Session 4. Environmental Accounts: The Australian Experience

Brendan Freeman
Australian Bureau of Statistics
Centre of Environment Statistics
brendan.freeman@abs.gov.au
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Session overview

- History of Environmental Accounting in Australia
- Energy
- Water
- Waste
- GHG Emissions
- Land – covered in Ecosystems course
- EPE
- Future plans… AEEA

History of Environmental Accounting in Australia

- Early on:
  - natural assets on the balance sheet; measures of depletion (Session 5.)
  - Energy account, EPE, Fish
- Flow accounts for Water, Waste, GHG Emissions
  - Water account is vitally important
- Land: regional, building to a national
- ABS a contributor to international development of the SEEA
  - And strong supporter of SEEA

History of Environmental Accounting in Australia, *cont…*

- ABS environmental statistics
  - Employment = 19 staff
    - Environmental Accounts = 10 staff
    - CES = 8 staff

- ABS national accounts compile all balance sheet estimates




Environmental accounts produced by the ABS

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Australian Government
AusAID

Account type	Year First published	Frequency or status	Reference Years for which accounts are available			
			Stock accounts		Flow accounts	
			Physical	Monetary	Physical	Monetary
NATIONAL BALANCE SHEET -land -minerals -energy -timber	1995	Annual from 1995	1988-89 to 2011-12	1988-89 to 2011-12		
-fish	2012	Experimental		2000-01, 2005-06 to 2009-10		
FISH	1995	Occasional	1996-97		1996-97	
ENERGY	1996	Annual from 2011	1988-89 to 2011-12	1988-89 to 2011-12	2008-09 to 2010-11; 2006-07; 2004-05; 1993-94 to 1996-97	2009-10; 2004-05
MINERALS	1998	Occasional	1985 to 1996		1992-93, 1993-94	
WATER	2000	Annual from 2010			2008-09 to 2010-11; 2004-05; 2000-01; 1993-94 to 1996-97	2009-10; 2008-09; 2004-05; 2003-04
LAND COVER AND LAND USE VALUES (BY STATE)*	2011	Annual from 2011	2011; 2012; 2013	2012; 2013	2013	2013
WASTE	2012	Annual from 2012			2009-10	2009-10
GHG EMISSIONS - EMBEDDED IN FINAL	2012	Experimental			2008-09;	

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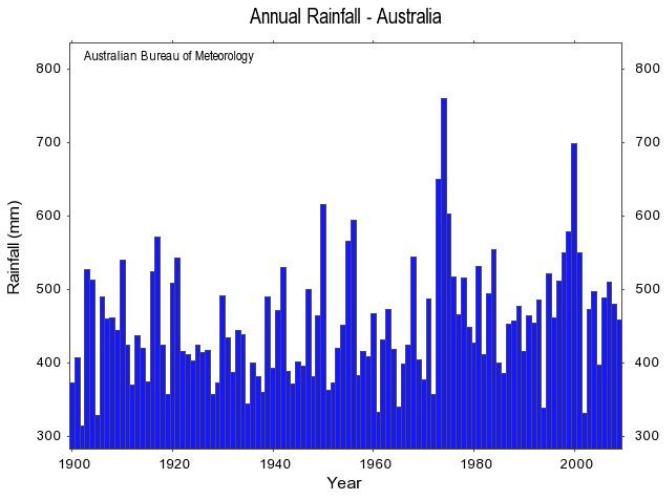
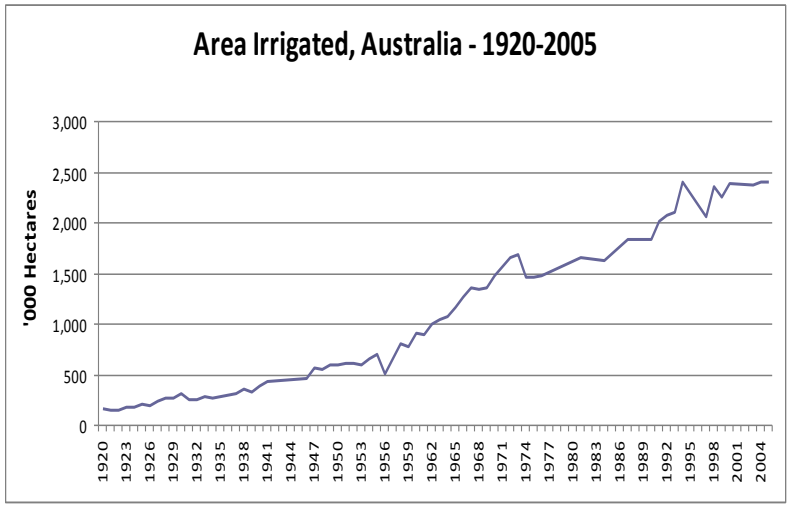
Who else is compiling environmental accounts?

WAVES

	Flow Accounts			
	Assets	Physical	Monetary	EPEs
Industrialised				
Australia	x	x	x	x
Canada	x	x		x
Finland	x	x		x
France	x	x		x
Germany	x	x	x	x
Italy	x	x		x
Japan	x	x	x	x
Norway	x	x		
NZ	x	x	x	x
Sweden	x	x	x	x
UK	x	x		x
US	x			x
Developing				
Botswana	x	x	x	
Chile	x		x	x
Korea	x	x	x	x
Columbia		x	x	x
Costa Rica				x
Indonesia	x			
Mexico	x	x	x	x
Moldova		x		
Namibia	x	x	x	
Philippines	x	x	x	x
South Africa	x	x	x	

It is not the first time you produce data that is important!





- The environment data landscape is littered with "one-off" case studies
- It is the 10th time (or better still the 100th!)

Energy Account, Australia

- Why produce an energy account?
- Data sources
- Data issues
- Data results
  - Including hybrid use of energy table
  - Energy intensity measures

Why an energy account?

- Importance of energy to economy and to environment
- Energy use data is needed to inform energy policy and monitor its effectiveness
  - assess sustainability of energy use
  - questions of efficiency and equity e.g. Who uses, who pays and how much?
  - better understanding and control of emissions
- global concern to decrease carbon emissions and improve energy efficiency => standardised global approach to energy reporting

Energy Account: Content

- Supply and use of energy products
- Supply and use by industry
- Hybrid use of energy account
- Energy intensity of Australian industries
- Stock of energy resources (PJ)

