Australian Bureau of Statistics

2009–10

4604.0

ENERGY ACCOUNT

AUSTRALIA

EMBARGO: 11.30AM (CANBERRA TIME) TUES 20 DEC 2011

CONTENTS

INQUIRIES

For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070.

NOTES

CHANGES TO THIS ISSUE

This issue is the first of the annual *ABS Energy Account Australia* (EAA) releases, forming the Australian Bureau of Statistics' commitment to the *System of Environmental–Economic Accounting for Energy* (SEEA-E) framework. Prior to this release ABS energy accounts were produced biennially for the 2006-07 and 2008-09 periods. The estimates for this publication are for the 2009-10 reference period.

Subsequent releases of the annual EAA will include estimates for the preceding year, which may include revisions reflecting improved source data and updated information. Details of any major revisions will be described within the Explanatory Notes.

The 2009-10 EAA is presented in a net supply and use format in accordance with SEEA-E. Net supply and use only records energy '*entering*' and energy '*leaving*' the economy. The previous EAA presented energy in a gross energy accounts format. Further information including explanations of differences between net and gross accounts can be found within the Explanatory Notes.

CONTENT

Additional data will be added to the ABS website, including information on hybrid (physical and monetary) accounts.

TERMINOLOGY

Every endeavour has been made to ensure terminology used in the 2009-10 EAA is consistent with definitions found in the 2008-09 EAA and those used in the Australian Bureau of Agricultural and Resource Economics and Sciences' (ABARES) *Australian Energy Statistics (AES) - Energy Update 2011*.

NEXT ISSUE

The next release of the *Energy Account Australia*, 2010–11 is scheduled for release in 2012.

Brian Pink
Australian Statistician

LIST OF TABLES, GRAPHS AND GRAPHICS

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ABBREVIATIONS

$m	million dollars
ABARE - BRS	Australian Bureau of Agricultural and Resource Economics - Bureau of Rural Sciences
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
ANZSIC	Australian and New Zealand Standard Industrial Classification
ANZSIC06	*Australian and New Zealand Standard Industrial Classification, 2006 Edition*
ANZSIC93	*Australian and New Zealand Standard Industrial Classification, 1993 Edition*
ASNA	Australian System of National Accounts
cat. no.	Catalogue number
EAA	Energy Account, Australia
EAS	Economic Activity Survey
EWES	Energy, Water and Environment Survey
GJ	gigajoule
IGVA	industry gross value added
LNG	liquefied natural gas
LPG	liquefied petroleum gas
MDBA	Murray-Darling Basin Authority
NGERS	National Greenhouse and Energy Reporting System
PJ	petajoule
SEEA	System of Integrated Environmental and Economic Accounting
SEEA-E	System of Integrated Environmental and Economic Accounting - Energy
SMVU	ABS Survey of Motor Vehicle Use
SNA	System of National Accounts
SNA08	System of National Accounts 2008 version
SNA93	System of National Accounts 1993

CHAPTER 1 MAIN FINDINGS AND INTRODUCTION

MAIN FINDINGS

Energy supply

- Australia's domestic energy production in 2009–10 was 17,282 petajoules(PJ), a decrease of 3% from 2008–09.
- Australia's energy imports increased 5% from 1,915 PJ in 2008–09 to 2,014 PJ in 2009–10.
- Imports equated to 51% of domestic energy consumption in 2009–10, the main energy products used were crude oil 1,056 PJ and diesel 335 PJ.
- Black coal production rose 8% from 9,066 PJ in 2008–09 to 9,827 PJ in 2009–10, and now accounts for over half (57%) of Australia's domestic energy production. Supply of natural gas rose 8% (2,005 PJ) and now accounts for nearly 12% of domestic energy production.
- Renewable energy production contributed 2% (286 PJ) of domestic supply in 2009–10.

Energy use

- Australia's domestic energy consumption (i.e. industry and household energy use) was 3,962 PJ in 2009-10, an increase of 39 PJ (1%) from 2008-09. The main fuels consumed were natural gas (24%), electricity (22%), diesel (18%) and petrol (16%).
- Household energy use increased by 2% to 1,015 PJ in 2009–10, with the main energy sources being petrol (457 PJ), electricity (217 PJ) and natural gas (144 PJ).
- The MANUFACTURING industry was the largest user of domestic energy (1,034 PJ) in 2009–10. Over one–third (35%) of manufacturing energy use occurred within NON-FERROUS METALS production.
- The export market is the single largest destination for Australian energy products, accounting for 13,702 PJ, or 71% of energy production.

Energy intensity

- The energy intensity of Australian industries declined by 1% between 2008–09 and 2009–10.
- Australia's most energy intensive industries in 2009–10 were MANUFACTURING (9,600 GJ/$m of IGVA), TRANSPORT (8,291 GJ/$m of IGVA) and MINING (5,651 GJ/$m of IGVA).
- The energy intensity of the AGRICULTURE industry increased by 3% between 2008–09 and 2009–10.

INTRODUCTION

Energy is of vital importance to policy makers and has both economic and environmental dimensions. Demand for energy products has risen in recent years, driven by growing exports and domestic use, which can in turn affect the price and security of supply. The *Energy Account Australia* (EAA), provides statistics to monitor changes over time in the supply and use of energy within Australia, both from an economic and an environmental perspective. The EAA forms part of a suite of environmental-economic accounts being developed for Australia.

INTRODUCTION *continued*

The energy data contained in this publication are produced in accordance with the principles outlined within the *System of Environmental–Economic Accounting for Energy* (SEEA–E) — a satellite system of the System of National Accounts (SNA).

The diagram below presents a graphical view of Australia's supply and use system of energy. Further detail on supply and use frameworks is contained in the Explanatory Notes.

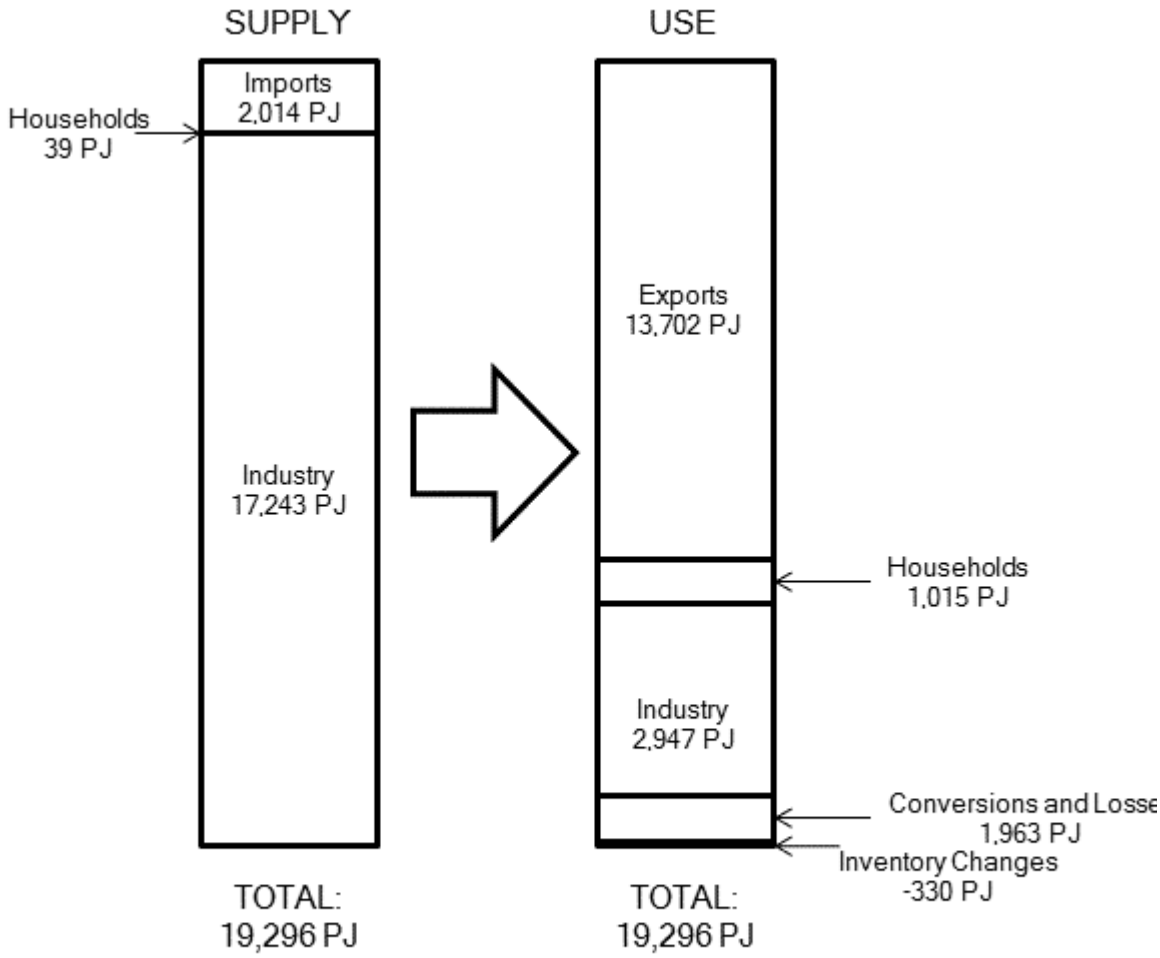
Physical supply is composed of:

- Domestic production
- Imports

Physical use is composed of:

- Household final consumption
- Industry intermediate consumption
- Exports
- Inventory changes
- Conversions and losses

1.1 SUPPLY AND USE, by components—2009–10



Note: Any discrepancies between totals and sums of components in this publication are due to rounding.

