Submission to the IPC on the Narrabri Coal Seam Gas Project

Professor Melissa Haswell and Professor David Shearman

Dear Members of the Independent Planning Commission,

We appreciate the opportunity to provide this submission to the Independent Planning Commission for the proposed coal seam gas mining expansion in Narrabri.

We are highly qualified to provide this comment based on decades of medical, public and environmental health experience. Our academic and medical credentials and experience give us a wide knowledge about the human health and wellbeing impacts of gas mining. We have been teaching, reading, examining and publishing evidence-based articles and submissions on this topic for over a decade.

Brief bios are provided below.

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Melissa Haswell is a Professor of Practice (Environmental Wellbeing) within the Office of the Deputy Vice Chancellor of Indigenous Strategy and Services at the University of Sydney and Professor of Health, Safety and Environment in the School of Public Health and Social Work at Queensland University of Technology. She holds a PhD from Imperial College of Science and Technology, University of London. Professor Haswell has taught undergraduate and post-graduate students in medicine, public health, Aboriginal health and environmental health for 25 years at University of Queensland, University of New South Wales and Queensland University of Technology. Professor Haswell has authored over 80 peer-reviewed publications in the fields of Aboriginal and Torres Strait Islander health, epidemiology, carcinogenesis associated with inflammation, environmental toxicology, psychosocial and community empowerment, mental health and social and emotional wellbeing.

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David Shearman is Emeritus Professor of Medicine at Adelaide University and previously held senior positions at Edinburgh and Yale Universities. He is author of many books relating to climate change, its science, consequences and democratic and other solutions; he served on the IPCC for two terms on health and scientific sections. He has been President of the Conservation Council of South Australia and with the late Professor Tony McMichael he founded Doctors for the Environment Australia in 2001 and was the Hon Secretary 2001- 2017. He is author and co-author of several hundred scientific and medical papers and writes frequently for the media. He was awarded an AM for service to medicine and climate change.

Executive Summary

The health consequences of gas mining have been ignored by Australian government and the industry. However we know that its local impacts, existing and predicted, on our life supports is all-pervasive. They relate to large consumption of water and contamination of water sources, air pollution around the myriad of wells, chemical contamination of productive farmland, household pollution causing childhood asthma and harm to the unborn child from complex chemicals.

We, the authors, have undertaken continuous review of the now very large literature, over 2000 papers, published by public health and environmental science researchers and doctors over the last seven years. There is a substantial body of research findings, mainly from the United States where rapid and expansive development of gas and oil fields has occurred in close proximity to residential areas. This involved literature searches on PubMed, Scopus and the ROGER (Repository of Oil and Gas Energy Research) database.

This submission raises, discusses and provides evidence regarding six clear points:

Point 1. Additional risks and uncertainties are still arising regularly in the peer reviewed published literature.

Point 2. The literature on chemicals entering the environment through air, water and land clearly demonstrates the potential for direct and ecologically-mediated human health risks.

Point 3. The literature indicates serious potential harms associated with endocrine disrupting chemicals in shale gas wastewater and air emissions, demanding equivalent research in CSG and more stringent monitoring, regulation and prevention actions.

Point 4. Human health is also damaged by distress and disturbing our psychological, social and spiritual health, from despair at loss of heritage and environmental integrity to fear for health.

Point 5. Evidence of poorer health outcomes among those living near to gas developments is getting stronger, especially those affecting unborn babies.

Point 6. Approval of the Narrabri gas project would violate the timeless custodianship of the Pilliga Forest by the Gomeroi People and today's Principles of Ecological Sustainability