Energy Account: Data sources

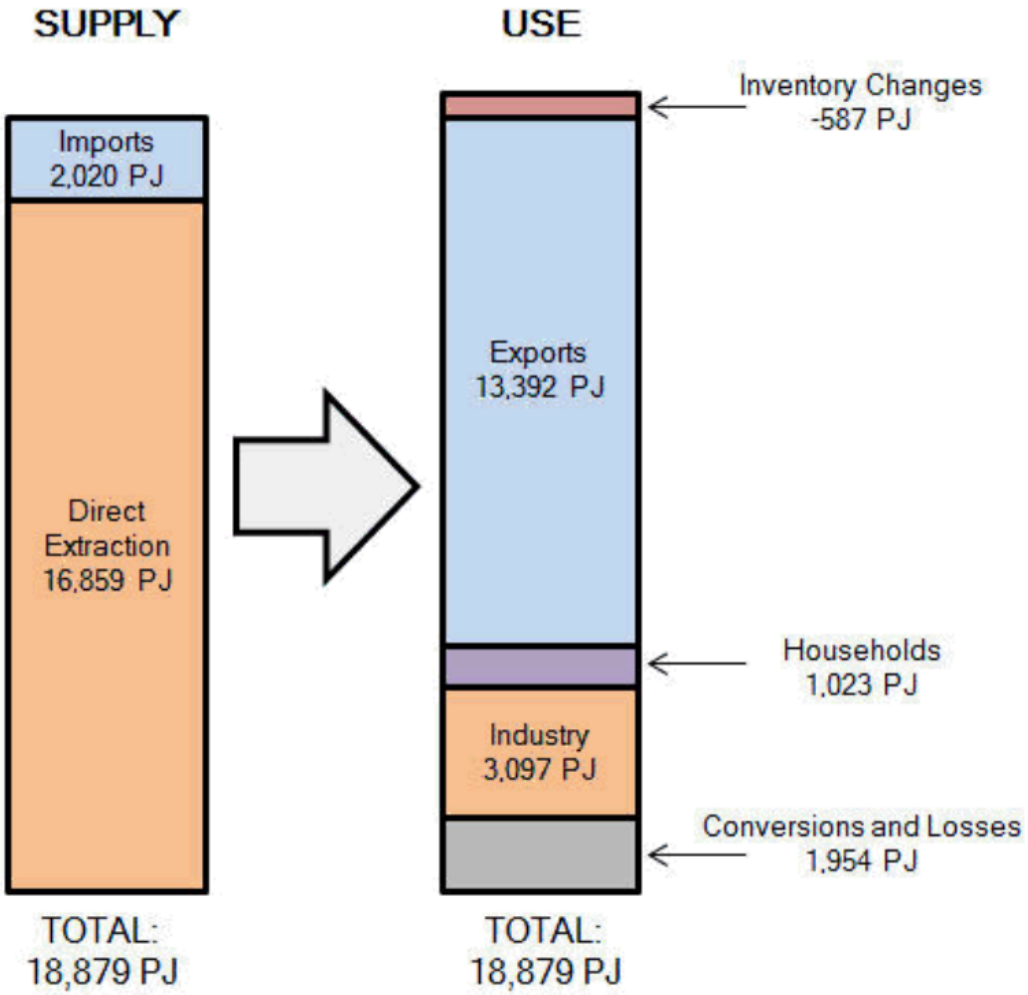
- Physical data (PJ): Sourced from ABARE's *Australian Energy Statistics* – richer product detail

- Monetary data ($): National Accounts - *Input Output tables 09-10* – richer industry detail

- Extensive use of physical information to guide monetary estimation (coherence)

Energy Account: Supply-Use components

1.1 Supply and use, by components - 2010-11



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

Supply and Use of energy

Challenges

- Conversion from ABARE “activity basis” to ABS “industry of ownership” basis

- Service industry usage of energy products

Hybrid use of energy

Challenges

- Questions raised re some national accounts data for some industries

- Highlights the importance of *routinely* comparing physical measures with related monetary information

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Physical vs. Monetary Use – Coal

WAVES

Industry	Physical use of Coal (PJ)	Monetary use of Coal ($m)	Implied Price ($m/PJ)
Mining	7	259	37
Manufacturing - non ferrous metals	64	147	2.3
Manufacturing - other	31	70	2.3
Electricity, gas and water supply	1,975	2,268	1.1
Households	0	1	-

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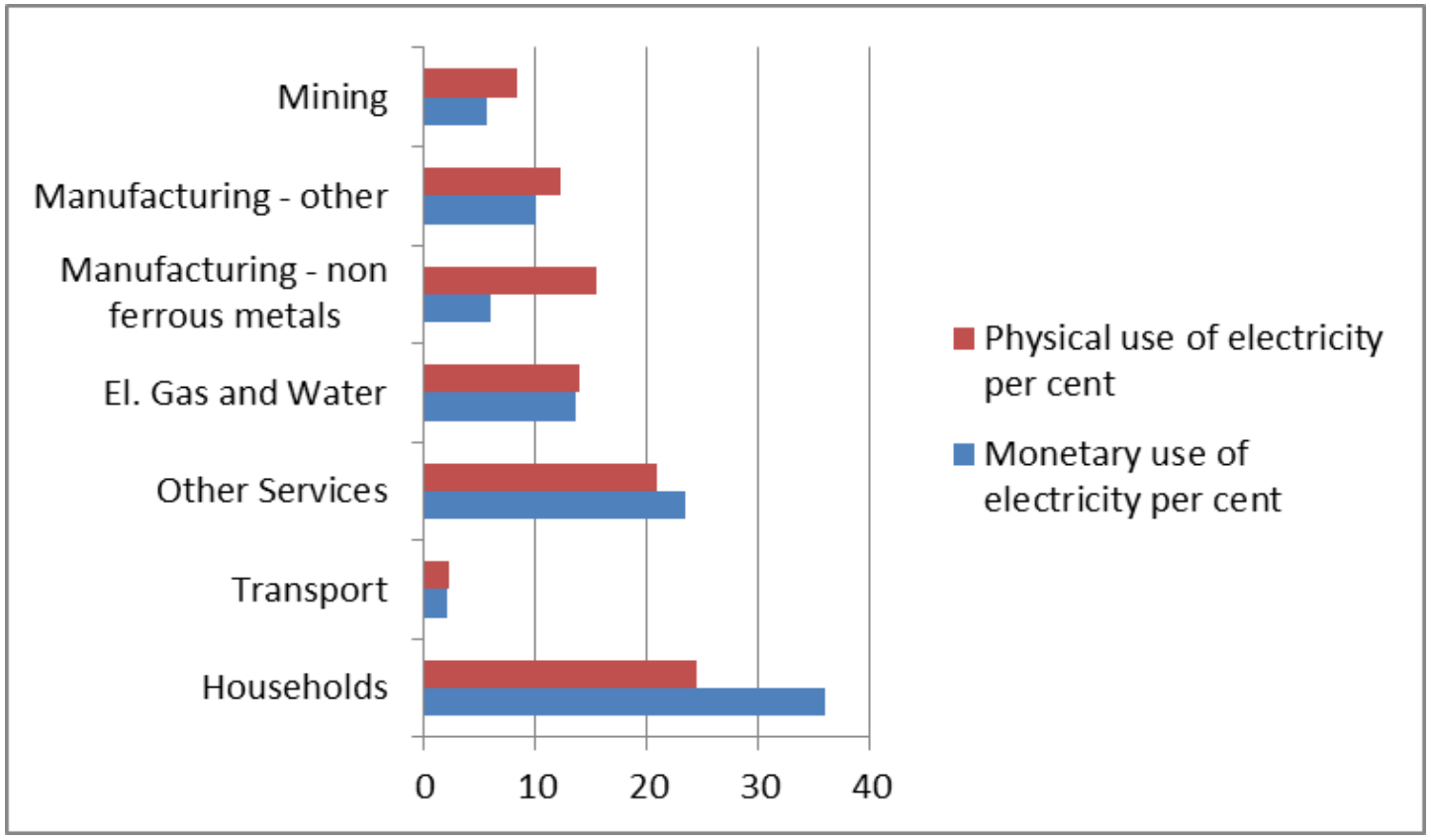
WAVES

Physical vs. Monetary Use – Electricity (percentage share, selected industries), 2010-11



Energy Intensity

- Interest in energy intensity measures will increase in economy with rising energy prices
  - Concern with carbon

