NATIONAL NUCLEAR LABORATORY

Preliminary Economic Assessment of GW Scale Nuclear Enabled Hydrogen Production

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Emin Veron, 07 February 2022

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Executive Summary

Estimates for the Levelised Cost Of Hydrogen (LCOH) in £ per MWh derived from GW scale nuclear electricity have been calculated using publicly available baseline BEIS data [1] [2]. This has been completed with the technology couplings of alkaline, proton exchange membrane, and solid oxide electrolysis from 2028 to 2058 inclusive. This data is presented in comparison with the cost of hydrogen produced using a range of low carbon energy options, using data from BEIS's 2021 Hydrogen Production Costs Report [1]. These estimates indicate that through a reduction in discount rate for funding GW scale nuclear projects, which could be offered by the RAB funding model, nuclear electricity from GW scale reactors could be used to produce hydrogen at a similar LCOH to other low-carbon technology couplings. Further work is required to underpin these initial estimates to cover a wider range of input scenarios. This will include AMR and SMR technology (when verifiable data is available), as these technologies could significantly reduce the LCOH due to their modular manufacture or high efficiency designs.

Verification Statement

This document has been verified and approved in accordance with NNL's procedures for the reporting of work.

History Sheet

Issue Number	Date	Comments
Draft 1	22/12/21	Emin Veron submitted for verification
Draft 2	25/01/22	Emin Veron submitted for verification
Issue 1	28/01/22	Caroline Pyke verified and Allan Simpson approved
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1 Introduction

Hydrogen is a key energy vector that could be used in hard to decarbonise sectors to meet the UK's ambition for Net Zero by 2050. Nuclear power can provide low carbon energy at large scale and high capacity factors, and at energy densities that make it suitable for hydrogen production at scale. Previous assessments of nuclear had deemed the technology too expensive. However, following an industry consultation, and a subsequent government response published in 2019, a new bill "the Nuclear Energy (Financing) Bill" has been introduced (currently under review in the House of Lords). This enables the Regulated Asset Base (RAB) model [3] to be used to finance nuclear new build. This potential reduction in the cost of nuclear derived electricity and heat has resulted in renewed attention at a policy level in a proposed use-case for nuclear new build in hydrogen production. Estimates for the impact this model has on the cost of hydrogen for domestic and industrial use, including the production of derivative products such as ammonia and sustainable airline fuel, are therefore useful to help underpin future policy decision making.

This report seeks to provide a preliminary estimate of the impact of the RAB model on the Levelised Cost Of Hydrogen (LCOH) when coupled with large-scale commercially available nuclear new build (GW scale) as a power source. It provides an estimate to the cost of GW scale nuclear derived hydrogen when coupled with a range of water-electrolysis techniques using publicly available BEIS data [1] [2], and compares this cost with the predictions for a range of other relevant price-points of low-carbon technologies from the year 2020 to 2050.

1.1 Background

Nuclear reactors produce heat which is used to generate electricity. In addition to the intrinsic benefits of nuclear energy such as being decoupled from the fossil-fuel energy market, a high capacity factor and a security of supply, this generated electricity can be supplied to a range of technologies that produce hydrogen. At present the hydrogen production technologies of most interest for future markets include alkaline, proton exchange membrane (PEM) and solid oxide electrolysis (SOE) methods, and are included within BEIS's 2021 Hydrogen Productions cost report [1]. These technologies require electricity to operate. While BEIS data includes a component of resistive heat being re-cycled to give a boost in the performance of SOE technologies, externally supplied heat has not been considered as a separate energy source as part of this work. This may have benefits for SOE technologies and is worthy of consideration in future developments.

The competitiveness of the cost of nuclear derived hydrogen is impacted by the cost of the nuclear power plant, the hydrogen technology, and the summation of relevant costs such as the fixed & variable operating costs of both plants, and connection costs. Future nuclear new build projects could benefit from both technological improvements and the use of alternative funding models.The RAB model is one funding model which can be used for the construction of large public projects and could be applied to reduce the cost base of GW scale nuclear projects.

Through new assurance measures in the way projects are commercially regulated, and funded using the RAB model and a reformed risk attribution, the Weighted Average Cost of Capital (WACC) of GW scale nuclear new builds could be reduced. In comparison to traditional large-scale infrastructure projects, this risk reduction could lead to a greater reduction in a parameter known as the 'discount rate'.

The discount rate is a measure of the depreciation of the rate-of-return of a project over time. This depreciation is attributed to a decrease in the value of the cash-flow of a project's funds in the future due to inflation and the static return of the project itself determined by its WACC. The discount rate is a compound effect akin to a compound interest rate. The overall effect of increasing the discount rate on the price-point of power produced by GW scale nuclear new build is predicted to be one which increases at an increasing rate with respect to time while the building project is ongoing.

BEIS data has assumed a discount rate of 9.5% for GW scale nuclear projects. For future nuclear new builds with a RAB model, this work considered a discount rate of 4% to be a reasonable long term best-estimate as part of a GW scale nuclear deployment programme. This is, however, subject to change on a project by project basis and therefore this work considers a range of other potential discount rates.

As historic GW scale nuclear projects have involved a higher overnight total cost and longer build time compared with other energy generating technologies, any reduction on the discount rate will likely result in a greater reduction in the cost of electricity from GW scale nuclear technologies when compared to other energy generating technologies.

1.2 Scope

This report provides estimates of the cost for GW scale nuclear derived hydrogen using existing published data publicly available from BEIS and where the finance discount rate is varied between 3.5% and 10%.

The cost of hydrogen produced is calculated per MWh for the hydrogen technologies of alkaline electrolysis, PEM electrolysis and SOE only; estimates for this cost are provided from 2028 to 2058 inclusive. This data is then presented in comparison with the cost of hydrogen produced using offshore wind, steam methane reformation with carbon capture and auto-thermal reformation with carbon capture technologies from 2020 to 2050; estimates for GW scale nuclear derived electricity at discount rates of 3.5, 4, 6, 7, 9.5 and 10% using data from BEIS's 2021 Hydrogen Production Costs Report [1] have also been produced for the years 2028 to 2058 inclusive.

For posterity this report captures the high-level assumptions and methodology used for all calculations and seeks to provide a direct comparison with the BEIS's Hydrogen Production Costs Report. Comment is provided on the data required to better underpin this estimate, but comment on the strengths and weaknesses of the approach in comparison with other available international LCOH models [4] are out of the scope of this report.

2. Methodology and Assumptions

The overall levelised cost of 1 MWh of hydrogen (HHV), or $LCOH$ is calculated as the sum of the components associated with the cost of hydrogen for each year as given by {1} [1]:

$$LCOH = CAPEX\ Cost + OPEX\ (fixed)\ Cost + OPEX\ (variable)\ Cost + Electricity\ Cost + Gas\ Fuel\ Cost + Heat\ Cost + CO2\ Cost + Carbon\ Cost \qquad \{1\}$$

These components are taken from data given in 2016 Electricity Generation Costs[1] [2] for GW scale nuclear, and the 2021 Hydrogen Production costs report [1], and is calculated using the process flow diagram shown in Figure 1.

The electricity cost in [2] is referenced as the price-point at initial investment decision, whereas in [1] the electricity to hydrogen conversion efficiency and the CAPEX & OPEX costs are set at the point of commission. For this data to be fairly comparable, the electricity price has been transposed to the date of commission to be in line with that of the 2021 Hydrogen production Costs report. Leigh-Fisher data [5] states an assumed central estimate of 8 years for the build-time of a nuclear FOAK GW scale PWR, and therefore all referenced electricity cost data is calculated 8 years to the date referenced in the 2016 Electricity Generation Costs report.

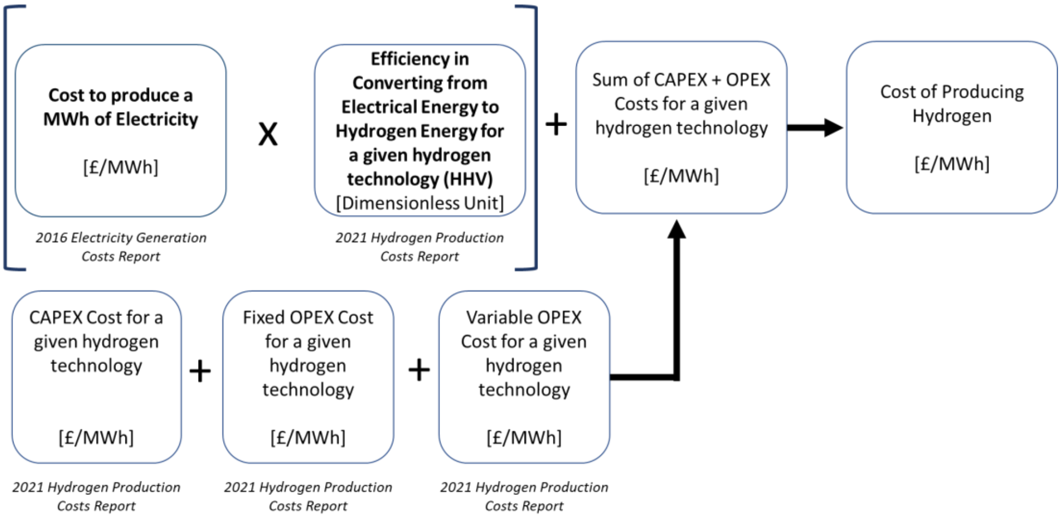

Figure 1 - Method used to Calculate Levelised Cost of Hydrogen per MWh.
Please note to convert to a price per kilogram the final value is divided by 25.4 as shown in Hydrogen Production Costs Report (Page 8), and electricity generating costs were inflated to 2020 values using [6].

The CAPEX and OPEX costs for grid-connected alkaline, PEM and SOE technologies were taken from the Annex of the 2021 Hydrogen Production Costs Report [1] and is expressed per MWh in Table 4 in Annex A. These costs assume a fixed capacity factor for nuclear plants, typical for GW scale power, and have been linearly interpolated to align with the transposed electricity cost data from 2028 to 2058 inclusive.

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[1] The data from the 2016 Electricity Generating Costs report for GW Scale is identical to data in 2020 Electricity generating costs report, and so the 2016 version has been referenced and subsequently inflated.

The cost of electricity from GW scale nuclear power is presented in BEIS's 2016 Electricity Generation Costs report [2]. These costs were inflated by 12.74% to 2020 values using Table 19 of BEIS's 'Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal' [6] from the year 2016. These are used as the base input cost per MWh for the electricity cost of hydrogen.

For values at a discount rate of 3.5, 7, 9.5 and 10 percent, this cost of electricity data was directly taken from the report [2]. For the 4% discount rate assumed as a typical value which could be agreed in the RAB model, and for a discount rate of 6%, values were interpolated using a plot comparing the discount rates and the price of electricity in the report using an approximate statistical fit.

