**Preparation of national and sub-national multi-regional 2022-23 CGE databases for Australia**

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**Contents**

Introduction 3

1. Industry splitsto create a 219 sector national database 4
2. Regional splits 8
3. Modifications to enable representation of GTAP sectors 10
4. How we use the master database 10

References 10

Appendix A SA3 codes and regions 11

Appendix B Maps of VU-TERM master database regions 14

**Figures**

Figure 1 Preparing VU-TERM with a 2022-23 initial year database 3

Figure 2: Australia’s remaining gas reserves, contingent reserves and cumulative production to end of 2021 9

Figure 3 Oil resources 9

**Tables**

Table 1 Tourism industries 7

Table 2 Allocation of air transport sales 7

**Introduction**

Figure 1 provides an overview of the sequence of VU-TERM database preparation tasks. The task starts with the published 2022-23 national input-output table. This is downloadable from <https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-input-output-tables/2022-23#data-downloads>. The code for the core tables is 5209.0.55.001. This is processed to devise a CGE database. Early modifications include diagonalization of the MAKE matrix on a commodity x commodity basis. The pipeline margin is separated from the rail transport sector. ABS provides data on several margins that are neither a commodity nor industry in the published IO tables. The pipeline sector is the only one of these margins processed as a separate new sector.

Product details data containing sales by user are available for over 900 commodities from the above link. The relevant ABS code is 5215.0.55.001.

**Figure 1: Preparing VU-TERM with a 2022-23 initial year database**

Diagonalise MAKE matrix (com x com)

Prepare value-added split   
Separate pipeline margin from rail transport

Process 115 sector IO table into CGE format

Split to 219 sectors

IOPD data ABS; online electricity data;  
Tourism satellite accounts;

Education exports;

NDIS customised split;

Agricultural census data, ABS 7121.0

Aggregate to sectors and regions of interest

2016 census data;  
State level national accounts 2022-23, ABS 5220.0;  
International trade data by port, ABS request, 2022-23

VU-TERM master database 219 x 334

Dynamic components: NFL, capital stocks, baseline shocks\*

Dynamic VU-TERM\*

Industry, household, trade splitting shares

\* Not applicable in comparative static applications

**1. Industry splits to create a 219 sector national database**

After routine processing of the 115 sector the IOPC data provide sales splits for many of the sectors. The IOPC appear to have improved over time to some extent superseding other sources, at the national level, such as agricultural data (catalogue 7121.0).

Other splits involve the use of dummy industries. Dummy industries consist of a bundle of intermediate inputs without primary inputs.

*Input-output product details data*

IOPD data from the ABS were used extensively in splitting the 115 sector database. DAGGHAR provides a default split. A program allocates specific splitting shares based on IOPD data. It is better to treat the IOPD data as shares of the original IO sectors rather than as absolute numbers. That is, an aggregation of split database to the original sectors should be the same as the original database.

*Splits using IOPD data with some supplementary data*

Splits include:

**Other agriculture** split into OtherAgriclt, OthVegetble, Potatoes, NPGrapes, CPGrapes, SPGrapes, TableGrapes, Orchardfruit, BerriesAll, ApplesPears, Stonefruit, Citrusfruit, Olives, Bananas, AlmondMacad, SugarCane, Cotton, HayCerealFod;

**Sheep, grains, beef & dairy cattle** split into Sheep, Wool, BeefCattle, Rice, Wheat, Barley, Oats, OthGrainLegu, DairyCattle;

**Agriculture, forestry & fishing support services** split into AgriSrvces, GinnedCotton;

**Coal** split into CoalThermal, CoalCoking;

**Oil & gas extraction** split into CrudeOil, LNG, Gas, LPG, CoalSeamGas;

**Other metal ores** split into Bauxite, NonFeOres, GoldOres, RareEarths;

**Other mining** split into OthMining, Silica;

**Meat products** split into CattleMeat, OtherMeat;

**Dairy products** split into MilkCream, IceCream, MilkDrinks, Butter, CreamYoghurt, CheeseCrdNEC;

**Milled grain & cereal products** split into FlourCereal, ProcRice;

**Wine, spirits & tobacco** split into NPwine, CPwine, SPwine, SpiritsTob

**Petroleum & coal products** split into Petrol, OthPetrlPrd, AviationFuel, RefinedLPG, Diesel;

**Iron & steel manufacturing** split into IronSteelPrd, Hydrogen;

**Basic non-ferrous metals** split into Alumina, Aluminium, OthNonFeMtl, Gold;

**Electricity generation** split into ElecCoal, ElecGas, ElecOil, ElecHydro, ElecSolar, ElecWind, ElecBioMass;

**Road transport** split into RoadFreight, RoadPassngr;

**Rail transport** split into RailFreight, UrbanRailway, InterUrbRail;

**Food & beverage services** split into Restaurants, PubsClubs;

**Professional, scientific & technical services** split into ArchEngScSvc, LegalSrv, AccountngSrv, PrfSrvNEC

**Public administration & regulatory services** split into FedGovAdmSrv, StaGovAdmSrv, LocGovAdmSrv;

**Public order & safety** split into PoliceCrctnl, OthPublicOrd, Firebrigades;

**Health care services** split into HospitalNurs, GPs, SpecialistSv, PathologySvc, DentalSrv, OpmetryOptic, OtherHealth;

**Primary & secondary education** split into Preschool, PrimSchool, SecdrySchool;

**Technical, vocational and tertiary education** split into TechVocEduc, TertiaryEdu;

**Insurance & superannuation funds** split into LifeInsur, HealthIns, FireOthIns, HouseInsur, OtherInsur, EmployerIns, Superannuatn;

**Gambling** split into Casinos, Lottery, TAB, GamblingNEC;

**Residential care & social assistance services** split into RC\_Aged, RC\_Disable, RC\_Other, ChildCare, OSA, NDIS;

**Personal Services** split into HrDresBeauty, OthPrsSrv, OthService, DomHHService

**Other Services** split into ReligiousOrg, IntrstGrpNEC;  
**Air & space transport** split into AirTransport, AirInt;  
**Dummy tourism** sectors – Tourism exports, Holidays, Foreign holiday  
**Dummy education exports** sector

*Using DAGGHAR*

In the database procedure, a pre-split program uses supply data from IOPD 5215.0.55.001 to provide initial splits.

