

# bitre

## Chapter 7

### Infrastructure





# Chapter 7      Infrastructure

This chapter discusses the infrastructure of Northern Australia. It does so by considering electricity generation and supply; major water storage and usage; gas supply; and telecommunications in 2006. In addition, the infrastructure of ports, major airports, roads and railway are discussed.

Within Northern Australia, an electricity grid interconnected with the rest of the state system is available only in northern Queensland regions. Overall, electricity supply in Northern Australia is based largely on local generators. Most generators are of relatively small capacity and use locally available gas and liquid fuels.

Water resources and storage in Northern Australia are strongly concentrated around the coastline with major water reserves in the north-eastern regions of Queensland and the Kimberley Region. The largest water reserves in Northern Australia are stored in the Argyle Dam on the Ord River.

The major water user is agriculture and, as there are no major population agglomerations in Northern Australia, supply systems for urban areas are on a relatively small scale. Artesian water is an important source for irrigation and other agricultural use.

Gas production and transmission is a large and growing industry in Northern Australia, providing vital sources of heat and electricity for commodity production and processing in the region, as well as for consumption by the local population. Northern Australia is the largest gas producer in Australia for exports and the domestic market.

In 2006, there were a greater proportion of people with no Internet connection within Northern Australia, compared to the rest of Australia. Within Northern Australia, there were lower proportions of people with broadband access, and higher proportions of people with dial-up access.

## 7.1      Electricity generation and supply

Electricity supply in Northern Australia is based largely on local generators. Most generators are of relatively small capacity and use locally available gas and liquid fuels. An electricity grid interconnected with the state system is available only in northern Queensland regions.

Electricity-generating capacity in Northern Australia represents 13.4 per cent of the Australian total in 2008 (Table 7.1.1). Generating capacity based on renewable fuels is only 186.2 megawatts, with the largest installed generators producing 156 megawatts in the Far North Region of Queensland, representing 2.2 per cent of the total Australian renewable generating capacities. No data on electricity generation and end use is available at disaggregated levels.

The highest fossil fuel electricity generation capacity is in the Gladstone and Rockhampton regions of Queensland, where predominantly coal-based power stations are interconnected with the East Coast Australian electricity grid. The third largest generating region is the Pilbara (most gas-fired), which is interconnected regionally but not connected to the state's grid (see Table 7.1.2 and Map 7.1.1). In the Darwin-East Arnhem Region, the generating capacity is gas/distillate-fired and connected south to Katherine.

**Table 7.1.1 Northern Australia—capacity of fossil fuel and renewable electricity power stations (megawatts) by region, 2008**

| <i>Region</i>                  | <i>Total capacity (megawatts) of fossil fuel electricity power stations</i> | <i>Per cent of state total fossil fueled</i> | <i>Total capacity (megawatts) of renewable energy electricity power stations</i> | <i>Per cent of state total renewable</i> |
|--------------------------------|---|--|--|--|
| Northern Australia (WA)        | 962   | 13.2   | 30   | 13.5                                     |
| Pilbara Region                 | 902   | 12.4   | –  | –  |
| Kimberley Region               | 60  | 0.8  | 30   | 13.5                                     |
| Western Australia state total  | 7 279   | 100.0  | 222  | 100.0                                    |
| Northern Australia (NT)        | 833   | 100.0  | 0.2  | 100.0                                    |
| Darwin-east Arnhem Region      | 725   | 87.1   | –  | –  |
| Katherine-Lower Top End Region | 49  | 5.9  | –  | –  |
| Barkly-Central NT Region       | 59  | 7.0  | 0.2  | 100.0                                    |
| Northern Territory total       | 833   | 100.0  | 0.2  | 100.0                                    |
| Northern Australia (QLD)       | 1 375   | 11.0   | 156  | 23.8                                     |
| Mackay Region                  | 291   | 2.3  | –  | –  |
| Northern Region                | 546   | 4.4  | –  | –  |
| Far North Region               | 26  | 0.2  | 156  | 23.8                                     |
| North West Region              | 512   | 4.1  | –  | –  |
| Longreach Region               | 0.0   | 0.0  | –  | –  |
| Queensland state total         | 12 502  | 100.0  | 656  | 100.0                                    |
| Northern Australia subtotal    | 3 170   | 6.5  | 156  | 1.8                                      |
| Australia total                | 48 487  |  | 8 540  |  |

Source: Geoscience Australia (2008a).

Apart from the very large coal-fired units installed in Gladstone and Stanwell, the majority of the generators are relatively small. These coal-fired power stations provide about a quarter of Queensland's total electricity to the state grid. This power, generated from locally extracted coal, is essential for aluminium smelting using bauxite shipped from Weipa in the Far North Region of Queensland.

The relative proportions of installed generator capacity in Northern Australia (13.4 per cent) and total population of that region (4.7 per cent) reflects the reality of electricity being used for industrial applications, particularly to produce and process commodities, to a much larger degree than in the rest of Australia.

Availability of local gas piped to many locations in Northern Australia allows for this fuel to be used in the vast majority of installed electricity generators. A small proportion of generators use distillate and other oil-based products of local industries.

**Table 7.1.2 Northern Australia—fossil fuel power stations by fuel type, technology, and capacity (megawatts), by SLA and region, 2008**

