost of special meter reads, avoided cost of manual de-energisations, better planning by the distributors and debt management.

The total costs are lower in Ergon Energy's distribution zone than in Energex's distribution zone because there are fewer customers in Ergon Energy's distribution zone and the IT costs are lower in the absence of multiple retailers operating in a competitive market.

The key benefits that are proportionally significantly higher in Ergon Energy's distribution zone than in Energex's distribution zone are:

1. Avoided cost of manual meter reading – the cost of manually reading a meter that can be avoided by remotely reading meters is between 2.5 and 3.6 times higher in Ergon Energy's distribution zone than in Energex's distribution zone.
2. Better planning – while there are two times more small customers in Energex's distribution zone than in Ergon Energy's distribution zone, the expenditure that can be avoided through better planning is 1.3 times higher in Ergon Energy's distribution zone than in Energex's distribution zone.
3. Deferred network augmentation arising from a reduction in peak demand – while there are two times more small customers in Energex's distribution zone than in Ergon Energy's distribution zone, the augmentation expenditure that can be avoided is only 6 per cent lower in Ergon Energy's distribution zone than in Energex's distribution zone.
4. Avoided cost of manual de-energisation and re-energisation – the cost of a manual de-energisation or re-energisation that can be avoided by providing remote services through advanced digital meters is over two times higher in Ergon Energy's distribution zone than in Energex's distribution zone.

FIGURE ES 2 NET BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, NPV TO 2049



Note: NPV values based on a 4 per cent discount rate

SOURCE: ACIL ALLEN MODELLING

Net benefits attributed to advanced digital meters if network monitoring devices installed

We understand that Energy Queensland is proposing to install network monitoring devices to provide them with real-time and engineering data. If network monitoring devices are installed, the following benefits cannot be attributable to the installation of advanced digital meters:

- realisable benefits – better planning
- potential benefits:
  - earlier fault notification
  - faster restoration of supply
  - reduction in calls to faults and emergencies line
  - reduction in operational costs to fix faults

- reduction in GSL payments
- avoided cost of investigations regarding quality of supply.

The net benefits attributed to the installation of advanced digital meters with network monitoring devices installed, to 2049 in NPV terms, for customers in Energex's and Ergon Energy's distribution zones, are set out in Table ES 4 and illustrated in Figure ES 3.

If network monitoring devices are installed, the net potential benefits attributed to advanced digital meters are reduced by $185 million and $169 million in Energex's and Ergon Energy's distribution zones, respectively.

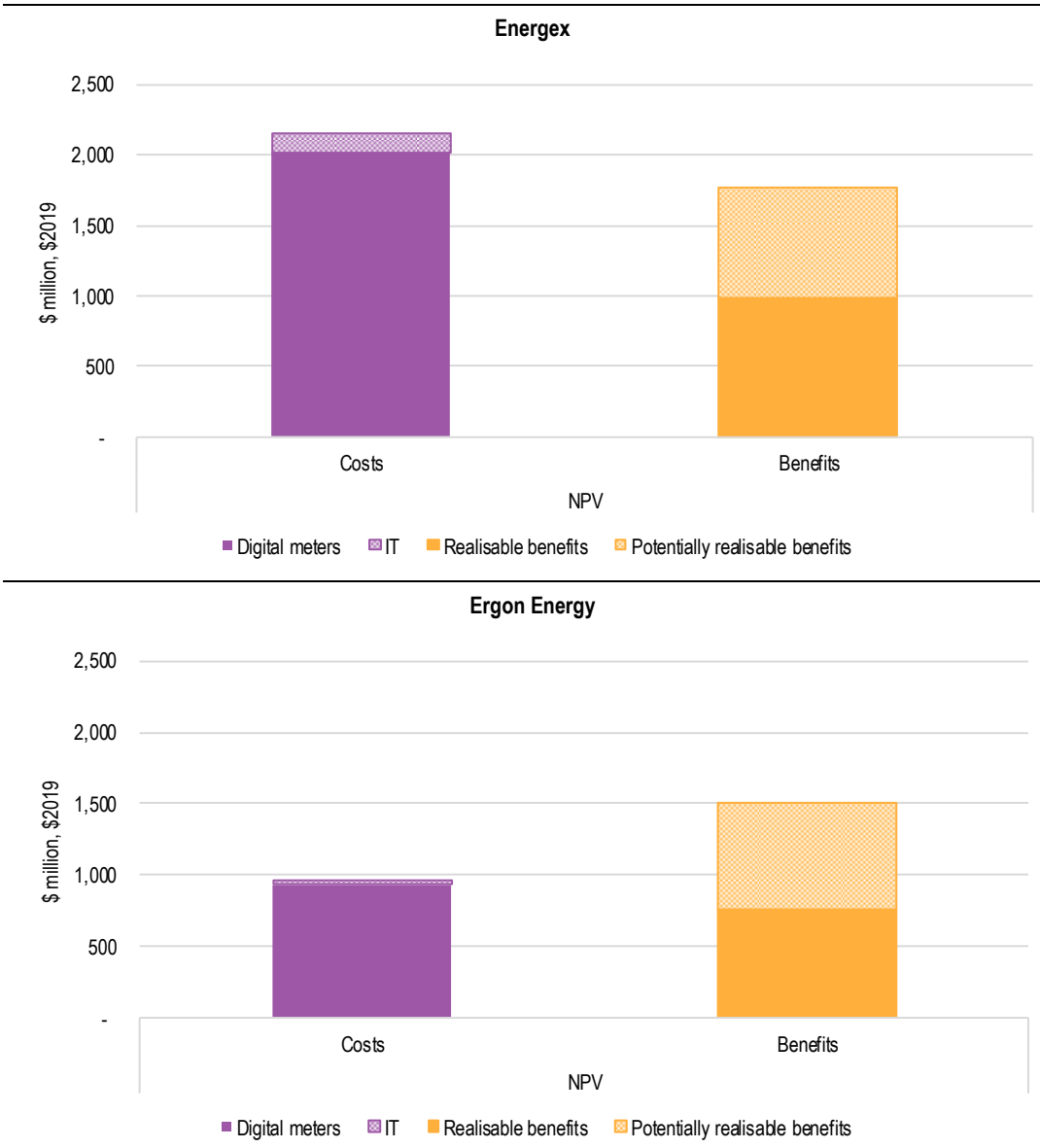
TABLE ES 4 NET BENEFITS ATTRIBUTED TO ADVANCED DIGITAL METERS IF NETWORK MONITORING DEVICES INSTALLED, NPV TO 2049, $ MILLION

	Energex	Ergon Energy
Advanced digital meters	2,022.8	935.1
IT costs	137.5	22.0
Total costs	***2,160.4***	***957.1***
Realisable benefits	989.0	755.3
Net realisable benefits	**(1,171.3)**	**(201.8)**
Potential additional benefits	780.1	746.4
Net potential benefits	**(391.2)**	**544.6**
Reduction in potential benefits with network monitoring devices installed	**185.0**	**169.0**

Note: Totals may not add due to rounding

SOURCE: ACIL ALLEN MODELLING

FIGURE ES 3 NET BENEFITS ATTRIBUTED TO ADVANCED DIGITAL METERS IF NETWORK MONITORING DEVICES INSTALLED, NPV TO 2049



Note: NPV values based on a 4 per cent discount rate

SOURCE: ACIL ALLEN MODELLING

1 INTRODUCTION

Traditionally, accumulation meters have been used to measure the electricity consumed by small customers. The accumulation meters can only measure the electricity consumed up to a point in time, similar to the odometer in a car. The electricity consumed during a period is derived by subtracting one meter reading from the next, similar to subtracting one odometer reading from the next to derive the length of a trip.

Over the last couple of decades, the cost of smarter meters has reduced, and these have increasingly been installed rather than accumulation meters. The smarter meters:

- measure the electricity used in intervals – traditionally 15 or 30 minute intervals, but following a recent rule change, in 5 minute intervals to align with settlement of the wholesale electricity market[7]
- enable meters to be read remotely, rather than manually
- allow supply to be energised and de-energised remotely, rather than through an on-site visit.

The smarter meters facilitate a range of benefits, including enabling a greater range of tariffs to be applied, and greater participation by customers in the electricity market through demand side response. They also provide more information to network service providers to plan and operate their networks.

Given the relative costs and benefits associated with smart meters for small electricity customers, there has been a debate as to whether smart meters should be rolled out within a mandated timeframe or whether they should be installed on a new and replacement basis. This debate commenced in the early 2000s. To date, the only jurisdiction in which smart meters have been rolled out to small electricity customers within a mandated timeframe is Victoria.

From 1 December 2017, the National Electricity Rules (NER) require that all new and replacement meters installed in the National Electricity Market (NEM) be smart meters, also referred to as advanced digital meters.[8]

Over time, this will facilitate a transition from accumulation meters to smart or advanced digital meters. However, as the life of the older accumulation meters is in the order of 40-50 years, it will take many years before there is a full rollout of smart meters to all small electricity customers.

To facilitate this market-led approach to the deployment of advanced digital meters, the Australian Energy Market Commission (AEMC) also made a rule change to introduce competition in metering services for small electricity customers.

Prior to the rule change, the distributor was responsible for providing metering services to small electricity customers. From 1 December 2017, the retailer is responsible for engaging a Metering

[7] On 28 November 2018, the Australian Energy Market Commission made a rule change requiring all remotely read interval meters installed from 1 December 2018 to be able to record and provide five minute data from 1 July 2021 at the latest for larger customers and from 1 December 2022 at the latest for smaller customers.

[8] Rule 7.8.3

Coordinator that is responsible for providing metering services to its customers that do not have an accumulation meter installed.[9] The distributor continues to be responsible for providing metering services to small customers with an accumulation meter.

1.1 Ministerial direction to provide advice on cost of advanced digital meters

On 26 April 2018, the Minister for Natural Resources, Mines and Energy issued a direction to the Queensland Competition Authority (QCA) to provide advice on the costs to all regional residential and small business customers should the additional costs associated with the deployment of advanced digital meters be spread across those customers, rather than be applied only to customers receiving the new meters. The Minister was concerned about the increased costs of advanced digital meters relative to standard meters:

I am concerned with the substantive price increase and lack of realisable value for these customers for the unavoidable additional cost if these costs are applied in full to customers receiving the meters.

The QCA subsequently advised the Minister that:

According to our calculations, spreading the costs of deployed advanced digital meters across all customers would add 1.435 c/day, or $5.24 per year, to a tariff 11 or tariff 20 customer bill compared to paying type 6 meter charges regulated by the Australian Energy Regulator.

The Minister applied that advice and reduced the annual cost of an advanced digital meter for a customer on Tariff 11 from $111 (as identified by the QCA) to $44. However, the Minister remains concerned that this approach will eventually mean that all customers will pay the full additional costs of advanced digital metering without recognition of the benefits across the supply chain.

Accordingly, the Minister is now seeking to better understand the benefits associated with the deployment of advanced digital meters and has issued a direction to the QCA seeking the following advice:

- *The potential benefits that may be realised by the various participants in the electricity supply chain.*
- *The extent to which these benefits are currently being realised by these participants.*
- *The barriers, if any, which currently limit potential benefits being passed through to customers and other participants in the electricity supply chain.*[10]

This advice must be provided to the Minister by 16 September 2019.

1.2 Scope of this report

The QCA has engaged ACIL Allen Consulting (ACIL Allen) to assist it in providing advice on the potential net benefits of the deployment of advanced digital meters for customers in the Energex and Ergon Energy distribution zones.

In providing this advice, we must have regard to the retailers' advanced digital metering deployment strategies, including deployments completed by 1 July 2019 and forecast installations to:

- estimate the costs incurred and benefits accrued from using advanced digital meters by various participants within the electricity sector, including but not limited to retailers, distribution and transmission network entities, generators and market administrators
- estimate the costs incurred and benefits accrued from using advanced digital meters by small retail customers in 2018–19 and future years, regardless of whether these customers act to realise the benefits from using advanced digital meters
- estimate the net benefits that advanced digital meters offer over accumulation meters, should there be no barriers to prevent realisation of these benefits
- estimate the net benefits expected to be realised by various participants (including small retail customers) on 30 June 2019, compared to 30 June 2020 and over the period until the expected maximum of advanced digital meter deployment is reached

[9] Rule 7.2.1

[10] Letter from the Minister to the QCA dated 5 April 2019

- identify and assess the barriers for various participants (including small retail customers) to realise the net benefits associated with advanced digital meters and the potential outcomes if the barriers are not addressed
- where possible, provide an annual value of net benefits accrued by each participant (including small retail customers), adjusted for the impacts of barriers to achieving the benefits.

Chapter 2 of this report sets out the methodology and assumptions that we have used to estimate the costs incurred and benefits accrued from installing advanced digital meters for small retail electricity customers. The results from our analysis are provided in chapter 3.

Throughout the report, years are financial years, for example, references to 2019 are to the financial year ending 30 June 2019, and, unless otherwise specified, costs and benefits are expressed in 2019 dollars.

2 METHODOLOGY AND ASSUMPTIONS

This chapter describes the methodology and assumptions for assessing the costs and benefits associated with installing advanced digital meters for small electricity customers in Queensland.

The categories of costs and benefits associated with advanced digital meters that have been considered in this report are identified in section 2.1.

An Information Request was issued to the electricity retailers operating in Queensland to collect information relevant to the costs and benefits associated with advanced digital meters. The Information Request is described in section 2.2.

An overview of the cost-benefit model that was developed is provided in section 2.3, and the assumptions that have been made are described in the following sections. Assumptions relating to the:

- net cost of meters are described in section 2.4
- benefits that may be realised directly by customers are described in section 2.5
- benefits that may be realised by the distributors are described in section 2.6
- benefits that may be realised by the retailers are described in section 2.7
- benefits that may be realised by other parties are described in section 2.8.

The benefits are summarised in section 2.9, with an assessment as to whether the benefits are realisable or whether there are barriers to them being realised, in which case, we have referred to them as potential benefits.

2.1 Identifying the categories of costs and benefits associated with advanced digital meters

The first step in assessing the potential net benefits associated with advanced digital meters was to identify the categories of costs that will be incurred and benefits that may be realised. These were identified by reference to previous analyses of the costs and benefits of smart meters, including assessments of the costs and benefits of the rollout of smart meters undertaken:

- in 2011 by Deloitte for the Victorian Government[11]
- in 2016 by the UK Government (the Department for Business, Energy & Industrial Strategy).[12]

[11] Deloitte, *Advanced metering infrastructure cost benefit analysis, Final report*, 2 August 2011
[12] Department for Business, Energy & Industrial Strategy, *Smart Meter Roll-out Cost-Benefit Analysis, Part II – Technical Annex*, August 2016

The broad categories of costs and benefits identified are:

1. the costs to install, operate and maintain the advanced digital meters
2. less the costs that are avoided by installing advanced digital meters – the cost of the conventional meters that would otherwise have been installed and for manually reading these meters
3. benefits that accrue directly to the customer, for example, the difference between the cost of a special meter read that is undertaken manually and the cost of a special meter read that is undertaken remotely
4. benefits that accrue to the network businesses, which would be expected to be passed through to customers over time through the regulatory process
5. benefits that accrue to the retailer, which would be expected to be passed through to customers in a competitive market
6. benefits that accrue to other parties.

The full list of costs and benefits that have been considered are summarised in Table 2.1.

TABLE 2.1 COST AND BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS

Category	Type of cost / benefit	Description
Cost	Advanced digital meters	Cost associated with installing, operating and maintaining an advanced digital meter and the costs associated with managing the metering data from that meter
	IT systems	The incremental costs associated with the IT systems for managing the advanced digital meters and associated metering data
Avoided cost	Meter	The costs that would otherwise be incurred to install a conventional meter: – for new connections – when meters are replaced – when a solar system is installed
	Manual meter reading	The costs associated with manually reading the meter that are avoided when a meter can be read remotely
Direct customer benefit	Special meter read	The difference in cost between a special meter read that is undertaken manually when, for example, a customer moves out and a special meter read that is undertaken remotely[13]
	After hours re-energisation	The difference in cost between a re-energisation that is undertaken manually after hours when, for example, a customer moves in, and a re-energisation that is undertaken remotely
	Reduction in energy consumption	Reduction in energy consumption arising from the improved data that is available from advanced digital meters, and the ability for this information to be provided to customers on a more timely basis
	Shift in energy consumption from peak to off-peak periods	A shift in energy consumption from peak to off-peak times arising from the introduction of more cost reflective tariffs that are enabled by advanced digital meters
	Queries regarding estimated reads	Electricity bills do not need to be estimated with an advanced digital meter installed, which results in a reduction in queries by customers of estimated bills

[13] In some cases, retailers do not pass on the cost of special meter reads to customers. The benefit would then be realised by the retailers which is then passed through to customers through the operation of the competitive market.

Category	Type of cost / benefit	Description
	Complaints regarding estimated reads	A reduction in queries by customers of estimated bills results in a reduction in the number of complaints by customers about estimated bills
	More timely customer transfers	With conventional meters, customer transfers to a different retailer generally occur at the time of the next manual meter read. Customer transfers can occur more quickly when an advanced digital meter is installed as the meter can be read remotely
	Calls to faults and emergencies line	Over time, customers will be confident that the network business is aware that a fault has occurred based on data from advanced digital meters, and will reduce the number of calls they make to the faults and emergencies line
	Earlier fault notification	Network businesses will be able to identify faults more quickly using data from advanced digital meters
	Faster restoration of supply	Network businesses will be able to resolve a fault more quickly with information from advanced digital meters on the nature, location and scope of an outage
Network benefit	De-energisation	The difference in cost between a de-energisation that is undertaken manually when, for example, a customer moves out, and a de-energisation that is undertaken remotely
	Re-energisation during business hours	The difference in cost between a re-energisation that is undertaken manually during business hours when, for example, a customer moves in, and a re-energisation that is undertaken remotely
	Reduction in peak demand	If customers respond to the data from advanced digital meters by reducing their peak demand, then augmentation of the network can be deferred
	Improved planning	The data from advanced digital meters will enable network businesses to better plan the network, and reduce the costs associated with asset replacement and connections
	Reduced operating costs to fix faults	The network businesses will be able to deploy their workforces more efficiently to restore supply using information from advanced digital meters on the location and scope of outages
	Calls to faults and emergencies line	Over time, customers will be confident that the network business is aware that a fault has occurred based on data from advanced digital meters, and will reduce the number of calls that are made to the network businesses' faults and emergencies lines
	Avoided cost of investigations into quality	Costs associated with investigating complaints about voltage and quality of supply could be avoided using data available from the advanced digital meter

Category	Type of cost / benefit	Description
	Reduction in Guaranteed Service Level (GSL) payments	The number GSL payments made by the distributor could be reduced: – Timely reconnection – by remotely re-energising customers rather than manually re-energising them – On time appointments – by reducing the number of appointments required by remotely interrogating the advanced digital meter – Interruption duration – by restoring supply more quickly
Retailer benefits	Debt management	With advanced digital meters, retailers will be able to manage debt more efficiently and effectively by issuing smaller bills more frequently that customers are more able to pay on a timely basis, and by more timely interventions where a customer is facing payment difficulties
	Electricity theft	Advanced digital meters facilitate the more timely identification of potential electricity theft
	Calls regarding estimated reads	Electricity bills do not need to be estimated when an advanced digital meter is installed, which results in a reduction in the number of calls to the retailer's call centre in relation to estimated bills
	Complaints regarding estimated reads	A reduction in the number of calls in relation to estimated bills results in a reduction in the number of complaints about estimated bills that need to be managed by the retailer
	Investigations re estimated bills	A reduction in the number of complaints in relation to estimated bills results in a reduction in the number of investigations into estimated bills that need to be managed by the retailer
	Complaints to the Ombudsman re estimated reads	A reduction in the number of estimated bills reduces the number of complaints made to the Ombudsman in relation to estimated bills, which reduces the fees paid by the retailer to the Ombudsman
	Investigations by Ombudsman into estimated reads	A reduction in the number of complaints made to the Ombudsman in relation to estimated bills reduces the number of investigations undertaken by the Ombudsman into estimated bills, which reduces the fees paid by the retailer to the Ombudsman
	More timely customer transfers	The direct benefits to customers of more timely customer transfers when an advanced digital meter is installed is a cost to the retailers
Other benefits	Reduction in peak demand – generation deferral	If customers respond to the data from advanced digital meters by reducing their peak demand, then augmentation of the generation capacity can be deferred
	Greenhouse gas emissions	If customers respond to the data from advanced digital meters by reducing their electricity consumption, then greenhouse gas emissions are avoided

SOURCE: ACIL ALLEN ASSESSMENT

2.2 Information Request to retailers

An Information Request was issued to the retailer operating in Queensland to collect data required to assess the costs and benefits of advanced digital meters. The Information Request sought the following information for small electricity customers:

- number of customers as at 30 June 2018 and forecast as at 30 June 2019 and 30 June 2020 by:
  - residential / small business
  - with / without a solar system installed
  - type of meter arrangement – 1 phase, 1 phase with load control, 3 phase or 3 phase with load control
  - type of meter installed – advanced digital meter, interval meter without remote communication, or conventional meter
- costs associated with advanced digital meters
- incremental costs associated with IT systems for advanced digital metering
- proportion of customers with an advanced digital meter installed on a retail electricity tariff:
  - with a demand component
  - with a time of use tariff without a demand component
- retailer benefits associated with advanced digital meters – energy cost savings, customer debt management savings and any other potential benefits.

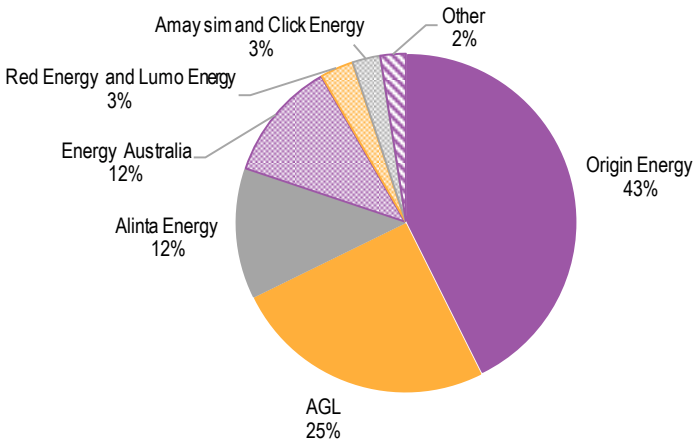
Information was provided to us by the following retailers:

1. Origin Energy
2. AGL
3. Energy Australia
4. Alinta Energy
5. Red Energy and Lumo Energy
6. Amaysim and Click Energy
7. Simply Energy
8. ERM Power
9. Diamond Energy
10. 1st Energy
11. Energy Locals
12. Sanctuary Energy
13. QEnergy
14. Next Business Energy
15. ReAmped Energy
16. Momentum Energy.

The information was sought for customers in Energex's distribution zone and retailers were given the option to provide information relating to customers in Ergon Energy's distribution zone. No retailer elected to provide information relating to customers in Ergon Energy's distribution zone.

Figure 2.1 provides a forecast breakdown of the number of customers by retailer in Energex's distribution zone at 30 June 2019. Around 98 per cent of customers are supplied by six retailers – Origin Energy, AGL, Alinta Energy, Energy Australia, Red Energy and Lumo Energy, and Amaysim and Click Energy. The remaining ten retailers supply around 2 per cent of customers in Energex's distribution zone.

FIGURE 2.1 FORECAST NUMBER OF CUSTOMERS IN ENERGEX'S DISTRIBUTION ZONE, BY RETAILER, 2019



SOURCE: INFORMATION PROVIDED BY RETAILERS

2.3 Developing a cost benefit model

A cost benefit model was developed in Microsoft Excel. The costs and benefits were modelled in real terms for approximately 30 years, from the financial year ending 30 June 2019 (2019) to the financial year ending 30 June 2049 (2049). Our modelling extended to 2049 as the costs and benefits, when discounted, are not material in each subsequent year. For example, the incremental net costs for Energex and Ergon Energy in 2049 represent 0.1 per cent of the NPV of the net costs from 2019 to 2049, and that proportion would decrease each year as the discounting increases.

By 2049, 87 per cent of meters in Energex's distribution zone and 83 per cent of meters in Ergon Energy's distribution zone are estimated to be advanced digital meters.

The costs and benefits were discounted using a real discount rate of 4 per cent. A real discount rate of 4 per cent was used based on our judgement, informed by the prevailing real rates of return that apply to the revenue determinations for the electricity distributors.[14]

The assumptions that were adopted to model the costs and benefits are set out in the following sections.

2.4 Net cost of advanced digital meters

This section considers:

- the costs associated with advanced digital meters, in section 2.4.1
- the costs associated with IT systems for managing advanced digital meters, in section 2.4.2
- the costs of installing conventional meters that are avoided by the installation of advanced digital meters, in section 2.4.3
- the costs of manually reading meters that are avoided by the installation of advanced digital meters, in section 2.4.4.

[14] One of the most recent revenue determinations made by the Australian Energy Regulator for an electricity distributor was for the NSW electricity distributors. The AER determined a nominal vanilla WACC of 5.72 per cent which equates to a real pre tax WACC of 3.7 per tax assuming the statutory rate of taxation. This decision reflects the current low interest rates. For example, refer Australian Energy Regulator, *Final Decision, Ausgrid, Distribution Determination 2019 to 2024, Overview*, April 2019, page 27

2.4.1 Costs associated with advanced digital meters

The costs associated with advanced digital meters were projected based on the number of customers with advanced digital meters installed and the cost of advanced digital meters.

Number of customers with advanced digital meters

The retailers provided us with the number of customers in Energex's distribution zone as at 30 June 2018 and forecast as at 30 June 2019 and 30 June 2020 by:

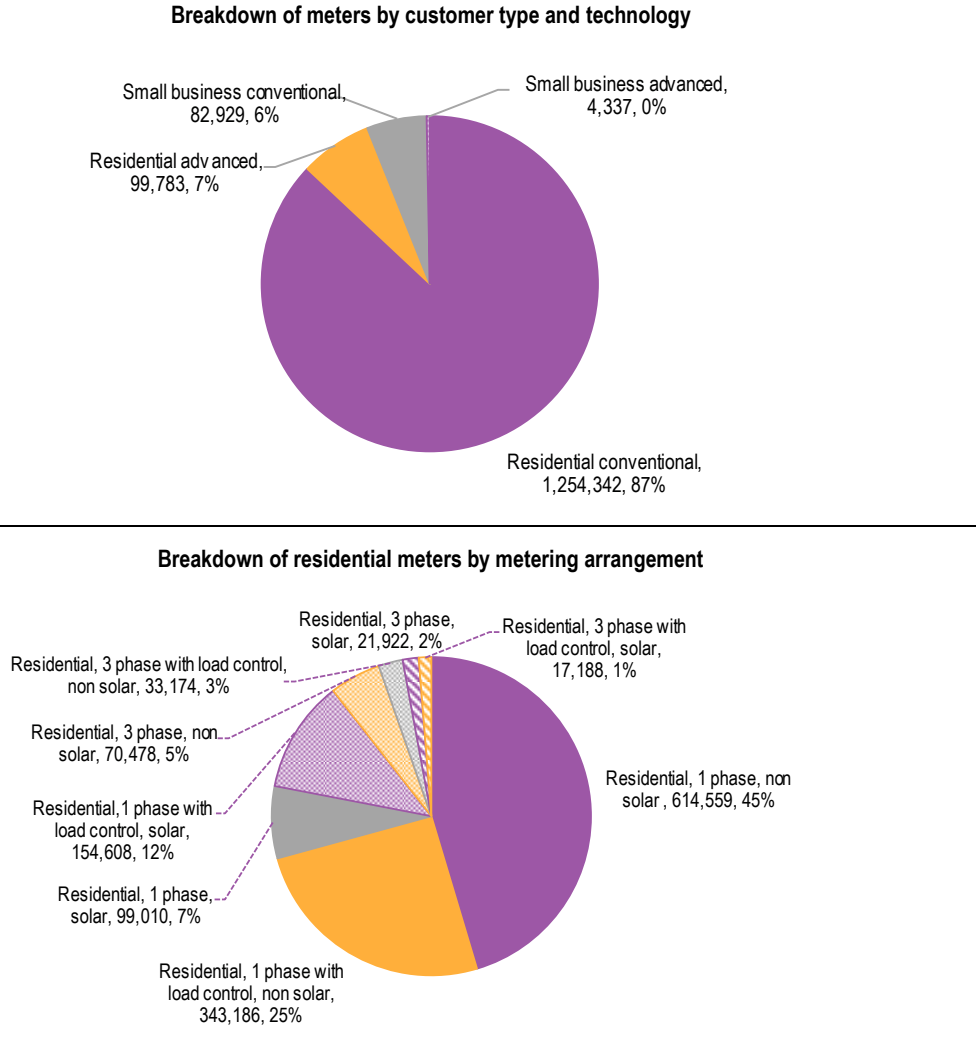
- residential / small business
- with / without a solar system installed
- type of meter arrangement – 1 phase, 1 phase with load control, 3 phase or 3 phase with load control
- type of meter installed – advanced digital meter, interval meter without remote communication, or conventional meter

Some of the smaller retailers did not provide a breakdown of meters. We assumed that the breakdown of meters for these retailers was the same as for Origin Energy.

