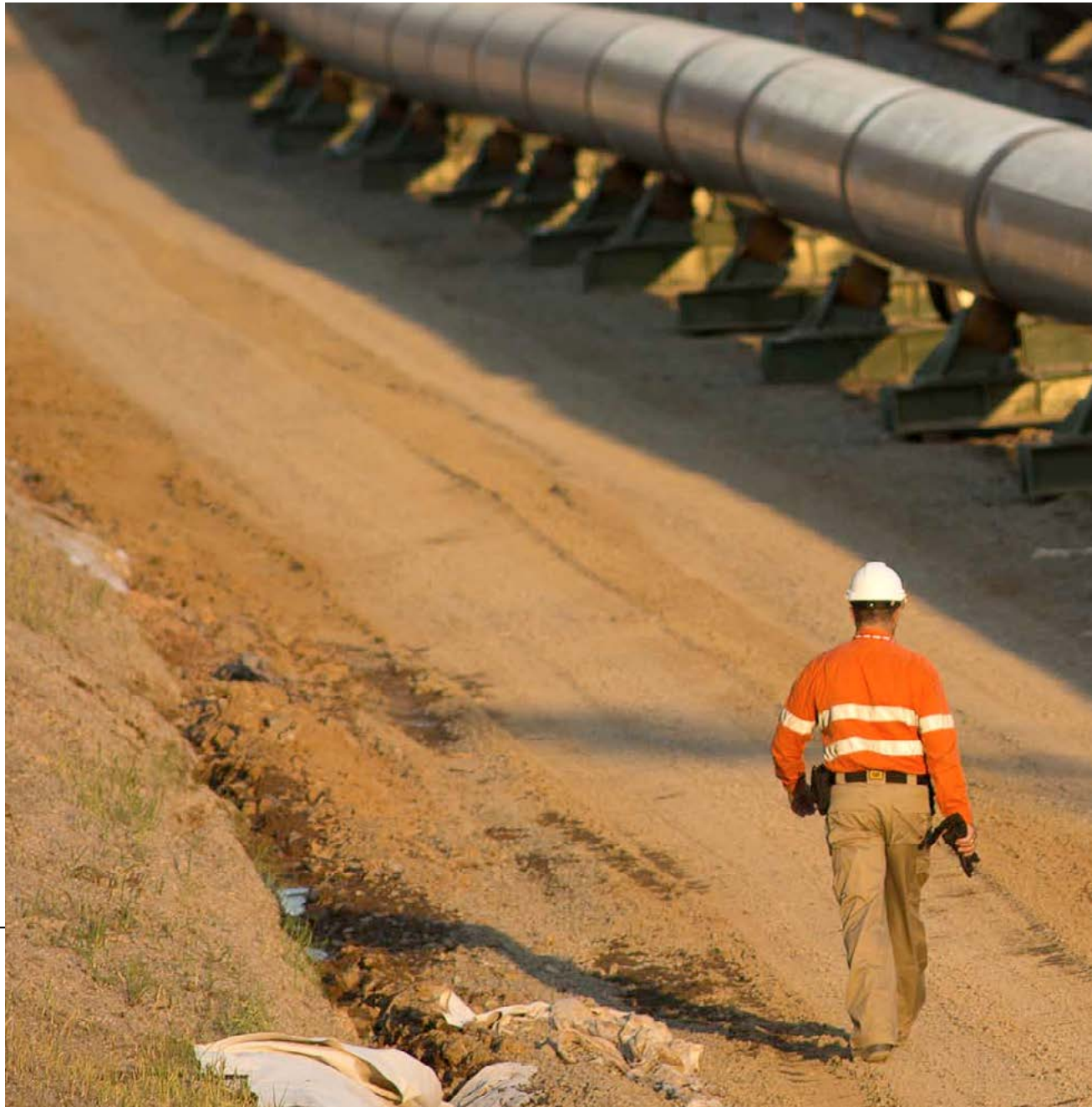


Construction of the QCLNG Pipeline (BG Group)



# 4 GAS PIPELINES





Gas pipelines transport gas from upstream producers to downstream energy customers (figure 3.1). This chapter focuses on gas pipelines in jurisdictions for which the Australian Energy Regulator (AER) has regulatory responsibilities—namely, those pipelines in jurisdictions other than Western Australia.

High pressure *transmission* pipelines transport gas from production fields to major demand centres (hubs). The pipelines typically have wide diameters and operate under high pressure to optimise shipping capacity. Australia's gas transmission network covers over 20 000 kms.

An interconnected transmission pipeline network runs from Queensland to Tasmania, providing a competitive environment for gas producers, pipeline operators and gas retailers, and strengthening security of supply. While Western Australia and the Northern Territory have no pipeline interconnection with eastern Australia, the New South Wales (NSW) and Northern Territory governments in November 2014 agreed to work closely on the development of a pipeline connecting the Northern Territory with eastern gas markets.

A network of *distribution* pipelines delivers gas from demand hubs to industrial and residential customers. A gas distribution network typically consists of high, medium and low pressure pipelines. The high and medium pressure mains provide a 'backbone' that services areas of high demand and transports gas between population concentrations within a distribution area. The low pressure pipes lead off the high pressure mains to end customers. The total length of gas distribution networks in eastern Australia is around 74 000 kms, with a combined asset value of \$8 billion.

Gas is reticulated to most Australian capital cities, major regional areas and towns, but the proportion of households and businesses connected to the networks varies across regions. Australian Gas Networks estimated in 2014 that gas penetration in the residential market was around 90 per cent in Victoria, for example, compared with 75 per cent in South Australia and 15 per cent in Queensland.<sup>1</sup>

Figure 4.1 illustrates the routes of major transmission pipelines and the locations of major distribution networks in jurisdictions for which the AER has regulatory responsibilities. Figure 3.2 includes a more extensive mapping of gas transmission pipelines, including those in Western Australia. Tables 4.1 and 4.2 summarise the major gas pipelines and networks.

