



Australian Government

STRATEGIC REVIEW OF
Geoscience Australia

May 2011

Strategic Review of Geoscience Australia

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TERMS OF REFERENCE

Strategic Review of Geoscience Australia

1. Geoscience Australia's primary purpose is to enable "informed government, industry and community decisions on the economic, social and environmental management of the nation's natural resources through enabling access to geoscientific and spatial information". Geoscience Australia provides information to the minerals, petroleum and energy sectors; information about the land and marine jurisdiction; and information on groundwater, natural hazards and risks. Geoscience Australia currently provides information and services to a wide range of government agencies (Australian Government, State, Territory and local governments), industry and international Partners.
2. Concerns were raised, in the context of the 2010-11 Budget, that the combination of terminating one-off funding measures in 2010-11 and the effects of certain large ongoing costs and overheads would put Geoscience Australia under significant financial pressure, impacting future product and service delivery. The Government subsequently agreed to supplement Geoscience Australia's appropriation by \$65.3 million over four years to enable Geoscience Australia to continue its role in providing geoscience products and services, many of which are used in examining and mitigating the risks of climate change. The Government also agreed to a Strategic Review of Geoscience Australia.

Objectives

3. The Strategic Review will examine the alignment of Geoscience Australia's products, services and activities with the Government's priorities for geosciences information and data capability and it will consider options for the most appropriate, efficient and sustainable mechanisms for funding and delivering its products, services and activities.
4. The Strategic Review will also evaluate Geoscience Australia's role in the broader public and private geoscientific community, including the uniqueness, utility and value of its current range of products and services to business, government and non-government users of geosciences data. This would include an assessment of the relative public and private benefits from these products and services and, ultimately, of the requirement for and extent of Commonwealth intervention in geoscientific research activity.

Aim

5. The Strategic Review will:
 - a. Outline the contribution of the resources sector to the Australian economy.
 - b. Examine the range of Geoscience Australia's products, services and activities to determine:
 - i. whether Geoscience Australia should be a provider of particular products, services and activities including through an assessment of the relative public and private benefits flowing from those products, services and activities and of the availability of those products and services from other sources including private providers.
 - ii. the most appropriate targeting of funding to Geoscience Australia's products, services and activities, as well as options for more transparent reporting of outcomes; and

- iii. how appropriately Geoscience Australia is currently structured and funded to deliver the optimum mix of products, services and activities to meet Government priorities and the demand for geosciences data.
- c. Examine how Geoscience Australia's activities relate to those of other Commonwealth and State and Territory government agencies that provide geosciences products, particularly the extent of overlap and duplication, as well as possible synergies between Geoscience Australia and those agencies.
- d. Examine what funding and revenue arrangements are appropriate for sustaining Geoscience Australia in the medium to long term, including determining:
 - i. the consistency of Geoscience Australia's cost recovery arrangements with the relevant Commonwealth guidelines, including comparisons with other agency arrangements; and
 - ii. the opportunities for improved cost recovery where its products and services are provided to the private and non-government sector as well as other government agencies;

taking into account Geoscience Australia's current costs, including an assessment of all fixed and variable costs associated with their products, services and activities.
- e. Consider international and domestic models for providing and funding scientific information.

Governance

6. The Strategic Review will be supported by an independent consultant, contracted by Department of Resources, Energy and Tourism (DRET) and jointly funded by the Department of Finance and Deregulation and DRET. The independent consultant will provide advice to the Joint Review team that will draft the Strategic Review report. The Joint Review team will be led by a senior officer from Finance and will include officers from Finance and DRET.
7. The Secretary of the Department of Resources, Energy and Tourism and the Secretary of Finance and Deregulation will monitor the Review's progress monthly.

Deliverable and Timeframe

8. The Strategic Review will commence in July 2010, and provide a final report by November 2010, to enable a Government response to the report to be considered in the 2011-12 Budget context.
9. The Strategic Review will, as relevant, consider:
- a. briefings from Geoscience Australia;
 - b. reports from independent studies commissioned in relation to this review, specifically the study of the:
 - i. market failure considerations, costs, economic value and public and private benefits in providing Pre-Competitive Information; and
 - ii. costs, economic value and public and private benefits of the provision of Geospatial, Earth Monitoring and Groundwater Information;
 - c. an assessment of all costs associated with other Geoscience Australia products, services and activities;

- d. relevant findings from the 2010 ANAO Audit Report on Geoscience Australia, including Geoscience Australia’s progress in responding to the audit recommendations, as well as findings from other related reports/audits and responses, whether internal, external, public or unpublished, including the Geoscience Australia Discussion Paper – Baseline Funding Review by Price Waterhouse Coopers in October 2009;
- e. consultation with relevant public sector agencies involved in geosciences data delivery, including Commonwealth, State and Territory agencies, research institutions and representative organisations;
- f. consultation with representative stakeholder groups;
- g. relevant expertise in the public and private sectors, if appropriate; and
- h. overseas and domestic examples and experience.

Affected agencies and groups

Department of the Prime Minister and Cabinet; the Department of the Treasury; Department of Finance and Deregulation; Department of Climate Change and Energy Efficiency; Department of Environment, Water, Heritage and the Arts; Department of Resources, Energy and Tourism; Geoscience Australia; Department of Innovation, Industry, Science and Research; CSIRO; Attorney-General’s Department; Department of Defence, relevant State and Territory Government Departments; Industry Groups.

EXECUTIVE SUMMARY

In the lead up to the 2010-11 Budget the Government was presented with an analysis of the financial outlook for Geoscience Australia (GA). The analysis suggested that under certain conservative assumptions on future funding, GA could face a need to reduce its workforce by approximately half. This, in turn, would necessitate a substantial wind back in products and services. The main contributing factors to this situation were expiration of a series of temporary budget funding initiatives and uncertainty on renewal or replacement of revenue received through services provided to other agencies. GA's total resourcing had grown strongly over the period 2002-03 to 2009-10 largely due to growth in temporary budget funding and revenues from external sources.

2. The difficult resource outlook facing GA gave rise to questions as to whether its various activities were justified, the appropriateness and adequacy of current funding arrangements and whether more should be done to source funding from external sources rather than relying on Budget appropriations. These are the core issues addressed by this Strategic Review.

3. The Government agreed to additional funding of \$65.3 million over four years in the 2010-11 Budget to enable GA to sustain its role in providing geoscience and geospatial products and services. The cost of this measure was offset within the Resources, Energy and Tourism (RET) portfolio by savings from the Carbon Capture and Storage (CCS) Flagships program. As this funding is not ongoing it does not provide a long-term solution to the financial pressures facing GA.

4. GA is Australia's national geoscience research and geospatial information agency which provides information and specialist research services to support Australian Government policy development and administration across a diverse range of economic, research and environment purposes. These purposes include the management and exploitation of mineral and energy resources, support to natural resource and climate change policies, providing key services to assist preparation and response to natural disasters, supporting understanding and definition of Australia's land and marine jurisdictions and providing monitoring and expert advice in support of Australia's role in international nuclear and uranium mining related matters.

5. GA is a prescribed agency within the RET portfolio. As at 30 June 2010, GA had a complement of 731 staff. Counting revenues from all sources, its total resourcing in 2009-10 was \$179.3 million, although almost ten percent of this represents monies received for on-payment to contractors or State and Territory authorities.

Key Findings

6. Overall, the Review has found that GA's main activities are underpinned by a sound business case in terms of servicing government policies and the Government's interests in facilitating development of community owned resources. The variety of GA's information products means that they do not all rest equally on the same rationale for government funding. However, common features of GA information products are:

- They have strong 'public good' attributes in terms of being products that, once created, may be accessed by any user without diminishing their availability to

other users (non-rivalry in consumption) and for which any restriction on access either creates unacceptable efficiency or welfare losses or is not practical.

- The products provide evidence that supports the Australian Government's engagement in a related policy or program.
- Information produced often has multiple policy applications with new applications sometimes arising well after information was collected or produced.
- The products can have strong linkages to Australian Government sovereign territorial and ownership interests.
- The products draw on a common base of skills and capabilities providing scale economies and increased scope for cross sectoral innovation.

7. At a more empirical level, observations of the contributions and impacts of GA's services and capabilities present much the same picture. The larger portion of GA's activities, such as the information produced on Australia's resource potential and future opportunities, groundwater studies, and environmental assessments, provides evidence that directly assists the Government and other stakeholders to make informed and efficient policy decisions on major topical resource management and environmental issues of national importance.

Managing priorities and strategic planning

8. The Review has found little reason to question the effectiveness of GA activities in providing effective support to specific related government policies when viewed in isolation. The key issue in assessing the alignment of GA's activities and capabilities against Government priorities is not a question of whether those activities and capabilities are aligned to Government objectives in an absolute sense, but whether they reflect Government priorities in terms of meeting the highest strategic requirements of Government.

9. A key part of determining what are the highest strategic requirements for GA services is reconciling the relative priority in the underlying policies supported by those services. This would be an appropriate role for DRET which, in addition to being the main sponsor for many policies supported by GA, already performs a strategic resource function in portfolio coordination of the budget process. The practical application of clearer Government direction on policies would be to inform on the appropriate trade-offs at a structural level, in the attention given to, and allocation of resources among, the various sectors and purposes that can be served by GA. Some examples of these sectoral trade-offs are in respect of: the relative importance of resource development as against conservation objectives; the mix of offshore and onshore investment supporting resource development; and the weight to be given to activities that may enhance energy security.

Avoiding duplication

10. In many projects GA is one of several contributors and may be supported by other research providers such as the CSIRO, the Bureau of Meteorology and/or state authorities. The financial pressure of limited resources appears to be providing a strong incentive for such agencies to coordinate activities so as to avoid duplication. Stakeholder consultations undertaken in the course of the Review revealed that GA is a party to numerous committee and consulting arrangements which work against any overlaps in activities between it and stakeholders. A significant exception is in respect of spatial data where there appears to be a case to strengthen whole-of-government management arrangements. GA houses the Office

of Spatial Data Management (currently five people) but whole-of-government arrangements for spatial data purchasing and management have not been actively developed over the last decade. Many government agencies are now seeking to take advantage of the greater sophistication in the availability and application of spatial information to improve efficiency and effectiveness in policy development and delivery. These investment opportunities are, in turn, strengthening the need for whole-of-government management to prevent duplication. Recently, the Secretaries Board endorsed an APS 200 project to look at improved whole-of-government management in this area.

11. The Office of Spatial Data Management as it is presently configured is not well placed to manage a whole-of-government policy or investment framework on spatial data. There is merit in a policy department assuming responsibility for whole-of-government coordination and management of spatial data, with GA continuing to provide technical and data support as appropriate. Designating DRET as this authority would minimise possible tensions with GA's other priorities. This matter could be addressed by the APS 200 project.

12. The Review did encounter two isolated cases where emerging arrangements suggested an element of duplication. These were in respect of the Attorney-General's Department's intention to take over full responsibility for the Critical Infrastructure Protection Modelling and Analysis Program and the Department of Climate Change and Energy Efficiency's construction of a new Earth observation satellite ground station in Darwin to be operated by GA, which already owns and operates a network of ground stations. In both cases, these arrangements are driven by particular requirements of other agencies.

Reporting performance

13. One area that stands out to this Review as needing work is GA's Key Performance Indicators (KPIs). The Review is cognisant of the need to devise a single, informative and practical set of KPIs, not separate KPIs for disparate corporate documents.

Cost recovery and inter-agency charging

14. GA generates significant funds from the sale of services and products to external parties. Only a small portion of this business falls within the technical scope of the Australian Government's Cost Recovery Policy. A high proportion of GA's 'off-the-shelf' products are forms of spatial data or related analysis. Current arrangements in place for cost recovery of this information are aligned to government policies including the Australian Government's 2001 Spatial Data Access and Pricing Policy. This policy requires that public spatial data be made available free of charge except for recovering the marginal cost of transfer. The principles underpinning the 2001 policy appear to have been embraced and reinforced in recent reforms relating to the distribution of public sector information generally.

15. In accordance with government policies, GA has a general policy of recovering costs for work performed on behalf of other agencies and other governments. These make up the majority of GA's revenue from external sources. Funds generated by these services (and other sales) are credited to GA's appropriation under Section 31 of the *Financial Management and Accountability Act 1997*.

16. Overall, the Review found that Section 31 arrangements were operating well to enable other government agencies to leverage off GA's specialist skills and capabilities on terms that do not compromise GA's ability to provide the outputs for which it is funded.

17. There are however three aspects of inter-agency charging that are problematic:
- Firstly, inter-agency charging arrangements tend to focus on the product or service to be delivered and with little regard to costs of building and maintaining related capabilities.
 - Secondly, reliance on periodic inter-agency agreements is impacting on GA staffing and staff development policies. GA necessarily has to maintain a flexible staff profile – meaning heavy reliance on non-ongoing staff – to match its revenue uncertainty.
 - Thirdly, it is often assumed that GA will provide indefinite custodianship of and access to information produced under an inter-agency agreement.
18. Consultations with stakeholders strongly support the use of structured agreements, such as those modelled on the National Collaboration Framework (developed to assist collaboration within and between Australian governments and promulgated by the Department of Finance and Deregulation) to cover inter-agency arrangements. Given GA has encountered resistance from some clients/partners on setting out roles and obligations in agreements, a clear Government policy mandating the use of structured agreements would assist GA in ensuring they are in place as a basis for any collaboration.
19. The Review noted an unpredicted jump in Section 31 revenues for 2009-10 (\$56.1 million compared to a May 2010 prediction of \$38.8 million) created by transactions related to funding by DRET of agreements with State and Territory governments (for CCS initiatives). These moneys appear in GA accounts as if they were revenue yet they do not represent payment for GA services or products. It would seem more practical for a GA officer to either be authorised to draw from a DRET appropriation or to advise an appropriate DRET officer when payments are required.

The role of pre-competitive information

20. Pre-competitive information generally refers to pre-exploration studies aimed at defining the geology of a basin or region. The Review paid particular attention to GA's role in producing pre-competitive information due to the significance of this information as a major (and expensive) product of GA and as an ongoing source of funding problems for the agency. Over the years, GA's programs for investment in new pre-competitive data have been aimed at capturing long-term investment in Australia by explorers. However, it is also increasingly finding use in other important applications such as in groundwater assessments, informing salinity management and identification of potential CCS sites.
21. GA is involved in the production of pre-competitive information for both offshore and onshore territory. Onshore pre-competitive work is undertaken in collaboration with State and Territory governments which also make significant investments in this work.
22. Large parts of Australia remain relatively unexplored or under-explored, particularly for petroleum in frontier offshore areas. Encouraging exploration in frontier areas has been regarded by governments as a high priority for achieving future domestic energy security and for servicing export markets.
23. For many years, debates on the business case for pre-competitive information have centred around its public good attributes, spill over benefits and its role in reducing exploration risks. While there are strong public good attributes to pre-competitive information, this argument does not address the primary basis for government investment in its production. A singular focus on pre-competitive information as public good information

appears to be the source of confusion as to whose interests are served by pre-competitive information.

24. Typically, the first application for pre-competitive information is in informing government decisions on which specific areas within a region or basin are viable to offer for private exploration. Pre-competitive information is then used by governments in promoting the exploration potential of Australian territory, either in general terms or for specific areas being offered for exploration permits. In both of these stages, the primary beneficiary is government in achieving the most favourable terms for the release of exploration permits. There are strong analogies to the due diligence and other costs in developing an investment prospectus for a major, complex asset. From this perspective alone, available evidence shows a strong case for the Government to continue investment in pre-competitive information.

25. This rationale for government investment in pre-competitive information rests heavily on current arrangements for allocation of exploration permits. A possible alternative strategy to the Government investing in pre-competitive information for attracting private sector investment to relatively small exploration areas is to offer much larger areas for exploration permits. The lower average prospectivity for the released acreage would be offset by the greater area offered which could also make strategic geological studies to find exploration targets more economic for private investors. DRET is in the early stages of developing an option of this kind – known as Reconnaissance Exploration or ‘ReconEx’ – for release of offshore exploration acreage. The option requires further investigation to assess its viability and whether the policy and administrative trade-offs are acceptable, prior to deciding the future of the Government’s investment in acquiring offshore pre-competitive information.

Offsetting the cost of pre-competitive information

26. GA’s provision of pre-competitive information has been a specific focus of a series of proposals raised over the last 20 years for greater cost recovery. Arguments for partial or full cost recovery for pre-competitive information point to the commercial profits to industry from exploitation of mineral and energy resources. Arguments against cost recovery have typically pointed to the conflict between adding cost and risk for private explorers and the Government’s core objective of encouraging exploration.

27. The Review reconsidered proposals raised in the past which range from attaching a charge at the point of distribution of pre-competitive information through to the introduction of new fees attached to the issuing of exploration or production permits.

28. Generally, the options that are closest to directly charging for information provided have the greatest policy problems in terms of conflicting with the core government objective of attracting a competitive field of potential investors. Potential investors would be required to pay significant amounts for information that they need in order to consider whether to respond to a government offer on exploration. This would inevitably reduce competition and could particularly impact the smaller specialist explorers that tend to show greater interest in frontier areas that the Government is strategically targeting for development. For these reasons, options of this nature are not recommended.

29. The revenue options that are logistically more practical (yet still difficult), such as introducing new fees attached to issuing exploration or production permits, are fundamentally separable transactions with at most a notional link to the distribution of pre-competitive information. The scale of fees required to achieve recovery of a significant portion of costs for pre-competitive information would involve orders of magnitude increases on current fees for exploration and production permits.

30. Industry already draws a link between the Government's role in providing pre-competitive information and the returns that accrue through taxation of resource extraction and can be expected to regard any new or additional fees for exploration or production permits as an additional tax on resource extraction. The argument that any new fees on exploration or petroleum have a stronger link to GA's activities in producing pre-competitive information than, for example, the Government's mainstream (and presumably optimised) arrangements for taxation of offshore petroleum production is not convincing. There is a high risk that any move in this direction will cause an expensive distraction from the Government's reform agenda for taxation of the minerals and energy sectors and for tighter regulation of offshore petroleum activities. Imposing additional permit fees would require renegotiation of related agreements with states and territories. For these reasons, the Review does not support either of these options.

31. This Review also considered the options for collective funding by industry of a share of pre-competitive information costs, either through syndication or a (government coordinated) levy arrangement. Neither of these options is recommended. Each involves the Government entering a partnership with a company or group of companies who may have conflicting interests. A levy proposal would raise issues similar to those discussed above in respect to alignment to general secondary taxation arrangements.

32. One option that this Review does consider warrants further investigation is the reintroduction of cash bidding as a mechanism for allocating exploration permits.

33. Currently, the Australian Government allocates permits for offshore exploration solely on the basis of a competitive work program bidding system. This system places a competitive incentive on bidders to enhance the nature and quantity of exploration proposed in respect of generating information useful to enhancing understanding of the geology of the relevant region. The importance and value of these information externalities is not uniform and in some situations, particularly 'brownfields' areas, may be diminished by the availability of information from earlier exploration and production. On the other hand, past and international experience in offshore exploration suggests that cash bidding is viable only for allocation of permits in regions that have realised resource potential (that is, 'brownfields' areas). The different areas of strengths of the work program bidding system and of cash bidding suggest that selective use of both methods according to circumstance is a better optimum than a system that uses either method exclusively. Further investigation of cash bidding options would be most appropriate alongside the examination of the aforementioned ReconEx concept and similar proposals looking at alternative arrangements for defining and awarding exploration acreage.

Conclusion

34. The recommendations of the Review do not suggest radical change or re-alignment of GA activities but suggest a number of measures aimed at assisting the Government to achieve higher valued outcomes from the services and capabilities available from GA. This includes addressing funding for acquisition of new pre-competitive information in a manner that reconciles with the priorities of Government and accords with the economic value of this activity.

RECOMMENDATIONS

Economic value of Geoscience Australia products

Recommendation 1

The Review recommends that DRET review current policy and legislative arrangements for determining the selection, size and terms for release of offshore exploration acreage. The DRET review should examine whether the current policy represents the optimum strategy for facilitating exploration, as well as how alternative policies affect the business case for further government investment in pre-competitive information.

Recommendation 2

Subject to any changes in requirements arising from review of the Government's system for release of offshore exploration permits, the Review recommends that DRET and GA prepare for consideration in the 2012-13 budget context a submission to Government on funding continued investment in pre-competitive information, including ongoing management of data and data access.

Alignment with Government priorities

Recommendation 3

- a. Further to the ANAO recommendations (Report No.22, 2009-10, Geoscience Australia), the Review recommends that DRET provide regular guidance to GA on Government priorities for geoscience and spatial capabilities and information to assist GA strategic planning, and advise GA of developments affecting government priorities as they arise. The key focus of this guidance should be on expectations to be met from GA's direct appropriation. This could include the Secretary of DRET reviewing and approving the GA strategic plan and annual business plans, with the Secretary also responsible for ensuring the GA priorities are aligned to government priorities. This is consistent with the Secretary's responsibility for GA under the *Public Service Act 1999*.
- b. The Review recommends that, without limiting its scope, a strategic plan for GA should specifically address the relative priority of pre-competitive information, including acquisition of data, against its other activities to resolve how to allocate resources to GA's pre-competitive activities, consistent with both the strategic plan and existing funding estimates.

Recommendation 4

Further to recommendation 2, the Review recommends that any new policy proposal for additional funding of pre-competitive data acquisition should be supported by information on how resources would be allocated across strategic priorities if no additional funding is agreed. The core purpose of this would be to improve transparency in reconciling the strategic importance of pre-competitive information against the deployment of existing budget resources.

Spatial data policy leadership

Recommendation 5

The Review recommends that the APS 200 Location project consider the case for designating a central policy centre or office to provide direction at a whole-of-government level for the creation, purchase and management of spatial data across departments and agencies. The Review suggests that such an office should be located in DRET. The office would need to work closely with GA who would continue as the Government's leading provider of spatial data and related capabilities, but should be located in a policy agency to ensure an ability to resolve competing interests and closer proximity to policy developments affecting spatial data priorities. The Review also suggests the office should absorb the functions of OSDM¹.

Maintenance of service capability

Recommendation 6

As referred to in Recommendation 3, the Review recommends that GA's strategic plan also recognise GA's role as a provider of geoscience and spatial services to other agencies. This recognition should provide a basis for GA to attach priority, and an appropriate level of funding from its direct appropriation, to maintenance of fundamental knowledge and capability relevant to a reasonable range of potential and expected external requirements where cost-effective. This would not extend to a general practice of retaining staff in reserve but does mean maintaining at a corporate level some basic level of competence in fields that may become the basis of a new capability or service in the future.

Performance management and reporting

Recommendation 7

The Review recommends that GA's KPIs be recast to include quantitative and qualitative factors. This would enable a clearer assessment against predefined targets or benchmarking of how well the outcomes compare with GA's goals, and provide a better view of whether the agency is maintaining or improving on its performance from previous years.

Recommendation 8

The Review recommends that GA make more visible the outputs and outcomes of its pre-competitive information including:

- a. Reporting specifically against the targets and expectations set out in budget documentation or government announcements related to funding of pre-competitive information.
- b. Adopting a systematic and structured approach to compiling information on the long-term impact on private exploration and resource discoveries to which pre-competitive information has made a significant contribution.

Inter and intra Government charging for services

Recommendation 9

- a. Noting the successful use of National Collaboration Framework Agreements or similar formal instruments between GA and other agencies, the Review

¹ The Office of Spatial Data Management.

recommends that their use be mandated for all significant instances of inter-agency services except in cases where alternative agreement models apply (for example, under Cooperative Research Centres).

- b. The Review recommends that Section 31 of the *Financial Management and Accountability Act 1997* not be used for intra-portfolio transactions that are in substance transferring funds through GA for payments to designated third parties.
- c. For instances where an inter-agency agreement covers requirements that are ongoing or longer term in nature, the Review recommends that GA and partners/clients adopt a default provision requiring negotiations on any renewed or extended agreement to be completed at least one year prior to expiration of the current agreement.

Geoscience Australia's cost recovery arrangements

Recommendation 10

Further to Recommendation 3, the Review recommends that the strategic plan for GA also assist in the identification of GA's 'basic information products' being the information products to be funded from GA's direct appropriation and not subject to cost recovery.

Options for revenue offsets for pre-competitive information

Recommendation 11

As part of Recommendation 1, the Review recommends that DRET consider reintroducing cash bidding, or introducing hybrid cash/work program bidding arrangements for release of exploration acreage in offshore regions that already have demonstrated resource potential from commercial exploration or production.

1. INTRODUCTION

Policy context

Role of Geoscience Australia

Geoscience Australia (GA) is Australia's national geoscience research and geospatial information agency. It undertakes geoscientific research and develops, maintains and encourages access to a wide range of fundamental geoscientific and geospatial information. This information serves a diverse range of economic, social and environmental purposes.

2. GA supports the Australian Government and the community to make informed decisions for the management and exploitation of mineral and energy resources and is Australia's national agency for the development and provision of geospatial data. Each of these roles has a long history and, while they remain significant and critically important roles, they reflect only a part of the responsibilities of GA as it exists today. Other responsibilities of the agency include providing expert geoscience support to natural resource and climate change policies, providing key services to assist preparation and response to natural disasters, supporting understanding and definition of Australia's land and marine jurisdictions and providing monitoring and expert advice in support of Australia's role in international nuclear and uranium mining related matters. Associated with many of GA's responsibilities are obligations and expectations that the agency will also serve as a custodian for geoscientific and geospatial information whether created by GA, other government agencies or lodged with the Australian Government.

3. For the purposes of this report, references to geoscience information should be read to cover the full range of GA's activities and include the fields of geology, geophysical science and geospatial activities.

4. GA is part of the Department of Resources, Energy and Tourism (DRET). However, its status as a prescribed agency under the *Financial Management and Accountability Act 1997* (FMA Act) enables it to present itself as an independent scientific advisor when dealing in matters where policy, economic or international stakeholders may have competing perspectives or interests.

5. Over the longer term, key drivers in the evolution of GA's responsibilities have been:

- institutional change within the Australian Government (notably, the merger of the former Australian Geological Survey Organisation (AGSO) and the Australian Survey and Land Information Group (AUSLIG) in 2001 to form GA as a single developer and provider of geoscientific and geospatial information);
- changing Government priorities and policies (including the emergence of the climate change debate with attendant heightened or new requirements for geoscientific information to improve understanding of Australia's natural environment);
- advances in geoscientific and geospatial technologies that, in turn, have fuelled a heightened awareness of their potential in bringing knowledge and evidence to bear in a variety of policy fields; and

- advances in general information technologies and tools that have improved the capabilities of users to access, combine and process data.

6. In deciding how to deploy resources – specifically use of its ongoing base appropriation and use of assets – GA has had to respond and adapt to the changing government policy environment which affects the level and direction of demand for geoscience information. Inevitably there are trade-offs between competing policy interests and between short and long-term priorities. This environment heightens the need for sound arrangements for defining Government priorities and expectations for GA.

Contribution of the resources sector to the economy

7. Australia's resources sector is internationally competitive and export-oriented. Australia is an important regional energy provider, particularly of coal, liquefied natural gas (LNG) and uranium. Australia is recognised as a reliable supplier with open access to high quality resources.

8. In economic terms, the resources sector makes a substantial contribution to gross domestic product (GDP), export earnings, employment, government revenues through royalties and taxation, exploration expenditure, and capital expenditure on new projects, including infrastructure. The sector's export performance is critical to the long-term maintenance of Australia's current account position and the strength of the economy.

GDP, exports and employment

9. The mining industry (which includes oil and gas production) accounted for 8.4 per cent of Australia's GDP (at basic prices)² in 2009-10.³ This has grown from around five per cent in the 1990s and (excluding ownership of dwellings) makes mining the third largest industry in the economy behind financial and insurance services (10.6 per cent) and manufacturing (9.3 per cent). A number of mining and petroleum related activities are classed as manufacturing industries in the Australian Bureau of Statistics' (ABS) GDP calculations. These mining related activities also make a significant additional contribution to GDP and include: petroleum refining; iron and steel manufacturing; alumina refining and aluminium smelting; other basic metal production; and cement production.

10. In the period from 2004-05 to 2008-09, the value of exports from the mining industry more than doubled.⁴ On a balance of payments basis, mineral resource exports made up 56.3 per cent of Australia's total exports of goods and services in 2008-09, up from 49.8 per cent in 2007-08. The forecast for 2010-11 export earnings from minerals and energy commodities is \$177.4 billion, compared with an estimated \$139.1 billion in 2009-10.⁵

11. Resource commodity prices and underlying demand are subject to fluctuations and market cycles which can result in the closure and re-opening of operations over time, and subsequent impacts on the national and regional economies. The global financial crisis

² GDP at basic prices excludes taxes and subsidies on products.

³ Australian Bureau of Statistics. 2010, *2009-10 Australian System of National Accounts*, cat. no. 5204.0, ABS, Canberra

[http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/556894E44C26469ECA2577CA00139858/\\$File/52040_2009-10.pdf](http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/556894E44C26469ECA2577CA00139858/$File/52040_2009-10.pdf)

⁴ Australian Bureau of Statistics. 2010, *2009-10 Year Book Australia*, cat. no. 1301.0, ABS, Canberra
[http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/AC72C92B23B6DF6DCA257737001B2BAB/\\$File/13010_2009_10.pdf](http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/AC72C92B23B6DF6DCA257737001B2BAB/$File/13010_2009_10.pdf)

⁵ ABARES.2010, *Australian Commodities – December quarter 2010*, Canberra, ABARES, p.779, 804

provided a stark example of the volatility of the sector when it hit in late 2008, resulting in significant falls in mineral commodity prices.⁶ While this was a significant factor in 2009-10 revenues and exports from the Australian resources sector falling well below those of 2008-09, the rapid recovery of markets, led in particular by Chinese demand, has seen forecasts for 2010-11 return to levels in line with or above those of before the crisis.

12. According to the ABS, employment in the sector grew from 176,400 to 201,000 between November 2008 and November 2010.⁷

Royalties and taxation

13. The resources sector is a significant source of government revenue for both the Australian Government through the Petroleum Resource Rent Tax (PRRT), crude oil excise tax and petroleum royalties, and for the states and territories through royalties. Data from 2006-07 (the latest data readily available), indicate that the overall taxation income from the sector was more than \$10 billion. Of this, more than \$7 billion was collected by the State and Territory governments and more than \$3 billion was received by the Australian Government.⁸ Mining revenue rose from 5.4 per cent of state and territory own-source revenue in 2002-03 to 7.8 per cent in 2007-08.⁹

Exploration

14. ABS data indicates that private mineral (including petroleum) exploration expenditure in Australia was \$5.7 billion in 2009-10, a decrease of five per cent on 2008-09.¹⁰ In real terms, exploration expenditure in 2009-10 is the third highest on record and nearly double the average exploration expenditure of the past 30 years.¹¹

15. Offshore exploration expenditure has been at record levels in recent years reflecting both the demand for oil and gas and increased exploration costs. In 2009-10, offshore exploration was worth \$2.7 billion, which was down on 2008-09's estimate of \$3.3 billion. The fall was to some extent likely to reflect the uncertainty in global financial markets as a result of the global financial crisis.

⁶ A significant example of mineral price volatility in recent times was the London Metal Exchange price for nickel, which fell from over \$54,000/t in mid 2007 to below \$9,000/t in late 2008. In early February 2011 the price is around \$28,000/t.

<http://www.lme.com/nickel.asp>

⁷ Australian Bureau of Statistics. 2010, *Labour Force Australia, Detailed, Quarterly, November 2010*, cat. no. 6291.0.55.003, ABS, Canberra

<http://www.ausstats.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003Nov%202010?OpenDocument>

⁸ Hogan, Lindsay. McCallum, Rebecca. 2010, *Non-renewable resource taxation in Australia*, Canberra, ABARE-BRS, p. 32

⁹ Commonwealth Grants Commission. 2009, *Report on State revenue sharing relativities 2009 update*, Canberra, p.52

http://cgc.gov.au/_data/assets/file/0017/15560/FINAL_REPORT.pdf

¹⁰ Australian Bureau of Statistics. 2010, *Mineral and petroleum exploration – September quarter 2010*, cat. no. 8412.0, ABS, Canberra

[http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/68CF51F6B9AA0E4ACA2577F20010B7BD/\\$File/84120_sep%202010.pdf](http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/68CF51F6B9AA0E4ACA2577F20010B7BD/$File/84120_sep%202010.pdf)

¹¹ Lampard, Michael. Copeland, Alan. Et al. 2010, *Minerals and energy – Major development projects – October 2010 listing*, Canberra, ABARE-BRS p.2

Capital expenditure and new projects, including infrastructure

16. Based on ABS data, new capital expenditure in the mining industry is estimated to be \$55.4 billion in 2010-11, which is 46.6 per cent higher than the corresponding estimate for 2009-10. New capital expenditure in 2009-10 was \$35.2 billion and \$38.0 billion in 2008-09.¹²

17. The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES – formerly ABARE) reports that at the end of October 2010, there were 72 resources projects at an advanced stage of development, that is, either under construction or committed. Of these, 26 are energy projects, 25 are mineral mining projects, 15 are infrastructure projects, four are minerals processing projects and two are energy processing projects. The total capital expenditure (planned and actual) of these is \$132.9 billion, an increase of 21 per cent since April 2010. In addition to the 72 advanced projects, there are a further 304 minerals and energy projects at a less advanced stage.¹³

Supported industries

18. In addition to the direct benefits described above, the resources sector can also be seen as generating economic benefits through associated service industries. For example, ABARE estimated that in 2008-09, Australia's mining technology services and equipment sector generated global sales revenue of \$8.7 billion, of which \$2.5 billion was export sales revenue.¹⁴ Total employment in the sector was estimated at over 31,000. This report had a particular focus on the technology component of the sector, with industry figures putting the total annual value of the sector at over \$30 billion.

¹² Australian Bureau of Statistics. 2010, *Private new capital expenditure and expected expenditure Australia – September quarter 2010*, cat. no. 5625.0, ABS, Canberra

[http://www.ausstats.abs.gov.au/Ausstats/meisubs.nsf/0/E6C9303F96AE84CBCA2577E500198614/\\$File/56250_sep%202010.pdf](http://www.ausstats.abs.gov.au/Ausstats/meisubs.nsf/0/E6C9303F96AE84CBCA2577E500198614/$File/56250_sep%202010.pdf)

¹³ Lampard, Michael. Copeland, Alan. Et al. 2010, *Minerals and energy – Major development projects – October 2010 listing*, Canberra, ABARE-BRS

¹⁴ Tedesco, Leanna. Haseltine, Chloe. 2010, *An economic survey of companies in the Australian mining technology services and equipment sector, 2006-07 to 2008-09*, Canberra, ABARE-BRS

http://adl.brs.gov.au/data/warehouse/pe_abarebrs99014504/EcoSurveyAustMiningTechCo.pdf

Table 1: Resources sector contribution to the economy¹⁵

Area of economic contribution	Amount of contribution
Share of GDP of the resources sector (2008-09) ¹⁶	8.0 per cent
Value of exports from the resources sector (2008-09)	\$161.8 billion
Share of total Australian goods and services exports (2008-09)	56.3 per cent
Resources sector royalties and taxation (2006-07)	> \$10.0 billion
Private sector resources exploration expenditure (2008-09)	\$6.0 billion
New capital expenditure in the resources sector (2008-09)	\$38.0 billion
Resources sector employment (August 2010)	193,500
Total planned and actual expenditure on resources projects (October 2010)	\$132.9 billion

Circumstances leading to the Review

19. In the lead-up to the 2010-11 Budget, PricewaterhouseCoopers was commissioned to prepare a discussion paper on GA's baseline funding. This paper (referred to in this report as the Baseline Funding Review) raised concerns that the combination of funding measures terminating after 2010-11, uncertainty about future revenues from other Australian Government agencies and the effects of certain large ongoing costs and overheads would put GA under significant and increasing financial pressure from 2011-12. The paper described how, under the budgetary outlook as it then existed and under certain assumptions, GA could face a reduction in service capacity of 50 per cent as it would have to reduce its workforce by approximately half.

20. The Baseline Funding Review underscored some of the downsides to funding arrangements for GA as it then existed. A core question posed by the report was whether the funding arrangements created unreasonable uncertainty for long-term planning and capacity development for GA, with attendant loss of efficiency and capability for the Government.

21. In the 2010-11 Budget, the Government agreed to supplement GA's direct appropriation by \$65.3 million over four years to enable GA to continue its role in providing geoscience products and services. As part of this decision, the Government agreed to this Review of GA to examine issues related to the value and financial sustainability of the agency's products and services.

Conduct of the Review

22. This strategic review was managed by the Strategic Reviews Branch of the Department of Finance and Deregulation (Finance). A special review team was convened comprising Finance officials and secondments from DRET and GA. A Project Management Committee was established, comprising officials from Finance, DRET and GA, to provide guidance on and discuss the progress of the Review, including: developing the Terms of Reference; discussing the outcomes of stakeholder consultation; exploring funding and revenue options; and reviewing report. The Review was also supported by a reference group comprising

¹⁵ 2009-10 figures have not been used due to the impact of the Global Financial Crisis

¹⁶ At basic prices

representatives of DRET, Finance, the Department of the Treasury and the Department of the Prime Minister and Cabinet.

