



Independent Expert Scientific Committee
on Coal Seam Gas and Large Coal Mining Development

Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development: Review of activities - December 2012-June 2014

*An overview of the activities of the Independent
Expert Scientific Committee on Coal Seam Gas and
Large Coal Mining Development from December
2012 to June 2014*

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This report outlines the activities of the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the IESC) for the period December 2012 to June 2014.

A previous review covering the period of December 2012 to December 2013 has been revised to align reporting with standard financial year reporting.

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1. Introduction

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the IESC) is a statutory body under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) which provides scientific advice to Australian governments on the water-related impacts of coal seam gas and large coal mining development proposals.

The IESC consists of eight members with extensive scientific qualifications and expertise in the fields of geology, hydrogeology, hydrology, ecology, ecotoxicology, natural resource management and environment protection. Members are appointed by the Minister for the Environment on a part-time basis.

Further information: www.iesc.environment.gov.au/committee/index.html



IESC members (left-right)

Professor Dayanthi Nugegoda
Dr Andrew Johnson
Ms Lisa Corbyn (Chair)
Emeritus Professor Angela Arthington
Ms Jane Coram
Professor Craig Simmons
Emeritus Professor Peter Flood
Mr Jim McDonald

Photo: Independent Expert Scientific Committee.

1.1. Legislative functions of the IESC

Under the EPBC Act, the IESC has several legislative functions to:

- Provide scientific advice to the Commonwealth Environment Minister and relevant state ministers on the water-related impacts of proposed coal seam gas or large coal mining developments.
- Provide scientific advice to the Commonwealth Environment Minister on:
 - bioregional assessments being undertaken by the Australian Government
 - research priorities and projects commissioned by the Commonwealth Environment Minister.
- Publish and disseminate scientific information about the impacts of coal seam gas and large coal mining activities on water resources.

1.2. Key achievements

The IESC has contributed to strengthening the science underpinning regulatory decisions on coal seam gas and large coal mining development proposals by:

- publishing *Information Guidelines* for use by regulators and proponents to ensure adequate water-related data and tools are used in assessing proposed developments;
- providing expert scientific advice on 44 requests from the Commonwealth, New South Wales and Queensland regulators on large coal mining and coal seam gas development proposals;
- providing advice to the Australian Government on bioregional assessments and research, including endorsing the methodology for the bioregional assessments, providing advice on research projects and priorities, endorsing six background reviews for publication and publishing three fact sheets on current scientific issues.

2. Scientific advice on coal seam gas and large coal mining development proposals

2.1. Scientific advice on development proposals

A primary role of the IESC is to provide expert scientific advice on the water-related impacts of coal seam gas and large coal mining development proposals to Commonwealth and state Government regulators to enable better informed regulatory decision-making. The IESC's advice is intended to help increase transparency and strengthen the scientific basis of regulatory decisions.

In March 2013, the IESC published *Information Guidelines*. The Information Guidelines assist regulators and proponents provide the information considered necessary by the IESC to enable the delivery of robust scientific advice. The IESC undertook a review of the Information Guidelines in consultation with regulators and government scientific agencies, and released an updated version in April 2014. The Information Guidelines are available online: www.iesc.environment.gov.au/publications.html.

To date, the IESC's advice has highlighted the need to provide adequate baseline information and to consider:

- the scale of developments in a regional context
- development and application of hydrological models
- site water and salt balances
- potentially significant impacts to water resources and water related assets, including upstream and downstream, direct and indirect impacts
- cumulative impacts from activities in the same catchment or region
- the effectiveness of ongoing monitoring, mitigation and management measures.

A list of development proposals considered by the IESC is provided at Appendix A.

Summary of development proposals considered by the IESC from Dec 2012 to June 2014

- 44 requests from the Commonwealth, New South Wales and Queensland regulators.
- 27 requests from the Commonwealth regulator, 12 joint requests from Commonwealth and Queensland regulators, 2 requests from the Queensland regulator, and 3 requests from the New South Wales regulator.
- 38 requests related to large coal mining development proposals and 6 related to coal seam gas proposals.
- 24 requests on development proposals in Queensland, 19 in New South Wales, and 1 in Western Australia.
- 25 requests were for new developments and 19 were extensions to existing developments.
- The expected production of the proposed coal mining developments ranged from 1 million to 30 million tonnes per year.
- The proposed coal seam gas developments have ranged from 60 to 6,500 wells and have covered development areas of up to 8,000 km².



