Project Order

Proforma 2019

1. Short Project Title

Assessing and projecting on-shore gas effects on regional economic activity in NSW

Long Project Title	Assessing and projecting on-shore gas effects on regional economic activity in New South Wales
GISERA Project Number	S.13
Proposed Start Date	01/08/2019
Proposed End Date	31/03/2021
Project Leader	Tom Measham

2. GISERA Region

☐ Queensland	☒ **New South Wales**	☐ Northern Territory
☐ South Australia	☐ Western Australia	☐ Victoria

3. GISERA Research Program

☐ Water Research	☐ GHG Research	☒ **Social & Economic Research**
☐ Biodiversity Research	☐ Agricultural Land Management Research	☐ Health Research

4. Project Summary

Objective

This project will analyse the extent to which the on-shore gas industry influences regional economic and social indicators such as changes in industry mix, employment, land development, productivity (e.g. yield improvements, added value), and human capital such as skill levels. Descriptions of potential future effects for NSW will be generated based on the application of economic models to identify the effects that the on-shore gas industry has produced in other domestic and international regions.

Description

This project will combine economic and spatial analyses of economic and social indicators to investigate the potential effects of the on-shore gas industry at different stages of development. This analysis will provide important insights into how NSW regions could develop, should the gas industry proceed. The research will address two objectives:

1. To develop a comprehensive analytical framework of the potential economic and social effects of on-shore gas extraction based on domestic and international experiences.
2. To describe and discuss economic and social changes generated by on-shore gas activity in Australia and other countries and use secondary data and analyses to estimate potential effects for NSW.

To address the first objective, a comprehensive literature review will be conducted to identify crucial theoretical and empirical analysis that document and assess linkages between the on-shore gas industry and broader regional economic and social outcomes. Through such review, Australian and international experiences (e.g. the Marcellus Shale in the United States and the Alberta Basin in Canada) will inform the discussion and analysis of the effects of potential on-shore industry development in NSW. As part of this process, the research team will validate methods with scholars with international experience on the estimation of the effects of on-shore gas industry development.

To achieve the second objective, a comprehensive data collection and quantitative analysis will be performed to estimate the impacts of on-shore gas activity on diverse economic indicators across regions. Depending on data availability, these indicators could include: employment, number of businesses, infrastructure, farm inputs, investments in machinery and other technologies, profitability, increased legal and administrative costs, and water supply. Statistical matching techniques, benefit transfer models, or related economic methods will be developed to extrapolate impacts occurred in other places in Australia, the U.S.A. and Canada to inform potential future effects in NSW.

The results will be communicated in multiple ways, including:

- Fact sheet summarizing economic effects for local and regional audiences
- Knowledge transfer presentation to stakeholders
- Presentation at one or more scientific conferences
- Publications as reports and papers

Need & Scope

Understanding the role of the gas industry across a comprehensive set of economic and social indicators is crucial to increase the resilience of regional economies to local, domestic and global pressures (e.g. unemployment, population ageing and commodity prices). Projecting potential effects based on domestic and international experiences is expected to provide valuable input to stakeholders for a more effective management of trade-offs and enhancement of positive effects. To date, the overall economic effects that on-shore gas activity has had on other industries in New South Wales are essentially unknown. Past GISERA research has been limited to an initial economic baseline for comparing future employment effects. Elsewhere, broader GISERA research estimated the potential local value of retired or degraded agricultural land due to on-shore gas activity (Marinoni and Navarro Garcia, 2016). However, those analysis only covered a subset of the multiple trade-offs and opportunities associated with on-shore gas activity. Other GISERA research highlights some conflicts and issues from the coexistence between on-shore gas activity, e.g. increased traffic volumes, soil erosion, impacts to mental health and wellbeing, place identity and loss of water resources for farming (Huth et al., 2018).

Despite the economic losses and conflicts documented in previous research, a comprehensive analysis of the economic and productive impacts generated by the on-shore gas industry on regional-level economic performance indicators is missing. Such an analysis is key to better understand the potential impacts that can occur in NSW if the on-shore gas industry proceeds. This project aims to fill this gap, providing scientific evidence on the net regional effects of gas activity related outcomes such as employment, income, business and farm profitability, compensation payments and infrastructure upgrades.

Recommendations from NSW Chief Scientist Independent Review of Coal Seam Gas Activities

Understanding and forecasting the likely effects of the on-shore gas industry on the economy, including agricultural performance and other economic aspects, will inform responses to recommendation 8 of the NSW Chief Scientist Independent Review of Coal Seam Gas Activities, which recommends moving towards a target and outcome-focused regulatory system and regularly reviewed environmental impacts. In particular, the project will inform what the likely regional scale impacts would be, which can inform targets and planning processes, should the industry proceed in NSW. In addition, the project will contribute towards

recommendation 13 by providing an economic model of cumulative economic effects at the regional scale which can feed into land use planning processes.

