Renewable Hydrogen Target – stakeholder feedback template

Submission from HDF Energy Australia

This template has been developed to enable stakeholders to provide feedback on the questions posed in the Renewable Hydrogen Target consultation paper.

Energy Policy WA encourage stakeholders to use this template. If you wish to provide additional feedback outside the template, wherever possible please reference the relevant question/section to which your feedback relates.

No.	Question	Feedback
Renewable Hydrogen Target for electricity generation		
1	What are some examples of an objective or objectives that could be used to assess the benefits, costs and impacts of a Renewable Hydrogen Target for electricity generation?	The objectives / outcomes highlighted in table 1 are well-defined and extremely relevant. KPIs such as number of jobs created, investment in hydrogen projects, CO2-e generated by the SWIS, cost of electricity, renewable energy share on the SWIS, etc. should be implemented and monitored on a regular basis to assess the impacts of a Renewable Hydrogen Target.
2	How might other uses of renewable hydrogen be accommodated under a Renewable Hydrogen Target certificate scheme? How might Government otherwise support and/or encourage other use cases for hydrogen?	Renewable hydrogen can be used in many applications such as power generation, green mobility (bus, trucks, trains, and boats), heat, feedstock (ammonia, steel …)and export. Each application requires a different cost of hydrogen to make it viable. It might be difficult to address all these sectors within a single certificate scheme. The government might implement additional funding streams to accelerate the deployment of hydrogen technology (feed-in tariff, tax rebate, direct funding, etc.).
Considering hydrogen		

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3	What role do you believe renewable hydrogen can play in the decarbonisation of electricity generation? To what extent will a Renewable Hydrogen Target for electricity generation in the SWIS assist in achieving the decarbonisation objectives of the State Government?	As highlighted in the consultation paper, hydrogen is one of the most cost-effective ways to store electricity for long period of time. HDF Energy strongly believes that hydrogen will play a significant role in the SWIS to achieve a high penetration of renewable energy and maintain grid stability by acting as a peaker plants / scheduled generators and providing green energy when variable renewable energy generators (PV, wind …) are not available. A Renewable Hydrogen Target will also allow the installation of more variable renewable energy generators and, as a result, speed-up the energy transition.
4	What role can the infrastructure associated with the production of renewable hydrogen (i.e. renewable electricity generation facilities, electrolysers, transport and storage infrastructure) play in the broader SWIS?	The infrastructure associated with the production of green H2 should be collocated with the generation equipment. This would avoid the need for grid augmentation and improve the energy management strategy and ultimately provide more flexibility on the SWIS.
Technical feasibility		
5	To the extent you are able please reflect on some of the technical issues, challenges and considerations in the utilisation of hydrogen in the generation of electricity. To what extent can these technical issues and challenges be overcome? How should this impact on the consideration of a Renewable Hydrogen Target for electricity generation in Western Australia?	Using green H2 in a gas turbine (blending or 100%) generates a significant amount of Nox. This should be taken into consideration especially when hydrogen fuel cells, that are not generating any emissions, are already available on the market at MWe scale. Production of electricity from hydrogen during period of high renewable energy production is a waste of energy and not cost-effective. To take full advantage of a Renewable Hydrogen Target, there should be some provisions:

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		- The hydrogen power plant should have at least 12 hours of storage (full load). - The plant should be able to generate electricity during peak hours or according to a defined dispatch profile.
Certificate schemes for Renewable Hydrogen Target for electricity generation in the SWIS		
6	Do you believe a renewable hydrogen electricity generation certificate-based scheme represents an efficient and effective means to deliver a Renewable Hydrogen Target for electricity generation in the SWIS? Please explain your answer.	HDF Energy doesn't believe that a certificate-based scheme as currently presented is an effective way to implement a Renewable Hydrogen Target for electricity generation. Firstly, the cheapest way to produce electricity from hydrogen is a power plant without any storage. There is a risk that IPPs will develop a power plant without, or with limited storage, to be able to sell electricity at low cost. In other words, the electricity generated by wind or solar farms would directly feed an electrolyser and a fuel cell without storing hydrogen. Secondly, it might be difficult to predict the value of these certificates over time and, as a result, to finance such projects. Most power plants have a lifetime of 25 years and require a stable revenue stream to be bankable and access attractive interest rates.
7	What are some other approaches which could be considered alongside a renewable hydrogen electricity	HDF Energy believes that a feed-in tariff / capacity contract mechanism linked to a specific dispatch profile would be more suitable.

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	generation certificate scheme that would provide a framework to deliver on the objectives or outcomes sought?	A similar initiative was successfully implemented in Spain for the development of Concentrated Solar Thermal Technology.
Liable entities		
8	Is the proposed approach of certification, deemed liability and certificate transfer an efficient and effective way to deliver on the intent of the Renewable Hydrogen Target for electricity generation? Are there alternative approaches which could better deliver on the objectives?	/
Exemptions		
9	What are the benefits, costs and impacts of an exemptions regime for a Renewable Hydrogen Target for electricity generation?	/
Non-renewable hydrogen		
Renewable fuels		
10	Should the Renewable Hydrogen Target for electricity generation consider alternative renewable fuels as eligible for the creation of Renewable Hydrogen Electricity Generation Certificate? Why or why not?	As the main goal of the Western Australian government is the development of a hydrogen industry, the Renewable Hydrogen Target shouldn't consider alternative renewable fuels.
Setting a target		
11	Please consider the benefits, costs and implications of a 1%, 5% and 10% Renewable Hydrogen Target for electricity generation in the SWIS on your business or industry, and provide commentary on how you would expect to react from a commercial and investment perspective to each target level.	Each target would result in new opportunities for HDF Energy. However, we believe that a 10% target (1800 GWh/y) would result in higher economies of scale leading to more opportunities and ultimately reducing the LCOH and hydrogen generation LCOE. In addition, a 10% target would allow us to manufacture our hydrogen fuel cell locally.

