

The following questions were posed during the dissemination webinar for Net Zero South Wales on 17th June 2020. Regen, WPD and WWU have given their responses below:

	Webinar question	Answer
1	What are the biggest technical issues around allowing more biogas into the grid or hydrogen?	<p>Regen: There is a good report from the CCC on this: https://www.theccc.org.uk/wp-content/uploads/2018/11/Hydrogen-in-a-low-carbon-economy.pdf</p> <p>Also we refer to this report: https://www.theiet.org/impact-society/sectors/energy/energy-news/transitioning-to-hydrogen-assessing-the-engineering-risks-and-uncertainties/</p> <p>WWU: There is a coordinated programme by all gas distribution and transmission networks to deliver the world's first net zero gas grid – this is called Gas Goes Green. There are a number of workstreams, including overcoming the technical challenges of increasing biomethane entry and hydrogen transformation: https://www.energynetworks.org/assets/files/GGG_Launch_Doc_FINAL.pdf</p>
2	following the second poll, how does this work show or quantify the economic benefits to Wales?	<p>Regen: This project is feeding into a National Grid project which is assessing that impact in detail. https://www.zero2050.co.uk/</p>
3	In considering the network maps have you looked at where hydrogen electrolyzers might be accommodated on both electric and gas networks	<p>Regen: In our scenarios electrolysis plants are located these close to industrial and heavy transport demand.</p>

	Webinar question	Answer
4	Can you please describe how the work you've done compliments (or materially differs from) the previous ENA gas net-zero pathways report?	<p>This report explores three heat pathways from High Electrification to High Hydrogen in South Wales.</p> <p>WWU: The ENA report looks specifically at gas decarbonisation in a maximised electrification scenario and a balanced scenario to inform a strategic grid-scale transition approach. The Pathways report considered the GB-wide analysis, with some regional variation to take into account locations which may see accelerated hydrogen development and others which may further develop a long term biomethane strategy. This top-down work has informed a balanced, least cost whole system approach. The programme of action stemming from Pathways is called Gas Goes Green and details can be found via the link above.</p> <p>This work in south Wales takes a bottom-up, local area energy planning approach, with the High Hydrogen scenario representing more closely what Pathways presented.</p>
5	For later I suspect, but have you considered situations when it may make sense to invest in one network where it benefits another? Can you transfer the money saved from electricity to gas customers or vice versa?	<p>Regen: We have projected an increase in flexible and cross network technologies that benefit both - but this would be an interesting area for the future.</p>
6	On Electricity network, is there any direction to work on DC to improve efficiency?	<p>WPD: WPD are currently undertaking a project called DC-Share, which looks at DC network solutions to facilitate rapid EV charging equipment. More information here: https://www.westernpower.co.uk/innovation/projects/dc-share</p>
7	Why so much focus on 2050 and not a range of net zero target dates? Scientists predict tipping points and chaos much sooner than that, eg NOAA predict Blue Water in the Arctic as soon as 2035.	<p>Regen: We worked to 2050 but note that the FES 2020 will be looking at scenarios that go faster than this.</p>
8	Have WPD or W&W considered future RAB models for CO2 networks and or blended/100% H2 networks. Do they have an appetite for this? Have potential investments been discussed to progress this as part of an overall decarbonisation solution? Do they	<p>WWU: A RAB approach has, and continues to be, considered for new and upgraded hydrogen networks – this has been assessed in detail as part of H21. Wales & West Utilities, as a transporter of gaseous material, is in a position to consider a role in CO₂ networks linking industry, hydrogen production and export (via pipeline or shipping</p>

