

Development of an Experimental Environmental Expenditure Account (EEA) for Australia

Information Paper for the
20th London Group Meeting
New Delhi, 15-17 October 2014

Australian Bureau of Statistics

Introduction

1. This paper presents experimental Environmental Expenditure Accounts (EEA) for Australia in accordance with the System of Environmental and Economic Accounting – Central Framework (SEEA Central Framework). The accounts were prepared in order to test the feasibility of preparing environmental expenditure accounts for Australia and to identify actual or potential issues with compilation as well as to examine ways in which the accounts may be used in policy development, monitoring and evaluation.
2. The experience in compiling these accounts will be useful in the production of any future accounts of this nature and in any guidance material prepared to support the development of EEA in other countries.

Compiling and presenting environmental expenditure statistics in Australia – a brief history

3. The ABS began collecting statistics on expenditure to protect the environment in 1990-91 (*Cost of Environment Protection, Australia: Selected Industries 1990-91* (cat. no. 4603.0) in response to both national and international demands for better economic information on the environment. Primarily, they were intended to:
 - i) be indicative of the response of various sectors to environment protection regulations and policies;
 - ii) provide input to early development of environmental-economic accounting and satellite accounts; and
 - iii) provide some indication of the flow-on demand on the suppliers of goods and services for environment protection.
4. Early compilations were based on the OECD's Pollution Abatement and Control (PAC) framework, and followed a relatively simple presentational format in which capital and current expenditure was presented by industry and general government.
5. From 1995-96 until 2002-03, data collection and compilation was guided by the analytical framework specified in the European System for the Collection of Economic

Information on the Environment (commonly known as SERIEE), and the international Classification of Environmental Protection Activities (CEPA). This framework and the associated classification underpin the current environmental activity accounts and related flows as specified in Chapter 4 of the 2012 SEEA Central Framework.

Publications included *Environment Protection Expenditure, Australia, 1995-96 and 1996-97* (cat. no. 4603.0) and *Environment Expenditure, Local Government, Australia, 2002-03* (cat. no. 4611.0).

6. However, a scarcity of available information and data priorities which focussed on other areas, such as water and energy environmental-economic accounts, has meant that regular environmental expenditure accounts have not been produced since 2002-03. The 2014 Discussion Paper – *Towards an Environmental Expenditure Account, Australia* (cat. no. 4603.0.55.001) – responds to the demand for relevant environmental expenditure information.
7. The tables compiled in the discussion paper are based on the SEEA Central Framework for expenditure on environmental protection and natural resource management. The data presented is considered experimental, and is intended to elicit feedback from users on the usefulness, relevance and potential demand for these accounts.

Scope and Coverage

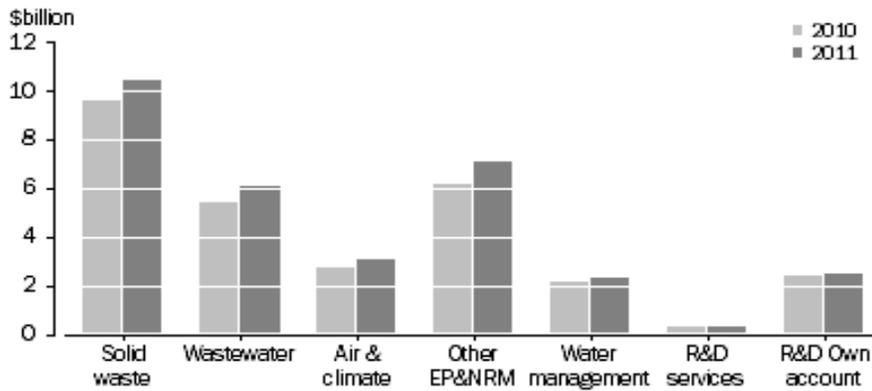
8. The scope of the experimental environmental expenditure account (EEA) was based on the scope and definition of environmental activities as specified in the SEEA Central Framework: “...those economic activities whose primary purpose is to reduce or eliminate pressures on the environment or to make more efficient use of natural resources.”
9. The various activities are broadly grouped into two types of environmental activity – environmental protection (EP) and natural resource management (NRM), as specified in Annex 1: Classification and lists in the SEEA Central Framework - Classification of Environmental Activities (CEA).
10. The ABS Discussion Paper did not provide totals for EP and NRM separately. Due to data limitations, some environmental activities were combined, and the following groupings were used where possible:
 - Waste water management
 - Solid waste management (includes recycling services)
 - Protection of air and climate
 - Water management
 - Other EP and NRM
 - Research and Development (R&D)

11. Coverage included Specialist producers (Government and non-Government); and Non-specialist producers (non-Government) of environmental services as specified in Appendix Table 1. Own account activities by Non-specialist producers of environmental services were not included. Expenditure on environmental goods and services by Government, Non-government and Households/NPISHs were included as specified in the Appendix.

