Submission to EPA on Greenhouse Gas Emissions Guidelines

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Sustainable Energy Now (SEN) is a voluntary group of some 200 members and associates, many of whom are professionals in the engineering, science, educational, business and IT fields. Its goal is to promote renewable energy in Western Australia.	Contact details: PO Box 341 West Perth, WA 6872 contact@sen.asn.au www.sen.asn.au

About SEN

SEN (Sustainable Energy Now Inc.) is a non-profit association advocating for the utilization of sustainable energy sources within Western Australia (WA). SEN brings together a mix of multidisciplinary knowledge and capability, providing advice on renewable energy.

SEN's working teams consist of volunteers whose professional backgrounds include engineering/science, business, education and the environment. The teams have committed thousands of hours to developing evidence-based solutions toward transitioning WA's energy use from fossil fuels to renewables for the good of humanity, the economy and the environment, as a way for WA to play its part in the global transition to a more sustainable future.

Contents

Executive Summary

This submission responds to the Environmental Protection Authority consultation about Guidelines to consider greenhouse gas emissions in its future assessments of developments in Western Australia. SEN has reviewed the Guidelines in terms of the latest scientific understanding, agrees with their content as an appropriate minimum first step, and suggests some extensions to the guidelines.

In framing this submission, SEN supports these principles:

- Australia, and WA in its own right, as a minimum, must conform to its legally binding Paris Agreement commitments.
- The EPA GHG Guidelines need to reflect that to do this requires significant curtailment of our options to permit new fossil fuel projects or the expansion of existing projects, if the emissions cannot be negated as they are created.
- The EPA must retain its independence and be protected from influences distorting the scientifically based recommendations that it is tasked to provide.

This submission discusses the following issues:

- Industry is increasingly including a cost of carbon in investment decisions, and these Guidelines will provide certainty around costing structures
- Fugitive emissions from natural gas extraction make methane equivalent to coal in terms of GHG pollution
- The planetary carbon budget required to remain below 1.5°C or 2°C of warming is being compromised by LNG extraction.
- WA's carbon budget is also being compromised by LNG extraction.
- Demand for LNG is forecast to decrease worldwide

The submission also discusses GHG drawdown options, and highlights mechanisms whereby GHG pollution can be avoided or reduced.

Key Findings

This submission has come to the following conclusions:

- Industry is increasingly including a cost of carbon in investment decisions, and these Guidelines will provide certainty around costing structures
- The planetary carbon budget required to remain below 1.5°C or 2°C of warming is being compromised by LNG extraction.
- WA's carbon budget is also being compromised by LNG extraction.
- Demand for LNG is forecast to decrease worldwide
- Fugitive emissions from natural gas extraction make methane equivalent to coal in terms of GHG pollution
- An argument about LNG as a transition fuel for 'baseload' electricity is not supportable. Renewables, properly regulated, are cheaper, more reliable and better for the environment.
- There is no scope (globally or locally) to develop new natural gas projects while attempting to reach the Paris COP21 warming targets.
- In order to meet the Paris commitments as a state, emissions from existing gas facilities will also need to be drawn down.
- In line with the Precautionary Principle, SEN advocates for the use of the GWP_{20} approach, based on the latest IPCC findings.
- SEN asserts that the science shows that no new or expanded project that doesn't fully offset all emissions should be approved.

- Cessation, in the short term, of LNG production in Western Australia will have substantial economic impacts and will be politically unacceptable. Some new or expanded LNG projects may proceed, and a pragmatic approach needs to be taken.
- SEN supports the bulk of the guidelines as they stand, but suggests possible ways of strengthening the guidelines
- There is an untapped opportunity for WA to capture significant employment and other benefits by requiring that offsets for LNG emissions be sourced from within Western Australia.
- SEN acknowledges that more work needs to be done by government and industry to facilitate mitigation of GHGs
- SEN supports the Polluter-Pays principle of the EPA legislation, and expects that industry will be held responsible for dealing with its waste products. The cost of doing so should be a consideration in the pricing of the product.

The evidence presented here highlights the urgency of acting quickly to reduce GHG emissions to keep global warming within Paris COP21 goals. Existing and proposed LNG emissions outweigh all savings to date from the national RET and solar PV. This makes in even more difficult to meet the 2030 federal target and serious emissions reductions will be required in WA, in the near term. Reducing/ offsetting LNG emissions is one step in the right direction.

Recommendations

SEN recommends the Guidelines be strengthened as follows:

- The 100,000 tpa threshold be retained as the starting point, but be reduced incrementally each year down to 25,000 tpa.
- The threshold for upgrades to existing facilities that already meet the 100,000 tpa threshold in the aggregate be lowered to 25,000 tpa.
- The EPA must be able to consider associated proposals in their aggregate when assessing both the threshold and general assessment.
- That there be an overarching requirement for offsets to be equivalent to emissions produced concurrently with each year of production, rather than postponed.
- The extraction and storage, or offsets, of the GHGs must be secured and verified for a period of significant duration, i.e. in the order of hundreds of years, to allow atmospheric GHG levels to return to a safe concentration for the climate.
- The proposal's proponent should be responsible for Scope 1, 2 & 3 GHG emissions unless they can demonstrate that scope 2 & 3 emissions are being offset by others to a standard that meets the requirements of the guideline.
- In line with the Precautionary Principle, SEN advocates for the use of the GWP_{20} approach to assess methane, based on the latest IPCC findings.
- The EPA should carefully review Global Warming Potential research on an ongoing basis, to determine the most appropriate way to offset methane emissions.
- Government needs to provide more policy certainty around the range of possible approaches, and streamline implementation of offset measures in agriculture, renewable energy, carbon farming, vegetation management and rangeland regeneration.

Introduction

On 7 March 2019, the Environmental Protection Authority (EPA) released Guidelines on how it would consider greenhouse gas emissions in its future assessments of developments in Western Australia [1]. These were withdrawn on 14 March 2019 under pressure from industry groups and the McGowan State Labor Government, and the EPA has subsequently undertaken further consultation from the community [2].

SEN has reviewed the withdrawn Guidelines in terms of the latest scientific understanding and provides this submission in response for consideration by the EPA when developing updates to the guidelines.

SEN's Position on Greenhouse Gases

SEN agrees with the position noted in the EPA Background Paper [1], that climate change – specifically increasing world temperatures – is occurring rapidly.

As the extraction and utilisation of fossil fuels results in an increase in the concentration of greenhouse gases (GHGs) in the atmosphere and the oceans, SEN advocates for the use of technologies that do not emit GHGs in their production or utilisation, as a first principle.

SEN's main concern is with the emission of GHGs that arise from fossil sources as these emissions add significantly to the concentration of GHGs in the atmosphere and the oceans, with consequent deleterious effects on the environment.

The rate of temperature increase is having profound effects on the environment in both the northern and southern hemispheres. We have already seen a 25% reduction in rainfall and water supply in South-West WA over the last 30 years. We have dozens of winter bushfires in NSW, 10,000 year old vegetation in Tasmania burning, coastal WA communities increasingly at risk from sea-level rise and numerous ecological communities on the brink of collapse (and all of them in decline).

SEN asserts there is an urgent need to achieve zero net emissions, and further:

- to draw down substantial volumes of GHGs from the atmosphere;
- that the cost of not taking action will far exceed the cost of taking the action;
- strongly urges the strengthening of government regulations to this end.

SEN has seen over the last 10 years a substantial shift in public opinion on the issue. There is now widespread understanding of the effect of GHGs in the atmosphere and the expectation is growing that governments will regulate emissions in their jurisdictions. From a vague feeling of unease 10 years ago about the climate, the public is now aware that ceasing emissions and reducing concentrations of the gases is required and repeated polling tells us a significant majority of people now expect our government and industry to act urgently.

Industry also understands this and there are many signals, both scientific and economic, that are forcing companies to address the issue. Directors are being required to factor into their plans the effects of global warming as part of their due diligence and to report on the plans to shareholders, auditors, insurers and creditors.

