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SA Energy and Mining Satellite Account Economic Indicators 2022/23

A report for Department for Energy and Mining

7 August 2024

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Abbreviations

ABS	Australian Bureau of Statistics
AEMO	Australian Energy Market Operator
AGN	Australian Gas Networks
ANZSIC	Australia and New Zealand Standard Industrial Classification
AER	Australian Energy Regulator
CER	Clean Energy Regulator
DEM	Department for Energy and Mining
FTE	full time equivalent
GOS	gross operating surplus
GSP	gross state product
GVP	gross value of production
GWh	Gigawatt hour
I-O	input-output
METS	Mining Equipment, Technology and Services
MW	Megawatt
MWh	Megawatt hour
PV	Photovoltaic
RISE	Regional Industry Structure and Employment (model)
SA	South Australia
SAPN	SA Power Networks

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1. Introduction

1.1. Purpose of the study

Government and the Energy and Mining sector are identifying local and international opportunities, accessing domestic and international markets and securing capital to accelerate business growth and employment across South Australia. If Government and industry are going to invest in these opportunities, it is important to be able to measure and monitor performance of the sector over time in terms of jobs generated and income created.

The estimation of economic data describing the Energy and Mining sector involved preparation of satellite accounts which allow an expansion of the information provided in the RISE (Regional Industry Structure and Employment) input-output (I-O) table of South Australia. The Energy and Mining satellite account was developed to describe the sector within the state I-O framework.

While all the products and services produced and consumed in the activities of the Energy and Mining sector are embedded in the I-O table, they are not readily apparent because the sector is not identified as a single industry or product in statistical standards (such as ANZSIC). In standard I-O tables, industries are defined on the basis of the goods and services which they mainly produce. On the other hand, the Energy and Mining sector is defined according to some defined production (minerals and energy) as well as the consumption of services products (including capital items), both domestically and in export markets.

The satellite accounts approach provides a means by which the economic aspects of the Energy and Mining sector can be drawn out and analysed separately using the structure of the I-O tables. In this way the Energy and Mining sector's contribution to economic activity, gross state product and employment, were estimated.

The satellite account in this report presents economic indicators by the individual components of Energy and Mining, in addition to the sector as whole. This approach provides a detailed picture of Energy and Mining and highlights significant contributors to the sector. The components of Energy and Mining are discussed in detail in Section 2.2. The economic indicators for Energy and Mining relate to direct activity of each component (e.g. mining employment, household income earned in metal smelting operations, etc.)[1].

Energy costs were also extracted from SA RISE I-O model transactions data to highlight the relative scale of energy consumption by different industries in SA (Section 3.2).

1.2. Outline of this report

This report includes:

a. Statement of purpose of study (Section 1.1)

b. Description of indicators and components of Energy and Mining (Sections 2.1 and 2.2 respectively)

c. Outline of the approach used to construct economic models and to estimate the components of Energy and Mining (Sections 2.3 and 2.4 respectively)

d. Presentation of results (Section 3)

e. Summary of findings and remarks relating to the future estimation of Energy and Mining satellite accounts (Section 4.1 and 4.2 respectively)

[1] The economic indicator values reported in this paper exclude flow-on (or in-direct) economic activity.

2. Method of analysis and data

2.1. Economic indicators

The primary focus in this report is on economic activity associated with the Energy and Mining sector. The key economic activity indicators considered in this analysis are gross value of production, employment and contribution to gross state product (GSP).

Gross value of production (GVP) is a measure of the gross revenue of goods and services produced by commercial organisations (e.g. value of minerals mined, electricity generated, metals smelted, etc.). GVP needs to be used with care as it includes elements of double counting (e.g. the value of basic manufactured steel includes the gross value of inputs including iron ore which was processed). To minimise the effect of double counting, total GVP is not reported.

Employment units: Employment numbers are usually reported in either full time equivalent (FTE) units, or job units defined as follows:

- **FTE**: is a way to measure a worker's involvement in a project. An FTE of 1.0 means that the person is equivalent to a full-time worker, while an FTE of 0.5 signals that the worker is only half-time. Typically, different scales are used to calibrate this number, depending on the type of industry and scope of the analysis, but the basic calculation is the total hours worked divided by average annual hours worked in full-time jobs. The reported indicators are calculated on the basis that 1.0 FTE is equal to 37.5 hours worked per week.
- **Jobs**: is used to refer to the number of workers employed, regardless of the number of hours worked.

This report presents employment in terms of both number of jobs and FTE units.

Contribution to **GSP**: is a measure of the contribution of an activity to the state economy. GSP is measured as value of gross output (business revenue) less the cost of goods and services (including imports) used in producing the output. In other words, it can be measured as the sum of:

- **household income** – compensation of employees (wages and salaries) plus payments to owner managers
- **gross operating surplus (GOS)** – this is calculated net of payments to owner managers
- **taxes less subsidies (TLS)** - taxes less subsidies on products and taxes less subsidies on production.

Contribution to GSP of an industry represents payments by that industry to the primary inputs of production (labour, capital and land). Using GSP as a measure of economic activity avoids the problem of double counting that may arise from using GVP for this purpose.

This report presents estimates of contribution to GSP, household income and GOS. TLS can be deduced by calculating the residual of GSP less household income and GOS.

2.2. Components of Energy and Mining

The satellite account provides economic indicators for the Energy and Mining sector by individual components. The Energy and Mining sector was defined in consultation with the Department for Energy and Mining (DEM) to include the following components.

Resources

Relates to mining activities, and consists of the Coal, Oil & Gas Extraction, Iron Ore Mining, Non-Ferrous Metal Mining, Non-Metal Mining and Exploration sectors (Appendix 1). Some of the economic contribution from these sectors was considered to be Mining Equipment, Technology and Services (METS) sector related. The economic contribution of METS activities by the Resources sector was excluded from this part of the satellite account to avoid double counting.

Energy

The energy component relates to energy generation and supply. This consists of the Electricity Generation, Electricity Distribution and Gas Supply sectors (Appendix 1). Some of the economic contribution from these sectors was also considered to be METS related, and was excluded from this part of the satellite account to avoid double counting.

Manufacturing (non-metallic minerals & basic metals)

Non-metallic minerals manufacturing and basic metals production, being a significant downstream component of the SA mining industry, was also included in the satellite account. Non-metallic minerals consists of glass product, ceramic product, cement, lime & ready-mixed concrete, plaster & concrete product, and other non-metallic mineral product manufacturing (Appendix 1). Basic metals consists of the Iron & steel manufacturing and Non-Ferrous metals manufacturing sectors (Appendix 1). Some of the economic contribution from these sectors was considered to be METS related, and was excluded from this part of the satellite account to avoid double counting.

Mining Equipment, Technology and Services (METS)

Mining Equipment, Technology and Services involves economic activity which is generated to meet the demands of the energy and resources sector. Note this only relates to operating activities (i.e. excludes resource sector investment) and consist of all industries across the SA economy.