| <i>Region/SLA name</i>         | <i>Power station name</i> | <i>Fuel type</i> | <i>Technology</i>                      | <i>Total capacity (megawatts)</i> |
|--------------------------------|---------------------------|------------------|--|-----------------------------------|
| Northern Australia (WA)        |                           |                  |  |                                   |
| Pilbara Region                 |                           |                  |  |                                   |
| East Pilbara (S)               | Newman                    | Gas              | Gas turbine                            | 108                               |
| East Pilbara (S)               | Telfer                    | Gas              | Gas turbine                            | 141                               |
| East Pilbara (S)               | Nifty                     | Gas              | Gas turbine                            | 23                                |
| Port Hedland (T)               | Port Hedland              | Gas              | Gas turbine                            | 180                               |
| Ashburton (S)                  | Paraburdoo                | Distillate       | Reciprocating engine                   | 20                                |
| Ashburton (S)                  | Cloud Break               | Gas              | Gas turbine                            | 45                                |
| Roebourne (S)                  | Dampier C                 | Gas              | Steam turbine                          | 120                               |
| Roebourne (S)                  | Cape Lambert              | Gas              | Gas turbine combined cycle             | 105                               |
| Roebourne (S)                  | Burrup Peninsula          | Gas              | Steam turbine                          | 40                                |
| Roebourne (S)                  | Dampier                   | Gas              | Steam turbine                          | 120                               |
| Kimberley Region               |                           |                  |  |                                   |
| Wyndham-East Kimberley (S)     | Argyle                    | Other            | Reciprocating engine                   | 20                                |
| Broome (S)                     | Broome                    | Gas              | Gas turbine                            | 40                                |
| Northern Australia (NT)        |                           |                  |  |                                   |
| Darwin-East Arnhem Region      |                           |                  |  |                                   |
| City-Remainder                 | Berrimah                  | Gas              | Gas turbine                            | 30                                |
| Litchfield (S)-Pt B            | Weddell                   | Gas              | Gas turbine                            | 78                                |
| Litchfield (S)-Pt B            | Channel Island            | Gas/other        | Gas turbine combined cycle             | 255                               |
| Litchfield (S)-Pt B            | Wickham Point             | Gas              | Gas turbine                            | 180                               |
| Jabiru (T)                     | Jabiru                    | Distillate       | Reciprocating engine and steam turbine | 28                                |
| Pine Creek (Cgc)               | Pine Creek                | Gas              | Gas turbine combined cycle/gas turbine | 49                                |
| Nhulunbuy                      | Gove                      | Other            | Steam turbine                          | 105                               |
| Katherine-Lower Top End Region |                           |                  |  |                                   |
| Borroloola (CGC)               | McArthur River            | Gas/other        | Gas turbine/reciprocating engine       | 21                                |
| Katherine (T)                  | Katherine                 | Gas/other        | Gas turbine/reciprocating engine       | 28                                |
| Barkly-Central Nt Region       |                           |                  |  |                                   |
| Alice Springs (T)-Stuart       | Alice Springs             | Gas/other        | Gas turbine/reciprocating engine       | 59                                |
| Northern Australia (QLD)       |                           |                  |  |                                   |
| Mackay Region                  |                           |                  |  |                                   |
| Mackay (C)-Pt A                | Mackay                    | Distillate       | Gas turbine                            | 34                                |
| Bowen (S)                      | Collinsville              | Black coal       | Steam turbine                          | 180                               |
| Broadsound (S)                 | German Creek              | Gas              | Reciprocating engine                   | 32                                |
| Nebo (S)                       | Moranbah North            | Gas              | Gas turbine                            | 45                                |
| Northern Region                |                           |                  |  |                                   |
| Stuart-Roseneath               | Mt Stuart                 | Other            | Gas turbine                            | 288                               |
| Thuringowa (C)-Pt B            | Yabulu                    | Black coal       | Steam (cogeneration)                   | 38                                |
| Thuringowa (C)-Pt B            | Yabulu                    | Gas              | Gas turbine combined cycle             | 220                               |
| Far North Region               |                           |                  |  |                                   |
| Weipa (T)                      | Weipa                     | Other            | Reciprocating engine                   | 26                                |
| North West Region              |                           |                  |  |                                   |
| Boulia (S)                     | Phosphate Hill            | Gas              | Gas turbine                            | 42                                |
| Boulia (S)                     | Cannington                | Gas              | Cogeneration                           | 38                                |
| Cloncurry (S)                  | Ernest Henry              | Other            | Reciprocating engine                   | 32                                |
| Mount Isa (C)                  | Mica Creek A, B and C     | Gas              | Steam turbine                          | 325                               |
| Mount Isa (C)                  | Mt Isa                    | Gas              | Gas turbine                            | 30                                |
| Mount Isa (C)                  | Mines Station-Mt Isa      | Gas              | Gas turbine                            | 45                                |

Notes: This table shows the fossil fuel power stations located in Northern Australia, by fuel type, technology and capacity (megawatts) and by SLA.

Source: Geoscience Australia (2008a).

The renewable electricity generating capacity of Northern Australia is predominantly comprised of hydro schemes, based on local dams and rivers in the northern regions of Queensland and the Kimberley in Western Australia (see Table 7.1.3). Generating capacities based on hydro schemes are relatively small but serve local population needs well, given the remoteness of most of these locations or long distances to the nearest state electricity grid. Wind and photovoltaic generation amount to only 12.2 megawatts but are important to local domestic use.

**Table 7.1.3 Northern Australia—renewable electricity power stations by fuel type, technology, and capacity (megawatts), by SLA and region, 2006–07**

| <i>Region/SLA Name</i>     | <i>Power station name</i> | <i>Fuel type</i> | <i>Technology</i> | <i>Total capacity (megawatts)</i> |
|----------------------------|---------------------------|------------------|-------------------|-----------------------------------|
| Northern Australia (WA)    |                           |                  |                   |                                   |
| Kimberley Region           |                           |                  |                   |                                   |
| Wyndham-East Kimberley (S) | Ord Dam                   | Hydro            | Water             | 30                                |
| Northern Australia (NT)    |                           |                  |                   |                                   |
| Barkly-Central NT Region   |                           |                  |                   |                                   |
| Tanami                     | Kings Canyon              | Photovoltaic     | Solar             | 0                                 |
| Northern Australia (QLD)   |                           |                  |                   |                                   |
| Far North Region           |                           |                  |                   |                                   |
| Cairns (C)-Barron          | Barron Gorge              | Hydro            | Water             | 60                                |
| Cardwell (S)               | Kareeya                   | Hydro            | Water             | 84                                |
| Herberton (S)              | Windy Hill                | Wind             | Wind              | 12                                |

Source: Energy Supply Association of Australia (ESAA) (2008a).

## 7.2 Major water storage and use

Water resources and storage in Northern Australia are strongly concentrated around the coastline with major water reserves in the Kimberley Region and north eastern regions of Queensland. The major water user is agriculture, as there are few major population agglomerations in Northern Australia. Artesian water is an important source for irrigation and other agricultural use.

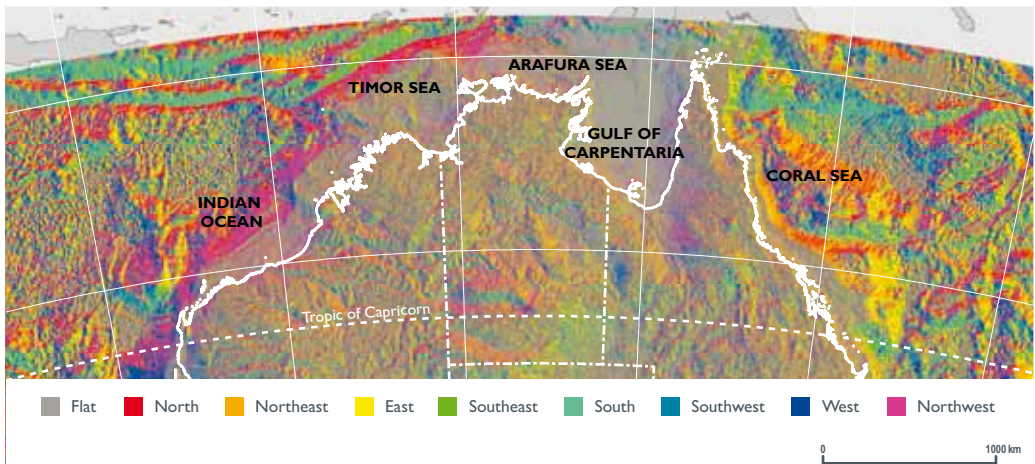
Map 7.2.1 illustrates Australia's landmass topography. In the northern regions of Western Australia, slopes direct runoff water toward the Indian Ocean, especially in the Pilbara Region.

