



WIND ENERGY IRELAND

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Seizing our
green hydrogen
opportunity

Introduction

Green hydrogen can be central to creating a clean, decarbonised Irish economy.

It can provide long-term energy storage. It can decarbonise parts of the heat and transport sectors which cannot be electrified. And by producing, storing and using our own clean, indigenous, fuel we can eliminate our dependence on imported fossil fuels, create a truly secure energy supply and become a net exporter of renewable energy.

Clean power. A secure energy supply. Jobs, investment and export opportunities for our economy.

Green hydrogen can deliver.

What is green hydrogen?

Hydrogen is a clean burning fuel. It can be used as a feedstock, a fuel, or to store or carry energy.

Its use globally is projected to increase from around 120 million tonnes per year today, to anywhere from 500 – 1,100 million tonnes by 2050.

While it emits no carbon when being used, the production of hydrogen today releases 70 to 100 million tonnes of CO₂ annually in the EU, as virtually all the hydrogen we use is made from fossil fuels (referred to as grey, black or brown hydrogen).

Green hydrogen is different.

It is produced from water through electrolysis powered by renewable energy like wind. The whole process, from production to use, is emissions free, with only water and oxygen as by-products.

The Green Hydrogen Opportunity

Interest in green hydrogen is growing rapidly as the technology becomes less expensive and the need to decarbonise our energy system grows ever more urgent.

The EU and the majority of EU Member States have hydrogen strategies in place or at an advanced stage of development, but Ireland does not.

The EU aims to create 80 GW of electrolyser capacity by 2030. The British target of 5 GW will support more than 9,000 jobs and unlock £4 billion of private sector investment.

Germany has earmarked €2 billion to spend on developing hydrogen imports and, in October 2021, a German delegation visited Ireland to assess the opportunities to invest here.

Given our vast renewable energy resources, particularly offshore wind, Ireland has huge potential to become a green hydrogen production hub.

The first step is to release a robust hydrogen strategy for Ireland as soon as possible. But a strategy alone will not be enough.

Government and supporting stakeholders must commit to develop the supply and the demand for green hydrogen and to put in place the necessary infrastructure.

Delivering for Ireland

Given our vast renewable energy resources, particularly offshore wind, Ireland should be a leader, not bringing up the rear.

We will not be able to decarbonise Ireland's energy system without green hydrogen. The MaREI *Zeroby50* report shows it is at the heart of any strategy to decarbonise by 2050 and to deliver the ambitious targets set out in the Climate Action Act.

The Climate Action Plan 2021 makes several references to green hydrogen but it lacks urgency. The actions set out in the Annex of Actions are too limited and we need a much more ambitious approach.

Achieving energy independence: In 2019 almost 70 per cent of our energy supply was imported and this is projected to increase in the coming years as production from the Corrib Gas field declines. The SEAI estimates the cost of energy imports into Ireland in 2019 was €4.5 billion.

By harnessing green hydrogen, alongside other indigenous renewable resources, we can end our dependence on fossil fuel imports and ultimately achieve energy independence.

A secure energy system: Wind and solar will be Ireland's main sources of electricity in the future. But we will need hydrogen to provide electricity when the wind isn't blowing and the sun isn't shining.

A zero-carbon electricity system will require 4.4 GW of zero-carbon dispatchable generation which can run on green hydrogen or green ammonia (an electrofuel which can be made using green hydrogen and nitrogen separated from the air).

Energy storage in the form of green hydrogen can provide the assurance that Ireland will need to guarantee a secure energy supply.

Jobs and investment: Developing a hydrogen economy would direct massive investment into Ireland, creating sustainable jobs and helping to power a truly just transition.

The GDG report, *Hydrogen and Wind Energy – The Role of Green Hydrogen in Ireland's Energy Transition*, estimates delivering just 290 MW of electrolyser capacity by 2030 would create 600 new jobs, with a further 1,200 indirect jobs. There is the potential to create multiples of this.

MaREI estimates that a net-zero energy system could create 50,000 jobs, across wind energy development, building retrofits and the hydrogen economy. The EU hydrogen strategy projects cumulative investments in renewable hydrogen in Europe could be up to €470 billion by 2050.

Unlocking our offshore wind potential: Given the high capacity-factor of offshore wind, it is ideally suited to hydrogen production. Ireland's offshore wind potential is enormous. We will develop 5 GW by 2030 and the Programme for Government contains an ambition of 30 GW of floating offshore wind.

This is far more than we can use domestically. Large scale hydrogen and electrofuel production will enable us to make the most of our offshore wind resource.

Export Opportunity: Hydrogen, used as electrofuels, presents a massive export opportunity for Ireland. Many European countries do not have the resources to produce the hydrogen they will need.

It is predicted that Germany will have to import almost 70 per cent of its 2050 hydrogen demand. JCB in the UK recently signed a multibillion-pound memorandum of understanding to import green hydrogen from Australia. Belgium is putting agreements in place with Chile. The list goes on.

Exporting hydrogen provides an opportunity that Ireland cannot afford to miss.

Case Study: Transport

Green hydrogen will be crucial to providing power generation and storage in a future net-zero electricity system but it has many more potential industrial uses and can play a key role in decarbonising sectors of our economy. One area where it could rapidly make a difference in cutting our emissions is in transport.