Industry is looking to government for action to ensure there is a level playing field in dealing with the emissions. Many companies now factor a carbon price into their investment decisions as a matter of course and this is discussed further below. The recent announcement of a State Climate Policy, while insufficient, will at least provide some much-needed investment certainty.

Nevertheless, it is apparent from the conditions under which the original EPA GHG Guidelines Assessment was withdrawn, that industry has a disproportionate influence on this critical issue. While SEN accepts the value that industry and business provides for the WA economy, their influence cannot be allowed to continue to impact on the future of human civilisation, and the livelihood of our children, grandchildren and future generations of all living species [3].

The opposition to the Guidelines demonstrated by the oil and gas sector has to be balanced against the economic cost to society and taxpayers of not dealing with the emissions, as the economic impacts of global warming and climate change increasingly take hold. Ethical consideration of the future means that scientific knowledge and externalised costs need to be considered against the short term profit motive of corporations.

In framing this submission, SEN supports these principles:

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Opposition to the Introduction of the Guidelines

The oil and gas industry in WA has been the most vocal in opposition to the implementation of the Guidelines due to the impact it feels the requirements will have on its profits.

Four LNG production facilities are currently regulated by the WA Government, and two more are proposed. However, current controls on carbon pollution from WA LNG projects are questionable. Where conditions have been imposed, they vary, and there have been deficiencies in implementation and monitoring. In one case, the license condition was removed.

The Conservation Council of WA reports that [4]:

The failure of current pollution controls on WA LNG can be put down to several factors, including:

- *Inadequate and weak conditions (all projects)*
- *Non-compliance with conditions and lack of enforcement (Chevron Gorgon)*
- *Questionable provision of offsets (Woodside Pluto)*
- *Removal of conditions (Chevron Wheatstone)*

Proponents of projects that emit greenhouse gases can no longer pretend that the pollution costs can be ignored, and these costs have to be incorporated in the charges they make for their products. It is ultimately less expensive to require the companies involved in the industry to include the costs in their cost structures, than it is to let them continue emitting the gases free of charge and society accepting the costs of climate change.

Industry groups claim to be working to offset their GHG emissions but even a brief analysis shows these attempts are trivial at best. For example, Woodside was reported in *the West Australian* as contributing 9.5 million tonnes of carbon emissions per annum [5]. In the same issue, Woodside CEO, Peter Coleman, stated that Woodside had *"offset more than 500,000 tonnes of CO_2 associated with our Pluto gas project since 2008"*. While that offset figure seems large in itself, it only represents a miniscule 0.5 percent of the 10 million tonnes actually being emitted.

By opposing the Guidelines, and moving slowly on GHG offsets, the industry is essentially arguing society should bear the cost of dealing with the gases. It is minimising its current costs by externalising them to current and future citizens.

The reality is that it is not cost free to emit GHGs into the atmosphere. While the industry has avoided having to include the costs of dealing with the gases in its cost structures, the world community is now paying the price of dealing with the emissions in the form of higher world temperatures and associated climate change impacts.

From an economic perspective this situation represents a market failure. The market is not adequately pricing its products, due to the costs associated with dealing with the industry's waste being externalised. The price is lower and there are two effects: firstly, too much of the product is purchased by consumers and, secondly, competitors that might be less polluting and more efficient are priced out of the market. Both effects are rectified by ensuring the industry meets the true cost of production and emission mitigation.

SEN asserts the public want the EPA Guidelines to result in an accurate, independent assessment of the effect of a project's emissions and that this assessment should be made public.

The Guidelines released by the EPA in March 2019 were created in the absence of both Federal and State policy around GHG emissions. The EPA therefore took a waste management approach, and, under the Polluter-Pays principle, dealing with the waste is not free of charge. The release of a State Government policy on climate change [6] in August 2019 will provide extra weight to the Guidelines, which SEN asserts need to be stringent in requiring project proponents to deal with their emissions.

Need for the Guidelines

This major section focusses on one particular source of greenhouse gas emission: LNG production. Other major emitters include electricity generation, alumina refining, agriculture, and fertiliser and cement production, and these will be discussed later.

The following sub-sections discuss relevant considerations in supporting the EPA Guidelines and proposing enhancements to them.

Industry Carbon Prices

Natural gas extraction leaks methane and CO_2 into the atmosphere. Further, CO_2 comingled with the methane is stripped from the methane and vented to the atmosphere before the methane is processed for transport (scope 1 emissions). Methane is also used to fuel the ships that transport the gas, which produces CO_2 and methane leakage (scope 2 emissions). Finally, combustion of natural gas contributes CO_2 to the atmosphere (scope 3 emissions).

SEN argues that these GHG contributions need to be allocated a carbon cost in any consideration of licencing for exploration and production, as the gas is sold into a global market which is trending to carbon costing.

This sub-section provides indications of ways it is possible to determine a cost for carbon, even in the situation where there is no Federal Government carbon price and little appetite for climate policy. The recent State Climate Policy and aspirations will provide some certainty to society and industry, but no explicit carbon cost is considered.

Australia implicitly imposes a price on carbon through its RET and LRET programs which subsidise renewable energy projects and the Climate Solutions Fund (previously the Emissions Reduction Fund), which pays companies to reduce their carbon emissions.

This concept of a carbon cost is neither new nor unrealistic. Despite political vilification of the concept in the past, there are many options in which polluters can pay for their emissions.

Many large fossil fuel companies already impose on their projects a cost of carbon or undertake abatement programs that imply a cost of emitted carbon. Abatement programs such as those likely to result from these proposed EPA GHG Guidelines can act as a proxy for a carbon charge, in the absence of suitable government policy. Some examples are described below.

In WA, Chevron has spent more than $2 billion over 3 years on developing a Carbon Capture and Storage project to sequester CO_2 stripped from the gas it extracts through its Gorgon project [7]. Chevron announced commencement of its geo-sequestration project [8] on 8th August 2019 with the target to capture 80% of its reservoir CO_2.

Globally, a study undertaken in 2016 found 1,249 companies disclosed their practice of allocating a cost for carbon emissions, or their plans to soon do so [9]. These findings are based on disclosures of 5,759 companies which responded to CDP's 2016 climate change and supply chain information requests, made on behalf of investors with US$100 trillion in assets, and purchasing organizations with over US$2 trillion in spending power.

The Centre for Climate and Energy Solutions [10] stated:

*Since 2012, **Microsoft** business groups have paid a fee, from $5 to $10 per metric ton, on the carbon emissions associated with their electricity consumption and employee air travel. The revenue is used to buy renewable energy, increase energy efficiency and e-waste recycling, and buy carbon offsets. Microsoft has been carbon neutral in its global operations since July 2012 (see also [11]).*

***Shell** has used an internal carbon price of $40 to $80 per metric ton since 2000 to evaluate investment decisions. Its greenhouse gas Project Screening Value has influenced decisions to invest in carbon capture technology, gas and biofuels. Shell reduced its direct greenhouse gas emissions from facilities by 2 million metric tons of carbon dioxide equivalent from 2015 to 2016.*

***Mahindra & Mahindra** (M&M), the world's largest manufacturer of tractors, became the first Indian company to launch an internal carbon fee of $10 per metric ton in 2016. The funds help reduce waste, water usage, and carbon emissions through projects such as LED lighting, energy-efficient motors, and waste-to-energy projects. M&M's goal is to reduce its greenhouse gas emissions intensity 25 percent by 2019 from 2016 levels.*

*Mining company **BHP** has had a shadow price of $24-$80 per metric ton of carbon dioxide equivalent since 2004 to inform decisions to improve energy efficiency, reduce greenhouse gas emissions from its existing operations, and diversify its portfolio for a carbon-constrained future. The company reduced emissions 13 percent from 2015 to 2016.*

The World Bank reported that "As of 2017, 42 national and 25 subnational jurisdictions are putting a price on carbon …" and that "These jurisdictions account for about half of the global economy and more than a quarter of global GHG emissions" [12] p. 22.

SEN asserts, in the absence of a federal 'carbon price', that drawdown and abatement measures as proposed by the EPA will act as a proxy for a carbon cost. Since many companies already factor a cost on carbon into their investment decisions, and all companies should, this is an appropriate approach to mitigating atmospheric pollution.