INTRODUCTION *continued*

The data on physical supply and use of energy products are primarily derived from the Australian Bureau of Agricultural and Resource Economics and Sciences' (ABARES) Australian Energy Statistics (AES) - Energy Update 2011. ABS uses the SEEA–E to transform AES into a framework consistent with the SNA, enabling linkages between energy supply, energy use and Australian National Accounts. A more detailed description of the data sources and processes used to develop the EAA is contained in the Explanatory Notes.

SECTION CONTENTS

This edition of the *Energy Account Australia* consists of three sections; Explanatory Notes; Glossary; abbreviations and a set of data cubes. Each section begins with an introduction and contains commentary to highlight key data and assist with interpretation of tables, which are interspersed within the section commentary.

The physical energy supply and use sections present commentary and summary graphs on the flow of energy through the Australian economy for 2008–09 and 2009–10. The complete physical supply and use tables for Australia can be found in the data cubes. Tables present volumes of energy supplied, used and energy losses by industry and energy product.

The energy intensity section presents commentary and summary graphs on the amount of energy industries consumed to produce one unit of economic output.

INQUIRIES

For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070.

CHAPTER 2 SUPPLY OF ENERGY

MAIN FINDINGS

- Australia's domestic energy production in 2009–10 was 17,282 petajoules(PJ), a decrease of 3% from 2008–09.
- Australia's energy imports increased 5% from 1,915 PJ in 2008–09 to 2,014 PJ in 2009–10.
- Imports equated to 51% of domestic energy consumption in 2009–10, the main energy products used were crude oil 1,056 PJ and diesel 335 PJ.
- Black coal production rose 8% from 9,066 PJ in 2008–09 to 9,827 PJ in 2009–10, and now accounts for over half (57%) of Australia's domestic energy production. Supply of natural gas rose 8% (2,005 PJ) and now accounts for nearly 12% of domestic energy production.
- Renewable energy production contributed 2% (286 PJ) of domestic supply in 2009–10.

The energy supply tables record details of the supply of energy products for 2008–09 and 2009–10. Net supply consists of energy products as they enter the economy, either by domestic extraction (eg mining production) or as imports.

IMPORTS

Australia's energy imports increased 5%, from 1,915 PJ to 2,014 PJ in 2009–10. The largest energy product imported was crude oil and refinery feedstock (52%), followed by diesel (17%), other refined fuels (12%), natural gas (11%), petrol (7%) and LPG (1%).

Imports (2,014 PJ) contributed 10% of total energy supply in 2009–10. However, imports equated to 51% of domestic energy consumption (3,964 PJ), a 2% increase from 2008–09.

DOMESTIC PRODUCTION

Australia's domestic energy production in 2009–10 was 17,282 PJ, a decrease of 3% from 2008–09. The majority of Australia's domestic energy production (79%) was exported in 2009–10. Further detail on exports is available within the energy use chapter.

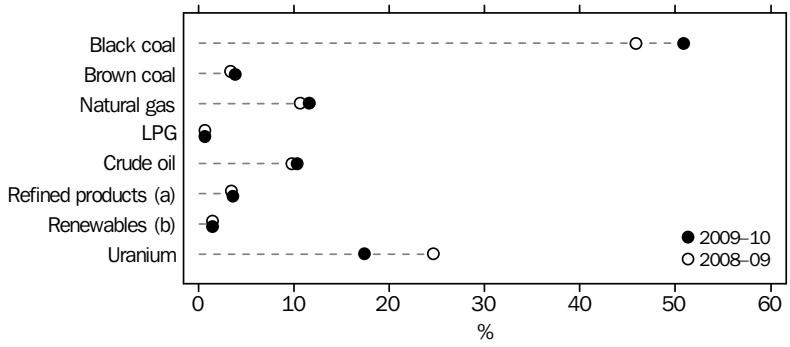
Black coal continues to be the largest component of Australian energy production, accounting for over half (57%) of Australia's domestic energy supply in 2009–10. Black coal production rose 8%, mainly in response to strong overseas demand for coking coal. In contrast, the contribution from the second largest energy source, uranium, fell sharply (31%). The third largest energy source, natural gas, rose 8% to 2,005 PJ and now accounts for 12% of domestic energy production.

Energy production from renewable energy sources, bagasse (sugar cane residue) and hydro-electricity, fluctuate according to sugar production and water availability for hydro-electricity generators. Together, they contributed 133 PJ (1%) to domestic energy supply in 2009–10, a decrease of 7% from the previous year. Supply from "newer" renewables, namely wind, solar and biofuels, is increasing rapidly but from a very low base. Wind energy increased 21% in 2009–10 to 17 PJ. Solar energy (photovoltaic and solar hot water) also increased by 22% to 11 PJ. Biofuels contributed 21 PJ, an increase of

DOMESTIC PRODUCTION
continued

11%. Despite these increases, the total contribution of all renewables to domestic energy supply was almost unchanged at 286 PJ, or nearly 2%.

2.1 NET ENERGY SUPPLY, by product (including imports)—2008–09 and 2009–10

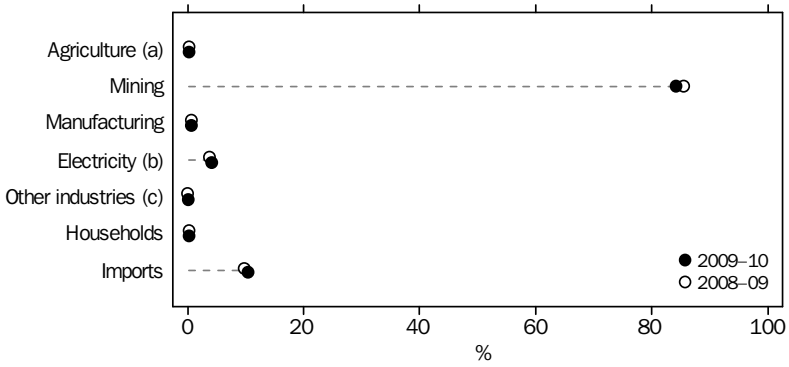


(a) 'Refined products' includes petrol, diesel, aviation fuel, kerosene, heating oil, fuel oil, refinery fuel and naptha.
(b) Renewables includes biomass wood, bagasse, biofuels, hydroelectricity, solar and wind energy

The MINING industry produced 84% of Australia's total energy supply in 2009–10, followed by imports (10%). ELECTRICITY, GAS, WATER AND WASTE SERVICES (4%) extract low amounts of energy products but supply high amounts of transformed energy (eg electricity). The remaining 2% was produced from MANUFACTURING, AGRICULTURE, FORESTRY AND FISHING and households.

Outside the MINING industry, most energy supply is from industries and households producing energy for their own use; the ELECTRICITY SUPPLY industry extracts its own brown coal as well as hydro and wind energy for producing electricity; manufacturing businesses use their own bagasse and organic waste for heat, electricity or biofuel production; and households extract solar energy for hot water and electricity, as well as self-extracting a portion of their own wood.

2.2 ENERGY SUPPLY, by industry, households and imports—2008–09 and 2009–10



(a) Includes Forestry and fishing
(b) includes Gas, water supply and waste services
(c) Includes Construction, Transport and Commercial and services industries

2.3 AUSTRALIAN NET SUPPLY OF ENERGY—2009–10

Supply by industry	*Black coal* PJ	*Brown coal* PJ	*Briquettes* PJ	*Coke* PJ	*Coal by-products*(a) PJ	*Natural gas* PJ	*Crude oil and refinery feedstock* PJ
Agriculture, forestry and fishing	—	—	—	—	—	—	—
Mining	9 827	—	—	—	—	2 005	946
Manufacturing							
Food, beverages, textiles	—	—	—	—	—	—	—
Wood, paper, printing	—	—	—	—	—	—	—
Petroleum and chemical products	—	—	—	—	—	—	—
Iron and steel	—	—	—	—	—	—	—
Non-ferrous metals	—	—	—	—	—	—	—
Other manufacturing	—	—	—	—	—	—	—
Total Manufacturing	—	—	—	—	—	—	—
Electricity, gas, water and waste	—	744	—	—	—	—	—
Construction	—	—	—	—	—	—	—
Transport							
Road	—	—	—	—	—	—	—
Rail	—	—	—	—	—	—	—
Air	—	—	—	—	—	—	—
Water	—	—	—	—	—	—	—
Other transport, storage and services	—	—	—	—	—	—	—
Total Transport	—	—	—	—	—	—	—
Commercial services							
Wholesale and retail trade	—	—	—	—	—	—	—
Accommodation(b)	—	—	—	—	—	—	—
Communication(c)	—	—	—	—	—	—	—
Other(d)(e)	—	—	—	—	—	—	—
Total Commercial and services	—	—	—	—	—	—	—
Total supply by industry	**9 827**	**744**	—	—	—	**2 005**	**946**
Supply by households	—	—	—	—	—	—	—
Imports	—	—	—	—	—	226	1 056
Net supply	9 827	744	—	—	—	2 231	2 002

— nil or rounded to zero (including null cells)

(a) Includes blast furnace gas, coal tar, benzene/toluene/xylene feedstock and coke oven gas.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

Note: Any discrepancies between totals and sums of components in this publication are due to rounding.