	Webinar question	Answer
	see themselves being involved in framing these solutions?	to storage). New operators are also likely for CO2 pipelines associated with capture and storage solutions.
9	Would be good to get Olly's view of the approach in this blog piece, perhaps off line Thanks https://www.activebuildingcentre.com/news/activating-our-constrained-local-electricity-grids/	WPD: Happy to discuss if you could contact wpdinnovation@westernpower.co.uk (FAO Oli Spink)
10	Hearing a lot about this concept of consenting infrastructure and then building gen when needs arise. But who pays and what threshold of certainty is needed to make this happen?	Regen: We have been working on the www.chargingfutures.com process and the cost of who pays for network upgrades is an interesting question. We are keen to see the constraint issue unlocked.
11	many rural areas aren't connected to gas and will need to rely on solar for much of the carbon reduction but often grid limits stop this when greater use on export limiters could allow buildings to achieve this are wpd working on plans for this we have a number of sites for this and would be willing to work with wpd on designing this option	WPD: We offer export limiting schemes as part of a suite of alternative connections. Please visit the page below for more information: https://www.westernpower.co.uk/connections-landing/connection-offers-and-agreements/alternative-connections
12	For Bethan: Would it be much easier to inject H2 in one or a very few locations rather than having injection very distributed?	WWU: At present there are a lot of approaches to delivering hydrogen networks on the table. These options may be narrowed down by feasibility studies and trials, for example work looking into whether the National Transmission System can transport hydrogen The ongoing Zero 2050 South Wales project has a work package dedicated to hydrogen which explores some of the options for hydrogen in this region. In determining the optimal whole system solution, there are wide ranging considerations, such as the relative ease of capturing carbon or co-locating storage, security of supply, implications for system operation and in the case of hydrogen produced through electrolysis from constrained generation the location of renewable generation and capacity constraints on the electricity networks.
13	Given the present high cost and relative technical complexity of heat pumps and the potential for	Regen: We recognise that there is no clear pathway for heat at present which is why the scenarios project three pathways for heat, but we note in Core Hydrogen that

	Webinar question	Answer
	times of excess renewable energy on the system, how do you think the balance of heat pumps to resistive heating and heat storage with hybrid gas might play out and are incentives/regulation needed to get the most efficient long term outcome for zero carbon considering network investments.	<p>there may in reality be a patchwork of solutions. We also developed a hybrid sensitivity.</p> <p>In terms of efficient network investment, scenarios play a key role in this – another important area is the review of network charging. www.chargingfutures.com</p> <p>WWU: Hybrid systems in homes that have a heat storage option (hot water cylinder or otherwise), could easily access the same grid signals as the heat pump to take advantage of cheap renewable electricity when it is available for direct heating for storage – optimised beneath the household and local network capacity ceilings. The zero carbon gas part of the hybrid can provide space heat and hot water during peak times of heat demand and when renewable generation is low, which is a higher whole-system efficiency outcome than back-up gas generation to operate the heat pump and deliver direct heating of the hot water cylinder.</p>
14	What work would be required to allow hydrogen to be safely used for domestic heating and is it clear whether it would be cost competitive with electrification of heat?	<p>Regen: There are many variables at play, firstly the thermal efficiency/performance of the property needs to be good for both electricity and hydrogen fuelled heating technologies.</p> <p>Within a unit rate cost of delivered hydrogen, there is consideration of the method of production, transportation, storage and end metered delivery to the property (domestic or non). There are various studies being undertaken for what the future of a hydrogen economy would look like, including the Gas Markets Plan being led by National Grid.</p>
15	Do you think your DFES in any way diverges from NG's FES presumptions?	<p>Regen: We have been steered by NG's FES 2019 but it differs particularly for Core Hydrogen where we consider a combined approach. As discussed in the webinar, we have also had to develop our own view of Net Zero compliant scenarios, drawing on the NG FES 2019 sensitivity and the CCC's Further Ambition scenario. The FES 2020 framework is set to have 3 out of 4 Net Zero compliant scenarios, which heavily link to the scenarios we have developed, e.g. the High Electrification scenario may be comparable to the FES 2020 Consumer Transformation scenario and the High Hydrogen scenario maybe comparable to the System Transformation scenario.</p>