SEN is of the view that any 'price' on carbon should be related to the cost of either abatement, or extraction and storing, of the GHG in a form that prevents it from harming the atmosphere or the oceans. In this sense the 'price' is really a cost that should be incorporated into the overall cost of production under the Polluter-Pays Principle.

Fugitive Emissions

Proponents of fossil fuels often argue that Natural Gas is a 'clean' fuel, compared to coal, and that use of Western Australian natural gas will reduce overall world-wide emissions, by supplanting coal as a fuel. While it is true that emissions from *burning* natural gas are approximately 50% that of burning coal, when viewed over the whole lifecycle, the carbon emissions are comparable.

Other sources of 'fugitive' greenhouse gas emissions during the natural gas lifecycle are:

- Venting of CO_2 (which may be present in high concentrations) at the well head
- The emission of methane to the atmosphere during well operations (typically vented to the atmosphere), processing, and during the liquefaction and transport processes.

Methane is a substantially more potent greenhouse gas than Carbon dioxide, and is responsible for as much as a third of the anthropogenic global warming that has occurred to date [13] [14]. However, methods of estimating the potency of methane (Global Warming Potential (GWP)) are contested. Two methods of Global Warming Potential are commonly used: whether methane should be compared with CO_2 in the atmosphere over 100 years (GWP_{100}) or 20 years (GWP_{20}).

A comparison of the two different GWP approaches is shown in Table 1 [13] which also includes some subtle variations, which are constantly being reviewed. Some research refers to the 100-year time frame and assigns methane a heating value of 28 to 35 times that of carbon dioxide, and other research uses values between 72 and 105 times the potency of CO_2 over the next decade or two. In other words, GWP_{100} values substantially reduce the global warming potential of methane compared to GWP_{20} values.

TABLE 1: CO_2 and methane relative Radiative Forcings [13]

	100-year timeframe not including climate feedbacks GWP_{100}	100-year timeframe including climate feedbacks GWP_{100}	20-year timeframe not including climate feedbacks GWP_{20}	20-year timeframe including climate feedbacks GWP_{20}	20-year timeframe including climate feedbacks and its role as a precursor to Tropospheric ozone GWP_{20}
CO_2	1	1	1	1	1
Methane	28x	35x	72x	86x	105x

The more conservative GWP_{100} has tended to be used in government and quasi-governmental evaluations of Global Warming potential, but this can substantially underestimate GWP. Some recent developments have used the GWP_{20} values, for example in New York [15]

Fugitive emissions first attracted major attention in the climate literature with the "Cornell Letter" [16]. This brief paper hypothesised that if methane emissions in gas fields were significantly higher than industry assumptions, then generating power by burning gas from could be significantly worse than burning coal to make power.

A figure of 3.2% methane emissions was calculated to be the threshold level at which power derived from burning gas was worse than burning most of the coal burnt in the US at that time.

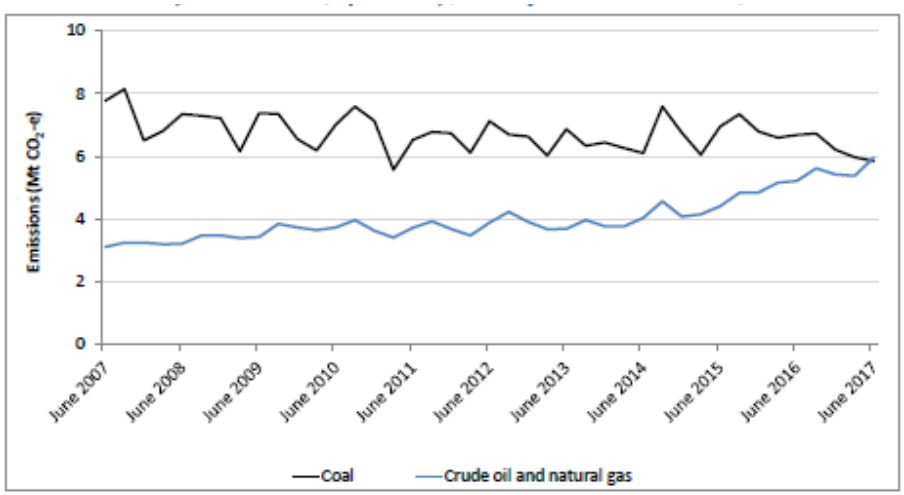
Similarly, the Union of Concerned Scientists [17] (para. 4), citing five scientific reports from sources including the IPCC and the US National Climate Assessment, stated:

The drilling and extraction of gas from wells and its transportation in pipelines results in the leakage of methane, primary component of gas that is 34 times stronger than CO_2 at trapping heat over a 100-year period and 86 times stronger over 20 years. Preliminary studies and field measurements show that these so-called "fugitive" methane emissions range from 1 to 9 percent of total life cycle emissions".

In line with the Precautionary Principle, SEN advocates for the use of the GWP_{20} approach, based on the latest IPCC findings. The EPA should carefully review GWP research on an ongoing basis, to determine the most appropriate way to offset GHG emissions.

Australia's own official methane emissions from the oil and gas industry are shown in Fig. 2 below, and illustrate a doubling of emissions between 2007 and 2017.

FIG. 2: Fugitive emissions by sub-sector, quarterly, 'unadjusted' emissions, June 2007 - 2017



(Source: Department of the Environment and Energy [18] p. 15)

Carbon Budgets

This Section argues that the world cannot utilise all known carbon deposits if it is to limit global warming to 2 degrees (or the preferred 1.5 degrees), and therefore GHG emissions must be reduced and GHGs drawn-down from the atmosphere and oceans.

The Intergovernmental Panel on Climate Change (IPCC) has calculated the total carbon limit remaining if the world is to limit human-induced warming to less than 2 degrees (relative to the period 1861- 1880 with a probability of >66%), as 2,900 $GtCO_2$-e within a range of 2550 to 3150 ([13], P63).

This figure is consistent with another estimate of known fossil fuel reserves in the world[19], provided in Table 2. Using data from the US Energy Information Administration [20] on the amount of CO_2 contained in specified non-renewable fuels, the CO_2 produced from burning these deposits is calculated to be approximately 3,000 Gigatons of CO_2.

TABLE 2: Estimated world reserves of fossil fuels as at 31 December 2016

World Reserves of non-renewable energy sources			
Fuel	**Units**	**CO_2 contained**	**Total CO_2 of known reserves once burnt ($GtCO_2$)**
Petroleum (billions of barrels)	1707	373 kg/gallon	650
Natural gas (Wet) Trillion Cu. Ft.	6588	53.1kg/thousand cubic feet	350
Coal (billions of short tons)	948	2,100kg/short ton	2,000
Total			3,000

The atmosphere currently contains approximately 2,211 $GtCO_2$, leaving approximately 689 $GtCO_2$ of the limit yet to be used [21] before reaching 2°C of global warming.

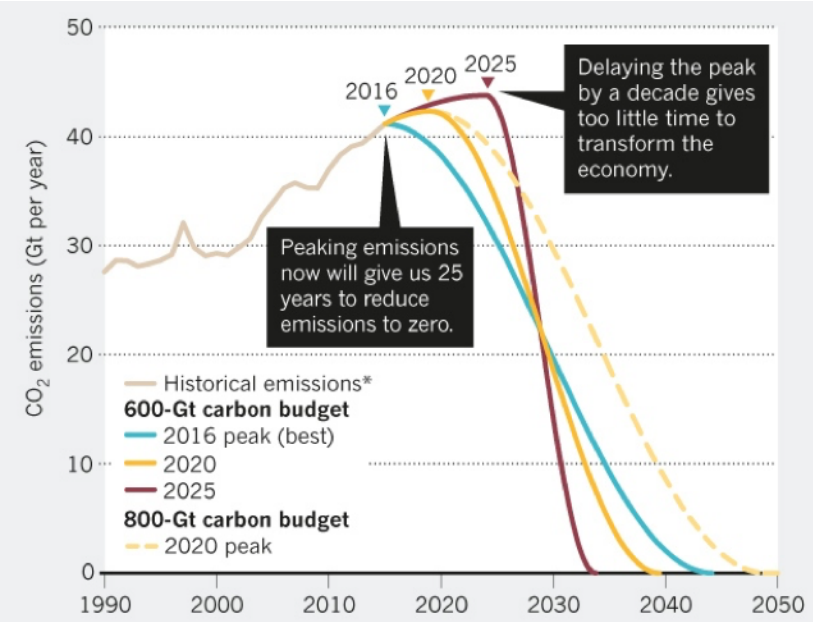
The world emitted 36.2 $GtCO_2$ in 2017 and was predicted (in December 2018) to emit 37.1 $GtCO_2$ in 2018 [22]. Assuming no change in this usage rate, the carbon budget will be exhausted in 18 years.