<sup>1</sup> Envestra, *Application for light regulation of Envestra's Queensland gas distribution network*, August 2014.

## 4.1 Ownership

Australia's gas pipelines are privately owned. APA Group is the principal owner in gas transmission. State Grid Corporation of China and Singapore Power International own a number of transmission and distribution pipelines through Jemena and AusNet Services (tables 4.1 and 4.2). Cheung Kong Infrastructure in 2014 acquired full ownership of Australian Gas Networks (formerly Envestra), with interests principally in gas distribution.

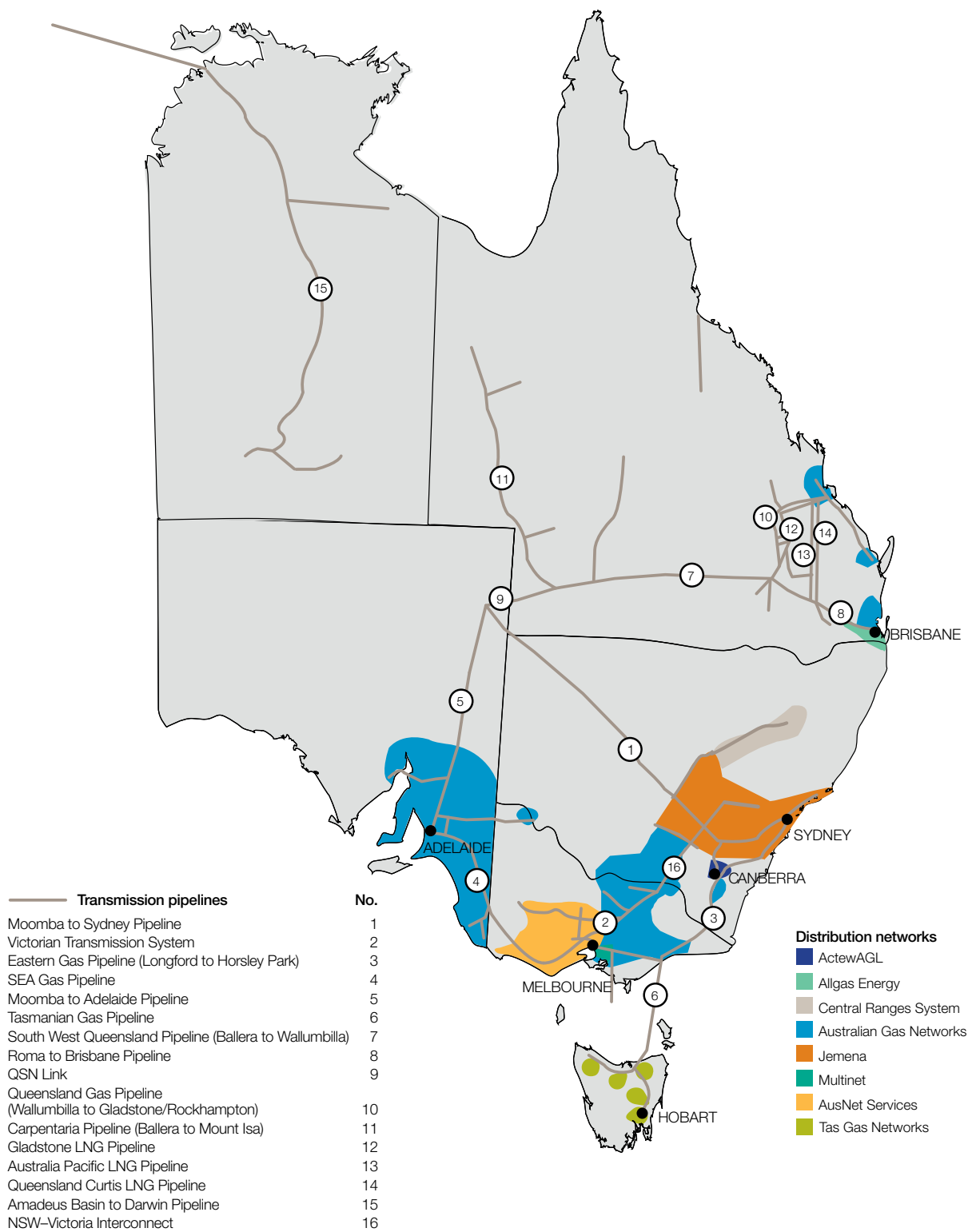
- *APA Group* owns three pipelines in NSW (including the Moomba to Sydney Pipeline), the Victorian Transmission System, five major Queensland pipelines (including three pipelines connecting the Cooper Basin in central Australia with Brisbane) and a Northern Territory pipeline. It has a 50 per cent interest in the SEA Gas Pipeline running from Victoria to South Australia, and a 20 per cent interest in Energy Infrastructure Investments (EII), which owns pipelines in the Northern Territory.

APA Group also has a minority interest in the Allgas Energy distribution network in Queensland, and owns the Central Ranges system in NSW. It manages and operates these assets.

- *Australian Gas Networks* owns distribution networks in Victoria, South Australia, Queensland and the Northern Territory, along with a transmission pipeline in the Northern Territory.
- *Jemena* owns the Eastern Gas, VicHub and Queensland Gas pipelines, along with the principal distribution network in NSW and 50 per cent of the Australian Capital Territory (ACT) network. Jemena's owners, State Grid Corporation of China and Singapore Power International, also have equity interest in Victoria's AusNet Services gas distribution network.

