



**Institute for Energy Economics  
and Financial Analysis**

# **Darwin Pipeline Duplication Project**

*Submission to the Northern Territory Environmental  
Protection Authority*

Thank you for the opportunity to present IEEFA's submission to this consultation.

Regards

Kevin Morrison – Energy Finance Analyst Gas/LNG  
John Robert – guest contributor to IEEFA

Institute for Energy Economics and Financial Analysis (IEEFA)  
91 Percy Street, Warwick Qld 4370

**June 2023**

## Contents

Darwin Pipeline Duplication Project.....	1
<b>Figures and Tables</b> .....	2
Figure 1: The Proposed Bayu-Undan CCS Project 4.....	2
Figure 2: Barossa Gas to Darwin LNG Project Emissions per Offshore Processing Platform 6.....	2
Figure 3: Emissions from the Modified Barossa Gas to Darwin LNG Project 6.....	2
Figure 4: Australian Gas Flows in the 2020-21 Financial Year (Petajoules) 13.....	2
Table 1: Feed Gas CO <sub>2</sub> Content for Australian Oil and Gas Developments 11.....	2
Table 2: Feed Gas CO <sub>2</sub> Content for Australian Offshore Gas Developments to LNG 12.....	2
Executive Summary.....	3
Further contentions.....	4
Gas is not a transition fuel.....	13
Decommissioning plan still needed.....	15
About IEEFA.....	15
About the Authors.....	15

## Figures and Tables

Figure 1: The Proposed Bayu-Undan CCS Project.....	4
Figure 2: Barossa Gas to Darwin LNG Project Emissions per Offshore Processing Platform.....	6
Figure 3: Emissions from the Modified Barossa Gas to Darwin LNG Project.....	6
Figure 4: Australian Gas Flows in the 2020-21 Financial Year (Petajoules).....	14
Table 1: Feed Gas CO <sub>2</sub> Content for Australian Oil and Gas Developments.....	12
Table 2: Feed Gas CO <sub>2</sub> Content for Australian Offshore Gas Developments to LNG.....	13

## Executive Summary

The Darwin Pipeline Duplication Project (DPD project) represents a component of the Barossa gas to Darwin LNG project and the Bayu-Undan carbon capture and storage (CCS).<sup>1</sup> To properly assess the DPD project, which is largely to enable the CCS part of the Barossa gas project, a greater definition of the CCS project is required.

So far, Santos has not filed its environmental impact statement (EIS) on the Bayu-Undan CCS project; nor is there any clarity on when Santos will make a final investment decision (FID) on Bayu-Undan CCS. It is far from certain Bayu-Undan CCS will be able to bury the volume of CO<sub>2</sub> Santos has suggested, given the problems other CCS projects have had around the world.<sup>2</sup> Therefore, the Northern Territory Environmental Protection Authority (NT EPA) should not make any decision on the DPD Project until FID is made on the Bayu-Undan CCS project.

There needs to be full disclosure of the greenhouse gas (GHG) emissions from the Barossa gas project, the Darwin LNG train and the Bayu-Undan CCS project to assess if the entire project poses a risk to Australia meeting its emissions reduction target for 2030 and the objective of the Safeguard Mechanism to reduce emissions at Australia's largest industrial facilities. It would also hinder the Northern Territory's plans to achieve net zero emissions by 2050, as well as make it difficult for Santos to meet its own 2030 emissions targets. Both the federal 2030 emissions reduction target and the Safeguard Mechanism have passed into law since the submissions were taken for DPD project in early 2022.

IEEFA reiterates the point it made in its February 2022 submission that a comprehensive decommissioning plan for the Darwin pipeline be put in place.<sup>3</sup> The federal government learnt expensive and painful lessons regarding decommissioning bonds, in particular the Northern Endeavour exercise in the Timor Sea.<sup>4</sup> The Northern Territory government should avoid replicating the federal government's experience.

Santos' responses to issues raised in IEEFA's submission to the DPD project in February 2022 largely fall short of addressing the issues, and IEEFA reiterates the calls it made in last year's submission.

---

<sup>1</sup> Santos. [Darwin Pipeline Duplication Project. Supplementary Environmental Report](#). May 2023. Page 17.

<sup>2</sup> The Institute for Energy Economics and Financial Analysis (IEEFA). [The carbon capture crux: Lessons learned](#). September 01, 2022.

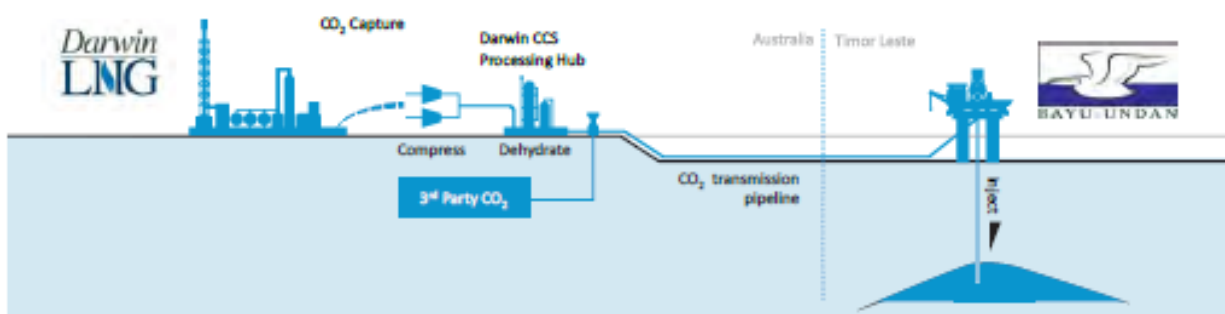
<sup>3</sup> The Institute for Energy Economics and Financial Analysis (IEEFA). [Darwin Pipeline Duplication Project, Submission to the NT EPA](#). February 2022.

