Renewable Hydrogen Target – stakeholder feedback template

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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.

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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?	Objectives to assess the impact of a RHT would be to set a target for zero/minimal LFAS load following ancillary service response target in the generation of the hydrogen. This would provide inroads for the hydrogen industry, if generation of hydrogen or electricity therefrom was dispatchable enough not to warrant considerable LFAS/FCAS charges as is the case with conventional grid connection, then this could set a framework for negotiating reduced connection and grid balancing charges for hydrogen projects thus not requiring ultra-low cost solar, improving the (LCOH) and providing demand dispatchability to combat duck-curves, potentially improving marginal loss factors when coupled with wind and solar offering. Another objective of the RHT would be to ensure the underlying project that seeks hydrogen injection has verified financials -that is it stacks up on its own and is cheaper than

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		a pumped hydro installation or big battery-, ensuring the cost of potentially unfinancial large hydrogen projects with no offtake for the hydrogen are not pursued at expense to better alternatives should they exist. Otherwise, it will be exploited as a means to simply use the SWIS as a dumping ground for unwanted hydrogen from obscenely/questionably large hydrogen projects of which presumably the proponents of said projects would still want commercial returns. Thirdly, an objective should be to ensure that the injection of hydrogen has no significant cost increase for electricity users. WA already has the highest inflation level in the country and the country as a whole may be susceptible to global recession should it occur.
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?	To encourage greater use of hydrogen for particularly diesel replacement in the various high-power transport applications in hard-to-abate sectors. Government could use the RHT to institute a *Hydrogen Equalisation Parity Payment*. Given most remote high-power sectors such as agriculture and mining receive a diesel fuel rebate on diesel and considering diesel fuel infrastructure is largely paid-off, then it seems in order to level the playing field for hydrogen technology that has to amortise high-cost infrastructure, that hydrogen producers receive a notional diesel fuel rebate parity payment of $1.47/kg ($12.25/GJ LHV). This will ensure a level playing field as diesel fuel infrastructure is not on a learning curve/R&D development path and subsequently hydrogen has to compete against a fuel that gets rebated on top of having to cover the costs of electricity that diesel does not

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		until such time as an economy of scale is established that the HEPP is no longer required for price parity. Whether the costs are deployed presumably in a similar manner as they would for the proposed RHT on electricity generation or through fuel stations/diesel offtakes is up to the Government to determine. It would have greater impact on emissions reduction as the hydrogen used in transport would be used to displace diesel in applications where there is no better alternative unlike the case with the current RHT where pumped hydro and big batteries are by-and-large a suitable alternative. This would have to only apply to transport-hydrogen and only for non-road going vehicles.
Considering hydrogen		
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?	I believe hydrogen has a minimal role to play in providing the decarbonising of electricity generation *(as far as electricity generation from hydrogen is concerned).* Outside of: - hydrogen genset use or; - heavy vehicle transport or; - applications where pumped hydro or big batteries are not cheaper in the long run or; - a connection to said resources is not available or; - unless there is a national security/military strategic reason; **hydrogen should <u>not</u> be used to generate electricity for the SWIS.**

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		This would require the state government to spend far more on VRE to achieve the same outcome than they would if they were to simply use the electricity generated from renewables as directly as possible. Effectively slowing down the state's efforts of achieving its decarbonisation objectives as there would need to be more investment spent than needed. Great for propping up the solar and wind manufactures' sales, not for any meaningful/timely emissions reduction. That said, hydrogen can have a significant role in decarbonising electricity generation *(from a load-support perspective),* in the facilitating of increased renewable energy resources. The ramping of PEM electrolysers provides an opportunity to increase uptake of wind and solar without constraint if designed with hydrogen generation in a systematic manner. This is the best use of an energy storage medium in hydrogen for the electricity sector. Additionally, the comment in the consultation paper about "However, in the long run, as the dynamics of the energy system change this may no longer be the case." In reference to P2H2P statement made on page 9 is fundamentally false. No amount of system dynamics manipulation is going to have any tangible impact on enhancing P2H2P efficiency over direct electrification. This is either a perpetual energy insinuation indicating a lack of understanding of basic thermodynamics or hopefully a diction error.
4	What role can the infrastructure associated with the production of renewable hydrogen (i.e. renewable electricity	In the broader SWIS, Cryogenic/ hydrogen carrier storage vessels/facilities provide an ideal energy security and supply redundancy mechanism for the broader hydrogen industry.