The ownership links between gas and electricity networks are significant. Jemena, AusNet Services, APA Group, Cheung Kong Infrastructure and DUET Group all have ownership interests (some substantial) in both sectors (section 2.1.1).

Figure 4.1  
Major gas pipelines—eastern Australia



**Table 4.1 Major gas transmission pipelines**

PIPELINE	LENGTH (KM)	CAPACITY (TJ/D)	COVERED?	OWNER
<b>EASTERN AUSTRALIA</b>				
<b>QUEENSLAND</b>				
North Queensland Gas Pipeline	391	108	No	Victorian Funds Management Corporation
Queensland Gas Pipeline (Wallumbilla to Gladstone)	629	142	No	Jemena (State Grid Corporation 60%, Singapore Power International 40%)
Carpentaria Pipeline (Ballera to Mount Isa)	840	119	Yes (light)	APA Group
Berwyndale to Wallumbilla Pipeline	113		No	APA Group
Dawson Valley Pipeline	47	30	No (revoked 2014)	Westside 51%, Mitsui 49%
Roma (Wallumbilla) to Brisbane	440	219	Yes (2012–17)	APA Group
Wallumbilla to Darling Downs Pipeline	205	400	No	Origin Energy
South West Queensland Pipeline (Ballera to Wallumbilla)	756	181	No	APA Group
QSN Link (Ballera to Moomba)	180	212	No	APA Group
Gladstone LNG Pipeline	435	1420	No	Santos; PETRONAS, Total, KOGAS
Queensland Curtis LNG Pipeline	334	1410	No	BG Group
Australia Pacific LNG Pipeline	362	1560	No	Origin Energy, ConocoPhillips, Sinopec
<b>NEW SOUTH WALES</b>				
Moomba to Sydney Pipeline	2029	420	Partial (light)	APA Group
Central West Pipeline (Marsden to Dubbo)	255	10	Yes (light)	APA Group
Central Ranges Pipeline (Dubbo to Tamworth)	300	7	Yes (2005–19)	APA Group
Eastern Gas Pipeline (Longford to Sydney)	795	268	No	Jemena (State Grid Corporation 60%, Singapore Power International 40%)
<b>VICTORIA</b>				
Victorian Transmission System (GasNet)	2035	1030	Yes (2013–17)	APA Group
South Gippsland Natural Gas Pipeline	250		No	DUET Group
VicHub		150 (into Vic)	No	Jemena (State Grid Corporation 60%, Singapore Power International 40%)
<b>SOUTH AUSTRALIA</b>				
Moomba to Adelaide Pipeline	1185	253	No	QIC Global Infrastructure
SEA Gas Pipeline (Port Campbell to Adelaide)	680	303	No	APA Group 50%, Retail Employees Superannuation Trust 50%
<b>TASMANIA</b>				
Tasmanian Gas Pipeline (Longford to Hobart)	734	129	No	Palisade Investment Partners
<b>NORTHERN TERRITORY</b>				
Bonaparte Pipeline	287	80	No	Energy Infrastructure Investments (APA Group 20%, Marubeni 50%, Osaka Gas 30%)
Amadeus Gas Pipeline	1512	104	Yes (2011–16)	APA Group
Daly Waters to McArthur River Pipeline	330	16	No	Power and Water
Palm Valley to Alice Springs Pipeline	140	27	No	Australian Gas Networks (Cheung Kong Infrastructure)

TJ/d, terajoules per day.

Note: The Moomba to Sydney Pipeline is uncovered from Moomba to the offtake point of the Central West Pipeline at Marsden.

Sources: National Gas Market Bulletin Board ([www.gasbb.com.au](http://www.gasbb.com.au)); Bureau of Resources and Energy Economics; EnergyQuest, *EnergyQuarterly* (various issues); corporate websites.

Table 4.2 Gas distribution networks in eastern Australia

NETWORK	CUSTOMER NUMBERS	LENGTH OF MAINS (KM)	ASSET BASE (\$ MILLION) <sup>1</sup>	INVESTMENT—CURRENT PERIOD (\$ MILLION) <sup>2</sup>	REVENUE—CURRENT PERIOD (\$ MILLION)	CURRENT REGULATORY PERIOD	OWNER
<b>QUEENSLAND</b>							
Allgas Energy	84 400	2 900	442	138	351	1 Jul 2011–30 Jun 2016	APA Group 20%, Marubeni 40%, RREEF 40%
Australian Gas Networks <sup>3</sup>	89 100	2 640	330	145	323	Light regulation from February 2015	Cheung Kong Infrastructure
<b>NEW SOUTH WALES AND ACT</b>							
Jemena Gas Networks (NSW)	1 050 000	24 430	2 483	777	2 372	1 Jul 2010–30 Jun 2015	Jemena (State Grid Corporation 60%, Singapore Power International 40%)
ActewAGL	124 000	4 720	299	94	302	1 Jul 2010–30 Jun 2015	ACTEW Corporation (ACT Government) 50%; Jemena (State Grid Corporation 60%, Singapore Power International 40%) 50%
Wagga Wagga <sup>4</sup>	23 800	680	64	22	52	Not regulated (coverage revoked 2014)	Australian Gas Networks (Cheung Kong Infrastructure)
Central Ranges System	7 000	180	na	na	na	2006–19	APA Group
<b>VICTORIA</b>							
AusNet Services	602 000	9 860	1 285	470	891	1 Jan 2013–31 Dec 2017	Listed company (Singapore Power International 31%, State Grid Corporation 20%)
Multinet	668 000	9 960	1 063	244	847	1 Jan 2013–31 Dec 2017	DUET Group
Australian Gas Networks	587 400	10 220	1 126	405	853	1 Jan 2013–31 Dec 2017	Cheung Kong Infrastructure
<b>SOUTH AUSTRALIA</b>							
Australian Gas Networks	410 700	7 790	1 061	512	1 071	1 Jul 2011–30 Jun 2016	Cheung Kong Infrastructure
<b>TASMANIA</b>							
Tas Gas Networks	9 800	730	na	na	na	Not regulated	Brookfield Infrastructure
<b>TOTALS</b>	<b>3 656 200</b>	<b>74 110</b>	<b>8 275</b>	<b>2 807</b>	<b>7 062</b>		

na, Not available.

