Australian Government
Clean Energy Regulator

Guarantee of Origin trials

Midway Report

March 2023

CLEAN ENERGY REGULATOR

Executive summary

The Guarantee of Origin (GO) is a world class assurance scheme being designed to show where a low emissions product has come from, how it was made, and its lifecycle carbon intensity. The scheme is being developed by the Department of Climate Change, Energy, the Environment and Water (the Department) with support from the Clean Energy Regulator (CER).

To support scheme development and facilitate effective co-design, the CER, jointly with the Department, is conducting GO trials. These early trials are being conducted with producers of hydrogen and its derivatives, as well as stakeholders involved in the carrying, storage and transport of these products.

Phase one of the GO trials, running through the first half of 2022, focused on scheme settings and design. This was to ensure that the scheme has integrity, is practical and minimises administrative burden. Additionally, the trials tested the emissions accounting methodologies set out by the International Partnership for Hydrogen and Fuel Cells in the Economy's (IPHE) Working Paper.

Participants in the trials were drawn from some of Australia's most progressed hydrogen projects, including producers and upstream and downstream entities associated with projects. Six trial workshops with 19 participants were conducted to test design elements for a GO certification scheme, including metering approaches, reporting frameworks and emission intensity calculation methods.

Several trial participants used a Hydrogen Production Emissions Calculator, developed by the CER with GHD, to estimate well-to-gate emissions for their hydrogen projects, applying methodologies in line with IPHE guidelines. Results and feedback from trial use of the GO trial calculator will provide a valuable base to refine and extend GO emissions accounting approaches.

The results of the GO trials phase one indicate that a robust GO scheme must be trustworthy, practical, flexible, consistent, and transparent. This includes:

- assurance and compliance frameworks
- transparency of information in gaining consumer trust
- using existing data frameworks to minimise reporting burden
- expansion over time to capture other low emissions products
- international alignment to facilitate exports into markets such as Europe and Asia.

Background

The CER has been working with the Department to conduct GO trials, scheduled to run for 18 months from early 2022, to test and refine policy settings for an effective GO scheme. Phase one of the trials, focusing on design for a hydrogen GO, ran from February to August 2022 across 6 trial workshops and 4 stakeholder forums.

Trial workshops focused on testing and refining GO scheme concepts presented in the Department's GO discussion paper – in alignment with internationally-agreed approaches set out in the IPHE 2021 guidelines document[1] – and to collect qualitative data on industry preferences to inform scheme design.

[1] https://www.iphe.net/_files/ugd/45185a_ef588ba32fc54e0eb57b0b7444cfa5f9.pdf

Trial participants

The trials involved projects[2] representing the 3 hydrogen production pathways of interest:

- Electrolysis
- Steam methane reforming with carbon capture and storage
- Coal gasification with carbon capture and storage

The topics covered across the GO phase one trial workshops and engagements were:

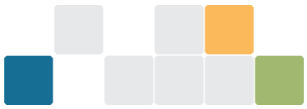
CER trial workshop topics	DCCEEW stakeholder forum topics
1. Introduction, emissions calculations, and certificate design	1. Introduction to the GO scheme and the approach to develop the scheme
2. System boundary, metering, and measurement	2. The principles of a GO scheme and approach to certificate trading
3. Data collection and reporting	3. Electricity accounting including RE-GOs and scope 2 emissions
4. Materiality and co-products	4. The use of offsets and scheme eligibility and expansion
5. GO data and registry design	
6. Scheme integrity risks and controls	

GO trial calculator and submissions findings

Trial participants were invited to use a Hydrogen Production Emissions Calculator to calculate emissions intensity estimates for hydrogen production projects. The CER also surveyed participants to collect project details and views on GO scheme design concepts. A summary of findings from these rich data sources is provided below.