	Webinar question	Answer
16	To what extent are Local Authority energy plans (where they exist) helpful?	<p>Regen: These are likely to be increasingly useful and helpful and would feed directly into DFES. For future DFES assessments Regen is set to develop an even more proactive dialogue with Local Authorities around local energy plans, as well as new development data exchanges and engagement around our interim pipeline analysis etc. via further workshops and webinars.</p> <p>WWU: Clearly, a whole-system GB-wide strategy needs to be set as a foundation for local area energy plans to build upon with their own resource advantages, demand settings and network capabilities for gas and electricity.</p>
17	On the scenarios, to what extent do you take into account what is connected at transmission? It feels like the 'state' of transmission would affect the ability to distribution grids to export, or indeed provide flex services to transmission.	<p>Regen: We have not included demand or supply connected at transmission, but this is a key question for the National Grid study. https://www.zero2050.co.uk/</p>
18	Could you clarify which large users were excluded from the scenarios in South Wales? What % of regional demand do these large users account for?	<p>Regen: We cannot disclose the users excluded but the scope of the study was elements connected to the gas or electricity distribution network – as a result we know there were two transmission connected power stations excluded, also excluded are potential future transmission-connected projects like Swansea Bay Tidal Lagoon.</p> <p>In addition, a further CCGT power station has been excluded. This is connected to the WWU gas distribution network but exports onto the electricity transmission system. We understand that this power station is a very significant part of WWU gas demand in the region.</p>
19	How do you derive your break down figures between air-source and ground-source heat pumps in all the scenarios?	<p>Regen: We aim to be broadly consistent with the National Grid FES and Committee on Climate Change's national net zero scenarios, while reflecting the South Wales region specifically.</p> <p>As a result, ASHPs outweigh GSHPs in each scenario, however through analysis of the South Wales housing stock and baseline of current heat pump installations through the RHI scheme, ground source heat pumps do feature more heavily in these South Wales net zero scenarios than the aforementioned national scenarios.</p>
20	To what extent are the two hydrogen scenarios dependent on the steel sector?	<p>Regen: They are not dependent on steel but we do project the industrial clusters to be a baseload from which the hydrogen network could grow.</p>

	Webinar question	Answer
21	Poppy What assumptions have you made about building retrofits to reduce energy demand for heat in your assessment of scenarios	Regen: All stock is retrofitted with energy efficiency measures by 2050, to ensure the vast majority of housing stock has an EPC of an A or B. Depending on the scenario, between 20% and 40% of homes receive 'deep retrofit' whole house efficiency measures by 2050.
22	Hydrogen is so far out in the future, what would you expect to do in the meantime for 15 years if the the high hydrogen option is selected? Do you just accept that the heat carbon mountain just gets bigger and steeper? How would you address all the buildings constructed during that 15 year period.	Regen: We have noted that the decisions need to be made as soon as possible for heat - and that energy efficiency on existing and new homes is no regrets first step for all scenarios. We project in here that all new homes from 2025 have low carbon heat. WWU: Hybrid heating systems can be installed without energy efficiency being a prerequisite. These can genuinely 'soak-up' renewable electricity as enough become available and be backed up by an increasingly decarbonising gas grid. Hybrid present a lower cumulative emission pathway then either full hydrogen or full heat pumps.
23	How is the H2 produced in your scenarios, and if it is Blue H2 how is the CO2 dealt with in the region?	Regen: This is a question for the National Grid transmission analysis. We have projected a small amount of hydrogen from electrolysis produced locally. WWU: Wales & West Utilities' HyHy Project (Hybrid Hydrogen) has used the UKCCC net zero assumptions of 85% blue and 15% green. Hybrid deployment with hydrogen improves CCUS logistics by reducing the volume of CO ₂ produced and therefore reducing the number of carbon shipments out of South Wales, recognising some is envisaged being used in carbon recycling/CCU industries. Route planning for CO ₂ out of south Wales include Liverpool Bay, North Sea (GB/Norway) and further afield, including the USA.
24	How closely are the D(E)NOs feeding into the Welsh Govt regional energy plans which will drive a lot of Welsh energy policy. Given a likely focus on regional / local decision making, these links are critical so there needs to be continuity, technical, economic competence etc. Are we confident regional energy plans will be up to the job?	Regen: Regen have been involved in the project on regional energy plans. The projections for this study (particularly for renewable generation) were aligned with those as much as possible. WPD: WPD is actively engaging with local stakeholders in Wales to get feedback on and inform future DFES projections. As part of this exercise we capture the regional energy plans in our network modelling. We also understand the importance of helping to shape regional energy planning and are keen to engage with Welsh Government on this.