- 1 The asset base is the initial capital base, adjusted for additions and deletions, as reset at the beginning of the current access arrangement period.
- 2 Investment data are forecasts for the current access arrangement period, typically of five years duration.
- 3 Australian Gas Networks' Queensland distribution network converts to light regulation in February 2015. The listed financial indicators reflect the access arrangement applicable until that time.
- 4 Coverage of the Wagga Wagga distribution network was revoked in April 2014. The listed financial indicators reflect the access arrangement applicable until that time.

Note: Asset base, investment and revenue data are converted to June 2013 dollars.

Sources: Access arrangements for covered pipelines; company websites.

## 4.2 Regulation of gas pipelines

The National Gas Law and Rules set out the regulatory framework for the gas pipeline sector. The AER regulates pipelines in jurisdictions other than Western Australia, in which the Economic Regulation Authority is the regulator.

### 4.2.1 Full regulation

The National Gas Law and Rules apply economic regulation to covered pipelines. Different forms of regulation apply, based on competition and significance criteria. Under *full regulation*, a pipeline provider must periodically submit an access arrangement to the regulator for approval. An access arrangement sets out the terms and conditions under which third parties can use a pipeline. It must specify at least one reference service that a significant part of the market is likely to seek, and a reference tariff for that service.

The AER regulates four transmission pipelines and eight distribution networks under full regulation, including:

- transmission pipelines supplying Brisbane, Melbourne and Darwin (table 4.1)
- all major distribution networks in NSW, Victoria, South Australia and the ACT, and one of Queensland's two networks.

The AER's regulatory decisions on access arrangement proposals are subject to merits review by the Australian Competition Tribunal.

An *Access arrangement guideline* (available on the AER website) details the regulatory process. Separate guidelines address dispute resolution and compliance with obligations under the National Gas Law. Figure 4.2 sets out the timelines for regulatory reviews of transmission pipelines and distribution networks.

In summary, the regulator assesses the revenue that a pipeline business needs to cover efficient costs (including a benchmark return on capital), then derives reference tariffs for the pipeline. It uses a building block model that accounts for a pipeline's operating and maintenance expenditure, capital expenditure, asset depreciation costs and taxation liabilities, and a return on capital. Figure 4.3 illustrates the revenue components of Queensland's Roma to Brisbane Pipeline (2012–17) and the Victorian distribution networks (2013–17).

The largest component is the return on capital, which accounts for up to two-thirds of revenue. The scale of a pipeline's asset base (and projected investment) and its weighted average cost of capital (the rate of return covering a commercial return on equity and efficient debt costs)

affect the return on capital. An allowance for operating expenditure typically accounts for a further 30 per cent of revenue requirements. The rules allow for income adjustments via incentive mechanisms that reward efficient operating practices.

In a dispute, an access seeker may request the regulator arbitrate on and enforce the terms and conditions of the access arrangement. Regulatory decisions on full regulation pipelines are subject to merits review by the Australian Competition Tribunal (section 4.4).

### 4.2.2 Light regulation

A pipeline may, in some circumstances, convert to *light regulation* without upfront price regulation. When light regulation applies, the pipeline provider must publish access prices and other terms and conditions on its website. In eastern Australia, the Carpentaria Gas Pipeline in Queensland, the covered portions of the Moomba to Sydney Pipeline, and the Central West Pipeline in NSW are subject to light regulation. Australian Gas Networks' Queensland network will in February 2015 become the first major distribution network to convert to light regulation.

