WATER | ENERGY | WASTEWATER
CONSULTING ENGINEERS

WEW Sustainable Engineering Services

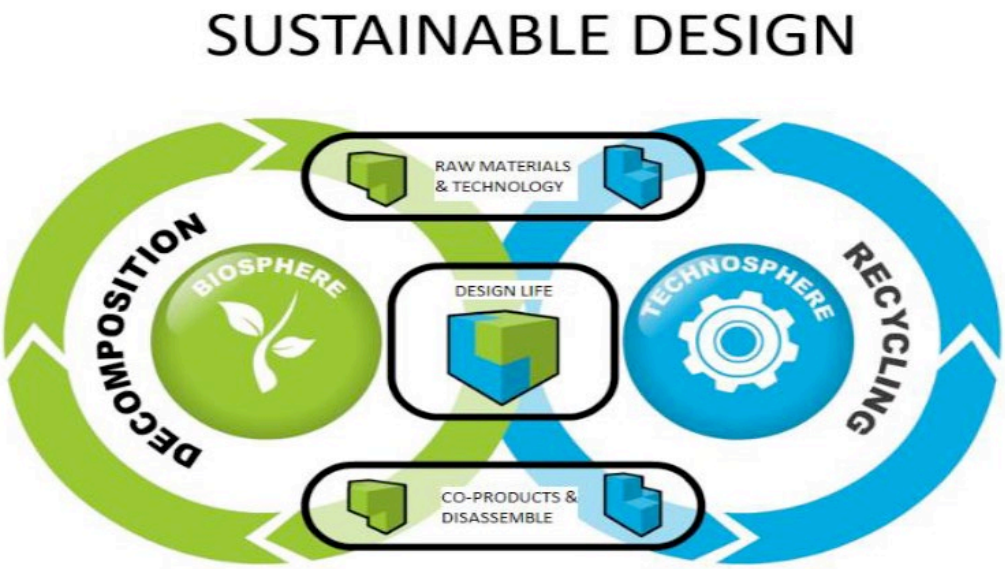
31-10-2019

The global environmental objectives have already been set down by the environmentalists and the Engineering profession must now modify some earlier norms in the interest of climate change and carbon footprint reduction.

Relatively new emphasis on design outputs are being dictated by incoming EU legislation, for example, 2010-75-EU Industrial Emissions, EU 2016-902-EU BAT Technology for wastewater/gas in the chemical sector, ROM-2018-07-02 Monitoring of Emissions to Air and Water and awaited BAT Regulations for the food and beverage industry (to become a directive shortly). These complement the Paris UN Directive Decision/COP21, a proposal for tackling global climate change.

Prime concepts to be addressed as independent criteria when designing processes and infrastructure for the future are:

- Engineering Sustainability is based on Cradle-to-Cradle fundamentals.
- Maximise use of nature cycles (C, N, P, W) with bias to biotechnology over chemistry.
- Minimise carbon oxidation and allied intensive energy use.
- Maximise prevalence of cultures exhibiting low to zero energy demand for normal bioprocess performance.
- Design to maximise greenhouse gas reduction.
- Examine all commercially viable alternatives to convert wastes to a defined co-product for reuse.
- Carry out a sustainability analysis of the facility, existing or new, and prioritise the costed alternatives to conclude the most attractive sustainable alternative in the Client's interest.
- The rate of change of Best Available Technology (BAT) is now Innovation led, and more flexibility is demanded by design to accommodate this. Modification of earlier designs to minimise energy consumption is becoming imperative. This may relate to process and /or plant.
- The principles apply to facilities processing liquids, solids or a combination of the same. Proper characterisation is a fundamental.



Consumed Energy Minimisation:

Modification to and automation of in-process operations are necessary to ensure modulation and minimisation of consumed energy. This is a fundamental of WEW policy over the years. Reduction in energy consumption and carbon footprint follow.

Typical WEW designs giving major reductions in energy demand using mainstream digestion (AD) for wastewater pre-treatment are:

- Dairy Processor: 12,000m3/d, 27,000kg COD/d, high quality outfall.