The use of DAGGHAR requires at least some post-split modifications. The most obvious is to aggregate the split MAKE matrix across affected sectors, to restore diagonality. If margins are part of the split, which is so for road transport, rail transport and insurance, margins activity needs to be assigned to margins sector. In the case of land transport, the margins sectors are “RoadFreight” and “RailFreight”.

In addition to splitting supply, DAGGHAR provides default sales splits that require modification. Matching IOUG sales to users are part of the post-DAGGHAR data modification programs.

Another programmed sales modification concerns “HayCerealFod”: it is sold to the livestock sectors in other agriculture, not crops. Other modifications include ensuring that “Cotton” is sold to “GinnedCotton”, winegrapes to wine, “GoldOres” to “Gold”, “Bauxite” to “Alumina”, “CoalCoking” to “OthNonFeMtl” (not “Aluminium”), “BeefCattle” to “CattleMeat”, other livestock to “OtherMeat”, “Rice’ to “ProcRice, other cereals to “FlourCereal” and the appropriate fuel type to each form of electricity generation. “AviationFuel” concerns fuel sold to “AirTransport”.

The split of Rail transport requires coding to ensure that households dominate use of “UrbanRailway” and “InterUrbRail”, with virtually no direct use of “RailFreight”. The need for this modification became obvious when the regional master database was tested. It is noted here as an example: it is virtually impossible to detect all potential database errors until a model has undergone some sort of testing. Programmed database modifications ensure that errors can be rectified. This error showed that sales to final users in the initial post-split program were not distributed as for intermediate users.

*Dummy sectors*

Dummy industries are those reflecting a sales pattern for a particular activity, without primary factor inputs. These include NDIS, tourism and education export sectors. In preparing these dummy industries, some sales to households, government and direct exports are moved to intermediate inputs into the dummy industries. That is, sales to final users are transferred from sectors such as “Hotels” and “Restaurants” to “Holiday”.

To construct tourism dummy sectors, we extract data from *52490DO001\_202223 Australian National Accounts: Tourism Satellite Account, 2022-23*. The “ExpTourism” dummy industry reflects the bundle of expenditures on travel, restaurants, accommodation and sight-seeing undertaken by foreign visitors to Australia. The “Holiday” industry captures the tourism activities of Australians within Australia, while “FgnHoliday” captures corresponding overseas activities by Australians. We split tourism sectors from the core database based on the methodology of Dixon and Rimmer (2003) in the USAGE model, summarised in table 6.1 of Wittwer (2017). At this stage, sales to households and exports are split between tourism and non-tourism activities.

Tourism expenditures are transferred from final use sales (i.e., to households and exports) to intermediates in the new tourism-specific sectors. According to ABS 5216.0, foreign tourism includes business activity. The modified CGE database gets tourism totals close to tourism satellite accounts for “Holiday” and “ExpTourism” without using existing intermediate inputs.

This is not the case for "FgnHoliday". The database includes amendments to sell business tourism to "FgnHoliday". The sector uses a substantial share of intermediate imports (the remainder being domestic sales of “AirInt”) and is treated as an export in final demands. The database amendments were more difficult than in the USAGE case (Wittwer 2017), because there are not substantial non-competing imports in the ABS IO table.

Table 2 summarises the inputs into each of the tourism industries. Note that Australian consumers can substitute between “Holiday” and “FgnHoliday”. The value of imported “Holiday” should be equal to the value of output of “FgnHoliday”. The latter is a separate sector because it includes some inputs that are domestically supplied.

The NDIS (National Disability Insurance Scheme) sectors are based on the original residential care & social assistance services sector. There are two types of NDIS services, namely residential and other social assistance (OSA). Inputs into NDIS include “GPs”, Specialist (medical) services, “RC\_disable” and “OSA\_disable”. NDIS consists only of these services as intermediate inputs with negligible primary factor inputs. Previous write-ups of the database include an appendix prepared by Janine Dixon the preparation of sectors related to NDIS activities. See https://www.copsmodels.com/archivep.htm TPGW0196.

**Table 1: Tourism industries**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | *Holiday (1)* | *Foreign  Holidays (2)* | *Exports of  Tourism (3)* |
| 1 | International airfares: Aust sourced |  | C | F |
| 2 | International airfares: imported |  | D | G |
| 3 | Domestic airfares | A |  | H |
| 4 | Other purchases within Aust | B |  | I |
| 5 | Other purchases in other countries |  | E |  |
| 6 | *Total industry output* | *h*=A+B | *fh*=C+D+E | *xt*=F+G+H+I |
| 7 | Tourism expenditure of Aust households | CES[*h+fh*] | |  |
| 8 | Tourism expenditure in Aust by non-residents |  |  | =*xt*-G |

One important modification is that exports of “Air Transport” are moved entirely to “AirInt”, where they are inputs to “FgnHoliday” and “ExpTourism”. The sector has zero usage as a margin (table 2): in this respect, the treatment of the sector differs from Dixon and Rimmer (2003).

**Table 2: Allocation of air transport sales** ($m)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *AirTrans* |  | *AirInt* |  |
|  | Domestic | Imported | Domestic | imported |
| ***Inputs to users*** |  |  |  |  |
| Foreign holidays | 0 | 0 | 8119 | 21389 |
| Domestic holidays | 7420 | 0 | 0 | 21 |
| Exports of tourism | 0 | 0 | 7400 | 0 |
| Exports of education | 14 | 0 | 0 | 0 |
| Other | 5517 | 0 | 0 | 419 |
| Total | 12951 | 0 | 15519 | 21819 |
| ***Margins usage*** | 396 | 780 | 0 | 0 |

*Education exports*

Exports of education are split into a separate sector “ExpEdu”. This sector takes account of education export fees plus the living expenses of overseas students. Part of household demands in the starting CGE database are moved to intermediate inputs into “ExpEdu”, reflecting living expenses of students. There were 975,229 international enrolments in 2023, equal to about 3.6% of the national population (https://www.education.gov.au/international-education-data-and-research/international-student-monthly-summary-and-data-tables). The input of “AirInt” to “ExpEdu” reflects a higher expenditure share than applies to domestic households.

Exports related to tertiary education are transferred from the export column to the intermediate inputs column of “ExpEdu”.