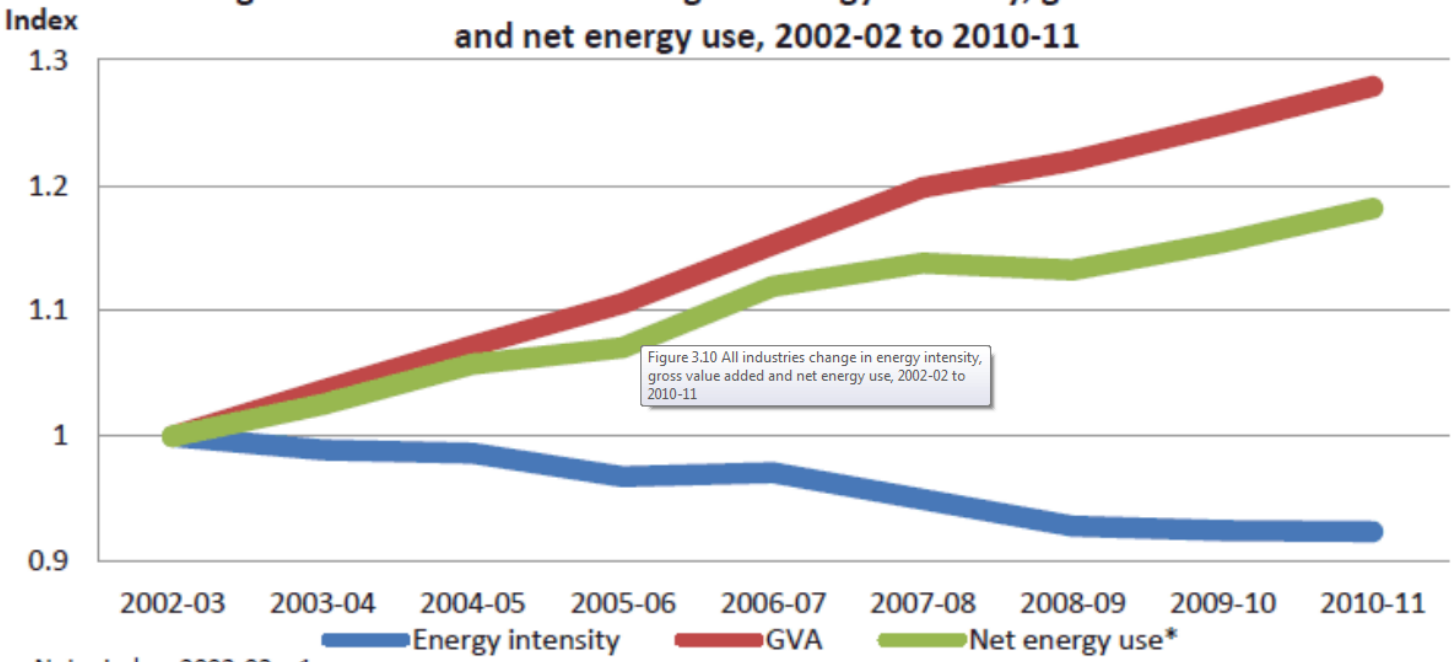
- Energy intensity:

  Physical energy use / by GVA

  - Not current price economic output (volume *and* price …)
  - Not per person energy use, which produces different results

Energy intensity - falling

Figure 3.10 All industries change in energy intensity, gross value added and net energy use, 2002-02 to 2010-11



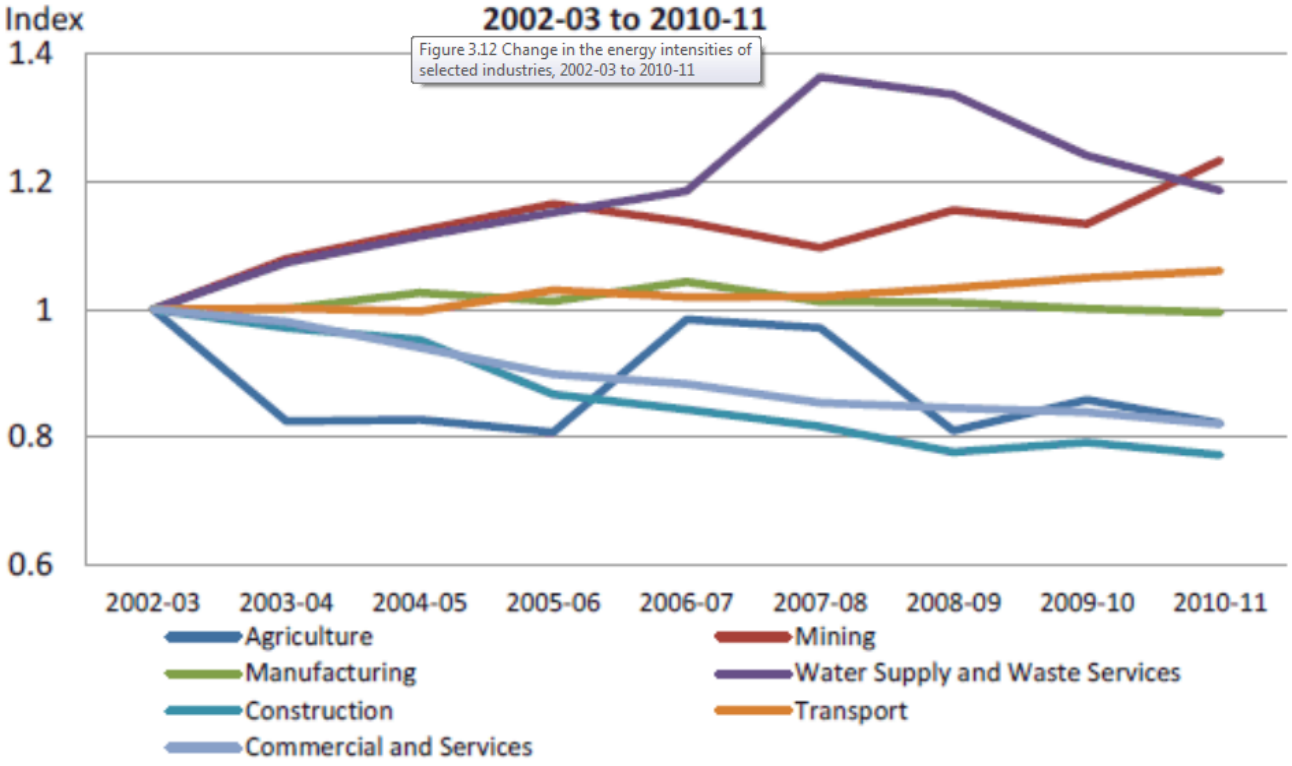
Note, Index: 2002-03 = 1

* Gas and electricity industries not included

Source: Energy Account, Australia (ABS cat. no. 4604.0), *Australian System of National Accounts* (ABS cat.no. 5204.0)

But not all industries followed the general downward trend…

Figure 3.12 Change in the energy intensities of selected industries, 2002-03 to 2010-11



Note, Index: 2002-03 = 1

Source: Energy Account, Australia (ABS cat. no. 4604.0), *Australian System of National Accounts* (ABS cat.no. 5204.0)

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Why mining has become more energy intensive

