A F U T U R E I N

RUINS

EXPLORING THE POSSIBILITIES FOR A NEW WAVE POWER PLANT AND VISITOR CENTRE AT TOFTESTALLEN

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This booklet should be read as an introduction to the project A FUTURE IN RUINS. For best appearance, side by side view is recommended

DIPLOMA PROGRAM

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PROJECT DESCRIPTION

INTRODUCTION

Toftestallen is an island located in Øygarden outside Bergen. In the 1980´s a pilot project for a wave power plant was built here. But rough weather, underdeveloped solutions, technology and financial issues put an early end to this ambitious project a few years later. Now only the ruins of this power plant remains.

Today many people visit the old power plant as it has become a popular hiking destination. People come to explore the island and enjoy the ocean view. On stormy days this is a fantastic, but dangerous place to observe and photograph waves crashing against the rocks and the concrete structures.

The local community have fought to get the ruins removed as they view them only as garbage, polluting the landscape. Local officials on the other hand have stated that ideally they want innovation rather than a clean-up at Toftestallen.
The remains of the abandoned power plant have recently been declared cultural heritage.

WHAT / WHY

With this project I want to explore the possibilities for a new wave power plant at Toftestallen.
My proposal consist of 3 autonomous power plants. 2 new plants, and 1 to be restored. In addition to this I want to create a visitor centre, and a new view point.
Besides being profitable for Øygarden municipality, this will be a place where people can observe and learn about wave and ocean power - past, current, and future.

A place to get a frontline experience of the wind, the weather and the ocean. A place where nature becomes an exhibit.

My project aims to maintain the way people use the site today, and to facilitate for other activities as an open public space. A chance to explore the site through both new and old structures.

HOW / APPROACH / STRATEGY

As the danger of «ruining the ruin» is eminent, I keep the level of intervention on the existing structures to the minimum. Preserving these structures will safeguard the history of the island for future generations and also be a reminder of the forces of nature.

The old Tapered channel (power plant) and adjacent structures (Dam and Generator house) will be restored, as this can be achieved with minor interventions.
The 2 new plants are based on the concept of a wave power plant called a Slotcone generator. They are shaped and placed in reference to wave directions (function), existing landscape and visual appearance.

The visitor centre is where people can enjoy views of the site from a sheltered atmosphere. The structure is inspired by the tapered channel and the rocky terrain in its orientation and form. It has several rooms with different functions. A sensory room, inspired by the old generator house. A common room that can host conferences, art exhibitions, and other events or happenings. An open area that functions as an extended flexible room for exhibitions and events in and around the building. A museum and observatory - a walk through the history of the site, the past, the current - displayed through a fixed view, and the potential future development.

As a part of my project I want to create an additional gesture to the visitors at Toftestallen. A view point inspired in shape and materiality by the ruins of some of the old power plant structures.
20 meters above the water, facing the horizon to the west, the view point offers a great panoramic view. Today people put themselves in harms way to get a glimpse of the the old power plant structures at the bottom of this cliff, they are now offered an opportunity to get a closer look from a safe distance as the waves crash against the west wall of the island.

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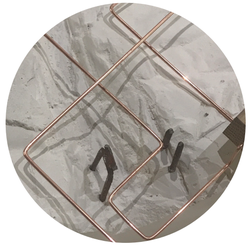


A FUTURE IN RUINS

TOPIC

Toftestallen, an Island in Øygarden was the location of an ambitious pilot project for a wave power plant that was completed in 1985. A few years after completion the plant was destroyed in a winter storm by the very same forces it aimed to harness. Today only the ruins remains. It has become a recognized hiking destination, and Dozens of stunning photographs have been captured on this spectacular location.

The site has recently been declared as cultural heritage. But in my opinion this site has the potential of becoming more than a ruin memory.
In a time when our planet cries for eco friendly power solutions, I want to explore the possibilities for sustainable innovation at Toftestallen in respectful intervention with the old structures that still remain on the site.

THE SITE

Øygarden is an island municipality in Vestland county. It is exposed to the North Sea and is otherwise surrounded by fjords. To the north are Fedje, with Radøy and Askøy to the east. The municipality was founded in 1964 when Hjelme and parts of Herdla were merged. In 2020, the former municipalities Fjell and Sund were incorporated into Øygarden. The merge was part of a nationwide municipal reform
The municipality is surrounded by a total of 550 islands, islets and reefs. Far from all the islands are possible to inhabit. The largest inhabited islands are Toftøyna, Rongøyna, Blomøyna, Ona, Alvøyna, Seløyna, Hellesøyna

With its many islands and islets, the archipelago of Øygarden is an experience worth a visit in itself. The weather is, as one might expect, very unpredictable much of the year. But the people who live here are accustomed to living with nature and know how to appreciate the wonderful experiences it can bring. The people here are like the landscape around them. They are both shaped by weather and wind.