*Split of electricity generation sectors*

The published ABS IO table follows the international convention: electricity transmission & distribution is partly a margins commodity, with remaining sales being mostly to electricity generators, own-inputs and non-housing construction.

The national split of electricity is based on AEMO data (<https://aemo.com.au/>). Around 2022-23, approximately 30% of National Electricity Market (NEM) generated electricity was from renewables. This is a lower share than is usually quoted, which exceeds 40%. This reflects the share of renewables that is not used. With increased storage, the effective generated share of renewables will rise for a given share of generation.

*Hydrogen*

Energy transition scenarios often require “Hydrogen” as a sector. There is an arbitrary split of Iron & steel products to provide a small hydrogen sector.

**2. Regional splits**

Horridge (2012) describes how the TERM database inputs are processed to produce a multi-regional CGE database. This section outlines regional data sources. Given concerns about atypical economic activities in services due to COVID, 2021 census data have not been used to estimate regional activity shares. Instead, the 2022-23 database uses 2016 census data. Activity shares at the SA3 level are based on 2016 census data. State level ANSZIC level one value-added estimates and state level agricultural output data for 2022-23 have been used to scale these shares.

Populations at the SA3 level have been collated, with population shares being compared with economic activity shares. Unsurprisingly, mining region population shares are much smaller than economic activity shares. Note the comment that follows on fly-in, fly-out workers.

Electricity generation data are compiled from an internet search for all power stations in Australia. These data include latitude and longitude coordinates. From these coordinates, a program assigns each station to an SA2 region. Depiction of electricity within the regional database is an example for which default activities estimated from aging sources could be amended for specific applications such as regional energy transition scenarios. This assumes that more recent or more detailed data become available.

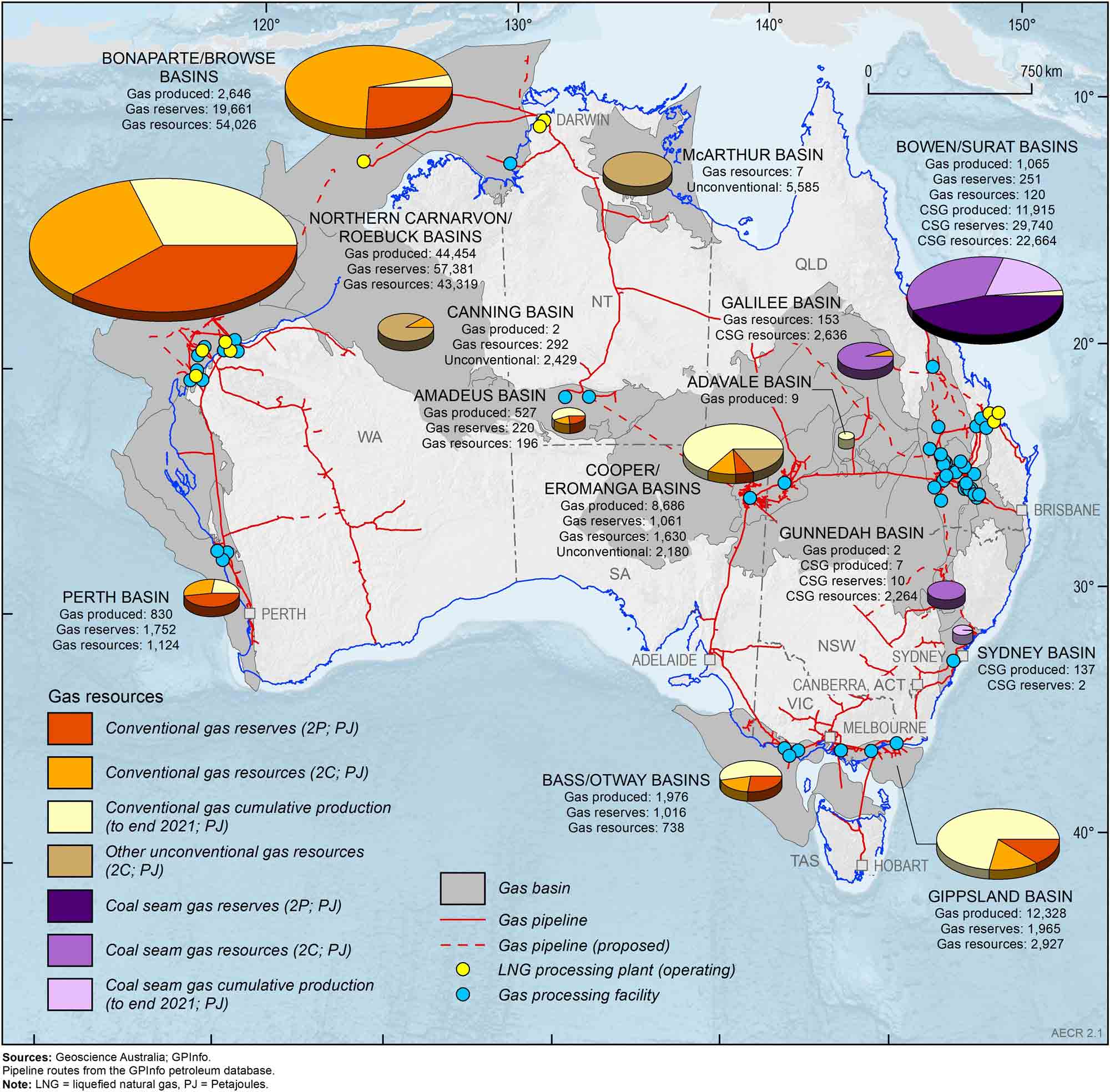
Tourism activity shares were mapped from TRA’s National Visitor Survey.

*Estimating regional activity levels for which employment data are of limited use*

By international convention, oil and gas is reported as a single sector in published input-output tables. In cases in which oil and gas are produced from the same well, this makes sense. However, gas can also be extracted from gas wells, shale gas wells and coal bed wells. Geoscience Australia provides some information on the location of energy resources. Figure 2 shows gas resources in Australia. Geoscience Australia provides helpful information on the regional split between oil, LNG and gas. In addition, they provide some information for the regional split of the pipeline sector.

