

Scenario development

Potential futures must be analysed to help reduce emissions from oil, gas and transport.

The development of scientific scenarios is an important tool for decision makers who choose how we should go about achieving a low-emission society in Norway by 2050.

Transport, enterprise and industry are the largest sources of greenhouse gas emissions in Norway. The oil and gas sector is very important for the Norwegian economy, while generating large emissions.

Developing this sector in a more climate-friendly direction can be of great importance both for the Norwegian economy, for value creation, and for the energy and power system, says Ingeborg Graabak, researcher at Sintef, one of Europe's largest independent research organisations.

The Norwegian Energy Road Map 2050, a CenSES project, has developed two scenarios for a low-emission society in Norway by 2050; The Industrial Scenario and The Service Scenario.

"We are not merely trying to predict the future. We work systematically by quantifying possible ways forward and by examining what this means in relation to our power supply, relative to the entire energy system, relative to



Norway's hydropower can help the rest of Europe's transition to a low-emission society

energy prices, as well as how it will affect the Norwegian economy," says Graabak.

The Industrial Scenario assumes a future where the oil and gas sector will decline, until the oil sector is closed down in 2030.

SCENARIO DEVELOPMENT

”We still have a gas sector, but it has been transformed into a low emissions sector by producing hydrogen from natural gas in a system where carbon capture and storage facilities ensure the emissions are not released into the atmosphere,” says Graabak.

Norway then produces hydrogen that is exported to other countries, for use both in the power sector to balance variable wind and solar power generation, and by the transport sector.

Hydrogen exports thus evolve to become a commercial area for Norwegian companies to explore.

The Service Scenario assumes that most people are eager to reduce their emissions.

People scale back their consumption of goods, take fewer flights, use private cars less and public transport more, or walking and cycling become more popular.

In addition, it is assumed that the service sector will continue to grow while the industrial sector remains relatively stable, as it has for some years.

This too contributes to lower emissions in Norway.

”Obviously, we hope our research will be used.”

~ Ingeborg Graabak, researcher, Sintef

Tough choices

CenSES does not see it as its role to decide which of these two scenarios is the most desirable or likely.

Instead, the aim is to point out possible ways forward, and to outline what is required to go down any particular path. Finally, the consequences of each option are investigated.

”A scenario is not a prediction about the future, but rather a potential future in development,” says Stefan Jaehnert, researcher at Sintef.

Impact assessments are conducted in cooperation with CenSES’s industry partners, public partners and research partners. The scenarios are developed in collaboration with the user partners in the project.

These different actors have different objectives, and they operate with different time perspectives.

”Industrialists tend to take a longer view than politicians do,” Jaehnert points out.

So while politicians are happy to work towards the next election, the processes in the power industry are long.

It may take a decade to roll out electric cables, construct a power plant, or build smart networks.

But this is not merely about the power sector. Power intensive industries such as aluminum also require investments over periods of 20-30 years, and by that measure we will soon reach 2050.

The collaboration between academia, business and politicians has nevertheless made it possible to identify the most important factors that affect the future, such as technological developments like carbon capture and storage, or lifestyle changes amongst ordinary people.

SCENARIO DEVELOPMENT

It also provides a realistic picture of how easy or how difficult it will be to make different choices.

”The scenarios help us define probable results of different actions and action patterns, and we can do this by using both quantitative and qualitative analyses,” says Jaehnert.

”We are working with both politicians and decision makers in the power and industrial sectors. They participate in the process, and this collaboration helps to increase both our own and their own knowledge. Thus the utility here arises not only from the actual scenarios, but also from the cooperative process in which we define and analyse the scenarios,” says Jaehnert.

CenSES believes that changes to our thinking, both by the general population and

by politicians, make it possible for them to see and understand the challenges we face. There is a hope that what the experts have learned during many years of research will inspire action.

- Obviously, we hope our research will be used. Everyone must contribute and you must contribute on many levels,” says Graabak.

”We have, for example, a flexible hydropower system that contributes to the transition to a low-emission society in the rest of Europe. Norway has natural resources that enable it to contribute in many areas, also internationally.”

In order to avoid the worst case scenarios, it is also important to develop good structures for cooperation between people, institutions and governments, also across borders.

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but rather a future in development.”*

~ **Stefan Jaehnert, researcher, Sintef**



Our recommendations:

- work systematically to quantify different scenarios.
- encourage broad participation in scientific and societal discussions and processes.
- develop an understanding of how different actors have different goals and of how they work within different time constraints, to ensure mutually beneficial solutions can be developed.
- build cooperative frameworks between people, institutions and governments, also across borders.

CenSES

Centre for Sustainable Energy Studies

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