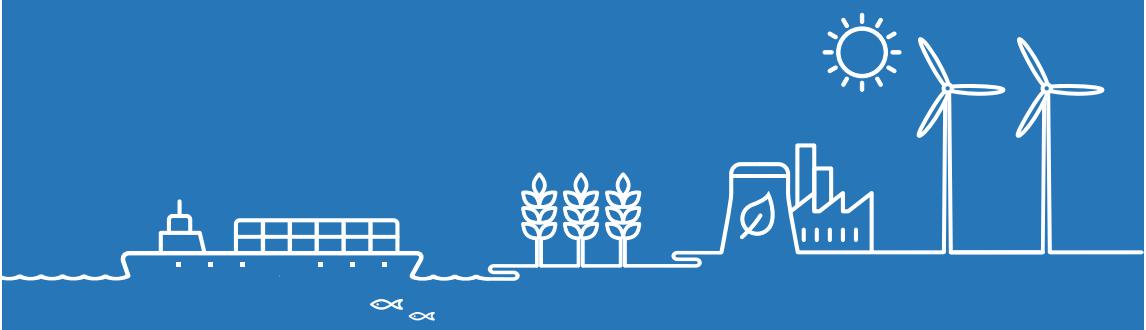
Yara Clean Ammonia

HEGRA

HERØYA GREEN AMMONIA

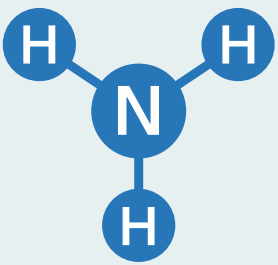


HEGRA - the green catalyst for hydrogen in Europe

HEGRA is the electrification of Yara's ammonia plant in Porsgrunn, Norway. By electrifying an already existing plant it is possible to deliver at least 400 000 tons of green ammonia yearly to the market by 2030, whilst at the same time cutting CO2-emissions by 800 000 tons per year.

By 2030 we need to cut our emissions by 55%. In order to meet these goals, we need to completely shift from a fossil fueled based society to one primarily made up of clean alternatives.

Green ammonia is an essential part of a new, clean energy mix. Ammonia is an integral part in the pro-duction of fertilizer around the world, but we need to ensure that the ammonia used is clean. If we can produce clean, green ammonia it could also be used as a fossil-free fuel in the maritime sector, or as a fossil-free energy-carrier. If we succeed, we've taken an important step towards our green future.



Ammonia is a shortcut to hydrogen

Green ammonia can be produced without CO2-emissions, and can be easily stored and transported due to its high energy density compared to liquid hydrogen and other alternatives. There's actually almost double the volume of hydrogen in ammonia as is in pure hydrogen, which makes ammonia an ideal ener-gy carrier and fuel. Long distance shipping in particular views green ammonia as it most promising fossil free fuel.

WHY HEGRA?

By utilizing an existing, large-scale ammonia plant we can ensure a swift entry of large volumes of green ammonia into the market. At Herøya, Yara is already producing 70 – 90 000 tons of hydrogen every year, which is further processed into ammonia, and from ammonia into other products, like fertilizer. All of these processes physically takes place at Yara's plant, and the transportation and infrastructure needed are already in place and working. Instead of building an entirely new plant, we can focus solely on the necessary adjustments needed to produce green hydrogen. This ensures speed and cost-effectiveness.

WHY GREEN AMMONIA?

We need new, green fuels in order to meet our common emissions goals. New, improved batteries can get us part of the way, working wonders in private transportation and shorter, fixed ferry routes, to name a few. But when you need access to massive amounts of energy, or if you need energy over long dis-tances, batteries won't be able to get the job done. Other alternatives are needed, like hydrogen and ammonia.

Hydrogen and ammonia can be used in similar ways. Hydrogen is a very good solution when you can consume or supply the hydrogen needed where it is produced, but hydrogen has shortcomings when it needs to be transported before being used. Ammonia is cheaper and easier to transport, and is already transported around the world on a large scale today.

Quick facts about ammonia

Ammonia is a colorless gas with a sharp odor that is easily dissolved in water. The chemical formula is NH3 (Nitrogen + 3 Hydrogen).