To account for the efficiencies of hydrogen production from electricity, the efficiency of conversion from the 'Technical and Costs Assumptions' tab of the 2021 Hydrogen Production Report [1] annex was used. This enabled the electricity cost to be fairly comparable for input to Equation 1.

The connection cost from the hydrogen to nuclear plant, and the gas fuel, heat, carbon and CO_2 cost is assumed to be zero for a nuclear coupling as this technology does not use external carbon-based feed stock or heat to function. No additional heat is directly provided into any of the hydrogen technologies from the nuclear reactor for these systems. Whilst this is of interest to SOE and water-splitting thermochemical techniques, it is beyond the scope of this report owing to the base data within [1] making the same assumption for grid connected SOE.

The efficiency of conversion from electricity to hydrogen and the cost of baseload electricity from BEIS data are tabulated under Table 2 and Table 7 of Annex A. In the BEIS data, and therefore also in this calculation, reductions in the cost of GW scale nuclear are assumed only for First-of-a-Kind (FOAK) plant built up to 2038. Whilst likely to occur, no additional reductions from 'learning-by-doing' are assumed from 2038 until 2058[2]. However, such reductions are assumed for hydrogen production technologies from 2020 to 2050 to provide consistency with existing BEIS data and estimates [1]. No BEIS published data is available for AMR or SMR technologies, hence it has been excluded from this analysis.

[2] Note that 'learning-by-doing' is built-in the underlying input data for hydrogen production technologies at all referenced years. This drives an uncertainty into the results data as interpolation of this data is required to fairly couple the data for hydrogen and nuclear technologies.

3. Results

This section presents calculated LCOH values against other comparable hydrogen producing technology data found in the 2021 Hydrogen Production Costs Annex for comparison.

In line with the BEIS methodology, values were calculated for estimated scenarios of:

- Lower, central and upper technology costs for hydrogen production[3];
- Discount rates of 3.5, 4, 6, 7, 9.5 and 10 percent for a GW scale nuclear new build project;
- Lower, central and upper estimates for the cost of electricity; and a
- Lower, central and upper estimate for the efficiency of the given hydrogen technology.

The key results from these calculations are displayed in Table 8 and Table 9 of Annex A, while the results from all variations of this calculation are tabulated in Annex B for completeness.

The LCOH from GW scale nuclear coupled technologies is dependent on the discount rate agreed under a RAB project and could change. The magnitude of this impact is presented in Figure 2 which shows the variation of LCOH at discount rates from 3.5 to 10% for nuclear coupled SOE technologies. Figure 3 presents the LCOH derived from GW scale nuclear electricity for all described hydrogen technologies, using central estimates at discount rates of 4% and 9.5%.

Figure 4 presents the LCOH derived from GW scale nuclear electricity with SOE at discount rates of 4% and 9.5% along with LCOH derived from a range of low-carbon energy couplings. These include Offshore Wind with SOE, Auto-thermal Reformation (ATR) with Carbon Capture, Usage or Storage (CCUS), and Steam Methane Reformation (SMR) with CCUS.

The solid lines shown in Figure 2, Figure 3, and Figure 4 indicate where cost data for GW scale nuclear electricity has been referenced by BEIS for projects reaching final investment decision up to 2038. At this point, where there are dotted lines, the same electricity cost has been assumed up until 2058, but no available data is currently available for use, and hence remains a best-estimate for the highest reasonable cost for the LCOH using GW scale nuclear electricity.

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[3] Realistic estimates for the upper, central and lower costs of the CAPEX, Fixed OPEX and Variable OPEX per MWh were obtained from the BEIS 2021 Hydrogen Production Report. For calculations which varied this parameter, the central cost of electricity and the efficiency of conversion from electricity to hydrogen have been assumed and presented on Figure 2, Figure 3 and Figure 4. All other cases that lead to variation of in electricity cost are tabulated in Annex B.

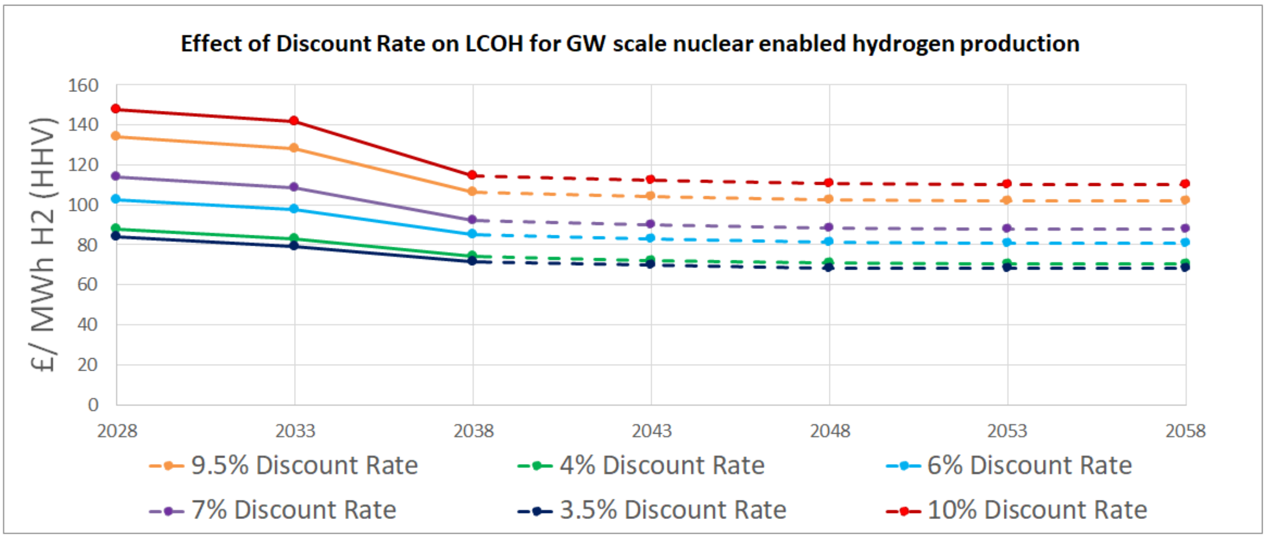

Figure 2 - Effect of Variation of Discount Rate on LCOH for GW scale nuclear enabled hydrogen production

Figure 2 presents the LCOH for GW scale nuclear coupled with SOE at discount rates of 3.5, 4, 6, 7, 9.5 and 10%. As the discount rate increases, the LCOH increases at a slight increasing rate, and all discount rates experience a decrease in LCOH over time. This decrease is larger at higher discount rates. The overall effect of this is that discount rates of 3.5 and 4% tend to converge towards a value of approximately 68 and 71 £/MWh H_2 (HHV).

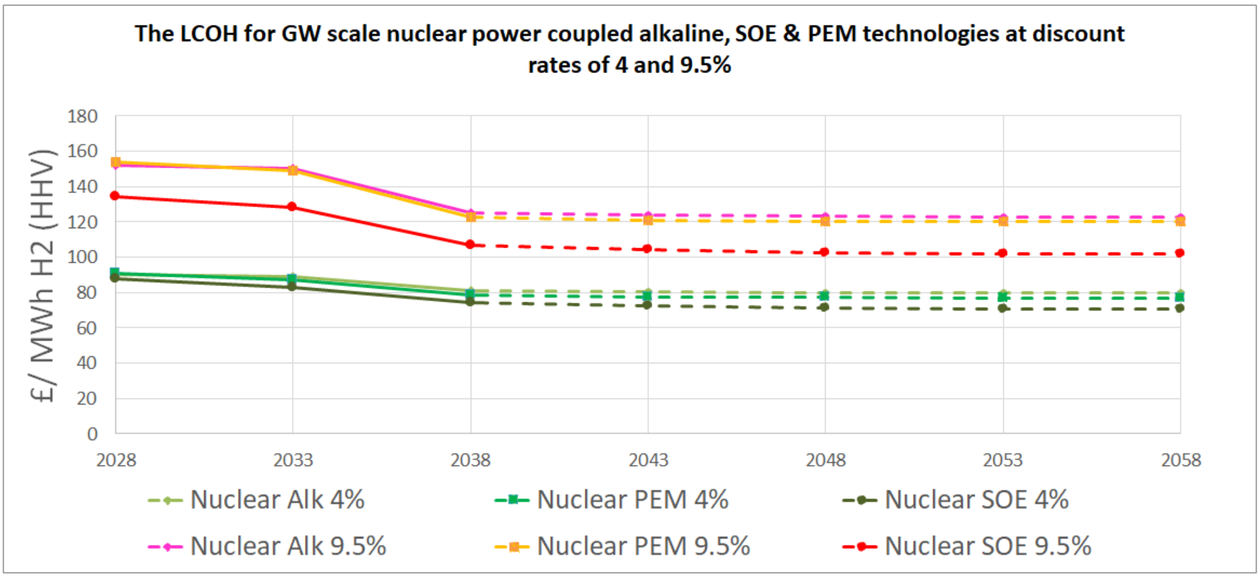

Figure 3 -The LCOH for GW scale nuclear power coupled alkaline, SOE & PEM technologies at discount rates of 4 and 9.5%

Figure 3 shows a significant difference between the LCOH at 4% and 9.5% discount rates. For alkaline and PEM technologies, a difference in price point per MWh H_2 (HHV) of approximately 43 £/MWh was calculated from 2038 to 2058, with a larger decrease seen in the 2028-2038 interval of 61 and 63 £/MWh. For SOE this difference is slightly smaller but still substantial at approximately 45 £/MWh from 2028 to 2038 and 32 £/MWh from 2038 to 2058.

There is also variation in the LCOH for different hydrogen production technologies, with a greater variation seen among technologies at a 9.5% discount rate. For both 4 and 9.5% discount rates, and while initially less competitive than alkaline technologies, alkaline technologies have a slightly greater LCOH than PEM technologies at all time periods. PEM decreases from 87.3 £/MWh H_2 (HHV) in 2033 to 76.9 £/MWh H_2 (HHV) by 2058 at a 4% discount rate where alkaline reduces from 88.9 £/MWh H_2 (HHV) in 2033 to 79.7 £/MWh H_2 (HHV) in 2058. In this comparison SOE technologies also appear to outperform both alkaline and PEM technologies at all time periods at both discount rates, reaching 70.6 £/MWh H_2 (HHV) by 2058.

Overall, three key features are present in this figure:

- A larger initial reduction in LCOH from hydrogen production technologies up to 2038 of approximately 27, 31 and 28 £/MWh H_2 (HHV) for alkaline, PEM and SOE technologies respectively at a 9.5% discount rate and approximately 9, 12 and 13 £/MWh H_2 (HHV) for alkaline, PEM and SOE technologies respectively at a 4% discount rate;
- A flattening of the LCOH cost reduction from 2038 to 2058; and
- A smaller reduction in the LCOH from 2038 to 2058 of 2, 2 and 5 £/MWh H_2 (HHV) for alkaline, PEM and SOE technologies respectively at a 9.5% discount rate, and approximately 1, 2 and 4 £/MWh H_2 (HHV) at a 4% discount rate.

