

# **PE2159/B: Halt the production of hydrogen from freshwater**

## **Petitioner written submission, 14 July 2025**

We have read through the SPICe briefing and have the following observations.

Water usage is freshwater usage. Production of hydrogen is large scale. Freshwater required for the process will require additional rainfall. Groundwater is variable in volume and availability is dependent on soil structure and geographical location. Geological conditions control levels of groundwater. The geography increases runoff of rainwater, affecting groundwater levels. Groundwater feeds rivers and streams 24/7, and supplies moisture to plants and vegetation, which in turn support all species. Current water abstractions are already high on many river basins. There are no records of groundwater levels and storage capacity in different soil types and geographical locations. Water volumes/levels in rivers and streams control total aquatic biomass capacity. Less water, fewer aquatic species. Read rainfall, river flows, soil moisture deficit and groundwater storage on SEPA reports.

SEPA reports Scotland is experiencing longer, hotter and drier periods. Rainfall has hardly increased and is confined to shorter periods. Land becomes dry and hard, unable to soak up all rainfall, which runs off. It takes longer and more rain for groundwater levels to recover. There is less snowfall, which melts quicker than previously, and no longer fully replenishes groundwater. Scotland has increasing periods of water shortages. Any process that abstracts additional groundwater will exacerbate that situation and will have major impacts on the ecology, environment and the economy.

The Government response identifies the volumes of water required to produce one kilogram of hydrogen. The electrolysis method uses the lowest volume. According to the graph, the freshwater requirement will be:

Abstracted:- up to 25.7 litres per 1 kg of hydrogen or 25,700 litres per 1 ton of hydrogen

Consumption:- 17.5 litres per 1 kg of hydrogen or 17,500 litres per ton of hydrogen.

More water will be abstracted than used for producing hydrogen. Excess abstraction will vary from plant to plant. Minimum excess extraction will be at least 25% of consumption. Excess abstraction will not be returned to groundwater.

One tonne of hydrogen will propel a large goods vehicle 6000 miles and a coach 10000 miles. Extrapolation of UK diesel consumption figures for 2023 suggests Scottish diesel consumption is approximately 2,500,000 tonnes a year. To meet that demand, the following additional volume of water will be required from groundwater abstraction:-

Abstraction - 64,250,000,000 litres or 64,250,000 cubic metres. That equates to 12% of the volume of Loch Lomond. Is equivalent to 2,141,666 road tankers of water.

Consumption - 43,750,000,000 litres or 43,750,000 cubic metres. That equates to the volume of 1,822,916 road tankers.

These calculations do not include water requirements to replace natural gas, heating and aviation fuel.

The water will be abstracted by borehole. It will be in addition to current abstractions, which are maintained by rainfall. Rainfall is not even across Scotland. Many areas experience the second-lowest levels in the UK. Many areas receive less than 1 cubic metre of rain per square metre of land per year. Natural water sources will require heavier rainfall to maintain current levels and support green hydrogen production. Current water resources are diminishing because of increasing water abstractions and weather. More high-volume abstractions are unsustainable.

Borehole abstraction draws water from a wide area. It lowers groundwater levels. SEPA records show Scotland is subject to longer and hotter dry spells. Scotland has lower snowfall, so the traditional snow melt no longer "tops up" groundwater levels. Groundwater levels sustain river and stream levels, vegetation, and the wide range of species that utilise the landscape. The lowering of groundwater levels will severely impact the whole of the countryside. Discharge of abstracted water will not replenish groundwater levels. This process of water abstraction, then partial discharging back into a river, will have a major impact on the dynamics of any water course, something that SEPA has not researched.

Water extraction has an adverse effect on streams and rivers. Longer, hotter, drier periods of weather reduce river water levels. Lower river levels increase temperatures and lower oxygen levels. That is fatal to fish and other aquatic species. Salmon numbers are already in decline, as are other aquatic species. Lower groundwater levels will have a major impact on vegetation, the ecology and environment, especially Sites of Special Scientific Interest and Special Areas of Conservation. A continuation of that situation will harm the environment, employment and the local economies.

Heavy rainfall does not initially soak in but runs off, causing flooding. Rainfall does not automatically replenish groundwater levels. Water abstraction draws water from wide areas. However, rainfall is not even across a whole river basin, therefore, heavy rain in one area will not raise groundwater levels in other parts of a catchment area.

Discharge water from sewage treatment plants will be minuscule against requirements and contain drug residues that will, when concentrated, impact the environment.

Green hydrogen production should be confined to coastal sites. Additional byproducts will cover extra costs.