



**Greenhouse gas
reductions in marine
leisure propulsion**

Proposal to ICOMIA Marine Engine Committee

© Ricardo plc 2022

www.ricardo.com

ICOMIA LCA Studie

Livscykelanalys för att reducera klimatpåverkan från fritidsbåtars framdrivningssystem

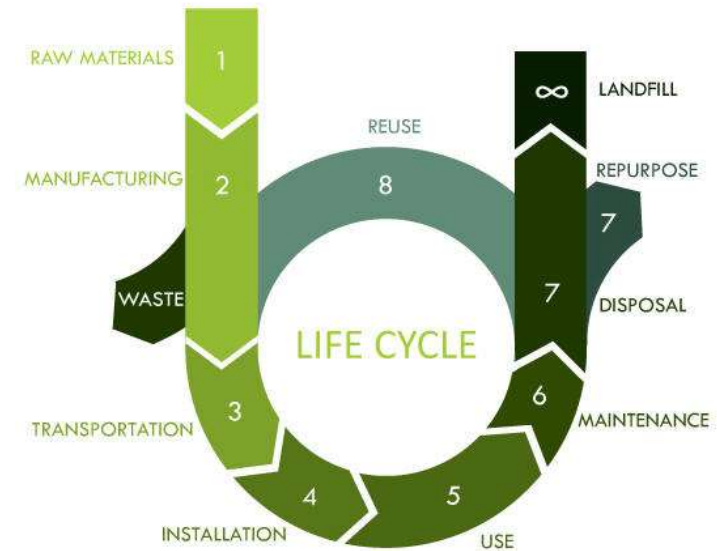




Skapa ett angreppssätt att över tid reducera växthusgaser från fritidsbåtars framdrivning.

RICARDO – ICOMIA – GREENHOUSE GAS REDUCTIONS IN MARINE LEISURE PROPULSION

LIFE CYCLE ASSESSMENT (LCA) BACKGROUND REPORT FOR ICOMIA



ISO 14040:2006 Environmental management -Life Cycle Assessment-Principles and Framework

ISO 14067:2018....

ISO 14044:2006+A1+A2:2020....

Environmental Life Cycle Assessment of a Standalone Hybrid Energy Storage System for Rural Electrification
Ayesha Shaik Mohiddin, Supervisor: M. L. Dennis Wong, and Co-Supervisor: Chee Ming Choo



Angreppssätt för studien

1. "Design"
2. LCA
3. Kostnad
4. Inverkan på båt
5. Inverkan på infrastruktur
6. Sammanvägt resultat

Suitability Analysis of 5 Power System Options

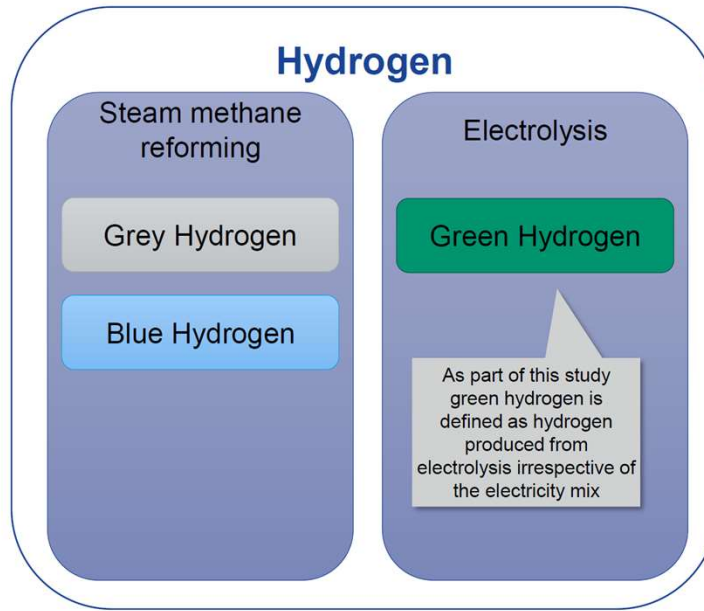
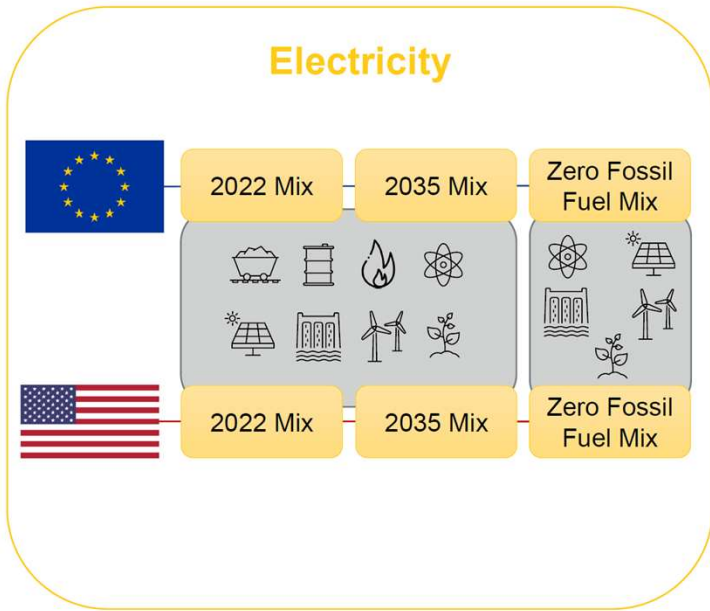