2.3 AUSTRALIAN NET SUPPLY OF ENERGY—2009–10 *continued*

Supply by industry	*Petrol* PJ	*Diesel* PJ	*Other refined fuels and products*(a) PJ	*LPG* PJ	*Biofuels* PJ	*Wood and wood waste* PJ	*Bagasse* PJ
Agriculture, forestry and fishing	—	—	—	—	—	45	—
Mining	—	—	—	111	—	—	—
Manufacturing							
Food, beverages, textiles	—	—	—	—	—	—	88
Wood, paper, printing	—	—	—	—	—	29	—
Petroleum and chemical products	—	—	—	—	11	—	—
Iron and steel	—	—	—	—	—	—	—
Non-ferrous metals	—	—	—	—	—	—	—
Other manufacturing	—	—	—	—	—	—	—
Total Manufacturing	—	—	—	—	***11***	***26***	***88***
Electricity, gas, water and waste	—	—	—	—	10	—	—
Construction	—	—	—	—	—	—	—
Transport							
Road	—	—	—	—	—	—	—
Rail	—	—	—	—	—	—	—
Air	—	—	—	—	—	—	—
Water	—	—	—	—	—	—	—
Other transport, storage and services	—	—	—	—	—	—	—
Total Transport	—	—	—	—	—	—	—
Commercial services							
Wholesale and retail trade	—	—	—	—	—	—	—
Accommodation(b)	—	—	—	—	—	—	—
Communication(c)	—	—	—	—	—	—	—
Other(d)(e)	—	—	—	—	—	—	—
Total Commercial and services	—	—	—	—	—	—	—
Total supply by industry	—	—	—	**111**	**21**	**74**	**88**
Supply by households	—	—	—	—	—	29	—
Imports	132	335	236	29	—	—	—
Net supply	132	335	236	139	21	103	88

— nil or rounded to zero (including null cells)

(a) Excludes non-fuel petroleum products such as bitumen, lubricants, solvents and greases.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

Note: Any discrepancies between totals and sums of components in this publication are due to rounding.

2.3 AUSTRALIAN NET SUPPLY OF ENERGY—2009–10 *continued*

Supply by industry	*Electricity* PJ	*Hydro energy* PJ	*Solar energy*(a) PJ	*Wind energy* PJ	*Uranium* PJ	*Total* PJ
Agriculture, forestry and fishing	—	—	—	—	—	45
Mining	—	—	—	—	3 363	16 252
Manufacturing						
Food, beverages, textiles	—	—	—	—	—	88
Wood, paper, printing	—	—	—	—	—	29
Petroleum and chemical products	—	—	—	—	—	11
Iron and steel	—	—	—	—	—	—
Non-ferrous metals	—	—	—	—	—	—
Other manufacturing	—	—	—	—	—	—
Total Manufacturing	—	—	—	—	—	***128***
Electricity, gas, water and waste	—	45	1	17	—	818
Construction	—	—	—	—	—	—
Transport						
Road	—	—	—	—	—	—
Rail	—	—	—	—	—	—
Air	—	—	—	—	—	—
Water	—	—	—	—	—	—
Other transport, storage and services	—	—	—	—	—	—
Total Transport	—	—	—	—	—	—
Commercial services						
Wholesale and retail trade	—	—	—	—	—	—
Accommodation(b)	—	—	—	—	—	—
Communication(c)	—	—	—	—	—	—
Other(d)(e)	—	—	—	—	—	—
Total Commercial and services	—	—	—	—	—	—
Total supply by industry	—	**45**	**1**	**17**	**3 363**	**17 243**
Supply by households	—	—	10	—	—	39
Imports	—	—	—	—	—	2 014
Net supply	—	45	11	17	3 363	19 296

— nil or rounded to zero (including null cells)

(a) Includes solar electricity and solar hot water.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

Note: Any discrepancies between totals and sums of components in this publication are due to rounding.

2.4 AUSTRALIAN NET SUPPLY OF ENERGY—2008–09

Supply by industry	*Black coal* PJ	*Brown coal* PJ	*Briquettes* PJ	*Coke* PJ	*Coal by-products*(a) PJ	*Natural Gas* PJ	*Crude oil and refinery feedstock* PJ
Agriculture, forestry and fishing	—	—	—	—	—	—	—
Mining	9 066	—	—	—	—	1 853	997
Manufacturing							
Food, beverages, textiles	—	—	—	—	—	—	—
Wood, paper, printing	—	—	—	—	—	—	—
Petroleum and chemical products	—	—	—	—	—	—	—
Iron and steel	—	—	—	—	—	—	—
Non-ferrous metals	—	—	—	—	—	—	—
Other manufacturing	—	—	—	—	—	—	—
Total Manufacturing	—	—	—	—	—	—	—
Electricity, gas, water and waste	—	669	—	—	—	—	—
Construction	—	—	—	—	—	—	—
Transport							
Road	—	—	—	—	—	—	—
Rail	—	—	—	—	—	—	—
Air	—	—	—	—	—	—	—
Water	—	—	—	—	—	—	—
Other transport, storage and services	—	—	—	—	—	—	—
Total Transport	—	—	—	—	—	—	—
Commercial and services							
Wholesale and retail trade	—	—	—	—	—	—	—
Accommodation(b)	—	—	—	—	—	—	—
Communication(c)	—	—	—	—	—	—	—
Other(d)(e)	—	—	—	—	—	—	—
Total Commercial and services	—	—	—	—	—	—	—
Total supply by industry	**9 066**	**669**	—	—	—	**1 853**	**997**
Supply by households	—	—	—	—	—	—	—
Imports	—	—	—	—	—	259	941
Net supply	9 066	669	—	—	—	2 111	1 938

— nil or rounded to zero (including null cells)

(a) Includes blast furnace gas, coal tar, benzene/toluene/xylene feedstock and coke oven gas.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

Note: Any discrepancies between totals and sums of components in this table are due to rounding.

2.4 AUSTRALIAN NET SUPPLY OF ENERGY—2008–09 *continued*

Supply by industry	*Petrol* PJ	*Diesel* PJ	*Other refined fuels and products*(a) PJ	*LPG* PJ	*Biofuels* PJ	*Wood and wood waste* PJ	*Bagasse* PJ
Agriculture, forestry and fishing	—	—	—	—	—	47	—
Mining	—	—	—	104	—	—	—
Manufacturing							
Food, beverages, textiles	—	—	—	—	—	—	103
Wood, paper, printing	—	—	—	—	—	27	—
Petroleum and chemical products	—	—	—	—	8	—	—
Iron and steel	—	—	—	—	—	—	—
Non-ferrous metals	—	—	—	—	—	—	—
Other manufacturing	—	—	—	—	—	—	—
Total Manufacturing	—	—	—	—	***8***	***27***	***103***
Electricity, gas, water and waste	—	—	—	—	11	—	—
Construction	—	—	—	—	—	—	—
Transport							
Road	—	—	—	—	—	—	—
Rail	—	—	—	—	—	—	—
Air	—	—	—	—	—	—	—
Water	—	—	—	—	—	—	—
Other transport, storage and services	—	—	—	—	—	—	—
Total Transport	—	—	—	—	—	—	—
Commercial and services							
Wholesale and retail trade	—	—	—	—	—	—	—
Accommodation(b)	—	—	—	—	—	—	—
Communication(c)	—	—	—	—	—	—	—
Other(d)(e)	—	—	—	—	—	—	—
Total Commercial and services	—	—	—	—	—	—	—
Total supply by industry	—	—	—	**104**	**19**	**74**	**103**
Supply by households	—	—	—	—	—	29	—
Imports	139	318	232	27	—	—	—
Net supply	139	318	232	131	19	103	103

— nil or rounded to zero (including null cells)

(a) Excludes non-fuel petroleum products such as bitumen, lubricants, solvents and greases.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

Note: Any discrepancies between totals and sums of components in this table are due to rounding.

2.4 AUSTRALIAN NET SUPPLY OF ENERGY—2008–09 *continued*

Supply by industry	*Electricity* PJ	*Hydro energy* PJ	*Solar energy*(a) PJ	*Wind energy* PJ	*Uranium* PJ	*Total* PJ
Agriculture, forestry and fishing	—	—	—	—	—	47
Mining	—	—	—	—	4 846	16 866
Manufacturing						
Food, beverages, textiles	—	—	—	—	—	103
Wood, paper, printing	—	—	—	—	—	27
Petroleum and chemical products	—	—	—	—	—	8
Iron and steel	—	—	—	—	—	—
Non-ferrous metals	—	—	—	—	—	—
Other manufacturing	—	—	—	—	—	—
Total Manufacturing	—	—	—	—	—	***138***
Electricity, gas, water and waste	—	40	1	14	—	734
Construction	—	—	—	—	—	—
Transport						
Road	—	—	—	—	—	—
Rail	—	—	—	—	—	—
Air	—	—	—	—	—	—
Water	—	—	—	—	—	—
Other transport, storage and services	—	—	—	—	—	—
Total Transport	—	—	—	—	—	—
Commercial and services						
Wholesale and retail trade	—	—	—	—	—	—
Accommodation(b)	—	—	—	—	—	—
Communication(c)	—	—	—	—	—	—
Other(d)(e)	—	—	—	—	—	—
Total Commercial and services	—	—	—	—	—	—
Total supply by industry	—	**40**	**1**	**14**	**4 846**	**17 785**
Supply by households	—	—	8	—	—	37
Imports	—	—	—	—	—	1 915
Net supply	—	40	9	14	4 846	19 737

— nil or rounded to zero (including null cells)

(a) Includes solar electricity and solar hot water.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

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CHAPTER 3 USE OF ENERGY

MAIN FINDINGS

- Australia's domestic energy consumption (i.e. industry and household energy use) was 3,962 PJ in 2009-10, an increase of 39 PJ (1%) from 2008-09. The main fuels consumed were natural gas (24%), electricity (22%), diesel (18%) and petrol (16%).
- Household energy use increased by 2% to 1,015 PJ in 2009–10, with the main energy sources being petrol (457 PJ), electricity (217 PJ) and natural gas (144 PJ).
- The manufacturing industry was the largest user of domestic energy (1,034 PJ) in 2009–10. Over one–third (35%) of manufacturing energy use occurred within Non-ferrous metals production.
- The export market is the single largest destination for Australian energy products, accounting for 13,702 PJ, or 71% of energy production.

The energy use tables record use of energy products for 2008–09 and 2009–10. Net use consists of intermediate consumption by industry, final consumption by households, exports, inventory changes, conversions and losses.

