

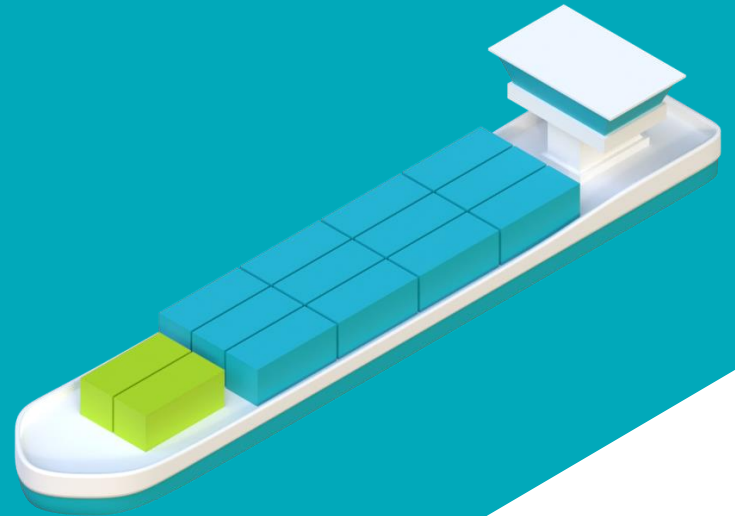


Condor H₂

Hydrogen shipping

A RH₂INE zero-emission shipping project

Business Case Condor



Confidential to Condor H2 primary partners

Introduction



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Project management Finance for Condor



Main goal is to get a validated and reliable business case as a fundament for shipowners to make the huge step to zero-emission now!

How the Business Case is working



Calculation starts with the ship's annual use of fossil fuel



Next step is to calculate the energy that is generated from this fuel



Combined with the energy efficiency of the combustion engine at 30%



Leaves us with the energy that we need to derive from the Hydrogen



Calculating backwards using the efficiency of the Fuel Cell/Batterypack at 55%



Resulting in the weight in kg Hydrogen needed



Last but not least: compare the pricing of fossil fuel against the pricing of Hydrogen



Together with the capex needed for the retrofit, the H2 containers and the maintenance over the years

Main drivers in de model

CAPEX: Conversion to Stage V engine vs the conversion to a Hydrogen drive train

- The conversion to Hydrogen is still way more expensive than the conversion to Stage V
- Results in dayrates to increase, to cover the initial higher capex for the shipowner
- The layout of an existing ship is not optimal for the storage of the Hydrogen containers
 - Current retrofit often is to the detriment of load-capacity
 - Other ways of retrofitting might be better

OPEX: Maintenance and Handling

- Maintenance of the Hydrogen drive train is lower than the conventional engine
- Handling to swap the hydrogen containers is new is an extra cost factor in business model

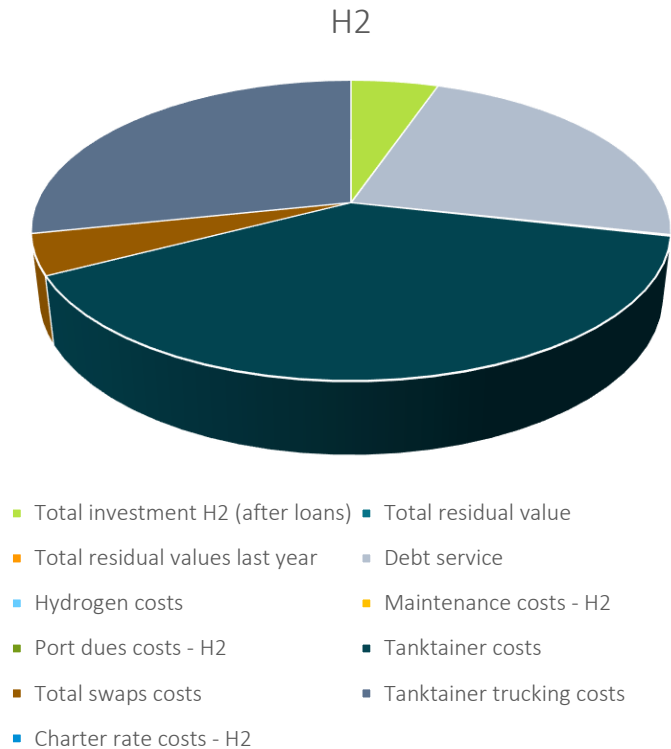
TOTAL COST OF OWNERSHIP: Transport cost

- Based on the model we see that with the current pricing of Hydrogen the transport cost are still way higher than the cost of fossil fuel