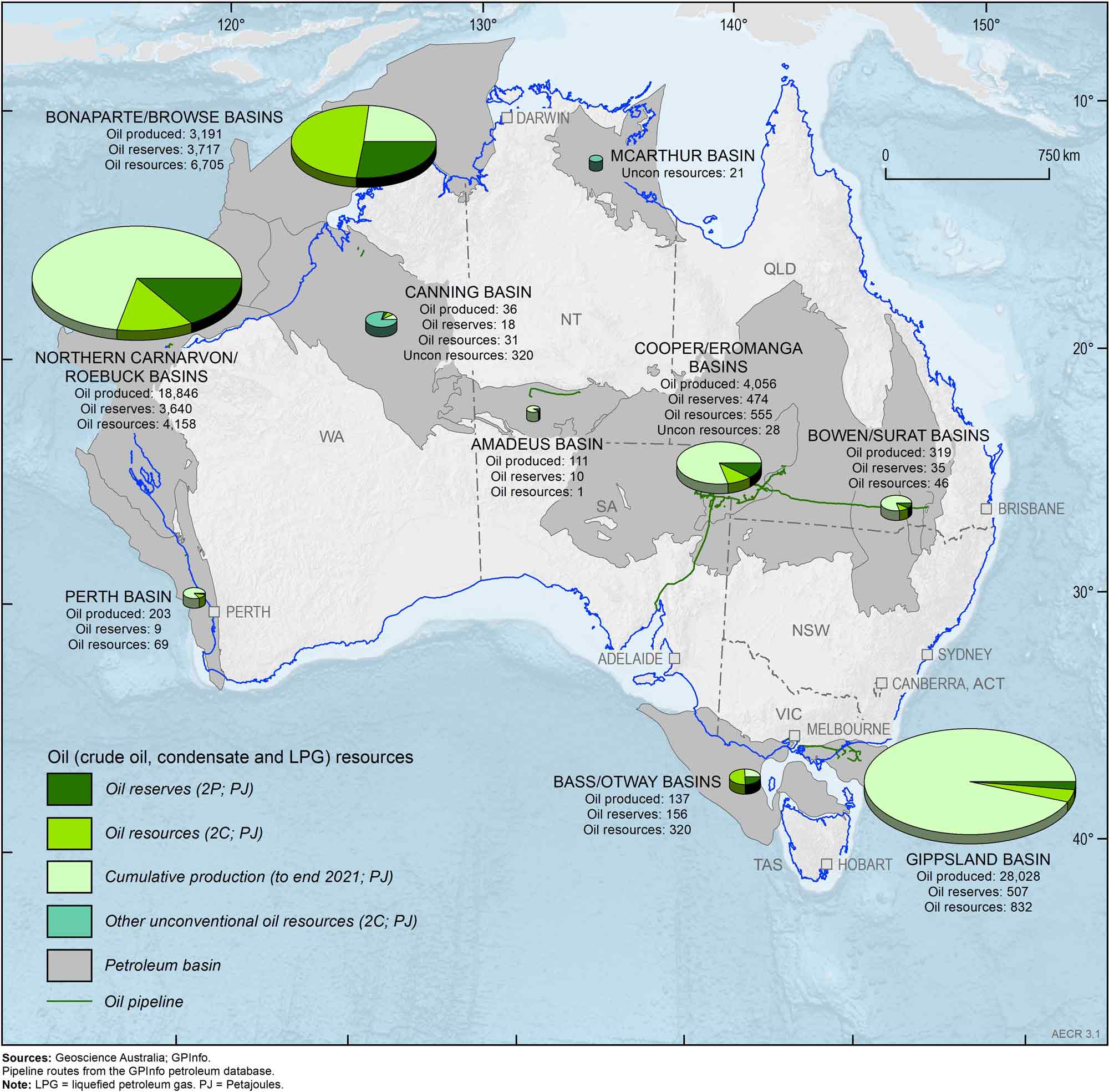
The workforce of mining activities consists of a combination of workers who live mainly in the region of the mine and fly-in, fly-out workers. The convention within TERM is to ascribe some mining activity to where fly-in, fly-out workers live rather than where they work. For example, significant iron ore activity is attributed to regions of Perth, which is many of the workers were on census night. This is because miners spend a substantial proportion of earnings within Perth, which impacts on demand for goods, services and housing within Perth.

**Figure 2: Australia’s remaining gas reserves, contingent reserves and cumulative production to end of 2021 (petajoules)**



*Source:* Geoscience Australia *https://www.ga.gov.au/digital-publication/aecr2023/gas#gallery-1*

**Figure 3: Oil resources**



Source: *https://www.ga.gov.au/digital-publication/aecr2023/oil#gallery-1*

Figure 3 shows the location of oil resources.

Bauxite is split from other non-ferrous ores and alumina and aluminium are split from non-ferrous metals to depict the energy intensity of aluminium production in VURM. Given the growing prominence of transition scenarios in CGE modelling, rare earths have been separated from other Metal ores and silica from other mining in the 2022-23 CGE database. The following are based on an internet search: 97% of national production of “RareEarths” is in GoldFieldsWA (Mount Weld), with the remainder in LimestnCstSA (Koppamurra mine, operation from around 2026), DubboNSW and GascoyneWA.

80% of “Silica” production is attributed to InnsCasCsQld (the Mourilyan Silican Sand Project), 19.5% to FarNorthQld (Cape Flattery) and the remainder to Onkaparinga (Mount Compass SA) and EyrePeninSA (Whyalla).

**3. Modifications to enable representation of GTAP sectors**

The 2022-23 has been prepared to enable a simple aggregation to align with GTAP sectors. This means that Wool is now a sector separate from Sheep. Processed rice is separate from other Milled grain & cereal products. Cattle meat is separate from Other meat.

**4. How we use the master database**

A master database is designed to be aggregated to preserve sectors and regions of specific interest in a study while aggregating elsewhere. To put this in context, the master database of VU-TERM is 3.4 gigabytes in size. An aggregation of 22 sectors and 2 regions is less than 0.4 megabytes. This aggregation in a 20 year dynamic simulation solves in less than a minute with recent GEMPACK software.

