

# Summary of WP3 results

## ***Summary of work***

- Relevant hydrogen-connected EU regulation was mapped, such as FuelEU Maritime, ReFuelEU Aviation, revised RED and its delegated acts
  - In addition to the EU perspective the mapping included the national perspective such as the expansion of the distribution obligation
- Hydrogen market development analysis was conducted based on the regulatory mapping in order to quantify the effects the regulation has on the future hydrogen economy
  - Results given in tonnes of hydrogen and GW of electrolyser capacity
  - EU is a frontrunner in renewable hydrogen regulation and the analysis concluded that regulation in the EU increases the demand for renewable hydrogen significantly

## ***Deviations to the original research plan***

- The primary focus of the executed research in WP3 was regulation, both EU and national, and its effects to the future demand formation
- As per the request of the steering group, the research was focused primarily on drivers of the future hydrogen market development and demand formation

# Importance of regulation for H2 market development

Aleksandra Saarikoski

27/04/2025 VTT – beyond the obvious

# Importance of regulation for H2 market development

## *Why is regulation important?*

- EU regulation has a significant influence to the synthetic fuel and hydrogen market within Europe – it creates new demand and production of hydrogen

## *What was researched?*

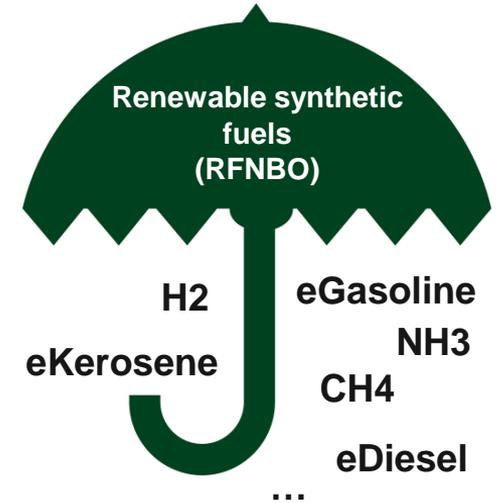
- Mapping of the most relevant EU and national legislation surrounding hydrogen and synthetic fuels
- Analysing the effects of regulation on the production of renewable hydrogen
- Regulation-based synthetic fuel\* market analysis was constructed to find out the demand for hydrogen in maritime and aviation sectors within Europe

\*RFNBO = "Renewable fuels of non-biological origin" or RFNBO-fuels refer to **renewable synthetic fuels that can be produced from hydrogen**. (incl. Hydrogen)

# Mapping of Hydrogen regulation within the EU

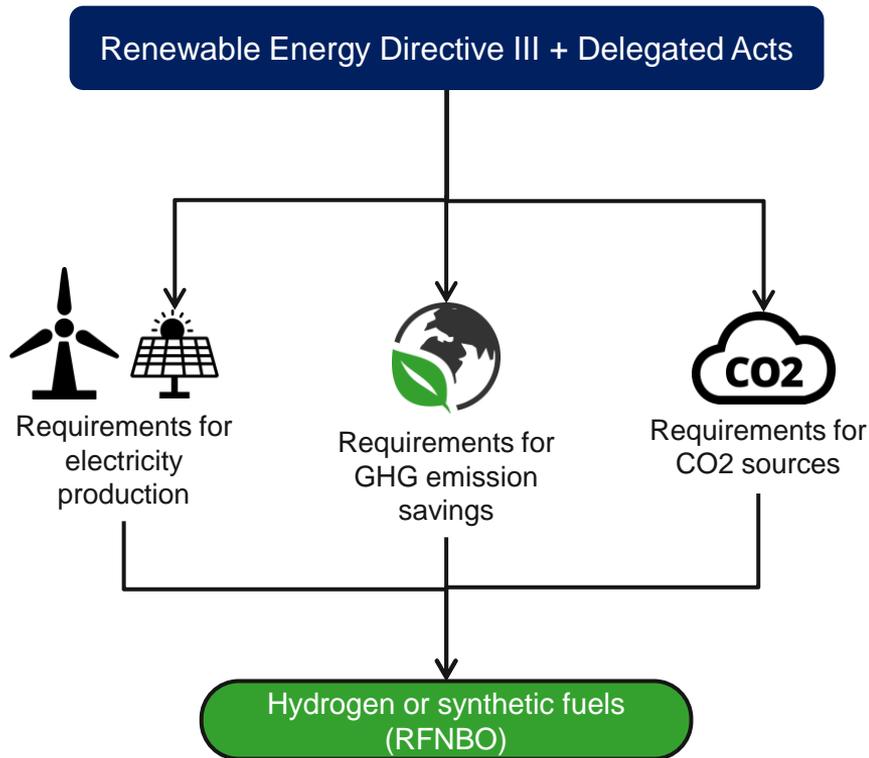
# Mapping of Hydrogen regulation

- The goal of the mapping was to **create an understanding of the latest EU regulation** connected to hydrogen and hydrogen-based fuels – **is regulation a driver or a barrier?**
- Understanding the legislation around hydrogen is crucial for future hydrogen economy formation
- **Production and consumption of fuels are regulated**
- The EU has been very active in the recent years around regulation of hydrogen and hydrogen-based fuels – the aim is to stay on top of this knowledge to provide valuable input to partners
- Finnish national regulation involving hydrogen and hydrogen-based fuels was included as a part of this mapping

