



Western Sydney Green Gas Project Modification 1

Fuel Cell and Hydrogen Cylinder Filling

State Significant Development Modification Assessment (SSD 10313 MOD 1)

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1 Introduction

Jemena Gas Networks (NSW) Limited (Jemena) owns the Western Sydney Green Gas Project (the project), located at the existing Jemena high pressure gas facility in Horsley Park (Horsley Park Facility), in the Fairfield local government area and Greater Sydney Parklands.

The Horsley Park Facility is located approximately 32 kilometres (km) west of the Sydney central business district and includes several facilities associated with Jemena's Eastern Gas Pipeline, Jemena Gas Networks Trunk Main, Sydney Primary Loop and secondary natural gas distribution network.

The predominant land use around the project site includes active open space area, rural land to the east and industrial land to the north. There are 10 residential properties within 500 metres (m) of the project, with 3 closest properties located approximately 90 m to 160 m south of the site boundary.

The project was approved under delegation from the Minister for Planning and Public Spaces on 10 August 2020, and allows Jemena to construct and operate a 500 Kilowatts (kW) power to gas (P2G) Facility to produce up to 52,600 kg of hydrogen gas per year using electrolysis, store hydrogen gas in a high-pressure storage and separate buffer storage pipeline on site. The consent allows the produced hydrogen to be injected into Jemena's secondary gas pipeline/distribution network up to 2% hydrogen by volume, refuel hydrogen buses at a new hydrogen refuelling station and generation of power on-site.

Construction works under this development consent commenced in January 2021, and a staged commissioning process commenced in May 2021. The project is to be operated autonomously with no permanent on-site operator required. Subject to planning approval, Jemena anticipates commencing operation in early 2022, following which the consent permits the project to operate for 5 years.

The project has a capital investment value of \$18 million, generating 30 full-time jobs during construction, and 2 full-time jobs during operation.

2 Proposed modification

To improve project's power generation efficiency using hydrogen and reduce project's overall hazards and risks, Jemena seeks approval to allow addition of a hydrogen fuel cell to the approved microturbine, substitution of the approved hydrogen bus refuelling station for an on-site hydrogen cylinder filling station and the use of compressed natural gas (CNG) as a fuel source for the microturbine in the first year of operation instead of the natural gas.

The proposed modifications would be contained within the approved project's footprint. The site layout and key components of the proposed modification are shown in **Figure 1** and **Figure 2**, respectively.

Construction of the proposed modification is anticipated to take approximately 2 weeks with commissioning taking approximately 1 week.

Jemena's proposed modification is described in detail in the Modification Report (see **Appendix A1**) and additional information provided by Jemena (**Appendix A3**).

A summary of the proposal is provided in **Table 1**.

Table 1 | Summary of proposed modifications

Component	Approved Project	Proposed Modification	Change
Hydrogen production rate	52,600 kg per year	87,600 kg per year	Increase in water usage from 2,135 litres/day to 2,400 litres/day.
Hydrogen delivery	Use a new hydrogen refuelling station on-site for buses. Hydrogen cylinder filling not permitted on-site.	Replace the hydrogen refuelling station with a hydrogen cylinder filling station on-site	Reduction in hydrogen delivery pressure from 70 MPa to 35 MPa.
Hydrogen Storage	Buffer storage. High pressure storage for refuelling.	Buffer storage.	Removal of high-pressure hydrogen storage.
On-site electrical generation	Use a microturbine to convert natural gas from the distribution network to electricity, with a transition from natural gas to hydrogen within 12 months.	Incorporate a hydrogen fuel cell into the microturbine. Fuel the microturbine with CNG instead of natural gas prior to the use of 100% hydrogen within 12 months. Use a CNG trailer (4 cylinders mounted on a stationary trailer, with full cylinders not stored on-site).	Increase power generation efficiency from hydrogen to up to 75%, compared to 30% with the approved project.
Traffic and Transport	Operations: Up to 3 buses per day to enter and exit the site for hydrogen refuelling. Construction: Up to 10 light and 8 heavy vehicles per day.	Operations: Up to 2 semi-trailers per week (4 movements per week) to enter and exit the project site for hydrogen cylinder replacement. One light vehicle movement per week for the first year for CNG delivery.	Overall reduced heavy vehicle movements. Minor changes to site access design and light vehicle movements. Reduced traffic safety and hazards during operations (no on-site storage of trailers with hydrogen filled cylinders).
Operational hours	All operations: 24-hours	Microturbine: once a week over the first 12 months.	Limit operation of the microturbine and fuel cell components to between 7 am and 10 pm.

