

# Hydrogen production: Direct seawater splitting is disadvantageous

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## Is direct seawater splitting economically meaningful?

*J. Niklas Hausmann, Robert Schlögl, Prashanth W. Menezes and Matthias Driess*

Electrocatalytic water splitting is the key process for the formation of green fuels for energy transport and storage in a sustainable energy economy. Besides electricity, it requires water, an aspect that barely has been considered until now. As freshwater is a limited resource, lately, reports were published on direct seawater splitting without or with additives. Alternatively, the seawater can be split in two steps, where it is first purified by reverse osmosis and then split in a conventional water electrolyser.

In their quantitative analysis, Hausmann et al. discuss the challenges of the direct usage of non-purified seawater. Further, they compare the energy requirements and costs of seawater purification with those of conventional water splitting.

The team of researchers from Technische Universität Berlin and Fritz-Haber-Institut der Max-Planck-Gesellschaft finds that direct seawater splitting has substantial drawbacks compared to

conventional water splitting and bears almost no advantage. In short, it is less promising than the two-step scenario, as the capital and operating costs of water purification are insignificant compared to those of electrolysis of pure water.

The analysis and findings of Hausmann et al. are found in an open-access paper in the RSC journal *Energy & Environmental Science*: Matthias Driess, Jan Niklas Hausmann, Robert Schlögl and Prashanth W. Menezes (2021) "Is Direct Seawater Splitting Economically Meaningful?" *Energy Environ. Sci.* DOI: [10.1039/D0EE03659E](https://doi.org/10.1039/D0EE03659E)

The paper gained much attraction and was mentioned on several international scientific blogs and websites. For further reading, see:

<https://daily.energybulletin.org/2021/06/study-finds-direct-seawater-splitting-has-substantial-drawbacks-to-conventional-water-splitting-offers-almost-no-advantage/>

<https://insights.globalspec.com/article/16828/the-economics-of-direct-vs-two-step-water-splitting>

<https://www.h2knowledgecentre.com/content/journal2222>

<https://www.greencarcongress.com/2021/06/20210616-seawater.html>

<http://www.nanoer.net/showinfo-4-32605.html>

<https://zhuanlan.zhihu.com/p/380940986>