Norway is a major energy nation in Europe blessed with a unique mix of resources: plentiful hydropower, offshore petroleum and the potential to further harness renewable energy sources such as wind and biomass.

Norway has only one percent of Europe's population, but 20 percent of the hydropower resources, 50 percent of its water magazines (stored water for hydropower production), 40 percent of the gas resources and 60 percent of the oil resources.

Norway's oil and gas industry is the most important driver of innovation and technology development in Norwegian society. These innovations are also being transferred on a large scale to other industries and business sectors such as aquaculture.

MIP business partners are committed to investing in new sustainable technologies to meet future global energy demand and improve energy efficiencies in operations, based on the current know-how and technologies from Norway's leading high-tech oil and gas industry.

MIP is also at the forefront of creating the next-generation of large-scale offshore wind; developing and advancing renewable technologies from pilot project to scale.

Greenspot Mongstad is a new strategic initiative to develop MIP into a diversified green industrial park. It is a joint initiative involving several stakeholders from multiple industries and sectors.

The common goal is to facilitate new growth and increase Mongstad Industrial Parks competitiveness based on current industries present at Mongstad, as well as CCS, renewable energy, low carbon fuels, aquaculture and other maritime industries.
Key figures for Mongstad Industrial Park

- 59 companies (2020)
- 2400 jobs (2020)
- 2400 ship arrivals p.a. (2019)
- 43% of the supply base activity in Norway (2019)
- 105 200 sqm of floor space (2020)
- 4 900 000 sqm of available land (2020)
- 5-10 MW available electrical power (continuous) (2020)
- Available capacity: Industry water = 0 m³/h Drinking water = sanitary use for new industry (2020)
Greenspot is a great opportunity to reshape the existing business portfolio and create new growth @Mongstad Industrial Park

<table>
<thead>
<tr>
<th>Vision</th>
<th>Transform Mongstad Industrial Park into the “green spot” of Norway by offering favorable conditions for sustainable business models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambition</td>
<td>Ensure a more diversified industrial mix</td>
</tr>
<tr>
<td>Ambition</td>
<td>Increase “green” investments @ the industrial park</td>
</tr>
<tr>
<td>Ambition</td>
<td>Create ripple effects and new attractive jobs</td>
</tr>
</tbody>
</table>
| Ambition | Increase focus on industrial circular processes to create favorable conditions for new business entrants }
Strategic Game plan – Short briefing

✓ Mongstad Industrial Park has been an energy hub for 40 years and will be an energy hub for at least the next 30 years, however the input and output mix will be different. The key success factor is to get the macro picture and megatrends of decarbonization aligned with the micro picture of profitable and sustainable business development @MIP.

✓ The oil & gas industrial activities @MIP will continue in the next decade be the key drivers of activity @MIP, but in addition we see a huge potential for MIP taking a leading role in the Hydrogen Economy.

✓ The Hydrogen Economy will boost a lot of other business opportunities. When combined with the existing industrial clusters competence, infrastructure and the strategic location close to offshore/maritime markets, MIP is well positioned to be the Norwegian Hydrogen Hub going forward.

✓ The Green Hydrogen pilot-e project decision to localize @MIP is a potential game changer and will create many possibilities if the demo project is profitable, scalable and providing demand continues to develop. A long-term vision building on these possibilities has been included in the vision 2030.

✓ In a 3-5 year scenario we need to be realistic and take smart decisions also in line with the philosophy of Nordhordlands status as a UN Biosphere Reserve. The business opportunities planned for the 3-5 year scenario are all considered attractive based on contribution to the green shift, profitability and the needed diversification @MIP. In addition; none of these opportunities will create hurdles for future larger scale opportunities.

✓ Establish industrial onshore wind
  ✓ Target production start 2025

✓ Establish production plant and supply system for green liquid hydrogen
  ✓ Target production start 2024

✓ Attracting the Aquaculture industry
  ✓ 2 cases – target production start 2024

✓ Maritime Battery production plant
  ✓ (go/no go opportunity in current pipe)

2024 - Step 1 - Demo: Hydrogen production 30 MWe
  ✓ Producing liquid hydrogen for maritime sector - Pilot-E project (~4000 tonnes H₂/year)

2027 - Step 2 - Scaling up: Hydrogen production >100 MW
  ✓ Producing Ammonia, e-fuel-pilot ~10 000t/year, etc.