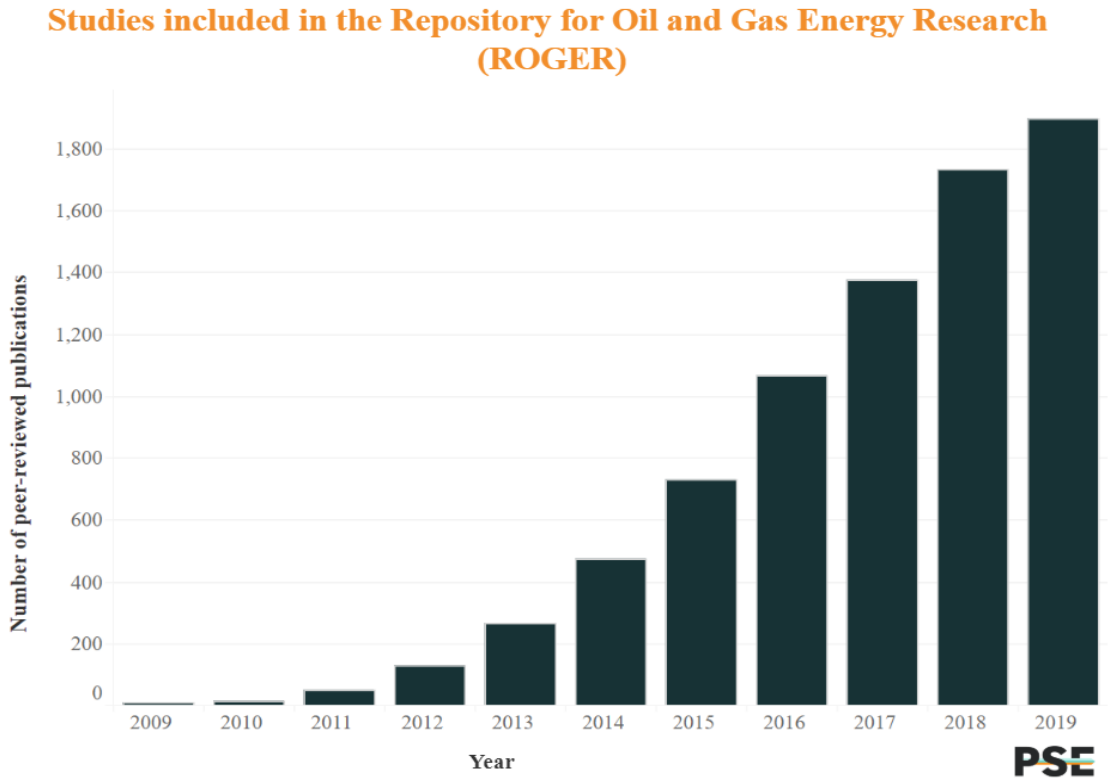
Conclusion

Based on these six points, which are also fully detailed in many presentations and submissions by concerned experts and community members, we urge the IPC to reject the proposed expansion of CSG mining in the Narrabri region until all concerns for the safety of people and the environment are addressed and properly mitigated.

Point 1. Additional risks and uncertainties are still arising regularly in the peer reviewed published literature.

There has been a remarkable rise in the number of peer reviewed publications revealing environmental health impacts associated with unconventional gas mining worldwide – but almost none in Australia.

Figure 1 shows the rapid rise in the cumulative number of peer reviewed published studies on unconventional gas mining and environmental health concerns (air, water, climate, noise, health impact studies, etc) from 2011 to 2019 – numbering over 2000 today – according to the Physicians and Scientists for Healthy Energy in the United States. About 1600 papers have been published since the NSW Chief Scientist and Engineer's Review in 2013/14, which was conducted long before the evidence had begun to emerge.



Physicians and Scientists for Healthy Energy (2020) https://www.psehealthyenergy.org/our-work/shale-gas-research-library/

A large proportion of these studies provide evidence that raises, rather than alleviates, concerns of negative impacts that directly or indirectly impact on human health (Hays and Shonkoff, 2016; Haswell and Bethmont, 2016; Saunders et al., 2016; Werner et al., 2015). New concerns are being discovered regularly, especially surrounding the repeated underestimation of fugitive methane emissions and their critical role in progressing global warming (IPCC, 2018).

The research has revealed extensive complexities between and within gas basins, high variability in chemical emissions over time and location and a deep appreciation of the multiple, inter-related hazards facing people trying to co-exist with gas fields. Long-term cumulative impacts remain largely unknown, despite the industry's multi-decadal expectation of operations.

When we contrast large and increasingly mature and independent literature on shale gas yielding these findings, mostly in the United States, we find a tiny handful of papers on health concerns on CSG in Australia. It is extremely concerning that there is only one single funded "study" of public health impacts associated with CSG in Australia.

This single study, which will deliver findings after the Narrabri decision is made, is funded by an Alliance of five gas industries and a state government, which openly supports the industry. Furthermore, it is being led, not by independent health researchers, but by a geologist with expertise in minerals geoscience and structural geology.

Like many of GISERA's outputs, it is quite possible that this single non-independent study will be publicised as providing certainty on all questions of health and safety – which many scientists in the US over a decade would find extraordinarily naive.

Thus, many serious health concerns remain unknown and require continuing comprehensive and independent study. This is especially true for coal seam gas mining for which there has been a severe lack of health research, despite over a decade of intensive operation in Queensland. To progress without addressing these uncertainties is a violation of the precautionary principle and shows disregard for the health and wellbeing of affected families and communities. We address a number of these concerns in the following points.