ØYGARDEN

LANDAREAL

300 km²

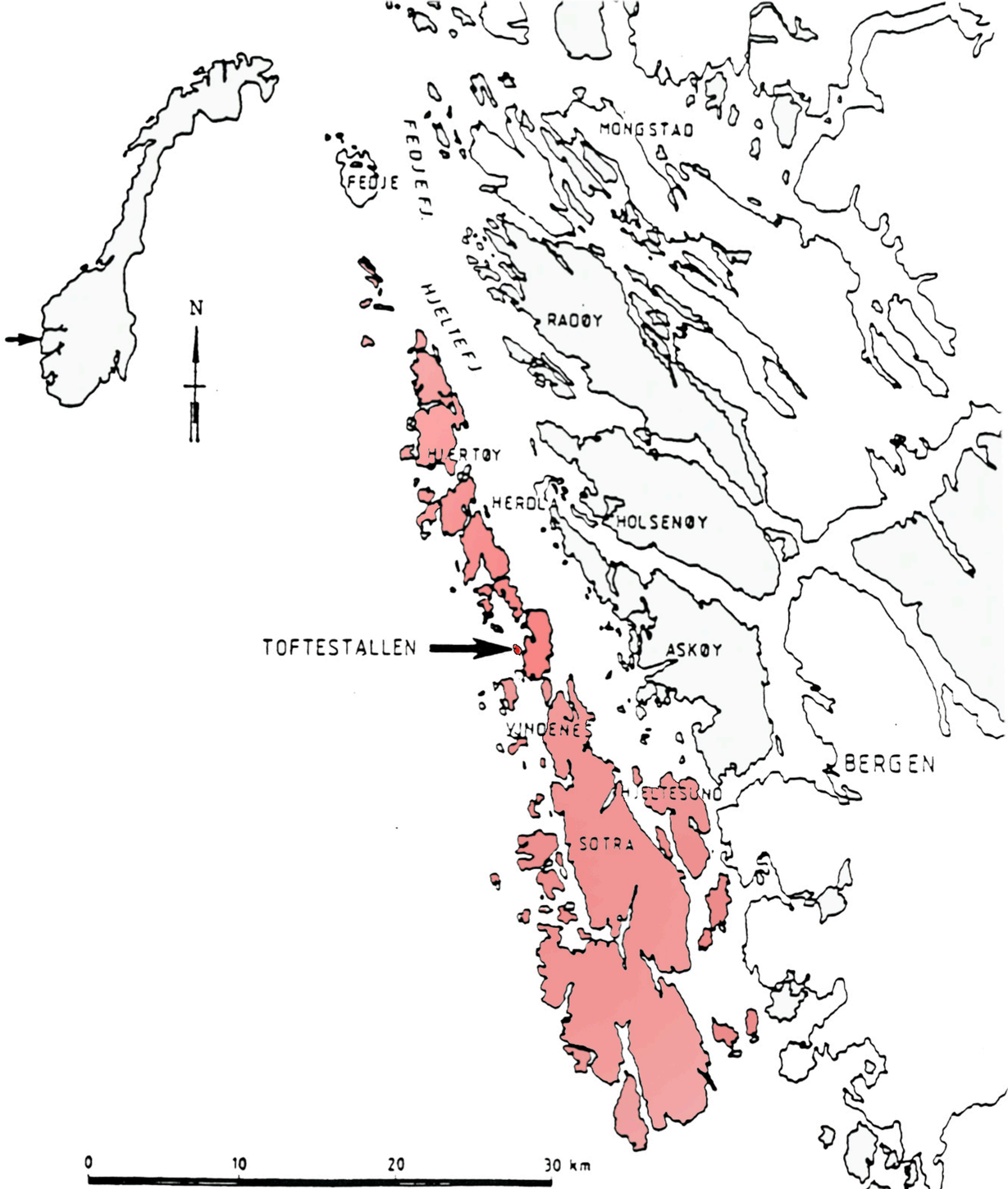
INHABITANTS

38 117

COUNTY

Vestland (fra 01.01.2020, former Hordaland)

