Energy Storage in Biofuels

Various biofuels, or biomass can be helpful in reducing the use of hydrocarbon fuels. Some chemical processes, such as Fischer–Tropsch synthesis can convert the carbon and hydrogen in coal, natural gas, biomass, and organic waste into short hydrocarbons suitable as replacements for existing hydrocarbon fuels. Many hydrocarbon fuels have the advantage of being immediately usable in existing engine technology and existing fuel distribution infrastructures. A long-term high oil price may make such synthetic liquid fuels economical on a large-scale production despite some of the energy in the original source being lost in the conversion processes. Carbon dioxide and hydrogen can be converted into methane and other hydrocarbon fuels with the help of energy from another source preferably a renewable energy source. As hydrogen and oxygen are produced in the electrolysis of water,

$$2H2O = 2H_2 + O_2$$

hydrogen would then be reacted with carbon dioxide in producing methane and water in the Sabatier reaction

$$CO2 + 4H2 = CH4 + 2H2O$$

Produced water would be recycled back to the electrolysis stage, give a sketch? reducing the need for new pure water. In the electrolysis stage oxygen would also be stored for methane combustion in a pure oxygen environment (eliminating nitrogen oxides)???.

In the combustion of methane, carbon dioxide and water are produced.

$$CH4 + 2O2 = CO2 + 2H2O$$

Produced carbon dioxide would be recycled back to the Sabatier process. Methane production, storage, and adjacent combustion would recycle all the reaction products, creating a cycle. Methane is the simplest hydrocarbon with the molecular formula CH4. Methane can be stored more easily than hydrogen and the technologies for transportation, storage, and combustion infrastructure are highly developed. Methane would be stored and used to produce electricity

later. Besides that, methanol can also be synthesized from carbon dioxide and hydrogen. If the hydrogen is produced by electrolysis using electricity from wind power, then the electricity is stored by the production of methane or methanol.