Presentation and Results

12. The ABS experimental EEA followed the structure and presentation as specified in the SEEA Central Framework's Environmental Protection Expenditure Accounts (EPEA). This essentially presents information by economic sectors (government, corporations, households) and by the environmental domain that is being protected or managed (such as air, water, waste).
13. The SEEA proposes four sets of tables as the basis for a full set of EPE Accounts:
- Supply and use tables for environmental protection specific services with supply including those services supplied by resident producers and through imports, and use encompassing domestic consumption plus exports;
 - Production (output) of environmental protection specific services by resident producers;
 - Total national expenditure on environmental protection, representing the total outlay by the economy on these activities including capital formation; and
 - Financing of national expenditure on environmental protection which provides information on how the environmental protection is funded
14. Although many countries regularly produce environmental protection statistics in one form or another, few (if any) countries compile comprehensive EPE Accounts in the form of inter-linked tables as described above. Even fewer countries have extended this coverage to include data on NRM expenditure as well. The ABS Discussion Paper – *Towards an Environmental Expenditure Account, Australia* (cat. no. 4603.0.55.001) – explores the compilation of environmental protection and natural resource management transactions for Australia, utilising the SEEA framework for compiling EPE Accounts. The full suite of tables can be found in the Appendix, but some results are summarised below.

Graph 1: Total Output of Environmental Services, Australia

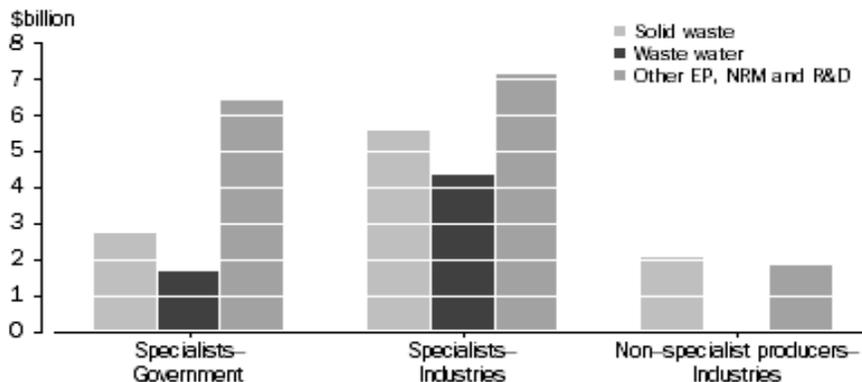


Notes: Other EP & NRM – Other Environmental Protection and Natural Resource Management.
R&D – Research and Development.

15. Graph 1 shows the total output of environmental-specific services for Australia, including income generated by sales of these services and the provision of services by government departments. The total supply of environmental-specific services for Australia was estimated at \$31.9 billion in 2010-11. Solid waste management (\$10.4 billion, almost 33% of total) and Waste water management (\$6.1 billion, or 19% of total) are the largest environmental services supplied to the economy.

16. The EEA are also structured to identify the type of economic units supplying the various environmental services. Graph 2 shows that most environmental services in Australia are provided by Specialist producers (around 88%). Waste and Waste water management activities are primarily served by the corporate (non-government) sector, while government plays a larger role in providing services relating to all other EP and NRM.