<sup>4</sup> ABC News. [Northern Endeavour's \\$325m decommissioning begins, Petrofac prepares oil well disconnection](#). 10 June 2023.

IEEFA calls for:

1. No decision on the Darwin Pipeline Duplication project be made until there is a final investment decision on the Bayu-Undan CCS project.
2. Details on the liability of the emissions if they are leaked from the Bayu-Undan field as it is CO<sub>2</sub> sourced from Australia buried in the maritime jurisdiction of Timor-Leste (Figure 1).
3. A full environmental impact statement for the Bayu-Undan CCS project, the Barossa gas field and the Darwin LNG train. The EIS must include a full lifecycle of the GHG emissions associated with the entire project.

**Figure 1: The Proposed Bayu-Undan CCS Project**



*Note: Uses the existing Bayu-Undan to Darwin gas pipeline.*

*Source: Santos. Darwin Pipeline Duplication Project. Supplementary Environmental Report*

## Further contentions

John Robert, a guest contributor with IEEFA, has written a report on the Barossa gas project, which concludes that the CCS project may not significantly lower emissions.<sup>5</sup> Robert's report raises a number of issues about the Bayu-Undan CCS project and the Barossa gas project.

1. How does Santos know that the well-known Bayu-Undan gas reservoir geological structures won't present the same issues as Chevron Gorgon CCS system has found on the also well-known Barrow Island structures? In the DPD project Supplementary Environmental Report – Executive Summary, Santos asserts that the Bayu-Undan CCS would be able to manage the reservoir CO<sub>2</sub> emissions from the Barossa gas field. What tests or evidence are there that Bayu-Undan can host 10 million tonnes a year (mtpa) of CO<sub>2</sub>, given that there is no CCS project of this scale in Australia or in neighbouring countries?<sup>6</sup>

<sup>5</sup> IEEFA. [Should Santos' Proposed Barossa Gas 'Backfill' for the Darwin LNG facility proceed to development?](#) John Robert. 1 March 2021.

<sup>6</sup> Santos. [Darwin Pipeline Duplication Project Supplementary Environmental Report – Executive Summary, May 2023](#). Page 3.

2. The CCS of Barossa reservoir gas would consume a lot of energy for compression/pumping 2.3mtpa of CO<sub>2</sub> for 800km (the distance from the Barossa gas field to Darwin and to Bayu-Undan) across the Bonaparte Basin and Timor Sea and then to be reinjected into Bayu-Undan reservoirs. If that energy were fuelled by raw Barossa gas at 18% of CO<sub>2</sub>, as likely, the emissions from that activity could exceed the reservoir gas CO<sub>2</sub> actually stored in Bayu-Undan. Santos needs to detail how much energy will be used to transport the CO<sub>2</sub> from Darwin to Bayu-Undan, given that CO<sub>2</sub> is almost three times denser than methane,<sup>7</sup> and what sources of energy will be used to move the CO<sub>2</sub> over vast distances?

3. Will an environmental impact statement amendment or reissue be required to permit the Darwin LNG plant to operate fuelled by Barossa gas with 18% of CO<sub>2</sub> gas rather than the gas with 6% CO<sub>2</sub> from Bayu-Undan it was designed and approved to operate with? The separation task in the Acid Gas Removal Unit (AGRU) at the front end of the LNG plant is tripled, and the energy demand and resultant emissions will be much higher than as approved.

4. How would the Bayu-Undan reinjection facility be powered since that function will replace gas production? There have been suggestions that diesel may be shipped out to Bayu-Undan to provide the required fuel. A large storage tank might be required on the platform that will sit above the Bayu-Undan field (Figure 1), and the constant fuel consumption to operate the CO<sub>2</sub> reinjection process. This is in addition to the life-cycle emissions from ferrying workers to and from the platform from the mainland by helicopter, and their energy consumption while working on the platform. These extra emissions that must be estimated and publicly declared before approval can be considered. Santos needs to detail how the CO<sub>2</sub> will be injected into the Bayu-Undan reservoir and what infrastructure will be installed at Bayu-Undan to inject the CO<sub>2</sub> into the reservoir.

5. The major concern arises from a statement on Page 8 of the Executive Summary<sup>8</sup> that, “the Bayu-Undan to Darwin pipeline will be left intact for the future use in the Bayu-Undan CCS project”. The clear implication of that statement is that the CCS project is intended by Santos to follow the re-establishment of LNG production, using the new gas source. That *Santos plans to pump emissions into the atmosphere before CCS is ready – at volumes that could jeopardise Australia’s 2030 emissions target* – is unacceptable. The Gorgon CCS project development followed a similar path, adding significantly to Australia’s GHG emissions at a time when the country is committed to reducing them.