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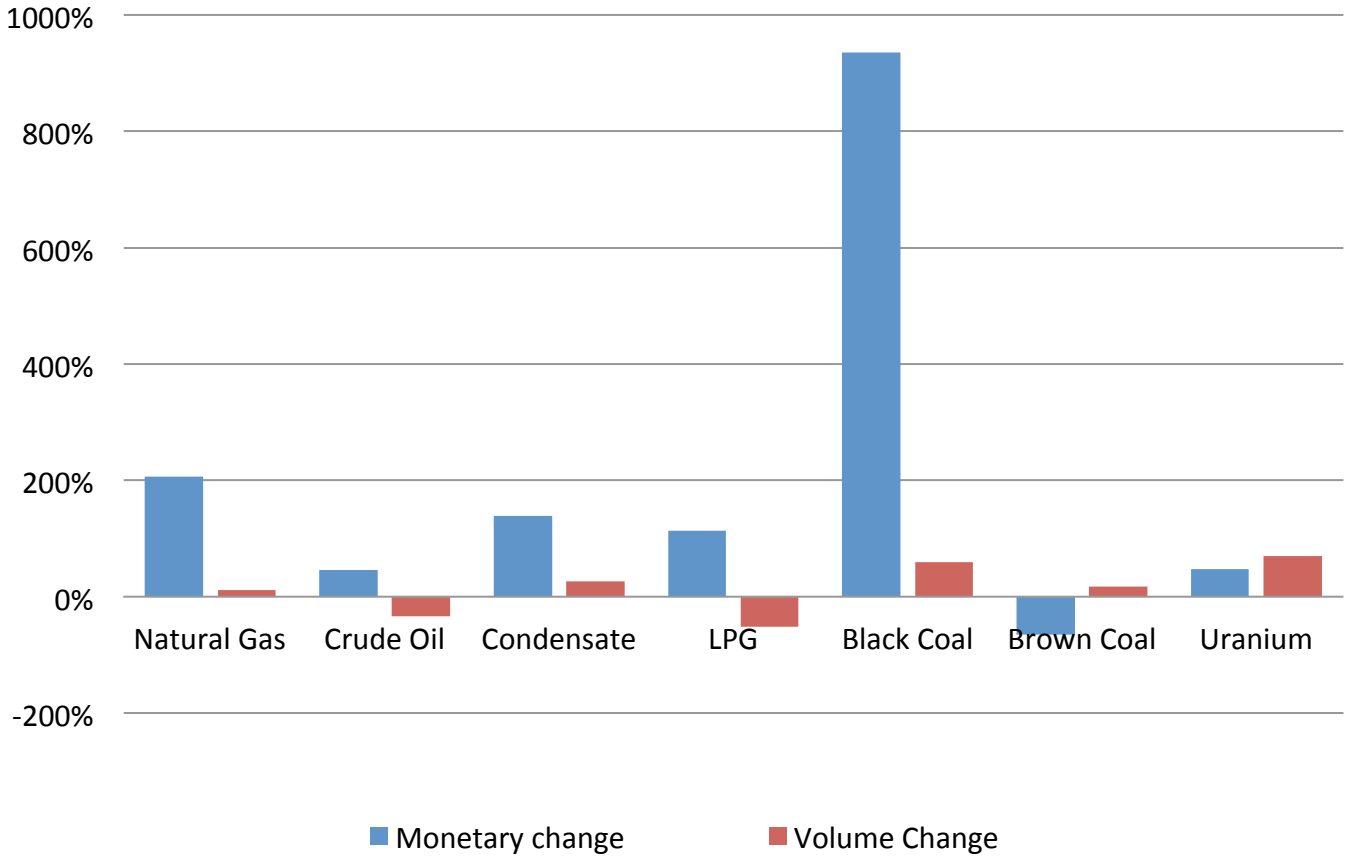
Stocks of energy assets

- Physical measures (PJ, Gt etc)
- Monetary measures (net present value NPV)
- For each major type of asset (coal, uranium etc…)




Change in stocks of energy assets

Percentage change in Australia's energy stocks, in volume and monetary terms – 2003-04 to 2012-13



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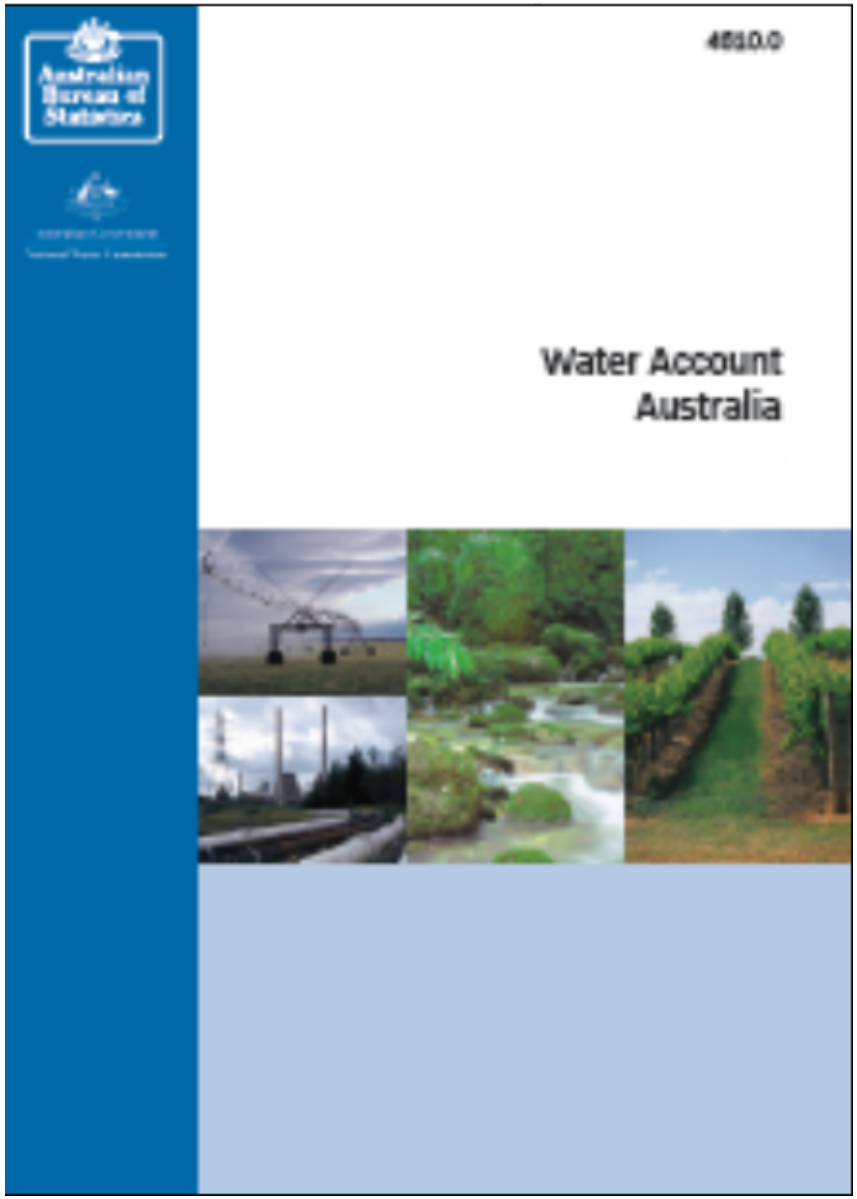
Water accounts



WAVES

ABS Water Accounts

- Background - what are water accounts?
- Data sources
- Climate conditions
- Recent data results

Background

- The Water Account, Australia presents information on the supply and use of water in the Australian economy
- First edition– 1993-94 to 1996-97, Annual cycle from 2008-09, release December 2010

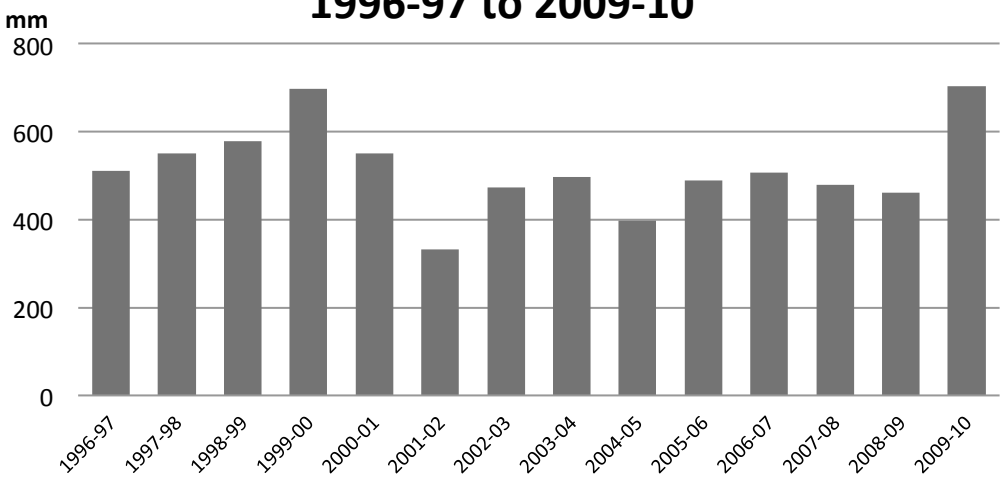
Content: Water Account, Australia - 2011-12