However, more recent modelling [23] on the effect of aerosols (which are emitted into the atmosphere by burning coal, and which provide a 'shading and cooling' effect), indicates that as these are reduced as the burning of coal is phased out, it will cause additional warming. This essentially means that the emissions limit to stay "well below 2°C and preferably a 1.5°C peak" has been passed, and the consequences of temperature rises beyond that are now unavoidable [23].

The implications are simple: there is no room for new fossil fuel development – gas included – within the Paris Agreement goals.

This is illustrated in Figure 3, which shows the trajectories required to meet global carbon budgets at different starting dates. The longer it takes to start reducing emissions, the harder it will be to avoid extreme temperature rises. This is another reason why it is important for WA to start taking immediate action, in line with the EPA's proposed guidelines. Figure 3 shows that net zero emissions need to be achieved by 2040 to keep global warming in check. A 2050 target will result in additional warming, with more severe consequences.

FIGURE 3: Trajectories to meet Paris COP21 commitments



Source: Figueres [24]

Australian carbon budget

Evidence in this section is summarised from the Conservation Council of WA's report: RUNAWAY TRAIN: The impact of WA's LNG industry on meeting our Paris targets and our national efforts to reduce emissions [4].

The five existing LNG plants in WA contribute 32 $MtCO_2$-e to the atmosphere. If Woodside's Browse and Scarborough projects are commissioned, the combined operations of the seven WA LNG projects would emit 41.6 $MtCO_2$-e per year [4]. This is a baseline against which to compare GHG reduction activities.

Australia has committed to a 5% reduction of GHG by 2020 and a 26-28% reduction of GHG on 2005 figures by 2030. Australia's emissions from fossil fuels and industry have been increasing over recent years, and are now 7% above 2005 levels [25].

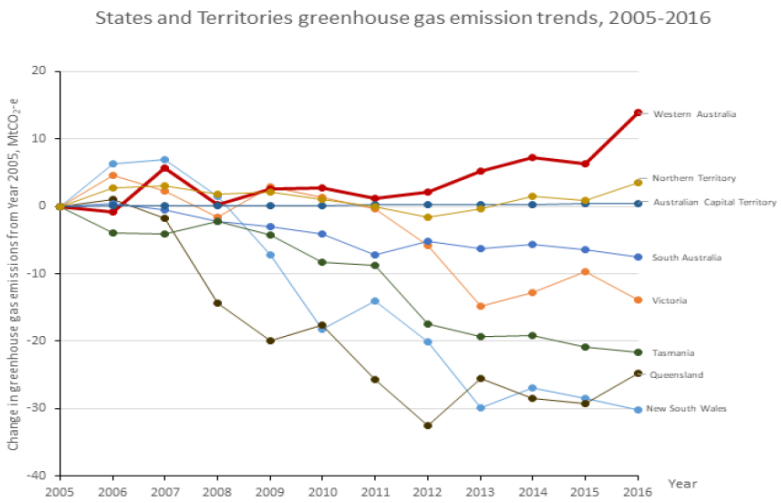
Figure 4 shows trends in GHG emissions over the last 14 years. While emissions have reduced in most Australian States and Territories, emissions increased from 2015 in the NT and WA. This is clearly attributable to emissions from LNG projects. This has been a major contributor to the national increase in GHG emissions – at odds with Australia's Paris commitments.

To attain the 26% target by 2030, Australia will need to reduce its total emissions between 2020 and 2030 by about 850$MtCO_2$. In the same 10-year period, the seven current and proposed LNG plants will produce about 420$MtCO_2$, equivalent to almost half of the national reduction task.

Even without the new plants coming online, annual emissions from WA's five LNG plants (32Mt) is greater than the renewable energy generation installed under the Federal Renewable Target: 26.3 $MtCO_2$e per year.

When combined with the emissions savings from the 2.1 million homes with rooftop PV (6.74 Mt Co2e abated), the pollution from the five existing LNG plants is equivalent to the emissions from the five plants. In other words, the Australian total amount of renewable electricity generation per year is offset by WA's current LNG GHG emissions. This is before the two new projects come online.

FIGURE 4: State and Territory GHG emission trends



(Source: Department of Water and Environmental Regulation [26])

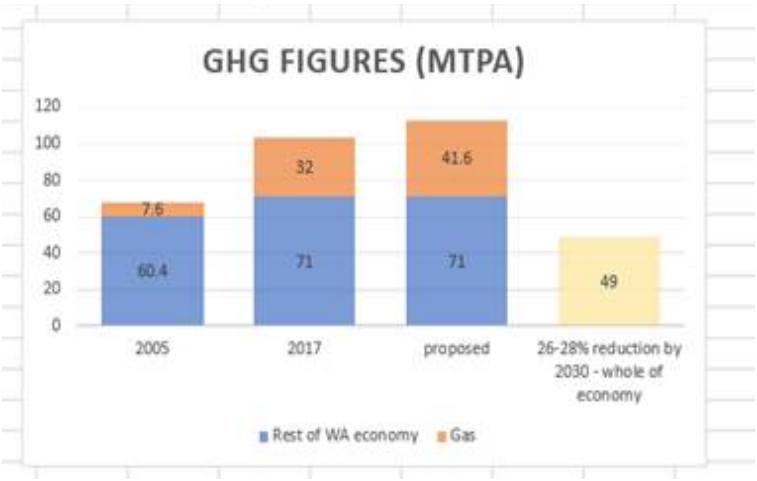
WA's carbon budget

The emissions of the current and proposed LNG plants will be equivalent to more than half (56%) of WA's total annual GHG emissions, and equivalent to a 61% increase on WA's 2005 baseline [4].

Figure 5 shows the proportion of WA's carbon budget that is comprised of LNG emissions (orange), compared to the rest of the economy (blue). To achieve the modest target of 26-28% decrease in emissions on 2005 levels by 2030, WA's annual emissions will need to drop to 49Mt. However, emissions from current and proposed LNG facilities are 41.6Mt.

The alternative is that other states will have to bear the load of deeper emissions cuts, a difficult proposition in Australia's federal system.

FIGURE 5: GHG emissions from LNG extraction compared to the rest of the economy, and to WA's carbon budget.



This means that, without any action by the LNG industry to curb its pollution, WA will have an emissions reduction target of 90% for the rest of the economy by

2030 to reach the modest national target of 26-28% reduction. This is an unrealistic impost on the rest of the economy and community.

Natural Gas Demand

Natural gas demand is forecast to continue to grow over the next 2-3 years, but at slowing rate, and then to begin to fall at an accelerating rate after that. There has been a boost to demand recently as a result of power generators switching from coal to gas. This is considered a short-term effect that has masked the emerging downward pressure on demand, as both coal and gas generators are replaced with renewable energy.

Natural gas is forecast to play an important but reducing role as a short to medium term (5-15 years) fuel to support the transition to renewable energy. It will be required in reducing quantities compared to current use, and, in the medium to long term, not at all as developing alternatives such as hydrogen become mainstream. SEN has modelled this in detail for the transition to renewable energy on the South West Interconnected System (SWIS), but the same principles apply worldwide.