Figure 2.2 provides a breakdown of the types of meters installed in Energex's distribution zone at 30 June 2018. The majority of small customers were residential (94 per cent), and the majority of small customers had conventional meters installed (93 per cent). For the purposes of the analysis, conventional meters included all meters that were not advanced digital meters. The number of interval meters without remote communication that were identified by the retailers was immaterial, and so we treated these meters as conventional meters.

The majority of residential customers had a single phase meter installed (89 per cent). Approximately 40 per cent of residential customers had a separate controlled circuit and 22 per cent had a solar system installed.

FIGURE 2.2 BREAKDOWN OF THE TYPE OF METERS IN ENERGEX'S DISTRIBUTION ZONE, 2018



SOURCE: ACIL ALLEN ANALYSIS OF INFORMATION PROVIDED BY THE RETAILERS

For each combination of customer type, metering arrangement and whether there was a solar system installed, we estimated the number of meters by year to 2049. The movement in the number of meters for each combination of customer type and metering arrangement is summarised in Table 2.2. The number of meters changes each year with new connections, meter replacements, installations of solar systems with advanced digital meters, and by the choice of the retailer or customer.

TABLE 2.2 ANNUAL MOVEMENT IN THE NUMBER OF METERS FOR EACH CUSTOMER TYPE AND METERING ARRANGEMENT

	Conventional meter No solar system	Advanced digital meter No solar system	Conventional meter Solar system	Advanced digital meter Solar system
	Opening balance	Opening balance	Opening balance	Opening balance
New connections		plus new connections		plus new connections
Meter replacements	less replacements	plus replacements	less replacements	plus replacements
Solar installations	less solar installations			plus solar installations
Retailer / customer choice	less retailer / customer choice	plus retailer / customer choice	less retailer / customer choice	plus retailer / customer choice
	Closing balance	Closing balance	Closing balance	Closing balance

SOURCE: ACIL ALLEN ASSESSMENT

We initially calculated the movements in meter numbers in Energex's distribution zone in 2019 and 2020 based on the data that was provided by the retailers. However, the data was not internally consistent. In particular, in aggregate, the number of customers with a conventional meter increased in 2019 and 2020. This is not possible given the requirement that that all new and replacement meters be advanced digital meters from 1 December 2017. Accordingly, we used the meter numbers provided by the retailers as at the end of 2018 and rolled the numbers forward based on our own assumptions that are discussed in the following sections.

The QCA provided us with an estimate of the number of advanced digital meters installed in Ergon Energy's distribution zone at the end of June 2018 and a forecast at the end of June 2019, as set out in Table 2.3. We assumed that the proportions of meter types were the same as in Energex's distribution zone.

TABLE 2.3 NUMBER OF ADVANCED INTERVAL METERS INSTALLED IN ERGON ENERGY'S DISTRIBUTION ZONE, 2018 AND 2019

	30 June 2018 (estimate)	30 June 2019 (forecast)
Residential	16,800	52,970
Small business	2,500	7,979
Total	19,300	60,949

SOURCE: QCA

New connections

We assumed that the number of customers increased by 1.5 per cent per annum based on the customer number growth rate projected by Energex and Ergon Energy in their 2020-25 regulatory proposals submitted to the AER.[15] We maintained that same growth rate over the 2019-49 period.

Meter replacements

From 2020, we assumed that 2.5 per cent of conventional meters installed for customers without a solar system would be replaced by advanced digital meters each year. This is consistent with a 40 year life for these types of meters.

The information provided by the retailers indicated that not many conventional meters were replaced by advanced digital meters in Energex's distribution zone during 2019. We therefore assumed that the replacement rate in 2019 in Energex's distribution zone was 1.0 per cent.

In Ergon Energy's distribution zone, we used a replacement rate in 2019 so that the forecast advanced digital meters, as set out in Table 2.3, are installed by 30 June 2019.

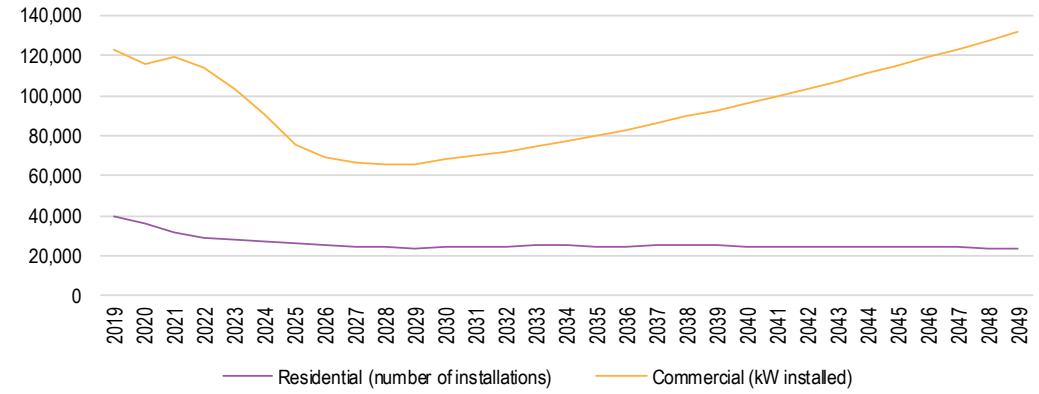
At the end of 2018 there were a significant number of customers with solar systems that do not have an advanced digital meter installed. We were advised that these customers had interval meters installed that were read manually. We assumed that 5 per cent of these meters would be replaced each year commencing in 2035. This is consistent with a 20 year life for these types of meters.

Solar installations

We projected the number of new residential solar installations and the additional capacity of commercial solar installations that will be installed in Queensland from 2019 to 2049, as illustrated in Figure 2.3.

[15] Energex, Regulatory Proposal 2020-25, January 2019, page 36; Ergon Energy, Regulatory Proposal 2020-25, January 2019, page 35

FIGURE 2.3 NEW SOLAR INSTALLATIONS IN QUEENSLAND, 2019-49



SOURCE: ACIL ALLEN ANALYSIS

We proportioned the number of new residential solar installations across Energex's distribution zone and Ergon Energy's distribution zone based on the total number of residential customers in each distribution zone. We then proportioned the number of new residential solar installations across different types of metering arrangements (single phase or three phase, with or without load control) in the same proportions as the metering arrangements.

We estimated the number of new commercial solar installations based on the projected increase in capacity in 2019 and the increase in the number of small business customers with solar systems as estimated by the retailers. We maintained this same ratio over the forecast period.

Retailer / customer choice

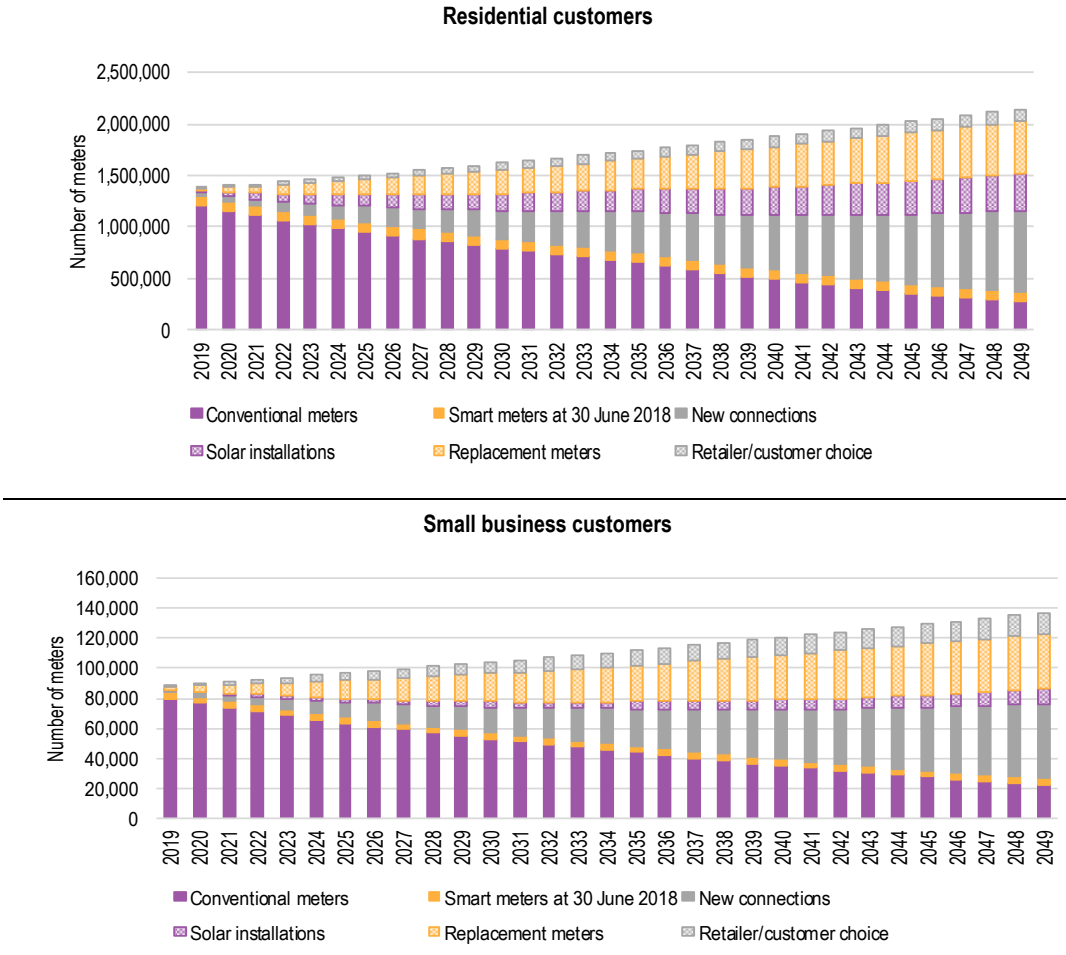
The number of advanced digital meters that have been installed by choice, either by the retailer or the customer, is relatively low. We assumed that the proportion of conventional meters that are replaced by choice in Energex's distribution zone remains consistent over time.

We assumed that no conventional meters are replaced by choice in Ergon Energy's distribution zone.

Number of meters installed

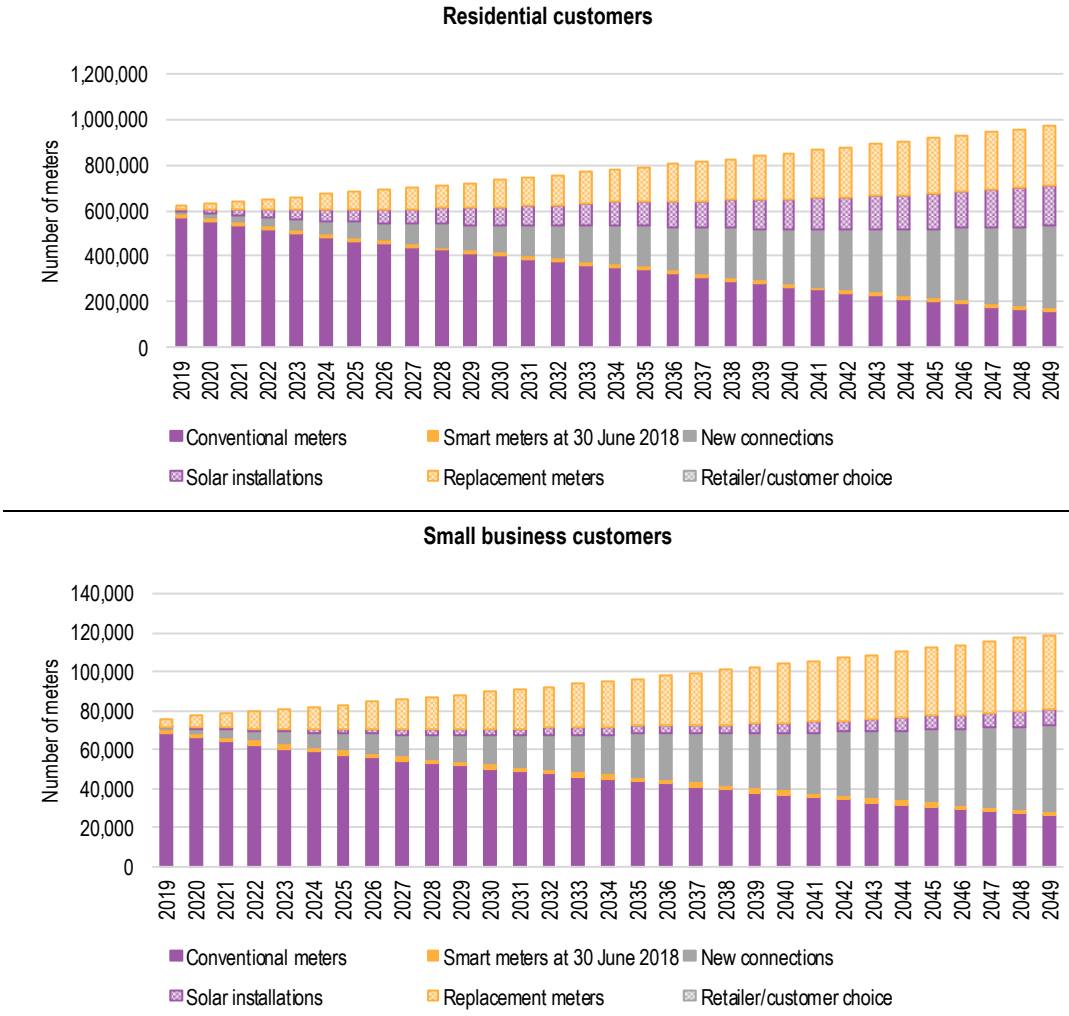
The number of advanced digital meters that are estimated to be installed between 2019 and 2049 is illustrated in Figure 2.4 for customers in Energex's distribution zone and in Figure 2.5 for customers in Ergon Energy's distribution zone.

FIGURE 2.4 NUMBER OF METERS INSTALLED, ENERGEX'S DISTRIBUTION ZONE, 2019-49



SOURCE: ACIL ALLEN ANALYSIS

FIGURE 2.5 NUMBER OF METERS INSTALLED, ERGON ENERGY'S DISTRIBUTION ZONE, 2019-49



SOURCE: ACIL ALLEN ANALYSIS

Cost of advanced digital meters

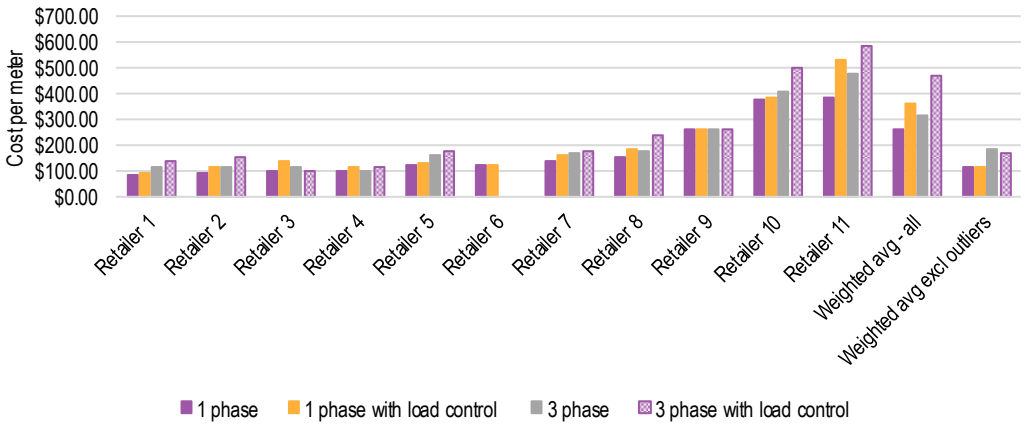
We received information from 11 retailers on the costs associated with advanced digital meters for customers in Energex's distribution zone. While most retailers provided an annual cost, some retailers provided an upfront cost and an annual cost. To be able to compare meter costs across retailers, we assumed that the upfront cost was recovered over five years.

The meter costs that were submitted by the retailers are illustrated in Figure 2.6. The meter costs submitted by eight of the retailers are within a reasonably small range. The meter costs submitted by one retailer are higher than this range and the meter costs submitted by two retailers are significantly higher again. We are aware that the meters of one of these retailers are read manually rather than remotely.

The weighted average meter cost across all retailers[16] was higher than the level that we considered to be reasonable. However, when the two outliers are removed, the costs are more reasonable.

[16] The meter costs were weighted by the number of meters.

FIGURE 2.6 METER COSTS, ENERGEX'S DISTRIBUTION ZONE



SOURCE: ACIL ALLEN ANALYSIS BASED ON INFORMATION PROVIDED BY RETAILERS

For the purposes of this cost benefit analysis, we assumed that the costs for advanced digital meters in Energex's distribution zone are the weighted average meter costs with the two outliers removed.

We assumed that the costs for meters in Ergon Energy's distribution zone are 5 per cent higher than in Energex's distribution zone due to the higher costs associated with installing the meters. This estimate is based on the difference in the upfront capital charge for non-smart meters in the two different distribution zones.

We do not expect the real cost of advanced digital meters to change over the period of the analysis. The real costs of advanced digital meters decreased substantially in the 2000s when the number of advanced digital meters installed increased significantly, but the real costs have not declined materially since.

The meter costs that have been used in the cost benefit analysis are set out in Table 2.4.

TABLE 2.4 ANNUAL COSTS OF ADVANCED DIGITAL METERS

Meter type	Meter cost	
	Energex's distribution zone	Ergon Energy's distribution zone
1 phase	$117.52	$123.40
1 phase with load control	$119.82	$125.81
3 phase	$183.81	$193.00
3 phase with load control	$173.68	$182.37

SOURCE: ACIL ALLEN ANALYSIS BASED ON INFORMATION PROVIDED BY RETAILERS

2.4.2 Costs associated with IT systems for advanced digital meters

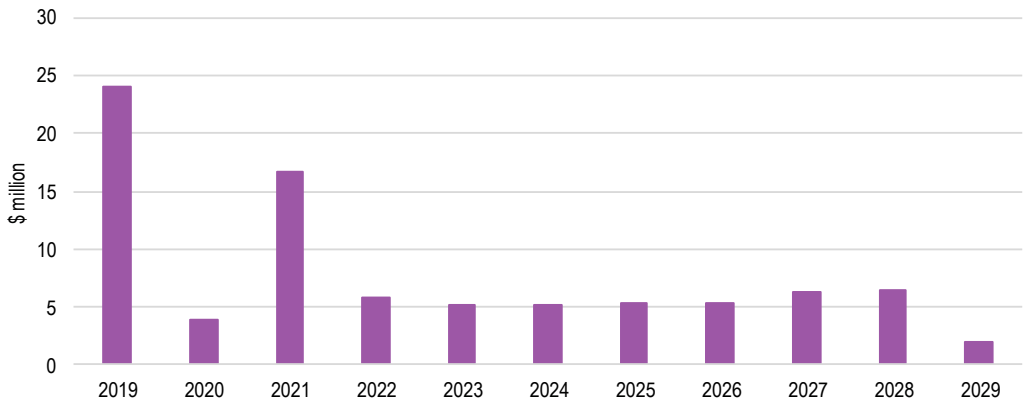
We received information from the retailers on the forecast costs associated with IT systems for advanced digital meters in Energex's distribution zone over the 2019-29 period, which are illustrated in Figure 2.7.

Some of the retailers indicated that the incremental costs for IT systems for managing advanced digital meters for small electricity customers in Queensland are not material as the number of advanced digital meters in Queensland is small relative to other states. However, one retailer submitted very significant IT costs in 2019 that represented Queensland's allocation of costs associated with the Power of Choice and five minute settlement rule changes. It is arguable as to whether all these costs should be included in this analysis as the IT costs associated with the five

minute settlement rule change, in particular, will be incurred regardless of which types of meters are installed for small electricity customers.

Nevertheless, for the purposes of the analysis, we have used the IT costs that were submitted by the retailers for the Energex distribution zone for the 2019-28 period, and then maintained that level of costs ($6.4 million) in real terms through to 2049. These costs are not material relative to the other costs considered and the total benefits, although they are material to the net benefits in 2019.

FIGURE 2.7 IT COSTS, ENERGEX DISTRIBUTION ZONE 2019-29



SOURCE: ACIL ALLEN ANALYSIS BASED ON INFORMATION PROVIDED BY RETAILERS

Based on the data submitted by the retailers, we have assumed that the IT costs in Ergon Energy's distribution zone are $1.2 million per annum. This is based on customers in Energex's distribution zone being predominantly supplied by six retailers, customers in Ergon Energy's distribution zone being predominantly supplied by one retailer, and rounding the IT costs up to $1.2 million.

2.4.3 Avoided cost of installing conventional meters

When conventional meters are replaced by advanced digital meters, the cost of installing a conventional meter is avoided.

The cost of a conventional meter is also avoided when an advanced digital meter is installed for a new connection.

The cost of an advanced digital meter would be incurred in any case where a solar system is installed. There is thus no incremental cost incurred from a policy requiring that an advanced digital meter be installed for all new and replacement meters, where a solar system is installed.

When a retailer or customer chooses to replace a conventional meter with an advanced digital meter, the replacement costs of a new conventional meter are brought forward. We have assumed that, of the advanced digital meters installed through retailer or customer choice in year n, the replacement of 2.5 per cent of those meters have been brought forward by one year, 2.5 per cent have been brought forward by two years, 2.5 per cent have been brought forward for three years etc.

We assumed that the avoided cost of installing a conventional meter is the upfront cost that would otherwise have been charged by Energex or Ergon Energy.

We estimated the 2018-19 upfront capital charge for a conventional meter in Energex's distribution zone from the approved 2015-16 upfront capital charge[17], indexed by the X-factors in the revenue determination[18], and escalated by CPI[19], in line with their treatment by the AER.

[17] The 2015-16 charges were $306.11 for a 1 phase meter, $399.03 for a 1 phase meter with load control and $597.40 for a 3 phase meter, with and without load control.

[18] The X factors were 5.22% for a 1 phase meter, 0.88% for a 1 phase meter with load control and -0.81% for a 3 phase meter in 2016-17, 0.37% in 2017-18 and 0.46% in 2018-19.

[19] The CPI was 114.1 in December 2018 and 108.4 in December 2015.

We used the 2018-19 upfront charges for a conventional meter in Ergon Energy's distribution zone as published in its approved price list. The charges are published for customers on urban and short rural feeders and for customers on long rural feeders. We weighted these charges by the number of customers in Ergon Energy's distribution zone on urban, short rural and long rural feeders.[20]

We assumed that the upfront capital charge is maintained in real terms from 2019 to 2049.

The upfront capital charges for conventional meters that we used in the cost-benefit analysis are set out in Table 2.5.

TABLE 2.5 UPFRONT COST FOR A CONVENTIONAL METER

Meter type	Meter cost	
	Energex's distribution zone	Ergon Energy's distribution zone
1 phase	$341.85	$374.18
1 phase with load control	$427.23	$453.45
3 phase	$628.91	$564.43
3 phase with load control	$628.91	$564.43

SOURCE: AER, FINAL DECISION, ENERGEX DETERMINATION 2015-16 TO 2019-20, ATTACHMENT 16 – ALTERNATIVE CONTROL SERVICES, OCTOBER 2015, PAGE 58; ERGON ENERGY, ATTACHMENT 2: REVISED INDICATIVE PRICING SCHEDULE, DISTRIBUTION SERVICES TO 30 JUNE 2020 PAGE 28

2.4.4 Avoided cost of manual meter reading

When advanced digital meters are installed and the meter is read remotely, the costs associated with reading the meter manually are avoided.

The avoided meter reading costs are set out in Table 2.6. They have been taken from the non-capital metering charges in Ergon Energy's approved 2018-19 price list. We have used the non-capital metering charges proposed by Energex for 2020-21, de-escalated to December 2018 dollars[21], as these are higher than the 2018-19 charges and better reflect the likely future charges.

We assumed that the real cost of manual meter reading increases by 1 percentage point each year from 2019-20 to reflect the reduction in the efficiency of meter reading routes as the proportion of meters that are read manually declines. For example, when all meters are manually read, a meter reader will walk from house to house reading meters. As advanced digital meters are installed, the meter reader may walk from one house to the next and then skip the next house. The proportion of houses that are skipped will increase as the number of advanced digital meters installed increases, and thus the efficiency of the meter reading route declines.

TABLE 2.6 AVOIDED METER READING COSTS

	Energex	Ergon Energy
	c/day ($ December 2020)	$ per annum ($ December 2018)
Primary tariff	3.358	40.06
Controlled load tariff	1.007	14.73
Solar PV	2.350	9.96

[20] Ergon Energy, 2017-18 Economic Benchmarking RIN, Worksheet '3.4 Operational data'

[21] We have assumed an inflation rate of 2.42 per cent per annum consistent with Energex, *Regulatory Proposal 2020-25*, January 2019, page 101

	Energex	Ergon Energy
	c/day ($ December 2018)	c/day ($ December 2018)
1 or 3 phase	3.201	10.975
1 or 3 phase with load control	4.161	15.011
1 or 3 phase, solar	5.441	13.704
1 or 3 phase with load control, solar	6.401	17.740

SOURCE: ENERGEX, REGULATORY PROPOSAL 2020-25, *JANUARY 2019, PAGE 126; ERGON ENERGY, ATTACHMENT 2: REVISED INDICATIVE PRICING SCHEDULE, DISTRIBUTION SERVICES TO 30 JUNE 2020 PAGE 29*

2.5 Customer benefits

This section considers the following benefits that may be realised directly by customers with the installation of advanced digital meters:

- remote rather than manual special meters reads, in section 2.5.1
- remote rather than manual after hours re-energisations, in section 2.5.2
- reduction in energy consumption, in section 2.5.3
- shift in energy consumption from peak to off-peak times, in section 2.5.4
- reduced queries and complaints regarding estimated bills, in section 2.5.5
- more timely customer transfers, in section 2.5.6
- reduced number of calls to the distributors' faults and emergencies lines, in section 2.5.7
- earlier fault notification, in section 2.5.8
- faster restoration of supply, in section 2.5.9.