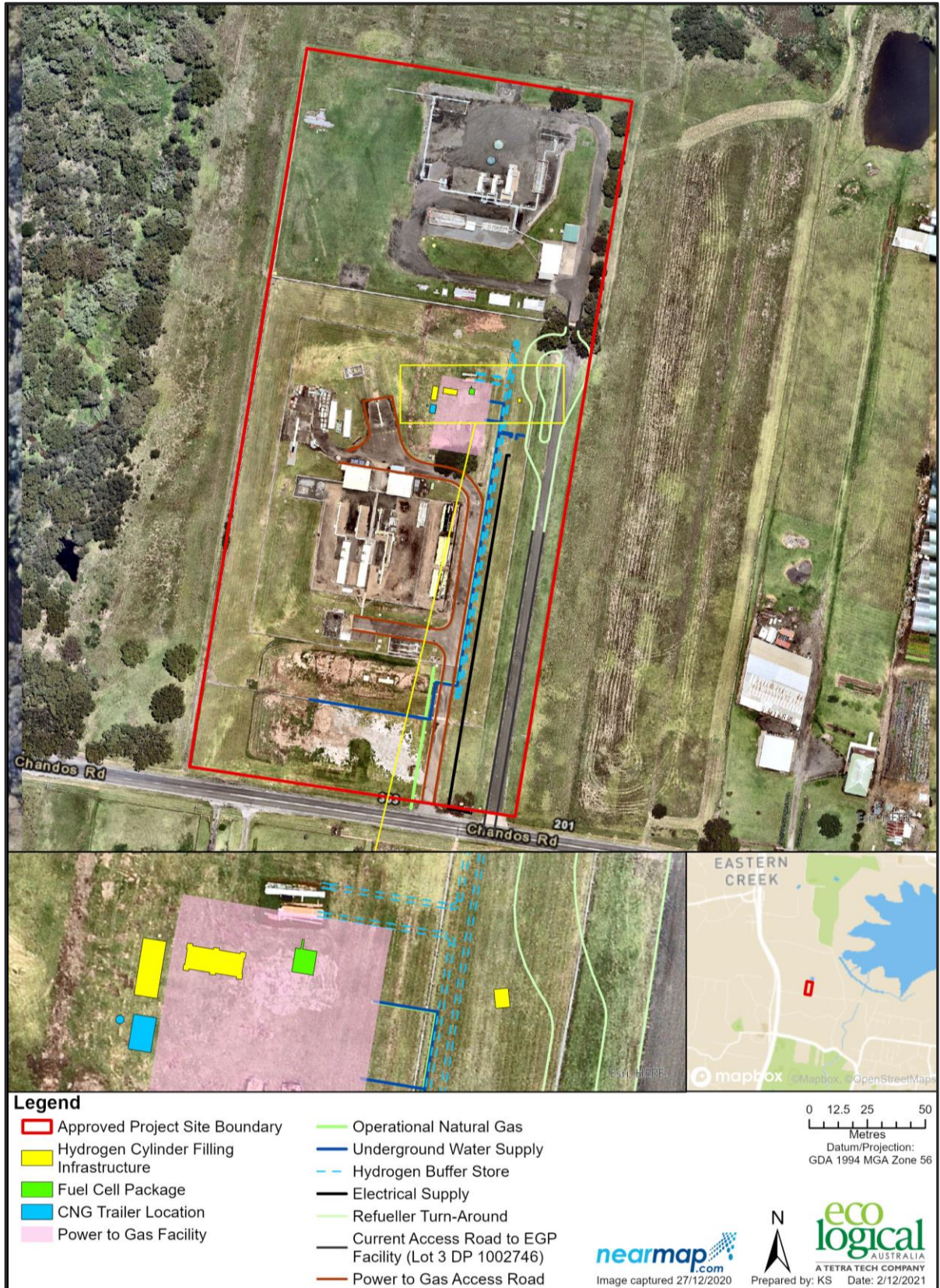


Figure 1 | Site Layout – Proposed Modification (Source: Jemena – Additional Information)

