The role of low carbon liquid fuels

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12 maggio 2021

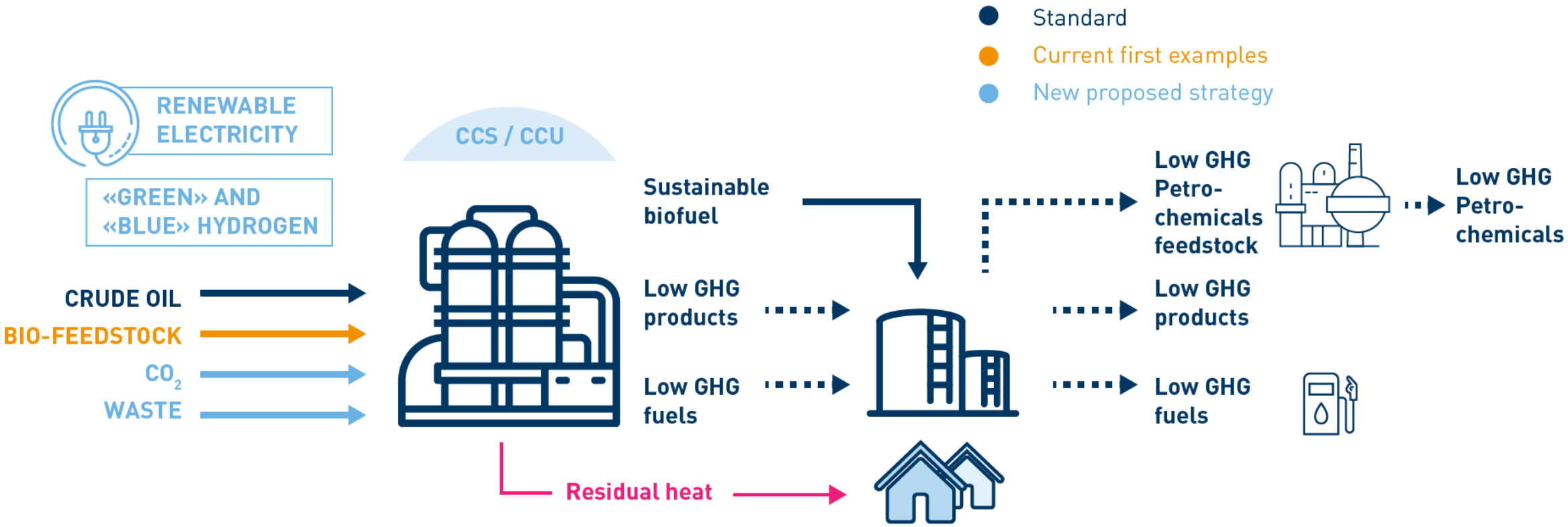
HiLights

- World energy demand will grow by 20% over the next twenty years, population +17%, global GDP +108%
- Currently 92% of transport energy demand is covered by fossil fuels, almost 100% in marine and aviation
- Path to energy transition must be sustainable from a social point of view, any transition plan not accepted by people is doomed to failure:
    - Cost of cars and infrastructure investments have to be bearable
    - Mass mobility must be ensured
- The decarbonization of transport can be achieved with the help of all available technologies without any exclusion
- Oil refineries will invest to gradually replace fossil raw material with biomass, waste and CO_2 to produce low carbon fuels
- Condition to promote investments in new technologies to produce low carbon fuels are strictly linked to modification of CO_2 regulations currently based on Tank-To-Wheel approach (TTW)
- An assessment based on the Life Cycle Analysis (LCA) and a system of carbon trading between car manufacturers and fuels suppliers is fundamental

The refining industry evolution in a carbon neutral economy

- For the future of refining industry we foresee an important role into the integrated energy system that will help ensure safe and affordable energy for all consumers
- We already started the transformation of our mineral oil refineries towards a progressive decarbonisation of process and products
- The refining system will evolve towards production processes where oil, as a raw material, will be gradually replaced by other feedstocks such as biomass, renewables, waste, captured CO_2 from CCS/CCU technologies and clean H_2
- Refineries will be able to operate in industrial clusters by providing a range of low-carbon energy and products (for transport, for petrochemicals, heat for civil uses, etc.), clean and low carbon hydrogen and by implementing common CCS and CCU schemes within these clusters

The refinery as an ENERGY HUB within an INDUSTRIAL CLUSTER



The great opportunities offered by e-fuels

- We perfectly know the high e-fuels costs production and the high conversion energy losses but this burdens need to be linked with the following opportunities

