

Use of e-fuels for aviation

Calculation made in January 2020, by Jakob Graichen, Öko-Institut Germany

According to IRENA, the total [worldwide renewable electricity production in 2017](#) was 22,287,413TJ (6,190,948 GWh).

When producing e-fuels through the conversion of electrical power into liquid fuel (Power to Liquid) the energy loss in the conversion is about 50 %. Which means that you need approximately 2 TJ of electrical power to produce 1 TJ of e-fuel. This is already an optimistic estimate when referring to e-kerosene. The process of making e-kerosene always produces waxes and diesel as byproducts, which is although not included in the conservative calculation.

Kerosene consumption: The IEA World Energy Outlook states global aviation CO₂ emissions of 915 Mt in 2017. Burning 1 TJ of kerosene emits 73,3 tons of CO₂. With this factor we can calculate that the aviation industry burned 12,482,947 TJ of kerosene in 2017.

Putting these numbers into perspective, this means that the worldwide renewable energy production would not be able to cover the electricity needed by the aviation sector. Even if we used the whole worldwide renewable electricity production to provide kerosene for the aviation sector, it would cover only about 90% of their energy consumption. **The aviation sector already today uses 12% more kerosene than could be produced even if we used the whole worldwide renewable electricity production.**