Investment activity

Investment by the direct components of Energy and Mining (i.e. resources, energy and manufacturing) also contributes significant economic activity. Similar to METS, this represents economic activity generated to meet the demand for capital investment by the resources, energy and manufacturing components. This captures activities such as construction of facilities, manufacture of plant and equipment, engineering and research.

A proportion of the capital investment was modelled to be provided by the resources and energy components themselves. Investment activity carried out by resources and energy components was already accounted for (in the direct components to Energy and Mining) and was excluded from capital formation to avoid double counting.

2.3. Constructing economic models with the METS sector

While all the products produced and consumed in meeting the demand of the minerals and energy sector are embedded in the SA RISE I-O table, they are not readily apparent because METS is not identified as an industry or product in statistical standards. In the Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006 edition, underlying the SA I-O table, industries are defined on the basis of the goods and services which they mainly produce. On the other hand, the METS industry is defined according to the status of the consumption by the minerals and energy sector, both domestically and in export markets. That is, it is the characteristics of the consuming industries that determine whether the production is included within the scope of METS.

The preparation of the METS sector economic information included the following broad steps:

1. Compiled detailed transactions data from SA RISE I-O tables for each of the mineral and energy sectors on an industry by industry basis (SA 122 sector level).
2. Identified those sectors at the 4-digit ANZSIC level that are likely to be wholly or largely servicing the minerals and energy industry (i.e. specialist Mining Equipment, Technology and Services industries). These include, for example:
    a. 1090 Other Mining Support Services
    b. 2462 Mining & Construction Machinery manufacturing
    c. 3212 Site Preparation Services
    d. 6922 Surveying & Mapping Services
    e. 6923 Engineering Design & Consulting Services
    f. 6925 Scientific Testing & Analysis Services
3. Matched 4-digit ANZIC industries identified in (Step 2) to the SA RISE 122 sector industry classification.
4. For each of the matched industries, investigated the range of products produced by these industries through reference to the Input–Output Product Classification (this is an ABS publication 5215.0.55.001 - Australian National Accounts: Input-Output Tables -Product Details (ABS 2024a))
5. Steps (3) and (4) enabled compilation of a set of products and services likely to be produced by specialist Mining Equipment, Technology and Services industries.
6. The data from step (5), together with the input-output transactions tables' data compiled in step (1), were then used to produce a METS sector as whole.

2.4. Satellite account calculation method and data sources

This section provides a brief overview of how each component of Energy and Mining was sourced and estimated.

Resources (mining including oil & gas extraction)

- All indicators (GVP, Household income, GSP and employment) were sourced from the 122 sector SA RISE model economic profile data, after attributing and excluding economic activity from METS.
- The I-O models have been constructed to be consistent with DEM mineral production data (DEM 2024) (i.e. GVP for mineral producing sectors sum to production values). Accordingly, GVP will differ from that reported in ABS Australian industry (ABS 2024b), due to the use of different data sources.

- Employment was attributed to mining sectors using the four-quarter average of ABS Labourforce employment, by industry (3-digit ANZSIC level) for 2022/23 (ABS 2024b). To reduce sampling error the 2022/23 data were smoothed using previous observations of ABS Labourforce. These employment estimates where then benchmarked to the 2022/23 four-quarter average of SA mining as whole (1-digit ANZSIC level).

  In earlier satellite accounts a different approach was used to attribute employment to mining. For these studies superior employment data, for select years, were received from DEM. These data were updated to a specific study year using growth rates calculated from ABS Labourforce. Employment data were received for:

  - Oil and gas extraction, for 2019/20 (2,500 jobs)
  - Iron ore mining, for 2020/21 (1,641 jobs)
  - Non-ferrous metals mining, for 2020/21 (5,518 jobs)
  - Total mineral extraction, for 2020/21, (7,879 jobs)

  The approach was changed to allow more robust estimates of employment, as significant time has elapsed since receiving superior data and given DEM has indicated there is low likelihood of receiving new data. The methodology changes will impact comparisons between this study and previous years for resource sector employment.

- In order to reflect the resource sector more closely, Compensation of employees (COE) data used in the I-O models, were taken from Australian Industry data (ABS 2024). The difference between the Australian industry data and State accounts COE was balanced out by adjusting Mining sector GOS.
- "Other mining support services", a component of "Exploration and Mining Support Services", is considered a METS activity and was excluded from Resources. It was reported as part of the METS economic indicators in order to avoid double counting.

Energy (electricity distribution & generation and gas supply)

- All indicators (GVP, household income, GSP and employment) were sourced from the 122 sector SA RISE model economic profile data, after attributing and excluding economic activity from METS.
- The I-O models have been constructed to be consistent with financial reporting to the Australian Energy Regulator (AER) and electricity generation information published by the Australian Energy Market Operator (AEMO).
- GVP for electricity distribution was calculated as 'Total revenue' less 'Contributions' from 'Audited Statutory Accounts' (SAPN 2023) plus 'Network charges' from 'Disaggregation Statements' (ElectraNet 2023).
- GVP for electricity generation was calculated as the total supply of SA electricity (14,185 GWh in 2022/23) multiplied by the average price (volume weighted) for SA electricity ($138.38 per MWh in 2022/23) in the 'South Australian Electricity Report' (AEMO 2023).
- Accordingly, the use of different sources means that GVP will differ from that reported in ABS Australian industry (ABS 2024b).
- The Energy sector may also function partly in the METS sector. Such activities are included as part of METS economic indicators (below).

Manufacturing (non-metallic minerals and basic metals)

- All indicators (GVP, Household income, GSP and employment) were sourced from the 122 sector SA RISE model economic profile data, after attributing and excluding economic activity from METS.
- Non-metallic minerals manufacturing consists of
    - Glass and glass product manufacturing
    - Ceramic product manufacturing
    - Cement, lime & ready-mixed concrete manufacturing
    - Plaster & concrete product manufacturing
    - Other non-metallic mineral product manufacturing.
- Basic metals manufacturing consists of
    - Iron & steel manufacturing
    - Non-Ferrous metals manufacturing.
- The Non-metallic Minerals and Basic Metals Manufacturing sectors may also function partly in the METS sector. Such activities are included as METS economic indicators (discussed below).
- Additional data and methods have been used to estimate the *Iron and Steel* and *Non-Ferrous Metals* manufacturing sectors. These being:
    - GVP: Based on *Primary metal and metal product manufacturing* from ABS *Australian Industry* (ABS 2024b) for SA, which was attributed proportionally to *Basic Ferrous Metal Manufacturing*[2] and *Basic Non-Ferrous Metal Manufacturing*[3] production figures for 2022/23.
    - COE was estimated using wage rates from ABS *Australian industry* (ABS 2024b).
    - TLS were estimated from the latest national I-O table (ABS 2024d). TLS were proportional to production for the *Iron and Steel Manufacturing* and *Basic Non-Ferrous Metal Manufacturing* I-O sectors combined.
    - Intermediate expenditure and imports were estimated similar to TLS.
    - GOS was estimated as the residual of GVP less COE, TLS, Intermediate expenditure and imports.