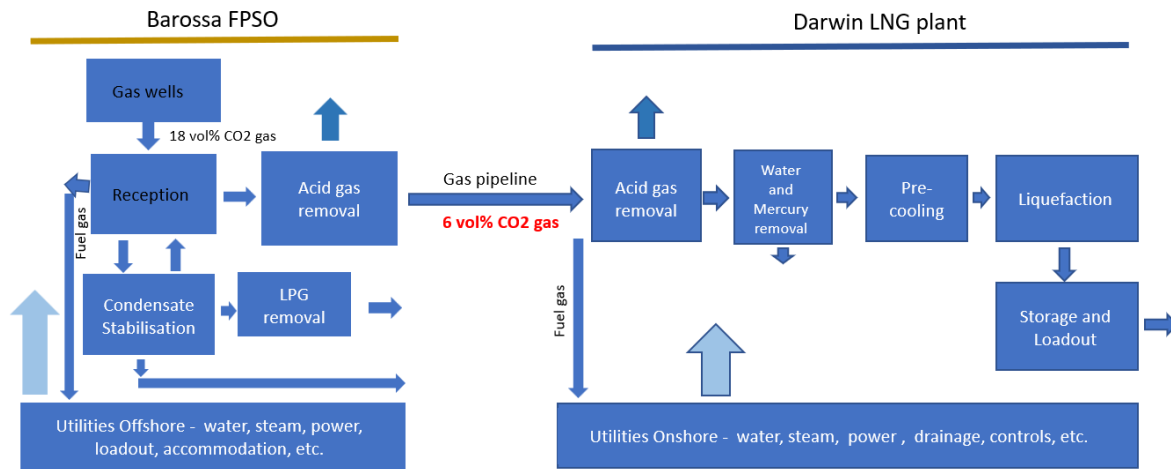
6. Santos is working towards an unapproved scheme for the acid separation activities at the Darwin LNG liquefaction plant (Figures 2, 3). The implications of moving 18% CO<sub>2</sub> from Bayu-Undan rather than 6% CO<sub>2</sub> from the Bayu-Undan field, as per the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) approved offshore project proposals (OPP) in March 2018,<sup>9</sup> are very significant in terms of emissions offshore at the Barossa floating production storage and offloading (FPSO) facility and onshore at the Darwin LNG liquefaction plant, and must be considered along with the timings of various parts of this now most complex of LNG projects.

<sup>7</sup> Saul Griffith. [The Big Switch: Australia’s Electric Future](#). 2022. Page 5.

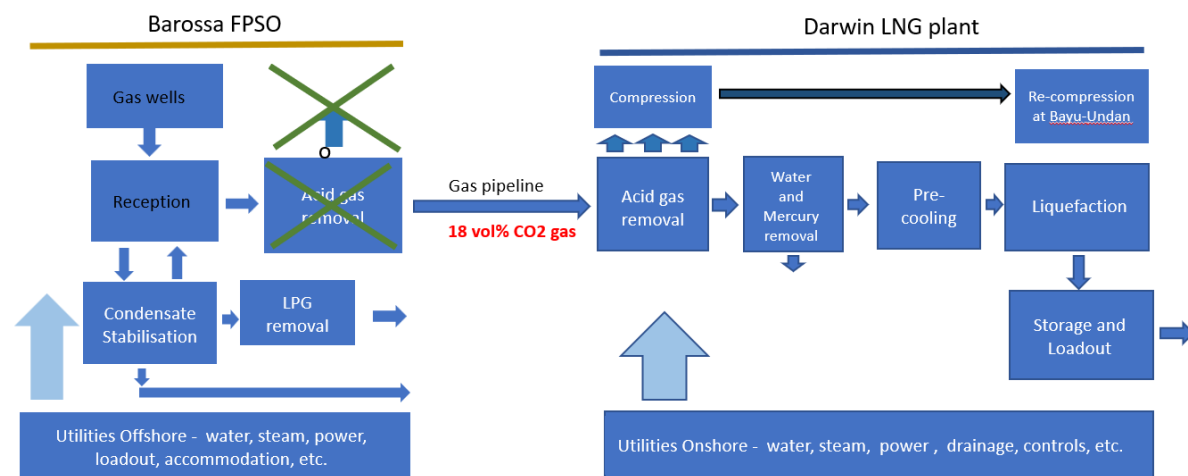
<sup>8</sup> Santos. [Darwin Pipeline Duplication Project Supplementary Environmental Report – Executive Summary](#), May 2023. Page 8.

<sup>9</sup> Santos. [Barossa Gas Project](#).

**Figure 2: Barossa Gas to Darwin LNG Project Emissions per Offshore Processing Platform**



**Figure 3: Emissions from the Modified Barossa Gas to Darwin LNG Project**



*Note: Santos' announced, but not approved, CCS alternative.*

## No pipeline decision until Bayu-Undan CCS decided

In IEEFA's opinion, there should be no decision on the DPD project until there is a final investment decision on the Bayu-Undan CCS project. Santos has said it is targeting an FID on Bayu-Undan CCS

for 2025<sup>10</sup> and starting in 2027,<sup>11</sup> but the engineers/construction partner SK Group recently said the CCS facility would not be ready until 2030.<sup>12</sup> “SK Group has set the goal of completing the project by 2030 after making a final investment.” That is three years later than Santos’ targeted timeline for the Bayu-Undan CCS. Hence, IEEFA calls for clarity on when the Bayu-Undan CCS project will be ready to receive CO<sub>2</sub> injections: is it 2027 or 2030? IEEFA urges that no LNG exports using Barossa gas should be shipped before Bayu-Undan CCS is ready for CO<sub>2</sub> injection as the carbon intensity of the project poses a risk to Australia meeting its 2030 emission reduction obligations.