As a result, a natural gas oversupply is expected, and any new natural gas developments (with 25-30 year life cycles) have a significant risk of becoming stranded assets [27]. This could result in associated environmental risks, arising from underfunded operational budgets and poor-to-no decommissioning. High levels of fugitive emissions become far more likely in these scenarios, especially with low cost infrastructure, such as fractured shale developments.

It should be noted that the term 'transition fuel' has two very different meanings when used in current dialog. The definition used by the natural gas industry is in terms of natural gas use as a bulk generation fuel to supplement or replace coal over the medium to long term. We have already argued elsewhere that fugitive emissions render LNG ineffective as a coal replacement.

The definition used elsewhere is as a fuel for balancing and peak generation, to support renewables. In this case, far less gas is used is used, and only over the short to medium term.

SEN Modelling

SEN and independent energy analyst Ben Rose have conducted extensive modelling [28, 29] of how the SWIS can transition to renewable energy in a planned, orderly and secure series of steps (See Fig. 6 below).

The findings were that electricity grids can operate on renewable energy with storage in various forms, plus backup generation by use of a small amount of carbon based fuel for occasional periods of low solar, wind or other renewable energy resources, which occur through the year. The total cost of this capability is now competitive with traditional fossil-only grids

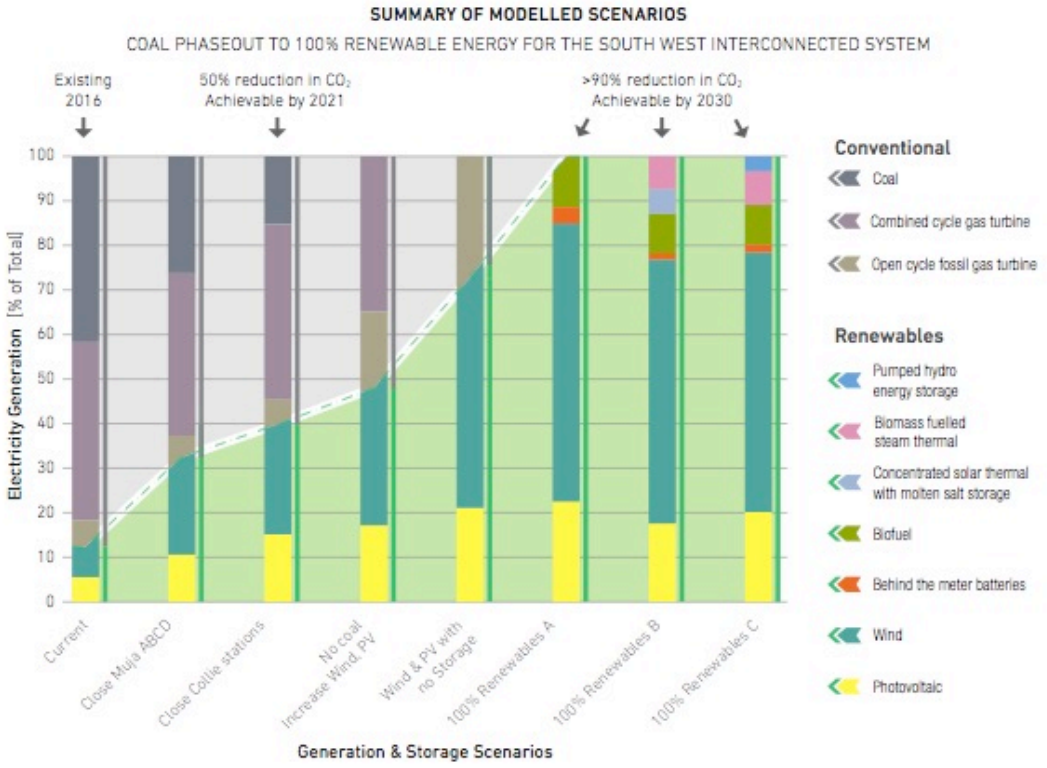
There are many transition permutations, but all share several similar characteristics:

- Methane (predominantly natural gas unless renewable alternatives are introduced) is required in the short to medium term as the transition fuel to support the transition to renewable energy.
- The usage of existing "baseload" (inflexible) closed cycle gas turbines will reduce to zero as renewable energy is progressively introduced, unless required to replace unplanned coal generator outages.
- While additional open cycle gas turbine (OCGT) mid-merit and peaking plant capacity will be required, their capacity factor (usage) will steadily drop as

more renewables are progressively introduced. Their role will be one of balancing overall supply with load (along with storage), particularly during winter.

- Modelling indicates that total methane usage for electricity generation will progressively drop to between 35% and 65% of current levels by the time Renewable Energy use has reached 90%-100%. Levels depend on several factors such as storage take up (battery and pumped hydro) and price points of the various technologies. Based on current trends, the 35% level is considered the more likely.
- Gas usage will drop significantly lower if alternative renewable fuels are introduced such as hydrogen or some renewable biomass for instance. The rapid advancement of hydrogen as an energy storage medium, makes this increasingly likely over the next decade.
- Current reservation supplies of natural gas are more than sufficient to meet the reduced demand over the transition period and beyond. There is a possible oversupply, dependent on contractual terms that have been agreed by the WA government and suppliers.

FIG. 6: SWIS renewable energy transition scenario modelling to 2030 [29]



Rest of the World

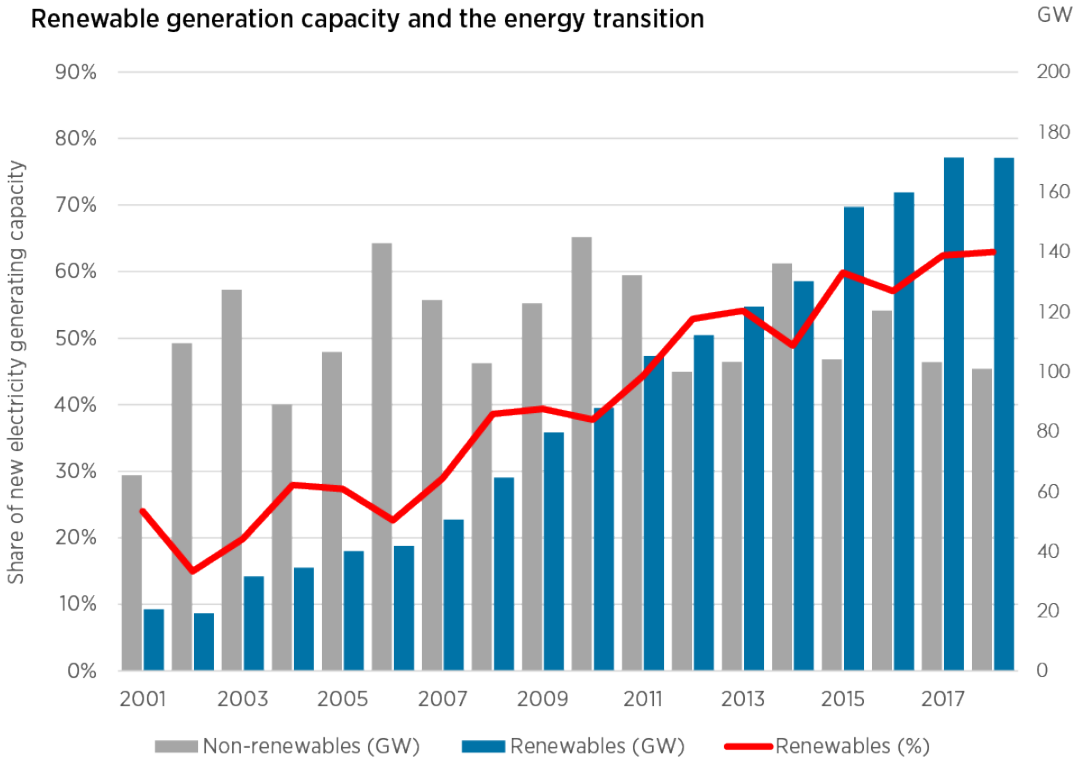
Similar patterns can be expected in most countries, as they progressively introduce renewable energy, and the role of methane changes from that of bulk generation to balancing generation.