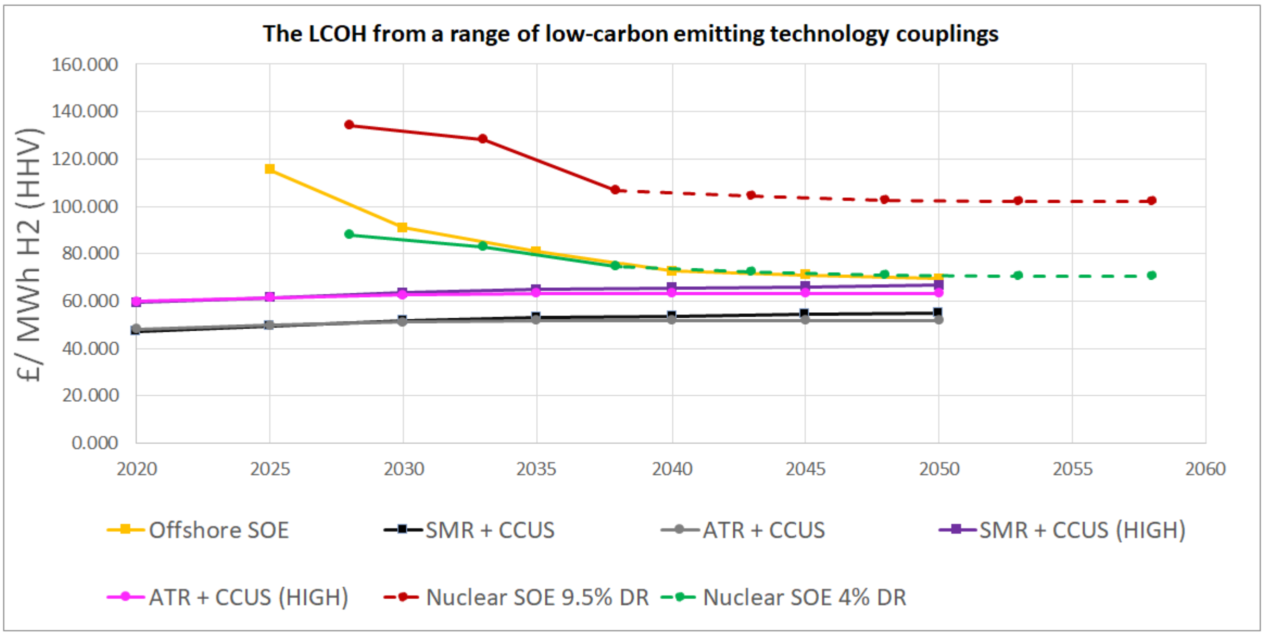

Figure 4- The LCOH from a range of low-carbon emitting technology couplings including GW Scale Nuclear & SOE Couplings

Figure 4 presents the LCOH for GW scale nuclear coupled with SOE at 4 and 9.5% discount rates against a range of low-carbon hydrogen production technologies. It can be seen that when the discount rate reduces from 9.5% to 4%, in the near term, GW scale nuclear enabled hydrogen has a similar LCOH to off-shore wind produced hydrogen from 2033 until 2050. At a discount rate of 4%, and when interpolated linearly in line with GW scale nuclear electricity data, nuclear is approximately 2.3% lower in LCOH in 2033, and approximately 1.5% higher in LCOH in 2048[4] However small differences between the results are likely to be trivial and occur as a result of uncertainties in the input data and methodology rather than genuine differences between the technologies . ATR and SMR processes appear to have a lower LCOH at all time periods, for their central and high cost estimates, but their cost profile increases over time, such that central estimates for ATR and SMR processes appear likely to approach a price close of 52 and 55 £/MWh H_2 (HHV) after 2050.

4 Discussion

4.1 Effect of Discount Rate on the LCOH from GW Scale Nuclear

The LCOH is compared for a range of discount rates in Figure 2 and visibly shows the compound effect of discounting. The spacing of the lines in Figure 2 appears to appear almost linear, and appears at lower discount rates to converge. This is due to the mathematics of a diminishing saving in LCOH seen at low discount rates, and also due to the incorporation of the CAPEX and OPEX electrolyser costs, which is assumed to be independent[5] to the nuclear discount rate, and is further explored in Section 4.2.

Three key features are seen over time for GW scale nuclear derived hydrogen:

- An initial reduction in LCOH from learning-by-doing in both the GW scale nuclear technology and hydrogen production technologies up to 2038;
- A flattening of the LCOH curve from 2038 to 2058 is seen as GW scale nuclear learning-by doing is excluded from the BEIS input data and also therefore in this analysis; and
- Smaller reductions in the LCOH from 2038 are seen due to technological improvement in the hydrogen production technology only.

Overall a significant decrease in the LCOH is observed as the discount rate is decreased from 10% to lower values. This strongly affects the overall cost of hydrogen via a reduction in cost of finance for the GW scale nuclear plant. The magnitude of this difference in LCOH across all nuclear-coupled technologies is due to the significant compound effect on cost that the discounting of cash-flow has on GW scale projects with a long payback period and operating life.

Overall it can been seen through Figure 2 that any small reduction in the discount rate translates to a large decrease on the cost of generated electricity and so the LCOH.

[4] This assumes that the nuclear SOE values are divided by the offshore SOE values.
[5] BEIS data assumes a fixed discount rate of 10% for hydrogen production systems.

4.2 Water-electrolysis technologies

Across all calculations described in Section 2, ignoring the discount rate used for GW scale nuclear hydrogen production, differences in the LCOH are observed between the hydrogen producing technology-coupling assumed, and for each coupling over time.

As shown in Figure 3 of Section 3, for both 4 and 9.5% discount rates, and while initially less competitive than alkaline technologies, PEM technologies out-perform alkaline technologies from 2033 for GW scale nuclear technologies at a 4% discount rate. In this comparison SOE technologies also appear to outperform both alkaline and PEM technologies at all time periods with the 4 and 9.5% discount rate.

These findings at a glance appear congruent with the maturity of these technologies. Alkaline methods are currently much more mature than PEM and SOE, with SOE technologies only becoming commercially available in recent years, and in the near-term less mature than PEM technologies [7]. All reductions in the LCOH of technologies over time are assumed due to an expected technical improvement in efficiency of operation or of manufacture, leading to a reduced cost per MWh installed in OPEX or CAPEX costs respectively. However, it is possible that the differences between the technologies represent an overestimate of the potential of SOE technologies in the near-term relating to a lack of available performance data for this technology at scale.

A key finding of the data which may account for possible discrepancies to the maturity-cost trend in high-technology cost, low discount rate scenarios, is that the cost of installation and operation of hydrogen technologies is a larger component of the overall LCOH at 4% than at 9.5%. This adds a premium to the LCOH such that when coupled with GW scale nuclear technologies, the difference in price for any hydrogen technology used is notably smaller.

While this levelling effect could be impacted if a nuclear discounting partially applies to hydrogen technologies at scale, this initial calculation suggests all described water-splitting technologies that could be coupled to a GW scale nuclear power source appear worthy of further investigation.

4.3 Comparison of GW Scale Nuclear with other Low-Carbon Technologies

The reduction in cost that GW scale new build stands to benefit from the RAB funding model is only relevant for hydrogen produced at scale if it can be shown that GW scale nuclear produced hydrogen is competitive within the low carbon energy market.

Figure 4 presents the data for the levelised cost of GW scale nuclear derived hydrogen for discount rates of 4% and 9.5% in conjunction with the LCOH when coupled with other low carbon technologies. These results show that at a 4% discount rate from 2033, the LCOH of GW scale nuclear derived hydrogen is similar to the LCOH up to 2033 generated by renewable sources.

This analysis excludes further likely cost savings and is drawing on existing BEIS data wholly, and hence shows that the RAB model alone could greatly affect the LCOH for GW scale nuclear technologies such that they become similar to other low-carbon technologies. Further cost savings via 'learning-by-doing' in current and future reactor builds in the UK could result in a further reduction in the levelised cost of GW scale nuclear derived hydrogen.

Additionally, the data for GW scale nuclear produced electricity used is based on estimates for FOAK GW scale nuclear and does not reflect the possibility of SMRs and AMRs to give a lower overnight capital cost per kW, leading to a lower LCOH. Lower overnight costs could also result in a secondary lowering in the LCOH through a reduced cost of insurance, ratio of equity to debt, and interest rates which could further reduce the price point of nuclear derived electricity, and so nuclear derived hydrogen.

There are also wider whole system benefits to the use of technologies which utilise nuclear power. These include security of supply, insulation from the effects of a changes in international energy markets, and in the case of hydrogen: efficiencies derived from having all electrolysers associated with an energy source in relative proximity to one another, and ready access to water for electrolysis following desalination from nuclear plants (due to typical proximity to the coast). These benefits also could be explored as part of a wider investigation which includes whole system modelling.

5. Conclusions

1. High-level calculations for the LCOH derived from GW scale nuclear power have been produced at discount rates from 3.5 to 10% inclusive. These estimates suggest that LCOH for GW scale nuclear derived hydrogen could be cost competitive with other low-carbon production routes when a discount rate of 4% is assumed.
2. The discount rate increases the LCOH at all time periods in a close to linear dependency from discount rates of 4 to 10%. The greatest decreases in LCOH over time are seen at higher discount rates. At low discount rates LCOH are more similar, especially when CAPEX and OPEX costs are considered.
3. At a 4% discount rate for GW scale nuclear derived electricity, all coupled electrolyser technologies could produce hydrogen at similar LCOH values, particularly in the mid to long term. Thus, all described water-splitting technologies which could be coupled to a GW scale nuclear power source appear worthy of further investigation.

Key results from all calculations are presented in Table 1 below.

These estimates are based on a limited set of assumptions and further work will be needed to explore alternative scenarios and provide more robust estimates. As a minimum these will consider further coupling scenarios such as thermochemical hydrogen production methods, and SMR and AMR nuclear technology couplings for which there is no BEIS published data at present.