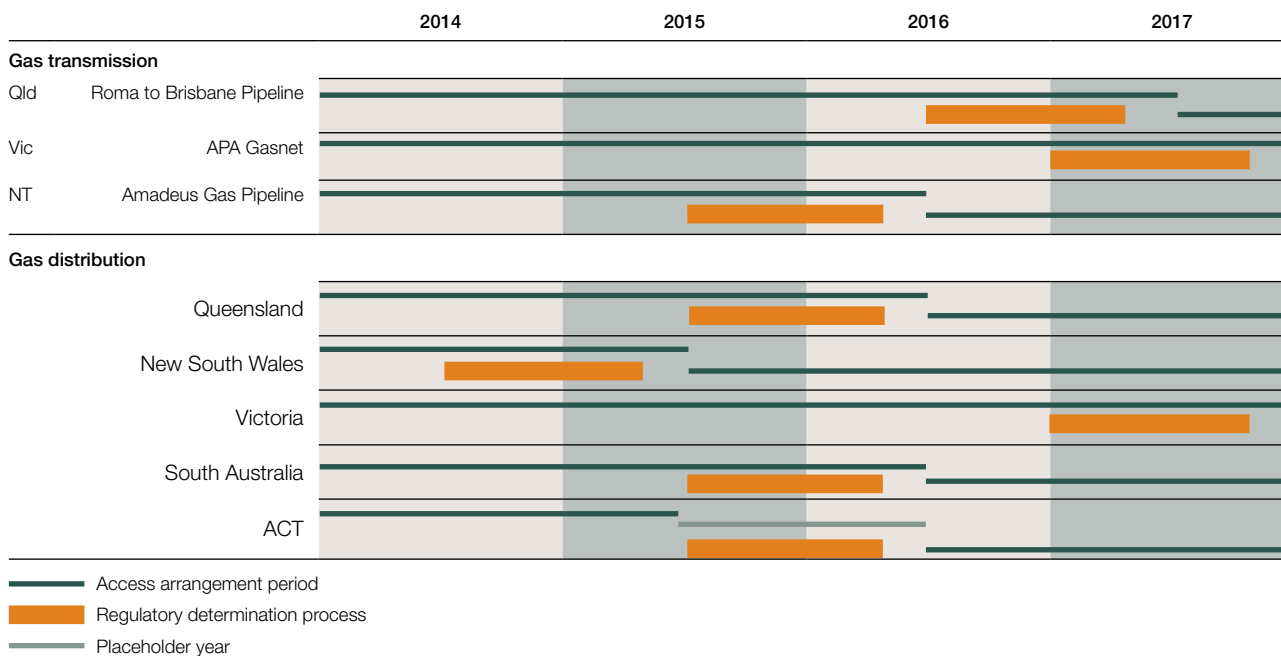
### 4.2.3 Changes in coverage status

The National Gas Law includes a mechanism for reviewing whether a particular pipeline needs economic regulation. The coverage of several major transmission pipelines has been revoked over the past decade. Additionally, only one transmission pipeline constructed in the past decade is covered.

Coverage decisions on three pipelines were made in 2014:

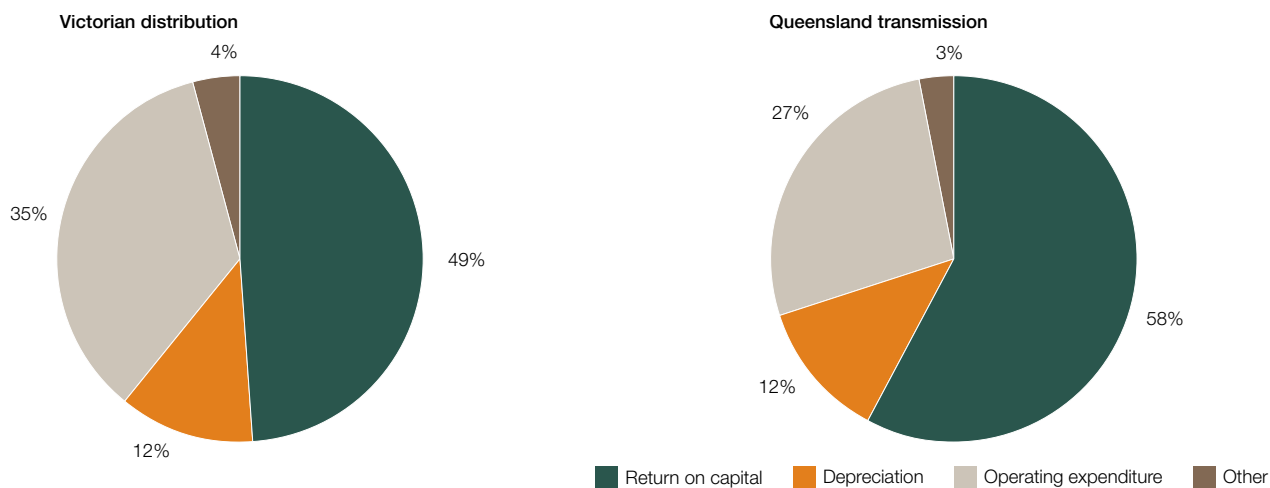
- In April 2014 the NSW Minister for Resources and Energy revoked coverage of Australian Gas Networks' Wagga Wagga distribution network (NSW). The National Competition Council (NCC) had recommended in August 2013 that coverage be revoked if retail gas price regulation continues in the medium term.
- In September 2014 the Federal Minister for Industry revoked coverage of the Dawson Valley Pipeline in Queensland. The minister was not satisfied that access to the pipeline would promote a material increase in competition in upstream or downstream gas markets, or that a competing pipeline would be uneconomic to develop.
- In November 2014 the NCC determined Australian Gas Networks' Queensland distribution network will convert from full to light regulation in February 2015. It found light

**Figure 4.2**  
Indicative timelines for regulatory reviews of gas pipelines



Note: The timeframes are indicative. The standard review period begins when a network business submits an access arrangement proposal to the AER. Timeframes may vary if the AER grants a time extension for the proposal submission. An access arrangement period is typically five years, but a provider may apply for a different duration.

**Figure 4.3**  
Indicative composition of gas pipeline revenues



Source: AER.



regulation of the network will be similarly effective to full regulation, but provide significant cost savings that may benefit customers.

The Gas Law also enables the federal Minister for Resources and Energy to grant a 15 year ‘no coverage’ determination for new pipelines in certain circumstances. Following recommendations from the NCC, the minister granted ‘no coverage’ determinations for three transmission pipelines supplying gas from the Surat–Bowen Basin to LNG projects on Curtis Island in Queensland.

### 4.3 Pipeline investment

Gas *transmission* investment typically involves large and lumpy capital projects to expand existing pipelines (through compression, looping or extension) or construct new infrastructure. Significant investment in eastern Australia’s regulated and unregulated transmission sector has occurred since 2010. Additionally, a number of major projects are under construction or have been announced for development:

- APA Group completed capacity expansions of pipelines linking Moomba to Sydney and Brisbane in 2012. Work included looping the South West Queensland Pipeline, which effectively doubled capacity. In 2014 APA Group re-configured the South West Queensland Pipeline for bi-directional operation, and plans bi-directional operation of the Roma to Brisbane and Moomba to Sydney pipelines.
- APA Group commenced work in 2014 on expanding capacity on the northern zone of the Victorian Transmission System by 145 per cent to support an increase in gas sales from Victoria to NSW. The expansion is due for completion by winter 2015.
- Three major transmission pipelines in Queensland were completed in 2014 to transport gas from the Surat–Bowen Basin to Gladstone for processing and export as LNG.
- Jemena began work to expand capacity on the Queensland Gas Pipeline in 2014. It was also considering a capacity expansion of the Eastern Gas Pipeline to boost capacity into NSW, which could be completed by the end of 2015.