	Webinar question	Answer
		WWU: There will need to be further degrees of work into Welsh Government Regional Energy Planning to include profiles of supply and demand throughout the year to better understand asset utilisation, storage needs and overall system cost.
25	Is CHP from H2 expected to play a role in the future or does pricing preclude it (i.e. hydrogen too expensive to warrant power generation)?	Regen: Under the High Hydrogen scenario we have modelled the potential for some of the natural gas fired power generation sites connected now and/or across the 2020s, to decommission in the 2030s, then seek to recommission as hydrogen peaking generators in the 2040s, reaching c.380MW of installed capacity in the licence area by 2050. We fully recognise the potentially challenging business model of converting supplied hydrogen to power, as the unit rate for hydrogen will almost certainly be higher than natural gas today. So the value of selling the power as both a commodity p/kWh sale and separate commercial flexibility income could be the key factor that determines whether distributed hydrogen peaking generation is a viable model in the future.
26	Why would you favour two technologies - an ASHP and gas boiler, both with short design lives - rather than a GSHP (and heat storage). The latter option would give you lower peak loads, far more ability to shift load and give the householder the lowest cost/lowest carbon heat? It can all be funded by charging a connection fee to the ground array.	Regen: We try to ensure that our scenarios are broadly consistent with national net zero scenarios, such as the National Grid FES and the Committee on Climate Change 'Further Ambition' scenario, both of which favour ASHPs and gas/hydrogen boilers for the majority of houses. However, our scenarios for South Wales do feature a significant number of GSHPs, both as standalone installations and particularly in urban areas with apartment blocks, which have great potential for GSHP-heated communal heating systems and district heat networks. In the denser areas of Cardiff and Swansea, GSHP heat networks heat more buildings than ASHPs and gas boilers, especially in the High Electrification scenario.
27	What level of likelihood does WPD ascribe to mid wales generation assets not being able to connect to mid wales distribution going forward?	WPD: WPD are licence obligated to provide the least cost connection for any customers wishing to connect to our network. We are able to offer alternative connections for generation. This enables a customer to connect ahead of required reinforcement through agreeing to temporarily reduce their capacity requirements during certain conditions. It is also worth noting any Statement of Works restrictions in South Wales on our website at: www.westernpower.co.uk/our-network/statement-of-works
28	Has the potential for recovering heat from disused deep mines been considered or is this not feasible in Wales?	Regen: We have included the Caerau Colliery mine water heat project in Bridgend when considering the distribution of district heating.