Point 2. The literature on chemicals entering the environment through air, water and land clearly demonstrates the potential for direct and ecologically-mediated human health risks.

Unconventional gas mining involves the handling of hundreds of chemicals – both deliberately added and those that are naturally occurring in the coal seams and present in large quantities of wastewater that must be handled. Even if hydraulic fracturing does not occur, the drilling process generates waste (used muds, drill cuttings, chemical additives) and provides a potential long-term avenue for gaseous chemicals from the coal seams to migrate to the aquifers and to the atmosphere. Dewatering, and if fracking is applied, produced water, generates thousands of litres of contaminated water that must be handled.

Although reverse osmosis water treatment will be used in the proposed Narrabri expansion, there is no long term solution for the disposal of salt waste in inland areas, which when not managed well, may threaten the ecological health and productivity of rivers, soil and vegetation (Davies et al., 2015).

Many studies report evidence of pathways through which ground and surface water can, and in some cases has, been impacted by gas well activity, spills or deliberate discharge of inadequately treated water and leakage from wastewater pits and ponds. Studies in the US have shown that spills of unconventional gas fluids are common – occurring in 2 to 20% of active well sites (Maloney et al., 2017; Patterson et al., 2017) – with many studies observing impacts on ground and surface water quality (discussed in Kassotis et al., 2018).

An incident in Santos' Narrabri operations led to uranium contamination of an aquifer caused by a leak in a wastewater holding pond liner (Carey, Redmond and Haswell, 2014). The saline wastewater dissolved and transported naturally occurring uranium into the groundwater.

These and other risks to water are no doubt extensively detailed in other submissions to the Commission as they are of major recognised concern in the Narrabri development.

Many volatile chemicals emitted during coal seam gas mining can also reach the atmosphere from flaring, venting, gas processing, holding tanks, ponds, compressors and other infrastructure.

Residents living near gas wells and infrastructure and industry workers may be exposed to air-borne pollutants directly, e.g. through diesel exhaust from extensive truck movements, drilling, compressors and other machinery used in the process, flaring and from gases from the coal seam released during well completion and other phases (Petron et al., 2012; Adgate et al., 2014; Field, Soltis and Murphy, 2014). Some gases form secondary atmospheric pollutants such as ground level ozone. Other exposure pathways involving inhalation of potentially harmful substances occur through the movement of volatile compounds from contaminated water into the air, and some toxins may return to contaminate soil and water bodies through subsequent rainfall, falling on waterways and livestock pastures.

Contamination of soils and competition for land use carries significant human health risks, especially when considering cumulative impacts of hundreds of wells over decades in important agricultural areas such as Narrabri.

Point 3. The literature indicates serious potential harms associated with endocrine disrupting chemicals in shale gas wastewater and air emissions, demanding equivalent research in CSG prior to progressing and more stringent monitoring, regulation and prevention actions.

People living near unconventional and conventional gas operations can be at elevated risk of exposure to a wide range of potentially hazardous organic compounds (like benzene), poly-aromatic hydrocarbons, heavy metals and radioactive materials in the air as well as water. These can affect the respiratory, endocrine, nervous and cardiovascular systems, and some have the potential to cause cancer and birth defects at sufficient levels of exposure (Colborn et al., 2011; ATSDR, 2013; McKenzie et al., 2012; Webb et al., 2014; 2016).

There are many opportunities for human exposures to harmful chemicals, and besides the well-known groups, there is also emerging concern about endocrine disrupting chemicals (EDCs). Despite a now quite extensive literature in the United States on these chemicals, as well as recent experiences across Australia with one family of endocrine disrupting chemicals namely PFAS, there has been little focus on these chemicals in gas mining activities in Australia.

The endocrine system plays an extremely important and delicate function in the body of humans that, together with our nervous system, regulates and coordinates communication between cells, organs and systems. This is achieved through the secretion of a complex array of hormones.

EDCs are defined as individual or mixtures of chemicals that can interfere with any aspect of the way that hormones – these major messenger within the endocrine system - act in the body. Hormones direct development, reproductive functions, metabolism and normal functioning of the body. By interfering with hormones, EDCs can therefore causes a wide array of health and developmental problems.