For 9 craft categories



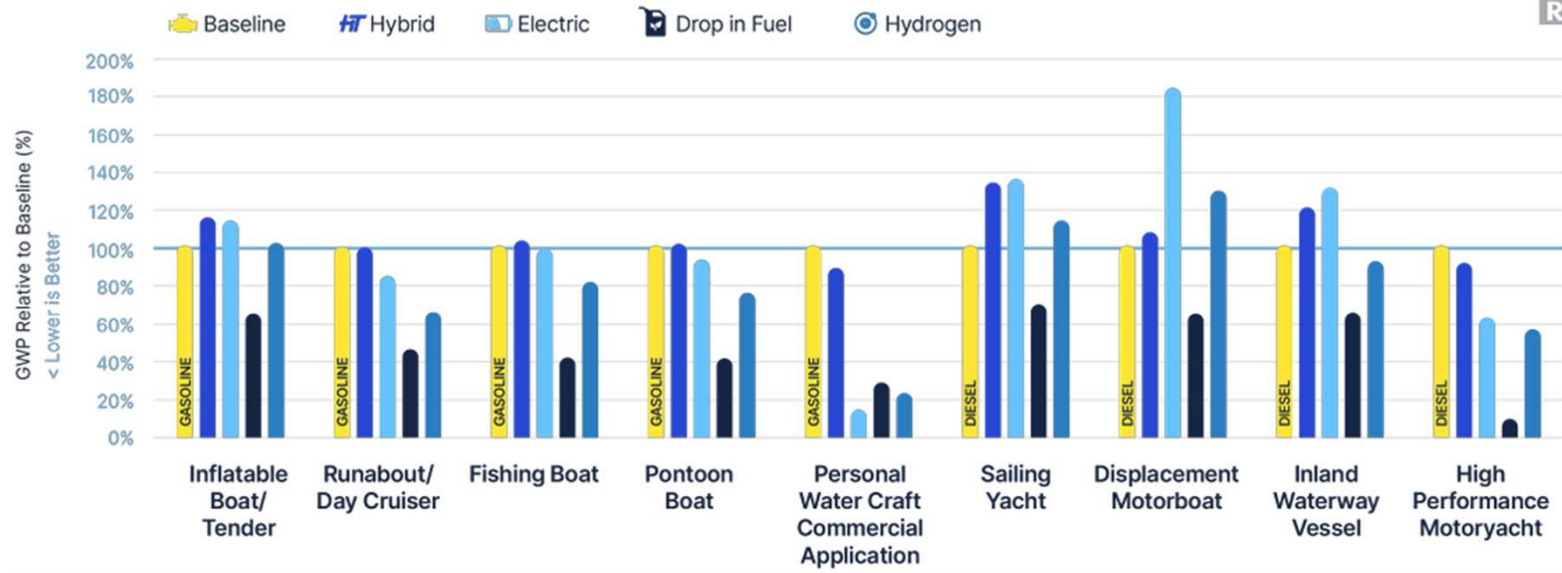


→ LCA Scenario – Alternativ energi



Sustainable drop-in fuel ICE (HVO or E-gasoline)