In the Kimberley Region, the land slopes towards the Timor Sea. The largest water reserves in Northern Australia are stored in the Argyle Dam on the Ord River, which is heading north at that point. The total water storage capacity of Argyle is 10.7 billion megalitres (see Table 7.2.1).

The northern regions of the Northern Territory do not have substantial water storage capacities apart from two small dams near Darwin.

Australia's main rivers and water reservoirs are illustrated on Map 7.2.2.

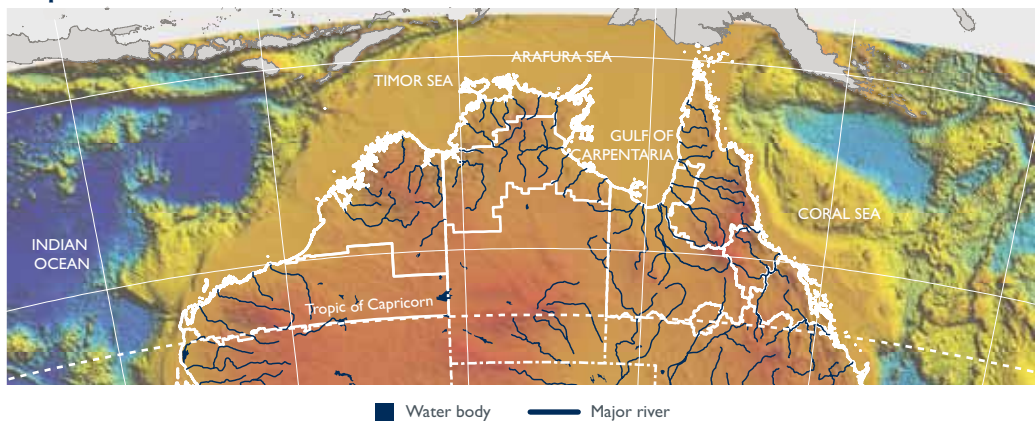
Map 7.2.1 Northern Australia's landmass topography



Source: Geoscience Australia (unpublished).

North Queensland's sloping terrain and rivers flow on both sides of the Great Divide and provide an ample reserve of run-off water in a number of regions. Part of the run-off waters head south west towards the centre of Australia and southwards, filling the seasonal rivers, lakes and storage ponds. Typically, flood headwaters from Queensland go south along the Diamantina and Georgina seasonal rivers, filling the Goyders Lagoon on their way through the desert to Lake Eyre, some 700 kilometres north of Adelaide.<sup>15</sup>

Map 7.2.2 Northern Australia—main rivers and reservoirs



Source: Geoscience Australia (unpublished).

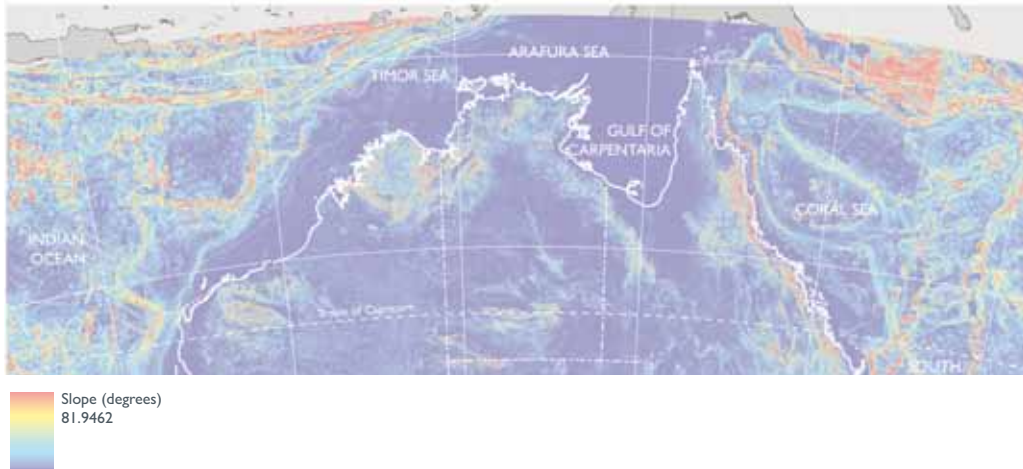
Dams and weirs built across rivers, sometimes multistage, provide a relatively stable source of water for agriculture, mining and other uses. For example, Cairns and its surrounds are supplied by dams at Copperlode Falls, Tinaroo and Behana Creek.

15. Lake Eyre is a 9690 square kilometre basin situated 15 metres below sea level, and is the lowest point in Australia. The lake has filled substantially only three times since it was first discovered about 160 years ago.



Although water resources of Northern Australia are large, as compared with southern states, the land is predominantly flat and low, as illustrated on Map 7.2.3. These characteristics significantly limit the potential of electricity generation, as discussed in Section 1 above.

**Map 7.2.3 Northern Australia—land slope**



Source: Geoscience Australia (unpublished).

The complexity of the system of barring rivers and piping water to various regions of northern Queensland does not allow for allocation of these water resources to particular regions, therefore the information in Table 7.2.1 is presented as a summary of information for northern Queensland regions. The total water storage capacity of northern Queensland regions represented about one-third of that of the Kimberley Region (Lake Argyle) in Western Australia. However, the volume of irrigation water used in northern Queensland regions was about 10 times larger than that of Kimberley’s due to the larger (about 20 times the size of the Kimberley’s) area of irrigation in these regions (see Table 7.2.2).

The area of agricultural land in Northern Australia was 154.3 million hectares in 2005–06, with only a small fraction of this irrigated. In the northern regions of Western Australia and Northern Territory about half of agricultural establishments irrigated their farms. In Queensland’s northern regions about one-third of farms are irrigated, but the total area and volume of water used is much larger than in the other state and territory. The largest volumes of water per hectare irrigated were applied in the Kimberley (Western Australia) and Northern Queensland regions.