- National level supply and use (Vol & $$) tables, by:
  - State and territory
  - Industry
  - Households
- Feature articles

  e.g. Rain water tanks – household consumption; Estimates of Soil water

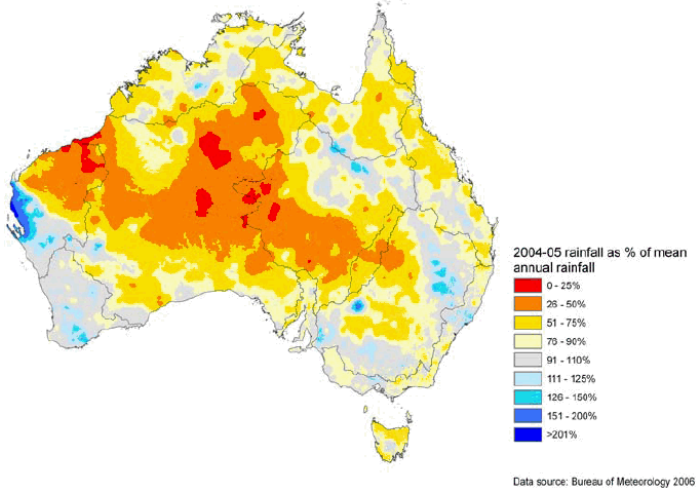
Australian climate conditions

Australian annual rainfall 1996-97 to 2009-10

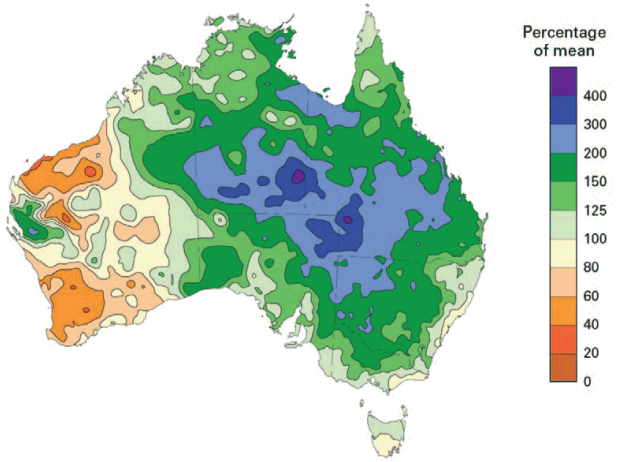


Percentage of 1961-1990 average rainfall, Australia

2004-05



2009-10



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Why are water accounts useful?

WAVES

- Australian water supply is variable
- Water accounts help to understand how water is being used, and how this use is changing over time.
- for predicting future water needs
- assessing impacts of water use:
  - water quality
  - economic changes which might result from reallocations of water

Data sources

Large number of sources, including ABS survey data and other sources

- 2011-12 Water Supply Survey
- 2011-12 Energy Water and Environment survey
- 2011-12 Agricultural Resource Management Survey
- 2008-09 Electricity Generators Survey of Water Use

- State government reports,
- Household Expenditure survey
- Administrative data (annual reports – Local Gov)

- ABS Economic Activity Survey
- Local Government Annual Reports




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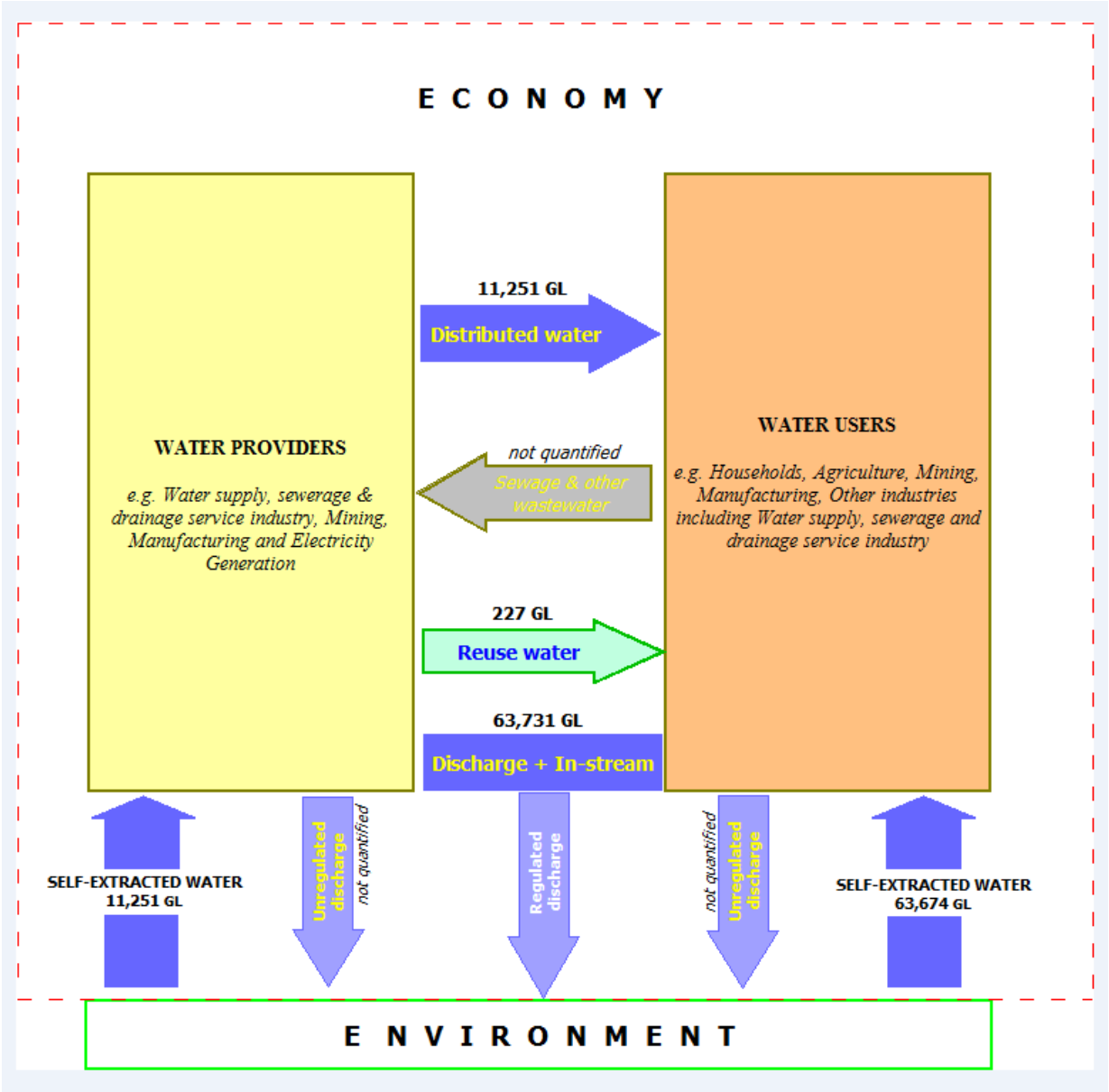
Water supply and use in Australia