2.5.1 Remote special meter reads

Special meter reads are required when customers move in and move out, and may also be required when customers transfer to a different retailer or where there is a query in relation to a meter read. When advanced digital meters are installed, meters can be read remotely rather than manually, which requires a site visit.

In some cases, retailers do not pass on the cost of special meter reads to customers. The benefit would then be realised by the retailers, which is then passed through to customers through the operation of the competitive market.

We assumed that, on average, 22 per cent of customers require one special meter read annually, consistent with Deloitte's 2011 analysis of the costs and benefits of the Victorian Advanced Metering Infrastructure program.[22]

We used the manual meter reading charges for 2018-19, as published by Energex and Ergon Energy.

We estimated the cost of a remote meter read based on the 2019 pricing proposals of the Victorian electricity distributors. We weighted the charges for CitiPower and Jemena by one and for AusNet Services, Powercor, and United Energy by two to reflect the different sizes of the distributors.

The costs that we assumed for manual and remote meter reads are set out in Table 2.7. We assumed that these costs will be maintained in real terms over the 2019-49 period.

[22] Deloitte, *Advanced metering infrastructure cost benefit analysis, Final report*, 2 August 2011, page 62

TABLE 2.7 COST OF MANUAL AND REMOTE SPECIAL METER READ (PER METER READ), 2018-19

		Energex	Ergon Energy
Manual special meter read		$24.00	$24.00
Remote special meter read	AusNet Services	$0.00	
	CitiPower	$1.43	
	Jemena	$0.87	
	Powercor	$0.00	
	United Energy	$0.00	
	Weighted average	**$0.29**	

SOURCE: ENERGEX, 15.009 FEE BASED AND QUOTED SERVICE MODEL – ACS – JANUARY 2019, WORKSHEETS 'EGX PRICES (DIRECT COSTS)' AND 'ERG PRICES (DIRECT COSTS)'; VICTORIAN ELECTRICITY DISTRIBUTORS' 2019 PRICING PROPOSALS

2.5.2 Remote after hours re-energisation

Re-energisations are required when, for example, customers move in. Advanced digital meters enable customers' premises to be re-energised remotely rather than manually, which requires a site visit. However, in Queensland, customers' premises cannot be re-energised remotely. Hence the benefits associated with remote re-energisation cannot currently be realised.

We estimated the benefits that could be realised if customers premises could be remotely re-energised in Queensland. In Queensland, distributors cannot charge customers for re-energisations during business hours but they can charge them for re-energisations after hours.[23] Accordingly, any benefits associated with re-energisations during business hours are realised by the distributors and any benefits associated with re-energisations after hours are realised directly by customers. After hours re-energisations are considered in this section, and re-energisations during business hours are considered in section 2.6.1.

For the purposes of this estimate, we have assumed that, on average, 22 per cent of customers' premises are required to be re-energised once annually, consistent with Deloitte's 2011 analysis of the costs and benefits of the Victorian Advanced Metering Infrastructure program.[24] We assumed that 20 per cent of these re-energisations occur after hours.

We used the after hours re-energisation charges published by Energex and Ergon Energy for 2018-19. The charges for Ergon Energy are published for customers on urban and short rural feeders and for customers on long rural feeders. We have weighted these charges by the number of customers in Ergon Energy's distribution zone on urban, short rural and long rural feeders.[25]

We estimated the cost of a remote re-energisation based on the 2019 pricing proposals of the Victorian electricity distributors. We weighted the charges for CitiPower and Jemena by one and for AusNet Services, Powercor, and United Energy by two to reflect the different sizes of the distributors.

The costs that we assumed for manual and remote after hours re-energisations are set out in Table 2.8. We have assumed that these costs will be maintained in real terms over the 2019-49 period.

[23] Electricity Regulations 2006, Schedule 8, Part 2
[24] Deloitte, *Advanced metering infrastructure cost benefit analysis, Final report*, 2 August 2011, page 62
[25] Ergon Energy, 2017-18 Economic Benchmarking RIN, Worksheet '3.4 Operational data'

TABLE 2.8 COST OF MANUAL AND REMOTE AFTER HOURS RE-ENERGISATION (PER SERVICE), 2018-19

		Energex	Ergon Energy
Manual service		$53.38	$121.46
Remote service	AusNet Services		$10.15
	CitiPower		$6.68
	Jemena		$10.87
	Powercor		$10.67
	United Energy		$10.72
	Weighted average		**$10.08**

Note: The charges for customers in Ergon Energy's area are the customer weighted average charges

SOURCE: ENERGEX, 15.009 FEE BASED AND QUOTED SERVICE MODEL – ACS – JANUARY 2019, WORKSHEETS 'EGX PRICES (DIRECT COSTS)' AND 'ERG PRICES (DIRECT COSTS)'; VICTORIAN ELECTRICITY DISTRIBUTORS' 2019 PRICING PROPOSALS

2.5.3 Reduction in energy consumption

The extent to which customers may reduce their energy consumption in response to the information provided by advanced digital meters is highly contentious.

Early estimates of the reduction in energy consumption for the Victorian Advanced Metering Infrastructure program assumed that customers on Time of Use (TOU) tariffs would reduce their energy consumption by 1.5 per cent.[26] Deloitte reduced this assumption to 0.1 per cent in a 2011 report for the Victorian Government.[27] Deloitte was of the view that:

… customers will shift their consumption from peak to off-peak times, however ... the overall reduction in energy due to TOU tariffs will be minimal.[28]

Deloitte summarised a number of international studies from the mid 2000s, and concluded that:

While some international studies have found that the introduction of TOU tariffs results in reduced energy consumption, trials done in Australia to date have not found any statistically significant change in overall consumption.[29]

However, we note that the Australian trials referred to by Deloitte were undertaken many years ago by Endeavour Energy and Energex, and noted no significant change in peak demand rather than energy consumption.

In 2016, the UK Department for Business, Energy & Industrial Strategy undertook a cost-benefit analysis of smart meters and considered the extent to which energy consumption will reduce with smart meters installed. They considered a series of large-scale international review studies (similar to the 2011 Deloitte analysis) and two major and more recent studies undertaken in Great Britain – the 2011 Energy Demand Research Project (EDRP) and the 2015 Early Learning Project (ELP).

The key evidence they considered was:

- A review of 57 feedback studies in nine different countries by the American Council for an Energy-Efficient Economy (ACEEE), which found that, on average, feedback reduces energy consumption between 4 and 12 per cent, with higher (9 per cent) savings associated with real-time feedback.
- A further study reported by ACEEE reported residential electricity savings from real-time feedback in the nine pilots reviewed ranging from 0 to 19.5 per cent, with average savings across the pilots of 3.8 per cent.
- A review of 100 pilots and 460 samples covering 450,000 customers that were reviewed by the European Smart Metering Industry Group (ESMIG) suggested savings from around 5 to 6 per cent from interventions without an in home display (IHD), to an average of 8.7 per cent with an IHD.

[26] Deloitte, *Advanced metering infrastructure cost benefit analysis, Final report*, 2 August 2011, page 67
[27] Ibid, page 68
[28] ibid
[29] ibid

- The EDRP trials found that the combination of a smart meter with an IHD was associated with significant electricity savings, with statistically robust electricity savings of 2 to 4 per cent. The savings in gas were around 3 per cent in the absence of an IHD.
- The ELP research projects quantified energy reductions of 1.6 to 2.8 per cent for electricity and 0.9 to 2.1 per cent for gas. The project concluded that it was realistic to expect durable savings of 3 per cent, and that greater savings may be achievable over time.
- Kema's cost-benefit analysis for the Dutch Ministry of Economic Affairs assumed a 6.4 per cent reduction in electricity consumption with an IHD (3.2 per cent with indirect feedback).
- An Irish cost-benefit analysis assumed electricity savings of 3 per cent.[30]

Based on this evidence, it adopted what it considered to be a conservative approach – a 2.8 per cent energy consumption reduction for electricity, with sensitivity analysis undertaken assuming a 1.5 per cent reduction and a 4 per cent reduction.

For the purposes of this analysis, we assumed that only customers with an advanced digital meter installed and on a TOU tariff, with or without a demand component, would reduce their energy consumption. Based on the evidence presented, we assumed that the average reduction in energy consumption by these customers is 2 per cent. By definition, some customers would reduce their energy consumption by more than the average assumed and some would reduce their energy consumption by less than the average assumed.

Given the uncertainty associated with this assumption, we have undertaken sensitivity analysis with an average reduction in energy consumption by customers on TOU tariffs of 1 per cent and 3 per cent.

Based on the information submitted by the retailers, we assumed that 5 per cent of customers in Energex's distribution zone with an advanced digital meter installed will be on a TOU tariff. We assumed that 0.5 per cent of customers in Ergon Energy's distribution zone with an advanced digital meter installed will be on a TOU tariff. We also estimated the additional potential benefits that could be realised if all customers with an advanced digital meter installed are on a TOU tariff.

As the number of customers on a TOU tariff may increase, we have undertaken sensitivity analysis with the percentage of customers in Energex's distribution zone on TOU tariffs increasing to 10 per cent and 20 per cent, and the percentage of customers in Energex's distribution zone on TOU tariffs increasing to 1.0 per cent and 2.0 per cent.

To quantify these benefits, we calculated the average energy consumption by customer from information submitted to the AER by Energex and Ergon Energy, and have calculated the reduction in energy cost associated with a reduction in energy consumption based on our projected energy cost for the QCA's determination of electricity tariffs. We assumed no change in any other costs.

The assumptions that have been used are set out in Table 2.9.

TABLE 2.9 ASSUMPTIONS FOR CALCULATING THE BENEFIT OF REDUCING ENERGY CONSUMPTION

Parameter	Energex	Ergon Energy
Reduction in energy consumption	2%	2%
Proportion of customers with an advanced digital meter on a TOU tariff (realisable benefit / potential benefit)	5% / 100%	0.5% / 100%

[30] Department for Business, Energy & Industrial Strategy, *Smart Meter Roll-out Cost-Benefit Analysis, Part II – Technical Annex*, August 2016, pages 19-20

Parameter		Energex	Ergon Energy
Average energy consumption			
	Residential	5.64 MWh per annum	5.82 MWh per annum
	Small business	16.07 MWh per annum	13.00 MWh per annum
Energy cost avoided		$96.24 per MWh	$77.85 per MWh

SOURCE: ACIL ALLEN ANALYSIS BASED ON INFORMATION PROVIDED BY THE RETAILERS; ENERGEX 2017-18 ECONOMIC BENCHMARKING RIN, WORKSHEET '3.4 OPERATIONAL DATA'; ENERGEX 2017-18 ECONOMIC BENCHMARKING RIN, WORKSHEET '3.4 OPERATIONAL DATA'; ACIL ALLEN, ESTIMATED ENERGY COSTS, 2019-20 RETAIL TARIFFS FOR USE BY THE QUEENSLAND COMPETITION AUTHORITY IN ITS FINAL DETERMINATION ON RETAIL ELECTRICITY TARIFFS, MAY 2019, PAGE 35

2.5.4 Shift in energy consumption from peak to off-peak periods

As well as reducing their energy consumption, customers with an advanced digital meter installed and on a TOU tariff may also shift energy consumption from peak to off-peak periods.

The 2011 Deloitte report on the Victorian Advanced Metering Infrastructure program did not specifically refer to this benefit – it only considered the deferral of network and generation augmentation arising from a reduction in peak demand.

The UK's 2016 cost benefit analysis of smart meters assumed that 20 per cent of load during peak times was discretionary, with the discretionary proportion increasing to 30 per cent over time. It also assumed that a third of this discretionary load would be shifted from peak to off-peak times, increasing to 50 per cent over time. That is, the proportion of energy shifted from peak to off-peak times increased from 6.7 per cent to 15 per cent over time.

They were of the view that these reductions were in line with recent trial results:

- Initial results from a Customer-Led Network Revolution Trial indicated that customers on TOU tariffs reduced their overall electricity demand by 3 per cent, with a 10 per cent reduction during the peak period.
- The EDRP trials found that the shifting effects varied between trials and were up to 10 per cent.
- A CER report on Irish smart meter trials found peak reductions of 8.8 per cent due to the combination of different types of demand side interventions and TOU tariffs.
- The ESMIG study suggested peak shifting of around 5 per cent from TOU tariffs and up to 16 per cent with more sophisticated tariffs.[31]

For the purposes of this analysis, we assumed that the proportion of energy consumption that is shifted from peak to off-peak periods is, on average, 10 per cent, which is within the range assumed in the UK's analysis. The proportion of customers on TOU tariffs in the base case is reasonably low and we have assumed that these customers are more likely to respond to price signals to shift load.

By definition, some customers would shift more energy from peak to off-peak times than the average assumed and some would shift less energy from peak to off-peak times than the average assumed.

We quantified this benefit by assessing the difference in the marginal resource cost of energy during peak times and during off-peak times. We assumed this difference is, on average, $30 per MWh, while noting that the actual difference will vary over the year and over the period of time under consideration. Detailed modelling would be required to determine a more accurate figure.

The proportion of customers with an advanced digital meter installed that we have assumed to be on a TOU tariff is set out in Table 2.9. We have undertaken sensitivity analysis on the proportion of customers on a TOU tariff, as discussed in section 2.5.3.

[31] Department for Business, Energy & Industrial Strategy, *Smart Meter Roll-out Cost-Benefit Analysis, Part II – Technical Annex*, August 2016, pages 33-34

Given the uncertainty associated with these assumptions, we have undertaken sensitivity analysis assuming that:

— the proportion of energy consumption that is shifted from peak to off-peak times is 6.7 per cent and 15 per cent

— the difference in the marginal resource cost of energy during peak times and during off-peak times is $20 per MWh and $40 per MWh.

2.5.5 Reduced queries and complaints regarding estimated bills

Many of the queries and complaints made to retailers are in relation to estimated bills. Bills do not need to be estimated when advanced digital meters are installed. This section considers the benefits to customers associated with a reduction in the number of queries and complaints regarding estimated bills when advanced digital meters are installed. The consequent benefits for retailers from reduced queries, complaints and investigations by the ombudsman into estimated bills are discussed in section 2.7.3 and the consequent benefits for the ombudsman are discussed in section 2.7.4.

In 2017-18, there were 5,509 billing complaints made by residential customers and 445 billing complaints that were made by small business customers in Queensland. Of these, 542 billing complaints by residential customers and 141 billing complaints by small business customers were made to Ergon Energy.[32] We have assumed that all billing complaints made to Ergon Energy related to customers in Ergon Energy's distribution zone and the balance relate to customers in Energex's distribution zone.

We assumed that 20 per cent of these billing complaints related to estimated bills.

We estimated the number of calls that are made to a call centre relative to the number of complaints by referring to detailed information reported by the Victorian Essential Services Commission (ESC) prior to the installation of smart meters. In 2009-10, the ESC reported that there had been 4,770,669 calls to the retailers' account line that were forwarded to an operator[33] and 55,850 complaints.[34] We have therefore assumed that the ratio of calls to complaints is approximately 85.

We quantified the benefits by assuming that a customer would spend half an hour preparing for and making a call to the call centre about an estimated bill and an additional two hours if a complaint is made. The cost of that customer's time is estimated based on the Australian Bureau of Statistics' Average Weekly Earnings at November 2018 ($1,605.50) and the number of working hours in the week (38).

An example of how this benefit for residential customers in Energex's distribution zone has been calculated is provided in Table 2.10. A similar calculation applies to small business customers in Energex's distribution zone and to customers in Ergon Energy's distribution zone.

TABLE 2.10 EXAMPLE CALCULATION OF THE BENEFITS ASSOCIATED WITH REDUCED QUERIES AND COMPLAINTS REGARDING ESTIMATED BILLS BY RESIDENTIAL CUSTOMERS IN ENERGEX'S DISTRIBUTION ZONE IN 2019

	Calculation
Complaints	
Number of billing complaints in 2017-18, Queensland	5,509
Number of billing complaints in 2017-18, Energex's distribution zone	5,509 – 542 = 4,967
Number of billing complaints in 2019 (increase by growth in the number of customers)	1,364,167 / 1,354,125 x 4,967 = 5,004
Number of billing complaints related to estimated billing in 2019	20% of 5,004 = 1,001
Number of billing complaints avoided by customers with an advanced digital meter	1,001 x 157,133 / 1,364,167 = 115

[32] AER, Schedule 3 – Q3 2018-19 Retail Performance data, Worksheets 'Complaints by type Resi' and 'Complaints by type Sml Bus'

[33] Essential Services Commission, *Energy Retailers Comparative Performance Report, Customer Service 2009-10*, December 2010, Table 5.1

[34] Ibid, Table 5.3

	Calculation
Time spent by a customer making a complaint on an estimated bill	2 hours
Cost to customers of making complaints on estimated bills	2 x 1605.50 / 38 x 115 = $9,740
Queries	
Number of queries regarding estimated bills avoided by customers with an advanced digital meter	85 x 115 = 9,798
Time spent by a customer enquiring about an estimated bill	0.5 hours
Cost to customers of enquiring about estimated bills	0.5 x 1605.50/38 x =$206,990

SOURCE: ACIL ALLEN ASSESSMENT

2.5.6 More timely customer transfers

If a customer chooses to transfer to a new retailer, that transfer generally occurs at the time of the next meter reading when a conventional meter is installed, but can happen more quickly when an advanced digital meter is installed because the meter can be read remotely.

We assumed that, with an advanced digital meter installed, a customer in Energex's distribution zone can transfer to a retailer 45 days earlier than when a conventional meter is installed. We have assumed that 25 per cent of customers will transfer retailers each year[35] and that the customer will save 10 per cent per annum on their electricity bill by transferring to a different retailer, which is assumed to be around $1,690 per annum on average for a residential customer in 2018-19.[36] We scaled this up for a small business customer based on the higher energy consumption.

An example of how this benefit for residential customers in Energex's distribution zone has been calculated is provided in Table 2.11. A similar calculation applies to small business customers in Energex's distribution zone.

TABLE 2.11 EXAMPLE CALCULATION OF THE BENEFITS ASSOCIATED WITH TIMELY TRANSFER OF RESIDENTIAL CUSTOMERS IN ENERGEX'S DISTRIBUTION ZONE IN 2019

	Calculation
Average electricity bill	$1,690 per annum
Annual average reduction by transferring to a different retailer	10% of $1,690 = $169
Savings realised by transferring to a different retailer 45 days earlier	45 / 365 x $169 = $20.84
Number of residential customers with a smart meter as at 30 June 2019	157,833 x $20.84 = $3,288,548
Proportion of customers transferring retailer	25% of $3,288,548 = $822,134

SOURCE: ACIL ALLEN ASSESSMENT

It should be noted that this is a distributional effect – any savings made by the customer are a cost to a retailer – so there is no net financial benefit.

As the retail electricity market is currently not effectively competitive in Ergon Energy's distribution zone, we have assumed there are no benefits for those customers from more timely customer transfers. There is a potential benefit with the transition to effective retail competition in Ergon Energy's distribution zone, but we have not made any such assumption in this analysis.

2.5.7 Reduced number of calls to faults and emergencies line

If the electricity distributor is able to access metering data from advanced digital meters in real-time and there are sufficient meters installed for the electricity distributor to be able to understand the

[35] Each month AEMO publishes the historical monthly annualised transfer rate. The monthly transfer rate in Queensland varies between 10 and 25 per cent, noting that the majority of the switching occurs in the south east of Queensland. Refer https://www.aemo.com.au/-/media/Files/Electricity/NEM/Data/Metering/MRTS/2019/NEM-Monthly-Retail-Transfer-Statistics-201907.pdf

[36] Based on Australian Energy Market Commission, 2018 Residential Electricity Price Trends, 21 December 2018, page 65. The AEMC has estimated a price of $1,425 per annum for a customer consuming 5,240 kWh per annum, which we have scaled up to 5,640 KWh per annum. We have also added GST.

location and scope of an outage without customers calling the faults and emergencies line, then there are benefits to customers from not having to call the faults and emergencies line to report when faults have occurred. There are also benefits to the distributor associated with responding to fewer calls, which are discussed in section 2.6.5.

Under the current metering model, the distributors do not get access to metering data in real-time and therefore there is no benefit that can be realised by customers. We have undertaken sensitivity analysis to assess the potential benefits if the distributors had access to the real-time data.

We assumed that the benefits will not accrue until 60 per cent of customers have advanced digital meters installed and then the number of calls to the faults and emergencies line will decrease by 20 per cent, with the decrease increasing to 60 per cent when all meters installed are advanced digital meters. The numbers of calls to the faults and emergencies lines in 2017-18 are set out in Table 2.12. All else being equal, we assumed that the number of calls to the faults and emergencies line would increase in line with the increase in the number of customers.

TABLE 2.12 NUMBER OF CALLS TO FAULTS AND EMERGENCIES LINE, 2017-18

	Energex	Ergon Energy
Number of calls to faults and emergencies line	364,999	115,068

SOURCE: ENERGEX, 2017-18 ANNUAL REPORTING RIN, WORKSHEET '3.6 QUALITY OF SERVICES'; ERGON ENERGY, 2017-18 ANNUAL REPORTING RIN, WORKSHEET '3.6 QUALITY OF SERVICES'

We quantified the benefits by assuming that a customer would spend 10 minutes preparing for and making a call to the call centre about an outage. The cost of that customer's time is estimated based on the Australian Bureau of Statistics' Average Weekly Earnings at November 2018 ($1,605.50) and the number of working hours in the week (38).

For this benefit, and a number of others, we have assumed that the benefits will not be realised until 60 per cent of customers have advanced digital meters installed. We have applied this threshold based on the UK's analysis of the costs and benefits of smart meters, which states, in relation to the realisation of benefits associated with outage management, that:

We have assumed that a critical mass of smart meters is required for these benefits to be realised. This is so that sufficient regional coverage is provided to identify the location and the scope of an outage. The critical mass threshold is only passed once 60% of all meters are SMETS2 meters which have outage detection functionality.[37]

This threshold accords with our experience of the realisation of benefits associated with advanced digital meters.

2.5.8 Earlier fault notification

If the electricity distributor is able to access metering data from advanced digital meters in real-time, and there are sufficient meters installed for the electricity distributor to be able to understand the location and scope of an outage without customers calling the faults and emergencies line, the distributor is able to identify that a fault has occurred earlier than it would in the absence of that data.

Consistent with our analysis in section 2.5.7, we have assumed that this benefit will not accrue directly to customers as the distributors do not have access to the real-time data from advanced digital meters. We have undertaken a sensitivity to assess the potential benefits if the distributors had access to the real-time data, assuming that the benefits will not accrue until 60 per cent of the meters installed are advanced digital meters.

We assumed that, with real-time data available and an appropriate penetration of advanced digital meters installed, the distributor will be able to identify faults four minutes earlier. This is consistent with an assumption made by the UK Department for Business, Energy & Industrial Strategy in its cost-benefit analysis of smart meters.[38]

[37] Department for Business, Energy & Industrial Strategy, *Smart Meter Roll-out Cost-Benefit Analysis, Part II – Technical Annex*, August 2016, page 29

[38] Department for Business, Energy & Industrial Strategy, *Smart Meter Roll-out Cost-Benefit Analysis, Part II – Technical Annex*, August 2016, page 29

We quantified the benefit by considering the average number of faults experienced by a customer (inclusive of Major Event Days), the average energy consumption (as set out in Table 2.9) and the value of customer reliability (VCR) as estimated for Queensland customers by the Australian Energy Market Operator. We escalated the VCR from March 2014 dollars to December 2018 dollars.[39] These assumptions are summarised in Table 2.13.

TABLE 2.13 QUANTIFYING THE CUSTOMER BENEFIT OF EARLIER FAULT NOTIFICATION

Parameter	Energex	Ergon Energy
Average number of interruptions, 2017-18	0.98782	2.9358
Value of Customer Reliability ($ March 2014)	$39.71 per kWh	

SOURCE: ENERGEX, 2017-18 ANNUAL REPORTING RIN, WORKSHEET '3.6 QUALITY OF SERVICES'; ERGON ENERGY, 2017-18 ANNUAL REPORTING RIN, WORKSHEET '3.6 QUALITY OF SERVICES'; AUSTRALIAN ENERGY MARKET OPERATOR, VALUE OF CUSTOMER RELIABILITY – APPLICATION GUIDE, FINAL REPORT, DECEMBER 2014, PAGE 5

2.5.9 Faster restoration of supply

If the electricity distributor is able to access metering data from advanced digital meters in real-time, and there are sufficient meters installed for the electricity distributor to be able to understand the nature, location and scope of an outage, it is able to respond more quickly to resolve the fault once it becomes aware of it.

Consistent with our analysis in sections 2.5.7 and 2.5.8, we have assumed that this benefit will not accrue directly to customers as the distributors do not have access to the real-time data from advanced digital meters. We have undertaken a sensitivity to assess the potential benefits if the distributors had access to the real-time data, assuming that the benefits will not accrue until 60 per cent of the meters installed are advanced digital meters.

We assumed that with real-time data available and an appropriate penetration of advanced digital meters installed, the distributor will be able to reduce the duration of a fault by 5 per cent. This is based on international evidence reviewed by the UK Department for Business, Energy & Industrial Strategy in its cost-benefit analysis of smart meters that the potentially achievable reductions are in the range of 5 to 35 per cent.[40]

We quantified the benefit by considering the average duration of faults experienced by a customer (inclusive of Major Event Days), the average energy consumption (as set out in Table 2.9) and the VCR as estimated for Queensland customers by the Australian Energy Market Operator (as set out in Table 2.13), which we have escalated from March 2014 dollars to December 2018 dollars.[41] The average duration of interruptions in each distribution zone is set out in Table 2.14.

TABLE 2.14 AVERAGE DURATION OF FAULTS, 2017-18

	Energex	Ergon Energy
Average duration of faults, 2017-18	161.4 minutes	394.4 minutes

SOURCE: ENERGEX, 2017-18 ANNUAL REPORTING RIN, WORKSHEET '3.6 QUALITY OF SERVICES'; ERGON ENERGY, 2017-18 ANNUAL REPORTING RIN, WORKSHEET '3.6 QUALITY OF SERVICES'

2.6 Network benefits

This section considers the following benefits that may be realised by network service providers with the installation of advanced digital meters:

- remote rather than manual de-energisations and business hours re-energisations, refer section 2.6.1
- reduction in peak demand, in section 2.6.2
- improved planning, in section 2.6.3
- reduced operating costs to fix faults, in section 2.6.4

[39] The CPI was 114.1 in December 2018 and 105.4 in March 2014.
[40] Department for Business, Energy & Industrial Strategy, *Smart Meter Roll-out Cost-Benefit Analysis, Part II – Technical Annex*, August 2016, page 29
[41] The CPI was 114.1 in December 2018 and 105.4 in March 2014.

— reduced number of calls to the faults and emergencies line, in section 2.6.5
— reduced cost of investigations into quality of supply, in section 2.6.6
— reduced number of GSL payments, in section 2.6.7.

2.6.1 Remote de-energisations and business hours re-energisations

De-energisations and re-energisations are required when customers move in and move out, and when bills have not been paid. Advanced digital meters enable customers' premises to be de-energised and re-energised remotely rather than manually, which requires a site visit. However, in Queensland, customers' premises cannot be re-energised remotely and retailers are requesting manual rather than remote de-energisations. Hence the benefits associated with remote de-energisation and re-energisation cannot currently be realised.

We have assumed that retailers may choose to request remote de-energisations when a critical mass of advanced digital meters are installed. For the purposes of the analysis, we have assumed that this will occur when 60 per cent of meters installed are advanced digital meters. We therefore regard the benefits associated with remote de-energisation as realisable from that point in time, and as a potential benefit prior to that point in time.