Ammonia is primarily used to produce fertilizer, and as a cooling medium in large scale cooling- and freezing plants. It is also used in plastics, chemicals, explosives and in the treatment of hemp.

Ammonia is almost exclusively produced from fossil gas.

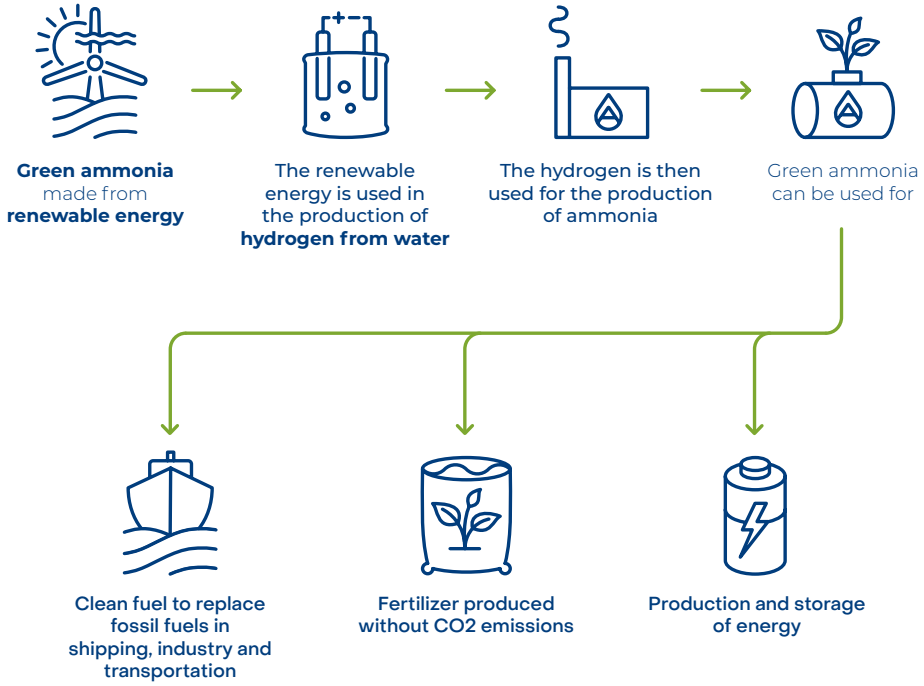
Around 25% of the ammonia being traded globally today is handled by Yara. The plant at Herøya plays an important part of this value chain.

Electrification will cut

800 000

tons of CO2 emissions every year, and at the same time provide fossil free fuel for the maritime sector and green fertilizer to the fields. This is equal to the yearly emissons of 300 000 fossil fueled cars

Well-established process, but new industry and new uses



HEGRA provides an opportunity to further grow other green industries in Europe – with positive impacts for other sectors as well

GREEN AMMONIA FROM HEGRA CAN CONTRIBUTE TO EMISSIONS FREE SHIPPING

The potential for cleaner fuels in the maritime sector is enormous. 2% of the worlds GHG-emissions comes from shipping, with 80% contributed by long-distance shipping.

If we could convert all long-distance shipping to be fueled by ammonia instead of fossil fuels, we would need 5 – 600 tons of ammonia per year – which is 3 to 4 times more than the entire global production today.

GREEN FERTILIZERS TO THE FIELDS

Ammonia is the basis for nitrogen fertilizers.

With the electrification of Yaras plant at Herøya, Yara will be able to produce green, fossil free fertilizer. It will be the first factory to do so on an industrial scale, thereby providing agriculture in both Norway, Eu-rope and globally a tool to reduce their GHG emissions, and provide sustainable farming solutions.

This will continue Yara's 120 year long history of providing goods and services to the agricultural sector around the world, and be a cornerstone for the next part of a nature-positive story together.