LCA resultat för 2035 med



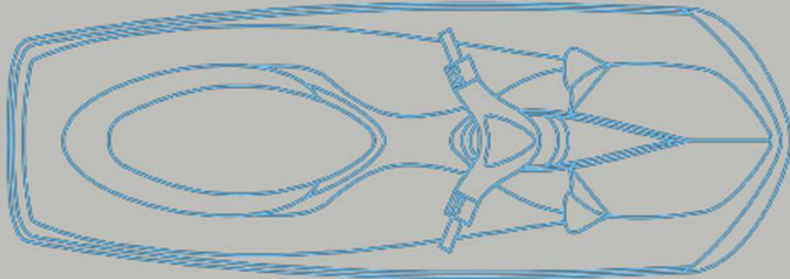
Annual utilisation (h)	35	43	35	35	156	24	48	48	130
Lifetime (y)	10	30	38	38	12.5	45	45	50	50

Figure 2 - Lowest global warming potential (GWP) for each propulsion system relative to the baseline ICE of each craft in 2035 (kgCO₂eq/vh). Lower values result in lower CO₂ emissions over the lifetime of the craft.

Production of hydrotreated vegetable oil (HVO) for diesel powered boats assumed to be produced from waste feedstocks such as cooking oil. All sources of electricity are zero fossil fuel.



