Gas Industry Social & Environmental Research Alliance

GISERA Annual research & development plan and budget

2016/17

GISERA, GPO Box 2583, Brisbane QLD 4001, Australia

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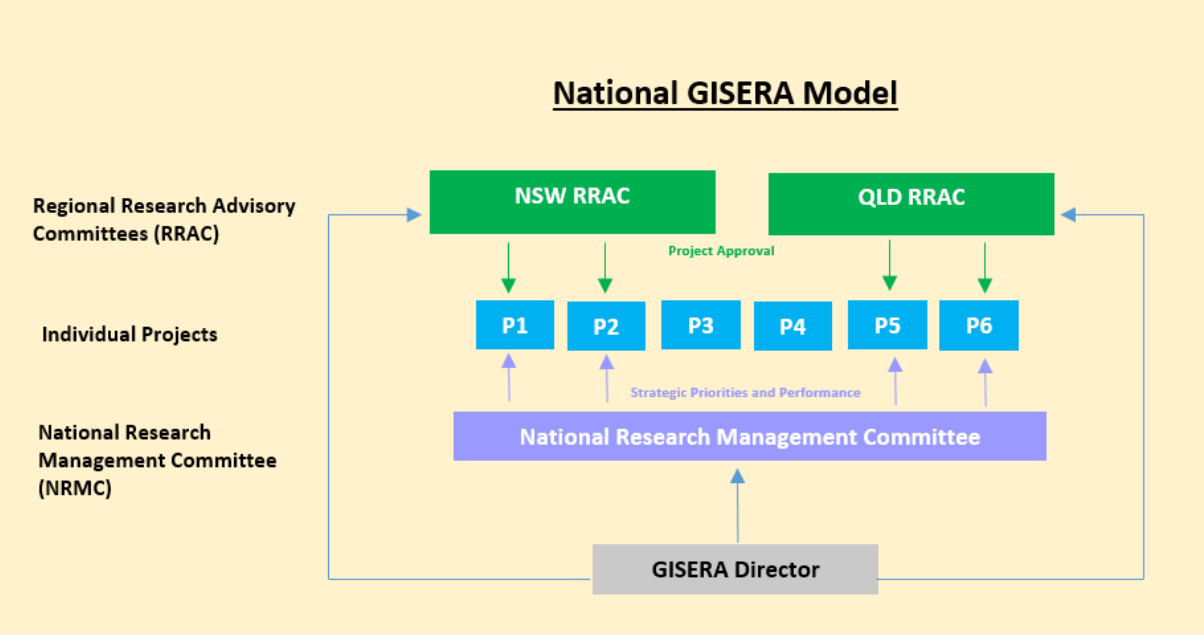
Director's summary

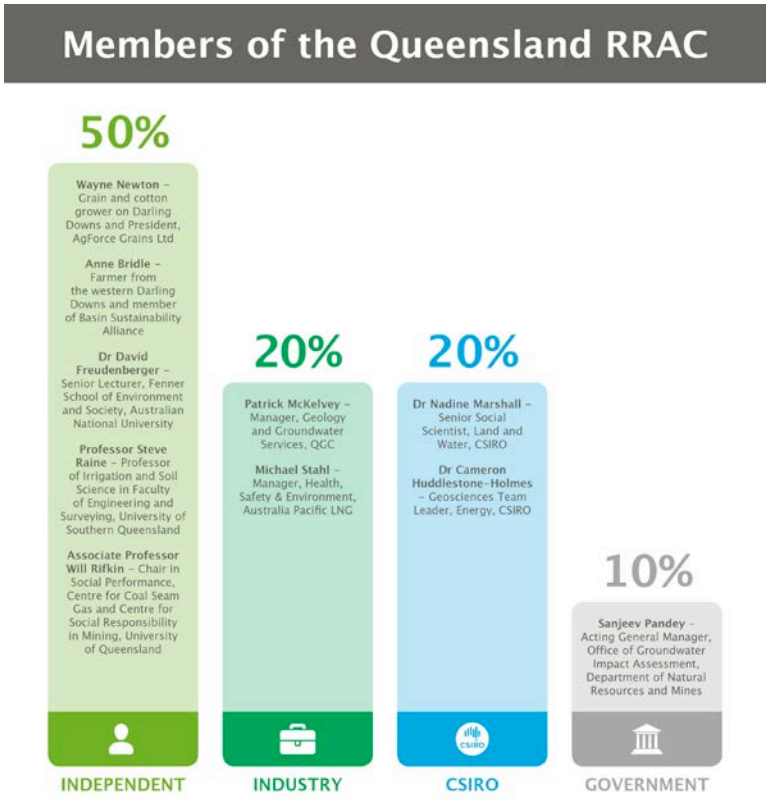
The Gas Industry Social & Environmental Research Alliance (GISERA) was formed to provide scientific research that contributes constructively and objectively to the community, government and industry need independent and trusted information on the coal seam gas industry in eastern Australia. GISERA's research addresses the potential social, economic and environmental challenges and opportunities that the gas industry poses to communities.

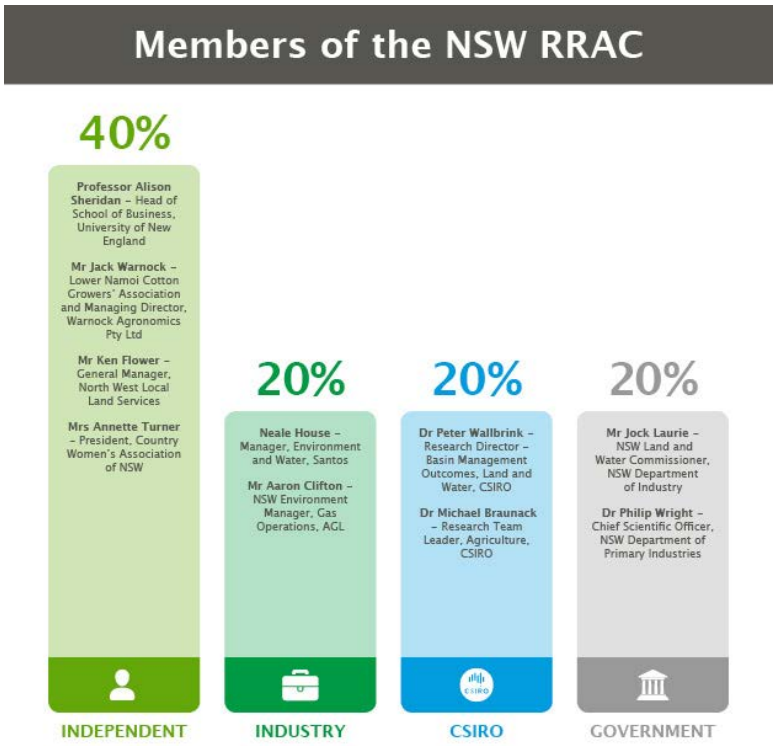
Members of GISERA now include Australia Pacific Liquefied Natural Gas (APLNG), Queensland Gas Company (QGC), Australian Gas Light Company (AGL), Santos, Origin Energy and CSIRO. GISERA also receives funding from the Australian Commonwealth and New South Wales Governments. The majority of funds have been made available to GISERA by government.

A key function of CSIRO in GISERA is to undertake research on issues of direct community interest using funding supplied by the gas industry and governments. To ensure independence of CSIRO research, a rigorous governance structure is imposed utilising external stakeholder dominated Regional Research Advisory Committees (RRAC) in NSW and Queensland. The RRACs are responsible for approving the allocation of research funds to projects which meet the community objectives. The National Research Management Committee ensures fiscal and project level responsibilities are met but does not determine where research funds are spent. The governance structure is shown below:



The composition and membership of the Queensland and NSW RRACs is critical to the success of GISERA and, as shown below, are dominated by esteemed and respected independent participants from the communities in which gas development is occurring:





GISERA's primary objectives are to:

- carry out independent research and improve and extend knowledge of social and environmental impacts and opportunities of onshore gas projects for the benefit of the industry, community and the broader public
- inform government, regulators and policy-makers on key issues regarding policy and legislative framework for the gas industry.

GISERA aims to achieve credibility, trust and respect from all stakeholders through the open and transparent conduct and communication of its research and synthesis activities. All aspects of GISERA research are publically available on the GISERA website: www.gisera.org.au.

The years that's been

The expansion of GISERA was finalised with industry partners Santos, AGL, APLNG, Origin and QGC all committing $450,000 each over the life of National GISERA. These contributions supplement the $3 million investment provided by the NSW Department of Industry and the Federal Government's Department of Industry, Innovation and Science. The new National Alliance Agreement was fully executed on 4 January 2016.

The NSW Regional Research Advisory Committee (RRAC) was established and held its first meeting in May 2016 to review the first tranche of research proposals resulting in the following 4 projects being approved:

- A Socio-Economic project titled 'Analysing economic and demographic trajectories in NSW regions experiencing CSG development and operations' that will identify current levels and trajectories of economic, social and demographic variables in CSG regions within NSW and analyse whether or not the CSG industry could change the trajectory of these variables. Project details are available on the website Analysing economic and demographic trajectories;

- A Socio-Economic project titled 'Social baseline assessment of the Narrabri region of NSW in relation to CSG development' which aims to understand and measure attitudes, perceptions and expectations that exist within the community with respect to CSG development, and current levels of community wellbeing and community resilience. Project details are available on the website Social baseline assessment;

- A Greenhouse Gas project titled 'Regional methane emissions in NSW CSG basins' that will identify and quantify methane emission sources such as CSG infrastructure, feedlots, coal mining, legacy bore holes in the Pilliga region. Project details are available on the website Regional Methane Emissions; and

- A Surface and Groundwater project titled 'Impacts of CSG depressurisation on the Great Artesian Basin (GAB) flux' that will improve the understanding of the GAB groundwater flow in the Pilliga region through integration of existing information from models, hydrochemical data and environmental tracers. Project details are available on the website Impacts of CSG depressurization on Great Artesian Basin flux.

The Queensland RRAC met in September 2015 and February 2016 to review research proposals resulting in the following 4 projects being approved:

- An Agriculture project titled 'Telling the Story' that will share understanding of changes on farms and in towns during CSG development. This will be done through the development of a detailed landscape change map and a series of communication tools that will be used at some local shows and community events. This community engagement will also be used to

gather feedback on our research to date, including its strengths and information gaps. Project details are available on the website Telling-the-Story;

- A Socio-Economic project titled 'Community functioning and wellbeing survey 2' that will examine and measure the changes since the end of the construction and beginning of the operations phases through comparisons with survey 1 in 2014. Project details are available on the website Community-wellbeing-2;

- A Surface and Groundwater project titled 'Constraining groundwater flow rates in the Surat Basin through environmental tracer and hydrochemical data' that will involve the measuring and modelling environmental tracers for an improved understanding of groundwater flow rates. Project details are available on the website Constraining-groundwater-flow-rates; and

- A Greenhouse Gas project titled 'Whole of life cycle greenhouse gas assessment of the exploitation of the Surat Basin gas reserve: global benefits and risks' that will assess the whole of life cycle greenhouse gas emissions of the exploitation of the Surat Basin natural gas reserve including extraction, transportation and usage. The analysis of GHG emissions will include domestic and offshore usage of the gas including for electricity generation in Asia. Project details are available on the website Whole-of-life-cycle-ghg-assessment.