**Table 7.2.1 Northern Australia—dams by location, storage capacity (megalitres), construction type, surface area and year of construction completion, by state**

| <i>Region/<br/>dam name</i>          | <i>Nearest town</i> | <i>Total storage<br/>capacity<br/>(megalitres)</i> | <i>Construction type</i>                     | <i>Surface<br/>area at<br/>full level<br/>(hectares)</i> | <i>Year<br/>completed</i> |
|--------------------------------------|---------------------|--|--|--|---------------------------|
| Northern Australia (WA)              | Total               | 10 826 800   |  | 84 400   |                           |
| Argyle Dam (Ord River)               | Kununurra           | 10 763 000   | Rockfill                                     | 70 300   | 1971                      |
| Harding Dam                          | Roebourne           | 63 800   | Rockfill                                     | 14 100   | –                         |
| Northern Australia (NT)              | Total               | 280 900  |  | 4 445  |                           |
| Darwin River Dam                     | Darwin              | 265 000  | Earth and Rockfill                           | 4 000  | 1972                      |
| Manton Dam                           | Darwin              | 15 900   | Concrete Arch<br>Construction                | 445  | 1942                      |
| Northern Australia (QLD)             | Total               | 3 355 512  |  | 37 385   |                           |
| Bowen River Weir (Collinsville Weir) | Collinsville        | 943  | Mass Conc.                                   | 50   | 1983                      |
| Eungella Dam                         | Eungella            | 1 12 400   | Earth and Rockfill                           | 848  | 1969                      |
| Gattonvale Offstream Storage         | Collinsville        | 5 234  | Earthfill                                    | 65   | 2005                      |
| Ben Anderson Barrage                 | Bundaberg           | 30 300   | Earth and Rockfill<br>Conc. Crest (Shutters) | 775  | 1976/83                   |
| Bucca Weir                           | North Kolan         | 1 1 600  | R.C.C.                                       | 250  | 1987                      |
| Kolan Barrage                        | Bundaberg           | 4 020  | Earth and Rockfill                           | 210  | 1973                      |
| Burdekin Falls Dam                   | Ravenswood          | 1 860 000  | Mass Conc.                                   | 22 000   | 1987                      |
| Clare Weir                           | Claredale           | 15 900   | Mass Conc. (Shutters)                        | 520  | 1978/86                   |
| Giru Weir                            | Giru                | 1 020  | S.S. Piling Cas.                             | 68   | 1977                      |
| Val Bird Weir                        | Giru                | 615  | S.S. Piling Cas. (R.D.)                      | 110  | 1983                      |
| Kinchant Dam                         | North Eton          | 62 800   | Earth and Rockfill                           | 920  | 1977/86                   |
| Julius Dam                           | Mount Isa           | 107 500  | Multiple Arch Conc.<br>Buttress              | 1 255  | 1976                      |
| Eden Bann Weir                       | Yaamba              | 35 900   | Mass Conc.                                   | 670  | 1995                      |
| Tinaroo Falls Dam                    | Atherton            | 438 900  | Mass Conc.                                   | 3 500  | 1958                      |
| Tartrus Weir                         | Marlborough         | 12 000   | Mass Conc.                                   | 280  | 1986                      |
| Dumbleton Weir                       | Mackay              | 8 840  | Mass Conc.                                   | 151  | 1982/93/98                |
| Marian Weir                          | Marian              | 3 980  | Mass Conc.                                   | 130  | 1952                      |
| Mirani Weir                          | Mirani              | 4 660  | Mass Conc. (R.D.)                            | 151  | 1987                      |
| Teemurra Dam                         | Mirani              | 147 500  | Conc. Faced Rockfill                         | 1 107  | 1996                      |
| Peter Faust Dam                      | Proserpine          | 491 400  | Earth and Rockfill                           | 4 325  | 1990                      |
| Northern Australia                   | Total               | 14 463 212   |  | 126 230  |                           |

Note: This table shows all of the dams in Northern Australia, by location, storage capacity, construction type, surface area and year of completion of construction.

Source: Sunwater (2008a); SunWater (2008b); Power and Water Corporation (2009); Water Corporation (2008).

**Table 7.2.2 Northern Australia—water usage by agricultural businesses, 2005–06**

| Region                         | Agricultural businesses (number) | Agricultural businesses irrigating (number) | Area of agricultural land (thousand hectares) | Area irrigated (thousand hectares) | Irrigation volume applied (megalitres) | Application rate megalitres per hectare |
|--------------------------------|----------------------------------|---|---|------------------------------------|--|---|
| Northern Australia (WA)        | 271                              | 114   | 35 331  | 10                                 | 104 773                                | 10.5                                    |
| Pilbara Region                 | 66                               | –   | 15 309  | –                                  | –                                      | –                                       |
| Kimberley Region               | 205                              | 114   | 20 022  | 10                                 | 104 773                                | 10.5                                    |
| Northern Australia (NT)        | 614                              | 342   | 43 378  | 5                                  | 2 754                                  | 0.6                                     |
| Darwin-East Arnhem Region      | 381                              | 266   | 2 757   | 4                                  | 1 034                                  | 0.3                                     |
| Katherine-Lower Top End Region | 138                              | 60  | 9 233   | 1                                  | 1 195                                  | 1.2                                     |
| Barkly-Central NT Region       | 95                               | 16  | 31 388  | n.p.                               | 525                                    | –                                       |
| Northern Australia (QLD)       | 8 899                            | 3 281                                       | 75 615  | 212                                | 1 020 852                              | 4.8                                     |
| Mackay Region                  | 2 830                            | 1 177                                       | 9 600   | 86                                 | 166 674                                | 1.9                                     |
| Northern Region                | 1 898                            | 857   | 6 908   | 89                                 | 710 965                                | 8.0                                     |
| Far North Region               | 3 187                            | 1 210                                       | 16 051  | 34                                 | 137 088                                | 4.0                                     |
| North West Region              | 873                              | 35  | 40 677  | 3                                  | 6 125                                  | 2.0                                     |
| Longreach Region               | 111                              | 2   | 2 379   | –                                  | 0                                      | –                                       |
| Northern Australia subtotal    | 9 784                            | 3 737                                       | 154 324                                       | 227                                | 1 128 379                              | 5.0                                     |

Notes: This table shows water usage by type of agricultural business by region in Northern Australia. Many of the estimates for the SLAs within each subregion had a relative standard error of 10 per cent to 50 per cent, and thus should be used with caution. For more detail on these errors, see SLA table. n.p. denotes regions where data was not available for publication—denotes regions where the values were nil or rounded to zero (including null cells).

Source: ABS (2008h).