	Webinar question	Answer
		<p>Beyond this, we have not used disused coal mines as a factor for distributing district heating. This is a consideration for future work, depending on the outcomes of these early projects, such as in Bridgend, Gateshead and County Durham.</p> <p>https://www2.groundstability.com/geothermal-energy-from-abandoned-coal-mines/</p>
29	did you take account of Heat Pump technology needing high levels of insulation? i.e. did you assume insulation would happen?	<p>Regen: Yes, we assumed ambitious levels of energy efficiency in every scenario, to provide continuous carbon and cost savings regardless of the technology and fuel used to decarbonise building heat. As a result, the vast majority of homes have the capability of utilising a heat pump for heating by 2050 in every scenario.</p>
30	Was there any role for district heating considered within these scenarios?	<p>Regen: Yes, four district heating technology variants are considered in the assessment for all scenarios:</p> <ul style="list-style-type: none"> • Heat network - GSHP • Heat network - biomass • Heat network - gas CHP • Heat network - gas boiler <p>This has been focussed on where there are plans in existence (e.g. Heat Network Deployment Unit or other planning information available) and also a consideration of net zero compliant fuels used out to 2050.</p>
31	For Jonty: Have you looked at different levels of deep-retrofit reducing heating demand.	<p>Regen: Depending on the scenario, between 20% and 40% of homes receive 'deep retrofit' whole house efficiency measures by 2050. This is imperative to provide continuous carbon and cost savings regardless of the technology and fuel used to decarbonise building heat.</p>
32	Is high hydrogen content gas supply technology for heating realistic in the time frames suggested?	<p>Regen: As noted in the webinar there are considerable unknowns, but research is being undertaken on this</p> <p>WWU: The ENA Pathways Project defined the zero carbon gas trajectory to meet net zero in a balanced energy system, which is realistically achievable (roughly equivalent to the High Hydrogen scenario in this project).</p>
33	How straightforward is it to inject hydrogen into gas networks and how much upgrade to the current pipe infrastructure would be needed to allow this to happen. I heard somewhere that the	<p>WWU: H21 has undertaken detailed studies to show that the existing gas network provides suitable capacity for delivery of hydrogen, which is a lower energy density gas than natural gas. The gas mains risk reduction programme is replacing existing pipes for plastic pipe. This not only improves safety but reduce leakage and is hydrogen-ready.</p>

	Webinar question	Answer
	<p>molecular size of hydrogen in comparison to Natural Gas could be a potential problem? Is this factored into cost assumptions in allocating hydrogen v electrification?</p>	<p>Wales & West Utilities' business plan outlines the delivery of a net zero-ready gas network by 2035. Areas converting to 100% hydrogen in advance of this date would need prioritisation in programming. Plastic networks are then significantly low cost to maintain.</p> <p>Also see the Gas Goes Green launch report and the workstream of actions that are being delivered on the back of the ENA Pathways to Net Zero report: https://www.energynetworks.org/assets/files/GGG_Launch_Doc_FINAL.pdf</p> <p>Regen: We have projected only energy delivered rather than energy density. However, we have noted that the energy density of hydrogen is lower than methane and therefore either the volume or pressure of gas that would need to be delivered in Core and High Hydrogen would be higher than today. We refer to this report: https://www.theiet.org/impact-society/sectors/energy/energy-news/transitioning-to-hydrogen-assessing-the-engineering-risks-and-uncertainties/</p>
	<p>What role do you think Advanced Thermal Technologies such as pyrolysis can play?</p>	<p>Regen: There is some of this projected for residual waste however for biomass we only assume electricity generation but note it could be used for either pyrolysis or for negative emissions.</p>
	<p>In considering hydrogen electrolyser production what were the assumptions around capital cost, full load hours, power & water costs. Recent work suggest a 500 Euro/kW capital for 4000h/yr at 30 Euro/MWh is required to reach parity with reformation</p>	<p>Regen: We did not make cost assumptions. These will be considered in the National Grid study.</p> <p>We made high level assumptions on to project electrolysis capacity which are detailed in the report.</p>
	<p>I'd be interested to hear from WWU and WPD how the scenarios have been/will be used in their RIIO 2 plans. What have you used them for, and in the case of WWU did it convince Ofgem on allowed revenues?</p>	<p>WPD: WPD has used DFES projections to inform the WPD Best View scenario which is used as an input to our RIIO-ED2 business plan submission.</p> <p>WWU: As part of our business plan WWU have taken account of previous research undertaken with Regen and other partners. We have included proposals for a net zero uncertainty mechanism in our Business Plan in chapter 13 – "Our net zero vision for 2035": https://www.wvutilities.co.uk/about-us/stakeholder-engagement/your-plan/</p>