Mining Equipment, Technology and Services

All indicators (GVP, Household income, GSP and employment) were attributed from the 122 sector SA RISE model economic profile data.

The METS sector involves economic activity across all 122 other sectors (to various degrees). Adjustments have been made across all I-O sectors to avoid double counting economic activity.

[2] Sourced from revenue data of key businesses: DEM, pers. comm., (12/06/24).

[3] The value of production was assumed to be equal to South Australian lead exports in 2022/23 DFAT (2024).

Investment Activity

Resources

- Total mining CAPEX of $2,951.0m in 2022/23, was calculated as the 4-quarter total, taken from ABS Private New Capital Expenditure and Expected Expenditure (ABS 2024e).
- The total CAPEX was allocated to I-O sectors based on a hypothetical mine establishment cost structure (Table 2-1).
- Economic indicators are estimated as the direct effect of a CAPEX (final demand) shock, as generated by the 122 sector RISE model.
- Economic indicators (Household income, GSP and Employment) for CAPEX spent within the Resources sector are excluded from the estimation process. These activities are accounted for under the Resources sector direct contribution described above.

Table 2-1 Hypothetical mining CAPEX I-O allocations

Asset Class	I-O allocation %	% of cost allocations
Accessibility (road, airstrip, etc.)	Non-Residential Building Construction (15%), Heavy & Civil Engineering Construction (75%), ProSciTech (10%)	30.0%
Accommodation village	Residential construction (100%)	5.0%
Communications	Telecommunication (100%)	2.5%
Power	Power supply (100%)	2.5%
Geotechnical services (construction)	Mining (100%)	2.5%
Mine development	Mining (100%)	45.0%
Vehicles and parts	Imports (100%)	2.5%
Other owners costs	Mining (100%)	10.0%
Total		**100%**

Source: BDO analysis

Energy

- Total capital formation data for Electricity, Gas, Water and Waste Services (ANZSIC division D) are available in the ABS State Accounts (ABS 2023a), Table 24 ($2,657.0m in 2022/23).
- The private sector Energy component of Electricity, Gas, Water and Waste Services capital formation was estimated using value of work done data from ABS Engineering Construction Activity (ABS 2024f), Table 22. This was estimated in proportion to:
    - Private investment in “Electricity generation, transmission etc. and pipelines” - $1,525.0m in 2022/23
    - Private and Public investment in “Electricity generation, transmission etc. and pipelines” and “Water storage and supply, sewerage and drainage” - $2,387.4m in 2022/23.
- Based on the above, energy was estimated to be approximately 64% of total capital formation for ANZSIC division D ($1,697.2m).
- The Electricity Generation component of total CAPEX ($548.3m in 2022/23) was then estimated using:

    - new capacity registered in 2022/23, where 642 MW of generational capacity was calculated from the SA Electricity Report (AEMO), and 25 MW of largescale battery storage was commissioned (ARENA 2024).
    - total CAPEX costings for various for new technologies (Aurecon 2024).
- The Electricity Transmission and Distribution components of total CAPEX ($946.6m in 2022/23) was sourced from ElectraNet and SAPN regulatory reports (ElectraNet 2023 and SAPN 2023).
- The Gas component of total CAPEX ($202.3m) was then calculated as the residual of total CAPEX ($1,697.2m) less Electricity Generation ($548.3m) and Transmission and Distribution CAPEX ($946.6m).
- Of the Electricity Generation and Distribution component of total CAPEX ($1,494.9m), $245.7m was conservatively assumed to be spent within the sector. Similarly of the Gas Supply component of total CAPEX ($202.3m), $2.1m was assumed to be spent within the sector. These assumptions are based on the 122 sector RISE model where $245.7m is the combined capital formation for Electricity Generation and Electricity Distribution sectors, and $2.1m is capital formation for the Gas Supply sector.
- The remaining CAPEX ($1,249.2m) for Electricity Generation and Distribution and $200.2m for Gas Supply in 2022/23 was proportionally allocated to organisations for which CAPEX data were available (SAPN, ElectraNet and AGN 2024).
- This allowed splitting total CAPEX (for each organisation) into asset classes, which were allocated to appropriate I-O sectors (Table 2-2, Table 2-3 and Table 2-4).
    - ElectraNet and SAPN data were sourced from statutory reporting to the Australian Energy Regulator
    - AGN: Asset classes were based proportionally on AGN's Mount Barker Natural Gas Extension Business Case.
    - Economic indicators are estimated as the direct effect of a CAPEX (final demand) shock, as generated by the 122 sector RISE model.
- Economic indicators (household income, GSP and employment) for CAPEX allocations made to the energy sector are excluded from the estimation process. These activities are already accounted for under the Energy sector direct contribution described above.

Table 2-2 Energy CAPEX – SAPN I-O allocations

Asset Class	I-O allocation % (% of asset class)	% of total CAPEX costs
Sub-transmission Lines	Heavy & Civil Engineering Construction (90%), ProSciTech (10%)	< 0.1%
Distribution Lines	Heavy & Civil Engineering Construction (90%), ProSciTech (10%)	20.0%
Substations	Heavy & Civil Engineering Construction (90%), ProSciTech (10%)	12.1%
Distribution Transformers	Heavy & Civil Engineering Construction (90%), ProSciTech (10%)	1.1%
Low Voltage Services	Heavy & Civil Engineering Construction (90%), ProSciTech (10%)	31.4%
Communications	Telecommunication Services (100%)	3.7%
Substation Land	NA (100%)	0.0%
Easements	NA (100%)	0.1%
Land	NA (100%)	0.0%
Buildings	Non-Residential Construction (100%)	4.7%
Heavy Vehicles - 15 Years	Imports (100%)	1.8%
Heavy Vehicles - 10 Years	Imports (100%)	1.3%
Light Vehicles	Imports (100%)	2.6%
Information Technology	Imports (50%), ProSciTech (50%)	0.6%
Plant and Tools / Office Furniture	Imports (50%), Other Machine Equip (40%), Furniture manufacturing (10%)	0.8%
In-house Software	ProSciTech (100%)	12.9%
Sub-transmission and Distribution Lines - Short Life	Heavy & Civil Engineering Construction (90%), ProSciTech (10%)	1.9%
Substations and transformers - Short Life	Heavy & Civil Engineering Construction (90%), ProSciTech (10%)	< 0.1%
Electronic Network Assets	Heavy & Civil Engineering Construction (90%), ProSciTech (10%)	5.0%
Total		**100.0%**