23. The Review drew in information from a number of past reviews into GA and its predecessors, including a 2010 ANAO Performance Audit Report on GA. The Review also drew on Australian and international research related to GA's acquisition of information that supports the Australian Government's offshore acreage release process. To support this Review, DRET commissioned consultants ACIL Tasman to undertake two separate studies addressing the economic value of GA's core products. One study addressed the economic value of geospatial, earth monitoring and groundwater information while the other addressed the economic value and benefit of pre-competitive information.

24. The Review commenced by engaging GA officials (and subsequently DRET officials) in intensive seminars to understand all aspect of GA's activities and its operating environment. This allowed the review team to understand the diverse policy and program objectives of GA's activities and the strategic and operational issues that face GA.

25. The Review tested and explored issues raised in seminars and research with key stakeholders of GA. The Review contacted major stakeholders, including partner and client government agencies, peak industry bodies for mining, exploration and spatial information as well as relevant state and territory government authorities – see Attachment B for the list of stakeholders consulted.

2. ABOUT GEOSCIENCE AUSTRALIA

Overview of the organisation

GA is a prescribed agency within the Resources, Energy and Tourism portfolio. It is one of five Australian Government prescribed agencies operating under the FMA Act that are not statutory agencies under the *Public Service Act 1999* and instead are staffed through a Department of State.

2. GA does not have specific enabling legislation, meaning it has not been established under an Act of Parliament to undertake specified geoscience related programs or other activities.
3. GA was created from a merger in 2001 of the former AGSO and AUSLIG. Both former organisations had a long and varied history following their establishment after World War II.

Background to the Australian Geological Survey Organisation

4. AGSO's predecessor was the Bureau of Mineral Resources, Geology and Geophysics (BMR) which was established in 1946 with a charter to systematically map Australia's geological and geophysical features as a basis for informed mineral exploration.
5. During the first three decades, BMR was focused on onshore research. This work was instrumental in the discovery of numerous commercial mining deposits, including manganese at Groote Eylandt, bauxite at Gove, uranium at Rum Jungle and nickel at Greenvale. Extension of the mapping project into New Guinea also played a part in the discovery of the Panguna copper deposit on the island of Bougainville. In addition, discoveries made with the help of BMR's geophysical data included petroleum at Moonie and copper-uranium-gold at Olympic Dam.
6. By the early 1970s, BMR's efforts concentrated on more detailed geological, geophysical and geochemical studies of specific mineralised areas and extended to geological and geophysical mapping of Australia's offshore areas. Following a review by the Australian Science and Technology Council in 1978, BMR's key role was redefined to focus on strategic geoscientific research.
7. In response to increasing government priorities for offshore petroleum research, a marine continental margins project was created in 1985. This project had the aim of establishing the geological framework of Australia's continental margins and stimulating petroleum company interest by pointing to economic potential. In 1983 the Government supported the charter of a data acquisition vessel, the *Rig Seismic*. This vessel was central to BMR's offshore program for the next decade.
8. Throughout the 1980s BMR's responsibilities extended to include remote sensing, groundwater investigations (particularly in the Murray-Darling Basin), geological hazard assessment and monitoring of nuclear explosions (which built on its long established earthquake monitoring capacity).
9. Following the Woods Review in 1989, BMR's role was expanded to include informing consideration of land use planning and environmental issues, including the mitigation of natural hazards. The Woods Review also called for re-establishment of geoscientific mapping, which resulted in a National Geoscience Mapping Accord between the BMR and the State and Territory governments being instituted in the early 1990s.

10. Following a reorganisation in 1992, BMR was renamed AGSO. A review (Richards Review) set up to examine the new agency concluded that “the relevance of geoscience lies in the provision of information essential to meeting two of the dominant concerns in society”. These were:

- the desire for economic prosperity; and
- that resource use in the economy is appropriately managed to ensure the protection of the local and global economy – Ecologically Sustainable Development.

11. In 1998, a new, purpose-built facility in Symonston, in the Australian Capital Territory (ACT) was opened, which co-located all parts of the agency at one site for the first time since 1975. In the same year, the Petroleum and Mineral Resource Branches, which had been transferred from BMR to the Bureau of Resource Sciences in 1992, returned to AGSO. The branches’ functions included provision of technical advice for the administration of petroleum exploration and development in Australia’s offshore waters and for policy relating to minerals, petroleum and coal exploration.

Background to Australian Surveying and Land Information Group

12. AUSLIG’s predecessor was the Division of National Mapping (Natmap) and, to a lesser extent, the Australian Survey Office (ASO). A national mapping office was established in the Department of the Interior in 1947 in order to coordinate the topographic mapping of Australia in support of post-war rural reconstruction, decentralisation, mineral resources development and transportation. This work was a cooperative effort between the states and various Australian Government parties including the Department of Defence, under the general direction of the National Mapping Council. It involved undertaking extensive geodetic control surveys, aerial photography and photogrammetry as well as cartography.

13. Tensions between the national mapping office and the more established Royal Australian Survey Corps over roles and responsibilities led to the Prime Minister requesting a review conducted by the head of the UK Ordnance Survey, Major-General RLI Brown in 1951. Consideration of Brown’s report eventually led to the transfer of the national mapping office to the Department of National Development and the creation of Natmap in 1954.

14. Over the next ten years Natmap focused on the completion of the first national topographic mapping coverage at 1:250,000 scale based on aerial photography. A parallel development was the densification of the national geodetic survey leading to a recomputation and national adjustment as the basis for the adoption of the Australian Geodetic Datum in 1966.

15. In 1965 the National Mapping Council endorsed the accelerated completion of national topographic coverage at 1:100,000 scale through harnessing the resources of Natmap, the states and the Army. This undertaking was completed in 1988. During this period Natmap adopted digital cartography as a production method and the resulting data was used by an increasingly broad range of users.

16. In the period 1979-1988 Natmap conducted a bathymetric mapping program of the continental shelf. The impetus for obtaining more knowledge of the topography and extent of the continental shelf was spurred by technological developments enabling exploration, evaluation and extraction of seabed resources. In 1984 Natmap assumed responsibility for operation of the Australian Landsat Station (later known as ACRES) from the Department of Science.

17. In the mid 1980s tensions over roles and responsibilities with the Army Survey Corps resurfaced, resulting in the Government commissioning a review by Prof Jack Richardson. His review recommendations were factored into a new Administrative Arrangements Order (AAO) issued in July 1987 which resulted in the merger of Natmap with the ASO within the Department of Administrative Services (DAS) to form a new entity, AUSLIG. The ASO was the Australian Government agency responsible for providing surveying support for assets such as Defence bases and airports.

18. In line with other DAS agencies, AUSLIG was required to act as a business enterprise and cost recover its activities. In the early 1990s this led to a major reduction in size and considerable tension with the private sector. Following a further review in 1996, the Government sold the commercial component of AUSLIG and market tested remaining public interest activities for outsourcing. This resulted in AUSLIG reverting to the functions undertaken by Natmap prior to 1986 albeit with a reduced capacity, under a public interest mandate.

19. With the abolition of DAS in 1997, AUSLIG became part of the Industry, Science and Tourism portfolio. AUSLIG was closely involved in the development of the Spatial Information Industry Action Agenda and the adoption by the Government of the Australian Government Policy on Spatial Data Access and Pricing (SDAP) and establishment of the Office of Spatial Data Management (OSDM) in 2001. During this period positive working relationships were re-established with industry and the Department of Defence.

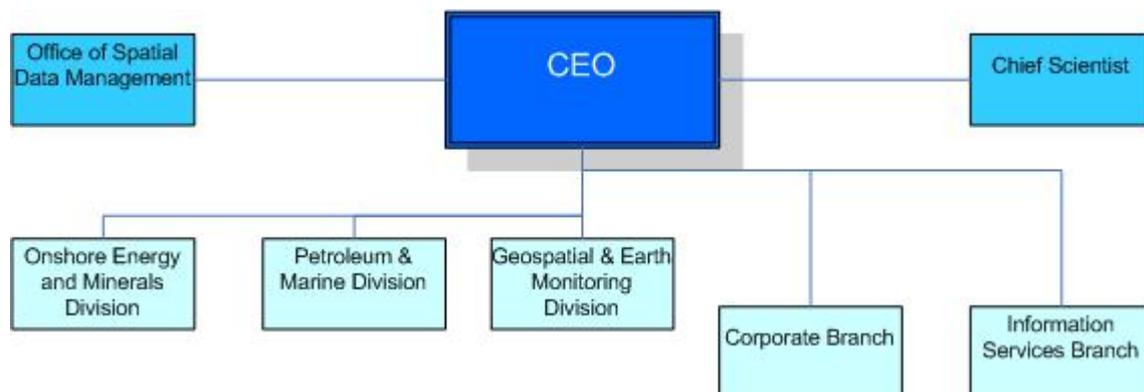
Following the Australian Geological Survey Organisation and Australian Surveying and Land Information Group merger

20. Since 2001 the scope of GA's activities has broadened further in support of new government policy priorities. For example, new capabilities have been developed in the areas of tsunami warning, critical infrastructure protection, energy security, geological storage of carbon dioxide and groundwater assessment and modelling. Today GA provides information to the Australian, State and Territory governments and to industry and the community to assist with decision making processes and planning for Australia's future challenges and social and economic wellbeing.

Structure and size

21. As at 30 June 2010, GA employed 731 Australian Public Service (APS) staff – 581 ongoing and 150 non-ongoing. GA staff resources are organised into three operational Divisions (Petroleum and Marine, Onshore Energy and Minerals, Geospatial and Earth Monitoring) and two support Branches (Corporate, Information Services).

Figure 1: Geoscience Australia Organisational Structure



Petroleum and Marine Division (PMD)

22. PMD focuses on offshore Australia with a significant activity being analysis of the petroleum potential of Australia's frontier basins. This work is aimed at attracting petroleum exploration investment to sustain oil and gas supplies into the future. The Division provides pre-competitive data and information to industry which underpins the annual offshore petroleum acreage release.

23. Under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGs Act), PMD provides technical advice to Government and industry on Australia's petroleum prospects, reserves and potential. PMD also has a role in studying the potential for geological storage of carbon dioxide as a way to mitigate carbon dioxide concentrations in the atmosphere. It provides technical support for the offshore greenhouse gas acreage release, and works with the State and Territory governments in assessing and developing monitoring techniques for geological storage of carbon dioxide. PMD also provides data, technical information, advice and research for maritime boundary definition, regional marine planning and marine environmental management. The diversity of the work programs in PMD reflects Australia's long coastline (almost 60,000 km) and large offshore jurisdiction (more than one and a half times the land area of mainland Australia).

Onshore Energy and Minerals Division (OEMD)

24. OEMD provides pre-competitive geoscience information for energy and mineral exploration in Australia. This is achieved through integrated programs of data gathering, interpretation and assessment which are conducted at national and regional scales, frequently in collaboration with state and territory geoscience agencies. Scientists use the latest geophysical imaging, research and mapping techniques to reduce geological uncertainty and enhance the opportunities for mineral discovery. In addition, OEMD advises the Australian Government on mineral resources, mining and land use. This work is integral to decisions relating to multiple and sequential land use and to developing an informed understanding of the nation's known mineral endowment, the sustainable development of mineral resources and the level of exploration activity. OEMD also assists with mineral exploration and studies into the geological evolution of Australia by providing high quality data about the age of Australian rocks.

Geospatial and Earth Monitoring Division (GEMD)

25. GEMD maps, monitors and models changes to the Earth and advises on how they affect Australian society. This is achieved by utilising its capabilities in geospatial information and

knowledge management, mapping, Earth observation, groundwater and risk assessment in order to respond flexibly to current and emerging government priorities. GEMD operates satellite ground stations and manages long-term archives of Earth observation data. It provides authoritative spatial data services, tools, solutions and products to many areas of the Government enabling general uptake of geospatial technologies in support of evidence-based decision making. It plays a lead role in coordinating national topographic and thematic mapping activities and standards. GEMD also monitors and reports on earthquakes and tsunamis and contributes to international efforts to monitor nuclear tests. It develops computational methods, models and decision-support tools for use in assessing the impact and risk posed by hazards. Groundwater has been an increasingly important Government priority and GEMD applies geoscientific expertise to the mapping and understanding of Australia’s groundwater systems and their impacts upon the management of broader environmental and natural resource assets.

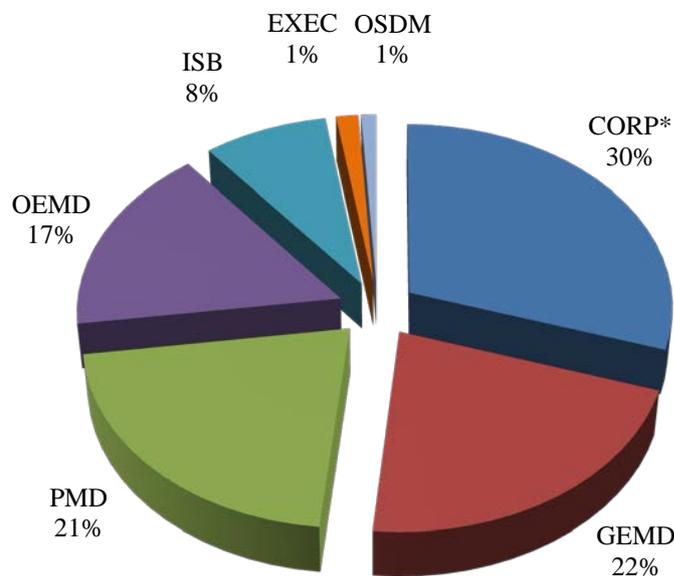
Corporate Branch

26. Corporate Branch provides advice and support in communications and governance, finance and human resources. The Branch is also responsible for the Geoscience Education Centre, the Geoscience Library and the Geoscience Sales Centre – these facilities assist in promoting awareness of the geosciences.

Information Services Branch (ISB)

27. ISB is responsible for the development and implementation of GA’s information and communications technology (ICT) strategy and the coordination of ICT-related activities across the agency.

Figure 2: Budget Appropriations 2010-11



* This includes property and related facilities management costs of \$23.2m for GA's headquarters in Symonston, ACT.

Source: Geoscience Australia (December 2010)

Geoscience Australia's core capabilities

28. Under the October 2010 AAO DRET is responsible for delivering “Geoscience research and information services including geodesy, mapping, remote sensing, groundwater and spatial data co-ordination”. DRET has assigned these responsibilities to GA. In order to deliver these services GA needs to develop and maintain a broad range of capabilities.

29. In addition to APS core capabilities in areas such as leadership, relationship management, and program and project management, GA places a strong emphasis on science and technology capabilities. A recent staff skills survey has indicated that approximately 55 per cent of staff have graduate qualifications. Twenty per cent also have a Masters degree while 18 per cent hold a PhD.

30. Key expertise is in the fields of geology, geography, geomatics, geophysics and geographic information systems. Around one third of GA staff claim to have qualifications and expertise in each of these fields. Smaller numbers have expertise in the specialised areas of geochronology and geochemistry. Fifty per cent of staff claim information management as a core skill.

31. GA is specifically recognised for its capabilities in:

- 3D geological mapping, integrating geophysical and geological mapping using constrained inversion – GA’s work in this field has been internationally recognised through the appointment of Dr Richard Lane as the 2010 Society of Exploration Geophysics Distinguished Lecturer;
- national geophysical mapping where GA has built a consistent national coverage by standardising and integrating disparate datasets produced by the states and the Northern Territory;
- geological storage of greenhouse gases, in particular the technical support provided for development of Carbon Capture and Storage (CCS) legislation and the world’s first CCS acreage release;
- mapping of the marine jurisdiction, with Australia being one of the first countries to successfully mount a claim to the United Nations (UN) for an expanded Exclusive Economic Zone based on geoscientific delineation of the extended continental shelf;
- marine environmental habitat mapping using geological characteristics as surrogates for ecological diversity;
- integrated assessment of natural disaster risk – tsunamis, earthquakes, floods, fires, wind, storm surge, etc, including development of sophisticated earthquake and inundation risk models;
- integrated mapping of salinity and groundwater using airborne electromagnetic techniques;
- resource assessment – the Australian Energy Resource Assessment was the first national scale integrated assessment of all energy resources;
- nuclear monitoring – GA is a designated lead participant in the work of the Comprehensive Test Ban Treaty Organisation technical committees; and

- geodesy and the International Terrestrial Reference Frame – GA is a leading researcher into global positioning systems (GPSs) and the geospatial coordinate system, and represents Australia on a number of global committees in this field.

Key facilities and networks

Laboratories

32. GA houses a number of specialist laboratories which provide a range of analysis services to support GA projects. These include:

- a dedicated mineral separation laboratory, which includes down-draft fume cabinets to accommodate use of heavy liquids;
- palaeontology, sedimentology, and organic/mineral geochemistry laboratories for analysis of a variety of marine, estuarine, freshwater, and regolith samples; and
- geochemistry and mineralogy laboratories for the identification and analysis of rocks, minerals, soils and the fluids trapped in rocks. This information is used to support GA's national and regional programs, mineral systems research and regolith studies.

SHRIMP

33. GA installed a new Sensitive High Resolution Ion MicroProbe IIe (SHRIMP IIe) at the end of 2007 to enable in-house analysis of mineral phases such as zircon and monazite, critical to the accurate dating of rock specimens. Along with existing resources and experience, this facility allows GA to have management of the 'outcrop-to-publication' analytical cycle to inform research projects. The facility also enables the development of new analytical methods, expanding GA's capability to address increasingly complex geoscience issues.

Australian Regional GPS Network

34. GA operates the Australian Regional GPS Network (ARGN) which consists of a network of permanent geodetic-quality GPS receivers, on geologically stable marks, in Australia and its territories. GPS data is collected at these sites every 30 seconds. The ARGN provides the geodetic framework for the spatial data infrastructure in Australia and its territories. It provides input for the measurement of earth processes, such as crustal dynamics and sea level rise. Data from the ARGN contributes to international collaborations.

Satellite Laser Ranging

35. GA operates laser ranging stations at Mount Stromlo in the ACT and at Dongara in Western Australia. The primary function of satellite laser ranging is the measurement of precise distances between a laser telescope and reflectors on orbiting satellites. This is done by firing short pulses of laser light at the reflectors, and measuring the time it takes for the light to return to Earth. Because the speed of light is known, the distance travelled by the light in that time can be accurately calculated.

36. Satellite laser ranging is the primary technique used to accurately determine the shape and size of the Earth and for Earth monitoring science. It contributes to the definition of the International Terrestrial Reference Frame by being the only space geodetic technique which defines the Earth's centre of mass. It monitors Earth rotation and polar motion, models the temporal and spatial variation of the Earth's gravity field, determines ocean and earth tides,

and monitors tectonic plates and horizontal and vertical crustal deformation. It also assists with precise orbit determination for spaceborne altimeters and radar measurements for studies in global ocean circulation and changes in ice masses.

Satellite Remote Sensing

37. GA owns and operates the primary acquisition facility for data from polar orbiting remote sensing satellites, which is located at Alice Springs. The facility includes two large X-band antennas and associated ICT infrastructure. It has been operating continuously since 1979 and GA maintains a large archive of time-series satellite imagery acquired over Australia from that year. GA also operates a second acquisition facility in Hobart and is a partner in a third facility located in Perth. Processing facilities for both optical and radar satellite data are housed at GA's Canberra headquarters.

Geophysical Network

38. GA operates the National Geophysical Network which collects geophysical data on earthquakes, nuclear explosions and geomagnetic fields. The network is designed to detect earthquakes of magnitude 3.5 and above in Australia and magnitude six and above within the region. The network provides data and information to help understand earthquake hazards for improved mitigation and disaster management strategies, provides alerts to emergency organisations, and supports research activities. It also forms a critical input to the Australian Tsunami Warning System (ATWS).

Geological and geophysical data repositories

39. GA houses one of the world's largest collections of geoscience data. Much of this data is non-confidential and available to industry, research organisations and the public. The collection includes seismic survey and well data submitted by industry since the 1960s under legislative requirements as well as specimens and data collected by GA or other government agencies.

40. The collections comprise:

- physical specimens and samples of geoscience material such as samples from petroleum wells and stratigraphic holes, down hole drill cores and cuttings, onshore side wall core samples, thin sections, reservoir plugs, liquid and gas hydrocarbon samples;
- minerals, rock and fossil samples;
- digital data such as 2D and 3D seismic survey field data, navigation data, processed data, velocity data, observers' logs, operational reports, processing reports, bathymetry data, potential field data (gravity and magnetic), well completion reports, well logs, destructive analysis reports, vertical seismic profiles, core photography, special studies;
- databases compiled from data/reports/interpretations from government activities or submitted by industry under legislation; and
- hard-copy reports and information submitted during the pre-digital era including seismic sections and other analogue formats.

Information and communications technology

Overview

41. ICT is a key enabler of GA's diverse science-based work program. In addition to the usual desktop and corporate support systems required by any public service agency, the nature of GA's work requires a large number of complex, ICT-enabled technical systems. GA operates a 'federated' ICT environment that involves a central ICT function within ISB that works in collaboration with devolved ICT capability and specialist applications across the rest of the agency.
42. GA is a heavy user of Geographic Information System (GIS) software, as the great majority of its data holdings have geospatial elements and are best presented in a geospatial context. Support of GIS technologies requires a technical understanding of surveying, map production and geodesy issues.
43. GA has two systems that have high availability expectations – the ATWS and Sentinel (bushfire mapping). These systems operate 24 hours a day, seven days a week. Even short outages could result in immediate serious consequences. No other GA systems fall into this category although non-availability over extended periods could result in data gaps and degradation of services to clients.
44. GA's ICT expenditure just exceeded the \$20 million per annum threshold for identifying 'large' agencies in implementation of Gershon review savings. As a result, GA has been required to meet the savings target applied to larger agencies of 15 per cent – equivalent to \$3 million per annum.
45. The total ICT expenditure for 2008-09 based on the Gershon definitions was \$25.3 million, with a 'Business As Usual' component of \$20.3 million. The following Table 2 provides a breakdown. Total Written Down Value (WDV) of ICT assets is currently \$6.4 million. Further details of GA's hardware and software are at Attachment A to this report.

Data stewardship

46. GA is the custodian, on behalf of the Australian Government, of a range of geoscientific and geospatial data that has been accumulated over 60 years. GA ensures that comprehensive, accurate and authoritative information from these sources is available for use and re-use. Data management issues at GA are further impacted by the long life cycle associated with scientific data. Geological and geospatial data records captured over the past 100 years remain relevant today, for two main reasons:
- some data obtained over this period is in the form of continuous time-series data, such as earthquake monitoring and satellite remote sensing data, where long-term trends are of vital importance; and
 - the development of new techniques and technology for data analysis and interpretation means legacy data can be reinterpreted to provide new insights.
47. In addition to geoscientific data being useful for long periods, GA has been experiencing significant data growth. Much of GA's funding, through which this data is being acquired, is in the form of terminating programs or discrete, one-off Section 31 funded projects. As such, this funding does not cover the ongoing costs for the custodial and stewardship activities associated with the data obtained.

Table 2: Breakdown of Geoscience Australia ICT Expenditure for 2008-09
(source: Gershon submission)

	Operational Exp (\$m)	Capital Exp (\$m)	Depreciation (\$m)
ICT Management	2.92	-	-
Applications Development	8.96	0.04	0.01
Mainframe Services	-	-	-
Midrange Services	1.70	0.94	0.15
Storage Services	1.39	2.02	0.29
Wide Area Network	1.25	-	-
Internet Gateway	0.43	-	-
Local Area Network	0.08	0.35	0.04
End user infrastructure	1.82	0.85	0.15
Voice services	0.78	0.02	0.01
Helpdesk Services	0.25	-	-
Facilities	0.05	1.49	0.09
<i>Total ICT expenditure</i>	19.64	5.70	0.74

ICT Strategy

48. In October 2010 GA released its Information and Communications Technology Strategy 2010-2015. This outlined that in the context of the GA Strategic Plan, ICT involves the acquisition, installation, use and disposal of information and communications technologies and services so as to utilise resources more effectively, increase productivity and improve efficiency, and reduce the environmental impact of operations.

49. ICT in the government and science sectors is rapidly advancing and placing new demands on agencies like GA. Some factors impacting GA include:

- the exponential increase in the amount of science data being produced, driven by advances in acquisition technologies and increasing client demand for digital data;
- the Australian Government's National Collaborative Research Infrastructure Strategy (NCRIS) and SuperScience Initiatives, which are investing in infrastructure and collaboration to support the growth of eResearch in Australia;
- compliance with whole-of-government ICT arrangements facilitated by the Australian Government Information Management Office (AGIMO) to implement efficiencies through greater collaboration, sharing of services and an increasing emphasis on ICT security;
- the continuing impact of the Gershon Review;

- the impact of Government 2.0 initiatives; and
- opportunities from advances in ICT infrastructure and tools including cloud computing.

50. Areas of continuing focus include:

- further developing ICT strategy, architecture and governance;
- stronger linkages between the ICT strategy and the overall GA strategic plan;
- particular emphasis on building ‘industrial strength’ capacity in the areas of data storage, specialised geoscientific/geospatial applications, network bandwidth and compute power; and
- continuing capability and capacity building within the federated model including fine tuning of the model to realise greater efficiency across GA in ICT.

Other assets

51. GA has an inventory of specialist plant and equipment with a total written down value (WDV) of approximately \$19 million. The major items are listed in Table 3 on the following page.

Overall cost profile

52. GA’s cost profile has a high element of fixed cost. The costs of leasing and operating the Symonston facility amount to approximately \$23.5 million per annum, and there are the costs of approximately \$15 million per annum associated with operating the key facilities and networks listed earlier in this chapter. These facilities require a minimum level of staffing and funding for effective maintenance and operation.

53. GA uses base appropriation funding to maintain and manage the geographic and geological data and knowledge of the nation. This role involves management of GA’s information holdings, derivation of geoscientific knowledge and dissemination of this information and knowledge to industry and government stakeholders and the broader community.

54. A small amount of base appropriation is used to develop base capability that is then built on to provide services to other areas of government under Section 31 arrangements (for example, in groundwater).

Table 3: Specialist plant and equipment

Category	Asset Description	WDV
Satellite earth observation	Alice Springs Buildings, nine and five metre diameter satellite reception antennas, ancillary reception equipment	\$2.7m
Marine surveying	>80 items including shallow water multi-beam sonar, box corer, rotary drill, under-water video and still camera systems, sub-bottom profiler	\$1.2m
Geophysical and magnetic laboratories	East Cowen, & Gin Gin magnetic observatories, (~50) magnetometers	\$1.0m
Geophysical seismic stations	(~35) seismic stations comprising building, seismometer, power, IT, communications and ancillary infrastructure and equipment	\$5.0m
Satellite laser ranging	Mt Stromlo observatory building, one metre laser tracking telescope, satellite laser ranging receiver and ancillary equipment	\$3.3m
SHRIMP	SHRIMP, scanning electron microscope, energy-dispersive x-ray	\$2.1m
Tasmanian Earth Resources Satellite Station (TERSS)	(joint venture) nine metre diameter satellite reception antenna plus ancillary reception equipment located in Hobart	\$0.4m
Geodetic infrastructure	(~20) geodetic reference stations including GPS receiver, antenna, meteorological equipment, IT, communications and ancillary infrastructure and equipment	\$0.7m
Laboratories	(~100) items of laboratory equipment including spectrometers, microscopes, chromatographs, ablation and reaction systems, freezers	\$1.6m

3. ECONOMIC VALUE OF GEOSCIENCE AUSTRALIA PRODUCTS AND ACTIVITIES

GA provides technical advice to government on matters of geoscience, thereby informing policy development and decision making. Questions arise regarding why government requires such an organisation for this advice, and whether such advice could be obtained from other sources, including through the private sector. In economic theory, government is generally recognised as having a role to play in addressing market failures, one of which is in the provision of public goods. There are a number of arguments that indicate the role of GA is important in addressing market failures in its areas of activity.

2. Through discussion with stakeholders, it became evident that there is a significant public good aspect to the geoscience products and services developed and maintained by GA. Public geoscience information is considered to meet the definition of public good to the extent that it is non-rivalrous (consumption by one person does not diminish availability to others) and non-excludable (it is difficult to exclude others from benefiting from the good).

3. The Terms of Reference of the Review include evaluation of GA's role in the broader public and private geoscientific community, including the uniqueness, utility and value of its current range of products and services to business, government and non-government users of geoscience data. This necessitated an assessment of the requirement for and extent of Commonwealth intervention in geoscientific research activity and specifically included the study of:

- benefits in providing pre-competitive information; and
- costs, economic value and public and private benefits of the provision of geospatial, Earth monitoring and groundwater information.

4. To support the Review DRET commissioned an independent consultant, ACIL Tasman, to report on the economic value of the core areas of GA's work. This work was separated into two reports, one focussing on GA's work relating to pre-competitive geological information on petroleum and minerals, the other on its work in gathering, processing and disseminating geospatial, Earth monitoring and groundwater information.

5. In each report, ACIL Tasman investigated the public good aspects to the products and services produced by GA, as well as the private and public benefits flowing from those products and services.

6. This chapter summarises a number of past reviews of relevance to assessing the value of GA's products. It draws heavily from the two ACIL Tasman reports. Following the summary of other reviews and the consultancy reports, the chapter presents this Review's assessment of the evidence and analysis available as a basis for informing on the value of key GA products and activities.

Consultancy evaluation of the economic value of geospatial, Earth monitoring, groundwater and hazards information

7. ACIL Tasman concluded that there were strong indications of public good characteristics of GA's work in these areas. However, it also noted that advances in technology and changing cost structures can be expected over time to result in the private sector moving into areas that were previously the exclusive domain of government. This

point has also been recognised by the Australian and New Zealand Land Information Council (ANZLIC).¹⁷ Provided GA continues to operate on the existing principle that it will not compete in areas where the private sector delivers products and services, this should ensure its activities continue to be a legitimate area of government activity.

Empirical evidence

8. In its report, ACIL Tasman developed an argument around the significant economic benefits flowing from GA's work in the geospatial, Earth monitoring, groundwater information and hazards fields. ACIL Tasman divided impacts into productivity and non-productivity types. Productivity benefits are realised in areas such as logistics, precision agriculture, asset mapping, and infrastructure maintenance. ACIL Tasman considered that geospatial information also generates economic impacts which are not captured as productivity benefits through improving public decision making, natural resource management including water management, natural disaster and emergency management and national security.

9. ACIL Tasman noted that GA provides fundamental geographic information at a national scale in a form that facilitates Australian Government and community decision making and community development. This information is used in sectors such as agriculture, fisheries, utilities, communications and transport. In addition there is a range of generic uses of spatial information that span across sectors, such as:

- market and infrastructure planning: analysing spatial trends, for example, when building new infrastructure, and providing services where they are needed the most (and where they are therefore likely to be most profitable);
- asset management: compiling registers of existing infrastructure, identifying faults and prioritising sites needing attention from maintenance crews; and
- use of geospatial systems as 'enterprise-wide' tools to drive productivity, for example, using one spatial system that is populated with different layers of information, and is accessed by all the different service groups within a local government or within large utilities companies.

10. GA provides Earth observation services, expert advice, and information for decision-makers through its National Earth Observation Group. GA's data acquisition facility located at Alice Springs and data processing facility in Canberra form Australia's principal Earth resource satellite data reception and processing facilities. GA also manages long-term archives of Earth observation data and distributes satellite data through a network of distributors and via the Internet.

11. GA applies exploration geoscience to groundwater issues, and groundwater mapping and analysis is rapidly emerging as an important function within the agency. Measurement of groundwater requires special technical and scientific skills which ACIL Tasman considers fit well with GA's existing knowledge base and provide a unique national capability to assist government policy making.

12. ACIL Tasman considers that use of satellite remote sensing and groundwater analysis by GA plays a significant role in understanding groundwater resources which is necessary for

¹⁷ Spatial Information Industry Joint Steering Committee. 2002, *Respective roles and conduct of relationships between the public and private sectors in the Australian spatial information industry*, ANZLIC, p.4

the joint management of surface and groundwater. This has been identified as one of the key priorities in the National Water Initiative.

13. GA provides natural hazard research, monitoring, assessment and advice. This function draws on a range of resources and capabilities within GA including national mapping functions, early warning systems, and satellite observation capabilities.

14. ACIL Tasman notes that this capability supports all stages of disaster management – planning, preparedness, response and recovery – and considered that its most valuable applications are in planning and preparedness. More comprehensive mapping data for planning and development can reduce the risk of damage to property and people. Better information on the location of risks – whether that comes from fire, floods or tsunamis – can result in better preparation and response to incidents.

Conceptual model

15. ACIL Tasman considers GA’s geospatial, Earth monitoring, groundwater and hazard activities exhibit strong public good characteristics (see Table 4). This suggests that, in the absence of government intervention, these services and dependent activities would be under-provided.

16. The fundamental arguments for government becoming involved in these activities according to ACIL Tasman are:

- Fundamental knowledge enables markets – the efficient functioning of a market economy relies on the existence of certain fundamental values and institutions such as property rights, agreed measures and accepted trading mechanisms – GA provides some of these functions in its role as a source of national, objective information which is recognised by market participants and as an arbiter in some types of disputes.
- Public goods – these are goods or benefits which are important to the economy but which private suppliers have little incentive to produce; a traditional example used is that of a lighthouse, and GA operates services such as tsunami and earthquake monitoring systems that have similar characteristics.
- Coordination failures – a market failure in the provision of public goods can be seen as a failure arising from the lack of a practical mechanism for collaboration between users to share the costs of producing the good. ACIL Tasman considered that this suggested a role for a single public agency to hold coordinating functions and responsibilities.
- Time horizon, risk and scale issues – market failure in some cases occurs because private companies discount the future more heavily, may be risk averse and too small in scale to undertake some of the services that GA provides – an example is the operation of geophysical networks.

Table 4: Likelihood of market failure assessment (source: ACIL Tasman Report)

Category	Activity	Fundamental Knowledge	Public Good	Coordination Failure	Time Horizon Risk and Scale Issues
Geospatial Information	Topographic databases and related services	✓✓	✓✓	✓✓	✓
	Satellite observation data collection and analysis	✓✓	✓✓	✓	✓
	National Geospatial Reference System	✓✓	✓✓	✓✓	✓✓
Earth monitoring	Geophysical network maintenance & operation	✓✓	✓✓	✓	✓✓✓
	National geomagnetic field monitoring	✓✓✓	✓✓	✓	✓✓✓
Groundwater	National groundwater mapping & analysis	✓✓	✓✓✓	✓✓✓	✓✓
Hazards	Hazards monitoring, impact assessment & advice	✓	✓✓✓	✓✓✓	✓✓✓

Geoscience Australia’s role in securing the overall value

17. ACIL Tasman considers that GA plays an important role in the ‘value chain’ that creates the overall economic value referred to previously. GA is the custodian of fundamental datasets, maintains some of Australia’s key geospatial infrastructure and provides a range of services in collecting and integrating various types of geospatial information, coordinates national efforts and provides strategic advice and analysis to government.

International comparison

18. ACIL Tasman reviewed the activities of similar agencies around the world including the USA, UK, Canada, New Zealand and France. While comparisons are difficult because no one organisation exactly replicates GA’s responsibilities for geoscientific and geospatial services, ACIL Tasman concluded:

- Other OECD governments are devoting significant public resources to maintain similar agencies, suggesting that the public good nature of the service provided is accepted worldwide.
- Some equivalent countries have reported significant increase in investment by government over the last decade, for example Canada.

- On a per capita basis, GA would appear to be well resourced but taking into account the size of the area and diversity of hazards that GA has responsibility for, the funding for GA is still low in comparison with other OECD countries.
- The agencies examined were targeting their effort at fairly similar areas including a continued focus on mapping and earthquake and nuclear monitoring.
- The emergence of demand for more complex modelling, analysis and advice services related to water management, climate change and natural hazards functions.

Quantitative modelling

19. ACIL Tasman was required to provide an estimation of the economic value and benefits to Australia of the provision of geospatial, Earth monitoring, and groundwater information and the value of mitigating the effects of natural hazards.

20. ACIL Tasman considered that the strong public good features of GA's spatial information and activities created particular challenges for placing a dollar value on associated outputs or outcomes. Geospatial, Earth monitoring and groundwater information and products and services typically enable a range of activities in the economy, and it is often only these activities or outcomes associated with downstream activities that offer more direct measures of value to society. The general approach attempted by ACIL Tasman was to derive a value for GA's contribution to spatial information from the estimated value of the benefits generated by government and industry activities and programs that used spatial data.

21. In some cases an activity may be almost impossible to undertake without fundamental data or some other service provided by GA, but it would be incorrect to attribute the entire value of that activity to the enabling information or service. A further challenge lies in the fact that multiple layers of data, representing separate types of geospatial information related activities, are often combined to provide a single valuable product. This means that it is difficult to attribute the value delivered by these types of information to individual agencies, or particular programs within the overall activity of a given agency.

22. Given these factors, the analytical questions addressed by ACIL Tasman were:

- What is the nature of the benefits created by geospatial information?
- What is the likely aggregate economic value to Australia derived from the provision and application of geospatial information?
- How important is the contribution of GA to the creation of this value?

Private economic benefits through improved productivity

23. ACIL Tasman noted that the Australian spatial information industry comprises over 3,000 businesses which generated estimated combined revenue of \$2.5 billion in 2007. However, the size of the industry only represents a small component of its impact on the economy and the benefits it delivers. A large part of the value from the use of geospatial data and systems accrues to consumers of spatial information products or by consumers of products that can be produced more efficiently using spatial information products.

