Written evidence submitted by Liverpool John Moores University

(ECO0017)

1 Introduction

[1] We, an independent academic research group comprised of Dr. Fan Zhang, Dr. Bin Gao, and Dr. Huifeng Bai from Liverpool John Moores University (LJMU), are conducting a project funded by Research England via LJMU. Our focus lies in investigating the use of hydrogen to achieve Net-Zero-Emission production within the Scottish Whiskey industry. Utilizing qualitative data collected through interviews with stakeholders, including both providers and users of hydrogen solutions, our project explores regional and sectoral attempts to reduce carbon emissions, aligning with the objectives set forth by the UK and other major economies. Through our evaluation and analysis, we aim to address critical questions in this call for evidence, including:

- What should be the underlying principles of the UK energy market?
- What are the major benefits that the UK should be seeking to deliver from energy market reform?
- What are the chief barriers to reform of the energy market and is the Government serious about addressing those?

[2] For the purpose of referencing the data from the interviews, we have anonymized the interviewees using codenames as detailed in Table 1. The quoted participants in this response include the managers (Rob, Chris, and Karl) of a hydrogen solution provider (HYDROSOL), and the owner (Tom) of a whiskey distillery (NEOWHISKEY) that has implemented the hydrogen solution.

Table 1: Codes of the Interviewees

Organisations	Roles	Nicknames	Codes
HYDROSOL	CEO	Rob	HR
	Director of Business	Chris	HC
	Director of Marketing	Karl	HK
NEOWHISKEY	Owner	Tom	NT

1. Response to Question 1 - What should be the underlying principles of the UK energy market?

- Sustainability

[3] The design of the energy market must be crafted with a dual focus on sustainability and economic growth, ensuring that environmental preservation and prosperity go hand in hand. This entails **promoting wider access to clean energy sources while fostering innovation and job creation** within the sector. Stakeholder engagement should be central, involving producers, consumers, regulators, and communities throughout the energy supply chain, facilitating transparency and addressing diverse interests. By prioritizing renewable energy adoption and minimizing environmental impact, the market can support both environmental preservation and

economic advancement, leading to a more sustainable and inclusive energy landscape. The evidence we've collected from the stakeholders reflect their commitment to this principle of sustainability and their desire for a more comprehensive approach (NT1).

NT1: In 2013, when we were talking about regenerative farming, about looking after our natural environment, about minimising waste, there weren't that many people doing that. So I think the good thing about doing something like this, when the world is kind of waking up to the challenge of global warming, that we are ahead of the game.

• Encouraging Innovations

[4] Innovations should be encouraged in both existing and new technology. The design of the energy market should facilitate long-term capital expenditure and investment in projects aimed at improving efficiency, maintaining competitiveness, and transitioning to renewable energy sources. **Lowering entry barriers** for smaller and more agile players is crucial to broadening market access and catering to niche markets, fostering diversity and innovation. Additionally, enabling the **development of brokerage services** for energy packages can efficiently match supply with demand from diverse stakeholders, promoting flexibility and optimization within the market. The evidence shown below demonstrates the call for support from the government in nurturing new innovations (NT2, HR1).

NT2 The largest one (challenge) I would think for anyone is cost. So, at the moment hydrogen is a new technology and all new technologies tend to be expensive, unproven. So for people to take the risk to go into hydrogen spending a lot of money, I think it's the unproven technology. It's the only real risk I see – cost.

HR1 Quite often the reaction is, well, it can't be that expensive. I can't afford that. Someone's got to get the government to do something about reducing the cost.

2 Response to Question 4 - What are the major benefits that the UK should be seeking to deliver from energy market reform?

[5] **Satisfy the need of smaller business owners**. Many small business owners aspire to portray a carbon-neutral image and prioritize corporate social responsibility and ethical production to meet the demands of increasingly conscientious consumers (NT3). While larger corporations possess greater resources to pursue these goals, smaller businesses often find themselves neglected due to **limited financial backing and access to information**. Nevertheless, evidence suggests that they possess a strong motivation to participate in the transition to renewable energy usage (NT4, NT5, NT6). Thus, designing the energy market to support and empower smaller business owners through financial incentives, access to information, and tailored solutions is essential for fostering a more inclusive and sustainable energy landscape.

NT3 : And the opportunity then becomes and particularly with social media and everything more and more people are aware of what we're doing here.

NT4 : (Our) ultimate aim is to produce the best single malt in the world, was to have complete traceability and also minimise any waste and be sustainable as possible which was relatively new in 2013.