Photo: Coal mining operations.



Photo: Coal seam gas operations.

2.2. Publication of advice

To achieve well informed communities that have greater confidence in the regulation of coal seam gas and large coal mining developments, all IESC advice is to be made publicly available. As at end of June 2014, 22 of the 44 pieces of advice provided to regulators on proposed developments have been published. Aiming to balance the principles of transparency, equity of access and commitment to informing the regulatory decision making process, the IESC has adopted a protocol for publishing that involves the advice being published within 10 business days of being provided to regulators.

Once published, the IESC's advice on development proposals is available on its website:

www.iesc.environment.gov.au/advice/proposals.html.

2.3. IESC advice on the EPBC Act amendment

In June 2013, the EPBC Act was amended to include significant impacts on water resources as a new matter of national environmental significance in relation to coal seam gas and large coal mining development ('water trigger'). Any project that has or is likely to have a significant impact on water resources must be referred to the Commonwealth regulator for assessment and approval.

The IESC also provided scientific advice to the Commonwealth Environment Minister on the implementation of the then proposed legislative amendment to the EPBC Act. In its advice, the IESC outlined scientific elements for inclusion in the definition of a significant impact on water resources and in the terms of reference for the assessment of coal seam gas and large coal mining developments, and identified mitigation actions that could be considered by regulators. The IESC also provided scientific advice to the Commonwealth regulator, as requested, on the draft Significant Impact Guidelines for the 'water trigger'.

The IESC's advice on these matters is available on its website:

www.iesc.environment.gov.au/advice/othermatters.html.

3. Advice on the Bioregional Assessment Programme

3.1. Advice on the Bioregional Assessment Programme

The IESC provides advice on the Australian Government's Bioregional Assessment Programme and the science underpinning the methodology used to prepare them. The bioregional assessments are being delivered through a collaboration between the Department of the Environment, the Bureau of Meteorology, CSIRO and Geoscience Australia.

Bioregional assessments are innovative science-based studies developing detailed baseline information and analysis of the environment in particular geographic areas underlain by coal and coal seam gas resources. Bioregional assessments are analysing the ecology, hydrology, geology and hydrogeology of bioregions, with explicit assessment of the potential direct, indirect and cumulative impacts of coal seam gas and large coal mining development on water resources both above and below ground.

Further information: www.bioregionalassessments.gov.au.

The initial bioregional assessments products were first released in June 2014 and are being progressively made available to June 2016. As products are released, the bioregional assessments are intended to provide a single authoritative source for all interested parties, including government regulators, natural resource managers, coal seam gas and coal mining companies, interested community members and the IESC, to refer to when considering the water-related impacts of potential coal seam gas and large coal mining developments.

Bioregional assessments are being undertaken across New South Wales, Queensland, South Australia and Victoria, in the following areas:

- the Galilee, Cooper, Pedirka and Arckaringa subregions, within the Lake Eyre Basin bioregion
- the Maranoa-Balonne-Condamine, Gwydir, Namoi and Central West subregions, within the Northern Inland Catchments bioregion
- the Clarence-Moreton bioregion
- the Hunter and Gloucester subregions, within the Northern Sydney Basin bioregion
- the Hawkesbury-Nepean, Georges River and Wollongong Coast subregions, within the Southern Sydney Basin bioregion
- the Gippsland Basin bioregion.



3.2. Advice on the Bioregional Assessment Methodology

A scientific methodology to guide how bioregional assessments are being undertaken has been developed. The methodology articulates the scientific and intellectual basis for a consistent approach to all bioregional assessments. The IESC was involved in the development of, and endorsed the bioregional assessment methodology, which was released in October 2013.

3.3. Advice on governance, quality assurance and products

The IESC also provides advice on governance and quality assurance processes for bioregional assessments, and has highlighted the importance of conducting effective stakeholder engagement.