24. Using existing and verifiable case studies, ACIL Tasman estimated that the minimum value of net accumulated benefit to the private sector of the productivity improvements to the Australian economy had grown to \$6.43 billion in 2006-07. However, ACIL Tasman considered this value could confidently be assessed as being up to \$12.6 billion based on

'realistic' assumptions derived from the case studies and literature review. ACIL Tasman considered the value of these accumulated benefits would be higher now, in particular given the conservative assumptions made in the previous analyses, and the accelerating adoption of geospatial technologies over the past three years. ACIL Tasman adopted a representative figure of \$12 billion in productivity benefits for 2010. ACIL Tasman considered that it would be conservative to attribute 15 per cent of the overall productivity benefits to GA's efforts. This results in an estimated increase in GDP due to the accumulated impact of GA's provision of geospatial products and services of \$1.8 billion for 2010.

Public economic benefits

25. ACIL Tasman examined non-productivity benefits associated with improvement in public decision making underpinned by GA's products and services in the areas of natural resource and environmental management, water management, natural disasters and emergency management, and national security.

26. Geospatial information provides fundamental knowledge about the land which underpins public debate and informs policy, particularly in natural resource management and environmental areas. Benefits include assisting farmers and other landholders or custodians to improve their land-use patterns for efficiency as well as maintenance of biodiversity and ecosystem values. ACIL Tasman estimated the annual benefits accruing from the use of geospatial information in support of applications such as managing dryland salinity, monitoring and managing the impacts of climate change, water quality management, locust control and biosecurity amount to \$1.1 billion.

27. ACIL Tasman estimated the annual water management benefits from improved water-use efficiency and improved investment in water infrastructure routing to be \$100 million.

28. ACIL Tasman estimated the annual benefits associated with mitigating natural disasters in areas where GA is involved such as tsunami warning, bushfire management and flood control amount to \$500 million.

29. Overall ACIL Tasman considered that a plausible estimate of the non-productivity benefits of geospatial, Earth monitoring, groundwater and hazards information is \$1.7 billion per annum. ACIL Tasman has not attempted to assign a particular percentage of this benefit to GA, given the difficulty in attributing value between various fundamental data acquisition and value adding activities. However, it claimed that a large portion is likely to be attributable to GA.

30. ACIL Tasman concluded that the economic and social benefits attributable to the geospatial programs of governments including GA are significantly higher than the annual costs incurred by GA in providing the underlying data and services. These costs were of the order of \$70 million in 2010-11. Therefore, it considered that the main issue was whether GA's programs were being managed in the most cost-effective way, and whether GA's services were being delivered to consumers in the most economically efficient manner.

Consultancy evaluation of the economic value of pre-competitive information

31. In this report, ACIL Tasman investigated levels of government expenditure on pre-competitive information in Australia and a range of other countries. It then examined the degree to which GA's work has contributed to successful resources exploration results and used regression analysis to model the relationships between pre-competitive data, private

exploration and resources production. Finally, the report included projections based on scenarios of the continuation versus the phasing out of government funding of pre-competitive data.

32. ACIL Tasman noted that the public good nature of pre-competitive geoscience is one of a number of market failures identified by a parliamentary inquiry which were seen as supporting the economic case for government investment here. Other factors identified included the positive externalities generated by the information, the reduction of risk in exploration and the harmonisation of data at regional and continental levels,¹⁸ all of which might not arise through the private sector if left to its own priorities. ACIL Tasman found that this in turn would result in economic welfare loss over the longer term, and more specifically that failure by governments to invest means private interests are not likely to invest in exploration to the optimum level.

Empirical evidence

Government expenditure

33. ACIL Tasman estimated that total annual Commonwealth expenditure on pre-competitive geoscience was around \$60 million in the last two years, having fallen from an all time high of around \$84 million in 2008 in real terms. The lack of consistent data available across the geological surveys of the states and territories meant no accurate figures could be provided for their overall expenditure on pre-competitive geoscience. For this reason the report focused largely on the offshore oil and gas sector where GA is the sole player acquiring pre-competitive geoscience information.

International comparison

34. ACIL Tasman undertook an investigation of investment by other countries in government geoscience, in particular pre-competitive data. It found that a number of countries with significant petroleum and minerals industries have established geological surveys with budgets that are comparable to or exceed the collective expenditures by GA and the state and territory geological surveys.

35. ACIL Tasman also found a correlation between exploration activity and the availability of good geoscience data. A significant contribution to the observed correlation was the data for Australia and Canada, which both had markedly higher levels of planned exploration expenditure than the other countries examined, and whose geological databases were significantly more highly regarded by investors. The ACIL Tasman report also stated that where pre-competitive geoscience data was sold, it appeared more likely that the exploration industry would focus on known prospective areas at the expense of under-explored or frontier areas.

36. ACIL Tasman found that Australia ranks well as a desirable place to invest in minerals exploration and there is a strong correlation between levels of expenditure and quality of data. However, Australia is not as well regarded in terms of prospectivity for petroleum. Nevertheless, on the basis of industry sources and analysis by organisations such as the Fraser Institute (a conservative ‘think tank’ in Canada), ACIL Tasman concludes that

¹⁸ House of Representatives Standing Committee on Industry and Resources. 2003, *Exploring: Australia's Future – impediments to increasing investment in minerals and petroleum exploration in Australia*, Canberra, pp. 50-51

<http://www.aph.gov.au/house/committee/isr/resexp/reportscript.pdf>

Australia's attractiveness as a destination for petroleum exploration is enhanced by what is regarded as a world class geoscience database built on a consistent program of pre-competitive geoscience.

History of exploration and discoveries

37. In focussing on the development of the offshore oil and gas sector, ACIL Tasman provided evidence that significant private benefits are derived from government provision of pre-competitive geological data, although the realisation of these benefits is generally subject to a significant time lag after the creation and dissemination of the data. The benefits accrue to resources companies in the form of informed bidding during the annual acreage release process for offshore exploration permits, reduced risk in exploration and, ultimately, profitable resources production where exploration is successful.

38. The report listed numerous examples of mineral and petroleum discoveries which have been facilitated through the pre-competitive geoscience of GA (refer to Table 11, Attachment C) This was a useful indication of private use of GA's data, noting that the specific role played by GA information as opposed to other data sources is not distinguishable.

39. ACIL Tasman's work provides strong evidence that the work of GA has contributed in a significant way to the discovery of a number of major minerals and petroleum deposits around Australia, including the Olympic Dam copper-gold-uranium deposit in South Australia, the Century zinc-lead-silver deposit in Queensland, and hydrocarbon deposits in the Otway Basin off the Victorian coast and the Bass Basin off Tasmania.

Conceptual model

40. ACIL Tasman's work focused in particular on the use of pre-competitive data to support the development of the resources sector in Australia while acknowledging the other potential applications for pre-competitive data.

41. In examining the case for a government role in the provision of pre-competitive geoscience, ACIL Tasman concluded that there are a variety of market failures and other reasons that justify and provide an economic case for government involvement in this activity.

42. In particular, ACIL Tasman considered that pre-competitive data is a public good which is non-rivalrous and non-excludable to some extent. It also considered that pre-competitive data plays a significant role in reducing risk for the resources industry, particularly for private explorers who are better able to determine exploration targets. ACIL Tasman found that government-produced pre-competitive data generates positive externalities in terms of new deposits providing information about regional prospectivity and comparable geological formations. They also noted that pre-competitive data also supported the Government in maximising the future value of resources that it owned on behalf of society.

43. The problem of free-riders is also addressed through the public provision of the information, offsetting under-investment in exploration by the private sector. In addition, ACIL Tasman noted that government involvement achieves economies of scale through the harmonisation of data at regional and national levels.

Quantitative modelling

44. Using regression analysis and a general equilibrium model, ACIL Tasman modelled the relationships between: (a) an increase in Australian Government expenditure on offshore pre-competitive geoscience and private offshore petroleum exploration expenditure; and (b) an increase in private offshore exploration expenditure and the value of offshore petroleum production. The modelling produced the following results:

- a. a one-off \$1 million increase in federal government (GA) expenditure on pre-competitive geoscience is associated with a short-run increase in private offshore petroleum exploration expenditure of \$31 million (in 2009-10 dollars), with a three year lag; and
- b. a \$1 million year-on-year increase in private offshore petroleum exploration expenditure is associated with a contemporaneous \$1.6 million year-on-year increase in the value of offshore production of crude, liquid petroleum gas, natural gas and condensate in 2009-10 dollars.

45. At face value, the modelling results indicate significant correlation between resource development and GA's pre-competitive work, most directly in terms of exploration expenditure, and more indirectly through eventual resources production.

46. ACIL Tasman used its modelling of relationships between expenditure on pre-competitive geoscience, private exploration expenditure and petroleum production, to project and compare the wider fiscal economic impacts of a scenario in which the Government continued investment in pre-competitive information with a scenario of the Government no longer funding any offshore pre-competitive geoscience program. It then used these scenarios as input to a Computable General Equilibrium model of the Australian economy to project economy-wide impacts. Its projections indicated the following:

- a potential economic loss over the period 2011 to 2030 of \$24.9 billion in GDP in present value terms, compared with program cost savings of \$323 million, also in present value terms; and
- 9,475 fewer Full Time Equivalent (FTE) positions over the period to 2030. The average employment impact is predicted to be 4,361 FTE per annum.

Other reviews

47. Examination of relevant literature and stakeholder discussions revealed wide acknowledgement that the work of government geoscience agencies bears significant economic benefits:

- Direct economic benefits accrue to resources sector companies, to governments through royalty and taxation income (including the PRRT and in future the Minerals Resource Rent Tax (MRRT)), and to other users of the information, for example the geospatial industry, land use planners, the agricultural and forestry sectors and others.
- Indirect economic benefits are generated through the development of regional communities, infrastructure and job creation, and avoidance of losses through preparedness for and improved responses to natural disasters.

Productivity Commission Review of Regulatory Burden on the Upstream Petroleum (Oil and Gas) Sector – 2009

“Finding 5.1

Geoscience Australia, and state and Northern Territory counterparts, by providing precompetitive data, play a valuable role in attracting private sector exploration investment in frontier areas”.¹⁹

48. The Productivity Commission identified several legitimate roles for government in managing oil and gas, including providing pre-competitive data. The Productivity Commission also noted that the provision of pre-competitive data has public good aspects, and that frontier exploration is a high cost, high risk activity with a low probability of resulting in a commercial discovery.

ABARE, Public Geological Surveys in Australia – 2003

49. ABARE found that basic geoscientific information is a public intermediate good that reduces private mineral exploration costs and risks and increases industry economic rent. While resource taxation and royalty arrangements provide a return to the community for the consumption of the resources, ABARE also found that they are a key mechanism for financing the activities of public geological surveys. To provide context, the report notes that while in 1999-2000, the exploration budgets of public geological surveys in Australia were around \$75 million, mineral and petroleum royalty payments that year were \$2.4 billion. The report considered that while all exploration companies may benefit from public geological information, increases in economic rents derived will depend on the efficiency of mechanisms used by governments to allocate exploration rights.

50. In line with the introductory comments to this section, ABARE found that public geological surveys provide direct economic benefits to the resources industry and governments, as well as to other users of the information. Indirect benefits were realised through contributions to regional economies. Importantly, Australian’s geological surveys were seen as being an important source of Australia’s competitive advantage in the resources sector. In this context, the report notes the fact that the international market for resources exploration funds is highly competitive.

51. Public geological information was considered by ABARE to be a public good as a non-rivalrous, albeit excludable product. As noted later in this chapter, ABARE viewed the exclusion of access to, or charging for, pre-competitive information produced by agencies such as GA to be inefficient, since the marginal cost of providing access to another user is zero. ABARE considered the value of the marginal product was not that attributed to it by any particular user, but the aggregate of its value to all users.

52. The report also noted that while geoscientific information may primarily be acquired to support resource exploration, an increasingly important aspect is supporting sustainable land resource management. ABARE found that public geological surveys could establish more formal mechanisms for assessing the economic benefits from their outputs.

Policy Transition Group, Minerals and Petroleum Exploration – 2010

53. As part of its brief, the Policy Transition Group (PTG) established by the Government in July 2010 was required to consider the best way to promote future exploration and ensure a

¹⁹ Productivity Commission. 2009, *Review of regulatory burden on the upstream petroleum (oil and gas) sector*, Melbourne, Productivity Commission, p. 84

stream of new resources projects for future generations. In its December 2010 report to the Government, the PTG examined the role of GA in relation to minerals and petroleum exploration. The PTG noted that the perceived prospectivity of a country is a key determinant of the incentive to invest in exploration, and found that investing in pre-competitive geoscience information is in the national interest. The PTG also noted stakeholder views that the Government has significantly under-invested in pre-competitive geosciences.

54. While the current resources boom and high commodity prices may have contributed to a focus on ‘brownfields’ exploration, the PTG considered that maintaining ‘greenfields’ exploration will be important in sustaining resources development in the longer term. The PTG further noted the widely held view that private industry would not conduct broad regional surveys on its own and that GA captures operational efficiencies and economies of scale in undertaking regional pre-competitive surveys.

55. In addition, the PTG noted that GA’s pre-competitive work has played a significant role in positioning Australia at the forefront of CCS development, as well as stakeholder comments that pre-competitive data have a range of additional land management related uses beyond resources sector development. The PTG also noted the function of GA as a data repository, and considered that the presentation of Australia’s privately and publicly collected geological data records in a useable form, and the availability of data for inspection by the public, is an important national asset.

56. The PTG recommended that the Australian Government should provide a more sustainable stream of funding for GA to acquire and make available pre-competitive geoscience and geospatial data, and manage publicly and privately acquired data through its national data repository.

Geospatial capability

Independent advisor role

57. A recurring theme from discussions with public and private sector stakeholders and clients was the importance of GA as a respected and independent authority on all matters of geoscience. The position and reputation of GA as an ‘honest broker’ is also facilitated by its avoidance of involvement in commercial activities and therefore possible conflicts of interest.

58. Government stakeholders, consider that GA can be relied upon to provide consistent and sound technical advice on matters within its expertise, free of policy influence.

59. An example was GA’s work in examining the impacts on groundwater of the coal seam methane industry in Queensland, of interest to both the resources and environment portfolios. GA’s world-leading expertise in CCS was also highlighted, particularly through its representation in the Technical Group of the Carbon Sequestration Leadership Forum.

Latent capability

60. Additional economic value rests in GA’s ongoing information holdings and corporate knowledge and skills which can be called on by the Government and applied in a range of unplanned or unforeseen circumstances.

Crisis support and response

61. GA has frequently been required to demonstrate its ability to provide sound technical advice and deliver new services in response to significant natural and man-made disasters. Selected examples are set out below.

Natural disasters

62. In response to the Sumatran earthquake and Indian Ocean tsunami in December 2004, GA quickly became involved with other government agencies and departments in the whole-of-government response. GA produced information for the public on the nature and causes of the two earthquakes, and provided timely information about the aftershocks, in support of Australia's disaster relief work in the devastated regions.

63. In May 2005, the Australian Government announced a four-year Budget measure to develop a new Australian Tsunami Warning Centre. The Joint ATWS, with round-the-clock operation centres in GA and the Bureau of Meteorology (BoM), commenced operations in July 2007.

64. Tropical cyclone Larry struck the Innisfail area of North Queensland in March 2006, causing damage to both the built environment and the agricultural economy. GA quickly responded by providing more than 2,500 maps of the affected region to the Department of Defence, damage assessments through field surveys and validation of remotely sensed data, and economic modelling and field-based surveying (at the Operation Recovery Task Force's request).

65. From early December 2010, GA was involved in the whole-of-government response to flooding in New South Wales, Queensland and Victoria. As part of this role GA activated the International Charter: Space and Major Disasters in order to access international satellite capabilities.²⁰ GA was also involved in providing satellite images, flood footprint mapping and preliminary assessment of populations, buildings and infrastructure likely to have been affected by flooding (at the request of Emergency Management Australia).

66. GA continues to refine the residential and business components of the National Exposure Information System, providing comprehensive, national-scale information on buildings for natural hazard risk assessments. The system provides information across all levels of government for a variety of risk and impact analysis projects, and was used in 2009 to assist with the damage and loss assessment of the Victorian bushfires. Associated with this, GA contributed to Bushfire Cooperative Research Centre reports to the Victorian Bushfires Royal Commission on the February 2009 Black Saturday fires. It also co-authored a report chapter on the impacts of the fires on structures, particularly dwellings, and authored a separate report on demographic characteristics of the fire-affected communities.

Man-made disasters

Oil spills – Montara uncontrolled hydrocarbon release

67. GA experts provided technical advice to DRET when managing the Government's response to the Montara uncontrolled hydrocarbon release of August to November 2009.

²⁰ The Charter provides a unified system of space data acquisition and delivery to those affected by natural or man-made disasters.

International Charter: Space and Major Disasters

<http://www.disasterscharter.org/home>

This included advice on the incident and technical detail on the volume, type of oil and possible causes and options for stopping the leak.

68. GA's technical advice was used in briefings for Government, including ministers and several departments and agencies, the Montara Commission of Inquiry and in assisting the development of the whole-of-government response to the report of the Commission of Inquiry.

69. GA's role in the whole-of-government response is that of providing technical advice on implications of particular recommendations and findings, and as the proxy for industry. GA is working with DRET in addressing matters that were identified by the Commissioner concerning the Northern Territory Department of Resources in carrying out its regulatory functions.

Nuclear monitoring

70. As a signatory to the Comprehensive Nuclear Test-Ban Treaty (CTBT), Australia, through GA, monitors nuclear explosions worldwide. The monitoring is part of Australia's commitment to strengthening the global verification system. In addition to carrying out these roles on behalf of the Department of Foreign Affairs and Trade, GA also provides related technical advice to key international stakeholders.

71. As an example of this function, GA detected and alerted Australian Government agencies of an explosive event near the North Korean test site, P'unggye, on 25 May 2009. The Democratic People's Republic of Korea later confirmed that a nuclear test had been conducted.

Data custodianship

72. The importance GA attaches to the storage and maintenance of its data holdings is recognised in GA's vision statement in its *Strategic Plan 2010-2012*:

“Geoscience Australia is custodian of the geographic and geological data and knowledge of the nation. We create, maintain and disseminate geographic and geological knowledge for the future well being of all Australians”.

73. The value of the consistent national datasets was also identified by several stakeholders from within and outside government as a significant asset to the nation for a range of purposes.

Petroleum data

74. GA houses one of the world's largest collections of petroleum data. Much of this data is non-confidential and available to the petroleum industry, research organisations and the public. The collection includes seismic survey data and well data submitted by industry under legislative requirements as well as data collected by research projects and marine surveys undertaken by GA or other government agencies or institutions.

75. During consultations, the Australian Petroleum Production and Exploration Association (APPEA) likened the national data repository to the National Library of Australia or the National Archives as a major public good, which is of primary benefit to the nation in ensuring future revenue from resource development, rather than specifically to APPEA's member companies. APPEA explained that the data, if properly maintained, does not lose its value over time, as new technology or new entrants to the Australian market can bring additional knowledge that allows benefits to continue to be derived. For example, the experience of new entrant explorers, including in comparable geological provinces, helps to

build the base of geological knowledge of Australia's natural endowment. A noted spill over benefit has been the use of the petroleum data in assisting the determination of possible locations for CCS.

Geospatial data

76. The Department of Climate Change and Energy Efficiency (DCCEE) cited GA's remote sensing capabilities and data holdings as one example of the benefits of the long-term collection of satellite imagery of Australia. The National Carbon Accounting System (NCAS) was established in 1998 as a tool for measuring carbon emissions from land-related activities, for example agriculture and land clearing. NCAS uses satellite imagery provided by GA to monitor land cover changes nationally every two years. NCAS was possible because GA had maintained a consistent, continuous, national archive of satellite imagery dating back to the 1970s.

Review Assessment

Empirical evidence

77. The specific economic benefits of public geoscience information have long been debated and investigated in various studies and reviews. While GA is not set up specifically to generate economic returns, four of the eight priorities identified in GA's *Strategic Plan 2010-2012* include economic considerations, covering all areas of GA's work.

78. From the Review's investigations, the activities of GA are delivering a wide range of public economic benefits. In the following analysis, these benefits are divided into those from pre-competitive data – both for resources sector development and other purposes – and those from geospatial, Earth monitoring, groundwater and hazard activities.

Pre-competitive data and geological functions – assistance for resources development

79. In a study commissioned by the Prospectors and Developers Association of Canada on the impacts of government geoscience on mineral exploration, Duke identifies the immediate outcomes of public geoscience programs as increased levels of exploration, lower exploration costs and reduced risk. However, the economic benefits are often difficult to quantify in dollar terms for a range of reasons: "Assumptions about the duration of exploration, the probability of discovery, and the share of results attributable to government geoscience are highly uncertain, making credible estimation of the net present value of benefits exceedingly difficult".²¹

80. The direct links between the work of a government geoscience agency and the resulting economic outcomes can therefore be particularly difficult to draw. Nevertheless, in examining a range of case studies and previous reviews, Duke concludes that six of ten mapping projects will have an immediate effect in terms of claim staking or new exploration, and that every \$1 spent by the government in Canada will result in \$5 of private sector exploration investment.

81. Resources industry stakeholders consider GA's activities to be especially important in encouraging exploration in frontier and 'greenfields' areas. Both in its discussions with the Review and in a submission to the Policy Transition Group, the Association of Mining and

²¹ Duke, J.M. 2010, *Government geoscience to support mineral exploration: public policy rationale and impact* (prepared for the Prospectors and Developers Association of Canada), p. 52

Exploration Companies (AMEC) noted there has been a decline in ‘greenfields’ exploration as well as in exploration success rates over the years, as it is becoming harder to find at or near-surface mineral deposits. This means more information is required about sub-surface geology, making GA’s work valuable for the ongoing success and viability of the industry.

82. AMEC also highlighted that in today’s minerals sector, ‘greenfields’ exploration is increasingly being undertaken by junior explorers who do not have the resources to conduct broad regional surveys: “Smaller companies have largely relied on government surveys and mapping to assist with early stage targeting and project generation. In a market that is focussed on drill results it is virtually impossible for junior explorers to raise funds to complete regional data acquisition”.²²

83. Former CEO of BHP Billiton, Charles Goodyear, noted in 2006 the significant costs of exploration and therefore the major benefits accruing to companies that demonstrate high performance in this field. In the period 1992-2004 the discovery cost for a single world-class equivalent mineral deposit for companies that consolidated into BHP Billiton was US\$294 million. By comparison the discovery cost for companies at the bottom of the range was more than US\$8 billion.²³

84. Where public geoscience information plays a role in the discovery of resources that can be developed economically, the return to government in Australia is through taxation of profitable production operations, as noted above. DRET noted that GA’s work in the collection, collation and dissemination of pre-competitive petroleum data is fundamental to the development of the oil and gas industry in Australia. This work is a key input to the offshore annual petroleum acreage release undertaken by the Minister for Resources and Energy. Average annual petroleum exploration investment is around \$3 billion, while the offshore oil and gas industry pays around \$4 billion in PRRT and crude oil excise tax and \$4.6 billion in company tax per annum.

85. One example highlighted to this Review is the \$2 million spent by GA on pre-competitive data acquisition and collation in 1996-97 for the Browse Basin off the Kimberley coast in north-western Australia. This resulted in a \$500 million exploration program undertaken by Japanese corporation Inpex, which is now developing the Ichthys LNG project, estimated to cost around \$28.5 billion.

86. Public pre-competitive data is seen as playing a key role in reducing the disadvantage arising from Australia’s relatively low world ranking in general geological prospectivity for petroleum. Analysis undertaken in 2007 indicated that the offshore Australia region ranked

²² Association of Mining and Exploring Companies. 2010, *Submission to the Policy Transition Group: The proposed Minerals Resource Rent Tax and exploration development options*, AMEC, p.33

²³ Goodyear, Charles W. 2006, *How does exploration add value?* (Presentation to SEG 2006 Conference, Keystone, Colorado), BHP Billiton, slide 27

<http://www.bhpbilliton.com/bbContentRepository/Presentations/060514CWGSEG2006Conf.pdf>

and

<http://www.bhpbilliton.com/bbContentRepository/Presentations/060514CWGSEG2006ConfScript.pdf>

More recent figures are contained in the October 2010 submission of the Australasian Institute of Mining and Metallurgy (AusIMM) developing the Minerals Resource Rent Tax, which states that “in the case of Giant Discoveries, the cost per discovery in Australia went from \$US522 million in 1990-99 to \$US4326 million in 2000-09, a seven-fold increase. This is compared with just under a two-fold increase over the same period for the rest of the Western world”. See

http://www.ausimm.com.au/Content/docs/submission_mrmt_ptg_oct2010.pdf, p.6

41st globally on a commercial success rate for oil exploration.²⁴ With the benefit of accessible pre-competitive data, companies are able to spend their exploration capital more efficiently, both by making more informed decisions on where they explore, and by not being required to reproduce information generated by others or spending money in non-prospective areas.

87. In a 1992-93 review by AGSO of its Continental Margins Program, industry consultations indicated that the Program informed explorers in making investment decisions, and encouraged investment in Australia rather than overseas. The review also found that industry would not consider undertaking the collection and compilation of pre-competitive data itself, since the returns on this kind of activity would be so far into the future and so strategic in nature as to render investment of this type unprofitable.²⁵ This may be seen as further evidence of market failure and a role for government in providing the services as a public good.

88. In supporting this view, APPEA noted that in the last decade around 30 new firms have entered the Australian petroleum market. Such firms are generally more attracted to frontier areas than incumbent producers. The injection of this experience from around the world, including in comparable geological provinces, helps to build the base of geological knowledge of Australia's natural endowment.

89. APPEA estimates that the rate of discovery of new crude oil fields over the past ten years has been insufficient to offset the decline in production. Based on ABARE figures the Minister for Resources and Energy, the Hon Martin Ferguson AM MP, has noted that Australia has a \$16 billion trade deficit in crude oil, refined products and LPG which is expected to rise, possibly as high as \$30 billion by 2015 in the absence of significant new discoveries and development.²⁶ APPEA describes the current state of knowledge of Australia's potential petroleum reserves as 'a blank canvas', referring to the fact that only a small portion of the nation's geological basins, particularly offshore, have been subject to any significant level of pre-competitive investigation.

90. The next most likely location of a major petroleum province in Australia is expected to be in one of Australia's prospective frontier basins. Australia has 40 offshore basins with petroleum potential with half of these remaining under-explored. Industry has reported stagnant and often decreasing levels of frontier exploration due to the high capital expenditure and risk in exploration of these areas. Long distances to markets and long lead times have contributed to the reluctance of companies to enter these frontier areas.

Additional uses of pre-competitive geological information

91. Consultations with GA and stakeholders confirmed that geoscience data, especially geological maps, can have broad applications with economic, environmental and safety (hazard mitigation) value to society. Geological maps and other pre-competitive geoscience information on the bedrock, soil and landscape are used by government agencies at federal and State and Territory level and by local government as well as the private sector and the community in land use planning, civil engineering, ground water resource management, land resource management, and environmental management.

²⁴ Australian Petroleum Production & Exploration Association Ltd. 2009, *Energy White Paper discussion papers – April 2009 – APPEA comments*, Canberra APPEA, p.33

²⁵ Australian Geological Survey Organisation. 1993, *Evaluation of the Continental Margins Program 1992/93*, Canberra, AGSO, p.21

²⁶ ABARES.2010, *Australian Commodities – December quarter 2010*, Canberra, ABARES, pp.803, 805

92. For example, geological maps with information on bedrock type and geological structure are essential for planning of civil engineering projects such as dam site developments and transport corridors for road and rail construction (both for alignment and for sources of construction material). Similarly, airborne geophysical data of the type used in mineral exploration (especially airborne electromagnetic and magnetic data) are playing an increasingly important role in mapping dryland salinity and shallow groundwater resources.

93. Geoscience information on the landscape and regolith (the soil and other materials covering solid rock) (including airborne radiometric data used in mineral exploration) has been used by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the former Bureau of Rural Sciences (now part of ABARES) for soil mapping and sustainable management of land resources.²⁷ Pre-competitive geoscience information on sedimentary basins, including geological maps, well information, and seismic surveys similar to those required for petroleum and coal exploration, are essential for GA in mapping and assessing groundwater resource potential. These datasets play an important role in predicting, avoiding and managing potential conflicts between land uses. For example, they underpin advice provided by GA to government on the impact of coal seam gas production on regional water tables and water quality.

94. Pre-competitive information is used by GA and industry to assess the potential of sedimentary basins as sites for geological storage of greenhouse gases. The data formed an important component of the information package issued in support of Australia's first CCS acreage release in March 2009. Geological maps together with seismic information underpin GA's research into earthquake hazard assessment. Similarly, pre-competitive geoscience (especially landscape information) combined with information on other natural hazards such as tsunamis, landslides, floods, severe storms, and bushfires has been used by GA and state geological surveys to create vulnerability maps that aid emergency management agencies in natural disaster mitigation.

95. Radiometrics data collected through airborne geophysical surveys were originally collected for purposes of determining prospectivity for radioactive elements including uranium, thorium and potassium. However, a recent study has indicated that radiometric datasets and vegetation could be used as predictors of biodiversity patterns of vertebrate species at the bioregional and landscape level. This is an important finding given the challenges posed in undertaking broad-scale biological surveys in the arid zone of Australia.

96. Geoscience information was the core of Australia's submission for areas of extended continental shelf lodged with the UN Commission on the Limits of the Continental Shelf. In 2008 the Commission confirmed the location of the outer limit of Australia's continental shelf in nine distinct marine regions based on geoscience information. This decision gives Australia jurisdiction over an additional 2.5 million square kilometres of continental shelf. The definition and management of marine environmental reserves in part relies on geoscience information for a regional understanding of biodiversity as seabed characteristics are surrogates for biological assemblages.

97. GA also provides some support for onshore resource development where State and Territory governments have jurisdiction and ownership. State and Territory governments appear to fund the larger share of investment in pre-competitive information for onshore Australia. GA involvement in onshore pre-competitive data acquisition has varied over the

²⁷ Wilford, J.R. Dent, D.L. Dowling, T. Braaten, R. 2001, *Rapid mapping of soils and salt stores using airborne radiometrics and digital evaluation models*, AGSO

years as government priorities change. A specific focus of GA is in encouraging and facilitating compatibility in data and information produced under state programs. The Australian Government also has a direct interest in onshore strategic basin studies:

- There are multiple uses of information produced from pre-competitive work and other strategic basin studies, including some applications that go directly to Australian Government involvement in matters such as groundwater and salinity management.
- The MRRT reforms currently in development increased the Australian Government's direct financial interest in onshore resources that may be exploited.

Geospatial, Earth monitoring, groundwater and hazards functions

98. In the age of the digital economy where spatial applications for smart phones, GPS navigation systems for cars and Google Earth are commonplace and private sector players are increasingly active, there is still seen to be a need for a single authoritative source of geospatial data which many consider can only be provided by government.

99. ANZLIC's report of December 2010, *Economic Assessment of Spatial Information Pricing and Access* stated that,

“Fundamental [spatial] data are a form of public infrastructure, unlike many other forms of public sector information, such as reports and legal documents. Fundamental data enable important business and policy decisions and facilitate the functions and operations of many government agencies”.

100. In a similar vein, in November 2008 the UK Government published its location strategy, *Place Matters: the Location Strategy for the United Kingdom*. This document set out dual goals of maximising the value to the public, the government, UK business and industry of geographic information, and providing a consistent framework to assist national, regional and local initiatives and service delivery.

101. Other factors seen as providing a rationale for public geoscience are the economies of scale in regional mapping and information dissemination, difficulties for private sector explorers in gaining access to land, and the benefits of information externalities.

Benefits of geospatial, earth monitoring, groundwater and hazard activities

102. The task of identifying economic benefits is far more difficult where there is a less defined and more dispersed group of clients, potentially as wide as the general public at large, as is the case with some of GA's geospatial, Earth monitoring, groundwater and hazard functions.

103. Increasing population and economic growth coupled with the impacts of climate change is putting pressure on Australia's limited water resources. GA's efforts are directed at improved identification and characterisation of Australia's groundwater assets, an important part of the total water equation. This is designed to assist governments, industry and the community in making better quality decisions about the allocation of groundwater, its sustainable use and the impact of development of resources such as coal seam gas. Decisions relating to groundwater use can have major economic and environmental impacts and be difficult to reverse, hence making the right decisions will have major efficiency and effectiveness benefits.

104. GA is the custodian of fundamental, national geospatial datasets that provide an extensive and authoritative information resource to assist governments, industry and the

community in making informed decisions across a broad spectrum of disciplines. GA's work in establishing a stable infrastructure for authoritative geospatial reference systems in Australia supports the continued development of innovative new applications by industry and government in the fields of precise navigation and positioning.

105. Earth observation imagery from satellites such as the *Landsat* series has provided important data to enable objective decision making and improve operational efficiency in fields such as natural resource management and emergency response. GA and its predecessors have acquired and maintained a time-series of this imagery dating back to 1979. More recently these data have proved valuable in monitoring the environmental condition of the continent and providing a key input to the NCAS and climate change modelling.

106. GA's provision of natural hazard research, monitoring, assessment and advice in areas such as earthquake monitoring, tsunami warning and bushfire detection lower future economic, social and environmental damage. For example, the production of hazard maps for floods and tsunami informs decision on sensible land development.

107. A snapshot of the industry and users of geospatial data is also instructive. The 2001 Spatial Industry Action Agenda report, *Positioning for Growth*, described the industry and users of geospatial data in the following terms:

“The spatial information industry encompasses the broad disciplines of remote sensing and photogrammetry, mapping and surveying, land administration and geographic information systems, together with related software development and provision of value-added services. Practical applications include environmental monitoring, mobile location-based services, customer relationship management and the management of natural resources, assets, land and emergencies”.²⁸

108. In a discussion paper, ANZLIC – the Spatial Information Council identifies a number of roles of and benefits from government involvement in spatial information, including promulgating and mandating use of standards and compliance, providing infrastructure, fundamental data and basic services, and ensuring equity of discovery and access to information.²⁹

109. The above points indicate that accurately quantifying the economic value of GA's activities in these fields is a complex and difficult task.

Conceptual model

110. In the context of public geoscience information being considered a public good, a number of factors contribute to the economic rationale for public geological surveys and public geoscience and geospatial information more broadly.

111. Through the evidence presented in the ACIL Tasman reports and through the Review team's own research and its discussion with stakeholders, it became evident that there is a significant public good aspect to the geoscience products and services developed and maintained by GA. Public geoscience information is considered to have strong public good attributes to the extent that it is non-rivalrous and often non-excludable.

²⁸ Department of Industry, Science and Resources. 2001, *Positioning for growth – Spatial Information Industry Action Agenda*, Canberra, p.7

²⁹ Spatial Information Industry Joint Steering Committee. 2002, *Respective roles and conduct of relationships between the public and private sectors in the Australian spatial information industry*, ANZLIC, p.4

112. This Review notes that it is becoming increasingly difficult to define goods or services as ‘pure’ public goods due to the availability of technologies capable of providing a wide distribution of information but on a basis that also enables excludability. Services once thought to be public goods, such as navigation signals and public broadcasts, can now be distributed through technologies that prevent unapproved or non-paying users from receiving that information. To some extent, this shifts debate on public goods from a question of whether excludability is technically possible to whether excludability is appropriate and practical. Restricting access to information can reduce efficiency in the use of that information. ABARE made the following point in this regard:

“The individuals who simultaneously consume or use the good generally derive different total and marginal benefits from the same output. For a given level of output, each individual could be charged a different price according to the marginal benefit that accrues to that individual. On efficiency grounds, individuals should not be excluded from using the public good even if exclusion is possible since, because of the jointness in use property, the marginal cost of allowing one more individual to use the public good is zero. As a consequence, any pricing mechanism that excludes individuals is inefficient”.³⁰

113. The Review considers that the ACIL Tasman report makes a strong case that many public and private benefits flow from GA’s activities. However, the Review examined an alternative analytical framework to ACIL Tasman’s approach of distinguishing public from private benefits as a basis for informing on the Government’s role in funding and providing pre-competitive information. ACIL Tasman distinguished private benefits as those that accrue mainly to private enterprises through improved productivity while public and social benefits are those that accrue to society as a whole. The Review considers that this is closer to a distinction between commercial and non-commercial benefits, each of which may contain benefits from public and private goods as generally defined.

Alternative perspective on pre-competitive data

114. Over the long term the core objective of pre-competitive information has been to stimulate private exploration for, and hopefully exploitation of, mineral and petroleum resources. This remains a central objective, although information generated in the course of collecting and analysing pre-competitive data benefits a broad range of other policy applications. However, just focussing on the objective of encouraging private exploration, it is useful to break down the main stages and related stakeholders involved in the application of pre-competitive information.

115. Pre-competitive information differs from normal commercial exploration in that the former is oriented towards defining the geology of a basin or region rather than towards attempting to locate a specific resource or deposit. It essentially involves a ‘large area’ perspective that combines new and historical data collected by GA as well as data lodged by industry in accordance with applicable laws. It falls well short of, and follows different priorities to, determining if there is a resource in a particular location.