- A Greenhouse Gas project titled 'Ambient air quality in the Surat Basin' that will identify the impact of CSG production activities on air quality in the Surat region. Project details are available on the website Ambient air quality in the Surat Basin.

The following 5 Queensland projects were completed during this reporting period:

- Fire ecology of grassy woodlands;

- Habitat selection at different spatial scales by two focal species: the golden-tailed gecko and glossy black-cockatoo;

- Monitoring of geochemical and isotopic characteristics of CSG formation waters, adjacent aquifers and springs;-

- Understanding and quantifying clogging and its management during re-injection of CSG water permeates, brines and blends; and

- Understanding community aspirations.

All GISERA results and research outputs including scientific reports, journal papers and factsheets are available to view and download on their respective research projects.

GISERA sponsored the Australian Academy of Technological Sciences and Engineering (ATSE) Unconventional Gas Conference which was held in Sydney on 22-23 September 2015. The ATSE Conference was a significant success and provided a considered and balanced viewpoint on what the science and research is telling us about the real risks (and also benefits) of unconventional gas development in Australia.

The 2015 Agriculture Director's Awards in CSIRO recognise the achievements of individuals and teams across 11 different categories. The GISERA Agricultural Land Management Team were nominated for and received the Collaboration Award. Team members included Neil Huth, Brett Cocks, Perry Poulton, Neal Dalgieish, Ethel Samalca, Cameron Vacher, Oswald Mainoni, Javier Navarro-Garcia (CSIRO Land & Water), Wu Xiaoling, Jeremy Wallace, Peter Caccetta , Simon Collings (CSIRO Data61), Dio Antilles and Jochen Eberhard (USQ/NCEA).

Looking ahead

The NSW RRAC will meet again in October 2016 to consider the proposals that have been developed as part of tranche 2. It is expected that this tranche will carry the bulk of the spending and comprise of 7 or 8 projects based on stakeholder consultation that has occurred across NSW with various stakeholder groups.

1 National Budget

GISERA's first *Annual research & development plan and budget* detailed research projects that were scheduled to commence in 2012. This is the fifth *Annual research & development plan and budget* and covers the financial year 2016-17.

The *Annual research & development plan and budget*:

- details the minimum contribution of each Partner to GISERA.
- includes the committed research investment and expenditure for existing projects
- identifies proposed research projects to be undertaken in the financial year, including draft project description and project budget.

1.1 National Budget

1.1.1 Contributions and Grants

The committed financial contributions received from membership, in-kind, grants and from APPEA over the life of GISERA is outlined in Table 1.1.

Table 1.1 Incoming contributions and grants, by contributor, 2011/12-2018/19

Group	Contributor	Payment type	Initial GISERA	National GISERA	Total
Industry	APLNG	Membership	$10,000,000	$300,000[1]	$10,300,000
	QGC	Membership	$1,250,000	$300,000[2]	$1,550,000
	Santos	Membership	-	$450,000	$450,000
	AGL	Membership	-	$450,000	$450,000
	Origin	Membership	-	$450,000	$450,000
	APLNG, Santos, Arrow Energy & QGC	Contribution via APPEA (GHG 1 - Methane Seepage fluxes project)	$1,121,707	-	$1,121,707
Government	Federal Government	Grant	-	$1,500,000	$1,500,000
	NSW Government	Grant	-	$1,500,000	$1,500,000
CSIRO	CSIRO	In-kind	$5,392,093	$1,500,000	$6,892,093
Other	USQ	In-kind (Agland 5 - Without a Trace project)	$79,990	-	$79,990
TOTAL			**$17,843,790**	**$6,450,000**	**$24,293,730**

[1] The figure does not include APLNG's first annual contribution of $150,000 towards National GISERA. As per clause 7.1 (d) of National Alliance Agreement, the parties agreed that this contribution was made under the Initial Alliance Agreement.

[2] The figure does not include QGC's first annual contribution of $150,000 towards National GISERA. As per clause 7.1 (d) of National Alliance Agreement, the parties agreed that this contribution was made under the Initial Alliance Agreement.

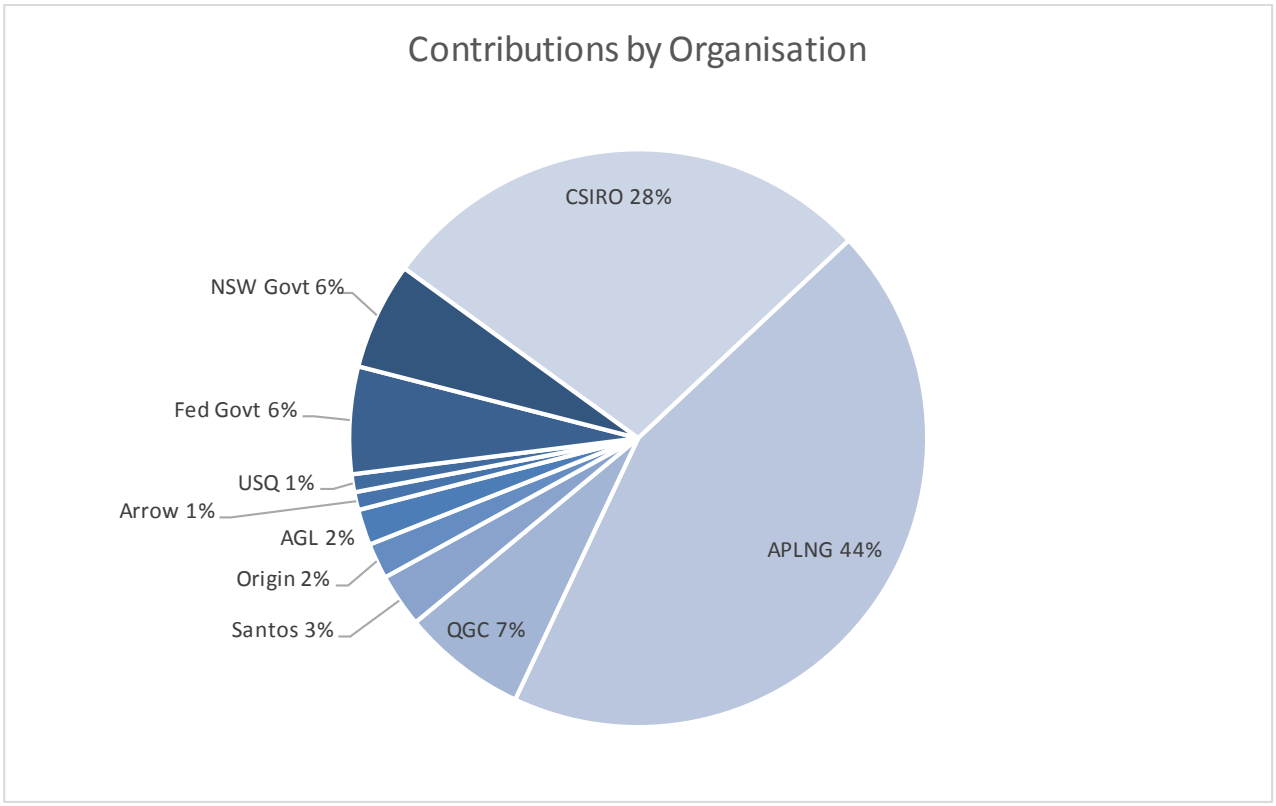


Figure 1.1 Committed contribution over life of GISERA, by organisation

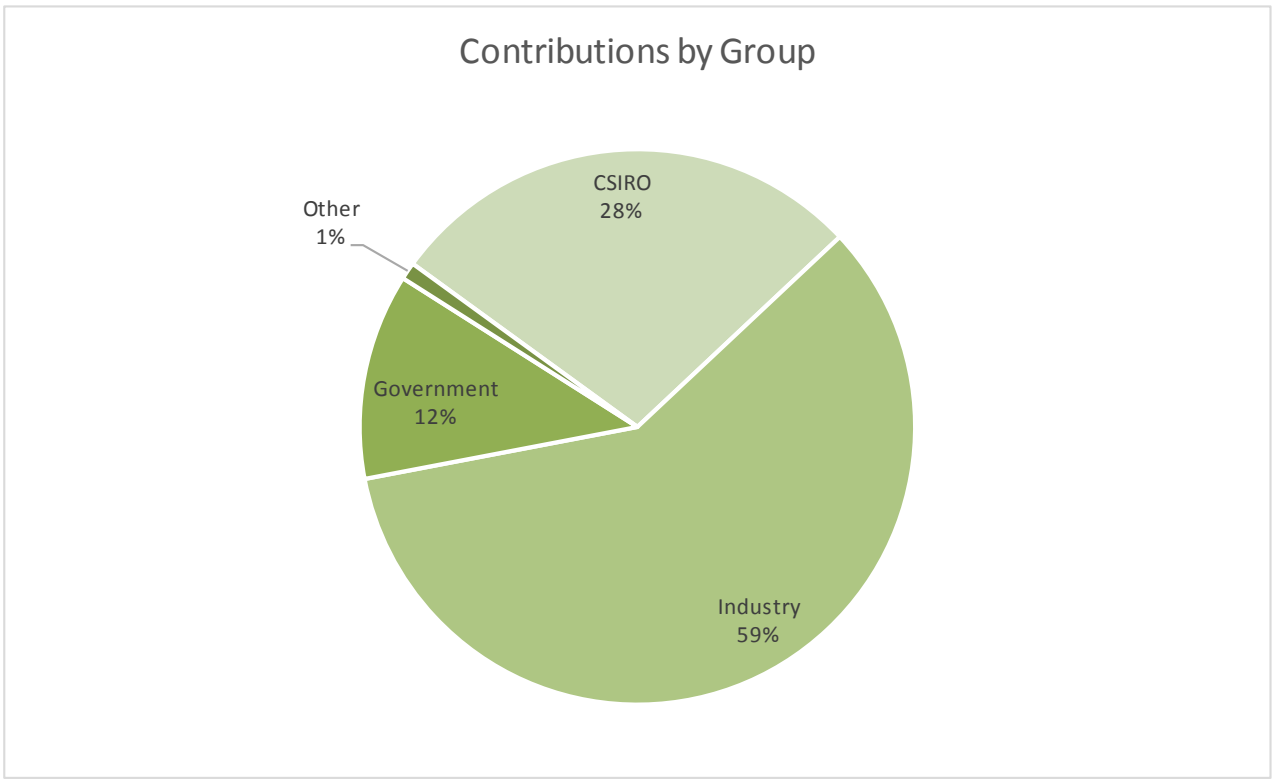


Figure 1.2 Committed contribution over life of GISERA, by group

1.1.2 Committed Research Investment

The committed budget for projects across all regions for 2011/12-2018/19 now stands at $16,679,471. A breakdown of the committed research budget for the various subject areas is illustrated in Table 1.2 and Figure 1.3 shows the percentage committed to each subject area.