- **Data availability** – trial participants submitted completed GO trial calculators for 5 projects that calculated well-to-gate emissions intensity estimates. While some of the data used is hypothetical because projects have not yet commenced operation, the ability for participants to obtain reasonable emissions estimates indicates that the underlying calculation methodologies are functional and provide a robust basis for more detailed methodology development.
  - » **Default emissions factors** – completed calculators used default emissions factors to estimate emissions from upstream inputs such as water and natural gas. This followed from trial feedback that attempting to obtain data directly from upstream suppliers would be impractical for many. Application of appropriate emissions factors will allow upstream emissions to be estimated in a robust manner without requiring high levels of data collection from scheme participants.

[2] https://www.cleanenergyregulator.gov.au/Infohub/Markets/guarantee-of-origin/trial-projects



  - » **Calculated values** – estimated emission intensities were calculated for hydrogen from 100% renewable electrolysis, steam methane reformation without CCS, and 0% renewable electrolysis. Calculated emissions intensities were broadly consistent with emissions intensities from literature.

- **Sensitivity** – emissions intensity is sensitive to changes in electricity consumption, particularly the proportion of energy which is zero emissions renewables. Unsurprisingly, this is especially critical for electrolysis projects for which the vast majority of emissions are associated with electricity consumption. A change from 100% renewable electricity to 95% renewable electricity electrolysis resulted in an emissions intensity increase of over 400 times due to the near-zero emissions associated with 100% renewable electrolysis.
  - » Sensitivity to changes in other emissions sources, such as water or on-site fuel consumption, fluctuate depending on the number of emissions sources that are reported under the production method. For renewable electrolysis, minor changes to inputs can lead to large percentage changes in emissions intensity due to the very small absolute emissions values.
- **In-scope emissions sources** – trial participants identified some emissions sources, such as water purification and on-site vehicle fuel emissions, that have not been clearly identified in the GO trial calculator or the IPHE guidelines. Further clarification on in-scope emissions will be refined through the policy development process.
- **Upstream emissions reductions** – trial participants identified that accounting for upstream emissions reductions upstream – for example, if inputs like water are powered by renewables – needs to be accounted for in calculation methodologies.

Overall findings from GO phase one trials

The hydrogen industry in Australia is nascent, with a significant pipeline of announced projects but few operational commercial scale hydrogen producers.

Trial participants confirmed that commercialisation would be aided by a high integrity government-backed GO scheme that can demonstrate emissions credentials to hydrogen buyers, providing market certainty and underpinning commercial arrangements.

The Department proposed 5 key principles as the foundation for policy design for the GO scheme – a GO scheme must be *trustworthy, practical, flexible, consistent* and *transparent*. These principles were tested and validated by trial participants across the workshops. Participants were supportive of the proposed principles and agreed that achieving these principles would ensure an effective GO scheme. Alignment with the 5 principles is informing scheme design and policy settings.

GO scheme principles

The 5 principles proposed are that a GO scheme must be:

1. *Trustworthy* – market participants perceive the scheme as having high integrity.
2. *Practical* – the scheme is designed to be commercially effective for businesses to use, minimising regulatory burden and leveraging technology to reduce costs and complexity.
3. *Flexible* – the scheme can align with evolving consumer needs, technology, and international market developments.
4. *Consistent* – the scheme can interact with and be accepted by domestic and international markets.
5. *Transparent* – the scheme provides core information about the supply chain to market participants.

Key findings from phase one of the trials have been organised against these principles.

Principles	Key findings
Trustworthy	• There was agreement that the scheme must be trusted by both producers and consumers in both the domestic and international market. • There was broad consensus that a government backed GO scheme can play a valuable role in providing a trusted and widely accepted emissions accounting data framework. This framework can then both: » be used directly by customers as a product origin and attribute label, or » be used and built upon by third-party schemes and certificates that may certify the product to their standards based on the common underlying GO data. • Scheme integrity was viewed as paramount. Scheme design elements raised as having a high impact on scheme trustworthiness included: » Assurance and compliance frameworks – detection and rectification of non-compliance. » Use of carbon offsets. » Emissions accounting approaches, particularly choices around co-product emissions allocations, materiality, and calculation of scope 2 imported electricity emissions.

