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Sustainable Drop-In Transport Fuels from Hydrothermal Liquefaction of Low Value Urban Feedstocks – the *NextGenRoadFuels* project

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A novel approach for obtaining sustainable transport fuels in Europe

NextGenRoadFuels is a Research and Innovation project (funded by Horizon 2020 Programme) to develop a competitive European technology platform for sustainable liquid fuel production. Started in 2018 and running until 2022, the project will prove the **Hydrothermal Liquefaction pathway (HTL)** as an efficient route to **produce high-volume, cost-competitive, drop-in synthetic gasoline and diesel fuels**, as well as **other hydrocarbon compounds** in a sustainable, efficient and economic way.

The project is compliant with the **SET Plan - Key Action 8 on renewable fuels**, the 14% transport target for renewable fuels by 2030 set by RED II and the European Energy Roadmap 2050.

THE SOLUTION

Urban areas are characterized by high amounts of multiple urban waste streams. The goal is to develop a **cost-effective valorisation pathway** for such streams (i.e. sewage sludge from treated wastewater, food waste and construction wood waste), to be converted into renewable fuels, fertilizers and proteins, thus **fostering the urban transition towards a circular economy**. The HTL pathway optimizes the carbon and energy conversion efficiency while minimizing the need for external hydrogen. All the biogenic urban resources will be co-processed together in single HTL facilities, thus solving various technological and operational challenges.

THE PROCESS

The process comprises the following steps :

Feedstock pre-treatment, nutrient recycling and water management

Proteins, phosphorous, ammonia and other compounds in the sewage sludge, which are detrimental to fuel production, must be removed before HTL processing. In NextGenRoadFuels, processes and methodologies based on enzymatic as well as chemical treatment will be performed for recovering and further valorize proteins and phosphorous from organic waste feedstock, adopting a circular economy approach.

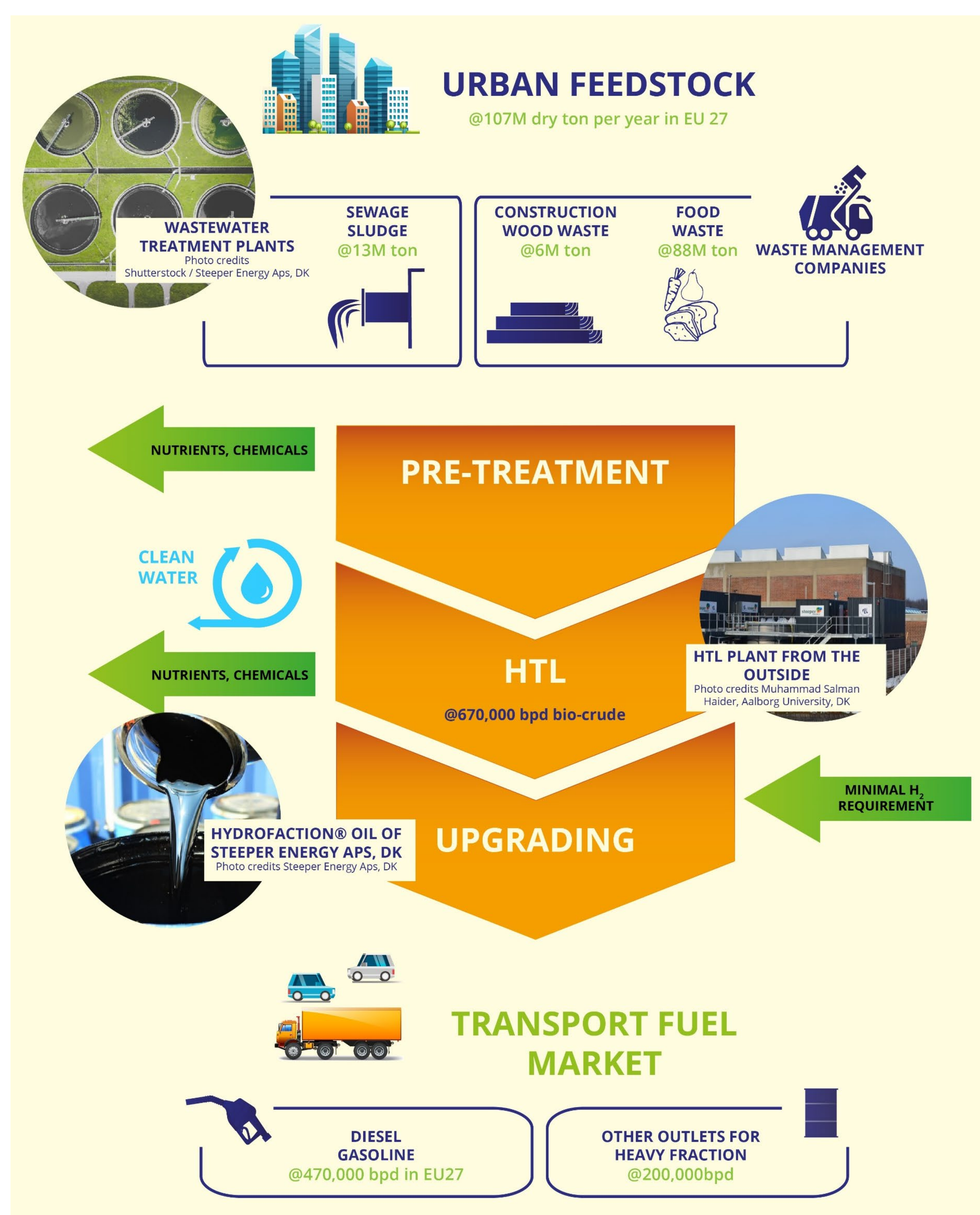
Hydrothermal Liquefaction (HTL) of sewage sludge and mixed feed streams

HTL can be used to process all types of organic materials. HTL oil is typically a complex mixture of several hundreds of organic compounds.

Its exact chemical composition and physical properties can vary substantially, depending on the type of feedstock as well as the reaction conditions (temperature, pressure, etc.). The pre-treatment and the post-treatment phases are extremely important to guarantee high-performance HTL process and high-quality end-products meeting current road transport fuel specifications.

Innovative upgrading of HTL products into drop-in fuels, after thermo-catalytic, electro-catalytic and biochemical processes

A novel, modular upgrading concept allows combinations of electrocatalytic and thermal catalytic upgrading of the high-quality HTL bio-crude oil into drop-in fuels. Innovative synthesized catalysts will be designed and tested as well.



THE EXPECTED RESULTS

NextGenRoadFuels will develop a **full scalable process**, easy to integrate into existing supply infrastructures, and competitive final costs for sustainable transport biofuels.

Available state-of-the-art pilot facilities will be used in two scenarios:

- a **standalone model** where a full production pathway from urban feedstock to drop-in fuels can be managed at a central facility;
- a **hub-and-spoke model**, with several HTL plants close to the sources of feedstock and serving a single upgrading facility.

The produced diesel will be compatible with EN 590; the same for gasoline with EN 228. The GHG reduction is expected to be **> 70% compared to equivalent fossil fuels**.

Project Partners



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