The key function of the DPD project is to allow the transport of CO<sub>2</sub> from the Barossa gas field in the Bonaparte Basin to Darwin through a 262km pipeline. At Darwin, CO<sub>2</sub> which has an averaged content of around 18% in the Barossa field, is split so that the CO<sub>2</sub> is sent into the pipeline connected to the Bayu-Undan gas and condensate field in the Timor Sea over a distance of 500km,<sup>13</sup> and under the administration of Timor-Leste. The CO<sub>2</sub> is to be injected into the Bayu-Undan field where Santos hopes the reservoir will store CO<sub>2</sub> with no leakages.

The DPD project is therefore an integral part of the proposed Bayu-Undan CCS project, and further details of the Bayu-Undan project need to be disclosed before a proper assessment of the DPD project can be made.

## Who is responsible if CO<sub>2</sub> leaks at Bayu-Undan CCS?

Santos needs to disclose more details on the liability of the emissions if they are leaked from the Bayu-Undan field as it is CO<sub>2</sub> sourced from Australia and buried in the maritime area under the jurisdiction of Timor-Leste. This follows the establishment of the Australia-Timor-Leste Maritime Boundary Treaty in August 2019,<sup>14</sup> which replaced the Joint Petroleum Development Area (JPDA) that was a maritime area jointly administrated by Timor-Leste and Australia. The owners of the Bayu-Undan production sharing contract (PSC) had to sign a new contract to recognise that the JPDA no longer existed.

This CO<sub>2</sub> disclosure should be included in the proposed legislation Environment Protection (Sea Dumping) Amendment (Using New Technologies to Fight Climate Change) Bill 2023 that was introduced in the Australian parliament on 22 June 2023.<sup>15</sup>

<sup>10</sup> Santos. [MOUs executed for potential CO2 supply to underpin Santos' Bayu Undan CCS project](#). 3 May 2023.

<sup>11</sup> Santos. [2022 Investor Briefing Day](#). 8 November 2022. Page 43.

<sup>12</sup> Maeil Newspaper. Chey Tae-won, Chairman of SK Group, met with the President of Timor Leste...Discussed business cooperation. 2 June 2023.

<sup>13</sup> ConocoPhillips Australia. [Bayu-Undan to Darwin Gas Export pipeline Environmental Plan Summary](#). Page 3.

<sup>14</sup> Australian Department of Foreign Affairs and Trade. [Australia's maritime arrangements with Timor-Leste](#).

<sup>15</sup> Australian Parliament. Environment Protection (Sea Dumping) Amendment (Using New Technologies to Fight Climate Change) Bill 2023. 22 June 2023.

Given the CO<sub>2</sub> from the Barossa gas field will be buried in Timor-Leste waters what agreement has been made between Santos and the government in Dili to establish who is liable in the case of leaked emissions from Bayu-Undan?

## Santos overstates CCS effectiveness

Santos has said emissions from the Barossa field will be buried in the Bayu-Undan CCS facility. However, given the performance of CCS facilities around the world have captured less<sup>16</sup> than they intended, it cannot be taken for certain that the Bayu-Undan CCS will absorb all of the Scope 1 and 2 emissions from the Barossa gas reservoir and the downstream Darwin LNG train. Hence an underperformance of Bayu-Undan CCS, if it does go ahead, would mean Santos would have to buy carbon credits to meet any shortfall. Carbon credits also have a problematic history,<sup>17 18</sup> and therefore raises the risk that Barossa's emissions could affect Santos' own plans to reduce Scope 1 and 2 emissions by 30% by 2030, and a 40% reduction in Scope 1 and 2 emissions intensity by 2030.<sup>19</sup> The Barossa emissions will also affect the Australian government's 2030 emissions reduction target of 43% below 2005 levels.

IEEFA does not find Santos responded adequately to its previous submission on the DPD project, questioning the effectiveness of CCS and whether the Bayu-Undan reservoir was suitable for CCS. Santos said CCS technologies had been in operation since the 1970s and were proven as a large-scale CO<sub>2</sub> storage solution. There are more than 20 large-scale CCS projects in operation around the world, storing about 40 mtpa of CO<sub>2</sub>.<sup>20</sup> The fact that it has taken 50 years to sequester a fraction of the global emissions of 36.8 gigatonnes of CO<sub>2</sub> from energy production in 2022<sup>21</sup> underlines that CCS is unlikely to provide an adequate response to lower global GHG emissions.

Santos responded inadequately to another concern by IEEFA in the 2022 submission to the DPD project that the implementation of the Bayu-Undan CCS may not reduce overall emissions from the Barossa gas project. *"The CCS system is not included in this DPD Project proposal as this is still undergoing technical and economic assessments," Santos said.*<sup>22</sup> This can imply that the Bayu-Undan CCS may not be feasible after all, and, if not, how does Santos plan to reduce its emissions to reach net zero for its Scope 1 and 2 emissions by 2040?