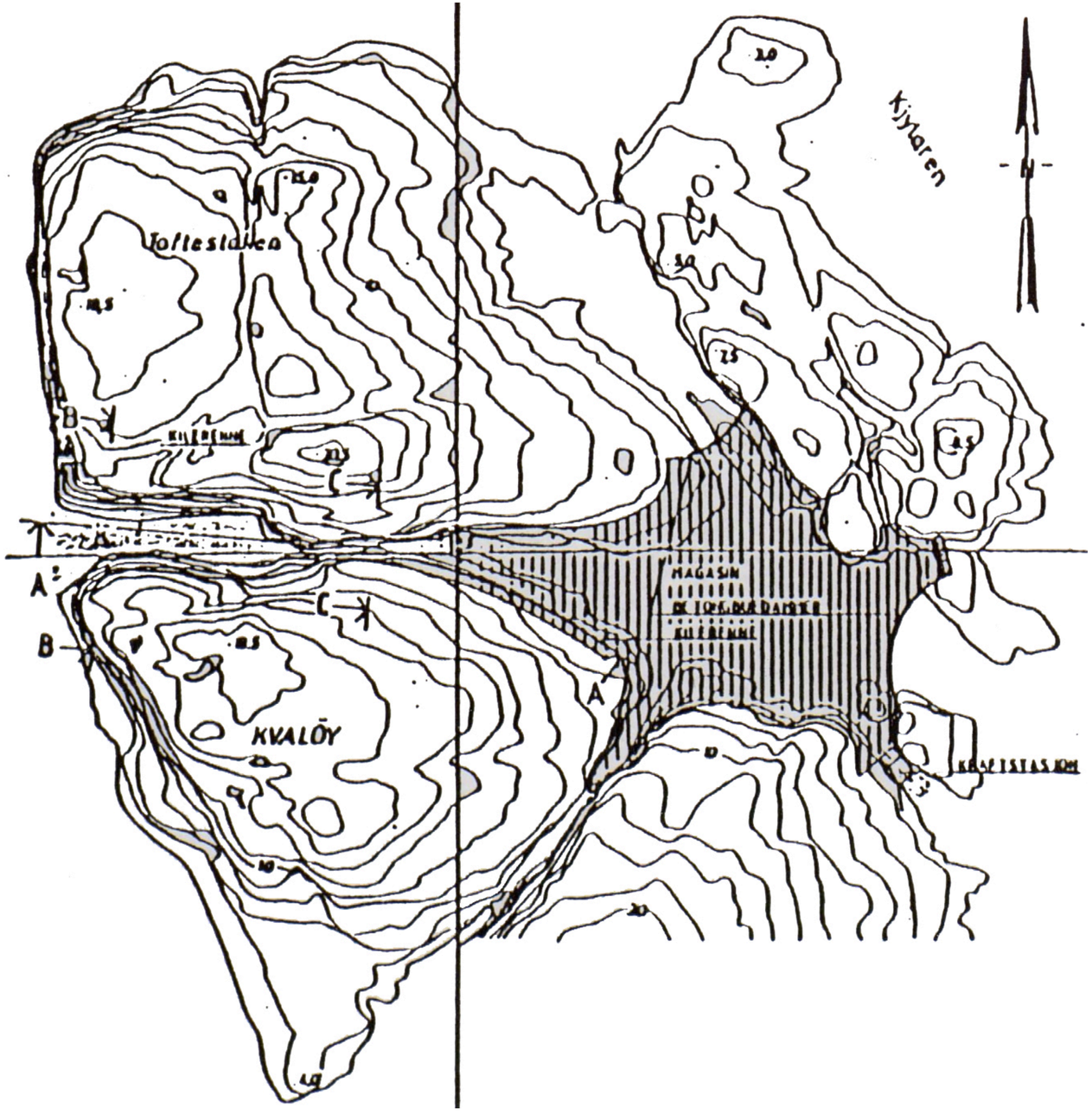
60°21′N 5°00′Ø


MONGSTAD
FEDJE
FEDJEFJ.
HJELTEFJ.
RADØY
N
HJERTØY
HEROL
HOLSENØY
TOFTESTALLEN
ASKØY
VINDENES
BERGEN
HJELTESUND
SOTRA
0
10
20
30 km

TOFTESTALLEN

Toftestallen is a small (500m long) island outside Toftøyna. The peninsula is openly exposed to the waves and rough weather from the north sea.

60°28'1N 4°55'29.1'E


Kjølaren
Tollestadneset
KVALØY
MAGASIN
A
A'
B
B'
C

A FUTURE IN RUINS

HISTORY

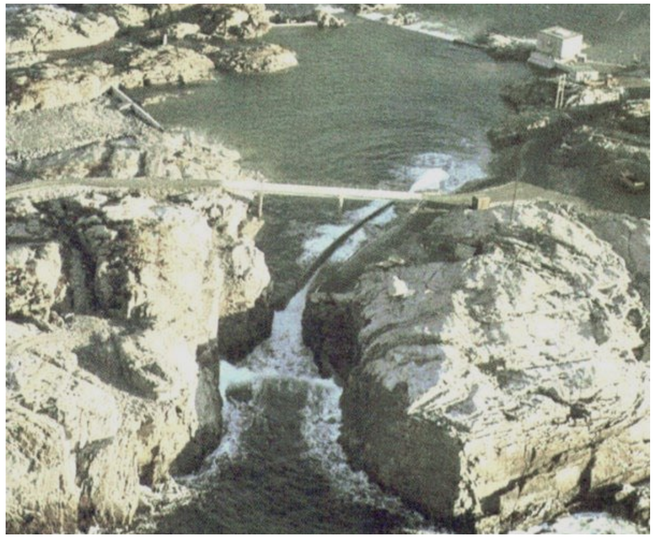
In the 1980´s a pilot project for a wave power plant was built at Toftestallen.

It was one of the most ambitious power projects in Norwegian history. With delegations from Europe visiting, the world's first land based wave power plant officially opened on a cold November day in 1985.

"This will in the long term replace the energy installations and energy generators that we have today," said then-Minister of Oil and Energy Kåre Kristiansen during the opening.

Green energy from the gray-blue sea on the west coast of Toftøyna in Øygarden was to become Norway's next major export product within renewable power production.

But few years later rough weather, underdeveloped solutions, technology, and financial issues put an early end to this ambitious project.



CURRENT SITUATION

Today only the ruins of this power plant remains. Many people visit the old power plant, as it has become a recognized hiking destination. On stormy days, this is a fantastic but dangerous place to observe and photograph spectacular waves crashing against the rocks and concrete structures.

The local community have fought to to get the ruins removed, as they view them only as garbage, polluting the landscape. Local officials on the other hand have stated that ideally they want innovation rather than a clean-up at Toftestallen..

In resent times, the remains of the abandoned power plant have been declared as cultural heritage. Preservation of this site will therefor be valuable for future generations and an important memory and reminder of the forces that lies within the ocean.

«This is an important memory of the forces that lies within the ocean, and the energy that can be extracted if one is able to tame these forces»

Rune Lid - local official

“Everyone who has lived along the coast knows that there are enormous forces in waves and tides. It is almost unbelievable that we do not use these powers”

Arne Sortevik - local official

“ideally, we want innovation rather than a clean-up at Toftestallen”

Kjetil Rong - local official

A FUTURE IN RUINS

POSSIBILITIES

The documented conditions at Toftestallen prove the site a good location for a wave power plant. Today, 40 years after the failed attempt, research and developed technologies provides new possibilities for wave power production.

There are numbers of well tested and promising wave power plants world wide, both on and of shore.