- E-fuels can accumulate large quantities of non-programmable renewable electricity from wind, photovoltaic and hydroelectric, ensuring both grid stability and production flexibility

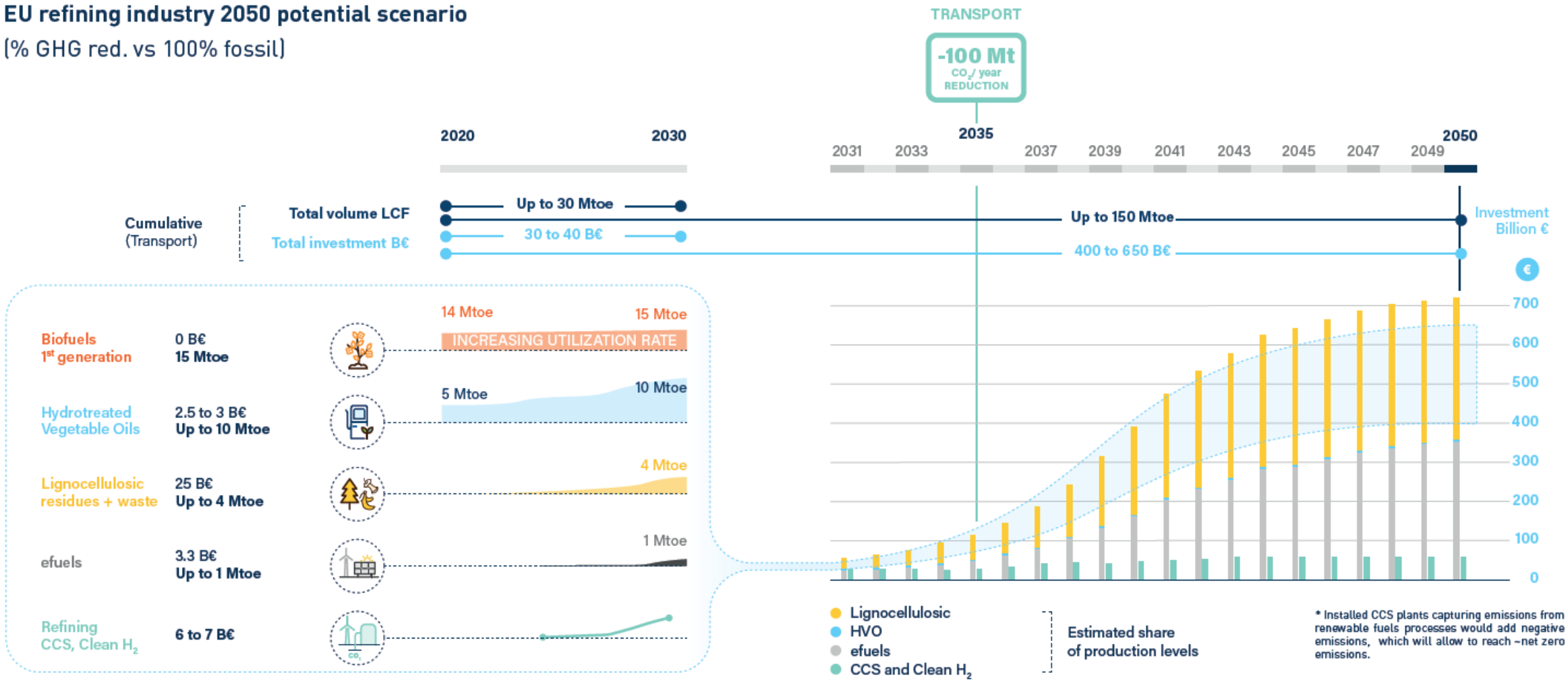
- The fundamental role of e-fuels will be to allow the decarbonization of all sectors of transport, especially in heavy duty road vehicles, in maritime and in aviation where liquid fuels are particularly difficult to replace

- E-fuels will play a role in light duty road transport also

- When available on the market, these products can be used by all existing vehicle fleet, without any technical adaptation, immediately achieving a consistent reduction of GHG emissions in transport without waiting the very costly and very long vehicles replacement cycles

- Another important benefit of low carbon liquid fuels is their completely compatibility with traditional liquid allowing the same, identical existing logistics and distribution infrastructures without any adaptation

Investments, production and CO_2 abatement



To stimulate low carbon liquid fuels (LCLF) development

The current EU Regulation is characterized by a Tank-to-Wheel (TTW) approach without any consideration of the CO_2 emitted upstream

