Adrian Ingleby
[redacted]

NSW Government
Planning & Environment
GPO Box 39,
Sydney NSW 2001

To the Manager,

Narrabri Gas Project – EIS exhibition - application number SSD6456

1. I object to the application.

2. I am making a personal submission and I have read, understand and accept the conditions of your "Privacy Statement." I have not made any political donations.

3. Thank you for the opportunity to respond to the application. Attached is my submission consisting of 15 pages. There are also 3 attachments being:

ATTACHMENT 1 - consisting of 7 pages and 14 photographs.
ATTACHMENT 2 - consisting of 3 pages.
ATTACHMENT 3 - consisting of 2 pages.

4. I have no objection to my name and suburb being published with my submission.

Regards,

Adrian Ingleby

Adrian Ingleby
[redacted]

NSW Government
Planning & Environment
Sydney NSW 2001

Narrabri Gas Project – EIS Exhibition – SSD 6456
Environmental Impact Statement application

I object to the application

"What is the purpose of an 'Environmental Impact Statement'?"

Answer

It is to assess **RISK !**

"What is risk?"

Answer

Risk is defined as **the product of the** *likelihood* **and** *consequences* **of an** *outcome.*

It is important to note that with *risk* you really have to think about worst-case scenarios in regard to risk management, because as with climate change the expected outcomes have proven to be far worse than originally expected.

THE RISKS

Risk # 1:

Independent baseline studies **have not** been carried out

The Queensland State government allowed extensive CSG extraction in their state without any 'government authorised independent investigations' to assess the risks involved. The NSW government did likewise. Even more concerning is the fact that 'independent baseline testing' has not been carried out by the NSW government [via contracted university and other qualified experts] in relation to groundwater, surface water, land and the atmosphere, meaning there is no original scientific record available with which to compare any potential adverse impacts to land, water and air against, "before" and "after" the mining commenced.

Any company involved in a mining project does not want 'baseline testing' done as they know that it would be a strong investigative tool that could be used to (1) identify any adverse impacts for which they are responsible and (2) to be produced as evidence in court in any prosecution of them for any alleged unlawful adverse impacts.

Risk # 2:

Above ground industrial footprint

[Attachment 1] - contains 14 photographs of the Narrabri – Pilliga State Forest - Gas project taken in December, 2013 showing the above ground industrial footprint during those early stages of the project. The footprint is exactly as described in documents that I read during my research about coal seam gas extraction. Trees and other vegetation were knocked down and mulched during land clearing to accommodate wellheads. A single wellhead takes up about one hectare, roads were widened for access and fire breaks and trees pulled down to dig trenches to carry pipes that transfer the gas and produced water. Land is cleared for holding ponds and compressor stations. The pristine bush environment had been destroyed.

3745 - YAAMA Welcome to Gomeroi Country – The camp at Ten Mile dam.
3754 - Pipes near the entrance to Dewhurst 22.
3762 - Front gate of Dewhurst 22.
3768 - *'Protectors'* rally outside front gate of Dewhurst 22.
3788 - Side fence of Dewhurst 22.
3799 - Tree clearing and road widening.
3800 - Tree clearing and road widening.
3803 - Tree clearing and road widening.
3804 - The Bohena 2 - old spill site [10 years old at time of photo in Dec 2013]
3805 - " " " "
3806 - " " " "
3807 - Bohena Creek Road, Pilliga East forest –pipes being installed.
3810 - " " " "
3826 - X Line Road – tree clearing and road widening.

Risk # 3:

Below ground industrial footprint

Drill holes are sunk to a dept of 300 to 900 metres through groundwater and aquifers and a steel pipe sunk with cement pumped down to form a casing around the pipe. **Steel rusts** and cement cracks, shrinks and not every gap is filled with cement. The underground environment is highly corrosive and the drilling companies have to pump chemicals down to slow down or reduce the speed of the **corrosion.** The result is a "hidden web" of failing steel infrastructure relentlessly releasing salty water, methane gas and dangerous chemicals into the surrounding land, groundwater and atmosphere.

What is the NSW government's view on corroding infrastructure such as steel pipes. The "Code of Practice for Coal Seam Gas – Well Integrity" prepared by Trade and Investment Resources & Energy in consultation with the CSG industry: The introduction at the front of the document states, "The code provides a practical guide for coal seam gas (CSG) titleholders on how to comply with a condition of title for CSG exploration, extraction or production under the Petroleum (Onshore) Act 1991 (PO Act) and the Petroleum (Onshore) Regulation 2007 to ensure that well operations are carried out **safely, without risk to health and without detriment to the environment."**

I believe that those last comments are a worthy aim or mission.