PWC – High Utilisation Rental

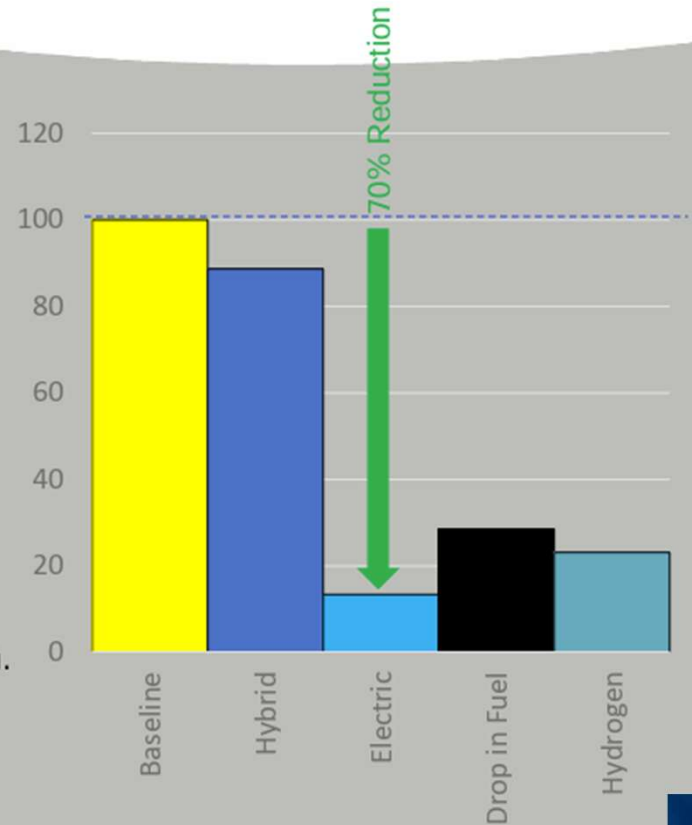


Use Case Assumptions

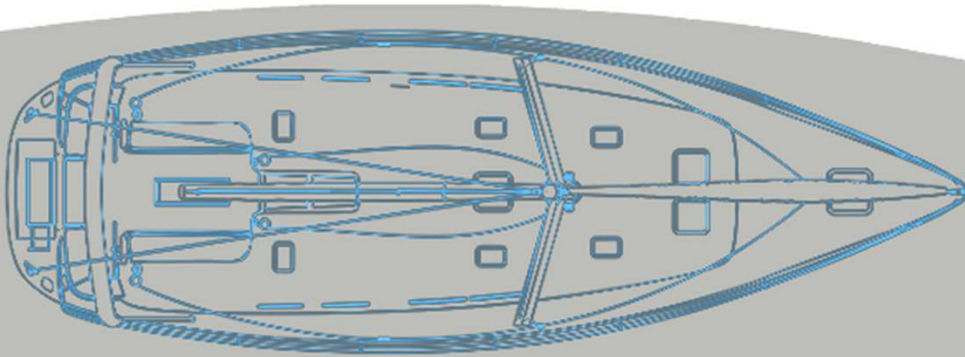
Annual Utilisation (hours)	156
Lifespan (years)	12.5

Results

- An electric propulsion system produces the highest carbon reduction.
- Modelled on a very high utilisation of a commercial use case.
- Assuming that a range reduction is not a limitation.



Sailing Yacht

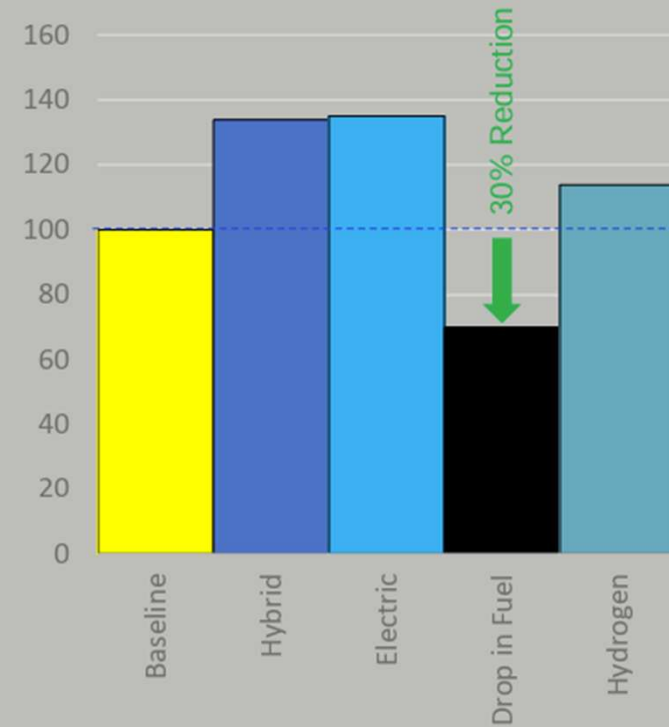


Use Case Assumptions

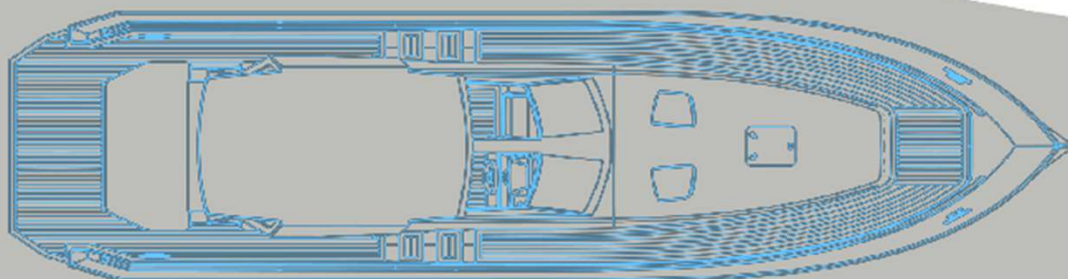
Annual Utilisation (hours)	24
Lifespan (years)	45

Results

- Sustainable marine fuel would have the biggest impact.
- The long life and low annual engine hours make it impossible to offset the manufacturing impact of other technologies.



