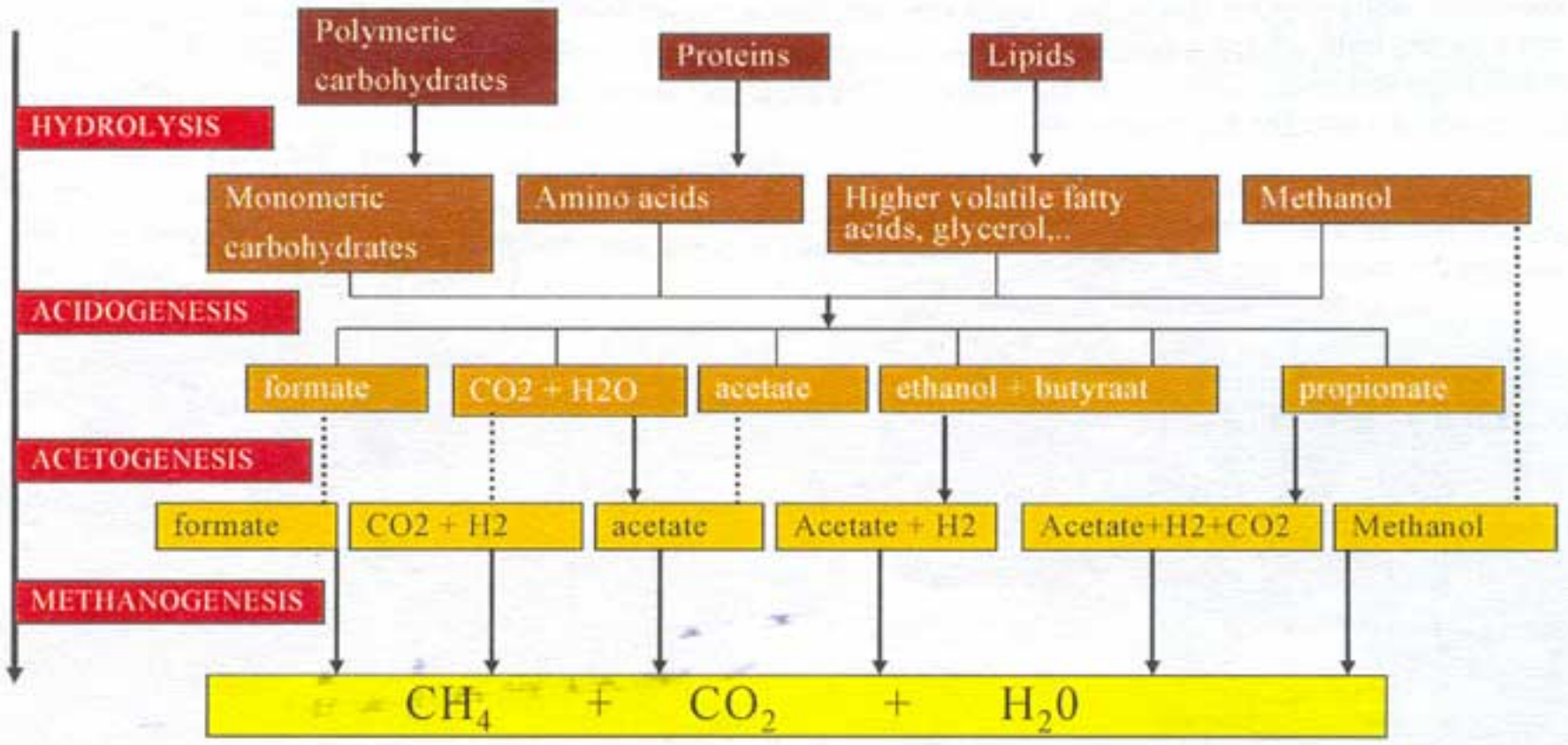
PURIFICATION OF RAW WASTEWATER: *LUCAS® Anaerobic*

LUCAS® Anaerobic is the brand name for an anaerobic wastewater treatment system making use of **UASB** technology (Upflow Anaerobic Sludge Blanket) treating raw wastewater. Depending on the characteristics of the brewery or sofdrink wastewater, a high removal efficiency of the organic matter of 70-90% is reached.

LUCAS® Anaerobic technology is typically applied as a first stage to remove on average 85% of the COD .emical Oxygen Demand) out of the water. This technology is particularly suited to treat highly concentrated wastewaters rich in carbohydrates and carboxylic acids such as brewery wastewaters and wastewaters derived from the softdrink and malthouse industry (see figure). Depending on the effluent limits that have to be met, the ***LUCAS® Anaerobic*** stage can be followed by a ***LUCAS® Aerobic*** stage to remove the remaining COD out of the water and to remove nutrients (N & P).



The major advantage of applying the ***LUCAS® Anaerobic*** technology lies in the high COD-removal efficiencies concomitant production of energy-rich biogas, while producing only very limited amounts of excess sludge. ce sludge treatment costs can make up to 60-70% of the operational costs of an aerobic treatment plant, high savings can be made in relatively short time by implementing the ***LUCAS® Anaerobic*** technology.

Recent projects on the **implementation of anaerobic wastewater technology** for breweries and soft drink industries have shown that the payback of a wastewater treatment installation can be less than 3 years.

Specifically developed to meet the needs of breweries and beverage companies, Waterleau offers the ***LUCAS® ANAEROBIC-AEROBIC*** system, which consists of an anaerobic stage followed by an aerobic stage. Both stages can be applied separately or in combination and are illustrated in this folder. Furthermore, to provide sustainable solutions for water re-use within the factory and to come along with the coming stringent legislation by 2010 on air pollutants, Waterleau also offers technologies for process water treatment and air treatment.

PURIFICATION OF RAW WASTEWATER:
LUCAS® Anaerobic

Anaerobic digestion is a biological treatment process, where organic compounds are anaerobically transferred into methane gas, and is depending on complex interactions between several involved groups of micro-organisms. These interactions take place in the anaerobic sludge granules that are normally present or selected in a UASB-system (1,2). In the first phase the complex particulate and solubilized polymeric substrates (e.g. polysaccharides and proteins) are hydrolysed to simpler soluble molecules (amino acids and sugars) by the aid of enzymes. The products of hydrolysis are next catabolized by fermentative micro organisms, to produce mainly volatile fatty aci (VFA), aldehydes, alcohols, carbon dioxide and hydrogen. The final step in the anaerobic digestion is carried ou by the methanogenic bacteria and is the formation of CH_4 from acetate and from H_2 and CO_2. Depending on the system scale the biogas (>100 Nm^3/hr) may be recuperated to produce heat or electricity.
The UASB reactor is the most used system mainly because of its simplicity and robustness. In the UASB, the wastewater will rise through an expanded bed of anaerobic, active, methanogenic sludge. The anaerobic sludge will convert the degradable organic material into biogas and new biomass. At the top of the reactor an internal 3-phase separator will separate the mixed liquor into clarified wastewater, biogas and sludge (3). The effluent will be flow to the effluent tank where a part will be mixed and recycled with the influent to recover alkalinity and to provide a sufficiently high upstream velocity in the reactor. The ***LUCAS® Anaerobic*** UASB technology is mostly applied in combination with an aerobic treatment (4).