On Page 22 at 4.7 "Well monitoring/maintenance" 4.7.1 Principles: it states,

"Wells, like any constructed asset, can deteriorate with age, operational and site specific conditions. This can lead to the well no longer being suitable for the intended use. Well monitoring and maintenance is required to preserve the well and its component parts in good repair for the life of the well."

Source:
http://www.resourcesandenergy.nsw.gov.au/__data/assets/pdf_file/0006/516174/Code-of-Practice-for-Coal-Seam-Gas-Well-Integrity.PDF

The section above [4.7], recognises that there are risks such as deterioration and *"4.7.1 Principles" - clearly identifies that constructed assets can deteriorate to the extent it can lead to the well no longer being suitable for the intended use.* An important question that comes to mind is, "How long is the life of the well." For the gas miner "the life of the well' ends when the gas is not flowing out at the desired and predicted rate for which they did their financial analysis, at which time they "frack" the well to cause the gas to flow faster and when the gas flow is not profitable they then "abandon the well" by capping it. They then continue drilling new wells to get new gas to keep up the "money flow" so as to supply gas as committed by previously signed long term contracts. For the NSW government "the life of the well" is when the gas miner abandons and caps the well. For the NSW environment "the life of the well" is basically "forever" as the underground hidden web of steel infrastructure continuously deteriorates causing lasting harm through the fugitive emission of methane gas into the ground, the groundwater and the atmosphere accompanied by the subsurface dispersion of salty water, toxic compounds, heavy metals and radioactive compounds.

Risk # 4:

Groundwater

Large volumes of water are pumped down under pressure to crack the coal seams and even more "produced water" is extracted with the methane gas. Each well will discharge about 20,000 litres of water a day and yield about 100kg of salt a day. [Parliament of Victoria – Research Papers – Unconventional Gas. The Williams Report: at 5,000 mg salt/L]

As a result of the extraction of produced water, the water table will be lowered and depressurised.

Australia's Great Artesian Basin covers 4 states and its underground aquifers are a vital source of water. Farmers and the Commonwealth Government have spent $150 million capping bores and fixing pipes to conserve water.
http://www.abc.net.au/news/specials/coal-seam-gas-by-the-numbers/
If the Narrabri Gas project is allowed to proceed the $150 million spent capping bores was a waste of time and money and will put our farming economy at high risk.

A televised interview took place on the ABC 7.30 Report on Friday, 14.03.2014, [Attachment 2] in regard to the Santos gas project as a result of it being alleged that pond-water containing uranium isotopes leaked. The ABC interviewer was Quentin Dempster and the participants were Professor Mary O'Kane –NSW Chief Scientist, James Baulderstone – Vice President for Santos, and Phillip Pells – "Groundwater Specialist" – UNSW Adjunct Professor and Independent Consultant to Industry.

Quentin Dempster asked Mr Pells, "We asked groundwater specialist Phillip Pells a University of NSW Adjunct Professor and independent consultant to industry for a preliminary risk assessment from publicly available documents on planning departments and Santos websites he noted what he believes is a glaring omission." Phillip Pells, "What I find most disturbing having gone through the studies, one for this, both for the Eastern gas time and also now by Santos is they are in fact silent on the Great Artesian Basin, the words' actually not even used and I find that's quite staggering that um in the environmental impact statement after environmental impact statement when they talk about impacts on the groundwater and the surface water there's no mention of the Great Artesian Basin." Later Quentin Dempster said, "With the O'Farrell Governments recently signed MoU with Santos to deliver investor confidence in the Narrabri CSG project there is now great scepticism that the coming Planning Assessment Commission process will be turned into a rubber stamp." Phillip Pells replied, **"When the impacts do occur they're irreversible**, so we have to be very certain and very carful at the start that we don't generate a system that causes unexpected and significant impacts which we can do nothing about, it's too late then."

Risk # 5:

Contaminants

The coal seams have toxic compounds, heavy metals and radioactive compounds resident in their seams. These contaminants together with methane gas and salt escape from the extraction pipes and surrounds, mixed with water and migrate through cracks and fissures in the subsurface into the groundwater and aquifers contaminating them forever. Once a groundwater system or aquifer is contaminated it can't be fixed, the damage is irreversible !

Salt: The Sydney Morning Herald, 21.02.2017 reported that the Santos project will produce:

100 tonnes of salt per day at it peak
115 tonnes of salt per day during the 2nd to 4th years
47 tonnes per day on average over 25 years

The project is spread over 950 square kilometres, drilling to a depth of 500 to 1200 metres. Therefore the above ground footprint will result in destruction on a massive scale in a bush fire prone state forest where families operate farms.

