

Hydrogen provision as part of the overall energy for Decarbonising heat in homes

“This paper provides a wider perspective on the implementation of Hydrogen for decarbonisation in homes with ideas for a significant improvement in energy & transport provision. The whole economy gains, providing jobs & investment and the very necessary improvement for the environment within local communities.”

My Background

Strategic thinking and implementation of change and transformation are my core skills. With a background in business, technology and business consultancy, I am fortunate to have skills and experience covering current technologies and their implementation. These have been developed from working within many different business sectors over the last forty years. My ideas are derived from practical experience of what works.

Web references:

<http://www.commonsthinking.co.uk/h2evgrid.html>

<http://www.commonsthinking.co.uk/innovation.html>

Introduction

It is strategically impossible to consider domestic energy decarbonisation without consideration of the wider energy processes and infrastructure.

As “there is currently no clear long-term heat policy”, my input provides a wider view of how the UK can move to decarbonising heat in homes in context with the scope for securing energy, transport and local community improvements:

- *Firstly, I wish to add to the strategic thinking, providing additional creative ideas for change*
- *Secondly, to provide a joined-up view of how such strategies may be successfully implemented for the aspects of research, business structures, investment processes and employment*

My mantra, *is joined-up thinking & implementation.* Throughout my life I have seen missed opportunity after missed opportunity simply because successive governments and their agencies have been incapable of understanding how to do this successfully.

With this proposed Hydrogen plan we get a completely virtuous cycle – investment in new clean energy, 30% decarbonisation for domestic and commercial use within 10 years. Provision of massive energy production, more & better jobs, more useful green products and improved local environments, with excess energy to further clean the planet. *The more energy we produce - the more jobs, the cleaner the air and the better the local environment becomes.*

The outcome in just ten to fifteen years would be a thriving, sustainable economy based on the greenest credentials without any of the downside of attempting to curtail energy use. The export opportunities of such investments also provide for increasing UK wealth long-term.

SUMMARY OF THE KEY STRATEGIES

These require legislative and investment provision by the government.

1) Hydrogen production from natural gas with CO₂ used to produce new products (Oxford University research Oct 2020)

An already proven process, the UK has the ability to ramp up this production many fold. New research shows that instead of sequestering CO2 it can be utilised for the production of plastics and building products.

2) Development of a new energy smart grid. (H2EV SmartGrid)

This brings together hydrogen distribution and storage with local solar and wind production. It creates a nationwide distribution network for hydrogen eventually replacing the current natural gas distribution.

It has already been shown (research from Keele & Oxford universities) that current natural gas appliances can safely operate with a 30% hydrogen / 70% methane mix without change to the gas appliances.

3) Long-term development and investment for delivering the installation of solar

These must go on every house and every building in the UK that can output energy efficiently into the new smart grids. Government has tried to encourage this with short-term schemes, this time it must be long-term to provide for serious investment in the solar installation sector.

4) Legal changes applied to local communities that provide for low carbon environments

- All larger city centres (over 100,000 population), within a 5 mile radius must allow only renewable and Hydrogen vehicles by 2025, extending to 10 mile radius by 2030
- All larger city centres (over 100,000 population), within a 5 mile radius must put in place a driverless infrastructure (eg traffic flow, drop off points, internal and external road sensors), extending to 10 mile radius by 2030
- All larger city centres (over 100,000 population), 5 mile radius must remove on road parking by 2025, extending to 10 mile radius by 2030
- These councils must also be mandated to provide car sharing schemes and 'eco taxis' via smart phone apps.
- As these schemes grow to a 10 mile radius, there must be introduced a nationwide car share/hire scheme based at the edge of each conurbation that provides Hydrogen or electric powered long range vehicles (range 300+ miles) at cost for people who have given up their own vehicles.
- All Hydrogen and electric vehicles must have automatic driving systems that help prevent collisions by 2023
- The motorway network will have the outer two lanes on a three lane motorway only for Hydrogen or fully electric vehicles by 2027 with an increase speed limit of 85 mph

5) A New Type of Business Structure for the UK

We start by defining a new business structure and framework for innovation, production and research businesses to use.

Current business structures do not provide the best platform for massive innovation and new production facilities. The proposal is to create a new legal identity that provides directly for these, and is quick to set-up using a pre-defined format and access to the innovation portal.

Summarised as:

- Quick and easy to establish, with standards for governance and legal requirements built-in to the new business structure

- Protection for owners, directors and employees, mandatory profit share scheme, rotation of directors, sales of business limitations
- Set rules for innovation collaboration embedded within the structure - linkages to universities and research entities, collaboration champions, inter-company collaboration, financial reporting and KPI reporting
- Immediate access to funding and investment from the new innovation portal

The detail is set out in the implementation section. Requires primary legislations to create this new business structure.