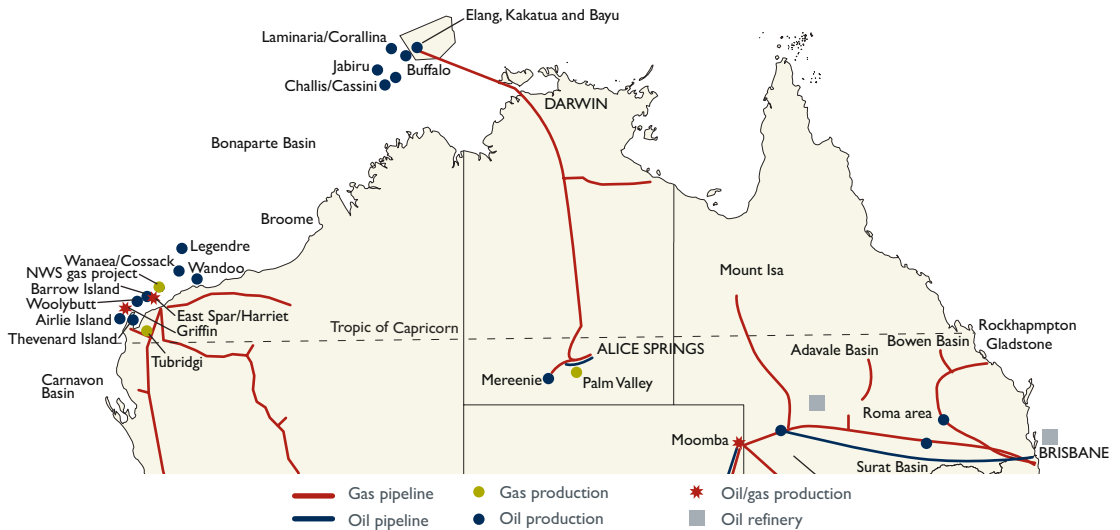
## 7.3 Gas supply

Gas production and transmission is a large and growing industry in Northern Australia providing vital sources of heat and electricity for commodity production and processing in the region, as well as for consumption by the local population. Northern Australia is the largest gas producer in Australia for exports and the domestic market. Map 7.3.1 illustrates the major gas pipelines in this region.

The largest pipelines join gas and oil fields offshore with processing facilities on shore and, further south, with major users such as mines, processors, power plants and communities (see Table 7.3.1). The Darwin-East Arnhem Region receives gas from the Timor Sea rigs via a pipeline joining these fields, with consumers located as far south as Alice Springs in the Barkly-Central NT Region. Another large pipeline system joins the North West shelf gas rigs with on-shore users south of Perth and, via a parallel pipeline, with Kalgoorlie and mines around that region as well as Esperance on the Southern Ocean. In addition to providing heat for mineral processing, these gas pipelines are a source of power for numerous power stations along their way, thus partially ‘substituting’ for an electricity grid in remote localities.

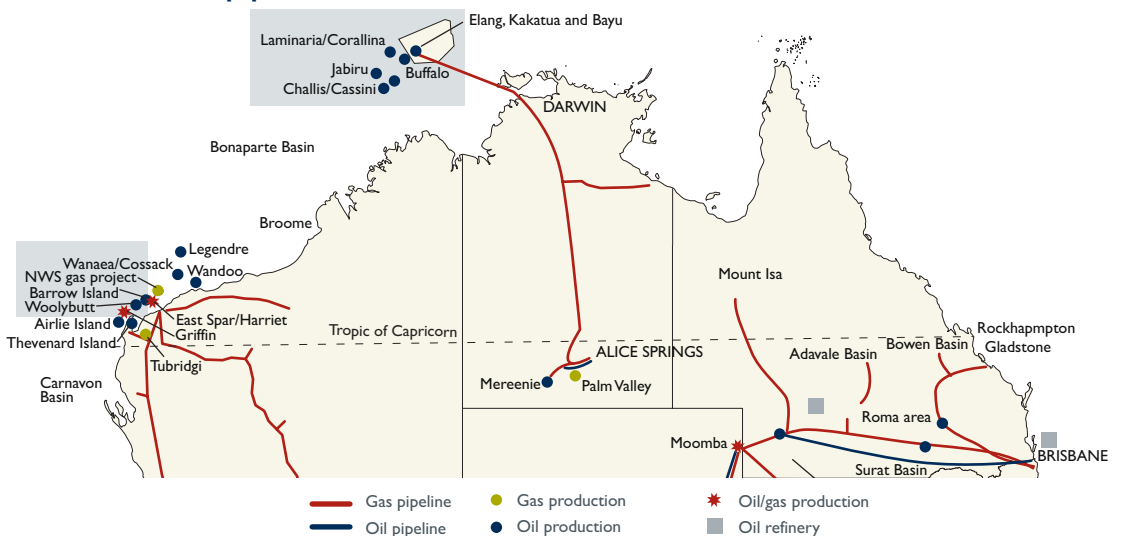
In Queensland’s North West Region, a gas pipeline from Ballera to the Mt Isa area is heading north and south-east from Ballera providing power to the mining industry and local communities on its way.

Map 7.3.1 Northern Australia—gas pipelines, 2009



Source: Geoscience Australia (2008b).

Map 7.3.2 Northern Western Australia and the Northern Territory—gas pipelines, 2009



Source: Geoscience Australia (2008b).

Table 7.3.2 lists proposed natural gas pipelines, which are new projects or additions to the existing capacity, as at June 2007. A new large development (currently on hold) would connect gas deposits developed jointly with Papua New Guinea, and connect the Northern Region of Queensland with markets along the eastern coast of Australia. Another large development (also on hold) would join the Timor Sea gasfields with Moomba in South Australia, and from there, the Queensland and New South Wales gas supply systems.<sup>16</sup>

16. Information on gas consumption is available at the state level only. No sales or consumption of gas could be attributed to a particular region or SLA.