Table 1 - LCOH for Varying Hydrogen Technologies Couplings (£/MWh H_2 (HHV))

Technology Coupling	2028	2048
GW scale nuclear (9.5% DR) Alkaline	152.1	123.2
GW scale nuclear (9.5% DR) PEM	154.0	120.4
GW scale nuclear (9.5% DR) SOE	134.1	102.7
GW scale nuclear (4% DR) Alkaline	90.4	80.0
GW scale nuclear (4% DR) PEM	90.7	77.1
GW scale nuclear (4% DR) SOE	87.9	71.1
Offshore Wind coupled SOE	100.8	70.1
Steam Methane Reformation + CCUS	50.7	54.6
Autothermal Reformation + CCUS	50.7	51.8

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Acronyms

ATR – Autothermal Reformation
BEIS – Department for Business, Energy and Industrial Strategy
CCUS – Carbon Capture, Usage and Storage
DR – Discount Rate
FOAK – First of a Kind
G4ECONS – Generation IV Excel Calculation of Nuclear Systems (GIF Economic Tool)
GIF – Generation IV (Four) Forum
GW – Gigawatt (scale nuclear reactors)
HEEP – Hydrogen Economic Evaluation Program
IAEA – International Atomic Energy Agency
LCOE – Levelised Cost of Electricity
LCOH – Levelised Cost of Hydrogen
RAB – Regulated Asset Base
SMR – Small Modular Reactor
SMR – Steam Methane Reformation *(Used in* Figure 4*, and in* Table 1*)*
SOE – Solid Oxide Electrolysis
WACC – Weighted Average Cost of Capital

Annex A

Efficiency of conversion from Electricity to Hydrogen for Alkaline, PEM & SOE Technologies

Table 2 - Efficiency of Conversion from Electricity to Hydrogen for Alkaline, SOE & PEM Technologies

			Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
			2020	2025	2030	2035	2040	2045	2050	2020	2025	2030	2035	2040	2045	2050	2020	2025	2030	2035	2040	2045	2050
Electrical conversion efficiency (kWhe/ kWh H2 HHV)*	kWh electric input per kWh H2 HHV output	Low Cost	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.9
		Medium	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.0	1.0	0.9	0.9	0.9	0.9	0.9
		High Cost	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.6	1.5	1.4	1.4	1.3	1.3	1.3	1.0	1.0	1.0	1.0	0.9	0.9	0.9

Table 3 - Efficiency of Conversion from Electricity to Hydrogen for Alkaline, SOE & PEM Technologies (Interpolated to 2028-2058)

			Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
			2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
Electrical conversion efficiency (kWhe/ kWh H2 HHV)*	kWh electric input per kWh H2 HHV output	Low Cost	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.9
		Medium	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.2	1.2	1.2	1.2	1.2	0.9	0.9	0.9	0.9	0.9	0.9	0.9
		High Cost	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.0	1.0	0.9	0.9	0.9	0.9	0.9

CAPEX & OPEX Costs of Hydrogen Technology per MWh

Table 4 - Sum of CAPEX & OPEX Costs for Hydrogen Technology (£/MWh H2 (HHV))

	ALK							PEM							SOE						
	2020	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Lower	16.7	14.4	13.0	12.6	12.1	12.1	12.0	19.6	14.4	11.8	11.2	10.7	10.3	10.2	34.5	26.5	22.7	21.5	20.4	20.0	19.6
Central	19.8	18.0	16.8	16.4	16.1	15.9	15.7	24.0	17.5	14.7	13.9	13.2	13.1	12.9	45.5	36.5	30.8	28.3	25.7	24.8	23.9
Upper	27.1	24.5	23.4	22.7	22.0	21.7	21.4	39.6	32.0	27.4	25.2	23.2	22.5	21.9	65.6	55.7	47.8	45.2	41.8	40.9	40.0

Table 5 - Sum of CAPEX & OPEX Costs for Hydrogen Technology (£/MWh H2 (HHV)) (Interpolated to 2028-2058)

	ALK							PEM							SOE						
	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
Lower	13.6	12.7	12.3	12.1	12.0	12.0	12.0	12.9	11.4	10.9	10.5	10.2	10.2	10.2	24.2	22.0	20.9	20.2	19.8	19.6	19.6
Central	17.3	16.6	16.2	16.0	15.8	15.7	15.7	15.8	14.2	13.5	13.1	13.0	12.9	12.9	33.1	29.3	26.8	25.2	24.3	23.9	23.9
Upper	23.8	23.0	22.3	21.8	21.5	21.4	21.4	29.3	26.1	24.0	22.8	22.2	21.9	21.9	50.9	46.2	43.1	41.3	40.3	40.0	40.0

LCOH at Varying Discount Rates, Including Results of Interpolation for 4% Discount Value

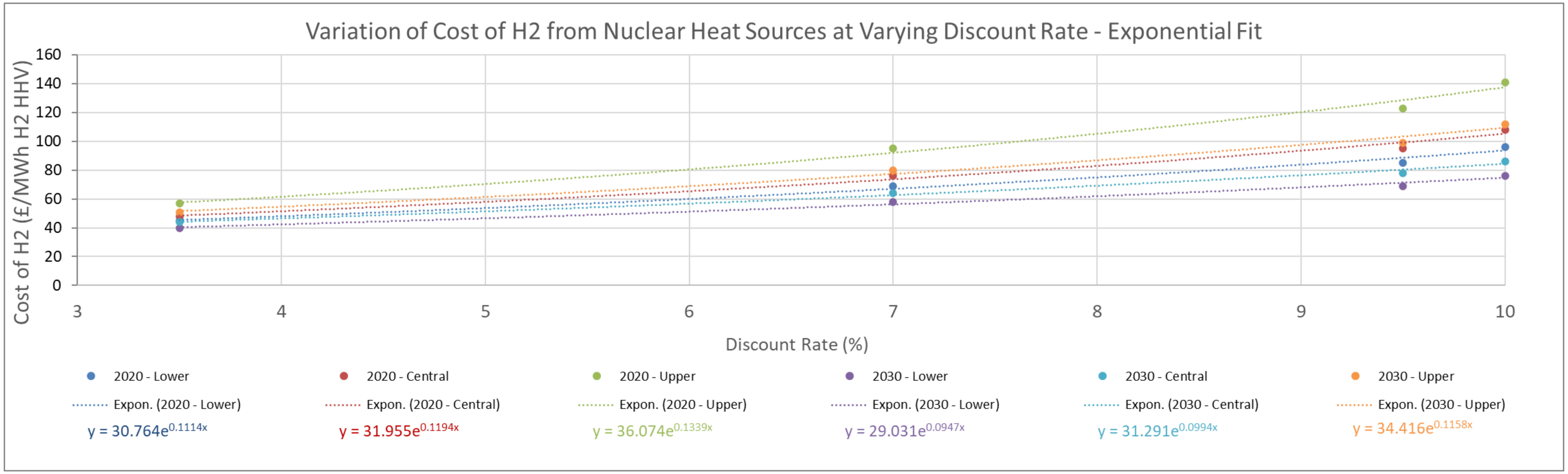

Figure 5 - Variation of Cost of Hydrogen from GW scale nuclear Heat Sources at Varying Discount Rate

LCOE from GW scale nuclear FOAK PWR - No Inflation, and no change in value after 2030

Table 6 - LCOE from GW scale nuclear FOAK PWR - at 2016 Values, and with no change in value after 2030 (From Electricity Generating Costs)

		2025 (2033)	2030 (2038)	2035 (2043)	2040 (2048)	2045 (2053)	2050 (2058)
3.5	High	57	51	51	51	51	51
	Central	48	44	44	44	44	44
	Low	45	40	40	40	40	40
4	High	61.6	54.7	54.7	54.7	54.7	54.7
	Central	51.5	46.6	46.6	46.6	46.6	46.6
	Low	48.0	42.4	42.4	42.4	42.4	42.4
6	High	80.6	68.9	68.9	68.9	68.9	68.9
	Central	65.4	56.8	56.8	56.8	56.8	56.8
	Low	60.0	51.2	51.2	51.2	51.2	51.2
7	High	95	80	80	80	80	80
	Central	76	64	64	64	64	64
	Low	69	58	58	58	58	58
9.5	High	123	99	99	99	99	99
	Central	95	78	78	78	78	78
	Low	85	69	69	69	69	69
10	High	141	112	112	112	112	112
	Central	108	86	86	86	86	86
	Low	96	76	76	76	76	76

LCOE from GW scale nuclear FOAK PWR – Inflation Added, and no change in value after 2030

Table 7 - LCOE from GW scale nuclear FOAK PWR - inflated to 2020 values, and with no change in value after 2030

		2025 (2033)	2030 (2038)	2035 (2043)	2040 (2048)	2045 (2053)	2050 (2058)
3.5	**High**	64.3	57.5	57.5	57.5	57.5	57.5
	Central	54.1	49.6	49.6	49.6	49.6	49.6
	Low	50.7	45.1	45.1	45.1	45.1	45.1
4	**High**	69.5	61.7	61.7	61.7	61.7	61.7
	Central	58.1	52.5	52.5	52.5	52.5	52.5
	Low	54.2	47.8	47.8	47.8	47.8	47.8
6	**High**	90.8	90.8	77.7	77.7	77.7	77.7
	Central	73.7	73.7	64.0	64.0	64.0	64.0
	Low	67.7	67.7	57.8	57.8	57.8	57.8
7	**High**	107.1	90.2	90.2	90.2	90.2	90.2
	Central	85.7	72.2	72.2	72.2	72.2	72.2
	Low	77.8	65.4	65.4	65.4	65.4	65.4
9.5	**High**	138.7	111.6	111.6	111.6	111.6	111.6
	Central	107.1	87.9	87.9	87.9	87.9	87.9
	Low	95.8	77.8	77.8	77.8	77.8	77.8
10	**High**	159.0	126.3	126.3	126.3	126.3	126.3
	Central	121.8	97.0	97.0	97.0	97.0	97.0
	Low	108.2	85.7	85.7	85.7	85.7	85.7

LCOH Data Tables for Central 4 and 9.5% Values

Table 8 - LCOH for GW scale nuclear Derived Hydrogen at 4% Discount Rate, and Central Technology and Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**
£/MWh H2 HHV output	**Low**	87.7	86.4	79.0	78.7	78.5	78.4	78.4	85.2	82.6	74.7	74.1	73.1	72.9	72.9	84.6	80.3	72.6	70.8	69.8	69.4	69.4
	Medium	90.4	88.9	81.1	80.5	80.0	79.7	79.7	90.7	87.3	78.6	77.6	77.1	76.9	76.9	87.9	83.0	74.4	72.3	71.1	70.6	70.6
	High	100.8	98.3	88.8	87.6	86.8	86.4	86.4	99.7	94.8	84.3	82.7	81.9	81.6	81.6	89.7	85.0	76.6	74.8	73.7	73.3	73.3

For Reference: This table is identical to Table 23 *in Annex B.*

Table 9 - LCOH for GW scale nuclear Derived Hydrogen at 9.5% Discount Rate, and Central Technology and Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**
£/MWh H2 HHV output	**Low**	147.1	145.4	121.4	121.0	120.8	120.7	120.7	143.8	140.4	116.0	115.3	113.7	113.4	113.4	128.2	123.4	103.5	101.6	100.5	100.1	100.1
	Medium	152.1	150.0	124.9	124.0	123.2	123.0	123.0	154.0	149.0	122.5	121.1	120.4	120.1	120.1	134.1	128.2	106.6	104.2	102.7	102.1	102.1
	High	171.3	167.3	137.7	135.9	134.6	134.1	134.1	170.6	162.8	132.1	129.7	128.4	127.9	127.9	137.5	132.1	110.3	108.2	107.0	106.6	106.6

For Reference: This table is identical to Table 50 *in Annex B.*

Annex B

The data in Annex B is organised in the structure shown in Figure 6, with each box representing an overarching heading, and sub-headings for that heading being represented by each respective internal box.