Three characteristics of EDCs make them very important to understand before allowing any risk of environmental contamination and hence human exposure:

- EDCs typically can profoundly impact on health at very low concentrations – much lower than other types of toxic chemicals – but the impact on health can be at least as great
- EDCs are rarely tested for as the testing is costly and highly technical, often requiring sophisticated assays
- The impacts of EDCs are rarely linked to the source hence prevention/risk reduction strategies regarding contamination and health damage is extremely difficult.

There is now a significant body of evidence indicating that the contamination of both air and water with emissions from oil and gas mining operations has the potential to expose humans, livestock and wildlife to a wide range of chemicals with endocrine disrupting chemicals. (Lloyd-Smith and Senjen, 2011; Kassotis et al., 2016; See **Appendix** page 20 for fuller listing).

The endocrine disrupting activities and likely health problems linked to the EDCs so far obesity, diabetes, reproductive abnormalities including lowered sperm counts, cancers, reduced fetal growth and birth defects.

Because of the very large array of peer-reviewed scientific papers on the topic – we list a sample of papers in the Appendix of this Submission. **We urge the Commissions to review this Appendix list to gain a fuller appreciation of the growing body of evidence**, which has come from in vitro and in vivo (mice) studies of these chemicals in models that are relevant to their potential impacts in humans.

In comparison, we are aware of only one study exploring one type of disruption activity has been conducted in Australia, hence very little is known about these chemicals in coal seam gas mining (Bain and Kumar, 2018).

Based on the extremely costly and distressing experience in Australia surrounding the discovery of the endocrine disrupting chemical PFAS in firefighting foam – we now understand that this is an extremely urgent area required for research to fully understand the risks to health and development in humans as well as to livestock and wildlife. This work may well reveal much more stringent air water quality guidelines due to the very low concentrations that these chemicals require in order to have profoundly negative metabolic, reproductive, and developmental impacts on humans, livestock and wildlife.

Point 4. Human health is also damaged by distress and disturbing our psychological, social and spiritual health, from despair at loss of heritage and environmental integrity to fear for health.

There are many avenues through which the unconventional gas industry can harm mental health and individual and community wellbeing (Hossain et al., 2013; Powers et al., 2014; Kriesky, 2012; Morgan et al., 2016; NSW Parliament, 2012; Sangaramoorthy et al., 2016; Lai et al., 2017; Fisher et al., 2018; Hirsch et al., 2018).

For the Narrabri gas expansion, we must first acknowledge the expression of deep and profound grief made by some Gomeroi People that accompanies both fear and realization of the loss of heritage in the fragmentation of the Pilliga Forest, loss of connection to ancestors and lost opportunities to share traditional knowledge and culture that the gas operation represents.

No doubt the Commission has been deeply moved by the expressions of deep despair within the presentations made by some of the Gomeroi Traditional Custodians regarding systematic clearing, road building, trucks, infrastructure, drilling, pollution, and wastewater production. Although varying views reportedly exist (Howlett & Hartwig, 2017), for those speaking, caring for the Land for future generations is a responsibility handed down by thousands of generations of ancestors. The Committee carries the responsibility for decision making on whether those fears will be realized as yet another profound and devastating loss or profound relief.

While there are no specific research publications to date, a submission to the draft Final Report of the Scientific Inquiry into Hydraulic Fracturing in the Northern Territory by the Aboriginal Medical Services Alliance NT (AMSANT, 2018) concluded,

"imposing fracking against the wishes of large sections of the Aboriginal community is likely to worsen health and wellbeing through increased community discord, and heightened levels of depression and anxiety with subsequent effects on physical health and wellbeing. Aboriginal health is connected to the health of the land and water- so threatening the physical environment directly affects Aboriginal wellbeing. Aboriginal people already suffer unacceptable rates of mental health issues and chronic disease. The benefits in terms of employment are likely to be limited and short term. AMSANT considers fracking to be an unacceptable risk to the health and wellbeing of Aboriginal people in the NT with the risks clearly outweighing the benefits".

This assessment is likely to be equally true for many of the Gomeroi People of the Narrabri region witnessing coal seam gas mining in the Pilliga Forest.

There are many people who are not traditional custodians, and also feel a very deep and spiritual connection to the beauty and vast integrity of the Pilliga Forest and would be at high risk of experiencing solastalgia and anxiety from the diminishment of its unique ecosystems, flora and fauna. Industrialisation of this wild landscape would cause great distress to many people.

For everyone, prior to commencement, impacts may include distress, anxiety, fear of the unknown and social disharmony due to disagreements that split the community into those who support the industry and those who oppose it (Moffatt and Baker, 2013; Hirsch et al., 2018).