The IESC is providing input to and reviewing bioregional assessments technical products. The first technical products—context statements for the Galilee, Gloucester and Namoi subregions, and the Clarence-Moreton bioregion—were released in June 2014. The context statements bring together existing information about the ecology, hydrology, geology and hydrogeology of each region and will provide a reference that will inform modelling and analysis of the impacts of coal seam gas and large coal mining activities in later technical products.

4. Advice on research

4.1. Advice on research projects

The IESC provides scientific advice to the Australian Government on previously commissioned background reviews and research projects being managed by the Department of the Environment. The IESC has made recommendations for improving quality assurance and peer review processes.

To date, the Australian Government has funded a series of research projects to address critical gaps in the current scientific understanding of water-related impacts of coal seam gas and large coal mining.

Projects include a national assessment of the chemicals associated with coal seam gas extraction (including hydraulic fracturing), and background reviews on important issues such as bore integrity, connectivity between aquifers and co-produced water.

In June 2014, six background reviews were published:

- Aquifer connectivity within the Great Artesian Basin, and the Surat, Bowen and Galilee Basins
- Hydraulic fracturing ('fracking') techniques
- Co-produced water – risks to aquatic ecosystems
- Subsidence from coal seam gas extraction in Australia
- Subsidence from coal mining activities
- Bore Integrity.

Further information: www.iesc.environment.gov.au/research/index.html.

4.2. Advice on research priorities

Following consultation with key stakeholders, the IESC provided advice to the Commonwealth Environment Minister on priorities for new research projects in September and October 2013. The advice concentrated on areas of high risk, significant knowledge gaps and where there was potential to produce outputs of national significance within three years. The IESC's advice was informed by a workshop with stakeholders in March 2013. The IESC also took into account current and emerging research being undertaken in Australia and overseas.

The IESC identified knowledge gaps and has provided scientific input to identify research needs in four priority areas or themes relating to the potential impacts on water resources from coal seam gas and large coal mining developments:

- Hydrology—better understanding and modelling of alterations to groundwater and surface water characteristics and processes.
- Ecosystems and water—strengthening knowledge of potential impacts on key species and ecosystems, as well as methods for monitoring and mitigating these impacts.
- Chemicals—chemical and ecotoxicological investigations including the potential cross-contamination of drinking water and other water resources.
- Cumulative impacts—assessing the potential impacts from individual coal seam gas or coal mining developments in conjunction with the impacts from other existing and likely developments in the region.



Photo: Soil sampling.

The Department of the Environment is progressing priority research projects within these themes.

Further information: www.iesc.environment.gov.au/research/index.html.

5. Understanding and disseminating scientific information

5.1. Communication and publication of information

The IESC has a role to build public confidence in the scientific evidence which informs regulatory decisions on coal seam gas and large coal mining development. The IESC aims to increase awareness of its scientific advice, inform scientific dialogue on research, and inform public dialogue on the potential impacts of coal seam gas and large coal mining developments on water resources.

The IESC's website is an important tool for communicating and publishing information and is available at: www.iesc.environment.gov.au/index.html.

The website contains:

- agendas and minutes for all meetings
- outcomes from workshops
- the IESC's advice on coal seam gas and large coal mining development proposals
- information on bioregional assessments and research
- other publications such as *Information Guidelines* and fact sheets.



Photo: Aquatic ecosystem in the Hunter Valley

The IESC has developed a number of fact sheets on key scientific issues associated with the water related impacts of coal seam gas and large coal mining development, including subsidence from longwall coal mining, subsidence from coal seam gas extraction, and connectivity between water systems. The fact sheets are available on the website: www.iesc.environment.gov.au/publications.html.

5.2. Improving understanding

In order to remain current on coal seam gas and coal mining activities, the IESC undertakes regional visits in conjunction with one of its meetings each year.

In July 2013, the IESC toured two well-established coal seam gas operations in the Bowen Basin, Queensland, and, in June 2014, toured an operating open cut and underground coal mine, and a coal mine undergoing rehabilitation in the Hunter Valley Region, New South Wales. These visits are a useful opportunity for the IESC to see firsthand the scale and complexity of operations and discuss on-ground processes, water management issues and rehabilitation with operators and local stakeholders.