The NSW and Northern Territory governments in November 2014 signed a Memorandum of Understanding to work closely on the development of a pipeline connecting the Northern Territory with eastern gas markets. The pipeline could run from Alice Springs to Moomba (1100 kms), or from Tenant Creek to Mount Isa (620 kms).

Investment in *distribution* networks in eastern Australia—including investment to augment capacity—is forecast at around \$2.8 billion in the current access arrangement periods (typically five years). The underlying drivers include rising connection numbers, the replacement of ageing networks, and the maintenance of capacity to meet customer demand.

Figure 4.4 illustrates recent investment data for gas transmission pipelines and distribution networks that are subject to full regulation. It compares approved forecasts in current access arrangements with actual expenditure in previous periods.

For *distribution* networks, investment is forecast to increase by an average 47 per cent in the current access arrangement periods, compared with previous periods. Investment is equal, on average, to 34 per cent of the networks’ opening capital bases. Forecast growth is highest in Australian Gas Networks’ Queensland and South Australian networks (up 71 per cent and 162 per cent respectively). More recent regulatory reviews reflect a moderation in growth. The decisions for Victoria’s distribution networks, for example, allow for investment to rise by an average 23 per cent in 2013–17, compared with previous periods.

For *transmission* pipelines, investment forecasts vary significantly. An expansion of the Roma to Brisbane Pipeline in the previous regulatory period contributed to a large capital expenditure allowance. But, with no major augmentations planned for the current period, forecast expenditure fell by over 80 per cent. Capital expenditure across the two periods is consistent for Victoria’s GasNet system, while the Northern Territory’s Amadeus Pipeline had a large increase in forecast capital expenditure for an enhanced integrity program.

## 4.4 Pipeline revenues and retail impacts

Figure 4.5 illustrates approved revenue forecasts for gas transmission pipelines and distribution networks that are subject to full regulation. It compares approved forecasts in current access arrangements with those approved in previous periods.

For *distribution* networks, revenues are forecast to increase by an average 11 per cent in the current access arrangement periods, compared with previous periods. The largest increases will be for Australian Gas Networks' South Australian and Queensland networks (43 per cent and 42 per cent respectively). The drivers include rising asset bases associated with greater investment (resulting in higher returns on capital). Some forecasts reflect a rise in underlying costs, including operating and maintenance expenditure and capital financing costs. For *transmission* networks, revenues are forecast to fall on the Roma to Brisbane Pipeline, but rise for the GasNet system and the Amadeus Pipeline.

Regulatory reviews since 2012 reflect reductions in the risk free rate that have lowered the overall cost of capital. The decisions for Victoria's distribution networks in 2013 will result in revenues falling by an average 8 per cent in 2013–17, compared with revenues in 2008–12.

### 4.4.1 Operating expenditure

Operating and maintenance costs are a key driver of pipeline revenue requirements. Figure 4.6 illustrates recent operating expenditure data for gas transmission pipelines and distribution networks that are subject to full regulation. It compares approved forecasts in current access arrangements with actual expenditure in previous regulatory periods.

For *distribution* networks, real operating expenditure is forecast to increase by an average 15 per cent in the current access arrangement periods, compared with actual expenditure in previous periods. Forecasts vary across the networks, with the largest increases forecast for the Allgas Energy (Queensland) and ActewAGL (ACT) networks (each by 28 per cent). For *transmission* networks, operating expenditure is forecast to increase by an average 22 per cent.

Regulatory decisions in 2013 for Victoria's distribution networks allow for operating expenditure to rise on average by 13 per cent in 2013–17 from that in 2008–12.

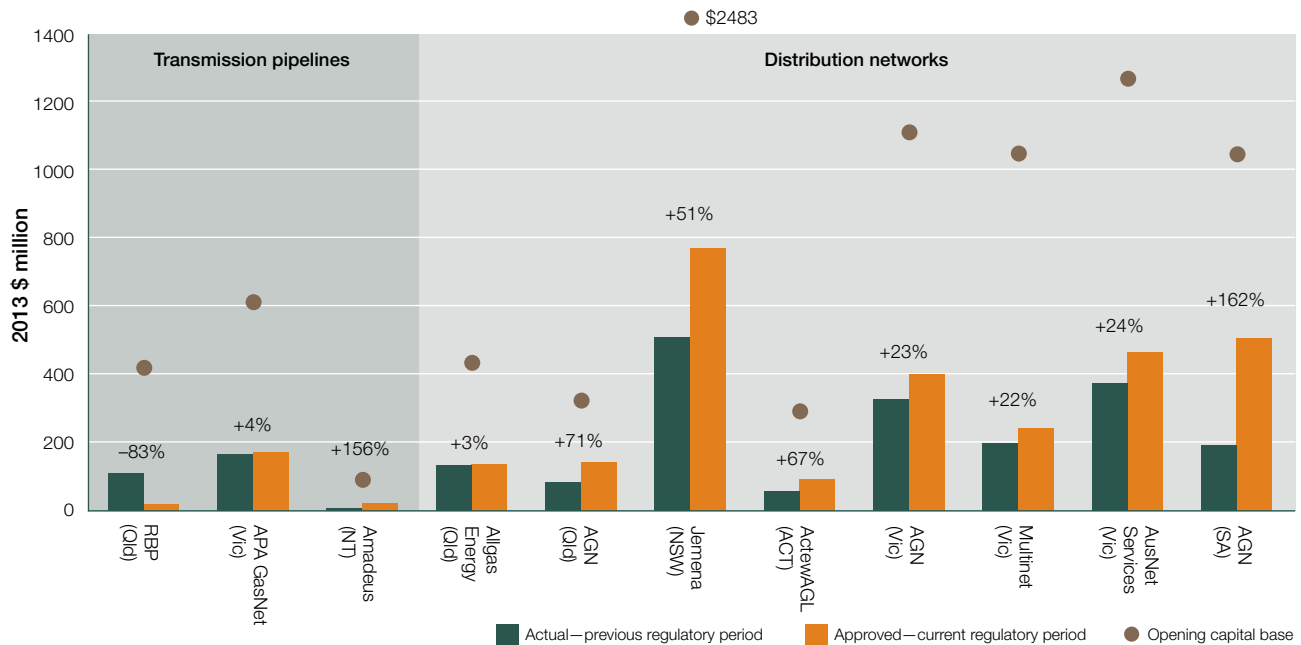
### 4.4.2 Retail impacts of regulatory decisions

