



Government of Western Australia  
Department of Mines, Industry Regulation and Safety  
Energy Policy WA

# Renewable Hydrogen Target for electricity generation in the SWIS

## Consultation Paper

Industry forum

25 October 2022

Working together for a  
**brighter** energy future.

An aerial photograph of a large body of water, likely a bay or harbor, with a city skyline in the background. The water is a deep blue, and the sky is clear. In the foreground, there is a marina with many sailboats docked. The city skyline is visible in the distance, with several tall buildings. The text is overlaid on the water in the center of the image.

# Acknowledgement of Country and Introduction

**Tim Bray – Assistant Coordinator,  
Strategic and Consumer Policy**

# Agenda

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1:05pm Item 1:  
**Background**  
Kathryn Barrie - Director, Strategic Energy Policy

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1:10pm Item 2:  
**Consultation Paper**  
Summa McMahon – Assistant Director, Strategic Energy Initiatives

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1:35pm Item 3:  
**Next steps**  
Summa McMahon – Assistant Director, Strategic Energy Initiatives

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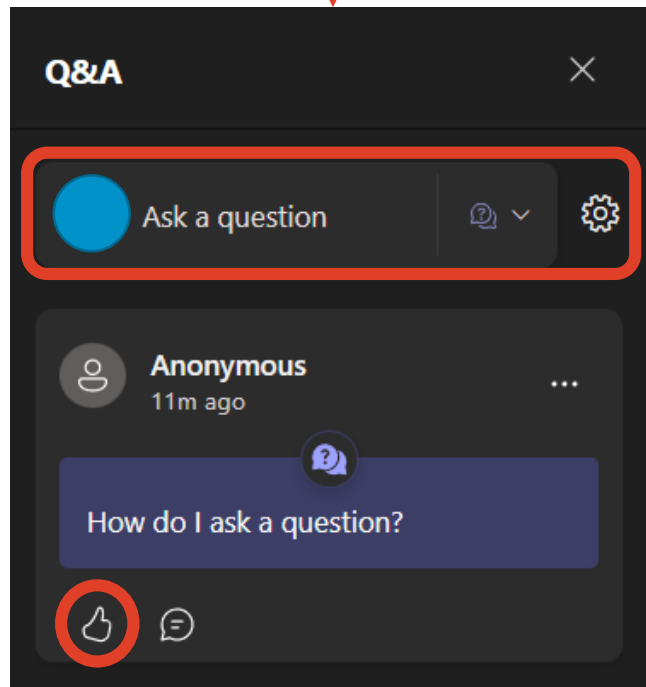
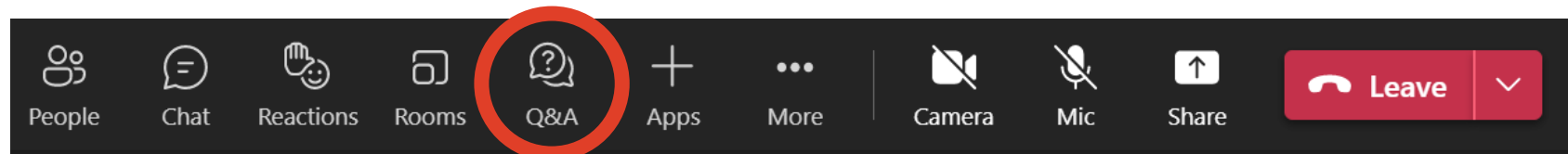
1:40pm Item 4:  
**Questions and Answers**  
Tim Bray, Assistant Coordinator, Strategic and Consumer Policy

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# Crowdsourcing questions

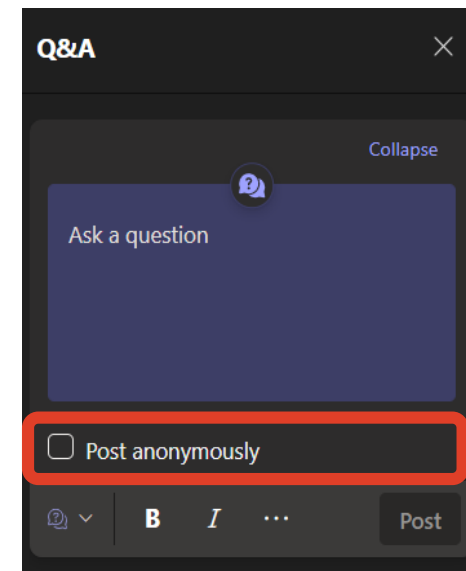
To maximise our session, we are making it easier for attendees to decide which questions you would most like answered

Please note that questions will be reviewed and moderated by Energy Policy WA. This session will also be recorded.