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	generation facilities, electrolysers, transport and storage infrastructure) play in the broader SWIS?	Transport oriented hydrogen supply and projects will require redundancy supply to insure against a loss of supply event as noticed in California with the Santa Clara hydrogen fire. - Electrolysers ***for*** grid load support. - Storage ***for*** energy security/fuel reserve. - Electricity facilities ***for*** standalone power supply/energy distribution. - Transport ***for*** fuel use only, not for hydrogen distribution. Only electrolysers and storage provide direct benefit for the SWIS, electricity facilities can assist with fragmenting a lot of the remote grid infrastructure nearing the end of its economic life; improving MLF's and providing economic drivers to upgrade or at least maintain those assets in remote WA whilst providing a zero emissions fuel supply and making inroads into decarbonising hard-to-abate sectors.
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?	The point made in the document around hydrogen flame speeds is quite correct, at three times the flowrate compared to natural gas, hydrogen will require dedicated hydrogen pipelines to supply such a facility at three times the pressure as flowrate is a function of upstream pressure. To utilise a mix blended natural gas pipeline with 5% H_2 would be heavily derated on pressure and energy delivery. This shortfall would have to be made-up by other sources arguably ruling out the hydrogen supply via existing X70+ HSS pipelines. Dedicated hydrogen pipeline infrastructure between source and turbine would have to be fully costed and

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		deployed along with the additional infrastructure outlined in **No 4**. A question then of whether a company such as EnergyAustralia would be prepared to purchase the *hydrogen at what cost* and how that would in turn affect their customers would have to be asked and answers disclosed. Would they pass the cost onto consumers and how much is that likely to contribute to electricity bills? There is no overcoming the need for dedicated hydrogen pipelines in the supply of hydrogen for use in electricity generation without having energy supply and line-pack effects on the day-to-day operation of a gas network. The feasibility study done by the DBNGP on hydrogen injection should be used as a baseline with the peaking load requirements of an intended H2-Gas turbine and what impact that may have on broader industry NG supply in assessing the use of existing NG pipeline infrastructure. Thus, when considering a project for the RHT, that a thorough techno-economic analysis is completed on the performance characteristics of the gas mix use on existing gas users and likely cost impacts any one project would have on electricity prices. Considering dedicated H_2 pipelines would be required with significant onsite storage vessels, ACIL Allens $4.71/kg should not be used when referring to a substituted cost of fuel as the SWIS would have to pay the full delivered and stored cost of hydrogen + IRR of said company providing the hydrogen which could be as high as (~$12-15/kg or $100-125/GJ, LHV). Even in the case study of Tallawarra B, it was

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		stated that the hydrogen was going to be bought-in (realistically via pipeline), It was stated to operate as a peaking plant, the problem being the hydrogen would be generated ~6hrs prior to consumption (again requiring storage). with no mention of *what price,* it was to be purchased at. Another consideration the WA state Government should have would be to assess what price cap for hydrogen supplied and subsequently burnt for P2H2P there will be. Considering there are only a few players in the large-scale hydrogen project space, there is risk for potential collusion on set price amongst project proponents should a guaranteed off-take for electricity be legislated. This potentially opens pandoras box for what can be considered a guaranteed offtake for potentially deliberately uneconomically designed large scale H_2 projects and incentivise proponents of said projects -of which the RHT largely benefits- to not at all consider the long-term, standalone viability of the projects without the target. This is of course speculative, but a contingent clause to limit feed-in price (CAP) for hydrogen should be determined to cover this possibility and should still be implemented under the RHT. Similarly, hydrogen project proponents should be critiqued upon what guaranteed offtake there will be for the hydrogen they sell before ascertaining a land/resource allocation to pursue a project. **There is a possibility of resource banking of key commonwealth wind and solar resources under the guise of hydrogen developments if the**

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		projects proposed are not originally structured around an off-take agreement but instead the other way around. There is considerable concern of the industry and within it about offtake of hydrogen in relation to newer and ever larger project proposals. Is the RHT going to create a market for hydrogen or is it going to inadvertently force offtake for expensive hydrogen of potentially failing large scale export projects that may well be failing to find a purchaser of their hydrogen and subsequently FID? It would from an ethical and economic sense, be better to see a semi-commercial demonstration with offtake operating ahead of a RHT certificate for electricity generation being awarded. Otherwise, what is fundamentally stopping large H2-players from feeding in at $100/kg for arguments sake?
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.	Yes and No, Fundamentally, there is a false cause fallacy at play with regard to relating what was done with the RET scheme. As the RHT consultation paper states itself, “Increase the use of renewable energy generation technology above existing generation”. Indicating the wind and solar uptake was already underway and that the economics of said technologies stood on their own legs without the need of the RET program. The RET program no doubt accelerated the deployment of said technologies, but it did not ‘create the market’ as is claimed in the RHT consultation paper.