How will Santos dispose of this waste salt? The company claims that the salt would be managed by off-site disposal to an appropriately licensed facility. How is this so-called "appropriately licensed facility' going to safely dispose of the salt? I won't hold my breath waiting for that answer.

Stuart Khan, an associate engineering professor at the University of NSW, said Santos had previously stated dumping the salt into landfills was a last resort as it hunted commercially viable "beneficial reuse" for the salt, from glassmaking to sodium bicarbonate production. "But here we are proposing to landfill 430,000 tonnes of salt over the life of the project," Professor Khan said. "Landfills will be lined with synthetic liners to prevent leakage to groundwater, but all synthetic liners have a lifespan and they will all fail over a period of time," he said. "In time, it is certain that someone will need to come along and clean up these legacy salt landfills in order to prevent environmental damage."

The SMH article reports that Santos claims that their project could supply as much as **half of NSW gas needs.** Notwithstanding such a claim by Santos, I refer you to "Risk # 9 – Gas is dead and will be replaced by renewable energy," which if true means NSW won't need their fossil fuel gas. I suspect that much of the gas extracted from the Pilliga will be exported to South East Asia. Further, there is a strong possibility that should the EIS be approved Santos will sell off their "non-core asset," so claims by Santos about where the gas will be sold and used mean nothing.

http://www.smh.com.au/environment/not-seen-anything-like-it-pleas-for-extension-to-examine-huge-santos-csg-plan-20170221-guhnoi.html

All of Australia's major energy companies are moving forward with renewable energy; **therefore gas generators will become redundant.**

Go to "Risk # 9: Renewable energy at grid level" - for further information on battery storage etc.,

Risk # 6

Health

The process of coal seam gas extraction can be harmful to people, especially children due to contamination of the atmosphere through flaring, venting and fugitive emissions of methane gas and the dispersion of volatile organic compounds [VOCs]. Should the groundwater be contaminated the local farmers and their families who rely on groundwater for their crops and stock face the threat of contamination to both and the loss of their livelihood. If they use groundwater to drink and wash their personal health is threatened. Once the gas miners move in your land and house become worthless, no other person will wants to live there. You're trapped.

[EcoWatch – 17.12.2014] In 2014 Governor Cuomo of New York State made a decision to ban fracking. The NYS Department of Health reported that studies showed that fracking poisons the air (especially with benzene) and contaminates water. They show that old wells leak. They show that new wells leak. That fracking has not been demonstrated to be safe as currently practiced and that there is no guarantee that any regulatory framework can make it safe are echoed in literature reviews conducted by three other scientific shops. Dr. Howard Zucker, N.Y. State Health Commissioner said, "Would I live in a community with high-volume hydraulic fracking, based on facts I have now. After looking at plethora of reports, my answer is no. Until the public health red flags are answered by valid evidence, I cannot support high volume hydraulic fracking in the great state of New York." Governor

Cuomo said, "Dr. Zucker, I found your statement especially effective. What I found most powerful in your presentation is you wouldn't let your family live in an area with high-volume fracking. If you don't believe your children should live there, your duty is to suggest no child should live there."
http://ecowatch.com/2014/12/17/cuomo-bans-fracking-new-york/

Risk # 7:

Greenhouse gases in the Atmosphere

Methane gas [CH4] is a greenhouse gas said to be 84 times more heat trapping than CO2 in the atmosphere over the first 20 years. It is a flammable gas which is often extracted in bushland areas similar to the Pilliga State Forest an area prone to bush fires. In the USA many of the areas where fracking occurs rely on groundwater to drink, bathe and for farming purposes. When it is proved that fugitive methane gas has migrated into the groundwater the mining companies have a responsibility to deliver safe, clean water to those homes for drinking, cooking and bathing. Methane gas when confined in a room and in the correct balance, can explode and there have been occasions in the U.S., where local authorities have advised residents to leave their windows and doors open when showering to avoid the risk of such explosions. The ability to ignite tap water is common in such areas.

Research in the United States of America and in other places throughout the world over the past 5 years has revealed that the quantity of ***"fugitive methane emissions"*** present in the atmosphere above or near gas-fields is far higher than that promised or predicted by the gas mining companies engaged in extracting the gas and oil.

As stated at "Risk # 1" the gas miners and the NSW government **do not** do baseline testing in regard to the level of methane emissions around gas-fields. **Independent** government directed BASELINE TESTING of land, water and the atmosphere is clearly a MUST in regard to the creditability and accountability of government before any extraction projects are approved and should then be done on a regular ongoing basis.

