Deliverable report

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Technical coordination	FEV (DE) (www.fev.com)
Project management	Uniresearch (NL) (http://www.uniresearch.com)

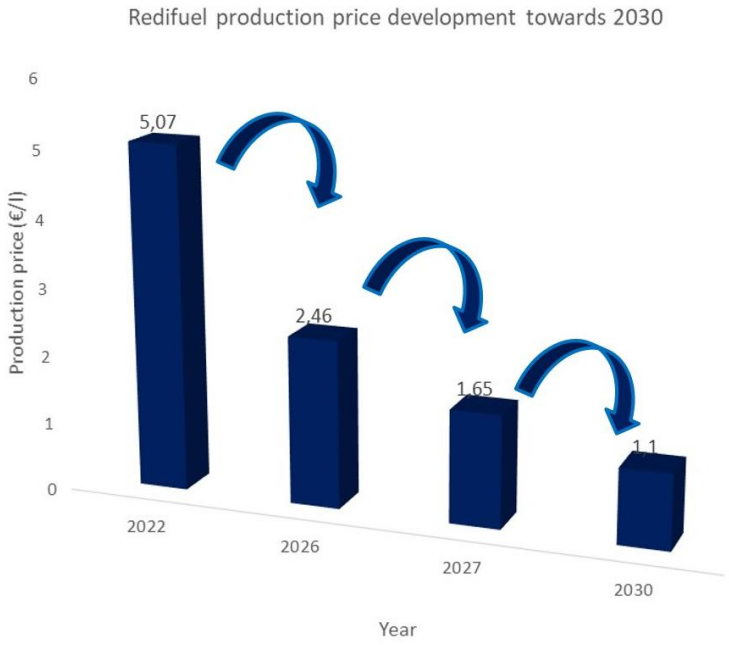
Executive Summary

The work presented in this document bases on Tasks 4.4, where the process design for the commercial scale REDIFUEL plant was done, and also on information about the chosen Fischer-Tropsch catalyst and assessment of product properties.

The aim of this Task 5.6. was to perform an overall technical and economical assessment of the process, including assessment of commercial value of fuel components. Furthermore, the aim was to calculate the production cost of REDIFUEL in an industrial-scale reference plant based on Task 4.4. Sensitivity analysis and production price forecast towards 2030 was also done. This report will aim at describing the feasibility of the production concept both at the end of the current project and the development pathway towards 2030 by viewing the production price of the fuel.

The production cost of REDIFUEL was calculated based on CAPEX data, utility data, and mass balances for the commercial scale plant calculated in Task 4.4. Fuel properties were estimated based on Task 3.1 and calculations in Task 4.4.

The REDIFUEL production price in 2022 and in the case when revenue is expected from selling by-products was estimated at 5.07 €/l, which is high compared to the target of the project being of 1 €/l. However, the production price of 1 €/l was already seen ambitious and below the production price usually calculated for gasification-FT based concepts for diesel production. The project developed a pathway for reducing the production price to the target level by 2030, and described actions that should be taken to reach that. There is clear potential for reducing the production price towards feasible fuel production by improving the yield of REDIFUEL alcohol/diesel blend and further by reducing the plant CAPEX. Due to the state of FT catalyst development that the project was able to reach, the production rate of REDIFUEL is fairly low (3.3 kt/a) in the current process concept. Improving the yield is possible via FT catalyst development that would reduce the production cost to a level of 2.5 €/l by ~2026. CAPEX reduction of 50% of the current concept brings the cost down to a level below 2 €/l. When the efficiency of the concept and CAPEX reduction can be simultaneously achieved, the production price could be lowered to the level of ~1 €/l. The production price evolution in the timespan of 2022-2030, as estimated, is presented in the figure below.



The production price of REDIFUEL is heavily influenced by fuel output and plant CAPEX, which is in line with other studies on similar production pathways. The final production price calculated at the end of the project is high due to low yield, which is again caused by FT catalyst performance. Future efforts should focus on improving the performance of the FT catalyst and process integration/intensification to produce more accurate CAPEX estimates and reduce the CAPEX. Fuel properties should also be taken as optimization target.

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Project partners:
1 - FEV – FEV EUROPE GMBH - DE
2 - MPI – MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTENEV - DE
3 - CSIC – AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS - ES
4 - VTT – Teknologian tutkimuskeskus VTT Oy - FI
5 - RWTH – RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN - DE
6 - OWI – OWI – Science for Fuels gGmbH - DE
7 - VUB – VRIJE UNIVERSITEIT BRUSSEL- BE
8 - NESTE – NESTE OYJ – FI
9 – MOL - MOL HUNGARIAN OIL AND GAS PLC - HU
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