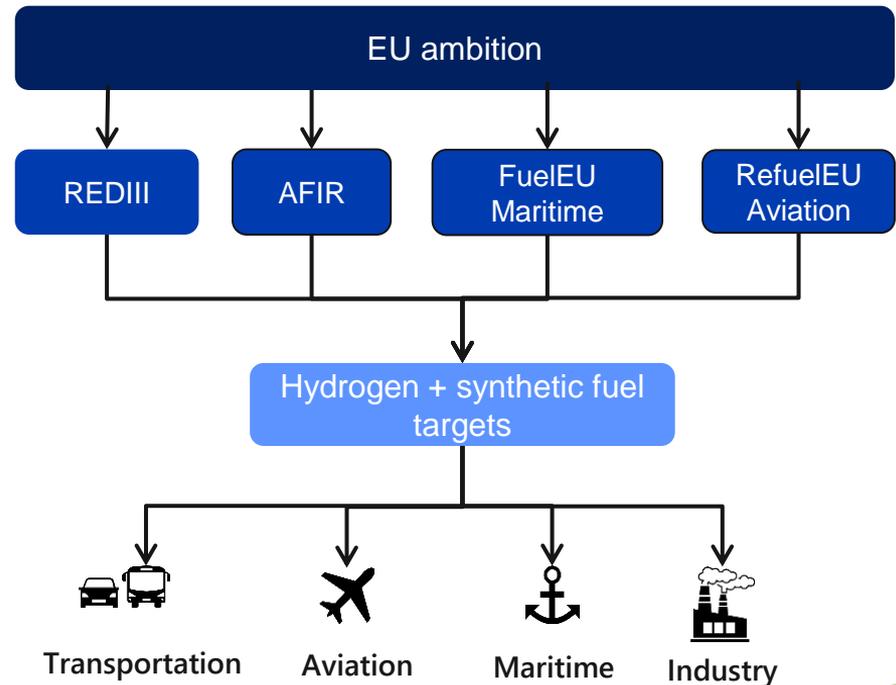


# Mapping of Hydrogen regulation

## Production



## Consumption



# Regulation-based renewable synthetic fuel market analysis in maritime and aviation sectors within Europe

# Hydrogen demand for synthetic fuel production in Europe 2030-2050

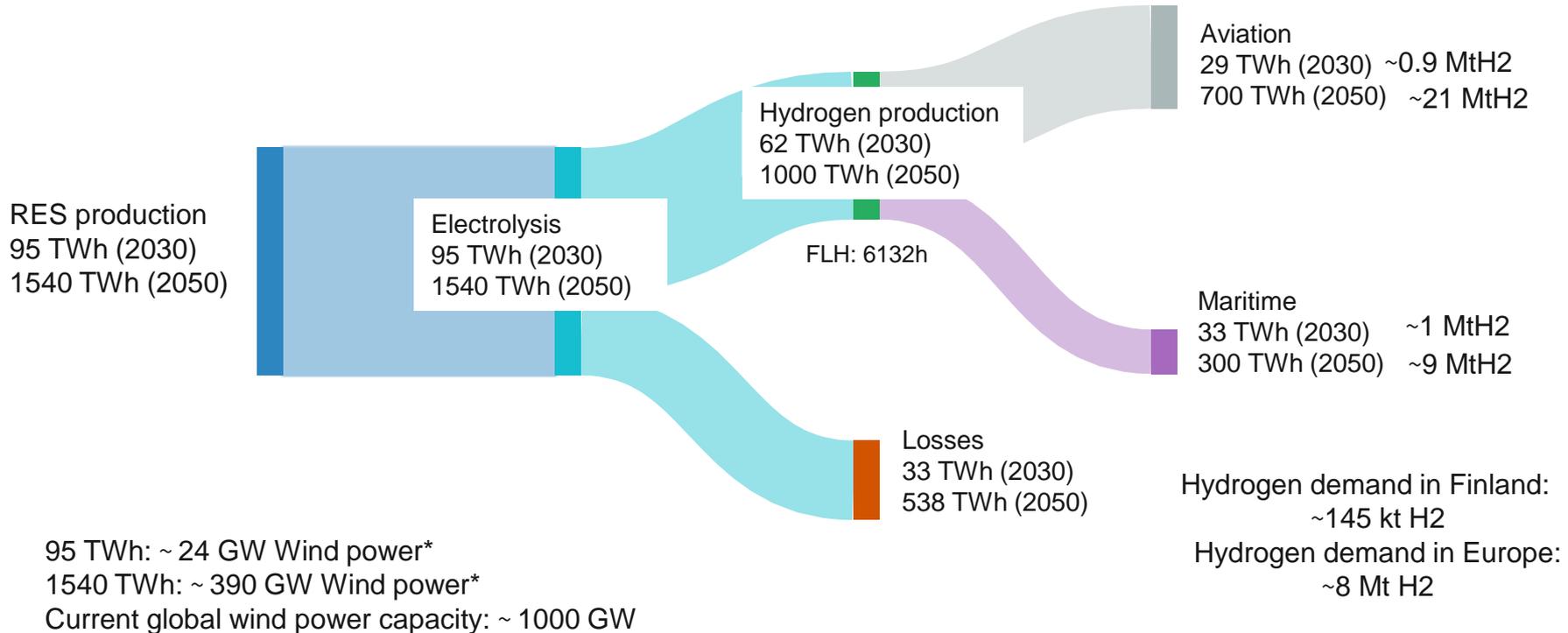
- **In 2030**, around **2 Mt of hydrogen** is required for synthetic fuel production in aviation and maritime which approximates to **15 GW\* of electrolyser capacity**. The REPowerEU target level for 2030 is to produce 10 Mt of renewable hydrogen.
- **In 2040**, around **10 Mt of hydrogen** is required for synthetic fuel production in aviation and maritime which matches the REPowerEU target level for 2030. Around 10 Mt of hydrogen approximates to **73 GW\* of electrolyser capacity**.
- **In 2050**, around **30 Mt of hydrogen** is required for synthetic fuel production in aviation and maritime most of which is hydrogen for aviation. This amount of hydrogen approximates to **250 GW\* of electrolyser capacity**.

\*Assumptions:  
Efficiency: 65%  
Capacity factor: 70%  
(FLH: 6132h)

# CO<sub>2</sub> need for synthetic fuel production in Europe 2030-2050

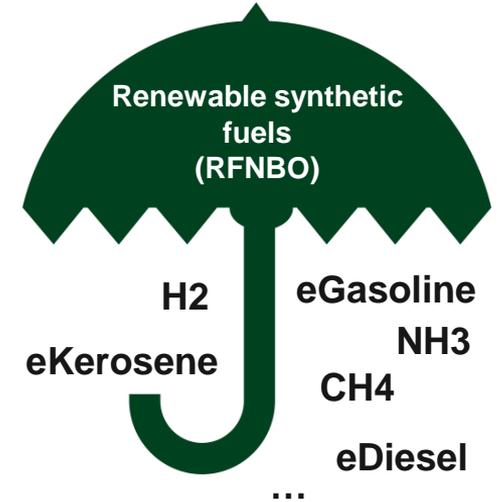
- **In 2030**, around **5 Mt of hydrogen** is required for synthetic fuel production in aviation and maritime.
- **In 2040**, around **32 Mt of hydrogen** is required for synthetic fuel production in aviation and maritime.