116. Typically, the first application for pre-competitive information is in informing decisions on which specific areas within a region or basin are viable for release for private exploration. For offshore petroleum, this decision process is managed by DRET on behalf of the Australian Government. At this stage the Government itself is the main beneficiary of the information in terms of identifying the specific acreage that has potential to be attractive to

³⁰ Hogan, Lindsay. 2003, *Public geological surveys in Australia*, Canberra, ABARE, p. 23

industry. For onshore minerals and energy, which come under state and territory responsibility, pre-competitive studies may identify areas that should not be made available for exploration or development for particular reasons such as on environmental grounds. Exploration leases are generally awarded by the states and territories using the ‘first come first served’ approach, where companies can apply to take up exploration tenements at any time provided they are not already taken or reserved for other purposes (for example, defence, environmental protection etc). The release of pre-competitive information may encourage companies to apply for leases in particular areas. Governments are again the initial beneficiaries of pre-competitive information through identifying areas that should be excluded from exploration as well as encouraging industry to apply for exploration permits in prospective areas.

117. A closely associated second stage in use of pre-competitive information is in promoting the exploration potential of Australian territory either in general terms or for specific areas being offered for exploration permits with a view to attracting investment from private explorers. Pre-competitive information is used to substantiate the Government’s assessment of the investment viability of acreage available. In the case of offshore petroleum, potential investors are invited to compete for exploration rights through bidding in the form of nominating exploration ‘work program’ commitments. Not all potential investors using the pre-competitive information decide to bid and the Government is not always successful in attracting a bid for a given area offered.

118. The two stages described above represent the primary application of pre-competitive data and have strong analogies to the costs and processes involved in developing a prospectus for the sale of an asset. While the process involves providing information to potential investors, the underlying objective is not to benefit those investors but to elicit a positive investment response. The Government’s interest in gaining the most favourable return for the community is served by ensuring the efficient provision of available information on that opportunity to potential investors. This holds regardless of how the Government seeks to capture a return for allocation of exploration rights.

119. The ‘prospectus’ analogy represents a departure from the public good argument that is typically used to justify government provision of pre-competitive information. While public good attributes certainly apply to pre-competitive information, under this model it is the Government’s desire to maximise its private interests, as sovereign owner of resources and recipient of secondary tax revenues from resource development, that forms the core business case for the Government to generate and provide pre-competitive information as described above. This business case is heavily dependent on the current system for allocating exploration acreage which generally does not assign exploration rights at a scale where strategic regional framework studies become viable for private investors.

120. There is historical precedent for broad regional studies to be privately funded or partly privately funded at the early stages of onshore exploration. It is likely that this precedent is relevant only to the search for easily discoverable deposits near the surface and does not apply to the more sophisticated sub-surface exploration capability that is now the focus in assisting future development. In its submission to the Policy Transition Group AMEC, which represents substantially small explorer interests, argues that historically it was only major companies that had the resources to undertake regional surveys.

121. For offshore exploration, the available evidence weighs heavily against any expectation that a private sector interest or consortium would invest in regional studies of frontier areas under the current regime for assigning exploration and production permits. The fact that such

areas have not been surveyed, taken together with clear statements from industry that such studies would not be a commercially viable investment, argue for a government role in information provision as ultimate owner and controller of any resource opportunities that may be found. This appears to be supported by the report of the Policy Transition Group on Minerals and Petroleum Exploration which argued that access to high quality pre-competitive geoscience information is vital to underpin successful commercial based resource exploration.

122. The dominant inhibitor to private funding is the lack of any certainty for a private investor (whether an individual company or collective) that they will be able to internalise any benefits from information yielded by the study. This concept was articulated by GA's predecessor, AGSO, in 2000:

“Pre-competitive information is ... provided by government at low cost to encourage companies to consider the opportunities available and because companies cannot internalise the benefit of the cost of data acquisition unless they win ownership of a specific lease through a competitive process. Moreover, the company cannot exclusively capture the benefits of the pre-competitive data provided by government as an incentive to invest even when they are successful in obtaining a petroleum or mineral exploration lease. This is primarily because the data is regional in nature and designed to be used for area selection only. In general, the data is not sufficiently detailed or specific to be directly applicable at the lease/tenement scale: the company will acquire more detailed data to augment the regional datasets prior to generate [sic] targets for drilling at its own cost”.³¹

123. The current state of science and knowledge strongly supports a view that pre-competitive information, being information that defines the geology of a basin or region, is an efficient and effective first step towards exploration.

124. None of the foregoing amounts to a presumption that pre-competitive exploration of any given region represents a sound risk from a resource development perspective. That remains a matter for scientific, commercial and policy judgement. The Government still faces an uncertainty in selecting where to undertake pre-competitive investigation and deciding how much to invest. In addition, there is also the question of when to invest, noting that changing technology and commercial circumstances can radically alter the cost and need for pre-competitive information over time.

Alternative approaches to release of offshore exploration permits

125. DRET has advised that it has been exploring fall-back alternative models to encourage investment in offshore exploration permits in areas where there is minimal pre-competitive data available to attract investors. The leading alternative being considered, known as Reconnaissance Exploration (ReconEx) Permits, works within the existing legislative framework and seeks to combine security of tenure with a reduced minimum guaranteed work period, larger acreage size and work expectations that are commensurate with existing geological knowledge of an area. For investors, this would provide some offset to the more limited information that would be available defining the prospectivity of any specific part of the permit area. For Government there would be a reduced need for investment in pre-competitive information.

³¹ Australian Geological Survey Organisation submission to the *Productivity Commission Review of Cost Recovery*, 2000, p.5

126. At this stage, it is not clear if the ReconEx concept would be sufficiently attractive to industry to be viable as a general model. Further examination appears warranted on other impacts of the ReconEx concept. These would include potential impacts on the timing of resource development, reduced availability of pre-competitive information used in non-resource policy applications, impact on competition and diversity of explorers able to participate and an increased Government dependence on commercial explorers for information needed to make policy and administrative decisions in regard to potential resources and other developments.

The relative merits of cash bidding and work program bidding

127. Pre-competitive information is important for identifying areas for exploration but less useful for exploring within those areas. However, even detailed information from exploration within a permit area can inform on the surrounding region or basin. That is, there are potential information externalities arising from privately funded exploration once an exploration permit has been issued.

128. Current Australian Government arrangements and regulations for offshore exploration contain two devices that seek to enhance and capture the public benefit from private exploration:

- firstly, the work program bidding (WPB) system creates competitive pressure on bidders to extend exploration commitments beyond the level that optimises their private benefits; and³²
- current legislation requires exploration companies to lodge data generated through private exploration with the Government where, after a period of confidentiality, it can be integrated into public information, including to promote further acreage releases in the region and to be utilised by other regional explorers.

129. The public availability of privately funded exploration data would normally reduce the need for pre-competitive data in the relevant region. The most powerful information created by private exploration in terms of creating externality benefits is, of course, the discovery of a commercially viable resource. Logically, the business case for new investment in pre-competitive data diminishes in areas adjacent to or closely related to areas where there is a known resource (known as 'brownfields' areas). This is reflected in GA's focus on 'greenfields' areas in the hope that this, through the process outlined above, will lead to successful exploration and production that in turn will obviate the need for further government data acquisition.

130. It has been proposed that a WPB system is incompatible with a Resource Rent Tax regime.³³ The central argument for this is that a competitive WPB system would encourage bidders to over-invest in exploration to the extent that their bids defray all the expected economic rent (super-profits) expected from the downstream development. If those expectations were realised for the winning bidder, the practical outcome would be the

³² This pressure is somewhat mitigated by the assessment process, which requires the work program to be technically sound and able to be pursued on a 'dry hole' basis (that is, in the event that the area is not viable for commercial exploitation of resources).

³³ Fane, G. Smith, B. 1986, *Resource Rent Tax*, article in Trengove, C.D. (ed). 1986, *Australian Energy in the 80's*, Sydney, George Allen and Unwin Australia, p. 221

elimination of any return to government (and the community) from a Resource Rent Tax. The over-investment in exploration would represent a net loss of resources to the economy.

131. WPB has remained the main method used by the Australian Government for competitive allocation of offshore exploration permits since a PRRT was introduced. Experience over this period shows that the WPB system does not come close to extinguishing expected future economic rents.

132. Cash bidding was introduced in 1985 by the Australian Government for allocation of exploration permits. Initially, the results appeared successful. Sixteen companies bid for four of five areas advertised, leading to the award of three permits with winning bids in the narrow range of \$10 million to \$11.1 million. However, this experience was not repeated in the following years in terms of frequency of releases through cash bidding or revenue raised. Some five more areas were released using cash bidding in the following seven years with the average return of \$1.8 million. Cash bidding remains an available option under current legislation for release of offshore exploration acreage.

133. There is some disagreement in literature on the value of information externalities from private exploration. Available evidence does suggest that the recycling of private exploration data through GA has value although, as described above, this is likely to vary from situation to situation and be diminished for established 'brownfields' areas. The WPB system, as a universal mechanism for allocation of offshore exploration acreage, is a crude device for addressing information externalities and would appear to have the greatest impact (through competitive pressure) in 'brownfields' areas of highest prospectivity. That is, the incentive to enhance exploration created by the WPB system appears to be strongest where it is both least needed and more likely to cause an over-investment in information.

134. The 1986 article on *A Resource Rent Tax* by Fane and Smith which advocated cash bidding, acknowledged that it would lead to an under-investment in exploration due to information externalities. To redress this, the authors proposed a fixed rate of subsidy for exploration expenditures, with perhaps a higher rate of subsidy for wildcat and rank wildcat projects.³⁴

135. An alternative approach would be to recognise that the relative merits of the WPB system and cash bidding vary according to how much exploratory information is already available. It would seem appropriate that cash bidding be reactivated as an option to be considered in allocating 'brownfields' areas and a tighter focus on WPB for cases where additional information will significantly enhance understanding of a region's geology. The extent of application of each requires more research that would also include building on experience as cash bidding is introduced.

A review of how exploration permits are allocated

136. More generally, noting the proposal for ReconEx permits discussed above and proposals to reintroduce cash bidding, and the radically changed technology and resource pricing environment that exists today compared to when current arrangements for allocation of exploration permits were put in place, there is a strong case for a more thorough review of how exploration permits are allocated. This is a matter that is beyond the scope of a review of GA but does critically impact on the business case for GA in regard to its role in providing pre-competitive data.

³⁴ *Ibid*

Quantitative modelling

137. As requested by the Review, ACIL Tasman has attempted to quantify public and private benefits arising from GA activities. In attempting to quantify benefits of geospatial, Earth monitoring and groundwater activities ACIL Tasman has relied on an approach of inferring a value for GA's contribution to spatial data from the estimates of the value of public and private benefits from programs and activities that use spatial data. Generally, the ACIL Tasman approach appears to infer a reduced effectiveness for activities using spatial data should GA's contribution not be available.

138. ACIL Tasman recognises the limitations and vulnerabilities of their methodology. While not being able to identify a better approach, this Review considers that the methodology has an inherent risk of generating large values due to the difficulty in modelling counter-factual scenarios, particularly where alternative strategies to achieve equivalent outcomes may have been possible. It is therefore more useful to illustrate the potential materiality of GA's contribution to the numerous value chains in which spatial data is a significant input.

139. A different approach was taken to model benefits arising from pre-competitive information where regression analysis has been applied. The Review considers that ACIL Tasman's modelling provides the most sophisticated and robust econometric analysis to date on attempting to quantify Australia's return on its investment in pre-competitive information. Although the modelling has extracted from the available data as much as statistical methodology allows, the Review considers the modelling has some limitations. The Review considers the modelling, appears to be dependent on assumptions, including an instantaneous relationship between changes in private exploration and the value of oil production. The model does not appear to explicitly recognise the influence of variables that would seem relevant – such as taxation, the cost of capital, global growth or technological change.

140. For these reasons much of the quantitative analysis requires qualification. They nevertheless give some further indication of the broad and more indirect economic benefits that may be attributable to GA's work with pre-competitive data.

Conclusion - Value of Geoscience Australia products

141. This Review has not found instances of major products or services of GA that do not have material value in serving a government policy or objective. The larger portion of GA's activities provides evidence that directly assists the Government and other stakeholders to make informed policy decisions on resource management and environmental issues of national importance. Other activities, such as providing authoritative fundamental spatial data and services for precision mapping have a less direct relationship with specific sectoral objectives but provide basic support for tools and systems used across the government and private sectors.

142. Both ACIL Tasman consultancy reports commissioned to support this Review contain compelling qualitative information supporting GA's role in providing pre-competitive information, fundamental spatial information and capabilities, earth monitoring and groundwater information.

143. The variety of GA's information products means that they do not all rest on the same rationale for government support. However, common attributes of GA information products are:

- Strong public good attributes in terms of non-rivalry in consumption and where excludability is not possible or only achievable through mechanisms that cause unreasonable social welfare loss and inefficiencies.
- They provide evidence to support Australian Government engagement in a related policy or program.
- Information produced frequently has multiple policy applications with new applications sometimes arising well after information was collected or produced.
- They draw on a common base of skills and capabilities providing scale economies and increased scope for cross sectoral innovation.

144. Notwithstanding the difficulties in quantitative modelling of benefits, there is strong evidence of public benefits underlying GA's major information activities. This evidence exists in an assessment of these products against the above attributes and in an empirical review of the uses and impacts of GA information and services. This Review has not identified any substantive activities of GA that indicate investment in products of low value. This is not surprising given that many of the challenges facing Australia in respect of management of the natural environment that have emerged or escalated in the past decade require geoscience input to inform effective response strategies.

145. While pre-competitive information also demonstrates strong public good attributes, closer analysis shows that its main benefit is in serving Government in attracting private investment into development of resources which it owns. There is presently no funding for new pre-competitive data acquisition and analysis by GA after 2010-11 following expiry of the Government's 2006 Energy Security initiative.

146. There is a close relationship between policy settings determining the selection, size and terms of exploration acreage releases and the business case for government support of pre-competitive information. Noting that international, industry and technical conditions have changed since the current policy framework for release of offshore acreage was established, there is merit in re-examining whether the current practice represents the optimum strategy for facilitating exploration. The ReconEx proposal developed by DRET, while untested and requiring more thorough examination, represents a potential alternative strategy that could reduce dependence on pre-competitive information. A review of the policy framework for release of offshore exploration permits should inform decisions on further investment in pre-competitive information.

Recommendation 1

The Review recommends that DRET review current policy and legislative arrangements for determining the selection, size and terms for release of offshore exploration acreage. The DRET review should examine whether the current policy represents the optimum strategy for facilitating exploration, as well as how alternative policies affect the business case for further government investment in pre-competitive information.

147. Funding for pre-competitive data acquisition is a high profile and recurring issue. This activity has been subject to a number of reviews over the past two decades which have reaffirmed the underlying case for GA to be engaged in pre-competitive data acquisition, particularly in the offshore areas where the Australian Government has jurisdiction.

Recommendation 2

Subject to any changes in requirements arising from review of the Government's system for release of offshore exploration permits, the Review recommends that DRET and GA prepare for consideration in the 2012-13 budget context a submission to Government on funding continued investment in pre-competitive information, including ongoing management of data and data access.

4. STRATEGIC PLANNING AND PRIORITISATION

This Chapter examines GA's strategic planning and the alignment of its products, services and activities with the Government's priorities for geoscience information and data capability.

2. Strategic planning is important for providing a frame for unifying management to a single understanding of key priorities and how they are to be achieved. If well done, strategic plans should:

- serve as a valuable reference when making decisions between competing options/investments;
- empower managers to tend to important challenges rather than react to transient pressures; and
- make it easier to decide longer term investments, commitments and capability development and ensure such decisions are consistent.

3. Strategic planning also serves to provide visibility to external stakeholders as to how the priorities of the Government/shareholders drive what the organisation is doing and how it deploys resources. A problem in the past for governments in deciding resources of GA is in the visibility of and how well GA resources are being applied to delivering geoscientific and spatial data to meet Australia's needs.

Strategic planning

Policy mandate

4. While GA's primary role is to provide technical advice to government to support policy decisions, GA does not have a specific legislated mandate. GA derives its role and responsibilities from relevant components of responsibilities set out for the Resources, Energy and Tourism portfolio under the current AAO. From time to time, GA is also provided with direction to take on additional responsibilities through specific Budget measures. The current AAO as it relates to GA in the Resources, Energy and Tourism portfolio includes: "Geoscience research and information services including geodesy, mapping, remote sensing, groundwater and spatial data co-ordination". AAOs have been generally the same since GA was formed in 2001. The only material change since then was made on 14 October 2010 to specifically acknowledge 'groundwater' and change 'land information coordination' to the broader concept of 'spatial data co-ordination'.

Appropriation outcome

5. GA's main source of funding is through direct Budget appropriation which is provided for a single outcome. This outcome is: "informed government, industry and community decisions on the economic, social and environmental management of the nation's natural resources through enabling access to geoscientific and spatial information". This has been GA's outcome since the 2009-10 Budget. In the previous decade, GA's outcome focused on enhancing benefits through the application of geoscientific research and information, and did not mention GA's role in spatial information.

Budget measures

6. GA also receives direction from the Government to carry out specific time-limited initiatives under the umbrella of its Budget appropriation outcome. Budget measures are discussed in more detail in Chapter 5. However, these measures, if they are time limited, do not provide for ongoing work once the measures have expired.

7. Many of the specific Budget measures, in which funding is provided for limited periods of generally four to five years, appear to be addressing longer-term, ongoing objectives. These types of measures frequently involve pre-competitive work (seismic surveys and pre-competitive data acquisition for petroleum and minerals).

Policy environment

8. There is no single source of policy direction for GA. This is a reflection of the fact that GA develops and distributes a range of products and services to and on behalf of a large number of Australian Government clients.

9. GA derives its understanding of Government priorities from a variety of sources including: the corporate objectives of its parent department (DRET); the policy objectives of other Australian Government portfolio agencies; the vision statement of the Ministerial Council on Mineral and Petroleum Resources (MCMPR); and other legislation that requires output from GA in order for the Australian Government to fulfil its obligations.

Department of Resources, Energy and Tourism – Corporate Plan

10. The key elements of the resources and energy-related parts of DRET’s Corporate Plan 2009-13 are all areas to which the advice of GA makes a significant contribution – namely enhancing productivity and international competitiveness, enhancing environmental and social sustainability, and enhancing national security, in particular energy security.

11. DRET considers the strategic focus of GA’s work in the resources and energy field is driven by Government policy in this area. Whilst DRET provides the central policy direction for specific fields in this area, it currently plays a limited role in determining the high level strategic directions of GA’s work, including in the areas that GA’s work indirectly contributes to the development of resources and energy policy. The detailed program design is left to GA and based on extensive stakeholder engagement with the resources sector and onshore with the state and territory geological surveys through the Chief Government Geologists Committee.

Other Australian Government Portfolio agencies

12. In the other areas of GA’s business, in particular spatial data, natural hazards and groundwater, the strategic direction is driven by other requirements, priorities and in some cases portfolio agencies. For example, natural hazards and some topographic mapping outputs are driven by emergency management requirements; GA’s groundwater work is mostly driven by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPAC) and provides services for the National Water Commission; the DCCEE agenda drives much of GA’s climate change analysis and mitigation projects; and the Attorney-General’s Department (AGD) and the Department of Defence steer GA’s involvement in critical infrastructure projects and disaster resilience.

13. Ideally, GA would be involved in the planning and policy development with these other agencies where GA is expected to play a role in the implementation of the policy. However, this is often not the case, as these relationships vary significantly in duration and formality –

from occasional calls for ad hoc advice to major multi-year work programs which are fully funded by the policy agency.

Ministerial Council on Mineral and Petroleum Resources

14. The MCMPR was established by the Council of Australian Governments (COAG)³⁵ in June 2001. The Ministerial Council consists of the Australian Government Minister for Resources, Energy and Tourism and State and Territory Ministers with responsibility for minerals and petroleum. MCMPR Ministers meet annually with ongoing issues dealt with out-of-session. A Standing Committee of Officials, which has met regularly each year, supports the Ministerial Council and taskforces and working groups have been established to deal with specific issues.

15. The MCMPR's mission has been to ensure the safe, responsible and competitive development of the nation's mineral and energy resources to optimise the long-term economic, social and environmental benefits to the community.

16. The minerals and energy related activities of GA, in particular those of the PMD and the OEMD, have directly supported the MCMPR's mission, providing advice to assist the council to;

- provide strategic advice across government on key issues for the minerals and energy resources sectors, focusing on impacts of land access issues, greenhouse gases and water;
- increase domestic and international investment in 'greenfield' and 'brownfield' exploration, increase collaboration on pre-competitive data and research to find new resources and reduce risk in the resources sector, and facilitate the collaboration of government, business and research providers on innovation priorities; and
- advise on an internationally competitive regime that delivers an appropriate return to the community, promote consideration of exploration incentives, and measure and advise the community and governments regarding our resource endowment.

17. Following the outcomes on reforms to the Ministerial Council system from the COAG meeting on 13 February 2011, a new Standing Council on Energy and Resources will be established from 30 June 2011 to replace the MCMPR and the Ministerial Council on Energy. The terms of reference for the new Council will be drafted over the next few months. It is reasonable to expect that GA will have a role to play in assisting the work of this new body.

Legislation and legal obligations of the Commonwealth

18. Although GA is not directed by any specific legislation, several Australian Government agencies rely on GA to fulfil their responsibilities under other legislation.

19. DRET is responsible for the OPGGS Act and relies on GA for technical assessment and provision of advice to the Minister's delegate under the Act for the grant and or renewal of petroleum titles. GA also assists DRET under the OPGSS Act on carbon capture and storage

³⁵ COAG has also provided some other input to policy for GA – the COAG National Climate Change Adaptation Framework 2006 recommended the development of a national digital elevation model for the whole of Australia, with vulnerable regions being mapped using high-resolution images.

matters by continuing development of supporting regulations and guidelines for offering commercial offshore acreage for storing greenhouse gases in geological formations.

20. GA has a delegated authority under the OPGGS Act as a custodian of pre-competitive data – storing data, information and physical samples generated by prospecting companies through drilling and exploring Australia’s offshore basins. The Act gives the Minister certain powers to collect information, with each state and territory having similar legislation in respect of its own jurisdiction. These powers are delegated by the respective State and Territory Ministers to GA.

21. GA works closely with the BoM, the CSIRO and the Murray-Darling Basin Authority in support of the BoM’s new water accounting responsibilities under the *Water Act 2007*.

22. DSEWPAC funds GA to provide technical assessments required under the *Environment Protection and Biodiversity Conservation Act 1999*. In particular, DSEWPAC relies on GA to provide authoritative advice for decisions regarding uranium mining proposals. Further, the *Atomic Energy Act 1953* requires that the discovery of prescribed substances (which include uranium) be reported by notice in writing to the Australian Government Resources and Energy Minister – GA maintains this register of known uranium deposits.

23. The Australian Government is a signatory to the Antarctic Treaty 1959, the Madrid Protocol 1991, and UN Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) 1982, which underpin Australian activities in the Antarctic. GA assists the Australian Antarctic Division in assessing Antarctic science proposals, helping manage geological and geophysical data and geological samples, and providing input into the process of identifying vulnerable marine ecosystems for protection by the CCAMLR.

24. GA contributes to fulfilling Australia’s obligations under the CTBT in respect of nuclear monitoring stations and data analysis. Australia has signed and ratified the Treaty, but it is yet to come into force. When it does, GA will have further obligations to provide technical advice, support and expert opinion to Government for establishing a global verification regime in support of Australia’s commitment to the Treaty, determining possible violations of the Treaty and capacity building for CTBT Member states within the region.

Geoscience Australia Strategic Plan 2010-12

25. Until 2006, GA’s strategic planning was informal and ad hoc – with strategic plans emphasising responsiveness to the needs of the Government and a changing work environment, and addressing emerging opportunities rather than defining core priorities and strategic direction. The ‘strategic goals’ for these early plans were influence, capability and effectiveness (ICE):

- increasing influence with stakeholders;
- improving the capability of the organisation and staff; and
- achieving excellence in all aspects of performance.³⁶

³⁶ Geoscience Australia, *Geoscience Australia Strategic Plan 2003-08*, p. 5

26. In 2006, GA developed a more formal Statement of Strategic Directions 2006-11 that included some more definition of outcomes and measures of success. However, the strategic goals in this document did not define core roles for GA and remained high level. These goals were to:

- integrate information management as a core competency;
- build the capability of people and culture to meet future needs;
- increase influence with stakeholders; and
- identify and address emerging issues.³⁷

27. In response to the 2010 Australian National Audit Office (ANAO) performance audit, GA revised and formalised its strategic planning approach. The current GA Strategic Plan runs from 2010 to 2012. The primary statement in the current *Strategic Plan 2010-12* acknowledges the need for flexibility, in that “Geoscience Australia exists to meet the geoscience information requirements of the nation as defined and redefined from time to time by Government”.

28. The Strategic Plan defines eight core priority areas and provides several key performance indicators (KPIs) for each priority, which are used for evaluating individual project outcomes.

1. Inform the minerals, petroleum and energy sectors to enhance national wealth and energy security
2. Groundwater for environmental, economic and social purposes
3. Support government policy development and decision making
4. Technical component of the legal framework for all of Australia’s spatial information and jurisdictional boundaries for environmental, economic and social purposes
5. Natural hazards and risk for community safety and resilience
6. Informed land and marine jurisdictions for environmental, economic and social purposes
7. Promote awareness of the geosciences
8. Maintain and manage the geographic and geological data knowledge of the nation.

29. One immediate observation on the first priority is that it suggests that GA is at least in part operating as a research and information service for the resource development sectors. As discussed in Chapter 3, the primary client for GA in producing pre-competitive information is government to inform administrative and policy decisions on resource management. While information is provided to the resources sector, it is generally to further government objectives and returns from resource development.

30. GA uses the Strategic Plan to inform the development of its Annual Work Program, setting out the projects and activities it will undertake at the operational level. The Executive Board formally and regularly reviews progress against this plan.

³⁷ Geoscience Australia, *Geoscience Australia Statement of Strategic Direction 2006-11*

Governance

31. The Chief Executive Officer (CEO) of GA is responsible for managing the affairs of the GA in a way that promotes the efficient, effective and ethical use of Australian Government resources. Under the FMA Act, the CEO is directly accountable to the Minister for Resources, Energy and Tourism in relation to reporting on the operations of GA. The CEO is also responsible for reporting to the Minister for Finance and Deregulation in relation to the financial affairs of GA. The CEO is responsible under the *Public Service Act 1999* to the Secretary of DRET and the CEO's performance is assessed by the Secretary.

32. Beyond this, there is little formal guidance on the relationship between the two bodies generally, and more specifically between the Secretary and CEO, including in the corporate documentation of both agencies. GA is in the relatively unusual position of being a prescribed agency under the FMA Act but not a statutory authority. Section 57 of the *Public Service Act 1999* states that “[t]he Secretary of the Department, under the Agency Minister, is responsible for managing the Department and must advise the Agency Minister in matters relating to the Department”.

33. The 2003 Uhrig *Review of the Corporate Governance of Statutory Authorities and Office Holders* noted that departments are the primary source of public sector advice to Ministers. “The portfolio secretary has a role akin to an advisory function within a parent company in providing advice to the CEO about activities of the company's subsidiaries”.³⁸ The report went on to state that “[t]he advisory role of departments includes, but is not limited to, advice and analysis on key documents produced by statutory authorities (for example, financial performance, corporate plan, progress against objectives and annual report)...”.³⁹

34. Noting that these comments relate to statutory authorities as opposed to prescribed agencies under the FMA Act, this Review considers that these same roles should be minimum requirements for a prescribed portfolio agency in the form of GA. In this regard, the Review sees potential for an increased role for the DRET Secretary in overseeing GA's activities. Work is underway within Finance to strengthen the role of departments in supporting Ministers in the execution of their responsibilities through amendments to the FMA Act.

Priority setting

35. GA's priorities are largely determined through DRET for work within the scope of the DRET portfolio, and through other agencies for GA's other functions. However, as a technical, operational agency, GA is often distant from the central policy making environment, and is operating in a challenging environment when deciding how to reconcile competing priorities – especially when the needs of other agencies may compete with the needs of DRET.

36. Given that GA is generally not directly involved in policy making, it might be expected to seek guidance from DRET on how to allocate and manage resources for its competing priorities. Historically, with the exception of the DRET component of the work program, GA's CEO has managed priorities and resources between the major programs and pressures based on his perception of the expectations of Government.

³⁸ Uhrig, J. 2003, *Review of the Corporate Governance of Statutory Authorities and Office Holders*, Canberra, p.63

³⁹ *Ibid*

37. It is not clear what mechanism GA uses for setting its priorities and resource allocation, particularly for work that is not funded through GA's appropriation and is outside the scope of the DRET portfolio. There is a general perception amongst agencies that GA gives the greatest priority to the work it undertakes for DRET and therefore that changes in priorities within the DRET portfolio have the potential to disrupt GA's contribution to projects of other portfolios.

38. The 2010 ANAO report noted that the Executive Board minutes and other agency documents do not provide information on how agency and divisional level priorities are determined and approved, what proportion of the agency work program they represent or their relative importance. Further, it is unclear whether GA systematically reviews the effectiveness of its strategic planning and management of priorities.

Aligning programs to Government priorities

39. Despite operating without a clear and complete set of Government mandates or priorities, GA has internally developed its priorities based on the high level budget appropriated outcome, and subsequently aligned its divisions' work programs to these (see Table 5 below).

40. The 2010 ANAO performance audit was critical that GA's 2006 Strategic Direction 2006-11 document did not include current (or future) Australian Government priorities and medium and longer term goals for its research activities, products and services. The 2010 GA Strategic Plan is a first step to address this issue. Further steps that can be taken to develop the strategic plan, with the involvement of DRET, are discussed later in this chapter.

41. As with most major government agencies, government requirements are not static, and a flexible approach is required. GA's early strategic planning was driven by the desire to be responsive to the changing needs of government and stakeholders, and underpinned by high level concepts of ICE rather than specifying capabilities.

42. GA has deliberately kept its 2010 Strategic Plan flexible, recognising that "geoscience information requirements of the nation are... redefined from time to time". However, without a more clear definition of government priorities, particularly for the medium to long term, GA's 2010 plan more or less defines from the bottom up the spectrum of GA activities.

Table 5: Alignment of individual Division activities with Geoscience Australia’s Strategic Plan

	Priority 1	Priority 2	Priority 3	Priority 4	Priority 5	Priority 6	Priority 7	Priority 8
GEMD	✓	✓	✓	✓	✓	✓		✓
Groundwater	✓	✓	✓			✓		✓
Earth Monitoring			✓	✓	✓			✓
National Earth Observation	✓			✓	✓	✓		✓
National Geographic Information					✓	✓		✓
Risk & Impact Analysis	✓		✓		✓	✓		✓
OEMD	✓	✓	✓				✓	✓
Energy Mineral Systems	✓		✓				✓	✓
Geophysics	✓	✓	✓					✓
Resources, Advice & Promotions	✓		✓					✓
PMD	✓	✓	✓	✓		✓	✓	✓
Repository and Petroleum Data Management	✓							✓
Marine & Coastal Environment			✓	✓		✓	✓	✓
Petroleum & Greenhouse Gas Advice	✓	✓	✓				✓	✓
Petroleum Prospectivity & Promotion	✓	✓	✓			✓		✓
Innovation & Specialist Services	✓	✓				✓		✓
CORPORATE BRANCH			✓				✓	✓

ANAO Performance Audit – Recommendation 1 – strategic planning

43. In the performance audit of GA delivered in February 2010, the ANAO recommended that to improve its strategic planning, GA should develop:

- a strategic plan that outlines its strategic directions, government priorities, and specific, measurable medium and longer term goals for its research activities, products and services;
- an information communications technology strategic plan that is aligned with the agency's strategic plan; and
- a strategic information management plan that identifies and prioritises information management initiatives.

44. The ANAO considered that GA's current approach to strategic planning focussed on its enabling activities, and identifying its core capabilities would assist GA to develop a strategic plan that includes a clearer framing of the agency's Annual Work Program (discussed later in this chapter) within the context of the Government's mandates and priorities.

45. The ANAO also considered that medium to long-term goals for the delivery of geoscientific products and services could be identified, and an appropriate set of qualitative and quantitative performance measures and targets developed and monitored. ANAO found that GA's processes for developing its Annual Work Program are generally sound, but management reporting of the Annual Work Program could be improved by linking project budgets and including measurable performance indicators. It would also be good governance practice for the agency to formally record how it had identified its Portfolio Budget Statement (PBS) work priorities, at both division and agency levels.

46. The ANAO also recommended development of a strategic information management plan as it considered that dealing with critical information technology infrastructure issues had taken precedence over information management.

47. Since the ANAO's performance audit, GA has made progress in reviewing and updating its Strategic Plan and was able to demonstrate to the Review how the work of individual groups aligns with key performance indicators. An ICT strategy has also been approved. GA may still need to work towards greater transparency of how it manages competing priorities, decision making processes, and reporting on performance.

Relationship with the Department of Resources, Energy and Tourism

48. GA is a prescribed agency under the FMA Act within the Resources, Energy and Tourism portfolio. DRET consider GA's services to be of fundamental importance in the development of evidence-based policy. DRET considers GA to be a world leader in providing first class geoscientific information and knowledge which enables the Government and community to make informed decisions about the exploitation of resources, the management of the environment, the safety of critical infrastructure and the resultant wellbeing of all Australians.

49. GA fills a role as DRET's technical partner in providing strategic advice to the Minister for Resources and Energy. The main areas in which GA provides advice and services to DRET include:

- technical contributions and leadership in the development of specific projects and publications such as the *Australian Energy Resource Assessment*, and *Australia's In Situ Recovery Uranium Mining Best Practice Guide*;
- technical advice in response to offshore incidents affecting health and safety and the environment, including the Montara incident of 2009;
- pre-competitive data acquisition and the annual offshore acreage release (for both petroleum and carbon capture and storage);
- advice on the development of the regulatory regime governing greenhouse gas storage;
- representation for international investment promotion;
- technical advice on the allocation and variation of offshore exploration permits, locations, production licenses, retention leases, pipeline licenses and infrastructure licenses;
- technical and geological advice to inform radioactive waste management policy;
- technical, geological and groundwater advice to inform resources policy development, including for minerals, coal seam methane and geothermal energy;
- solar mapping including data collection and maintenance for the Solar Flagships Program; and
- representation on technical committees for international research and development programs.

50. During discussions, DRET indicated that interaction between DRET and GA takes place in a range of contexts, from formal to informal, and at all levels between staff.

Informal interaction

51. Much of the interaction between GA and DRET is ad hoc in nature, with most elements of interaction based on past practice and personal contacts, rather than any formal management framework. This is consistent with the findings of the ANAO in its performance audit of GA delivered in February 2010.

52. While the relationship between GA and DRET is clearly positive and strong, its predominantly informal nature and lack of reporting and documentation may have an impact on the planning and strategic goal setting ability of GA, as well as GA's ability to manage its resources and finances.

53. Although DRET has oversight and some influence in the policy direction within each field of GA's work to support resources and energy sector development, there does not appear to be any framework in place for advising GA on priorities between the respective fields of work.

Formal arrangements

54. Currently, DRET plays a limited role in determining the high level strategic directions of GA's work, including in the areas that GA's work contributes to the development of

resources and energy policy. The GA CEO is a member of the Executive Board of DRET, and is therefore able to stay informed of policy developments and priorities, including through attendance at weekly meetings. However, GA determines the detailed program design through consultation with the resources industry and the geoscience organisations of the states and territories, through the Chief Government Geologists Committee of the MCMPR. Conversely, no DRET officer is involved in GA executive meetings.

55. Generally, GA services that support DRET portfolio responsibilities for resources and energy development are funded from GA's Budget appropriation. However, DRET directly funds a small number of GA activities where the program is directly determined by DRET and GA is the service provider. Examples of this include a \$100,000 payment for project management services relating to pre-competitive carbon capture and storage data acquisition projects with the states, small annual contributions for supporting promotion of the petroleum acreage release, and payments for new work in the fields of renewable energy developments such as solar mapping (\$5 million).

Conclusion –Alignment of Geoscience Australia's activities with Government priorities

56. The information, services and capabilities provided by GA support a diverse and growing array of Government policies and objectives. The Review has not found instances of major products or services of GA that do not have material value in serving a government policy or objective. From the information available to this Review, there is no 'low hanging fruit' within GA in terms of an area of work that may be cut with little consequence to a Government priority.

57. Therefore the key issue in assessing the alignment of GA's activities and capabilities against Government priorities is not a question of whether those activities and capabilities are aligned to government objectives in an absolute sense, but whether they reflect Government priorities in terms of meeting the highest strategic requirements of Government. Given the ever increasing number and variety of demands for GA applications in the past decade, it has become imperative for Government to articulate its highest priorities.

58. This was the central issue of the 2010 ANAO performance audit of GA which found a need to improve strategic planning. One component of the ANAO's recommendations – that the strategic plan should outline the Government's strategic priorities – does not appear to be a matter that GA can fully address internally. It essentially requires reconciling the relative priority in the underlying policies supported by GA's work. This suggests a role for the DRET that, in addition to being the main sponsor for many policies supported by GA, already performs a strategic resource function in portfolio coordination of the Budget process. The practical applications of clearer Government direction on policies would be to inform on the appropriate trade-offs at a structural level, in the attention given to, and allocation of resources between, the various sectors and purposes that can be served by GA. For example, the trade-offs between resource development or conservation objectives, the mix of offshore and onshore investment supporting resource development, the weight to be given to activities that may enhance energy security, and support for spatial data and related capabilities.