Source: SAPN (2023) and BDO analysis

Table 2-3 Energy CAPEX – ElectraNet I-O allocations

Asset Class	I-O allocation % (% of asset class)	% of total CAPEX costs
Commercial Buildings	Other Construction (100%)	0.9%
Communications – Civil	Communication Services (100%)	0.2%
Communications – Other	Communication Services (100%)	< 0.1%
Computers, software, and office machines	Imports (50%), Other Machine Equip (25%), ProSciTech (25%)	3.4%
Easement	NA (100%)	< 0.1%
Land	NA (100%)	1.7%
Network Switching Centres	Other Construction (90%), ProSciTech (10%)	0.0%
Office furniture, movable plant, and misc	Imports (50%), Other Machine Equip (40%), Furniture Manufacturing (10%)	0.5%
Refurbishment	Construction Services (100%)	0.0%
Substation Primary Plant	Other Construction (100%)	18.5%
Substation Demountable Buildings	Other Manufacturing (50%), Other Construction (50%)	0.2%
Substation Establishment	Other Construction (100%)	5.2%
Substation Fences	Other Construction (100%)	0.4%
Substation Secondary Systems - Electro-mechanical	Imports (50%), Other Machine Equip (25%), ProSciTech (25%)	1.2%
Substation Secondary Systems - Electronic	Imports (50%), Other Machine Equip (25%), ProSciTech (25%)	9.9%
Transmission lines - Overhead	Other Construction (90%), ProSciTech (10%)	52.6%
Transmission lines - Underground	Other Construction (90%), ProSciTech (10%)	< 0.1%
Refurbishment 2008-13	Other Construction (100%)	0.0%
Transmission Line Refit - insulators replacement 2013-18	Other Construction (90%), ProSciTech (10%)	< 0.1%
Communications - other (post 2018)	Communication Services (100%)	2.2%
Transmission Line Refit 2018-2023	Other Construction (90%), ProSciTech (10%)	2.9%
Synchronous Condensers	Imports (60%), Other Construction (13%), Other Machine Equip (13%), ProSciTech (14%)	0.2%
Total		**100.0%**

Source: ElectraNet (2023) and BDO analysis

Table 2-4 Energy CAPEX – Australian Gas Network I-O allocations

Asset Class	I-O allocation % (% of asset class)	% of total CAPEX costs
Pipeline	Heavy & Civil Engineering Construction (100%)	72.2%
Offtake facilities (filtration, metering, heating pressure regulation, controls and control hut as required)	Imports (50%), Other Machine Equip (50%)	6.1%
Trunk reticulation	Imports (50%), Other Machine Equip (50%)	21.8%
Total		**100.0%**

Source: ElectraNet (2023) and BDO analysis

Basic metals manufacturing

- Total base metals manufacturing CAPEX was provided by DEM[4].
- This CAPEX was proportionally split into two asset classes ABS Private New Capital Expenditure and Expected Expenditure data (ABS 2024e). These being
    - Buildings and Structures (31%)
    - Equipment, Plant and Machinery (69%)
- Manufacturing CAPEX by asset class was allocated to I-O sectors for a hypothetical CAPEX scenario (Table 2-5).
- Economic indicators are estimated as the direct impacts of a CAPEX (final demand) shock, as generated by the 122 sector RISE model.

Rooftop solar PV

- A ratio of 5.8 FTE Job-years per MW installed of Rooftop PV for construction and installation was taken from Rutovitz et. al. (2020)
- The increase in solar generation capacity for 2022/23 was sourced from the Clean Energy Regulator (CER 2024) small scale solar installation data.
- The annual increase in small scale rooftop solar PV capacity for SA in 2022/23 (263.4 MW) was obtained from CER (2024).
- SA FTE employment was estimated using the ratio (discussed above) and change in solar generation.
- GVP of solar PV investment was calculated using the SA FTE estimate and the RISE model direct coefficients. Final demand and resulting direct impacts (economic indicators) were estimated for the residential construction industry.

[4] Source: DEM, pers. comm., (12/06/24).

Table 2-5 Hypothetical manufacturing CAPEX I-O allocations

Asset Class	I-O allocation % (% of asset class)	% of total CAPEX costs
Building and structures	Non-Residential Building Construction (50%), Heavy & Civil Engineering Construction (25%), Construction Services (25%)	30.8%
Equipment	Other Machinery & Equipment (50%), Imports (50%)	69.2%
Total		**100.0%**

Source: ABS (2024d) and BDO analysis

3. Energy and Mining economic indicators

3.1. Economic indicators

Energy and Mining sector household income, gross operating surplus (GOS), contribution to gross state product (GSP) and employment (both number of jobs and FTEs) for South Australia are summarised in Table 3-1.

In 2022/23 the Energy and Mining sector contributed $11.4b to South Australian GSP (8.0 per cent). The largest contributors to GSP, by component of Energy and Mining, were Resources ($5.0b), Mining Equipment, Technology and Services (METS) ($2.2b) and Energy ($1.8b).

Energy and Mining sector employment (FTE) in 2022/23 was about 46,700 jobs in South Australia. Of this, the largest employing components were METS (14,100 FTE), Resources (13,400 FTE) and Manufacturing (8,600 FTE).

Household income, which is associated with both employment and contribution to GSP, provides a measure of the standard of living of those who are employed in the sector. In 2022/23 about $5.0 billion was earned by those employed in Energy and Mining. The largest earning components were Resources ($1.7b), METS ($1.3b) and Investment Activity ($0.7b).

Table 3-1 Summary Energy and Mining satellite account, 2022/23

	GVP ($m)	Household income ($m)	Contribution to GOS ($m)	Contribution to GSP ($m)	Employment (Jobs)	Employment (FTE)
Resources	10,003	1,726	3,109	5,006	10,636	13,402
Energy	3,942	612	1,275	1,847	4,396	4,325
Manufacturing [a]	4,040	593	416	1,052	8,517	8,569
METS [b]	5,014	1,323	780	2,213	13,462	14,125
Investment Activity	6,009	742	464	1,267	6,198	6,312
Total [c]		**4,996**	**6,045**	**11,385**	**43,210**	**46,734**
South Australia		80,447	45,629	142,036	1,006,053	859,021
Total as % of SA		6.2%	13.2%	8.0%	4.3%	5.4%

[a] Includes non-metallic minerals & basic metals manufacturing.

[b] Mining Equipment, Technology and Services (METS) includes sectors at the 4-digit ANZSIC level that are likely to be wholly or largely servicing the minerals and energy industry.

[c] Totals may not sum due to rounding.

Source: BDO analysis

Table 3-2 presents a detailed satellite account which shows economic activity attributed to the sub-components of Energy and Mining. Manufacturing sub-components however, are not published in Table 3-2 due to confidentiality issues. Of these sub-components Iron & Non-Ferrous Ore Mining was estimated to be the largest contributor to Energy and Mining GSP ($3.5b). This represented approximately 71 per cent of the contribution to GSP by Resources ($5.0b in Table 3-1). The next two largest contributors to GSP were METS ($2.2b) and Electricity Distribution ($1.3b relative to $1.8b for Energy as a whole).