Simply type your question into this section of the Q&A

Vote for the questions you want answered with the thumbs up icon.



You can also post questions anonymously if preferred.

# Agenda item 1: Background

**Kathryn Barrie – Director, Strategic Energy Policy**

# Background

- On 6 May 2022, the State Government announced that it would investigate the implementation of a Renewable Hydrogen Target for electricity generation in the South West Interconnected System (SWIS).
- The SWIS is WA's main electricity network and covers WA's south west corner, from Kalbarri in the north, Albany in the south and Kalgoorlie to the east.
- Renewable hydrogen is hydrogen produced via electrolysis (water-splitting) powered by renewable energy sources (e.g. wind and solar).
- The Renewable Hydrogen Target would seek to introduce an obligation on electricity retailers to purchase a certain portion of their electricity from hydrogen-fuelled generation.
- ACIL Allen is assisting EPWA in the development and analysis of the Renewable Hydrogen Target for electricity generation.



# Rationale

A key challenge to hydrogen industry growth is the cost to produce hydrogen. There is a need to support emerging projects to drive necessary technical and commercial improvements



# Approach

## Stakeholder views are essential



- Stakeholder engagement is crucial to the investigation of a Renewable Hydrogen Target for electricity generation.
- Government's decision on whether to progress will be informed by stakeholder feedback.
- Written submissions are preferred. EPWA will also organise 1:1 meetings with stakeholders during the consultation period to discuss any questions.



# Early stakeholder consultation

Stakeholders are supportive of investigation of RHT for electricity generation in the SWIS and raised legitimate issues to be considered. Key themes included:

Decarbonisation

Infrastructure

Government Policy

Best use of hydrogen

# Agenda item 2: Consultation paper

**Summa McMahon – Assistant Director, Strategic Energy Initiatives**

# Western Australia's Renewable Hydrogen Ambition

## WA Renewable Hydrogen Strategy

### Vision

WA will be a significant producer, exporter and user of renewable hydrogen.

### Mission

WA will develop industry and markets to be a major exporter of renewable hydrogen to enable the export of renewable hydrogen. WA will develop domestic production capabilities and applications of renewable hydrogen, thereby improving local hydrogen industry expertise, contributing to global decarbonisation and decarbonising the WA economy. It will also contribute to improving air quality.

### Strategic focus areas

- Export
- Remote applications
- Hydrogen blending in natural gas networks
- Transport