6) Innovation Investment, Banking & Governance Portal

- This goes hand in hand with the New Business Structure envisaged.
- A new online innovation bank is required to provide online services, governance issues and direct funding for innovation. This investment portal must utilise online, easy to use systems for both investors and for the new innovation businesses.
- Funding will be controlled using standard methods of due diligence but the new business structure proposed will enable quick access to new funds as their structure is pre-configured for on-going assessment and strict governance.

Key provisions are:

- An easy to use portal for all parties to enable business innovation
- An easy to use investment portal for all UK investors (private and institutional)
- A publicly open feedback portal for the governance and assessment of the new innovation businesses (via financials and KPI's)
- Banking, loan and other funding portal for innovation businesses
- Company taxation, benefits, certification, patents
- Employee portal providing access to share purchase & profit share scheme administration
- Business owner, executive and intermediary portal providing access to specific director obligations, share information, profit share scheme

Key advantages:

- All stakeholders can access all pertinent information at any time
- Everyone in the UK will be able to invest easily, securely and confidently in these new innovation businesses.
- Governance is ensured as it is monitored real time via the portal
- Financial and key performance indicators provide the critical information for real time assessment of the business

Legislative Timescales

Due to Covid, these should be moved so that investments can be made now. The UK and many other countries face major economic with high unemployment for the foreseeable future. A plan for a future based on a Hydrogen economy allows for the younger people and those currently facing longer-term unemployment the hope that we all need to move forward. These are the proposes timescales:

- New cars to have zero emissions by 2030
- All ground transport to have zero emissions by 2035 (including trains)
- All energy derived from renewables along with the new Hydrogen methane plants by 2035 (excepting current nuclear).

- All plastics sold must be recyclable by 2023
- All Hydrogen and electric vehicles must have automatic driving systems that help prevent collisions by 2023
- The motorway network will have the outer two lanes on a three lane motorway only for Hydrogen or fully electric vehicles by 2027 with an increase speed limit of 85 mph
- For the standard piped domestic and consumer natural gas - 30% by volume of methane replaced with Hydrogen by 2027, 100% Hydrogen by 2035 (this requires boiler and gas equipment modification).
- Completion of a high performance Hydrogen distribution and storage system by 2030

APPENDIX

Details for implementing the necessary new business structures, investment portals and training required to create large scale businesses that can tackle the proposed hydrogen plan.

New Innovation Business Structure - Implementation

This implementation depends upon the Innovation and Investment Portal, along with new legislation. The other main implementation issue is the initial funding for these new businesses.

This requires government seed-corn investment funding, export funding, funding for patents and supply chain commitments. The people and skills to manage this funding and provide board level oversight can be found from existing investment sector for SME's.

Government Budget Provisions:

These businesses will gain from fast track loans and investment, fast track government contracts, preferential tax rates, export marketing help and finance, provision for gaining patents, guarantees for supply chain partners.

Active investment dealing requires an intermediary to improve liquidity for these small businesses and initial low volume transactions. This can be handled by the new innovation bank. This would allow for online buying and selling of investments by individuals and investment companies, (no shorting allowed).

Built-in Risk Mitigation:

Investing individuals could be offered a guaranty that protects a proportion of their total investment if a company fails. This guaranty would come from a small levy on the profits of all innovation companies. Initially, it would require a government backed fund.

It is very important to build a consensus and structure that allows for failure. Innovation is risky by nature and these new businesses must be allowed to fail within a fair and supportive structure. The governance systems promoted via the legal provisions and the innovation portal will provide the best possible feedback to allow investors and the innovation bank to agree when failure is the best option.

This rigorous yet fair approach will enable entrepreneurs, inventors and technically capable people to create a business without the fear of failure. The UK has been poor at allowing such failure and this new business structure allows this to be put right. We shall all benefit from such a change in attitude.

Key Legislative Inclusions:

These businesses will form a new type of shared ownership structure that everyone in the UK can invest in and benefit from. These businesses will not be available for purchase on the open market. All employees and directors would benefit from a profit share scheme built into the structure.

This new structure will be designed to open the business to both innovation and investment. The directors would rotate with a cap on pay scales and tight guidelines for live financial reporting via the innovation bank portal, including specific key performance indicators.

The board will contain designated people from the banking team plus innovation champions (see below). All the intellectual property rights will be shared throughout these innovation companies.

All investments in an innovation business would have provision for profit sharing, (perhaps also under special tax allowances for individuals). The rest of the profits would not be distributable and therefore available for re-investment and business growth.

Business takeovers would be controlled by a UK innovation panel and only allowed in the interests of ongoing improvement in innovation. These companies would not be able to be bought by non-domicile UK businesses.