Table 1.2 Committed research investment across all regions, by topic, 2011/12-2018/19

Topic / Year	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017/18	2018/19	Total
Water	$1,102,043	$1,467,581	$712,243	$100,000	$579,672	$1,147,202	$191,783	$10,000	$5,310,524
Greenhouse gas	-	-	$111,553	$627,286	$740,638	$1,038,437	$483,413		$3,001,325
Agriculture	-	$732,594	$863,669	$533,301	$273,747	$172,522	-		$2,575,833
Biodiversity	-	$414,761	$663,163	$503,048	$290,265	$228,691	-		$2,099,928
Marine	-	$857,142	$357,143	$478,914	-				$1,693,199
Social & economic	-	$420,365	$434,000	$300,581	$266,933	$525,501	$51,282		$1,998,662
Total	**$1,102,043**	**$3,892,443**	**$3,141,771**	**$2,543,130**	**$2,151,253**	**$3,112,353**	**$726,478**	**$10,000**	**$16,679,471***

**These figures do not include funds for the GISERA Director's office and communications.*

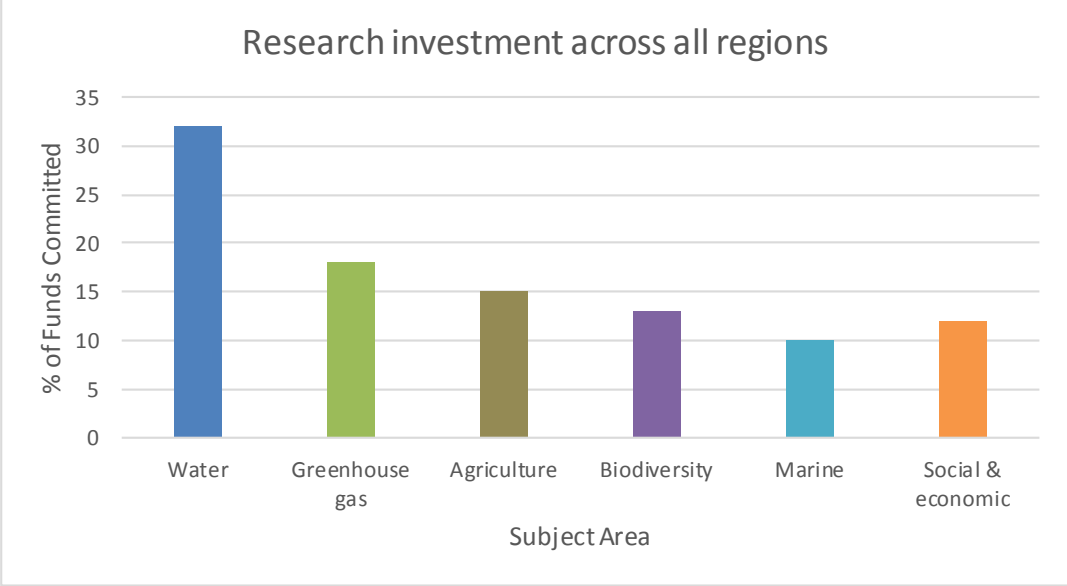


Figure 1.3 Committed research investment across all regions, by subject area, 2011/12-2018/19

2 Queensland R&D Plan & Budget

2.1 Queensland Investment profile

2.1.1 Committed research investment for 2011/12-2018/19

The committed budget for projects in Queensland for 2011/12-2018/19 now stands at $15,638,817. A breakdown of the committed research budget across the various subject areas is illustrated in Table 2.1 and Table 2.2 shows the investment committed by contributor.

Table 2.1 Committed research investment in Queensland by topic, 2011/12-2018/19

Topic / Year	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017/18	2018/19	Total
Water (31%)	$1,102,043	$1,467,580	$712,245	$100,000	$579,672	$895,698		-	$4,857,238
Greenhouse gas (18%)	-	-	$111,553	$627,286	$740,636	$836,528	$483,410	-	$2,799,414
Agriculture (17%)	-	$732,594	$863,669	$533,301	$273,747	$172,522	-	-	$2,575,833
Biodiversity (13%)	-	$414,761	$663,163	$503,048	$290,265	$228,691	-	-	$2,099,928
Marine (11%)	-	$857,142	$357,143	$478,914	-	-	-	-	$1,693,199
Social & economic (10%)	-	$420,365	$434,000	$300,581	$266,933	$191,326	-	-	$1,613,205
Total	**$1,102,043**	**$3,892,442**	**$3,141,773**	**$2,543,130**	**$2,151,253**	**$2,324,765**	**$483,410**	-	**$15,638,817**

Table 2.2 Committed research investment in Queensland by contributor, 2011/12-2018/19

Partner	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017/18	2018/19	Total
CSIRO (29%)	$220,410	$1,000,445	$862,590	$812,370	$680,418	$803,137	$159,410	-	$4,538,784
USQ (1%)	-	$37,958	$42,032	-	-	-	-	-	$79,990
Australia Pacific LNG (58%)	$881,633	$2,854,039	$1,950,354	$987,988	$1,096,033	$989,461	$87,336	-	$8,846,844 (GISERA membership)
	-	-	$18,574	$104,443	$52,470	$52,470	$52,470	-	$280,427 (Methane Seepage project)
QGC (8%)	-	-	$212,500	$325,000	$164,922	$322,287	$26,784	-	$1,051,493 (GISERA membership)
	-	-	$18,574	$104,443	$52,470	$52,470	$52,470	-	$280,427 (Methane Seepage project)
Santos (2%)	-	-	$18,574	$104,443	$52,470	$52,470	$52,470	-	$ 280,427 (Methane Seepage project)
Arrow Energy (2%)	-	-	$18,574	$104,443	$52,470	$52,470	$52,470	-	$280,427 (Methane Seepage project)
Total (100%)	**$1,102,043**	**$3,892,442**	**$3,141,773**	**$2,543,130**	**$2,151,253**	**$2,324,765**	**$483,410**	-	**$15,638,817**

2.1.2 Queensland Current Research Portfolio

A summary of all approved research projects in Queensland is provided in table 2.3.

Table 2.3 Approved Queensland Research Projects

Research Subject Area	Project	Scope	Outcomes
Surface and groundwater	Geochemical responses to re injection	**SCOPE:** understand and quantify aquifer reactions occurring due to re-injection of CSG water, and their impacts on water quality.	**OUTCOMES:** methods for predicting water quality changes resulting from CSG water re-injection.
	Re-injection of CSG water*	**SCOPE:** understand, quantify and manage clogging of injection wells during re-injection of CSG water permeates, brines and blends.	**OUTCOMES:** strategies to manage clogging of re-injection wells to maximise re-injection volumes.
	High performance groundwater modelling*	**SCOPE:** determine the feasibility of large scale re-injection schemes.	**OUTCOMES:** models that assess the feasibility of large re-injection schemes and predict how re-injection may reduce impacts from CSG development.
	Isotope and geochemical groundwater baseline study *	**SCOPE:** characterise the baseline geochemistry of groundwater and formation water prior to and during initial stages of development to understand groundwater age and origin.	**OUTCOMES:** baseline measures of groundwater quality and protocols for monitoring changes in groundwater quality, during and after development.
	Hydrocarbons in groundwater, Surat and Bowen basins	**SCOPE:** review and assess the presence of organic compounds in groundwater found in the Surat and Bowen basins using existing open source and company held data	**OUTCOMES:** information and methods to assess possible sources of hydrocarbons in groundwater to help differentiate naturally occurring hydrocarbons and those potentially introduced during gas extraction process.
	Improving groundwater flow models	**SCOPE:** measuring and modelling specific chemicals called environmental tracers to gain a better understanding of the speed and direction of groundwater flow.	**OUTCOMES:** new data and modelling approach to assess flow rates and volumes of usable groundwater resources in CSG regions in Queensland.
Social and economic	Monitoring regional transition*	**SCOPE:** synthesise existing knowledge on the nature of rural socio-economic transitions occurring as a result of resource developments, and track the social impacts of regional economic change.	**OUTCOMES:** identify ways to help local communities in responding to resource development in order to maximise social benefit.

Research Subject Area	Project	Scope	Outcomes
	Community functioning and well-being*	**SCOPE:** identify principal indicators of community function and well-being, the resources and strategies necessary for enabling and enhancing community responses, and how communities respond to major developments in their region.	**OUTCOMES:** inform strategic investments that will help maintain or enhance community function and well-being.
	Economic assessment and forecasting project	**SCOPE:** understand future impacts on regional economies and how local businesses can respond.	**OUTCOMES:** forecasts calculating likely economic effects during the operations phase and lessons to support local businesses.
	Understanding community aspirations*	**SCOPE:** identify community aspirations and their overlaps and/or disparities with existing resources, industry, and policy trajectories. Specifically, to understand how different community segments see the future of the region and how these reflect the economic and policy avenues for the region.	**OUTCOMES:** help inform sound industry and policy activities to satisfy the social licence to operate
	Community function and well-being survey 2	**SCOPE:** conduct a community well-being survey to measure the changes since the end of the construction and start of the operations phases and compare results with the Survey 1 in 2014.	**OUTCOMES:** identify strategies that can be enacted by local and state government to proactively reduce stresses associated with rapid change and also to take advantage of opportunities arising from resource development
Marine environment	Sustaining turtles and their homes*	**SCOPE:** understand how sediments from dredging and discharges affect seagrass and turtles.	**OUTCOMES:** quantifying the risks to turtle populations from dredging and increased boat traffic.
Greenhouse gas footprint	Methane seepage in the Surat Basin	**SCOPE:** detect and measure methane seeping from underground in the Surat Basin, and identify sources of methane to provide a baseline of methane emissions on a regional scale.	**OUTCOMES:** a methane emissions data set that can be used to compare changes in methane concentrations as coal seam gas production in the Surat Basin increases.
	Greenhouse gas emission assessment of the Surat Basin Gas Reserve	**SCOPE:** analysis of the whole of life cycle GHG emissions, including extraction, transportation and usage of CSG in the Surat Basin.	**OUTCOMES:** assessments of benefits and risks related to the extraction, transport and usage of gas in terms of their GHG emission footprint
	Ambient air quality in the Surat Basin	**SCOPE:** comprehensive assessment of air quality in the Surat Basin region in Queensland using air quality measurement network and modelling.	**OUTCOMES:** identify the impact of CSG production activities on air quality in the Surat region.
Agricultural land management	Preserving agricultural productivity	**SCOPE:** assist in the preservation of agricultural productivity during land use change.	**OUTCOMES:** developing methods for most equitably and/ or cost-effectively preserving agricultural productivity