DOMESTIC CONSUMPTION

Australia's domestic energy consumption (i.e. industry and household energy use) was 3,962 PJ in 2009–10, an increase of 39 PJ (1%) from 2008–09. The main fuels consumed were natural gas (24%), electricity (22%), diesel (18%) and petrol (16%).

The Manufacturing industry was the largest consumer of domestic energy (1,034 PJ) in 2009–10. Over one–third (35%) of manufacturing energy occurred within non-ferrous metals production. This was followed by chemicals and petroleum production (21%) and other manufacturing products (16%). The remaining energy was used in the Iron and steel, Food, beverages and textiles, Wood, paper and printing industries.

Household energy use increased by 2% from 997 PJ in 2008–09 to 1,015 PJ in 2009–10. Households accounted for 26% of domestic energy use in 2009–10, with petrol (457 PJ), electricity (217 PJ) and natural gas (144 PJ) the principal fuels used.

The Mining and Transport industries each accounted for 14% of domestic energy use. The primary fuels consumed by the Mining industry were natural gas (314 PJ) and diesel (147 PJ).The main fuels used by Transport were other refined fuel products (279 PJ) and diesel (202 PJ).

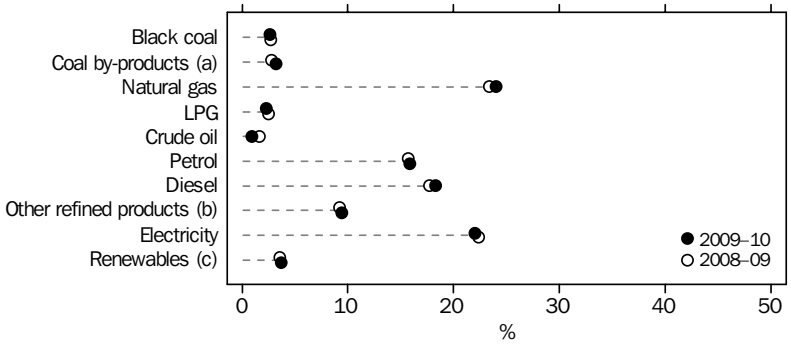
Commercial and services industries accounted for 11% of domestic energy use, with the predominant fuels being electricity (206 PJ) and petrol (93 PJ).

Net losses and conversions accounted for 1,963 PJ in 2009–10. Losses and conversions occur in the transformation of fossil fuels and organic waste into electricity, crude oil into LPG and petroleum products, and coal by-products in steel making.

DOMESTIC CONSUMPTION

continued

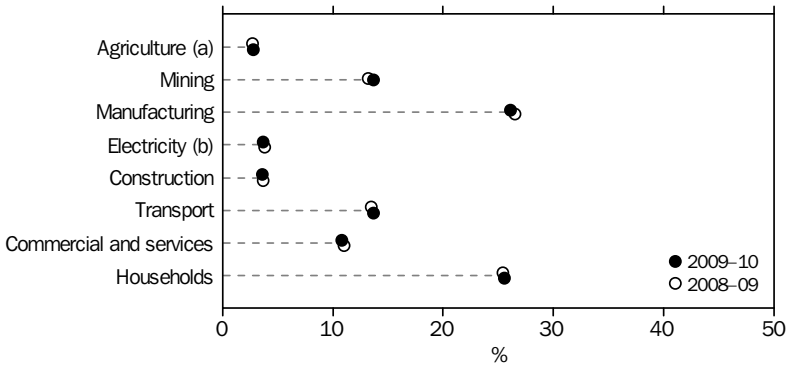
3.1 DOMESTIC ENERGY USE, by product—2008–09 and 2009–10



(a) Coal by-products include metallurgical coke, blast furnace gas, coal tar, benzene/toluene/xylene feedstock and coke oven gas.
(b) Other refined products includes aviation fuel, kerosene, heating oil, fuel oil, refinery fuel and naptha.
(c) Renewables includes biomass wood, bagasse, biofuels, hydroelectricity, solar and wind energy.

Note: All uranium is exported

3.2 DOMESTIC NET ENERGY USE—2008–09 and 2009–10



Excludes net conversion losses and inventory changes
(a) Includes Forestry and fishing
(b) Includes Gas supply, water supply and waste services

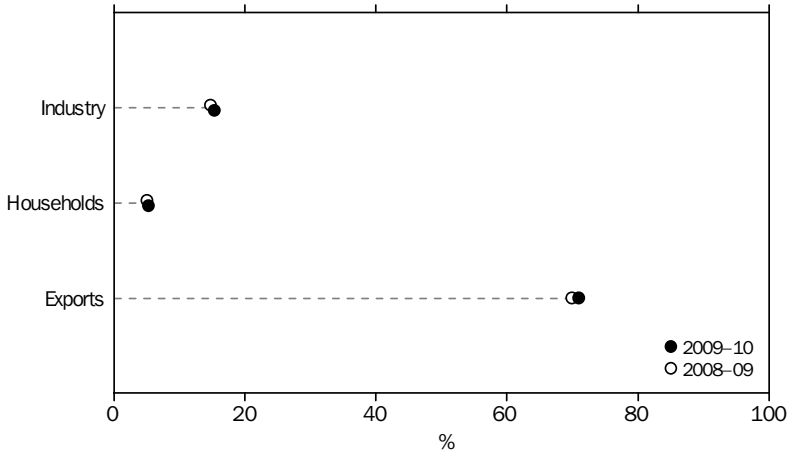
EXPORTED ENERGY

The export market is the single largest user of Australian energy products, accounting for 71% of total energy use. Together, black coal (8,327 PJ) and uranium (3,551 PJ) contributed 87% to total energy exports in 2009–10. Uranium exports decreased by 25% between 2008–09 and 2009–10. Total exports also fell slightly due to this sharp drop in uranium exports, though exports of black coal (up 12%) and natural gas (up 16%) continued to rise. Exports of natural gas (as LNG), while still small compared to coal and uranium, now account for 7% (972 PJ) of total energy exports. Crude oil (668 PJ) made up the majority of remaining exports, with small quantities of LPG and refined petroleum products.

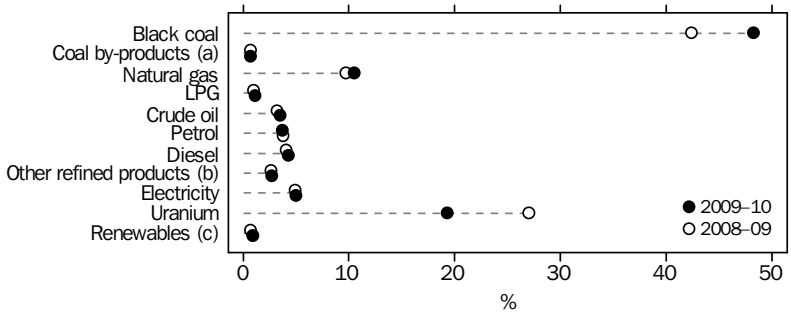
EXPORTED ENERGY

continued

3.3 NET ENERGY USE—2008–09 and 2009–10



3.4 NET ENERGY USE, by product—2008–09 and 2009–10



(a) Coal by-products include metallurgical coke, blast furnace gas, coal tar, benzene/toluene/xylene
(b) Other refined products includes aviation fuel, kerosene, heating oil, fuel oil, refinery fuel and naptha.
(c) Renewables includes biomass wood, bagasse, biofuels, hydroelectricity, solar and wind energy.

Note: Excludes conversion losses.

3.5 AUSTRALIAN NET USE OF ENERGY—2009–10

Net use by industry	*Black coal* PJ	*Brown coal* PJ	*Briquettes* PJ	*Coke* PJ	*Coal by-products*(a) PJ	*Natural gas* PJ	*Crude oil and refinery feedstock* PJ
Agriculture, forestry and fishing	—	—	—	—	—	—	—
Mining	4	—	—	—	—	314	—
Manufacturing							
Food, beverages, textiles	12	—	3	—	3	36	—
Wood, paper, printing	4	—	—	—	—	25	—
Petroleum and chemical products	6	—	—	1	1	119	37
Iron and steel	1	—	—	2	30	27	—
Non-ferrous metals	50	—	—	3	1	122	—
Other manufacturing	27	—	—	—	—	70	—
Total Manufacturing	99	—	3	6	34	399	37
Electricity, gas, water and waste	—	—	—	—	—	14	—
Construction	—	—	—	—	—	3	—
Transport							
Road	—	—	—	—	—	2	—
Rail	—	—	—	—	—	—	—
Air	—	—	—	—	—	—	—
Water	—	—	—	—	—	—	—
Other transport, storage and services	—	—	—	—	—	18	—
Total Transport	—	—	—	—	—	20	—
Commercial and services							
Wholesale and retail trade	—	—	—	—	—	5	—
Accommodation(b)	—	—	—	—	—	17	—
Communication(c)	—	—	—	—	—	9	—
Other(d)(e)	—	—	—	—	—	17	—
Total Commercial and services	—	—	1	—	—	48	—
Total net use by industry	**104**	—	**4**	**6**	**34**	**798**	**37**
Net use by households	—	—	—	—	—	144	—
Inventory changes	11	2	—	2	–1	–113	–93
Exports	8 327	—	—	—	—	972	668
Conversions and losses(f)	1 387	742	–4	–8	–34	429	1 390
Total net use(g)	8 443	2	4	8	34	1 801	613

— nil or rounded to zero (including null cells)

(a) Includes blast furnace gas, coal tar, benzene/toluene/xylene feedstock and coke oven gas.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

(f) Negative numbers indicate net production of fuels.

(g) Net use of individual energy products do not sum to total energy use due to exclusion of conversions

Note: Any discrepancies between totals and sums of components in this publication are due to rounding.