Foto: Frode Heiland

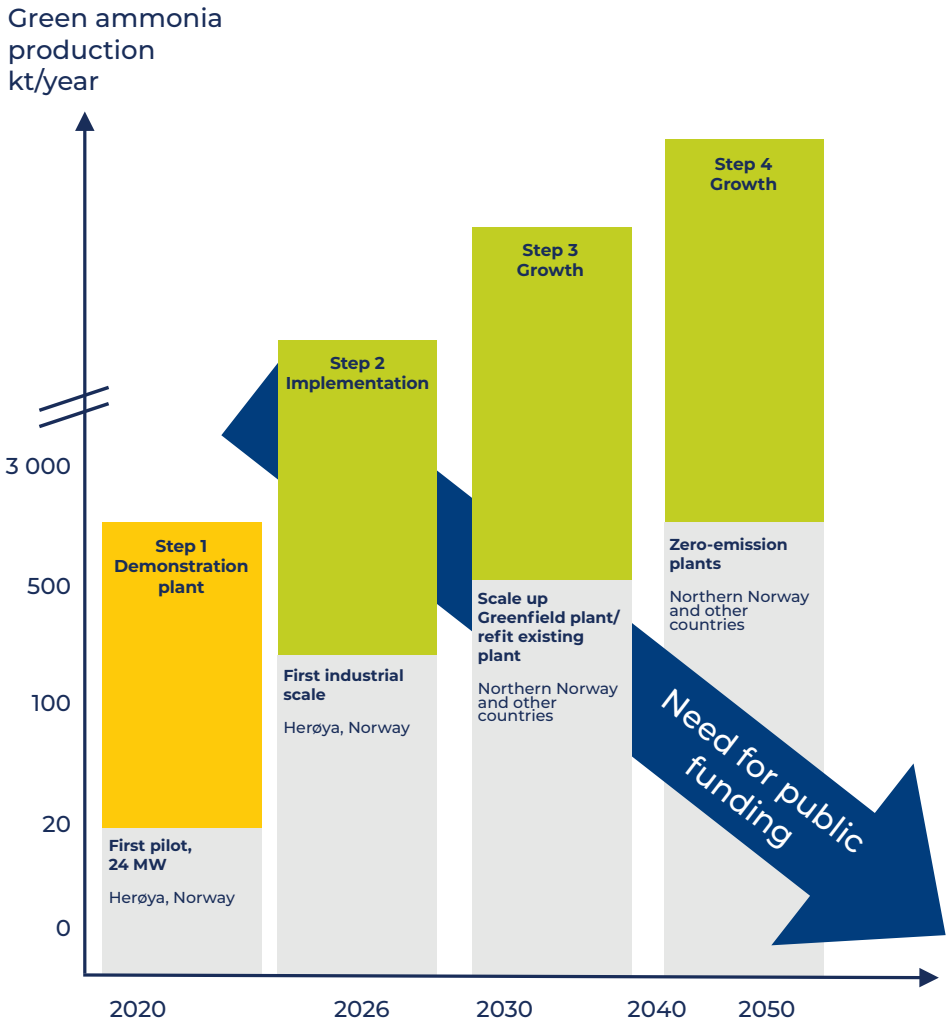
STRENGTHENING THE COMPETETIVENESS OF EUROPEAN INDUSTRY

HEGRA will contribute by establishing new, green industry in Europe that will increase our self-sufficiency in the important areas of food and fossil-free fuels.

Yara's factory at Herøya will be a cornerstone for the development of a competitive value chain for green ammonia and hydrogen-production in Europe. By replacing natural gas with electrolysis we are both cut-ting emissions and freeing up the natural gas for other uses. At the same time we are paving the way for the hydrogen economy in Europe.

CREATING GREEN GROWTH

HEGRA will be the worlds' first large scale production of green ammonia. If we succeed, the green am-monia produced in Norway can provide both green fertilizers and green fuels for shipping before 2030. However, Europe and the world will need new production in order to provide clean alternatives to both fields and ships.



To realize Hegra, we need strategic partnerships across different sectors and efficient public funding

1.
Efficient refitting of new technology at Herøya – pilot

2.
Supply of renewable electricity

3.
Develop a market for green ammonia (agriculture, shipping, EU)

4.
Efficient refitting of new technology at Herøya – full scale

5.
Conditions ensuring a new market and abate first mover risks

NOTES

www.yaracleanammonia.com