Photo: IESC members and staff from the Department of the Environment at a coal seam gas operation in Queensland, July 2013.



Photo: IESC members at a coal mine in New South Wales, June 2014.

Appendix A

Development proposals considered by the IESC

#	IESC #	Project title	Location	Requesting regulator
1	2012-001	Drake Open Cut Coal Mine	QLD	Commonwealth
2	2012-002	Maules Creek Coal Project	NSW	Commonwealth
3	2012-003	Boggabri Coal Mine Extension	NSW	Commonwealth
4	2012-004	Tarrawonga Coal Project	NSW	Commonwealth
5	2012-006	Gloucester Coal Seam Methane Gas Project	NSW	Commonwealth
6	2012-007	Sonoma Coal Mine Extension	QLD	Commonwealth
7	2012-008	Moolarben Coal Mine - Stage 2	NSW	Commonwealth
8	2012-009	Newlands Coal Mine Extension Project	QLD	Commonwealth
9	2012-010	Drayton South Coal Project	NSW	Commonwealth
10	2012-011	Northern Expansion of the Camden Gas	NSW	Commonwealth
11	2012-012	Kevin's Corner Coal Mine and Infrastructure	QLD	QLD and Commonwealth
12	2012-013	Mt Penny Coal Project	NSW	Commonwealth
13	2013-014	Arrow Surat Gas Project*	QLD	Commonwealth
14	2013-016	Stratford Coal Mine Extension Project	NSW	Commonwealth
15	2013-019	Cobbora Coal Project	NSW	Commonwealth
16	2013-020	Foxleigh Coal Mine Project	QLD	Commonwealth
17	2013-021	The Range Project	QLD	Commonwealth
18	2013-022	Bowen Gas Project	QLD	QLD
19	2013-023	Watermark Coal Project	NSW	Commonwealth
20	2013-025	Bengalla Mine Extension	NSW	Commonwealth
21	2013-026	Wallarrah 2 Underground Coal Mine	NSW	Commonwealth
22	2013-027	Galilee Coal (Northern Export Facility)*	QLD	QLD
23	2013-028	Coalpac Consolidation Project	NSW	Commonwealth
24	2013-030	Arrow Surat Gas Project*	QLD	QLD and Commonwealth
25	2013-031	Byerwen Coal Mine	QLD	QLD and Commonwealth
26	2013-032	Galilee Coal (Northern Export Facility)*	QLD	Commonwealth
27	2013-033	Duchess Paradise Project	WA	Commonwealth
28	2013-034	Carmichael Coal Mine and Rail Project	QLD	QLD and Commonwealth
29	2013-035	Springsure Creek Coal Project	QLD	Commonwealth
30	2013-036	Meteor Downs South Coal Project	QLD	Commonwealth
31	2013-037	Moranbah South Project	QLD	QLD and Commonwealth
32	2013-038	Bulga Coal Optimisation Project	NSW	Commonwealth
33	2013-039	Spur Hill Underground Coal Project	NSW	New South Wales
34	2014-040	Bylong Coal Project	NSW	New South Wales
35	2014-041	Teresa Coal Project	QLD	QLD and Commonwealth
36	2014-042	Surat North Development	QLD	Commonwealth
37	2014-043	Liddell Coal Operations Extension	NSW	Commonwealth
38	2014-044	Red Hill Mining Lease	QLD	QLD and Commonwealth
39	2014-045	New Acland Coal Mine Stage 3	QLD	QLD and Commonwealth
40	2014-046	Boundary Hill South	QLD	QLD and Commonwealth
41	2014-047	Caroona Coal Mine	NSW	New South Wales
42	2014-048	Washpool Coal Mine	QLD	QLD and Commonwealth
43	2014-049	Taroborah Coal Project	QLD	QLD and Commonwealth
44	2014-050	Rolleston Coal Expansion	QLD	QLD and Commonwealth

* Considered by the IESC multiple times at different stages of the assessment process.