Current status of the Business case

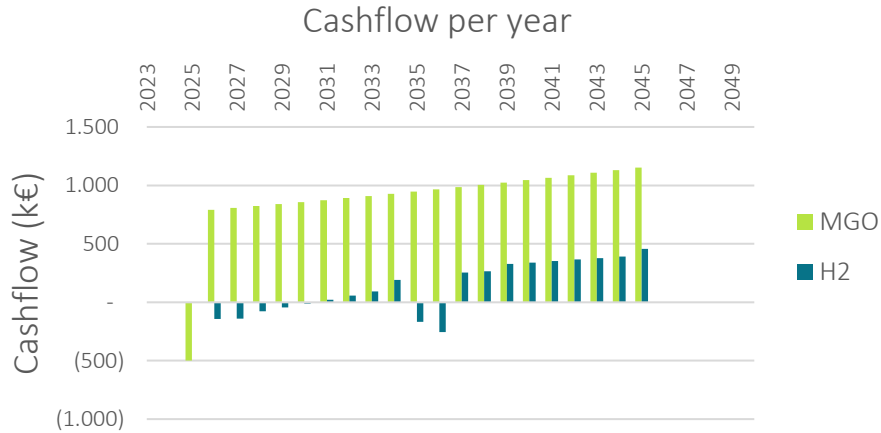
- The model calculates the differences between conventional and zero emission shipping based on hydrogen/zero emission and electrification
- All input has been validated by partners of Condor to make the calculation reliable, but every trade line and company is different
- Some items are depending on scale of operations like:
 - Tanktainers needed per ship
 - Rental cost tanktainers
 - Swap cost per change
- We calculate with an total inefficient pool at start, but gradually the pool will become more efficient and tanktainers per ship will drop in count
- Efficiency of diesel engine is still being measured and outcome will be available in march 2024. Current efficiencies of the engines and fuel cell in the model have been confirmed by several companies.

What are the key Capex cost drivers for the shipowner?



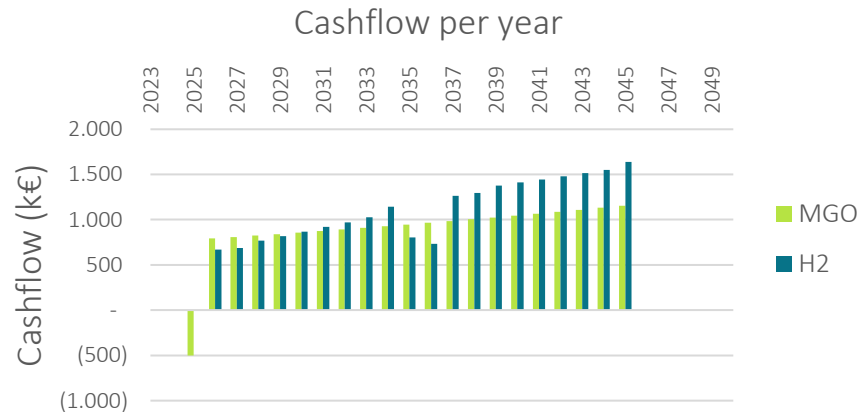
- Based on 1000KW Fuel Cell
- Lower maintenance cost for electrical drivetrain vs combustion engine
- Usage of 4 x 40ft Tanktainers
- Approx. 800-1000 kg H2 per Tanktainer
- Tanktainers will be leased and no cash out in year 1, but rental cost are high

