Viatcheslav Kafarov, J Pet Environ Biotechnol 2014, 5:4
http://dx.doi.org/10.4172/2157-7463.S1.008

OMICS Group Conferences
Accelerating Scientific Discovery

2nd World Congress on
Petrochemistry and Chemical Engineering
October 27-29, 2014 Embassy Suites Las Vegas, USA

Sustainable bio-refinery based on multicomponent feedstock

Viatcheslav Kafarov
Industrial University of Santander, Colombia

A biorefinery is a facility that integrates biomass conversion processes and equipment to produce bio-based products (food, feed, chemicals, materials) and bioenergy (biofuels, power and/or heat). The main challenge is to achieve the sustainable processing of biomass which includes economic sustainability, close to zero emission and positive energy balance. Traditional biorefineries based on specific biomass could not yet reach the sustainable processing of biomass which includes all above mentioned factors.

For example despite a positive energy balance, Sugarcane based biorefineries produced different types of negative environmental impacts, such as CO_2 due to fermentation processes for first and second generation bioethanol, CO_2 due to bagasse or lignin combustion processes.

The Algal biorefineries presents the negative energy balance with relation to consumption/production close to 2 which is far from sustainable from an energy point of view.

The authors proposed the strategy to achieve sustainability of green integrated biorefinery based on optimal design of multicomponent feedstock and biorefinery topology.

On one hand with energy and material integration of Sugarcane and Multi Species Algae biorefineries, it is possible to approach a zero emission system due to CO_2 (produced in fermentation and combustion processes) sequestration in phototrophic algae cultivation systems, and vinasse utilization in algal mixotrophic systems, and a positive energy balance due to utilization of energy stored in sugarcane bagasse or lignin in an integrated topology.

On the other hand, the integrated biorefinery takes advantage of numerous components in multicomponent feedstock, producing several low-volume, but high-value, chemical biochemical or biological products, increasing the general profitability and assuring the economic sustainability.

The PSE, Process Integration, LCA, exergy and economic analysis tools were applied at all steps of integrated biorefinery design, integration and evaluation for selected case study and allowing significant reductions of CO_2 and vinasse emissions and improve global energy balance.

kafarov@uis.edu.co