	Webinar question	Answer
	Is the EV demand based on charging capacity or miles driven or both?	Regen: The energy demand for EVs is based on miles driven. For connections to the network assumptions are made as the utilisation factor of various types and sizes of chargers. There is more information about this in the report.
	What are your scenarios for improvement in housing thermal efficiency - i.e. the improvements in EPC ratings?	Regen: All stock is retrofitted with energy efficiency measures by 2050, to ensure the vast majority of housing stock has an EPC of an A or B. Depending on the scenario, between 20% and 40% of homes receive 'deep retrofit' whole house efficiency measures by 2050.
	Don't get me wrong this looks like great work, but who are these scenarios actually for though? Policy makers? I can't think of anything better as a way of figuring what might/should happen but with NG FES, your FES, CCC pathways positing new scenarios, are we in danger of scenario fatigue and how do we help policy makers stop being overwhelmed?	Regen: The primary audience for this study is the distribution networks. This applies the NG FES to their regions and so is not in conflict with it. WWU: It also takes account of regional plans from Local Authorities and other connections which the networks are already processing.
	Could the panel discuss the timing and complexity of making strategic decisions around electrification v hydrogen. When do we need the national strategy to enable a 2035 switch over and what will be the key decision factors?	Regen: As noted in the webinar we have assumed a switch over or switch off date by 2035. This assumes decisions will need to be made ahead of this. A national strategy is critical for decision making and is needed as soon as possible.
	How have the current changes in energy demand during the Covid crisis affected your thinking on future energy scenarios?	Regen: This has not been reflected but we note the National Grid FES will do a sensitivity on this for their 2020 analysis.
	can I ask how you supply heating in the high electrification scenario if the wind is not blowing, please?	Regen: This would be provided by the transmission system, non-wind renewables, hydrogen peaking or through fossil gas with CCUS.
	Jonty and Ray: if you had absolute power, what would you do to the network/system? Someone else can worry about how it is paid for, but what should happen?	Regen: Unfortunately we do not have absolute power! However, we do think that there should be more scope for strategic investment by the networks.
	Olli has just mentioned looking at whole system approach to the price control. Has OFGEM given any indication that it might move from a position where costs and benefits have to be contained with	WPD: Ofgem have committed to develop the Coordinated Adjustment Mechanism in line with other sectors for the start of RIIO-ED2, which should encourage a whole systems approach to strategic investment decisions.

	Webinar question	Answer
	a single vector and not allowing cross-subsidising	Coordinated Adjustment Mechanism (CAM) is a process by which licensees can apply to re-open a price control to transfer the responsibility and revenues for an output onto another party, who is able to deliver them most cost effectively. This will be consulted on later this year.
	Did you consider large scale pyrolysis of biomass for biochar, liquid synthetic fuel and synthetic gas? How would synthetic gas be distributed?	Regen: No but we did note that this would be an option potentially however there is also a potential to use biomass for negative emissions.
	Has you looked at the impact of transitioning to net zero on fuel poor customers ?	Regen: Cost was not considered but we did have different assumptions for social housing and higher levels of deep retrofit in these areas.
	have you factored in the energy efficiency of products (e.g. white goods) becoming better in your scenario?	Regen: Our scenarios follow the National Grid FES 2019 projections on this aspect.
	What's your view on voltage optimisers being installed in peoples homes to help reduce energy consumption?	Regen: We are aware these have benefits for some commercial users but have not considered them in a domestic setting. WPD: The Voltage Reduction Analysis Project run by WPD may be of interest, which investigated the effects of long term LV voltage reduction. More information here: https://www.westernpower.co.uk/innovation/projects/voltage-reduction-analysis
	There seem to be some very optimistic assumptions here on the transition to heat pumps and the mount of deep property retrofitting required to enable this. What makes you assume that homeowners are going to be willing to pay for and tolerate the domestic disruption during deep refits that will be necessary to achieve this?	Regen: To note we have produced scenarios not a forecast. We do not project consumer attitudes in this analysis but consider that tolerance of disruption would be related to the cost and associated benefit of works.
	Is there a need for a detailed dynamic simulation of the energy systems, on a par with weather/climate simulations, to assess the impact of the future options on network stability? Is there a role for AI to help the analysis? Maybe this is already	Regen: We have noted in the learnings that it would be useful to understand further how the changing climate might impact weather demand. WWU: Networks are developing new ways of analysing networks to take account of changing demand and supply patterns and increase interaction between the vectors.

