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RECEIVED 12 September 2025
REVISED 16 October 2025
ACCEPTED 20 October 2025
PUBLISHED 18 November 2025

CITATION
Dave Y, Márquez Torres JS, Kazemi Esfeh S,
Baetcke L and Ehlers S (2025) Correction:
Energy efficiency of future hydrogen-based
fuel supply chain routes for Germany's
maritime demand.
Front. Energy Res. 13:1704363.
doi: 10.3389/fenrg.2025.1704363

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Correction: Energy efficiency of future hydrogen-based fuel supply chain routes for Germany's maritime demand

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KEYWORDS

synfuels, scenarios, import efficiency, maritime transport, pipeline infrastructure, hydrogen geopolitics

A Correction on Energy efficiency of future hydrogen-based fuel supply chain routes for Germany's maritime demand

by Dave Y, Márquez Torres JS, Kazemi Esfeh S, Baetcke L and Ehlers S (2025). *Front. Energy Res.* 13:1600803. doi: 10.3389/fenrg.2025.1600803

“In the abstract, Line 24 The analysis showed that the efficiency of import varies from 44.6% to 53.9% between the analyzed countries. This has been corrected to read: The analysis showed that the efficiency of import varies from 42.17 % to 50.02% between the analyzed countries.”

There was a mistake in [Figure 4](#) as published. In order to plot the graphs, unlike stated, the higher heating value of methanol was taken (22.9 MJ/kg) instead of the lower heating value, i.e. 19.9 MJ/kg. The corrected [Figure 4](#) appears below.

There was a mistake in [Figure 5](#) as published. In order to plot the graphs, unlike stated, the higher heating value of methanol was taken (22.9 MJ/kg) instead of the lower heating value, i.e. 19.9 MJ/kg. The corrected [Figure 5](#) appears below.

There was a mistake in [Figure 6](#) as published. In order to plot the graphs, unlike stated, the higher heating value of methanol was taken (22.9 MJ/kg) instead of the lower heating value, i.e. 19.9 MJ/kg. The corrected [Figure 6](#) appears below.

There was a mistake in [Figure 7](#) as published. In order to plot the graphs, unlike stated, the higher heating value of methanol was taken (22.9 MJ/kg) instead of the lower heating value, i.e. 19.9 MJ/kg. The corrected [Figure 7](#) appears below.

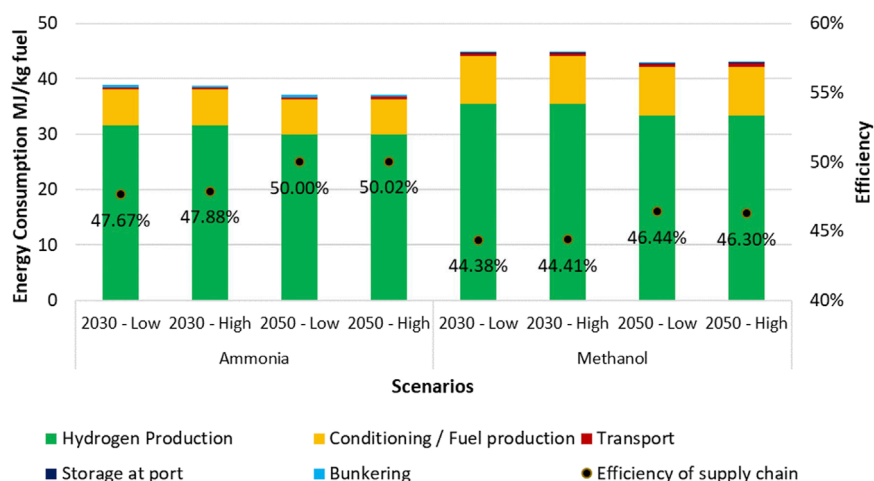


FIGURE 4
Energy consumption and efficiency of supply chain 1 – Norway.