Methodology

The assessment will be based on two approaches: 1) literature review of the broad regional economic effects of the on-shore gas activity in different areas of the world (USA, Canada, Australia) and design of a framework to understand potential impacts, and 2) economic modelling of regional economic performance indicators. The second approach will rely on econometric models to investigate the net effects of the gas industry on economic and social performance indicators.

The econometric modelling will rely on data and estimates of the effects of on-shore gas activity to estimate potential effects for NSW. This will provide insights of potential economic outcomes in the Narrabri region should the on-shore gas industry proceed. The potential effects will be contextualised for the NSW regions, through economic and statistical models (e.g. matching, benefit transfer models).

Regional time series (panel data) will be created combining socioeconomic data (e.g. census data) at different scales (e.g. ABS levels SA2 to SA4). These data will be complemented with ABS regional profile data, industry information on the spatial distribution and age of coal seam gas wells, and data from State government. All these analyses will be designed by considering theory and empirical evidence developed in multiple studies available in international literature and in previous GISERA projects.

5. Project Inputs

Research

To date, only the GISERA project 'Monitoring regional transition' has estimated the impact of on-shore gas activity on regional employment during the construction phase of the industry (in Queensland). Although this evidence has been used by other studies and policy discussions, it does not provide a comprehensive understanding of on-shore gas activity effects on the different productive sectors and no further evidence has been collected to better understand this. Some aggregated employment trends are being tracked through the boomtown indicators toolkit (developed by UQ Centre for Coal Seam Gas). This project will complement and extend this existing research by focusing on the direct and indirect impacts that on-shore gas activity has produced on multiple sectorial regional-level indicators such as productivity, employment, number and size of businesses, water use and land values. This project seeks to fill this gap by providing a comprehensive and detailed analysis on these and other relevant indicators across regions and the effects that the on-shore gas industry have generated upon them. Addressing this gap in knowledge would allow better information for decision making if the on-shore gas industry proceeds in NSW.

Resources and collaborations

Researcher	Time Commitment (project as a whole)	Principle area of expertise	Years of experience	Organisation
Tom Measham	28 days	Project leadership, geographer	22	CSIRO
David Fleming	65 days	Applied economics and modelling	12	CSIRO
Raymundo Marcos Martinez	65 days	Natural resources economics and spatial data scientist	10	CSIRO
Javier Navarro-Garcia	9.5 days	Modelling and GIS analysis	10	CSIRO

Subcontractors (clause 9.5(a)(i))	Time Commitment (project as a whole)	Principle area of expertise	Years of experience	Organisation
Not applicable	-	-	-	-

GISERA
Gas Industry Social and Environmental Research Alliance

Budget Summary

Source of Cash Contributions	2018/19	2019/20	2020/21	% of Contribution	Total
GISERA	$0	$148,107	$54,320	75%	$202,427
- Federal Government	$0	$118,486	$43,456	60%	$161,942
- NSW Government	$0	$19,747	$7,243	10%	$26,990
- Santos	$0	$9,874	$3,621	5%	$13,495
Total Cash Contributions	**$0**	**$148,107**	**$54,320**	**75%**	**$202,427**

Source of In-Kind Contribution	2018/19	2019/20	2020/21	% of Contribution	Total
CSIRO	$0	$49,369	$18,107	25%	$67,476
Total In-Kind Contribution	**$0**	**$49,369**	**$18,107**	**25%**	**$67,476**

6. Project Impact Pathway

Activities	Outputs	Short term Outcomes	Long term outcomes	Impact
Conduct project inception workshop and establish TRG	A group of experts is established in order for them to provide technical input into the research	Comprehensive understanding of on-shore gas industry regional economic effects	Governments, regulators & policy-makers understanding on issues regarding policy & legislative framework for the gas industry	Long term positive impact through greatly improved understanding of the on-shore gas industry's effects on different regions.
Complete literature review, data collection and modelling design	Written section completed for subsequent public dissemination as part of activity 4	Comprehensive understanding of on-shore gas industry regional economic effects		
Establish baseline analysis	Written section completed for subsequent public dissemination as part of activity 4	Comprehensive understanding of on-shore gas industry regional economic effects	Improve community awareness about the economic impacts of onshore gas development	
Report Preliminary Findings	Written report combining outputs from activities 2 and 3 plus findings from forecasting process.	Improved capacity to forecast economic effects of on-shore gas industry on agriculture		
Communicate findings to stakeholders	Factsheet, journal submission, knowledge transfer session	Improve community awareness about the economic impacts of onshore gas development	Improve community understanding and knowledge of the economic impacts of onshore gas development	