We estimated the benefits that could be realised if customers premises could be remotely de-energised and re-energised in Queensland. In Queensland, distributors cannot charge customers for de-energisations and re-energisations during business hours but they can charge them for re-energisations after hours.[42] Accordingly, any benefits associated with re-energisations after hours are realised directly by customers and any benefits associated with de-energisations and re-energisations during business hours are realised by the distributors. De-energisations and re-energisations during business hours are considered in this section, and after hours re-energisations are considered in section 2.5.2.

For the purposes of this estimate, we assumed that, on average, 22 per cent of customers' premises are required to be de-energised and re-energised once annually, consistent with Deloitte's 2011 analysis of the costs and benefits of the Victorian Advanced Metering Infrastructure program.[43] We assumed that 80 per cent of re-energisations occur during business hours and that retailers request remote rather than manual de-energisations when 60 per cent of meters installed are advanced digital meters.

We used the de-energisation and business hours re-energisation charges published by Energex and Ergon Energy for 2018-19. The charges for Ergon Energy are published for customers on urban and short rural feeders and for customers on long rural feeders. We weighted these charges by the number of customers in Ergon Energy's distribution zone on urban, short rural and long rural feeders.[44]

We estimated the cost of a remote de-energisation and re-energisation based on the 2019 pricing proposals of the Victorian electricity distributors. We weighted the charges for CitiPower and Jemena by one and for AusNet Services, Powercor, and United Energy by two to reflect the different sizes of the distributors.

The costs that we have assumed for manual and remote de-energisations and re-energisations during business hours are set out in Table 2.15. We assumed that these costs will be maintained in real terms over the 2019-49 period.

[42] Electricity Regulations 2006, Schedule 8, Part 2
[43] Deloitte, *Advanced metering infrastructure cost benefit analysis, Final report*, 2 August 2011, page 62
[44] Ergon Energy, 2017-18 Economic Benchmarking RIN, Worksheet '3.4 Operational data'

TABLE 2.15 COST OF MANUAL AND REMOTE DE-ENERGISATION AND BUSINESS HOURS RE-ENERGISATION (PER SERVICE), 2018-19

		De-energisation		Re-energisation (business hours)	
		Energex	Ergon Energy	Energex	Ergon Energy
Manual service		$42.35	$96.92	$38.11	$92.40
Remote service	AusNet Services	$10.15		$10.15	
	CitiPower	$6.68		$6.68	
	Jemena	$10.87		$10.87	
	Powercor	$10.67		$10.67	
	United Energy	$10.72		$10.72	
	Weighted average	**$10.08**		**$10.08**	

Note: The charges for customers in Ergon Energy's area are the customer weighted average charges

SOURCE: ENERGEX, 15.009 FEE BASED AND QUOTED SERVICE MODEL – ACS – JANUARY 2019, WORKSHEETS 'EGX PRICES (DIRECT COSTS)' AND 'ERG PRICES (DIRECT COSTS)'; VICTORIAN ELECTRICITY DISTRIBUTORS' 2019 PRICING PROPOSALS

2.6.2 Reduction in peak demand

The extent to which customers may reduce their peak demand in response to the information provided by advanced digital meters, and the extent to which this reduces expenditure on network augmentations, is also highly contentious. Network expenditure on network augmentations can only be realised when the reductions in peak demand occur at the time and location at which the network is constrained.

In its report on the costs and benefits of the Victorian Advanced Metering Infrastructure program, Deloitte assumed that customers on TOU tariffs would reduce their peak demand by 1.5 per cent[45] and customers on Critical Peak Pricing would reduce their peak demand by 15 per cent.[46] Deloitte adopted an assumption of $200,000 per MW (or $2,000 per kW) per year as the avoided cost of network and generation investments realised by reducing peak demand.[47]

As part its Power of Choice review, the AEMC estimated peak demand reductions by small customers of between 2.5 and 7.5 per cent in response to efficient pricing.[48] It also estimated the avoided cost of network augmentation investments in Energex's distribution zone at around $3,200 per kW per year and in Ergon Energy's distribution zone at around $5,700 per kW per year ($2012-13).[49]

The UK Department for Business, Energy & Industrial Strategy undertook sensitivity analysis of the reductions in peak demand, assuming a 10 per cent and a 40 per cent reduction.[50]

Based on these studies, we assumed a reduction in peak demand by customers with an advanced digital meter installed and on a TOU tariff of, on average, 10 per cent. By definition, some customers would reduce their peak demand by more than the average assumed and some would reduce their peak demand by less than the average assumed.

Given the uncertainty associated with this assumption, we have undertaken sensitivity analysis assuming that the reduction in peak demand is 5 per cent and 15 per cent.

Consistent with our discussion in section 2.5.3, we assumed that 5 per cent of customers in Energex's distribution zone with an advanced digital meter installed will be on a TOU tariff, and that 0.5 per cent of customers in Ergon Energy's distribution zone with an advanced digital meter installed will be on a TOU tariff. We also estimated the potential benefits assuming that all customers with an advanced

[45] Deloitte, *Advanced metering infrastructure cost benefit analysis, Final report*, 2 August 2011, page 70
[46] Ibid, page 72
[47] Ibid. The dollars are not specified but are most likely to be in 2008 dollars
[48] Australian Energy Market Commission, *Final Report, Power of choice review – giving consumers options in the way they use electricity*, 30 November 2012, page 262
[49] Australian Energy Market Commission, Figure 10.7
[50] Department for Business, Energy & Industrial Strategy, *Smart Meter Roll-out Cost-Benefit Analysis, Part II – Technical Annex*, August 2016, page 34

digital meter installed are on a TOU tariff, and have undertaken sensitivity analysis on the proportion of customers on a TOU tariff, as discussed in section 2.5.3.

We estimated the avoided cost of network augmentations from a review of the peak demand growth and capital expenditure for growth as forecast by Energex and Ergon Energy over the 2020-25 period. We converted the capital expenditure to December 2018 dollars assuming an inflation rate of 2.42 per cent per annum from December 2018 to December 2020, consistent with the inflation assumption in the regulatory proposals for Energex and Ergon Energy. We assumed that the peak demand growth rate and capital expenditure for growth (in real terms) remain constant to 2049.

The maximum reduction in capital expenditure is the average annual expenditure, prorated across residential and small business customers based on their contribution to peak demand. We capped these benefits when the reduction in peak demand is equal to the growth in peak demand.

The assumptions that have been used to calculate the benefits associated with reducing peak demand are set out in Table 2.16.

TABLE 2.16 ASSUMPTIONS FOR CALCULATING THE BENEFIT OF REDUCING PEAK DEMAND

Parameter		Energex	Ergon Energy
Reduction in peak demand		10%	10%
Proportion of customers with an advanced digital meter on a TOU tariff (realisable benefit / potential benefit)		5% / 100%	0.5% / 100%
Contribution to peak demand			
	Residential	36 per cent	28 per cent
	Small business	9 per cent	10 per cent
Peak demand (10 POE)			
	2019	5,397 MW	2,679 MW
	2025	5,493 MW	2,735 MW
Peak demand growth		0.45 per cent per annum	0.46 per cent per annum
Forecast augmentation expenditure – 2020-25 ($2020)		$171 million	$161 million
Augmentation cost avoided ($2018)		$3,399 per kW per annum	$5,477 per kW per annum

SOURCE: ACIL ALLEN ANALYSIS BASED ON INFORMATION PROVIDED BY THE RETAILERS; ENERGEX 2017-18 ECONOMIC BENCHMARKING RIN, WORKSHEET '3.4 OPERATIONAL DATA'; ENERGEX 2017-18 ECONOMIC BENCHMARKING RIN, WORKSHEET '3.4 OPERATIONAL DATA'; ENERGEX, REGULATORY PROPOSAL 2020-25, JANUARY 2019, PAGES 36 AND 71; ERGON ENERGY, REGULATORY PROPOSAL 2020-25, JANUARY 2019, PAGES 36 AND 69

2.6.3 Improved planning

Having more detailed historical information available from advanced digital meters will allow constraints in the network to be identified more easily. Better planning data will enable investment in network replacement and connections to be better directed.

The UK Department for Business, Energy & Industrial Strategy assumed that the potential savings were 5 per cent of expenditure increasing to 10 per cent once a critical mass of smart meters had been installed.[51]

The cost benefit analysis for the Victorian Advanced Metering Infrastructure program included a number of benefits related to better planning including:

- reduced cost of network loading studies for network planning
- avoided cost of replacing service fuses that fail on overload
- avoided cost of proportion of HV/LV transformer fuse operations on overload

[51] Department for Business, Energy & Industrial Strategy, *Smart Meter Roll-out Cost-Benefit Analysis, Part II – Technical Annex*, August 2016, page 31

— avoided cost of supply capacity circuit breaker.[52]

For the purposes of this study, we assumed that the benefits associated with improved planning will not accrue until 60 per cent of customers have smart meters installed and then the replacement and connection expenditure will decrease by 5 per cent, with the decrease increasing to 10 per cent when all meters installed are advanced digital meters.

We used the annual average replacement and connections capital expenditure forecast by Energex and Ergon Energy for the 2020-25 period, as summarised in Table 2.17, as the basis for estimating the benefits associated with improved planning, and have assumed that the expenditure remains constant in real terms to 2049. We converted the expenditure to December 2018 dollars assuming an inflation rate of 2.42 per cent per annum from December 2018 to December 2020, consistent with the inflation assumption in the regulatory proposals for Energex and Ergon Energy.

TABLE 2.17 FORECAST REPLACEMENT AND CONNECTIONS CAPITAL EXPENDITURE, 2020-25, $2020

	Energex	Ergon Energy
Replacement expenditure	$642 million	$1,094 million
Connections expenditure	$475 million	$376 million

SOURCE: ENERGEX, REGULATORY PROPOSAL 2020-25, JANUARY 2019, PAGE 58; ERGON ENERGY, REGULATORY PROPOSAL 2020-25, JANUARY 2019, PAGE 56

2.6.4 Reduced operating costs to fix faults

If the electricity distributor is able to access metering data from advanced digital meters in real-time and there are sufficient meters installed for the electricity distributor to be able to understand the location and scope of an outage, the distributor will be able to:

… deploy fault resolution teams in a more cost effective manner, and avoid instances where they return to the depot only to be redeployed because a nested fault was not fully resolved. It will also reduce the need for unnecessary visits, where the outage is the result of a fault in the premises rather than with the distribution network.[53]

By deploying fault resolution teams in a more efficient manner, the UK Department for Business, Energy & Industrial Strategy assumed savings of £50 per fault.[54]

We have assumed that the reduced operating cost per fault is $100 per fault. Consistent with our analysis in sections 2.5.7, 2.5.8, and 2.5.9, we assumed that this benefit will not accrue directly to customers as the distributors do not have access to the real-time data from advanced digital meters. We have undertaken a sensitivity to assess the potential benefits if the distributors had access to the real-time data, assuming that the benefits will not accrue until 60 per cent of the meters installed are advanced digital meters.

While the average number of interruptions experienced by customers in Energex's and Ergon Energy's distribution zones is publicly available, the number of faults is not. We have confidential data on the number of faults experienced by other electricity distributors. We estimated the number of interruptions experienced by customers in Energex's and Ergon Energy's distribution zones based on the ratio of the number of faults experienced by the other electricity distributors, the average number of interruptions experienced by customers supplied by those other electricity distributors and the average number of interruptions experienced by customers supplied by Energex and Ergon Energy. We used electricity distributors that are predominantly urban in nature to estimate the number of faults in Energex's distribution zone and electricity distributors that are predominantly rural in nature to estimate the number of faults in Ergon Energy's distribution zone.

[52] Deloitte, *Advanced metering infrastructure cost benefit analysis, Final report*, 2 August 2011, pages 78-80

[53] Department for Business, Energy & Industrial Strategy, *Smart Meter Roll-out Cost-Benefit Analysis, Part II – Technical Annex*, August 2016, page 30

[54] Ibid

On the basis of that analysis, we estimated the annual number of faults as set out in Table 2.18. We assumed that the annual number of faults increases in line with the increase in the number of customers.

TABLE 2.18 ESTIMATED ANNUAL NUMBER OF FAULTS, 2019

	Energex	Ergon Energy
Annual number of faults	10,156	7,178

SOURCE: ACIL ALLEN ANALYSIS BASED ON CONFIDENTIAL INFORMATION

2.6.5 Reduced number of calls to faults and emergencies line

As discussed in section 2.5.7, if the electricity distributor is able to access metering data from advanced digital meters in real-time and there are sufficient meters installed for the electricity distributor to be able to understand the location and scope of an outage without customers calling the faults and emergencies line, then there are fewer calls made to the distributor's faults and emergencies line.

Consistent with the assumptions that were made to assess the customer benefits associated with making fewer calls to the faults and emergencies line, we estimated the benefits to the distributors by assuming that:

- the benefit is potential rather than realisable as the distributors do not have access to real-time data
- the benefits will not accrue until 60 per cent of customers have advanced digital meters installed and then the number of calls to the faults and emergencies line will decrease by 20 per cent, with the decrease increasing to 60 per cent when all meters installed are advanced digital meters
- the number of calls to the faults and emergencies lines in 2017-18 are set out in Table 2.12, and that, all else being equal, the number of calls to the faults and emergencies line would increase in line with the increase in the number of customers.

To quantify these benefits, we have assumed that the average time taken for each call is 5 minutes, the cost of the call centre operator is $60 per hour and the indirect cost is $16 per hour (20 per cent of the direct time at $80 per hour).

2.6.6 Avoided cost of investigations into quality of supply

If the advanced digital meters had the functionality to monitor the voltage and quality of supply, then the distributor would be able to avoid the costs associated with investigating complaints about voltage and quality of supply. While the meters rolled out in Victoria under the Advanced Metering Infrastructure program include this functionality, the functionality is not included in the national minimum functional specification.

Despite the national minimum functional specification not including the requirement to monitor the voltage and quality of supply, we understand that the meters that are being installed in Queensland have this functionality. However, if the distributors do not have the assurance that the data will be available and are not able to access this data, then the benefits associated with that data cannot be realised.

If the advanced digital meters installed in Queensland include this functionality, and the distributors are able to access the data, then we have assumed that the avoided cost per investigation is $1,000. We assumed that the number of complaints for which an investigation is avoided is based on the number of complaints currently received by the distributors on the quality of supply, increasing over time in line with the increase in the number of customers, and the proportion of customers with advanced digital meters installed. The number of complaints currently received by the distributors on the quality of supply is set out in Table 2.19.

TABLE 2.19 COMPLAINTS ON THE QUALITY OF SUPPLY, 2017-18

	Energex	Ergon Energy
Number of complaints on the technical quality of supply	1,346	1,888

SOURCE: ENERGEX, 2017-18 ANNUAL REPORTING RIN, WORKSHEET '3.6 QUALITY OF SERVICES'; ERGON ENERGY, 2017-18 ANNUAL REPORTING RIN, WORKSHEET '3.6 QUALITY OF SERVICES'

2.6.7 Reduced number of GSL payments

Under the Electricity Distribution Network Code, Energex and Ergon Energy are required to make the GSL payments in relation to:

- wrongful disconnection
- timely connections
- timely reconnections
- timely visit in relation to loss of hot water supply
- timely appointments
- notice of planned interruptions
- long interruptions
- frequent interruptions.[55]

The number of GSL payments that are made could be reduced by using the functionality available through advanced digital meters as set out in Table 2.20.

TABLE 2.20 IMPACT OF ADVANCED DIGITAL METERS

Nature of GSL payment	Magnitude of GSL payment	Impact of advanced digital meters on GSL payments	Payments made ($ / number), 2017-18	
			Energex	Ergon Energy
Wrongful disconnection	$142	Nil	$5,254 / 37	$9,088 / 64
Timely connections	$57 per day	Nil	$79,179 / 137	$12,363 / 61
Timely reconnections	$57 per day	If premises can be remotely re-energised, reconnection more likely to occur on a timely basis	$6,667 / 58	$2,107 / 23
Timely visit re loss of hot water supply	$57 per day	Number of visits required may be reduced if issues with hot water supply system can be identified remotely	$0 / 0	$57 / 1
Timely appointments	$57	Number of appointments relating to meters may be reduced if matter can be addressed remotely	$9,690 / 170	$9,120 / 58
Notice of planned interruptions	$28 for residential customers; $71 for small business customers	Nil	$33,656 / 1,202	$32,536 / 1,162
Long interruptions	$104	Number of interruptions that exceed GSL threshold may be reduced with faster restoration times	$4,777,740 / 41,910	$2,587,002 / 22,693
Frequent interruptions	$104	Nil	$0 / 0	$6,498 / 57

SOURCE: ACIL ASSESSMENT; ELECTRICITY DISTRIBUTION NETWORK CODE, CLAUSE 2.3.10; ENERGEX LIMITED, GSL APR-JUN18 QTR4 1718 REPORT; ERGON ENERGY CORPORATION LIMITED, GSL MAR-JUN18 QTR4 1718 REPORT

Of the eight GSL payments that are made by the distributors, there are four payments that are more likely to be impacted by the installation of advanced digital meters – timely reconnections, timely visits regarding the loss of hot water supply, timely appointments and long interruptions. Of these, there was

[55] Electricity Distribution Network Code, section 2.3

only one payment that was made in 2017-18 for a timely visit regarding the loss of hot water supply, and therefore any benefit from a reduction in GSL payments with the installation of advanced digital meters would be immaterial.

We have assumed that, all else being equal, the number of GSL payments made will increase in line with the increase in the number of customers and that:

- timely reconnections – the number of GSL payments to customers with an advanced digital meter installed will decrease by 50 per cent, but only if the distributors are permitted to remotely re-energise the premises
- on time appointments – the number of GSL payments to customers with an advanced digital meter installed will decrease by 20 per cent
- long interruptions – the number of GSL payments to customers with an advanced digital meter installed will decrease by 5 per cent, but only if the distributors have access to real-time data.

The only GSL payment for which a reduction in the number of payments made with the installation of advanced digital meters is material is the GSL payment for long interruptions. We have therefore only considered this payment in our analysis.

2.7 Retailer benefits

This section considers the following benefits that may be realised by retailers with the installation of advanced digital meters:

- reduced costs associated with debt management, in section 2.7.1
- reduced electricity theft, in section 2.7.2
- reduced number of calls, complaints and investigations relating to estimated bills, in section 2.7.3
- reduced complaints to and investigations by the Ombudsman into estimated bills, in section 2.7.4.

2.7.1 Debt management

The UK Department for Business, Energy & Industrial Strategy identified that advanced digital meters can help to avoid debt in a number of ways:

1. Information for customers about energy consumption can help them to manage consumption and raise awareness of the costs, which can avoid large energy bills and therefore the risk of debt arising.
2. More frequent and accurate metering data for billing purposes will enable retailers to identify customers at risk of building up debt sooner and will enable them to discuss and agree reactive measures.
3. Bills based on remote reads rather than estimated reads will avoid large arrears accumulating where customers receive a succession of estimated bills.

The avoidance of debt reduces the retailers' working capital requirements. The UK Department for Business, Energy & Industrial Strategy assumed the savings from better debt management to be £2.2 per meter per annum based on an earlier estimate by Mott MacDonald that was endorsed by the retailers.[56]

We based our assumption of the debt management saving on the UK estimate and have:

- converted it from British pounds to Australian dollars using an exchange rate of $1.80 to the British pound
- scaled it based on the difference between the average electricity bill and average consumption in the UK and in Australia
- escalated it from March 2016 dollars to December 2018 dollars.

The average UK electricity bill has been assumed to be £785 for a customer consuming 6,000 kWh per annum.[57]

[56] Department for Business, Energy & Industrial Strategy, *Smart Meter Roll-out Cost-Benefit Analysis, Part II – Technical Annex*, August 2016, pages 25-26

[57] https://www.statista.com/statistics/496661/average-annual-electricity-bill-uk/

The amount that we assumed for debt management savings is $4.69 per advanced digital meter installed.

2.7.2 Electricity theft

Both the UK Department for Business, Energy & Industrial Strategy and Deloitte for the Victorian Government included a benefit associated with reduced electricity theft in their cost benefit analyses for smart meters.

Deloitte assumed that electricity theft was equal to 0.5 per cent of energy sales, and the uncovering of electricity theft through smart meters would reduce the energy use at theft sites by 50 per cent.[58] The potential reduction in energy use equates to 0.25 per cent of energy. The benefit was quantified based on the resource cost of energy sales.

The UK Department for Business, Energy & Industrial Strategy assumed that the level of electricity theft was 5.5 TWh per annum and that theft could be reduced conservatively by 10 per cent, but could be reduced by 20-33 per cent. It also valued the benefits associated with reduced electricity theft based on the resource cost of energy sales.

To put the UK assumption on electricity theft into perspective, the electricity consumption in the UK was 301 TWh in 2017, of which 35.0 per cent was for residential use, 34.1 per cent for public administration, transport, agriculture and commercial, and 30.9 per cent was for industrial use.[59] The energy lost through theft equates to 1.8 per cent of electricity consumed.

The energy consumption in Queensland was 54,396 GWh in 2017-18[60], of which 21,262 GWh was delivered to distribution customers in Energex's distribution zone[61] and 13,243 GWh was delivered to distribution customers in Ergon Energy's distribution zone.[62] If the proportion of electricity theft in the UK is the same as in Queensland, the energy lost through sales in Queensland is 994 GWh, and if the theft occurs in the distribution system, electricity theft equates to 2.9 per cent of energy sales at the distribution level.

If we assume that the reduction in electricity theft is 10 per cent, consistent with the UK assumptions, this equates to a potential reduction of 0.29 per cent of energy.

For the purposes of this analysis, we made the same assumptions as in the Victorian cost-benefit analysis, that is, that electricity theft is equal to 0.5 per cent of energy sales and the uncovering of theft through the installation of advanced digital meters reduces the energy use at theft sites by 50 per cent. We have quantified the benefit using the cost of energy as set out in Table 2.9.

2.7.3 Reduced calls, complaints and investigations regarding estimated bills

As discussed in section 2.5.5, many of the queries and complaints made to retailers are in relation to estimated bills. With the installation of advanced digital meters, bills do not need to be estimated which will lead to a reduction in the number of calls, complaints and investigations regarding estimated bills.

To quantify the benefits to retailers we have used the same assumptions used to quantify the benefits for customers, that is, we have:

- noted that in 2017-18, there were 5,509 billing complaints made by residential customers and 445 billing complaints that were made by small business customers in Queensland
- noted that, of these, 542 billing complaints by residential customers and 141 billing complaints by small customers were made to Ergon Energy[63]
- assumed that all billing complaints made to Ergon Energy related to customers in Ergon Energy's distribution zone and the balance relate to customers in Energex's distribution zone

[58] Deloitte, *Advanced metering infrastructure cost benefit analysis, Final report*, 2 August 2011, page 64
[59] Department for Business, Energy & Industrial Strategy, Digest of United Kingdom Energy Statistics, 5.1.2 Electricity Supply, Availability and Consumption, 1970 to 2017
[60] ACIL Allen electricity market modelling
[61] Energex 2017-18 – Economic Benchmarking RIN, Worksheet '3.4 Operational data'
[62] Ergon Energy 2017-18 – Economic Benchmarking RIN, Worksheet '3.4 Operational data'
[63] AER, Schedule 3 – Q3 2018-19 Retail Performance data, Worksheets 'Complaints by type Resi' and 'Complaints by type Sml Bus'

— assumed that 20 per cent of these billing complaints relate to estimated bills
— estimated that the ratio of calls to complaints is approximately 85.

We quantified the benefits by assuming that the average duration of calls to the retailer's call centre is 6 minutes, the cost of the call centre operator is $60 per hour and the indirect cost is $16 per hour (20 per cent of the direct time at $80 per hour).

In 2017-18, the Energy and Water Ombudsman Queensland dealt with 3,659 billing complaints and 874 investigations relating to billing in the electricity sector.[64] We assumed that 20 per cent of these complaints and investigations related to estimated bills and proportioned them between Energex's and Ergon Energy's distribution zones using the same proportion as for complaints made to the retailers.

To quantify the costs incurred by the retailers in dealing with these complaints and investigations, we relied upon a confidential submission made on the customer impacts of a new payment difficulties framework in Victoria. That retailer suggested that:

… for each dollar spent on [the Energy and Water Ombudsman Victoria] EWOV case fees, $2 is spent resourcing our customer advocacy team.[65]

We estimated the Ombudsman's costs for dealing with complaints and investigations by:

— noting that the Ombudsman dealt with 7,931 complaints and 1,748 investigations in 2017-18
— assuming that the Ombudsman spent five times longer dealing with an investigation than a complaint
— noting that the total cost of the Ombudsman's office was $6.278 million in 2017-18.

We estimated that the cost for the Ombudsman to deal with a complaint is $377 and to deal with an investigation is $1,883. We therefore assumed that the cost for a retailer to deal with a complaint is $754 and to deal with an investigation is $3,766.

2.7.4 Reduced complaints to and investigations by the Ombudsman regarding estimated bills

When advanced digital meters are installed, reducing the number of estimated bills, the number of complaints to and investigations by the Ombudsman regarding estimated bills will reduce. The cost associated with the Ombudsman's office will decrease, reducing the fees that are paid by the retailers for the Ombudsman.

The assumptions that have been used to quantify these benefits are discussed in section 2.7.3.

2.8 Other benefits

This section considers the following benefits that may be realised by other parties with the installation of advanced digital meters:

— deferred investment in generation due to a reduction in peak demand, in section 2.8.1
— reduction in greenhouse gas emissions, in section 2.8.2.

2.8.1 Deferred investment in generation due to reduction in peak demand

Many cost-benefit analyses for smart meters have considered the benefits that may be realised by deferring investment in generation with a reduction in peak demand by customers responding to the information provided by smart meters.

However, in Queensland, the investment in new generation capacity is being driven more by Government policy decisions to increase the capacity of renewable energy generation, rather than to accommodate a growth in peak demand.

For the purposes of this cost-benefit analysis, we have therefore assumed that the benefits associated with the deferral of investment in new generation capacity by the installation of advanced digital meters are not material.

[64] Energy and Water Ombudsman Queensland, Annual Report 2017-18, pages 32 and 34
[65] ACIL Allen Consulting, *New Framework for Customers Facing Payment Difficulty, Assessment of the Retailers' Costs*, 9 October 2017, page 23

2.8.2 Reduction in greenhouse gas emissions

As discussed in sections 2.5.3 and 2.5.4, customers may reduce their energy consumption and may shift their energy consumption from peak to off-peak times in response to the information provided by advanced digital meter. If this occurs, there may be a reduction in greenhouse gas emissions.

For the purposes of this study, we quantified the benefits associated with a reduction in greenhouse gas emissions by assuming:

- there is no net change in greenhouse gas emissions by shifting energy consumption from peak to off-peak times
- there is a reduction in greenhouse gas emissions by reducing energy consumption
- the reduction in greenhouse has emissions is estimated based on the reduction in energy consumption, as discussed in section 2.5.3, and the average emissions intensity for Queensland
- the average emissions intensity in Queensland decreases from 0.79 t CO2-e per MWh in 2019 to 0.10 t CO2-e per MWh in 2049[66]
- the price on greenhouse gas emissions is $20 per tonne[67].

2.9 Overview of the benefits associated with advanced digital meters

Table 2.21 summarises for each benefit considered whether:

- the benefit is realisable
- there are barriers to the realisation of the benefits, and therefore whether they are referred to in chapter 3 as potential benefits.

This assessment is made separately with respect to advanced digital meters installed in Energex's and Ergon Energy's distribution zones.

[66] Based on ACIL Allen's energy market modelling

[67] As there is no price on greenhouse gas emissions in Australia, there is no firm basis for this assumption.