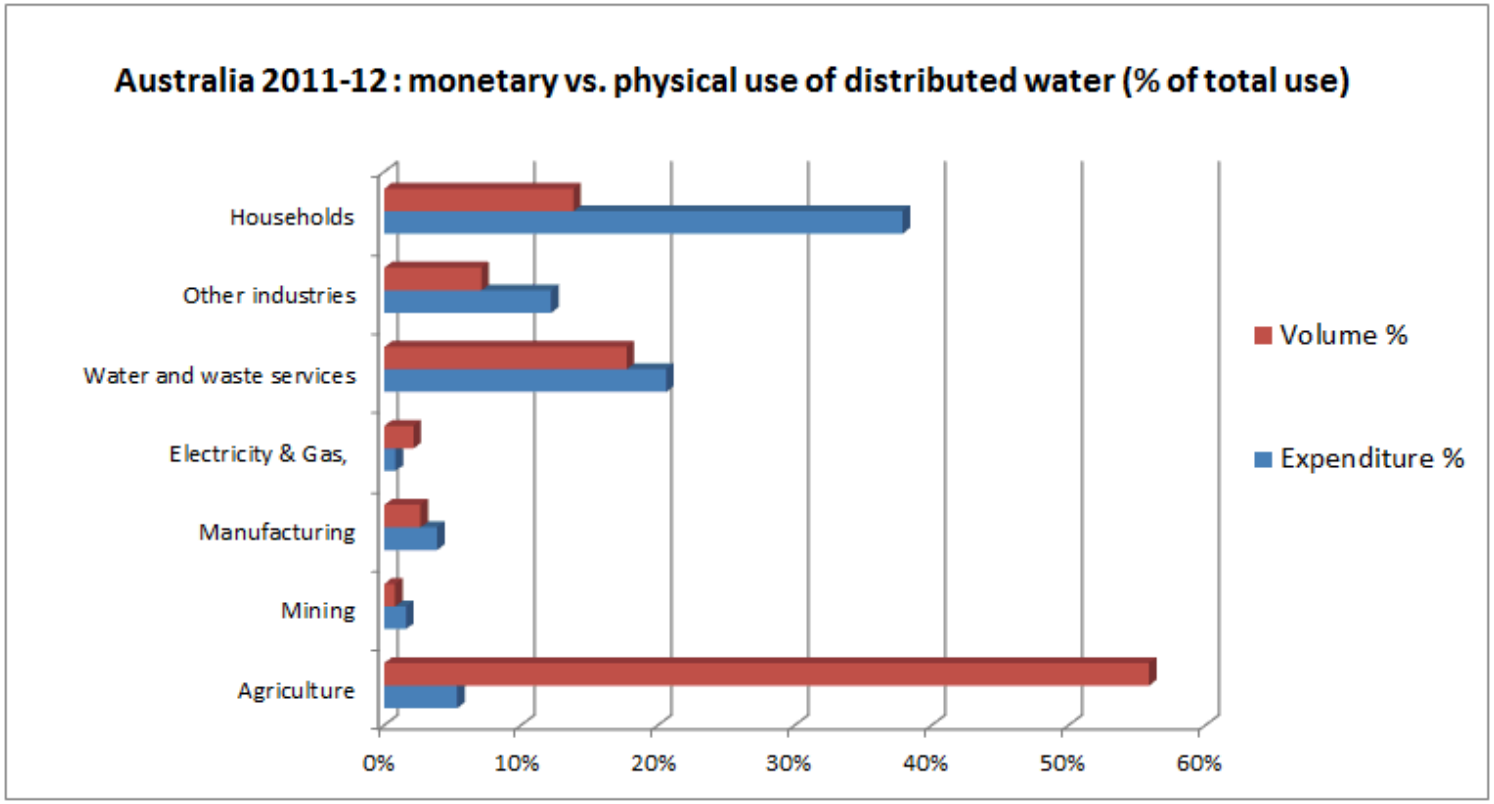
Hybrid (monetary and physical) water account

1. Why are hybrid accounts (i.e. combined monetary *and* physical accounts) useful?
2. Water valuation issues
3. Experimental hybrid water account for Australia
   - Methods and results

Why produce a hybrid water accounts?

- Enables the economic costs and benefits of water supply to matched with physical data on water stocks and flows.
- Informs more efficient water allocations:
  - ideally, require information on: physical water flows; prices paid for water used; value added of water users
- Achieving cost recovery for water infrastructure assets

Monetary vs. physical use of distributed water (% of total use)



Making every drop count: Water Accounting Workshop

Getting started!!

- Water ‘users’ are institutional units that use water i.e. households, agriculture etc. (but the ‘environment’ is not a ‘water user’)

- ISIC = International Standard Industry Classification. However, in the workshop exercises a descriptive title is also provided for each industry…

Making every drop count: Water Accounting Workshop

Getting started, continued…

- Water can be obtained through:

  'abstraction' – i.e. extracted from the environment; or
  'received water' i.e. from other economic units

- Water may be abstracted for:

  'own use'; or
  'distribution' i.e. it is extracted for the purpose of supplying to another unit

Making every drop count: Water Accounting Workshop

Getting started, continued…

- Water ‘from the environment’ i.e. from a river etc. rather than from an institutional unit

- Water ‘within the economy’ i.e. water involving transactions between institutional units e.g. a water supplier sells water to an agricultural unit.