3.5 AUSTRALIAN NET USE OF ENERGY—2009–10 *continued*

Net use by industry	*Petrol* PJ	*Diesel* PJ	*Other refined fuels and products*(a) PJ	*LPG* PJ	*Biofuels* PJ	*Wood and wood waste* PJ	*Bagasse* PJ
Agriculture, forestry and fishing	7	92	—	2	—	—	—
Mining	2	147	8	3	1	—	—
Manufacturing							
Food, beverages, textiles	3	6	1	4	—	2	34
Wood, paper, printing	2	4	—	1	1	29	—
Petroleum and chemical products	2	2	27	1	—	—	2
Iron and steel	—	1	1	—	—	—	—
Non-ferrous metals	—	3	51	—	—	1	—
Other manufacturing	9	16	4	3	1	1	—
Total Manufacturing	17	33	85	9	2	34	35
Electricity, gas, water and waste	3	9	—	—	—	—	—
Construction	39	96	1	5	—	—	—
Transport							
Road	4	153	—	5	8	—	—
Rail	—	29	—	—	—	—	—
Air	2	—	246	—	—	—	—
Water	—	2	33	—	—	—	—
Other transport, storage and services	4	18	—	6	—	—	—
Total Transport	10	202	279	11	8	—	—
Commercial and services							
Wholesale and retail trade	33	25	—	3	—	—	—
Accommodation(b)	4	1	—	7	—	—	—
Communication(c)	30	18	—	3	—	—	—
Other(d)(e)	26	18	—	4	—	—	—
Total Commercial and services	93	63	—	17	—	1	—
Total net use by industry	**170**	**642**	**373**	**48**	**10**	**34**	**35**
Net use by households	457	82	—	47	—	57	—
Inventory changes	14	11	8	14	—	—	—
Exports	8	7	94	75	—	—	—
Conversions and losses(f)	–517	–408	–238	–45	11	12	53
Total net use(g)	649	743	474	184	10	92	35

— nil or rounded to zero (including null cells)

(a) Excludes non-fuel petroleum products such as bitumen, lubricants, solvents and greases.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

(f) Negative numbers indicate net production of fuels.

(g) Net use of individual energy products do not sum to total energy use due to exclusion of conversions

Note: Any discrepancies between totals and sums of components in this publication are due to rounding.

3.5 AUSTRALIAN NET USE OF ENERGY—2009–10 *continued*

Net use by industry	*Electricity* PJ	*Hydro energy* PJ	*Solar energy*(a) PJ	*Wind energy* PJ	*Uranium* PJ	*Total* PJ
Agriculture, forestry and fishing	8	—	—	—	—	109
Mining	64	—	—	—	—	543
Manufacturing						
Food, beverages, textiles	22	—	—	—	—	125
Wood, paper, printing	18	—	—	—	—	84
Petroleum and chemical products	24	—	—	—	—	222
Iron and steel	14	—	—	—	—	75
Non-ferrous metals	133	—	—	—	—	365
Other manufacturing	31	—	—	—	—	163
Total Manufacturing	241	—	—	—	—	1 034
Electricity, gas, water and waste	121	—	—	—	—	146
Construction	—	—	—	—	—	144
Transport						
Road	—	—	—	—	—	171
Rail	8	—	—	—	—	38
Air	—	—	—	—	—	247
Water	—	—	—	—	—	36
Other transport, storage and services	5	—	—	—	—	51
Total Transport	14	—	—	—	—	544
Commercial and services						
Wholesale and retail trade	54	—	—	—	—	121
Accommodation(b)	27	—	—	—	—	57
Communication(c)	77	—	—	—	—	137
Other(d)(e)	47	—	—	—	—	114
Total Commercial and services	206	—	—	—	—	429
Total net use by industry	**653**	—	—	—	—	**2 947**
Net use by households	217	—	10	—	—	1 015
Inventory changes	—	—	—	—	–188	–331
Exports	—	—	—	—	3 551	13 702
Conversions and losses(f)	–870	45	1	17	—	1 963
Total net use(g)	870	—	10	—	3 363	19 296

— nil or rounded to zero (including null cells)

(a) Includes solar electricity and solar hot water.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

(f) Negative numbers indicate net production of fuels.

(g) Net use of individual energy products do not sum to total energy use due to exclusion of conversions

Note: Any discrepancies between totals and sums of components in this publication are due to rounding.

3.6 AUSTRALIAN NET USE OF ENERGY—2008–09

Net use by industry	*Black coal* PJ	*Brown coal* PJ	*Briquettes* PJ	*Coke* PJ	*Coal by-products*(a) PJ	*Natural gas* PJ	*Crude oil and refinery feedstock* PJ
Agriculture, forestry and fishing	—	—	—	—	—	—	—
Mining	4	—	—	—	—	295	—
Manufacturing							
Food, beverages, textiles	12	—	2	—	2	37	—
Wood, paper, printing	5	—	—	—	—	23	—
Petroleum and chemical products	6	—	—	1	—	103	65
Iron and steel	—	—	—	1	25	21	—
Non-ferrous metals	55	—	—	3	1	131	—
Other manufacturing	25	—	—	—	—	67	—
Total Manufacturing	***103***	—	***3***	***6***	***30***	***381***	***65***
Electricity, gas, water and waste	—	—	—	—	—	15	—
Construction	—	—	—	—	—	3	—
Transport							
Road	—	—	—	—	—	2	—
Rail	—	—	—	—	—	—	—
Air	—	—	—	—	—	—	—
Water	—	—	—	—	—	—	—
Other transport, storage and services	—	—	—	—	—	18	—
Total Transport	—	—	—	—	—	***20***	—
Commercial and services							
Wholesale and retail trade	—	—	—	—	—	5	—
Accommodation(b)	—	—	—	—	—	16	—
Communication(c)	—	—	—	—	—	9	—
Other(d)(e)	—	—	—	—	—	16	—
Total Commercial and services	—	—	***1***	—	—	***46***	—
Total net use by industry	**107**	—	**4**	**6**	**30**	**760**	**65**
Net use by households	—	—	—	—	—	141	—
Inventory changes	77	–31	—	6	—	–39	–111
Exports	7 411	—	—	—	—	838	614
Conversions and losses(f)	1 472	700	–4	–12	–30	411	1 370
Total net use(g)	7 598	–31	4	69	47	1 745	568

— nil or rounded to zero (including null cells)

(a) Includes blast furnace gas, coal tar, benzene/toluene/xylene feedstock and coke oven gas.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

(f) Negative numbers indicate net production of fuels.

(g) Net use of individual energy products do not sum to total energy use due to exclusion of conversions.

Note: Any discrepancies between totals and sums of components in this table are due to rounding.

3.6 AUSTRALIAN NET USE OF ENERGY—2008–09 *continued*

Net use by industry	*Petrol* PJ	*Diesel* PJ	*Other refined fuels and products*(a) PJ	*LPG* PJ	*Biofuels* PJ	*Wood and wood waste* PJ	*Bagasse* PJ
Agriculture, forestry and fishing	7	90	—	2	—	—	—
Mining	2	141	6	4	—	—	—
Manufacturing							
Food, beverages, textiles	3	5	2	4	—	3	35
Wood, paper, printing	3	4	—	1	—	27	—
Petroleum and chemical products	2	2	27	1	—	—	—
Iron and steel	—	1	1	—	—	—	—
Non-ferrous metals	—	3	48	—	—	2	—
Other manufacturing	9	16	5	3	1	1	—
Total Manufacturing	***18***	***32***	***83***	***10***	***1***	***33***	***35***
Electricity, gas, water and waste	3	8	—	—	—	—	—
Construction	41	93	1	5	—	—	—
Transport							
Road	4	149	—	5	6	—	—
Rail	—	28	—	—	—	—	—
Air	2	—	230	—	—	—	—
Water	—	2	40	—	—	—	—
Other transport, storage and services	4	18	—	6	—	—	—
Total Transport	***10***	***198***	***271***	***12***	***6***	—	—
Commercial and services							
Wholesale and retail trade	35	25	—	4	—	—	—
Accommodation(b)	4	1	—	7	—	—	—
Communication(c)	32	17	—	3	—	—	—
Other(d)(e)	28	18	—	5	—	—	—
Total Commercial and services	***99***	***61***	—	***18***	—	***1***	—
Total net use by industry	**180**	**623**	**360**	**51**	**7**	**33**	**35**
Net use by households	454	70	—	50	—	58	—
Inventory changes	32	25	17	13	—	—	—
Exports	8	14	97	68	—	—	—
Conversions and losses(f)	–536	–414	–243	–51	11	11	69
Total net use(g)	675	732	474	182	7	92	35

— nil or rounded to zero (including null cells)

(a) Excludes non-fuel petroleum products such as bitumen, lubricants, solvents and greases.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

(f) Negative numbers indicate net production of fuels.

(g) Net use of individual energy products do not sum to total energy use due to exclusion of conversions.

Note: Any discrepancies between totals and sums of components in this table are due to rounding.

3.6 AUSTRALIAN NET USE OF ENERGY—2008–09 *continued*

Net use by industry	*Electricity* PJ	*Hydro energy* PJ	*Solar energy*(a) PJ	*Wind energy* PJ	*Uranium* PJ	*Total* PJ
Agriculture, forestry and fishing	8	—	—	—	—	107
Mining	67	—	—	—	—	519
Manufacturing						
Food, beverages, textiles	22	—	—	—	—	127
Wood, paper, printing	17	—	—	—	—	80
Petroleum and chemical products	23	—	—	—	—	232
Iron and steel	12	—	—	—	—	63
Non-ferrous metals	136	—	—	—	—	379
Other manufacturing	32	—	—	—	—	160
Total Manufacturing	***243***	—	—	—	—	***1 041***
Electricity, gas, water and waste	124	—	—	—	—	150
Construction	—	—	—	—	—	144
Transport						
Road	—	—	—	—	—	166
Rail	10	—	—	—	—	38
Air	—	—	—	—	—	232
Water	—	—	—	—	—	43
Other transport, storage and services	5	—	—	—	—	51
Total Transport	***15***	—	—	—	—	***531***
Commercial and services						
Wholesale and retail trade	55	—	—	—	—	123
Accommodation(b)	28	—	—	—	—	57
Communication(c)	78	—	—	—	—	138
Other(d)(e)	48	—	—	—	—	115
Total Commercial and services	***208***	—	—	—	—	***433***
Total net use by industry	**665**	—	—	—	—	**2 926**
Net use by households	215	—	8	—	—	997
Inventory changes	—	—	—	—	93	81
Exports	—	—	—	—	4 754	13 803
Conversions and losses(f)	–880	40	1	14	—	1 931
Total net use(g)	880	—	8	—	4 846	19 737

— nil or rounded to zero (including null cells)

(a) Includes solar electricity and solar hot water.