Gas *transmission* charges typically make up 3–8 per cent of a residential gas bill. The percentage is significantly higher for industrial users. The 2012 regulatory decision on Queensland's Roma to Brisbane Pipeline was expected to cause almost no change in a typical residential customer's bill over the five years of the determination. In Victoria, the 2013 decision on the Victorian Transmission System resulted in a typical residential bill falling by around 0.4 per cent per year.

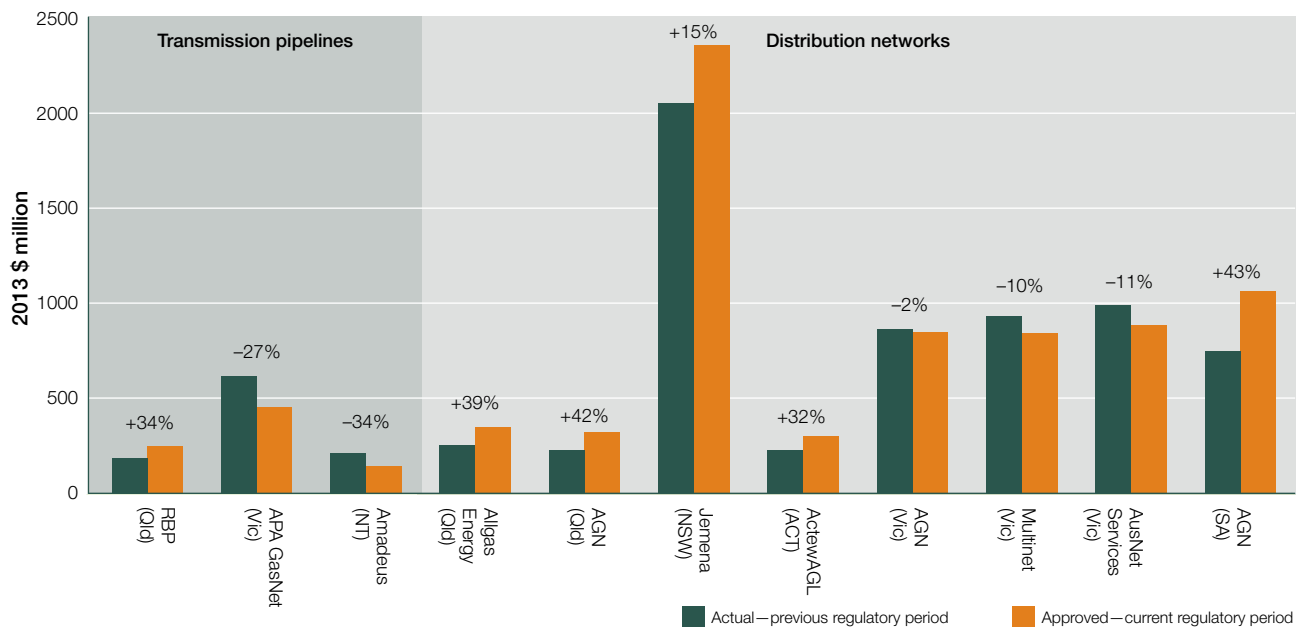
Gas *distribution* charges typically make up 40–60 per cent of a residential gas bill. In recent years, rising capital and operating expenditure and other cost drivers (including higher financing costs and the rising cost of unaccounted for gas) pushed up gas distribution costs, leading retail charges for residential customers to rise by 5–6 per cent per year (figure 4.7).

However, the 2013 regulatory decisions for the Victorian distribution networks show a different trend, leaving little impact on customer charges in 2013–17. Charges are rising annually by around 1.3 per cent for Australian Gas Networks and 0.3 per cent for Multinet. Customer charges for AusNet Services customers are expected to fall by around 0.4 per cent annually. A key reason for this shift was reductions in the risk-free rate that lowered the overall cost of capital for gas networks.