59. The pending expiration of funding for pre-competitive data acquisition was a key factor leading to the commissioning of the Review that in turn requires an examination of GA activities against Government priorities. The information uncovered in this Review, past budget-linked reviews and independent assessments argue for pre-competitive data acquisition to be afforded a high priority in GA resourcing. However, the 2010 Budget funding outcome for GA, which ostensibly decided against continued funding of pre-competitive data, allocated funding for a series of other activities. A review of the

process leading to this outcome supports a view that the main motive for the additional funding was to sustain GA's resource base in the short term. The practical upshot however is a decision that, if anything, results in continuing uncertainty as to what should be the strategic priorities of GA. It is reasonable to conclude that if a more developed articulation of Government priorities was already available to inform the Budget process, Ministers and other stakeholders would have been better equipped to assess the relative merits of pre-competitive data acquisition against other GA activities or new proposed activities. This, in turn, would have informed consideration of whether other (albeit valuable) GA activities should be regarded as more dispensable than pre-competitive data acquisition.

Recommendation 3

- a. Further to the ANAO recommendations (Report No.22, 2009-10, Geoscience Australia), the Review recommends that DRET provide regular guidance to GA on Government priorities for geoscience and spatial capabilities and information to assist GA strategic planning, and advise GA of developments affecting government priorities as they arise. The key focus of this guidance should be on expectations to be met from GA's direct appropriation. This could include the Secretary of DRET reviewing and approving the GA strategic plan and annual business plans, with the Secretary also responsible for ensuring the GA priorities are aligned to government priorities. This is consistent with the Secretary's responsibility for GA under the *Public Service Act 1999*.
- b. The Review recommends that, without limiting its scope, a strategic plan for GA should specifically address the relative priority of pre-competitive information, including acquisition of data, against its other activities to resolve how to allocate resources to GA's pre-competitive activities, consistent with both the strategic plan and existing funding estimates.

Recommendation 4

Further to recommendation 2, the Review recommends that any new policy proposal for additional funding of pre-competitive data acquisition should be supported by information on how resources would be allocated across strategic priorities if no additional funding is agreed. The core purpose of this would be to improve transparency in reconciling the strategic importance of pre-competitive information against the deployment of existing budget resources.

Relationship with other Government agencies

Other Commonwealth agencies

Policy departments

60. A wide range of policy departments in the Australian Government use products and services provided by GA. Agencies consulted in this Review often indicated that they sought GA's services because of the quality and independence of the advice received. GA's credibility and reputation, including in the private sector, are also highly valued by other agencies – these are seen as adding weight to policies developed with the assistance of GA's advice. This sentiment was also emphasised by DRET, which advised that it is careful not to seek to influence the scientific independence of GA's advice.

61. From discussions held with stakeholders, the Review assesses that in some dealings with Australian Government agencies, early stages of relationships suffered through differing expectations and understanding of what could be delivered, including in what timeframe and at what cost. However, as relationships matured, these issues were almost always overcome.

62. Arrangements governing GA's interaction with other Australian Government agencies vary considerably, from formal Memorandums of Understanding (MoUs) and subsidiary agreements to completely irregular interaction with no formal governance.

63. The Review found that in general, where there is a well defined governance structure and supporting documentation, relationships are positive and to mutual satisfaction, and project management is successful. Formal agreements are seen as important for clearly defining roles and responsibilities, for defining benchmarks for managing delivery, as well as for funding arrangements where relevant. GA generally demonstrated a strong ability to deliver tasks on time and on budget where suitable documentation was in place.

64. Successful relationships have often been governed by a head agreement setting out general provisions and service standards, with more specific contracts governing individual projects. The National Collaboration Framework has been used successfully in several instances. Examples where this is the case include arrangements between GA and state geoscience bodies, the Defence Imagery and Geospatial Organisation (DIGO), DCCEE, the Australian Safeguards and Non-Proliferation Office in the Department of Foreign Affairs and Trade, and some work for DSEWPAC.

65. Overall, there is a high degree of satisfaction among Australian Government policy departments with the quality of the work and advice delivered by GA.

Implications for policy/financial sponsorship of Geoscience Australia programs and initiatives

Policy sponsorship

66. As mentioned earlier, DRET plays a role in representing the interests and capabilities of GA across government, but this is not systematic and may depend on the knowledge and experience of the particular officers involved with individual policies and submissions. However DRET concedes there may well be instances where this does not occur, given the lack of full knowledge of GA's work and capabilities across DRET or lack of DRET policy interests – with the result being a lack of DRET input in a matter being developed by another portfolio. In addition, there is no such opportunity where policies or Cabinet submissions

deal with issues not relevant to the DRET portfolio, but where GA could nevertheless have a relevant role or capability.

67. At the same time, GA also has an opportunity to build awareness of its capabilities and interests through direct membership and participation in various inter-departmental and other committees. Despite these circumstances, the Review found that this does not always ensure that GA is consulted on the development of policy initiatives that may require its support when implemented, particularly where the policy is outside the DRET portfolio.

68. One particular example relates to the allocation of funding for GA in new policy proposals. While agencies do make deliberate efforts to factor GA work and funding into new policy proposals, the full funding amount for proposals is not always forthcoming. In such circumstances, it appeared that GA is at risk of bearing a disproportionate share of the funding shortfall, while still being expected to deliver the work. One example of this is outlined later in this chapter.

69. Ideally, GA should be involved in the planning and policy development of other agencies where GA is expected to play a role in the implementation of the policy. However, some agencies commented that GA is not sufficiently experienced in policy development. GA might benefit from a greater understanding of policy processes to assist engagement with policy agencies. Policy agencies should accept primary responsibility for articulating their priorities and the decision processes they face. GA may consider developing a more systematic approach to educating and communicating with policy agencies on their technical capabilities so as to build shared understanding of the value GA activities can provide.

70. The Review observes that DRET could further facilitate the development of GA knowledge and awareness of policy making processes through the greater involvement of relevant GA staff in the policy making environment. The Review also notes that as GA is formally staffed as part of DRET, this could facilitate a staff exchange or a formal short-term rotations program between GA and DRET.

Ongoing obligations from time limited initiatives

71. A number of agencies expect GA to provide long-term data repository and storage services for information generated by projects that GA is involved in. Noting the data management demands of GA's own-account programs and the increasing breadth and detail of data, it is not clear if these expectations are sustainable and cost-effective for the long term, notwithstanding technological advances. Often there is no ongoing mandate of funding for GA to fulfil this role. One aspect of this is that a number of projects in which GA is involved have a potentially long tail in terms of ongoing costs that may not be adequately addressed in formal Section 31 arrangements.

72. The CSIRO agreed in general terms that there may be some risk where there is no formal mandate for long-term support, noting the example of fire monitoring through the Sentinel project where there is no formal mandate for where the capability is housed. GA itself also indicated that where GA anticipates an issue for government but there is no clear policy agency or driver, it can be difficult to gain traction until it becomes a real problem, in part because of a perception that GA may be spruiking for business.

73. Beyond this, there is a lack of clear policy ownership of some areas in which GA provides advice, increasing the potential for duplication and missed opportunities. Spatial data policy stands out as an area where there appears to be a lack of leadership within the Australian Government. While OSDM is housed within GA, it is not ostensibly the owner of or advisor on spatial data policy. Some stakeholders see an opportunity for policy leadership

here. To date however, GA has not promoted itself as providing a facility for other Australian Government agencies to leverage off the Australian Government's spatial data holdings and capabilities in policy and program development.

74. Other areas where there may not be clear policy ownership within the Australian Government include GA's space-related activities and the maintenance and collection of new environmental data. This increases the likelihood of disparate investments across government agencies in spatial data and data capabilities, with attendant duplication and lack of consistency. It also increases the potential for missed opportunities or failure to utilise GA where its technical skills would have been valuable.

Financial accountability to clients and partners

75. GA does not currently track in a consistent or comprehensive way the value of its ongoing services for DRET. However, having reviewed GA's service delivery arrangements, the ANAO⁴⁰ recommended the establishment of formal agreements with GA's major clients, including DRET. In its response, GA indicated it had accepted this recommendation and would be enhancing its performance reporting systems to accurately capture the costs of major services delivered. This would improve GA's ability to plan and allocate resources for its largest client. While GA is still clarifying the specific details of the recommendation with the ANAO, a new draft Chief Executive Instruction concerning cost recovery has been prepared and GA has undertaken a review into internal cost recovery processes.

76. Despite these efforts at improving arrangements and creating a consistent financial framework under which GA does business, discussions with stakeholders did reveal some areas of difficulty. Evidence was also presented that agencies sometimes had difficulty in seeing where their money was being spent. To address this, GA needs to be able to demonstrate in a consistent manner that its charges can be robustly acquitted and directly related to outputs.

77. GA is in the process of establishing formal agreements with all of its major Australian Government clients. This is clearly an important process for defining the rights and obligations of each party and putting GA on firmer footing in terms of planning and funding.

Science and research agencies

78. The Review's investigations indicated positive, collaborative relationships between GA and other science based agencies, most notably the BoM and the CSIRO.

79. GA and the BoM have a head agreement under the National Collaboration Framework, with more specific agreements and schedules governing individual projects. Areas of collaboration include satellite observation, ground station support, geofabric mapping, emergency management, planning and risk management, and the Joint Tsunami Warning Centre (officially launched in 2008), where the BoM operates the warning system and GA provides the technical advice and seismic data.

80. In the relationship between GA and the CSIRO, there is a wider range of governance structures, from highly formalised work obligations and funding arrangements where Cooperative Research Centres are involved, to collaborations and partnerships such as AuScope, salinity investigations, Great Artesian Basin modelling, marine biodiversity for marine bioregional planning with DSEWPAC, bathymetry, and National Research Flagships

⁴⁰ Australian National Audit Office. 2010, *Audit Report No. 22. 2009-10 Performance Audit: Geoscience Australia*, Canberra, recommendation 3, p.69

involving the CSIRO, GA and other research agencies. Considerable work is also carried out without formal contracts and/or exchange of funds between the two agencies, for example, through ad hoc collaboration and exchange of professional expertise and views.

81. From the CSIRO perspective, the relationship is often based on the premise that the CSIRO is a developer of tools, processes and algorithms that GA can use to deliver services and products on a national scale. One example noted was remote sensing, where the CSIRO developed an algorithm and a prototype system that GA turned into an operational system. It was also noted that the CSIRO sees its role as providing scientific services to individual parties, whereas GA will not provide individual services for profit or where private sector players could provide the same service.

82. While this situation is well understood by both GA and the CSIRO, the difference between the approaches of GA and the CSIRO to commercial work does not appear to be well understood across the Government more broadly.

State and Territory agencies

83. GA's relationships with counterpart agencies in the State and Territory governments are complicated by two circumstances. The first is that there is a range of different policy drivers for the work GA undertakes, as outlined above. The second is that the broad range of functions undertaken within GA is generally housed within two or more separate agencies within each State and Territory government.

Geological functions

84. State and Territory geological authorities were contacted as part of this Review. Responses received revealed that GA is highly regarded by the geological survey organisations of the State and Territory governments. Most State geological survey organisations are located within departments that have responsibilities for the resources sector. The relationships are highly collaborative in nature, with GA generally working at a regional and national level which is beyond the scope of the activities of individual State agencies. The key areas of work undertaken by GA of greatest importance to the states and territories are identified as follows:

- national resource assessments and overviews of exploration;
- advice and services in the design, contract formulation, contract management and supervision of large geophysical and geochemical surveys funded by State agencies which are aimed at filling gaps in the national coverage of such surveys;
- cross-jurisdictional, geological province-scale geoscience in collaboration with state surveys (for example, the North Australia Project);
- collection of regional datasets that are beyond the scope of state geological surveys, such as the 1:1 million scale geology of Australia, deep seismic traverses, airborne electromagnetic surveys and Australia-wide geophysical datasets (for example, the Australia-wide Airborne Geophysical tie-line Survey (AWAGS) survey to level Australia's radiometric datasets) that build a fundamental framework of the geology and resource potential of the Australian continent;

- coordination of international promotion of investment in Australia’s resource sector through the ‘Team Australia’ concept, which brings together Australian, State and Territory government agencies and representatives from Australian industry;
- a national geochronology service to states under the National Geoscience Agreement (NGA);
- provision of specialist expertise in areas such as geophysical modelling, seismic processing and interpretation, mineral systems, and geothermal energy;
- the development and management of geoscience standards;
- the distribution of geoscience information to the public through its website; and
- the custodianship of national geoscience datasets.

85. The relevant State agencies here were highly complimentary of GA’s work, in particular its technical expertise, ability to provide a regional or national perspective, and its key role in promoting Australia as a single and coherent investment destination at international events.

Geospatial functions

86. The relationship between GA and State and Territory agencies involved in geospatial functions is less well defined. This appears to be a result of there being no single policy driver for geospatial matters, either at Commonwealth or state level, and no single Ministerial Council which sets geospatial policy. A number of organisations involving both Australian Government and state officials are active in this area.

ANZLIC

87. Along with the states and territories, GA is a member of ANZLIC – the Spatial Information Council. GA cooperates with State and Territory mapping agencies, through ANZLIC in the development of national maps, and in support of the maintenance and promulgation of geospatial data. GA also provides administrative support to the ANZLIC national office located in Canberra.

88. ANZLIC describes itself as the peak inter-governmental organisation providing leadership in the collection, management and use of spatial information in Australia and New Zealand. Membership of ANZLIC’s Council includes senior officials from the Australian and New Zealand Governments and the Australian State and Territory governments. The CEO of GA is the Australian Government representative on the Council.

89. ANZLIC is responsible for developing nationally agreed guidelines for spatial data management. It focuses on strategic policy advice and direction to government as well as supporting government initiatives such as those relating to critical infrastructure protection. To support these functions, ANZLIC has a number of subcommittees concerned with coordination between the Australian, State and Territory governments:

- Emerging Issues and Geospatial Futures (EM&GFSC)
- Standing Committee on Land Administration (SCoLA)
- All-Hazards (Emergency Management, Counter Terrorism & Critical Infrastructure Protection) Standing Committee (AHSC)

- Intergovernmental Committee on Surveying and Mapping (ICSM).

90. ANZLIC indicated that it has a close working relationship with PSMA Australia Limited (PSMA), formerly known as the Public Sector Mapping Agencies. ANZLIC does not report to a specific Ministerial Council, having been established by the Prime Minister and the heads of the State and Territory governments in 1986. It reports to various Ministerial Councils and related bodies on an issues basis. The current Chair of ANZLIC sees this as a particular strength given the activities of ANZLIC span so many different areas of government.

Intergovernmental Committee on Surveying and Mapping

91. ICSM is a subcommittee of ANZLIC. ICSM's role is to provide leadership, coordination and standards for surveying, mapping and charting, and facilitate the assemblage and maintenance of national framework datasets. It describes its core function as coordinating and promoting the development and maintenance of key national spatial data including geodetic, topographic, cadastral, street addressing, tides and sea level, and geographical names. Australian Government representation is provided by GA, as well as Defence organisations (Navy and DIGO). GA also fulfils the secretariat function for ICSM. Part of ICSM's role is to ensure work across all jurisdictions is coordinated and there is no duplication of effort.

PSMA Australia Limited

92. PSMA is an unlisted public company limited by shares and owned by the State, Territory and Australian governments. Originally formed to create an integrated national digital base-map for the 1996 National Census, PSMA has gradually expanded in size and function. It describes its operational role as creating and commercialising national datasets with spatial information sourced from ANZLIC members. GA has supported PSMA through its Board membership to ensure there remains a constructive relationship between the Australian Government and states in this field, and noting the importance of PSMA's function in bringing together detailed datasets from numerous jurisdictions and combining these in a common format.

93. The State and Territory government mapping agencies have established licences with PSMA so that national datasets can be built from data held in each jurisdiction. While no such licence has been put in place between PSMA and GA or any other Commonwealth agency, GA is the primary source of Commonwealth spatial data that is supplied to PSMA. GA supplies significant amounts of topographic and transport data to the relevant State and Territory agencies (generally housed within environment, land and planning portfolios), which then provide this data to PSMA. The data is acquired and processed by GA under a co-funding model with the individual State and Territory agencies. The ABS and Australian Electoral Commission are the other Commonwealth agencies that supply some data to PSMA.

94. PSMA notes on its website that the policies, standards and operational techniques of the different government mapping agencies are different, as are their levels of sophistication and advancement, so part of PSMA's role is to help their disparate data resources mesh, cooperate and function uniformly. This function is recognised as particularly valuable by GA, as well as the fact that agencies across the Commonwealth are significant users of products generated by PSMA, generally in the form of value-added applications developed by third party resellers.

95. The Board of PSMA comprises senior public servants from each of the State and Territory governments and the Australian Government. The Australian Government representative is the General Manager of OSDM, who is a senior staff member of GA. As the Australian Government representative on the Board, GA receives a small annual dividend from PSMA, but does not receive royalties for its data contributions, despite the fact that State agencies are paid royalties.

Office of Spatial Data Management

96. OSDM is located within GA, and facilitates and coordinates spatial data management across Australian Government agencies. GA provides administrative and technical support to OSDM, including accommodation, corporate services, and information technology support. OSDM was intended to operate under the guidance and direction of the Spatial Data Policy Executive and the Spatial Data Management Group (SDMG). One of OSDM's key roles is to provide support and services to facilitate implementation of the 2001 Commonwealth Policy on SDAP.

97. Other roles fulfilled by OSDM include:

- facilitating sharing of experience and expertise between Australian Government agencies;
- providing technical advice to the SDMG;
- promoting efficient use of Australian Government spatial data assets;
- representing the Australian Government's interests in spatial data coordination and access arrangements with the states and territories; and
- fostering the development of a private sector spatial information industry.

Pulling it together – the role of Geoscience Australia in geospatial activities

98. While it is evident that there are a range of agencies bringing together the geospatial activities of the State and Territory and Australian governments, GA maintains a constant presence as a representative at the Australian Government level. GA is a known and respected contributor to these fora and maintains open and collaborative relationships with its state partners.

99. However, while all governments agree on the importance of collaboration, there remains debate about what should be done at the national versus jurisdictional level. The Government has acknowledged a general lack of leadership in spatial data policy. The Government 2.0 Taskforce Report argues that leadership is vital to drive open government data policy reforms and notes that Australia has fallen behind for lack of coordination and leadership in this area.⁴¹ At the time of OSDM's establishment, it may have been envisaged that it would provide Australian Government leadership in this field. The Review considers that this expectation does not align with the size or placement of OSDM. There has been no revision to the Commonwealth Policy on SDAP since its commencement in 2001, or any expansion of spatial policy beyond this.

⁴¹ *Engage: Getting on with Government 2.0 – Report of the Government 2.0 Taskforce*, 2009, p. 21
<http://www.finance.gov.au/publications/gov20taskforcereport/doc/Government20TaskforceReport.pdf>

100. A review of the Implementation of the Spatial Information Industry Action Agenda and the SDAP Policy conducted by the Department of Industry, Tourism and Resources in 2004⁴² found that the best way to progress major spatial data initiatives within government was to leverage off key strategic issues of importance to senior decision-makers. However, this demand-driven strategy has not resulted in the establishment of any clear policy or lead agency. The Australian Government's Spatial Data Policy Executive has met only once since its creation, in 2002, which is also indicative of a policy vacuum.

101. Rapid developments are taking place in the geospatial industry, a point also highlighted in discussions with ANZLIC. The Review is cognisant of a current review of Australian Government Spatial Capabilities being undertaken by Vanessa Lawrence, Director General and Chief Executive of the UK Ordnance Survey. The Review supports this initiative, noting that it has been commissioned among other things to recommend the most suitable policy and program framework for implementing an Australian Government spatial capability, taking into consideration Australia's political and economic geography, recommend a suitable implementation model, and recommend an appropriate governance structure to ensure effective operation of the policy and program framework.

102. The Review also notes that in late 2010 the Secretaries Board commissioned an APS200 location project on spatial data – specifically to develop options to address location information policy, governance, and investment. The APS 200, comprising the Secretaries Board and senior government officials, is the senior leadership forum for the APS to lead the vision of the future APS and build the engagement of staff to the APS reform agenda. The APS200 members: undertake specific policy or change management projects commissioned by the Secretaries Board; bring forward proposals for consideration; and provide feedback on the progress of the reform agenda and APS culture, attitudes and beliefs.

Recommendation 5

The Review recommends that the APS 200 Location project consider the case for designating a central policy centre or office to provide direction at a whole-of-government level for the creation, purchase and management of spatial data across departments and agencies. The Review suggests that such an office should be located in DRET. The office would need to work closely with GA who would continue as the Government's leading provider of spatial data and related capabilities, but should be located in a policy agency to ensure an ability to resolve competing interests and closer proximity to policy developments affecting spatial data priorities. The Review also suggests the office should absorb the functions of OSDM.

⁴² Department of Industry, Tourism and Resources. 2004, *Review of the implementation of the Spatial Information Industry Action Agenda and the Spatial Data Access and Pricing Policy*, Canberra, p.5

Recommendation 6

As referred to in Recommendation 3, the Review recommends that GA's strategic plan also recognise GA's role as a provider of geoscience and spatial services to other agencies. This recognition should provide a basis for GA to attach priority, and an appropriate level of funding from its direct appropriation, to maintenance of fundamental knowledge and capability relevant to a reasonable range of potential and expected external requirements where cost-effective. This would not extend to a general practice of retaining staff in reserve but does mean maintaining at a corporate level some basic level of competence in fields that may become the basis of a new capability or service in the future.

Overlap and duplication

Commonwealth level

103. Overall, the Review found little evidence of overlap of GA's work with activities being pursued by other Australian Government agencies. Other Australian Government scientific agencies also commented that GA's role is separate and complementary to their own, even if it may appear at a high level that they are working on the same issue. GA views itself and is viewed by others as operating in applied science rather than pure research.

104. The Review specifically raised the issue of possible duplication with the CSIRO. The CSIRO explained how in instances where it and GA are working on a common project, the two organisations would be fulfilling different roles – for example, the CSIRO doing initial development and prototyping while GA would operationalise the concept. The Review did not find evidence of duplication and pressures on both organisations to contain costs provide a strong incentive to avoid overlap.

105. The Review did, however, find some areas of potential overlap between the work of GA and other agencies undertaking new projects in areas more traditionally part of the GA domain.

Critical Infrastructure Protection Modelling and Analysis Program (CIPMA)

106. Following a successful proof of concept in 2006, the CIPMA Program was established to provide the Government with an ability to model the impacts of hazards on the built environment. The primary goal of CIPMA is to strengthen national security and better protect critical infrastructure.

107. While AGD was the policy driver behind the program, the functional outputs were initially largely delivered by GA.

Department of Climate Change and Energy Efficiency– Darwin ground station

108. GA's satellite imagery is a key input to DCCEE's NCAS, which provides world-leading accounting for greenhouse gas emissions from land based activities. DCCEE indicated that NCAS was possible because GA, unlike the case in many other countries, had maintained a consistent, continuous, national archive of satellite imagery dating back to the 1970s.

109. A current special project is in support of the International Forest Carbon Initiative. This involves the collation of historical satellite imagery of Papua New Guinea (PNG) and Indonesia from regional archive centres such as Thailand to establish a carbon accounting regime in these countries. This is important to give assurance to international donor countries.

110. An extension of this project involves building a new ground station in Darwin for the ongoing collection of imagery over PNG and Indonesia. DCCEE will own the infrastructure and set the work program for how the infrastructure is used, but GA will operate it on DCCEE's behalf. GA assisted with ground station tender specifications and has participated on the tender evaluation team. The arrangement for this ground station leaves open the possibility of duplication of effort and function, confusion in interacting with international stakeholders (space agencies) and uncertainty in the ownership and responsibility for maintenance of key assets. However, with GA operating the station on behalf of DCCEE it is reasonable to expect that these problems can be managed.

State level

Geological functions

111. There appears to be minimal overlap between GA's work and capabilities and those of State agencies. In particular, State agencies strongly support GA's role in providing a national perspective, national leadership, national standards, national data custodianship and national investment promotion through the 'Team Australia' concept described earlier.

112. State agencies consistently commented that where there may have been overlap in the past, this has been removed through deliberate discussion and rationalisation, through the NGA, and ongoing stewardship of the Chief Government Geologists Committee under the MCMPR. The Chief Government Geologists Committee develops an annual work program which is reviewed and endorsed by the Standing Committee of Officials under MCMPR, providing further confidence that any overlap between Commonwealth and state functions is minimised.

113. Given state and territory responsibility for onshore minerals and energy resources, decisions on where to acquire pre-competitive information are taken individually by the states and jointly by the Chief Government Geologists Committee. GA endeavours to complement State and Territory programs and link datasets together to form a nationally consistent perspective. GA may also acquire data to provide a broad national perspective on new energy resources such as geothermal.

114. The Review gave consideration to whether the activities being undertaken by GA in pre-competitive geoscience are appropriate to be performed by a Commonwealth agency. Taking into consideration factors such as economies of scale, potential spill overs from one state to another, and the regional and national scales on which GA operates, the Review team was satisfied that GA's activities are appropriate.

Geospatial and earth monitoring functions

115. The lack of a clear policy owner or driver in the geospatial work undertaken by GA appears to have led to the establishment of several different agencies and committees for purposes of national coordination between the Australian and State and Territory governments. While the Review acknowledges that these bodies are responsible for a range of different functions under the broad banner of geospatial applications, there is an increased likelihood of overlap and duplication of effort within the Australian Government. Specific

examples include potential inefficiencies in whole-of-government procurement, where several agencies may buy data or services that could otherwise be made available to all agencies from a central point (in line with the ‘collect once and use many times’ principle), and difficulty in identifying the authoritative datasets and standards across government. In addition, PSMA is expanding its activities and may be developing products that are more appropriately generated by GA. The current situation also creates a significant degree of confusion for stakeholders.

Conclusion – Overlap and duplication

116. The financial pressure of limited resources appears to be providing a strong incentive for agencies to coordinate activities so as to avoid duplication.

117. A significant vulnerability in this regard however is in respect of spatial data where whole-of-government management arrangements could be strengthened. This is less a matter of duplication between GA and another agency as a general issue of duplication between agencies in a field where GA has general coordinating responsibilities.

118. The administrators of the CIPMA and Earth observation satellite ground station activities are aware of the need to avoid unnecessary duplication with GA activities.

Performance and standards management

Visibility of Geoscience Australia outputs

119. The outputs of GA’s activities are primarily visible through the PBS and the chapter on GA in the DRET annual report. The annual GA Work Program, which is published on the GA website, also provides further context and details on GA’s work and a breakdown of its programs.

Portfolio Budget Statements

120. As in previous years, GA has one outcome in the 2010-11 Resources, Energy and Tourism PBS. This is supplemented by a Strategic Direction Statement, including a list of nine key priorities for 2010-11, an Outcome Strategy, and four KPIs. The Outcome and KPIs are as reproduced in Table 6 below.

121. These statements are broad and general, and give little opportunity for any definitive measurement against their achievement. They do not identify any qualitative or quantitative indicators against which GA’s work can be assessed. The ANAO drew similar conclusions in its 2009-10 performance audit of GA.

122. The Strategic Direction Statement and key priorities in the PBS do provide more specific guidance and detail on the areas of focus for GA over the year. These identify areas of activity and goals under the Offshore and Onshore Energy Security Programs, the petroleum acreage release, carbon dioxide storage and acreage release, critical infrastructure protection work, topographical mapping and remote sensing, among others. However, the majority of GA’s ongoing activities are not reflected in the key priorities list, which limits its utility for overall performance management purposes.

Table 6: Geoscience Australia’s 2010-11 PBS Outcome and Key Performance Indicators

Outcome 1:
Informed government, industry and community decision [sic] on the economic, social and environmental management of the nation’s natural resources through enabling access to geoscientific and spatial information.
Key Performance Indicators:
<ul style="list-style-type: none"> • Technical advice provided to the government is used in policy development and decision making. • Information provided to minerals, petroleum and energy sector influences exploration companies’ behaviour. • Stakeholders use Geoscience Australia information for environmental, economic and social purposes. • Stewardship of the geographic and geological data and knowledge of the nation is enhanced.

Department of Resources, Energy and Tourism Annual Report

123. The chapters on GA in DRET annual reports contain a significant amount of information on specific outputs from GA’s work over the preceding year. This information is set out in the order of the KPIs, although the links between the relevant KPI and each section could be made more explicit in the layout.

Geoscience Australia Annual Work Program

124. GA’s Annual Work Program is a forward looking document that is published on the GA website. At over 150 pages for 2010-11,⁴³ it is a detailed document which provides a breakdown of work by division. For each division it contains an overview and a list of priorities for the year, broken down by project. Details are given of project descriptions, project outcomes, links to intermediate-level agency outcomes, links to National Research Priority goals, key performance information including whether budgets and milestones are met, project outputs including delivery dates, and key performance indicators. This level of information is an improvement on previous years and clearly indicates that GA has responded positively to the ANAO’s recommendations in this area.

125. In many cases the key performance indicators for individual projects are more readily measurable and assessable than the PBS KPIs. The use of the Annual Work Program could be further enhanced by drawing more direct links between individual projects and the agency’s overall PBS outcome and KPIs. It would also benefit from a more consistent and clearer structure.

126. Discussions with GA officers indicated that work is underway to further improve the Annual Work Program, including through linking projects and outputs more directly to the eight priorities in GA’s *Strategic Plan 2010-2012* and removing unnecessary detail. GA is also considering additional information categories in line with the ANAO’s recommendations, including the type and source of funding for each project, key clients, any

⁴³ The 2010-11 Annual Work Program is available at:
<http://www.ga.gov.au/about-us/corporate-documents/work-program.html>

specific mandates and relative priority. GA is continuing its progress towards establishing clearer alignment between its PBS outcome, its current Strategic Plan and its Annual Work Program.

Internal performance management

127. Internally, GA uses a number of different reporting systems to assist its performance management and tracking. As reported by the ANAO and confirmed through the Review team's own investigations, these include the following:

- divisions and branches provide the weekly senior management team meeting with written progress reports for their parts of the PBS work priorities, which include a selected number of projects. These reports also cover other current activities and emerging issues relating to the wider Annual Work Program. Senior management team members report back to their staff on the resulting discussion;
- divisions provide the CEO with monthly and more detailed six-monthly written progress reports for their parts of the agency's PBS work priorities and the Annual Work Program. For both of these processes and the weekly reporting noted above, the standard traffic light template provided by DRET is used, and the traffic light reporting is also provided to the Secretary of DRET and the Minister;
- Executive Board receives monthly reports from Standing Committees, the Chief Finance Officer, and also for the critical stages of major geoscience projects; and
- divisions provide the CEO with quarterly written reports on feedback received from clients and stakeholders.

128. The internal reporting thus allows some ongoing tracking of how well the PBS outcome, KPIs and key priorities are being achieved throughout the year. However, the broad nature of the KPIs, and the fact that the key priorities do not cover a major portion of the agency's ongoing activities, mean that the overall tracking of performance is limited in detail and scope. While the ANAO identified that different divisions within GA use different systems for reporting progress against the Annual Work Program, this is currently being addressed through further improvements to the uniform reporting template, expected to be in place for the 2011-12 work program.

ANAO Report – Recommendation 4 – measuring and reporting performance

129. The ANAO investigated the way in which GA measures and reports on performance, including incorporating feedback from clients and stakeholders. The ANAO's resulting Recommendation 4 was:

“To improve its monitoring and measurement of performance, and subsequent annual reporting, the ANAO recommends that Geoscience Australia:

- develops a suite of performance information and targets, which indicate the extent to which the agency is achieving its Portfolio Budget Statements outcome and delivering its Annual Work Program; and
- supplements its current ad hoc client and stakeholder feedback with structured, periodic surveys”.

130. Noting the requirements for annual reports to align with PBS, the ANAO examined the effectiveness of the GA chapter in DRET annual reports in informing the portfolio minister

and Parliament on GA's performance. The ANAO considered that aggregating time, cost, client satisfaction and other quality measures, for example, levels of use of GA products by its clients, would provide clearer performance information and targets.

131. The ANAO also investigated GA's internal reporting processes, finding that project based performance information and targets at agency and division level would improve management reporting. In relation to stakeholder feedback, the ANAO investigated options for more structured monitoring of service level achievement and internal as well as external reporting.

132. While GA agreed with the ANAO recommendation, new performance information and targets do not appear in the revised format of the GA section in the DRET PBS for 2010-11. However, GA is actively revising its performance reporting processes and the Review understands that the better alignment of GA's KPIs in the PBS and strategic plan, and reporting against these, will form part of this.

Acquittal of Budget funding

Energy Security Program acquittal

133. The Energy Security Program is an example of a major GA activity. The program is now in its final year of funding – it officially ceases on 30 June 2011. The program has proceeded as planned. Almost all data acquisition has been completed and most projects are entering their final analysis and publication stage.

Background

134. On 14 August 2006 the Minister for Industry, Tourism and Resources announced additional funding for GA for pre-competitive data collection and analysis in support of energy security.

135. The Energy Security Program included offshore and onshore components:

- The offshore component comprised \$75.2 million over five years for expanding the program of seismic analysis and data collection by GA in new offshore frontier areas. This figure included a \$2 million capital allowance for the purchase of a nearline mass storage system to house the petroleum data archive.
- The onshore component comprised \$58.9 million over five years to help identify potential onshore areas of petroleum, uranium, thorium and geothermal energy in Australia using the latest geophysical and mapping techniques.

136. In his announcement the Minister said the package was designed to provide new impetus for exploration activity across Australia.

“The package will spur exploration throughout our continent and is aimed at capturing serious long-term investment in Australia by explorers. This country remains mostly unexplored, particularly for petroleum in frontier offshore areas and encouraging exploration in these zones is a high priority in terms of future energy security and export markets”.

137. The package provided GA with the resources to supply the geoscientific information necessary for companies to make informed decisions about investing in targeted exploration activities, with the aim of discovering major new energy resources. Building a credible geological story is seen as essential to gain the attention of the global exploration industry.

The package expanded on the work carried out offshore under the previous 'Big New Oil' program through pre-competitive data acquisition, but on a bigger scale.

138. The onshore component was designed to enable GA to pioneer innovative integrated geoscientific research to better understand the geological potential of onshore Australia for both minerals and petroleum.

Outputs from the Program - Offshore

139. The major activities in the offshore program comprised marine reconnaissance and 2D seismic acquisition surveys in the remote eastern frontiers and South West margin. All data collected was catalogued, processed and analysed and has progressively been made available to industry and the research community. While it is too early to assess the full impact of these activities, GA and DRET consider that the initial results have been encouraging.

Table 7: Planned outputs, activities and results to date of the Offshore Energy Security Program

Planned Outputs	Main Activities	Results
Acquisition of 2D seismic and non-seismic geophysical data	Collection of 2D seismic and other geophysical data in the Capel-Faust basins off the eastern coast of Australia and in the South West margin off the Western Australia coast.	Outputs incorporated in Mentelle acreage release. Analysis of these data has been used to engage industry and other key stakeholders through publications and presentations.
Geological sampling and seabed mapping as part of marine reconnaissance surveys	Acquisition of high resolution bathymetry data and seabed samples in the Capel-Faust basins and off the South West margin. Samples were analysed by the GA laboratories.	Data package released for South West margin. Analysis of these data has been used to engage industry and other key stakeholders through publications and presentations.
Development of online capability for seismic navigation data	Purchase of Shared Navigation Integration Project (SNIP), originally a commercial product provided by Fugro Multi Client Services that provided survey navigation data for onshore and offshore Australia.	SNIP data has been made available via the GA website and has received good feedback – 160 downloads in the last 12 months.
Creation of workstation-ready seismic packages for acreage release	Workstation package developed for each acreage release from 2007.	Strong uptake by industry (70 per year) and positive feedback on value.
Creation and operation of a physical data room for display and use of the seismic packages	Scoping and construction of a digital data room for use by the petroleum industry.	Data room opened in time for 2007 Acreage Release – 14 company visits so far.
Purchase of a nearline data storage system for seismic data	Scoping, purchase and installation of a nearline robotic storage system with an initial capacity of two terabytes.	Migration of data well advanced, data delivery time to clients reduced from 30 days to three days – positive feedback from industry.

Outputs from the Program - Onshore

140. The onshore program continues to be delivered through integrated projects of data gathering and assessment, conducted at national and regional scale. In most jurisdictions, the program has leveraged supplementary funding from state and territory geological surveys. Funding through AuScope Ltd made it possible to extend deep seismic survey lines in some regions. The arrangements and collaborative engagement with state and territory officials was formalised in schedules under the NGA.