(b) Includes Accommodation and food services.

(c) Includes Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services.

(d) Includes Administrative and support services, Public administration and safety, Education and training, Health care and social assistance, Arts and recreational services, Other services.

(e) Includes General government.

(f) Negative numbers indicate net production of fuels.

(g) Net use of individual energy products do not sum to total energy use due to exclusion of conversions.

Note: Any discrepancies between totals and sums of components in this table are due to rounding.

CHAPTER 4 ENERGY INTENSITY

MAIN FINDINGS

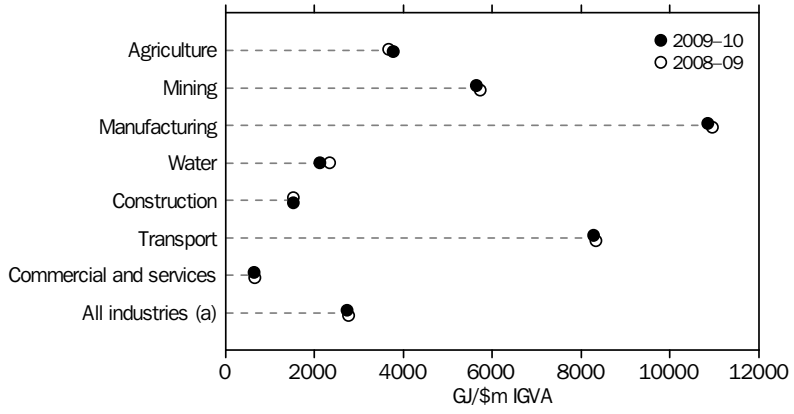
- The energy intensity of Australian industries declined by 1% between 2008–09 and 2009–10.
- Australia's most energy intensive industries in 2009–10 were MANUFACTURING (9,600 GJ/$m), TRANSPORT (8,291 GJ/$m) and MINING (5,651 GJ/$m).
- The energy intensity of the AGRICULTURE industry increased by 3% between 2008–09 and 2009–10.

ENERGY INTENSITY

The energy intensity of an industry is a measure of the energy consumed to produce one unit of economic output. The unit of measure used in the following graphs and commentary for each industry is gigajoules of energy consumed per million dollars of Industry Gross Value Added (GJ/$m IGVA). A high energy intensity figure does not necessarily imply that an industry is using energy inefficiently. Most industries engaged in physical transformation of raw materials will use more energy than service industries.

Differences in energy intensity between industries reflect different production processes and the share of energy within the production input mix. This is demonstrated in the energy intensity graph below; the MANUFACTURING industry is the most energy intensive industry within the Australian economy, followed by TRANSPORT and MINING. The COMMERCIAL AND SERVICES industries, such as RETAIL, HEALTH AND EDUCATION, are non-energy intensive industries.

4.1 ENERGY INTENSITY, by industry—2008–09 and 2009–10



Note: (a) Excluding Electricity and gas supply

The table below presents data on energy consumption, industry gross value added and energy intensity by industry. Energy intensity of the Australian economy decreased by 1% from 2,650 GJ/$m in 2008–09 to 2,613 GJ/$m IGVA in 2009–10. This is generally reflected in a decrease in the energy intensity of most Australian industries between 2008-09 and 2009-10. For example, energy use in the WATER SUPPLY AND WASTE SERVICES

ENERGY INTENSITY
continued

industry declined by 5%, while IGVA rose 5%. This resulted in an energy intensity decrease of 9%. Equally, energy use in the COMMERCIAL AND SERVICES industry declined by 1%, while IGVA rose 2%, resulting in energy intensity falling by 3%.

The energy intensity of the MANUFACTURING, MINING and CONSTRUCTION industries was relatively unchanged between 2008-09 and 2009-10. In contrast, energy use in AGRICULTURE increased by 1.7% between 2008–09 and 2009–10, while IGVA decreased by 1.2%. This resulted in an energy intensity increase of 3%.

4.2 ENERGY INTENSITY, by industry—2008–09 and 2009–10

	2008–09			2009–10		
	Energy use	*IGVA*(a)	*Energy intensity*	*Energy use*	*IGVA*(a)	*Energy intensity*
Industry	PJ	$m	GJ/$m IGVA	PJ	$m	GJ/$m IGVA
Agriculture(b)	107	29 109	3 676	109	28 764	3 783
Mining	519	90 507	5 736	543	96 105	5 651
Manufacturing	1 041	106 363	9 787	1 034	107 707	9 600
Water supply and waste services(c)(d)	22	9 332	2 342	21	9 786	2 129
Construction	144	95 292	1 527	144	95 804	1 529
Transport	531	63 885	8 330	544	65 392	8 291
Commercial and services	433	661 113	651	429	677 380	636
Total	**2 797**	**1 055 601**	**2 650**	**2 824**	**1 080 963**	**2 613**

(a) Industry Gross Value Added
(b) Includes Forestry and fishing
(c) Includes Water supply, sewerage and drainage services and waste collection, treatment and disposal services
(d) Excludes Electricity supply and gas supply
Note: One petajoule (PJ) = 1,000,000 gigajoules (GJ)

Describing changes in energy intensity between individual years does not imply a structural change in the way an industry uses energy. These changes in energy intensity between years may reflect 'one-off' changes in production processes, or short term changes in the level or mix of energy products consumed. We can only begin to consider structural impacts attributable to changes in the pattern of energy consumption of an industry over a longer time period. More detailed analysies of changes in energy intensity over time can be found in 'Energy Account Australia 2008-09' and 'End use energy intensity in the Australian economy'.

EXPLANATORY NOTES

INTRODUCTION

1 The ABS *Energy Account Australia* (EAA) is one of the environmental-economic accounts produced by the ABS based on the *System of Environmental-Economic Accounting for Energy* (SEEA-E). It consists of supply and use tables that identify physical volumes by industry and energy product. The aim of the EAA is to integrate data from different sources into a consolidated information set, making it possible to link physical data on energy to economic data, such as that in Australia's National Accounts.

2 Environmental-Economic accounts can provide information and improved understanding on a range of issues that include:

- broader assessment of the consequences of economic growth;
- the contribution of sectors to particular environmental problems; and
- implications of environmental policy measures across sectors (for example, regulation, charges and incentives).

ENVIRONMENTAL ACCOUNTING FRAMEWORK

3 The EAA was developed using the *System of Environmental–Economic Accounts* (SEEA) and the *SEEA for energy* (SEEA–E). SEEA was first published by the United Nations in 1993 and revised in 2003. SEEA is a supplementary account to the System of National Accounts 2008 and will be elevated to an international statistical standard in 2012. Environmental accounts extend the boundaries of the System of National Accounts (SNA) framework to include environmental resources, which occur outside the economic production and asset boundaries measured by the SNA.

RELATIONSHIP BETWEEN ENERGY ACCOUNT, AUSTRALIA AND NATIONAL ACCOUNTS

4 Energy supply and use tables provide a framework to link physical information to core components of the National Accounts. Physical data are presented in supply and use tables.

PHYSICAL SUPPLY AND USE

5 The supply table records the total supply of energy products within the economy (including imports).The use table records the total use of energy products within the economy and for export. The supply and use tables can be compiled in both physical and monetary terms.

6 The supply and use methodology is based on the fundamental economic identity that supply of products equals use of products.

Scope

7 This edition of EAA presents information on the net supply and use of energy in the entire Australian economy in physical terms.

8 Data on the physical supply and use of energy products are primarily derived from the Australian Bureau of Agricultural and Resource Economics and Sciences' (ABARES) *Australian Energy Statistics - Energy Update 2011* (AES). The ABS uses the SEEA-E to transform AES into a framework to enable linkages between energy supply, energy use and Australian National Accounts.

NET ENERGY FLOW ACCOUNTS

9 Net energy flow accounts record only energy 'entering' the economy (imports and extraction) and energy 'leaving' the economy (exports, energy used for final purposes and energy losses in conversion processes), within a supply-use framework.

10 The supply table of the net energy flow accounts shows the different energy products extracted within a country and supplied from the rest of the world (imports).

Scope continued

11 The use table shows the different energy products consumed for final purposes (final use of energy plus energy losses due to conversions) and supplied to the rest of the world (exports), along with inventory changes. In contrast to the gross energy accounts, there is no double counting. The main accounting identity underlying the net flow accounts for energy is:

Supply (Imports + Direct extraction) = Use (Exports + Final use of energy + Energy losses due to conversions + Inventory changes)

12 This accounting identity is only valid for the sum of all energy products in the economy and not for individual energy products. This is because the net supply table balances all energy use, whereas supply of an individual product will generally not equal use of that product due to losses and transformations.

13 Data contained in the net supply and use tables of this publication are used to compile the energy intensity time series estimates.

GROSS ENERGY FLOW ACCOUNTS

14 Gross energy flow accounts record total energy products extracted from nature and energy products processed from that energy. For example, a gross energy account includes electricity, in addition to fuels (i.e. coal) combusted to generate that electricity. The total gross energy use by industry is, therefore, not equal to total '*net*' energy consumption, which is energy consumed for '*final purposes*'. In our electricity generation example, only the electricity is considered as '*net*' use by the industry (transmission losses and own use), as it can no longer be used for any other energy purpose. The fuels used to generate electricity are treated separately as conversions and losses.