Documented Trends in Global Natural Gas Usage

There is international evidence of renewables displacing coal and natural gas. The rapidly reducing costs of wind and solar PV energy, plus climate and pollution issues are driving a global change from traditional fossil fuels to renewables. A comparison

of generation capacity in renewable energy versus non-renewables (Figure 7) shows a clear increasing trend for renewables.

FIG. 7: Renewables as a share of global capacity additions (2001-2018) [30]



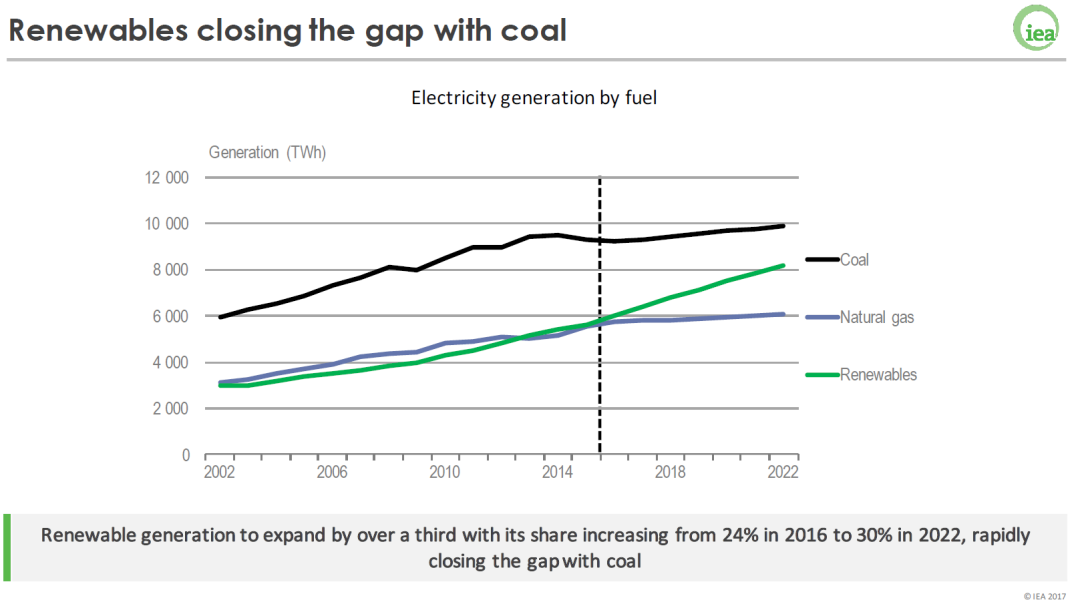
(Source: IRENA Renewable capacity highlights [30], p. 3)

Furthermore, SEN asserts that the global trend of displacement of gas by renewables for electricity and heating will reduce demand for gas internationally, thus reducing export demand. This is backed up by recent announcements from AGL in Australia [31] where they have confirmed that they plan to go straight to renewable energy with storage and leapfrog natural gas as a bulk generation transition fuel.

The International Energy Agency conservative projections show demand for gas to be, at most, relatively flat (Figure 8).

Further evidence comes from the Conservation Council of WA: “The Intergovernmental Panel on Climate Change (IPCC) pathways that would allow a 1-in-2 to 2-in-3 chance of limiting global warming to 1.5°C above pre-industrial levels require a decline in natural gas of 15% by 2030.” [4].

FIG. 8: Global gas and coal displacement projections to 2022



Drawdown Options (GHG extraction and storage)

Recent scientific research has identified that achieving Paris Agreement commitments is now not likely by reducing GHG emissions alone. Stand-alone extraction and storage of GHGs is now required.

There is increasing focus on negative emissions technologies. Negative emissions technologies are covered in two reports, one by the British Royal Society with the Royal Academy of Engineering [32] and the other by the National Academy of Science in the US [33].

Traditional ways of drawing down CO_2 have been through planting trees, regenerative farming, carbon farming, etc. All these use natural processes to sequester CO_2 and convert to a semi stable vegetation form, however generally work over long periods with low rates of drawdown.

Funding renewable energy projects does not qualify as GHG drawdown as it is only reducing new emissions, not drawing down existing GHGs.

Aquatic carbon capture, involving algae beds and seaweed plantations, have potential to absorb GHGs. However, these require large levels of fertilisers if developed in artificial environments with accelerated rates (nitrogen and phosphorus), the use of which may lead to other environmental problems.

There are drawbacks in offsetting carbon emissions through vegetation. In the words of the UN Environment Programme [34]:

> *"Offsets are only part of the answer... If we are serious about averting catastrophic planetary changes, we need to reduce emissions by 45% by 2030. Trees planted today can't grow fast enough to achieve this goal... What we must look at is how these actions sum up to reflect the true cost of emissions and the urgency of their reduction. It cannot simply be a one-for-one model. If one tonne of sequestered CO_2 is the price of one carbon credit, we still need to deliver the missing 45 per cent emissions' reduction, as well as the future projected increase." [34]*

The first step in negative emissions technologies is to extract GHGs from the atmosphere [35]. Technologies that extract CO_2 directly from the atmosphere include those utilising sodium and calcium hydroxide and calcium carbonate and those using amine technologies.

Approaches to utilise the captured carbon dioxide include Carbon Capture and Storage (geo-sequestration) and Carbon Capture and Manufacture.

In geo-sequestration, the CO_2 recovered can be injected into underground reservoirs designed for the purpose. An example of a reservoir that could be used is the Lesueur formation in the south west of Western Australia, which has been assessed as capable of accommodating 3 million tonnes of CO_2 per year for many years (see The Southwest Hub Project [36]).

Geo-sequestration is rapidly improving in efficiency and reducing in price, although it can be technically problematic, as evidenced by Chevron's attempts on the Gorgon project.

Carbon Capture and Manufacture technologies are being developed that will use the GHG extracted from the atmosphere in manufacturing processes that eliminate both the need to use fossil fuels, and the need to sequester the gases [37].

Development of techniques to remove methane from the atmosphere is currently in its early stages so is not considered a viable consideration in the short to medium term. However methane decays to CO2 in the atmosphere with a relatively short decay half-life (seven years) and the CO2 produced has far less warming effects than the original methane. Given this reduction in methane release into the atmosphere can be considered as pseudo drawdown as the methane levels will then be able to reduce naturally in a relatively short time period. One of the fastest methods of reducing methane releases is to reduce extraction of natural gas and its associated fugitive emissions.

SEN advocates for the producers of those emissions to be required to offset them within the same year they are released by either:

- Extracting and storing an equivalent amount of GHGs emitted (equivalent greenhouse warming potential over a twenty year period) in a form that prevents the gases from interacting with the atmosphere or the oceans for long periods of time (hundreds to thousands of years).
- Offsetting those emissions by preventing or causing a reduction in emissions in other GHG emitting activities, preferably within WA.

A recent study by Reputex [38] investigated the abatement potential and economic benefit to WA of offsetting direct emissions generated by the LNG industry within the state. It found that approximately 80 million tonnes of emissions could be offset per year. This included activities related to agriculture, renewable energy, carbon farming, and vegetation management activities, including rangeland regeneration and savannah burning.

The report found that offsetting 30 million tonnes per year would create around 4,000 jobs, which is the majority of the current LNG emissions of 32Mtpa. There are clear benefits for offsets to be delivered in WA to create jobs and benefit the environment. There is little benefit to the state if abatement funds are spent elsewhere. However, Government needs to provide more policy certainty around the range of possible approaches.

Avoiding and reducing the need for fossil fuels

SEN outlines here the current developments that are taking place that will reduce the demand for fossil fuels. Previous sections have discussed the need to *offset* GHG emissions by drawing down Carbon from the environment. This section discusses the other two aspects of the Mitigation Hierarchy: *avoidance* and *reduction*. This section applies to major emitting industries across the economy, not just LNG production.

The first principle to be followed is to avoid the extraction and combustion of fossil fuels to prevent the problem in the first place. Reductions in GHG production can be achieved by *fuel switching* and process improvements, in line with the EPA Guidelines.