2030 - Step 3 - 2030: Preparing large scale infrastructure
  ✓ Full scale e-fuel delivery to Maritime sector, aviation, long haul trucks etc. >100 000 tonnes/year
Highlight of the competitive advantages – capitalizing on the strengths identified in the SWOT analysis

- **Strategical positioned for growth in the “sea meets land” industries**
- **Largest industrial energy cluster in Norway**
- **Competent workforce - skilled in process industry, maintenance and logistics**
- **Nordhordland Biosphere Reserve (the only in Norway)**
- **World class port facilities with quayside access to electricity, LNG and bunker oils**
- **Large areas ready for new industrial development, without causing large interventions in nature**
- **Largest refinery in Northern Europe and world leading test center on CCUS**
- **Potential access to:**
  - Natural gas
  - Hot industrial water
  - Refinery products
  - CO2
- **Good road infrastructure on site and links to national main roads**
- **Extensive pipeline system and oil storage facilities**
During this project 32 business opportunities were identified and evaluated.
The most strategic and commercial attractive business opportunities in a 3-5 year scenario is green hydrogen, onshore wind and aquaculture. The long-term strategy is to position Mongstad Industrial Park as a Hydrogen Hub generating several additional opportunities.

**SHORT-TERM POSSIBILITIES**

- Land-based fish farming
- Post-smolt
- Green hydrogen
- Onshore wind
- Battery production

**LONG-TERM POSSIBILITIES**

- Blue hydrogen & CCS
- Sustainable fuel
- Ammonia
- Offshore wind
- Micro-organism
- Fish feed ingredients

The long-term possibilities are related to the up-scaling of hydrogen production and spin-off possibilities at scale.
Renewable energy and hydrogen are key to a green development in accordance with Greenspot Mongstad`s vision.

Renewable electricity + water → Hydrogen + Oxygen
- Hydrogen can be:
  - Burnt directly
  - Used in transport such as maritime applications

Natural gas → Hydrogen + Carbon dioxide

Further processing:
Sustainable fuels are chemically the same as fossil fuels and have multiple uses e.g.:
- Fuels for aviation, maritime and road vehicles
- Chemical feedstocks for plastics etc.

Fermenting bacteria/algae can produce:
- Food for human consumption
- Feed for animals such as fish

Green ammonia is key for:
- Fertilizer production
- Nitrogen based chemicals
- Fuel
Mongstad by 2025 could have a large number of new businesses established across the site on a number of these plots.
Further development by 2030 could make Mongstad the world’s most advanced and sustainable industrial park.
Sharing energy and materials throughout the park would allow for optimal resource utilization and sustainable circular growth.
Short-term business concepts can attract significant investments and generate regional value, but could be limited by electricity constraints.

- Green hydrogen production
- On-site land-based wind generation
- Land-based grow-out farming of salmon + biogas production
- Post-smolt salmon production + biogas production
- Battery production
- E-fuel (sustainable fuel)

CAPEX (mNOK)

Annual revenue (mNOK)

Number of new jobs

Future electricity demand

Supply: 5
Demand: 25

Electricity (MW)

5
+94

CAPEX

~ 3 800 mNOK
Aggregated number for the short (3-5 year) business concepts.

Annual revenue

~ 1 500 mNOK
Aggregated number for the short (3-5 year) business concepts.

Number of new jobs

~ 100
Aggregated number of the cases for each business concept. Directly employment effect for daily operation. Employment during construction phase is much larger as is potential and indirect employment during operation.

Future electricity demand

~ 68 MW
Aggregated number of the cases for each business concept. The gap is considerable, but several measures are being taken to solve the critical situation.

* Based on a 50% capacity factor for wind
If we want to take a leading position in the green transition it is critical to establish new value chains, strategic alliances and green deals now. In EU several new innovation giga-projects is planned and we need to step-up to be capitalize on our competitive advantages...

1. Port of Gent – the CCU hub
2. The H-Vision and Porthos project in Rotterdam
3. Sustainable fuel project in Denmark

**Consortium partners**

**Timeline**

- **2023:** Demo
  - Estimated CAPEX 80 mEUR
- **2023:** 10 MW Electrolyser – bus and trucks
- **2027:** Scaling up
- **2027:** 250 MW Electrolyser – methanol for maritime transport and jet fuel (e-kerosene)
- **2030:** 1.3 GW Electrolyser – producing 250,000 tonnes of sustainable fuel (circa 30% of Copenhagen airport demand)

**H-Vision concept:** Blue & green hydrogen. H2.50- FEED: 250MW electrolyser

**Athos:** Concept: CCUS project between

**Porthos:** CCUS Demo 2023, Scaling up 2027. Netherlands has circa 3 GW green & 3 GW blue hydrogen production under consideration
For questions about the report, please contact

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The report has been constructed based on information current, as of 9th June 2020. Since this date, material events may have occurred since completion which are not reflected in the report. It must also be considered that within the project scope it is not possible to include all relevant measures or details in the study. The quality of the report is also dependent on the gathered information, and we have taken reasonable care to verify the information. The report is only for general guidance and information purposes. It should under no circumstances be used for financial and investments decisions. Our Report may be relied upon by Greenspot Mongstad for the purpose set out in the Scope section only pursuant to the terms of our engagement letter. We disclaim all responsibility to any other party for any loss or liability that the other party may suffer or incur arising from or relating to any way connected with the contents of our report, the provision of our report to the other party or the reliance upon our report by the other party. This report (or any part of it) may not be copied or otherwise reproduced except with the written consent of EY.