# Scope of consultation

## This paper examines a RHT for electricity generation in the SWIS

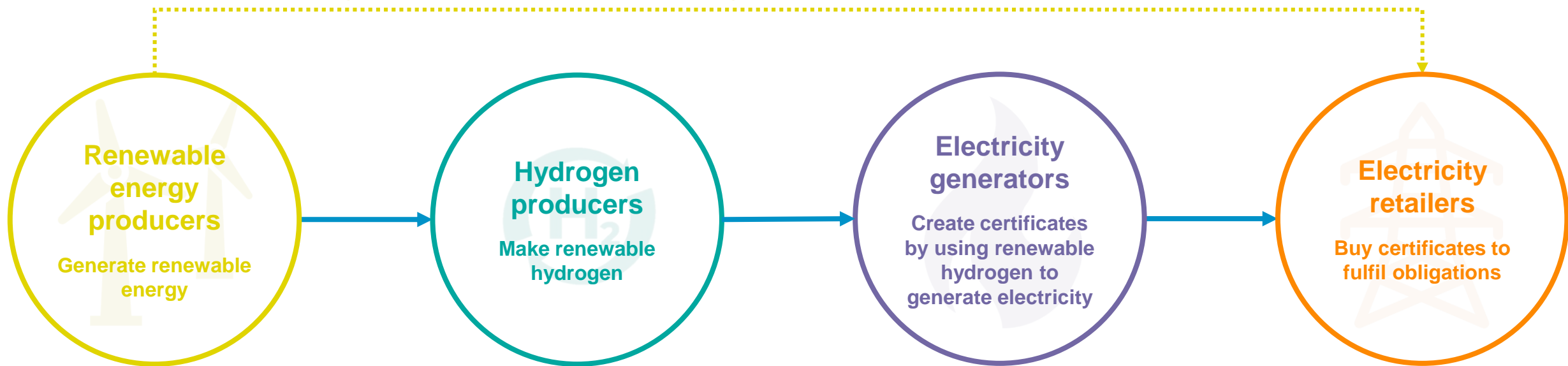
- The *WA Renewable Hydrogen Strategy* provides for a range of opportunities for renewable hydrogen to displace diesel, natural gas and grey hydrogen.
- The WA Government through the Department of Jobs, Tourism, Science and Innovation (JTISI) is progressing a number of initiatives to realise WA's renewable hydrogen ambition under the Strategy, including:
  - demand stimulation
  - legal frameworks review
  - hydrogen value chain modelling
- This consultation paper examines placing a liability on electricity retailers and using renewable hydrogen in electricity generation.



# RHT for electricity generation

High-level design being investigated

Renewable energy still sold directly to retailers/large users



**Note:** Hydrogen could be produced by renewable energy generators, or by integrated VRE / H<sub>2</sub> projects

**Note:** There would need to be storage of hydrogen to avoid hydrogen-fuelled generators competing directly with renewable generation.

**Note:** Tech-agnostic approach, i.e. fuel cells, gas turbines, and any other electricity generation technology fuelled by renewable hydrogen would be eligible.

# Objectives of RHT for electricity generation

- The following objectives have been developed to help guide analysis of options.
- Industry development is considered the most important objective.

Industry  
development

Decarbonisation of  
the electricity grid

Electricity grid  
reliability and  
stability

Reducing the risk of  
fuel cost escalation  
in a carbon  
constrained world

Decarbonisation of  
the WA economy

# Role of hydrogen in the electricity sector

Hydrogen electricity generators can perform a variety of services in the electricity system, and they may have an important role to play in future grid decarbonisation (i.e., providing generation at peak demand times when renewable energy sources may not be available)

Peaking  
generation

Energy storage

Essential  
System  
Services

Reserve  
capacity

# Consultation paper inputs and assumptions

Inputs based on publicly available information / market modelling

## Inputs

- Whole of System Plan
- AEMO Integrated System Plan 2022
- AEMO Electricity Statement of Opportunities (WA)
- AEMO 2022 Reserve Capacity Cycle
- AEMO 2021 Inputs, Assumptions and Scenarios Report
- Geoscience Australia capacity factor map

## Assumptions

- Electrolyser efficiency: ~66% (60kWh/kg) in 2021, rising to ~79% (50kWh/kg) by 2050<sup>1</sup>
- Grid connected electricity cost: ~\$40/MWh<sup>2</sup> in 2021, rising to ~\$63/MWh by 2050<sup>2</sup>
- Off-grid integrated renewable hydrogen project capacity factor: 43%<sup>3</sup> with CAPEX and OPEX as per AEMO ISP 2022.

1: Sourced from AEMO ISP 2022

2: Derived estimate by ACIL Allen from WEM Outlook reference case modelling (utilising in-house *PowerMark* model) centred on grid-connected electrolyser with 65% capacity factor. Modelling results in average WEM generation cost of ~\$41/MWh in 2020s, \$52/MWh in 2030s and \$62/MWh in 2040 (real 2022 dollars)

3: Capacity factor selected as reasonable estimate of capacity for typical project proximate to SWIS, as per Geoscience Australia. Capacity factor is applied to electrolyser (i.e. no firming)