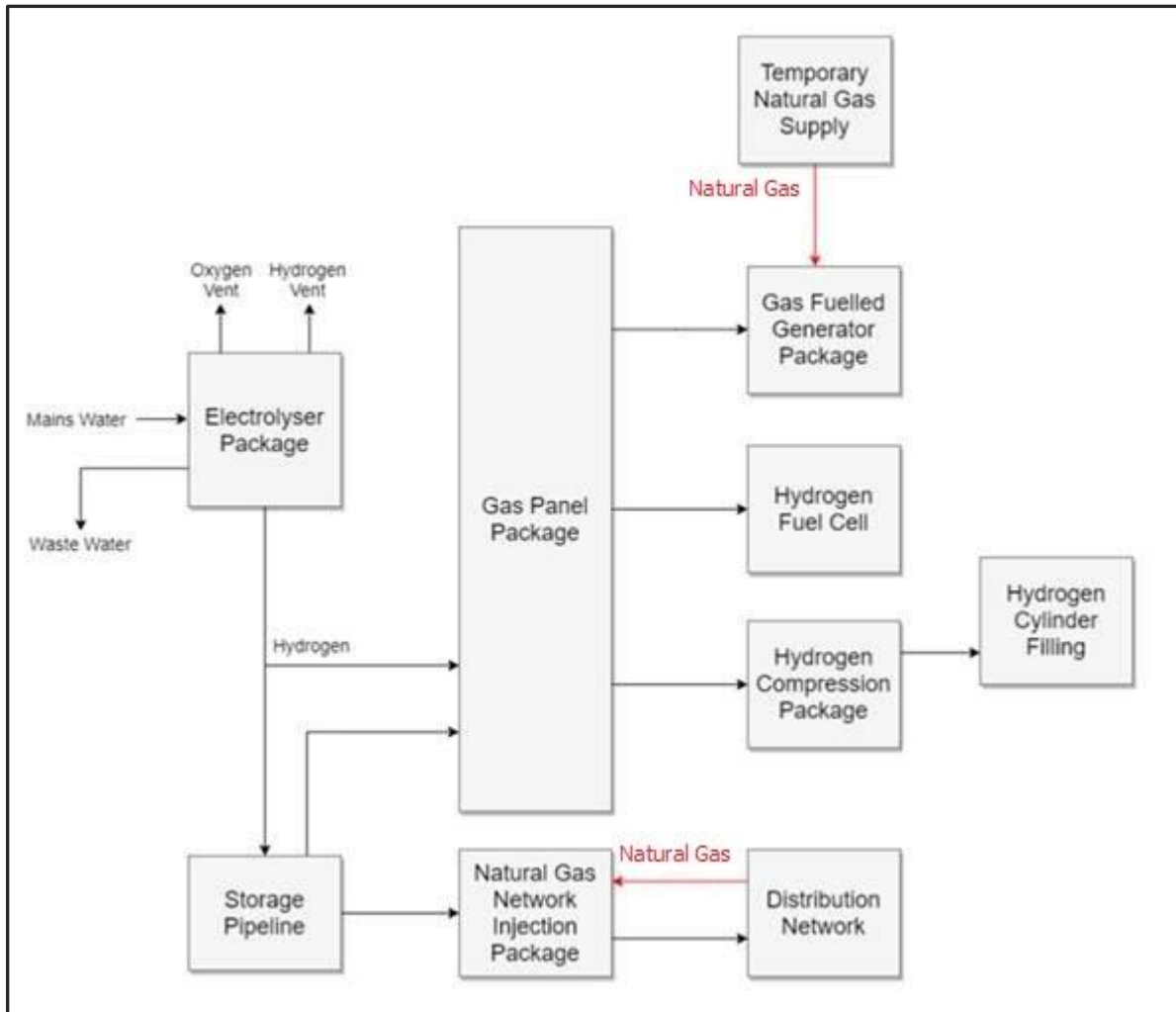


Figure 2 | Key Components of the Modified Project (Source: Jemena – Additional Information)

3 Statutory context

3.1 Scope of modifications

The project was originally approved on 10 August 2020 under Section 4.38 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). As such, any modification to this consent must be made under Section 4.55 of the EP&A Act.