The Horridge TERM data generation programs are freely downloadable from <https://www.copsmodels.com/archivep.htm> TPMH0197. The RASLIN program in this archive is not usable on larger databases. In practice, we create the master database and attempt to balance it in its full dimensions. But all our modelling is undertaken with aggregations. It has become routine to use TERMSCAL (TPMH0182 at the above link) to balanced aggregations. We prefer to keep a minimum of around 15 sectors to maintain compositional differences between sectors. Some applications require more regions and sectors. Advances in GEMPACK enable bigger models to run without solution times becoming excessively long. The aggregation programs used at CoPS automate much of the aggregation procedure. The use of a given aggregation for more than one project tends to be the exception rather than the rule.

**References**

Dixon P, Rimmer M (2003) Regional database for USAGE. Centre of Policy Studies Mimeo. http://www.copsmodels.com/archivep.htm TPGW0157. Accessed 15 July 2016

Horridge M (2012), “The TERM Model and Its Database”. In: Wittwer G (ed) *Economic Modeling of Water: The Australian CGE Experience*. Springer, Dordrecht, pp 13-36

Wittwer, G. (2017), “Tourism and Transport in a CGE Model and an Illustrative Application”, in Wittwer, G. (ed.), *Multi-Regional Dynamic General Equilibrium Modeling of the U.S. Economy, USAGE-TERM Development and Applications*, pp. 99-112.

Tourism Research Australia:

*https://www.tra.gov.au/Research/International-visitors-to-Australia/international-tourism-statistics*

*https://www.tra.gov.au/Research/View-all-publications/All-Publications/National-Visitor-Survey-results/national-visitor-survey-results*

**Appendix B: SA3 codes and regions** (1: NSW, part Vic)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x10102 | Queanbeyan | Queanbeyan | x11801 | ESubNorth | Eastern Suburbs - North |
| x10103 | SnowyMnts | Snowy Mountains | x11802 | ESubSouth | Eastern Suburbs - South |
| x10104 | SouthCoast | South Coast | x11901 | Bankstown | Bankstown |
| x10105 | GoulburnNSW | Goulburn | x11902 | Canterbury | Canterbury |
| x10106 | YassYoungNSW | Yass - Young | x11903 | Hurstville | Hurstville |
| x10201 | Gosford | Gosford | x11904 | KogrhRckdale | Kogarah - Rockdale |
| x10202 | Wyong | Wyong | x12001 | CanadaBay | Canada Bay |
| x10301 | Bathurst | Bathurst | x12002 | Leichhardt | Leichhardt |
| x10302 | LachlanVlley | Lachlan Valley | x12003 | StrfdBwdAshf | Strathfield - Burwood - Ashfield |
| x10303 | LithgwMudgee | Lithgow - Mudgee | x12101 | ChtswdLaneCv | Chatswood - Lane Cove |
| x10304 | Orange | Orange | x12102 | Hornsby | Hornsby |
| x10401 | ClarenceVlly | Clarence Valley | x12103 | Kuringgai | Ku-ring-gai |
| x10402 | CoffsHrbrNSW | Coffs Harbour | x12104 | NthSydnyMsmn | North Sydney - Mosman |
| x10501 | BrkCbrCnbNSW | Bourke - Cobar - Coonamble | x12201 | ManlyNSW | Manly |
| x10502 | BrokenHilNSW | Broken Hill and Far West | x12202 | Pittwater | Pittwater |
| x10503 | DubboNSW | Dubbo | x12203 | Warringah | Warringah |
| x10601 | LwrHunterNSW | Lower Hunter | x12301 | Camden | Camden |
| x10602 | MaitlandNSW | Maitland | x12302 | CampbltwnNSW | Campbelltown (NSW) |
| x10603 | PtStephnsNSW | Port Stephens | x12303 | Wollondilly | Wollondilly |
| x10604 | UprHunterNSW | Upper Hunter | x12401 | BlueMntains | Blue Mountains |
| x10701 | DaptoPtKmbla | Dapto - Port Kembla | x12403 | Penrith | Penrith |
| x10703 | KiamaShlHNSW | Kiama - Shellharbour | x12404 | RichWindsNSW | Richmond - Windsor |
| x10704 | Wollongong | Wollongong | x12405 | StMarysNSW | St Marys |
| x10801 | GrtLakesNSW | Great Lakes | x12501 | Auburn | Auburn |
| x10802 | KmpsyNmbcNSW | Kempsey - Nambucca | x12502 | Carlingford | Carlingford |
| x10803 | LordHoweIs | Lord Howe Island | x12503 | MrylndGldfrd | Merrylands - Guildford |
| x10804 | PtMcqurieNSW | Port Macquarie | x12504 | Parramatta | Parramatta |
| x10805 | TreeGlstrNSW | Taree - Gloucester | x12601 | PennantEppng | Pennant Hills - Epping |
| x10901 | AlburyNSW | Albury | x12602 | RydeHntrsHll | Ryde - Hunters Hill |
| x10902 | LwrMurrayNSW | Lower Murray | x12701 | BringllyGrnV | Bringelly - Green Valley |
| x10903 | UprMurrayNSW | Upper Murray exc. Albury | x12702 | Fairfield | Fairfield |
| x11001 | ArmidaleNSW | Armidale | x12703 | Liverpool | Liverpool |
| x11002 | InvrlTntrNSW | Inverell - Tenterfield | x12801 | CrnllaMirCar | Cronulla - Miranda - Caringbah |
| x11003 | MreeNaribNSW | Moree - Narrabri | x12802 | SuthMenHeath | Sutherland - Menai - Heathcote |
| x11004 | TamwrthGnNSW | Tamworth - Gunnedah | x20101 | BallaratVic | Ballarat |
| x11101 | LakeMacqENSW | Lake Macquarie - East | x20102 | CresDylBlBic | Creswick - Daylesford - Ballan |
| x11102 | LakeMacqWNSW | Lake Macquarie - West | x20103 | MaryPyrVic | Maryborough - Pyrenees |
| x11103 | NewcastleNSW | Newcastle | x20201 | BendigoVic | Bendigo |
| x11201 | RichValCsNSW | Richmond Valley - Coastal | x20202 | HthClmKynVic | Heathcote - Castlemaine - Kyneton |
| x11202 | RichValHnNSW | Richmond Valley - Hinterland | x20203 | LoddonVic | Loddon - Elmore |
| x11203 | TweedValNSW | Tweed Valley | x20301 | BarwonWstVic | Barwon - West |
| x11301 | GrffthMrmNSW | Griffith - Murrumbidgee (West) | x20302 | GeelongVic | Geelong |
| x11302 | TumutTumbNSW | Tumut - Tumbarumba | x20303 | SurfCstBPVic | Surf Coast - Bellarine Peninsula |
| x11303 | WaggaNSW | Wagga Wagga | x20401 | UpGolbValVic | Upper Goulburn Valley |
| x11401 | Shoalhaven | Shoalhaven | x20402 | WangarattVic | Wangaratta - Benalla |
| x11402 | SthHighldNSW | Southern Highlands | x20403 | WodongaVic | Wodonga - Alpine |
| x11501 | BaulkhamHlls | Baulkham Hills | x20501 | BawBawVic | Baw Baw |
| x11502 | DuralWiseNSW | Dural - Wisemans Ferry | x20502 | GippslndEVic | Gippsland - East |
| x11503 | Hawkesbury | Hawkesbury | x20503 | GippslndSWVi | Gippsland - South West |
| x11504 | RouseMcGrath | Rouse Hill - McGraths Hill | x20504 | LatrobeVlVic | Latrobe Valley |
| x11601 | BlacktownNSW | Blacktown | x20505 | WellngtonVic | Wellington |
| x11602 | BlacktownNth | Blacktown - North | x20601 | BrunswickVic | Brunswick - Coburg |
| x11603 | MountDruitt | Mount Druitt | x20602 | DarebinSVic | Darebin - South |
| x11701 | Botany | Botany | x20603 | EssendonVic | Essendon |
| x11702 | MarrckvSydPe | Marrickville - Sydenham - Petersham | x20604 | MelbCityVic | Melbourne City |
| x11703 | SydneyInnerC | Sydney Inner City | x20605 | PortPhlipVic | Port Phillip |