Table 3-2 Detailed Energy and Mining satellite account, 2022/23

	GVP ($m)	Household income ($m)	Contribution to GOS ($m)	Contribution to GSP ($m)	Employment (Jobs)	Employment (FTE)
Resources						
Coal	0	0	0	0	0	0
Oil & Gas Extraction	1,427	321	624	995	1,409	1,602
Iron & Non-Ferrous Ore Mining	7,763	1,144	2,290	3,534	6,560	8,419
Non-Metallic Mineral Mining	476	130	139	280	992	1,198
Exploration	336	131	57	198	1,674	2,183
Energy						
Electricity Generation	1,894	201	247	384	1,175	1,218
Electricity Distribution [b]	1,830	349	891	1,263	2,525	2,403
Gas Supply	218	62	137	199	696	705
Manufacturing [c]	4,040	593	416	1,052	8,517	8,569
METS [d]	5,014	1,323	780	2,213	13,462	14,125
Investment Activity						
Resources						
Construction	944	171	127	315	1,190	1,312
Mining	1,697	-	-	-	-	-
Other sectors	310	70	52	127	605	561
Energy [e]						
Construction	1,055	219	167	406	1,323	1,499
Energy, Water & Waste	248	-	-	-	-	-
Other sectors	395	122	7	134	1,103	1,035
Basic Metals Manufacturing						
Construction	30	5	2	8	48	52
Other sectors	69	12	1	14	116	117
Rooftop Solar PV (dwellings & other sectors)						
Construction	1,262	143	108	263	1,812	1,737
Total [f]		**4,996**	**6,045**	**11,385**	**43,210**	**46,734**
South Australia		80,447	45,629	142,036	1,006,053	859,021
Total as % of SA		6.2%	13.2%	8.0%	4.3%	5.4%

[a] Exploration differs from "Exploration and Mining Support Services" in the ABS national I-O tables, as it excludes "Other mining services".

[b] "Electricity distribution" refers to the "Electricity Supply" sector in the 122 sector RISE model.

[c] Includes Non-metallic Minerals, Iron & Steel and Non-Ferrous Metals. Sub-components are not reported due to confidentiality.

[d] Mining Equipment, Technology and Services includes other mining services. Indicators for "Other mining services" are as follows $655m GVP, $255m household income, $111m GOS, $386m GSP, 2,648 jobs and 3,453 fte jobs.

[e] The majority of Energy investment activity is by the Electricity Generation and Distribution sectors. Of total Energy investment, $1,697m (GVP subtotal for Energy investment activity in Table 3-2), $548.3m was estimated for electricity generation, 946.6m was for transmission and distribution (SAPN and ElectraNet 2023), with $202.3m remaining for Gas Supply.

[f] Totals may not sum due to rounding.

Source: ABS (2024d) and BDO analysis

The largest employing (FTE) sub-components of Energy and Mining in 2022/23 were METS (14,100 FTE jobs), followed by Manufacturing (8,600 FTE jobs) and Iron & Non-Ferrous Ore Mining (8,400 FTE jobs relative to 13,400 for Resources as a whole).

In 2022/23 the largest earning sub-components of household income were METS ($1.3b), by Iron & Non-Ferrous Ore Mining ($1.1b relative to $1.7b for Resources as a whole), followed by Manufacturing ($0.6b).

3.2. Energy costs

Energy costs were extracted from SA RISE I-O model transactions data to highlight the relative scale of energy consumption by different industries in SA. The transactions data provides information relating to purchase of SA produced electricity (generation and distribution separated) and gas by industries in SA. The estimates of energy cost (below) exclude interstate imports of energy as these are not directly allocated to an I-O sector in the I-O model. However, given SA was a small net importer of electricity in 2022/23, we can argue that imports of electricity (generation and distribution) were unlikely to materially impact the I-O model data. Further analysis is required to support this claim. Energy costs in this section exclude any direct purchases of fossil fuels, which align to the Petroleum and Coal Manufacturing sector.

Using the I-O model transactions data, we calculated the cost (of SA produced) energy for SA industries. These transaction values are before energy subsides, which appear in the primary inputs of the I-O model. Energy costs are presented relative to total input costs[5] and value of production (Table 3-3 and Table 3-4, respectively) so can vary with the relative quantity or price of the inputs.

These input costs can be further contextualised by referring to the ABS Producer Price Indexes (ABS 2024g) which include measures of change in price of electricity and gas inputs across manufacturing at the national level.

Table 3-3 Energy cost as a proportion of total inputs, 2022/23

Purchasing industry [a]	Electricity Generation	Electricity Distribution [b]	Gas Supply	Total
Agriculture, Forestry and Fishing	0.3%	0.2%	0.0%	0.4%
Mining	1.0%	0.7%	0.0%	1.8%
Manufacturing	0.7%	0.6%	0.0%	1.3%
Construction	0.3%	0.2%	0.0%	0.5%
Trade and transport [c]	1.1%	0.8%	0.0%	1.9%
Public services [d]	0.2%	0.2%	0.0%	0.4%
Other services [e]	0.5%	0.4%	0.0%	0.9%
State total	**0.6%**	**0.4%**	**0.0%**	**1.0%**

[a] Purchasing industries refer to industries at the 20 sector level.

[b] "Electricity distribution" refers to the "Electricity Supply" sector in the 122 sector RISE model. See BDO EconSearch (2023) for additional information.

[c] Trade and transport consists of Wholesale Trade, Retail Trade, Accommodation & Food Services and Transport, Postal & Warehousing services.

[d] Public services consists of Public Administration & Safety, Education & Training and Health Care & Community Services.

[e] Other services consists of Electricity, Gas, Water & Waste Services, Information, Media & Telecommunication Services, Finance & Insurance, Rental, Hiring & Real Estate Services, Professional, Scientific & Technical Services, Cultural & Recreational Services and Personal & Other Services.

Source: BDO analysis

[5] These consists of purchases of goods and services and includes interstate and international imports.

Table 3-4 Energy costs as a proportion of total value of output, 2022/23

Purchasing industry [a]	Electricity Generation	Electricity Distribution [b]	Gas Supply	Total
Agriculture, Forestry and Fishing	0.1%	0.1%	0.0%	0.2%
Mining	0.5%	0.3%	0.0%	0.8%
Manufacturing	0.4%	0.4%	0.0%	0.8%
Construction	0.2%	0.2%	0.0%	0.3%
Trade and transport [c]	0.5%	0.4%	0.0%	0.9%
Public services [d]	0.1%	0.1%	0.0%	0.1%
Other services [e]	0.2%	0.2%	0.0%	0.4%
State total	**0.3%**	**0.2%**	**0.0%**	**0.5%**

[a-e] See Table 3-3

Source: BDO analysis

4. Conclusions

4.1. Summary

As demonstrated in Section 3.1, Energy and Mining is a significant component of the State economy. The sector contributed about $11.4 billion to GSP representing about 8.0 per cent of the state economy in 2022/23.

In addition to providing information on the size of the Energy and Mining sector, the satellite account illustrates the large scope of industries which make up the sector. Notably, Resources (i.e. mining and exploration activities) and METS form the majority of Energy and Mining[6]. Notwithstanding the significance of Resources and METS, a sizable amount of Energy and Mining related economic activity can be attributed to Energy, Investment and Manufacturing[7].

4.2. Future modelling improvements

This study is an application of a previously developed method (BDO EconSearch 2019) that allows ready compilation and updating of Energy and Mining data.