# Projected costs

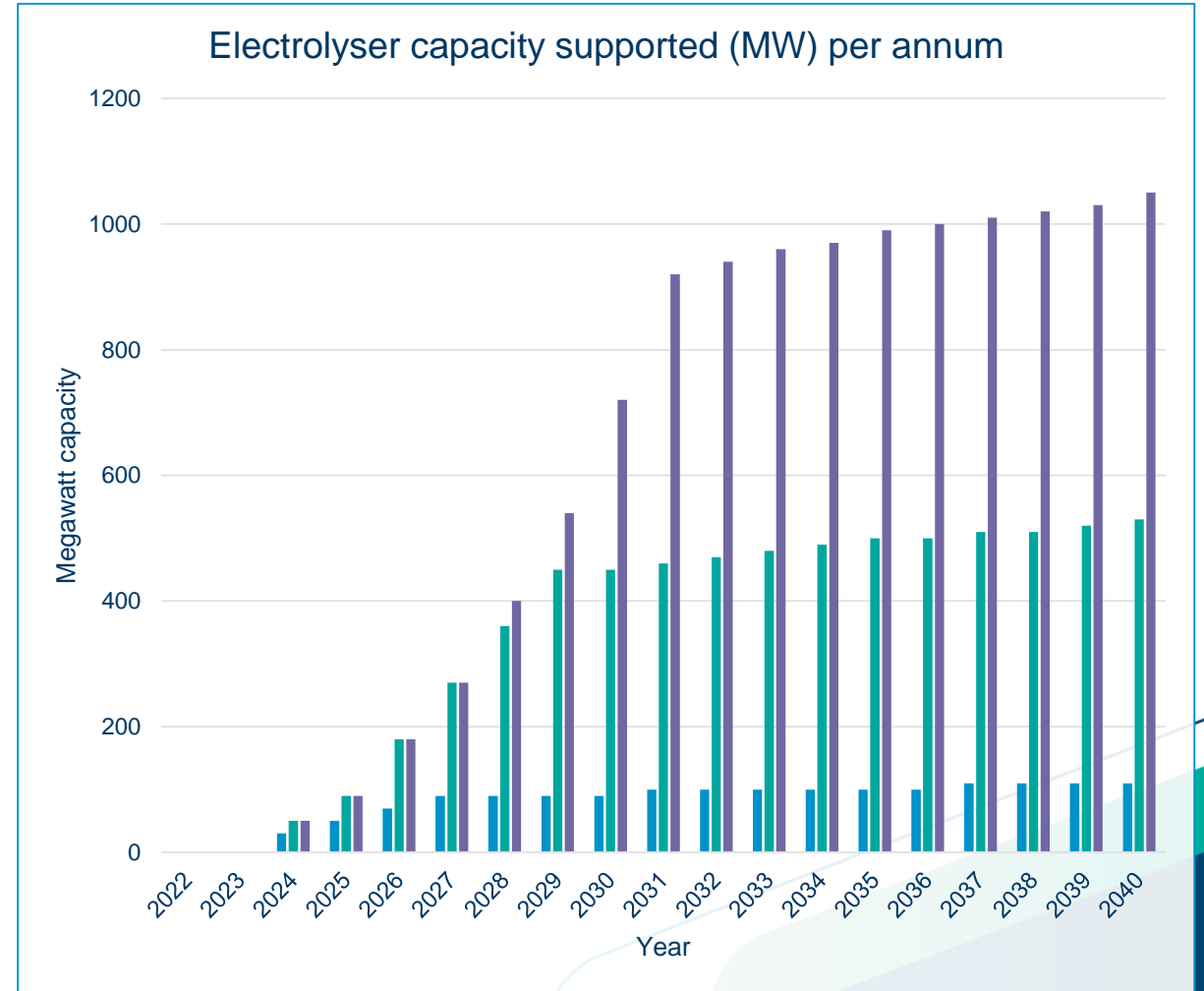
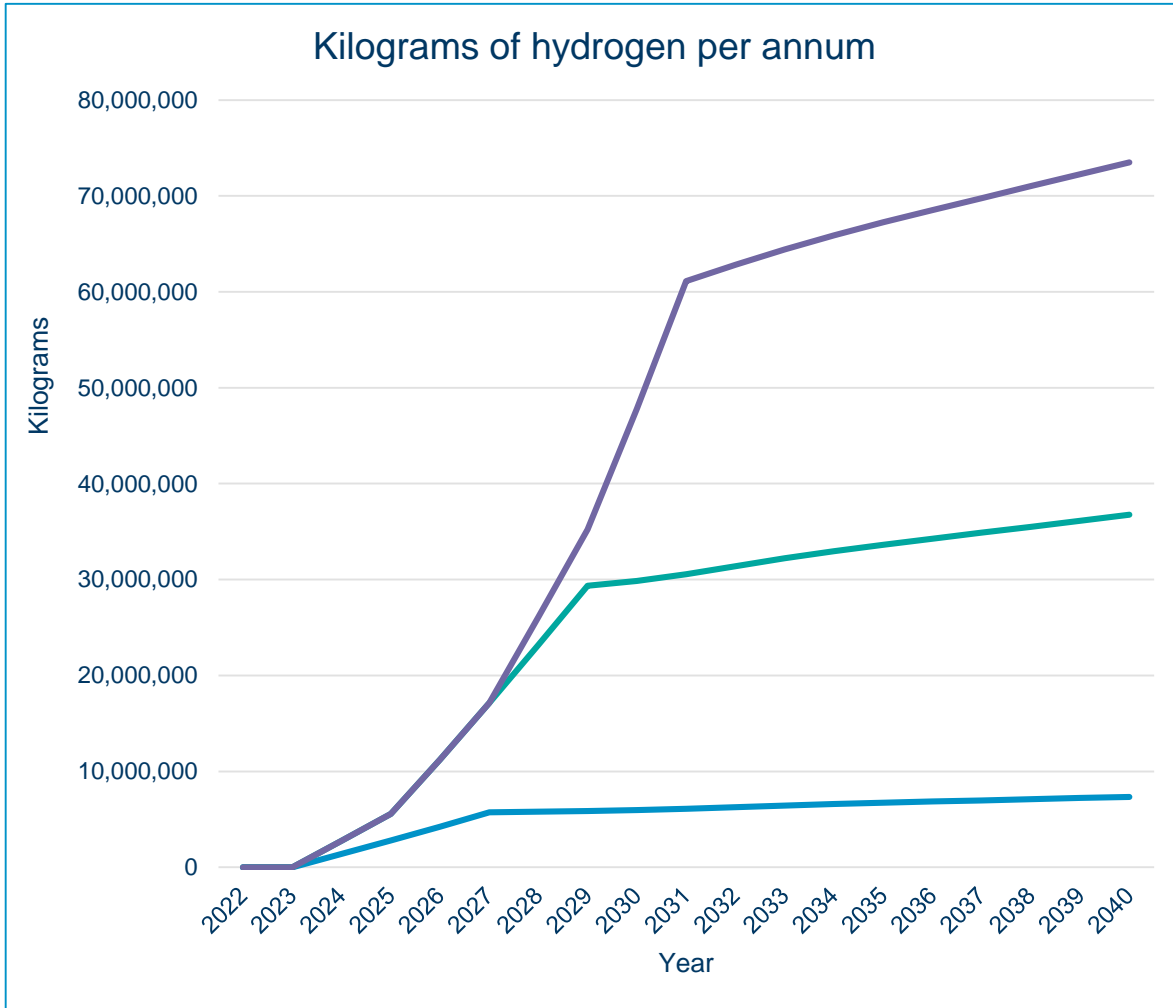
Early analysis of gross annual cost of switching renewable hydrogen for natural gas in the SWIS<sup>1</sup>