A modification application under Section 4.55(1A) of the EP&A Act was submitted to the Department of Planning and Environment (the Department) on 2 July 2021.

The Department has reviewed the proposal and considers that the application can be characterised as a modification involving minimal environmental impact, as it is substantially the same development as originally approved in 2020, would not significantly increase the environmental impacts of the project as approved, and would not change the approved project's disturbance area, or schedule of the land.

Consequently, the Department considers that the proposed modification is within the scope of Section 4.55(1A) of the EP&A Act.

3.2 Consent authority

The Minister for Planning (the Minister) is the consent authority for the modification application. However, under the Minister's delegation dated 26 April 2021, the Director, Resource Assessments, may determine the application. This is because Jemena has not made any reportable political donations, Fairfield City Council did not object to the proposal, and there were no objections from the community.

3.3 Mandatory Matters for Consideration

The Department has considered relevant required matters in accordance with section 4.15(1) of the EP&A Act including the objects of the Act, applicable environmental planning instruments, the likely impacts of the modification application, site suitability and the public interest. The Department has also considered the reasons for the granting of the original application in its assessment of the project and is satisfied that the proposed modification does not affect the decision that was previously made.

3.4 Impacts on Biodiversity Values

Under Clause 30A(2)(c) of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*, the Department considers that the proposed modification would not result in an increase in impacts on biodiversity values and is satisfied that a Biodiversity Development Assessment Report (BDAR) is not required to be submitted with the modification application.

4 Engagement

In accordance with the requirements for a 4.55(1A) modification involving minimal impact, the modification application was not formally exhibited. Nevertheless, the Department made the modification application publicly available on the Department's website from 6 August 2021 and consulted with the key agencies and **Fairfield City Council**. No submissions were received from the public and full copies of the public authority advice are available in **Appendix A2**.

Environment Protection Authority (EPA), **Greater Sydney Parklands (GSP)**, and **Transport for New South Wales (TfNSW)** did not raise any concerns or recommended conditions. EPA confirmed that the project does not require an environment protection licence under the *Protection of the Environment Operations Act 1997*, and therefore it did not need to be further consulted. Fairfield City Council is the appropriate regulatory authority under the *Protection of the Environment Operations Act 1997*.

Fairfield City Council raised concerns about the traffic impacts of the proposal on the maintenance and safety of Chandos Road, which is a council road, which were addressed by Jemena through additional information to the Department during the assessment process (see **Appendix A3**). The Department's consideration of traffic and transport impacts is outlined in **section 5.2** of this report.

5 Assessment

The Department has assessed the modification application and supporting information in accordance with the relevant requirements of the EP&A Act, including the matters for consideration, as set out in Section 4.15(1A) of the EP&A Act.

The Department considers the key assessment issues for the proposed modification relate to potential hazards and risks and traffic impacts. The Department's consideration of these matters is provided in the following subsections. The Department's assessment of other relevant issues associated with the proposed modification is described in **section 5.3**.

5.1 Hazards and risks

The potential risks and hazards from the proposed modification would be associated with the operation of a cylinder filling station, the addition of the fuel cell and the use of CNG as a fuel source.

The Modification Report included a revised Preliminary Hazard Analysis (PHA), in accordance with the relevant requirements of the *State Environmental Planning Policy No 33—Hazardous and Offensive Development* (SEPP 33), the Department's *Hazardous Industry Planning Advisory Paper 6: Guidelines for Hazard Analysis (2011)* (HIPAP 6) and *Assessment Guideline: Multi Level Risk Assessment (2011)* (MLRA Guideline). Risk was evaluated and compared with the criteria specified in the Department's *Hazardous Industry Planning Advisory Paper 4: Risk Criteria for Land Use Planning (2011)* (HIPAP 4).