Making every drop count: Water Accounting Workshop

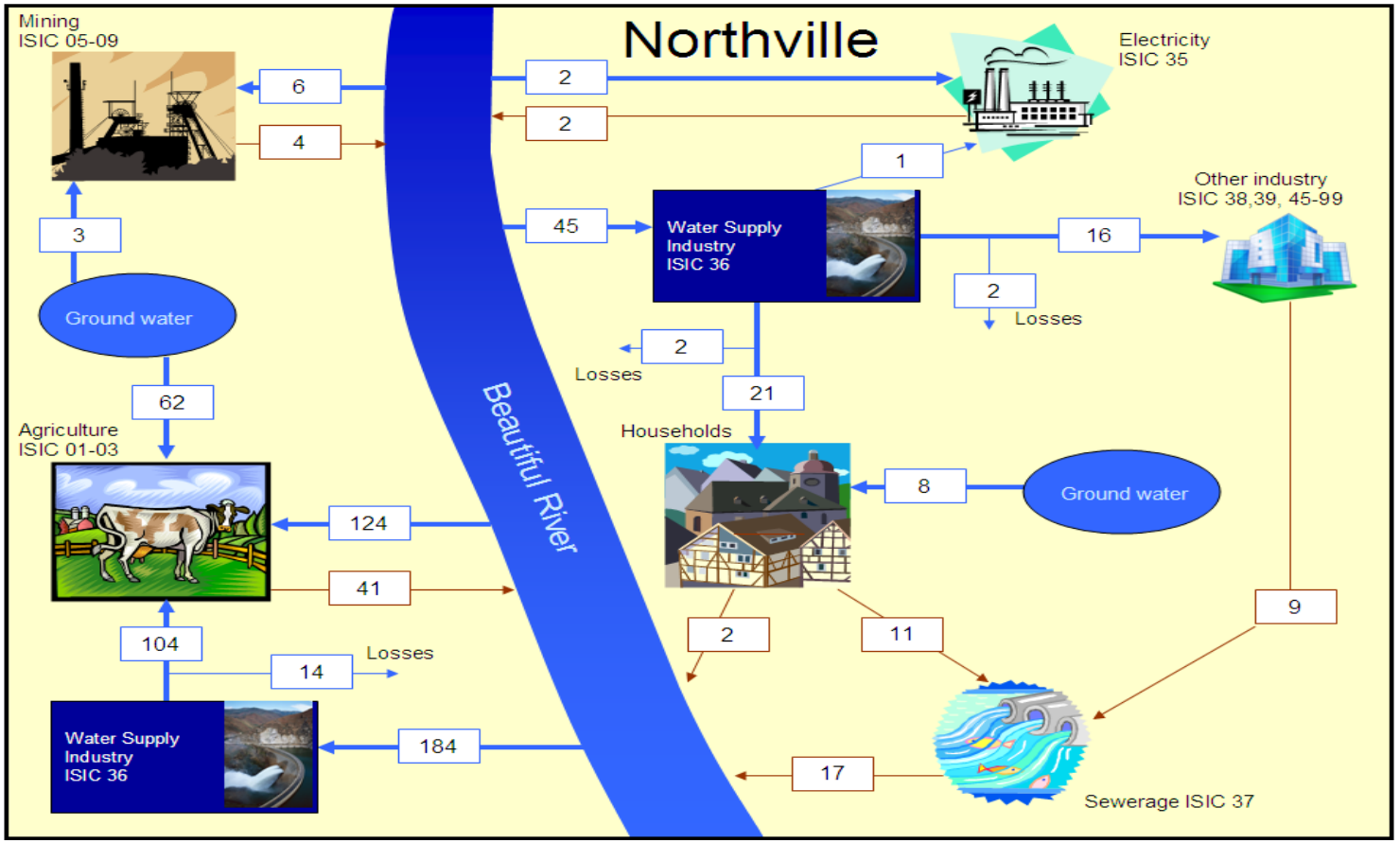
Getting started, continued…

- Water consumption defined:

  'the water that is evaporated, transpired or incorporated into products'

- Water 'use' is water received by an institutional unit

Case study:
The Republic of Blue – Northville



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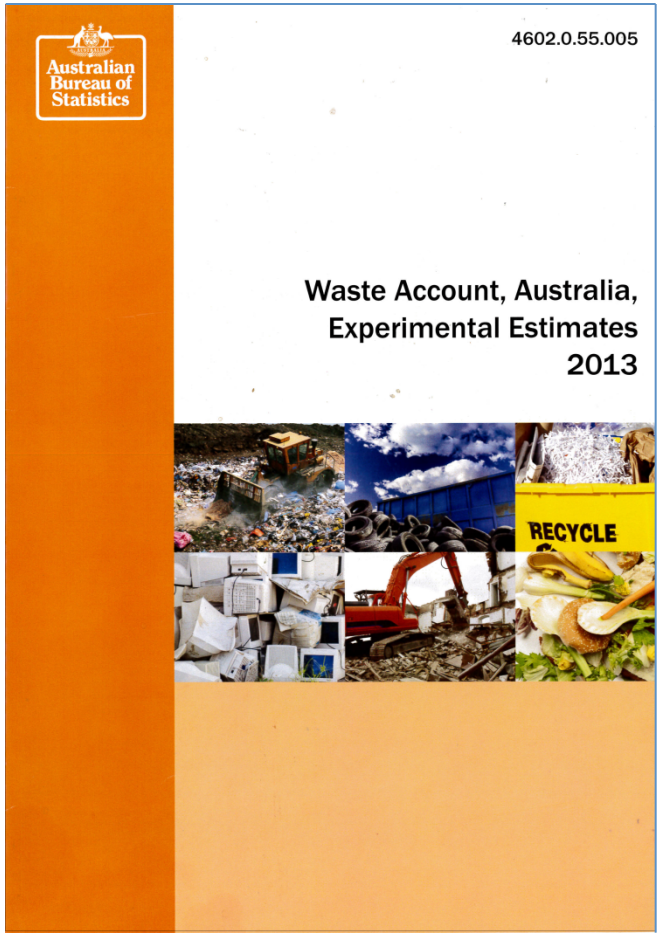
WAVES

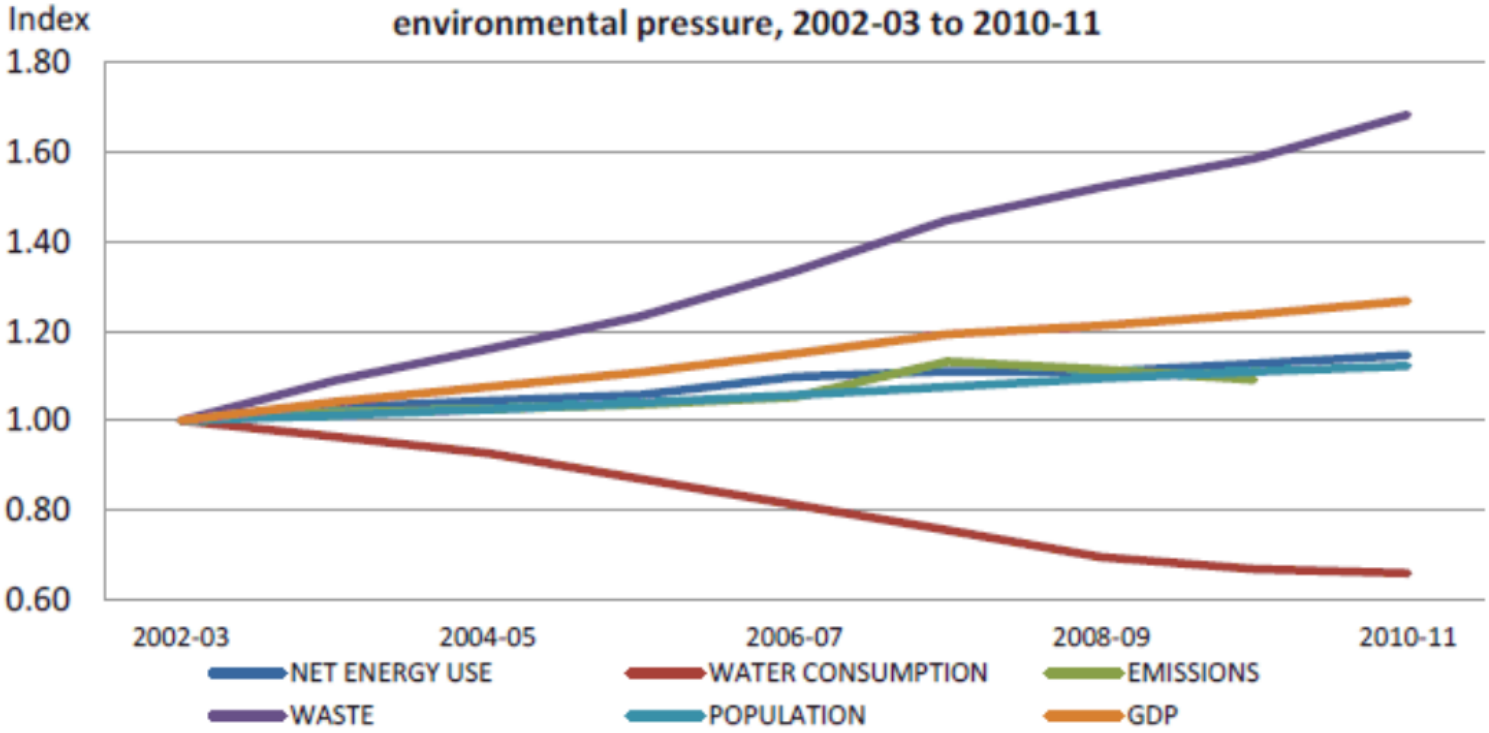
Experimental Environmental Accounts

Waste Accounts



Why do Waste Accounts?