**Table 7.3.1 Main natural gas pipelines in Northern Australia, June 2007**

| Route   | Year commissioned | Length (kilometres) | External diameter (millimetres) | Pipeline operator                               |
|---|-------------------|---------------------|---------------------------------|---|
| <b>Northern Australia (WA)</b>                                |                   |                     |                                 |   |
| North Rankin to Withnell Bay                                  | 1984              | 134                 | 1 016                           | Woodside Energy                                 |
| Dampier to Bunbury (including laterals)                       | 1984              | 1 789               | 660                             | Alinta Asset Management                         |
| Karratha to Cape Lambert                                      | 1984              | 57                  | 273                             | Alinta Asset Management/<br>Robe River Iron Ore |
| Tubridgi Pipeline (Tubridgi to Dampier/<br>Bunbury)           | 1991              | 88                  | 168                             | BHP Billiton                                    |
| Griffin Pipeline (Tubridgi to Dampier/Bunbury)                | 1991              | 88                  | 273                             | BHP Billiton                                    |
| Varanus Island to Dampier/Bunbury                             | 1993              | 100                 | 324                             | Apache Energy                                   |
| Thevenard Island to Tubridgi                                  | 1993              | 44                  | 168                             | WAPET   |
| Griffin to Tubridgi   | 1993              | 70                  | 200                             | BHP Billiton                                    |
| Karratha to Port Hedland                                      | 1995              | 219                 | 457                             | Epic Energy                                     |
| East Spar to Varanus Island                                   | 1996              | 22                  | 356                             | Apache Energy                                   |
| GGT Pipeline to Newman lateral                                | 1996              | 47                  | 219                             | Goldfields Gas Transmission                     |
| Goldfields Gas Pipeline (Yarraloola to<br>Newman/Kalgoorlie)  | 1996              | 1 378               | 400/350                         | Goldfields Gas Transmission                     |
| Pilbara Pipeline System to Wodgina lateral                    | 1996              | 80                  | 457                             | Epic Energy                                     |
| Port Hedland main to Burrup Peninsula                         | 1998              | 24                  | 610                             | Epic Energy                                     |
| Varanus Island to Dampier/Bunbury                             | 1999              | 100                 | 400                             | Apache Energy                                   |
| Midwest pipeline (Dampier/Bunbury main to<br>Windimurra)      | 1999              | 353                 | 203/178                         | Australian Pipeline Trust                       |
| Port Hedland to Telfer gold mine                              | 2004              | 443                 | –                               | Australian Pipeline Trust                       |
| Telfer to Birla Nifty   | 2006              | 47                  | 156                             | Australian Pipeline Trust                       |
| Dampier Bunbury Stage 4 expansion                             | 2006              | 400                 | 750                             | Alinta Asset Management                         |
| <b>Northern Australia (NT)</b>                                |                   |                     |                                 |   |
| Palm Valley to Alice Springs                                  | 1983              | 146                 | 219                             | OEAM  |
| Mereenie to Tylers Pass                                       | 1987              | 116                 | 273                             | NT Gas  |
| Palm Valley to Mataranka/Darwin                               | 1987              | 1 512               | 356/324                         | NT Gas  |
| Daly Waters to McArthur River Mine                            | 1995              | 333                 | 168                             | NT Gas  |
| Bayu-Undan field (Timor Gap) to Darwin                        | 2006              | 92                  | 660                             | ConocoPhillips                                  |
| Timor Sea to Darwin Pipeline (LNG<br>processing)              | 2006              | 483                 | 660                             | ConocoPhillips                                  |
| <b>Northern Australia (QLD)</b>                               |                   |                     |                                 |   |
| Gilmore to Blackall/Barcaldine                                | 1995              | 240                 | 168                             | Australian Gasfields                            |
| Carpentaria Pipeline (Ballera to Mt Isa)                      | 1997              | 841                 | 324                             | Australian Pipeline Trust                       |
| Ballera/Mt Isa main to Cannington                             | 1998              | 100                 | 150                             | Australian Pipeline Trust                       |
| Bunya Vernon Fields (Cooper Basin) to Ballera/<br>Mt Isa Main | 1999              | 130                 | 150/100                         | Santos  |
| North Queensland gas pipeline (Moranbah to<br>Townsville)     | 2005              | 393                 | 273                             | Enertrade                                       |

Note: Northern Australia is based on regions which fall above the Tropic of Capricorn. Where the data did not precisely meet this definition, approximations were used. All pipelines which passed through an area with latitude of less than 24 degrees were included.

Source: ESAA (2008b),

Table 7.3.2 Northern Australia—natural gas pipelines, June 2007

| Route  | Proposed<br>year commissioned | Length<br>(kilometres) | Proponent                        | Capacity<br>(terajoules<br>per day) | Status             |
|--|-------------------------------|------------------------|----------------------------------|-------------------------------------|--------------------|
| <b>Northern Australia (WA)</b>                           |                               |                        |                                  |                                     |                    |
| Dampier Bunbury Stage 5 expansion                        | 2008                          | 1 150                  | DBNGP                            | 110                                 | Under construction |
| Dampier Bunbury Stage 5A expansion—additional looping    | 2008                          | 570                    | DBNGP                            | 80                                  | Under construction |
| Dampier Bunbury Stage 5A(2) expansion—additional looping | 2008                          | 100                    | DBNGP                            | —                                   | Proposed           |
| Great Northern Pipeline                                  | 2010                          | 630                    | ARC Energy                       | 150/300                             | Proposed           |
| Scarborough Gas Field LNG Development                    | —                             | 280                    | BHP Billiton                     | —                                   | Proposed           |
| Dampier-Bunbury Natural Gas Pipeline extension to Albany | —                             | 320                    | —                                | —                                   | Proposed           |
| Gorgon Gas Field Development                             | —                             | —                      | Gorgon Gas Venture               | —                                   | Proposed           |
| Pluto Gas Pipeline (Gorgon to Dampier)                   | —                             | 200                    | Woodside Energy                  | —                                   | Proposed           |
| Angel Gas Pipeline                                       | —                             | 49                     | Woodside Energy                  | —                                   | Proposed           |
| <b>Northern Australia (NT)</b>                           |                               |                        |                                  |                                     |                    |
| Bonaparte Gas Pipeline (Wadeye to Amadeus-Darwin)        | 2009                          | 275                    | Australian Pipeline Trust        | 82                                  | Advanced planning  |
| Darwin to Moomba (linking Bayu-Undan)                    | —                             | 3 500                  | Australian Pipeline Trust / Epic | 100                                 | On hold            |
| PNG-Queensland to Gove Lateral                           | —                             | 3 200                  | Cape York Pipeline Company       | —                                   | On hold            |
| Blacktip-Wadeye Gas Pipeline                             | —                             | 108                    | Eni Australia                    | —                                   | Proposed           |
| <b>Northern Australia (QLD)</b>                          |                               |                        |                                  |                                     |                    |
| Papua New Guinea to Queensland (Brisbane)                | —                             | 3 200                  | Cape York Pipeline Company       | 800                                 | On hold            |
| Townsville to Ballera                                    | —                             | —                      | Cape York Pipeline Company       | 1 200                               | On hold            |