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		Additionally, with the GEC, gas is similar to coal in that the underlying energy content is already present within the fuel. Subsequently, the price of NG was close enough and provided greater ramp rates that made it an ideal transition fuel. In the case with hydrogen, the energy model is fundamentally different than is the case with natural gas as the hydrogen needs to be made, transported and stored at less practicality and more cost than natural gas. This means hydrogen from a gravimetric and volumetric energy point is always going to be more expensive than natural gas if one seeks to replicate hydrogen use in a fossil fuel structured energy system. Forcing people to purchase a zero emissions fuel that ultimately requires its own unique energy/business model into a fossil fuel structured energy system is only going to lead to higher cost electricity. A certificate scheme structured in this manner will force offtake, but it will not create demand **for** hydrogen. Demand for hydrogen will come from parity matching diesel and other feed fuels in transport and chemical feedstock applications. Hydrogen projects must establish a viable business model canvas before a certificate scheme is implemented and why someone/group is going to purchase the hydrogen.
7	What are some other approaches which could be considered alongside a renewable hydrogen electricity generation certificate scheme that would provide a framework to deliver on the objectives or outcomes sought?	An arguably better alternative to a hydrogen certificate scheme for electricity generation that provides benefits to the SWIS as well as accelerated industry market demand for the transport hydrogen market would be to include the *Hydrogen Equalisation Parity* Payment as discussed in **No 2.**

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		To encourage greater use of hydrogen for diesel replacement in the various high-power transport applications in hard-to-abate sectors. Government could use the RHT to institute a *Hydrogen Equalisation Parity Payment*. Given most remote high-power sectors such as agriculture and mining receive a diesel fuel rebate on diesel and considering diesel fuel infrastructure is largely paid-off, then it seems in order to level the playing field for hydrogen technology that has to amortise high-cost infrastructure and displace a fuel that *does not have to be made* unlike hydrogen, that hydrogen producers receive a notional ~$1.47/kg (44.2c/L diesel equivalent LHV/LHV) payment. This will ensure a level playing field in the embryonic H_2 transport market as diesel fuel infrastructure is not on a learning curve/R&D development path and subsequently; hydrogen has to compete against a fuel that gets rebated on top of having to cover the costs of its own technology and electricity. This would only need to be done until such time as an economy of scale was established **(market created)** that a HEPP would no longer be required for price parity. Con-currently, the electrolysers used to supply hydrogen as a result could still make inroads into providing grid support services for the SWIS. The downside to this over the RHT certificates for electricity generation is that it would only work for small-scale hydrogen production initially. Large-scale hydrogen projects would otherwise flood the transport market, and thus is arguably why using hydrogen for electricity generation is sought, because it guarantees offtake for all existing large-scale hydrogen proposals that cannot get offtake because they seek to dislodge wholesale gas at ~$5/GJ with a fuel that is ~$78/GJ and need to make far more

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		hydrogen than demand requires hence using the SWIS as a dumping ground for hydrogen but not truly creating demand specifically **for** the hydrogen. It will create demand for electrolysers so there is an upside. A HEPP scheme would assist in creating demand **for** hydrogen and only contribute 15.7% the cost of the RHT for produced hydrogen. It would largely benefit farmers and tier 3 miners until such time hydrogen reduces in cost to supply against wholesale diesel.
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?	The current proposal is a high-cost solution to generating a H_2 industry. Support for H_2 projects is required in the embryonic stage. A targeted solution would assist. As it stands, the certificate and liability is not the best way to achieve the renewable hydrogen target. It would be better to focus on back-at-base, small-scale hydrogen generation until such time as a critical mass of hydrogen demand is in that larger scale hydrogen developments.
Exemptions		
9	What are the benefits, costs and impacts of an exemption's regime for a Renewable Hydrogen Target for electricity generation?	A massive cost/ impact an exemptions regime would have, would be that large corporates could circumvent a lot of the costs they impose on small-to medium energy consumers and business as they would either; A) Get paid to supply hydrogen generated electricity or; B) Be eligible as an emissions-intensive trade-exposed (EITE) entity, ensuring that the particular companies in the industries seeking to become hydrogen electricity generators never have to pay for the increased cost of electricity they impose on others.