Fuel switching avoids or reduces demand for fossil sources of carbon by other means of achieving the same outcomes, typically using renewably-generated electricity as the energy source. This provides numerous advantages, including lower overall cost and maintenance, high performance and efficiency, ability for self-generation by on-site solar PV or wind, and reduction for the need for gas infrastructure. [39]

It is helpful to distinguish between Scope 1 emissions (direct emissions from the Industry) and Scope 2 & 3 emissions (indirect emissions).

Direct Emissions

In addition to fossil fuel use, other activities and products such as agricultural nutrients/fertilisers/chemicals, meat and dairy production, cement, aluminium and steel making are additional to the Earth's pre-industrial carbon cycle and must be included in the accounting of GHGs.

This section provides examples of fuel switching approaches.

Examples of substitute technologies for gas include:

- Industrial process heating, including replacement of aged Combined Heat and Power (CHP) units to use renewable electricity, which could potentially be made even more economically attractive by taking advantage of low-cost surplus renewable electricity
- 'Synthetic inertia' from electrical inverters running on battery and renewable generated electrical energy. This has the ability to substitute for, and out-perform, gas turbines for grid stability and ancillary services [40].

Stationary Energy in Industry

Heating and other thermal processes, which typically have used gas as an energy source, can be displaced virtually entirely by electrical energy from renewables. Beyond Zero Emissions' "Electrifying Industry" [41] report shows that electricity can power:

- industrial heat pumps
- electromagnetic heating – infrared, induction and microwaves
- electric furnaces – resistance, arc and plasma
- renewable hydrogen production by electrolysis
- heat generation and storage – storing electricity as heat

Manufacturing of products such as food, paper, bricks, plastic and steel can be transformed away from fossil fuel use in the following ways [41]:

- Prepared food Heat pumps, storage and infrared

- Beer — Heat pumps
- Milk powder — Heat pumps
- Paper — Infrared
- Aluminium casting — Induction
- Alumina refining — Electric resistance
- Brick — Microwave
- Glass — Electric resistance
- Plastic — Electric resistance
- Steel — Renewable hydrogen and electric arc furnace
- Ammonia — Renewable hydrogen

Further, the BZE "Rethinking Cement" [42] report shows how a zero carbon cement sector can be achieved through:

- Geopolymer cement
- Developing high-blend cements with reduced clinker content
- Mineral carbonation
- Minimising the use of cement
- Carbon negative cements

In terms of fuel switching for Pilbara mining industries, the proposed 15–20 GW wind+solar+storage+H_2 Asia Renewable Energy Hub in the Pilbara, has the potential to provide relatively inexpensive power to industrial facilities.

Indirect Emissions

An emerging major approach to avoid and reduce indirect emissions is though electrified vehicles (EVs).

Electric Transport

The displacement of the use of petroleum fossil fuels by EVs is at the beginning of an exponential growth due to advancements in motor, electronics and battery technologies. Investment in EVs could also be used as potential offsets for GHG emissions.

All electrified transport has the ability to be essentially 'zero carbon emission' where charged with renewable energy, or otherwise will automatically become 'cleaner' as our grids transform to renewable energy generation. As transport fuels rely heavily on imported oil, switching to locally produced renewable energy will afford greater security of energy supply for this vital sector of our economy. Other cost, reliability, performance and maintenance advantages over the lifecycle of vehicle ownership adds further impetus for this transformation.

In terms of industrial processes, various options are becoming available for commercial trucking enterprises [43-45]

Hydrogen production

A further mechanism to reduce the demand for fossil fuels is to invest in hydrogen production, as a superficially non-polluting fuel. Substantial work is being done in the area around Australia, both at the Federal [37] and State levels [46].

Hydrogen as a fuel is quickly emerging as a renewable alternative to fossil fuels, in particular natural gas. It is currently early on the learning curve and following similar rapid development as wind, Solar PV and battery storage have done over the last

decade. Both technical advances and cost reductions are being notified on a regular basis as a result of the large interest and investment it now attracts.

Hydrogen gas can be produced by renewable energy sources making it an attractive option to investigate. It can also be suitable for use of surplus energy that would otherwise be wasted. The technologies and business models of hydrogen storage and transport are closely related to natural gas infrastructure, allowing WA to draw upon its existing strengths.

While the technologies to generate, store and distribute hydrogen are still being developed for large amounts at commercial and utility scale levels, they are mature and well used at smaller scales. WA already has a very large scale hydrogen development proposal being considered for the Kimberley region. The LNG industry is promoting hydrogen as a way to leverage existing natural gas supplies, and pipeline infrastructure, but there are numerous technical issues to overcome to make that particular transition including:

- Hydrogen leakage through existing metal pipe and plant structures due to the smaller molecule size of hydrogen compared to methane. Some existing infrastructure may need replacement with new equipment using different materials and manufacturing processes.
- Deterioration in existing metal structures due to reactions with hydrogen. Some existing infrastructure may need replacement with new equipment using different materials and manufacturing processes.
- Difficulties in compressing or liquifying hydrogen into low volumes for transport. Much research is directed at this area including transport of hydrogen as ammonia and other suitable hydrogen carriers.
- The flammable nature of hydrogen. Hydrogen has a lower ignition energy than methane so requires more advanced safeguarding infrastructure and operational processes. Those currently used for the smaller hydrogen industry will need to be adapted and adopted for larger scale developments.

Arguments Supporting the Proposed Guidelines

Previous sections have argued that natural gas extraction, transport and combustion is equivalently polluting as the use of coal, when fugitive emissions are taken into account. The argument about LNG as a transition fuel is not supportable.

The section on carbon budgets has demonstrated that there is no scope (globally or locally) to extract more natural gas while attempting to reach the Paris COP21 warming targets. SEN also argued that coal and LNG demand for the electricity sector is likely to fall as cheaper renewables come onto the market.

In order to meet the Paris commitments as a state, the emissions from existing gas facilities will also need to be drawn down, but this is not proposed at this stage.

However, SEN recognises that cessation, in the short term, of LNG production in Western Australia will have substantial economic impacts and will be politically unacceptable. Further, in the short term, some new or expanded LNG projects may proceed, and a pragmatic approach needs to be taken.

SEN asserts that the science shows that no new or expanded project that doesn't fully offset all emissions should be approved.

In this context, the Guidelines proposed by the EPA represent a satisfactory *initial* approach to assessing projects – an acceptable minimum compromise. SEN's view on the positive elements of the Guidelines are that:

- the cost of extraction and storage, or offsets, would be borne by the producer, including their monitoring over time by the EPA;
- proponents are required to avoid, reduce or offset emissions, including the requirement that all projects must offset Scope 1 emissions;
- they allow the EPA to provide appropriate advice to the government on the effect a proposal's GHG emissions will have on global warming and the environment.

SEN also supports the bulk of the guidelines as they stand, but notes several areas that raise concerns:

- The guidelines only apply to projects with Scope 1 and 2 emissions in excess of 100,000 tonnes CO_2-e;
- The guidelines only stipulate offsets for Scope 1 emissions to reduce those emissions to net zero;
- The offsets that are accepted as mitigating emissions include carbon absorption technologies, the effectiveness of which may be difficult to substantiate over the long term
- Project proponents should be responsible for offsetting Scope 2 & 3 GHG emissions unless they can demonstrate that these emissions are being offset by others

SEN suggests possible ways of strengthening the guidelines, either now or over time, as the political and economic environment changes. These include:

- The 100,000 tpa threshold be retained as the starting point, but be reduced incrementally each year down to 25,000 tpa[1].
- The threshold for upgrades to existing facilities that already meet the 100,000 tpa threshold in the aggregate should be lowered to 25,000 tpa.
- The EPA must be able to consider associated proposals in their aggregate, when assessing both the threshold and general assessment.
- That there be an overarching requirement for offsets to be equivalent to emissions produced concurrently with each year of production, rather than postponed.
- The extraction and storage, or offsets, of the GHGs must be secured and verified for a period of significant duration, i.e. in the order of hundreds of years, to allow atmospheric GHG levels to return to a safe concentration for the climate.
- The proposal's proponent should be responsible for Scope 1, 2 & 3 GHG emissions, unless they can demonstrate that scope 2 & 3 emissions are being offset by others to a standard that meets the requirements of the guideline.