One of them, a shoreline wave power plant, known as LIMPET (Land Installed Marine Power Energy Transmitter), was installed on the Isle of Islay off the west coast of Scotland and was commissioned in November 2000. The plant has been operating remotely since that time and is supplying energy to the electrical grid in the United Kingdom. The successful unattended operation of the plant since commissioning has demonstrated the potential of shoreline wave energy for contributing towards national energy supplies.

LIMPET on the Isle of Islay off the west coast of Scotland.

The **ruins of the old power plant must be respectfully incorporated into my project.** This can be done through reuse or restoration of the old structures. But they can also be preserved through a «museum» approach, where new structures facilitate for the exploration of the old.

But the question on how to engage with a modern ruin site like this must be carefully considered . Because there is always an issue of ruining the ruin, by for instance restoration. The danger of removing the very reason for its fascination and making the site less spectacular or attractive to visit is eminent.

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A FUTURE IN RUINS

A FUTURE IN RUINS

SUSTAINABILITY

Wave energy presents a more environmentally friendly means of generating energy, compared to hydropower. Generating energy from water has traditionally been done using hydropower, which is a leading renewable resource – constituting over 94% renewable energy production in Norway. Nowadays, the use of hydropower is in decline and research has shown that it can damage river ecology, risks displacing communities, and has negatively contributed to climate change by releasing climate gases from the decomposition of flooded lands and forests.

Dams disrupt flows, degrade water quality, block the movement of a river’s vital nutrients and sediment, destroy fish and wildlife habitat, impede migration of fish and other aquatic species.

1609 HYDRO POWER PLANTS

94 % of the Norwegian energy production capacity

1000 RESERVOIRS

The storage capacity is equivalent to 70 % of the annual Norwegian power consumption.

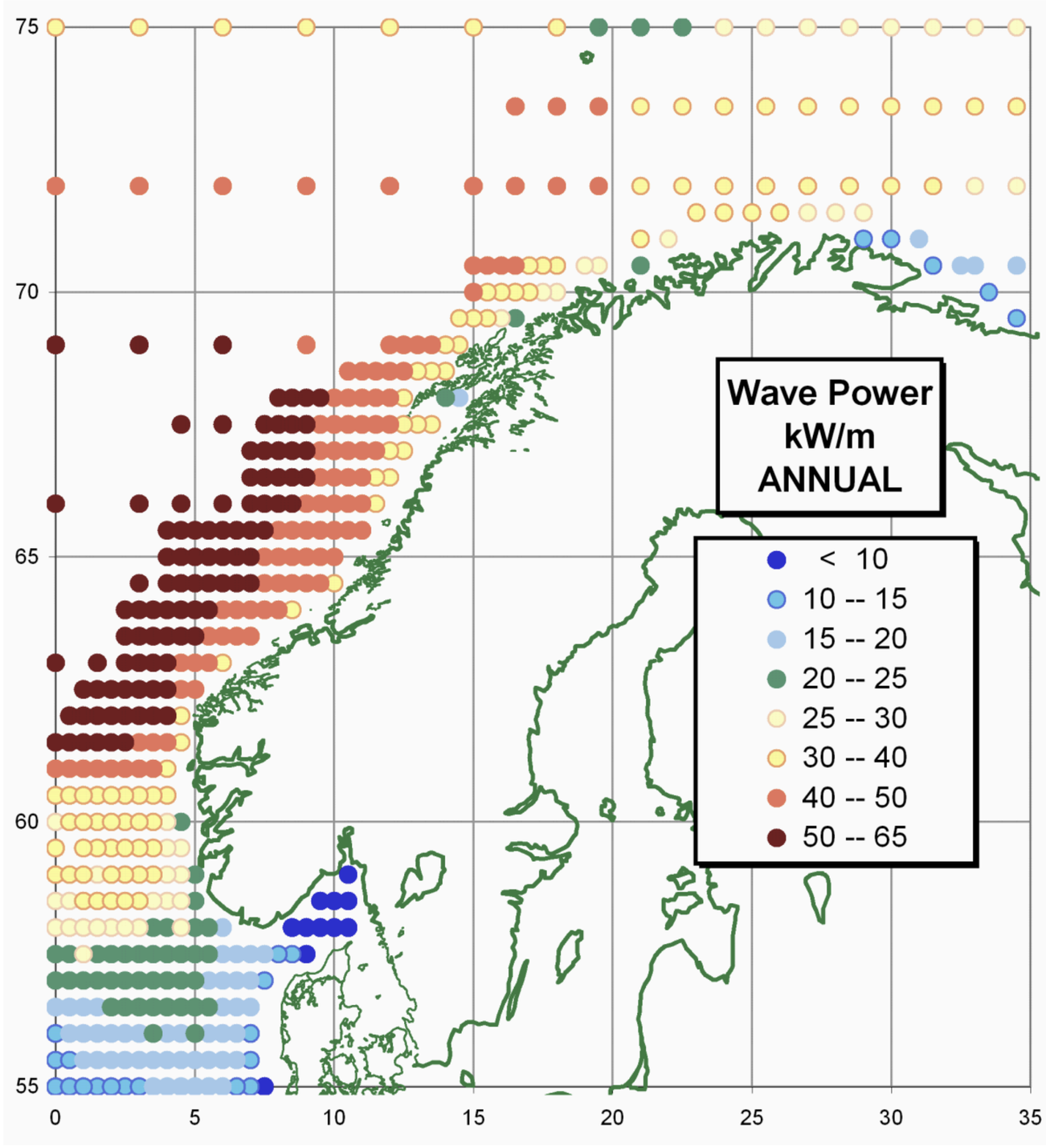
33 WIND POWER PLANTS

3,4 % of the Norwegian energy production capacity

Norway wast coastline offers some of the best conditions in the word in terms of utilizing the power potential of the ocean. A potential that seems utterly neglected.