High Performance Motoryacht

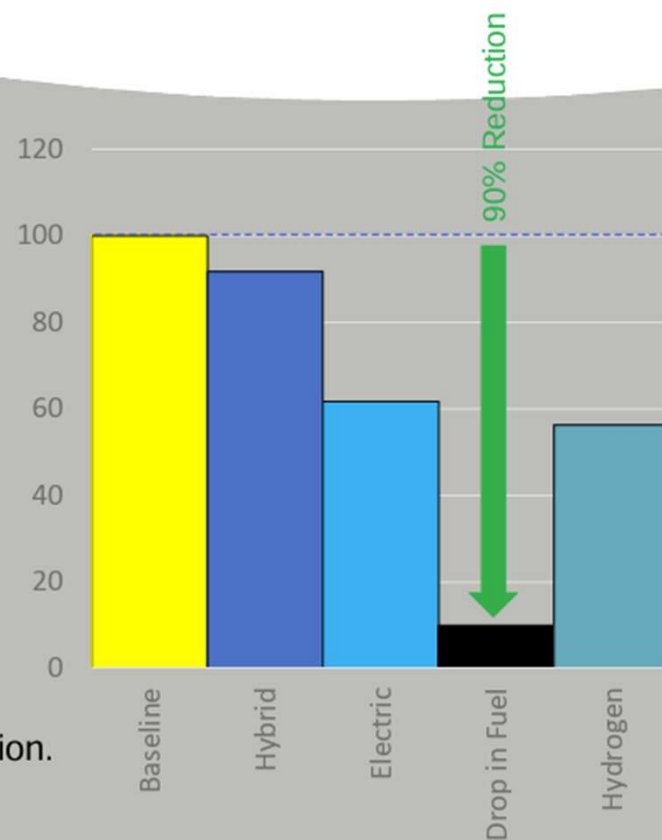


Use Case Assumptions

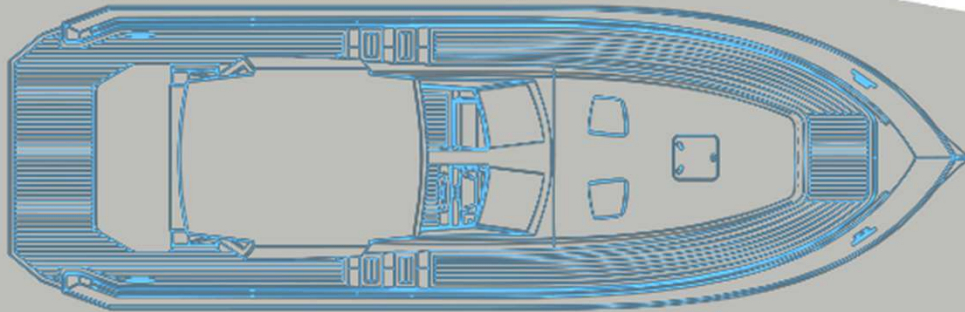
Annual Utilisation (hours)	130
Lifespan (years)	50
LOA	<20m

Results

- All alternative technologies could present an opportunity.
- Hydrogen presents an interesting opportunity given the high utilisation.
- Sustainable marine fuel presents the biggest carbon reduction.



