

IFE - Innovation Liquid Energy

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Project Description

- Design of a pilot scale Power-to-Liquid plant.
- Combination of a SOEC unit operated in co-electrolysis mode and Fischer-Tropsch synthesis.
- Production of naphtha, diesel and wax by valorising CO₂ and H₂O.
- Maximization of the middle distillate fraction complying with EN 15940.
- Power input of $P_{Co-SOEC} = 1 \text{ MW}_{el}$.
- Power-to-Liquid efficiency $\eta_{PtL} > 55 \%$.
- Production of 500 000 L/a diesel equivalents.

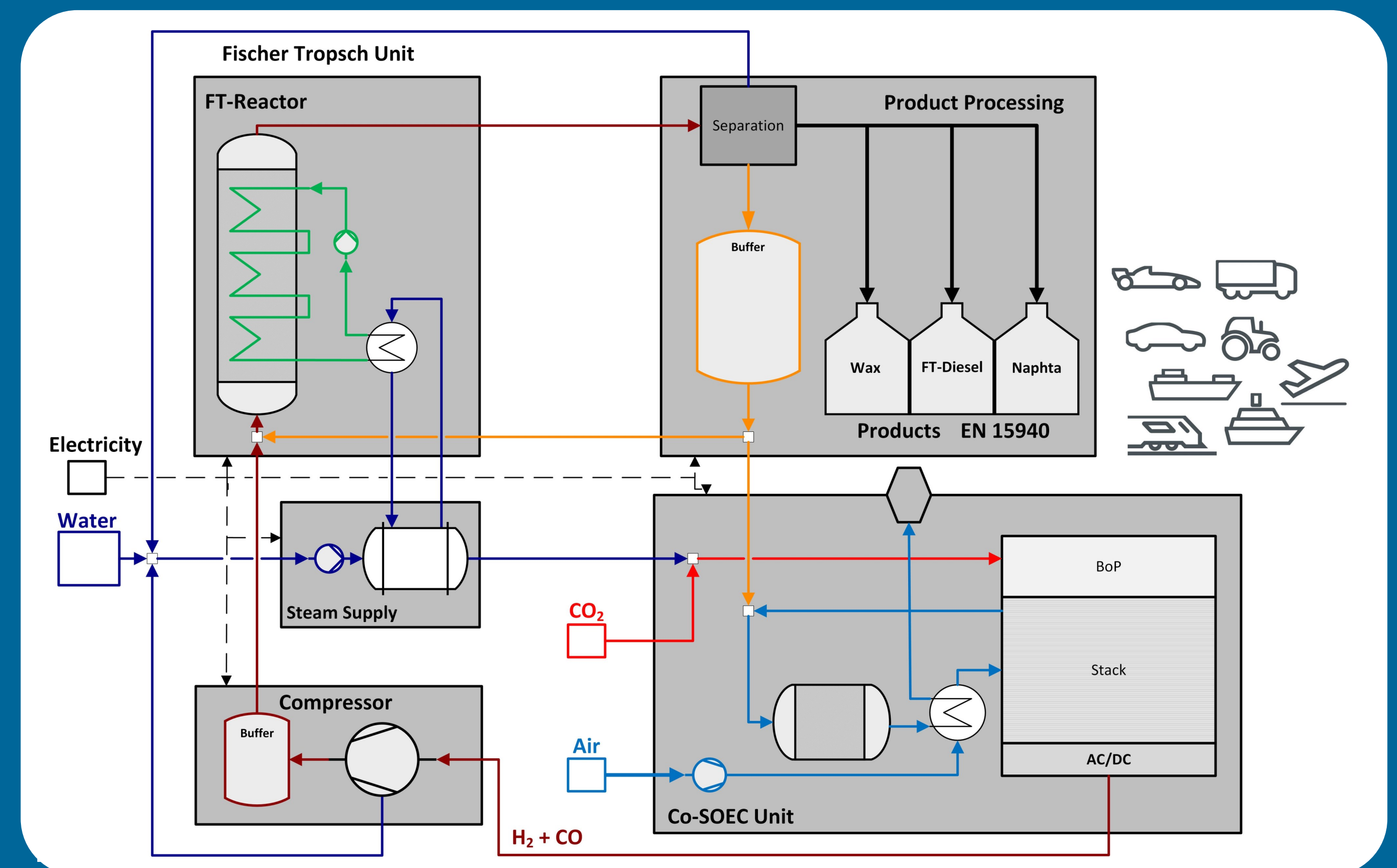


Figure 1: Schematic design of a Power-to-Liquid plant



Detailed Design of the Fischer-Tropsch Synthesis

- Design of two process configurations with and without tail gas reforming.
- Process simulation with IPSEpro 8.0.
- Maximizing the synergy with the SOEC unit.