## Full-cycle emissions needed not cherry-picking

IEEFA calls for a full environmental impact statement for the Bayu-Undan CCS project, the Barossa gas field and the Darwin LNG train. The EIS must include a full lifecycle of the GHG emissions

<sup>16</sup> IEEFA. [The Carbon Capture Crux. Lessons Learned](#). September 2022. Page 34.

<sup>17</sup> Climate Analytics. [The Dangers of Overreliance on Carbon Offsets](#) 15 February 2023.

<sup>18</sup> Crikey. [Confirmed: new evidence shows tens of millions of carbon credits worthless](#). 22 June 2023

<sup>19</sup> Santos. [Darwin Pipeline Duplication Project. Supplementary Environmental Report](#), May 2023. Page 299.

<sup>20</sup> Santos. [Darwin Pipeline Duplication Project. Supplementary Environmental Report](#), May 2023. Page 110.

<sup>21</sup> International Energy Agency (IEA) CO<sub>2</sub> Emissions in 2022. Page 3.

<sup>22</sup> Santos. [Darwin Pipeline Duplication Project Supplementary Environmental Report](#). May 2023. Page 111.



associated with the entire project. The DPD project is a component of an integrated gas, LNG and CCS project, and therefore any proper assessment of the DPD project must be put in the context of the whole project as the pipeline is not a standalone project, and therefore cannot be assessed in isolation.

The selective use of GHG emissions data by Santos in the DPD project Supplementary EIS provides little context. IEEFA has argued for a whole of project EIS. It calls for whole of project emissions data to be disclosed to make a proper assessment of the impact of the entire project on Australia's 2030 emissions reduction target<sup>23</sup> and meeting the objectives of the Safeguard Mechanism,<sup>24</sup> as well as the Northern Territory's net zero emissions ambitions by 2050.<sup>25</sup>

There appears to be a lack of consistency between Santos' emissions data on the Barossa gas project and the data provided by former operator of the Barossa gas venture, ConocoPhillips. In the Barossa Area development offshore project proposal (Barossa OPP) submitted to NOPSEMA in 2017, it states that the total emissions from the Barossa FPSO facility will be 2.1-3.8mtpa of CO<sub>2</sub>, but likely to be in the order of 3.4mtpa.<sup>26</sup> A further 2.051mtpa of CO<sub>2</sub> would be released via the downstream Darwin LNG train under the prevailing licence. This means total emissions from the Barossa gas field and the Darwin LNG plant will be around 5.451mtpa of CO<sub>2</sub>,<sup>27</sup> but excluded any emissions from pumping CO<sub>2</sub> more than 500km from Darwin to Bayu-Undan and injecting it into the near depleted gas and condensate field.

This does not seem to tally with the data provided by Santos. In its Supplementary Environment Report,<sup>28</sup> it says Scope 1 GHG emissions from Barossa operations and maintenance will be 2.5mtpa of CO<sub>2</sub>, and Scope 1 from onshore processing, which is assumed to be the downstream liquefaction plant, Darwin LNG, 1.7mtpa of CO<sub>2</sub>. It does provide an estimate for end product emissions of 11mtpa of CO<sub>2</sub> and therefore a total of 15.2mtpa of CO<sub>2</sub> coming from the Barossa gas project. Santos will need to explain how its estimates for Scope 1 emissions from the upstream and downstream activities of Barossa gas and Darwin LNG are 4.2mtpa of CO<sub>2</sub> or around 23% less than ConocoPhillips estimates. The Santos emissions estimate of 4.2mtpa also represents almost 30% of the Northern Territories' total emissions in 2021.<sup>29</sup>

IEEFA is of the view that Santos' response<sup>30</sup> to concerns raised by IEEFA and other groups in the 2022 consultation process about the overall emissions of the Barossa and DPD project is not sufficiently comprehensive as there is no disclosure about the emissions from transporting CO<sub>2</sub> from the Barossa field to the Bayu-Undan CCS and its subsequent injection.

<sup>23</sup> Australian Government. [Australia's 2030 Emissions Reduction Target. Strong, credible, responsible](#). Page 1.

<sup>24</sup> Australian Government Clean Energy Regulator. [The Safeguard Mechanism](#). 5 May 2023.

<sup>25</sup> Northern Territory Government. [Climate Change NT. Net Zero Emissions](#).

<sup>26</sup> ConocoPhillips Australia. [Barossa Area Development Offshore Project Proposal. 2018](#). Page 128.

<sup>27</sup> ConocoPhillips Australia. [Barossa Area Development Offshore Project Proposal. 2018](#). Page 128.

<sup>28</sup> Santos. [Darwin Pipeline Duplication Project. Supplementary Environmental Report](#), May 2023. Page 297.

<sup>29</sup> Australian Government. Department of Climate Change, Energy, the Environment and Water. [Australia's Greenhouse Accounts 2021](#).

<sup>30</sup> Santos. [Darwin Pipeline Duplication Project. Supplementary Environmental Report](#). May 2023. Page 110.

Santos' use of the emissions data is misleading. In addition, its response<sup>31</sup> to concerns raised about the high CO<sub>2</sub> content in the Barossa gas field and the total emissions footprint through submissions in the 2022 consultation process is also insufficient.