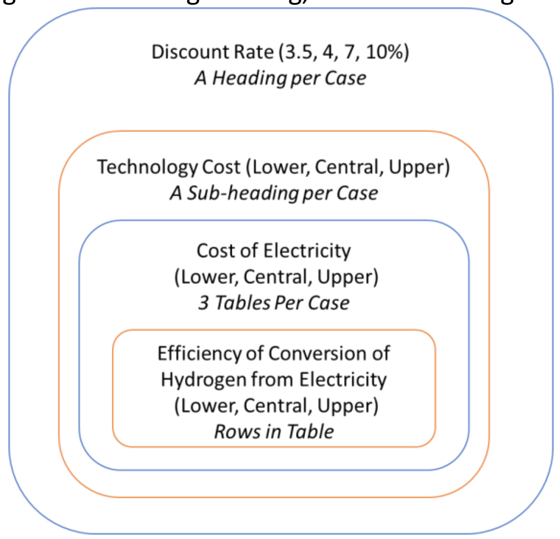

Figure 6 - Diagram representing the organisation of the calculated data for all possible variations in estimate.

3.5% Discount Rate

Upper Technology Cost

Table 10 - LCOH for GW scale nuclear Derived Hydrogen at 3.5% Discount Rate, at an Upper Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	85.3	84.0	76.2	75.7	75.4	75.3	75.3	89.9	85.9	76.6	75.2	73.8	73.5	73.5	96.0	90.8	82.5	80.4	79.4	79.0	79.0
	Medium	87.7	86.1	78.0	77.2	76.6	76.4	76.4	94.7	90.0	79.9	78.2	77.3	76.9	76.9	98.8	93.1	84.1	81.8	80.6	80.1	80.1
	High	96.8	94.4	84.6	83.4	82.5	82.1	82.1	102.6	96.5	84.8	82.6	81.4	80.9	80.9	100.4	94.9	86.0	83.8	82.8	82.4	82.4

Table 11 - LCOH for GW scale nuclear Derived Hydrogen at 3.5% Discount Rate, at an Upper Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	89.4	88.1	81.6	81.1	80.8	80.6	80.6	93.9	89.9	81.8	80.4	79.0	78.6	78.6	99.0	93.8	86.4	84.4	83.4	83.0	83.0
	Medium	92.0	90.4	83.6	82.8	82.1	81.9	81.9	99.1	94.2	85.5	83.7	82.8	82.4	82.4	102.0	96.2	88.2	85.8	84.6	84.1	84.1
	High	101.6	99.1	90.8	89.5	88.6	88.2	88.2	107.5	101.2	90.9	88.6	87.3	86.8	86.8	103.7	98.1	90.3	88.1	87.0	86.6	86.6

Table 12 - LCOH for GW scale nuclear Derived Hydrogen at 3.5% Discount Rate, at an Upper Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	101.7	100.3	91.1	90.5	90.2	90.1	90.1	106.1	101.8	91.0	89.6	88.0	87.6	87.6	108.0	102.7	93.3	91.2	90.2	89.8	89.8
	Medium	104.7	103.0	93.3	92.5	91.8	91.5	91.5	112.2	107.0	95.3	93.4	92.4	92.0	92.0	111.6	105.6	95.4	92.9	91.6	91.1	91.1
	High	116.2	113.4	101.7	100.3	99.2	98.8	98.8	122.1	115.2	101.5	99.0	97.7	97.1	97.1	113.6	107.9	97.8	95.6	94.5	94.0	94.0

Central Technology Cost

Table 13 - LCOH for GW scale nuclear Derived Hydrogen at 3.5% Discount Rate, at a Central Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	78.8	77.6	70.2	69.8	69.6	69.6	69.6	76.4	74.0	66.1	65.5	64.6	64.4	64.4	78.1	73.9	66.1	64.4	63.4	63.0	63.0
	Medium	81.1	79.8	72.0	71.4	70.9	70.7	70.7	81.3	78.1	69.4	68.5	68.1	67.9	67.9	81.0	76.2	67.7	65.7	64.5	64.0	64.0
	High	90.2	88.0	78.5	77.5	76.7	76.4	76.4	89.1	84.6	74.3	72.9	72.2	71.9	71.9	82.6	78.0	69.6	67.8	66.7	66.3	66.3

Table 14 - LCOH for GW scale nuclear Derived Hydrogen at 3.5% Discount Rate, at a Central Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	82.9	81.7	75.6	75.2	75.0	75.0	75.0	80.5	78.0	71.3	70.8	69.8	69.6	69.6	81.1	76.8	70.0	68.3	67.3	66.9	66.9
	Medium	85.4	84.0	77.5	76.9	76.4	76.2	76.2	85.6	82.3	75.0	74.0	73.6	73.4	73.4	84.1	79.3	71.8	69.7	68.5	68.0	68.0
	High	95.1	92.7	84.8	83.6	82.8	82.5	82.5	94.0	89.3	80.4	78.9	78.1	77.8	77.8	85.9	81.2	73.9	72.0	71.0	70.5	70.5

Table 15 - LCOH for GW scale nuclear Derived Hydrogen at 3.5% Discount Rate, at a Central Technology Cost and an Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	95.1	93.9	85.0	84.6	84.5	84.4	84.4	92.6	89.9	80.5	79.9	78.8	78.6	78.6	90.1	85.8	76.9	75.2	74.1	73.7	73.7
	Medium	98.2	96.6	87.3	86.6	86.1	85.8	85.8	98.7	95.1	84.8	83.7	83.2	83.0	83.0	93.7	88.7	79.0	76.8	75.5	75.0	75.0
	High	109.7	107.0	95.7	94.4	93.5	93.1	93.1	108.7	103.3	91.0	89.4	88.5	88.1	88.1	95.8	90.9	81.4	79.5	78.4	78.0	78.0

Lower Technology Cost

Table 16 - LCOH for GW scale nuclear Derived Hydrogen at 3.5% Discount Rate, at a Lower Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	75.0	73.8	66.3	65.9	65.8	65.8	65.8	73.5	71.2	63.4	62.9	61.9	61.7	61.7	69.3	66.6	60.2	59.4	58.9	58.7	58.7
	Medium	77.4	75.9	68.0	67.5	67.1	66.9	66.9	78.3	75.3	66.8	65.8	65.3	65.2	65.2	72.1	68.9	61.8	60.7	60.0	59.7	59.7
	High	86.5	84.1	74.6	73.6	72.9	72.7	72.7	86.2	81.8	71.7	70.3	69.5	69.2	69.2	73.7	70.7	63.7	62.8	62.2	62.0	62.0

Table 17 - LCOH for GW scale nuclear Derived Hydrogen at 3.5% Discount Rate, at a Lower Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	79.1	77.8	71.7	71.3	71.2	71.2	71.2	77.5	75.2	68.7	68.1	67.1	66.9	66.9	72.3	69.6	64.1	63.3	62.8	62.6	62.6
	Medium	81.7	80.1	73.6	73.0	72.6	72.4	72.4	82.7	79.5	72.3	71.4	70.9	70.7	70.7	75.3	72.0	65.9	64.7	64.0	63.7	63.7
	High	91.3	88.9	80.9	79.7	79.0	78.7	78.7	91.1	86.5	77.8	76.2	75.4	75.1	75.1	77.0	73.9	68.0	67.0	66.5	66.2	66.2

Table 18 - LCOH for GW scale nuclear Derived Hydrogen at 3.5% Discount Rate, at a Lower Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	91.4	90.0	81.1	80.7	80.6	80.6	80.6	89.7	87.1	77.9	77.3	76.1	75.9	75.9	81.3	78.5	71.0	70.1	69.6	69.4	69.4
	Medium	94.4	92.8	83.4	82.7	82.2	82.1	82.1	95.8	92.3	82.1	81.1	80.5	80.3	80.3	84.9	81.4	73.1	71.8	71.0	70.7	70.7
	High	105.9	103.2	91.8	90.5	89.7	89.4	89.4	105.8	100.5	88.4	86.7	85.8	85.4	85.4	86.9	83.7	75.5	74.5	73.9	73.7	73.7

4% Discount Rate

Upper Technology Cost

Table 19 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 4% Discount Rate, at an Upper Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	89.5	88.1	79.5	78.9	78.6	78.5	78.5	94.0	89.9	79.7	78.3	76.9	76.6	76.6	99.0	93.8	84.9	82.8	81.8	81.4	81.4
	Medium	92.0	90.4	81.4	80.6	79.9	79.7	79.7	99.1	94.3	83.2	81.5	80.6	80.2	80.2	102.0	96.2	86.6	84.2	83.0	82.5	82.5
	High	101.7	99.2	88.3	87.0	86.1	85.8	85.8	107.5	101.2	88.5	86.2	84.9	84.5	84.5	103.8	98.2	88.6	86.4	85.3	84.9	84.9

Table 20 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 4% Discount Rate, at an Upper Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	94.2	92.8	85.1	84.5	84.2	84.1	84.1	98.7	94.5	85.2	83.8	82.3	81.9	81.9	102.5	97.2	89.0	86.9	85.9	85.5	85.5
	Medium	96.9	95.3	87.2	86.3	85.7	85.4	85.4	104.2	99.2	89.1	87.3	86.3	85.9	85.9	105.7	99.9	90.8	88.4	87.2	86.7	86.7
	High	107.3	104.7	94.8	93.5	92.5	92.1	92.1	113.2	106.7	94.8	92.4	91.1	90.6	90.6	107.6	101.9	93.0	90.8	89.8	89.3	89.3

Table 21 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 4% Discount Rate, at an Upper Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	108.0	106.5	96.1	95.5	95.2	95.0	95.0	112.3	108.0	95.9	94.4	92.8	92.4	92.4	112.6	107.3	96.9	94.8	93.8	93.4	93.4
	Medium	111.3	109.5	98.5	97.6	96.9	96.6	96.6	118.9	113.6	100.4	98.5	97.5	97.1	97.1	116.5	110.4	99.1	96.6	95.3	94.8	94.8
	High	123.7	120.7	107.5	105.9	104.9	104.4	104.4	129.7	122.5	107.2	104.5	103.1	102.6	102.6	118.7	112.9	101.7	99.5	98.4	97.9	97.9