People who are well informed on the substantial contribution of the gas industry – through both carbon dioxide emissions during production, processing, transporting, flaring, liquefaction, piping, shipping and burning, as well as fugitive methane emissions also released at all points, can experience extreme anxiety, feelings of depression, hopelessness and demoralisation while observing apparent government failure to recognition of the urgency of transition away from fossil fuels ad promote gas mining.

In the ‘boom’ phase tight-knit communities can feel inundated with strangers coming in, burdening health and other services (Hossain et al., 2013; Hirsch et al., 2018). Crime may also increase (Bartik et al., 2017). Such impacts are detrimental to the social cohesion and for some, the moral character, of the community (Moffatt and Baker, 2013; Sangaramoorthy et al., 2016; Lai et al., 2017; Fisher et al., 2018).

In the post-construction phase, jobs may decline and housing demand drops. Production continues, with drilling and fracking, with its 24-hour lights, noise, privacy invasion, odours, tree clearing and truck movements - causing some people to feel a deep sense of loss of control, loss of place, anger, powerless and loss of peace and a feeling of being trapped and unable to escape (Lai et al., 2017; Sangaramoorthy et al., 2016; Hirsch et al., 2018).

All the phases may exacerbate the risk of depression and anxiety and suicidal ideation (Moffatt and Baker 2013; Morgan et al., 2016; Hirsch et al., 2018).

While the ‘boom’ phase may appear to bring positive social change, impacts on residents are uneven and most feel uncertainty in how communities will cope with the post-construction phase (Rifkin 2015; Walton et al., 2014). A survey by Australia’s Commonwealth Scientific and Industrial Research Organisation of 390 residents found that 48.5% felt their community was 'only just coping', 'not coping' or 'resisting' the industry. While 51.5% felt their community was adapting, just 11.4% of this group saw the change as 'into something different but better' (Walton et al., 2014). Disturbance of place attachment as a result of unconventional gas development may contribute to loss of wellbeing (Lai et al., 2017; Sangaramoorthy et al., 2016).

The New South Wales Parliament Legislative Council Inquiry into Coal Seam Gas (2012) found widespread concern about CSG developments from rural, urban and indigenous communities. Some inquiry participants were concerned about poor behaviour by CSG companies and contractors, the pace of development and fear of loss of land and livelihood.

A recent study by Casey et al. (2018) found a strong positive association between symptoms of depression and living in close proximity to greater numbers of unconventional gas wells in Pennsylvania.

In southern Queensland, 239 landholders, community and service representatives attending workshops linked psychosocial, health service, housing and financial stressors and negative mental health impacts with coal and UCG mining (Hossain et al., 2013). Participants urged greater protection of mental health and increased health and psychological services in mining areas.

Augmenting the Edinburgh Farming Distress Inventory to include stressors linked to CSG mining, Morgan et al. (2016) found that concerns about CSG mining contributed to overall stress burdens and odds of experiencing depression and anxiety, especially among farmers directly affected by mining activities.

The suicide of an Australian farmer in 2015 who, according to a family statement (Bender family, 2015), resisted pressure and experienced the consequences of unconventional gas mining and underground coal gasification on his farmland for over 10 years adds gravity to the findings of these studies. This death stimulated a national Senate Select Committee Inquiry on Unconventional Gas Mining (Parliament of Australia, 2016) but, after an interim report, the Inquiry was suspended due to the 2016 Australian election.

To summarise, potential social, emotional, cultural and spiritual impacts from the Narrabri gas expansion are likely to include:

- Severe and profound feelings of grief and loss among some Traditional Custodians – the Gomeroi People – for the destruction of forest integrity and cultural and spiritual heritage
- Solastalgia and anxiety from destruction of nature and industrialisation of landscapes ad from the knowledge that gas mining contributes significantly to GHG emissions
- Distress and division within and between families and communities
- Disempowerment, loss of control, loss of livelihood, loss of belonging
- Disturbances from lights, noise, traffic, reduced property values, fear, etc
- Local, regional & broader unfavourable economic changes, boom bust cycles
- Demoralisation and anxiety that the government is not transitioning away from fossil fuels despite the climate imperative
- Fear for own and children's health and future.

(Ferrar et al., 2013; Moffatt & Baker, 2013; Hirsch et al., 2018; Rifkin 2015; Walton et al., 2014; Sherval & Hardiman, 2014; Kriesky 2012; Hossain et al., 2013; Lai et al., 2017; Sangaramoorthy et al., 2016; Morgan et al., 2016; Casey et al., 2018; Evensen and Stedman, 2016; Fisher et al., 2018; MacTaggart et al, 2018; McHenry-Sorber et al., 2016; Willow et al., 2014).