Displacement Motorboat

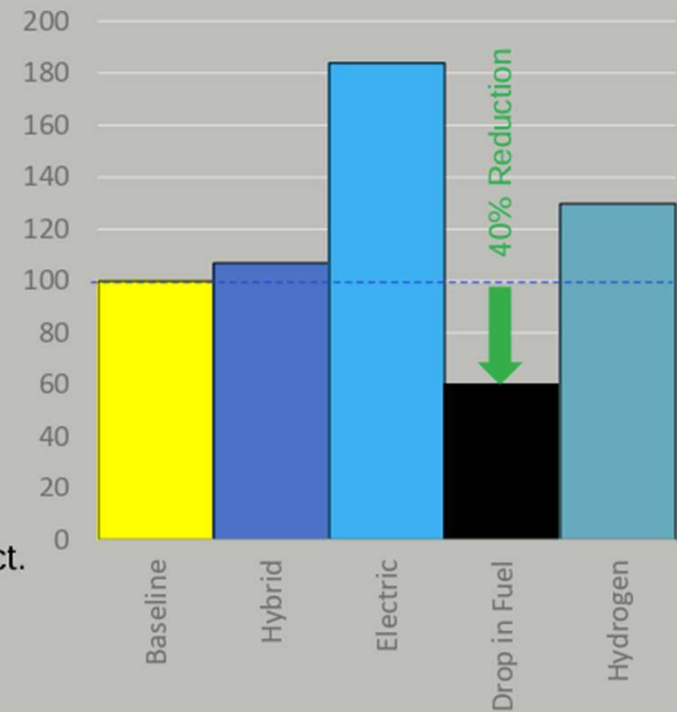


Use Case Assumptions

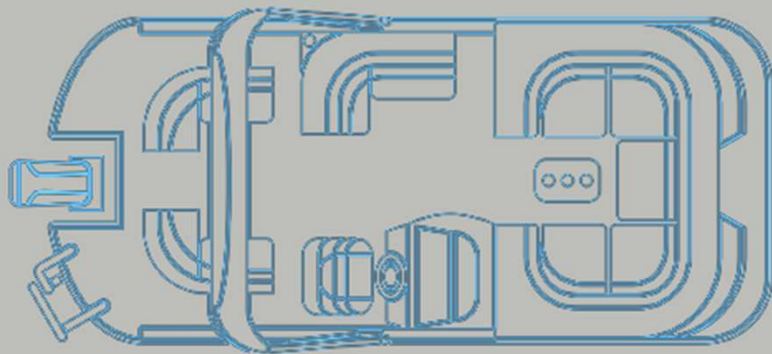
Annual Utilisation (hours)	48
Lifespan (years)	45

Results

- Switching to sustainable marine fuel would have the biggest impact.
- Electric propulsion would present too great of range compromise.