The development of the satellite account has resulted in identification and incorporation of new data inputs. Producing reliable and consistent updates of Energy and Mining information in the future will be dependent on sourcing similar data. Notably this includes sourcing:

- Investment information relating to SA mining, energy and basic metal manufacturing industries (provided by DEM)
- Value of production data for iron & steel and non-ferrous metals manufacturing (provided by DEM)
- Value of production of electricity providers (sourced from AEMO (2022), AER (2022) and statutory reporting to AER by SAPN and ElectraNet)
- Mining and basic metals manufacturing employment data (provided by DEM).
- Up to date studies that attribute energy related economic activity which are not already classified in ANZSIC division D, such as employment factors for solar PV installations (sourced from Rutovitz et. al. 2020).

The above data, where not provided in-confidence or as confidential should be incorporated into other economic models such as the SA state I-O models.

Additionally, there is potential for annual revisions to ABS and other data (e.g. ABS State Accounts) to be incorporated into previous years' estimates to enable the reporting of an energy and mining satellite account time series that reflects such revisions.

Business Longitudinal Analysis Data Environment (BLADE) has also been identified as a potentially more accurate and timely source of Energy and Mining data. BLADE links business activity across many government held administrative data sources[8] resulting in high resolution and readily updatable industry data.

[6] Table 3-1 shows Resources and METS combined contributed about $7.2b to GSP, out of a total contribution to GSP of $11.3b.

[7] Table 3-1 shows Energy; Investment activity; and Non-Metallic Minerals & Basic Metals Manufacturing; combined contributed about $4.2b to GSP, out of a total contribution to GSP of $11.3b.

[8] E.g. ABS Business Register, ATO Business Activity Statements, DFAT Trade data, etc.

Researchers use BLADE to understand how businesses fare over time and the factors that drive performance, innovation, job creation, competitiveness, and productivity, and provide new insights into the development and evaluation of government policies, programs and services (ABS 2023b). In order to access BLADE, the Energy and Mining satellite account project would need to be approved as an integrated data project by the ABS.

In addition to sourcing data that accurately describe Energy and Mining, additional focus may be required to identify new activity which should be incorporated into the satellite account. With increasing policy attention in South Australia, nationally and internationally on reducing carbon emissions, and in capturing economic opportunities emerging from the clean energy transition, there is greater importance for 'Energy and Mining' to be suitably defined for these policy purposes.

National developments include:

- a sectoral 'net zero' approach with identified 'resources' and 'energy and electricity' sectors, and
- a focus on clean energy workforce skills defining a 'clean energy workforce' spanning energy supply, energy demand, enabling clean energy workforce, the workforce associated with the carbon lifecycle, emissions-intensive sectors and the workforce from transitioning sectors.

Future South Australian Energy and Mining sector data should be aligned to, or be able to integrate with, these developments.

References

AURECON 2024, *2023 Costs and Technical Parameter Review*, Brisbane, April.

ABS 2023a, *State Accounts 2022/23*, ABS Cat. No. 5220.0, Canberra, November.

ABS 2023b, *Business Longitudinal Analysis Data Environment (BLADE)*, https://www.abs.gov.au/about/data-services/data-integration/integrated-data/business-longitudinal-analysis-data-environment-blade

ABS 2024a, *Australian National Accounts: Input-Output Tables (Product Details) 2021/22*, ABS Cat. No. 5215.0.55.001, Canberra, March.

ABS 2024b, *Australian Industry 2022/23*, ABS Cat. No. 8155.0, Canberra, May.

ABS 2024c, *Labour Force, Australia, Detailed*, ABS Cat. No. 6291.0.55.001, Canberra, March.

ABS 2024d, *Australian National Accounts: Input-Output Tables - Electronic Publication 2021/22*, ABS Cat. No. 5209.0.55.001, Canberra, March.

ABS 2024e, *Private New Capital Expenditure and Expected Expenditure, Australia, Mar 2024*, ABS Cat. No. 5625.0, Canberra, June.

ABS 2024f, *Engineering Construction Activity, Australia*, March 2024, ABS Cat. No. 8762.0, Canberra, March.

ABS 2024g, *Producer Price Indexes, Australia*, March 2024, ABS Cat. No. 6427.0, Canberra, April.

Australian Energy Market Operator (AEMO) 2023, *South Australian Electricity Report (and prev. publications)*, Sydney, November.

Australian Gas Networks (AGN) 2018, *Mount Barker Natural Gas Extension, Business Case*, Adelaide, June.

Australian Renewable Energy Agency (AREA) 2024, *Lake Bonney Battery - Australian Renewable Energy Agency*, accessed 25 June 2024, <https://arena.gov.au/projects/lake-bonney-battery-energy-storage-system/>

BDO EconSearch 2019, Energy and Mining Satellite Account Economic Indicators, a report to the Department for Energy and Mining, Adelaide, July

BDO EconSearch 2023, *SA RISE Model 2021/22: Technical Report, a report for Department for the Premier and Cabinet*, Adelaide, December

Clean Energy Regulator (CER) 2024, *Postcode data for small-scale installations – May 2023 (and prev. publications)*, Canberra, September.

Department of Foreign Affairs and Trade (DFAT) 2024, *Trade statistical pivot tables - State by country and SITC pivot table 2013-14 to 2022-23*, Canberra, March

Department for Energy and Mining (DEM) 2024, *South Australian mineral resource production statistics: 12 month resources for the period ended June 2023*, pers. comm. Energy Resources Division, Department for Energy and Mining.

ElectraNet 2023, *Regulatory Financial Report 2022/23, prepared for the Australian Energy Regulator (AER)*, Adelaide, October.

Rutovitz, J., Briggs, C., Dominish, E., Nagrath, K. (2020), *Renewable Energy Employment in Australia: Methodology, Prepared for the Clean Energy Council by the Institute for Sustainable Futures*, University of Technology Sydney

SA Power Networks (SAPN) 2023, *Distribution Network Service Provider, Annual Reporting RIN 2022/23, prepared for the Australian Energy Regulator (AER)*, Adelaide, October.

Disclaimer

The assignment is a consulting engagement as outlined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 17. Consulting engagements employ an assurance practitioner's technical skills, education, observations, experiences and knowledge of the consulting process. The consulting process is an analytical process that typically involves some combination of activities relating to: objective-setting, fact-finding, definition of problems or opportunities, evaluation of alternatives, development of recommendations including actions, communication of results, and sometimes implementation and follow-up.

The nature and scope of work has been determined by agreement between BDO and the Client. This consulting engagement does not meet the definition of an assurance engagement as defined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 10.

Except as otherwise noted in this report, we have not performed any testing on the information provided to confirm its completeness and accuracy. Accordingly, we do not express such an audit opinion and readers of the report should draw their own conclusions from the results of the review, based on the scope, agreed-upon procedures carried out and findings.