Point 5. Evidence of poorer health outcomes among those living near to gas developments is getting stronger, especially those affecting unborn babies.

Many studies are now underway in the US to measure concentrations of potentially harmful chemicals in ambient air and water, assess likely levels of exposure to children and adults living in nearby communities to estimate their potential to cause or contribute to disease and compare disease frequencies among those close to and further from gas mining operations (McKenzie et al., 2012; Elliot et al., 2017).

There are also a wide array of studies that have reported health impairments associated with living in the proximity of gas mining operations for children and adults that may result from both chemical exposures and chronic distress. These include:

- Hospitalisations - for cardiological, respiratory and neurological disorders and for those with existing asthma conditions (emergency department visits, inpatient stays) and for some cancers and immune related diseases (Rasmussen et al., 2016; Jemielita et al., 2015; Werner et al., 2017; Whitworth et al., 2018; McCarron, 2018; McKenzie et al., 2017).

- Symptoms – migraine headaches, chronic nasal and sinus irritation, fatigue, nausea, skin rashes, eye irritation, nosebleeds, and asthma worsening requiring medication changes (McCarron, 2013; Rabinowicz et al., 2015, Rasmussen et al., 2016; Tustin et al., 2017).

- Traffic injuries and fatalities (Retzer et al., 2013; Graham et al., 2015; Blair et al 2017).

- Sexually transmitted infections – increased incidence rates of chlamydia and gonorrhoea infections which are associated with changes in sexual behaviour that can be associated with mobile workers coming in to depressed areas (Mabey and Mayaud, 1997; Komarek and Cseh, 2017; Deziel et al., 2018).

While no spatial community-level health studies have been done in Australia, there have been two limited single time-point studies. One by Queensland Health (2013) with low community participation and few reports of physical symptoms at a one-day clinic, did not identify likely links between existing air emission data and symptoms reported at the clinic. In contrast, many community members reported a range of signs and symptoms potentially related to CSG activities in a house-to-house survey conducted by local General Practitioner, Dr Geralyn McCarron (2013). While their results on the prevalence of physical symptoms were conflicting, the findings of both studies support Queensland Health's statement that:

"the available data were insufficient to properly characterise any cumulative impacts on air quality in the region, particularly given the anticipated growth of the industry. It is necessary to assess those impacts according to health-based standards which are relevant to long-term exposure" (Queensland Health, 2013, p18).

Also in the Darling Downs, Queensland, where increasingly extensive unconventional gas mining and production of coal seam gas has occurred to date, McCarron (2018) reported substantial rises in hospitalisation rates of 133% for acute circulatory and 142% rises in acute respiratory conditions between 2007 and 2014. Annual analysis of hospitalisations demonstrated that the rates were largely constant between 2007 and 2009, then climbed steeply from 2010 onwards; simultaneously with sharp rises in gas production and accompanying annual atmospheric emissions of nitrogen oxides, volatile organic compounds, PM2.5 and PM10, formaldehyde and sulphur dioxides that were reported by the companies and published in the National Pollutant Inventory. There is an urgent need to further investigate these coincidental increases in hospitalisations and pollution emissions (McCarron, 2018).

Many of the chemicals involved in unconventional gas mining, including some endocrine disrupting chemicals as discussed in Point 3, have potential reproductive and developmental toxicity (Webb et al., 2014; 2016; Elliott et al., 2017a; 2017b). Therefore, it is not unexpected that negative birth outcomes have been found to arise more frequently from pregnancies spent in proximity of gas wells and, very recently, areas with gas flaring. As a healthy start to life is critically important, this finding suggests that the industry may already be affecting the next generation before birth. These negative outcomes include:

- Reduced average birth weight
- Small for gestational age births and low birth weight babies
- Higher frequency of extreme pre-term deliveries and spontaneous abortions
- Congenital heart defects
- Antenatal depression and anxiety

(McKenzie et al. 2014; 2019; Stacy et al., 2015; Casey et al., 2016; 2018; Ma et al., 2016; Currie et al., 2017; Hill et al., 2018; Whitworth et al., 2018; Tran et al., 2020; Cushing et al., 2020).