**Appendix B** cont.**: SA3 codes and regions** (2: Part Vic, part Qld)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x20606 | StonngtonVic | Stonnington - West | x30306 | SunnybankQld | Sunnybank |
| x20607 | YarraVic | Yarra | x30401 | CentenaryQld | Centenary |
| x20701 | BoroondarVic | Boroondara | x30402 | KenBrookMogg | Kenmore - Brookfield - Moggill |
| x20702 | MannghamVic | Manningham - West | x30403 | SherIndoorpy | Sherwood - Indooroopilly |
| x20703 | WhitehrsWVic | Whitehorse - West | x30404 | TheGapEnogra | The Gap - Enoggera |
| x20801 | BaysidMlbVic | Bayside | x30501 | BrisbaneInnr | Brisbane Inner |
| x20802 | GlenEiraVic | Glen Eira | x30502 | BrisbaneInnE | Brisbane Inner - East |
| x20803 | KingstonVic | Kingston | x30503 | BrisbaneInnN | Brisbane Inner - North |
| x20804 | StonngtnEVic | Stonnington - East | x30504 | BrisbaneInnW | Brisbane Inner - West |
| x20901 | BanyuleVic | Banyule | x30601 | CairnsNthQld | Cairns - North |
| x20902 | DarebinNVic | Darebin - North | x30602 | CairnsSthQld | Cairns - South |
| x20903 | NllmbkKLVic | Nillumbik - Kinglake | x30603 | InnsCasCsQld | Innisfail - Cassowary Coast |
| x20904 | WhttleseaVic | Whittlesea - Wallan | x30604 | PtDougDaintr | Port Douglas - Daintree |
| x21001 | KeilorVic | Keilor | x30605 | TablndEQld | Tablelands (East) - Kuranda |
| x21002 | MacedonVic | Macedon Ranges | x30701 | DarlDMrnoQld | Darling Downs (West) - Maranoa |
| x21003 | MorelandNVic | Moreland - North | x30702 | DarlDwnEQld | Darling Downs - East |
| x21004 | SunburyVic | Sunbury | x30703 | GranitBltQld | Granite Belt |
| x21005 | TullaBrdMVic | Tullamarine - Broadmeadows | x30801 | CentHlndQld | Central Highlands (Qld) |
| x21101 | KnoxVic | Knox | x30803 | RockhmptnQld | Rockhampton |
| x21102 | MannghamEVic | Manningham - East | x30804 | BiloelaQld | Biloela |
| x21103 | MaroondahVic | Maroondah | x30805 | GladstoneQld | Gladstone |
| x21104 | WhitehrsEVic | Whitehorse - East | x30901 | BroadbchBurl | Broadbeach - Burleigh |
| x21105 | YarraRngVic | Yarra Ranges | x30902 | Coolangatta | Coolangatta |
| x21201 | CardiniaVic | Cardinia | x30903 | GoldCstNQld | Gold Coast - North |
| x21202 | CaseyNthVic | Casey - North | x30904 | GldCstHntQld | Gold Coast Hinterland |
| x21203 | CaseySthVic | Casey - South | x30905 | MudgrabaTall | Mudgeeraba - Tallebudgera |
| x21204 | DandenongVic | Dandenong | x30906 | NerangQld | Nerang |
| x21205 | MonashVic | Monash | x30907 | OrmeauOxnfrd | Ormeau - Oxenford |
| x21601 | BrimbankVic | Brimbank | x30908 | RobinaQld | Robina |
| x21602 | HobsonBayVic | Hobsons Bay | x30909 | SouthportQld | Southport |
| x21603 | Maribyrnong | Maribyrnong | x30910 | SurfersPrQld | Surfers Paradise |
| x21604 | MeltonBacVic | Melton - Bacchus Marsh | x31001 | ForestLkOxly | Forest Lake - Oxley |
| x21605 | WyndhamVic | Wyndham | x31002 | IpswchHintld | Ipswich Hinterland |
| x21401 | FrankstonVic | Frankston | x31003 | IpswichInner | Ipswich Inner |
| x21402 | MornngPenVic | Mornington Peninsula | x31004 | SprngfldRdbk | Springfield - Redbank |
| x21501 | GrampiansVic | Grampians | x31101 | Beaudesert | Beaudesert |
| x21502 | MilduraVic | Mildura | x31102 | BeenleighQld | Beenleigh |
| x21503 | MurRivSwnHil | Murray River - Swan Hill | x31103 | BrownsPlains | Browns Plains |
| x21601 | CampaspeVic | Campaspe | x31104 | Jimboomba | Jimboomba |
| x21602 | MoiraVic | Moira | x31105 | LgnleaCarbrk | Loganlea - Carbrook |
| x21603 | SheppartnVic | Shepparton | x31106 | SprngwdKgstn | Springwood - Kingston |
| x21701 | GlenSGrmpVic | Glenelg - Southern Grampians | x31201 | BowenBasQld | Bowen Basin - North |
| x21703 | ColacCorVic | Colac - Corangamite | x31202 | MackayQld | Mackay |
| x21704 | WarrnmblVic | Warrnambool - Otway Ranges | x31203 | WhitsundyQld | Whitsunday |
| x30101 | CapalabaQld | Capalaba | x31301 | BribieBchmre | Bribie - Beachmere |
| x30102 | ClevelndStrd | Cleveland - Stradbroke | x31302 | CaboolturQld | Caboolture |
| x30103 | WynnumManly | Wynnum - Manly | x31303 | CabltureHint | Caboolture Hinterland |
| x30201 | BaldHlEvPark | Bald Hills - Everton Park | x31304 | NarangbaBrp | Narangba - Burpengary |
| x30202 | ChermsideQld | Chermside | x31305 | RedcliffeQld | Redcliffe |
| x30203 | NundahQld | Nundah | x31401 | HillsMBSQld | Hills District |
| x30204 | SandgateQld | Sandgate | x31402 | NthLakeQld | North Lakes |
| x30301 | CarindaleQld | Carindale | x31403 | StrthpineQld | Strathpine |
| x30302 | HollandPkYrg | Holland Park - Yeronga | x31501 | FarNorthQld | Far North |
| x30303 | MtGravattQld | Mt Gravatt | x31502 | OutbackNQld | Outback - North |
| x30304 | NathanQld | Nathan | x31503 | OutbackSQld | Outback - South |
| x30305 | RockleaAcQld | Rocklea - Acacia Ridge | x31601 | BuderimQld | Buderim |