Why isn't it done? Well the buck stops with the NSW government and it seems to me that the governments' desire for money into treasury blinds them and stops them from implementing critical actions that the proponent would not want, even though on behalf of the State and the people living in it, they have a moral and probably a legal obligation to implement such vital actions. The high rollers in government would be saying, "List this as a 'State significant project' and we'll push it through quickly." In fact the Deputy Premier, Andrew Stoner, signed a memorandum of understanding with Santos in February, 2014 designating the Santos project as a "strategic energy project" and guaranteeing a final decision on whether or not to approve the project by January 23,2015.

[Southern Cross University – 18.11.2014] The first peer-reviewed paper on atmospheric methane and carbon dioxide concentrations in Australian coal seam (CSG) fields, was published in November, 2014 in the international journal *Water, Air and Soil Pollution.* The research was carried out by Southern Cross University scientists, the authors being Dr. Damien Maher, Professor Isaac Santos and Dr Douglas Tait from the Centre for Coastal Biogeochemistry Research in the School of

Environment, Science and Engineering. The paper titled "Mapping methane and carbon dioxide concentrations and δ13C values in the atmosphere of two Australian coal seam gas fields" is a result of the researchers physically going to the gas-field areas and using novel instrumentation to map atmospheric methane and carbon dioxide concentrations in and around coal seam gas-fields in the Darling Downs, Queensland and northern New South Wales. Dr Tait said they found consistently elevated methane and carbon dioxide concentrations within the CSG fields of the Darling Downs, Queensland.
http://scu.edu.au/news/media.php?item_id=11561&action=show_item&type=M

http://link.springer.com/article/10.1007/s11270-014-2216-2

What about fugitive methane emissions from abandoned wells? [SMH - 08.07.2016] AGL in July, 2016 held a community meeting in Gloucester, NSW to discuss the 12 wells in the mid-north coast region, including near the town, and expects to decommission all by the year's end, a spokesman said. Locals asked about the threat of future venting of methane and the contamination and mixing of aquifers that could affect quality and quantity of groundwater. Nicky Coombs, one of the locals attending, said they were told the EPA never tested decommissioned wells. They also asked about the expected lifespan of the steel and cement used to plug the wells, particularly given the potential for sulphur-reducing bacteria to corrode those materials.

AGL have 144 wells drilled near Camden, 91 are still operating while 16 have been "signed off by the regulator" with 3 others being revegetated "ahead of formal sign-off," the AGL spokesman said. When asked by Fairfax Media how many of the 16 wells had been independently audited for leakage or water contamination, neither the Department of Industry (DoI) nor the NSW Environment Protection Authority (EPA) could confirm any had been checked. When a well is to be plugged and abandoned, the company is required to notify the department and provide a decommissioning program. After the plugging, the firm is required to give the regulator a report on how it went. A Department of Industry spokesman said it "has the ability to revisit the performance of plugged and abandoned wells." The EPA runs "an extensive leak detection and repair program" during a gasfield's exploration and production stages but relies on the company to do the testing during decommissioning.

http://www.smh.com.au/environment/abandoned-csg-wells-go-untested-by-nsw-regulators-fanning-community-concern-20160703-gpxtfi.html

[SMH – 02.07.2016] Australia's coal seam gas industry claims its leakage is just 0.02 per cent but increased detection leaks in the US – triggering a flurry of studies – suggest some big changes are in the winds. US regulators this year [2016] lifted their estimate of America's annual emissions of methane – the potent gas that makes up most of natural gas – by 13 per cent with leakage from the oil and gas industry largely blamed. While Australia's gas boom, particularly for coal seam gas, is of a much smaller scale than the US shale bonanza, many of the issues are identical. These include **the lack of baseline studies** to distinguish the impacts of drilling and fracking of wells from natural methane seepage.

According to Santos' environmental impact statement (EIS) for its $25 billion Gladstone LNG project, fugitive emissions would only be 0.1 per cent for the CSG gasfields themselves. Total emissions were just 20,000 tonnes of carbon-dioxide equivalent last year across its entire business. "Santos meets all its regulatory requirements around emissions," a spokesman said. "We monitor, independently audit and make this data publically available in our annual Sustainability Report."

But a spokesman for Queensland's Department of Environment and Heritage Protection conceded that **Santos's EIS "does not include provisions for a formal auditing process".** However, the proponent is required "to document its proposed operations and how these will impact on the environment, which the department uses to "to inform the relevant permit conditions and requirements".