	2024	2030			2040		
	H <sub>2</sub> median expected cost	H <sub>2</sub> volume	H <sub>2</sub> median expected cost	Projected cost (\$m in year & % of grid)	H <sub>2</sub> volume	H <sub>2</sub> median expected cost	Projected cost (\$m in year & % of grid)
1% target	\$6.60/kg \$50.72/GJ	5.97kt 0.72PJ	\$4.71/kg \$36.23/GJ	\$20.82m 1.7%	7.35kt 0.88PJ	\$3.52/kg \$27.05/GJ	\$16.10m 1.1%
5% target	\$6.60/kg \$50.72/GJ	29.87kt 3.58PJ	\$4.71/kg \$36.23/GJ	\$104.09m 8.9%	36.75kt 4.41PJ	\$3.52/kg \$27.05/GJ	\$80.52m 5.4%
10% target	\$6.60/kg \$50.72/GJ	47.79kt 5.73PJ	\$4.71/kg \$36.23/GJ	\$166.55m 14.2%	73.51kt 8.82PJ	\$3.52/kg \$27.05/GJ	\$161.03m 10.7%

1: Values are subject to assumptions, caveats and limitations as defined in the Consultation Paper. Costs presented are derived from ACIL Allen's LCOH model at the plant-gate (excluding transmission and storage), for vertically integrated VRE/H<sub>2</sub> production and assume 100% of energy input switching occurs at the expense of natural gas fuels. Further work is underway to analyse and model total system costs in a Cost Benefit Analysis. Cost are fuel switching cost as share of Reference Case generation sent-out.

