



HYDROGENREGION SOGN OG FJORDANE

HYDROGEN REGION SOGN OG FJORDANE: A LIVING LAB FOR HYDROGEN VALUE CHAINS

2016-2018 PROJECT REPORT
SOGN OG FJORDANE COUNTY COUNCIL

SUPPORTED BY



SOGN OG FJORDANE
FYLKESKOMMUNE



sparebankstiftinga
sogn og fjordane



MILJØ-
DIREKTORATET



REGIONALE
FORSKNINGSFOND
VESTLANDET



NORA

BACKGROUND

The Sogn og Fjordane region is rich in renewable energy, and its annual electricity production of 15-17 TWh comes mainly from hydro and wind power.

In the 2016 White Paper «Power to Change – Energy Policies towards 2030», the Norwegian Government called for an extensive decarbonisation of the national transport and industry sectors, enabled by a more strategic use of the locally produced, renewable energy.

As a response to this, Sogn og Fjordane County Council launched a two year project to help the development of local hydrogen value chains. The goal has been to establish the region as a Living Lab for demonstration of hydrogen production, different enabling technologies and the use of hydrogen as a zero emission alternative.

The main task has been to identify potential hydrogen value chains in the region, and inspire businesses, local authorities, R&D institutions and other stakeholders to gain and share knowledge while developing their project ideas.

This brochure is a short summary of the results and spin-off activities from the 2016-2018 Hydrogen Region Sogn og Fjordane project. The full report is available on www.sfj.no/hydrogen



Jenny Følling, County Mayor:

«Sogn og Fjordane has a long-held tradition of developing world leading industry and business clusters based on our local renewable resources. The hydrogen project takes this tradition a step further, by building new and green value chains from the bottom up, thus preparing our region, businesses and communities for a more sustainable future.»



Photo: Øystein Torheim / Frequency.no



HYDROGEN REGION SOGN OG FJORDANE, 2016-2018 PROJECT REPORT

HYDROGEN COMMUNITIES

Following a grant from the Norwegian Environment Agency, a network of eight municipalities with a shared interest in hydrogen value chains was established in 2016.

The purpose of the network was to gain new knowledge and improve the planning process for emissions reduction in the local communities, by analyzing potential business cases for the production and use of hydrogen. Årdal, Høyanger, Flora, Bremanger, Vågsøy, Selje, Eid and Gloppen Municipalities took part in the network.

The output from this initiative is a tool box to be used in local development strategies and the planning of local energy and transport systems. The tool box includes a detailed report for each municipality, a hydrogen calculator and other relevant resources. This material is available at www.sfj.no/hydrogen.

Jan Henrik Nygård, Deputy Mayor Flora Municipality

«The network of hydrogen communities has helped us with shaping our own strategies for local development, climate change and public transport. I think it is crucial for the hydrogen economy that there is a transfer of knowledge from experts and specialists to local decision makers and administrators. Global change starts on the local level.»



HYDROGEN VALUE CHAINS

With support from the local bank Sparebanken Sogn og Fjordane, and its foundation Sparebankstiftinga, seed funding has been granted to local business clusters that aim to develop products or services for the future hydrogen economy. Six projects, each representing different parts of the hydrogen value chains, have received funding.

HYDROGEN PASSENGER VESSEL

Business case: A passenger vessel with a hydrogen fuel cell energy system; 30 meters long, 100-150 pax, >20 knots

Team: Brødrene Aa Shipyard, MANCRAFT, operator Florø Skyssbåt, Flora Municipality and Maritime Association Sogn og Fjordane

Status: Design and technical economic analysis ready, initial testing has started



Photo: Brødrene Aa.

HYDROGEN SERVICE VESSEL

Business case: A 11x15 meters hydrogen fuel cell service vessel for fish farming operations such as fish feeding and maintenance

Team: Fish farmer Osland Havbruk, Kvernevik Engineering, Høyanger Municipality and Greenstat

Status: Design and technical economic analysis ready, funding secured for detailed engineering phase



Photo: Osland Havbruk.

HEAVY DUTY ROAD TRANSPORT

Business case: A complete value chain of locally produced hydrogen combined with hydrogen fuel cell trucks for long distance transport

Team: Dairy producer TINE Byrkjelo, local energy companies, Gloppen Municipality and Greensight

Status: Technical economic study ready, partners to decide on next step



Photo: TINE.