Dimitri Lafleur, a former geoscientist at energy giant Shell, said the industry has little idea of how much "migratory emissions" are making it to the surface. "With such a vast network and thousands of wells, it is very difficult to come up with an accurate number if you don't monitor on a regular basis," said Mr Lafleur, a PhD student at Melbourne University under Professor Rayner. **"And given it is not a requirement to minimise fugitive emissions, why would you?"** Mr Lafleur is part of a team commissioned by The Australia Institute to examine how big a problem such leakage is and how it might affect Australia's national emissions targets given the industry's rapid expansion.

http://www.smh.com.au/environment/climate-change/sleeper-issue-of-leaking-coal-seam-gas-fields-may-blow-hole-in-emissions-goals-20160622-gpph1q.html

The Federal Government is always keen to tell anyone who will listen that "mining is a state issue" and this allows them to dodge pesky questions from voters who live near mining projects who are concerned about adverse damage to the environment and to their and their children's health. At other times, especially when an election is looming they will buy into things like council amalgamations, notwithstanding that they are also "a state issue."

The Federal government may be able to assert that "mining is a state issue" but they are legally responsible for the estimation of greenhouse gas emissions as directed by the National Greenhouse and Energy Reporting act 2007 and the "National Greenhouse Accounts" which are reported via the "Australian Greenhouse Emissions Information System (AGEIS)" The reporting is done as a result of the emitters producing estimations according to a criteria set out in the act or regulations. The Australian government does not contract or use staff to actually go out and measure any emissions using scientific instruments.

Result: **No government authority at a state or federal level is actually physically measuring greenhouse gas emissions anywhere.**

Risk # 8:

Paris climate agreement

Prime Minister Turnbull signed the Paris Climate Agreement and when he signed that document he committed Australia and every state and territory in Australia to taking action to reduce our greenhouse gas emissions [carbon dioxide and Methane] in the hope of holding any rise in temperature to 1.5 to 2.0C. Basically scientists and heads of state such as Pope Francis and other people in respected leadership positions throughout the world are calling out, "Keep it in the ground." That is keep fossil fuels in the ground. Why" The probable risk of rising sea levels, floods, drought, storms, famine and health issues to mention a few.

Climate Change deniers: There are many people who do not believe in the concept of human induced climate change and global warming. The fact is that 97% of scientists do believe in human induced climate change and global warming and they claim that the scientific evidence proves it beyond a reasonable doubt.

Insurance companies worldwide have been factoring climate change into their risk assessments for over 40 years. [SMH – 25.02.2017] - In July 2017, a group of global firms with combined market value of US$1.5 trillion and US$20 trillion in assets will deliver recommendations to G20 leaders on how to avoid the risk of serious financial dislocation caused by **a carbon bust**. The group's draft report in December called for sweeping changes to how much big companies **should tell investors** about their climate change exposure, and how they plan to manage these risks. And as a carbon-intensive economy with $2.1 trillion in retirement savings that is heavily exposed to equity markets, Australia has plenty at stake in this debate. **"I think the penny is dropping for everyone that climate change represents one of the most important financial risks for investors,"** says Ross Barry, head of research at $59 billion fund First State Super. "It's not a 50-year thing, **it's a here and now problem."** A chief executive with an Investor Group on Climate Change recently said, "Once you put it on your financial statements, companies start to treat it differently. Climate change is one of those issues that will never be material in any historical reporting period, right up until the point where your whole industry goes out of business." http://www.smh.com.au/business/banking-and-finance/investor-pushing-business-to-avoid-a-carbon-bust-20170209-gu9e1x.html

The world-wide movement for divestment from fossil fuel companies began on campuses in the USA in 2011 and involves individuals, universities, super funds, pension funds, trusts and foundations moving their money out of fossil fuels and selecting more climate friendly investments. As of December, 2016, world-wide, 688 institutions and over 58,000 individuals had withdrawn funds representing $5.5 trillion in assets from fossil fuel investments. The ordinary people of the world are letting their money talk. https://en.wikipedia.org/wiki/Fossil_fuel_divestment

There is one particular group in Australia and throughout the world who are vocal deniers of climate change and global warming. That group are *politicians,* which is probably not that surprising considering that their main focus is on balancing the budget with money to treasury from mining and development projects, rather than a focus on the environment. Only a fool would say that politicians are not influenced

by donations and promises from fossil fuel lobbyists to their respective political parties.

Risk # 9:

Gas is dead
and
will be replaced by
renewable energy

Gas producers are selling their gas to South East Asia as LNG from the terminal in North Queensland. Once the first delivery left Australia by ship everyone in Australia was then locked into paying the higher "export price" for their gas. Long term contracts mean the gas will continue to be exported.