TABLE 2.21 EXTENT TO WHICH BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS ARE REALISABLE

Category	Type of cost / benefit	Description	Energex distribution zone	Ergon Energy distribution zone
Direct customer benefit	Special meter read	The difference in cost between a special meter read that is undertaken manually when, for example, a customer moves out, and a special meter read that is undertaken remotely[68]	Realisable	Realisable
	Re-energisation after hours	The difference in cost between a re-energisation that is undertaken manually after hours when, for example, a customer moves in, and a re-energisation that is undertaken remotely	Potential – remote re-energisation not permitted under Queensland regulations	Potential – remote re-energisation not permitted under Queensland regulations
	Reduction in energy consumption	Reduction in energy consumption arising from the improved data that is available from advanced digital meters, and the ability for this information to be provided to customers on a more timely basis	Realisable for 5 per cent of customers with advanced digital meters assumed to be on TOU tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff	Realisable for 0.5 per cent of customers with advanced digital meters assumed to be on TOU tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff
	Shift in energy consumption from peak to off-peak periods	A shift in energy consumption from peak to off-peak times arising from the introduction of more cost reflective tariffs that are enabled by advanced digital meters	Realisable for 5 per cent of customers with advanced digital meters assumed to be on TOU tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff	Realisable for 0.5 per cent of customers with advanced digital meters assumed to be on TOU tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff
	Queries regarding estimated reads	Electricity bills do not need to be estimated with an advanced digital meter installed, which results in a reduction in queries by customers of estimated bills	Realisable	Realisable
	Complaints regarding estimated reads	A reduction in queries by customers of estimated bills results in a reduction in the number of complaints by customers about estimated bills	Realisable	Realisable

[68] In some cases, retailers do not pass on the cost of special meter reads to customers. The benefit would then be realised by the retailers which is then passed through to customers through the operation of the competitive market.

Category	Type of cost / benefit	Description	Energex distribution zone	Ergon Energy distribution zone
	More timely customer transfers	With conventional meters, customer transfers to a different retailer generally occur at the time of the next manual meter read. Customer transfers can occur more quickly when an advanced digital meter is installed as the meter can be read remotely	Realisable	Potentially realisable with effective retail competition in Ergon Energy's distribution zone
	Calls to faults and emergencies line	Over time, customers will be confident that the network business is aware that a fault has occurred based on data from advanced digital meters, and will reduce the number of calls they make to the faults and emergencies line	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
	Earlier fault notification	Network businesses will be able to identify faults more quickly using data from advanced digital meters	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
	Faster restoration of supply	Network businesses will be able to resolve a fault more quickly with information from advanced digital meters on the nature, location and scope of an outage	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
Network benefit	De-energisation	The difference in cost between a de-energisation that is undertaken manually when, for example, a customer moves out, and a de-energisation that is undertaken remotely	Potential – remote de-energisation not practicable initially. Retailers continuing to request manual de-energisation Assumed to be realisable when 60 per cent of meters installed are advanced digital meters	Potential – remote de-energisation not practicable initially. Retailers continuing to request manual de-energisation Assumed to be realisable when 60 per cent of meters installed are advanced digital meters
	Re-energisation during business hours	The difference in cost between a re-energisation that is undertaken manually during business hours when, for example, a customer moves in, and a re-energisation that is undertaken remotely	Potential – remote re-energisation not permitted under Queensland regulations	Potential – remote re-energisation not permitted under Queensland regulations

Category	Type of cost / benefit	Description	Energex distribution zone	Ergon Energy distribution zone
	Reduction in peak demand	If customers respond to the data from advanced digital meters by reducing their peak demand, then augmentation of the network can be deferred	Realisable for 5 per cent of customers with advanced digital meters assumed to be on TOU tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff	Realisable for 0.5 per cent of customers with advanced digital meters assumed to be on TOU tariffs Potential for remaining customers with advanced digital meters if they are on a TOU tariff
	Improved planning	The data from advanced digital meters will enable network businesses to better plan the network, and reduce the costs associated with asset replacement and connections	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
	Reduced operating costs to fix faults	The network businesses will be able to deploy their workforces more efficiently to restore supply using information from advanced digital meters on the location and scope of outages	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
	Calls to faults and emergencies line	Over time, customers will be confident that the network business is aware that a fault has occurred based on data from advanced digital meters, and will reduce the number of calls that are made to the network businesses' faults and emergencies lines	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
	Avoided cost of investigations into quality	Costs associated with investigating complaints about voltage and quality of supply could be avoided using data available from the advanced digital meter	Potential – if advanced digital meters had the functionality to monitor voltage and quality of supply	Potential – if advanced digital meters had the functionality to monitor voltage and quality of supply

Category	Type of cost / benefit	Description	Energex distribution zone	Ergon Energy distribution zone
	Reduction in GSL payments	The number of GSL payments made by the distributor could be reduced:		
		– Timely reconnection – by remotely re-energising customers rather than manually re-energising them	Potential – remote re-energisation not permitted under Queensland regulations (but not material)	Potential – remote re-energisation not permitted under Queensland regulations (but not material)
		– On time appointments – by reducing the number of appointments required by remotely interrogating the advanced digital meter	Realisable (not material)	Realisable (not material)
		Interruption duration – by restoring supply more quickly	Potential when 60 per cent of meters installed are advanced digital meters, if Energex has access to real-time data	Potential when 60 per cent of meters installed are advanced digital meters, if Ergon Energy has access to real-time data
Retailer benefits	Debt management	With advanced digital meters, retailers will be able to manage debt more efficiently and effectively by issuing smaller bills more frequently that customers are more able to pay on a timely basis, and by more timely interventions where a customer is facing payment difficulties	Realisable	Realisable
	Electricity theft	Advanced digital meters facilitate the more timely identification of potential electricity theft	Realisable	Realisable
	Calls regarding estimated reads	Electricity bills do not need to be estimated when an advanced digital meter is installed, which results in a reduction in the number of calls to the retailer's call centre in relation to estimated bills	Realisable	Realisable
	Complaints regarding estimated reads	A reduction in the number of calls in relation to estimated bills results in a reduction in the number of complaints about estimated bills that need to be managed by the retailer	Realisable	Realisable

Category	Type of cost / benefit	Description	Energex distribution zone	Ergon Energy distribution zone
	Investigations re estimated bills	A reduction in the number of complaints in relation to estimated bills results in a reduction in the number of investigations into estimated bills that need to be managed by the retailer	Potential – if advanced digital meters are required to monitor voltage and quality of supply and Energex has access to this data	Potential – if advanced digital meters are required to monitor voltage and quality of supply and Ergon Energy has access to this data
	Complaints to the Ombudsman re estimated reads	A reduction in the number of estimated bills reduces the number of complaints made to the Ombudsman in relation to estimated bills, which reduces the fees paid by the retailer to the Ombudsman	Realisable	Realisable
	Investigations by Ombudsman into estimated reads	A reduction in the number of complaints made to the Ombudsman in relation to estimated bills reduces the number of investigations undertaken by the Ombudsman into estimated bills, which reduces the fees paid by the retailer to the Ombudsman	Realisable	Realisable
	More timely customer transfers	The direct benefits to customers of more timely customer transfers when an advanced digital meter is installed is a cost to the retailers	Realisable	Potentially realisable with effective retail competition in Ergon Energy's distribution zone
Other benefits	Reduction in peak demand – generation deferral	If customers respond to the data from advanced digital meters by reducing their peak demand, then augmentation of the generation capacity can be deferred	Not material – investments in generation capacity driven more by Government policy than increases in peak demand	Not material – investments in generation capacity driven more by Government policy than increases in peak demand
	Greenhouse gas emissions	If customers respond to the data from advanced digital meters by reducing their electricity consumption, then greenhouse gas emissions are avoided	Realisable – assumes a price on greenhouse gas emissions avoided Potential – increase in greenhouse gas emissions reductions if all customers are on a TOU tariff	Realisable – assumes a price on greenhouse gas emissions avoided Potential – increase in greenhouse gas emissions reductions if all customers are on a TOU tariff

SOURCE: ACIL ALLEN ASSESSMENT

3 RESULTS FROM THE MODELLING

This chapter describes the results from the modelling of the net benefits of advanced digital meters. Section 3.1 provides an overview of the net benefits in 2019 and 2020 and section 3.2 provides the Net Present Value (NPV) of the net benefits to 2049.

More detail on the net costs of advanced digital meters are provided in section 3.3, the net realisable benefits are provided in section 3.4 and the net potential benefits if barriers are removed, in section 3.5.

Given the uncertainty associated with some of the assumptions that have been made for this analysis, we have undertaken sensitivity analysis to test the sensitivity of the results to changes in these assumptions. The results from the sensitivity analysis are provided in section 3.6.

We understand that Energy Queensland is proposing to install network monitoring devices to provide them with real-time and engineering data. If network monitoring devices are installed, a number of benefits cannot be attributable to the installation of advanced digital meters. The net potential benefits attributable to advanced digital meters if barriers are removed and network monitoring devices are installed are discussed in section 3.7.

The costs and benefits associated with advanced digital meters are tabulated in Appendix A.

3.1 Net benefits associated with advanced digital meters – 2019 and 2020

The net benefits associated with installing advanced digital meters in 2019 and 2020, for customers in Energex's and Ergon Energy's distribution zones, are set out in Table 3.1 and illustrated in Figure 3.1.

The net realisable benefits are estimated to be negative in Energex's distribution zone in 2019 and 2020, and positive in Ergon Energy's distribution zone. The net realisable benefits are higher in Ergon Energy's distribution zone than in Energex's distribution zone largely because:

1. The net costs associated with installing advanced digital meters are relatively lower in Ergon Energy's distribution zone as it is assumed that none are installed based on retailer / customer choice. The incremental costs associated with these meters are higher than for meters installed on a new and replacement basis or where a solar system is installed.
2. The IT costs in Energex's distribution zone are higher, particularly in 2019. In 2019, one of the retailers in Energex's distribution zone has allocated substantial IT costs to Queensland associated with the Power of Choice and five minute settlement rule changes. Additionally, there are more retailers operating in Energex's distribution zone, each of which incurs its own IT costs.

If the potential additional benefits are also considered then the net benefits in Energex's distribution zone are negative in 2019, largely due to the high IT costs in 2019, and positive in 2020. The potential additional benefits are benefits associated with:

- Safety – if the regulations[69] are changed to allow remote re-energisation, the costs associated with re-energisation would reduce.
- Practicability – if the retailers requested remote rather than manual de-energisations, the costs associated with de-energisation would reduce.
- Cost reflective tariffs – if all customers with an advanced digital meter are on a cost reflective tariff then the benefits associated with shifting energy from peak to off-peak times and for deferring augmentation of the network with a reduction in peak demand, would increase.
- Quality data – if the meters are able to monitor voltage and quality of supply, and the distributors are able to access this data, then the costs associated with investigating complaints about quality of supply would decrease.

TABLE 3.1 NET BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, 2019 AND 2020, $ MILLION

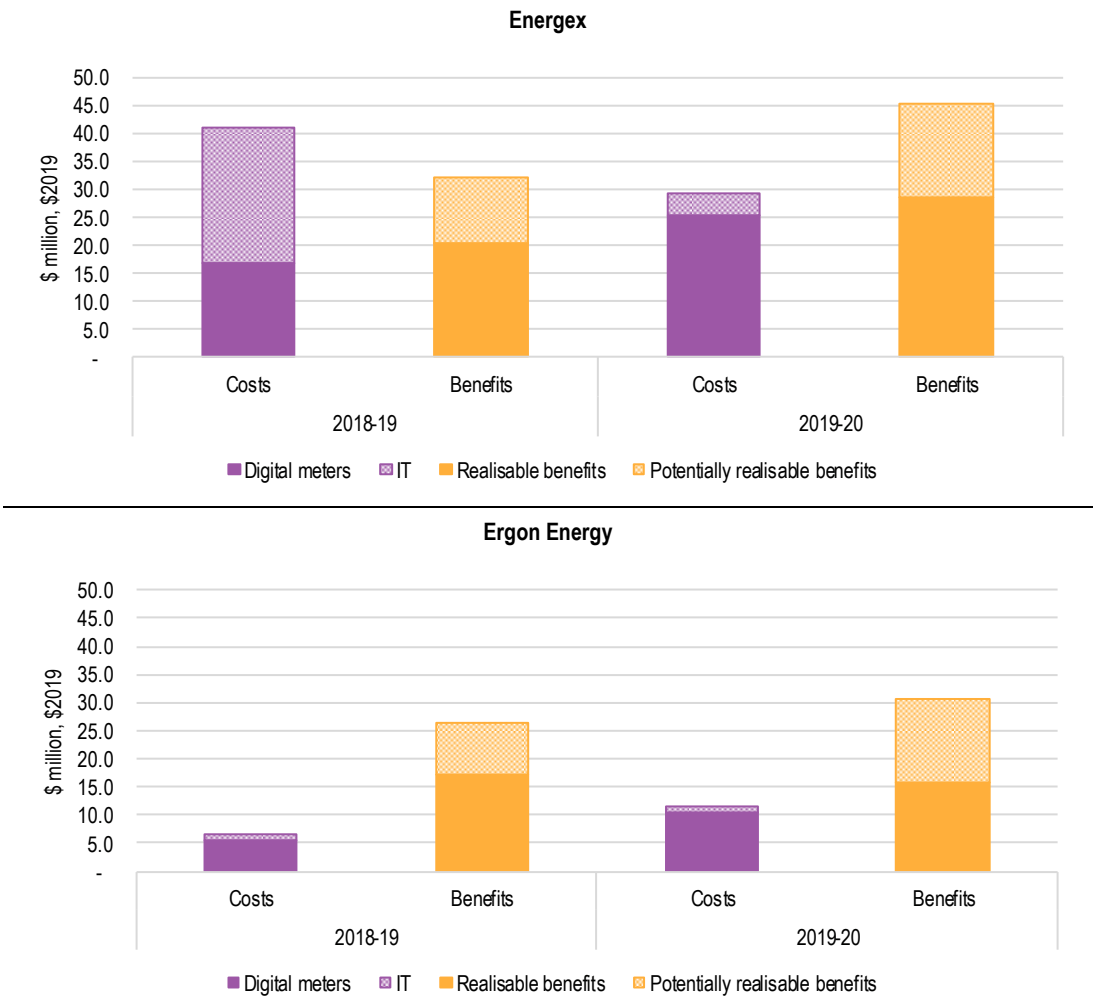
	Energex		Ergon Energy	
	2019	2020	2019	2020
Advanced digital meters	17.0	25.4	5.4	10.3
IT costs	24.0	3.9	1.2	1.2
Total costs	***41.0***	***29.3***	***6.6***	***11.5***
Realisable benefits	20.5	28.6	17.1	15.9
Net realisable benefits	**(20.5)**	**(0.7)**	**10.5**	**4.4**
Potential additional benefits	11.7	16.7	9.4	14.6
Net potential benefits	**(8.8)**	**16.0**	**19.9**	**19.0**

Note: Totals may not add due to rounding

SOURCE: ACIL ALLEN MODELLING

[69] *Electricity Safety Act 2013*, section 220

FIGURE 3.1 NET BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, 2019 AND 2020



SOURCE: ACIL ALLEN MODELLING

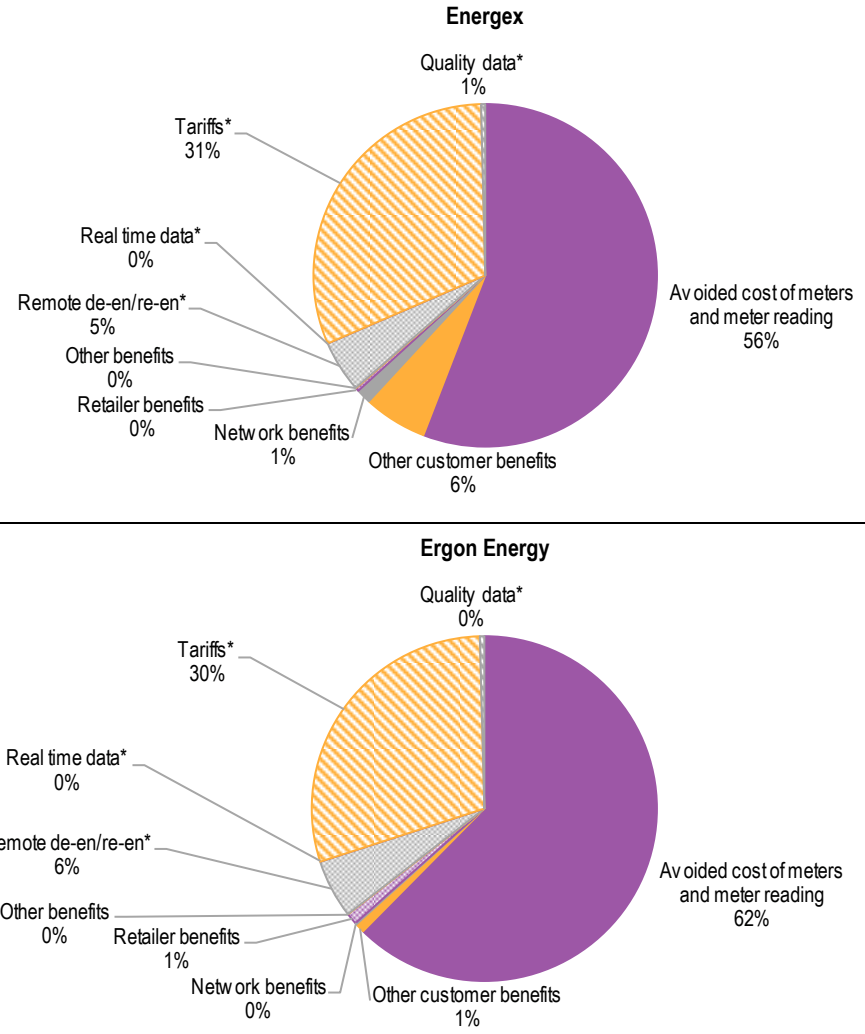
Figure 3.2 illustrates the relativities of the potential benefits associated with the installation of advanced digital meters, for customers in Energex's and Ergon Energy's distribution zones, in 2019. The potential benefits are asterisked.

The realisable benefits represent 64 per cent of the total benefits in Energex's distribution zone and 65 per cent of the total benefits in Ergon Energy's distribution zone in 2019.

The most significant realisable benefit in 2019 is the avoided costs of installing conventional meters and manually reading these meters. These costs would otherwise be incurred by distributors or Metering Coordinators and passed through to customers.

The most significant potential benefits in 2019 are the shift in energy from peak to off-peak times and the deferral of augmentation expenditure with the reduction of peak demand, if all customers with advanced digital meters are on TOU tariffs. There are also significant potential benefits if customers could be remotely de-energised or re-energised.

FIGURE 3.2 BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, 2019



Note: Asterisked benefits are potential additional benefits

SOURCE: ACIL ALLEN MODELLING

3.2 Net benefits associated with advanced digital meters to 2049

The net benefits associated with installing advanced digital meters, to 2049 in NPV terms, for customers in Energex's and Ergon Energy's distribution zones, are set out in Table 3.2 and illustrated in Figure 3.3.

The net realisable benefits in Energex's and Ergon Energy's distribution zones are negative to 2049 in NPV terms. The net potential benefits are negative in Energex's distribution zone and positive in Ergon Energy's distribution zone to 2049 in NPV terms.

The total costs are lower in Ergon Energy's distribution zone than in Energex's distribution zone because there are fewer customers in Ergon Energy's distribution zone and the IT costs are lower in the absence of multiple retailers operating in that distribution zone.

The realisable benefits in Ergon Energy's distribution zone are proportionately higher than in Energex's distribution zone because:

— the costs of manually reading meters that are avoided with the installation of advanced digital meters are significantly higher in Ergon Energy's distribution zone than in Energex's distribution zone

— while there are two times more small customers in Energex's distribution zone than in Ergon Energy's distribution zone, the expenditure that can be avoided through better planning is 1.3 times higher in Ergon Energy's distribution zone than in Energex's distribution zone.

The potential benefits in Ergon Energy's distribution zone are also proportionately higher than in Energex's distribution zone because:

— if customers are able to be remotely de-energised and re-energised, the benefits for customers in Ergon Energy's distribution zone are greater than for customers in Energex's distribution zone due to the higher cost to manually de-energise and re-energise customers in Ergon Energy's distribution zone

— while there are two times more small customers in Energex's distribution zone than in Ergon Energy's distribution zone, the augmentation expenditure that can be avoided is only 6 per cent lower in Ergon Energy's distribution zone than in Energex's distribution zone.

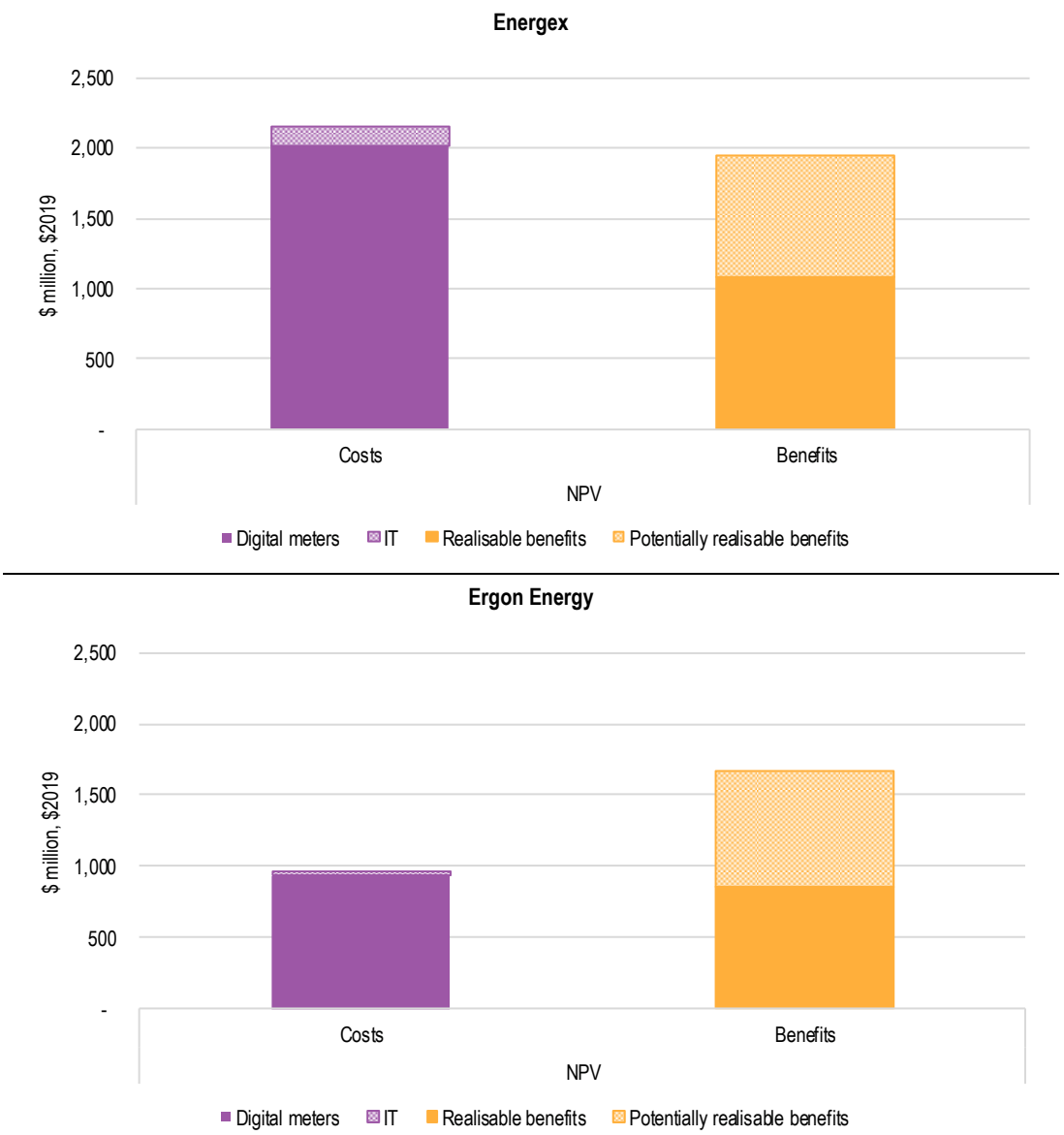
TABLE 3.2 NET BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, NPV TO 2049, $ MILLION

	Energex	Ergon Energy
Advanced digital meters	2,022.8	935.1
IT costs	137.5	22.0
Total costs	***2,160.4***	***957.1***
Realisable benefits	1,079.2	849.7
Net realisable benefits	**(1,081.2)**	**(107.3)**
Potential additional benefits	874.9	820.9
Net potential benefits	**(206.3)**	**713.6**

Note: Totals may not add due to rounding

SOURCE: ACIL ALLEN MODELLING

FIGURE 3.3 NET BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, NPV TO 2049



Note: NPV values based on a 4 per cent discount rate

SOURCE: ACIL ALLEN MODELLING

Figure 3.4 illustrates the relativities of the potential benefits associated with the installation of advanced digital meters, for customers in Energex's and Ergon Energy's distribution zones, to 2049 in NPV terms. The potential benefits are asterisked.

The realisable benefits represent 55 per cent of the total benefits in Energex's distribution zone and 51 per cent of the total benefits in Ergon Energy's distribution zone to 2049 in NPV terms.

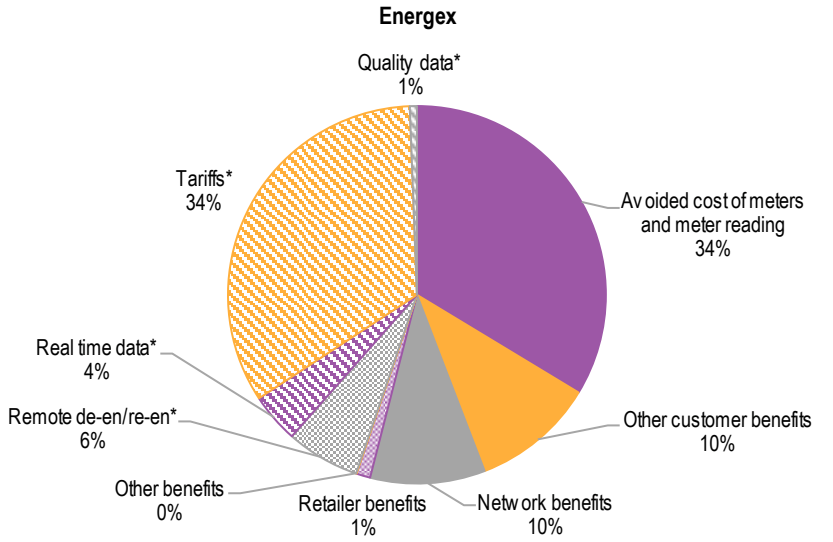
The most significant realisable benefit to 2049 is the avoided costs of installing conventional meters and manually reading these meters. These costs would otherwise be incurred by the distributors or Metering Coordinators and passed through to customers. To 2049, the most significant other realisable benefits are the avoided cost of special meter reads, avoided cost of manual de-energisations, better planning by the distributors and debt management.