Santos attempts to minimise the Barossa emissions footprint in a global context. A far more appropriate comparison is to include Barossa with all the oil and gas projects in the planning and development stage around the world. The combined estimated emissions profile of these fossil fuel projects must be considered in terms of how they will affect Australia's commitments to a 2-degree or 1.5-degree scenario under the Paris Climate Agreement.

Santos' repeatedly cites the emissions footprint of Barossa gas as a percentage of global emissions in its Response to Submissions section of the Supplementary Environmental Report.<sup>32</sup> This is misleading. Every fossil fuel project around the world will itself contribute only a fraction of global emissions, but collectively they make a significant contribution to global GHG emissions. It is in this context that the DPD and Barossa gas field projects should be viewed.

Santos also needs to provide more clarity about the Scope 2 emissions from the Darwin LNG plant. Although it does provide a Scope 1 estimate for onshore processing, it states<sup>33</sup> that the management of the emissions from the Darwin LNG facility is covered by its environmental protection licence (EPL217-03) and an operations environmental management plan (EMP). As a result, it does not provide much more detail about the downstream liquefaction plant even though John Robert concludes that Santos will need to reconfigure the acid removal unit at the facility to cope with the higher volumes of CO<sub>2</sub> from the Barossa field.

Santos further states<sup>34</sup> that the operation of the FPSO and Darwin LNG plant and the resultant emissions are not within the scope of the DPD Project and so are not assessed in the Supplementary Environment Report. The operation of the FPSO and the resultant emissions will be assessed by NOPSEMA in the Barossa Operations EP, which is currently under development. This statement by Santos is contrary to IEEFA's view that a whole life-cycle of the project's total emissions is required to assess the pipeline.

IEEFA disputes Santos' view of the scope of DPD project, and reiterates the importance of having an EIS that covers the entire project. To look at a small component of the project in isolation does not give a comprehensive view of the full GHG emissions of the project and its potential impact on Australia's emissions reduction targets for 2030 and the objectives of the Safeguard Mechanism.

<sup>31</sup> Santos. [Darwin Pipeline Duplication Project. Supplementary Environmental Report](#). May 2023. Page 107-108.

<sup>32</sup> Santos. [Darwin Pipeline Duplication Project. Supplementary Environmental Report](#). May 2023. Page 107-108.

<sup>33</sup> Santos. [Darwin Pipeline Duplication Project. Supplementary Environmental Report](#). May 2023. Page 295.

<sup>34</sup> Santos. [Darwin Pipeline Duplication Project. Supplementary Environmental Report](#). May 2023. Page 301.

## Nothing safe about emissions-intensive Barossa

To put Barossa's emissions profile in a more meaningful context, it is best to show what proportion of emissions the project will represent in Australia's LNG sector. Even assuming Santos' CO<sub>2</sub> average annual estimate of 4.2mtpa, it would represent 10.2% of estimated emissions of 41mtpa of CO<sub>2</sub><sup>35</sup> from Australia's LNG sector in 2030 and 4.8% of Australia's estimated LNG production of 88mtpa in 2030.<sup>36</sup>

Emissions from LNG projects come under the safeguard mechanism, and the sector represents one of the largest sources of emissions under the mechanism at about 40% of the estimated emissions in 2030. Therefore Australia's 10 LNG exporting projects have to make significant emissions reductions for the Safeguard Mechanism to meet its objectives.

Australia's Safeguard Mechanism legislation was amended with tighter GHG emissions limits on 30 March 2023.<sup>37</sup> The mechanism places a GHG emissions ceiling on all facilities in Australia that emit more than 100,000 mtpa of CO<sub>2</sub>. This equates to the top 215 emitters and accounts for a total of 28% of Australia's annual emissions.

The revised scheme, which comes into force on 1 July 2023, sets an annual reduction of 4.9% for each facility to ensure that Australia's largest emissions polluters contribute to Australia's total emissions reduction target of 43% by 2030 from 2005 levels of 621mt of CO<sub>2</sub>. This means Australia's emissions have to fall to about 354mtpa of CO<sub>2</sub> by the end of the decade. Based on Australia's latest GHG emissions inventory report, total emissions were 463.9mt in 2022.<sup>38</sup> Australia's emissions therefore need to fall a further 23.6% to reach the 2030 target. The addition of the most carbon-intensive gas to LNG project in Australia does not fit with the country's pledge to cut emissions to meet its 2030 target.

Emissions from all facilities under the Safeguard Mechanism are about 137mtpa of CO<sub>2</sub>, and the amendments to the mechanism have set a ceiling of 100mtpa of CO<sub>2</sub> by the end of the decade. The Safeguard Mechanism together with Australia's 2030 emissions reduction targets, mean that Santos' estimates of Barossa's Scope 1 emissions from upstream and downstream represent 4.2% of the safeguard mechanism at 2030 and about 1.2% of Australia's total emissions at 2030. Under the ConocoPhillips emissions estimates, this would represent 5.45% and 1.5% respectively of the safeguard mechanism and Australia's total emissions by 2030.

<sup>35</sup> Australian Department of Climate Change, Energy, the Environment and Water (DCCEEW). [Australia's emissions projections 2022](#). December 2022. Page 47.