Installation of mainstream AD upstream of upstream BNR design still complies with discharge licence. It reduces the net costs of aeration from €400K pa down to zero. Excess Dry Solids (ES) mass production is reduced by 55% without nutrient loss.

- Distillery wastewater: 65m3/d, 2275kg COD/d, high-quality outfall.

Installation of mainstream AD upstream of upstream BNR design still complies with discharge licence. Net costs of aeration reduce from +€30K pa down to -€20.5K. Excess Dry Solids (ES) mass production is reduced by 58% without nutrient loss.

For any BNR projects, it is possible to further reduce carbon footprint by nitrite shunt / SND technologies which now forms part of WEW's BAT service. This may further reduce energy by 25% and allows up to 40% more carbon for bio-energy. Allied energy savings follow from upgrade of outdated process technology.

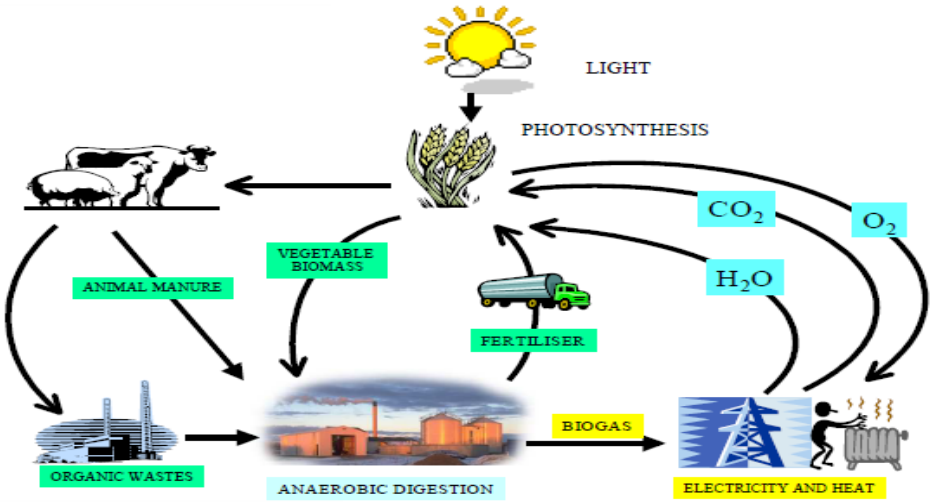
SUSTAINABILITY assessments/audits relating to wastes/wastewaters requires development of an integrated model dedicated to the in-house production, product loss, on-line monitoring, modulating control, internal by-product generation / pre-treatment and conversion to co-product status for reuse.

In order to provide working indicators of installation efficiency of an existing plant a detailed energy audit is required to confirm energy trends over a designated of the working process. This is related to corresponding loading criteria for respective process loops. Assessment of information versus ideal operation leads to conclusion on measures to automatically reduce energy usage while ensuring desired process operation. See WEW - Energy Audits.

The quantity and characteristics of resulting by-products may require consideration within sustainability study brief. This may require a system to minimise resulting by-product mass or to convert to an end-use product.

In most cases, the issue of water reuse may justify advanced treatment of condensates or high-quality tertiary effluents for ultimate reuse. The sustainability studies may be incorporated leading to a conclusion on commercial sustainability of the concept.

The sustainability report is presented with proposed costed recommendations for maximum reduction in energy and chemical outlay.



WEW Engineering is continually pursuing excellence in the water, energy/bioenergy, and wastewater sectors. This demands integrated overlapping of process (chemical/biochemical), mechanical and electrical/ICA disciplines – all within the guidelines of cradle-to-cradle sustainability. Findings from our ongoing professional investigations on new projects confirm that vast innovative global R&D is continually introducing new process sustainable concepts, WEW apply these in practise when full-scale evidence the risks associated with formal PI warranty. WEW Engineering have worked successfully with Lead industry, local authorities and National Agencies in upgrading municipal water and wastewater treatment facilities. This includes Biological Nutrient Removal (BNR), Energy Efficiency programmes and conversion of conventional plants to sustainable state of the art process facilities, incorporating Anaerobic and Aerobic technology, bioenergy production, and conservation engineering with minimal carbon/water footprints.

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