Central Technology Cost

Table 22 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 4% Discount Rate, at a Central Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	82.9	81.7	73.4	73.1	72.9	72.8	72.8	80.5	78.0	69.2	68.7	67.7	67.5	67.5	81.2	76.9	68.5	66.7	65.7	65.3	65.3
	Medium	85.4	84.0	75.3	74.7	74.2	74.0	74.0	85.7	82.4	72.8	71.8	71.4	71.2	71.2	84.2	79.3	70.2	68.1	66.9	66.4	66.4
	High	95.1	92.8	82.3	81.2	80.4	80.1	80.1	94.1	89.3	78.0	76.5	75.7	75.4	75.4	85.9	81.3	72.2	70.3	69.3	68.8	68.8

Table 23 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 4% Discount Rate, at a Central Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	87.7	86.4	79.0	78.7	78.5	78.4	78.4	85.2	82.6	74.7	74.1	73.1	72.9	72.9	84.6	80.3	72.6	70.8	69.8	69.4	69.4
	Medium	90.4	88.9	81.1	80.5	80.0	79.7	79.7	90.7	87.3	78.6	77.6	77.1	76.9	76.9	87.9	83.0	74.4	72.3	71.1	70.6	70.6
	High	100.8	98.3	88.8	87.6	86.8	86.4	86.4	99.7	94.8	84.3	82.7	81.9	81.6	81.6	89.7	85.0	76.6	74.8	73.7	73.3	73.3

Table 24 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 4% Discount Rate, at a Central Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	101.5	100.2	90.0	89.6	89.4	89.3	89.3	98.8	96.1	85.4	84.8	83.6	83.4	83.4	94.8	90.4	80.5	78.8	77.7	77.3	77.3
	Medium	104.7	103.1	92.4	91.7	91.1	90.9	90.9	105.4	101.7	89.9	88.8	88.3	88.1	88.1	98.6	93.5	82.7	80.6	79.3	78.7	78.7
	High	117.2	114.4	101.4	100.1	99.1	98.7	98.7	116.2	110.6	96.7	94.9	93.9	93.5	93.5	100.9	96.0	85.3	83.4	82.3	81.9	81.9

Lower Technology Cost

Table 25 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 4% Discount Rate, at a Lower Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	79.2	77.9	69.5	69.2	69.1	69.0	69.0	77.6	75.2	66.6	66.0	65.0	64.8	64.8	72.3	69.6	62.6	61.7	61.2	61.0	61.0
	Medium	81.7	80.2	71.4	70.8	70.4	70.2	70.2	82.8	79.6	70.1	69.2	68.7	68.5	68.5	75.3	72.0	64.3	63.1	62.4	62.1	62.1
	High	91.4	88.9	78.4	77.3	76.6	76.3	76.3	91.1	86.5	75.3	73.8	73.0	72.7	72.7	77.0	74.0	66.3	65.3	64.8	64.5	64.5

Table 26 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 4% Discount Rate, at a Lower Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	83.9	82.6	75.1	74.8	74.7	74.6	74.6	82.3	79.8	72.1	71.5	70.4	70.2	70.2	75.8	73.1	66.7	65.8	65.3	65.1	65.1
	Medium	86.7	85.1	77.2	76.6	76.1	76.0	76.0	87.8	84.5	75.9	74.9	74.4	74.2	74.2	79.0	75.7	68.5	67.3	66.6	66.3	66.3
	High	97.1	94.5	84.9	83.7	82.9	82.6	82.6	96.8	92.0	81.7	80.1	79.2	78.9	78.9	80.9	77.7	70.7	69.8	69.2	69.0	69.0

Table 27 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 4% Discount Rate, at a Lower Technology Cost and an Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	97.7	96.3	86.1	85.7	85.6	85.6	85.6	95.9	93.3	82.7	82.1	80.9	80.7	80.7	85.9	83.1	74.7	73.7	73.2	73.0	73.0
	Medium	101.0	99.3	88.5	87.8	87.3	87.1	87.1	102.5	98.9	87.3	86.2	85.6	85.4	85.4	89.8	86.2	76.9	75.5	74.7	74.4	74.4
	High	113.4	110.5	97.5	96.2	95.3	95.0	95.0	113.3	107.8	94.0	92.2	91.2	90.8	90.8	92.0	88.7	79.4	78.4	77.8	77.6	77.6

6% Discount Rate

Upper Technology Cost

Table 28 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 6% Discount Rate, at an Upper Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	105.8	104.4	91.4	90.8	90.5	90.4	90.4	110.1	105.8	91.3	89.9	88.3	88.0	88.0	111.0	105.7	93.6	91.5	90.4	90.0	90.0
	Medium	109.0	107.2	93.7	92.8	92.1	91.9	91.9	116.6	111.3	95.6	93.7	92.7	92.4	92.4	114.8	108.7	95.6	93.1	91.9	91.3	91.3
	High	121.1	118.2	102.1	100.6	99.6	99.2	99.2	127.1	120.0	101.9	99.4	98.0	97.5	97.5	116.9	111.1	98.0	95.8	94.7	94.3	94.3

Table 29 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 6% Discount Rate, at an Upper Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	113.2	111.7	98.9	98.3	98.0	97.9	97.9	117.4	113.0	98.7	97.2	95.5	95.1	95.1	116.4	111.0	99.0	96.9	95.9	95.5	95.5
	Medium	116.7	114.8	101.4	100.5	99.8	99.5	99.5	124.4	118.9	103.4	101.4	100.4	100.0	100.0	120.5	114.3	101.3	98.8	97.5	96.9	96.9
	High	129.9	126.7	110.8	109.2	108.1	107.6	107.6	135.9	128.4	110.4	107.7	106.3	105.7	105.7	122.9	117.0	104.0	101.7	100.6	100.2	100.2

Table 30 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 6% Discount Rate, at an Upper Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	133.9	132.2	115.3	114.6	114.3	114.2	114.2	137.8	133.1	114.6	113.1	111.2	110.8	110.8	131.6	126.0	111.0	108.8	107.7	107.3	107.3
	Medium	138.1	136.1	118.3	117.3	116.5	116.2	116.2	146.5	140.4	120.3	118.2	117.1	116.7	116.7	136.6	130.1	113.7	111.1	109.6	109.1	109.1
	High	154.4	150.8	129.7	127.9	126.6	126.1	126.1	160.5	152.1	128.8	125.8	124.2	123.6	123.6	139.5	133.3	117.0	114.7	113.5	113.0	113.0

Central Technology Cost

Table 31 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 6% Discount Rate, at a Central Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	99.3	98.0	85.3	85.0	84.8	84.7	84.7	96.7	93.9	80.9	80.2	79.1	78.9	78.9	93.2	88.8	77.2	75.4	74.4	74.0	74.0
	Medium	102.5	100.9	87.6	86.9	86.4	86.2	86.2	103.1	99.4	85.1	84.1	83.5	83.3	83.3	96.9	91.8	79.2	77.1	75.8	75.3	75.3
	High	114.6	111.8	96.1	94.8	93.9	93.5	93.5	113.6	108.1	91.4	89.7	88.8	88.5	88.5	99.1	94.2	81.6	79.7	78.7	78.2	78.2

Table 32 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 6% Discount Rate, at a Central Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	106.6	105.3	92.9	92.4	92.3	92.2	92.2	103.9	101.1	88.2	87.5	86.3	86.1	86.1	98.6	94.1	82.6	80.8	79.8	79.4	79.4
	Medium	110.1	108.4	95.4	94.6	94.1	93.8	93.8	110.9	107.0	92.9	91.8	91.2	91.0	91.0	102.7	97.4	84.9	82.7	81.4	80.9	80.9
	High	123.3	120.4	104.7	103.3	102.4	102.0	102.0	122.4	116.5	99.9	98.0	97.1	96.7	96.7	105.0	100.0	87.6	85.7	84.6	84.1	84.1

Table 33 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 6% Discount Rate, at a Central Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	127.3	125.8	109.2	108.8	108.6	108.5	108.5	124.3	121.2	104.1	103.4	102.0	101.7	101.7	113.7	109.1	94.6	92.7	91.7	91.2	91.2
	Medium	131.6	129.7	112.3	111.4	110.8	110.5	110.5	133.0	128.5	109.8	108.6	107.9	107.7	107.7	118.8	113.2	97.3	95.0	93.6	93.0	93.0
	High	147.9	144.4	123.6	122.0	120.8	120.4	120.4	147.1	140.2	118.3	116.2	115.0	114.6	114.6	121.7	116.4	100.6	98.6	97.4	97.0	97.0

Lower Technology Cost

Table 34 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 6% Discount Rate, at a Lower Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**
£/MWh H2 HHV output	**Low**	95.5	94.1	81.4	81.1	81.0	80.9	80.9	93.7	91.1	78.2	77.6	76.4	76.2	76.2	84.3	81.5	71.3	70.4	69.9	69.7	69.7
	Medium	98.7	97.0	83.7	83.0	82.6	82.4	82.4	100.2	96.6	82.5	81.4	80.8	80.6	80.6	88.1	84.5	73.3	72.0	71.3	71.0	71.0
	High	110.8	108.0	92.1	90.9	90.1	89.7	89.7	110.7	105.3	88.8	87.1	86.1	85.8	85.8	90.2	86.9	75.7	74.7	74.1	73.9	73.9

Table 35 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 6% Discount Rate, at a Lower Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**
£/MWh H2 HHV output	**Low**	102.9	101.4	88.9	88.6	88.5	88.4	88.4	101.0	98.3	85.5	84.9	83.6	83.4	83.4	89.7	86.8	76.8	75.8	75.3	75.1	75.1
	Medium	106.4	104.6	91.5	90.7	90.2	90.1	90.1	108.0	104.2	90.2	89.1	88.5	88.3	88.3	93.8	90.1	79.0	77.7	76.9	76.6	76.6
	High	119.6	116.5	100.8	99.4	98.5	98.2	98.2	119.5	113.7	97.2	95.4	94.4	94.0	94.0	96.1	92.8	81.7	80.7	80.0	79.8	79.8

Table 36 - LCOH for GW scale nuclear Derived Hydrogen at an Interpolated 6% Discount Rate, at a Lower Technology Cost and an Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**
£/MWh H2 HHV output	**Low**	123.6	122.0	105.3	104.9	104.8	104.8	104.8	121.4	118.4	101.5	100.8	99.3	99.0	99.0	104.8	101.8	88.7	87.7	87.2	86.9	86.9
	Medium	127.9	125.8	108.4	107.5	107.0	106.7	106.7	130.1	125.7	107.2	105.9	105.2	105.0	105.0	109.9	105.9	91.5	90.0	89.1	88.7	88.7
	High	144.1	140.5	119.7	118.1	117.0	116.6	116.6	144.1	137.4	115.7	113.5	112.3	111.9	111.9	112.8	109.1	94.7	93.6	92.9	92.7	92.7