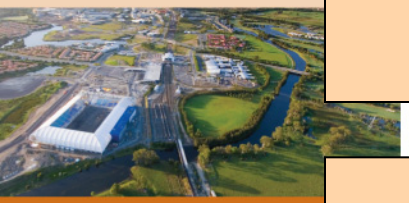
Figure 1.3 GDP, population and selected physical indicators of environmental pressure, 2002-03 to 2010-11



Note: Index: 2002-03 = 1

Sources: ABS; Department of Climate Change and Energy Efficiency; Department of Sustainability, Environment, Water, Population and Communities.

Why do Waste Accounts? (*cont…)*



Greenhouse Gas Emissions Account (????)

Assist others (e.g. BoM, Victorian government, others

Water Account (2013)

Energy Account (2013)

Land Account (????)

Waste Account (2013/14)

Environmental Taxes (????)

Australian Environmental - Economic Accounts

National Accounts Data

Environment Industry Account (2013)

Why do waste accounts? (*cont…)*

- A waste account could inform National Waste Policy objectives to:
  - generate less waste
  - dispose less waste to landfill by increasing re-use & recycling
  - keep more hazardous waste out of the environment.

Waste supply tables

Table 1: Waste Generated (amounts supplied, '000 tonnes)

	Generation of solid waste								
	Manufacturing	Mining	Construction	Waste Management	Other Industries	General Government	Households	Imports of Solid Waste	Total Supply
	'000 tonnes								
Paper & Cardboard									
Glass									
Plastics									
Metals									
Organics									
Construction/ Demolition									
Electrical & Electronic									
Solid Hazardous Waste									
Liquid Waste									
Mixed/General									
Total									

Waste use tables

Table 2: Waste Management (amounts used/treated/disposed, '000 tonnes)

	Recovery, treatment, disposal							
	Waste management		Other industries					
	Landfill	Recovery facility	Manufacturing	Mining	Construction	Other	Exports of solid waste	Total use
Paper & cardboard								
Glass								
Plastics								
Metals								
Organics								
Construction/ demolition								
Electrical & electronic								
Solid hazardous waste								
Liquid waste								
Mixed/general								
Total								

Waste and the SEEA

Main material flows covered in the physical supply-use tables are:

- products
- natural resources (extractions)
- residuals (to air, water and solid waste)

Waste - the Australian situation

- Australia (& ABS) compile some waste statistics
- State government & Industry associations compile regular landfill data
- ABS produced Waste Account, 2013
  - Experimental
  - Physical and monetary tables
  - Planned to be produced annually

Data gaps

- Even with these data sources still do not have:
  - Quantities waste disposed to landfill x industry
  - Quantities waste recovered (by material) x industry
- Funding limitations will restrict data sources available
- However, agreed structure in place.

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WAVES

Greenhouse Gas Emissions Account

Greenhouse Gas Emissions Account

- Based on AUS Dept. of Environment's National Greenhouse Accounts – Territory basis
- ABS makes adjustments to bring them onto a SEEA – residence basis
  - Bunkering
  - Tourism
- Input-output analysis tables for consumption-based Greenhouse (GHG) emissions in Australia

Environmental Protection Expenditure (EPE)

EPE accounts identify economic transactions directly concerned with using, managing and protecting the environment:

- make protective expenditure on the environment more explicit
- reorganise existing information, without necessarily adding new information

The scope of EPE accounts includes:

- protection of ambient air and climate
- waste water management
- solid waste management etc.

Environmental Protection Expenditure (EPE) *cont…*

- Environment Protection must be the prime objective of an expenditure for inclusion in an EPE account.
- Environment Protection is "actions and activities aimed at the prevention, reduction and elimination of pollution as well as any other degradation of the environment" (SERIEE 1994).
- EPE accounts identify such expenditure incurred by industry, governments and households.

Environmental Protection Expenditure (EPE) *cont…*

- **National Accounting Matrix (*including* Environmental Flow Accounts)**

Institutional sector	Environment Protection Expenditure Classes (CEPA)								
	Ambient air and climate	Waste water management	Waste management	Soil, groundwater & surface water	Noise & vibration	Biodiversity & landscape	Radiation	Research & development	Other
Government:									
National									
State									
Local									
Industry									
Household									

SOURCE: *SERIEE EPE* Account in SEEA (2012).

Environmental Taxes

What are they?

- Taxes which have a tax base with a proven negative impact on the environment. (SEEA-2012, para 4.150)
- Environmental taxes in Australia consist of taxes on transport and energy.

Data sources

- ABS Government Finance Statistics (GFS) (cat. no. 5506.0)
- ATO and various other departments

What can they tell us

- By tax payer category
- By industry and households

Environmental Taxes: Presentation and Analysis

By tax payer category

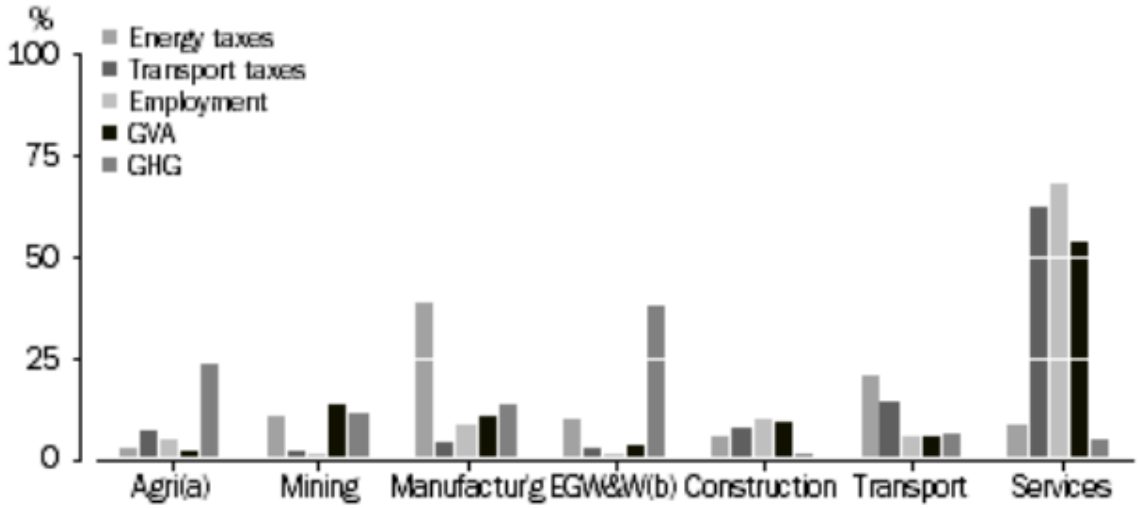
6.1 Environmental taxation revenue, Australia, 2000-01 to 2010-11, $m, current prices

	2000-01	2005-06	2010-11
Crude oil, LPG, gas and petroleum products	12 453	14 075	16 305
Petroleum products taxes	174	-	-
Ozone Protection and synthetic GHG(a)	1	1	1
Renewable energy certificates(b)	-	90	980
Stamp duty on vehicle registration	1 387	1 922	2 167
Road maintenance and heavy vehicle registration(c)	2 646	3 672	5 294
Luxury car tax(d)	172	324	489
Passenger motor vehicles duty (import)(a)	na	na	780
Total environmental taxes	16 833	20 085	26 016
% of GDP(e)	2	2	2
% of total tax rev(e)	8	7	7

Environmental Taxes: Presentation and Analysis *cont…*

By industry and households

6.4 Environmental-Economic profile % of total industries - 2010-11



(a) Agriculture, forestry and fishing
(b) Electricity, gas, water and waste services

Source: ABS cat. no. 8155.0. Hao, Lestoff et al 2012

Australian Environmental-Economic Accounts, 2014

Greenhouse Gas Emissions Account (????)

Assist others (e.g. BoM, Victorian government, others

Water Account (2013)

Energy Account (2013)

Land Account

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Questions?