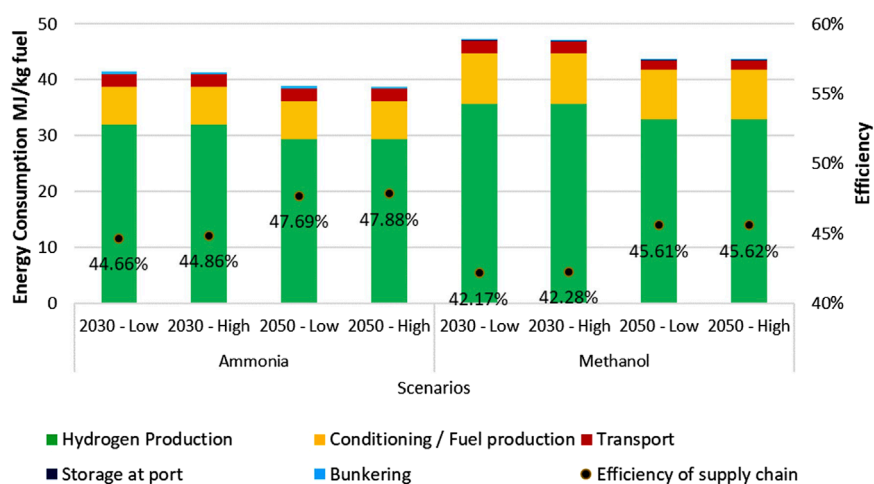


FIGURE 5
Energy consumption and efficiency of supply chain 2 – Namibia.

There was a mistake in Figure 8 as published. In order to plot the graphs, unlike stated, the higher heating value of methanol was taken (22.9 MJ/kg) instead of the lower heating value, i.e. 19.9 MJ/kg. The corrected Figure 8 appears below.

Equation 3 in 4.3 Transport, 4.3.2 Ship-based transport, was erroneously given as:

$$\text{No. of ships required} = \frac{V_{\text{Methanol per day}} * \text{voyage duration}}{V_{\text{Methanol per ship}}}$$

The correct equation is:

$$\text{No. of ships required} = \frac{V_{f \text{ per day}} * \text{voyage duration}}{V_{f \text{ per ship}}}$$

Equation 4 in 4.3 Transport, 4.3.2 Ship-based transport, was erroneously given as:

$$\text{No. of voyages per year} = \frac{V_{\text{Methanol per year}}}{V_{\text{Methanol per ship}}}$$

The correct equation is:

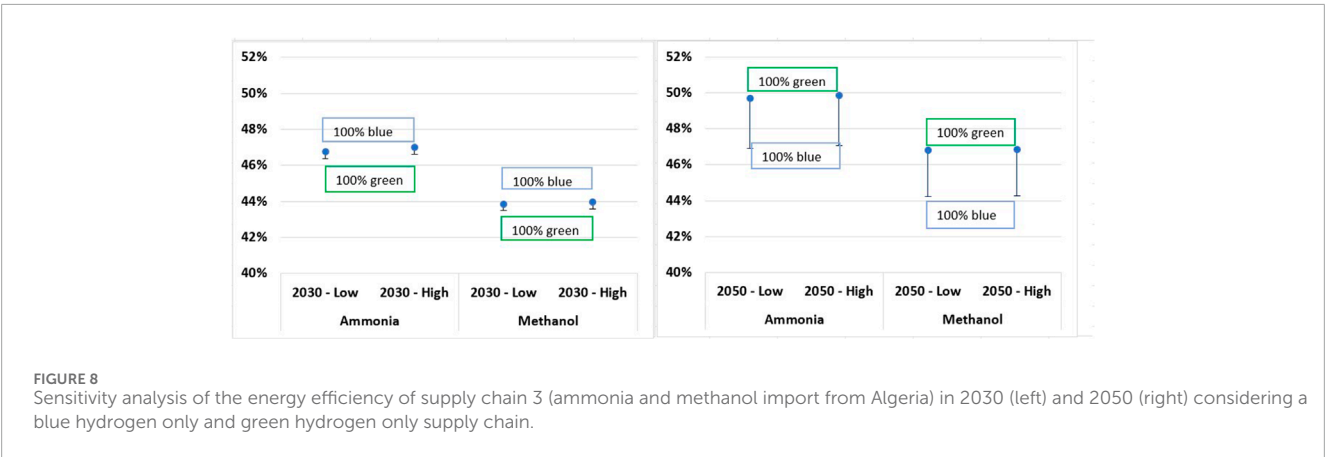
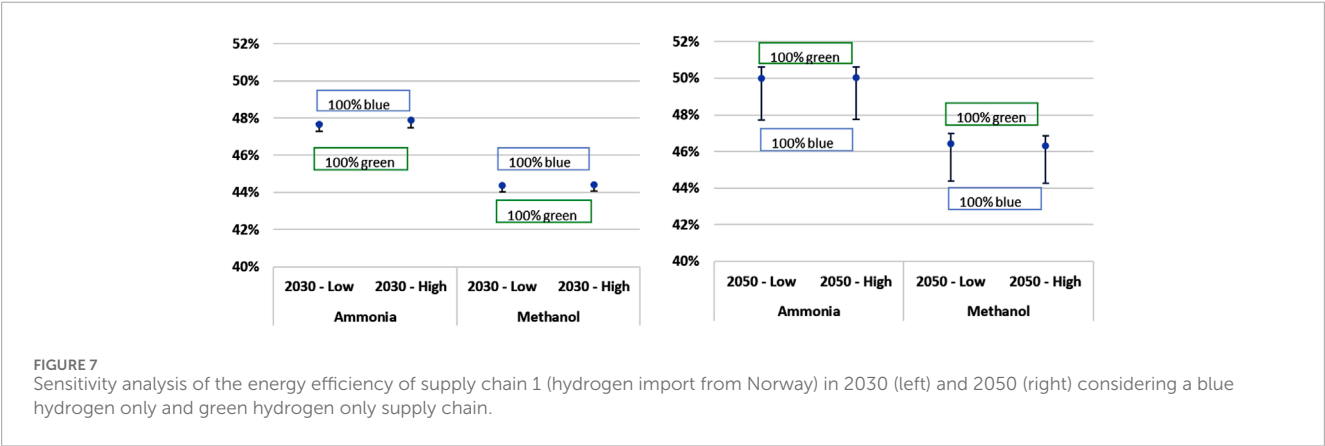
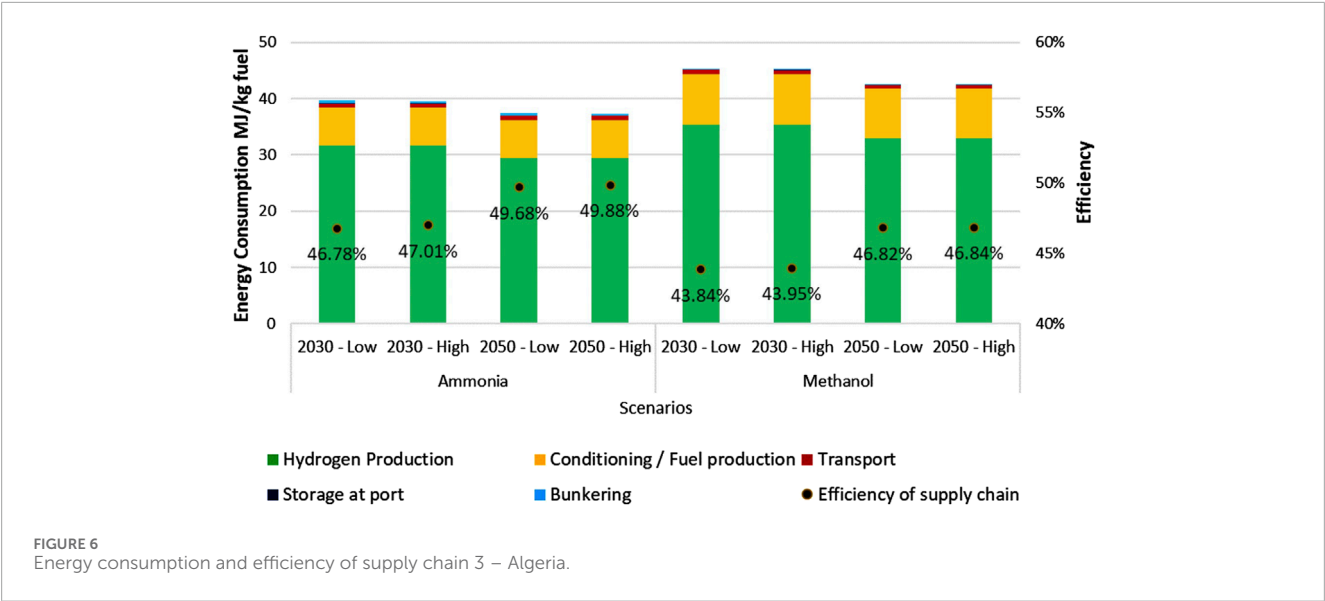
$$\text{No. of voyages per year} = \frac{V_{f \text{ per year}}}{V_{f \text{ per ship}}}$$