7. Project Plan

Project Schedule

ID	Activities / Task Title (should match activities in impact pathway section)	Task Leader	Scheduled Start	Scheduled Finish	Predecessor
Task 1	Conduct project inception workshop and establish TRG	Tom Measham	1/8/2019	1/09/2019	none
Task 2	Complete literature review, data collection and modelling design	Raymundo Marcos Martinez and David Fleming	2/09/2019	2/12/2019	1
Task 3	Establish baseline analysis	David Fleming and Raymundo Marcos Martinez	2/12/2019	2/06/2020	2
Task 4	Report Preliminary Findings	Tom Measham	2/06/2020	2/12/2020	3
Task 5	Communicate findings to stakeholders	Tom Measham	2/12/2020	31/03/2021	4

Task description

Task 1:

TASK NAME: Conduct project inception workshop and establish Technical Reference Group

TASK LEADER: Tom Measham

OVERALL TIMEFRAME: 1 August 2019 – 1 September 2019

BACKGROUND: A workshop will be conducted with the project team to establish the project. The technical reference group will be identified and assembled.

TASK OBJECTIVES: Establish cohesive team and technical reference group

TASK OUTPUTS AND SPECIFIC DELIVERABLES: Workshop completed, technical reference group established.

Task 2

TASK NAME: Complete literature review, data collection and modelling design

TASK LEADER: Raymundo Marcos Martinez and David Fleming

OVERALL TIMEFRAME: 2 September 2019 – 2 December 2019

BACKGROUND: To effectively assess and forecast likely effects, the project needs to identify and validate indicators based on international experience and pressure test those indicators to ensure they are internationally in line

TASK OBJECTIVES: Conduct Literature review, data collection and statistical modelling design. The task will also confirm whether the indicators to be analysed are relevant to key stakeholders across community, government, and industry and validate the overall methods with international research community

TASK OUTPUTS AND SPECIFIC DELIVERABLES: Detailed methods statement completed for subsequent inclusion as a section of the report submitted as part of Task 4.

Task 3

TASK NAME: Establish baseline analysis

TASK LEADER: David Fleming and Raymundo Marcos Martinez

OVERALL TIMEFRAME: 2 December 2019 – 2 June 2020

BACKGROUND: The task will involve establishing a baseline analysis by exploring economic/productive changes across regions with and without on-shore gas activity and contrast district level data in areas with no gas industry activity.

TASK OBJECTIVES: Establish a baseline analysis by exploring economic/productive changes across regions with and without on-shore gas activity and contrast economic data to district level data in areas with no industry presence.

TASK OUTPUTS AND SPECIFIC DELIVERABLES: Baseline analysis written up as a section for future inclusion in the report submitted as part of Task 4.

Task 4

TASK NAME: Report Preliminary Findings

TASK LEADER: Tom Measham

OVERALL TIMEFRAME: 2 June 2020 – 2 December 2020

BACKGROUND: The task will involve preparing and submitting a written report which brings together sections from tasks 2 and 3 with new sections comprising a discussion and conclusion section for public release as the principal output of the project.

TASK OBJECTIVES: Report preliminary findings from statistical and econometric models identifying the impact of the on-shore gas industry over a set of key economic and productive indicators and develop empirical forecasts for economic impacts in NSW.

TASK OUTPUTS AND SPECIFIC DELIVERABLES: Publicly available written report

Task 5

TASK NAME: Communicate findings to stakeholders

TASK LEADER: Tom Measham

OVERALL TIMEFRAME: 2 December 2020 – 31 January 2021

BACKGROUND: Communications of GISERA research are an important component of outreach and dissemination of findings to diverse audiences.

TASK OBJECTIVES: Communicate findings to stakeholders through meetings, knowledge transfer session, local and international conferences, factsheet and journal article, in collaboration with GISERA Communications officers.

TASK OUTPUTS AND SPECIFIC DELIVERABLES: Factsheet, journal paper submitted, knowledge transfer session and community workshop completed.