Every year, waves hit the Norwegian coast with 5-600 TWh, That is three times Norway's energy needs. Of course, we cannot extract all this energy, but the electricity generated from the power of the waves does not have the same environmental consequences and should clearly be exploited to a greater extent than today.

Annual average KW pr meter shoreline



“With 2/3 of the earth’s surface covered in water, ocean waves represent our planet’s last untapped natural renewable energy resource. The waves hold tremendous amounts of energy”

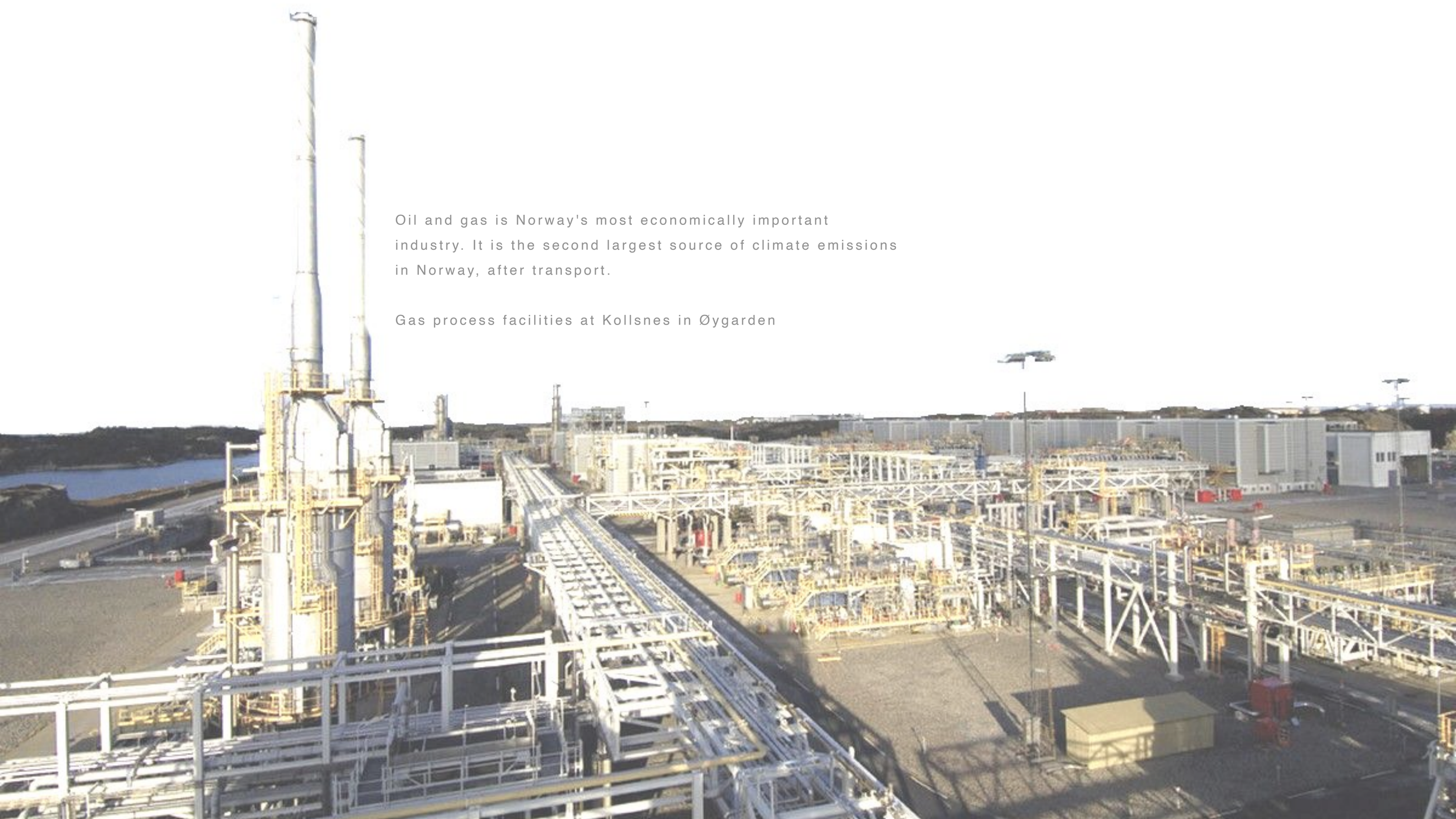
The population of Øygarden has been feeding on fishing and farming as long as people have lived on the island. Due to the island's strategic location, it was hit hard by World War II. When the Germans invaded and set up a number of bunker-stations in the small island community, Øygarden almost died out.

Øygarden did not see a clear upturn in the population until the 1980s when the oil industry came to the island. The Norwegian oil age was blooming and once again Øygarden's strategic location proved useful. The municipality experienced a significant increase in both investment and population. Thanks to the oil companies that wanted to establish themselves in the island community, it was subsequently heavily invested in roads and infrastructure, which opened up for population growth also in neighboring municipalities of Øygarden. The oil industry employed many thousands of people in the 1980s and with Øygarden at the forefront, a number of island municipalities experienced a significant increase in population and tax money.

Today, we clearly see the climatic downside of oil and gas production, and it is time to search for alternative profitable solutions

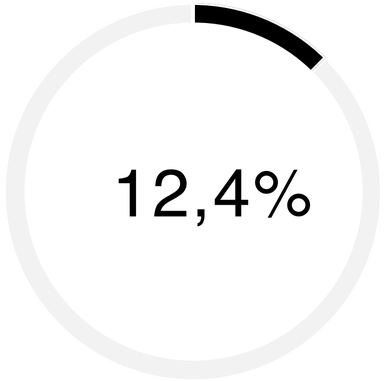
Oil and gas is Norway's most economically important industry. It is the second largest source of climate emissions in Norway, after transport.