Prime Minister Turnbull and Mr Josh Frydenberg the federal Minister for the Environment and Energy in recent weeks have been spruiking the benefits of "ultra-supercritical coal-fired power stations" [carbon capture] which they call "clean coal." Highly qualified people in the field and economists say that "clean coal" is at least twice as expensive as renewable energy, maybe far more. Prior to that they claimed that the Labor state governments had renewable energy targets that were too high, which could not be achieved and they also tried to blame the South Australian blackout in September, 2016 on their wind turbines. Reports since have shown that the blackout was caused by 22 transmission lines being knocked over in the storm and the fact that the wind turbines "ride-through settings" were incorrect forcing the turbines to shut down. They have since been adjusted which will fix the problem and stop a repeat, something that was corrected in Europe 10 years ago. The old centralised grid system needs an upgrading of the law, rules and regulations to accommodate distributed energy and to stop the established big players from "gaming the system" through manipulation of the system in regard to getting the highest bids. A proposal is being considered that could help re-shape the energy landscape, such as changing the settlement time-frame from 30 minutes to 5 minutes to align dispatch and make the market more efficient.

So the Prime Minister, the Minister for the Environment and Energy and the federal Liberal / National government are actively pushing fossil fuels for the national electricity grid, especially coal generators and gas generators.

Therefore it would not be surprising to me that Santos is telling government that there is a "gas shortage" and that their fossil fuel greenhouse "gas product" is desperately needed.

The Sydney Morning Herald, 06.06.2016 reported on the APPEA conference in Brisbane [on Monday] where Cameron Hepburn an Oxford University professor of environmental economics, during an address, said that in the longer-run gas is "dead" without the wide-scale deployment of carbon capture and storage technology or until some other technology is developed that allows fossil fuels to be burnt without releasing carbon emissions. He said, "The window for the golden age of gas is closing very quickly. Ten years is a long time in the renewables industry and prices are coming down every year. The gas sector needs to take a stand now **because in the long-term gas is dead**." Elliot Diringer, executive vice-president of the US-

based Centre for Climate and Energy Solution, painted a bleak picture for the coal and gas industry, saying they had no choice but to act after the Paris climate change conference. "The Paris conference sounded the death knell for the fossil fuel industry. Real change is possible if the industry shows leadership rather than pass it off onto governments to do the work," Mr Diringer told the APPEA conference.
http://www.smh.com.au/business/energy/gas-industry-facing-death-in-zerocarbon-future-warns-expert-20160606-gpchku.html

Renewable energy at grid level

Renewable energy is available for use at grid level via solar photovoltaic arrays, solar concentrated tower, wind turbine, wind turbine supported by pumped hydro and at industrial level and household level via rooftop solar and solar tiles.

[RenewEconomy – 09.02.2017] Korean owned zinc refiner Sun Metals in Townsville, Queensland is in the planning process stage of building a 116 MW solar farm and it will be the first of many major energy consumers owning and operating renewable energy assets. Sun Metals previously said the project would underpin plans to expand its refinery, a position that undermines attacks on renewable energy as a "manufacturing killer.

http://reneweconomy.com.au/sun-metals-goes-bigger-solar-plant-hedge-energy-costs-21064/

Grid level power plants can be supported by battery storage which is available now. The old system of a centralised grid is redundant and will be replaced by micro grids and distributed energy, including household battery storage and households will be selling excess from their battery storage to the grid and peer to peer.

[RenewEconomy – 27.02.2017] A study led by Australian National University (ANU) experts, Professor Andrew Blakers, Bin Lu and Matthew Stocks suggests that a 100 per cent renewable energy electricity grid – with 90 percent of power coming from wind and solar will be a significantly cheaper future option than a coal or gas-fired network in Australia. They suggest that with most of Australia's current fleet of coal generators due to retire before 2030, a mix of solar PV and wind energy, backed up by pumped hydro, will be the cheapest option for Australia and this includes integration costs.
http://reneweconomy.com.au/anu-wind-solar-hydro-grid-cheapest-option-australia-87796/?utm_source=RE+Daily+Newsletter&utm_campaign=b138279020-EMAIL_CAMPAIGN_2017_02_27&utm_medium=email&utm_term=0_46a1943223-b138279020-40390981

In an interview on ABC News 24 on 27.02.2017 [Attachment 3], Kathryn Robinson asked Professor Blakers, "Is there a suggestion with this research that it could **eliminate the need for coal and gas fired power.'** Professor Blakers replied, **"Absolutely,** two thirds of Australia's current coal and gas fleet **will reach the end of its technical life time by 2036**, it needs to be replaced by something and the cheapest thing to replace it is photovoltaic's and wind. PV and Wind is now being deployed around the world at the same rate as everything else put together, that's coal, oil, gas, nuclear, hydro, all other renewables. **So the race is over, photovoltaic's and wind**

have won the race. It's 100% new generation technology in Australia and our research has shown that 100% deployment of, for the entire electricity system supported by pumped hydro delivers stability and reliability and affordability."