Research Subject Area	Project	Scope	Outcomes
	Shared space*	**SCOPE:** understand how farmers from a range of production systems (extensive grazing to intensive cropping) perceive and value CSG developments on their and others' farms.	**OUTCOMES:** information that assists farmers and developers to negotiate means of co-existence that maximise benefits and minimise social and economic costs.
	Gas farm design	**SCOPE:** understand how to design farms for a new mixed land use	**OUTCOMES:** design principles and practices that optimise farm and gas infrastructure and operations, minimising negative impacts and maximising benefits.
	Making tracks, treading carefully	**SCOPE:** understand the direct and indirect impacts of tracks and traffic on invasive species and erosion in agricultural landscapes	**OUTCOMES:** guidelines for quantifying, monitoring and managing weed and erosion threats.
	Without a trace*	**SCOPE:** identify the nature and likely extent of damage to agricultural soils, and methods for avoiding and improving soils.	**OUTCOMES:** methods for installing and operating gas infrastructure that avoids soil damage, and novel methods for rehabilitating damage that does occur.
	Telling the story	**SCOPE:** share understanding of changes on farms and in towns during CSG development in the Surat area.	**OUTCOMES:** development of a detailed landscape map showing changes during CSG developments and face-to-face engagements at local shows or community events in the Surat region.
Terrestrial biodiversity	Priority threat identification, management and appraisal *	**SCOPE:** identify and understand the broad range of existing and new threats to biodiversity across a CSG development region.	**OUTCOMES:** determine which conservation management activities will best mitigate the risks to biodiversity
	Fire ecology of grassy woodlands*	**SCOPE:** determine the sensitivity of the region's flora and fauna to changed fire regimes, and the thresholds at which changed fire regimes cause substantial ecological impact.	**OUTCOMES:** advice on how to best manage the biodiversity impacts of altered fire regimes associated with CSG development.
	Habitat selection by two focal species*	**SCOPE:** study two species, the Golden-tailed gecko and Glossy black-cockatoo, to assess the range of impacts from CSG development in south-west Queensland on their habitat.	**OUTCOMES:** management options for the Golden-tailed gecko and Glossy black-cockatoo habitats to ensure their long-term endurance
	Ensuring biodiversity offset success: the right kind of seed for a rare daisy *	**SCOPE:** identify genetic and demographic factors that may limit the success of establishing a rare daisy (*Rutidosis lantana*) in a new location.	**OUTCOMES:** best practice guidelines for moving the *Rutidosis lantana*, a rare daisy, to a new location. The guidelines will help to minimise biological limits to reproductive success and maximise population viability of the daisy.

*These projects have been completed and their reports are available at www.gisera.org.au

2.1.3 Queensland Research Progress and Expenditure

The committed Queensland research budget, expenditure and milestones completed for each project is provided in table 2.4.

Table 2.4 Committed research investment, expenditure and progress in Queensland, by project

Research Subject Area	Project	Allocated budget	Expenditure up to 30 June 2016[3]	Percentage of budget spent up to 30 June 2016	Percentage of milestones completed up to 30 June 2016[4]
Surface and groundwater	Geochemical responses to re-injection	$1,061,242	$969,418	91%	92%
	Re-injection of CSG water*	$1,039,989	$1,085,085	104%	100%
	High performance groundwater modelling*	$928,215	$1,024,173	110%	100%
	Isotope and geochemical groundwater baseline study*	$667,053	$709,848	106%	100%
	Hydrocarbons in groundwater, Surat & Bowen basins	$571,782	$382,739	67%	13%
	Improving groundwater flow models	$588,957	$76,476	13%	25%
Social and economic	Monitoring regional transition*	$376,088	$404,084	107%	100%
	Community functioning and well-being*	$417,438	$457,314	110%	100%
	Economic assessment and forecasting project	$296,508	$279,998	94%	70%
	Understanding community aspirations*	$342,692	$341,821	100%	100%
	Community function and well-being survey 2	$180,479	$126,102	70%	33%

[3] This is derived from the actual costs (labour, operating and other expenses) occurring against specific projects. It is important to note that actual and budget costs are likely to move in and out of phase during the life of a project. Discrepancies during project life may or may not exist at project completion. If, at any point in time (including project completion), actual costs exceed budgeted costs, there is no financial penalty to GISERA members. Those responsible for executing projects (e.g. CSIRO portfolios) bear the cost of budget over-runs.

[4] Partially completed milestones are not included in this figure.

Research Subject Area	Project	Allocated budget	Expenditure up to 30 June 2016[3]	Percentage of budget spent up to 30 June 2016	Percentage of milestones completed up to 30 June 2016[4]
Marine environment	Sustaining turtles and their homes*	$1,693,199	$1,802,905	106%	100%
Greenhouse gas footprint	Methane seepage in the Surat Basin	$2,015,936	$1,347,682	67%	40%
	Greenhouse gas (GHG) emission assessment of the Surat Basin Gas Reserve	$241,708	$92,823	38%	17%
	Ambient air quality in the Surat Basin	$541,770	$187,015	35%	0%
Agricultural land management	Preserving agricultural productivity	$547,756	$508,190	93%	92%
	Shared space*	$140,445	$138,805	99%	100%
	Gas farm design	$651,329	$621,238	95%	93%
	Making tracks, treading carefully	$564,089	$578,030	102%	92%
	Without a trace*	$339,990	$339,990[5]	100%	100%
	Telling the story	$332,224	$223,511	67%	50%
Terrestrial biodiversity	Priority threat identification, management and appraisal	$945,400	$922,192	98%	83%
	Fire ecology of grassy woodlands*	$789,042	$839,972	106%	100%
	Habitat selection by two focal species*	$167,432	$200,863	120%	100%
	Ensuring biodiversity offset success: the right kind of seed for a rare daisy	$198,055	$223,423	113%	67%
	TOTAL ALLOCATED BUDGET	**$15,638,817**			

**These projects have been completed and their reports are available at www.gisera.org.au*

[5] This includes $79,990 in-kind contribution from USQ.

2.1.4 Queensland Research Progress update

An approved research project consists of a Project Order and Budget that has been approved by the Regional Research Advisory Committee and signed by all participating partners.

During the execution of an approved project, changes and modifications to the Project Order and Budget may be submitted to the Director for consideration. The Director may approve minor modifications to Project Orders that do not significantly alter the proposed outcomes, and do not have significant financial consequences for the project. The Director may consult the Regional Research Advisory Committee about these modifications.

Major modifications to Project Orders that may involve significant financial consequences or significant change in project scope will be prepared in consultation with the Director and presented to the Regional Research Advisory Committee for approval. Any changes made to Project Orders are clearly recorded on the Project Order, and available for public perusal.

Research updates and progress against project milestones are reported quarterly. Variations, if any, are also included as this allows any variations/modifications to the Project Order to be tracked easily. Summaries of each project's progress against milestones and variations, as well as the original Project Order, are available on the GISERA website: https://gisera.org.au/research/

2.2 Queensland proposed research investment for 2016/17 - 2018/19

There is approximately $624,054 Australia Pacific LNG and QGC cash research budget available for new project proposals to be initiated in FY 2016/17 and beyond.

The *Annual research & development plan and budget* proposes committing about $432,511[6] of Australia Pacific LNG and QGC cash to prospective projects for which budgets have been estimated (Table 2.5). Table 2.5 shows the proposed division of the available research budget across the various subject areas. Table 2.6 illustrates the estimated research investment by GISERA's existing contributors.

Table 2.5 Proposed research investment in Queensland by topic, 2016/17-2018/19

Topic /Year	2016-2017	2017-2018	2018-2019	Total
Biodiversity	$70,000	$147,873	-	$217,873
Agriculture	$116,667	$200,000	$83,333	$400,000
TOTAL	**$186,667**	**$347,873**	**$83,333**	**$617,873**

[6] Total cost of $617,873 (includes $432,511 GISERA funding and $185,362 CSIRO appropriation)

Table 2.6 Proposed research investment in Queensland by contributor, 2016/17-2018/19

Partner	2016-17	2017-18	2018-19	Total
CSIRO	$56,000	$104,362	$25,000	$185,362
Australia Pacific LNG and QGC	$130,667	$243,511	$58,333	$432,511
TOTAL	**$186,667**	**$347,873**	**$83,333**	**$617,873**[7]

[7] Total cost of $617,873 (includes $432,511 GISERA funding and $185,362 CSIRO appropriation)

2.3 Queensland proposed new research projects for 2016/17

The following project is proposed, but is yet to be ratified and is subject to review by the QLD Regional Research Advisory Committee. CSIRO is currently drafting a project proposal. It is currently unknown whether this project will be approved and proceed.

Table 2.7 Proposed research investment in Queensland for 2016/17 and beyond, by project

Subject Area	Title	Objective	Duration
Biodiversity	Guidelines for conservation management of plants using modelling methods	This project will create generic but biologically-based guidelines for plant population restoration or offset practices using computer simulation models that consider demography and genetics. Plant species with different sets of life history traits have different ecological requirements for survival and reproduction. Therefore, these considerations are important for population viability and the maintenance of genetic diversity. This project will provide clear guidelines for groups of plants defined by shared ecology or similar life-history traits (e.g. short-lived generalist herbs, long-lived bird-pollinated shrubs). For multiple groups of plants, the aim is to provide guidelines for the size and number of populations needed to achieve at least 80% probability of population survival across 100 years. Plant groups will be defined to cover species of conservation and management interest in Queensland and especially in CSG areas. Results can be used to guide specific current and future restoration activities and more generally to inform future legislative requirements and frameworks.	18 months
Agriculture	CSG and Livestock – Inside the herd	This research will address questions about the impacts of traffic and dust on animals and pastures, methane emissions from wells and livestock, and impacts of CSG on hydrology and pastures. It aims to provide information for graziers through the detailed monitoring of a grazing property. Researchers will discuss these data with landholders at relevant rural industry events using maps and animations worked into story pieces.	2 years

3 NSW R&D Plan & Budget

3.1 NSW Investment profile

3.1.1 Committed research investment for 2015/16-2018/19

The committed budget for projects in New South Wales for 2015/16-2018/19 now stands at $1,040,654. A breakdown of the committed research budget across the various subject areas is illustrated in Table 3.1 and Table 3.2 shows the investment committed by contributor.

