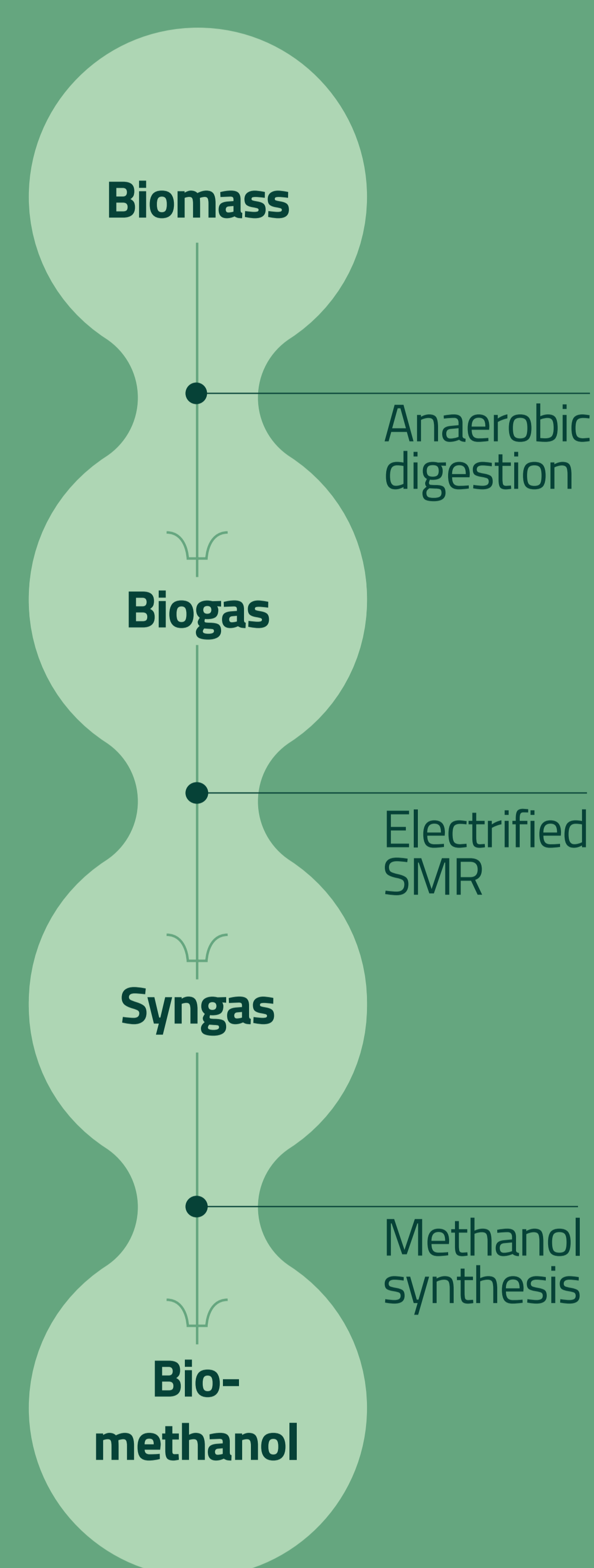


NextFuel

The next shipping fuel: electrifying steam methane reforming for biomethanol production



Introduction

As the maritime sector aims to reduce emissions, **biomethanol** emerges as a promising green fuel. It **has the potential to substantially cut emissions** compared to traditional marine fuels while remaining economically viable. The **NextFuel project focuses on electrifying the Steam Methane Reforming (SMR) process** to produce biomethanol more sustainably, significantly reducing its carbon footprint. By starting methanol synthesis with biogas (or biomass) instead of natural gas, the sustainability of the process is further enhanced.

The electrification of the SMR process represents a major advancement in sustainable fuel production. By **utilizing renewable electricity and innovative reactor designs, it can greatly reduce fossil fuel dependency and CO₂ emissions**. Furthermore, integrating onboard carbon capture technology ensures the maritime industry can move towards a zero-emission future. The adoption of electrified SMR technology is projected to significantly lower greenhouse gas emissions. [1]

This novel approach has already been successfully demonstrated at lab scale by one of our project partners. With promising results, NextFuel aims to upscale it for commercial viability. **Biomethanol production can be further expanded by using green hydrogen and CO₂ captured onboard ships as feedstock**. This integration not only enhances fuel production but also contributes to significant CO₂ reduction, transforming emissions into valuable resources.