	Webinar question	Answer
	being done - I'd be interested to know. Thanks.	
	How are Regen and the South Wales distribution networks looking to support the development of the South Wales Industrial Cluster?	Regen: As noted this is feeding into a National Grid study of which that is a part.
	Could we make all new cooking and water heating electric starting now?	Regen: We assume in the report that all heating and cooking for new homes is electric from 2025. This is consistent with the England policy and is currently being consulted on in Wales. https://www.energylivenews.com/2020/01/21/clean-energy-to-power-all-new-welsh-homes-from-2025/
	Has there been any innovation of connection PV + Network + EV + Storage that this region is working on?	Regen: Not that we are aware of. We discuss in the report that the current level of large battery connections are low – this is due to a transmission network constraint on dispatchable generation which has been in place since 2016 and is expected to last until late 2020s. WPD: WPD are currently undertaking a project called Multi Asset Demand Execution (MADE) to better understand the feasibility of managing and aggregating multiple energy assets, including EV, hybrid heating and PV. More information here: https://www.westernpower.co.uk/projects/multi-asset-demand-execution-made
	If the system actually reaches net zero (which means 0 fossil) what is the assumption about any residual carbon emissions in the system? Do they not exist, or do you offset by buying negative emissions (e.g. in agricultural land use change?) or by use Bioenergy with CCS?	Regen: The study projects a small residual emission mainly the carbon factor for hydrogen. We note that this is needed but not how it is delivered.
	do you reference anything on policy that is required to achieve these., because at the moment policy for heating will not achieve this there has been almost no movement in the last few years/	Regen: Our recommendations are mainly for distribution networks but we do note the importance of early decisions on heat.
	What are the main challenges stopping greater, quicker progress? I.e. how could the supply chain help?	Regen: We explore a number of recommendations around how we can accelerate the decarbonisation of heat in our latest “Decade to Make a Difference Paper”, available here:

	Webinar question	Answer
		https://www.regen.co.uk/wp-content/uploads/Regen-Heat-Paper-WEB2-Single-Page.pdf
	<p>Given that WPD can't invest in the network ahead of need to meet larger customer requirements, you have to wait for a connection application, how do you factor in such planned projects into your RIIO business plans?</p>	<p>Regen: We include the near term 'pipeline' of sites in our DFES projections, which accounts for the sites with an accepted connection offer but have not yet connected to the distribution network.</p> <p>WPD: When used in RIIO-ED2 business planning, the DFES projections help us identify where strategic reinforcement may be required. As we transition to a DSO, we will be utilising our network by contracting with customers to change their behaviour through Flexible Power to defer reinforcement which would traditionally require build solutions. That is not to say that we will not need to reinforce the network to deal with increased demand, and these will be localised depending on the particular plans for local areas.</p>
	<p>Interested in the bar chats you had of the three scenarios - could you talk through the changes from the 2040 to 2050 bars - seemed like you forecast a reduction in hydrogen (darker blue) in each scenario?</p>	<p>Regen: The majority of hydrogen conversion occurs between 2035 and 2040, but energy efficiency improvements in homes, buildings and industrial processes continue out to 2050. As a result, the amount of hydrogen energy delivered falls slightly between 2040 and 2050, while the number of connections remains similar.</p>