Table 8: Planned outputs, activities and results to date of the Onshore Energy Security Program

Planned Outputs	Main Activities	Results
New geophysical datasets from targeted seismic, airborne electromagnetic, aeromagnetic, radiometric, gravity, and magnetotelluric surveys	Deep seismic surveys in the Mt Isa province, north west Queensland, Rankin Springs, Gawler Craton, Arrowie Basin, Officer Basin and north to Amadeus Basin, Georgina and Arunta region; airborne electromagnetic, aeromagnetic, radiometric, gravity, and magnetotelluric surveys completed.	Maps and interpretations of the new geophysical data including new national radiometric and magnetic anomaly maps. Seismic data and interpretations have been released on the GA website. Key stakeholders engaged through public workshops, conference presentations and papers.
Databases of new heat flow and thermal conductivity measurements	Heat flow measurement capability has been established in GA (this involves drill hole temperature logging in the field and measurement of thermal conductivity in the laboratory).	Thermal gradients have been logged in all mainland States and the Northern Territory. OZTemp well temperature database – a national compilation of borehole temperature data.
Improved assessments of Australia’s geothermal potential	Used new geothermal datasets to produce a revised estimate of Australia’s total contained geothermal resource.	Australian radiogenic granite and sedimentary basin geothermal hot rock potential map. Significant input to the <i>Australian Energy Resource Assessment</i> .
Integrated regional geological interpretations and energy and mineral potential assessments	A specialist group of geoscientists (geologists, geochemists, geophysicists, geochronologists, 3D modelling experts), is assessing and interpreting geophysical and other data being acquired by the program.	3D geological models constructed for North Queensland and South Australia from new and existing data, including seismic, magnetotelluric, gravity, magnetics, geochronology and geological observations.
Database of geochemical composition of surface and near-surface materials in Australia	Nationwide, internally consistent and state-of-the-art dataset on the geochemical composition of surface and near-surface materials in Australia from collecting surface and near-surface regolith samples.	Samples have been collected at 1,315 sites representing the outlet of major catchments, which cover ~80 per cent of the continent. Over 8,000 samples analysed by the GA laboratories.
3D geological maps and models of targeted petroleum basins and mineral provinces	Collection of airborne magnetics and radiometrics and, where appropriate, gravity followed by seismic reflection data.	Discovered a previously unknown sedimentary basin in Queensland, named the Millungera Basin - seismic data and interpretations have been released on the GA website.

Planned Outputs	Main Activities	Results
Documentation of the spatial distribution of uranium and thorium in Australia	Synthesised results from data acquisition projects to determine regional prospectivity for uranium and thorium.	New process-based classification for uranium mineral systems devised. National datasets to assess uranium mineral potential derived. Substantial upgrade of the status and distribution of Australia's thorium resources.

Acquittal of financials

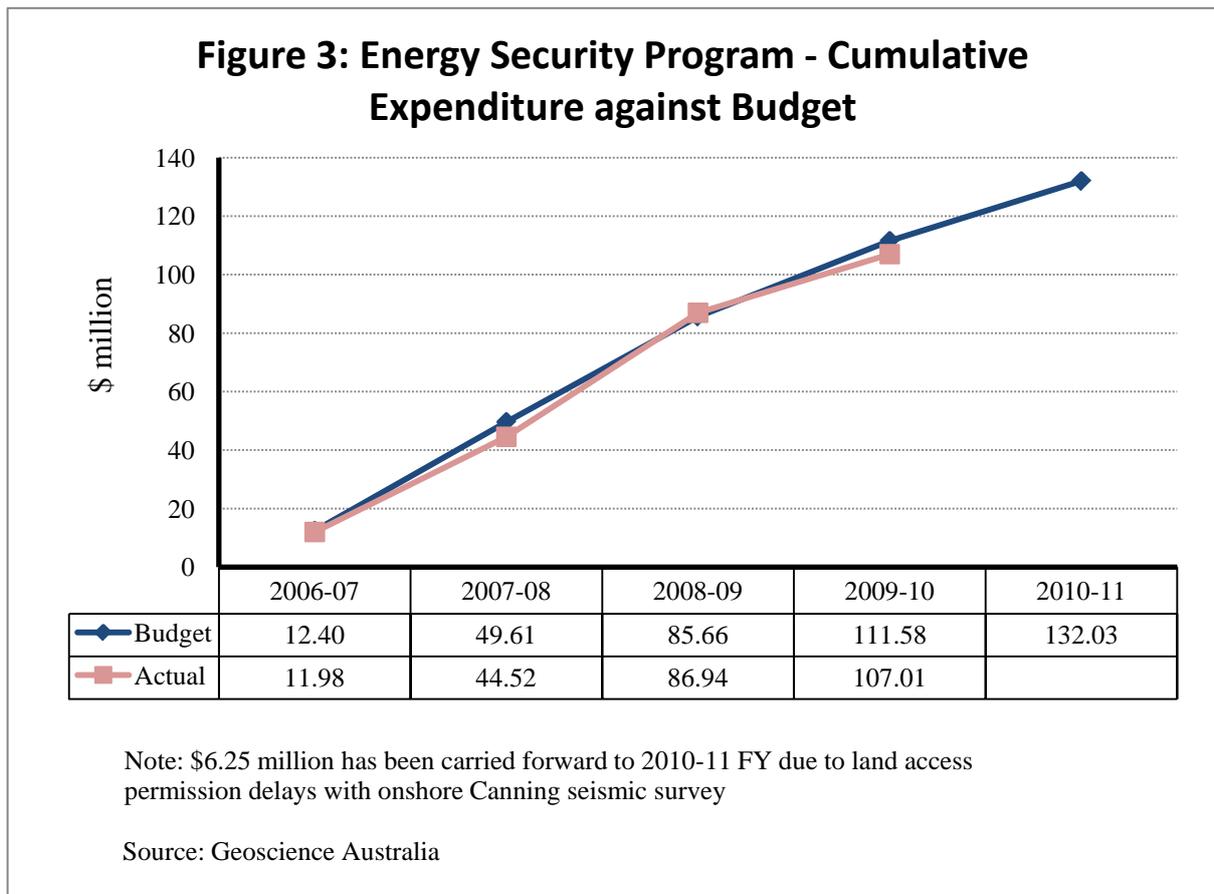
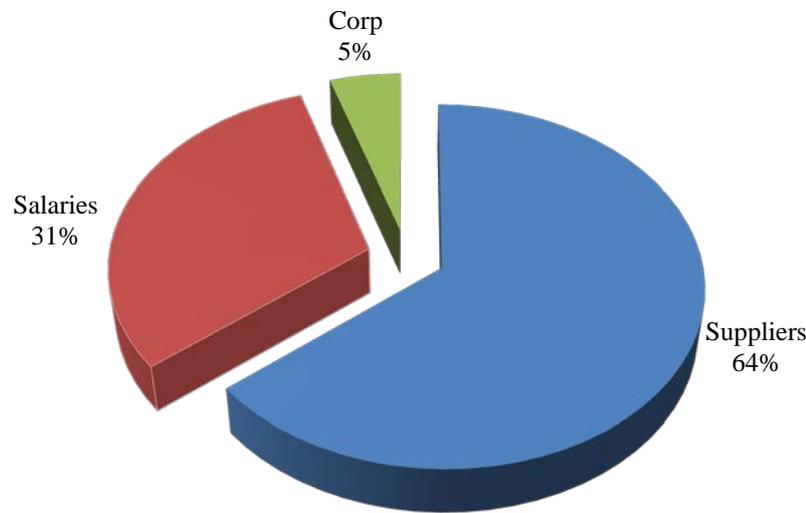


Figure 4: Energy Security Program expenditure breakdown



Note: Corporate expenditure comprises program contribution to GA corporate overheads.

Source: Geoscience Australia Financial Management Information System

Conclusions – Performance management and reporting

141. One area that stands out to the Review as needing work is GA's KPIs. The Review is cognisant of the need to devise a single, informative and practical set of KPIs, rather than separate KPIs for disparate corporate documents.

Recommendation 7

The Review recommends that GA's KPIs be recast to include quantitative and qualitative factors. This would enable a clearer assessment against predefined targets or benchmarking of how well the outcomes compare with GA's goals, and provide a better view of whether the agency is maintaining or improving on its performance from previous years.

142. The difficulty in ascertaining from publicly available information how GA's pre-competitive work has stimulated private exploration and the eventual discovery of resources alongside clear resistance from industry to contribute to its costs creates room for speculation on just how important pre-competitive information is. The fact that the Review could not just 'tap into' readily available information on the long-term impacts of GA's pre-competitive work or, for example, on what has been achieved to date from the 2006 Energy Security Initiative is noteworthy in itself. Such information was compiled in the course of one of the ACIL Tasman reports commissioned to assist the Review. However, the Review is a very atypical event and budget deliberations by central agencies, ministers and parliament usually operate from information that is readily available. The Review considers there is scope for increased visibility and accountability for the outcomes of pre-competitive

programs through an upfront statement of expected outcomes as well as the longer-term tracking and reporting on actual outcomes for resource discoveries.

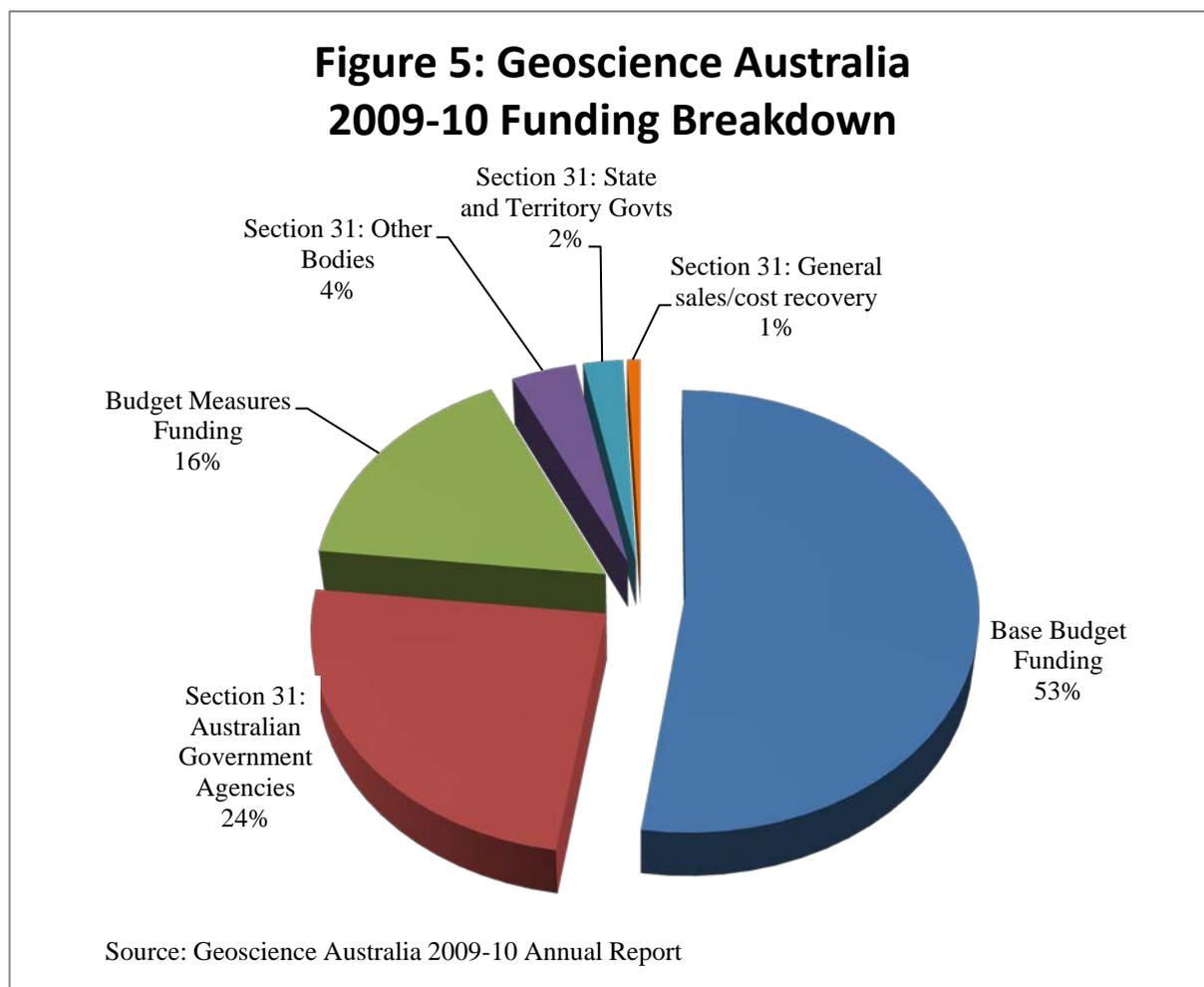
Recommendation 8

The Review recommends that GA make more visible the outputs and outcomes of its pre-competitive information including:

- a. Reporting specifically against the targets and expectations set out in budget documentation or government announcement related to funding of pre-competitive information.
- b. Adopting a systematic and structured approach to compiling information on the long-term impact on private exploration and resource discoveries to which pre-competitive information.

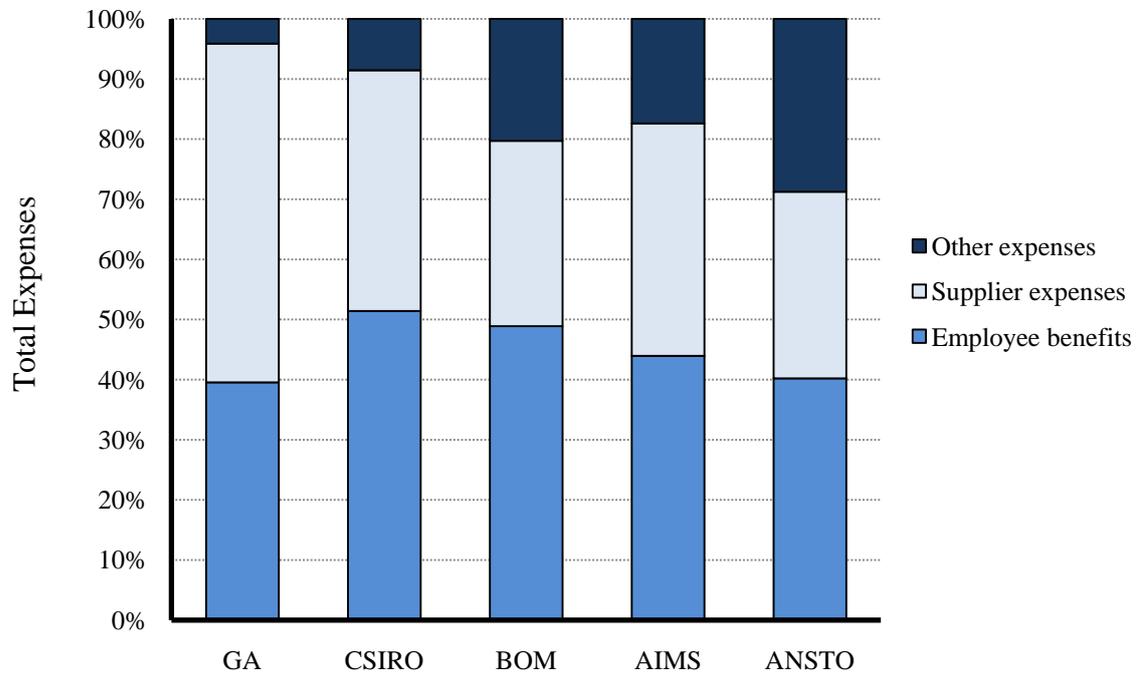
5. FINANCIAL SUSTAINABILITY

GA's resourcing is a mix of funding through direct Budget appropriation as well as funding received from other Australian Government agencies and unrelated entities for the performance of services and sale of products (Section 31 revenue). Direct Budget appropriations are predominantly ongoing base funding but also include a significant element of time-limited new policy initiatives (Budget measures). Direct Budget appropriations are almost exclusively departmental appropriations rather than administered or special appropriations.



2. The larger part of GA's funding is applied to payment of suppliers, reflecting in part that the bulk of fieldwork in data acquisition and technical services outside of the ACT is contracted out. For GA supplier expenses include the annual lease costs for its main accommodation in Symonston, ACT, as well as 'flow-through' transactions that are part of arrangements whereby GA receives funds from other areas of government for on-payment to service providers. In comparison to other research agencies (reference Figure 6), the expense break-up for GA shows a comparatively greater share of its budget being used for supplier expenses and correspondingly lower staffing and asset (depreciation) costs. However, even adjusting for the Symonston building rent and 'flow-through' transactions, GA's cost structure indicates a relatively more intense use of outsourcing (commercial providers) when compared to other research agencies.

**Figure 6: Australian Government Research Agencies
Break-up of Expenses**

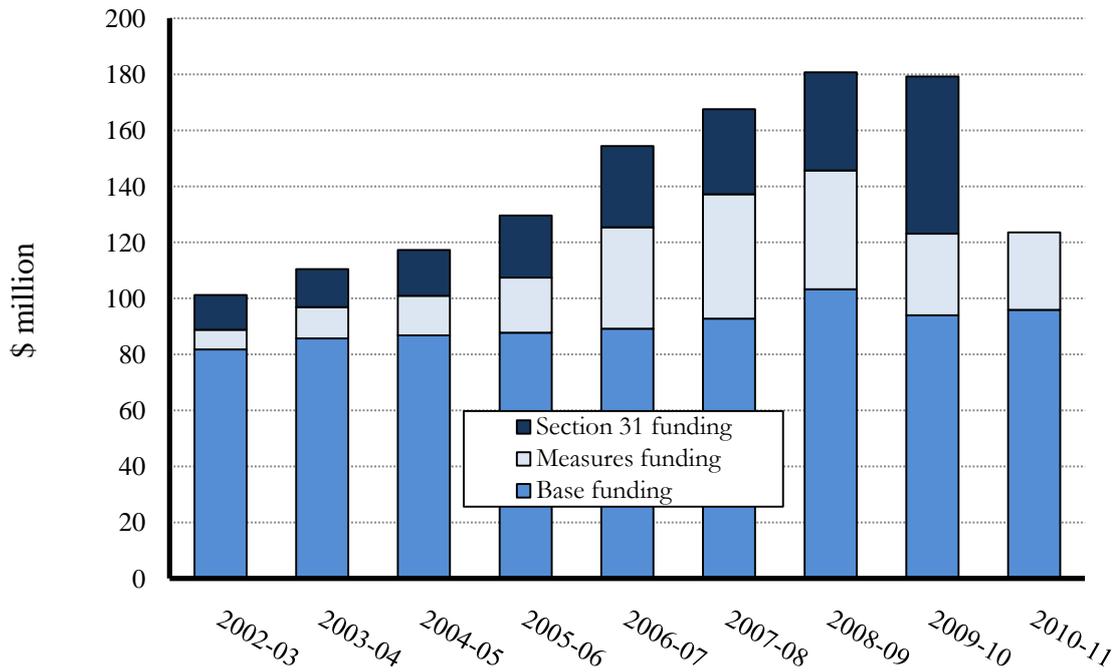


Source: 2009-10 Annual Reports of GA, CSIRO, BOM, AIMS and ANSTO

3. Since 2002-03, ongoing funding from the Budget for GA has been substantially maintained in real terms but declining significantly as a share of total GA resourcing. This latter observation reflects the significant growth over this period in Section 31 revenue and Budget funding for specific, time-limited measures. In gross terms, total revenues for GA grew an average of 8.4 per cent (nominal) per annum for the period 2002-03 to 2009-10.

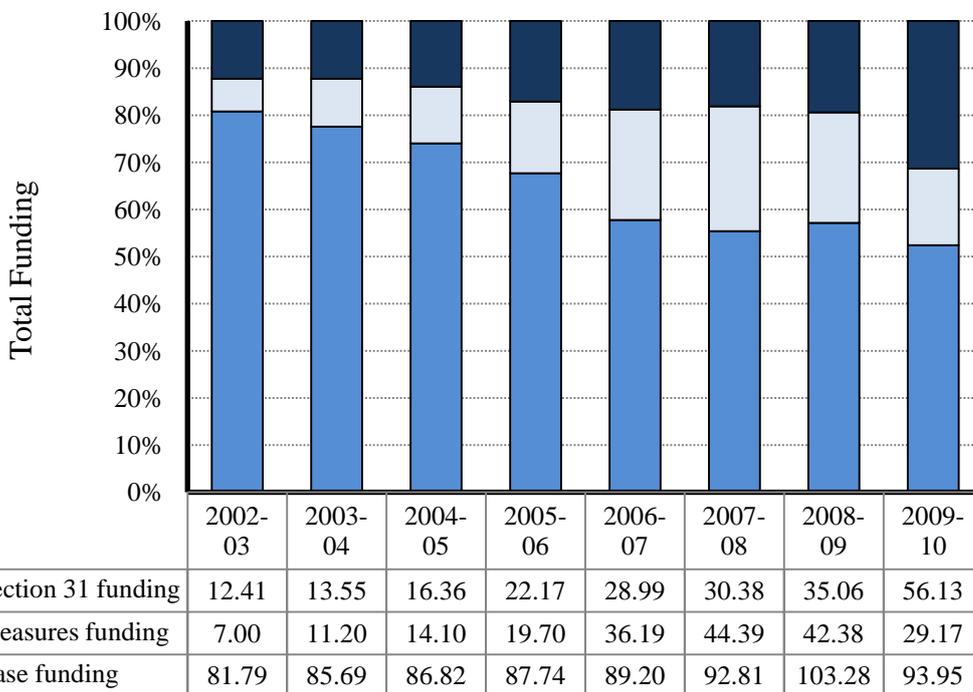
4. A clear major driver for the growth in GA funding from new policy measures and from services performed for other agencies is the heightened priority both within government and through the economy of policy challenges that require geoscience information and analysis.

Figure 7: Total Revenue



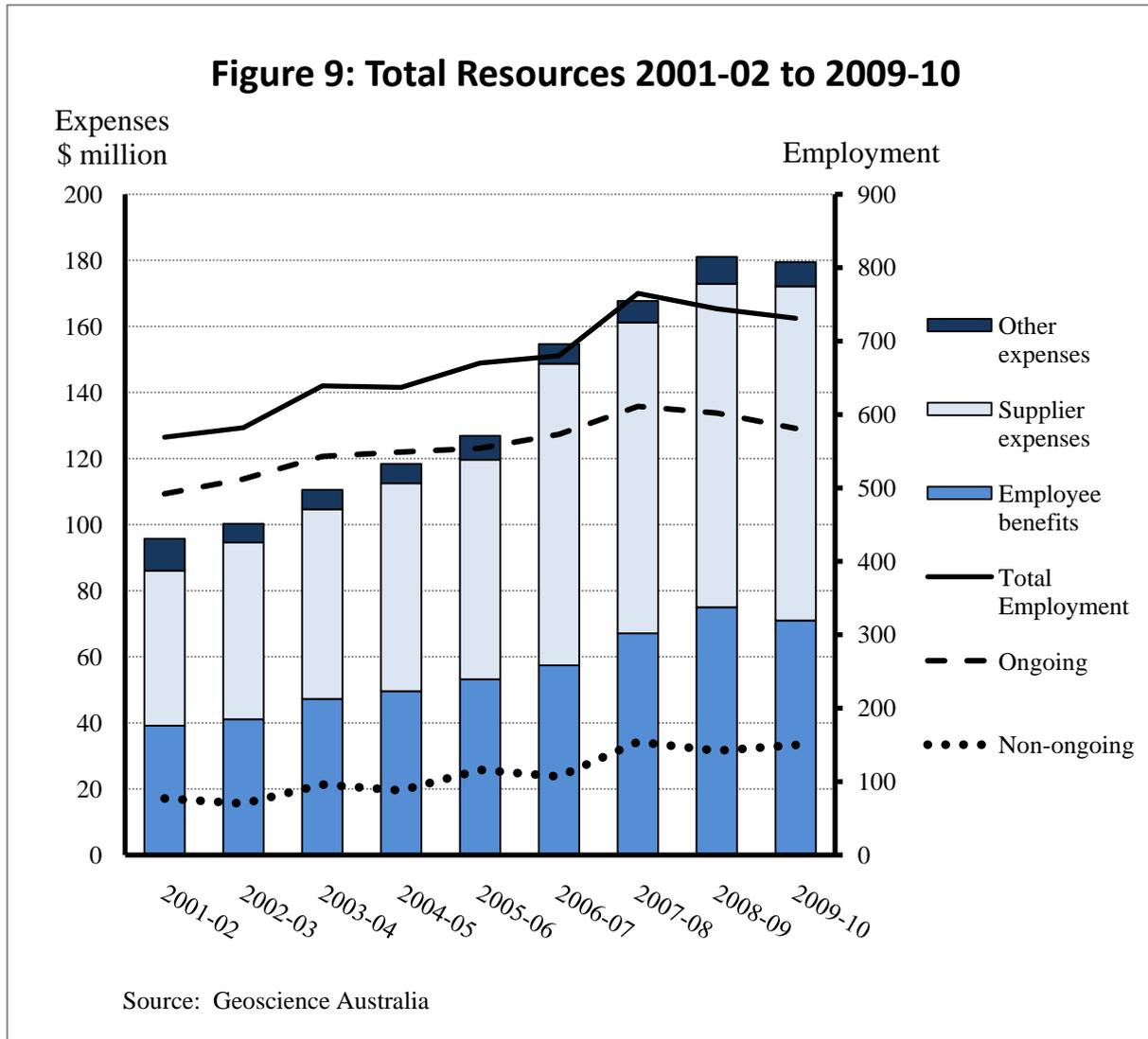
Source: Geoscience Australia

Figure 8: Overall Funding Composition



Source: Geoscience Australia Portfolio Budget Statements

5. The growth in revenue has funded increased expenses and employment over the same period. As at 30 June 2010, total employment (not counting contractors) in GA was 731, down from a peak of 765 in 2008. Approximately seven to eight per cent of employment in recent years has been part-time. More significant has been the growth in non-ongoing employees who made up 150 of the 731 total as at 30 June 2010.



Fixed costs

6. GA, as with any organisation, has a number of fixed costs which remain largely static regardless of the size of the organisation. These fixed costs include such things as a finance function, a human resource function, ministerial, IT, internal audit, legal and procurement services. These costs total approximately \$20 million per annum. Additional fixed costs include the lease costs associated with the Symonston facilities, which are committed until 2020.

7. The property costs of GA are significant, at approximately 17 per cent of total appropriations in 2009-10. In 1997, the Government identified buildings which it wished to sell as part of the divestment strategy of the Commonwealth Office Estate. The GA building was deemed a Special Purpose and Industrial Estate, and was one of these buildings. The

building was divested in May 2000 for \$152.4 million. As part of this transaction, GA was required to sign a long-term lease with the new owner of the building.

8. The first year rental amount of \$13.1 million was made available in GA's appropriation. However, terms of the lease included annual rent increases based on the Consumer Price Index (CPI) (all groups) for Canberra, or three per cent, whichever was higher. CPI (all groups) for Canberra was significantly high in the early years of the lease (up to six per cent). This rental increase has not been matched in the indexation of appropriations received by GA. As a result, a shortfall has occurred over the past nine years and will continue to grow as time goes on. The current shortfall was estimated by PricewaterhouseCoopers to be around \$4 million per annum. The lease also contained a ratchet clause enabling the landlord to initiate a rental market review every five years allowing an increase in the rent if it had fallen below market.

9. However, notwithstanding the above, it is not clear that the overall lease arrangement for the Symonston building has to date operated to the detriment of GA.

10. A disadvantage to GA in respect of the lease for the Symonston facility is that it has limited flexibility to consider other accommodation options while it is locked into the lease. This 'lock-in' has also advantaged GA by guaranteeing accommodation which enabled it to meet new government demands for services, requiring a significant increase in staff (by around a quarter since 2002), within one facility.

11. Advice from the Property Branch of Finance suggests that over the decade since year 2000, the gap between the lease rent for Symonston and a current market rent (recognising the triple net terms of the lease) has narrowed. The rental still appears to be significantly above market but not to the extent that prevailed at the time the lease commenced when supplementation was built into GA's funding base. The fact that property costs as one element of general inflation has, on average over this period, outpaced indexation of departmental appropriations is a market-wide phenomenon affecting most agencies. For GA, rising property costs are a comparatively minor contributor to the overall financial pressures it is currently facing. The high original lease cost built into GA's funding base provided some degree of moderation to property cost pressures compared to what other agencies would have experienced. How this situation evolves for the remaining period of the lease depends on future economic developments. For example, a scenario of rising inflation against a softening Canberra property market would cause the gap between the lease costs and market rents to start to widen.

New policy initiatives

12. New policy initiatives are Budget measures that allocate or reallocate funds to enable new projects or activities or to increase funding for existing projects or activities. The new funding may be ongoing or temporary. Typically, GA's appropriation in any given year includes direct funding for a number of temporary (two to five year) Budget measures.

13. Between 2002 and 2010 GA received funding from 11 specific Budget measures⁴⁴:

- 2002 - *Australia's Pre-commercial Oil Exploration Program* - \$7 million in 2002-03 (plus \$1.5 million absorbed resources) to continue Australia's Pre-commercial Oil Exploration Program;

⁴⁴ Amounts stated for new policy measures are as at the time of the relevant funding decisions and have not been indexed.

- 2003 - *Core Petroleum Program (pre-competitive oil exploration programme)* - \$36 million to continue with the existing Pre-competitive Oil Exploration Program. The program provided geological information to organisations wishing to explore for petroleum and so increased opportunities for Australian production. As the existing program relied on previously acquired data, the Government also decided to fund a program of new data acquisition.
- 2003 - *Seismic data acquisition and preservation* - \$25 million for the collection of new seismic data and the preservation of existing data. The collection of new seismic data added to the existing pool of data available for release to organisations wishing to explore for petroleum. The preservation of deteriorating seismic data tapes held by GA, which store valuable geological information, ensures that the data is available for future use.
- 2004 - *Investing in Australia's Security – critical infrastructure protection* - \$0.8 million to continue efforts to ensure there are adequate levels of protective security in respect of critical infrastructure, minimal single potential points of failure and rapid, tested recovery arrangements. This measure provided resources for nine Government agencies for a range of activities to progress three key areas of critical infrastructure protection: national coordination and leadership – including activities such as the provision of expanded Secretariat support to the Trusted Information Sharing Network for Critical Infrastructure; infrastructure vulnerability identification, analysis and remediation – including activities such as the testing of Australian Government and private sector national information infrastructure; and infrastructure interdependence modelling and analysis – including activities to model and analyse interdependencies between different critical systems and networks.
- 2005 - *Australian Tsunami Warning System – Indian and Pacific Oceans* - \$14.9 million (plus \$6.5 million in capital) to establish an ATWS and to contribute to regional warning systems in the Indian and Pacific Oceans – to develop a 24-hour analysis and warning centre that is connected to a network of new and upgraded seismographs and tidal gauges covering Australia's coastlines on the Indian and Pacific Oceans. This will enable more accurate detection of the magnitudes and locations of large earthquakes occurring on Australia's plate boundaries, and better measurement of oceanographic effects. The centre will be able to analyse data in real-time and verify potential tsunamis. In such an event, the centre would issue warnings to state and territory emergency services to take prompt action to avoid loss of life and minimise damage to infrastructure.
- 2006 - *Energy initiatives – identifying potential onshore energy sources* - \$58.9 million to identify potential onshore energy sources such as petroleum and geothermal energy, using the latest geophysical imagery and mapping techniques. The information gathered through this programme will help attract companies to explore in new areas by enhancing the chances of discovery and reducing the risk to investors.
- 2006 - *Energy initiatives – (offshore) pre-competitive data development expansion* - \$73.2 million (plus \$2 million in capital) to expand GA's current programme of seismic analysis and data collection in new frontier offshore areas to be chosen in consultation with industry. This measure was to enable GA to acquire information on the mineral and petroleum potential of under-explored

frontier regions with a view to assisting government to find and promote specific areas where conditions are sufficiently prospective to invite commercial exploration.

- 2007 - *Carbon capture and storage – regulatory implementation* - \$9.3 million (plus \$0.3 million in capital). Part of a larger measure to implement a national regulatory and legislative framework, and ongoing regulatory oversight for the emerging area of carbon capture and storage. For GA this involved supporting acreage release for offshore geological storage of carbon dioxide, including assessment of competitive bids; further development of modelling of geological storage sites; implementation and management of monitoring and verification programs; and provision of technical advice to the Department of Industry, Tourism and Resources and other government agencies.
- 2008 - *Commonwealth Spatial Data Integration* - \$1.2 million to develop a coordinated approach to the sharing of social data with geospatial attributes to underpin research, evidence-based policy development and evaluation, and service delivery.
- 2008 - *National Security – Critical Infrastructure Protection Modelling and Analysis program* - \$0.8 million to further develop the Critical Infrastructure Protection Modelling and Analysis program, which uses computer models to simulate the effect of disasters on Australia’s people, infrastructure and economy. The program helps to develop plans to protect communities from natural and human-made disasters.
- 2010 - *GA additional resourcing (mitigating the risks of climate change; carbon capture and storage)* - \$65.3 million to allow GA to continue its role in providing geoscience products and services, many of which are used in examining and mitigating the risks of climate change. The role includes work on water management, geothermal projects and providing information on how the landscape is changing over time. GA will continue to provide technical advice on carbon capture and storage in Australia and internationally.

14. Further information on funding received by GA from new policy measures is at Table 9 below.

15. Many of the new funding measures have been for activities that can reasonably be expected to be ongoing. A significant case in point is funding for pre-competitive data acquisition and analysis, which has been funded through a series of temporary measures for most of the past 25 years. As previously noted, the uncertainty created by use of time-limited measures has required GA to adopt strategies to maintain flexibility in its cost structure to be able to respond to a drop off in revenue from temporary funding measures (and from a fall away in Section 31 revenues). The major strategy applied by GA to address this has been to rely more on non-ongoing staff. The specialist skills required make this particularly difficult, as it often means attempting to attract people to Canberra without being able to offer permanent employment. It is inevitable that this approach compromises the cost-effectiveness of the supported activities and capabilities over the long term and represents a value-for-money trade-off for the Government to the value of maintaining budget flexibility.

Table 9: New Policy Measures 2002-2010 excluding capital (Discrepancies in some totals are due to rounding)

Year	Measure	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	TOTAL
2002	Pre-commercial oil exploration	7.00												7.0
2003	Core petroleum programme		8.70	8.90	9.10	9.30								36.0
2003	Seismic data preservation		2.50	5.00	7.50	10.00								25.0
2004	Critical infrastructure			0.20	0.20	0.20	0.20							0.8
2005	Tsunami warning				2.90	4.29	4.33	3.33						14.9
2006	Offshore energy security					5.02	22.38	21.25	13.25	11.26				73.2
2006	Onshore energy security					7.38	14.83	14.80	12.67	9.19				58.9
2007	Carbon capture and storage						2.64	2.40	2.25	2.00				9.3
2008	Critical infrastructure							0.20	0.20	0.20	0.20			0.8
2008	Spatial data integration							0.40	0.80					1.2
2010	Additional GA resourcing									5.00	24.34	25.77	10.18	65.3
	TOTAL	7.00	11.20	14.10	19.70	36.19	44.39	42.38	29.17	27.65	24.54	25.77	10.18	

Pre-competitive data acquisition

16. The *Baseline Funding Review* which preceded this study stated that “GA currently has no funding in its baseline for acquisition of new data in support of pre-competitive purposes...”. This same view was echoed by some stakeholders, including GA, consulted in the course of this Review. However, this data acquisition is also generally regarded by GA itself and others as a core activity due to its critical role in producing pre-competitive information, particularly in frontier areas.

17. Production of pre-competitive information fits within the currently stated outcome and strategic priorities for GA. However, for most of the past two decades, the Government has funded offshore data acquisition through a series of Budget measures that provided funding for limited periods. This practice appears to date back to the period when the former BMR operated its own research vessel (the *Rig Seismic*) as the core element of the then Continental Margins Program. From some perspectives, it would be reasonable to interpret this arrangement as suggesting that the Government wanted specific control of this activity and/or wanted to ensure that longer-term funding was conditional on periodic evaluation. Either interpretation would have reinforced a view that the activity is not part of GA’s ongoing resource base.

18. The last occasion on which specific funding was allocated for pre-competitive data acquisition, covering both offshore and onshore elements, was as part of a five year energy security initiative announced by the Government in 2006. One of the factors identified in the *Baseline Funding Review* as contributing to the impending financial stress faced by GA was expiration of this funding in 2010-11.

19. A common challenge for central agencies in the consideration of a new funding proposal is assessing why the proposed activity is not already a priority for the relevant sponsoring portfolio or agency. Without information on how existing resources are applied to meet Government priorities, a new funding proposal can appear arbitrary for both the proponent and (in the course of Budget evaluation) by central agencies and ministers. The case of funding to GA for pre-competitive data acquisition – which is treated as a marginal activity in internal GA resource allocation but is also regarded as a core priority – appears to illustrate this tension. While there is considerable information available on GA programs and activities, it generally tends to be too detailed and unstructured to inform the strategic trade-offs between high level priorities or provide a clear account of the deployment of resources already available to GA across those priorities.

20. The current GA strategic plan identifies, as part of Priority 1,⁴⁵ that GA will:

“1.1 Provide pre-competitive geoscience data for use by industry and other key decision makers.

1.2 Support the annual release of offshore areas for exploration for petroleum and geological storage of carbon dioxide”.