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		This is potentially a way for companies in industries directly or indirectly eligible under the EITE to become the ones to pursue the hydrogen generation and not incur the added costs for electricity. The companies' related body corporates that apply to become certified hydrogen-based electricity generators should be made exempt from any EITE eligibility when consuming grid-based power for purposes outside of hydrogen production as well as other large companies that do not apply to become certified producers. This would set a precedent that if large corporations are not prepared to foot the cost of hydrogen generated electricity that neither should the working class of WA have to accept an increased wholesale price increase that will realistically get passed on to their power bills.
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?	No, the purpose of the RHT is specific to reducing electrolyser and associated hydrogen infrastructure costs. There are applications where hydrogen has no alternative largely, chemical feed stocks and high-power applications. To 'chew' into the targets with alternative fuels will not achieve increased emissions reduction of the burnt fuel because there is a scope 3 emissions aspect to bio-X related fuels. Negative externalities such as exacerbated land clearing to fulfill offtakes or the non-geological storage times for biomass related carbon stores poses a significant threat to the validity of using biofuels. Hydrogen does not have this issue, either the renewable hydrogen is produced and used to displace emissions, or it is not.

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		There are no sovereign liability insurance costs associated with hydrogen displaced emissions as there are with LULUCF or Bio-synthetic fuels especially if new fossil fuels are burnt.
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.	Outside of participating in the scheme the targets are likely only to increase grid-oriented power costs. How much this drives increased rooftop solar uptake to switch off grid should prices increase too much will be a matter of whole-of-system modelling. From a commercial standpoint it would drive a desire to either participate as a RHT participant or potentially disconnect from the grid for those that can afford to do so.
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 whole-of-economy / sectoral assessment of the benefits or otherwise of a RHT and its various targets is not for private industry to determine. It is the role of a government body to perform analysis of these impacts given the greater access to information government has on businesses and electricity corporations in synergy, western power & horizon power. Considering the scale of a RHT is likely to impose far greater impact beyond the scope of a single entity.
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?	If the targets are not performing the goal of decarbonisation and industry development to the extent determined, then a revision of targets is welcomed.
14	To what extent should banking and borrowing of liabilities be permitted under the scheme? What are the benefits and	Banking of the certificates should not be done as it creates cause for accounting tricks and deferring accountability of the

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	costs of a borrowing mechanism as described in the paragraph above?	offtaker/producer to provide/consume the hydrogen per the RHT certificate. Also, trading has the potential for speculation and financial manipulation.
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.	Based off my own organisation, ~10tpa of hydrogen is deliverable within 24months given the regulatory and engineering development yet to occur. Given there is no transport hydrogen market, early-stage uptake will be governed by early market demand; which at this point in time is hard to quantify until such time as our commercial demonstration project is running. Exact ramp rates cannot easily be determined until market demand is established. Otherwise only commissioning timeframes can be used to assess growth rates. Given no commercial business model canvas has been established for hydrogen, it will be difficult to assess how soon these targets can be achieved. We do not believe any other hydrogen project is commercial at this point in time.
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 cost is a consideration, then based off existing largescale projects and government's appetite to not fund smaller scale innovation. There is likely no way the target can conceivably be achieved.**
17	Over what period of time do you believe is an appropriate ramp up period for the Renewable Hydrogen Target for 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.	Over the course of a decade.
Hydrogen cost outlook		

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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?	Drivers of cost mitigation may come from the deployment from a RHT based off standardisation & increased electrolyser sales. However, large cost reductions are likely to occur from transport-oriented fuel cell deployments which largely share the same componentry as electrolysers; simply operating in reverse. In the short term, the cost of hydrogen is hardly likely to move much until such time a commercial business model is established for hydrogen, with or without a mandated price on carbon.
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 rates required do not coincide with the task and number of projects deliverable in that time frame. A 1% target may be achievable but it is difficult to say without greater study, of which I am not paid to do.
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?	Strongly advise multiple entities to participate in the RHT to ensure market forces and strong competition. I also think reverse auctions should be the primary mode for issue of certificates to ensure collusion does not occur and high prices are simply paid to fulfil the targets but instead a price cap is set based on industry data and similar developments around the world.
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?	Same as above, ensuring multiple producers at various scales and business models ensures the best delivered price of hydrogen possible. A domestic focused producer will have scale if they have a business model that makes financial sense. Export oriented projects looking to supply domestically have the benefit of economies of scale but incur transportation and far greater storage costs in comparison to local supply. Domestic

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		suppliers will be able to compete should they adopt alternative business models in the supply of hydrogen.