To learn more about the NextFuel project, visit our website at nextfuel-project.eu or scan the QR code below. For any information, please feel free to contact us at info@nextfuel-project.eu

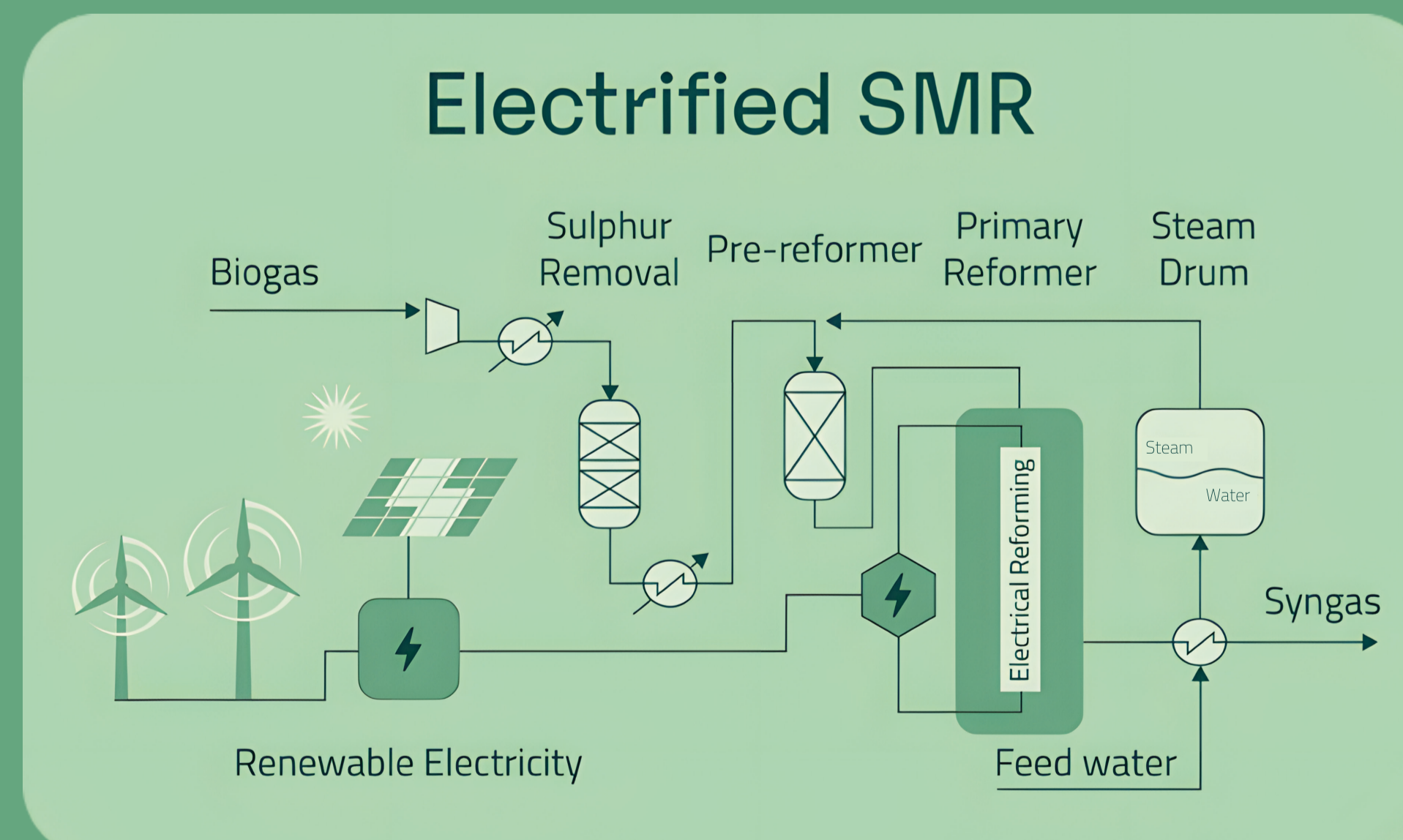
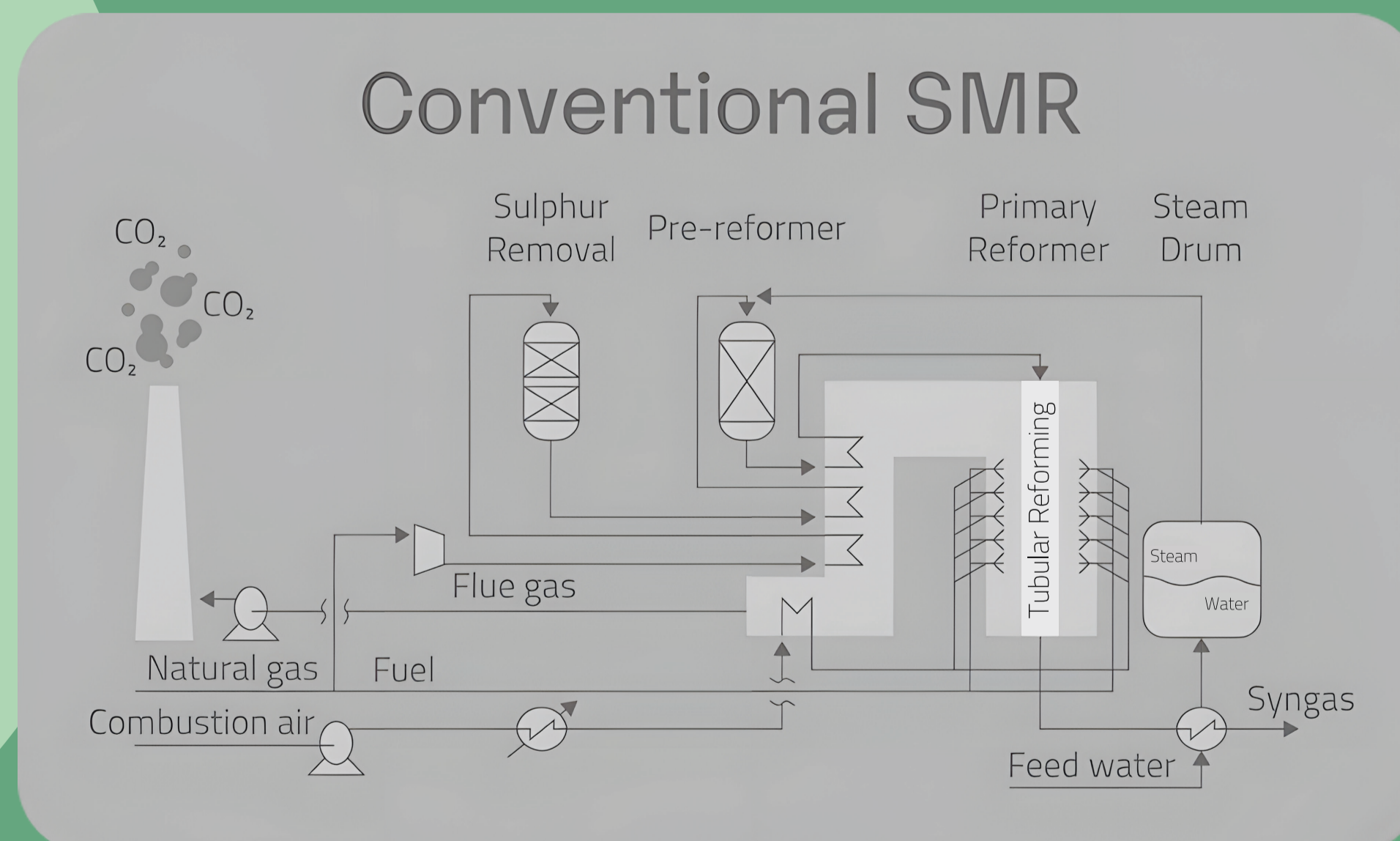
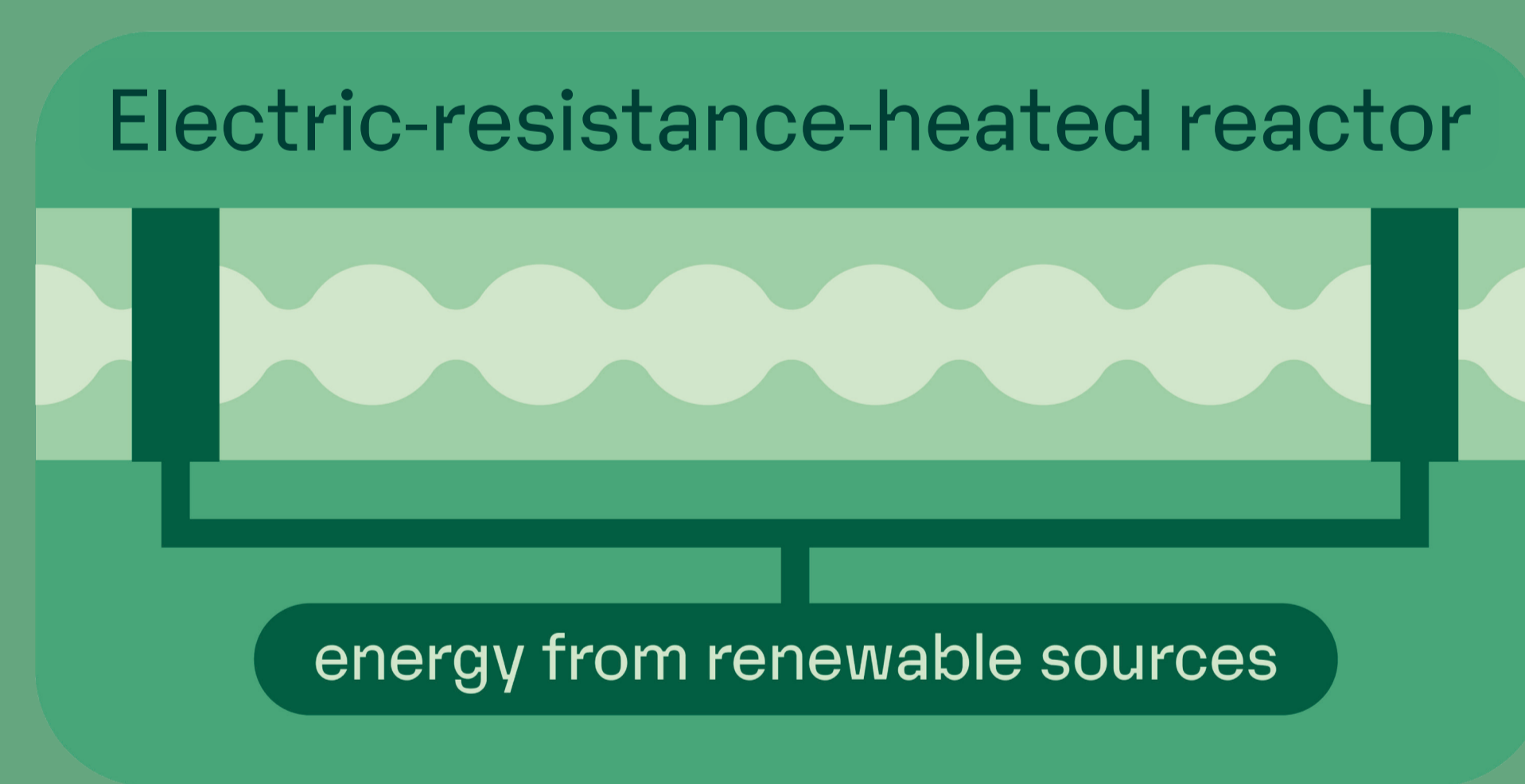