Appendix 1 Sector definitions

Appendix Table 1-1 Intermediate sector specifications for the input-output models

	RISE Sectors, 2024 122 Sectors		RISE Sectors, 2018 78 Sectors	ANZSIC 1-digit level Description 20 Sectors
1	Sheep	1	Sheep	Agriculture,
2	Grains	2	Grains	Forestry & Fishing
3	Beef Cattle	3	Beef Cattle	
4	Dairy Cattle	4	Dairy Cattle	
5	Poultry	5	Poultry	
6	Pigs	6	Pigs	
7	Other Livestock	7	Other Livestock	
8	Winegrapes	8	Winegrapes	
9	Vegetables	9	Vegetables	
10	Fruits & Nuts	10	Fruits & Nuts	
11	Other Agriculture	11	Other Agriculture	
12	Aquaculture	12	Aquaculture	
13	Forestry & logging	13	Forestry & Logging	
14	Fishing, hunting & trapping	14	Fishing, Hunting & Trapping	
15	Agriculture, forestry & fishing support services	15	Agriculture, Forestry & Fishing Support Services	
16	Coal mining	16	Coal Mining	Mining
17	Oil & gas extraction	17	Oil & Gas Extraction	
18	Iron ore mining	18	Iron & Non-ferrous Ore Mining	
19	Non-ferrous metal ore mining			
20	Non-metallic mineral mining	19	Non Metallic Mineral Mining	
21	Exploration & mining support services	20	Exploration & Mining Support Services	
22	Meat & meat product manufacturing	21	Meat & Meat Product Manufacturing	Manufacturing
23	Processed seafood manufacturing	22	Processed Seafood Manufacturing	
24	Dairy product manufacturing	23	Dairy Product Manufacturing	
25	Fruit & vegetable product manufacturing	24	Fruit & Vegetable Product Manufacturing	
26	Oils & fats manufacturing	25	Oils & Fats Manufacturing	
27	Grain mill & cereal product manufacturing	26	Grain Mill & Cereal Product Manufacturing	
28	Bakery product manufacturing	27	Other Food Product Manufacturing	
29	Sugar & confectionery manufacturing			
30	Other food product manufacturing			
31	Soft drinks, cordials & syrup manufacturing	28	Other Beverages	
32	Beer manufacturing	29	Beer Manufacturing	
33	Wine, spirits & tobacco	30	Wine, Spirits & Tobacco Manufacturing	

RISE Sectors, 2024 122 Sectors		RISE Sectors, 2018 78 Sectors		ANZSIC 1-digit level Description 20 Sectors
34	Textile manufacturing	31	Textiles, Clothing & Footwear Manufacturing	Manufacturing (cont.)
35	Tanned leather, dressed fur & leather product manufacturing			
36	Textile product manufacturing			
37	Knitted product manufacturing			
38	Clothing manufacturing			
39	Footwear manufacturing			
40	Sawmill product manufacturing	32	Sawmill Product Manufacturing	
41	Other wood product manufacturing	33	Other Wood Product Manufacturing	
42	Pulp, paper & paperboard manufacturing	34	Pulp, Paper & Paperboard Manufacturing	
43	Paper stationery & other converted paper product manufacturing	35	Paper Stationery & Other Converted Paper Product Manufacturing	
44	Printing (including the reproduction of recorded media)	36	Printing (including the reproduction of recorded media)	
45	Petroleum & coal product manufacturing	37	Petroleum & Coal Product Manufacturing	
46	Human pharmaceutical & medicinal product manufacturing	38	Pharmaceutical & Other Chemical Product Manufacturing	
47	Veterinary pharmaceutical & medicinal product manufacturing			
48	Basic chemical manufacturing			
49	Cleaning compounds & toiletry preparation manufacturing			
50	Polymer product manufacturing			
51	Natural rubber product manufacturing			
52	Glass & glass product manufacturing	39	Non-metallic Mineral Product Manufacturing	
53	Ceramic product manufacturing			
54	Cement, lime & ready-mixed concrete manufacturing			
55	Plaster & concrete product manufacturing			
56	Other non-metallic mineral product manufacturing			
57	Iron & steel manufacturing	40	Iron & Steel Manufacturing	
58	Basic non-ferrous metal manufacturing	41	Basic Non-Ferrous Metal Manufacturing	
59	Forged iron & steel product manufacturing	42	Metal Product Manufacturing	
60	Structural metal product manufacturing			
61	Metal containers & other sheet metal product manufacturing			
62	Other fabricated metal product manufacturing			
63	Motor vehicles & parts; other transport equipment manufacturing	43	Motor Vehicles & Parts; Other Transport Equipment Manufacturing	

	RISE Sectors, 2024 122 Sectors		RISE Sectors, 2018 78 Sectors	ANZSIC 1-digit level Description 20 Sectors
64	Ships & boat manufacturing	44	Other Machinery & Equipment Manufacturing	
65	Railway rolling stock manufacturing			
66	Aircraft manufacturing			
67	Professional, scientific, computer & electronic equipment manufacturing			
68	Electrical equipment manufacturing			
69	Domestic appliance manufacturing			
70	Specialised & other machinery & equipment manufacturing			
71	Furniture manufacturing	45	Furniture Manufacturing	
72	Other manufactured products	46	Other Manufactured Products	
73	Electricity generation	47	Electricity Generation	Electricity, Gas,
74	Electricity transmission, distribution, on selling & electricity market operation	48	Electricity Supply	Water & Waste services
75	Gas supply	49	Gas Supply	
76	Water supply, sewerage & drainage services	50	Water Supply, Sewerage & Drainage Services	
77	Waste collection, treatment & disposal services	51	Waste Collection, Treatment & Disposal Services	
78	Residential building construction	52	Residential Building Construction	Construction
79	Non-residential building construction	53	Other Construction	
80	Heavy & civil engineering construction			
81	Construction services	54	Construction Services	
82	Wholesale trade	55	Wholesale Trade	Wholesale Trade
83	Retail trade	56	Retail Trade	Retail Trade
84	Accommodation	57	Accommodation	Accommodation &
85	Food & beverage services	58	Food & Beverage Services	Food Services
86	Road transport	59	Road Transport	Transport, postal & warehousing
87	Rail transport	60	Rail Transport	
88	Water, pipeline & other transport	61	Water, Pipeline & Other Transport	
89	Air & space transport	62	Air & Space Transport	
90	Postal & courier pick-up & delivery service	63	Transport Support Services & Storage	
91	Transport support services & storage			
92	Publishing (except internet & music publishing)	64	Publishing (except Internet & Music Publishing)	Information, Media & Telecommunications
93	Motion picture & sound recording	65	Communication Services	
94	Broadcasting (except internet)			
95	Internet service providers, internet publishing & broadcasting, websearch portals & data processing			
96	Telecommunication services			
97	Library & other information services			
98	Finance	66	Finance	Finance & Insurance
99	Insurance & superannuation funds	67	Insurance & Other Financial Services	
100	Auxiliary finance & insurance services			