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12	At a whole-of-economy and / or sectoral level, what do you consider to be some of the benefits, costs and implications of a 1% target, a 5% target, and a 10% target?	A 10% target would foster more H2 investment but more importantly attract local manufacturing due to the size of the market.
Target terms		
13	Is the suggested approach of a medium term aggregate target, with annual entity targets, an efficient and effective means to achieve the objectives of the Renewable Hydrogen Target for electricity generation in the SWIS? Why or why not?	/ An annual target is required to assess the effectiveness of this scheme. However, as suggested earlier, we believe that a dispatch profile or a similar mechanism should be implemented in order to make sure hydrogen electricity is not generated when the grid is already being powered by variable renewable energy plants.
14	To what extent should banking and borrowing of liabilities be permitted under the scheme? What are the benefits and costs of a borrowing mechanism as described in the paragraph above?	/
Scheme commencement and ramp up		
15	How soon do you believe a Renewable Hydrogen Target for electricity generation in the SWIS could be feasibly delivered from a technical perspective (i.e. if cost was not a consideration)? Please reflect on your own organisation and/or sector when providing your answer.	HDF believe that it would take at least two years to develop and finance a power-to-power project and another two years to build and commission such project. As a result, it would require at least four years.
16	Similar to the above, how soon do you believe a Renewable Hydrogen Target for electricity generation in the SWIS could be feasibly delivered from a commercial or economic perspective (i.e. if cost was a consideration)? Please reflect on your own organisation and/or sector when providing your answer.	If there were no incentive / certification scheme, HDF Energy wouldn't consider developing a power-to-power project on the SWIS due to the current cost of hydrogen compared to the cost of gas in W.A. Power-to-power project are already viable against diesel generation in remote areas, but not against gas generation on the main network.
17	Over what period of time do you believe is an appropriate ramp up period for the Renewable Hydrogen Target for	A ten-year period is an appropriate ramp-up period. It would allow HDF energy to build and ramp-up its fuel cell

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	electricity generation in the SWIS? In providing your answer reflect on the actions your organisation and / or sector would need to take to participate in the scheme.	manufacturing capabilities and provide certainties regarding our business model. In addition, HDF Energy is also developing its next generation of MWe scale fuel cells (Generation 2 and 3). These fuel cells will be more cost-effective and efficient than the current generation and could be implemented around 2027.
Hydrogen cost outlook		
18	In the short (<5 years), medium (5-15 years) and long (15+ years) term, where do you expect the cost of production of renewable hydrogen to move from the estimated levels of today? What do you expect to be the drivers of this change?	HDF Energy has built a performance model which takes into consideration cost of production of renewable hydrogen for the next three years based on discussions with the main EPCs, technology providers and OEMs. We expect the cost of hydrogen production to go down by 20% by 2025. The main drivers are: - Declining cost of renewable energy (wind and PV). - Declining cost of hydrogen equipment (electrolysers, storage tanks, fuel cells) supported by large investment and fundings. - Improvement of hydrogen equipment efficiency/performance. - Declining cost of financing by building more and more projects around the world.
Hydrogen demand and electrolyser capacity		
19	To what extent to you believe the above scenarios are reasonable and achievable? Please explain your answer with reference to your previous answers regarding the objectives of the scheme.	The three scenarios are reasonable and achievable. The last scenario (10% blend) is the only one which would achieve the objectives of the scheme. Conversely, the 1% blend scenario wouldn't attract electrolyser and fuel cell manufacturers to establish operations in W.A. In the same way, it wouldn't contribute significantly to the

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		decarbonisation of the W.A. electricity grid, stability of the grid nor decarbonisation of the Western Australian economy.
20	How would you expect the levels of hydrogen demand for electricity generation in the SWIS to be met at various points in the supply chain? Would you expect a single generator would emerge and provide all certificates?	HDF Energy believes that it would make sense to install several generators in location where the network is constraint to avoid grid augmentation. In the same way, a few generators spread across the W.A. network would maximise the use of renewable energy as they would have different yield profile.
21	Would you expect one very large renewable hydrogen producer, a number of very small renewable hydrogen producers, or some other combination, to emerge in the State as a result of the scheme? Alternatively, would a domestic-focused producer have sufficient scale to operate in a domestic market only?	HDF Energy expects to see one hydrogen producer per project; and several projects deployed across the SWIS. HDF Energy believes that hydrogen should be produced at the consumption point. Indeed, transporting hydrogen over long distance requires compression or the use of pipelines, which is expensive. Collocating the renewable energy source, hydrogen production, hydrogen storage and fuel cell is the more cost-effective solution and can be implemented at scale. In this way, there is no need to transfer a large amount of electricity through the network nor hydrogen through costly pipelines.