7% Discount Rate

Upper Technology Cost

Table 37 - LCOH for GW scale nuclear Derived Hydrogen at a 7% Discount Rate, at an Upper Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	118.1	116.5	100.5	99.9	99.6	99.5	99.5	122.2	117.8	100.2	98.8	97.1	96.7	96.7	120.0	114.6	100.2	98.1	97.0	96.6	96.6
	Medium	121.7	119.8	103.1	102.1	101.4	101.1	101.1	129.6	124.0	105.0	103.1	102.1	101.6	101.6	124.3	118.1	102.5	100.0	98.6	98.1	98.1
	High	135.7	132.4	112.6	111.0	109.9	109.4	109.4	141.7	134.0	112.2	109.5	108.0	107.5	107.5	126.8	120.8	105.3	103.0	101.9	101.4	101.4

Table 38 - LCOH for GW scale nuclear Derived Hydrogen at a 7% Discount Rate, at an Upper Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	127.7	126.0	108.6	108.0	107.7	107.6	107.6	131.7	127.0	108.1	106.6	104.8	104.4	104.4	127.0	121.5	106.1	103.9	102.9	102.5	102.5
	Medium	131.7	129.7	111.5	110.5	109.7	109.4	109.4	139.8	134.0	113.4	111.4	110.3	109.9	109.9	131.8	125.4	108.7	106.0	104.7	104.1	104.1
	High	147.0	143.5	122.0	120.3	119.0	118.6	118.6	153.1	144.9	121.3	118.5	116.9	116.3	116.3	134.5	128.4	111.7	109.4	108.3	107.8	107.8

Table 39 - LCOH for GW scale nuclear Derived Hydrogen at a 7% Discount Rate, at an Upper Technology Cost and an Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	153.6	151.8	130.2	129.5	129.2	129.1	129.1	157.3	152.3	129.1	127.6	125.5	125.0	125.0	146.0	140.3	121.8	119.6	118.5	118.1	118.1
	Medium	158.6	156.3	133.7	132.6	131.7	131.4	131.4	167.5	160.9	135.8	133.5	132.4	131.9	131.9	152.0	145.2	125.0	122.2	120.8	120.2	120.2
	High	177.8	173.7	146.9	144.9	143.4	142.8	142.8	184.1	174.7	145.6	142.4	140.6	139.9	139.9	155.4	149.0	128.8	126.4	125.2	124.7	124.7

Central Technology Cost

Table 40 - LCOH for GW scale nuclear Derived Hydrogen at a 7% Discount Rate, at a Central Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	111.5	110.1	94.5	94.0	93.9	93.8	93.8	108.8	105.9	89.7	89.1	87.9	87.6	87.6	102.1	97.7	83.8	82.0	81.0	80.6	80.6
	Medium	115.2	113.5	97.0	96.3	95.7	95.5	95.5	116.2	112.1	94.6	93.4	92.8	92.6	92.6	106.5	101.2	86.1	83.9	82.6	82.1	82.1
	High	129.1	126.1	106.6	105.2	104.2	103.8	103.8	128.2	122.1	101.7	99.8	98.8	98.4	98.4	109.0	103.9	88.9	86.9	85.8	85.4	85.4

Table 41 - LCOH for GW scale nuclear Derived Hydrogen at a 7% Discount Rate, at a Central Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	121.1	119.6	102.6	102.1	101.9	101.9	101.9	118.2	115.2	97.6	97.0	95.6	95.4	95.4	109.1	104.6	89.7	87.9	86.8	86.4	86.4
	Medium	125.1	123.3	105.4	104.6	104.0	103.7	103.7	126.3	122.1	102.9	101.7	101.1	100.9	100.9	113.9	108.5	92.3	90.0	88.6	88.1	88.1
	High	140.5	137.2	115.9	114.4	113.3	112.9	112.9	139.6	133.1	110.8	108.8	107.7	107.3	107.3	116.7	111.5	95.3	93.3	92.2	91.7	91.7

Table 42 - LCOH for GW scale nuclear Derived Hydrogen at a 7% Discount Rate, at a Central Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	147.1	145.4	124.1	123.7	123.5	123.4	123.4	143.8	140.4	118.7	117.9	116.3	116.0	116.0	128.2	123.4	105.4	103.6	102.5	102.0	102.0
	Medium	152.1	150.0	127.7	126.7	126.0	125.7	125.7	154.0	149.0	125.3	123.9	123.1	122.9	122.9	134.1	128.2	108.6	106.2	104.7	104.1	104.1
	High	171.3	167.3	140.9	139.0	137.7	137.2	137.2	170.6	162.8	135.1	132.7	131.4	130.9	130.9	137.5	132.1	112.4	110.4	109.2	108.7	108.7

Lower Technology Cost

Table 43 - LCOH for GW scale nuclear Derived Hydrogen at a 7% Discount Rate, at a Lower Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**
£/MWh H2 HHV output	**Low**	107.8	106.3	90.5	90.2	90.1	90.0	90.0	105.8	103.1	87.1	86.5	85.2	84.9	84.9	93.3	90.4	77.9	77.0	76.5	76.3	76.3
	Medium	111.5	109.6	93.1	92.4	91.9	91.7	91.7	113.3	109.3	91.9	90.8	90.1	89.9	89.9	97.6	93.9	80.2	78.9	78.1	77.7	77.7
	High	125.4	122.2	102.7	101.3	100.4	100.0	100.0	125.3	119.3	99.1	97.2	96.1	95.7	95.7	100.1	96.6	83.0	81.9	81.3	81.1	81.1

Table 44 - LCOH for GW scale nuclear Derived Hydrogen at a 7% Discount Rate, at a Lower Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**
£/MWh H2 HHV output	**Low**	117.4	115.8	98.6	98.2	98.1	98.1	98.1	115.3	112.4	95.0	94.3	92.9	92.7	92.7	100.3	97.3	83.8	82.9	82.3	82.1	82.1
	Medium	121.4	119.4	101.5	100.7	100.2	99.9	99.9	123.4	119.3	100.3	99.1	98.4	98.2	98.2	105.1	101.2	86.4	85.0	84.1	83.8	83.8
	High	136.7	133.3	112.0	110.5	109.5	109.1	109.1	136.7	130.3	108.2	106.1	105.0	104.6	104.6	107.8	104.2	89.4	88.3	87.7	87.4	87.4

Table 45 - LCOH for GW scale nuclear Derived Hydrogen at a 7% Discount Rate, at a Lower Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**	**2028**	**2033**	**2038**	**2043**	**2048**	**2053**	**2058**
£/MWh H2 HHV output	**Low**	143.3	141.5	120.2	119.8	119.7	119.6	119.6	140.9	137.6	116.0	115.3	113.6	113.3	113.3	119.3	116.1	99.6	98.5	98.0	97.7	97.7
	Medium	148.3	146.1	123.8	122.9	122.2	121.9	121.9	151.1	146.2	122.7	121.2	120.4	120.2	120.2	125.3	121.0	102.8	101.2	100.2	99.8	99.8
	High	167.5	163.4	136.9	135.1	133.9	133.4	133.4	167.7	160.0	132.5	130.0	128.7	128.2	128.2	128.7	124.8	106.5	105.3	104.7	104.4	104.4

9.5% Discount Rate

Upper Technology Cost

Table 46 - LCOH for GW scale nuclear Derived Hydrogen at a 9.5% Discount Rate, at an Upper Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	139.9	138.2	115.4	114.7	114.4	114.3	114.3	143.8	139.0	114.7	113.2	111.3	110.8	110.8	136.0	130.4	111.0	108.8	107.8	107.4	107.4
	Medium	144.5	142.3	118.4	117.4	116.6	116.3	116.3	152.9	146.7	120.4	118.3	117.2	116.8	116.8	141.4	134.7	113.8	111.1	109.7	109.1	109.1
	High	161.6	157.8	129.8	128.0	126.7	126.1	126.1	167.8	159.0	128.9	125.9	124.3	123.7	123.7	144.4	138.1	117.0	114.7	113.6	113.1	113.1

Table 47 - LCOH for GW scale nuclear Derived Hydrogen at a 9.5% Discount Rate, at an Upper Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	153.6	151.8	127.5	126.8	126.5	126.4	126.4	157.3	152.3	126.5	125.0	122.9	122.4	122.4	146.0	140.3	119.9	117.7	116.6	116.2	116.2
	Medium	158.6	156.3	131.0	129.8	129.0	128.6	128.6	167.5	160.9	133.0	130.8	129.6	129.1	129.1	152.0	145.2	123.0	120.2	118.7	118.2	118.2
	High	177.8	173.7	143.8	141.8	140.4	139.8	139.8	184.1	174.7	142.6	139.4	137.6	137.0	137.0	155.4	149.0	126.7	124.3	123.1	122.6	122.6

Table 48 - LCOH for GW scale nuclear Derived Hydrogen at a 9.5% Discount Rate, at an Upper Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	191.9	189.7	155.8	155.1	154.8	154.7	154.7	195.0	189.5	154.1	152.5	150.0	149.5	149.5	174.0	168.1	140.5	138.2	137.1	136.7	136.7
	Medium	198.4	195.6	160.2	158.9	157.9	157.5	157.5	208.2	200.6	162.3	159.9	158.5	158.0	158.0	181.8	174.3	144.5	141.5	139.9	139.2	139.2
	High	223.2	218.1	176.5	174.1	172.4	171.7	171.7	229.7	218.4	174.5	170.8	168.7	167.9	167.9	186.2	179.3	149.2	146.6	145.4	144.9	144.9

Central Technology Cost

Table 49 - LCOH for GW scale nuclear Derived Hydrogen at a 9.5% Discount Rate, at a Central Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	133.4	131.8	109.3	108.9	108.7	108.6	108.6	130.3	127.1	104.2	103.5	102.1	101.8	101.8	118.2	113.5	94.6	92.8	91.7	91.3	91.3
	Medium	137.9	135.9	112.4	111.5	110.8	110.6	110.6	139.4	134.8	109.9	108.6	108.0	107.7	107.7	123.5	117.8	97.4	95.0	93.6	93.1	93.1
	High	155.1	151.4	123.7	122.1	120.9	120.5	120.5	154.3	147.1	118.4	116.3	115.1	114.6	114.6	126.6	121.2	100.6	98.6	97.5	97.0	97.0