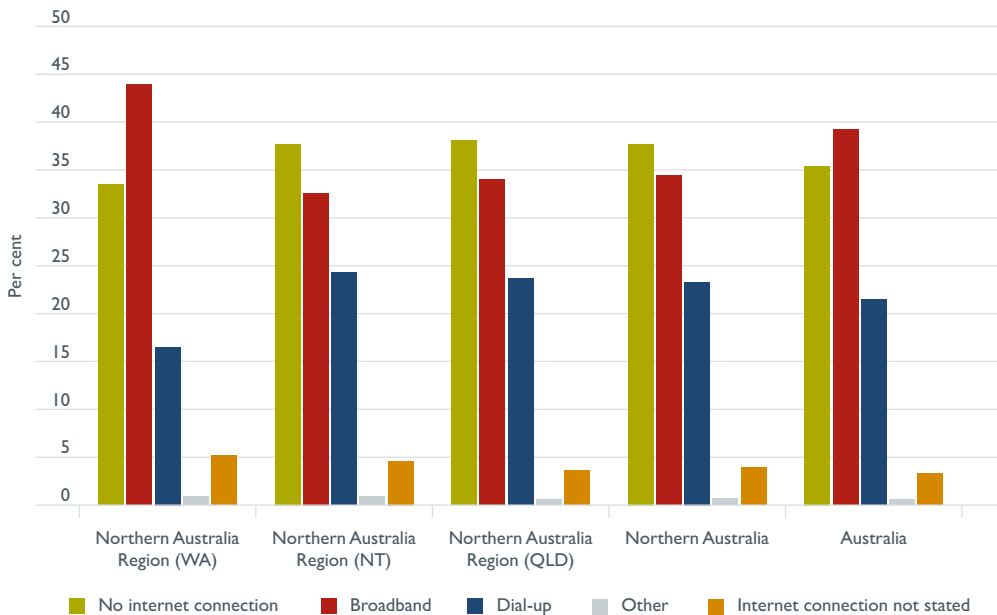
Note: Northern Australia is based on regions which fall above the Tropic of Capricorn. Where the data did not precisely meet this definition, approximations were given. All pipelines which passed through an area with a latitude of less than  $-24$  degrees were included.

Source: ESAA (2008b).

## 7.4 Telecommunications

The availability of the Internet is generally lower in Northern Australia than in the rest of Australia. There was a greater proportion of households with no Internet connection within Northern Australia than in Australia as a whole. In 2006 (see Table 7.4.1), there were also lower numbers of households with broadband<sup>17</sup> within Northern Australia, and slightly higher numbers of households with a dial-up Internet connection (see Figure 7.4.1).

**Figure 7.4.1 Northern Australia—household Internet connection by type, by state (per cent), 2006**



Note: This figure shows the proportion of households which have an Internet connection (by type), by state.  
 Source: ABS (2006b).

At the state level, there were higher proportions of households without an Internet connection within northern Queensland and the Northern Territory. In contrast, there was a lower proportion of people within northern Western Australia without the Internet, as compared with Northern Australia and the rest of Australia. The highest proportion of households with broadband is in Western Australia (43.9 per cent), which is well above the national average (39.2 per cent), while the Northern Territory had the highest proportion of households with a slower dial-up connection (24.3 per cent).

17. The ABS defines ‘broadband’ as ADSL, cable, wireless and satellite connections. ‘Dial-up’ includes analog modems and ISDN connections. ‘Other’ includes Internet access through mobile phones, set-top boxes, games, machines or connections other than dial-up or broadband.

Table 7.4.1 Northern Australia—type of internet connection by household, by region, 2006