The modification proposes to remove the hydrogen refuelling station and high-pressure hydrogen storage, which would result in an overall reduction in hazards and risks compared to the approved project in terms of potential risks of fatality, injury and propagation (including jet fire, explosions and flash fire). Furthermore, there would be no overnight storage of hydrogen or CNG cylinders on-site, meaning the risks associated with it are mainly mitigated.

In relation to jet fires and flash fires, the revised PHA did not identify fatality or propagation risks on neighbouring Jemena natural gas facilities (Jemena Gas Network Trunk Receiving Station and Eastern Gas Pipeline). There was one scenario remaining where a jet fire with potential radiation effects sufficient to cause injury that extended beyond the Jemena boundary fence which was estimated to have a probability of 7.6×10^{-10} , well below the tolerable risk target of 50×10^{-6} listed in HIPAP 4, and reduced from the calculated probability of 3×10^{-7} for the approved project. Due to the open-air nature of the facilities and lack of congestion, the possibility of an explosion having an impact beyond the site boundary would not be a credible scenario.

The Department's hazard and risk experts have reviewed the Modification Report and revised PHA and are satisfied that they met the criteria of the HIPAP 6 and HIPAP 4, and that the existing conditions would adequately address the hazards and risks associated with the modified project. The existing conditions require Jemena to undertake studies based on the final design of the project, including a range of pre-construction studies (construction safety study, hazard and operability study, final hazard analysis, fire safety study, and a revised Safety and Operating Plan), pre-commissioning studies (emergency plan and safety management system), and a pre-startup compliance report.

These studies must be to the satisfaction of the Planning Secretary, except for the revised Safety and Operating Plan that must be to the satisfaction of the Secretary administering the *Gas Supply Act 1996* in relation to all the assets and equipment located within the development footprint.

Summary

There were no risks from explosions or flash fires extending beyond the site boundary found in relation to the proposed modified project. There were also no scenarios showing potential propagation or fatality impacts from jet fires. One scenario was found relating to a jet fire with the potential to extend beyond the site boundary, however it was of a likelihood well below the tolerable risk target stipulated in the Department's guidelines.

Consequently, the Department considers that the modified project would result in a reduction in the hazards and risk to people or the environment, subject to the conditions of consent.

5.2 Traffic and transport

Although the proposal would reduce the number of heavy vehicles accessing the project site weekly using Chandos Road by around 80% (from 21 to 4 heavy vehicle movements per week), Fairfield City Council (the road authority) raised concerns about its maintenance and safety (see **Appendix A2**).

The Modification Report was supported by a traffic impact assessment, including a swept path analysis, prepared in accordance with the relevant guidelines. Jemena provided additional information and addressed the matters raised by Fairfield City Council (see **Appendix A3**), which are summarised below:

- **Design traffic loading assessment:** a desktop review of the Chandos Road pavement demonstrated that impacts of the modified project would be less based on the design Equivalent Standard Axle (as an indicator of impacts on the pavement), which would be about 4 times greater for the approved bus movements comparing to the proposed semi-trailers.
- **Site access design:** comparison of the swept path analysis for both the approved and modified projects showed that heavy vehicles (being buses or semi-trailers) would cross the centreline of Chandos Road to exit the site by turning left and travel eastbound. Both the approved and modified projects would require widening of either the inner or outer radius of the internal turn around area for the hydrogen refilling point and widening of the layback for the driveway giving access to Chandos Road to avoid crossing the Chandos Road's centreline so that the driveway edge is not deteriorated over time.
- **Road safety:** the proposal would not change the approved project's transport routes, which have sufficient geometry to accommodate the approved and proposed vehicles. Risks to safety of vehicles using Chandos Road were generally considered as minor, since that section of the Chandos Road is relatively flat with good sight lines and a posted speed limit of 60 km/h in each direction.