Table 3.1 Committed research investment in NSW by topic, 2015/16-2018/19

Topic / Year	2015/16	2016/17	2017/18	2018/19	Total
Water (44%)	-	$251,504	$191,783	$10,000	$453,287
Greenhouse gas (19%)	-	$201,910	-	-	$201,910
Social & economic (37%)	-	$334,175	$51,282	-	$385,457
TOTAL	-	**$787,589**	**$243,065**	**$10,000**	**$1,040,654**

Table 3.2 Committed research investment in NSW by contributor, 2015/16-2018/19

Partner	2015/16	2016/17	2017/18	2018/19	Total
CSIRO (25%)	-	$196,897	$60,765	$2,500	$260,162
Santos (12.5%)	-	$98,449	$30,383	$1,250	$130,082
AGL (12.5%)	-	$98,449	$30,383	$1,250	$130,082
Federal Government (25%)	-	$196,897	$60,767	$2,500	$260,164
NSW State Government (25%)	-	$196,897	$60,767	$2,500	$260,164
TOTAL		**$787,589**	**$243,065**	**$10,000**	**$1,040,654**[8]

[8] Total cost of $1,040,654 (includes $780,492 GISERA funding and $260,162 CSIRO appropriation)

3.1.2 NSW Current Research Portfolio

A summary of all approved research projects in NSW is provided in table 3.3.

Table 3.3 Approved NSW Research Projects

Research Subject Area	Project	Scope	Outcomes
Surface and groundwater	Impacts of CSG depressurization on Great Artesian Basin flux	**SCOPE:** improve the understanding of the GAB groundwater flow in the Pilliga region through integration of existing information from models, hydrochemical data and environmental tracers	**OUTCOMES:** assess the chances of extreme changes in GAB groundwater flux (flow volumes) as a result of CSG development using state of the art uncertainty analysis and modelling.
Social and economic	Analysing economic and demographic trajectories in NSW regions experiencing CSG development	**SCOPE:** identify current levels and trajectories of economic, social and demographic variables in CSG regions within NSW and analyse whether or not the CSG industry could change the trajectory of these variables.	**OUTCOMES:** comprehensive baseline assessment of economic, social and demographic characteristics of CSG regions in NSW and the potential impacts of CSG on these characteristics.
	Social baseline assessment of the Narrabri region of NSW in relation to CSG development	**SCOPE**: understand and measure attitudes, perceptions and expectations that exist within the community with respect to CSG development, and current levels of community wellbeing and community resilience.	**OUTCOMES:** baseline information about the community's wellbeing, perceptions, expectations and resilience in relation to CSG development.
Greenhouse gas footprint	Regional Methane Emissions in NSW CSG Basins	**SCOPE:** identify and quantify methane emission sources such as CSG infrastructure, feedlots, coal mining, legacy bore holes in the Pilliga region	**OUTCOMES:** detailed inventory and map of methane emissions for the Pilliga region that can be used to compare emissions once large scale gas extraction starts.

3.1.3 NSW Research Progress and Expenditure

The committed New South Wales research budget, expenditure and milestones completed for each project is provided in table 3.4.

Table 3.4 Committed research investment, expenditure and progress in NSW, by project

Research Subject Area	Project	Allocated budget	Expenditure up to 30 June 2016*	Percentage of budget spent up to 30 June 2016*	Percentage of milestones completed up to 30 June 2016*
Surface and groundwater	Impacts of CSG depressurisation on the Great Artesian Basin (GAB) flux	$453,288	$0	0%	0%
Social and economic	Analysing economic and demographic trajectories in NSW regions experiencing CSG development and operations	$113,167	$0	0%	0%
	Social baseline assessment of the Narrabri region of NSW in relation to CSG development	$272,292	$0	0%	0%
Greenhouse gas footprint	Regional methane emissions in NSW CSG basins	$201,910	$0	0%	0%
	TOTAL ALLOCATED BUDGET	**$1,040,654**			

**It is expected that project progress and expenditure will commence for all projects in 2016/17.*

3.1.4 NSW Research Progress update

An approved research project consists of a Project Order and Budget that has been approved by the Regional Research Advisory Committee and signed by all participating partners.

During the execution of an approved project, changes and modifications to the Project Order and Budget may be submitted to the Director for consideration. The Director may approve minor modifications to Project Orders that do not significantly alter the proposed outcomes, and do not have significant financial consequences for the project. The Director may consult the Regional Research Advisory Committee about these modifications.

Major modifications to Project Orders that may involve significant financial consequences or significant change in project scope will be prepared in consultation with the Director and presented to the Regional Research Advisory Committee for approval. Any changes made to Project Orders are clearly recorded on the Project Order, and available for public perusal.

Research updates and progress against project milestones are reported quarterly. Variations, if any, are also included as this allows any variations/modifications to the Project Order to be tracked easily. Summaries of each project's progress against milestones and variations, as well as the original Project Order, are available on the GISERA website: https://gisera.org.au/research/

It is important to note that as all projects in NSW have just commenced, no project milestones have been completed and therefore no progress updates are included.

3.2 NSW proposed research investment for 2016/17-2018/19

There is approximately $2,252,260[9] Santos, AGL, Federal Government and NSW Government cash research budget available for new project proposals to be initiated in FY 2016/17 and beyond.

The *Annual research & development plan and budget* proposes committing about $1,804,446[10] of Santos, AGL, Federal Government and NSW Government cash to prospective projects for which budgets have been estimated (Table 3.5). Table 3.5 shows the proposed division of the available research budget across the various subject areas. Table 3.6 illustrates the estimated research investment by GISERA's existing contributors.

Table 3.5 Proposed research investment by topic, 2016/17-2018/19

Topic /Year	2016-2017	2017-2018	2018-2019	Total
Water	$349,792	$448,667	$143,541	$942,000
Agriculture	$355,833	$254,167	$0	$610,000
Social & Economic	$116,666	$200,000	$183,334	$500,000[11]
Health	$275,278	$78,651	-	$353,929
TOTAL	**$1,097,569**	**$981,485**	**$326,875**	**$2,405,929**

Table 3.6 Proposed research investment by contributor, 2016/17-2018/19

Partner	2016-17	2017-18	2018-19	Total
CSIRO	$274,393	$245,371	$81,719	$601,483
Santos	$137,196	$122,686	$40,859	$300,741
AGL	$137,196	$122,686	$40,859	$300,741
Federal Government	$274,392	$245,371	$81,719	$601,482
NSW Government	$274,392	$245,371	$81,719	$601,482
TOTAL	**$1,097,569**	**$981,485**	**$326,875**	**$2,405,929**

[9] This figure is total GISERA funding for NSW, less $780,492 already committed to research (tables 3.1 and 3.2) and less anticipated costs for the Director's office/Communications for the life of National GISERA.

[10] Total cost of $2,405,929 (includes $1,804,446 GISERA funding and $601,483 CSIRO appropriation)

[11] The Economic project *Using gas to meet NSW energy needs and GHG targets* listed above includes $175,000 GISERA funding and $58,333 CSIRO funding. Potential expansion of this project may increase its total budget up to ~$1,000,000 depending on sources including a significantly increased CSIRO contribution.

3.2.1 Summary of leading stakeholder key issues/questions

Following extensive consultation with various stakeholders in NSW, a list of stakeholder questions/concerns was developed. A list of these issues can be found in table 3.7 and the proposed projects to address the issues is provided in table 3.8.

Table 3.7 List of key issues identified during stakeholder consultation

Subject Area	ID No.	Key issue / Question
Water	WQ01	What amount of water is used by the CSG industry, and where does it come from?
	WQ02	How much groundwater is being extracted from CSG wells; and how much from other bores and industries?
	WQ03	How do coal seams and aquifers and groundwater systems interact?
	WQ04	Is fraccing dangerous for the environment or people?
	WQ05	What are the major water impacts from CSG; and what are the cumulative impacts along with agriculture and mining?
	WQ06	Is there a sufficient amount of water for everyone, including future generations?
	WQ07	What will happen with produced water? What amount of water is recycled and reused? Will this be an overall net gain?
	WQ08	Does CSG development affect any particular water sources, or other people's water uses such as farmers?
	WQ09	How will the brine resulting from CSG activities be cost-effectively and sustainably managed?
Greenhouse Footprint	GQ01	What is the overall carbon account or baseline of the region and what contribution will come from CSG?
	GQ02	What is the gap between the carbon content of CSG and coal, and could fugitive emissions and seeps affect that gap?
	GQ03	What are the risks and opportunities for CSG around climate change?
	GQ04	Under what climate change mitigation scenarios is CSG an advantage; and when are gas resources at risk of being underused (creating stranded assets)?
	GQ05	What is the full breadth of scientific research being undertaken in the region on greenhouse gases and what are the collective findings?
Health	HQ01	Do people get sick from CSG?
	HQ02	What are the potential exposure pathways or situations where people's health or livelihoods can be affected and what is the probability of being affected?

Subject Area	ID No.	Key issue / Question
	HQ03	How do people typically assess risk; and does this affect the way people interpret both factual and non-factual data?
Impacts on Communities	SQ01	Which communities, and who in those communities, are impacted by CSG?
	SQ02	Are impacts being managed to the satisfaction and acceptance of the impacted communities?
	SQ03	Does CSG development, and the activities designed to attenuate its imposition such as community investment, align with community aspirations?
	SQ04	What are the most effective and efficient social impact mitigation programs that can be implemented?
Land management issues (also includes community and economic questions)	LQ01	How much land do CSG companies need access to and what type of land will it be?
	LQ02	Will access to land be gained voluntarily? And at what cost and benefit to locals?
	LQ03	Do landholders obtain an overall net gain from the presence of CSG?
	LQ04	How many landholders are aggrieved by CSG and why? What proportion are content? (considering both Queensland and NSW)?
	LQ05	What is the estimated net result for ecosystem services and agriculture productivity for the lands to be impacted?
Biodiversity	BQ01	What can be done about the cumulative impacts of the CSG industry, agriculture, transport and mining on biodiversity?
	BQ02	Which CSG projects are to be located in or near protected or high value areas?
	BQ03	Has CSG or natural gas development had any detrimental impacts on biodiversity anywhere in Australia?
	BQ04	Is there any possible danger to any threatened species?
	BQ05	How much land will be disturbed and how much of this will have to be rehabilitated? Will this reduce biodiversity?
	BQ06	What is the potential success of the relevant offset programs?
	BQ07	To what success will current policies and strategies protect biodiversity going forward?
Economics	EQ01	How much will be spent at the local / regional / state levels in the future because of CSG? Will this expenditure meet community aspirations?
	EQ02	How many jobs will the CSG industry create in the future; how many will be directly employed by companies vs contractors vs supply chain impacts?