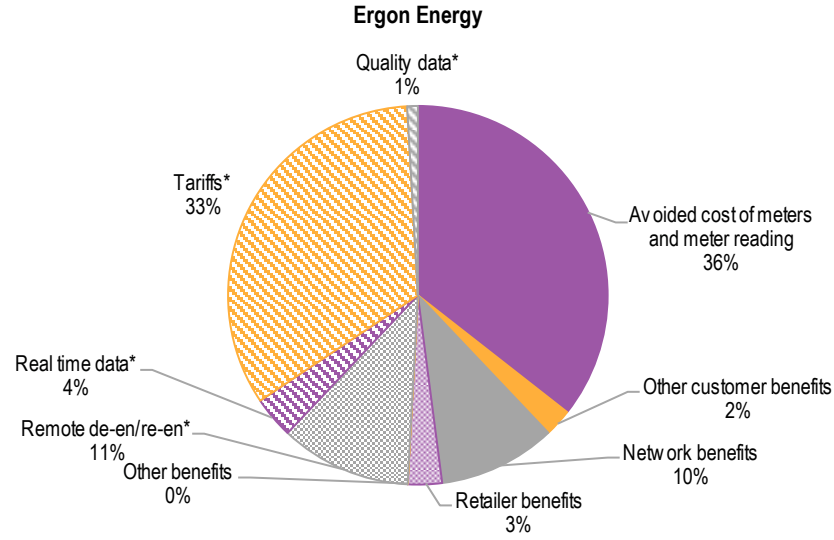
The benefits associated with special meter reads and debt management increase over the period as more advanced digital meters are installed. We have assumed that the benefits associated with better planning by the distributors and avoided cost of manual de-energisations will only occur when 60 per cent of meters installed are advanced digital meters.

The most significant potential benefits to 2049 are:

- the shift in energy from peak to off-peak times (which is a customer benefit) and the deferral of augmentation expenditure with the reduction of peak demand (which is a network benefit), if all customers with advanced digital meters are on cost reflective tariffs
- remote rather than manual de-energisation and re-energisation:
  - if the regulations[70] are changed to allow remote re-energisations, which is a customer benefit for after hours re-energisations and a network benefit for business hours re-energisations
  - if retailers request remote rather than manual de-energisations, which is a network benefit.

FIGURE 3.4 BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, TO 2049 IN NPV TERMS





Notes:

1. Asterisked benefits are potential additional benefits
2. NPV values based on a 4 per cent discount rate

SOURCE: ACIL ALLEN MODELLING

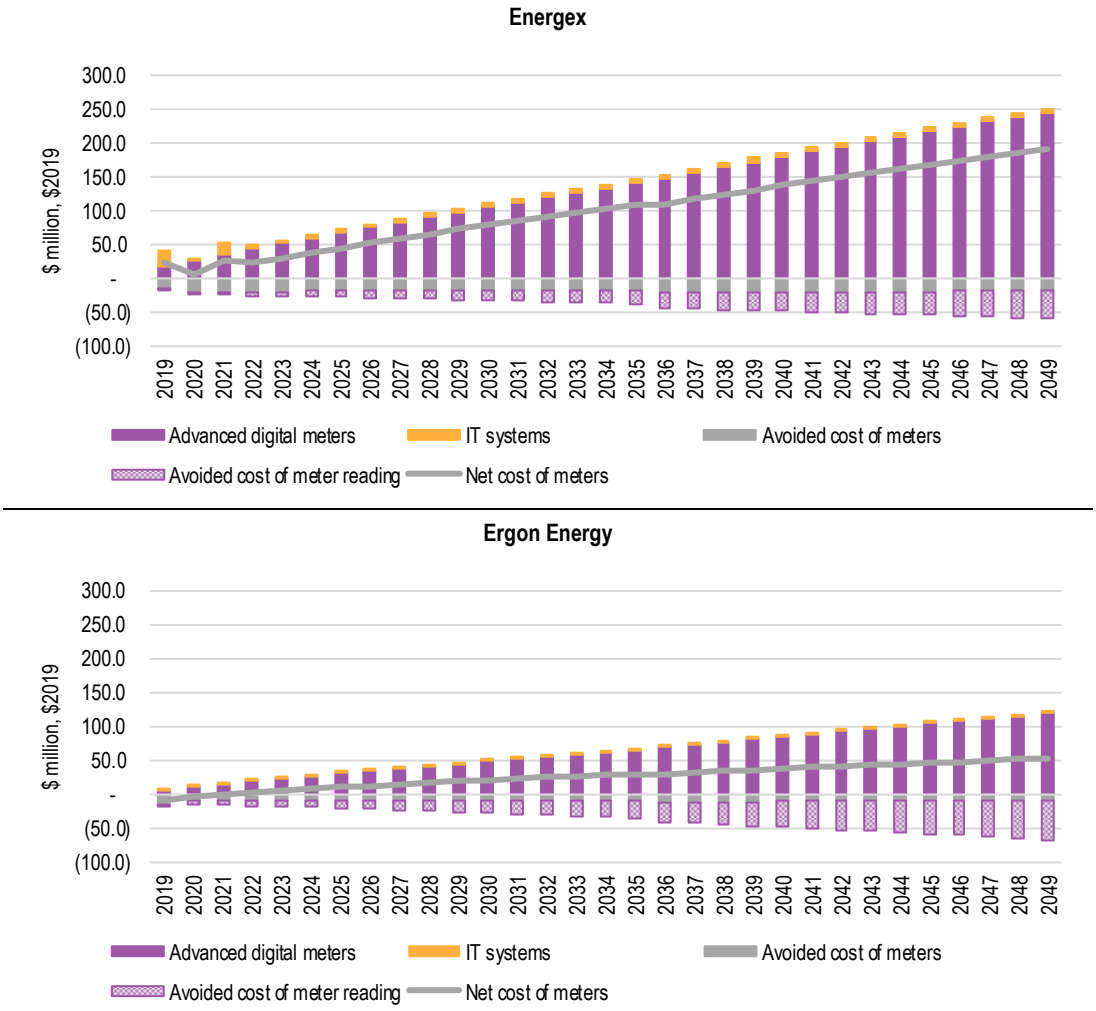
[70] *Electricity Safety Act 2013*, section 220

3.3 Net cost of meters

The net cost of meters is the cost of the advanced digital meters and IT systems less the costs that are avoided by not installing conventional meters or manually reading meters. The net cost of meters over the 2019-49 period, in Energex's and Ergon Energy's distribution zones, is illustrated in Figure 3.5.

The net cost increases over time as the number of advanced digital meters installed increases.

FIGURE 3.5 NET COST OF METERS, 2019-49



SOURCE: ACIL ALLEN MODELLING

3.4 Realisable benefits

The benefits that are realisable from the installation of advanced digital meters, over the 2019-49 period, by customers directly are discussed in section 3.4.1, by the distributors are discussed in section 3.4.2 and by retailers are discussed in section 3.4.3. Other realisable benefits are discussed in section 3.4.4.

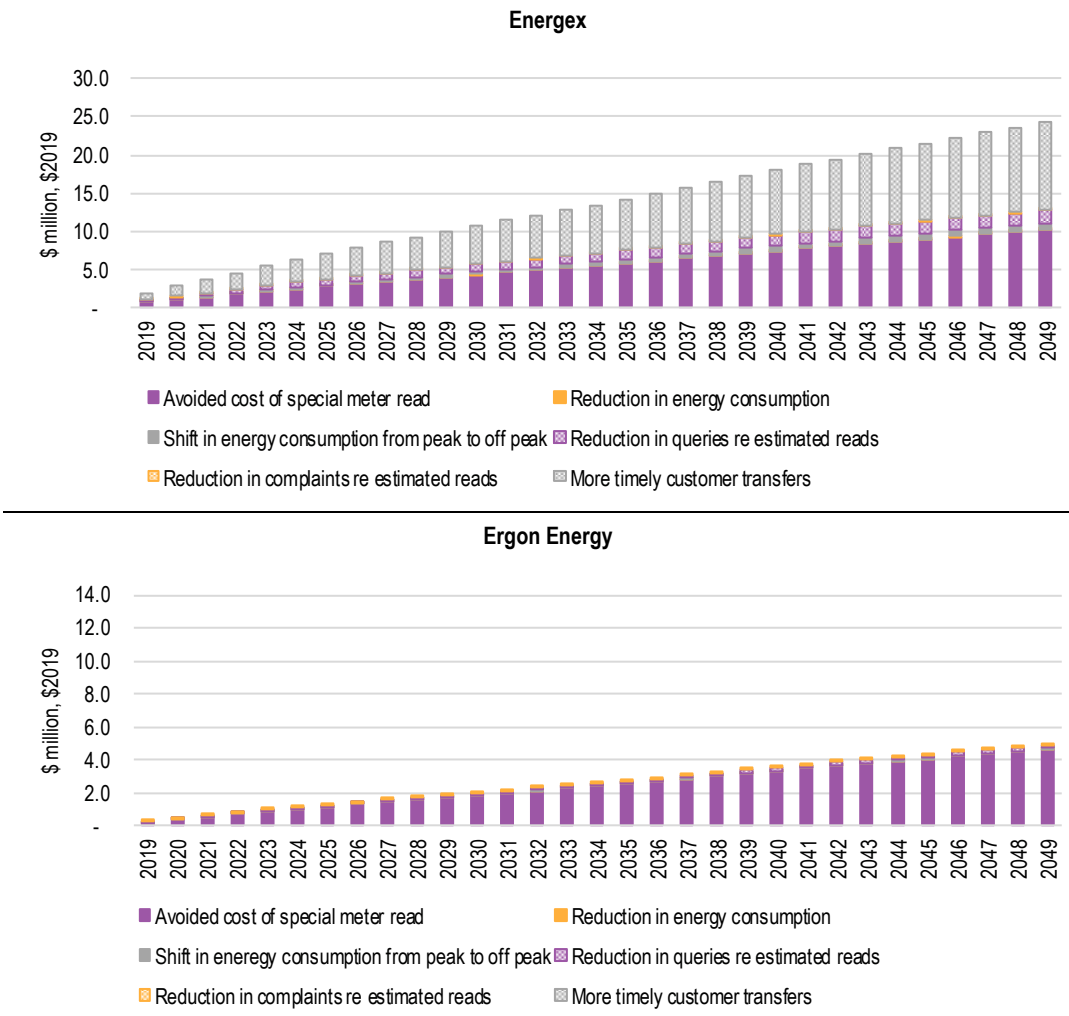
The total realisable benefits are discussed in section 3.4.5 and the net realisable benefits, after deducting the net costs associated with the installation of advanced digital meters are discussed in section 3.4.6.

3.4.1 Realisable customer benefits

The benefits that are realisable directly by customers in Energex's and Ergon Energy's distribution zones from the installation of advanced digital meters, over the 2019-49 period, are illustrated in Figure 3.6. These benefits exclude the avoided cost of installing conventional meters and manually reading meters, which are included in the net cost of meters.

The benefits that are realised directly by customers increase over time as the number of advanced digital meters that are installed increases. The most significant benefit is the avoided cost of special meter reads and, for customers in Energex's area, the benefits associated with more timely transfers to a different retailer.

FIGURE 3.6 BENEFITS REALISED DIRECTLY BY CUSTOMERS, 2019-49



SOURCE: ACIL ALLEN MODELLING

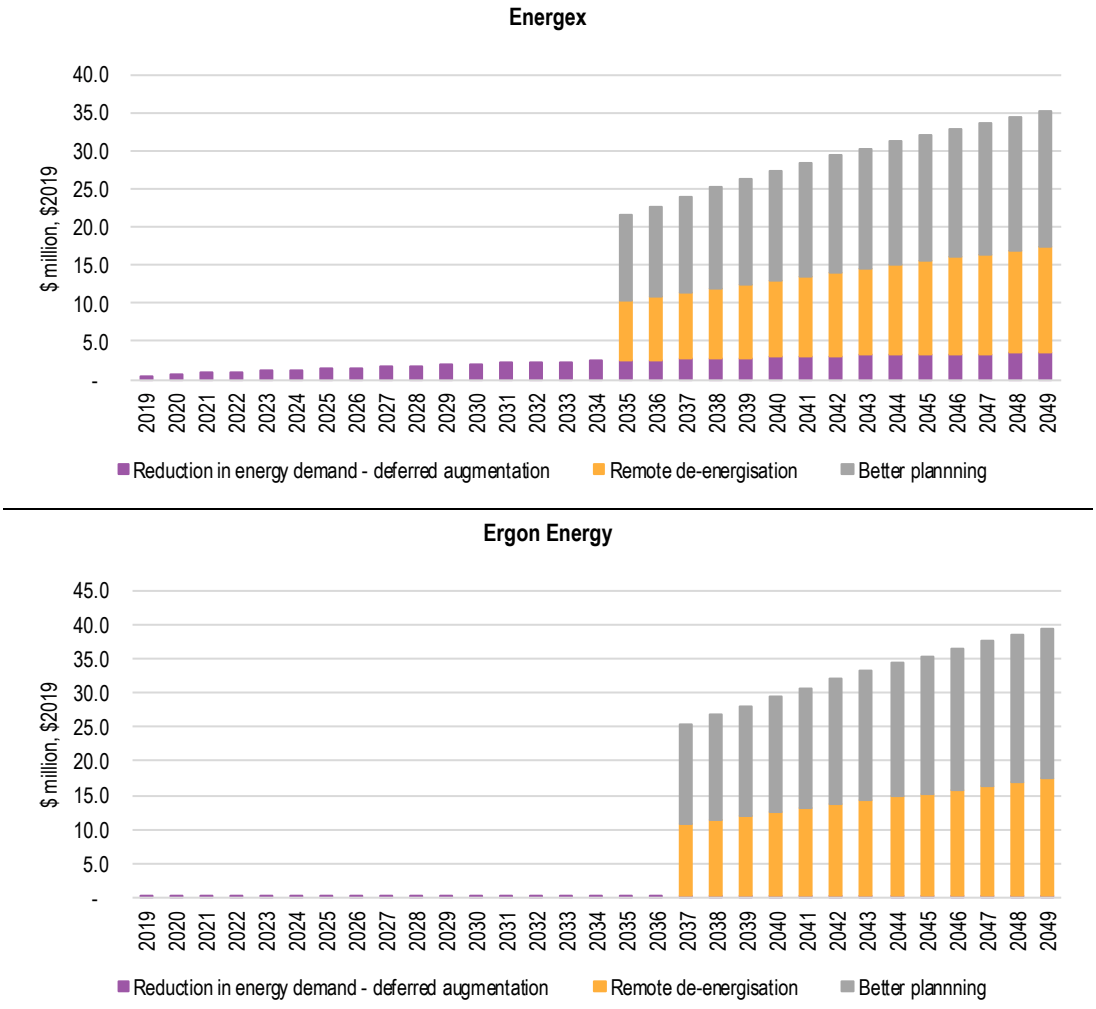
3.4.2 Realisable network benefits

The benefits that are realisable by Energex and Ergon Energy from the installation of advanced digital meters, over the 2019-49 period, are illustrated in Figure 3.7. These benefits would be expected to be passed through to customers over time through the regulatory process.

The most significant benefits that would be realised by Energex and Ergon Energy are from remote de-energisations and improved planning using the data from the advanced digital meters. We have assumed that these benefits will not be realised until 60 per cent of meters installed are advanced digital meters. The benefits associated with reducing peak demand and deferring augmentation of the network are relatively low as we have assumed only 5 per cent of customers in Energex's distribution

zone and 0.5 per cent of customers in Ergon Energy's distribution zone that have an advanced digital meter installed are on a cost reflective tariff.

FIGURE 3.7 BENEFITS REALISED BY THE DISTRIBUTORS, 2019-49



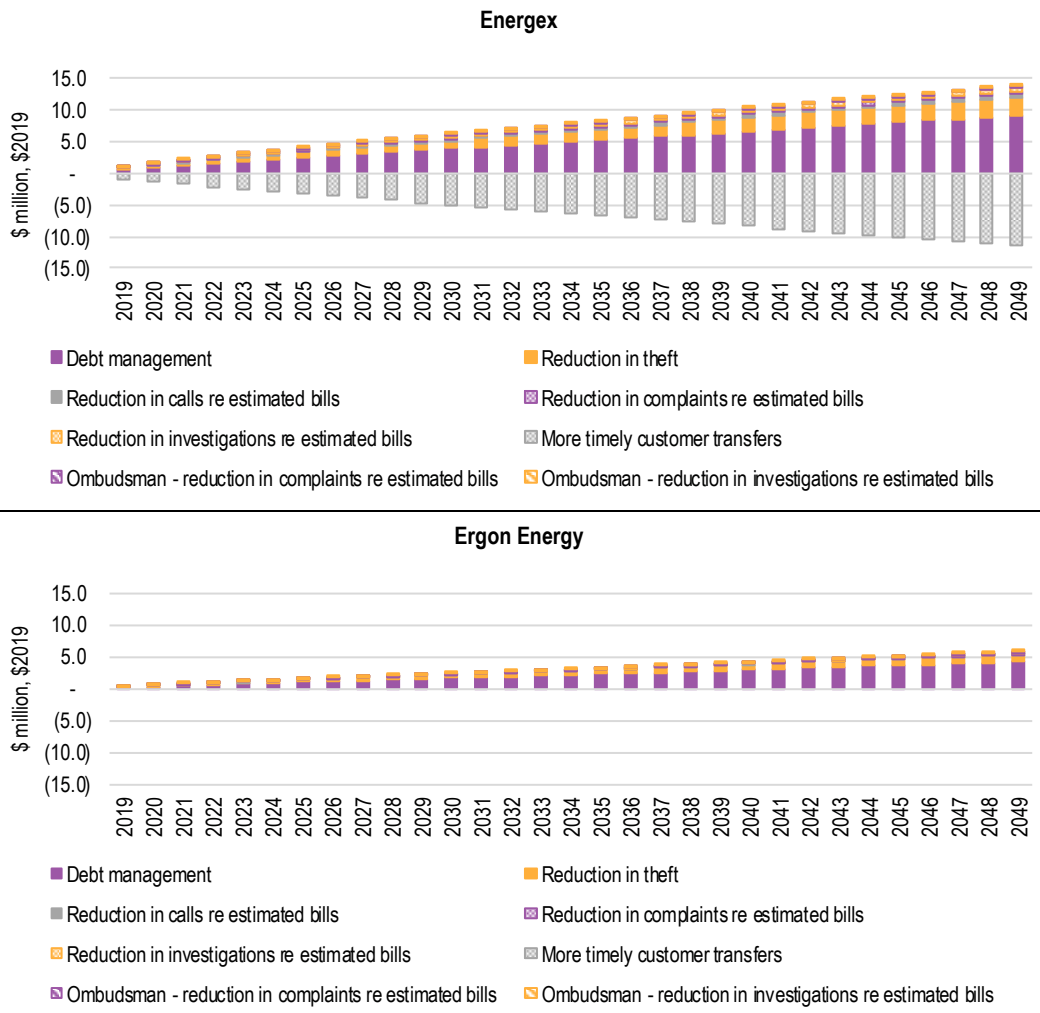
SOURCE: ACIL ALLEN MODELLING

3.4.3 Realisable retailer benefits

The benefits that are realisable by retailers operating in Energex's and Ergon Energy's distribution zones from the installation of advanced digital meters, over the 2019-49 period, are illustrated in Figure 3.8. These benefits would be expected to be passed through to customers over time through the competitive process.

The most significant benefit that would be realised by retailers operating in Energex's and Ergon Energy's distribution zones is from improved debt management and reduced electricity theft. These benefits increase over time as the number of advanced digital meters installed increases. However, in Energex's distribution zone, these benefits are offset by the disbenefits to the retailers of more timely transfers by customers to different retailers.

FIGURE 3.8 BENEFITS REALISED BY THE RETAILERS, 2019-49

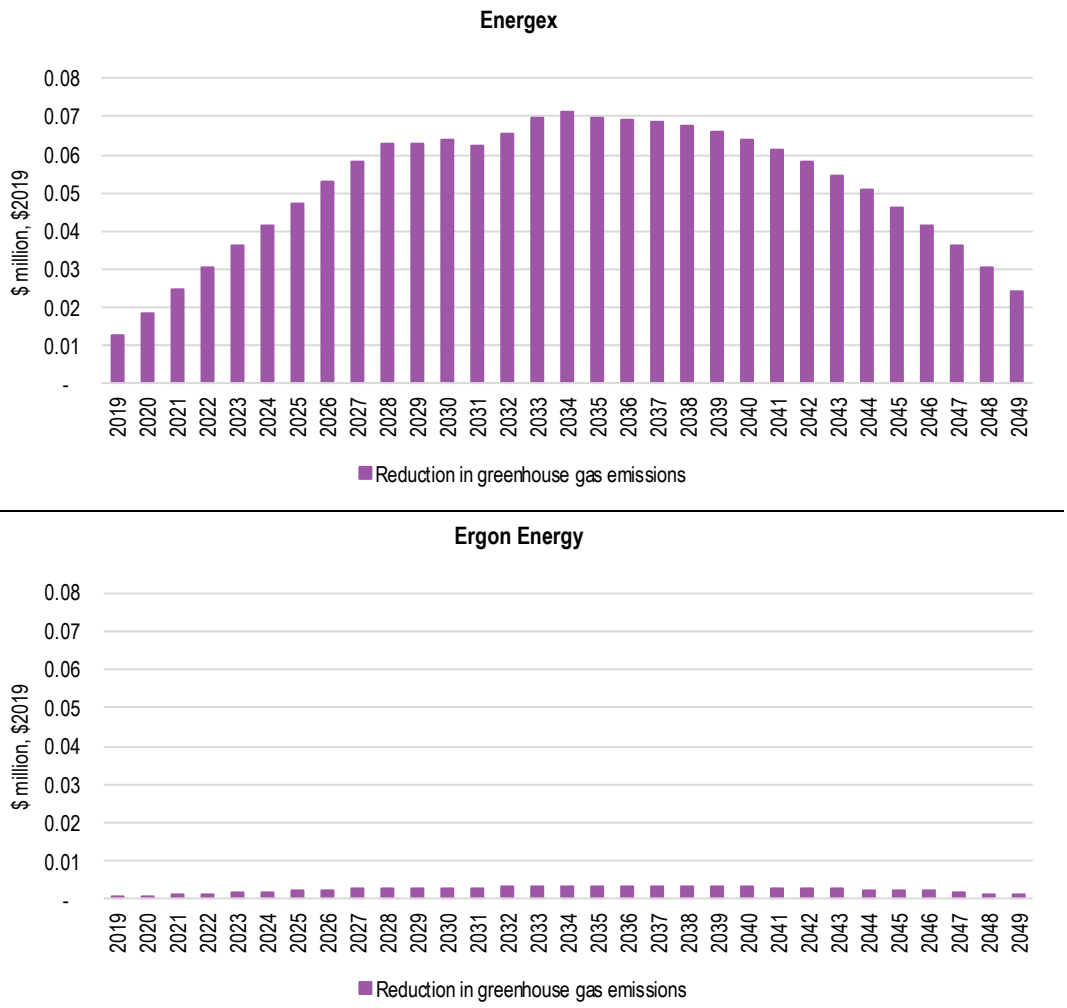


SOURCE: ACIL ALLEN MODELLING

3.4.4 Other realisable benefits

The other realisable benefits associated with the installation of advanced digital meters over the 2019-49 period for customers in Energex's and Ergon Energy's distribution zones are illustrated in Figure 3.9. These benefits are associated with a reduction in greenhouse gas emissions and are not material, because a relatively small proportion of customers with advanced digital meters are assumed to be on a cost reflective tariff, reducing their energy consumption. Additionally, the emissions intensity of generation increases over time.

FIGURE 3.9 OTHER BENEFITS REALISED, 2019-49



SOURCE: ACIL ALLEN MODELLING

3.4.5 Total realisable benefits

The total benefits that are realisable over the 2019-49 period with the installation of advanced digital meters, in Energex's and Ergon Energy's distribution zones, are illustrated in Figure 3.10. These benefits exclude the avoided cost of installing conventional meters and manually reading meters, which are included in the net cost of meters.

The total realisable benefits increase over time as the number of advanced digital meters installed increases, with a step increase in benefits when 60 per cent of meters installed are advanced digital meters. The step increase in benefits is largely due to remote de-energisations and improved planning by the distributors.

In Energex's distribution zone, the benefits realised by Energex represent 46 per cent of the total realisable benefits (excluding the avoided cost of installing conventional meters and manually reading meters), the benefits realised directly by customers represent 49 per cent of the total realisable benefits, and the benefits realised by retailers represent 6 per cent of the total realisable benefits.

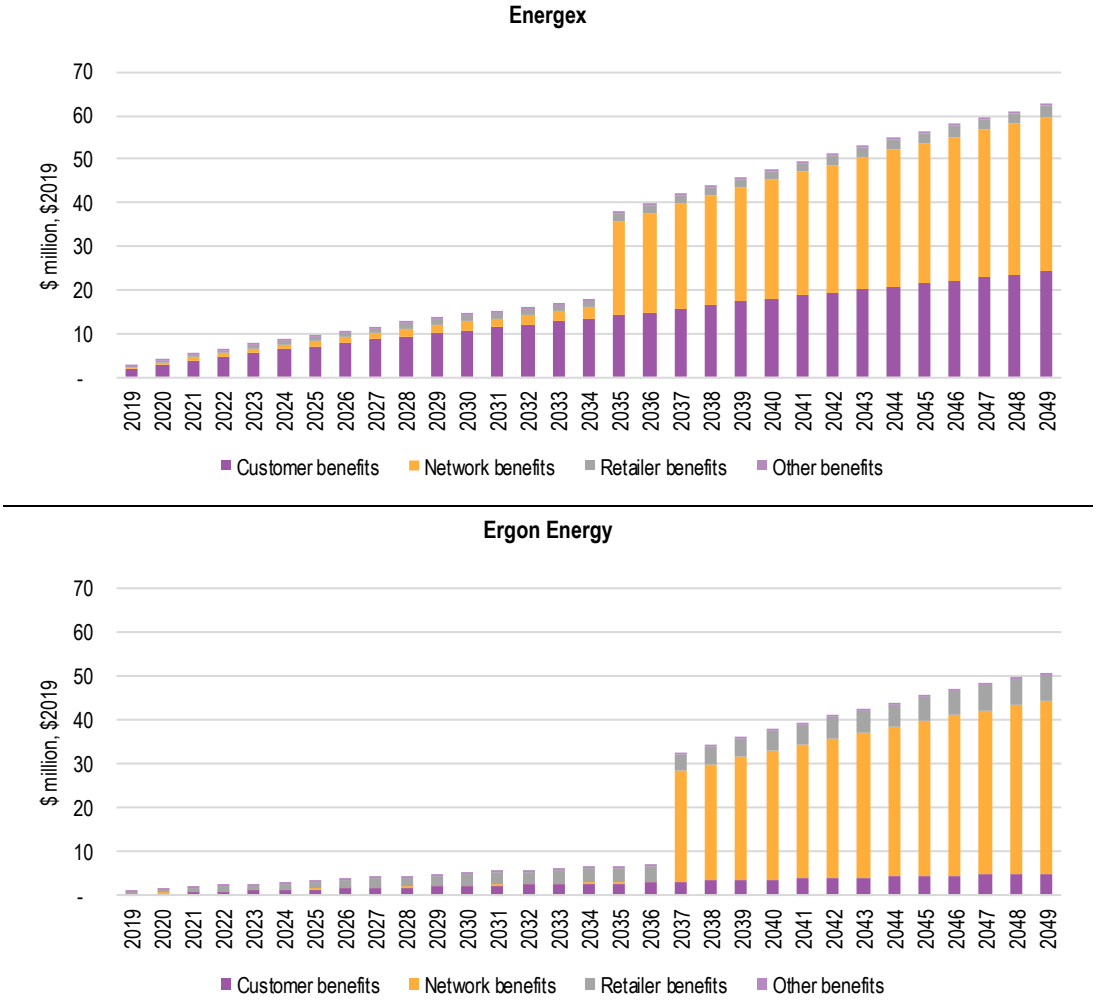
In Ergon Energy's distribution zone, the benefits realised by Ergon Energy represent 66 per cent of the total realisable benefits (excluding the avoided cost of installing conventional meters and manually reading meters), the benefits realised by retailers represent 19 per cent of the total realisable benefits and the benefits realised directly by customers represent 15 per cent of the total realisable benefits.