Pontoon Boat

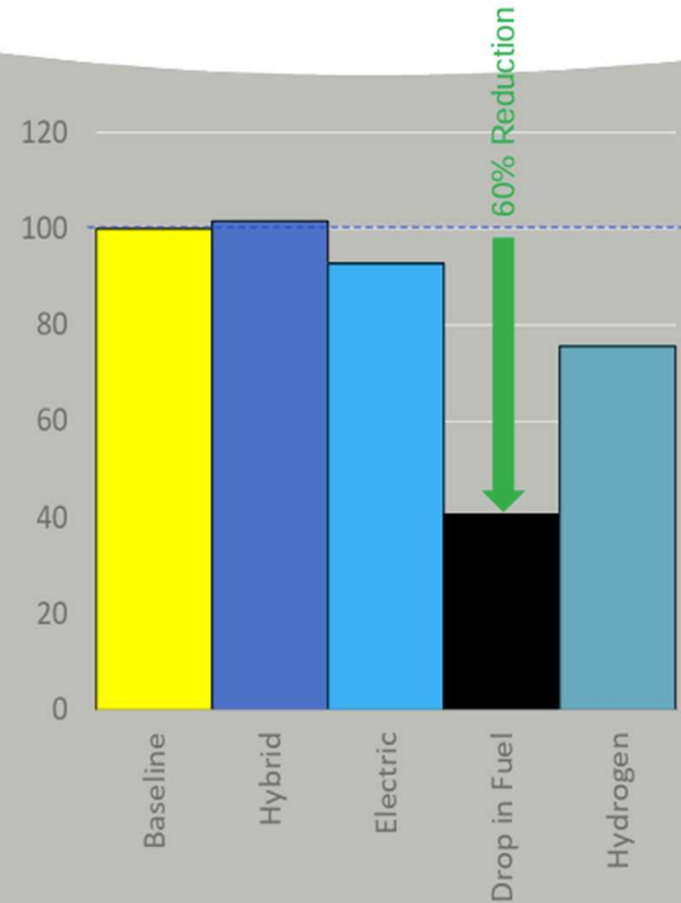


Use Case Assumptions

Annual Utilisation (hours)	35
Lifespan (years)	38

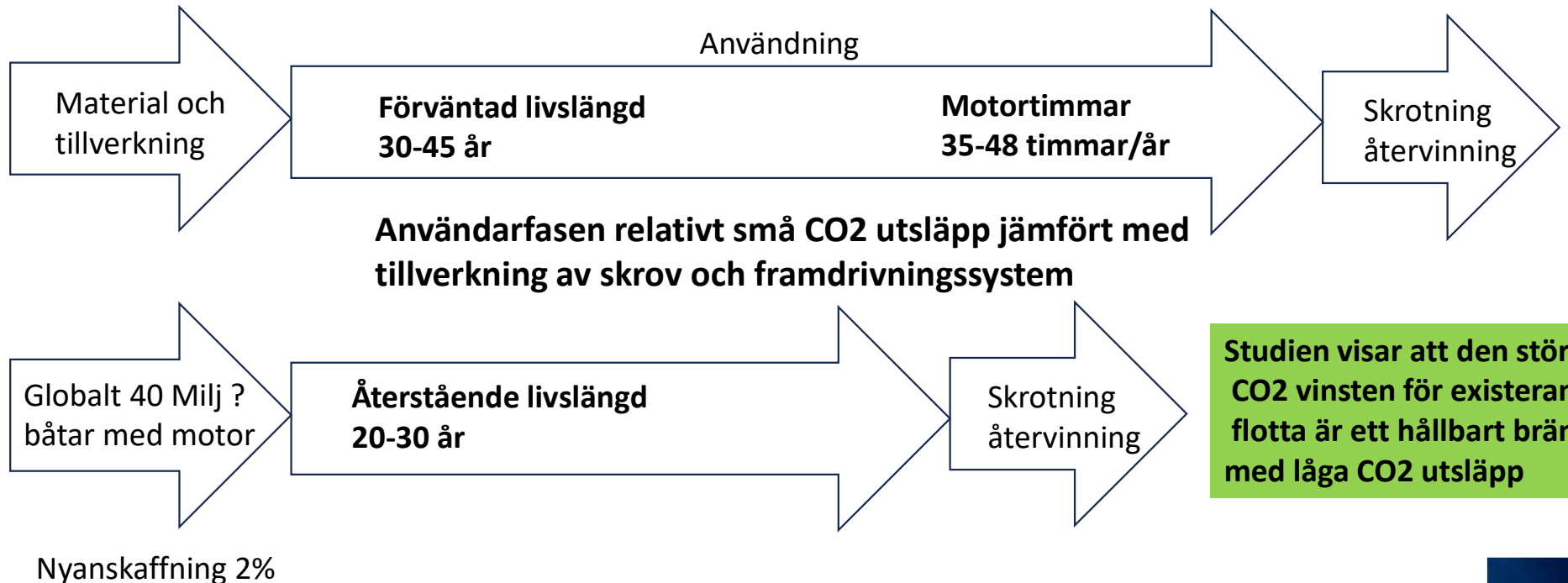
Results

- Switching to sustainable marine fuel would have the biggest impact.
- Benefits of other technologies restricted by low utilisation scenarios.





Båtar lever länge och har få gångtimmar



**Greenhouse gas
reductions in marine
leisure propulsion**

Proposal to ICOMIA Marine Engine Committee

© Ricardo plc 2022

www.ricardo.com

En variation av lösningar behövs



Ingen enda lösning ger svaret för en variation av båtar med olika livslängd, gångtimmar och olika behov av prestanda och räckvidd.

**Greenhouse gas
reductions in marine
leisure propulsion**

Proposal to ICOMIA Marine Engine Committee

© Ricardo plc 2022

www.ricardo.com

Inriktning på fritidsbåtspolitik

1. Stöd en variation av hållbara lösningar
2. Att ersätta dagens flotta ger stora CO2 utsläpp
3. Prioritera infrastruktur och tillgång på hållbart bränsle för dagens motorer såväl som för ny teknik.
4. Säkerhetsstandarder för ny teknik
5. Forskning o utveckling av kommande tänkbara lösningar.
6. Minska CO2 utsläpp i material och tillverkning.