Gas process facilities at Kollsnes in Øygarden

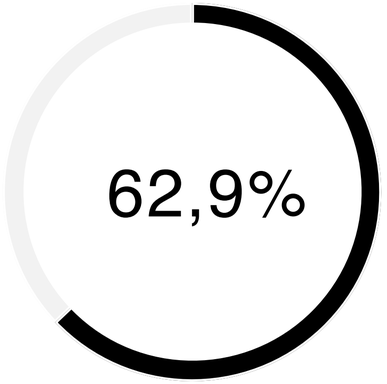


CLIMATE GAS EMISSIONS DISTRIBUTION IN ØYGARDEN

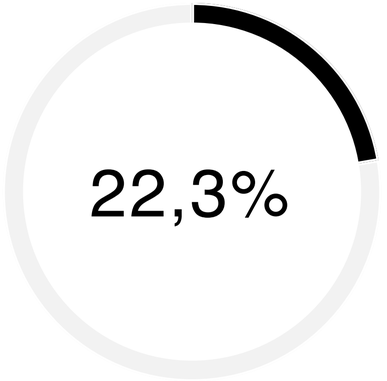
Today's climate gas emissions in a municipality provide an indicator of where the emissions cuts can take place. The graph shows direct climate gas emissions in Øygarden, 2017, by emission sources. The figures are taken from municipalities distributed emissions statistics at the Norwegian Environment Agency



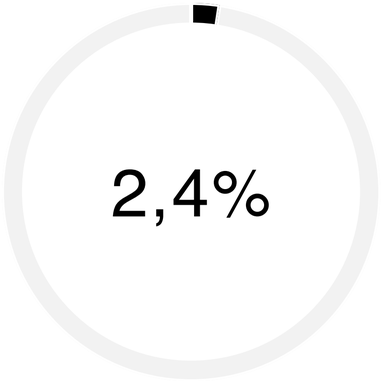
ENERGY SUPLY



INDUSTRY, OIL AND GAS

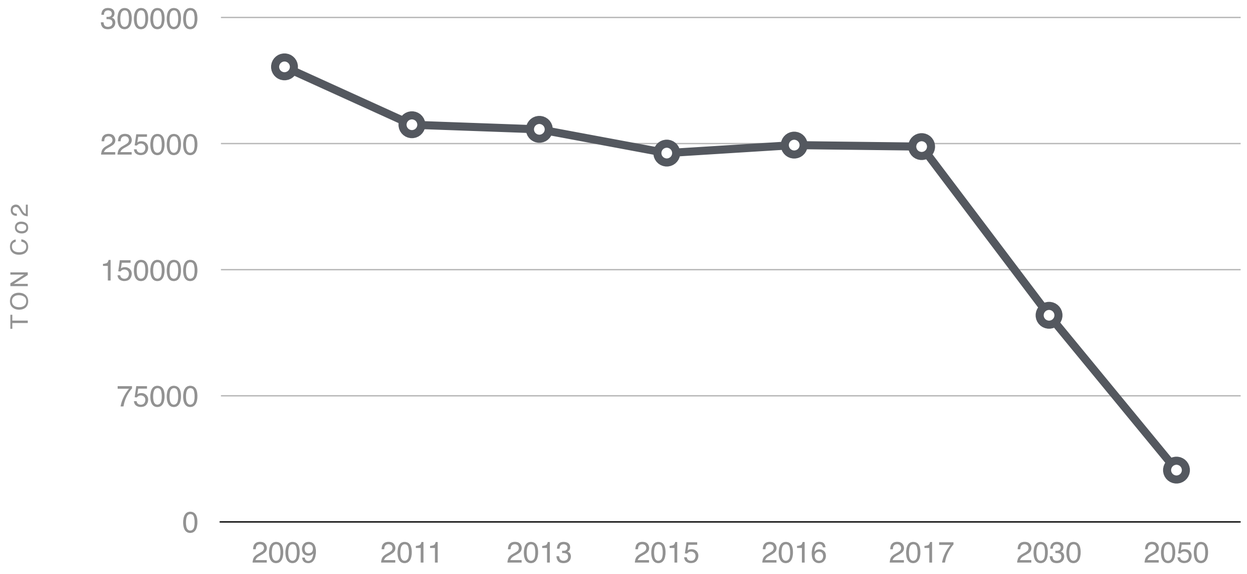


MARINE TRAFFIC



OTHER

Climate emissions in Øygarden in recent years, as well as emission reduction goals for 2030 and 2050, provided that the municipality fulfills its share of the national reduction goal .