Methodology

Steam methane reforming is energy intensive. Traditional SMR reactors rely heavily on fossil fuels to drive the strongly endothermic reactions within the reactor, resulting in substantial CO₂ emissions. NextFuel introduces an electrified SMR process to revolutionize biomethanol production. By replacing the large furnace of conventional SMR reactors with electric-resistance-heated reactor walls, this concept uses **renewable electricity to convert biogas into syngas**. This approach bypasses the thermal limitations of traditional SMR reactors, enhancing catalyst utilization, reducing reactor volume up to 100 times, and eliminating direct CO₂ emissions. [2]

Conclusion

Electrification of the SMR process offers a transformative approach to sustainable biomethanol production. By leveraging renewable electricity, biogas, green hydrogen, and CO₂ capture, **this technology can significantly reduce the maritime sector's carbon footprint**. The scalability and flexibility of this technology provide a viable pathway for widespread adoption, promising substantial environmental benefits.



Partners

The **Next Fuel Consortium** represents a multidisciplinary group composed of **7 partners from 4 countries**.



TOPSOE

NTNU



Topeka



FLEXFUELS

[1] From TN, Partoon B, Rautenbach M, Østberg M, Bontien A, Aasberg-Petersen K, & Mortensen PM. (2024). Electrified steam methane reforming of biogas for sustainable syngas manufacturing and next generation of plant design: A pilot plant study. *Chemical Engineering Journal*, 479, 147205.

[2] Wismann ST, Engbæk JS, Vendelbo SB, Bendixen FB, Eriksen WL, Aasberg-Petersen K, et al. Mortensen PM. (2019). Electrified methane reforming: A compact approach to greener industrial hydrogen production. *Science*, 364 (6442), 756–759.