

Scope of Project

Introduction

The background for this project:

- The use of surplus power from Smøla wind farm to produce hydrogen.
- CO₂-print
- Commercial/ political/ Global aspects (zero/low emission, paris agreement/UN's sustainable development goals)
- Energy consumption in marine industry.

Define project/issue (own document)

Assignment: Specifying a hydrogen powered drive line that is equivalent to power needed in a diesel powered service vessel.

- Gather data from a diesel driven service vessel
- Do a consumption and power analysis
- Power output (different rpm, distance)
- Dimensioning a drive line for hydrogen (tank and fuel cell)
- estimate / calculate range and refueling frequency

Theory

Diesel as an energy carrier:

- Production
- Energy density
- Utilize energy by using combustion engine/fuel generator (principle)
- Types of motor/generator used in large vessels (technology)
- Efficiency
- Operational life expectancy
- CO₂ print
- Advantage/disadvantage
- HMS
- Economic aspects (commercial, availability, costs)

Hydrogen as an energy carrier

- Production
- Energy density
- Utilize hydrogen energy using fuel cell (principle)
- Types of fuel cell used in large vessels (technology)

- Efficiency
- Operational life expectancy
- CO2 print
- Advantage/disadvantage
- HMS
- Economic aspects (commercial, availability, costs)
- Storage on and offshore (technology, tank)

Battery as energy storage

- Principle, types of battery/ battery pack, volum, weight, size.
- Advantage/disadvantage

Infrastructure

- Transport of hydrogen
- Refueling station (planned/ imagined)

Fosna Orion

- Qualification
- Technical information and documentation (appendix?)
- Types of motor/generator (appendix?)

Method:

Sky nordic logging system: MCU-log , data.

Marine traffic: AIS, historic data, live data (position and speed)

Software: Python, MatLab, Simulink LabView

Observation: Observe Orion during normal operation.

Results

Diesel:

- Consumption analysis
- Power analysis
- CO2 print
- Identify patterns
- Economical analysis (cost: distance, year)

Hydrogen:

- Power needed
- Power analysis with respect to size of tank/fuel cell
- Efficiency

- Refuel frequency
- Stored energy (battery)
- Total efficiency of the system

Discussion

Summary and comparison of power and cost analysis for different solutions, environmental aspects, Advantage/disadvantage. (NOK/kWh , NOK/volume diesel/hydrogen)

Conclusion