Photo: Øystein Torheim / Frequency.no

FISH FARM ENERGY SYSTEM

Business case: A self sufficient fish farm energy system, based on decentralized renewable energy, hydrogen and battery storage and resource efficiency

Team: Local fish farms, energy consultants and wind, wave and solar technology suppliers

Status: Technical economic study in progress, report ready in early 2019

HYDROGEN PRODUCTION FROM HYDRO POWER

Business case: A complete local value chain with production of hydrogen for industrial purposes and transport on sea and land

Team: Energy companies Østfold Energi and E-CO, Hydro AS, Årdal Utvikling and DNV GL

Status: Technical economic study in progress, report ready in early 2019

HYDROGEN PRODUCTION FROM WAVE POWER

Business case: A hydrogen production unit powered by electricity from a wave power converter that can be integrated in a barge or breakwater

Team: Hydrowave, Havkraft, Sunnfjord Maritime Consortium and Greenstat

Status: Technical economic study ready, partners to decide on next step

Hydrogen value chain cluster

Maritime Association Sogn og Fjordane represents more than 70 member businesses within the ocean industries. The association has initiated the formalisation of a hydrogen value chain cluster. The cluster's vision is to create value and competitiveness for businesses based on commercialization of zero emission hydrogen technology.

Kristine Kopperud Timberlid,
Innovation Norway:

«A cluster initiative is an important step to promote radical innovation within the hydrogen value chains. The key to change is collaboration between businesses, R&D institutions and public sector.»

Did you know?

55% of CO₂-emissions in the public transport sector in Sogn og Fjordane come from high speed passenger vessels. Hydrogen will help reduce emissions from maritime transport.



HYDROGEN REGION SOGN OG FJORDANE, 2016-2018 PROJECT REPORT

HYDROGEN NETWORKS

With funding from the Norwegian Environment Agency (MDir), the Regional Research Fund Western Norway (RFFV) and the North Atlantic Cooperation (NORA), several spin-off activities and networks have been initiated throughout the project period:

- A national network of 12 Norwegian cities and regions, sharing knowledge and experiences from working with hydrogen as a zero emission alternative
- A collaboration between the 4 counties in Western Norway, Rogaland, Hordaland, Sogn og Fjordane and Møre og Romsdal, resulting in a common hydrogen strategy
- A research project with Western Norway Research Institute, Northern Norway Research Institute and Maritime Association Sogn og Fjordane, focusing on the role of the regional authorities in the effective implementation of hydrogen technology within the maritime transport sector
- A learning network of hydrogen communities in the North Atlantic region, with 15 partners from Orkney Islands, Iceland, Faroe Islands, Canada and Sogn og Fjordane



Photo: Elisabet Kjerstad Bøe



Photo: Elisabet Kjerstad Bøe

Hydrogen Region Sogn og Fjordane delegation to the North Atlantic hydrogen network, Orkney Islands, 2018



Photo: Kristian Vik, Norwegian Hydrogen Association

Kick-off meeting for the Norwegian network of hydrogen communities



HYDROGEN COMPETENCE STRATEGIES

Businesses in the region were asked to answer a survey about their plans for recruiting and future positioning within the hydrogen value chains.

Key findings from the survey include:

- Only a few companies believe they need hydrogen specialist competence; equally or more important is generalist competence related to hydrogen project management and business development, renewable energy and zero emission solutions
- A hydrogen competence strategy for the region should concentrate on the traditional and competitive industries, but aim to build new knowledge through pilot projects
- Public procurement is a key driver for change, and tender processes that encourage hydrogen innovation will also introduce important knowledge to the regional authorities, including important issues such as safety
- A hydrogen competence strategy should strengthen already existing institutions for secondary and higher education, but with a main focus on cross-sectoral learning, collaboration with regional businesses and practical training programmes
- The international perspective is important; the knowledge and competence that we develop in our region can grow into an export industry

Erling Holden, Professor at Western Norway University of Applied Sciences:

«The Hydrogen Region Sogn og Fjordane project maintains a uniquely broad perspective on the development of the hydrogen value chains. The community involvement, cross-sectoral thinking and end user focus that this initiative has advocated is key to finally succeed in introducing hydrogen to the energy mix.»



Students from Western Norway University of Applied Sciences learn about hydrogen production from tidal power





HYDROGENREGION SOGN OG FJORDANE

THE FULL REPORT IS AVAILABLE AT WWW.SFJ.NO/HYDROGEN

CONTACT INFORMATION:

Project Manager Elisabet Kjerstad Bøe
Elisabet.Kjerstad.Boe@sfj.no

MANY THANKS TO THE STEERING COMMITTEE FOR THEIR SUPPORT AND CONTRIBUTIONS

Harald Kjelstad (Chairman)
Erling Holden, Western Norway University of Applied Sciences
Trond Strømgren, Maritime Association Sogn og Fjordane
Ingvild Smelvær, Sunnfjord Energi
Ingrid Lydvo, Flåm AS
Kristine Dahl, Eid Municipality