15 In any aggregation of gross data by industry, totals are subject to double counting.

16 Gross energy flows can be combined with expenditure on various energy products to derive implicit energy prices. This allows analysis of differentials in unit prices paid by industry for various energy products. Gross energy accounts are consistent with national accounting principles and with relevant monetary measures from the National Accounts.

TERRITORY PRINCIPLE

17 Information contained in this publication is based on data collected on a '*territory basis*', rather than on the National Account's '*residency basis*'. Although the net effect of this method is considered small, the ABS is currently reviewing available data to determine whether a more complete compliance with the residency principle is possible.

Coverage

18 Coverage for both supply and use tables includes the following energy products:

- Black coal;
- Brown coal;
- Brown coal briquettes;
- Metallurgical coke;
- Coal by-products (including blast furnace gas, coal tar, benzene/toluene/xylene feedstock and coke oven gas);
- Natural gas;
- Crude oil and other refinery feedstock;
- Propane, butane, LPG;
- Refined products (including petrol, diesel, aviation turbine fuel, kerosene, heating oil, fuel oil, refinery fuel and naphtha);
- Liquid/gas biofuels;
- Biomass wood;
- Biomass bagasse;
- Electricity;
    - solar electricity

Coverage continued

- wind electricity
- hydro-electricity
- other (i.e. that generated from combustion)

- Solar hot water; and
- Uranium

Wherever possible, data related to the refined petroleum products (petrol and diesel), have been shown separately in this edition of EAA.

19 Industry classifications used in this publication follow the 2006 edition of the Australian and New Zealand Standard Industry Classification (ANZSIC) (ABS cat. no. 1292.0).

- Agriculture, forestry and fishing;
- Mining;
- Manufacturing;
- Construction;
- Transport;
- Electricity, gas, water supply and waste services; and
- Commercial and services (see below).

20 Commercial and services covers a broad grouping of thirteen ANZSIC division level service industries. These industries have been grouped together because the energy consumption of each individually is relatively small and the ABARES statistical coverage of such industries is not as detailed as for other industries. Commercial and Services corresponds to the grouping of the same name used in ABARES AES and consists of the following ANZSIC divisions:

- Wholesale trade;
- Retail trade;
- Accommodation and food services;
- Information media and telecommunications;
- Financial and insurance services;
- Rental, hiring and real estate services;
- Professional, scientific and technical services;
- Administrative and support services;
- Public administration and safety;
- Education and training;
- Health care and social assistance;
- Arts and recreation services; and
- Other services

Data Sources

21 The estimates contained in this publication are drawn from a wide range of ABS and non-ABS data sources, including:

ABS SOURCES:

- 2008-09, Energy, Water and Environment Management survey (ABS cat. no. 4660.0); and
- 2010, Survey of Motor Vehicle Use (ABS cat. no. 9208.0).

NON ABS SOURCES:

- 2011, ABARES, Australian Energy Statistics - energy update 2011.

22 A range of other data sources were used in EAA for validation, or as an input to developing estimation methodologies.

ABS DATA SOURCES:

- Government Finance Statistics (ABS cat. no. 5512.0);
- Government Financial Estimates, Australia (ABS cat. no. 5501.0.55.001);
- Australian Industry (ABS cat. no. 8155.0); and

Data Sources continued

- Australian System of National Accounts (ABS cat. no. 5204.0).

NON-ABS SOURCES:

- ABARES, Australian Energy: National and State Projections to 2029-30 ;
- Australian Tax Office, Fuels schemes essentials;
- Department of Climate Change and Energy Efficiency, *National Greenhouse and Energy Reporting System (NGERS)*; and
- Department of Climate Change and Energy Efficiency, Energy Use in the Australian Government's Operations 2008-09.

Methods for Calculating Energy Supply and Use

23 These notes are intended as a general guide to the method of calculating estimates of energy supply and use. For more detail on the methods please contact the National Information and Referral Service on 1300 135 070.

24 Data on the physical supply and use of energy products are primarily derived from ABARES AES. In particular, the following tables were used from AES: Table A - Australian energy supply and disposal and Table F - Australian energy consumption by industry and fuel type.

25 ABS domestic energy consumption figures do not align with ABARES Total Final Energy Consumption (TFEC) due to differing treatments of distribution losses and own use of energy within industries. TFEC excludes losses and own use while EAA treat them as intermediate consumption.

26 While the EAA draws on data from ABARES AES, data from the Energy, Water and Environment Management survey 2008-09 (ABS cat. no. 9208.0) were used to assist in reallocating the supply and use of energy products between industries.

27 The following changes have been applied to allow linkages between energy supply, energy use and the Australian National Account:

- Re-allocation of petrol, diesel and LPG use by industry and households
- Treatment of bitumen, solvents, lubricants and greases
- Netting out energy products derived from directly extracted energy

RE-ALLOCATION OF PETROL, DIESEL AND LPG USE BY INDUSTRY AND HOUSEHOLDS

28 In ABARES AES, physical use of land transport fuels (petrol, diesel and LPG) is assigned on the basis of activity type, rather than according to '*industry of ownership*'. For example, fuel used by a truck owned by a mining company and operating between mining sites would likely be treated as transport activity in AES but an industry-based view would assign this use to the MINING industry. In practice, application of the fuel use re-allocation methodology impacts significantly on derived estimates of fuel use.

29 EAA uses the Energy, Water and Environment Management survey (ABS cat. no. 9208.0) and the Survey of Motor Vehicle Use (ABS cat. no. 4660.0) data to reallocate land transport fuels, to align with SEEA-E and National Accounts' industry ownership principle.

30 The re-allocation methodology impacts significantly on AES fuel use figures. For example, the proportion of refined fuel use attributed to households (residential) in AES is negligible. However, when usage is recorded on the basis of ownership, households are the most significant single user of refined fuels. The implications are also significant for industry-based measures of energy intensity.

TREATMENT OF BITUMEN, SOLVENTS, LUBRICANTS AND GREASES

31 Bitumen, solvents, lubricants and greases are classified by ABARES as derived energy within petroleum refining. These products, while containing energy, are not consumed for energy purposes. Their production is classified as final use within the CHEMICAL MANUFACTURING industry.

Methods for Calculating Energy Supply and Use continued

NETTING OUT SECONDARY FUELS

32 Secondary fuels (which were then re-consumed) are required to be netted out when producing flow accounts.

33 The following sources were used to assist in the process of netting out secondary fuels:

- ABARES Australian Energy Statistics - Table F Australian energy consumption by industry and fuel type;
- ABS, 2008-09, Energy, Water and Environment Management survey (ABS cat. no. 9208.0) ; and
- Department of Climate Change and Energy Efficiency, *National Greenhouse and Energy Reporting System* (NGERS).

Data Quality and Reliability

34 Due to recent revisions in AES methodology, data for 2008-09 supply and use figures have been adjusted. Detail highlighting the 2008-09 revisions and methodology changes are available in ABARES AES.

ENERGY INTENSITY

Scope

35 Energy intensity is a ratio of energy consumed per unit of economic output (GJ/$m IGVA).The energy intensity analysis is based on the ratios of physical energy consumption statistics to industry gross value added (IGVA) data.

36 Energy consumption figures are based on Table F of ABARES AES, with adjustments for land transport fuels to their industry of ownership (see above paragraphs 28, 29 and 30). ABS industry gross value added is from the Australian System of National Accounts (ASNA) (ABS cat. no. 5204.0) and is based on the ANZSIC 2006.

Coverage

37 Refer to paragraphs 18, 19 and 20.

Data Sources

ABS SOURCES

- 2010-11, Australian System of National Accounts (ABS cat. no. 5204.0, Table 5: Gross Value Added by Industry).

NON ABS SOURCES

- 2011, ABARES, Energy Statistics-energy update 2011 (Table F).

OTHER DATA SOURCES

- 2008-09, Energy, Water and Environment Management survey (ABS cat. no. 4660.0);
- 2010, Survey of Motor Vehicle Use (SMVU) (ABS cat. no. 9208.0);
- 2009-10, Government Finance Statistics (ABS cat. no. 5512.0) and Government Financial Estimates, Australia (ABS cat. no. 5501.0.55.001);
- 2009-10, Economic Activity Survey (published in Australian Industry - ABS cat. no. 8155.0); and
- Department of Climate Change and Energy Efficiency, Energy Use in the Australian Government's Operations.

The above data sources were used to adjust ABARES physical consumption by industry data to align with '*industry of ownership*' and for data validation.

Methods for Calculating Energy Intensity

38 Energy intensity is a ratio of energy consumed per unit of economic output (GJ/$m IGVA). ABARES publishes comprehensive data on energy consumption by industry. This data has been applied to ABS IGVA data, after making adjustments for land transport fuel consumption assigned by ABARES to the TRANSPORT industry rather than to the industry in which they were actually consumed.

Data Quality and Reliability

39 Due to recent revisions in AES methodology, data for 2008-09 energy intensity have been adjusted. Further detail highlighting 2008-09 revisions and methodology changes are available in ABARES AES.