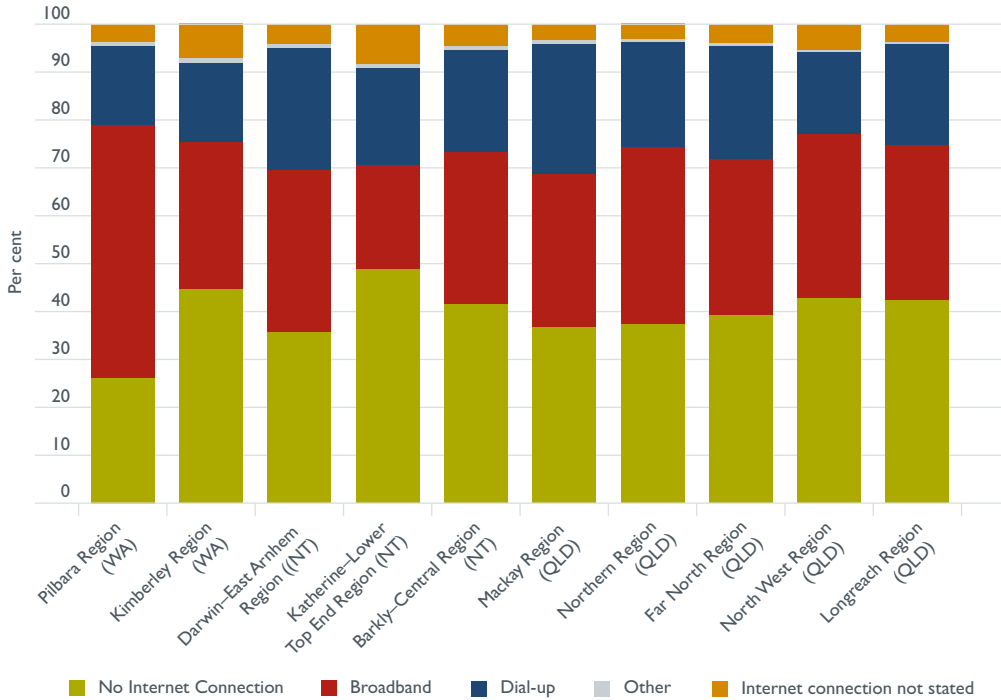
| Region                         | No Internet connection | Broadband | Dial-up   | Other  | Internet connection not stated | No internet connection (per cent) | Broadband (per cent) | Dial-up (per cent) | Other (per cent) | Internet connection not stated (per cent) | Total     |
|--------------------------------|------------------------|-----------|-----------|--------|--------------------------------|-----------------------------------|----------------------|--------------------|------------------|---|-----------|
| Northern Australia (WA)        | 6 629                  | 8 687     | 3 266     | 174    | 1 020                          | 33.5                              | 43.9                 | 16.5               | 0.9              | 5.2                                       | 19 776    |
| Pilbara Region                 | 3 095                  | 6 240     | 1 969     | 97     | 448                            | 26.1                              | 52.7                 | 16.6               | 0.8              | 3.8                                       | 11 849    |
| Exmouth                        | 242                    | 298       | 141       | 10     | 28                             | 33.7                              | 41.4                 | 19.6               | 1.4              | 3.9                                       | 719       |
| Port Hedland                   | 890                    | 1 485     | 471       | 22     | 149                            | 29.5                              | 49.2                 | 15.6               | 0.7              | 4.9                                       | 3 017     |
| Kimberley Region               | 3 534                  | 2 447     | 1 297     | 77     | 572                            | 44.6                              | 30.9                 | 16.4               | 1.0              | 7.2                                       | 7 927     |
| Western Australia state total  | 236 997                | 284 425   | 155 460   | 4 424  | 21 862                         | 33.7                              | 40.4                 | 22.1               | 0.6              | 3.1                                       | 703 168   |
| Northern Australia (NT)        | 20 749                 | 17 906    | 13 338    | 474    | 2 523                          | 37.7                              | 32.6                 | 24.3               | 0.9              | 4.6                                       | 54 990    |
| Darwin-East Arnhem Region      | 14 472                 | 13 722    | 10 304    | 372    | 1 700                          | 35.7                              | 33.8                 | 25.4               | 0.9              | 4.2                                       | 40 570    |
| Darwin                         | 7 665                  | 8 935     | 5 220     | 252    | 1 076                          | 33.1                              | 38.6                 | 22.6               | 1.1              | 4.6                                       | 23 148    |
| Katherine-Lower Top End Region | 1 933                  | 860       | 810       | 28     | 333                            | 48.8                              | 21.7                 | 20.4               | 0.7              | 8.4                                       | 3 964     |
| Katherine                      | 661                    | 584       | 313       | 13     | 234                            | 36.6                              | 32.4                 | 17.3               | 0.7              | 13.0                                      | 1 805     |
| Barkly-Central NT Region       | 4 344                  | 3 324     | 2 224     | 74     | 490                            | 41.5                              | 31.8                 | 21.3               | 0.7              | 4.7                                       | 10 456    |
| Alice Springs                  | 2 336                  | 2 916     | 1 713     | 61     | 320                            | 31.8                              | 39.7                 | 23.3               | 0.8              | 4.4                                       | 7 346     |
| Tennant Creek                  | 408                    | 164       | 148       | 6      | 67                             | 51.5                              | 20.7                 | 18.7               | 0.8              | 8.4                                       | 793       |
| Northern Territory total       | 21 267                 | 18 144    | 13 468    | 492    | 2 554                          | 38.0                              | 32.4                 | 24.1               | 0.9              | 4.6                                       | 55 925    |
| Northern Australia (QLD)       | 83 594                 | 74 517    | 51 965    | 1 376  | 7 985                          | 38.1                              | 34.0                 | 23.7               | 0.6              | 3.6                                       | 219 437   |
| Mackay Region                  | 21 596                 | 18 838    | 16 118    | 395    | 1 988                          | 36.6                              | 32.0                 | 27.3               | 0.7              | 3.4                                       | 58 935    |
| Mackay Town                    | 8 236                  | 8 383     | 5 207     | 144    | 707                            | 36.3                              | 37.0                 | 23.0               | 0.6              | 3.1                                       | 22 677    |
| Northern Region                | 25 587                 | 25 447    | 15 053    | 379    | 2 202                          | 37.3                              | 37.1                 | 21.9               | 0.6              | 3.2                                       | 68 668    |
| Townsville                     | 15 379                 | 18 444    | 9 362     | 252    | 1 385                          | 34.3                              | 41.1                 | 20.9               | 0.6              | 3.1                                       | 44 822    |
| Charters Towers                | 1 377                  | 767       | 471       | 13     | 118                            | 50.1                              | 27.9                 | 17.2               | 0.5              | 4.3                                       | 2 746     |
| Far North Region               | 31 486                 | 26 283    | 18 781    | 529    | 3 206                          | 39.2                              | 32.7                 | 23.4               | 0.7              | 4.0                                       | 80 285    |
| Weipa                          | 239                    | 456       | 142       | 10     | 24                             | 27.4                              | 52.4                 | 16.3               | 1.1              | 2.8                                       | 871       |
| Cairns                         | 13 559                 | 16 722    | 8 660     | 271    | 1 628                          | 33.2                              | 40.9                 | 21.2               | 0.7              | 4.0                                       | 40 840    |
| North West Region              | 4 405                  | 3 550     | 1 756     | 66     | 544                            | 42.7                              | 34.4                 | 17.0               | 0.6              | 5.3                                       | 10 321    |
| Mount Isa                      | 2 199                  | 2 116     | 1 176     | 45     | 310                            | 37.6                              | 36.2                 | 20.1               | 0.8              | 5.3                                       | 5 846     |
| Longreach Region               | 520                    | 399       | 257       | 7      | 45                             | 42.3                              | 32.5                 | 20.9               | 0.6              | 3.7                                       | 1 228     |
| Longreach                      | 483                    | 310       | 213       | 7      | 43                             | 45.7                              | 29.4                 | 20.2               | 0.7              | 4.1                                       | 1 056     |
| Queensland state total         | 475 307                | 557 972   | 307 723   | 7 797  | 42 834                         | 34.2                              | 40.1                 | 22.1               | 0.6              | 3.1                                       | 1 391 633 |
| Northern Australia subtotal    | 110 972                | 101 110   | 68 569    | 2 024  | 11 528                         | 37.7                              | 34.4                 | 23.3               | 0.7              | 3.9                                       | 294 203   |
| Australia total                | 2 531 018              | 2 802 177 | 1 535 028 | 42 727 | 233 146                        | 35.4                              | 39.2                 | 21.5               | 0.6              | 3.3                                       | 7 144 096 |

Note: This table shows the number of households and the percentage of households which have internet connections (by type), by region. For regions SLAs data was aggregated and for major towns in those regions UCL data was used, wherever available.

Source: ABS (2006b).



**Figure 7.4.2 Northern Australia—household Internet connection by type, by region (per cent), 2006**



Note: Note: This figure shows the proportion of households which have an Internet connection (by type), by region.  
 Source: ABS (2006b).

At the regional level there was a large variability in terms of the household access to the Internet (see Figure 7.4.2). The Pilbara Region had the lowest proportion of households with no Internet connection (26.1 per cent), while the Katherine-Lower Top End Region had the highest (48.8 per cent). At the town level, Tennant Creek and Charters Towers also had very high proportions of households without the Internet. The highest proportion of households with a dial-up Internet connection was reported in the Mackay Region (27.3 per cent), while the lowest proportion was in the Kimberley Region (16.4 per cent). The region with the highest proportion of households with broadband was the Pilbara (52.7 per cent), while the region with the lowest proportion was the Katherine-Lower Top End Region (21.7 per cent).

## Data relating to infrastructure available in the online compendium

### Tables

- 7.1 Electricity generation and supply
- Northern Australia—capacity of fossil fuel and renewable electricity power stations (megawatts), by SLA, 2008
  - Northern Australia—fossil fuel power stations by fuel type, technology, and capacity (megawatts), by SLA, 2008.
- 7.2 Major water storage and use
- Northern Western Australia—dam name, nearest town, current storage and data, storage capacity, type of construction, year built, catchment area, surface area at full, wall height, crest length, spillway type, spillway capacity, highest storage reading, lowest storage reading
  - Northern Northern Territory—dam name, nearest town, total storage capacity, construction type, surface area at full level, year completed, height of wall, crest length, catchment area, spillway capacity, and pipeline length
  - Northern Queensland—dam details including name, total storage capacity, construction type, nearest town, full supply level, storage level above original bed, area at full level, year completed, full capacity, current storage and date, current storage per cent full, blue green algae level, 2008
  - Northern Australia—water usage, by SLA, 2005–06.
- 7.4 Telecommunication
- Northern Australia—type of Internet connection, by SLA, 2006.