

Speira VIA Maris NJORDAL aluminium

Comparative LCA of a higher-strength shipbuilding aluminium alloy against Speira's standard VIA Maris 5083 (BAU)

1 INTRODUCTION

VIA Maris NJORDAL is a new aluminium alloy from Speira for hull plates, sheets and strip. The report states it is 16% stronger than VIA Maris 5083, so less metal is needed for the same strength. Speira makes both alloys mostly from recycled aluminium.

The study compares NJORDAL (Scenario 2) with VIA Maris 5083 (Scenario 1, BAU) for a 500 GT superyacht. The comparison is per tonne of aluminium, not per yacht. Goal: verify NJORDAL for Water Revolution Foundation's Hub of Verified Solution.

2 METHODOLOGY

Functional unit. 1 equivalent tonne of shipbuilding aluminium: 1 t of NJORDAL against 1.16 t of 5083, based on the 16% strength difference.

System boundaries. Same for both. *Upstream*: primary aluminium, internal and external scrap, master alloys, lubricants. *Core*: raw-material transport (primary metal and alloys by ship), melting, casting and rolling (electricity and methane), waste. *Downstream*: distribution (50% 1,000 km by truck, 50% 7,500 km by ship) and scrap transport to recycling. Installation and use-phase fuel are left out (no data); recycling itself is left out per PCR and tested in sensitivity.

Impact methods. CML 2001 (GWP100, AP, POCP, EP, ODP, NOx, SOx, PM10); AWARE (water); ReCiPe 2016 (H) for Ecopoint.

Standards. ISO 14040; ISO 14044 (incl. Amd 2, 2020); PCR Yachts and small crafts (2015, being updated); stages per EPD System GPI v4.0.

Data sources. Primary data from Speira for both alloys (data collection sheet, questionnaire). Lubricants and cooling water from the Alunorf Environmental Statement; alloy additives from aluminium standards. Ecoinvent v3.9; SimaPro 9.5. No allocation.

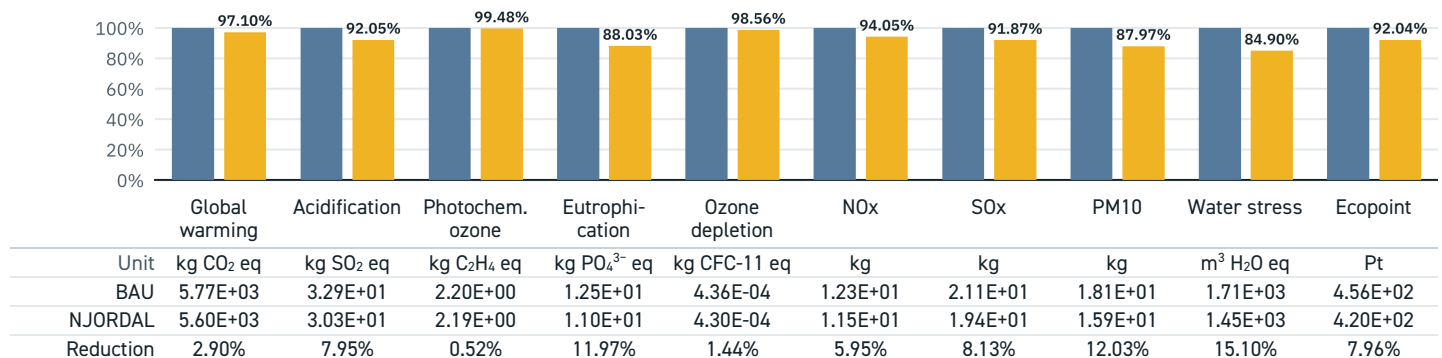
Composition. 5083: internal scrap 77%, primary metal 8%, external scrap 14%, master alloys 2%. NJORDAL: 72%, 16%, 10%, 2%. Same primary-metal origins and the same energy per tonne for both.

Lifetime. 20 years (PCR). No maintenance or use-phase energy. 3% production loss.

3 RESULTS per functional unit (1 equivalent tonne)

■ Scenario 1 – BAU (VIA Maris 5083, 1.16 t) ■ Scenario 2 – NJORDAL (1 t)

Scenario 2 as % of BAU (BAU = 100%), report Figure 4



Sensitivity: reduction vs BAU as printed (negative = higher than BAU). End of life added: recycling only (Table 17), or with credits for avoided primary metal (Table 18).

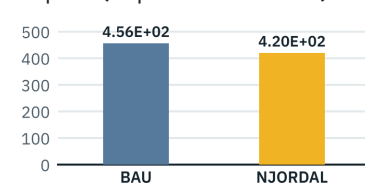
Recycling ops	3.89%	9.17%	2.50%	12.30%	2.95%	6.94%	9.47%	12.19%	14.73%	8.78%
Full recycling†	-17.04%	-15.53%	-18.56%	-14.81%	-37.94%	-15.55%	-15.56%	-14.33%	-11.81%	-16.85%

Break-even (Table 19): NJORDAL's strength advantage lowered from 16% (base case).

Strength 12%	-0.57%	4.67%	-3.03%	8.82%	-2.08%	2.59%	4.85%	8.89%	12.07%	4.67%
Strength 8%	-4.29%	1.13%	-6.85%	5.45%	-5.87%	-1.01%	1.33%	5.51%	8.81%	1.14%
Strength 7%	-5.27%	0.21%	-7.85%	4.56%	-6.86%	-1.96%	0.41%	4.63%	7.96%	0.21%
Strength 6%	-6.26%	-0.73%	-8.86%	3.66%	-7.86%	-2.92%	-0.53%	3.73%	7.09%	-0.73%

Bar labels as on report Figure 4. Base case: Tables 15–16 (table numbers as captioned). † Report: shown for completeness.

Ecopoint (Pt per functional unit)



Ecopoint by damage category

Pt	BAU	NJORDAL	Reduction
Human health	445.2121061	409.2600625	8.08%
Ecosystems	8.184334345	7.658381663	6.43%
Resources	2.880277445	3.057283745	-6.15%
Total	4.56E+02	4.20E+02	7.96%

Values as printed in Table 16 (negative = higher than BAU).

Where the impacts come from (report §4)

Both: upstream dominates every category, from primary (virgin) aluminium production.

Core energy affects eutrophication, ozone depletion and global warming.

Long shipping adds to ozone depletion, NOx, acidification and global warming.

Layout of Figure 1; values from Table 16.

4 KEY FINDINGS

NJORDAL is lower in all nine indicators, by 0.52% to 15.10% (Table 15); Ecopoint by 7.96% (Table 16). Smallest gain: photochemical ozone (0.52%); largest: water stress (15.10%).

Trade-off: per tonne, NJORDAL contains twice the primary aluminium (16% vs 8%). The gain comes from needing less metal. Resources damage is 6.15% higher (Table 16).

Depends on the 16% strength claim: at 12%, global warming, photochemical ozone and ozone depletion are already higher for NJORDAL. The report puts the break-even (WRF criteria) between 6% and 7% (Table 19).

End of life: with recycling operations added, NJORDAL stays lower in all indicators (Table 17).