There was an error in the explanation of Equation 4. A correction has been made to Section 4.3 Transport, 4.3.2 Ship-based transport, paragraph 2:

“Where f stands for fuel (ammonia or methanol), $V_{f \text{ per day}}$ represents the volume of fuel produced per day, $V_{f \text{ per ship}}$ the volume of fuel transported per ship, $V_{f \text{ per year}}$ the volume of fuel produced per year and the voyage duration is the sum of the round trip.”

There was an error in the percentages. A correction has been made to Section 5 Results and discussion, paragraph 2:

“The power-to-fuel efficiencies obtained in this study for 2030 range between 44.51% in Namibia and 44.88% in Algeria, while in 2050 they increase to 47.56% for both countries, primarily due to the anticipated improvement of electrolyzer efficiency. This is lower



compared to the 52.4% and 54.7% figures found by (Rahmat et al., 2023) when considering a VDB kinetic model and a GRF model respectively.”

There was an error in the percentages. A correction has been made to section 5 Results and discussion, 5.1 Import from Norway, paragraph 3:

“The overall efficiency of the supply chain is approximately 48% and 44% in 2030 and 50% and 46% in 2050 for ammonia and methanol respectively.”

There was an error in the percentages. Corrections have been made to section **5 Results and discussion**, 5.4 Sensitivity analysis for 100% blue hydrogen and 100% green hydrogen scenarios:

Paragraph 2:

“In the case of supply chain 1- Norway to Germany, when considering a 100% green hydrogen scenario, the energy efficiency in 2030 decreases by approximately 0.40% for ammonia and 0.36% for methanol (lower whisker bars on the left side of [Figure 7](#)), while for 2050 it increases by 0.61% and 0.55% respectively (upper whisker bars on the right side).”

Paragraph 3:

“This observation is further corroborated by the results of the 100% blue hydrogen scenario: in 2030, the supply chain efficiency increases marginally (by 0.01%) for both ammonia and methanol, while in 2050 it decreases by approximately 2.28% in the case of ammonia and 2.06% in the case of methanol (lower whisker bars on the right side of [Figure 7](#)).”

Paragraph 4:

“A comparable phenomenon is observed in the case of supply chain 3- Algeria to Germany, wherein considering a 100% green hydrogen scenario, the energy efficiency in 2030 decreases by approximately 0.38% for ammonia and 0.35% for methanol (lower whisker bars on the left side of [Figure 8](#)). For the year 2050, supply chain efficiency remains constant, as a 100% green scenario had previously been considered. In contrast, for the 100% blue scenario, efficiency increases marginally (by 0.01%) for both ammonia and methanol in 2030, while for 2050 it decreases by 2.80%

and 2.59% respectively (lower whisker bars on the right side of [Figure 8](#)).”

There was an error in the percentages. Corrections have been made to section **6 Conclusion**.

Paragraph 2:

“As observed from the results, the technical efficiency of import varies from 42.17% to 50.02% between the analyzed countries.”

Paragraph 3:

“And for methanol, the average supply chain efficiency of Norway is 44.40% and Algeria 43.90%.”

The original article has been updated.

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