Practical	• Participants highlighted that a GO scheme should, where possible, leverage existing data frameworks to minimise the reporting burden. • The scheme should allow for technology integration to streamline participation – for example, supporting APIs for automated data collection from smart meters. • Participants agreed that the scheme must be designed to facilitate commercial needs and arrangements, including: » Communicating product information in a clear, uniformly understandable manner. » Minimising burden and cost from reporting and compliance processes. » Designing a GO certificate viewer that is suitable for a range of users (producers, potential customers, general public etc.) that provides transparency and protects commercially sensitive information.
Flexible	• Participants observed that the scheme must be able to expand over time to capture other products and create a GO 'ecosystem' – for example, hydrogen, ammonia, hydrogen carriers, renewable electricity etc. » Trial participants expressed a desire for greater clarity and transparency about how and when other products would be brought under a GO framework. • Participants wanted to ensure that the scheme is adaptable to evolving consumer needs given the nascent nature of the industry - for example, flexibility in certificate claiming frequency, or adaptability on the information carried on a GO certificate. Satisfying consumer demands is a key reason for the GO scheme, and demands are likely to evolve in time and between jurisdictions. • Participants desired flexibility in reporting processes, noting a range of producers with varying resources and technological sophistication may be part of the GO scheme.
Consistent	• GO certificate information should be comparable between producers to support informed consumer decisions. » Consistent approaches to emissions accounting (e.g., ensuring emissions sources are consistently reported between producers) and a consistent method of collecting and validating supplied data are critical. This is relevant when comparing domestic producers, as well as ensuring the accounting rules are consistent with international requirements. » Trial participants were hesitant about extending consistency measures to creating 'benchmarking' tools for products (e.g., Producer X's GO emissions intensity compared to the average industry emissions intensity). • Participants highlighted that international alignment is key to facilitating exports into markets such as Europe and Asia. » Further work is required to determine how international consistency can be achieved, both from a policy perspective (e.g., the role of the IPHE in setting international rules), and from a data capture perspective (e.g., Europe's proposed RED II policies that impose 24/7 time matching and physical location connection).

Transparent	• Participants observed and highlighted that the transparency of information is key to providing trust to consumers. In principle, maximum transparency is desirable to maximise consumer trust. • Stakeholders noted some information, e.g., supply chain data, is commercially sensitive and should only be available to specific entities and not the general public. • Stakeholders also observed transparency and effective communication about GO scheme systems and policy will support confidence in and acceptance of a government backed certification scheme.

Conclusion

- IPHE methodologies can be translated into an Australian context with few issues identified by trial participants.
  - » Several trial participants used the Hydrogen Production Emissions Calculator to estimate well-to-gate emissions for their proposed hydrogen projects.
  - » Application of carbon capture and storage (CCS) and operationalising scope 2 electricity emissions accounting will require further exploration as projects were not sufficiently advanced to provide details to guide the development of these approaches.
- Reaffirming early industry views, the scheme must have high integrity and be trusted among domestic and international stakeholders.
- GO scheme design, including emissions accounting approaches, must be consistent with international markets and standards.
- For an effective 'value proposition' for scheme participation, the GO scheme will need to balance measures that enhance scheme integrity and transparency against the costs of participation, including regulatory burden and disclosure of commercially sensitive information.

Next steps

The end of phase one of the trials was the culmination of 6 months of workshops, meetings, and information sharing. Phase 2 consultation is continuing in parallel with policy design. The key activities taking place are:

- **GO phase 2 trials**
  - » Phase 2 of the GO trials, proposed to cover hydrogen transport and hydrogen carriers run from November 2022 to March 2023, supported by the release of IPHE WP Methodology Doc Ver2 Nov 2022.
- **GO discussion paper 2022**
  - » Learnings from phase one of the trials and other consultation have contributed to development of further GO discussion papers, released by the Department in late 2022. The papers set out the proposed GO scheme framework for public consultation and will lay the groundwork for scheme legislative development in 2023.