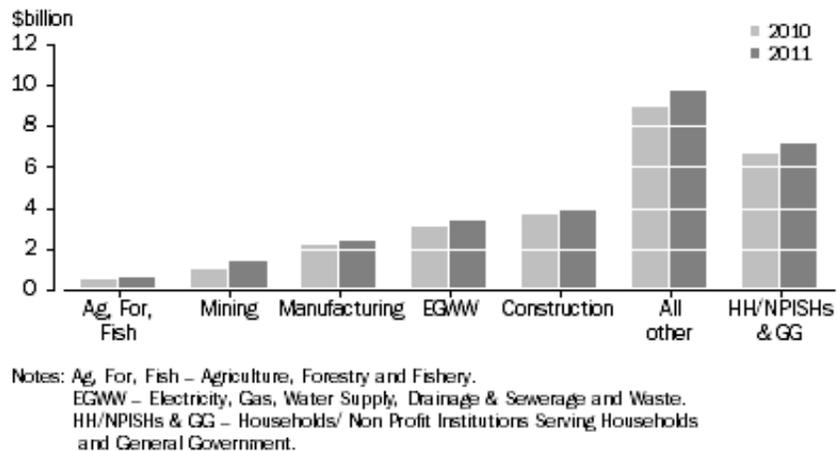
Graph 2: Total Output of Environmental Services, by producer of service, Australia, 2010-11



Note: Other EP, NRM and R&D – Other Environmental Protection, Natural Resource Management and Research and Development.

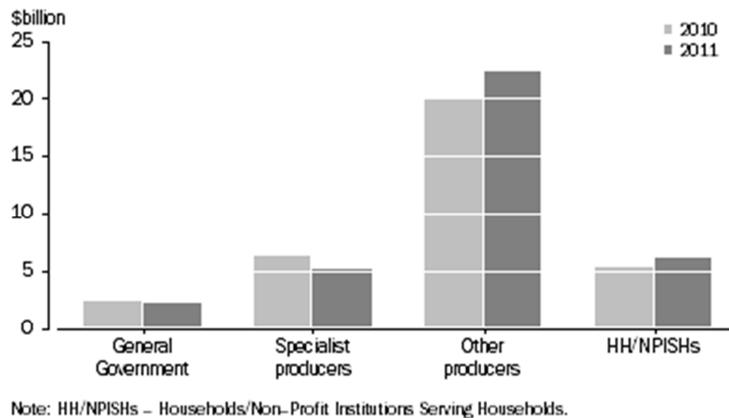
17. The full suite of SEEA tables account for both the production (supply) of environmental services, as well as the consumption (use) of these services. It is this consumption (expenditure) view of environmental expenditure accounts (usually EP) that most countries report.
18. Graph 3 shows that three-quarters (75%) of environmental services were consumed by Australian industry, with the bulk of the remainder used as final consumption by Households and General government. The information can be further analysed to determine what type and level of environmental service is consumed by what industry/economic unit (eg nearly half (47%) of total Construction industry expenditure on environmental services was on solid waste management). Appendix Table 2.8 provides more detail.

Graph 3: Consumption (\$b) of Environmental Services, Australia



19. The final view in a full suite of EEA are the tables to show the financing of national expenditure on EP and RM. The financing tables present information on which economic units have financed the expenditure (as distinct from who has undertaken the activity), taking into account transfers flowing between economic units such as grants and subsidies. Graph 4 show that Australian industry financed over three-quarters (77%) of the expenditure on goods and services related to environmental protection and natural resource management.

Graph 4: Financing (\$b) of Environmental Goods and Services, Australia



Data Sources and Limitations

20. The results presented here (and in the Discussion Paper) are considered experimental and are used to illustrate the type of information that can be presented and derived from a full suite of EEA. Table 1 in the Appendix provides a summary of data availability.
21. The best and most comprehensive data in the EEA were those relating to Waste management and Waste water management, as these figures were generally sourced either directly, or derived from, the ABS Waste Account and the ABS Water Accounts. Much of this was direct-collection via ABS economic survey vehicles.
22. It should be noted that most other data were sourced, estimated or modelled from collections and administrative sources whose primary aim was not for the purpose of producing estimates for expenditures relating to environmental protection or natural resource management.
23. Research and Development (R&D) estimates were sourced from unpublished ABS Research and Development collections.
24. Local government estimates were sourced from unpublished ABS Local Government Finance data collections.
25. State and Commonwealth government estimates of supply (output) were sourced from Annual Financial Reports and Budget Papers for State/Territory and Commonwealth government departments. Reporting across jurisdictions and departments is inconsistent and variable in coverage.
26. The supply (income) estimates for other industries and activities were sourced from the ABS economy-wide *Energy, Water and Environment Survey, 2011-12*.