The proposal would include one light vehicle movement per week in the first year for CNG delivery. Given that operation of the project would only require intermittent and limited staff accessing the site mainly for maintenance and estimated number of vehicles using Chandos Road is about 6,000 per day, the proposed vehicle movements are considered insignificant and not further discussed in this report.

The proposal would reduce the number of heavy vehicles associated with operation of the project, without changing the number of vehicle movements during constructions, being up to 10 light vehicles and 8 heavy vehicles per day.

This existing conditions of consent includes provisions to upgrade the site access road and turning circle to an all-weather sealed surface, measures to minimise traffic safety issues during construction and operations, a protocol for undertaking independent dilapidation surveys to assess the existing condition of Chandos Road, prior to and following construction or decommissioning activities, as well as a swept path analysis and identify a schedule for access upgrades (if required) to the satisfaction of Council and TfNSW.

Nevertheless, the Department has modified the relevant conditions to reflect the proposed modification, including heavy vehicle movement frequency (see **section 5.4**).

Summary

The Department considers that the proposal would not result in significant additional impacts beyond those currently approved and that Fairfield City Council concerns and/or any potential impacts from the modified project would be adequately managed and mitigated through the revised conditions of consent.

5.3 Other issues

Table 2 summarises the Department’s consideration of other issues associated with the proposal.

Table 2 | Assessment of Other Issues

Issue	Findings	Recommendations
Amenity (air quality, noise and visual)	<ul style="list-style-type: none"> The only by-product from the proposed fuel cell would be water vapour. No additional construction noise over that already assessed for the approved project would be expected. The proposal included limiting operation of the fuel cell and compressor to 7 am and 10 pm, as the cumulative noise of the fuel cell and compressor would exceed night time noise limits. The visual impacts of the modification would be negligible. The fuel cell would be only 2 m tall and the hydrogen tube trailers are not expected to have a significant visual impact externally to the site when parked. 	<ul style="list-style-type: none"> Limit operation of fuel cell and compressor to 7 am to 10 pm. Limit cylinder filling activities to day time period, and no filling on Saturday afternoons, Sundays or public holidays. Comply with existing conditions.
Greenhouse gas emissions	<ul style="list-style-type: none"> The proposed use of CNG for a maximum of 52 days in a year, would reduce microturbine operations based on the approved use of natural gas for a maximum of 180 days in the first 6 months of operation. This would reduce the associated Scope 1 greenhouse gas from 15 tonnes of carbon dioxide equivalent (CO_{2-e}) to 4.3 tonnes CO_{2-e}, and the project’s total greenhouse gas emissions by about 44% (from 19 tonnes CO_{2-e} to 8.3 tonnes CO_{2-e}). 	<ul style="list-style-type: none"> Comply with existing conditions.
Waste	<ul style="list-style-type: none"> Additional waste would be generated from the packaging of the fuel cell and potentially from additional general waste from staff and contractors. On site spill kits would be utilised to contain and remove any contaminated materials, which would be disposed of at a licenced waste facility. 	<ul style="list-style-type: none"> Comply with existing conditions.
Water and land	<ul style="list-style-type: none"> Impacts on erosion, sedimentation, encountering groundwater or increased flooding risk would be unlikely. The increased water usage from 2,135 L/day to 2,400 L/day due to the proposed increased production capacity is considered insignificant. 	<ul style="list-style-type: none"> Comply with existing conditions.

5.4 Summary of the Revised Conditions

Based on this assessment, the Department has made the following changes to the existing conditions of consent to account for the proposed modification:

- updates to the definition table, including addition of the modification proposal in the project description and changes to agency names;
- administrative changes to reflect the Department's standard requirements for incident and compliance reporting, independent environmental audits and staging of studies, strategies and plans;
- allow a maximum of 87,600 kg of hydrogen production at the site in any calendar year;
- remove the prohibition of hydrogen cylinder filling;
- prohibit on-site storage of filled hydrogen cylinder or CNG vehicles, and on-site high-pressure hydrogen storage facility;
- removal of requirements for inclusion, installation and maintenance of a firewall in the hazard and operability study, due to the removal of the high-pressure hydrogen storage from the project from the hazards and risks conditions;
- updates to the traffic related conditions to limit the number of heavy vehicle movements to 4 trips weekly, remove referencing to bus movements, and a require recording and tracking of any light and heavy vehicle movements associated with the project in the traffic management plan;
- updates to the approved operational hours, limiting operation of fuel cell and compressor to 7 am to 10 pm, and cylinder refilling to 7 am to 6 pm Monday to Friday, 8 am to 1 pm Saturday, and at no time on Sundays and NSW public holidays; and
- updates to the project site layout and site development plan to reflect the project as modified.