Transport accounts for over 40 per cent of our energy related CO₂ emissions (15 million tonnes per year) and is almost entirely fossil fuel dependent. Decarbonising transport will be a huge task and require massive investment in a range of solutions, like increased public transport, policies to facilitate cycling and walking, and a large rollout of Electric Vehicles (EVs).

But large buses, trucks and particularly Heavy Goods Vehicles (HGVs) are less suitable for electrification and could use green hydrogen powered fuel cell electric vehicles (FCEVs) to decarbonise. Green hydrogen through e-fuels will also be needed to decarbonise maritime shipping and long-haul aviation.

Heavy Goods Vehicles

HGVs currently account for 15 per cent of transport energy demand. Providing enough green hydrogen to enable the current Irish HGV fleet of around 25,000 vehicles to travel an average of 1,000 km per week would require 1.4 GW of dedicated offshore wind capacity.

Public transport

Dublin Bus and Bus Éireann operate predominantly diesel fuelled fleets. Neither is permitted to purchase diesel only buses.

Dublin and Belfast have each recently deployed three hydrogen busses. Servicing these cities plus Galway, Waterford, Limerick and Cork would require enough hydrogen for more than 1,500 buses, which could be supplied by 210 MW of offshore wind. This demand will ultimately be served by a combination of electric and hydrogen powered vehicles.

Shipping

MaREI estimates Irish demand for shipping fuel will be 3 terrawatt hours in 2050.

An electrofuel currently being investigated for shipping is e-ammonia.

As well as supplying our own demand, there is an opportunity for Irish ports to attract large European freight vessels that will likely find it hard to get refuelling spots in busy EU ports.

Aviation

Aviation accounts for over 20 per cent of our transport energy demand.

There are several pilot projects among EU airports and airlines to develop sustainable aviation fuels to decarbonise. Ryanair plans to power 12.5 per cent of its flights with sustainable aviation fuels by 2030, while IAG has committed to 10 per cent.

Based on the European Commission's Fit for 55 Aviation Fuel targets, Ireland will require a minimum of 8 per cent of its aviation fuel to be e-fuels by 2040, which would require 860 MW of offshore wind.

E-fuel targets are also very likely to increase in ambition over time, particularly in Ireland which is forecast to have excess renewable generation and has limited biofuel resources.

Key Actions

Green hydrogen represents a transformative opportunity for Ireland. But the industry is in its infancy. Action must be taken to ensure we do not miss this opportunity.

Below, we have listed key actions needed to begin to build this new industry for Ireland.

Action: Develop and release a robust hydrogen strategy

Responsibility: Minister for Environment, Climate Action and Communications

Timeline: End of Q2 2022

There are indications that the Government hopes to have a Hydrogen Strategy in place by the end of 2022. We cannot afford to let another year go by and should target Q2 2022 for its publication.

This strategy must provide certainty to industry and stakeholders and should focus on green hydrogen only (as opposed to carbon emitting sources of hydrogen production), considering the energy sector as a whole.

Developing the strategy will require close cooperation between Government and industry to assess hydrogen's suitability for each sector of our energy economy and identify infrastructure requirements.

Once this process is complete, targets should be set across industry, heavy road transport, shipping, aviation and power generation to stimulate demand and to send a clear signal to investors that Ireland is committed to the development of green hydrogen.

As highlighted in the EU Hydrogen Strategy, support schemes will be required to make green hydrogen competitive. Therefore, Ireland's strategy should set out the Government's plan for support schemes aimed at the development of green hydrogen and accelerating the decarbonisation of our energy supply.

Action: Establish a high-level cross-Government Group with a brief to develop policy recommendations to cut the price of renewable electricity and report to the Cabinet within six months.

Responsibility: Minister for Environment, Climate Action and Communications

Timeline: Q2 2022

The price of electricity accounts for between 50 and 65 per cent of the cost of green hydrogen so reducing the price of electricity generated by renewables must be a top priority.

Research by renewable energy consultancy Everoze in the 2020 *Saving Money* report shows how we can lower the cost of onshore wind in Ireland, with many of these also impacting the costs of offshore wind and solar.

The Government should bring together Government departments with industry and consumer groups to identify policy proposals which would cut the price of renewable electricity.

If we fail to act and to deliver substantial cost reductions we will simply not be able to produce green hydrogen at a price that could compete internationally.

Action: Establish enabling framework and remove policy barriers to facilitate growth

Responsibility: Department of Environment, Climate Action and Communications

Timeline: Q2 2022

It is crucial that an enabling policy framework is put in place to facilitate green hydrogen projects in the early years and that any barriers are identified and removed.

Examples of such policy barriers include the possible introduction of the so-called 'Additionality Principle', which would require new dedicated renewable generation capacity for the production of green hydrogen.

This could risk delaying the deployment of hydrogen projects due to the longer lead times for new renewable projects.

Related to this is the application of 'temporal matching', i.e., requirements that the generation of the renewable power and the subsequent production of hydrogen from that power should occur very closely together in time.

This could prevent electrolysers from operating in a smart and flexible way to support the grid, thereby reducing their load factors, and increasing the cost of hydrogen to the end consumer.

Both are associated with discussions around the revised Renewable Energy Directive, which proposes criteria for producing green hydrogen that could restrict early projects.

As the building blocks for this new industry are put in place here, it will be important that the Government starts work in the first half of 2022 to design a policy environment that actively supports early deployment of green hydrogen projects.