<sup>36</sup> DCCEEW. [Australia's emissions projections 2022](#). December 2022. Page 47.

<sup>37</sup> Parliament of Australia. [Safeguard Mechanism \(Crediting\) Amendment Bill 2023](#). 30 March 2023.

<sup>38</sup> DCCEEW. [National Greenhouse Gas Inventory Quarterly Update: December 2022](#).

## Barossa part of another wave of Australian gas projects

Barossa is also not the only gas field proposed to be developed in Australia by 2030. Woodside intends to have its Scarborough gas field offshore Western Australia operating by 2026,<sup>39</sup> and has talked about developing the gas fields in the Browse Basin offshore WA.<sup>40</sup> Italian oil and gas producer Eni intends to develop the Verus gas field in the Bonaparte Basin, formerly known as Evans Shoal, also by 2030.<sup>41</sup> Verus is even more carbon intensive than Barossa with an average CO<sub>2</sub> content in the Verus field of 27%. Hence, the NT EPA and the federal EPA need to look at all oil and gas development project proposals and assess their accumulative impact on emissions and make some industry rule about future industry development.

Although Santos did not provide comparative CO<sub>2</sub> data with other oil and gas fields either under development or offshore northern Australia, the previous operator ConocoPhillips provided some comparisons.

**Table 1: Feed Gas CO<sub>2</sub> Content for Australian Oil and Gas Developments**

Operator	Reservoir	Vol% CO <sub>2</sub>	Development
PTTEP	Montara	13	Developed for liquids, blowouts. <sup>6</sup> Oil producer under new owner.
Shell	Prelude	9	Floating LNG
INPEX	Ichthys	8-17 (average 9)	LNG
Woodside	Browse	10	Not developed
ConocoPhillips	Barossa/Caldita	18/13	Not yet developed
ENI	Evans Shoal	27	Not developed

*Note: Evans Shoal has been renamed Verus.*

*Source: IEEFA. Should Santos' proposed Barossa Gas 'Backfill' for the Darwin LNG facility proceed to Development*

<sup>39</sup> Woodside Energy. [Scarborough Gas Project and Pluto Train 2 website](#)

<sup>40</sup> The West Australian. [Woodside Energy sees Shell's Browse exit helping development call](#). 3 May 2023.

<sup>41</sup> IEEFA. [Eni's Verus Not So True on Net Zero](#). Page 14.

**Table 2: Feed Gas CO<sub>2</sub> Content for Australian Offshore Gas Developments to LNG**

Operator	Reservoir	Vol% CO <sub>2</sub>	Development
Woodside NWS T1-5	Rankin/Goodwyn/etc	<2	LNG
Chevron	Janz/Gorgon	0.5-14 (average 9)	LNG with Carbon Capture and Storage
Chevron	Wheatstone	2	LNG
Woodside	Pluto	2	LNG

*Source: IEEFA. Should Santos' proposed Barossa Gas 'Backfill' for the Darwin LNG facility proceed to Development*

IEEFA also disagrees with Santos' response<sup>42</sup> to the previous submission authored by Bruce Robertson, that Barossa gas is a low emissions fuel. On the contrary, Barossa/Darwin LNG represents the most CO<sub>2</sub>-intensive gas project in Australia (Nothing safe about emissions-intensive Barossa).

## Gas is not a transition fuel

IEEFA also contests Santos' response to its previous submission in 2022 that it had overstated the role methane gas will play in the energy transition. Santos cited a speech by Australia's former chief scientist Alan Finkel, who referred to comments made by the then prime minister Scott Morrison and then energy minister Angus Taylor that gas was playing a role in the energy transition to lower-emissions intensive electricity systems based on renewable energies.<sup>43</sup>

Since Finkel's speech in February 2020, the share of gas as a fuel in eastern Australia's power generation network, which represents around 90% of national power generation, has declined. The latest quarterly gas data from the Australian Energy Regulator (AER) shows that daily average gas consumption in the national electricity market (NEM), which covers the eastern Australia states and the Australian Capital Territory (ACT), is at its lowest in the nine months to 31 March 2023 since 2008-09.<sup>44</sup> The average daily gas use in power generators was 262.67 terajoules a day (TJ/d) in the first nine months of the 2022-23 fiscal year, more than half of the 586.25TJ ten years ago in 2012-13 and is down almost 36% from the average of 407.5TJ/d in 2019-20, the year Finkel made his speech. In the past three years, batteries have emerged as a greater competitor to gas peaking plants.

In IEEFA's report<sup>45</sup> Gas' role in the transition, a fuel transitioning out of the energy system, author Bruce Robertson highlighted the greater role batteries are playing in Australia's power system at the expense of gas.

<sup>42</sup> Santos. [Darwin Pipeline Duplication Project. Supplementary Environmental Report](#), May 2023. Pages 107-8.

<sup>43</sup> Australian Government Chief Scientist. Dr Alan Finkel National Press Club Address. ['The orderly transition to the electric planet.'](#) 12 February 2020.

<sup>44</sup> Australian Energy Regulator. [Average daily gas used for gas powered generation.](#)

<sup>45</sup> IEEFA. Gas's role in the transition. 11 May 2023

“Grid-scale batteries arrived in Australia in November 2017, with the construction of the Hornsdale power reserve in South Australia. The battery was a 100MW/129MWh. It was upgraded in September 2020 to 150MW/193.5MWh.

