

SKF RecondOil ROBX3115DSL oil filtration system

Comparative LCA against traditional oil changes (BAU) in the stabilising system of a 500 GT superyacht

1 INTRODUCTION

RecondOil ROBX3115DSL is SKF's offline oil filtration system for tanks up to 1,600 l. On a yacht's stabilising system it keeps the hydraulic oil's properties, so the oil is not changed during the yacht's life. The product is mainly stainless steel; 33 kg.

It compares the stabilising system of a 500 GT superyacht with RecondOil (Scenario 2) and with oil changes only, no product (Scenario 1, BAU), for Water Revolution Foundation's Hub of Verified Solutions.

2 METHODOLOGY

Functional unit. 1 hour of use while the stabilising system is on (3,854 h/yr, data from WRF); 20-year yacht life; 1,600 l tank.

System boundaries. Cradle to grave. *Upstream*: stainless steel, cellulose, rubber, plastics (all virgin), hydraulic oil. *Core*: transport, cutting and forming (Swedish sub-suppliers), assembly (SKF), distribution (1,000 km). *Downstream*: installation, use, filter changes, disassembly, end of life. BAU: oil production and disposal only.

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

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

Data sources. Mainly primary data from SKF (bills of materials, invoices, measurements, counters). Operating profile and oil-change interval from WRF. Ecoinvent v3.8; SimaPro 9.4. No allocation.

Use phase. 0.17 kW, assumed on whenever the stabilisers run (conservative), powered by the diesel-driven alternator: 0.0383 kg diesel per hour. Filter changed every 2,890 h.

BAU reference. Oil changed every 10,000 h (upper end of 8,000–10,000 h, most favourable to the BAU): 12,333 l over 20 years vs 1,600 l with RecondOil. Waste oil incinerated without energy recovery.

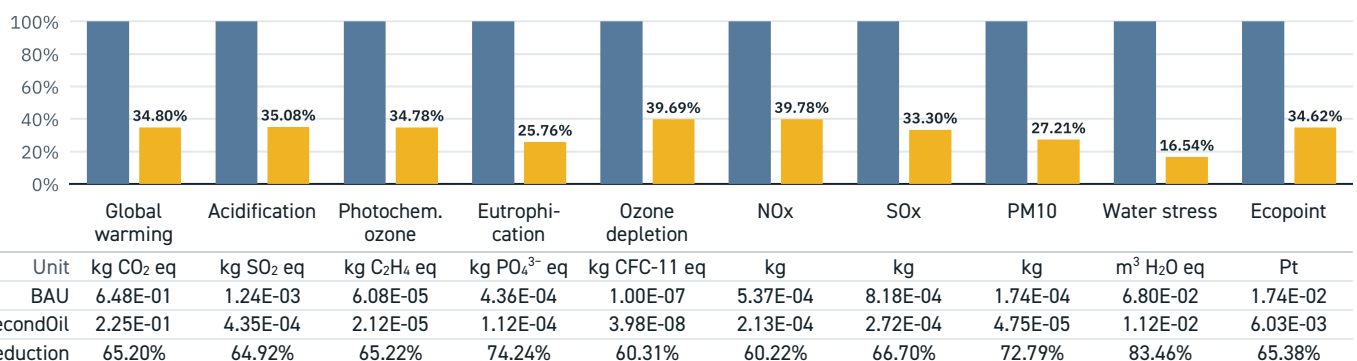
Assumed data. Materials of three components, packaging (30% of weight), average transport distances.

Excluded: raw-material packaging (according PCR), oil leakage (negligible).

3 RESULTS per functional unit (1 hour of use)

■ Scenario 1 – BAU (oil changes) ■ Scenario 2 – RecondOil

Scenario 2 as % of BAU (BAU = 100%), report Figure 5

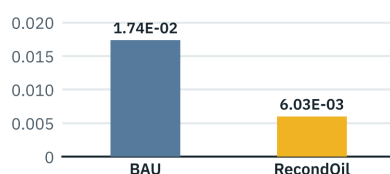


Sensitivity: reduction vs BAU, as printed (negative = higher than BAU). Tables 14–16; heat + el. = 50% heat + 30% electricity recovery from waste oil.

85% heat	37.71%	55.66%	7.33%	72.12%	47.19%	44.38%	59.54%	70.29%	83.21%	47.65%
Heat + el.	31.9%	34.2%	-40.2%	66.8%	34.7%	1.9%	45.1%	62.3%	-89.1%†	47.7%‡
500 l tank	17.2%	16.3%	17.3%	46.1%	1.6%	1.3%	22.0%	41.5%	75.7%	17.8%
2,000 l tank	69.6%	69.3%	69.6%	76.8%	65.6%	65.6%	70.8%	75.6%	84.2%	69.7%

Bar labels as printed on Figure 5. Base case (Tables 12–13): no energy recovery from waste oil, 1,600 l tank. † Both scenarios negative (credit from avoided hydropower); the report says to read this with care. ‡ Table 15 repeats Table 14's Ecopoint values.

Ecopoint (Pt per hour of use)



Ecopoint by damage category

Pt per hour	BAU	RecondOil	Reduction
Human health	1.61E-02	5.56E-03	65.36%
Ecosystems	6.91E-04	2.29E-04	66.77%
Resources	6.70E-04	2.38E-04	64.41%
Total	1.74E-02	6.03E-03	65.38%

Values as printed in Table 13.

Where the impacts come from (report §4)

RecondOil: upstream and the use phase give most of each impact; diesel leads the use phase.

Oil vs product: the oil's impact is higher than RecondOil's own production and disposal.

BAU: oil production is the largest stage, except for GWP.

Layout of report Figure 1, values from Table 13.

4 KEY FINDINGS

RecondOil is lower in all 10 indicators, by 60.2% to 83.5% (report §4); Ecopoint by 65.38%.

Avoiding oil changes drives the result. BAU: 12,333 l of oil over 20 years; RecondOil: 1,600 l. Hydraulic oil and diesel production contribute most to all categories.

The use phase is a worst case: full power whenever the stabilisers run. The report says this may overestimate it and recommends measuring real use.

Keep in mind: the BAU has no product; only its oil is modelled, with the oil-change interval most favourable to the BAU (operating hours and interval from WRF).

Trade-off: energy recovery from waste oil. With 85% heat recovery, RecondOil stays lower in all 10 (7.3–83.2%). With 50% heat + 30% electricity it is lower in 8 of 10 (1.9–66.8%): photochemical ozone creation is 40.18% higher and the BAU does better on water stress.

Tank size. RecondOil stays lower in all 10 indicators for all four sizes (500–2,000 l); the gap narrows for small tanks (500 l: 1.3% to 75.7%).