Subject Area	ID No.	Key issue / Question
	EQ03	How are other industries affected by the CSG industry e.g. growth/decline in the service industry, agriculture, incubation of new industries?
	EQ04	Are there potential innovations to consider such as using methane for energy demand by farmers?
	EQ05	What interventions can be recommended to make it easier for local businesses to supply goods and services to the industry?
	EQ06	What market position does Australian unconventional gas have under various climate change mitigation scenarios?
Decommissioning and legacy issues	DQ01	What happens to wells, and any contaminants, once they are plugged and abandoned?
	DQ02	Who has the legal and financial responsibility for the maintenance and integrity of CSG assets over time? Is this adequate?
	DQ03	What improvements can be found to decommissioning approaches and technologies?
	DQ04	What legacy issues bother the community and what is socially and environmentally acceptable?

3.3 NSW proposed new research projects for 2016/17

The following projects are proposed, but are yet to be ratified and are subject to review by the NSW Regional Research Advisory Committee. CSIRO is currently drafting project proposals on these topics. It is currently unknown whether these projects will be approved and proceed.

Table 3.8 Proposed research investment in NSW for 2016/17 and beyond, by project

Subject Area	Title	Objective	Key issue / questions to be addressed ID Number	Duration
Surface and Groundwater	Assessment of water quality risk to farmers' bores and spatial design of groundwater monitoring networks for early detection of groundwater quality impacts in the Narrabri Gas Project area	The project aims to deliver a quantitative assessment of water quality risk to farmers' bores. Based on the assessed risks it will also deliver a set of monitoring locations that would be ideal for sentinel wells and allow for early detection of groundwater quality impacts and the protection of important environmental and economic assets in the Namoi. The methods developed in this project could also be used as a basis for designing groundwater monitoring networks in other regions of NSW.	WQ05, WQ06,WQ08	2 years
Surface and Groundwater	Improving the representation of the impact of coal seam gas extraction in groundwater flow models for the Namoi region	This project would develop a relationship to describe the link between the CSG well field and the groundwater system for the Namoi region. This relationship would then be used in MODFLOW modelling of groundwater impact assessment being performed under other GISERA funded projects.	WQ01	2 years
Surface and Groundwater	Water contamination risk assessment tool for borehole delamination and hydraulic fracturing activity in unconventional gas extraction	This project will develop a tool to provide quantitative information on the contamination risk profile at a basin / sub-basin scale and identify key parameters that may increase or reduce the likelihood of stimulation of key conductive pathways. The tool will focus on two key potential conductive pathways: wellbore delamination and hydraulic fracture stimulation	WQ04, WQ05, WQ08	12 months

Subject Area	Title	Objective	Key issue / questions to be addressed ID Number	Duration
Agricultural	Landscape values in the Namoi	The project objectives are: i) to improve understandings of biodiversity and agricultural values for the Namoi region in NSW; and ii) to identify existing and emerging effects of CSG development on these values. This project will identify potential pathways to impact for research undertaken within this region.	BQ01, BQ02, BQ03, BQ04, LQ04	1 year
Decommissioning (Agriculture)	Decommissioning Pathways for CSG Projects	Through literature review and stakeholder engagement, this project will identify engineering, environmental, social and legislative needs around: • Decommissioning • Identification of potential for optimisation of CSG life cycle to reduce the decommissioning burden • Providing a baseline of information for efficient, effective and socially acceptable decommissioning.	DQ03, DQ04, BQ05 Partial - WQ09, SQ02 & LQ05	12 months
Social	Building a Learning Community	This project is a mix of operational engagement activity and research. The work is aimed at generating regionally relevant tools, actions and mechanisms to enable implementation of engagement activities by CSIRO with all relevant stakeholders. A Three-point plan will be used for building a learning community: (1) short term regionally focused impact within 6 -12 months; (2) medium term delivery of regionally focused outputs on 12 - 18 month timescales; and, (3) long term development of industry/nationally relevant products.	SQO2, SQ04	2 years
Economic	Using gas to meet NSW energy needs and GHG targets	To investigate the future of energy demand in NSW based on structural change in the economy, building sector regulations and consumer preferences. And to assess the potential benefits of coal seam gas in reducing the emission intensity of electricity generation in NSW.	EQ06, GQ03	2.5 years
Health	Health effects of Coal Seam Gas Activity: Review and Study Design	This project is Phase 1 of a study to address the question: does CSG activity in the NSW region influence human health, and if so, how and to what degree? Such a study would include integrating data on public health assessments and environmental monitoring and would involve significant community engagement. Phase 1 focuses on a review of the state of knowledge about health	HQ01, HQ03	9 months

Subject Area	Title	Objective	Key issue / questions to be addressed ID Number	Duration
		impacts of CSG activity and identification of gaps in the knowledge base and the design of a study to address these gaps.		

4 Proposed management and communication budget for 2016/17

Table 4.1 shows GISERA's actual management and communications expenditure during the 11-12, 12-13, 13-14, 14-15 and 15-16 financial years and the proposed management and communications budget for 16-17.

Table 4.1 Proposed management and communications budget, 2016/17 with actual expenditure for 2011/12-2015/16

Item	Sub-item	Actual expenditure						2016-17	Total
		2011-12	2012-13	2013-14	2014-15	2015-16 Initial GISERA (Jul-Dec 15)	2015-16 National GISERA (Jan-Jun 16)		
Comms	Comms salary & OH	$188,899	$214,378	$259,429	$110,422	$95,405	$86,480	$175,164[12]	$1,130,177
	Travel & accommodation	-	-	$4,116	$3,490	$8,787	$11,039	$20,000	$47,432
	Factsheets, brochures infographics, videos etc.	$11,300[13]	-	$600	$489	$0	$7,110	$15,000	$34,499
	Public information sessions	-	-	-	-	$3,145	-	$2,000	$5,145
	Vodcasts	-	-	$3,000	-	-	-	-	$3,000
	Printing	$4,520	-	$296	$555	$2,109	$2,038	$2,500	$12,017
	Annual review of web design	-	-	-		-	-	$20,000	$20,000
	General Expenses & Annual report	$8,303	$21,937	$511	$3,507	$372	$2,922	$6,500	$44,052
	Media training	$7,530	$689	$7,327	$10,741	-	-	-	$26,287
Comms total		**$220,552**	**$237,004**	**$275,279**	**$129,204**	**$109,817**	**$109,589**	**$241,164**	**$1,322,608**

[12] Includes additional Communications Officer from 10 October 2016.

[13] Includes design & artwork for GISERA launch

Item	Sub-item	Actual expenditure						2016-17	Total
		2011-12	2012-13	2013-14	2014-15	2015-16 Initial GISERA (Jul-Dec 15)	2015-16 National GISERA (Jan-Jun 16)		
Director's office	Director salary & OH	$104,671	$148,924	$101,727	$204,799	$62,688	$61,827	$61,389	$746,026[14]
	Admin support	$0	$25,801	$18,416	$167,848	$63,488	$68,411	$256,191[15]	$600,155
	Contractor	-	-	-	-	-	$61,584	$94,000	$155,584
	Travel & accommodation	$28,384	$13,653	$23,760	$48,129	$15,853	$42,619	$45,000	$217,398
	Conferences	-	-	-	-	-	$30,315	$10,000	$40,315
	Annual GISERA Workshop	-	-	$1,859	$13,410	$10,279	$417	$5,000	$30,965
	Office supplies	-	-	-	-	$1,089	$7,648	$2,000	$10,737
	Auditor	-	-	-	-	-	-	$2,975	$2,975
Director's office total		**$133,055**	**$188,378**	**$145,762**	**$434,186**	**$153,399**	**$272,821**	$476,555	$1,804,157
TOTAL (Director's office & Comms)		**$353,607**	**$425,382**	**$421,041**	**$563,390**	**$263,216**	**$382,411**	**$717,720[16]**	**$3,126,765**

[14] GISERA costs for Director's salary have decreased over last 2 years due to an increased contribution by CSIRO.

[15] Includes additional Administration Support Officer from 1 November 2016.

[16] This figure is the anticipated Director's office and Communications costs up to 30 June 2017 (not over life of National GISERA).

Table 4.2 Partner contributions – Initial GISERA 2011/12-2015/16

	Comms & Mngt Costs Contributions	2011-12	2012-13	2013-14	2014-15	2015-16 (Jul-Dec 15)	2015-16 (Jan-Jun 16)	2016-17	Total
Initial GISERA	CSIRO	$176,804	$212,691	$210,520	$281,695	$131,608	-	-	$1,013,318
	APLNG/QGC	$176,804	$212,691	$210,520	$281,695	$131,608	-	-	$1,013,318
TOTAL		**$353,607**	**$425,382**	**$421,041**	**$563,390**	**$263,216**	-	-	**$2,026,636**

Table 4.3 Partner contributions – National GISERA 2015/16-2016/17

	Comms & Mngt Costs Contributions	2011-12	2012-13	2013-14	2014-15	2015-16 (Jul-Dec 15)	2015-16 (Jan-Jun 16)	2016-17	Total
National GISERA	CSIRO	-	-	-	-	-	$172,083	$322,974	$495,057
	DoIS	-	-	-	-	-	$45,889	$86,126	$132,015
	NSW Government	-	-	-	-	-	$68,834	$129,190	$198,024
	APLNG	-	-	-	-	-	$19,121	$35,886	$55,007
	QGC	-	-	-	-	-	$19,121	$35,886	$55,007
	Origin	-	-	-	-	-	$19,121	$35,886	$55,007
	Santos	-	-	-	-	-	$19,121	$35,886	$55,007
	AGL	-	-	-	-	-	$19,121	$35,886	$55,007
TOTAL		-	-	-	-	-	**$382,411**	**$717,720**	**$1,100,129**

5 Communication

5.1 Overview

Communities around Australia want trusted and unbiased information about coal seam and shale gas, the techniques used in the extraction processes, the environmental risks and social impacts associated with these developments. GISERA's extensive communication program has prepared the foundation upon which research results will be effectively received. Early communication is integral to establishing trust, gaining endorsement of our goals by communities and for recognition of the CSIRO 'brand' in delivering important information to stakeholders. These positive attributes underpin the value of investment in this research.

Since launching GISERA in July 2011:

- GISERA Director and CSIRO research staff have provided over 178 briefings and technical advice to a range of stakeholders (e.g. Federal Members of Parliament, Queensland Members of Parliament, NSW Members of Parliament, industry associations, community groups, research organisations, gas developers, journalists and consultants). A breakdown of this activity can be found in Table 6.3 Summary of engagements over the life of GISERA.
- GISERA received a total of 170 invitations to present at conferences, workshops and seminars. The GISERA Director and CSIRO research staff have provided over 149 presentations at conferences, workshops, community information sessions and seminars. Examples of presentations can be found on https://gisera.org.au/more-information/presentations/
- GISERA Director and CSIRO research staff have provided over 91 media interviews (includes print, television and radio).