Table 50 - LCOH for GW scale nuclear Derived Hydrogen at a 9.5% Discount Rate, at a Central Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	147.1	145.4	121.4	121.0	120.8	120.7	120.7	143.8	140.4	116.0	115.3	113.7	113.4	113.4	128.2	123.4	103.5	101.6	100.5	100.1	100.1
	Medium	152.1	150.0	124.9	124.0	123.2	123.0	123.0	154.0	149.0	122.5	121.1	120.4	120.1	120.1	134.1	128.2	106.6	104.2	102.7	102.1	102.1
	High	171.3	167.3	137.7	135.9	134.6	134.1	134.1	170.6	162.8	132.1	129.7	128.4	127.9	127.9	137.5	132.1	110.3	108.2	107.0	106.6	106.6

Table 51 - LCOH for GW scale nuclear Derived Hydrogen at a 9.5% Discount Rate, at a Central Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	185.3	183.4	149.8	149.2	149.1	149.0	149.0	181.5	177.6	143.6	142.8	140.8	140.5	140.5	156.2	151.2	124.1	122.2	121.0	120.6	120.6
	Medium	191.8	189.3	154.2	153.1	152.2	151.8	151.8	194.7	188.8	151.8	150.2	149.3	149.0	149.0	163.9	157.4	128.1	125.4	123.8	123.1	123.1
	High	216.6	211.7	170.5	168.2	166.6	166.0	166.0	216.2	206.5	164.0	161.1	159.5	158.9	158.9	168.3	162.3	132.8	130.6	129.3	128.8	128.8

Lower Technology Cost

Table 52 - LCOH for GW scale nuclear Derived Hydrogen at a 9.5% Discount Rate, at a Lower Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	129.7	128.0	105.4	105.0	104.9	104.8	104.8	127.4	124.3	101.6	100.9	99.4	99.1	99.1	109.3	106.2	88.7	87.8	87.2	87.0	87.0
	Medium	134.2	132.1	108.4	107.6	107.0	106.8	106.8	136.5	132.0	107.3	106.0	105.3	105.0	105.0	114.6	110.5	91.5	90.0	89.1	88.8	88.8
	High	151.3	147.6	119.8	118.2	117.1	116.7	116.7	151.4	144.3	115.8	113.6	112.4	111.9	111.9	117.7	114.0	94.8	93.6	93.0	92.7	92.7

Table 53 - LCOH for GW scale nuclear Derived Hydrogen at a 9.5% Discount Rate, at a Lower Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	143.3	141.5	117.5	117.1	117.0	116.9	116.9	140.9	137.6	113.4	112.7	111.0	110.7	110.7	119.3	116.1	97.6	96.6	96.0	95.8	95.8
	Medium	148.3	146.1	121.0	120.1	119.4	119.2	119.2	151.1	146.2	119.9	118.5	117.7	117.4	117.4	125.3	121.0	100.7	99.1	98.2	97.8	97.8
	High	167.5	163.4	133.8	132.0	130.8	130.3	130.3	167.7	160.0	129.5	127.1	125.7	125.2	125.2	128.7	124.8	104.4	103.2	102.5	102.3	102.3

Table 54 - LCOH for GW scale nuclear Derived Hydrogen at a 9.5% Discount Rate, at a Lower Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	181.6	179.5	145.8	145.3	145.2	145.2	145.2	178.6	174.8	141.0	140.2	138.1	137.8	137.8	147.3	143.9	118.2	117.1	116.5	116.3	116.3
	Medium	188.1	185.4	150.2	149.2	148.4	148.0	148.0	191.8	186.0	149.2	147.5	146.6	146.3	146.3	155.1	150.1	122.2	120.4	119.3	118.8	118.8
	High	212.9	207.9	166.5	164.3	162.8	162.2	162.2	213.3	203.7	161.4	158.5	156.8	156.2	156.2	159.5	155.1	126.9	125.6	124.8	124.5	124.5

10% Discount Rate

Upper Technology Cost

Table 55 - LCOH for GW scale nuclear Derived Hydrogen at a 10% Discount Rate, at an Upper Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	155.0	153.1	124.8	124.1	123.8	123.7	123.7	158.6	153.6	123.9	122.4	120.3	119.9	119.9	147.0	141.3	117.9	115.7	114.6	114.2	114.2
	Medium	160.1	157.7	128.2	127.1	126.2	125.9	125.9	168.9	162.3	130.2	128.0	126.9	126.4	126.4	153.1	146.2	121.0	118.2	116.7	116.2	116.2
	High	179.4	175.3	140.7	138.7	137.3	136.8	136.8	185.7	176.2	139.6	136.4	134.7	134.0	134.0	156.5	150.0	124.5	122.2	121.0	120.5	120.5

Table 56 - LCOH for GW scale nuclear Derived Hydrogen at a 10% Discount Rate, at an Upper Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	171.4	169.4	138.3	137.6	137.3	137.2	137.2	174.8	169.5	137.0	135.5	133.2	132.7	132.7	159.0	153.2	127.7	125.5	124.4	124.0	124.0
	Medium	177.1	174.6	142.1	140.9	140.0	139.6	139.6	186.4	179.4	144.2	141.9	140.6	140.1	140.1	165.8	158.7	131.2	128.3	126.8	126.2	126.2
	High	198.9	194.3	156.3	154.1	152.6	151.9	151.9	205.2	195.0	154.8	151.3	149.5	148.8	148.8	169.7	163.0	135.3	132.8	131.6	131.1	131.1

Table 57 - LCOH for GW scale nuclear Derived Hydrogen at a 10% Discount Rate, at an Upper Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	216.4	214.2	173.4	172.6	172.3	172.2	172.2	219.2	213.4	171.2	169.5	166.8	166.2	166.2	192.1	185.9	153.3	151.0	149.8	149.4	149.4
	Medium	223.9	220.9	178.3	176.9	175.8	175.4	175.4	234.4	226.2	180.5	177.9	176.4	175.9	175.9	200.9	193.1	157.8	154.6	152.9	152.2	152.2
	High	252.4	246.7	196.8	194.1	192.2	191.4	191.4	259.0	246.6	194.3	190.2	188.0	187.1	187.1	206.0	198.7	163.1	160.5	159.2	158.7	158.7

Central Technology Cost

Table 58 - LCOH for GW scale nuclear Derived Hydrogen at a 10% Discount Rate, at a Central Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	148.4	146.8	118.7	118.3	118.1	118.0	118.0	145.1	141.7	113.4	112.7	111.1	110.8	110.8	129.2	124.4	101.5	99.6	98.6	98.1	98.1
	Medium	153.5	151.4	122.1	121.2	120.5	120.2	120.2	155.4	150.4	119.7	118.3	117.6	117.4	117.4	135.2	129.3	104.6	102.1	100.7	100.1	100.1
	High	172.9	168.9	134.6	132.9	131.6	131.1	131.1	172.2	164.3	129.1	126.7	125.5	125.0	125.0	138.6	133.1	108.1	106.1	104.9	104.4	104.4

Table 59 - LCOH for GW scale nuclear Derived Hydrogen at a 10% Discount Rate, at a Central Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	164.8	163.0	132.2	131.7	131.6	131.5	131.5	161.3	157.6	126.5	125.8	124.0	123.7	123.7	141.2	136.3	111.3	109.4	108.3	107.9	107.9
	Medium	170.5	168.2	136.0	135.1	134.3	133.9	133.9	172.9	167.5	133.7	132.2	131.4	131.1	131.1	148.0	141.8	114.8	112.3	110.7	110.1	110.1
	High	192.3	187.9	150.2	148.2	146.8	146.3	146.3	191.8	183.1	144.3	141.7	140.3	139.7	139.7	151.8	146.1	118.9	116.7	115.5	115.0	115.0

Table 60 - LCOH for GW scale nuclear Derived Hydrogen at a 10% Discount Rate, at a Central Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	209.9	207.8	167.3	166.7	166.5	166.5	166.5	205.8	201.5	160.7	159.8	157.6	157.2	157.2	174.2	169.0	136.9	134.9	133.7	133.3	133.3
	Medium	217.4	214.5	172.3	171.1	170.1	169.7	169.7	220.9	214.3	170.0	168.2	167.2	166.8	166.8	183.1	176.2	141.4	138.6	136.9	136.2	136.2
	High	245.8	240.3	190.7	188.2	186.4	185.7	185.7	245.5	234.7	183.8	180.5	178.8	178.1	178.1	188.1	181.8	146.7	144.4	143.1	142.6	142.6

Lower Technology Cost

Table 61 - LCOH for GW scale nuclear Derived Hydrogen at a 10% Discount Rate, at a Lower Technology Cost and Lower Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	144.7	142.9	114.8	114.4	114.3	114.3	114.3	142.2	138.9	110.8	110.0	108.4	108.1	108.1	120.3	117.1	95.6	94.6	94.1	93.8	93.8
	Medium	149.8	147.5	118.2	117.3	116.7	116.4	116.4	152.5	147.6	117.1	115.7	114.9	114.7	114.7	126.3	122.0	98.7	97.1	96.2	95.8	95.8
	High	169.1	165.0	130.7	129.0	127.8	127.3	127.3	169.3	161.5	126.4	124.1	122.8	122.3	122.3	129.8	125.9	102.3	101.1	100.4	100.1	100.1

Table 62 - LCOH for GW scale nuclear Derived Hydrogen at a 10% Discount Rate, at a Lower Technology Cost and Central Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	161.1	159.2	128.3	127.8	127.7	127.7	127.7	158.4	154.8	123.9	123.1	121.3	121.0	121.0	132.3	129.0	105.5	104.4	103.8	103.6	103.6
	Medium	166.8	164.4	132.1	131.2	130.5	130.2	130.2	170.0	164.7	131.0	129.5	128.7	128.4	128.4	139.1	134.5	108.9	107.2	106.2	105.8	105.8
	High	188.6	184.1	146.3	144.3	143.0	142.5	142.5	188.9	180.3	141.6	139.0	137.6	137.0	137.0	143.0	138.8	113.0	111.7	111.0	110.7	110.7

Table 63 - LCOH for GW scale nuclear Derived Hydrogen at a 10% Discount Rate, at a Lower Technology Cost and Upper Electricity Cost

		Alkaline							Proton Exchange Membrane (PEM)							Solid Oxide Electrolysis (SOE)						
		2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058	2028	2033	2038	2043	2048	2053	2058
£/MWh H2 HHV output	Low	206.1	203.9	163.4	162.8	162.7	162.7	162.7	202.8	198.7	158.1	157.2	154.9	154.5	154.5	165.3	161.7	131.0	129.9	129.2	129.0	129.0
	Medium	213.6	210.7	168.3	167.2	166.3	165.9	165.9	218.0	211.5	167.4	165.5	164.5	164.1	164.1	174.2	168.9	135.5	133.6	132.3	131.9	131.9
	High	242.1	236.4	186.8	184.3	182.6	181.9	181.9	242.6	231.9	181.2	177.9	176.1	175.4	175.4	179.3	174.5	140.8	139.4	138.6	138.3	138.3

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