**Appendix B** cont.**: SA3 codes and regions** (3: Part Qld, SA, WA, TAS, NT, ACT)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x31602 | CaloundraQld | Caloundra | x50603 | | Canning | | | Canning |
| x31603 | MaroochyQld | Maroochy | x50604 | | Gosnells | | | Gosnells |
| x31605 | NoosaQld | Noosa | x50605 | | KalamundaWA | | | Kalamunda |
| x31606 | SunCstHntQld | Sunshine Coast Hinterland | x50606 | | SerpentinJa | | | Serpentine - Jarrahdale |
| x31607 | NambourQld | Nambour | x50607 | | SouthPerth | | | South Perth |
| x31608 | NoosaHntQld | Noosa Hinterland | x50701 | | CockburnWA | | | Cockburn |
| x31701 | ToowoombaQld | Toowoomba | x50702 | | FremantleWA | | | Fremantle |
| x31801 | ChrTowAyrQld | Charters Towers - Ayr - Ingham | x50703 | | KwinanaWA | | | Kwinana |
| x31802 | TownsvillQld | Townsville | x50704 | | MelvilleWA | | | Melville |
| x31901 | BundabergQld | Bundaberg | x50705 | | RockinghamWA | | | Rockingham |
| x31902 | BurnettQld | Burnett | x50901 | | AlbanyWA | | | Albany |
| x31903 | GympiCoolQld | Gympie - Cooloola | x50902 | | WheatBltNWA | | | Wheat Belt - North |
| x31904 | HerveyBayQld | Hervey Bay | x50903 | | WheatBltSWA | | | Wheat Belt - South |
| x31905 | MarybrghQld | Maryborough | x51001 | | KimberleyWA | | | Kimberley |
| x40101 | AdelaideSA | Adelaide City | x51002 | | EastPilbara | | | East Pilbara |
| x40102 | AdelaideHill | Adelaide Hills | x51003 | | PilbaraWA | | | Pilbara |
| x40103 | BurnsideSA | Burnside | x51101 | | EsperanceWA | | | Esperance |
| x40104 | CampblltwnSA | Campbelltown (SA) | x51102 | | GascoyneWA | | | Gascoyne |
| x40105 | NwdPayneham | Norwood - Payneham - St Peters | x51103 | | GoldfieldsWA | | | Goldfields |
| x40106 | PrspctWklvSA | Prospect - Walkerville | x51104 | | MidWestWA | | | Mid West |
| x40107 | UnleySA | Unley | x60101 | | Brighton | | | Brighton |
| x40201 | GawlerSA | Gawler - Two Wells | x60102 | | HobartNEast | | | Hobart - North East |
| x40202 | PlayfordSA | Playford | x60103 | | HobartNWest | | | Hobart - North West |
| x40203 | PtAdelaideE | Port Adelaide - East | x60104 | | HobartSthWst | | | Hobart - South and West |
| x40204 | SalisburySA | Salisbury | x60105 | | HobartInner | | | Hobart Inner |
| x40205 | TeaTreeGlySA | Tea Tree Gully | x60106 | | SorellDodges | | | Sorell - Dodges Ferry |
| x40301 | HoldfastBay | Holdfast Bay | x60201 | | Launceston | | | Launceston |
| x40302 | MarionSA | Marion | x60202 | | MeanderTamar | | | Meander Valley - West Tamar |
| x40303 | MitchamSA | Mitcham | x60203 | | NorthEastTas | | | North East |
| x40304 | Onkaparinga | Onkaparinga | x60301 | | CentHighTas | | | Central Highlands (Tas.) |
| x40401 | CharlesSrtSA | Charles Sturt | x60302 | | HuonBruny | | | Huon - Bruny Island |
| x40402 | PtAdelaideW | Port Adelaide - West | x60303 | | SECoastTas | | | South East Coast |
| x40403 | WestTorrnsSA | West Torrens | x60401 | | BurnieUlvers | | | Burnie - Ulverstone |
| x40501 | BarossaSA | Barossa | x60402 | | Devonport | | | Devonport |
| x40502 | LwrNorthSA | Lower North | x60403 | | WestCoastTas | | | West Coast |
| x40503 | MidNorthSA | Mid North | x70101 | | DarwinCity | | | Darwin City |
| x40504 | YorkePenSA | Yorke Peninsula | x70102 | | DarwinSuburb | | | Darwin Suburbs |
| x40601 | EyrePeninSA | Eyre Peninsula and South West | x70103 | | Litchfield | | | Litchfield |
| x40602 | OutbackSA | Outback - North and East | x70104 | | Palmerston | | | Palmerston |
| x40701 | FleurieuKISA | Fleurieu - Kangaroo Island | x70201 | | AliceSprings | | | Alice Springs |
| x40702 | LimestnCstSA | Limestone Coast | x70202 | | Barkly | | | Barkly |
| x40703 | MurMalleeSA | Murray and Mallee | x70203 | | DalyTiwiWArn | | | Daly - Tiwi - West Arnhem |
| x50101 | AugustaMarg | Augusta - Margaret River - Busselton | x70204 | | EastArnhem | | | East Arnhem |
| x50102 | BunburyWA | Bunbury | x70205 | | Katherine | | | Katherine |
| x50103 | ManjimupWA | Manjimup | x80101 | | Belconnen | | | Belconnen |
| x50201 | Mandurah | Mandurah | x80103 | | CanberraEast | | | Canberra East |
| x50301 | CottesloeClr | Cottesloe - Claremont | x80104 | | Gungahlin | | | Gungahlin |
| x50302 | PerthCity | Perth City | x80105 | | NthCanberra | | | North Canberra |
| x50401 | BaysBssndean | Bayswater - Bassendean | x80106 | | SthCanberra | | | South Canberra |
| x50402 | Mundaring | Mundaring | x80107 | | Tuggeranong | | | Tuggeranong |
| x50403 | SwanWA | Swan | x80108 | | WestonCreek | | | Weston Creek |
| x50501 | Joondalup | Joondalup | x80109 | | Woden | | | Woden |
| x50502 | StirlingWA | Stirling | x80110 | | Molongo | | | Molonglo |
| x50503 | Wanneroo | Wanneroo | x80111 | | UrriarNamdgi | | | Urriara - Namadgi |
| x50601 | ArmadaleWA | Armadale | |  | |  |
| x50602 | BelmntVicPWA | Belmont – Victoria Park | |  | |  |