Key communication highlights during this period include:

- A series of communication products around GISERA research:
    - Rutidosis lanata fact sheet;
    - Understanding the way farmers see their farm fact sheet;
    - Soil compaction fact sheet;
    - Access tracks and soil erosion fact sheet;
    - CSIRO Community Wellbeing Survey: 2014 and 2016 fact sheet;
    - CSIRO Community Wellbeing and Responding to Change Survey: 2014 and 2016 fact sheet;
    - CSIRO research alliance expands into New South Wales media release;
    - Writing an article for ECOS and The Conversation on 'A fine balance: saving Australia's unique wildlife in a contested land';
    - Writing an article for FOCUS magazine on 'Researching social, economic and environmental impacts and opportunities of the natural gas industry'; and
    - Writing an article for the CSIRO website on 'Priority threat management for imperilled species of the Brigalow Belt'.

- Informing community and key stakeholders of research results through community and industry forums and rural shows:
    - Miles and District Show and CRT FarmFest where CSIRO researchers through GISERA engaged with landowners, farmers and the local communities.
    - GISERA and University of Queensland provided a special breakfast briefing to Queensland Parliamentarians on 'The Science of GSG and Onshore Gas'. In attendance was 25 MP's, 4 ministers, other government and NRM representatives.

    - GISERA, UQ's CCSG, AgForce and the Department of Agriculture & Fisheries Queensland, held a joint research forum in Roma on 'Agriculture and Coal Seam Gas'. In attendance was landholders, CSG staff, local government, and NRM representatives.
    - Marine environment CSG research forum.

- Increasing understanding of research results through knowledge transfer sessions with industry partners:
    - Social project 1 - Monitoring regional transition;
    - Social project 2 - Community functioning & well-being;
    - Social project 5 - Understanding community aspirations;
    - Biodiversity project 1 – Threatened Species
    - Biodiversity project 2 – Fire ecology
    - Biodiversity project 3 – Habitat selection by two focal species
    - Biodiversity project 4 – Translocation research project for Rutidosis lanata
    - Water project 1 – Geochemical response to re-injection;
    - Water project 2 – Re-injection of CSG water; and
    - Water project 4 – Geochemical baseline monitoring

- Presentations and posters
    - Australian Institute of Geographers Conference 2015;
    - International Symposium for Farming Systems Design;
    - Australian Agronomy Conference;
    - ATSE International Unconventional Gas Conference;
    - Clean Air Society of Australia and New Zealand Conference;
    - SA Government Oil and Gas Roundtable;
    - The Australasian Environmental Law Enforcement and Regulators network webinar on unconventional gas;
    - Atmospheric Composition & Chemistry Observations & Modelling Conference;
    - International Congress on Modelling and Simulation (MODSIM2015);
    - Queensland Murray Darling Fire Management Technical Advisory Team Workshop;
    - UQ Centre for Biodiversity and Conservation Science Seminar;
    - Queensland Department of Environment and Heritage Monthly Seminar Series;
    - Central Land Council Information Session;
    - Badgingarra (WA) Community Forum;
    - GISERA, UQ's CCSG, AgForce and the Department of Agriculture & Fisheries Queensland joint research forum on 'Agriculture and Coal Seam Gas';
    - Narrabri Gas Project CCC Community Consultation Committee; and
    - DNRM Coal Seam Gas Compliance Unit CSG Forum.
- Several radio and print media interviews were conducted with lead scientists.

GISERA plays an important role in providing trusted information about the challenges and opportunities associated with coal seam and shale gas industries. Details of GISERA's communication goals are summarised in Section 6.2 Communication goals and KPIs.

5.2 Communication outputs

A suite of communication tools have been used to ensure effective and meaningful communication of research outcomes. Table 5.1 shows a range of communication outputs GISERA has achieved over the last 5 years.

Table 5.1 Summary of multi-media communication outputs

Communication tool	Name of communication product	Date first published	Latest edition	Number of views
Newsletter	GISERA e-newsletter (for both external and internal stakeholders)	December 2013 (bi-annual publication)	June 2016	N/A
Videos - CSIRO	Unearthing shale gas	October 2014	-	3230
	Unearthing coal seam gas	September 2014	-	7916
Videos - GISERA	Methane seeps in the Surat Basin	September 2014	-	424
	Understanding groundwater movement	January 2014	-	400
	Collecting ants in coal seam gas development regions	June 2013	-	198
	Tagging turtles in Gladstone Harbour	May 2013	-	119
	GISERA overview	March 2013	-	350
	Overview of surface and groundwater projects	March 2013	-	327
	Overview of agricultural land management projects	March 2013	-	333
	Overview of terrestrial biodiversity projects	March 2013	-	196
	Overview of marine environment projects	March 2013	-	157
	Overview of social and economic projects	March 2013	-	274
Brochures / info-graphics	Research progress info-graphic	August 2013 (updates are on-going)	June 2016	N/A
	Summary of research projects	May 2012 (update as required)	May 2016	N/A
	Development process for GISERA research projects	May 2012	-	N/A
	Snapshot of GISERA's five research areas	August 2012	-	N/A
Fact sheets	Soil Compaction	May 2016	-	N/A
	Understanding the way farmers see their farm.	May 2016	-	N/A
	Access tracks and soil erosion.	May 2016	-	N/A
	Community Wellbeing in the Western Downs: 2014 and 2016	May 2016	-	N/A
	Community attitudes towards CSG development: 2014 and 2016	May 2016	-	N/A

Communication tool	Name of communication product	Date first published	Latest edition	Number of views
	Rutidosis lanata	January 2016	-	N/A
	Characteristics of methane seeps	April 2015	-	N/A
	Shale gas in Australia	October 2014	-	N/A
	Coal seam gas regions reverse rural decline trend	January 2014	-	N/A
	Community resilience	July 2013	-	N/A
	Rural change as a result of CSG developments and the associated economic impacts	July 2013	-	N/A
	Social licence to operate	May 2013	-	N/A
	Six fact sheets on coal seam gas extraction and some potential environmental impacts. Now incorporated on the FAQs page.	April 2012 (updated as required)	October 2014	N/A
Media Releases / Statements	Australia Institute "discussion paper"	October 2016	-	N/A
	Live stream air quality data from coal seam gas regions	August 2016	-	N/A
	CSIRO research alliance expands into New South Wales	March 2016	-	N/A
	CSIRO conducting world's best practice methane emissions research	May 2015	-	N/A
	Landmark report reveals how regional communities really feel about coal seam gas	September 2014	-	N/A
	First ever coal seam gas scientific research alliance established	July 2011	-	N/A
Presentations	Briefings, seminars, workshop forums and conference presentations on unconventional gas have been given to scientists, students, teachers, the general public, government departments and members of parliament	Published as required	-	N/A
Articles	Over 33 media articles have been published on GISERA and its research projects in the Courier Mail, The Land, Stock Journal, Rural Press, ECOS, Conversation, ABC Science, GasFields Commission e-newsletter, Australian Oil and Gas Review, AusIMM Bulletin, Australian Resources and Investment and Resourceful magazines.	N/A	N/A	N/A

5.3 Stakeholder Engagement

GISERA aims to achieve credibility, trust and respect from all stakeholders through the open and transparent conduct and communication of its research and synthesis activities. Table 5.2 outlines the engagements for 2015-16 and Figure 5.1 shows stakeholder interactions over the last five years.

Table 5.2 Summary of GISERA engagements for 2015-16

Stakeholder	Number of engagements for 2015-16
Regional community	11
Gas Industry	40
Federal, State and Local Departments and Agencies	49
Media (includes print, TV and radio)	16
School/Educational institutions/Students	0
Research organisations	23
Industry associations	8
Business groups	4
Total	**151**[17]

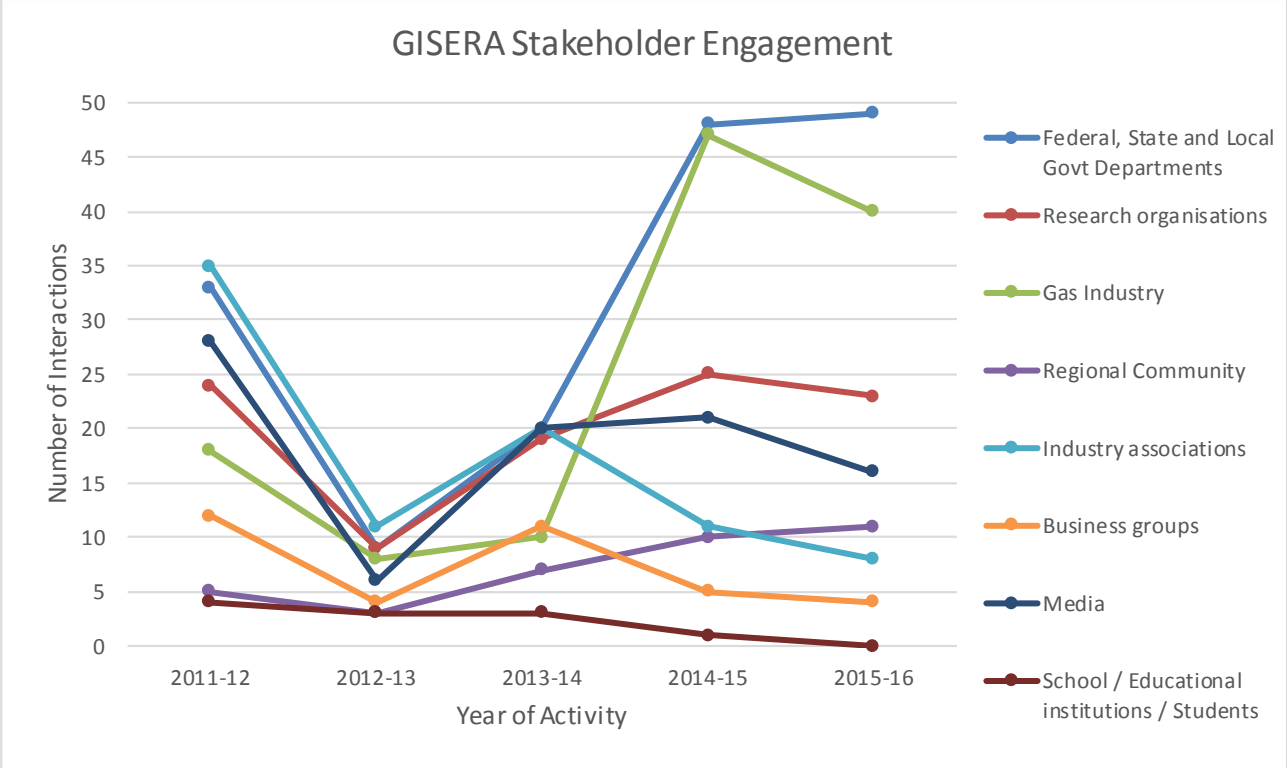


Figure 5.1 Stakeholder interactions from 2011-12 to 2015-16[18]

[17] It is important to note here that these numbers of interactions do not take into account the number of individuals engaged in that interaction. For example regional community group interactions can range from 20-360 participants and a gas industry interaction can be a technical meeting with only 1-10 participants

[18] Refer to footnote 17 above.