Professor Blakers did not include "battery storage" in his report. However Mr David Green from Lyon Solar a leading battery storage developer gave evidence at the NSW Senate Select Committee into the Resilience of Electricity Infrastructure in a Warming World 20.02.17." He told the inquiry that Australian authorities **simply did not understand the potential of battery storage** which has been deployed at scale around the world, and simply don't appreciate what the technology can do to support the energy transition. His company hopes to have 350MWh of battery storage in the South Australia market by the end of financial year 2018.
http://reneweconomy.com.au/battery-storage-held-back-by-ignorance-of-regulators-ministers-64037/?utm_source=RE+Daily+Newsletter&utm_campaign=817f3b7e25-EMAIL_CAMPAIGN_2017_02_28&utm_medium=email&utm_term=0_46a1943223-817f3b7e25-40390981

http://parlinfo.aph.gov.au/parlInfo/search/display/display.w3p;db=COMMITTEES;id=committees%2Fcommsen%2F85f8dc79-d9d5-4c29-beac-6a0f65ed4b94%2F0002;query=Id%3A%22committees%2Fcommsen%2F85f8dc79-d9d5-4c29-beac-6a0f65ed4b94%2F0000%22

An article in RenewEconomy, 22.02.2017 commented about the toxic political debate about the level of renewable energy, specifically wind and solar, that can be accommodated into the system. At the "Senate Select Committee into the Resilience of Electricity Infrastructure in a warming world," CSIRO energy division's principal research scientist Paul Graham said there were no barriers to 100 per cent renewable energy, and lower levels could be easily absorbed.

http://reneweconomy.com.au/csiro-says-australia-can-get-100-per-cent-renewable-energy-86624/?utm_source=RE+Daily+Newsletter&utm_campaign=b29d82978f-EMAIL_CAMPAIGN_2017_02_22&utm_medium=email&utm_term=0_46a1943223-b29d82978f-40390981

[Echo Netdaily – 08.08.2016] AGL Energy has announced plans to develop what it describes as 'the world's largest battery storage 'virtual power plant' in South Australia. The project will comprise a centrally controlled network of 1,000 residential and business battery storage systems with a combined total of 7MWh capacity that will both store rooftop solar power and help manage grid stability in the state. The $20 million virtual power plant will be developed over three phases in conjunction with the Australian Renewable Energy Agency. It will work by using a cloud-connected intelligent control system that will allow the batteries to be directed in unison: a strategy aimed at helping both consumers to maximise solar self-consumption and the broader community to manage state-wide peaks in electricity demand. When working together at this scale, they can be used to provide grid stability services by discharging at a time that will be of greatest benefit for the customer and the community.
http://www.echo.net.au/2016/08/agl-invests-worlds-largest-battery-storage-virtual-power-plant/

[RenewEconomy - 15.11.2016] Elisabeth Brinton, AGL Energy Head of Energy says it is likely that nearly one-third of households in Australia will have rooftop solar by 2025, and will likely want battery storage too, creating new opportunities for households to provide much of their own energy, provide back up power and provide grid services. Ms Brinton cited Bloomberg New Energy Finance predictions that suggest 30 per cent of Australian households would have solar by 2025. This compares to around 16 per cent of households now. [RenewEconomy – 15.11.2016]

http://reneweconomy.com.au/agl-says-one-third-households-solar-storage-42630/?utm_source=RE+Daily+Newsletter&utm_campaign=2ad24565a6-EMAIL_CAMPAIGN_2016_11_15&utm_medium=email&utm_term=0_46a1943223-2ad24565a6-40390981

An article in RenewEconomy, 28.02.2017, advises that Mr David Green of Lyon Solar a leading battery storage developer, gave evidence at the "Senate Select Committee into the Resilience of Electricity Infrastructure in a warming world," and he told the inquiry that Australian authorities simply did not understand the potential of battery storage. Lyon Solar hope to build 350MWh of battery storage in the South Australia market by the end of financial year 2018. He said, "Australia is still quite naïve about batteries. In the discussions we have had with regulators, they were not aware that there were batteries like this are operational in other parts of the world." Mr Lyon says that there are perhaps 20 different value streams for battery storage, including providing peak power, substituting for grid upgrades, and providing the fast response services that could have kept the light on in recent blackouts.

http://reneweconomy.com.au/battery-storage-held-back-by-ignorance-of-regulators-ministers-64037/?utm_source=RE+Daily+Newsletter&utm_campaign=817f3b7e25-EMAIL_CAMPAIGN_2017_02_28&utm_medium=email&utm_term=0_46a1943223-817f3b7e25-40390981