# Size of a target – hydrogen and electrolyser requirements

— 1% target — 5% target — 10% target



# Stakeholder questions

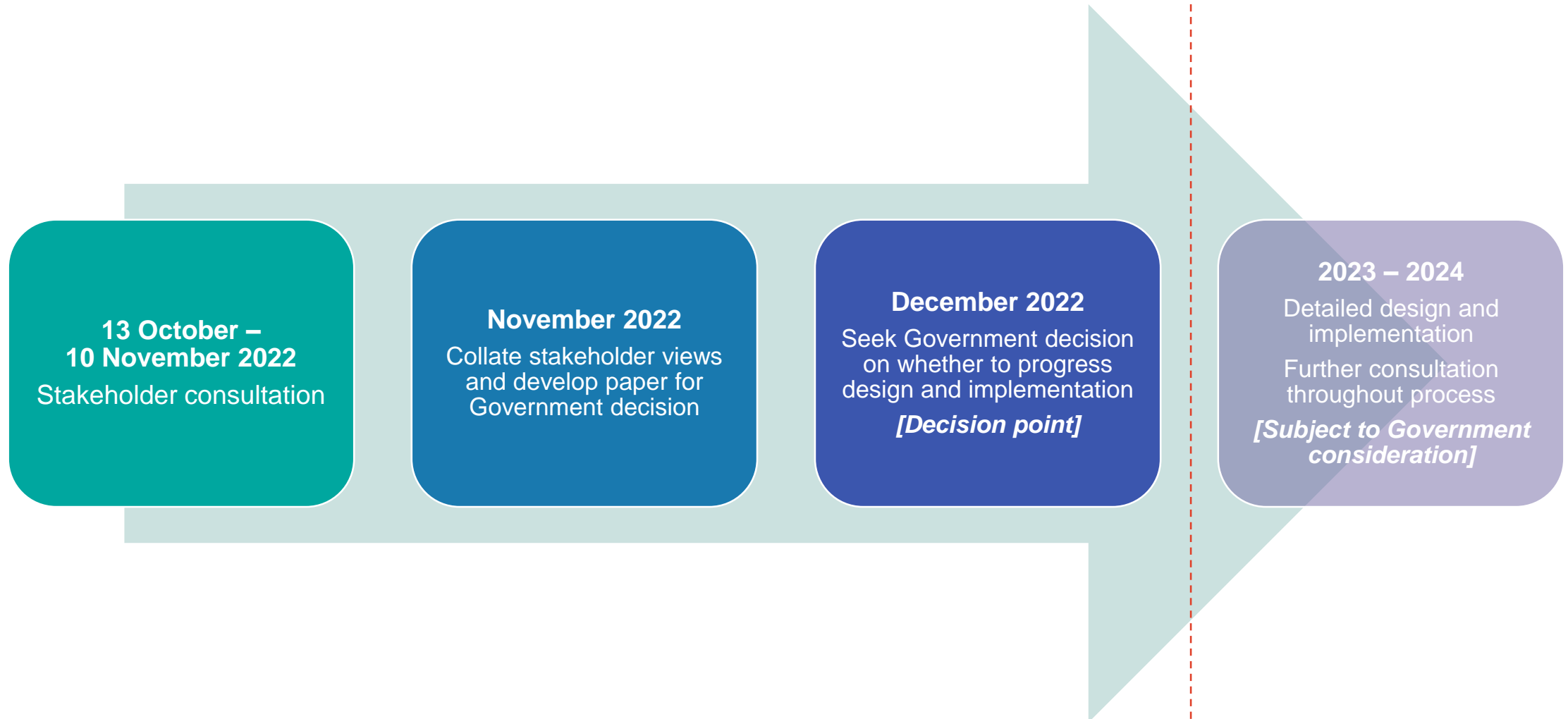
<p><b>Renewable Hydrogen Target for electricity generation (1-2)</b></p> <ul style="list-style-type: none"> <li>• How a Renewable Hydrogen Target for electricity generation can contribute to WA's hydrogen and electricity generation goals.</li> </ul>	<p><b>Renewable fuels (10)</b></p> <ul style="list-style-type: none"> <li>• Consideration of alternative renewable fuels.</li> </ul>
<p><b>Considering hydrogen (3-4)</b></p> <ul style="list-style-type: none"> <li>• Hydrogen's role in electricity generation, including decarbonisation and the role of infrastructure associated with production of renewable hydrogen</li> </ul>	<p><b>Setting a target (11-12)</b></p> <ul style="list-style-type: none"> <li>• Benefits and implications of the 1%, 5% and 10% targets.</li> </ul>
<p><b>Technical feasibility (5)</b></p> <ul style="list-style-type: none"> <li>• What technical challenges may impact the use of hydrogen in electricity generation.</li> </ul>	<p><b>Target terms (13-14)</b></p> <ul style="list-style-type: none"> <li>• Whether the proposed targets and proposed operation is appropriate and what other options could be explored.</li> </ul>
<p><b>Certificate schemes (6-7)</b></p> <ul style="list-style-type: none"> <li>• The efficacy of a certificate scheme and other approaches that could be considered.</li> </ul>	<p><b>Scheme commencement and ramp-up (15-17)</b></p> <ul style="list-style-type: none"> <li>• Appropriateness and feasibility of ramp-up of the Renewable Hydrogen Target for electricity generation.</li> </ul>
<p><b>Liable entities (8)</b></p> <ul style="list-style-type: none"> <li>• The efficacy of the proposed liability approach.</li> </ul>	<p><b>Hydrogen cost outlook (18)</b></p> <ul style="list-style-type: none"> <li>• Expected future costs of renewable hydrogen and drivers of change.</li> </ul>
<p><b>Exemptions (9)</b></p> <ul style="list-style-type: none"> <li>• Should there be any exemptions from the Renewable Hydrogen Target for electricity generation in the SWIS.</li> </ul>	<p><b>Hydrogen demand and electrolyser capacity (19-21)</b></p> <ul style="list-style-type: none"> <li>• Are targets sufficient to provide demand stimulation to industry and how do industry expect electrolysers to meet demand.</li> </ul>

# Agenda item 3:

## Next steps

**Summa McMahon – Assistant Director, Strategic Energy Initiatives**

# Indicative timeline



# How to get involved

Submissions close at 5pm (WST) on Thursday 10 November 2022

Please email your submissions to: [EPWA-info@dmirs.wa.gov.au](mailto:EPWA-info@dmirs.wa.gov.au)

Energy Policy WA has developed a stakeholder feedback template for use in your submission. You are welcome to provide feedback outside this template should you prefer.

If you have any follow-up questions, please contact Summa McMahon at [summa.mcmahon@dmirs.wa.gov.au](mailto:summa.mcmahon@dmirs.wa.gov.au)

# Agenda item 4: Questions and Answers

**Tim Bray – Assistant Coordinator, Strategic and Consumer Policy**

**Thank you**

*We're working for  
Western Australia.*