Confirming previous studies suggesting an association between birth weight and exposure to unconventional gas mining mentioned above, Currie et al. (2017) found a 25% increased risk of low birth weight infants among mothers living within 1 km of a hydraulically fractured well, and smaller but detectable elevated risks at 2 and 3 kilometres distance. Using these findings, it was estimated that 29,000 infants born in the United States each year were at increased risk of low birth weight; which has significant implications for their subsequent health.

Further work has indicated that unconventional gas mining is also associated with increased risk and severity of preterm birth, especially when exposures to mining activity occurs in the first trimester of pregnancy (Whitworth et al., 2018).

Point 6. Approval of the Narrabri gas project would violate the timeless custodianship of the Pilliga Forest by the Gomeroi People and today's Principles of Ecological Sustainability

The Gomeroi People of the Narrabri Region, like Aboriginal peoples across Australia, have ensured maximum health of their Lands, waters and animals for thousands of years to enable the thriving of ongoing human generations. This was achieved through a clear commitment to living in a manner that continuously adhered to systems -- something similar to what we now call "ecologically sustainable development (ESD) principles".

Australia's environmental laws are supposed to strongly recognise environmental sustainability alongside economic and social values when making decisions on developments. However, this proposal fails to meet any of the ESD principles.

Precautionary Principle

As mentioned in Point 1, research has identified many substantial concerns and arguably, we are moving out of precaution and towards approval of an industry with known significant health risks associated with potential harms to the climate, water and air quality which human health and wellbeing depends on. Because of this, Australian Medical Association, Public Health Association, Doctors for the Environment Australia, the Climate and Health Alliance and the National Toxics Network – along with many professional health bodies In the United States and globally – urge governments to apply the precautionary principle and stop expansion until its safety is assured.

Intergenerational Equity

The climate change risks associated with gas mining are well known and highly significant, as time to reduce emissions enough to secure a limit warming to 1.5oC is rapidly running out. These have no doubt been described in detail in many submissions to the Commission. It is now recognised we are already in a Climate Emergency – and expansions of the gas industry are working against the chances of a decent future for current and future generations.

Protection of biodiversity and ecological integrity;

Many presentations and submissions to the Commission highlight significant concerns associated with the Narrabri proposal for the risks it places on the extremely high biodiversity values and ecological integrity of the Pilliga Forest.

Improved valuation, environmental pricing mechanisms;
With no carbon tax or credible mechanism for paying for carbon emissions, this development would not be held accountable for its contribution to accelerating climate change. Approval of the development without full understanding and mitigation of the risks posed to both surface and ground water, especially the Great Artesian Basin, would clearly violate this ESD principle.