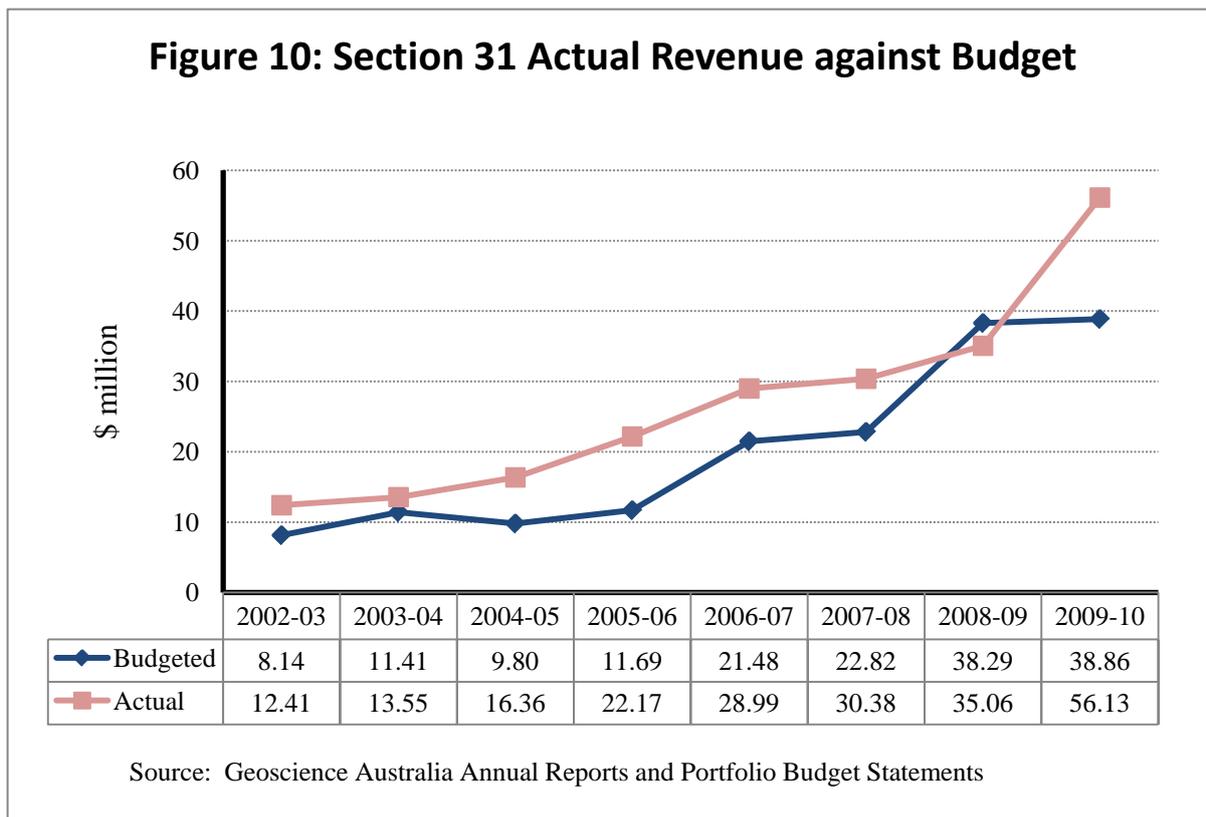
At face value, this does not reconcile with the exclusion of pre-competitive data acquisition from resourcing in GA’s resource base. It is worth noting that the provision of pre-competitive information does not depend fully on continuous acquisition of new data. Given the history of funding of pre-competitive data and the economic value as found in this

⁴⁵ Priority 1: Inform the Minerals, Petroleum and Energy sectors to enhance National Wealth and Energy Security.

Review and other studies, there is a clear need for the Strategic Plan to be clearer on the relative priority it places on this activity.

Section 31 revenue

21. GA has an increasing level of revenue from other sources (Section 31 revenue).⁴⁶ This includes some revenue from the sale of products such as maps, imagery and publications to the general public but is predominantly comprised of charges for services provided to other Australian Government agencies.



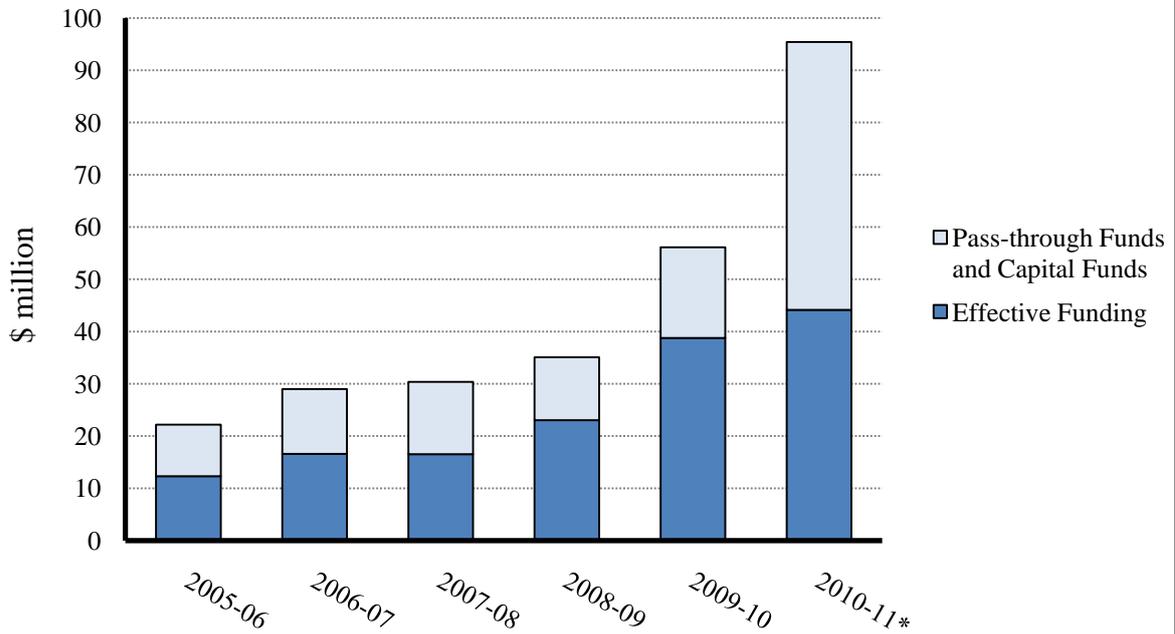
22. Care is required in the interpretation of Section 31 revenue as the reported amounts include transactions that would not normally be regarded as receipts for services or products produced by GA. For example, the amounts include funding:

- provided for purchase of capital equipment (for example, AuScope funding from NCRIS);
- provided by State governments to cover seismic acquisition services procured through the GA panel arrangement; and
- provided by DRET for payment to states for acquisition of pre-competitive carbon storage information under NGA project agreements.

23. For example, removal of these effects from the 2009-10 figure would reduce the revenue by around 30 per cent from \$56.1 million to \$38.8 million (refer Figure 11).

⁴⁶ Under Section 31 of the *Financial Management and Accountability Act 1997*, certain types of receipts by an agency (including receipts from the sale of goods and services) may be added to that agency's appropriation, effectively making those monies available to the agency. Such receipts are often referred to as 'Section 31' revenues.

Figure 11: Section 31 Revenue Break-up

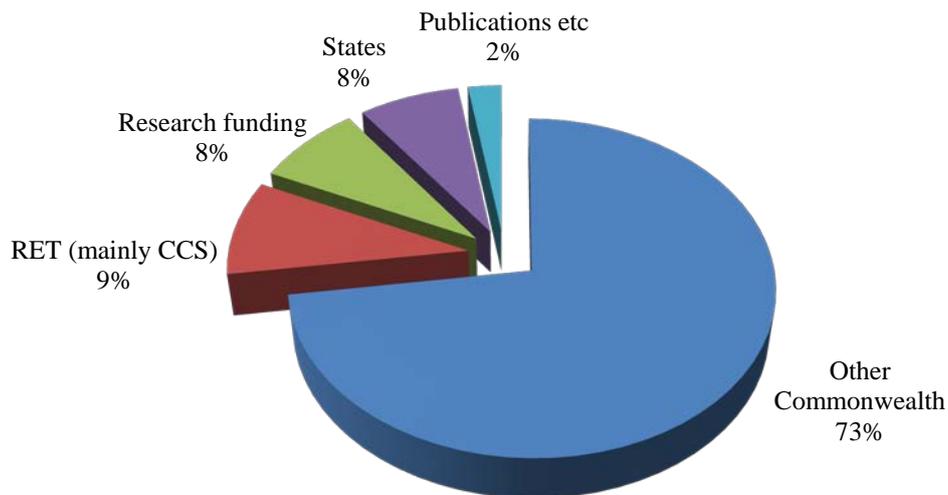


* 2010-11 are estimates only

Source: Geoscience Australia Annual Report

24. The major Australian Government Section 31 clients in 2009-10 were the former Department of the Environment, Water, Heritage and the Arts and DCCEE. Other significant clients included AGD, DIGO and AusAID.

Figure 12: 2009-10 Section 31 Revenue



Source: Geoscience Australia

25. Charging for products such as maps, imagery and publications is based on the ‘marginal cost of transfer’, in accordance with the Australian Government’s SDAP Policy (2001).

26. Section 31 funding has allowed GA to grow capacity in particular fields to support other areas of Government. However, this funding tends to be short-term and other agencies are reluctant to guarantee long-term commitment. Hence this funding is often used to engage non-ongoing or contract staff and pay for external contract work.

When should funding be directly appropriated to Geoscience Australia?

27. A large part of Section 31 revenue received by GA is for services provided to other Australian Government Budget funded agencies. In a sense, this represents indirect Budget funding and has led to questions as to whether at least some of these funds should instead be directly appropriated to GA. The main advantages put forward for this are:

- a greater planning certainty for GA on future resources through reduced dependence on continued support from other agencies;
- more scope to take account of the value to other users of information produced by projects sponsored by specific agencies; and
- a potential to overcome limitations in inter-agency cost recovery arrangements in respect of investment, capability development and meeting the longer-term costs associated with research projects required by other government agencies.

28. It is reasonable to assume that agencies engaging GA for specialist services are already making judgements on the relative efficiency and effectiveness of those services when entering into agreements with GA. A client or partner agency may seek new services or reassess the value of existing services in response to new developments within the relevant policy field, changes in government priorities or simply changed circumstances in available resources. In any of these situations, current arrangements for inter-agency funding have an advantage in providing a mechanism for adjustment to changes in client priorities. Any certainty achieved at the expense of this responsiveness would represent an efficiency loss for the Government.

29. Incorporating funding for specific activities sponsored by other portfolios into the funding directly appropriated to GA would increase the breadth of policies that would need to be considered in strategically managing GA’s appropriation. It would require GA and DRET to make judgements on policies managed by other portfolios and the strength of the case for GA support. From a whole-of-government perspective, there would also be a marginal reduction in transparency due to a fragmentation in agencies managing resources allocated for specific purposes.

30. Current arrangements under which GA provides services to other agencies are most often closer to a partnership model than a pure service-provider relationship. The Review notes that GA already has a practice of assessing if a specific project proposal will also yield benefits for its other programs. In such cases, GA may agree to not recover all costs from the sponsoring agency. This provides some scope for benefits beyond the client agency’s interests to be brought to account. In addition, it is always open to either a client agency or GA to seek to join other potential beneficiary agencies into a project proposal.

31. One weakness of reliance on inter-agency cost recovery arrangements is the tendency for such arrangements to focus on the immediate service requirements as a discrete product to

be funded. This can overlook issues of funding capability development and other related investments and the longer-term costs of storage and access for data created by a specific project.

32. The *Baseline Funding Review* study by PricewaterhouseCoopers that preceded this Review proposed that GA be directly funded for the employee costs associated with projects funded through Section 31 arrangements while recovering other costs from the sponsoring agencies. The study argued that this arrangement would enable GA to sustain the skills and capabilities required to deliver such projects. However, there would appear to be a number of disadvantages to this approach that would make it complex and impractical:

- the approach would still create the same cross-portfolio prioritisation problems described above, albeit limited to the allocation of staff resources;
- it assumes a constant level of staffing required to service Section 31 projects and would impose some inflexibility around that level; and
- the approach would apply only to projects sponsored by other Australian Government agencies if it is to avoid subsidisation of services to other clients (notably State and Territory government agencies, Statutory authorities and private companies).

Had this arrangement applied since 2002, it is likely that the pool of staff available to service other Australian Government agencies would today be inadequate due to the growth in demand from other agencies for GA specialist services.

33. Evidence from stakeholder consultations undertaken as part of this Review generally supported GA's implementation of inter-agency cost recovery arrangements. A key feature of many of these arrangements is the use of formal agreements or memorandums that set out the key principles, roles and responsibilities of each party. GA's experience, supported by stakeholder feedback, in fact appears to commend this as a general approach. One advantage noted by the CEO of GA is that the agreements assist internal executive management by providing key benchmarks for comparing project progress and performance. The Review noted in particular that the isolated cases of client problems were also cases where such an agreement was not in place.

34. The Review considers that, overall, these arrangements are working satisfactorily and that a shift to direct funding (or partial funding) of GA for services sponsored by other portfolios would be a regressive step in terms of assisting alignment between policy priorities and resource allocation.

35. Areas for improvement in inter-agency cost recovery agreements include addressing the 'ramping up' and 'ramping down' of projects that require the acquisition of specialist capabilities and/or have ongoing costs once the main work is completed.

36. Section 31 revenues for 2009-10 show an unexpected jump between the May 2010 prediction of \$38.8 million and the final outcome of \$56.1 million. A significant reason for this appears to be a distortion created by transactions related to funding by DRET of agreements with State and Territory governments – where funding for CCS initiatives was transferred to GA under Section 31 substantially for on-payment to the relevant states and territories. These moneys appear in GA accounts as if they were revenue yet they do not represent payment for GA services or products. It would seem more practical for a GA officer to either be authorised to draw from a DRET appropriation or to advise an appropriate DRET officer when payments are required.

Recommendation 9

- a. Noting the successful use of National Collaboration Framework Agreements or similar formal instruments between GA and other agencies, the Review recommends that their use be mandated for all significant instance of inter-agency services except in cases where alternate agreement models apply (for example, under Cooperative Research Centres).
- b. The Review recommends that Section 31 of the *Financial Management and Accountability Act 1997* not be used for intra-portfolio transactions that are in substance transferring funds through GA for payments to designated third parties.
- c. For instances where an inter-agency agreement covers requirements that are ongoing or longer term in nature, the Review recommends that GA and partners/clients adopt a default provision requiring negotiations on any renewed or extended agreement to be completed at least one year prior to expiration of the current agreement.

Cost Recovery

37. The general nature of information products and services provided by GA has frequently led to questions about whether the agency should be seeking to recover more of its cost, particularly from commercial users of GA information. The central attraction of this option is providing reduced dependence on Budget funding to support GA products and services.

38. A survey of past new policy proposals and budget related reviews for GA and its predecessors shows a long history of debate about the scope for cost recovery usually involving the same options being re-examined. A common trigger for this has been episodes of financial pressure on GA and the attraction of finding a solution that avoids an additional Budget impost.

39. The *Australian Government Cost Recovery Guidelines* define cost recovery as:

“...the recovery of some or all of the costs of a particular activity. Australian Government cost recovery charges fall into two broad categories:

- fees for goods and services; and
- ‘cost recovery’ taxes (primarily levies, but also some excises and customs duties)”.⁴⁷

40. In the case of cost recovery taxes, the direct link – or ‘earmarking’ – between revenue and funding of an activity distinguishes such revenues from general taxation.

⁴⁷ Department of Finance and Administration. 2005, *Australian Government Cost Recovery Guidelines – July 2005*, Canberra, p.10

http://www.finance.gov.au/publications/finance-circulars/2005/docs/Cost_Recovery_Guidelines.pdf

Perspectives on cost recovery

General discussion of the usefulness of cost recovery

41. Cost recovery is generally applied as a tool for: providing price signals that affect demand and encourage the efficient allocation of resources for producers and users; improving equity by making firms and consumers pay more directly for the products they receive from the Government; and increasing revenue for agency activity.⁴⁸ Each of these purposes is discussed below.

Pricing signals and efficiency

42. The pricing of government products can impact on both the producers and consumers of those products:

- Cost recovery from users provides a very direct means of communicating to government service providers which products are valued and which are not. This helps agencies adjust their mix of outputs and allocate resources accordingly and encourages a focus on the clients' needs in producing and delivering services. In some cases, the client response is important to validating claims and assessments on the value of the information.
- By requiring a payment for products supplied, users gain an incentive to adjust their consumption to recognise the cost of making those products available.

43. To work most effectively, price signals require a direct connection between the charges and fees paid by users, acting as individuals or as part of a cooperative group, and the provision of a service or information. Problems can arise when it is not possible to identify all users of a service or product, when it is not possible or practical to separate paying customers from other beneficiaries in allocating the product or service, or when there is too weak a connection between the creation of a product or service and the realisation of benefits by specific users.

44. Pricing may also cause an efficiency loss where it causes underutilisation of a product or service. This is relevant when the marginal cost of additional usage of a product or service, once produced, is very low or negligible due to natural monopoly circumstances (where the average cost of a product significantly exceeds the costs of additional production at the margin) or non-rivalrous in consumption (where consumption by one user does not diminish the availability to other users).

45. A specific and relevant example of non-rivalry applies to the creation and use of information which, once available, does not diminish as it is used. An increasingly relevant consideration for public sector information is the difficulty in anticipating all possible applications of that information and therefore the value being sacrificed by restricting its usage.

⁴⁸ These issues are discussed at length in the Productivity Commission's inquiry on *Cost Recovery by Government Agencies*.

46. Limiting access through pricing can create dynamic efficiency losses by choking off innovation and discouraging the discovery of new ways of applying and combining public sector information. This appears to be a particularly relevant consideration for spatial data due to its pervasiveness across many social and economic policy applications. For example:

- aero-electromagnetic survey information originally compiled by GA over many years to assist onshore resource development planning is finding increasing application in groundwater and salinity definition and management;
- archives of satellite imagery originally aimed at identifying surface mineral deposits are now useful for time-series analysis of land clearing and land degradation; and
- information from offshore seismic surveys aimed at identifying geological features favourable to petroleum reserves are now being used to identify potential carbon dioxide stores and to assist protection of marine biodiversity.

Equity

47. Cost recovery may also provide a more equitable basis for sharing the costs of a product or service between its consumers and general taxpayers by allocating costs to those who created the need for or benefit from the product or service being provided. This is a particularly important consideration when the relevant product or service is applied by some or all users to generate commercial returns.

48. A practical difficulty in achieving equity that sometimes arises is in developing a business model for identifying and charging users. It may not be possible to structure a cost recovery regime that is both administratively efficient and treats all users equitably. This is particularly the case for situations where a product or service is applied in consultations to assist public policy development as well as being of value to specific user groups. For example, in policy deliberations on release of offshore exploration acreage, current practice is to consult industry in the interpretation of pre-competitive information prior to a final decision. This process draws in industry expertise and assists the Government to identify those areas actually likely to attract investor interest. A necessary part of this consultation is sharing the information made available by pre-competitive studies.

Revenue

49. Practically all sources of general revenue for government involve efficiency losses and economic distortions. Cost recovery can reduce the reliance on these other revenue sources and lead to a net efficiency gain where the administrative and efficiency losses of user charges compare favourably to other revenue alternatives.

50. A valuable attribute of cost recovery is that it can provide an additional source of funding to support an activity that may otherwise not be affordable. Counter-balancing this is the need to manage any dysfunctional effects that may arise if cost recovery becomes a distraction to an agency meeting its core charter or is applied contrary to government policy. This can skew resources away from activities that are strategically important (but not 'marketable') towards activities that directly or indirectly enhance an agency's ability to earn revenue. With the exception of Government Business Enterprises, Australian Government agencies are not established to earn revenue and need to demonstrate Government authority for any cost recovery activities.

Administration

51. Cost recovery arrangements are generally not costless to implement. Implementing cost recovery arrangements may require significant investment to develop and maintain an ongoing capability, including in respect to the collection and handling of fees and in developing financial systems capable of informing on the cost of specific products or services. This can be particularly difficult where the products or services being considered for cost recovery represent only a portion of the outputs of the providing agency and rest heavily on common infrastructure and capabilities. As cost recovery is not for making a profit, but rather covering costs incurred by Government, agencies need to ensure their pricing is soundly based on actual costs for the products and services supplied.

Australian Government policies

Australian Government cost recovery policy

52. The Australian Government's decision in December 2002 to adopt a formal cost recovery policy and issue the *Australian Government Cost Recovery Guidelines* (the Guidelines) was in response to a Productivity Commission inquiry which examined cost recovery practices across government agencies. The Guidelines issued by the Government aim to improve the consistency, transparency and accountability of Australian Government cost recovery arrangements and promote the efficient allocation of resources.⁴⁹ The policy applies to all FMA Act agencies, which includes GA.⁵⁰

53. Under the policy, 'cost recovery' broadly encompasses fees and charges related to the provision of government goods and services (including regulation) to the private and other non-government sectors of the economy.

54. The Guidelines give direction to agencies that cost recovery may not be warranted where:

- it is not cost-effective; or
- it would be inconsistent with government policy objectives; or
- it would unduly stifle competition and industry innovation.

55. As noted in the Guidelines, "... cost recovery can provide an important means of improving the efficiency with which Australian Government products and services are produced and consumed. Charges for goods and services can give an important message to users or their customers about the cost of resources involved. It may also improve equity by ensuring that those who use Australian Government products and services or who create the need for regulation bear the costs".⁵¹

⁴⁹ Department of Finance and Administration. 2005, *Australian Government Cost Recovery Guidelines – July 2005*, Canberra

http://www.finance.gov.au/publications/finance-circulars/2005/docs/Cost_Recovery_Guidelines.pdf

⁵⁰ The policy also applies to relevant *Commonwealth Authorities and Companies Act 1997* (CAC Act) bodies that have been notified, under sections 28 or 43 of the CAC Act, to apply the cost recovery policy.

⁵¹ Department of Finance and Administration. 2005, *Australian Government Cost Recovery Guidelines – July 2005*, Canberra, p.11

http://www.finance.gov.au/publications/finance-circulars/2005/docs/Cost_Recovery_Guidelines.pdf

Intra-agency cost recovery

56. The Australian Government cost recovery policy formally excludes any form of intra-/inter-Government cost recovery. These in fact make up the bulk of GA's Section 31 revenue. However, the Guidelines do provide for the same principles to be applied to such arrangements:

“Where Australian Government agencies have service level agreements or other cost recovery arrangements with State and Territory Governments or with other Australian Government agencies, these guidelines should be complied with to the greatest possible extent, depending on other government requirements”.⁵²

Cost recovery guidelines specific to information agencies

57. In general, information activities result from a combination of information collection, compilation and storage, analysis and enhancement, and dissemination. The Guidelines recommend that there be two steps in considering whether to impose cost recovery for information products: determining which products are taxpayer funded (basic information product set); and establishing the approach to cost recovery for other products (additional products).

58. The Australian Government may agree to a taxpayer funded basic product set. Most other information products outside this set are funded through a fee charged to the users of those information products. In some cases, the fee is charged to an organisation that represents the final users of the product. Some products may be funded by a levy or other cost recovery arrangement that is targeted at an identifiable group that uses the product.

59. In terms of a basic product set, the Guidelines acknowledge that an agency cannot decide alone what level of taxpayer funding it will receive; its principles can help identify products for which taxpayer funding may be appropriate. A useful distinction that may inform this process is that between:

- general information products produced for the Australian community; and
- information products produced at the request of specific groups or individuals.

60. An information product is more likely to be a basic product set if it has: strong public good characteristics; the beneficiaries cannot be defined; and it has spill over effects to non-users. It is also worth considering if there are other policy reasons for providing the product free of charge.

61. The Guidelines note that an agency may wish to provide information products outside the taxpayer funded basic product set, consistent with its charter. These additional products should be assessed for cost recovery using the principles outlined below. Assessment should be on a case-by-case basis, with regard to the efficiency and cost-effectiveness of cost recovery.

⁵² *Ibid*

62. Activities that are funded through general taxation form the basic product set of an agency. All products to be cost recovered should recoup at least the additional direct costs incurred beyond those of the basic product set. Capital and overhead costs, on the other hand, should be recovered for only some cost recovered products. However, charges may not be efficient and cost-effective if:

- it is difficult to establish a charge that accurately links the cost of a product to the users of that product; or
- the charge is costly to collect because it is difficult to identify and bill each user of the product.

63. The Guidelines identify three different categories that additional information products tend to fall into:

- *Commercial products*, which the private sector could provide. These products may draw on the agency's basic product set but also include a substantial enhancement. Products subject to competitive neutrality principles are not subject to these cost recovery guidelines.
- *Incremental products*, which only the agency can provide. These products build on or enhance the agency's basic product set. The charges for incremental products should be based on incremental cost and should include those costs (including capital costs) and overheads that arise as a result of providing the incremental product (or that would not have been incurred if the incremental product were not provided).
- *Marginally costed products*, which only the agency can provide. These products involve further dissemination of existing taxpayer funded products. For marginally costed dissemination (for example, where additional copies of an information product are required), charges should not include any capital or overhead costs, only the direct costs such as labour and materials.

Commonwealth Spatial Data Access and Pricing Policy

64. In 2001 the Australian Government launched the Commonwealth Policy on SDAP to provide access to spatial data free of charge, preferably over the internet, or to provide packaged data at a charge of no more than the cost of transfer.⁵³ This policy applies to all Australian Government departments and agencies that provide spatial data. Noting that the Australian Government policy on cost recovery explicitly requires that cost recovery be consistent with other government policies, the SDAP policy operates to preclude cost recovery above the marginal cost of transfer for spatial data supplied by those departments and agencies, including GA itself.

Pricing

65. The purpose of the pricing policy is to provide a whole-of-government approach to pricing of fundamental spatial data, and it applies to data collected by agencies in the public interest.

⁵³ *Commonwealth Policy on Spatial Data Access and Pricing*, 2001, available from:
<http://www.osdm.gov.au/OSDM/Policies+and+Guidelines/Spatial+Data+Access+and+Pricing/default.aspx>

66. This pricing policy is premised on the view that all fundamental spatial data should be freely available at marginal cost of transfer in order to maximise the net economic and social benefits arising from its use. It is also assumed that all agencies will make spatial data available through their websites and that as information is posted on the internet, its marginal cost approaches zero (ergo, prices should be set at zero).

67. Under the pricing policy, data should be made available in one of three forms:

- *Online spatial data* will be made available free, as soon as appropriate technology becomes available within the custodian agency.
- *Packaged spatial data* will be made available at a price not exceeding the marginal cost of transfer.
- *Customised spatial data* will be made available at a price not exceeding the full cost of transfer.

68. The policy also adds that there will be no restrictions on commercial use or value-added activities related to the spatial data, although copyright may be reserved by the Commonwealth and each transaction will be covered by a licence setting out the conditions of the transfer.

Access

69. The purpose of the access policy is to provide better access to Commonwealth holdings of spatial data – with the community having easy, efficient and equitable access to spatial data in an environment where technology requirements, data formats, institutional arrangements and contractual conditions do not inhibit its use.

70. The access policy was designed to provide access to spatial data in a manner consistent with Government Online⁵⁴ and supports access by several communities of users:

- Australian Government departments and agencies;
- State and Territory government departments and agencies;
- the general public; and
- commercial and other users.

71. The access policy aims for a long-term model for addressing the following user needs:

- access mechanisms should provide a single point of access to Commonwealth spatial data;
- Commonwealth spatial data covered by the policy should be ‘discoverable’ through the access point;
- at least some of the data should be downloadable from the access point;
- there should be an online e-commerce capability to pay for data that must be purchased; and
- there should be a basic online mapping capability.

⁵⁴ Government Online was announced in April 2000 as part of the 1997 Investing for Growth Statement made by the then Prime Minister, John Howard AC. Government Online defined a strategy for putting all appropriate Government services and information online by 2001. The aim was to improve service quality and increase the responsiveness of the public service, with more of agency information and services to be accessible online.

Open public sector information policies

72. On 16 July 2010 the Minister for Finance and Deregulation made a Declaration of Open Government on behalf of the Australian Government:

“The Declaration is about making government information available to the public online and encouraging reuse of that information in new, valuable and potentially unexpected ways. This is very much in line with our Government 2.0 agenda”.⁵⁵

73. The declaration followed release of the report of the Government 2.0 taskforce and the Government’s response to that report. In this response, the Government specifically agreed that:

“public sector information (PSI) is a national resource and that releasing as much of it on as permissive terms as possible will maximise its economic and social value to Australians and reinforce its contribution to a healthy democracy”.

74. In addition to the declaration, the Government agreed in principle that PSI should be free, easily discoverable and freely reusable and transformable, as well as that:

“agencies proactively identify and release, without request, such data that might reasonably be considered as holding value to parties outside the agency”.⁵⁶

75. The Government also stated that these matters would be addressed in guidelines on the Information Publication Scheme to be issued by the Information Commissioner under legislation.

76. The Report noted that government revenue will often benefit more from taxes on economic growth stimulated by open access to PSI than it will suffer where government loses direct revenue from the sale of PSI. Hence the Report argues the default position for PSI should be that it is provided freely licensed and at the marginal cost of distribution.⁵⁷

77. However, the Report acknowledges the practical difficulties in implementing and resourcing this open PSI policy:

- Under the Government’s current stringent fiscal targets, taxpayer funding for PSI initiatives is unlikely.
- The revenue from taxation of increased economic benefits will take time to materialise.
- Agencies earning revenue from the sale of PSI will typically not be the agencies that reap the tax revenue from the additional economic activity stimulated by open PSI.⁵⁸

78. In making the Declaration, the Minister for Finance and Deregulation also noted that it also aligned to a key reform from the report: *Ahead of the Game: Blueprint for the reform of Australian Government Administration*, 2010. Recommendation 2.1 of this latter report also

⁵⁵ Minister for Finance and Deregulation (Lindsay Tanner). July 2010, Media Release: Declaration of Open Government – 16 July 2010

http://www.financeminister.gov.au/archive/media/2010/mr_412010.html

⁵⁶ *Government response to the report of the Government 2.0 Taskforce – Engage: Getting on with Government 2.0*, 2010, Recommendation Rec 6 – specifically Rec 6.1 and 6.8.2 are quoted

<http://www.finance.gov.au/publications/govresponse20report/doc/Government-Response-to-Gov-2-0-Report.pdf>

⁵⁷ *Engage: Getting on with Government 2.0 – Report of the Government 2.0 Taskforce*, 2009, p.62

<http://www.finance.gov.au/publications/gov20taskforcereport/doc/Government20TaskforceReport.pdf>

⁵⁸ *Ibid.* p.61

recommended that the Australian Government make public sector data open to the wider public, consistent with privacy and secrecy laws.

79. The Government 2.0 Taskforce Report noted how advanced GA was in moving toward open PSI and is already “releasing much of their output using Creative Commons attribution only licences permitting others to use and remix it with minimal costs and restriction”. The Government 2.0 report noted that the Commonwealth Policy on SDAP – coordinated by OSDM – was one of the first substantial programs in the world which moved towards government data being made available at the marginal cost of transfer.⁵⁹ In fact, it is interesting to note that the 2001 SDAP appears to follow many of the same principles that are now more generally embraced in the recent PSI and Open Government reforms.

Geoscience Australia's experience and policies

Geoscience Australia's experience with cost recovery

80. GA and its predecessor organisations (BMR, AGSO and AUSLIG) operated under various cost recovery arrangements.

81. BMR commenced implementation of cost recovery principles in 1988, including charging for many types of information. Prior to that, information was provided to clients at the cost of reproduction.

82. In 1994 the Government, in its response to the Richards Review in 1993, set AGSO an external revenue target of 30 per cent of its 1994-95 Budget appropriations by 1995-96, with AGSO retaining all revenue up to the target and revenue in excess of the target to be shared on an 85/15 basis between AGSO and the Consolidated Revenue Fund. The Government also determined that AGSO funding be based on the principles of:

- public interest programs being funded by appropriation;
- functions primarily benefiting industry being funded by industry; and
- functions benefiting industry and the wider community being jointly funded.

83. In relation to this last principle, the Government sought to have half of the cost of the Continental Margins Program funded by offshore petroleum and mineral companies. This was fervently opposed by industry bodies and eventually defeated in the Senate, as the proposal was viewed as additional taxation on oil explorers.

84. It is relevant to note that the 2001 Productivity Commission inquiry into cost recovery recommended that cost recovery be approached on an activity basis rather than an agency basis. The Government has adopted this recommendation in current government policy on cost recovery.

85. AUSLIG was required to act as a business enterprise and cost recover some of its activities. AUSLIG recovered the costs of distributing products derived from its public interest programs, with the major costs associated with collecting and processing spatial information funded through appropriation. AUSLIG cost recovery revenue from the sale of all products was equal to the average cost of all distribution of all products. AUSLIG's distribution costs were determined through the application of activity or task based costing, which was an integral part of its financial management system. AUSLIG commercial activities, such as provision of surveying and spatial information services to government

⁵⁹ *Ibid.* p.10

agencies and the private sector, were subject to full cost recovery. Following a further review in 1996, the Government decided to sell off the commercial component of AUSLIG and market test the delivery of the remaining public interest activities for outsourcing.

86. Since the 2001 merger of the AGSO and AUSLIG to form GA, GA's external revenue activities have focused mainly on charging other government agencies for services. Private sector revenue is limited to the sale of publications such as maps, data and satellite imagery sold at marginal cost of transfer. Over the past five years, cost recovery from the private sector has averaged less than \$2 million and is a small proportion of GA's total cost recovery revenue.

Geoscience Australia's cost recovery policy

87. As noted earlier, revenues from other Government agencies, State and Territory governments and purchasers of GA information products now comprise a significant share of GA's total revenue base. However, only a small portion of these revenues fall within the formal definition of cost recovery as set out in the Government's cost recovery policy. The bulk of revenues represent receipts from other Australian Government departments and agencies and from State and Territory governments for work performed or managed by GA.

88. GA does not seek business in competition with private sector suppliers although it may, as opportunities arise, allow a private sector partner to join it in commissioning work from a specific contractor and thereby defray some costs of that contract.

89. GA advised that whenever it is approached by other agencies for assistance or advice, it will apply a 'mutual benefits test' of its cost recovery policy to the work involved. If the work is not aligned with GA's core functions, GA will seek 100 per cent cost recovery based on its cost model of 2.85 times salary, which incorporates full overheads. If there is some alignment with GA's core functions, or the work brings in-kind benefits to GA, there may be some cost sharing.

90. GA's internal cost recovery guidance, which applies to intra- and inter-government cost recovery, is set out in Box 1 below.

91. An anomaly in GA's internal cost recovery policy is the inclusion of a return on equity in accordance with the Government's Competitive Neutrality Policy. This latter requirement applies only in situations where a service is being provided within either a competitive or potentially competitive market. GA has advised that it does not operate in competition with the private sector. Further, the Competitive Neutrality Policy only requires agencies to note a return on equity where the business activity meets the competitive neutrality business criteria test (which includes potential or actual competition) and significance test (commercial turnover greater than \$10 million per annum).

Box 1: Geoscience Australia Cost Recovery Guidelines

GA has and continues to use cost recovery mechanisms for a variety of business reasons. This document provides guidelines that are to be used when considering undertaking work for or on behalf of another government department or agency. GA should not be competing with the private sector for work.

When GA should undertake externally funded work?

- When the work is for an Australian Government department or agency that requires a geoscience input.
- When the work is consistent with GA core work program and provides resources to extend that work.
- When the work provides an opportunity for GA to develop a new line of business consistent with GA's mandate.

What costing model should apply?

- Wherever possible GA should recover the full cost of undertaking the work. This includes the following costs: salary; salary on-cost, overheads and operational costs.
- Where there is a clear mutual benefit to both GA and the purchaser a different model may be applied where by GA co-funds or otherwise contributes resources to the work.
 - Any such benefit to GA must be clearly documented and approved by the Chief of Division or appropriate Branch Head.
- In some circumstance, when developing a new relationship or line of business, it may possible to carry out work to demonstrate the viability of GA's capability to the potential client or partner but at minimal or no cost to the potential client. This option is to be used infrequently and only for small scale pilot studies. This type of work is sometimes referred to as a loss-leader activity. Any loss-leader project must be approved by the Chief of Division or appropriate Branch Head.

What costing basis in the cost model should I use?

GA's cost model is available at:

http://www.ga.gov.au:88/newintranet/finance/budgeting_reporting/costing.html

- In the first instance, the costing basis to be selected in either cost model is the full cost. This model provides a full costing that includes salary, salary on-costs, overheads, direct project costs and a return on equity.
- Please note, that the return on equity must be included in every costing as it is a requirement under the Australian Government's competitive neutrality policies.

92. In its submission to the 2001 Productivity Commission inquiry into *Cost Recovery by Government Agencies*, AGSO outlined the following impacts of the 30 per cent cost recovery target that applied from 1994:

- Cost recovery conflicts directly with the Government’s objective of encouraging investment in, and exploitation of, community owned mineral and energy resources and specifically may disadvantage Australia in competing for investment internationally.
- The pressure to attract funding can lead to distortion of a program away from efficiently meeting long-term strategic objectives to short-term tactical activities with more immediate investment prospects.
- Pricing of pre-competitive data can disadvantage small and medium enterprises that historically have had a major role in mineral discoveries.
- Potential for pricing can encourage creation of multiple datasets for any sector/field, reducing inter-operability and creating overall efficiency loss in terms of data management and innovation.