NT5 : I think we will be the first green hydrogen distillery in the world.

NT6 : It wasn't why we set out to do it (sustainability), we set out to do it for all the right reasons.

[6] There are users in remote area. cost and reliability are their main concerns. Such users include farmers and whiskey producers. (HR2)

HR2 : So we have people coming to us like, a group of farmers ... in an area that have a collection of farms. They have potential wind and solar resources on that land. And they need fertiliser. So they want to look at producing hydrogen to produce ammonia for fertiliser. Because the cost of fertiliser they are paying is doing this... Because based on oil and gas prices, but they have the ability with their resource which is land, to produce something that they need. So that what they need is ...fertiliser at a cost they can afford. And they can guarantee, what they have is wind, solar, land that they could grow things on. They could do biomass. And they could produce electricity with that and then produce higher. But actually, they have wind and solar. And that's probably a better way of doing it. And they can then produce more crops. With their green fertiliser. That's an example. So that's got nothing to do with hydrogen specifically, but hydrogen is key to that. That's a way to store energy, but that's all converted to a some fairly like (fertiliser).

[7] **Full package energy solution rather than only focusing on the price.** Beyond merely addressing the supply and demand of energy, **solutions should encompass more comprehensive packages** incorporating the unique factors to specific parties such as geographic locations, time and intensity of energy needs, etc. (HR3, HR4) This approach not only nurtures new industries but also establishes strategic advantages for economies (HR5, HR6). **Embracing experimentation**, particularly led by entrepreneurial ventures and supported by research centres, is crucial for fostering solutions to the global challenge of decarbonization. Evidence underscores a high demand for innovative solutions such as hydrogen or other renewable energy alternatives tailored to meet the specific needs of different users. Thus, fostering an environment that incentivizes and supports innovation across the energy sector is essential for driving progress towards a more sustainable future.

HR3 : I think we don't regard hydrogen as hydrogen. We regard it as a way of solving problems... It's just a route to solving a problem...

HR4 : ...One thing that's very annoying is saying how much is a kilo of hydrogen worth. Very annoying. Because no one wants hydrogen...they want a solution.

HR5 : They (users) are not engaging with the problem, they are reacting to the price. So we've developed a system that they can have solar panels on their roof. They generate hydrogen and use it and surplus they put into storage and then when they have a deficiency, they take it from the storage...So hydrogen is providing a solution for them to say we have roof space that is a resource, because we can get sunshine on it and use that sunshine, and we can drive our vehicles all year round on that sunshine...So that's using hydrogen, that is where hydrogen works beautifully. If we had a wind turbine there as well, which they can't do. Then they would need less storage. And it would be sort of they would potentially need less this capital outlay, but you then got the wind turbine. So it would cost so which actually takes us on to NEOWHISKEY.

HR6 So another conversation I have with them (owners of distilleries), is about there are a number of distilleries that are relatively close to each other in various parts of Scotland...what they need is someone, an energy company to come up with that solution. So that's an opportunity for us to be an energy (solution provider).

3 Response to Question 5 - What are the chief barriers to reform of the energy market and is the Government serious about addressing those?

[8] **Higher rate of failure.** First, venturing into a new area, especially in terms of business or innovation, inherently carries a higher risk of failure. This is because the landscape is often uncharted, with unforeseen challenges and uncertainties (NT7, NT9, NT10). Second, success in new areas often requires collaboration and coordination among various stakeholders such as government entities, financial markets, and research institutions (NT8, NT9). When these efforts are not well-coordinated or aligned, it can lead to inefficiencies and increased risk of failure (HP1). The challenges associated with entering new areas are often highlighted in interviews with experts or stakeholders. These firsthand accounts provide insights into the specific hurdles faced and the areas that need improvement.

NT7 The largest one (challenge) I would think for anyone is cost. So, at the moment hydrogen is a new technology and all new technologies tend to be expensive, unproven. So for people to take the risk to go into hydrogen spending a lot of money, I think it's the unproven technology. It's the only real risk I see – cost.

NT8 : ...And obviously (HYDROSOL is) based in Scotland and they (HYDROSOL)'ve got their ties with (Anonymous) University and everything.