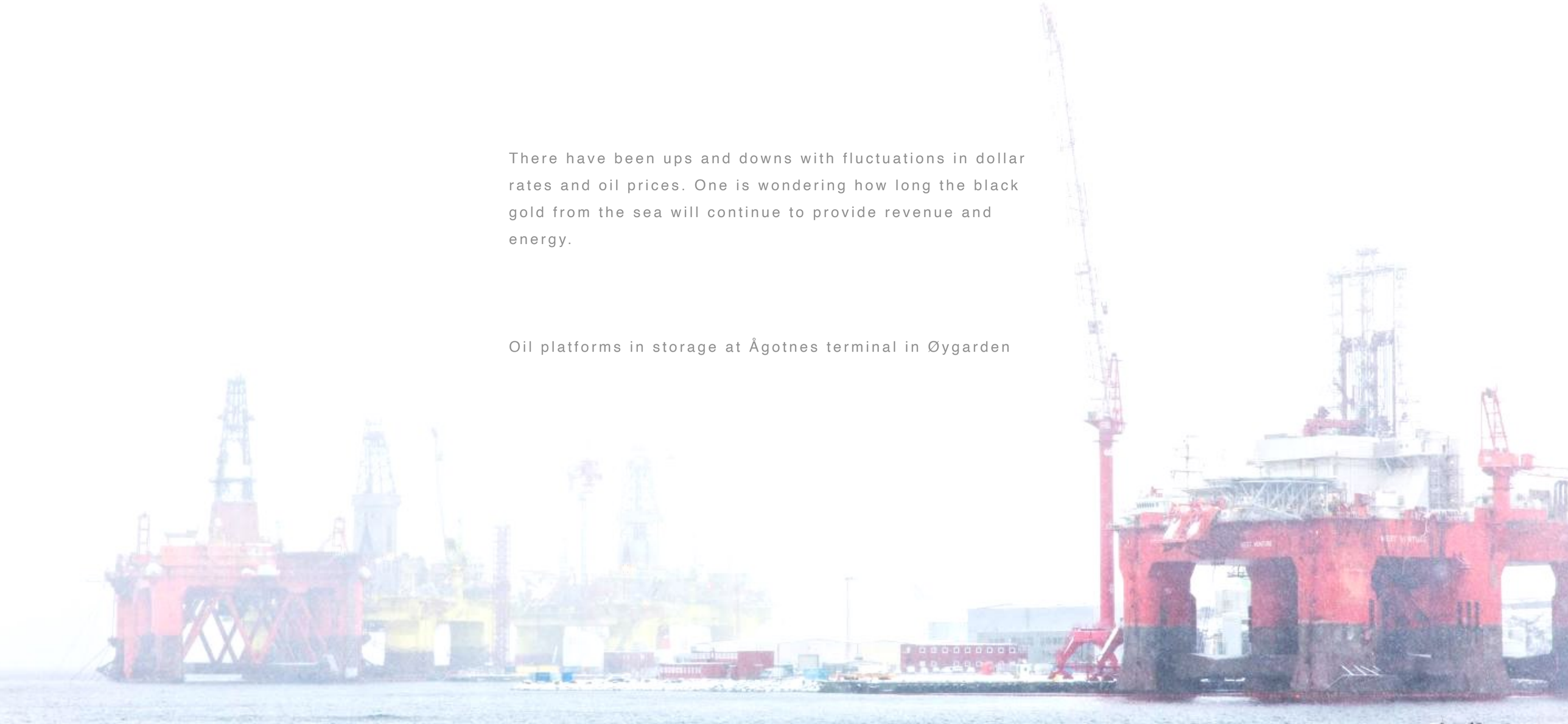
What are the consequences if activity in the oil and gas industry is lower due to. regulation, carbon pricing or lowered demand?

What are the consequences if phasing out the oil and gas business over the next 30 years becomes the most likely scenario?

Maybe the unexploited potential in wave power production, can emerge from the ruins at Toftestallen, And this time become the next profitable, and eco friendly, adventure for Øygarden.

There have been ups and downs with fluctuations in dollar rates and oil prices. One is wondering how long the black gold from the sea will continue to provide revenue and energy.

Oil platforms in storage at Ågotnes terminal in Øygarden



FRAMEWORK

JANUARY

WEEK 2

WEEK 3

Social science - Lectures and essay writing

WEEK 4

Delivery of Essay

Diploma program development

WEEK 5

1. PRESENTATION - Social science in relation to diploma. + Concept model

FEBRUARY

WEEK 6

WEEK 7

SITE VISIT

Toftestallen and Øygarden Kystmuseum.

Process the material collected.

Defining program.

WEEK 8

Site model, Intuitive models, Concept models, 3D Work, sketches and diagrams

WEEK 9

WEEK 10

06.02 HAND IN DIPLOMA PROGRAM

WEEK 11

WEEK 12

WEEK 13

MARCH

2. PRESENTATION - Conceptually elaborated material with models, and drawings

Define arguments for the project

3D model work

Focus on sustainability.

Sketches, research and investigations

Define arguments for architectural proposal, diagrams.

Plans, sections, model

APRIL

WEEK 14

EASTER HOLIDAY

Possible site visit, or other relevant sites

WEEK 15

Re-evaluate architectural proposal

Define arguments for the main aspect of the project

WEEK 16

Develop project in plans, sections, model

WEEK 17

3. PRESENTATION - Project review

MAY

WEEK 18

Develop the project through drawings, further strengthen the project.
Models and detail models in different scale

WEEK 19

WEEK 20

(pos)EXTERNAL REVIEW

WEEK 21

Fill in gaps

WEEK 22

Prepare material for exhibition

WEEK 23

JUNE

01.06 EXHIBITION START

WEEK 24

15.06 HAND IN PROGRAM DESCRIPTION

WEEK 25

18.06 EXHIBITION PREVIEW

WEEK 26

24.06 EXHIBITION COMPLETE
27.06-30.06 EXAM

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CURRICULUM VITAE

EDUCATION

2019 - 2020

Master in architecture, Bergen School of Architecture

(New wood / Vanishings / Complex Context)