The extraction and storage or offsets of the GHGs must occur at the same time and rate with the emissions and must be secured and verified for a period of

[1] This was the trigger under the national Clean Energy Act and will ensure the EPA captures any proposals that will significantly increase WA's emissions while at the same time balance what is practicable to assess.

significant duration, i.e. in the order of hundreds of years to allow atmospheric GHG levels to return to a safe concentration for the climate.

The cost of extraction and storage, or offsets, including their monitoring over time by the EPA, would be borne by the producer.

In summary, the EPA Guidelines are a good starting point, but GHG reduction measures will need to be continually revised upwards in order to meet Federal and State targets, and international commitments.

Principles to be reflected in the EPA's Guidelines

The Guidelines should state:

1. That assessments will be made based on the best available scientific consensus of the effect of GHG emissions on the environment;
2. That projects must demonstrate how GHG emissions are minimised to the extent technologically achievable and how the project will continue to implement reduction strategies as technology improves;
3. That projects must demonstrate that where GHGs are emitted that concurrent drawdown of equivalent volumes of GHGs to those emitted by the project will be undertaken, including the independent monitoring of the method proposed by the proponents, for the expected lifetime of that method;
4. That the Guidelines apply to all projects and include all GHG emissions; that is Scope 1, 2 and 3. With respect to Scope 3 emissions, the project should be exempt from responsibility for scope 3 emissions where the foreign authority regulates the emissions, and this can be guaranteed and independently monitored by a reputable method or body. Otherwise the project should take responsibility for expected scope 3 emissions.

Implementation

The EPA Guidelines stated that *"The EPA recognises the need for proponents to have sufficient time to develop and then implement their avoidance, reduction and offsetting plans, and that an allowance for an effective transition period is warranted."* [47]

SEN acknowledges that action on mitigation of GHGs cannot be done in a vacuum, and more work needs to be done by government and industry to facilitate this process.

While offsets can currently be purchased throughout Australia and internationally, there is an untapped opportunity for WA to capture significant employment and other benefits by requiring that offsets for LNG emissions be sourced from within Western Australia.

Since new LNG projects take 4-6 years before being commissioned there is a relatively long period of time to organise offsets. Specialist companies can manage offsetting and drawdown activities.

However, government needs to provide more policy certainty around the range of possible approaches, and streamline implementation of offset measures in agriculture, renewable energy, carbon farming, vegetation management and rangeland regeneration.

Conclusion

This submission has considered the proposed EPA GHG Guidelines in the context of the available scientific evidence and the costs to society of not acting on the 'science'.

The current concentration of GHGs in the atmosphere and oceans is already enough to cause catastrophic global warning.

The science is clear and the economics of global warming are also now clear – the world must prevent further GHGs from entering the atmosphere and the oceans and must actively reduce the concentration of GHGs already in the atmosphere by drawing them down into suitable repositories, where they can no longer interact with the atmosphere, oceans and environment.

SEN agrees that WA should play its role in meeting its share of Australia's Paris Commitments by reducing use of fossil fuels. It endorses the EPA Guidelines, as a starting point, to reduce large-scale GHG emissions in WA. The recent climate policy announcement by the State Government, and these Guidelines, are a first step in a transition to a low GHG future.

SEN advocates for a ban on new or expanded GHG emitting projects, but recognises that in the short term some of these projects may proceed. Where they do, and there are GHG emissions, SEN advocates for the producers of those emissions to be required to offset them within the same year by either:

- Extracting and storing an equivalent amount of GHGs emitted in a form that prevents the gases from interacting with the atmosphere or the oceans.
- Offsetting those emissions by preventing or causing a reduction in emissions in other GHG emitting activities, preferably within WA.

SEN supports the withdrawn Guidelines being adopted by the EPA with the qualifications that the Guidelines should gradually be extended to cover smaller projects.

SEN supports the Polluter-Pays principle of the EPA legislation, and expects that industry will be held responsible for dealing with its waste products. The cost of doing so should be a consideration in the pricing of the product.

Until now, the community has permitted industry to dispose of its carbon pollution essentially free of charge. While the industry has avoided having to include the costs of dealing with the gases in its cost structures, the world community is now paying the price of dealing with the emissions in the form of higher world temperatures and climate change impacts.

Government must now step in and ensure that industry takes responsibility, while it considers how best to rectify the damage caused by the previous disposal of GHGs into the atmosphere.

This may fundamentally change the business model and profitability of the LNG industry, but it is preferable that the currently externalised costs become the responsibility of the GHG polluter.

The evidence presented here highlights the urgency of acting quickly to reduce GHG emissions to keep global warming within Paris COP21 goals. Existing and proposed LNG emissions outweigh all savings to date from the national RET and solar PV. This makes in even more difficult to meet the 2030 federal target and serious emissions reductions will be required in WA, in the near term. Reducing/ offsetting LNG emissions is one step in the right direction.

Key Findings

This submission has come to the following conclusions:

- Industry is increasingly including a cost of carbon in investment decisions, and these Guidelines will provide certainty around costing structures
- The planetary carbon budget required to remain below 1.5°C or 2°C of warming is being compromised by LNG extraction.
- WA's carbon budget is also being compromised by LNG extraction.
- Demand for LNG is forecast to decrease worldwide
- Fugitive emissions from natural gas extraction make methane equivalent to coal in terms of GHG pollution
- An argument about LNG as a transition fuel for 'baseload' electricity is not supportable. Renewables, properly regulated, are cheaper, more reliable and better for the environment.
- There is no scope (globally or locally) to extract more natural gas while attempting to reach the Paris COP21 warming targets.
- In order to meet the Paris commitments as a state, emissions from existing gas facilities will also need to be drawn down.
- In line with the Precautionary Principle, SEN advocates for the use of the GWP_{20} approach, based on the latest IPCC findings.
- SEN asserts that the science shows that no new or expanded project that doesn't fully offset all emissions should be approved.
- Cessation, in the short term, of LNG production in Western Australia will have substantial economic impacts and will be politically unacceptable. Some new or expanded LNG projects may proceed, and a pragmatic approach needs to be taken.
- SEN supports the bulk of the guidelines as they stand, but suggests possible ways of strengthening the guidelines
- There is an untapped opportunity for WA to capture significant employment and other benefits by requiring that offsets for LNG emissions be sourced from within Western Australia.
- SEN acknowledges that more work needs to be done by government and industry to facilitate mitigation of GHGs
- SEN supports the Polluter-Pays principle of the EPA legislation, and expects that industry will be held responsible for dealing with its waste products. The cost of doing so should be a consideration in the pricing of the product.

Recommendations

SEN recommends the Guidelines be strengthened as follows:

- The 100,000 tpa threshold be retained as the starting point, be reduced incrementally each year down to 25,000 tpa.
- The threshold for upgrades to existing facilities that already meet the 100,000 tpa threshold in the aggregate be lowered to 25,000 tpa.
- The EPA must be able to consider associated proposals in their aggregate when assessing both the threshold and general assessment.
- That there be an overarching requirement for offsets to be equivalent to emissions produced concurrently with each year of production, rather than postponed.
- The extraction and storage, or offsets, of the GHGs must be secured and verified for a period of significant duration, i.e. in the order of hundreds of years, to allow atmospheric GHG levels to return to a safe concentration for the climate.

- The proposal's proponent should be responsible for Scope 1, 2 & 3 GHG emissions unless they can demonstrate that scope 2 & 3 emissions are being offset by others to a standard that meets the requirements of the guideline.
- In line with the Precautionary Principle, SEN advocates for the use of the GWP_{20} approach to assess methane, based on the latest IPCC findings.
- The EPA should carefully review Global Warming Potential research on an ongoing basis, to determine the most appropriate way to offset methane emissions.
- Government needs to provide more policy certainty around the range of possible approaches, and streamline implementation of offset measures in agriculture, renewable energy, carbon farming, vegetation management and rangeland regeneration.

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