6 Evaluation

The Department has assessed the modification application and supporting information in accordance with the requirements of the EP&A Act, including the relevant 'matters for consideration', and considered all information provided by Jemena and government agencies.

The modification includes the addition of a hydrogen fuel cell to the approved microturbine, substitution of the approved hydrogen bus refuelling station for an on-site hydrogen cylinder filling station and the use of CNG as a fuel source for the microturbine in the first year of operation instead of the natural gas.

The Department consulted with key agencies including TfNSW, EPA, GSP, and Fairfield City Council and considers that hazards and risks, and traffic and transport are the main assessment issues.

The Department considers that the proposed modification would:

- improve the project's key objective in knowledge development to assess the viability of hydrogen as a fuel source to generate electricity and decentralisation of electricity market;
- increase the project's overall electrical generation efficiency and capabilities by adding the hydrogen fuel cell to the microturbine, compared to the approved microturbine alone;
- reduce delivery pressure of the hydrogen, and remove the hydrogen bus refuelling station and high-pressure hydrogen storage, which in turn would reduce the project's hazards and risks impact;

- reduce the overall traffic and transport impacts of the project by reducing the frequency of heavy vehicles accessing the site with the residual impacts relating to site access design managed through the existing and revised conditions of consent;
- be limited to the approved project's development footprint with no additional land clearing or vegetation disturbance; and
- the proposed modification application is consistent with the reasons given for the original consent.

Based on this assessment, the Department is satisfied that the proposed modification can be undertaken without any additional significant environmental impacts beyond those already assessed and approved and that any other residual impacts can be adequately managed and mitigated by the revised consent, including updated management plans in consultation with relevant agencies.

Consequently, the Department considers that the proposed modification is in the public interest, the benefits of the project outweigh its costs, and should be approved, subject to the revised conditions of consent.

7 Determination

The Department has drafted an Instrument of Modification (see **Appendix B**) for the proposed modification, as well as a consolidated version of the consent as modified (see **Appendix C**).

It is recommended that the Director, Resource Assessments, as delegate of the Minister for Planning:

- **considers** the findings and recommendations of this report;
- **determines** that the Western Sydney Green Gas Project Modification 1 (SSD 10313 MOD 1) falls within the scope of Section 4.55(1A) of the EP&A Act;
- **accepts and adopts** all of the findings and recommendations in this report as the reasons for making the decision to approve the modification;
- **modifies** the consent (SSD-10313); and
- **signs** the attached Instrument of the modification (**Appendix B**).

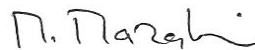
Recommended by:



21/12/2021

Kiran Ashby
Planning Officer
Resource Assessments

Recommended by:



21/12/2021

Mandana Mazaheri
Team Leader
Resource Assessments

The recommendation is **Adopted / ~~Not adopted~~** by:



23/12/2021

Steve O'Donoghue

Director

Resource Assessments

as delegate of the Minister for Planning

Appendices

Appendix A – List of Key Documents

A1 - Modification Report: Refer to folder 'Modification Application' on the Department's website at

<https://www.planningportal.nsw.gov.au/major-projects/project/41631>

A2 – Agency Advice: Refer to folder 'Agency Advice' on the Department's website at

<https://www.planningportal.nsw.gov.au/major-projects/project/41631>

A3 – Additional Information: Refer to folder 'Additional Information' on the Department's website at

<https://www.planningportal.nsw.gov.au/major-projects/project/41631>

Appendix B – Instrument of Modification

Appendix C – Consolidated Development Consent