



*we think for YOU everyday*

CANOPUS

SUSTAINABILITY REPORT

Indian Institute of Technology, Kharagpur

## **Sample - Sustainability Report on LOCUS**

The discussion below explains how our business model with reference to LOCUS is sustainable in terms of socio, economic and environmental aspects.

### **Social sustainability**

Metrics that have been considered in our business plan:

- Contributions to climate change mitigation effects: The reduction in green house gas production will play a significant role in reducing global warming and its other deleterious effects.
- Contributions to public health: No poisonous gas is liberated and the emission of carbon dioxide is also reduced to a large extent. Moreover, waste water is being treated and then it will be sent to the municipalities for distribution to the households.

Also, in normal MFCs, compounds called mediators are added to the growth media at specific concentrations that squeeze out electrons from the growing cell and supply to the anode electrode. However, addition of mediators increases the cost of the application since most of the mediators used are expensive. In addition, the mediators are also proved to be toxic to humans. *LOCUS* is a Mediator-less MFC where bacteria itself directly transfers the electrons using its natural mediators or a cascade of outer-membrane proteins.

- Contributions to public infrastructure: *LOCUS* is a general purpose product, which can be tampered to be used with industrial to domestic to hospital waste discharges. Capital costs involved are small for infrastructure and also the problems like rehabilitation of people that arise due to construction of large hydel or thermal power projects can be averted.

## **Economic sustainability**

Economic sustainability is about meeting the diverse needs of a community by providing what it needs. It is about livelihood and service. It is about how we choose to use our resources while taking into consideration how those choices will affect future generations.

Metrics considered in our business plan:

- Low Installation costs
- Low operational costs
- Generation of employment

## **Environmental sustainability**

Metrics that have been considered in our business plan:

- Greenhouse gas productions: The total output (in CO<sub>2</sub> equivalents) can be reduced from 2.4 kg CO<sub>2</sub>/kg COD (removed) for fully aerobic treatment to 1.0 kg CO<sub>2</sub>/kg COD (removed) for primarily anaerobic processes. All of the CO<sub>2</sub> produced in the anaerobic processes comes from the wastewater pollutants and is therefore greenhouse gas neutral, whereas up to 1.4 kg CO<sub>2</sub>/kg COD (removed) originates from power generation for the fully aerobic process.
- Solid waste emissions: Estimated cell yields from an MFC process with acetate are thought to be on the order of  $Y_{x/s} = 0.16\text{g-COD-cell/g-COD}$ . This is about 40% of the value produced by an aerobic process of  $Y_{x/s} = 0.40\text{g-COD-cell/g-COD}$ . Thus, we expect that solids production from the MFC unit would be reduced to be only 40% of that generated from an aerobic process. This has the advantage of a substantial reduction in solids handling at a treatment plant, and thus a savings in capital expenditures.

- Fresh water use: We will be using waste water obtained from sewage and effluents from industries and treating it to get VSS (volatile suspended solids) free water which will be sent to the municipalities for distribution to the households. Thus, instead of *using* fresh water, we will be *generating* fresh water from wastewater, addressing the needs of thousands of people.