Project Gantt Chart

	Aug-Sep 2019	Oct-Dec 2019	Jan-Mar 2020	Apr-Jun 2020	Jul-Sep 2020	Oct 2020 -Dec March 2021
Task 1						
Task 2						
Task 3						
Task 4						
Task 5						

8. Technical Reference Group

- CSIRO scientific advice: (e.g. Mike Bange, Perry Poulton and Neil Huth)
- External economics advise: Yu (Eric) Sheng (Senior Agricultural economist at ABARES) and Mark Partridge (Professor at the Ohio State University)
- GISERA representative: Dan O'Sullivan
- Stakeholder representatives: (Robert Farquharson)

9. Communications Plan

Stakeholder	**Objective**	**Channel** (e.g. meetings/media/factsheets)	**Timeframe** (Before, during at completion)
NSW Government	Technical Reference Group establishment	Meetings, online communication	At commencement
NSW Government, Resource companies, other interested government agencies	Communicate findings	Knowledge transfer session	On completion
Wider public	Communicate findings	Factsheet, presentations	On completion
Applied economic research community	Seek input to methods	Engagement through meetings, conferences and workshops	During project
Broader scientific community	Communicate findings	Presentations, literature review, journal article	On completion

10. Budget Summary

Expenditure	2018/19	2019/20	2020/21	Total
Labour		$188,348	$61,427	$249,775
Operating		$9,128	$11,000	$20,128
Subcontractors		$0	$0	$0
Total Expenditure		**$197,476**	**$72,427**	**$269,903**

Expenditure per Task	2018/19	2019/20	2020/21	Total
Task 1	$0	$10,190	$0	$10,190
Task 2	$0	$51,194	$0	$51,194
Task 3	$0	$89,143	$0	$89,143
Task 4	$0	$46,949	$38,801	$85,750
Task 5	$0	$0	$33,626	$33,626
Total Expenditure	**$0**	**$197,476**	**$72,427**	**$269,903**

Source of Cash Contributions	2018/19	2019/20	2020/21	Total
Federal Government (60%)	$0	$118,486	$43,456	$161,942
NSW Government (10%)	$0	$19,747	$7,243	$26,990
Santos (5%)	$0	$9,874	$3,621	$13,495
Total Cash Contributions	**$0**	**$148,107**	**$54,320**	**$202,427**

In-Kind Contributions	2018/19	2019/20	2020/21	Total
CSIRO (25%)	$0	$49,369	$18,107	$67,476
Total In-Kind Contributions	**$0**	**$49,369**	**$18,107**	**$67,476**

	Total funding over all years	Percentage of Total Budget
Federal Government investment	$161,942	60%
NSW Government investment	$26,990	10%
Santos investment	$13,495	5%
CSIRO investment	$67,476	25%
TOTAL	**$269,903**	**100%**

Task	Milestone Number	Milestone Description	Funded by	Start Date (mm-yy)	Delivery Date (mm-yy)	Fiscal Year Completed	Payment $ (excluding CSIRO contribution)
Task 1	1.1	Conduct project inception workshop and establish TRG	GISERA	Jul-19	Aug-19	2019/20	$7,642.50
Task 2	2.1	Complete literature review, data collection and modelling design	GISERA	Aug-19	Nov-19	2019/20	$38,395.50
Task 3	3.1	Establish baseline analysis	GISERA	Nov-19	May-20	2019/20	$66,857.25
Task 4	4.1	Report Preliminary Findings	GISERA	May-20	Nov-20	2020/21	$64,312.50
Task 5	5.1	Communicate findings to stakeholders	GISERA	Nov-20	Mar-21	2020/21	$25,219.50

11. Intellectual Property and Confidentiality

Background IP (clause 11.1, 11.2)	**Party**	**Description of Background IP**	**Restrictions on use (if any)**	**Value**
				$
				$
Ownership of Non-Derivative IP (clause 12.3)	CSIRO			
Confidentiality of Project Results (clause 15.6)	Project Results are not confidential.			
Additional Commercialisation requirements (clause 13.1)	Not Applicable			
Distribution of Commercialisation Income (clause 13.4)	Not Applicable			
Commercialisation Interest (clause 1.1)	**Party**		**Commercialisation Interest**	
	CSIRO		Not Applicable	
	Santos		Not Applicable	

12. References

Fleming, D. A., & Measham, T. G. (2015). Local economic impacts of an unconventional energy boom: the coal seam gas industry in Australia. Australian Journal of Agricultural and Resource Economics, 59(1), 78–94. https://doi.org/10.1111/1467-8489.12043

Huth, N. I., Cocks, B., Dalgliesh, N., Poulton, P. L., Marinoni, O., & Garcia, J. N. (2018). Farmers' perceptions of coexistence between agriculture and a large scale coal seam gas development. Agriculture and Human Values, 35(1), 99-115.

Marinoni, O., & Garcia, J. N. (2016). A novel model to estimate the impact of Coal Seam Gas extraction on agro-economic returns. Land Use Policy, 59, 351-365.

Measham, T. G., & Fleming, D. A. (2014). Impacts of unconventional gas development on rural community decline. Journal of Rural Studies, 36, 376–385. https://doi.org/10.1016/j.jrurstud.2014.04.003