The "REnescience" system consists of a pretreatment of the waste based on heat and enzymes which liquefy the biogenic fraction of the waste (paper and organics). The outputs of the process are then liquid slurry and a remaining solid fraction from which metals, plastic and glass can eventually be separated for recycling. In this study the environmental assessment of a number of scenarios for the "REnescience" concept is presented. The scenarios assessed are co-combustion of solid and liquid fraction in coal-fired power plants (CC-CC), co-combustion of the liquid fraction and incineration of the solid fraction (CC-INC), anaerobic digestion of the liquid fraction to produce biogas and co-combustion of the solid fraction (BG-CC) and anaerobic digestion of the liquid fraction to produce biogas and incineration of the solid fraction (BG-INC). The reference technology for the comparison is the incinerator "Amagerforbrænding" (INC) located in Copenhagen (Denmark). Two different energy systems are considered for the assessment: coal as marginal energy and natural gas as marginal energy. The results of the LCA show that the co-combustion (CC-CC) and biogas scenarios (BG-CC) perform better than incineration (INC) with respect to Global Warming (GW), Acidification (AC) and Ecotoxicity in water, chronic (ETwc). The major savings are due to electricity recovery at the power plant. The waste refinery (pretreatment) contributes with a net load on GW equal to 20-30 mPE/tonne of ww. Savings from recycling are mainly connected to metals recovery (around -12 mPE/tonne of ww). The results for the toxicity categories show that the "REnescience" options are more environmentally friendly with respect to ETwc because of the higher recycling but contribute with environmental loads on HTs and HTw because of potential emissions of Hg and other metals to air (co-combustion) and to soil (use-on-land of the digestate). Keywords: environmental impact, waste, liquefaction, biogas.