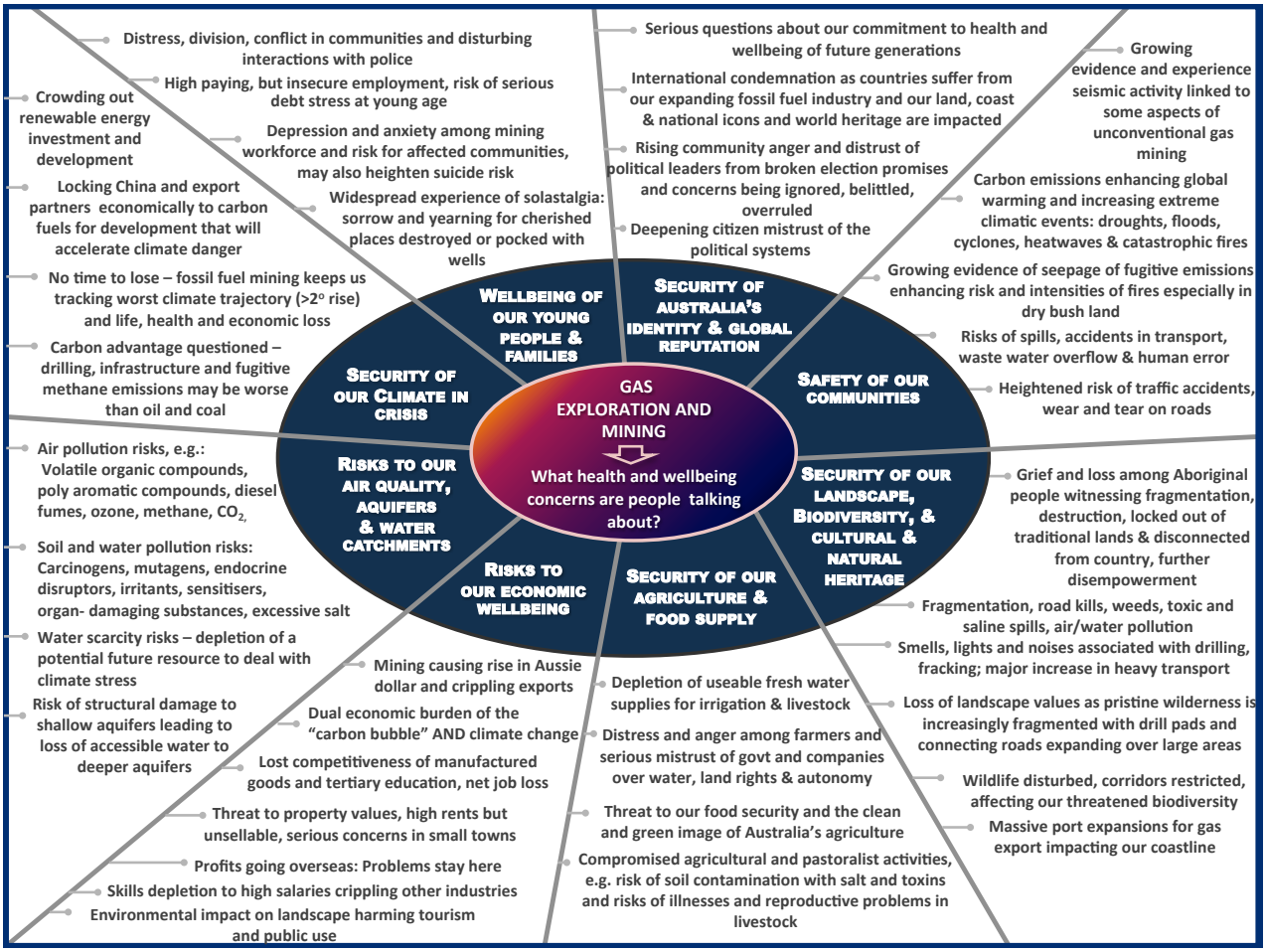
Polluter pays principle; environmental justice
There are frequent allegations of the gas industry deliberately breaching pollution guidelines because the fines are less expensive than ensuring environmental protection. It would be impossible for the company to 'pay' for damage to the priceless Great Artesian Basin or to the climate, and highly unlikely for individuals who experience illnesses or lower birth weight due to the industry to become compensated.
Public participation in decision-making
Clearly a process has been followed by the IPC to allow the public to participate in the public forums, and it is widely hoped that a safe and responsible decision will be made by the Commission based on public and expert input.

We urge the IPC to place these crucial values at the forefront on your decision.

Conclusion

As we have previously written, "Good health requires not merely the absence of disease, but also clean air, safe and sufficient supply of water and nutritious food, and a stable climate—the pillars of human health. Human activities, particularly since the Industrial Revolution, have both enhanced and diminished people's continuing access to these fundamental requirements. Major global efforts mobilised by the United Nations Millennium Development Goals achieved improvements in human health and wellbeing. However it is recognised that these goals, and the economic developments of individual nations, were largely achieved at the expense of the environment. Global efforts are now guided by the Sustainable Development Goals, which aim to work in harmony with national commitments to the 2015 Paris Agreement on Climate Change to achieve "Dignity, prosperity and peace on a healthy planet" by 2030 (Haswell & Shearman 2019; https://www.un.org/sustainabledevelopment/repositioning-the-un-development-system/).

The diagram below identifies examples of how unconventional gas exploration and mining has and is impacting on human health and wellbeing.



The message of this diagram is that the impacts of the Narrabri development – as a step forward in the progression of gas mining locally, nationally and globally – can only be understood correctly to result from a multiplicity of worries, potential chemical exposures and physical impacts on water, climate and land and the future chance of our children to enjoy a decent world. This 'cocktail' is a very heavy burden on human health and wellbeing.

Comparison with other potential 'post-COVID' recovery options – such as wind and solar energy for domestic and export with secure job, economic, market, environmental and health futures – gas, coal and oil mining is by far the worst choice for Narrabri and for Australia.

Recommendation to the IPC

Based on these six points, which are also fully detailed in many presentations and submissions by concerned experts and community members, we urge the IPC to reject the proposed expansion of CSG mining in the Narrabri region until all concerns for the safety of people and the environment are addressed and properly mitigated.

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Appendix: Special Bibliography of a Sample of Peer Reviewed Publications on research examining birth outcomes, children, endocrine disrupting chemicals and chemicals with potential developmental effects in association with gas mining

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