The distribution of benefits is different in Ergon Energy's distribution zone relative to Energex's distribution zone because:

— customers in Energex's distribution zone can benefit by transferring to a different retailer on a more timely basis, although this is a distributional impact only with the benefit offset by a disbenefit to the retailers; customers in Ergon Energy's distribution zone cannot benefit from more timely transfers

— the expenditure that can be avoided through better planning is higher in Ergon Energy's distribution zone than in Energex's distribution zone.

FIGURE 3.10 TOTAL REALISABLE BENEFITS, 2019-49



SOURCE: ACIL ALLEN MODELLING

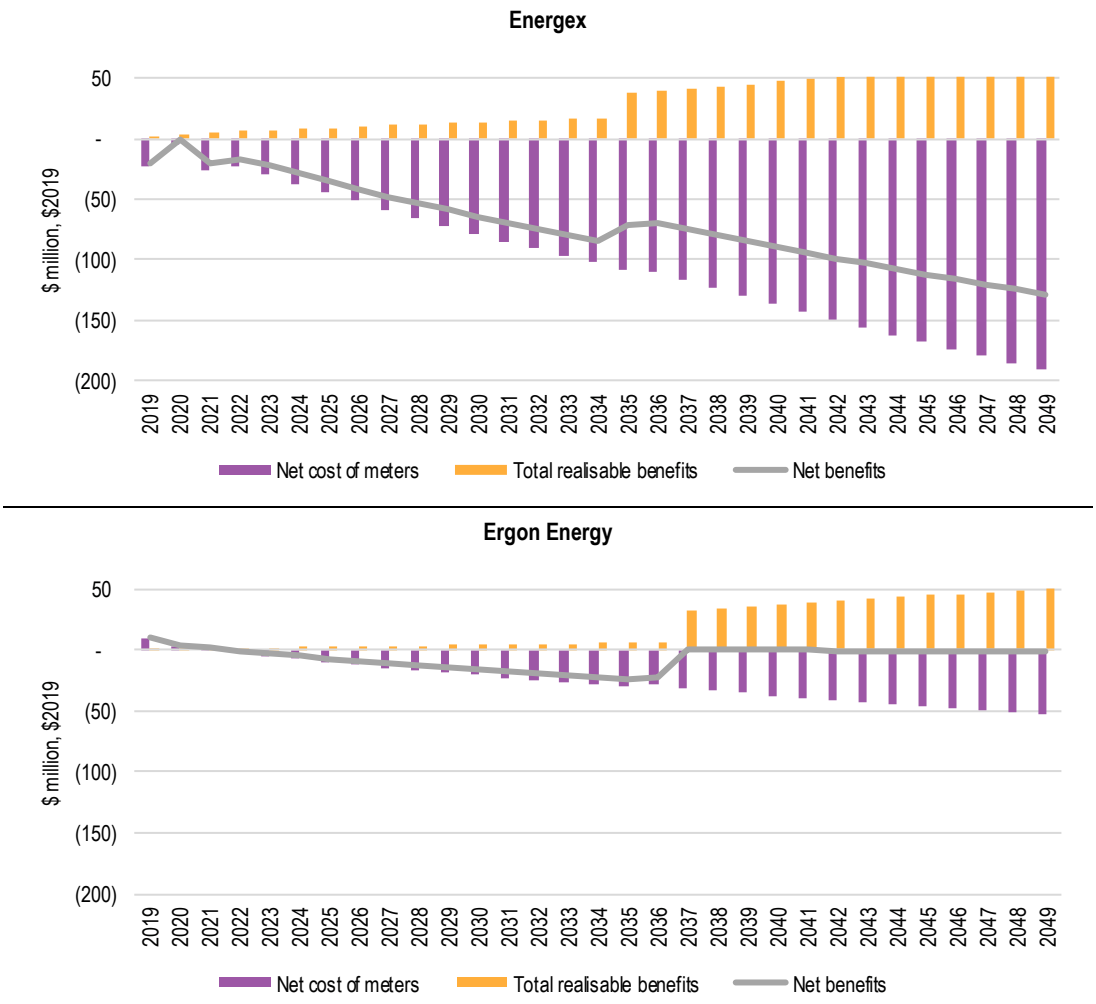
3.4.6 Net realisable benefits

The net benefits that are realisable over the 2019-49 period with the installation of advanced digital meters, in Energex's and Ergon Energy's distribution zones, are illustrated in Figure 3.11.

The net realisable benefit associated with installing advanced digital meters in Energex's distribution zone is negative, increasing over time as the number of advanced digital meters increases. The step increase in realisable benefits when 60 per cent of meters installed are advanced digital meters (from 2035) is not significant relative to the net costs to install advanced digital meters.

Similarly, the net realisable benefit associated with installing advanced digital meters in Ergon Energy's distribution zone is negative. However, the step increase in realisable benefits when 60 per cent of meters installed are advanced digital meters (from 2037) is more significant relative to the net costs to install advanced digital meters than in Energex's distribution zone.

FIGURE 3.11 NET REALISABLE BENEFITS, 2019-49



SOURCE: ACIL ALLEN MODELLING

3.5 Potential additional benefits

This section considers the additional potential benefits that may be realisable if the barriers to the realisation of those benefits are addressed. The additional potential benefits that are realisable from the installation of advanced digital meters, over the 2019-49 period, directly by customers are discussed in section 3.5.1 and by the distributors and other parties are discussed in section 3.5.2.

The total potential benefits are discussed in section 3.5.3 and the net potential benefits, after deducting the net costs associated with the installation of advanced digital meters are discussed in section 3.5.4.

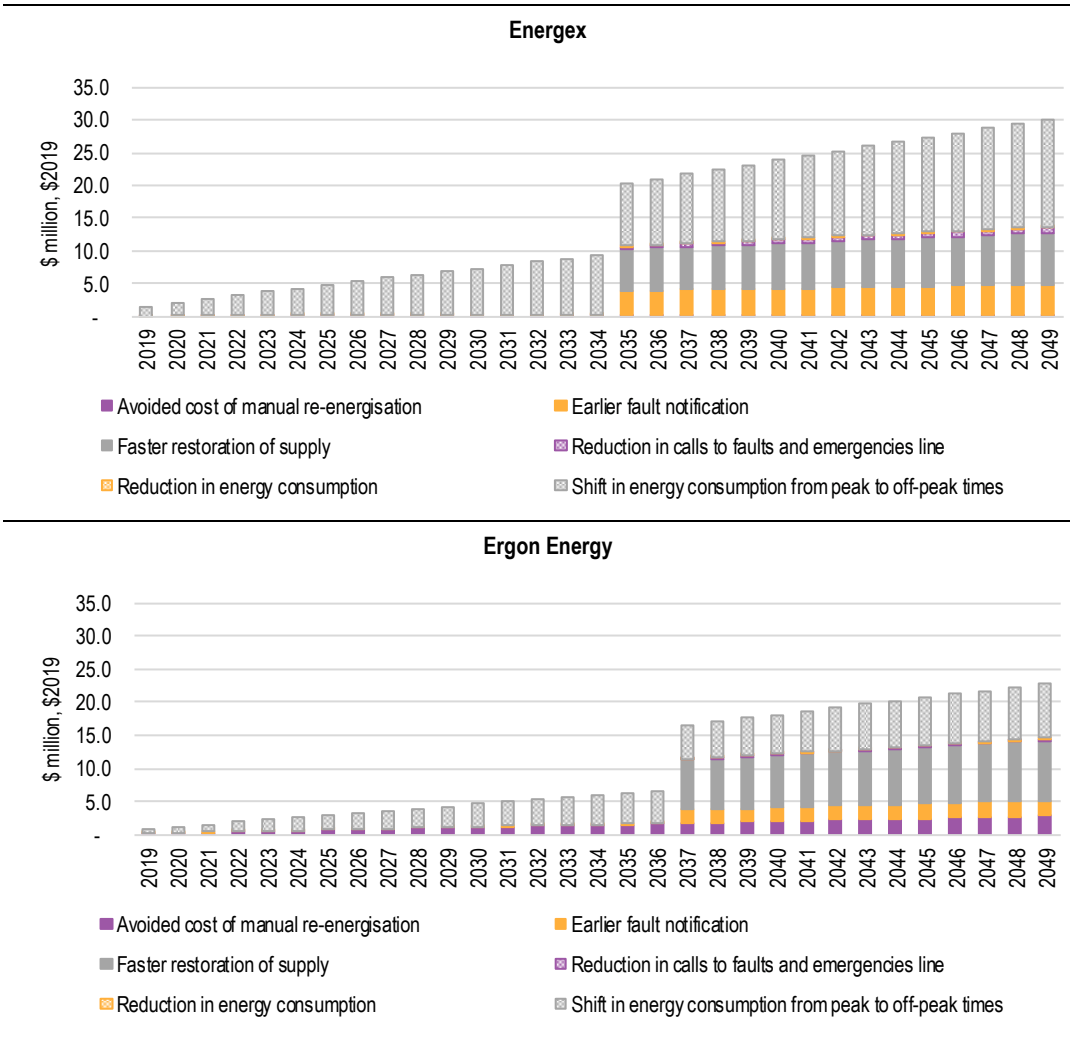
3.5.1 Potential additional customer benefits

The additional potential benefits that may be realised directly by customers in Energex's and Ergon Energy's distribution zones from the installation of advanced digital meters, over the 2019-49 period, are illustrated in Figure 3.12.

The potential additional benefits are:

- if the regulations[71] are changed to allow remote re-energisation, the avoided cost of manual after hours re-energisations
- if all customers with advanced digital meters are on cost reflective tariffs, a reduction in energy consumption and a shift in energy consumption from peak to off-peak times
- if the distributors are able to access real-time data, their customers would be able to benefit directly from earlier fault notification, faster supply restoration and a reduction in the number of calls to the faults and emergencies line when 60 per cent of meters installed are advanced digital meters.

FIGURE 3.12 ADDITIONAL POTENTIAL BENEFITS THAT MAY BE REALISED DIRECTLY BY CUSTOMERS, 2019-49



SOURCE: ACIL ALLEN MODELLING

3.5.2 Potential additional network and other benefits

The additional potential benefits that may be realised by the distributors and other parties from the installation of advanced digital meters in Energex's and Ergon Energy's distribution zones from the installation of advanced digital meters, over the 2019-49 period, are illustrated in Figure 3.13.

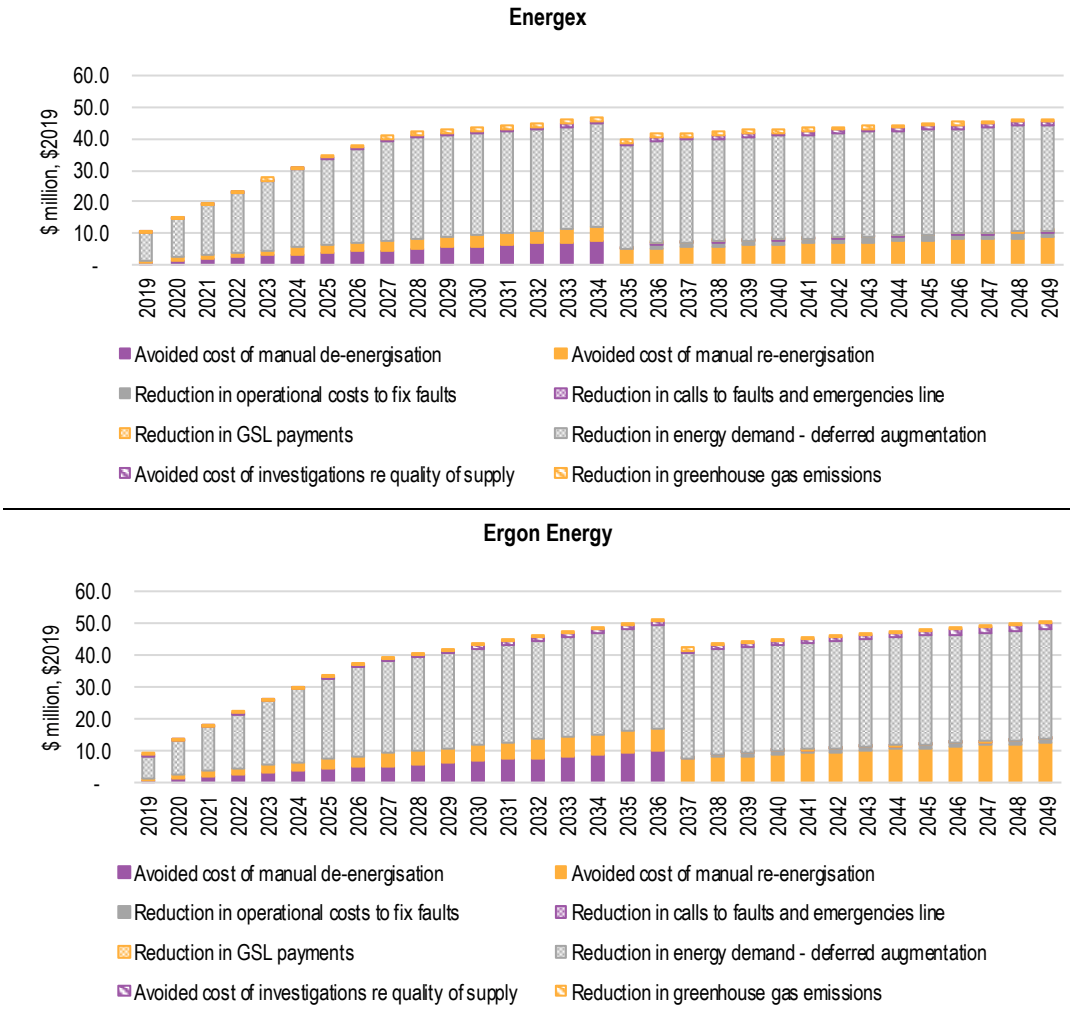
The most significant of these additional potential benefits is the deferred augmentation expenditure from a reduction in peak demand that may be realised if all customers with an advanced digital meter

[71] *Electricity Safety Act 2013*, section 220

are on a cost reflective tariff. However, these benefits are capped when the reduction in peak demand results in no net increase in peak demand.

There are also significant potential benefits associated with remote re-energisations during business hours if remote services are permitted in Queensland, and with remote de-energisations until it is assumed that these benefits will be realised (when 60 per cent of meters installed are advanced digital meters).

FIGURE 3.13 ADDITIONAL POTENTIAL BENEFITS THAT MAY BE REALISED BY OTHER PARTIES, 2019-49



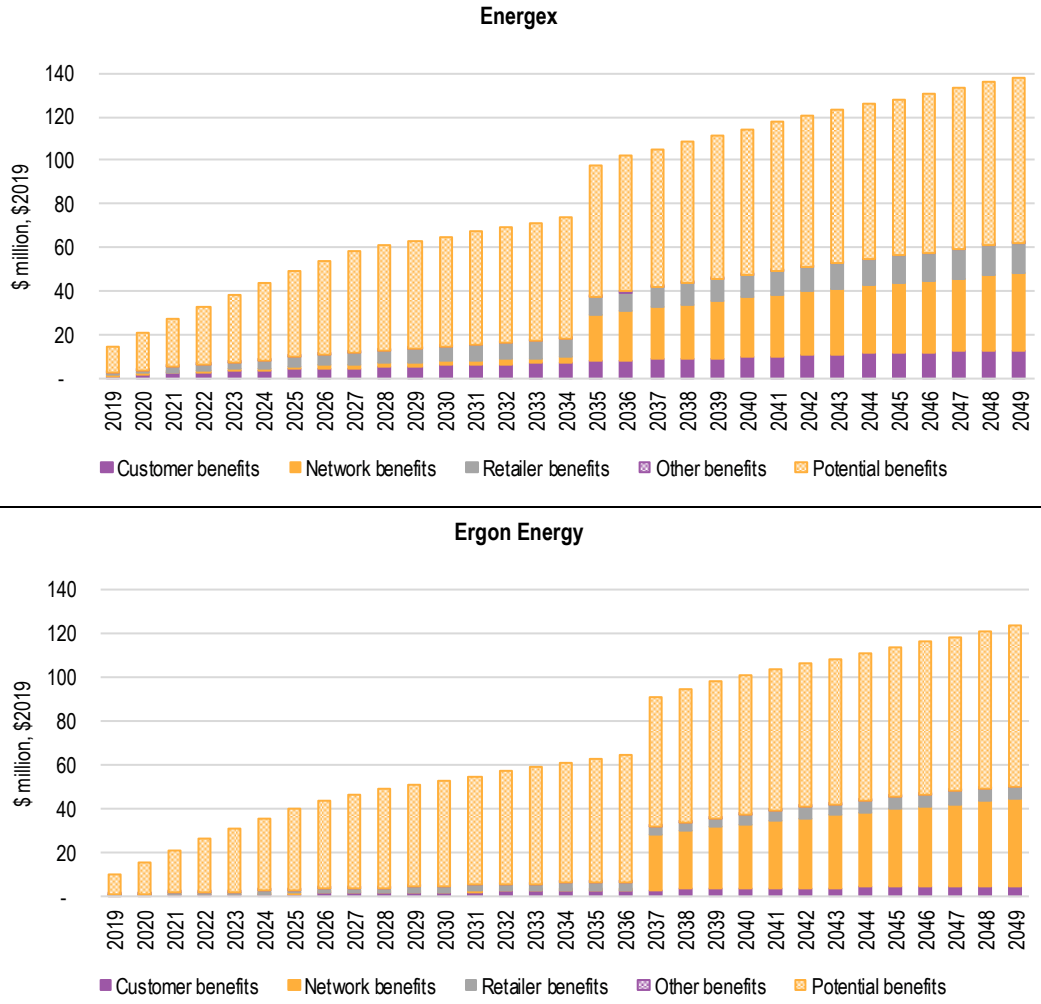
SOURCE: ACIL ALLEN MODELLING

3.5.3 Total potential benefits

The total potential benefits that may be realised over the 2019-49 period with the installation of advanced digital meters, in Energex's and Ergon Energy's distribution zones, are illustrated in Figure 3.14.

The potential additional benefits that have been discussed in sections 3.5.1 and 3.5.2 are very significant relative to the realisable benefits, represented by the customer benefits, network benefits, retailer benefits and other benefits, and excluding the avoided cost of installing conventional meters and manually reading meters, which are included in the net cost of meters.

FIGURE 3.14 TOTAL POTENTIAL BENEFITS THAT MAY BE REALISED, 2019-49



SOURCE: ACIL ALLEN MODELLING

3.5.4 Net potential benefits

The net potential benefits that may be realised over the 2019-49 period with the installation of advanced digital meters, in Energex's and Ergon Energy's distribution zones, are illustrated in Figure 3.15.

If the potential additional benefits could be realised, the net benefits associated with installing advanced digital meters would be positive in Ergon Energy's distribution zone, but would still be negative in Energex's distribution zone.

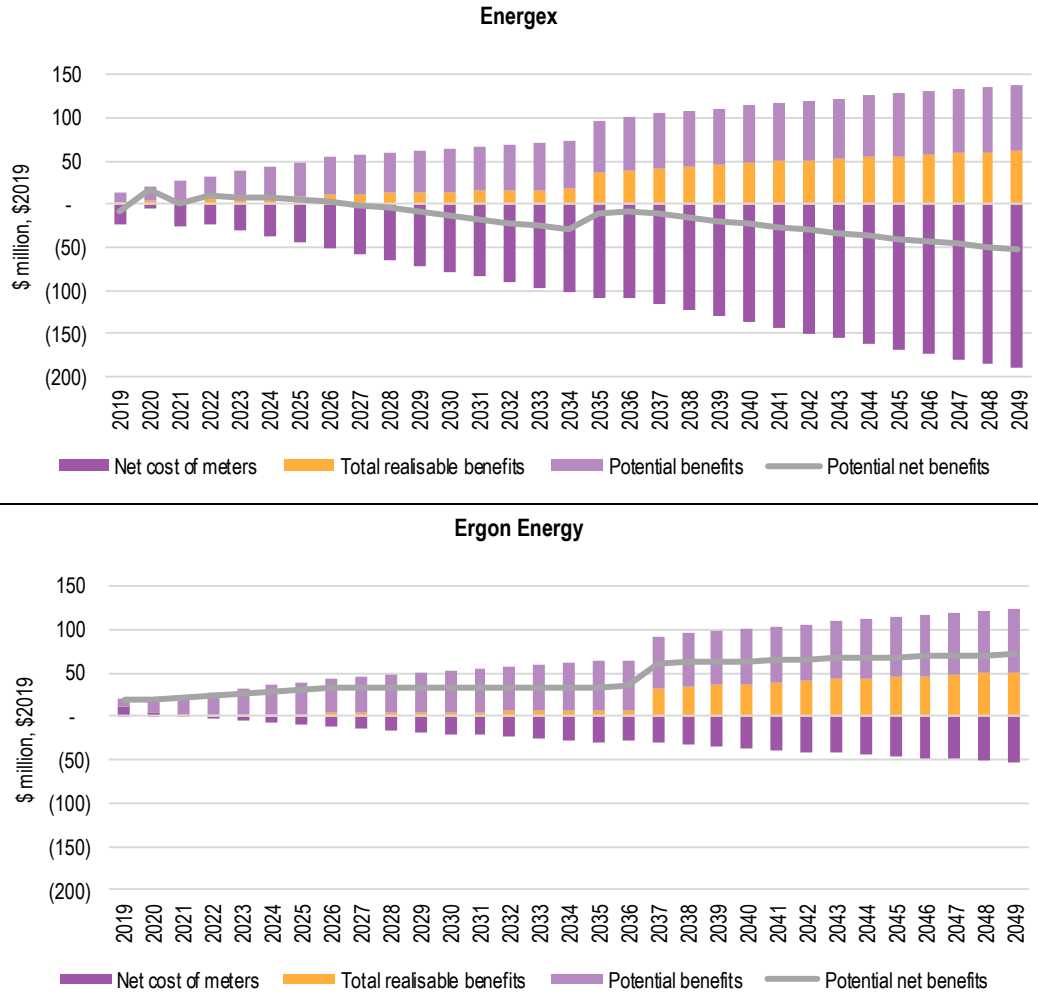
The key benefits that are proportionally significantly higher in Ergon Energy's distribution zone than in Energex's distribution zone are:

1. Avoided cost of manual meter reading – the cost of manually reading a meter that can be avoided by remotely reading meters is between 2.5 and 3.6 times higher in Ergon Energy's distribution zone than in Energex's distribution zone.
2. Better planning – while there are two times more small customers in Energex's distribution zone than in Ergon Energy's distribution zone, the expenditure that can be avoided through better planning is 1.3 times higher in Ergon Energy's distribution zone than in Energex's distribution zone.
3. Deferred network augmentation arising from a reduction in peak demand – while there are two times more small customers in Energex's distribution zone than in Ergon Energy's distribution zone, the

augmentation expenditure that can be avoided is only 6 per cent lower in Ergon Energy's distribution zone than in Energex's distribution zone.

4. Avoided cost of manual de-energisation and re-energisation – the cost of a manual de-energisation or re-energisation that can be avoided by providing remote services through advanced digital meters is over two times higher in Ergon Energy's distribution zone than in Energex's distribution zone.

FIGURE 3.15 TOTAL POTENTIAL BENEFITS THAT MAY BE REALISED, 2019-49



SOURCE: ACIL ALLEN MODELLING

3.6 Sensitivity analysis

We have undertaken sensitivity analysis by varying the assumptions as set out in Table 3.3.

TABLE 3.3 SENSITIVITY ANALYSIS – ASSUMPTIONS VARIED

Benefit	Assumptions	Base case	Sensitivity 1	Sensitivity 2
Customer benefits				
Reduction in energy consumption	Percentage of customers on TOU tariffs			
	– Energex's distribution zone	5%	10%	20%
	– Ergon Energy's distribution zone	0.5%	1.0%	2.0%
	Reduction in energy consumption by customers on TOU tariffs	2%	1%	3%

Benefit	Assumptions	Base case	Sensitivity 1	Sensitivity 2
Shift in energy consumption from peak to off-peak	Percentage of customers on TOU tariffs			
	– Energex's distribution zone	5%	10%	20%
	– Ergon Energy's distribution zone	0.5%	1.0%	2.0%
	Amount of energy shifted from peak to off-peak	10%	6.7%	15%
	Value of energy shifted from peak to off-peak	$30/ MWh	$20 / MWh	$40 / MWh
Network benefits				
Reduction in peak demand	Percentage of customers on TOU tariffs			
	– Energex's distribution zone	5%	10%	20%
	– Ergon Energy's distribution zone	0.5%	1.0%	2.0%
	Reduction in peak demand	10%	5%	15%

SOURCE: ACIL ALLEN ASSESSMENT

The results from the sensitivity analysis are presented for Energex's distribution zone in Table 3.4 and for Ergon Energy's distribution zone in Table 3.5.

The value of the reduction in energy consumption increases as the proportion of customers on TOU tariffs increases and as the average reduction in energy consumption by customers on TOU tariffs increases.

The value of the shift in energy consumption from peak to off-peak times increases as the proportion of customers on TOU tariffs increases, the amount of energy shifted from peak to off-peak times increases, and as the difference in the marginal resource cost of energy during peak times and during off-peak times increases.

The value of the reduction in peak demand increases as the proportion of customers on TOU tariffs increases and the reduction in peak demand by customers on TOU tariffs increases.

If all the assumptions are varied to deliver the maximum benefits, the net realisable benefits in Energex's distribution zone increase from a net cost of $1,081.2 million to a net cost of $844.8 million and the net potential benefits increase from a net cost of $206.3 million to a net cost of $4.6 million, in NPV terms. The net realisable benefits in Ergon Energy's distribution zone increase from a net cost of $107.3 million to a net cost of $88.2 million and the net potential benefits increase from a net benefit of $713.6 million to a net benefit of $834.8 million.