93. The Productivity Commission in its report, noted that:

“The high price of this [geophysical] information has implications for other objectives of Government. It is likely to reduce the amount of exploration of Australia’s mineral and petroleum resources”.

94. Anecdotal evidence provided to this Review has also indicated that the cost recovery target pressed the organisation into offering services that many considered to be competing with the private sector or a significant departure from the agency’s core activities at the time. Examples included:

- use of the AGSO research vessel *Rig Seismic* for commercial work, which was viewed as unfair competition by the seismic exploration industry; and
- undertaking of overseas consultancies and mapping projects in countries such as Oman – as well as requiring the diversion of AGSO’s very best human resources from other tasks, it was questionable whether strengthening the quality of the geoscience capability of other competitor countries could be seen as in line with the agency’s primary objective of increasing exploration in Australia.

95. The desire to avoid a repeat of the tensions between government and industry that resulted from AGSO’s foray into commercial services are a factor in GA’s current policy of not providing services that are available from the commercial market.

Conclusion – Geoscience Australia’s cost recovery arrangements

96. Overall, the Review has found GA’s arrangements for cost recovery to be in alignment with Government policies.

97. Only a small proportion (typically less than \$2 million) of GA’s Section 31 revenue falls within the technical scope of the Government’s cost recovery policy. A core concept in this policy is the definition of a ‘basic information product set’ being information funded by the agency’s appropriation.

Recommendation 10

Further to Recommendation 3, the Review recommends that the strategic plan for GA also assist in the identification of GA's 'basic information products' being the information products to be funded from GA's direct appropriation and not subject to cost recovery.

Scope for additional cost recovery

Assessment against Australian Government policy framework

98. GA's core business is producing information, a large share of which is spatial data or analysis based on spatial data. Accordingly, a large proportion of products from GA activities falls within both the Government's SDAP Policy and the Government's more recent reforms on management of PSI.

99. In accordance with Government policy on SDAP, GA recovers the marginal cost of transfer for distribution of publicly available information. Increasingly, this is effectively a zero cost as more data becomes available over the internet.

100. Exceptions to this are GA's activities specifically commissioned by external parties and collaborative projects with other agencies and State and Territory authorities. This can include consultancies and professional opinions, joint ventures and collaborative research and commissioned research and service work.

101. Another arguable exception is in respect of GA's relationship to PSMA. GA currently does not supply data directly to the PSMA but does process data for State and Territory governments that is then passed on to PSMA to generate a return for the states and territories. The data processing undertaken by GA is to effectively unify the transport and topographic data of the various jurisdictions into one dataset. This work is done under an arrangement whereby the State and Territory governments contribute 30 to 40 per cent of GA's costs. Noting the GA investment, the arrangements for PSMA marketing the data and providing a return to states and territories appears to be both side-stepping the Commonwealth's SDAP policy and allowing other jurisdictions a disproportionate share of returns.

Pre-competitive information

102. An enduring policy issue of discussion in resourcing of GA and its geoscience predecessors is whether users of this information in the mining and petroleum sectors should be required to meet at least part of the costs of creating this information.

103. Arguments for partial or full cost recovery for pre-competitive information point to the commercial profits to industry from exploitation of mineral and energy resources and a view that, once specific exploration rights have been assigned, the utility of pre-competitive information relating to the assigned acreage becomes privatised and substantially ceases to be a public good. To the extent that it is possible, cost recovery for pre-competitive information, as with any information, can be used as an indicator to validate that it is generating information of most relevance to the intended clients.

104. Arguments against cost recovery for pre-competitive information have typically pointed to how adding cost and risk for private explorers works against the Government's core objective of encouraging exploration. In the course of consultations for the Review, industry

bodies claimed that the impact of any form of cost recovery would be more severe for smaller, independent explorers with potential to detrimentally affect overall competition in the exploration industry. A view strongly expressed by industry groups consulted in the Review is that the Government should regard its economic returns from mining and petroleum extraction as containing, in part, its return on the investment in pre-competitive information.

105. Noting the long history of this matter, the Review has looked closely at the conceptual merits of cost recovery as it applies to pre-competitive information and at various models proposed for either cost recovery or creating a revenue offset for the costs of pre-competitive information.

106. As explained in Chapter 3 of this report, from a resource development perspective the principal client for pre-competitive information is the Government itself. Under current arrangements for release of exploration acreage, pre-competitive information serves important, arguably critical, roles in enabling the Government to identify areas that have conditions sufficiently favourable for exploration to be considered viable for commercial investment and in promoting and validating those areas to potential investors. This indicates that no more than partial cost recovery or industry funding would be appropriate.

107. The analysis in Chapter 3 of this report strongly suggests that the production and distribution of pre-competitive information in this context was akin to the costs of developing and distributing a prospectus when marketing other investment opportunities. This does not discount the existence of private benefits from making available new investment opportunities (indeed it would be hard to motivate investors without prospects of returns), but it does recognise that the most common approach in public offerings is to focus on maximising the return for the investment opportunity or asset being marketed. For Australian governments, the dominant part of this return is realised in the form of secondary taxes (such as royalties, resource rent taxes and other charges) specific to resource extraction.

Options for raising revenue from offshore exploration

108. Options for raising revenue linked to offshore pre-competitive information have been considered a number of times in the past two decades. Generally, the options considered have been variants of the following:

- a. Introduce a charge (beyond the marginal cost of transfer) for information packs distributed when an acreage release is being announced.
- b. Introduce a fee as a condition for bidding for exploration acreage.
- c. Increase fees for award of exploration acreage.
- d. Increase fees at point of application for a production license or retention lease.
- e. Re-introduce cash bidding as a method for allocating exploration licenses.

109. It is worth noting at this point that only option 'a' above represents a form of cost recovery for pre-competitive information. Other options are essentially revenue options that have increasingly tenuous links to the provision and value of pre-competitive data. From past discussions a failure to distinguish cost recovery from other revenue options appears to be a source of confusion as well as a counter-productive distraction from examining the options on their functional and legal merits rather than how they may be optically represented to defray the costs of pre-competitive data. This is particularly relevant to options that are in effect methods of achieving additional returns for resource extraction outside of the mainstream (and likely more efficient) secondary tax arrangements applying to the mining

and energy sectors. The prospect that new charges would also be deductible against resource rent taxes further diminishes their attractiveness (and sensibility) where rent taxes apply. With increasing distance between a charge and the actual distribution of pre-competitive information is a reduction in the relevance of efficiency and allocative benefits normally attached to cost recovery as discussed earlier in this chapter.

110. Analysis of option ‘a’ indicates it would be detrimental to the Government’s objectives of encouraging investment in petroleum information and would also represent a departure from the Government’s SDAP policy. There would be complications in bringing to account in any cost recovery arrangements the contributions from industry and State and Territory governments to pre-competitive data. DRET advises that an important element of deciding acreage release is seeking industry reactions to the information in order to assess the likelihood that there will be interest from industry when acreage is offered. Managing equal and fair access to information between the consultation and bidding stages may be difficult in a regime of price-restricted access in the bidding stage.

111. Similar considerations apply to option ‘b’ as to option ‘a’ in terms of conflicting with the Government’s objectives of attracting investment competition. It is less defensible as a recovery of costs for pre-competitive data as it targets only those users that positively responded to the Government’s invitation. From a bidder’s point of view, the value of the opportunity offered, rather than the value of the data, would be the key consideration in justifying additional bid expense.

112. Option ‘c’ is considered to add to exploration costs before a commercial resource has been proven and would be administratively complex. To achieve revenue equivalent to a significant share of pre-competitive project costs would require orders of magnitude increases in fees. The fee would pose a significant deterrent to investment in exploration, particularly for smaller players. It would require amendment to Commonwealth, State and Territory legislation which could prove difficult to engineer. An additional recent consideration is that it may be more difficult to implement (operationally or in terms of acceptability) alongside proposed regulatory reforms of offshore activities following the Montara incident.

113. The significant advantage of option ‘d’ is its revenue potential – applying an additional fee after a commercial resource has been proven. Disadvantages are that it would require renegotiation of agreements with states and territories and amendment of the Commonwealth regulations.

Re-introducing cash bidding for allocation of exploration permits

114. *Australia’s Future Tax System* recommended that the Australian and State governments should consider using a cash bidding system to allocate exploration permits, and that for small exploration areas, where there are unlikely to be net benefits from a cash bidding system, a ‘first come first served’ system could be used. Chapter 3 of this report examined the relative merits of the current WPB system currently used by the Government for allocation of offshore exploration acreage and the proposed cash bidding approach. As discussed in Chapter 3, a key factor in this assessment is addressing the information externalities generated by private exploration and the resulting potential for under-investment in exploration if driven by private incentives alone. As mentioned above, data supplied by industry can represent a significant component of pre-competitive information provided supporting new acreage offers (or the re-offering of surrendered acreage). Indeed, it is knowledge coming from surrounding areas that substantially distinguishes ‘brownfields’ areas from ‘greenfields’ areas.

115. In discussing rationales for government intervention, the Productivity Commission noted in 2009:

“For example, the information obtained from petroleum exploration has public good characteristics, and incentives to undertake exploration would be poor if other companies could ‘free ride’ off those who made initial discoveries. One response to this problem is for governments to establish a system of property rights, such as exclusive retention or exploration licences for particular areas (possibly following a competitive bidding process) (PC 2001a).

....

To deal with information problems, governments typically provide maps and data to upstream petroleum businesses to assist with exploration, and often require provision of data about exploration activities or oil and gas discoveries. The public good nature of much of this information makes governments more likely to regulate on this basis”.⁶⁰

116. Past and international experience in offshore exploration suggest that cash bidding is only viable for allocation of permits in regions that have demonstrated resource potential, such as commercially successful production. For other regions, notably frontier (‘greenfields’) areas, there is a stronger economic case for the current WPB system because of the limited or non-availability of exploration data (specifically drilling samples and the like). This suggests that cash bidding should only be an option considered for allocation of permits in mature regions. Experience to date shows that only a minority of acreage releases in Australia would be sufficiently attractive to attract cash bids.

117. A 2009 World Bank Paper assessed the factors influencing optimal design of allocation of exploration and production rights across a range of countries, including Australia. The paper considers information asymmetries and uncertainty of the geological potential of an area strongly influences how efficiently different allocation regimes achieve government objectives – especially in relation to resource rents. While “theoretically, pure bonus [cash] bidding approximates the optimum allocation mechanism when the Government’s objective is to maximize rent capture”, the paper concludes that in practice the uncertainty of the value of a resource means bidders are likely to reduce their bids and, in the end, the Government may capture less than the total value of the economic rent if the results of exploration and production are better than anticipated. The paper concludes that cash bidding is “generally less efficient in frontier and under explored areas” and is therefore “generally only contemplated in areas where there is a high probability of success and/or sufficient available information”. The paper also notes that often the policy objective pursued by governments is to improve the understanding of the geological potential of frontier areas – that is, they choose to allocate exploration rights on the basis of WPB, which directly affects the quality and level of exploration investment in an area.⁶¹

118. The World Bank paper considers that an important factor for Australia in explaining the variability in work program bids is the geological maturity of the basin. The paper considers that government could acquire additional geological and geophysical surveys in frontier areas that are earmarked for release, and “as more information on the geological potential becomes available – that is, frontier and immature areas graduate to sub-mature status – the licensing

⁶⁰ Productivity Commission. 2009, *Review of regulatory burden on the upstream petroleum (oil and gas) sector*, Melbourne, Productivity Commission, pp. 30-31

⁶¹ Tordo, Silvana. Et al. 2009, *Petroleum exploration and production rights: Allocation strategies and design issues (World Bank Working Paper No. 179)*, Washington, World Bank, (quotes from p. 17, xii & 18 respectively)

policy may shift from encouraging exploration (work program bidding) to maximising the NPV [net present value] of the economic rent (bonus [cash]/royalties/profit share bidding)".⁶²

119. A cash bidding system for competitive allocation of exploration permits provides no incentive for commercial explorers to have regard to the potential for benefits to other users through information externalities when deciding how and how much to invest in exploration. However, as discussed in Chapter 3, the importance and value of these externalities would not be uniform and may in some situations, particularly 'brownfields' areas, be diminished by the availability of information from earlier exploration and production (directly or indirectly enhanced by earlier WPB). Neither extreme of exclusive use of WPB or exclusive use of cash bidding (including 'first come first served') seems sustainable as a universally optimal solution. Further, there would also seem to be scope for consideration of hybrid models in any acreage release, such as cash bidding against minimum work program requirements or, if operationally possible, inviting bidders to decide the mix of cash and work program commitments that would be included in any bid.

Options for private sector sponsorship of pre-competitive studies

120. Two further options were raised in the course of the Review as potential revenue options to offset the costs of pre-competitive data.

121. In one model, private investors or a syndicate could be requested to subscribe to a pre-competitive study to finance a portion of its costs. Subscribers would be vested with limited rights – such as a first right of refusal over any initial acreage releases. Such an approach would face a number of challenges:

- The level and mix of rights to be assigned to the private interests necessary to achieve the desired level of subscription may be difficult to identify or unacceptable:
 - These rights would have to be defined prior to the availability of pre-competitive information.
 - The Government would be assigning rights, including negotiating terms and conditions, over community wealth without benefit of pre-competitive information.
- The Government's broader policy responsibilities may create conflict with commercial partners focussed on resource development.
- The arrangement would impact on the Government's ability to use pre-competitive data to promote Australian exploration to new investors, including international interests that may not have contributed to the data acquisition.

122. An alternative option put forward is an arrangement modelled on rural research and development corporations. This model would create a pool of funding, jointly funded by government and an industry (production, site based or corporate) levy. This approach would ameliorate some of the concerns with the syndicate model described above, although it is likely that industry would require greater control of pre-competitive programs and decisions on acreage release, with consequences for government discretion both in resource development and other policies served by pre-competitive data. It is also likely that industry will argue that funding should be by way of hypothecation of a part of revenue from

⁶² *Ibid.* p.60

secondary taxes from resource extraction rather than through a new levy. A similar option was analysed by the 1988 Woods review of the former BMR. That review found “fundamental difficulties in applying the rural research model to the financing of BMR activities”⁶³ largely due to the strategic nature of BMR research. In this respect, there is little difference between the role of BMR in regards to pre-competitive information and the role GA performs today.

123. The following Table 10 summarises the preceding discussion on the advantages and disadvantages for various models for cost recovering pre-competitive information raised in the course of this Review.

Conclusion - Options for revenue offsets for pre-competitive information

124. Cost recovery for the provision of pre-competitive data has somewhat of a tortuous history. The Review examined the issue closely and considers that there are conceptual and operational problems in proposals advanced to date.

125. Typically, calls for pre-competitive data to be cost recovered from industry are based on the view that the information is produced primarily to assist the exploration industry. This is an incomplete perspective of the underlying business model for production of pre-competitive information.

126. Cost recovery of pre-competitive information through a direct (transaction) charge to companies to which the information is supplied directly conflicts with the purpose for which the information exists. This appears to be the dominant reason why the option has been rejected on past occasions.

127. The major pressure for cost recovery for pre-competitive information has for the most part been an issue of funding its acquisition and management costs. Cost recovery should not be confused with more general mechanisms for raising revenue that may be used to offset or recoup the costs of pre-competitive information.

128. Currently, the Australian Government allocates permits for offshore exploration solely on the basis of a competitive work program bidding system. This system places a competitive incentive on bidders to enhance the nature and quantity of exploration proposed in respect of generating information useful to enhancing understanding of the geology of the relevant region. The importance and value of these information externalities is not uniform and in some situations, particularly ‘brownfields’ areas, may be diminished by the availability of information from earlier exploration and production. On the other hand, past and international experience in offshore exploration suggests that cash bidding is viable only for allocation of permits in regions that have realised resource potential (that is, ‘brownfields’ areas). The different areas of strengths of the work program bidding system and of cash bidding suggest that selective use of both methods according to circumstance is a better optimum than a system that uses either method exclusively. Further investigation of cash bidding options would be most appropriate alongside the examination of the aforementioned ReconEx concept and similar proposals looking at alternative arrangements for defining and awarding exploration acreage.

⁶³ Woods, A.J. 1989, *Review of the Bureau of Mineral Resources, Geology and Geophysics, December 1988: A report to the Minister for Resources*, Canberra, Australian Government Publishing Service, p. 73

Recommendation 11

As part of Recommendation 1, the Review recommends that DRET consider reintroducing cash bidding, or introducing hybrid cash/work program bidding arrangements for release of exploration acreage in offshore regions that already have demonstrated resource potential from commercial exploration or production.

Table 10: Summary of revenue options linked to exploration

Option Description	Advantages	Disadvantages
Charge for acreage release information package (including data supply)	<ul style="list-style-type: none"> • Provides a sustainable income stream for GA assuming steady stream of acreage releases. • Provides a direct mechanism for price signals through a direct connection between the information supplied and user charges. • Relatively simple to apply prospectively. • Any cost recovery target would be defrayed over a larger number of users than other options. 	<ul style="list-style-type: none"> • Directly works against the Government’s objectives of seeking to stimulate investor interest by discouraging companies from acquiring data. • Would breach the Commonwealth SDAP Policy and represent a departure from the direction of Government PSI reforms. • Would require discrimination between policy applications for use of the same data. • May be difficult to administer for second and subsequent acreage releases supported by the same datasets. • Requires companies to invest well ahead of achieving revenue which itself is not assured. • Typically, a significant component of data in the package has been previously lodged at no charge by industry in accordance with the relevant Act.
Charge companies who submit an acreage release bid	<ul style="list-style-type: none"> • Provides a sustainable income stream for GA assuming steady stream of acreage releases. • Does not discourage companies from at least considering acreage take-up. • Could be seen as just another cost of doing business – companies have other substantial costs associated with preparing an acreage release bid. • Relatively simple to apply prospectively. 	<ul style="list-style-type: none"> • Targets the companies that responded positively to Government solicitations and would operate to discourage companies from bidding for acreage. • Less direct relationship to information provided than the preceding option, particularly for non-greenfields areas. • Any significant cost recovery target may result in the bidding fee being greater than other costs in developing a bid. • Companies have not derived any financial benefit at this stage and there is no guarantee of future revenue stream.

Option Description	Advantages	Disadvantages
Charge companies awarded an exploration permit from the acreage release process	<ul style="list-style-type: none"> • Provides a sustainable income stream for GA. • Does not discourage companies from bidding for acreage. • Relatively simple to apply prospectively. 	<ul style="list-style-type: none"> • Targets a limited pool of users – namely those companies that respond positively to Government solicitations and are successful. • Would require Commonwealth and State legislative change. • Companies have not derived any financial benefit at this stage and there is no guarantee of future revenue stream. • Tenuous link to information provided in terms of sending price signals on the appropriateness or quality of pre-competitive studies.
Charge companies when granted production licences	<ul style="list-style-type: none"> • Provides a sustainable income stream for GA. • Does not discourage companies from exploring acreage. • At this stage companies should have derived tangible benefit from the GA work (especially if in a frontier area). • Difficult to apply prospectively without creating sovereign risk for exploration already underway. • Reasonably predictable number of licences and hence fee stability. 	<ul style="list-style-type: none"> • Severely limits the pool of users from which contribution sought. • This charge would require both Commonwealth and State legislative change. • Negligible price signal effect and tenuous connection to cost recovery: <ul style="list-style-type: none"> - long lead time between GA work and this stage (usually 10-30 years); - legal representation as a non-tax relies on functional representation as a fee to access a known resource. • The charge could result in marginally-profitable discoveries not proceeding to production. • Companies have not yet derived any financial benefit at this stage.

Option Description	Advantages	Disadvantages
Charge companies when profitability reached on production lease	<ul style="list-style-type: none"> • Does not discourage companies from exploring acreage. • At this stage companies should have derived financial benefit from the GA work (especially if in a frontier area). • There is a clear trigger point for the charge. • Charge is a relatively small percentage of the profits that most discoveries will make. 	<ul style="list-style-type: none"> • This charge would require both Commonwealth and State legislative change. • Not defensible as cost recovery due to long lead time between GA work and this stage (10-30 years) and the limited portion of users of the information required to contribute. • Industry commences paying PRRT at this stage and this new charge could be seen as an arbitrary method of increasing this tax. • Likely negative industry reaction in terms of perceived change in sovereign risk and perceived elements of retrospectivity.

Option Description	Advantages	Disadvantages
<p>Syndicate pre-competitive studies (invite corporate subscriptions before study is commissioned)</p>	<ul style="list-style-type: none"> • Core attraction is potential to defray costs of pre-competitive studies. • Provides visibility to early potential investor interest in regions proposed for pre-competitive study. 	<ul style="list-style-type: none"> • Untested model. Adds a layer to risk faced by investors in that they would be required to invest without assurance of any opportunity to explore. • May bind the Government to commercial interests of a few large commercial interests. • Complex – requires early definition of rights and obligations, including arrangements for deciding acreage release, ahead of pre-competitive information being available. • Industry likely to want more control of pre-competitive program, with consequences for focus on long-term strategic objectives and on non-resource development objectives. • Commercial investors would want preferential treatment that would constrain Government’s choices and competition in allocation of exploration permits. • Unlikely to be compatible with competitive allocation of exploration permits – even within syndicate players. Also may operate to facilitate collusion between companies at a broader level.

Option Description	Advantages	Disadvantages
<p>Joint Government-Industry funding. (Modelled on rural R&D corporations)</p>	<ul style="list-style-type: none"> • Core attraction is potential to defray costs of pre-competitive studies across larger group of players: <ul style="list-style-type: none"> - Costs per company likely to be low and represent minimal risk. • Provides visibility to early potential investor interest in regions proposed for pre-competitive study. 	<ul style="list-style-type: none"> • Potential to effectively operate as Syndicate model above in favour of players already in the Australian market. • Industry likely to want more control of pre-competitive program, with consequences for focus on long-term strategic objectives and on non-resource development objectives. • Difficulty in devising an equitable regime for industry contributions – production based or membership (company) based. • Would be seen as effectively an additional tax.
<p>Cash bidding for exploration acreage</p>	<ul style="list-style-type: none"> • Has precedents in Australia in allocation of offshore acreage in mature ‘brownfields’ areas. <ul style="list-style-type: none"> - The application of work program bidding for these areas arguably is less beneficial. 	<ul style="list-style-type: none"> • Likely to be viable only for more prospective acreage in regions where resources proven. • Likely to be unstable as a basis for resourcing a program. • Tenuous link to GA activities given GA focus in ‘greenfields’.

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ATTACHMENT A – GEOSCIENCE AUSTRALIA’S HARDWARE AND SOFTWARE ENVIRONMENT

Desktop Environment

GA currently uses 218 laptops and 1,129 PCs. Approximately 33 per cent of these devices are not allocated to an individual user, but are required to undertake data processing and presentation, field work, instrument control, data logging and telemetry. The current desktop Standard Operating Environment is based on Microsoft Windows XP, the Microsoft Office suite and the TRIM records management system. Over 60 per cent of all desktops are high performance workstations with specifications considerably above AGIMO’s standard desktop configuration. This is due to the performance demands created by geoscientific applications and data.

Software Environment

2. The major applications systems used by GA are proprietary, commercial-off-the-shelf, for example, the ArcGIS product from ESRI. However, many applications used are sourced from academia, open source communities or other collaborating groups. There are over 950 standard desktop-based applications installed covering 60 discrete application areas such as 3D visualisation, data interpretation and geospatial modelling. There are more than 2,000 other applications installed considering different versions, plug-ins and software extensions.
3. In addition, GA has a large volume of software developed in-house (over 300 databases and 105 web applications) across a variety of platforms including .Net and Java. Software development is largely devolved to the operational Divisions and is supported by a developer community within the agency. To support the enterprise-wide applications, some 17 different web technologies are employed.
4. The diversity of the software operating environment has several implications:
 - the application of a Standard Operating Environment is a much more difficult task than in other less diverse and non-science based organisations; and
 - a range of operating systems is required to support these applications – Linux, Unix and Microsoft operating systems, each requiring their own patching, upgrades and technical support.
5. A major initiative planned for 2011 is the examination of all GA software applications with a view to rationalising down to the minimum feasible level of diversity.

Server and Storage Infrastructure

6. GA’s server infrastructure comprises over 210 midrange servers operating under Windows, Unix and Linux. The introduction of virtualisation has seen a considerable saving in energy use and floor space whilst delivering the compute power needed.
7. Geological, geophysical, satellite remotely sensed and topographic data and information involve very large data volumes. In particular, the geophysical data used as pre-competitive information for the minerals and petroleum exploration industries, and satellite-related datasets are very large – total data holdings for the agency currently amount to at least two petabytes.

8. Data is the agency's fundamental business asset and many of its operations are centred on the acquisition, ingest, interpretation and dissemination of data. As a result, the agency's storage requirements are considerable and are expected to continue to increase.

9. A two petabyte IBM nearline storage system was installed in 2009 to accommodate marine seismic and satellite remote sensing data archives. In February 2010 a five year contract was signed with Hitachi Data Systems for a further 300 terabytes of tiered storage to accommodate all other current GA storage requirements. This system includes a full disaster recovery solution and is designed to scale up to at least 50 petabytes if required. The tiers are designed as follows:

- Tiers 1 and 2 – High performance for enterprise applications such as Microsoft Exchange, Oracle ESRI ArcSDE, TRIM, VMWare (virtualisation software);
- Tier 3 – Standard personal, project and shared network drive storage for user and project documents, files etc. This is also used in GA as working space for modelling tasks.
- Tier 4 – Nearline, tape-based storage which includes archive, but is seamless to end users. This is where most of GA Corporate Data Store files now reside as finished products and where the greatest growth could be expected over the coming years, followed by Tier 3.

Network

10. The storage, collaboration and web requirements of the agency are all placing significant demand on network communications which will need to be significantly improved to meet the increasing demand for online information availability both internally and from external consumers of data.

11. Most government organisations can work with the standard 100 megabytes per second network, however given the processing and modelling requirements, the need for speed and efficiency of the agency, the core network at GA is 10,000 megabytes per second (ten gigabytes per second), with standard desktop connectivity increasing over time to one gigabyte per second.

12. GA is highly reliant on internet access as it utilises the internet for data communications into internal systems as well as a portal for receipt and publishing of information. The agency has a number of services in the seismic, nuclear and tsunami warning fields which deliver data to GA via the internet. These real-time information systems increase reliance on the internet and drive up internet usage costs in the agency. GA consumes approximately two terabytes of data per month in internet usage, and this continues to grow. In addition to the requirements for real-time information, there is increasing demand for the agency to make datasets accessible via web technologies.

High Performance Computing/E-Research Engagement

13. The demands of processing and modelling increasingly large volumes of scientific, geospatial and geophysical information have required GA to engage with high performance computing. GA currently employs both a clustered server environment within the agency and external facilities to satisfy its high performance computing needs.

14. Increasingly GA is using external facilities to deliver this requirement. Engagement with the E-Research community for large scale compute capacity and data sharing capability has resulted in a MOU between GA and the National Computational Infrastructure national

facility. This increases the timeliness of outputs, making it possible for GA to use its data assets to their full resolution. This mode of operation is expected to increase dramatically over the coming years starting with an initial purchase of 390,000 core hours over a one year period. This will be used for geophysical modelling and the processing of remotely sensed satellite imagery. The use of cloud computing in the research domain is a direction that GA is monitoring closely.

15. The inherent complexity of GA's ICT environment is driven by the need to provide support across a heterogeneous environment. Although consolidation of infrastructure and applications is an ICT strategy objective, GA will inevitably maintain a comparatively diverse ICT environment in order to support business diversity and innovation. Considerable effort is required to meet the agency's ICT needs whilst ensuring compliance with whole-of-government requirements.

ATTACHMENT B – LIST OF STAKEHOLDERS CONSULTED

Australian Government Stakeholders

- Attorney-General's Department
- Australian Agency for International Development (AusAID)
- Australian Government Information Management Office
- Australian Institute of Marine Science
- Bureau of Meteorology
- Commonwealth Scientific and Industrial Research Organisation
- Defence Imagery and Geospatial Organisation
- Department of Climate Change and Energy Efficiency
- Department of Finance and Deregulation
- Department of Foreign Affairs and Trade
- Department of Innovation, Industry, Science and Research
- Department of Resources, Energy and Tourism
- Department of Sustainability, Environment, Water, Population and Communities
- Department of the Treasury
- Geoscience Australia
- Great Barrier Reef Marine Park Authority
- Office of Spatial Data Management
- Office of International Law

State and Territory Government Stakeholders

- Australian and New Zealand Land Information Council – the Spatial Information Council
- Geological Survey of Queensland, Department of Employment, Economic Development and Innovation
- Geological Survey of Western Australia, Department of Mines and Petroleum
- Geoscience Victoria, Department of Primary Industries
- Industry and Investment New South Wales
- Northern Territory Geological Survey, Department of Resources
- Primary Industries and Resources South Australia

Industry Stakeholders

- Association of Mining and Exploration Companies
- Australian Petroleum Production and Exploration Association
- Minerals Council of Australia
- Spatial Industries Business Association

ATTACHMENT C

Table 11: Examples of pre-competitive Geoscience Australia data contributing to discovery (including area selection and targeting)

Discovery (Deposit)	Commodity	Status (mine, closed mine, undeveloped deposit, prospect)	Discovery Year	Company	Type of pre-competitive information
Olympic Dam (SA)	copper-gold-uranium-REE	Operating mine	1975	Western Mining Corporation Ltd.	Regional gravity and aeromagnetic data by BMR, regional mapping by SA Geological Survey and BMR.
Nickel deposits in the Eastern Goldfields Province (EGP: WA)	Nickel (copper-PGEs)	Operating mines	1966-present	Kambalda near Lake Lefroy discovered by prospector with follow-up by WMC Resources Ltd; many other nickel deposits in EGP discovered by WMC and other companies using government-generated data.	Regional aeromagnetic data and regional geological maps by BMR and GSWA.
Duchess (Phosphate Hill) and other deposits (Qld)	phosphate	Phosphate Hill currently operating (First phase of mining by Queensland Phosphate Ltd - subsidiary of WMC - 1975-78) Other deposits undeveloped.	Phosphate Hill 1966	Broken Hill South (discovered Phosphate Hill) currently owned by Incitec Pivot.	BMR 1:250 000 geological maps used to locate the Duchess area for sampling.

Discovery (Deposit)	Commodity	Status (mine, closed mine, undeveloped deposit, prospect)	Discovery Year	Company	Type of pre-competitive information
East Alligator uranium field including Ranger and other deposits (NT)	uranium	Ranger - operating mine. Jabiluka, Koongarra undeveloped deposits, Nabarlek - closed mine	Ranger discovered 1969 during airborne radiometric survey by Geopeko Ltd. Koongarra and Nabarlek in 1970 by airborne radiometrics survey, Jabiluka 1 in 1971 by airborne and ground radiometrics surveys, Jabiluka 2 in 1973 by drilling	Geopeko Ltd (Ranger), Koongarra (Noranda Ltd), Nabarlek (Queensland Mines Ltd), Jabiluka (Pancontinental NL).	BMR revised regional map (1:500 000 scale) of Darwin-Katherine region.
Thalanga (Qld)	copper-lead-zinc-silver	Mine	1975	Penarroya (Australia) Pty Ltd.	BMR regional geological mapping.
Yeelirrie (WA)	uranium	Undeveloped deposit	1971	Western Mining Ltd.	BMR regional aerial magnetic and radiometric survey results over part of Yilgarn Craton.
Marsden (NSW)	Cu-Au	Undeveloped Prospect	1997	Newcrest Mining Ltd.	Regional aeromagnetic data.
Goonumbla-Northparkes (NSW)	Cu-Au	Mines	1980 (Endeavour 26 & 27)	Geopeko Ltd.	Regional gravity and aeromagnetic data.

Discovery (Deposit)	Commodity	Status (mine, closed mine, undeveloped deposit, prospect)	Discovery Year	Company	Type of pre-competitive information
South Alligator River uranium field (NT)	uranium	Historic mine	Coronation Hill was discovered by a BMR geologist in 1953, another 13 deposits found by companies	BMR and companies.	Detailed regional geological mapping and radiometric surveys.
Westmoreland (QLD)	uranium	Undeveloped deposit	1956	Mount Isa Mines -Conzinc Rio Tinto of Aust JV.	BMR low level airborne radiometric survey.
Oobagooma (WA)	uranium	Undeveloped deposit	1980	AFMECO.	Found by targeting formations older than the Grants Group drawing on regional geology provided by BMR mapping.
Cadia (NSW)	Gold-copper	Operating mine	1996	Newcrest Mining Ltd.	Regional geological mapping (jointly with GSNSW) and GA geochemical data provided new geological framework.
Nebo-Babel (WA)	nickel-copper-platinum group elements	undeveloped deposit	2000	BMR, and later by WMC Resources Limited.	Regional aeromagnetic and gravity data and AGSO Research Newsletter 27 (1997); BMR Bulletin 239 provided a regional geological setting for the mafic-ultramafic intrusions and possible analogues to major deposits in Canada.

Discovery (Deposit)	Commodity	Status (mine, closed mine, undeveloped deposit, prospect)	Discovery Year	Company	Type of pre-competitive information
Century	Zinc-lead-silver	Operating mine	1980	Discovered by CRA Exploration Pty Ltd; mine owned by	Geological mapping used as part of a conceptual targeting.
Ernest Henry	Copper-gold	Operating mine	1991	Discovered by Hunter Resources Ltd and WMC Resources Ltd; mine now owned by Xstrata.	Regional Geology and geochemical data and concepts published in AGSO Research Newsletter.
Mount Webb	Copper-gold	Prospects	Current	Several companies.	Geochemical data and concepts published in AGSO Research Newsletter.
Cannington	Lead-zinc-silver	Operating mine	1980	BHP Ltd.	Regional Geology.
Crystal Creek	uranium	undeveloped deposit	2009	Uranium Exploration Australia Ltd.	Data from GA airborne radiometric map of Australia (AWAGS) released in 2006.

Source: ACIL Tasman Data source: Geoscience Australia

ACRONYMS

AAO	Administrative Arrangements Order
ABARE	Australian Bureau of Agricultural and Resource Economics
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AGD	Attorney-General's Department
AGIMO	Australian Government Information Management Office
AGSO	Australian Geological Survey Organisation
AIMS	Australian Institute of Marine Science
AMEC	Association of Mining and Exploration Companies
ANAO	Australian National Audit Office
ANSTO	Australia Nuclear Science and Technology Organisation
ANZLIC	Australian and New Zealand Land Information Council – the Spatial Information Council
APPEA	Australian Petroleum Production and Exploration Association
APS	Australian Public Service
ARGN	Australian Regional GPS Network
ASO	Australian Survey Office
ATWS	Australian Tsunami Warning System
AusAID	Australian Agency for International Development
AUSLIG	Australian Surveying and Land Information Group
AWAGS	Australia-wide Airborne Geophysical tie-line Survey
BoM	Bureau of Meteorology
BMR	Bureau of Mineral Resources, Geology and Geophysics
CCS	Carbon Capture and Storage
CCAMLR	UN Convention for the Conservation of Antarctic Marine Living Resources 1982
CEO	Chief Executive Officer
CIPMA	Critical Infrastructure Protection Modelling and Analysis
COAG	Council of Australia Governments
CPI	Consumer Price Index
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTBT	Comprehensive Nuclear Test-Ban Treaty
DAS	Department of Administrative Services

DCCEE	Department of Climate Change and Energy Efficiency
DIGO	Defence Imagery and Geospatial Organisation
DRET	Department of Resources, Energy and Tourism
DSEWPAC	Department of Sustainability, Environment, Water, Population and Communities
FMA Act	Financial Management and Accountability Act 1997
FTE	Full Time Equivalent
GA	Geoscience Australia
GDP	Gross Domestic Product
GEMD	Geospatial and Earth Monitoring Division
GIS	Geographic Information System
GPS	Global Positioning System
ICE	Influence, Capability and Effectiveness
ICSM	Intergovernmental Committee on Surveying & Mapping
ICT	Information and Communications Technology
ISB	Information Services Branch
KPI	Key Performance Indicator
LNG	Liquefied Natural Gas
MCMPR	Ministerial Council on Mineral and Petroleum Resources
MoU	Memorandum of Understanding
MRRT	Minerals Resource Rent Tax
Natmap	Division of National Mapping
NCAS	National Carbon Accounting System
NCRIS	National Collaborative Research Infrastructure Strategy
NGA	National Geoscience Agreement
NPP	New Policy Proposal
OEMD	Onshore Energy and Minerals Division
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OSDM	Office of Spatial Data Management
PBS	Portfolio Budget Statements
PNG	Papua New Guinea
PMD	Petroleum and Marine Division
PRRT	Petroleum Resource Rent Tax
PSI	Public Sector Information
PSMA	PSMA Australia Limited (formerly Public Sector Mapping Agencies)

PTG	Policy Transition Group
ReconEX	Reconnaissance Exploration
RET	Resources, Energy and Tourism
SDAP policy	Spatial Data Access and Pricing policy
SDMG	Spatial Data Management Group
SHRIMP	Sensitive High Resolution Ion Microprobe
SNIP	Shared Navigation Integration Project
TERSS	Tasmanian Earth Resources Satellite Station
UN	United Nations
WDV	Written Down Value
WPB	Work Program Bidding