The ownership of the innovation businesses is spread between the innovation bank (ie public ownership) and the voting shareholder directors and employees. The investments made in each business would not provide ownership or voting rights.

Joined-up Innovation Implementation – creating tight coupling for innovation excellence

Direct coupling is essential between businesses with research, universities, colleges, apprenticeships and all other education establishments. The creation of STEM understanding for *all* young people is also a continuing requirement and will have massive long-term results.

Key Implementation Provision for Tight Coupling

- Research universities and bodies will directly assist within these new innovation businesses.
- Depending upon the nature of the sector and technology, one or more innovation champions will be assigned to each business from specific universities or research units.
- These champions will be mandated to exchange ideas enabling cross-fertilisation between technologies and businesses.
- Research grants for each business will provide for research with collaboration in mind.
- All research will be monitored by the innovation investment portal team along with the champions with full disclosure of progress, whilst protecting the IP of the research to within the innovation businesses.

Education, Training and Jobs:

There are already innovation hubs across the UK. These must be ramped-up to engage every school, every college, all apprenticeship schemes and every young person in the UK.

The aim is to deliver the importance and opportunities regarding STEM subjects. This must be achieved with impact. Direct liaison with the innovation businesses will provide internships, placements, apprenticeships and full time jobs for our young people.

This involvement for students must be pro-actively managed with local hubs creating projects and awards for all students to engage in conducting STEM based project. These

should be managed by the innovation business people and collaboration champions.

Fast Track Education:

Many businesses find that young people do not have relevant skills. This uplift in skills can be achieved quickly and cost effectively.

A new fast track training process based on the MOOC models is required to provide a good level of STEM and core business understanding for school leavers and graduates. This will provide a substantial new stream of talent for innovation companies.

This fast track system will be designed to deliver core training within a course of just a few weeks. This course will be configured to provide employers with the precise skill they require. It must be based on practical learning projects, with people from a business background providing role-play to ensure realism and effectiveness.

Technology Solutions for Education and Skills transfer:

There is poor use of available solutions for delivering and monitoring education and skills. While the MOOC's use good technology, most teachers and lecturers are poorly equipped to lever these new ways of delivering educational concepts. Worse still is the concentration on facts rather than on conceptual issues, key learning points and critical thinking.

As part of the overall drive to create innovation, we must use the new data processes and innovation businesses to create and develop superb new systems that produce much better educational outputs and deliver automatic evaluation of student progress. The MOOC's have shown the way forward, we must build on this methodology and create stunning, immersive learning environments that capture students imagination along with developing their interest and creative thinking ability. VR and augmented technologies are also becoming available for use within education, the UK has one of the strongest gaming sectors and yet we have not found a way to apply this significant resource to help educate our young people.

The first Innovation Businesses can be tasked in creating new online, VR and augmented formats for STEM subjects. These can then be rolled out across UK educational establishments using the new open data platform. The Innovation Portal will provide these businesses with investment funding – who wouldn't want to invest in our young people's education – and become an investor in a world leading educational provider using the most up to date technologies.?

Innovation Investment, Banking & Governance Portal Implementation

This new banking, compliance and investment structure would be overseen by independent trustees, including government representatives and financial services authority people.

This implementation can be started as soon as possible once legislation is underway. It is essentially a standard web-based application that allows for both information provision and for individual and business transactions.

The UK based IG Group has an excellent web-based platform. This is effective and fast, runs directly in a standard browser and it is considered one of the world's leading share dealing platforms. It currently provides both transactions and live data streaming information. Perhaps the basic technology can be adapted and licensed from IG.

The platform would be powered by the new open data structure when it comes on line, the initial data can be provided by a local or cloud system.

The Platform must Provide:

- User access for specific functions depending on user status

- Purchase and selling of the investment vehicles for each Innovation Business - for individuals and institutional investors
- Banking and loans for innovation businesses
- Publicly accessible information for innovation businesses; financials, KPI's, director, ownership, employee information and other specific company information for investment decision making.
- Detailed research, collaboration, Intellectual Property, patent applications, and other sector specific information to allow collaborators, oversight people and the risk analysis to ensure the business is performing as expected.

References:

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<https://www.oxfordenergy.org/wpcms/wp-content/uploads/2020/03/Insight-66-Hydrogen-and-Decarbonisation-of-Gas.pdf>

The HyNet Low Carbon Hydrogen Project

<https://hynet.co.uk/>

<https://www.theengineer.co.uk/waste-plastic-hydrogen-plant-uk/>

<https://www.nationalgrid.com/uk/stories/journey-to-net-zero/high-hopes-hydrogen>

October 2020