27. The use/consumption (expenditure) estimates for other industries and activities as well as households, NIPSHs and General government, were modelled based on total supply, and using coefficients derived from National Accounts data for the products Engineering, technical testing and analysis services and Other professional, scientific and technical services.
28. Estimates for connected products (used in National Expenditure and Financing Tables) were based on data from the economy-wide *Energy, Water and Environment Survey, 2011-12*.
29. Purchase of recovered/recyclable material was sourced from the *ABS Waste Account, Australia, 2010-11* (cat. no. 4602.0.55.006) and included in the estimates for expenditure on Environment related Connected/adapted products in the National Expenditure table (Table 4.2 in Appendix).
30. Estimates for grants and subsidies used to compile the Financing of National Expenditure table (Table 5.2 in the Appendix) were sourced from: *ABS Waste Management Services, Australia, 2009-10* (cat. no. 8698.0); *ABS Australian Industry* (cat. no. 8155.0); ABS Local Government Finance collections; and Commonwealth and State/Territory government annual financial and budget reports.

Discussion – lessons learnt, issues and observations

31. The production of comprehensive, experimental EEA by the ABS was primarily undertaken as a feasibility project to determine:
 - i) the extent of data availability (and quality) to produce these estimates;
 - ii) what a full suite of EEA might look like and how it might be interpreted; and
 - iii) potential user interest in these SEEA-style accounts.
32. While the third point is still under investigation, there are certainly some key observations and lessons learnt in producing these accounts.
33. It was decided to broaden the scope of the account to natural resource management, rather than restricting it to environmental protection only. Together, these transactions concern activities that are undertaken to “preserve and protect the environment”. Given the quality of some of the data sources, it was sometimes difficult to make a distinction between an activity whose primary purpose was EP, versus an activity whose primary purpose was NRM, and it was determined it was more useful to compile all transactions whose purpose is an improved environmental outcome.
34. The most fundamental problem faced in compiling the EEA was the presentation of relatively complex ideas and terminology in a format that was user-friendly. The resulting output was potentially complicated and difficult to interpret as a consequence of using a framework broadly consistent with the System of National Accounts as well

as an elaborate accounting framework to avoid double-counting (which is inherent in the SERIEE).

35. It would be beneficial to have a clearer understanding of the reasons/usefulness of compiling the Supply/Production tables of an EPEA (or EEA) versus statistics on the Environmental Goods and Services Sector (EGSS). The SEEA does explain the technical differences, but not necessarily the circumstances under which a country may choose to compile one over another.
36. Australia intentionally did not completely follow the natural resource management classification in relation to management of water resources. The (interim) Natural Resource Management classification as specified in the SEEA explicitly stated the inclusion of de-salinisation of sea water. It was determined in the Australian circumstances de-salinisation of sea water was primarily for the purpose of exploitation, not to “minimise the intake of water resources”.
37. The accounts did not attempt to measure own account production of environmental products. Although own account production is not normally separately identified in the SNA, the SEEA recommends that own-account production activities be separately identified wherever possible. Data sources to measure this were not available but it is acknowledged that this figure could potentially be quite significant.
38. ABS found the use of the term “Other producers” to describe industries that were purchasing environmental goods and services but not producing them (Table 4.3.3 SEEA Central Framework) confusing and used the term “Other industries” to make the distinction from industries producing environment-specific services.

Conclusion

39. The tables and information presented here are indicative of the type of information that can be produced using the guidelines to compile a full suite of Environmental Expenditure Accounts (EEA).
40. Additional analyses (beyond the scope of this paper), including deriving indicators over time, comparing and combining estimates with other macro-economic aggregates such as Gross Domestic Product (GDP) and Gross Value Added (GVA), and linking EEA data to physical data, such as quantities of waste to landfill, recovery rates, air emissions data would be valuable, and could prove more helpful in analysing and reviewing the effectiveness of environmental policies and expenditures.
41. Future work in this field will probably be dependent on user feedback and the provision of resources. It may result in more targeted accounts of these types, rather than using broad assumptions and limited data sources to cover all aspects of environmental expenditures (eg focus on waste management; air and climate only).