NT9 I think it (shifting to hydrogen) is hard. Because I'm not one for getting government to do everything. I mean I think government and the cash and that is an enabler particularly amongst young technology to allow you to get to a certain level. I think what the government then must do is to put in the playing field where it makes. It (government) almost incentivises other companies to come and invest, to come and see - "yeah, we want this". And whatever that investment structure is to encourage private companies to enter that. I think that's what they need to do. It's not to disincentivize but actually to incentivise that whether that's special zones or tax breaks or whatever, but to try and drive companies in the bigger investors and companies to zero-emissions. And then and you see that everywhere when you get clusters as well, whether the technology and Seattle or...Once you get that cluster effect, you get more innovation and more drive. And I think that's what the government can try to do.

NT10 : I think there's always challenges. There's always challenges with putting anything that's really new ...And what should have happened is the UK government and the funders should have increased funding slightly. Because everyone knows the challenges of any kind of cost and the government is aware of this. They should have looked upon as a special case and allocated more money towards it.

HP1 : And those areas are gonna be dependent on investment coming in. because particularly in the UK, when it comes to energy, we've privatised everything. Well, that means we need private investment. Government handing out subsidies is not going to help. It's only a short-term gap and ultimately the taxpayer pays for it. That's not the way this will need to change. We need government policy to allow people to come in and invest.

[9] **The needs of small business are easy to be neglected.** Small businesses often have diverse and unique needs that cannot be addressed by one-size-fits-all solutions. Unlike larger corporations, small businesses may lack the resources or leverage to demand tailored solutions (HR8). There is also the difficulty in articulating needs (HP2). Small business owners may struggle to articulate their needs effectively, either due to limited resources or a lack of understanding of available solutions. This can lead to their needs being overlooked or underestimated. The needs of small businesses span a wide range of industries and contexts, making it challenging to develop comprehensive solutions. Factors such as industry-specific regulations, market dynamics, and resource constraints contribute to this diversity. While cost is often a primary concern for small businesses, their needs extend

beyond just financial considerations (HR7). They require holistic solutions that address operational efficiency, market competitiveness, and scalability, among other factors. Examples and evidence from various industries can illustrate the diverse range of needs that small businesses have. These could include case studies, surveys, or testimonials highlighting specific challenges and requirements faced by different types of small businesses.

HP2 : He talked about the fact that the farmers want to know what they can afford and can it be guaranteed. The problem that we have with trying to break this problem is everyone gets fixated on the afford bit ...Everyone straight away latches onto that and that's the wrong question (How much is a kilo of hydrogen? – sidenote) straight away to be asking. Yes, it's important, but let's look about what we can achieve and do. Put the money to one side, build an infrastructure,...a number of farmers in a particular area. Maybe we need to expand that out and find what is the best way of doing this. Because if you're buying ammonia nitrate at the moment and the price is volatile, it might be that if you look at the flatline.. But you know that price is going to be the same for the next 20-30 years or forever. You might just say, actually I'll go with that because the volatility, volatility means that I'm not paying those ridiculously high prices, but also, I know I can get it. It's always going to be here, and it effectively belongs to us.

HR7 So it's security of supply, it's security of cost, it's low carbon potentially if they use their own resources. And so it ticks a lot of boxes for them, and it gives them stability, commercial stability, production stability. It gives stability in food production. It means they can enter a five-year contract with the supermarket chain to provide grain or flour or whatever it is to that supermarket. Whatever it happens to be. At a cost that they know is going to be for the next five years or 10 years or 20 years.

HR8 : They (users) are not engaging with the problem, they are reacting to the price. So we've developed a system that they can have solar panels on their roof. They generate hydrogen and use it and surplus they put into storage and then when they have a deficiency, they take it from the storage...So hydrogen is providing a solution for them to say we have roof space that is a resource, because we can get sunshine on it and use that sunshine, and we can drive our vehicles all year round on that sunshine...So that's using hydrogen, that is where hydrogen works beautifully. If we had a wind turbine there as well, which they can't do. Then they would need less storage. And it would be sort of they would potentially need less this capital outlay, but you then got the wind turbine. So it would cost so which actually takes us on to NEOWHISKEY.

4 Summary and Recommendations

[10] In short, our study highlights what smaller businesses want as the energy market changes. They really want to do things in a more eco-friendly way, and they're asking the government for more help with that. It's crucial for the government to listen to what these small business owners are saying, as they know their needs best. Some of these small businesses are looking for services that help them switch to using renewable energy. But for these new services to succeed, they need support from the government, banks, and research centres. By giving them the support they need, policymakers can help these small businesses grow and make progress towards a greener future.

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