Cashflow 1 ship on hydrogen vs MGO



- Assumptions

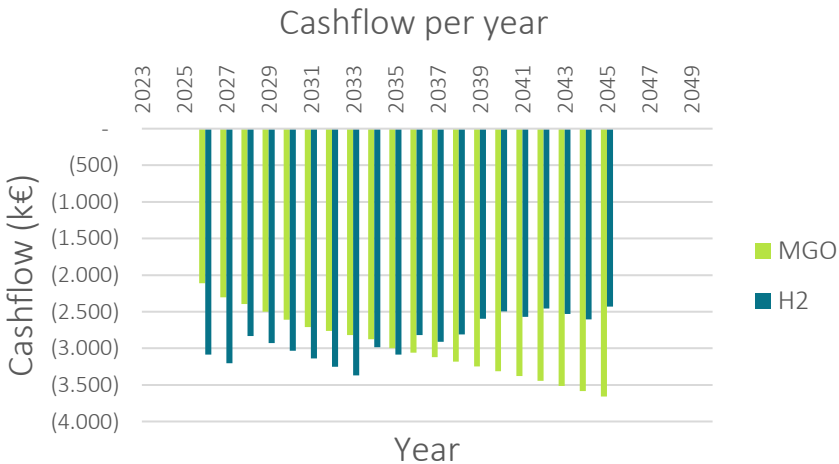
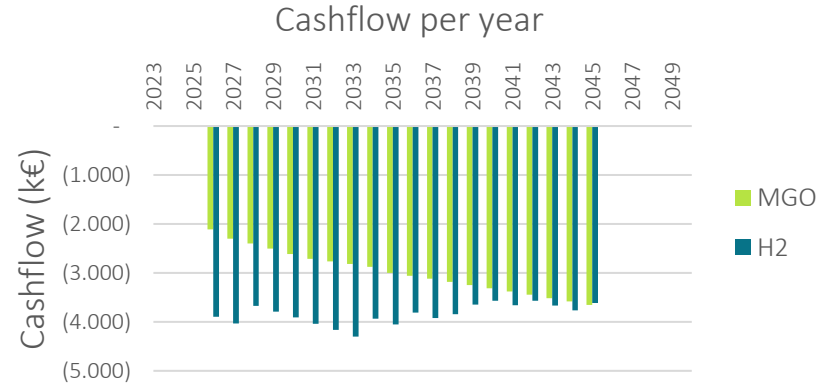
- Dayrate MGO ship @ EUR 3.000 per day
- Dayrate H2 ship @ EUR 3.000 per day
- Energy use 2500 MWh/yr
- Fuel cost to be paid by the cargo owner
- CAPEX fully allocated to year 1



- Conclusion

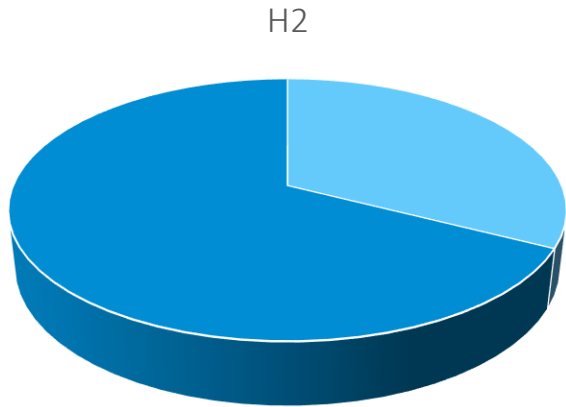
- More capex needed than Stage V conversion
- Skipper needs firm compensation for higher operating model H2
- Dayrate H2 ship @ EUR 6.000 per day needed
- On the long run H2 is competitive

Yearly total cost for dayrate + fuel use



- Based on Dayrate of EUR 6.000/day for H2
- MGO pricing stable @ EUR 750/mT
- Hydrogen starts @ EUR 12/kg and will be EUR 6/kg in 2031
- MGO/HVO mixture up to 70% in 2030 to reach label B in Inland shipping
- Conclusion
 - Hydrogen will become competitive, on the long run but coming years availability and pricing of green H2 are big question marks
 - No room to raise dayrate to compensate for investment skipper in until 2035

What are the key cost drivers for the cargo-owner?