Appendix

TABLE 1: DATA AVAILABILITY OF EXPERIMENTAL ENVIRONMENTAL EXPENDITURE ACCOUNT

	PRODUCTION OF ENVIRONMENTAL SERVICES			EXPENDITURE ON ENVIRONMENTAL GOODS AND SERVICES		
	Specialist producers (a)	<i>Environmental services as secondary activities (non-specialist producers)</i> (b)	<i>Own account activities (non-specialist producers)</i> (c)	Domains	Connected/ adapted products	Services
	Agriculture, Forestry, Fishing	..	E	na	Wastewater	na	Y
Mining	..	Y (waste)	na	Water management	E	P,E
Manufacturing	..	Y, E (waste, R&D)	na	Waste management	P	Y
Construction	..	Y (waste)	na	R&D	..	P
Electricity and Gas	P,E	E	na	Other EP & NRM	E	P,E
Water supply	..	E	na			
Wastewater	Y	E	na			
Waste	Y	E	na			
Local Government authorities	Y	..	..	
All other Industries	E	Y (waste, R&D), E (air, other EP&NRM, water)	na			
Households/NPISH	..	..	na			
General Government	P,E	..	..	

.. not applicable

na not available

(a) Units whose primary activity is the production of environmental services. Includes Waste and Wastewater management services plus Environment-specific services produced by Government and Other organisations.

(b) Units that produce environmental services as secondary output, but have a different primary activity.

(c) Units that produce environmental services but do not sell these services to other economic units and consume these outputs themselves. SEEA recommends that own-account production activities be separately identified wherever possible.

Note: Y – Available data. E – Modelled estimates. P – Partial data available. Other EP & NRM – Other Environmental Protection and Natural Resource Management. R&D – Research and Development. NPISH – Non Profit Institutions Serving Households.

TABLE 2.7: EXPERIMENTAL SUPPLY OF ENVIRONMENTAL SERVICES, by Industry and Domain, 2010–11(\$m)

	Waste water management	Solid waste management (a)	Protection of air and climate	Other EP & NRM (b)	Water management	R&D services	R&D – own account	Total
Agriculture, Forestry, Fishing	0	0	0	0	0	0	13	13
Mining	0	185	0	0	0	0	223	408
Manufacturing	0	175	0	0	0	22	142	339
Water supply and sewerage services	6 038	0	0	0	1 231	0	46	7 315
Waste management	0	8 641	0	0	0	0	83	8 724
Construction	0	810	0	0	0	0	147	957
Local government and Government departments	0	0	854	4 932	614	0	0	6 400
All other Industries	0	535	2 203	2 203	489	255	1 891	7 575
Total industries	6 038	10 346	3 056	7 134	2 334	277	2 546	31 371
Imports	np	0	0	0	0	68	0	np
Taxes less subsidies	np	85	1	2	1	0	0	np
TOTAL	6 077	10 431	3 057	7 136	2 335	345	2 546	31 927

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Includes recycling services.

(b) Includes protection of biodiversity, protection and remediation of soil, groundwater and surface water, noise and vibration abatement, other environmental protection activities not stated elsewhere, other natural resource management (e.g. land, timber, aquatic resources).

Note: Other EP & NRM services – Other Environmental Protection and Natural Resource Management services. R&D – Research and Development.

TABLE 2.8: EXPERIMENTAL USE OF ENVIRONMENTAL SERVICES, by Industry and Domain, 2010–11(\$m)

	Waste water management	Solid waste management (a)	Protection of air and climate	Other EP & NRM (b)	Water management	R&D services	R&D – own account	Total
Agriculture, Forestry, Fishing	3	58	51	120	393	0	0	625
Mining	29	66	367	857	26	2	0	1 346
Manufacturing	475	720	311	726	129	2	0	2 363
Electricity, Gas, Water supply, drainage sewerage and waste	9	3 290	18	41	33	1	0	3 392
Construction	(c)na	1 841	615	1 435	13	1	0	3 904
All other Industries	1 456	2 595	1 386	3 236	957	111	0	9 742
Total industries	1 972	8 570	2 748	6 415	1 550	117	0	21 373
Final consumption by HH/NPISHs and GG	4 105	1 861	63	148	784	127	0	7 089
TOTAL domestic consumption expenditure	6 077	10 431	2 811	6 563	2 334	244	0	28 462
Exports	0	0	0	0	0	101	0	101
Capital formation	..	..	245	573	0	0	2 546	3 364
TOTAL	6 077	10 431	3 056	7 136	2 334	345	2 546	31 926

.. not applicable

na not available

(a) Includes recycling services.

