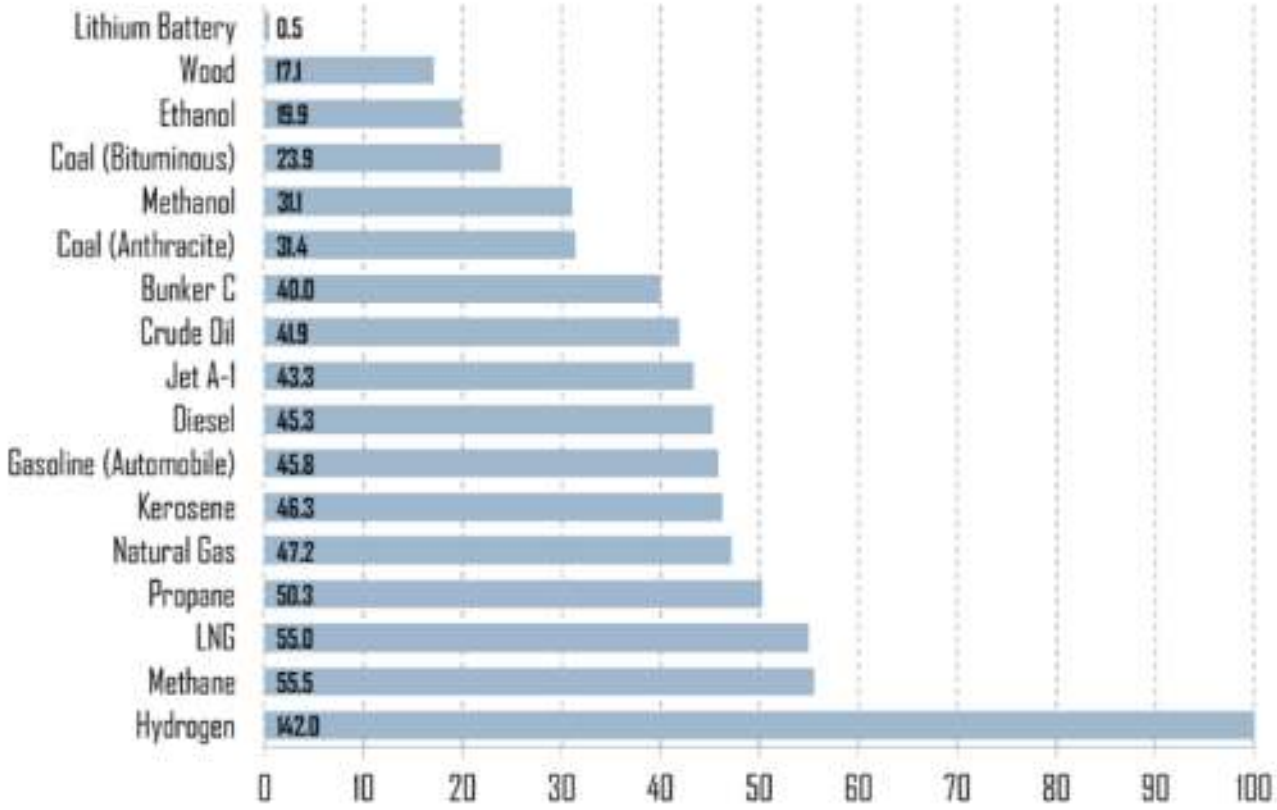
THE GEOGRAPHY OF TRANSPORT SYSTEMS



Source: adapted from C. Ronneau (2004), Energie, pollution de l'air et developpement durable, Louvain-la-Neuve: Presses Universitaires de Louvain.

Energy Content of some Combustibles (in MJ/kg)

Different fuels have different levels of energy content and the above graph relates to energy released through combustion. The higher the energy content the higher the quality of the fuel, which is inversely proportional to its chemical complexity. High quality fuels are gases while low quality fuels are solids, with liquids in between. The fuel which has the highest energy content is hydrogen, which is also the simplest chemical component in existence. Gasoline, which is derived from refining crude oil, contains much more energy than coal (twice than the lower grade bituminous) or wood (three times). Liquid natural gas is almost entirely composed of methane while natural gas has about 85% of is mass accounted by methane. Jet A-1 is the standard fuel used by commercial jet planes and is mostly composed of kerosene and a number of additives (antifreeze, antioxidant and antistatic) since the fuel must meet very strict specifications as it will be exposed to high altitudes and low temperatures. Conversely, Bunker C fuel which is the main fuel used for maritime shipping can be considered as one of the lower quality fuel in liquid form, but suitable for the vast ship engines.

Although methane and hydrogen both have higher energy content than gasoline, their gaseous form creates storage difficulties. Furthermore, hydrogen must be synthesized, which requires energy. As a comparison, with a conversion rate of 100%, it would require 100 hours to capture the solar energy equivalent of 1 kg of gasoline on a surface of one square meter. One of the most efficient energy storage devices, the lithium battery, can only hold about the equivalent of 0.5 MJ per kilogram, underlining the challenge of developing electric vehicles.

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