TTW approach betrays technological neutrality by establishing a method to assess CO_2 emissions that does not guarantee decarbonisation and forces the car industry to focus solely on BEV technology in order to meet the limits

In fact, EU CO_2 Regulation assign zero emissions only to cars that emit nothing at the exhaust making two serious mistakes:

- It makes no distinction between tailpipe emissions of fossil and renewable CO_2
- It does not take into account the CO_2 emissions emitted upstream to produce fuels in case of ICE vehicles and electricity for BEV vehicles

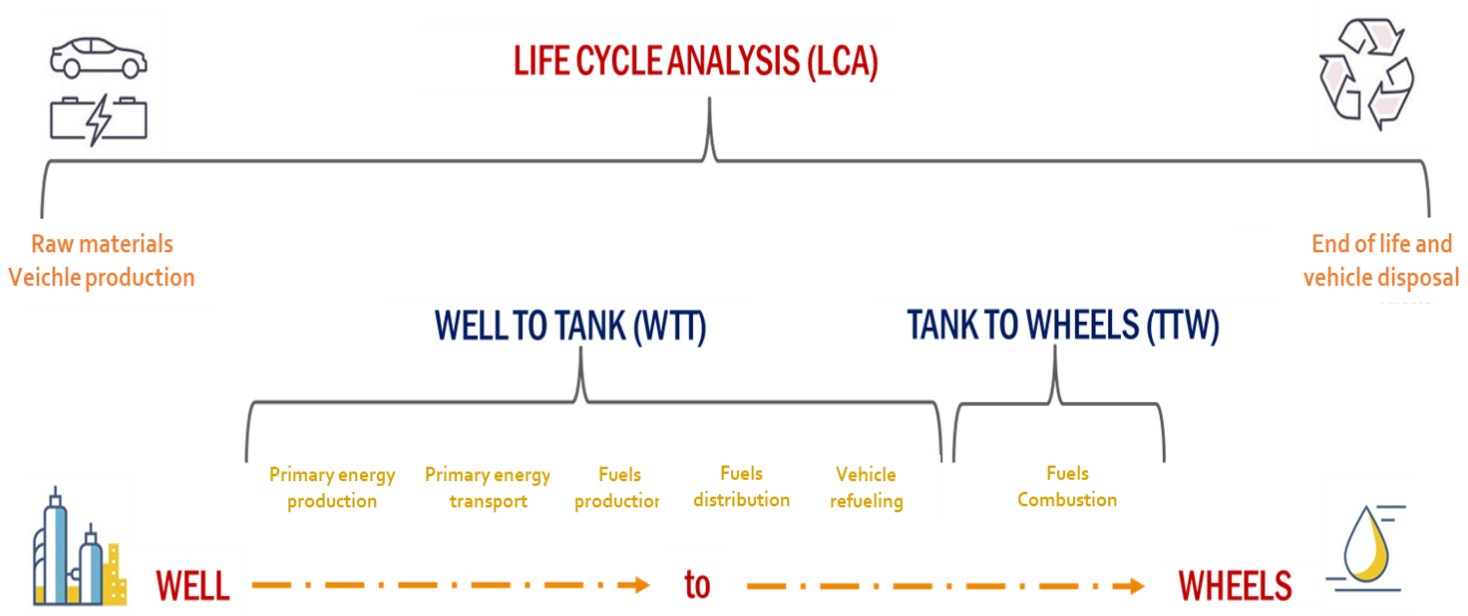
It is therefore essential to modify it with a new piece of legislation that considers GHG emissions released along the entire fuel supply chain, to enhance investments in decarbonised liquid fuels

There are several options able to manage the GHG from road transport with a methodologically more correct and neutral approach, through "carbon trading" mechanisms between car manufacturers and fuels supplier

These solutions must be accompanied by a market system of certificates and credits that allows to reward the technologies that are able to achieve the objectives of the transition in the most effective and efficient way

A new regulatory framework to control CO_2 in transport

- The responsibility of "Original Equipment Manufacturers" (OEMs) and fuel suppliers should be kept separate with their respective objectives
- In particular, OEMs will maintain a TTW target but the credits generated by Fuels' suppliers can also contribute to the achievement of their CO_2 targets. Therefore the overall reduction of CO_2 in road transport will be a combination of the different strategies
- Car manufacturers are currently forced to deploy only the BEV technology in order to avoid the high penalties laid down into the Regulation for failing to meet their fleet targets
- Engines powered by decarbonised liquid fuels (e.g. biofuels) could reduce CO_2 by almost 100%



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Grazie per l'attenzione

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