2015 - 2018

Bachelor in architecture, Bergen School of Architecture

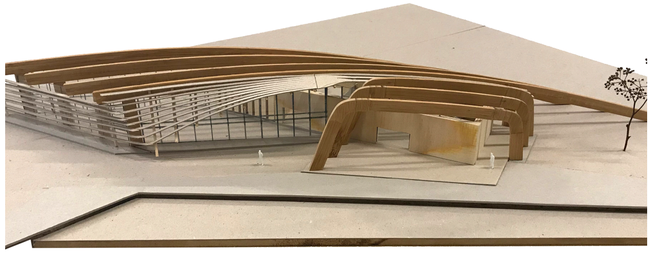
2009 - 2012

Bachelor in leadership (Royal Norwegian naval academy)

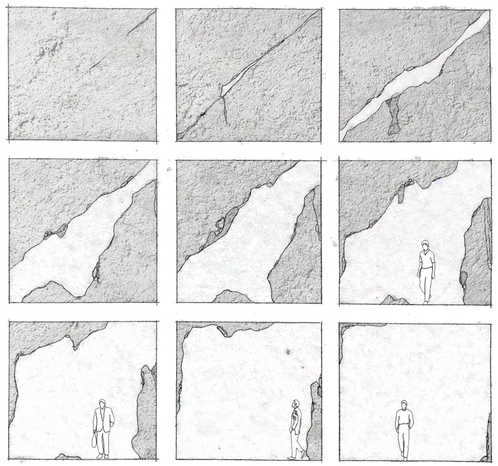
WORK EXPERIENCE

2004 - 2015

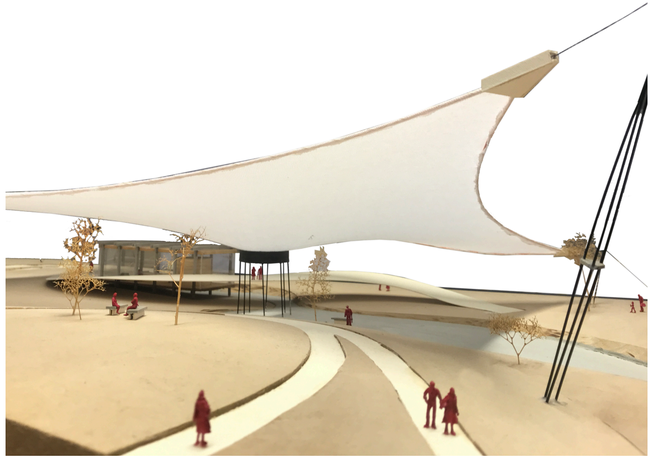
Royal Norwegian Navy (KJK/MDK)



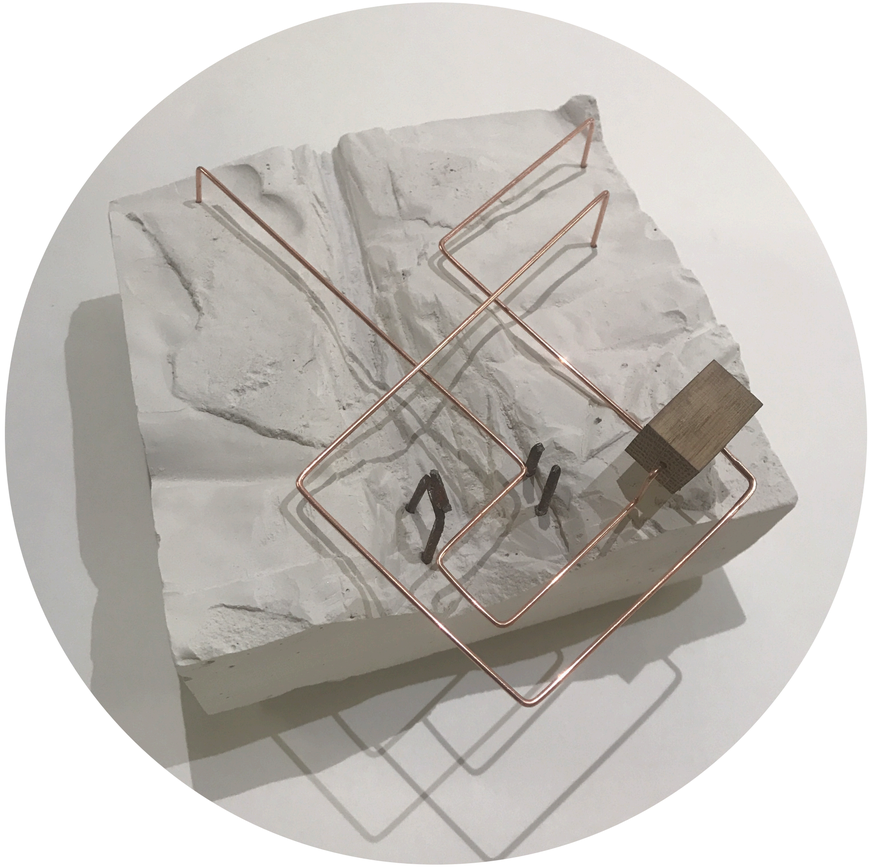
NEW WOOD



VANISHINGS



COMPLEX CONTEXT



ENOVA - Potensialet i havenergi i Norge

Nasjonalbiblioteket - Norske bølgekraftverk - 1987

https://klimarisiko.kommunalbanken.no/kommuner/%C3%B8ygarden/

https://energifaktanorge.no/norsk-energiforsyning/kraftforsyningen/

http://www.bergensregionkart.com/om-oygarden/

Vestnytt - Øygarden er klimaversting
Vestnytt - Toftestallen, på tide å rydde opp
Vestnytt - Bølgekraftverk blir kulturminne