**Appendix C: Maps of VU-TERM master database regions**

**Map of SA3 regions excluding detail in metropolitan areas**



**Map of NSW SA3 regions excluding metropolitan detail**



**SA3 regions in NSW**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | GoulburnYass | 17 | MaitlandNSW | 33 | InvrlTntrNSW |
| 2 | Queanbeyan | 18 | PtStephnsNSW | 34 | MreeNaribNSW |
| 3 | SnowyMnts | 19 | UprHunterNSW | 35 | TamworthNSW |
| 4 | SouthCoast | 20 | DaptoPtKmbla | 36 | LakeMacqENSW |
| 5 | Gosford | 21 | IllaCatchNSW | 37 | LakeMacqWNSW |
| 6 | Wyong | 22 | KiamaShlHNSW | 38 | NewcastleNSW |
| 7 | Bathurst | 23 | Wollongong | 39 | RichValCsNSW |
| 8 | LachlanVlley | 24 | GrtLakesNSW | 40 | RichValHnNSW |
| 9 | LithgwMudgee | 25 | KmpsyNmbcNSW | 41 | TweedValNSW |
| 10 | Orange | 26 | LordHoweIs | 42 | GrffthMrmNSW |
| 11 | ClarenceVlly | 27 | PtMcqurieNSW | 43 | TumutNSW |
| 12 | CoffsHrbrNSW | 28 | TreeGlstrNSW | 44 | WaggaNSW |
| 13 | BrkCbrCnbNSW | 29 | AlburyNSW | 45 | Shoalhaven |
| 14 | BrokenHilNSW | 30 | LwrMurrayNSW | 46 | SthHighldNSW |
| 15 | DubboNSW | 31 | UprMurrayNSW | *47* | *SydneyALL (composite)* | |
| 16 | LwrHunterNSW | 32 | ArmidaleNSW |  |  |

**Map of Sydney’s SA3 regions**

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**\*** Blue Mountains South is combined with Blue Mountains in VU-TERM, as the region only had 6 residential workers in the 2016 census.

**Map of Victoria’s SA3 regions excluding metropolitan detail**



**Melbourne’s SA3 regions**



**Map of Queensland’s SA3 regions excluding metropolitan detail & selected SA4s**



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | BrisbaneALL | 9 | GranitBltQld | 17 | MackayQld | 25 | ToowoombaQld |
| 2 | CairnsNthQld | 10 | CentHlndQld | 18 | WhitsundyQld | 26 | ChrTowAyrQld |
| 3 | CairnsSthQld | 11 | GladstnBlQld | 19 | MoretonNSA4 | 27 | TownsvillQld |
| 4 | InnsCasCsQld | 12 | RockhmptnQld | 20 | MoretonSSA4 | 28 | BundabergQld |
| 5 | PtDougDaintr | 13 | GoldCoastSA4 | 21 | FarNorthQld | 29 | BurnettQld |
| 6 | TablndEQld | 14 | IpswichSA4 | 22 | OutbackNQld | 30 | GympiCoolQld |
| 7 | DarlDMrnoQld | 15 | LoganBeaDSA4 | 23 | OutbackSQld | 31 | HerveyBayQld |
| 8 | DarlDwnEQld | 16 | BowenBasQld | 24 | SunshnCstSA4 | 32 | MarybrghQld |

**Brisbane’s SA3 regions**



**Gold Coast’s SA3 regions**



**SE Queensland’s SA3 regions**



**Map of South Australia’s SA3 regions excluding metropolitan detail**



**Adelaide’s SA3 regions**



**Map of Western Australia’s SA3 regions excluding metropolitan detail**



**Perth’s SA3 regions**



**Map of Tasmania’s SA3 regions**



**Map of Northern Territory’s SA3 regions**



|  |  |  |  |
| --- | --- | --- | --- |
| 1 | DarwinCity | 6 | Barkly |
| 2 | DarwinSuburb | 7 | DalyTiwiWArn |
| 3 | Litchfield | 8 | EastArnhem |
| 4 | Palmerston | 9 | Katherine |
| 5 | AliceSprings |  |  |