NEXT EDITION

40 The next release of the EAA, 2010–11 is scheduled for 2012.

GLOSSARY

ANZSIC	The Australian and New Zealand Standard Industrial Classification (ANZSIC) is the standard classification used in Australia and New Zealand for the collection, compilation, and publication of industry statistics.
Bagasse	Residue of the sugar cane milling process.
Black coal	A sedimentary organic rock consisting of anthracite, bituminous and sub-bituminous rank coals. Black coal is primarily used as a solid fuel to raise steam to generate electricity and to produce coke for steelmaking.
Biofuels	Produced from renewable organic sources or 'feedstocks', biofuels include ethanol and biodiesel, and are commonly used as a fuel in transportation.
Biomass wood	Includes wood and wood waste used to produce energy, usually through burning.
Briquettes	Made from brown coal through a process of crushing, drying and the addition of a binding agent, to produce a compact, high energy fuel easily transported and commonly used for industrial and domestic heating.
Brown coal	Also known as lignite, is a low rank, brownish-black coal with a high moisture content of around 60%.
Butane	A gaseous hydrocarbon. When exposed to higher pressures or lower temperatures it can be converted to liquid form, and is a major component of LPG.
Chain Volume Measure	For certain types of economic analysis it is useful to examine estimates of the principal flows of goods and services in the economy revalued in such a way as to remove the direct effects of price change over the relevant period. These estimates are obtained by first weighting together the elemental volume indexes from the previous financial year to the current financial year, where the weights are calculated using the current price value shares of the previous financial year. Second, the resulting aggregate year-to-year volume indexes are linked together to form a time series. Third, the time series is referenced to the current price estimates of the reference year.
Coal by-products	Include blast furnace gas (from iron and steel processing), coal tar and benzene/toluene/xylene (BTX) feedstock and coke oven gas (from the coke making process).
Condensate	A liquid mixture of pentanes and heavier hydrocarbons that form part of the vapour phase of natural gas in the reservoir and become liquid under standard field separation conditions.
Conversion loss	Energy lost in the transformation of energy into a different energy product.
Crude oil	A mixture of hydrocarbons, existing in the liquid state; both in natural underground reservoirs and at atmospheric pressure after passing through surface separating facilities.
Domestic net energy consumption	In this publication excludes net conversion losses and inventory changes.
Electricity	The flow of electrical power or charge. It is commonly derived from burning organic matter, especially coal and natural gas. Other sources include hydroelectricity, solar photovoltaic, wind and nuclear.
Energy intensity	A measure of the energy consumed to produce one unit of economic output, commonly measured in gigajoules of energy per million dollars of Industry Gross Value Added (GJ/$m IGVA)

Environmental account	An information system and framework that links the economic activities and uses of a resource to changes in the natural resource base, thus linking resource use with the System of National Accounts. See also SEEA.
Exports	The exports of goods represents the quantity of goods sent to other countries or for which ownership changes from residents to non-residents.
Final use	Use that finally consumes a product, as opposed to an intermediate use. Final use includes: household final consumption; government final consumption; exports; and changes in inventories.
Flow accounts	General term used for a framework which presents information on the physical flows of resources throughout the economy. Flow accounts published for energy include supply and use tables.
Fossil fuel	Any natural fuel derived from decomposed or partly decomposed organic matter (eg. oil, natural gas and coal).
Gigajoule (GJ)	A unit of energy equal to one billion (10^9) joules, which is roughly equivalent to the energy content of 29 litres of petrol or 280 kilowatt hours of electricity. The gigajoule is the principal unit of energy used in the Energy Intensity chapter of this publication.
Gross energy	Is the energy contained in primary energy (energy sourced directly from nature) as well as the energy derived from it. See also net energy.
Hydropower	A process in which flowing water is harnessed to generate power, especially electricity.
Industry gross value added (IGVA)	The value of an industry's output at basic prices, minus the value of goods and services consumed as inputs during the process of production. Basic prices valuation of output removes the distortion caused by variations in commodity taxes and subsidies across the output of individual industries.
Intermediate use	Intermediate use consists of goods and services consumed as inputs by a process of production, excluding fixed assets whose consumption is recorded as consumption of fixed capital. The goods or services may be either transformed or used up by the production process.
Liquefied natural gas (LNG)	Natural gas which has been refrigerated to a liquid state, which greatly reduces its volume and enables its transport by sea-going vessels.
Liquefied petroleum gas (LPG)	A combination of propane and butane, along with trace amounts of other compounds, recovered in either natural gas extraction or oil refining. The gases are transformed into a liquid to assist in transport.
Metallurgical coke	A product resulting from high-temperature retorting of suitable coal; a dense, crush-resistant fuel commonly used in blast furnaces.
National Accounts	Systematic summary of national economic activity. At a detailed level it shows a statistical picture of the performance and structure of the economy.
Natural gas	A combustible mixture of hydrocarbon gases. While natural gas is formed primarily of methane, its composition can vary widely, commonly including ethane, propane, butane and pentane.
Net energy	Total net energy accounts for the conversion losses associated with transforming one form of energy into another form. In this way, estimates for total net energy use avoid double-counting the amount of converted primary energy. See also gross energy.
NGER	The National Greenhouse and Energy Reporting System, which commenced in relation to the 2008–09 reference period, is a framework for the mandatory reporting of greenhouse gas emissions, energy consumption and energy production by Australian businesses exceeding specified thresholds of emissions or energy consumption.
Other volume changes	Quantify changes in resources that occur between one period and another.

Output	Consists of those goods and services produced within a business that become available for use outside that business, plus any goods and services produced for own final use.
Petajoule (PJ)	A petajoule is equal to one million gigajoules, or 1015 joules. Petajoules are typically used to measure national or industry energy production and consumption. The energy supply and use data present in this publication are in petajoules (PJ).
Petroleum	Naturally occurring hydrocarbon or mixture of hydrocarbons as oil or gas, or in solution, found in sedimentary rocks.
Propane	A gaseous hydrocarbon. When exposed to higher pressures or lower temperatures it can be converted to liquid form, and is a major component of LPG.
Refined products	Includes products derived from crude oil and other refinery feedstock e.g. automotive gasoline and diesel, aviation gasoline and turbine fuel, kerosene and heating oil, industrial diesel and fuel oil, naphtha and petroleum coke used as fuel.
Resource	A concentration of naturally occurring solid, liquid, or gaseous materials in or on the earth's crust and in such form that its economic extraction is presently or potentially feasible. The definition does not intend to imply that exploitation of any such material will take place in that time span, but only that its possibility might reasonably be considered.
SEEA	The System of Environmental and Economic Accounting. It is a framework used to develop environmental accounts by integrating environmental information into an accounting framework. The SEEA 2003 handbook provides the conceptual basis for developing a framework to describe the inter-relationship between the natural environment and the economy. See also Environmental account.
Solar power	Photovoltaic conversion generates electric power directly from the light of the sun in a photovoltaic (solar) cell. Solar thermal electric generators use the radiant energy from the sun to produce steam to drive turbines.
Structural effect	The changes in energy consumption resulting from a change in the mix of industrial output; for example, a contraction in energy intensive sectors.
Subdivision	A subdivision is a sub-industry within the ANZSIC classification of Australian industries. ANZSIC Subdivisions generally reflect distinct production processes related to material inputs, production equipment and employee skills. For example, Coal mining is a subdivision within the Mining division.
Supply-use framework	An accounting framework utilising the basic principle that the total supply of a product is equal to its total use.
System of National Accounts	The System of National Accounts (SNA) is an international framework which can be used to develop a comprehensive, consistent and flexible set of macroeconomic accounts.
Total supply	Australian production plus imports.
Uranium	A heavy, radioactive metallic element, used as a source of nuclear energy.
Wind power	The conversion of wind energy into electricity using wind turbines.

BIBLIOGRAPHY

ABARES 2011, *Australian Energy Statistics*, 2011, ABARES, Canberra.

ABARES 2011a, *Australian Commodity Statistics*, 2011, ABARES Canberra.

ABS 2004, *Value of Agricultural Commodities Produced, Australia, 2002–03*, cat. no. 7503.0, ABS, Canberra.

ABS 2008, *Value of Agricultural Commodities Produced, Australia, 2006–07*, cat. no. 7503.0, ABS, Canberra.

ABS 2011, *Australian System of National Accounts, 2009-10*, cat. no. 5204.0, ABS, Canberra.

ABS 2011a, *Government Finance Statistics, Australia, 2009–10*, cat. no. 5512.0, ABS, Canberra.

ABS 2011b, *Engineering Construction Activity, Australia*, June 2011, cat. no. 8762.0, ABS, Canberra.

ABS 2011c, *Survey of Motor Vehicle Use, Australia*, 12 months ended 31 October 2010, cat. no. 9208.0, ABS, Canberra.

Coughlan, M., Jones, D., Plummer, N., Watkins, A., Trewin, B. & Dawkins, S. 2003, *Impacts of 2002–03 El Nino on Australian climate*, BoM, Canberra.

DCCEE (Department of Climate Change and Energy Efficiency) 2011, *Energy use in the Australian Government's operations 2008-09*, DEWHA, Canberra.

Knights, D., MacGill, I., & Passey, R. 2007 "*The sustainability of desalination plants in Australia: is renewable energy the answer?*", UNSW Centre for Energy and Environmental Markets (CEEM), presentation at the OzWater Conference, 5th March 2007, Sydney.

MDBA (Murray Darling Basin Authority) 2009, *Murray River System Drought Update Issue 18: April 2009*, MDBA, viewed 17 March 2011.

National Water Commission 2008, *Emerging trends in desalination: A review , Waterlines Report Series No9*, National Water Commission, Canberra

Rocheta, E. and Peirson, W. 2011, *Urban water supply in a carbon constrained Australia - water-energy linkages*, UNSW Water Research Centre (WRC), published under the National Climate Change Adaptation Research Facility (NCCARF), an Australian government initiative.

Sandu, S. & Petchey, R. 2009, *End use energy intensity in the Australian economy*, ABARE, Canberra,

Treasury 2006*, Inquiry into the Price of Petrol in Australia*, Senate Economics Legislation Committee, Canberra, viewed 7 March 2011.

UN 1993, *System of National Accounts 1993*, United Nations, New York.

UN 2003, *Handbook of National Accounting - Integrated Environmental and Economic Accounting (SEEA) 2003*, United Nations, New York.

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