- **In 2050**, around **130 Mt of hydrogen** is required for synthetic fuel production in aviation and maritime.
- Currently the total biogenic CO<sub>2</sub> availability in Europe is **~200 Mt** of which **~50-120 Mt** is estimated to be accessible

# Power need for aviation and maritime in Europe



# Regulation-based synthetic fuel analysis

- **FuelEU Maritime & RefuelEU Aviation regulations set the targets for the aviation and maritime sectors** to achieve emission reductions and increase the supply of renewable synthetic fuels
- **Significant amounts of hydrogen and CO<sub>2</sub> are required for future renewable synthetic fuel production**, especially in aviation – for maritime the future estimates are still uncertain
- A total of around **2 Mt of hydrogen** could be required in aviation and maritime to reach EU's decarbonization goals **in 2030** – this value increases to around **30 Mt in 2050**
- **In 2050 up to 250 GW of electrolyser capacity** is required for synthetic fuel production for aviation and maritime. Around 100 TWh of renewable power are needed in 2030 to reach EU's RFNBO targets for maritime and aviation (~24 GW wind power capacity).
- Biogenic CO<sub>2</sub> availability should be sufficient for synthetic fuel production in 2030 and even 2040 but **Direct Air Capture (DAC) is needed in 2050**



**Aleksandra Saarikoski**  
**aleksandra.saarikoski@vtt.fi**  
**+358 50 595 8964**



**Funded by  
the European Union**

NextGenerationEU

**Euroopan unionin  
rahoittama**

NextGenerationEU