(b) Includes protection of biodiversity, protection and remediation of soil, groundwater and surface water, noise and vibration abatement, other environmental protection activities not stated elsewhere, other natural resource management (e.g. land, timber, aquatic resources).

(c) Included under All other industries.

Note: Other EP & NRM services – Other Environmental Protection and Natural Resource Management services. R&D – Research and Development. GG – General Government. HH/NPISH – Households / Non Profit Institutions Serving Households.

TABLE 3.3: EXPERIMENTAL TOTAL OUTPUT OF ENVIRONMENTAL SERVICES, by type of Producer, 2010–11(\$m)

	SPECIALIST PRODUCERS		NON-SPECIALIST PRODUCERS	TOTAL
	Government	Other		
Total Output of environmental specific services	10 786	17 037	3 908	31 730
Intermediate consumption (IC)	5 317	12 108	2 874	20 298
Environmental specific goods and services	2 908	5 442	1 349	9 698
Other goods and services	2 408	6 666	1 525	10 600
Gross Value Added (GVA) Total = Output – IC	5 469	4 929	1 034	11 432
Compensation of employees (CE)(a)	4 189	2 959	na	..
Taxes less subsidies on production (IT–SU)(a)	–904	93	na	..
Consumption of fixed capital (CFC)(a)	1 147	1 659	na	..
Net Operating Surplus = (GVA–(CE+(IT–SU)+CFC))	1 036	218	..	..

.. not applicable
na not available

(a) Only includes Solid waste management and Waste water management.

TABLE 4.2: EXPERIMENTAL TOTAL NATIONAL EXPENDITURE ON ENVIRONMENT PROTECTION AND NATURAL RESOURCE MANAGEMENT, 2010–11(\$m)

	INDUSTRY					Total
	Specialist producers of Environment related goods and services	Non-specialist producers	Other industries	Households/ NPISH	General Government	
Environment related Services						
Intermediate consumption	(a)	1 349	12 754	..	..	14 102
Final consumption	..	..	..	6 009	1 080	7 089
Gross Fixed Capital Formation	(a)	0	3 364	..	..	3 364
Environment related Connected/adapted goods						
Intermediate consumption	(a)	363	4 438	..	..	4 801
Final consumption	..	..	..	287	0	287
Gross Fixed Capital Formation	(a)	na	0	0	0	0
Capital formation for characteristic activities	5 578	21	na	..	..	5 598
Specific transfers for environmental protection not included above	na	na	na	na	152	152
Environmental protection transfers to and from the rest of the world (net)	65	0	0	(a)na	315	379
Total national expenditure on environmental protection	5 642	1 732	20 556	6 297	1 546	35 773

.. not applicable
na not available

(a) Not included in the derivation of total national expenditure on environmental protection.

Note: NPISH – Non-Profit Institutions Serving Households.

TABLE 5.2: EXPERIMENTAL FINANCING OF NATIONAL EXPENDITURE ON ENVIRONMENTAL PROTECTION AND NATURAL RESOURCE MANAGEMENT, 2010–11 (\$m)

USERS OF FINANCE							
	<i>Specialist producers</i>	<i>Non-specialist producers</i>	<i>Other Industries</i>	<i>Households/ NPISH</i>	<i>General Government</i>	<i>Rest of the World</i>	<i>Total</i>
Providers of Finance for EP & NRM							
Government	417	na	na	190	1 232	315	2 153
Industry							
Specialist producers	5 161	na	na	na	na	65	5 226
Other producers	na	1 732	20 556	na	na	na	22 288
Households	na	na	na	6 107	na	na	6 107
Total National Expenditure	5 578	1 732	20 556	6 297	1 232	379	35 773
Rest of the World	na	na	na	na	na	na	na
Total	5 578	1 732	20 556	6 297	1 232	379	35 773

na not available

Note: NPISH – Non-Profit Institutions Serving Households. EP & NRM – Environmental Protection Services and Natural Resource Management.