	RISE Sectors, 2024 122 Sectors		RISE Sectors, 2018 78 Sectors	ANZSIC 1-digit level Description 20 Sectors
101	Rental & hiring services (except real estate)	68	Rental, Hiring & Real Estate Services	Rental, Hiring & Real Estate Services
102	Ownership of dwellings	69	Ownership of Dwellings	Ownership of Dwellings
103	Non-residential property operators & real estate services	68	Rental, Hiring & Real Estate Services (cont.)	Rental, Hiring & Real Estate Services (cont.)
104	Professional, scientific & technical services	70	Professional, Scientific & Technical Services	Professional, Scientific & Technical
105	Computer systems design & related services			Services
106	Employment, travel agency & other administrative services	71	Administrative & Support Services	Administrative & Support Services
107	Building cleaning, pest control & other support services			
108	Public administration & regulatory services	72	Public Administration & Regulatory Services	Public Administration & Safety
109	Defence	73	Defence	
110	Public order & safety	74	Public Order & Safety	
111	Primary & secondary education services	75	Education & Training	Education & Training
112	Technical, vocational & tertiary education services			
113	Arts, sports, adult & other education services			
114	Health care services	76	Health & Community Services	Health & Community
115	Residential care & social assistance services			Services
116	Heritage, creative & performing arts	77	Cultural & Recreational Services	Cultural &
117	Sports & recreation			Recreational Services
118	Gambling			
119	Automotive repair & maintenance	78	Personal & Other Services	Personal & Other
120	Other repair & maintenance			Services
121	Personal services			
122	Other services			

Source: BDO analysis

Appendix 2 Resources data correspondence

Appendix Table 2-1 DEM resources production statistics to RISE model sector correspondence

RISE Sectors, 2024 122 Sectors	SA mineral resource production statistics Category	SA mineral resource production statistics Commodity	GVP ($m)
Coal Mining	Energy	Coal	0
Oil & Gas Extraction	Petroleum Production	Condensate (kL)	75
	Petroleum Production	Crude oil (kL)	694
	Petroleum Production	LPG	102
	Petroleum Production	Natural Gas (Gm3)	557
Iron Ore Mining	Metallic Minerals	Iron Ore	0
	Metallic Minerals	Iron Ore - Hematite	0
	Metallic Minerals	Iron Ore - Hematite DSO	987
	Metallic Minerals	Iron Ore - Hematite Feed	45
	Metallic Minerals	Iron Ore - Magnetite	0
	Metallic Minerals	Iron Ore - Magnetite DSO	291
	Metallic Minerals	Iron Ore - Magnetite Feed	63
Non-Ferrous Ore Mining	Metallic Minerals	Contained Cobalt	0
	Metallic Minerals	Contained Copper	1,269
	Metallic Minerals	Contained Gold (grams)	513
	Metallic Minerals	Contained Lead	0
	Metallic Minerals	Contained Molybdenum	0
	Metallic Minerals	Contained Silver (Kg)	36
	Metallic Minerals	Contained Zinc	0
	Metallic Minerals	Copper	2,582
	Metallic Minerals	Gold (grams)	515
	Metallic Minerals	Silver (Kg)	36
	Energy	Uranium Oxide	878
	Industrial Minerals	Heavy Mineral Concentrate	549
Non-Metallic Mineral Mining	Gem & Semi-precious Stones	Total	0
	Opal Production	Total	18
	Industrial Minerals	Total (excluding Heavy Mineral Concentrate)	149
	Construction Materials	Total	310

Source: BDO analysis

Appendix 3 Energy and Mining correspondence to ANZSIC (3-digit level industry)

Appendix Table 3-1 Energy and Mining components and sub-components to ANZSIC (3-digit level industry)

Energy and Mining components	Energy and Mining sub-components	ANZSIC code (3-digit)	Description
Resources	Coal	60	Coal Mining
	Oil & Gas Extraction	70	Oil and Gas Extraction
	Iron & Non-Ferrous Mining	80	Metal Ore Mining
	Non-Metal Mining	91	Construction Material Mining
		99	Other Non-Metallic Mineral Mining and Quarrying
	Exploration	101	Exploration
Energy	Electricity Generation	261	Electricity Generation
	Electricity Supply	262	Electricity Transmission
		263	Electricity Distribution
		264	On Selling Electricity and Electricity Market Operation
	Gas Supply	270	Gas Supply
Manufacturing (non-metallic minerals & basic metals)	Non-metallic minerals	201	Glass and Glass Product Manufacturing
		202	Ceramic Product Manufacturing
		203	Cement, Lime, Plaster and Concrete Product Manufacturing
		209	Other Non-Metallic Mineral Product Manufacturing
	Iron & Steel	211	Basic Ferrous Metal Manufacturing
		212	Basic Ferrous Metal Product Manufacturing
	Non-Ferrous Metals	213	Basic Non-Ferrous Metal Manufacturing
		214	Basic Non-Ferrous Metal Product Manufacturing
Mining Equipment, Technology & Services	Mining Equipment, Technology & Services	109	Other Mining Support Services
		n.a.	Miscellaneous sectors (from parts of ANZSIC 3-digit sectors)
Investment activity	Resources (construction investment activity)	301	Residential Building Construction
		302	Non-Residential Building Construction
		310	Heavy and Civil Engineering Construction

Energy and Mining components	Energy and Mining sub-components	ANZSIC code (3-digit)	Description
Investment activity (cont.)	Resources (other sectors investment activity)	262	Electricity Transmission
		263	Electricity Distribution
		264	On Selling Electricity and Electricity Market Operation
		580	Telecommunications Services
		691	Scientific Research Services
		692	Architectural, Engineering and Technical Services
		693	Legal and Accounting Services
		694	Advertising Services
		695	Market Research and Statistical Services
		696	Management and Related Consulting Services
		697	Veterinary Services
		699	Other Professional, Scientific and Technical Services
	Energy (construction investment activity)	302	Non-Residential Building Construction
		310	Heavy and Civil Engineering Construction
	Energy (other sectors investment activity)	245	Pump, Compressor, Heating and Ventilation Equipment Manufacturing
		246	Specialised Machinery and Equipment Manufacturing
		249	Other Machinery and Equipment Manufacturing
		251	Furniture Manufacturing
		259	Other Manufacturing
		580	Telecommunications Services
		691	Scientific Research Services
		692	Architectural, Engineering and Technical Services
		693	Legal and Accounting Services
		694	Advertising Services
		695	Market Research and Statistical Services
		696	Management and Related Consulting Services
		697	Veterinary Services
		699	Other Professional, Scientific and Technical Services
	Solar PV (construction investment activity)	301	Residential Building Construction

Energy and Mining components	Energy and Mining sub-components	ANZSIC code (3-digit)	Description
Investment activity (cont.)	Basic Metals Manufacturing (construction investment activity)	302	Non-Residential Building Construction
		310	Heavy and Civil Engineering Construction
		321	Land Development and Site Preparation Services
		322	Building Structure Services
		323	Building Installation Services
		324	Building Completion Services
		329	Other Construction Services
	Basic Metals Manufacturing (other sectors investment activity)	245	Pump, Compressor, Heating and Ventilation Equipment Manufacturing
		246	Specialised Machinery and Equipment Manufacturing
		249	Other Machinery and Equipment Manufacturing

Source: BDO analysis

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