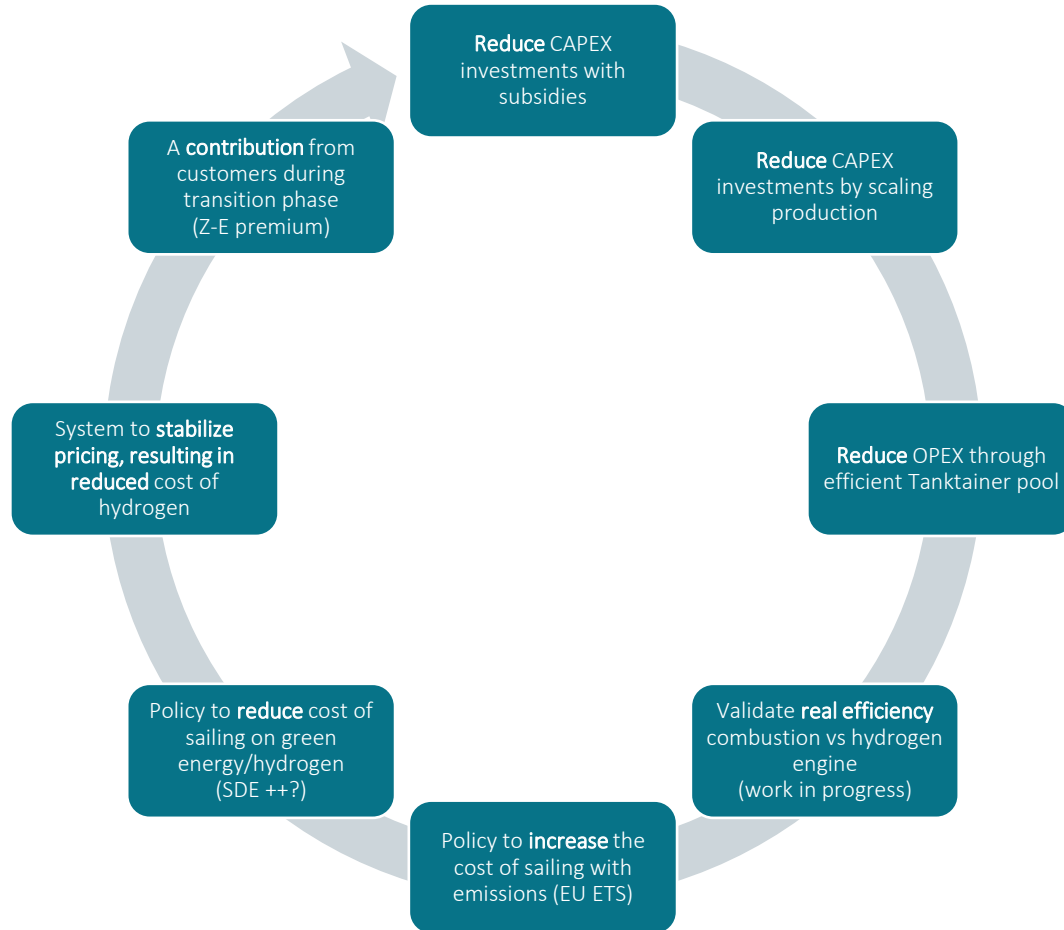


- Total investment H2 (after loans)
- Total residual value
- Total residual values last year
- Debt service
- Hydrogen costs
- Maintenance costs - H2
- Port dues costs - H2
- Tanktainer costs
- Total swaps costs
- Tanktainer trucking costs
- Charter rate costs - H2

- Based on EUR 6.000 per day
- H2 EUR 10 EUR per kg
- Doubling the cost for the cargo-owner

- Higher dayrate is needed to compensate mainly for the rental cost of the tanktainers and the operational cost of the skipper
- With EUR 3.000 per day, it would be 50-50, but still EUR 1 mln per year higher in cash out (EUR 2 mln vs EUR 3 mln)

What is required to make the business case work?



What are the main issues in this business case?

- According to you: How realistic is it to assume clients would voluntarily pay twice the amount of transport cost?
- Will insetting be the portal to use to find such clients?
- Do you believe in H2 as fuel in shipping, in the future green production and the availability for shipping?
- Will a tanktainer pool evolve to a mature market in less than 10 years time?
- Do you support that fossil fuel will become more expensive due to ETS and Fuel EU Maritime? Will this trend open the door for H2 or other alternatives in the market?
- What will drive the market to sustainable transport most likely? A pull from cargo owners and their public or a push from transporters (based on regulatory principles)
- What are, according to you, the three most likely events that could ruin this case for an investor/shipper/bank?

Other important topics to discuss

- How would a guarantee from Atradius help the bank to finance such a transaction?
- Would such a project classify for green-EIB funding (if available)?
- Are you willing to accept the granted subsidy as equity?
- What characteristics are necessary for the contracts in this set-up?
- How do you look at modular ships?
 - Is a ship still a ship, if it has only a electric engine?
 - Without fuel cell or tanks?
 - How would you value a ship in the future (when tanks are available and fuel cells are too) if these assets are not in the ship?



Condor H₂

Please feel free to contact us, if you have any questions!

Contact

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