**Figure 4.4**  
Pipeline investment—five year period



**Figure 4.5**  
Pipeline revenues—five year period

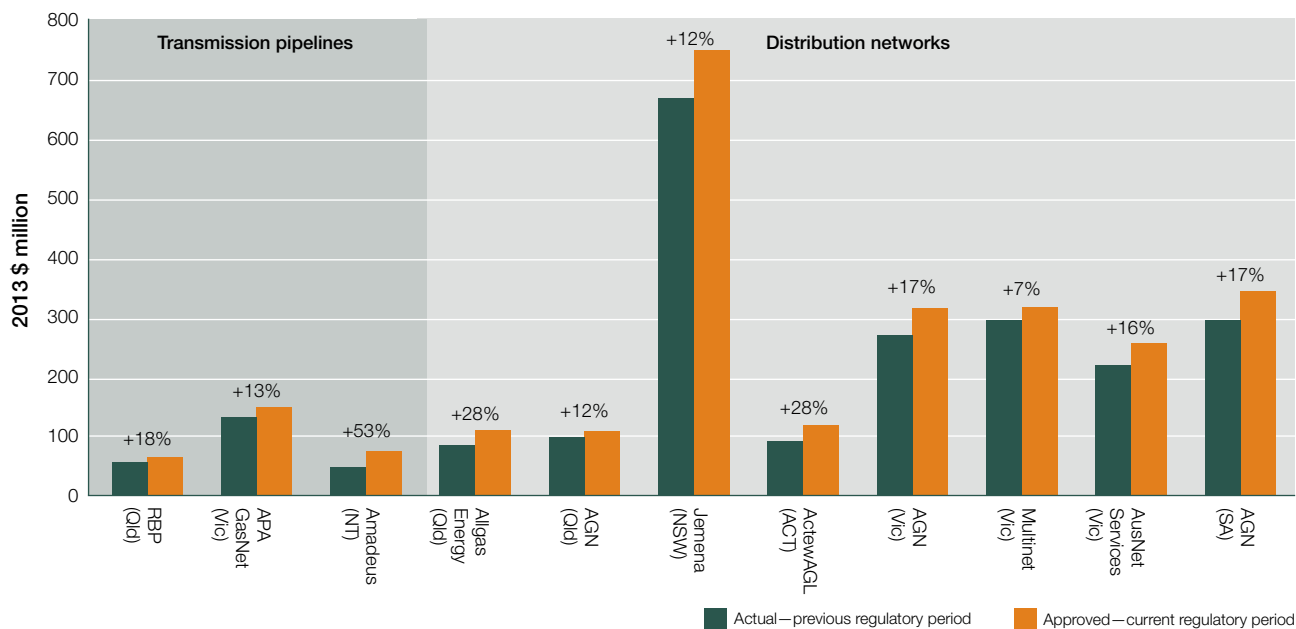


RBP, Roma to Brisbane Pipeline; AGN, Australian Gas Networks.

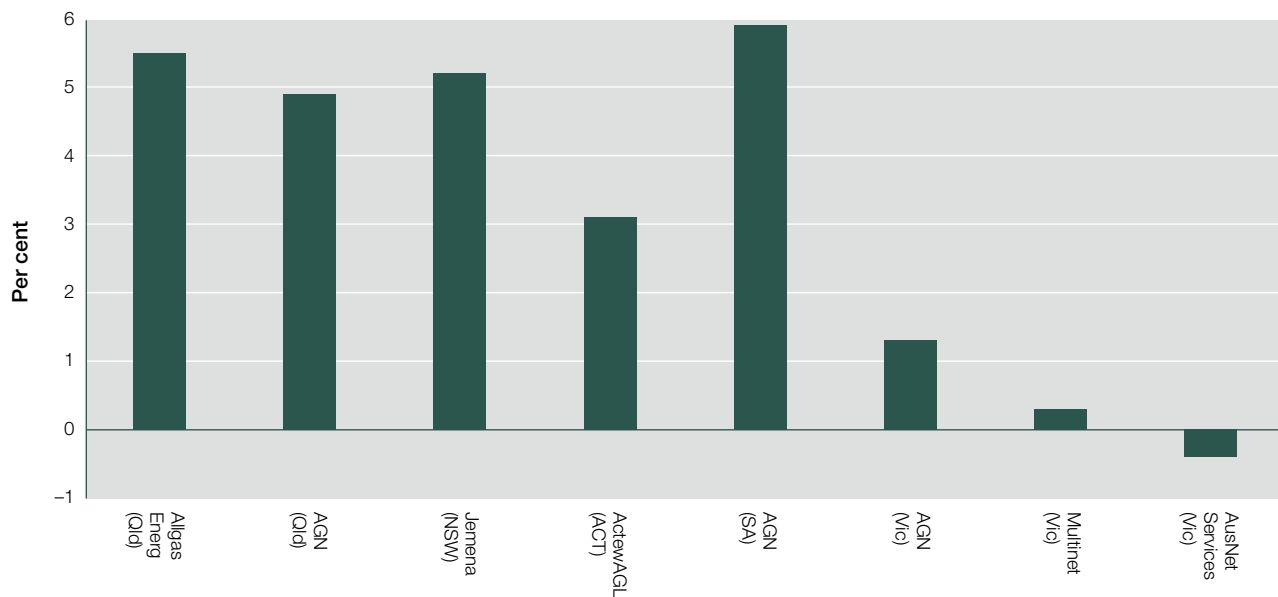
Note (figures 4.4–4.6): Forecasts in the current access arrangement period (typically five years), compared with actual levels (revenue and operating expenditure) and forecasts (capital expenditure) in previous periods. The data account for the impact of decisions by the Australian Competition Tribunal. Opening capital bases are at the beginning of the current access arrangement period.

Source (figures 4.4–4.6): AER final decisions on access arrangements.

**Figure 4.6**  
Pipeline operating expenditure—five year period



**Figure 4.7**  
Annual impact of AER decisions on residential gas charges



AGN, Australian Gas Networks.

Note: Impact on annual gas charges for a typical residential customer in that jurisdiction in the current access arrangement period. See table 4.2 for the timing of regulatory periods. The data account for the impact of decisions by the Australian Competition Tribunal.

Source: AER final decisions on access arrangements.