TABLE 3.4 RESULTS FROM SENSITIVITY ANALYSIS, ENERGEX'S DISTRIBUTION ZONE

Benefit	Assumptions	Value	NPV ($m, $2019)
Customer benefits			
Reduction in energy consumption	Reduction in energy consumption	2%	
	Percentage of customers on TOU tariffs	5%	0.1
		10%	0.2
		20%	0.4
Reduction in energy consumption	Percentage of customers on TOU tariffs	5%	
	Reduction in energy consumption	1%	0.1
		2%	0.1
		3%	0.2
Shift in energy consumption from peak to off-peak	Amount of energy shifted from peak to off peak	10%	
	Value of energy shifted from peak to off-peak	$30 / MWh	
	Percentage of customers on TOU tariffs	5%	7.2
		10%	14.5
		20%	28.9

Benefit	Assumptions	Value	NPV ($m, $2019)
Shift in energy consumption from peak to off-peak	Percentage of customers on TOU tariffs	5%	
	Amount of energy shifted from peak to off peak	10%	
	Value of energy shifted from peak to off-peak	$20 / MWh	4.8
		$30 / MWh	7.2
		$40 / MWh	9.6
Shift in energy consumption from peak to off-peak	Percentage of customers on TOU tariffs	5%	
	Value of energy shifted from peak to off-peak	$30 / MWh	
	Amount of energy shifted from peak to off peak	6.7%	4.8
		10%	7.2
		15%	10.8
Network benefits			
Reduction in peak demand	Reduction in peak demand	10%	
	Percentage of customers on TOU tariffs	5%	36.2
		10%	72.3
		20%	144.6
	Percentage of customers on TOU tariffs	5%	
	Reduction in peak demand	5%	18.1
		10%	36.2
		15%	54.2

SOURCE: ACIL ALLEN ASSESSMENT

TABLE 3.5 RESULTS FROM SENSITIVITY ANALYSIS, ERGON ENERGY'S DISTRIBUTION ZONE

Benefit	Assumptions		NPV ($m, $2019)
Customer benefits			
Reduction in energy consumption	Reduction in energy consumption	2%	
	Percentage of customers on TOU tariffs	0.5%	0.0
		1.0%	0.0
		2.0%	0.0
Reduction in energy consumption	Percentage of customers on TOU tariffs	0.5%	
	Reduction in energy consumption	1%	0.0
		2%	0.0
		3%	0.0
Shift in energy consumption from peak to off peak	Amount of energy shifted from peak to off peak	10%	
	Value of energy shifted from peak to off-peak	$30 / MWh	
	Percentage of customers on TOU tariffs	0.5%	0.3
		1.0%	0.7
		2.0%	1.3
Shift in energy consumption from peak to off peak	Percentage of customers on TOU tariffs	0.5%	
	Amount of energy shifted from peak to off peak	10%	
	Value of energy shifted from peak to off-peak	$20 / MWh	0.2
		$30 / MWh	0.3
		$40 / MWh	0.4

Benefit	Assumptions		NPV ($m, $2019)
Shift in energy consumption from peak to off peak	Percentage of customers on TOU tariffs	0.5%	
	Value of energy shifted from peak to off-peak	$30 / MWh	
	Amount of energy shifted from peak to off peak	6.7%	0.2
		10%	0.3
		15%	0.5
Network benefits			
Reduction in peak demand	Reduction in peak demand	10%	
	Percentage of customers on TOU tariffs	0.5%	3.3
		1.0%	6.6
		2.0%	13.3
	Percentage of customers on TOU tariffs	0.5%	
	Reduction in peak demand	5%	1.7
		10%	3.3
		15%	5.0

SOURCE: ACIL ALLEN ASSESSMENT

3.7 Net potential benefits if network monitoring devices are installed

We understand that Energy Queensland is proposing to install network monitoring devices to provide them with real-time and engineering data. With network monitoring devices installed, the following benefits cannot be attributable to the installation of advanced digital meters:

- realisable benefits – better planning
- potential benefits:
  - earlier fault notification
  - faster restoration of supply
  - reduction in calls to faults and emergencies line
  - reduction in operational costs to fix faults
  - reduction in GSL payments
  - avoided cost of investigations regarding quality of supply.

If network monitoring devices are installed, the net benefits that can be attributed to the installation of advanced digital meters, to 2049 in NPV terms, for customers in Energex's and Ergon Energy's distribution zones, are set out in Table 3.6 and illustrated in Figure 3.16.

If network monitoring devices are installed, the net potential benefits attributed to advanced digital meters are reduced by $185 million and $169 million in Energex's and Ergon Energy's distribution zones, respectively.

TABLE 3.6 NET BENEFITS ATTRIBUTED TO ADVANCED DIGITAL METERS IF NETWORK MONITORING DEVICES INSTALLED, NPV TO 2049, $ MILLION

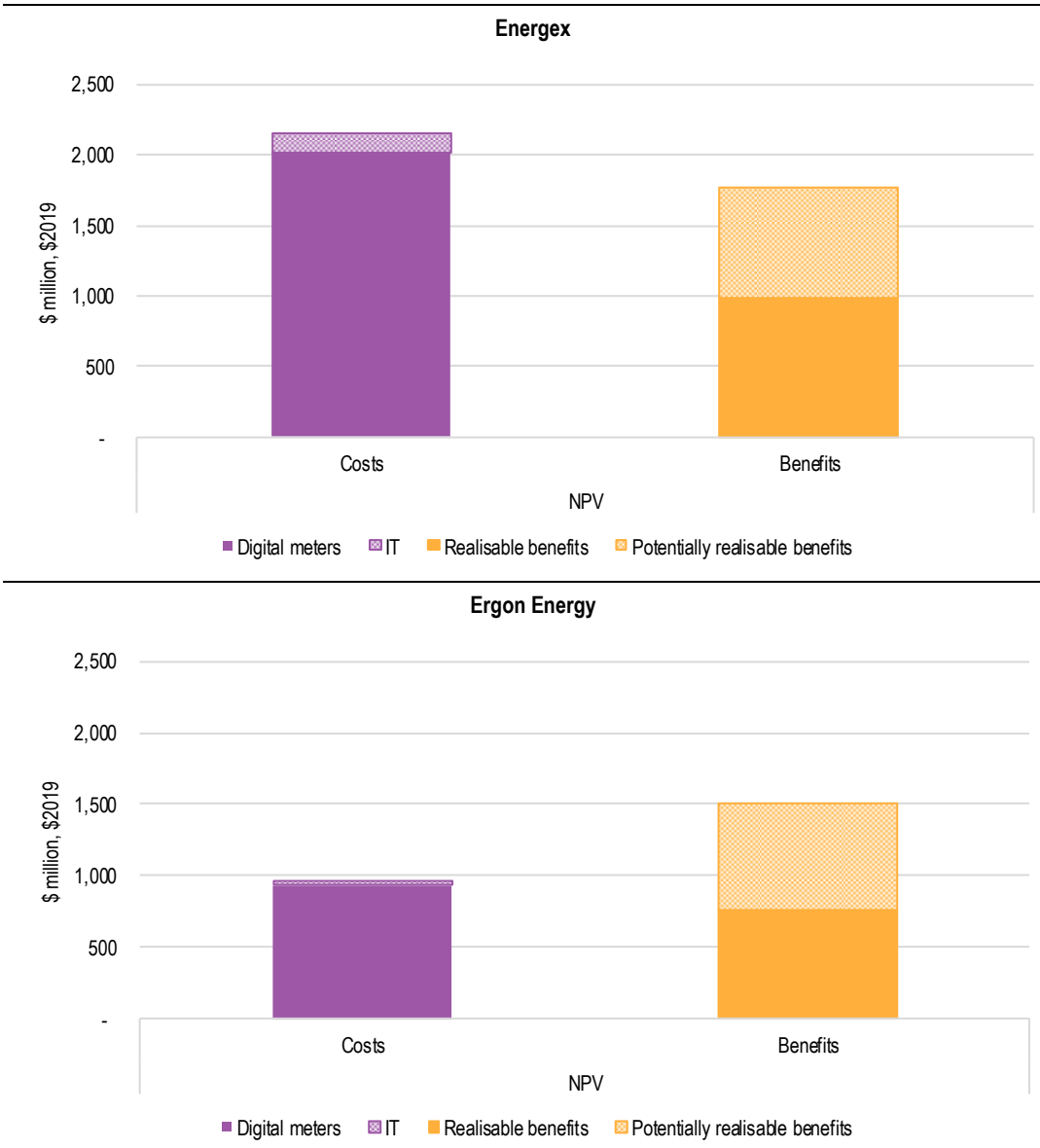
	Energex	Ergon Energy
Advanced digital meters	2,022.8	935.1
IT costs	137.5	22.0
Total costs	***2,160.4***	***957.1***
Realisable benefits	989.0	755.3
Net realisable benefits	**(1,171.3)**	**(201.8)**

	Energex	Ergon Energy
Potential additional benefits	780.1	746.4
Net potential benefits	**(391.2)**	**544.6**
Reduction in net potential benefits with network monitoring devices installed	**185.0**	**169.0**

Note: Totals may not add due to rounding

SOURCE: ACIL ALLEN MODELLING

FIGURE 3.16 NET BENEFITS ATTRIBUTED TO ADVANCED DIGITAL METERS IF NETWORK MONITORING DEVICES INSTALLED, NPV TO 2049

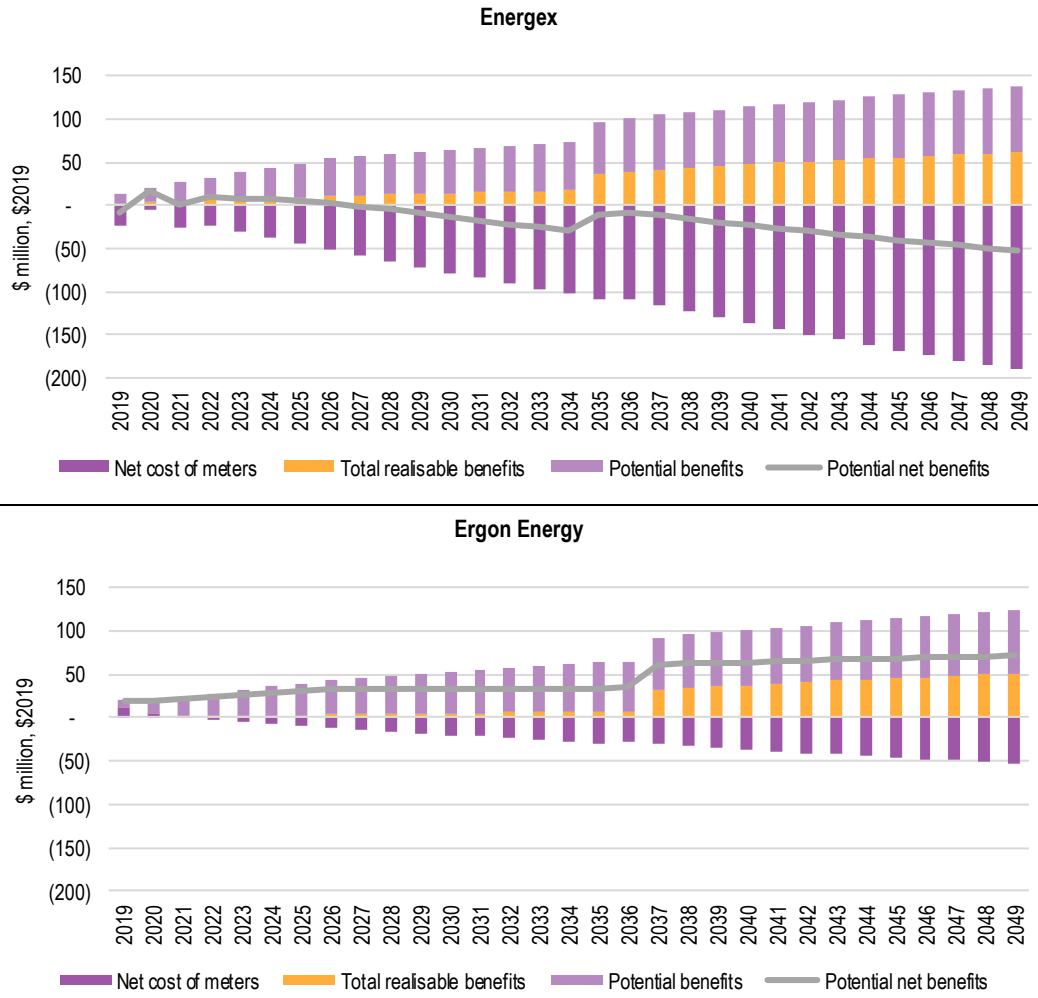


Note: NPV values based on a 4 per cent discount rate

SOURCE: ACIL ALLEN MODELLING

If network monitoring devices are installed, the net potential benefits that may be attributed to the installation of advanced digital meters over the 2019-49 period, in Energex's and Ergon Energy's distribution zones, are illustrated in Figure 3.17.

FIGURE 3.17 TOTAL POTENTIAL BENEFITS THAT MAY BE ATTRIBUTED TO ADVANCED DIGITAL METERS IF NETWORK MONITORING DEVICES ARE INSTALLED, 2019-49



SOURCE: ACIL ALLEN MODELLING

APPENDICES

A COSTS AND BENEFITS OF ADVANCED DIGITAL METERS

This appendix tabulates the costs and benefits associated with advanced digital meters. The costs and benefits for Energex are provided in section A.1 and for Ergon Energy are provided in section A.2.

A.1 Energex

The costs and benefits associated with installing advanced digital meters for customers in Energex's distribution zone are tabulated in Table A.1.

TABLE A.1 COSTS AND BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, ENERGEX

Category of costs/benefits	NPV ($m, $2019)	2019 ($m, $2019)	2020 ($m, $2019)
Advanced digital meters	2,022.8	17.0	25.4
IT systems	137.5	24.0	3.9
Sub total	2,160.4	41.0	29.3
Avoided cost of meters	(357.4)	(15.8)	(21.7)
Avoided cost of meter reading	(300.4)	(2.2)	(3.3)
Net cost of meters	**1,502.6**	**23.0**	**4.4**
Customer benefits			
Avoided cost of special meter read	83.9	0.7	1.1
Reduction in energy consumption	0.1	0.0	0.0
Shift in energy consumption from peak to off peak	7.2	0.1	0.1
Reduction in queries re estimated reads	17.4	0.2	0.3
Reduction in complaints re estimated reads	0.8	0.0	0.0
More timely customer transfers	95.8	0.9	1.4
Sub total	***205.3***	***1.9***	***2.8***
Network benefits			
Reduction in energy demand – deferred augmentation	36.2	0.4	0.6
Remote de-energisation (when 60% of meters installed are advanced digital meters)	65.7	0.0	0.0
Better planning	90.2	0.0	0.0

Category of costs/benefits		NPV ($m, $2019)	2019 ($m, $2019)	2020 ($m, $2019)
	Sub total	***192.0***	***0.4***	***0.6***
Retailer benefits				
	Debt management	75.4	0.6	0.9
	Reduction in electricity theft	24.2	0.2	0.3
	Reduction in calls re estimated bills	5.3	0.1	0.1
	Reduction in complaints re estimated bills	4.2	0.0	0.1
	Reduction in investigations re estimated bills	5.1	0.1	0.1
	More timely customer transfers	(95.8)	(0.9)	(1.4)
	Ombudsman - reduction in complaints re estimated bills	2.4	0.0	0.0
	Ombudsman - reduction in investigations re estimated bills	2.5	0.0	0.0
	Sub total	***23.3***	***0.1***	***0.2***
Other benefits	Reduction in greenhouse gas emissions	0.9	0.0	0.0
	Sub total	***0.9***	***0.0***	***0.0***
Total realisable benefits		**421.4**	**2.5**	**3.7**
Net realisable benefits		**(1,081.2)**	**(20.5)**	**(0.7)**
Customer benefits				
Safety	Avoided cost of manual re-energisation (AH)	2.1	0.0	0.0
Real-time data for networks	Earlier fault notification	25.5	0.0	0.0
	Faster restoration of supply	43.4	0.0	0.0
	Reduction in calls to faults and emergencies line	3.4	0.0	0.0
Cost reflective tariffs	Reduction in energy consumption	2.0	0.0	0.0
	Shift in energy consumption from peak to off-peak times	137.4	1.3	1.9
Network benefits				
Practicability	Avoided cost of manual de-energisation (when less than 60% of meters installed are advanced digital meters)	48.6	1.0	1.4
Safety	Avoided cost of manual re-energisation (BH)	72.2	0.6	0.9
Real-time data for networks	Reduction in operational costs to fix faults	8.0	0.0	0.0
	Reduction in calls to faults and emergencies line	1.5	0.0	0.0
	Reduction in GSL payments	1.1	0.0	0.0
Cost reflective tariffs	Reduction in energy demand – deferred augmentation	500.7	8.4	12.1
Quality data	Avoided cost of investigations re quality of supply	11.8	0.1	0.2

Category of costs/benefits		NPV ($m, $2019)	2019 ($m, $2019)	2020 ($m, $2019)
Other benefits				
Cost reflective tariffs	Reduction in greenhouse gas emissions	17.1	0.2	0.4
Potential benefits		**874.9**	**11.7**	**17.0**
Potential net benefits		**(206.3)**	**(8.8)**	**16.3**

Note: Totals may not add due to rounding

SOURCE: ACIL ALLEN MODELLING

We understand that Energy Queensland is proposing to install network monitoring devices to provide them with real-time and engineering data. Table A.2 tabulates the costs and benefits associated with advanced digital meters for customers in Energex's distribution zone if the benefits associated with real-time and engineering data cannot be attributable to the installation of advanced digital meters.

With network monitoring devices installed, the following benefits cannot be attributable to the installation of advanced digital meters:

- realisable benefits – better planning
- potential benefits:
  - earlier fault notification
  - faster restoration of supply
  - reduction in calls to faults and emergencies line
  - reduction in operational costs to fix faults
  - reduction in GSL payments
  - avoided cost of investigations regarding quality of supply.

TABLE A.2 COSTS AND BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS IF NETWORK MONITORING DEVICES ARE INSTALLED, ENERGEX

Category of costs/benefits		NPV ($m, $2019)	2019 ($m, $2019)	2020 ($m, $2019)
Advanced digital meters		2,022.8	17.0	25.4
IT systems		137.5	24.0	3.9
Sub total		2,160.4	41.0	29.3
Avoided cost of meters		(357.4)	(15.8)	(21.7)
Avoided cost of meter reading		(300.4)	(2.2)	(3.3)
Net cost of meters		**1,502.6**	**23.0**	**4.4**
Customer benefits				
	Avoided cost of special meter read	83.9	0.7	1.1
	Reduction in energy consumption	0.1	0.0	0.0
	Shift in energy consumption from peak to off peak	7.2	0.1	0.1
	Reduction in queries re estimated reads	17.4	0.2	0.3
	Reduction in complaints re estimated reads	0.8	0.0	0.0
	More timely customer transfers	95.8	0.9	1.4
	Sub total	***205.3***	***1.9***	***2.8***

Category of costs/benefits		NPV ($m, $2019)	2019 ($m, $2019)	2020 ($m, $2019)
Network benefits				
	Reduction in energy demand – deferred augmentation	36.2	0.4	0.6
	Remote de-energisation (when 60% of meters installed are advanced digital meters)	65.7	0.0	0.0
	Sub total	***101.8***	***0.4***	***0.6***
Retailer benefits				
	Debt management	75.4	0.6	0.9
	Reduction in electricity theft	24.2	0.2	0.3
	Reduction in calls re estimated bills	5.3	0.1	0.1
	Reduction in complaints re estimated bills	4.2	0.0	0.1
	Reduction in investigations re estimated bills	5.1	0.1	0.1
	More timely customer transfers	(95.8)	(0.9)	(1.4)
	Ombudsman - reduction in complaints re estimated bills	2.4	0.0	0.0
	Ombudsman - reduction in investigations re estimated bills	2.5	0.0	0.0
	Sub total	***23.3***	***0.1***	***0.2***
Other benefits	Reduction in greenhouse gas emissions	0.9	0.0	0.0
	Sub total	***0.9***	***0.0***	***0.0***
Total realisable benefits		**331.3**	**2.5**	**3.7**
Net realisable benefits		**(1,171.3)**	**(20.5)**	**(0.7)**
Customer benefits				
Safety	Avoided cost of manual re-energisation (AH)	2.1	0.0	0.0
Cost reflective tariffs	Reduction in energy consumption	2.0	0.0	0.0
	Shift in energy consumption from peak to off-peak times	137.4	1.3	1.9
Network benefits				
Practicability	Avoided cost of manual de-energisation (when less than 60% of meters installed are advanced digital meters)	48.6	1.0	1.4
Safety	Avoided cost of manual re-energisation (BH)	72.2	0.6	0.9
Cost reflective tariffs	Reduction in energy demand – deferred augmentation	500.7	8.4	12.1
Other benefits				
Cost reflective tariffs	Reduction in greenhouse gas emissions	17.1	0.2	0.4
Potential benefits		**780.1**	**11.7**	**17.0**

Category of costs/benefits	NPV ($m, $2019)	2019 ($m, $2019)	2020 ($m, $2019)
Potential net benefits	**(391.2)**	**(8.8)**	**16.3**
Reduction in potential net benefits with network monitoring devices installed	**185.0**	**0.0**	**0.0**

Note: Totals may not add due to rounding

SOURCE: ACIL ALLEN MODELLING

A.2 Ergon Energy

The costs and benefits associated with installing advanced digital meters for customers in Ergon Energy's distribution zone are tabulated in Table A.3.

TABLE A.3 COSTS AND BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS, ERGON ENERGY

Category of costs/benefits	NPV ($m, $2019)	2019 ($m, $2019)	2020 ($m, $2019)
Advanced digital meters	935.1	5.4	10.3
IT systems	22.0	1.2	1.2
Sub total	957.1	6.6	11.5
Avoided cost of meters	(193.0)	(14.6)	(11.1)
Avoided cost of meter reading	(401.6)	(1.9)	(3.7)
Net cost of meters	**362.5**	**(10.0)**	**(3.4)**
Customer benefits			
Avoided cost of special meter read	36.9	0.2	0.4
Reduction in energy consumption	0.0	0.0	0.0
Shift in energy consumption from peak to off peak	0.3	0.0	0.0
Reduction in queries re estimated reads	2.0	0.0	0.0
Reduction in complaints re estimated reads	0.1	0.0	0.0
More timely customer transfers	0.0	0.0	0.0
Sub total	***39.3***	***0.2***	***0.4***
Network benefits			
Reduction in energy demand – deferred augmentation	3.3	0.0	0.1
Remote de-energisation (when 60% of meters installed are advanced digital meters)	69.5	0.0	0.0
Better planning	94.4	0.0	0.0
Sub total	***167.2***	***0.0***	***0.1***
Retailer benefits			
Debt management	33.1	0.2	0.4
Reduction in electricity theft	9.0	0.1	0.1
Reduction in calls re estimated bills	0.5	0.0	0.0
Reduction in complaints re estimated bills	0.5	0.0	0.0
Reduction in investigations re estimated bills	0.6	0.0	0.0

Category of costs/benefits		NPV ($m, $2019)	2019 ($m, $2019)	2020 ($m, $2019)
	More timely customer transfers	0.0	0.0	0.0
	Ombudsman - reduction in complaints re estimated bills	2.2	0.0	0.0
	Ombudsman - reduction in investigations re estimated bills	2.6	0.0	0.0
	Sub total	***48.6***	***0.3***	***0.6***
Other benefits				
	Reduction in greenhouse gas emissions	0.0	0.0	0.0
	Sub total	***0.0***	***0.0***	***0.0***
Total realisable benefits		**255.2**	**0.6**	**1.1**
Net realisable benefits		**(107.3)**	**10.5**	**4.4**
Customer benefits				
Safety	Avoided cost of manual re-energisation (AH)	22.1	0.1	0.2
Real-time data for networks	Earlier fault notification	10.9	0.0	0.0
	Faster restoration of supply	42.3	0.0	0.0
	Reduction in calls to faults and emergencies line	0.8	0.0	0.0
Cost reflective tariffs	Reduction in energy consumption	1.0	0.0	0.0
	Shift in energy consumption from peak to off-peak times	66.7	0.6	0.9
Network benefits				
Practicability	Avoided cost of manual de-energisation (when less than 60% of meters installed are advanced digital meters)	66.5	0.8	1.5
Safety	Avoided cost of manual re-energisation (BH)	99.2	0.6	1.1
Real-time data for networks	Reduction in operational costs to fix faults	4.6	0.0	0.0
	Calls to faults and emergencies line	0.4	0.0	0.0
	Reduction in GSL payments	0.5	0.0	0.0
Cost reflective tariffs	Reduction in energy demand – deferred augmentation	483.7	7.2	10.7
Quality data	Avoided cost of investigations re quality of supply	15.1	0.1	0.2
Other benefits				
Cost reflective tariffs	Reduction in greenhouse gas emissions	8.2	0.1	0.2
Potential benefits		**820.9**	**9.4**	**14.8**
Potential net benefits		**713.6**	**19.9**	**19.2**

Note: Totals may not add due to rounding

SOURCE: ACIL ALLEN MODELLING

We understand that Energy Queensland is proposing to install network monitoring devices to provide them with real-time and engineering data. Table A.4 tabulates the costs and benefits associated with

advanced digital meters for customers in Ergon Energy's distribution zone if the benefits associated with real-time and engineering data cannot be attributable to the installation of advanced digital meters.

With network monitoring devices installed, the following benefits cannot be attributable to the installation of advanced digital meters:

- realisable benefits – better planning
- potential benefits:
  - earlier fault notification
  - faster restoration of supply
  - reduction in calls to faults and emergencies line
  - reduction in operational costs to fix faults
  - reduction in GSL payments
  - avoided cost of investigations regarding quality of supply.

TABLE A.4 COSTS AND BENEFITS ASSOCIATED WITH ADVANCED DIGITAL METERS IF NETWORK MONITORING DEVICES ARE INSTALLED, ERGON ENERGY

Category of costs/benefits	NPV ($m, $2019)	2019 ($m, $2019)	2020 ($m, $2019)
Advanced digital meters	935.1	5.4	10.3
IT systems	22.0	1.2	1.2
Sub total	957.1	6.6	11.5
Avoided cost of meters	(193.0)	(14.6)	(11.1)
Avoided cost of meter reading	(401.6)	(1.9)	(3.7)
Net cost of meters	**362.5**	**(10.0)**	**(3.4)**
Customer benefits			
Avoided cost of special meter read	36.9	0.2	0.4
Reduction in energy consumption	0.0	0.0	0.0
Shift in energy consumption from peak to off peak	0.3	0.0	0.0
Reduction in queries re estimated reads	2.0	0.0	0.0
Reduction in complaints re estimated reads	0.1	0.0	0.0
More timely customer transfers	0.0	0.0	0.0
Sub total	***39.3***	***0.2***	***0.4***
Network benefits			
Reduction in energy demand – deferred augmentation	3.3	0.0	0.1
Remote de-energisation (when 60% of meters installed are advanced digital meters)	69.5	0.0	0.0
Sub total	***72.8***	***0.0***	***0.1***
Retailer benefits			
Debt management	33.1	0.2	0.4
Reduction in electricity theft	9.0	0.1	0.1
Reduction in calls re estimated bills	0.5	0.0	0.0
Reduction in complaints re estimated bills	0.5	0.0	0.0
Reduction in investigations re estimated bills	0.6	0.0	0.0
More timely customer transfers	0.0	0.0	0.0

Category of costs/benefits		NPV ($m, $2019)	2019 ($m, $2019)	2020 ($m, $2019)
	Ombudsman - reduction in complaints re estimated bills	2.2	0.0	0.0
	Ombudsman - reduction in investigations re estimated bills	2.6	0.0	0.0
	Sub total	***48.6***	***0.3***	***0.6***
Other benefits				
	Reduction in greenhouse gas emissions	0.0	0.0	0.0
	Sub total	***0.0***	***0.0***	***0.0***
Total realisable benefits		**160.8**	**0.6**	**1.1**
Net realisable benefits		**(201.8)**	**10.5**	**4.4**
Customer benefits				
Safety	Avoided cost of manual re-energisation (AH)	22.1	0.1	0.2
Cost reflective tariffs	Reduction in energy consumption	1.0	0.0	0.0
	Shift in energy consumption from peak to off-peak times	66.7	0.6	0.9
Network benefits				
Practicability	Avoided cost of manual de-energisation (when less than 60% of meters installed are advanced digital meters)	65.5	0.8	1.5
Safety	Avoided cost of manual re-energisation (BH)	99.2	0.6	1.1
Cost reflective tariffs	Reduction in energy demand – deferred augmentation	483.7	7.2	10.7
Other benefits				
Cost reflective tariffs	Reduction in greenhouse gas emissions	8.2	0.1	0.2
Potential benefits		**746.4**	**9.4**	**14.8**
Potential net benefits		**544.6**	**19.9**	**19.2**
Reduction in potential net benefits with network monitoring devices installed		**169.0**	**0.0**	**0.0**

Note: Totals may not add due to rounding

SOURCE: ACIL ALLEN MODELLING

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