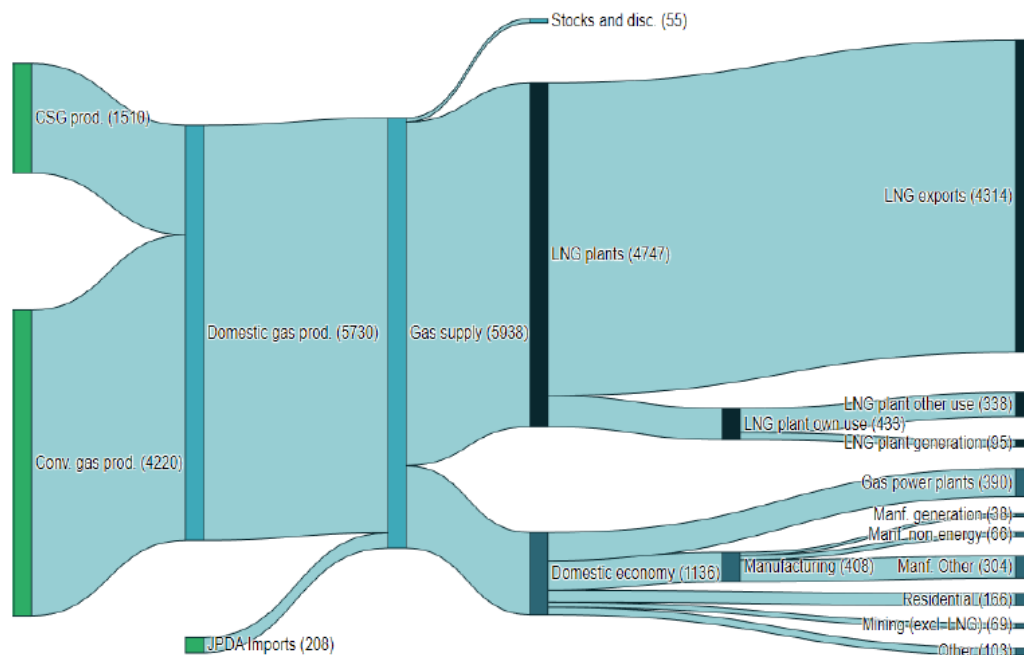
“It has since been dwarfed by other projects, such as AGL’s big battery project at Torrens Island in SA. The 250MW big battery, sized initially at one-hour storage (250MWh), is likely to expand to up to four hours storage (1,000MWh).

“In December 2021, the Victorian Big Battery opened in Geelong. The 300MW/450MWh facility is the biggest completed battery storage installation in Australia.

“Even bigger batteries are planned by AGL, with a 500MW battery for the Liddell site following the closure of its 52-year 1,500MW Liddell coal-fired power station in April, and Origin Energy plans a 700MW battery for its Eraring site, where it intends to close its 2,992MW coal-fired power plant in 2025.

“The increasing scale and number of grid-scale batteries will crimp demand for gas.”<sup>46</sup> Santos’ emphasis on the importance of gas is not consistent with its use in Australia. Figure 4 shows that the largest consumers of gas in Australia are the country’s LNG plants to generate electricity to operate the liquefaction plants, and the gas used in the process of liquefying gas for export. It is greater than the volumes used for manufacturing, households and for power generation combined.

**Figure 4: Australian Gas Flows in the 2020-21 Financial Year (Petajoules)**



Note: Components may not sum due to rounding

Source: Department of Climate Change, Energy, the Environment and Water (2022) Australian Energy Statistics, Tables A and F and internal sources

<sup>46</sup> IEEFA. [Gas’ role in the transition](#). May 2023. Page 6.

## Decommissioning plan still needed

IEEFA maintains the view that Santos needs to provide a decommissioning plan for the new Darwin pipeline duplication, given both the NT and Australian federal governments plan to reach net zero emissions by 2050. Santos said in response to IEEFA's call for a decommissioning plan in the February 2022 submission<sup>47</sup> that decommissioning would not take place until after 2050.<sup>48</sup> The Santos response does not align with the NT and Australian net zero emissions plan.

## About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. [www.ieefa.org](http://www.ieefa.org)

## About the Authors

### Kevin Morrison

Kevin Morrison is an energy finance analyst, Australia LNG/Gas. Kevin works closely with analyst Bruce Robertson and the global oil and gas team to examine issues facing the Australian LNG and gas sector. [kmorrison@ieefa.org](mailto:kmorrison@ieefa.org)

### John Robert

IEEFA guest contributor John Robert is a Chemical Engineer and Industrial Economist with more than 40 years of experience, including directly developing and/or managing estimates for capital and operating costs for LNG plants, along with benchmark comparisons for export competitiveness and reviewing the potential impact of emissions trading schemes such as Australia's proposed Carbon Pollution Reduction Scheme (CPRS) on LNG and chemicals projects.

<sup>47</sup> IEEFA. [Darwin Pipeline Duplication Project, Submission to the NT EPA](#), February 2022. Page 3.

<sup>48</sup> Santos. [Darwin Pipeline Duplication Project, Supplementary Environmental Report](#), May 2023. Page 97.