Key Findings

- 48 kg/h Fischer-Tropsch products without tail gas reforming.
- 58 kg/h Fischer-Tropsch products with a tail gas reformer.
- Maximum Power-to-Liquid efficiency of $\eta_{PtL} = 62.7 \%$ when implementing a tail gas reformer.

$$\eta_{PtL} = \frac{\Sigma \text{Energy}_{Products}}{\text{Electricity}_{in}}$$

Find our recent publication here:

Pratschner, S.; Hammerschmid, M.; Müller F.J.; Müller, S.; Winter, F. Simulation of a Pilot Scale Power-to-Liquid Plant Producing Synthetic Fuel and Wax by Combining Fischer-Tropsch Synthesis and SOEC. *Energies* 2022, 15, 4134. <https://doi.org/10.3390/en1514134>



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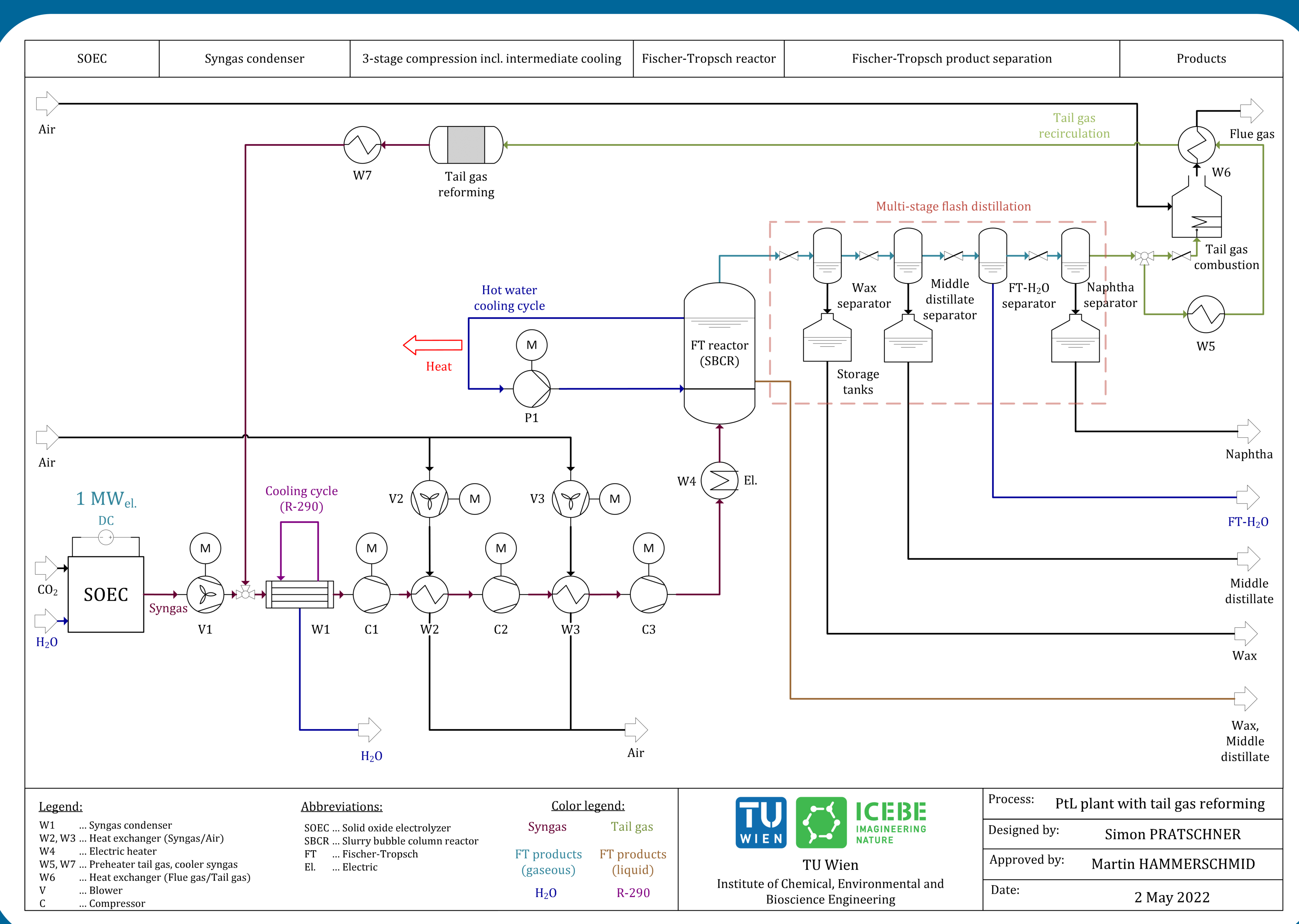


Figure 2: Detailed flow chart - Fischer-Tropsch synthesis

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