6 Performance against KPIs

6.1 Overall KPIs

GISERA's key performance indicators are:

- impact
- capacity building
- leverage
- management.

Table 6.1 illustrates GISERA's performance against each KPIs specific assessment criteria from 2011/12-2015/16.

Table 6.1 GISERA's performance against its overall KPIs

KPIs	Assessment criteria	Performance (over life of GISERA)
Impact	Formal government, industry and community request for technical advice	GISERA's communication goals and KPIs tie in with this objective. GISERA has made significant impact in this area as detailed in Section 6.2
	Industry and institutional awards for innovative research	The 2015 Agriculture Director's Awards in CSIRO recognise the achievements of individuals and teams across 11 different categories. The GISERA Agricultural Land Management Team were nominated for and received the Collaboration Award. Team members included staff from CSIRO and USQ/NCEA.
	Publication of papers	Journal – 6 Conference – 7
	Citation of publications	228 163
	Conference invitations and presentations	
Capacity building	Total number of research studentships	3
	Number of research studentships for residents of CSG and LNG operational areas	2
	Number of Masters and PhD theses awarded	0 (still in progress)
	Number of Publication authorships by industry staff	Nil
Leverage	Participation from industry developers	Australia Pacific LNG, QGC, Origin, AGL, Santos through membership to GISERA and Arrow Energy

KPIs	Assessment criteria	Performance (over life of GISERA)
		(through Industry Leader's Group, APPEA)
	Participation from government departments and agencies	Queensland Department of Natural Resources and Mines, North West Local Land Services, NSW Department of Industry, NSW Department of Primary Industries, Department of Industry Innovation and Science, Gladstone Area Water Board and CSIRO
	Participation from non-government organisations	AgForce, Basin Sustainability Alliance, Australian National University, University of Queensland, University of Southern Queensland, University of New England, Lower Namoi Growers' Association, Country Women's Association of NSW
	Number of universities, particularly those local to CSG and LNG activity, participating in research projects	University of Queensland, University of Southern Queensland, University of Sydney, University of Heidelberg
	Financial leverage, or the ability to multiply the research value of contributions	See section 1.1.1
Management	Percentage of research projects achieving target deliverables	38% of projects are complete and have achieved deliverables (11 projects) 59% of projects are currently meeting or exceeding target deliverables (17 projects) 3% of projects are not meeting target deliverables due to delays in obtaining required data (1 project). It is anticipated that this will be resolved early 2016/17.
	Percentage of research projects meeting schedule	38% of projects are complete (11 projects) 52% pf projects are currently meeting schedule (15 projects) 7% of projects currently have an amber light for their remaining and final milestone (2 projects). It is expected that these milestones will be completed first quarter 2016/17. 3% of projects are not meeting research schedule due to delays in obtaining required data (1 project). It is anticipated that this will be resolved early 2016/17.
	Percentage of research project meeting budget	38% of projects were completed within 7% of budget (based on aggregate average across the 11 projects). 21% of current projects are within budget (6 projects) 7% of projects are over budget (2 projects).

KPIs	Assessment criteria	Performance (over life of GISERA)
		21% of projects are currently overspent due to phasing issues (6 projects). This issue is expected to be rectified by the end of project.[19] 13% of projects are new (4 projects) with expenditure expected to commence in early 2016/17.

6.2 Communication goals and KPIs

GISERA aims to achieve credibility, trust and respect from all stakeholders through the open and transparent conduct and communication of its research and synthesis activities.

To help achieve GISERA objectives and research aims, the same strategic communication and engagement goals for GISERA are still relevant for National GISERA and summarised as follows:

- Engage with and build landholder, community, government and industry understanding of risks, challenges and opportunities associated with gas development.
- Communicate in plain English information that helps to address knowledge gaps in GISERA's areas of interest, whether that is through original research or synthesis of existing knowledge.
- Raise awareness of GISERA and its regional and public good focus to enhance its capacity to inform public discourse, regulation and monitoring of gas industries.
- Redesign and maintain GISERA's website, the aim of which is to be a trusted and citable source of information on gas development and its social and environmental impacts and opportunities.

Over the last five years a large volume of written, visual, aural and verbal communication material has been developed and tailored to meet the widest range of audience requirements: politicians, farmers, NGOs, journalist, industry, science community and general public. As a consequence of engaging in an actively contended public debate, GISERA and its messages have received considerable scrutiny.

A clear and robust communication strategy has been developed to guide GISERA through this challenging environment; in addition to proactive management, preparation and review of high quality communication material. This has resulted in ongoing public trust in CSIRO's work undertaken as part of GISERA and has positioned CSIRO as a credible knowledgeable provider in a contested space full of scientific and science communication challenges.

Table 6.2 provides an overview of the performance to date in achieving GISERA's strategic communication goals.

[19] CSIRO is responsible for any budget overspend at completion of project.

Table 6.2 Performance against key communication goals

Stakeholder	KPI (target)	Performance over life of GISERA
Government	Advice provided to senior bureaucrats / ministers / policy makers Requests by policy makers for advice	Since July 2011, 94 invitations to provide advice, briefings and presentations were received from senior ministers and policy makers (e.g. Prime Minister and Cabinet Office, Queensland Premiers Office, Independent Expert Scientific Committee on CSG and Large Coal Mining Development, Qld Agriculture Resources and Environment Committee, Private Briefings to Qld Parliamentarians, Private Briefings to Federal Parliamentarians). GISERA input sought during development of the Commonwealth's Government Domestic Gas Strategy of the GISERA and University of Queensland provided a briefing to Queensland Parliamentarians on 'The Science of GSG and Onshore Gas'. In attendance was 25 MP's, 4 ministers, other government and NRM representatives. The Bureau of Resources and Energy Economics' (BREE) 2014 Gas Market report drew strongly on GISERA research, in particular the research on employment effects, household income and demographic change. Three GISERA publication outputs were specifically cited. The report also recognises the need for more detailed analysis of cumulative economic impacts as well as the distributional effects. This demand reinforces the need for further primary economic research. Briefings on results from GISERA's community wellbeing and responding to change survey were provided to local government in the Surat Basin region, Chambers of Commerce, State members of Parliament and Queensland Resources.
Community	GISERA seen as trusted source of information by community	CSIRO researchers through GISERA engaged with landowners, farmers and the local communities at the Miles Show (May 2016) and CRT Farmfest (June 2016) in Toowoomba. The researchers provided information on the results of their research such as impacts on soil compaction and soil erosion, how understanding the way farmers see their farm helps communication, community wellbeing and community attitudes towards CSG development.

Stakeholder	KPI (target)	Performance over life of GISERA
		GISERA sought as trusted source of advice on hydraulic fracking and shale gas development at the Central Land Council Information Session in April 2016 (CLC represents the indigenous communities of the southern half of the Northern Territory). GISERA sought as a trusted source of advice on the drilling and proposed development of the deep gas project nearby (Warro Gasfield) managed by Latent Petroleum during the Badgingarra Community Forum in September 2015. GISERA sought as a trusted source of advice on impacts of gas development by KRED and Yamatji Marlpa (representatives of 33 Traditional Owner groups in WA) – community workshops for Yamatji were undertaken in July 2014. GISERA sought as a trusted source of advice on the drilling process, well integrity, water safety and fracking by Badgingarra Community Association - community forum held on 2 September 2015.
	Demand for GISERA's engagement is maintained as development progresses	The Social and economic CSG research forum was held on November 2014 in Chinchilla and attracted stakeholders from state government departments, local government, service providers, local businesses, gas companies and community groups. Feedback from the forum was very positive, the importance of having future longitudinal data extending into the operational phase was emphasised. The GHG and Agricultural CSG research forum was held on 22 April 2015 in Chinchilla and attracted 48 stakeholders from government departments, industry, Council, service providers, research organisations, landowners and community groups. Landowners and members of the community found the interactive open station format a really useful way to communicate 1-1 with the researchers and ask questions of particular interest. The Marine environment CSG research forums were held in Brisbane and Gladstone on 11 and 12 August 2015 and attracted 70 stakeholders from community groups, Council, service providers, research organisations, government and industry. Feedback indicated that this work was viewed as ground-breaking and cutting edge. Members of the community found the open discussion/Q&As really useful.

Stakeholder	KPI (target)	Performance over life of GISERA
		GISERA has had over 641 engagements with a wide range of stakeholders over the last five years (See Table 6.3). As the shale gas industry increases its exploration activities in Australia, this demand from GISERA is expected to increase.
Industry	GISERA members adopt practice change	CSIRO through GISERA has provided policy related advice to industry on a range of topics including groundwater reinjection strategies, agricultural engagement, socioeconomic advice and information for stakeholders of Gladstone Harbour. Furthermore, advice to Queensland and Federal governments has been incorporated into development of the regulatory environment towards improved industry best practice. Geochemical response to re-injection project work informed GISERA members and regulators about the required level of injectant pre-treatment to minimise adverse impacts on groundwater quality by reinjection
	Industry adopts methods for improving community engagement	In July 2016, researchers from the Community Wellbeing project were approached by and met with Origin's Manager for Public Policy to discuss indicators of community wellbeing, resilience and social licence to operate. Origin were planning to conduct their own survey to monitor the community 'pulse'. After discussing findings, methods and measures from the CSIRO community wellbeing surveys, Origin planned to use 5 or 6 of the same items in their own survey to allow for comparison with CSIRO's 2014 and 2016 research findings. In this way, the community wellbeing research is feeding into industry benchmarks, standards and policies.

Continued demand for information and advice from GISERA shows that GISERA is meeting the needs of a range of stakeholders (see Table 6.3) and that it is seen as a source of trusted information and advice.

Table 6.3 Summary of engagements over life of GISERA

Stakeholder	Number of engagements over life of GISERA
Regional community	36
Gas Industry	123
Federal, State and Local Departments and Agencies	159
Media (includes print, TV and radio)	91
School/Educational institutions/Students	11
Research organisations	100
Industry associations	85
Business groups	36
Total	**641**[20]

[20] It is important to note here that these numbers of interactions do not take into account the number of individuals engaged in that interaction. For example regional community group interactions can range from 20-360 participants and a gas industry interaction can be a technical meeting with only 1-10 participants

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