An article in RenewEconomy, 20.02.2017, reports that a trial will take place involving the newly constructed 100MW Hornsdale 2 wind farm in South Australia. It is funded by the Australian Renewable Energy Agency and it will involve the Australian Energy Market Operator, with the aim of showing that wind farms can provide what is known as FCAS- frequency control and ancillary services – a critical component in ensuring grid stability in the face of unexpected voltage swings and other faults. Only a few gas generators provide FCAS in South Australia, leading to massive price spikes when the service is called upon. If successful it will show that wind can provide the same stability services as baseload.

http://reneweconomy.com.au/australian-wind-farms-to-compete-with-gas-to-provide-grid-stability-62697/?utm_source=RE+Daily+Newsletter&utm_campaign=663ae8f96b-EMAIL_CAMPAIGN_2017_02_20&utm_medium=email&utm_term=0_46a1943223-663ae8f96b-40390981

Summary

The fact that the NSW government [and Queensland government] did not authorise any independent investigations into the risks that this new extraction process posed prior to coal seam gas exploration taking place in NSW is basically prima facie evidence that the politicians and miners feared that such investigations may reveal some of the potential adverse impacts highlighted in this report. They most probably thought that it may stop or slow down a good money generating mining project.

I suspect that the government did not authorise any independent **baseline testing** because they knew that such testing might end up being a 'road hump' initially and further down the track it may turn into a lighthouse that could be used to bring any coal seam gas projects to a halt by shining a light on any adverse impacts, thereby crushing their dream of vast economic benefits.

The methods that are used to extract coal seam gas mean that vast stretches of bushland and vegetation will be torn down and land dug up for trenches and drilling. Enormous quantities of groundwater are taken in the process, the remaining groundwater is placed at **high risk** of contamination by the fugitive migration of methane, salt and other toxic compounds. The underground pipes will rust and corrode and the contaminants will migrate into the groundwater. The process will continue unchecked for hundreds of years after the wells have been capped and abandoned. **No regulatory framework is capable of making this flawed process safe.**

The Great Artesian Basin which runs under four states, is one of Australia's most precious and priceless assets as it has stored fresh clean water for thousands of years. A gem in a continent that is mostly sparse and desert like and prone to drought. It should not be placed at risk so as to generate gas money, which in the end will be short term gain for long term pain.

Enormous quantities of toxic "produced water" will be drawn out and although it is claimed that it will be treated, I doubt that it can be treated to the level of pristine drinking water.

Water tables will be lowered and depressurised.

Millions of tonnes of waste salt will be produced with no safe way of disposing of it.

Adverse impacts to human and animal health and the environment are inevitable.

Once it is revealed that contamination is occurring the farming sector will collapse as a result of losing its hard earned reputation for producing good, clean safe food and products.

Methane is a fossil fuel greenhouse gas at least as dangerous and potent in trapping atmospheric heat as carbon dioxide, probably more so.

Climate change and global warming is real and recognised by most reputable scientists throughout the world as being real. Australia is a signatory to the Paris agreement designed to restrict the worlds' emissions of carbon dioxide. The only way that every country in the world can achieve the necessary reduction in carbon emissions is by keeping fossil fuels in the ground.

Safe renewable energy generated by solar and wind infrastructure is being constructed here and throughout the world at a massive pace. It will grow into a multi-trillion dollar business.

The National Electricity grid in Australia is now capable of being serviced by 100% renewable energy, without the need for any additional gas or coal generators. Claims to the contrary by politicians and the fossil fuel industry are wrong.

The gas and coal industry has been made redundant because renewable energy is carbon neutral and is equal on price or better, than gas or coal. The final nail in the coffin is the fact that super funds, trust funds, foundations, universities and individuals around the world are divesting from fossil fuel investments before they become redundant and commendably because they feel that they have a moral obligation to do so.

Santos wants the NSW government to approve a toxic gas project that will operate for 20 to 50 years and the fact is, that as renewable energy continues to come on line now and into the future, we won't need gas. Gas is dead. Coal is dead.

The fact that Santos have a market for our gas overseas **should carry no weight.** The protection of Australia's 'public trust assets' should override the desire of Santos shareholders to make a profit on their gas investment. Should the gas project be approved and proceed, the money generated in tax revenue from overseas gas sales will be a drop in the ocean in comparison to the trillions of dollars that will be generated here in Australia and throughout the world by the renewable energy market which is a source of high employment and which generates no carbon and does no harm.

Conclusion:

There is a very high *likelihood* that as a *consequence* of the stated contaminants migrating into the groundwater of the Great Artesian Basin, into the land, into the atmosphere and into the environment, such adverse changes, will result in a catastrophic *outcome* rendering the area occupied by the gasfield [and a much wider area] permanently unsuitable for any other purpose, including farming and residential occupation. Any homes, farms and land in or near the gasfields will be rendered valueless and impossible to sell in the real estate market.

Adrian Ingleby
5th March, 2017