APPLIED ENVIRONMENTAL BIOTECHNOLOGY LABORATORY

Department of Biological Sciences

Overview

BITS Pilani

K K Birla Goa Campus

Focus of the Lab

Horizontal Plug Flow Anaerobic Digester for Mess food Waste

MESS
(WASTE FOOD)

Food waste Macerator room

1 tpd plant at BITS Goa Campus, 2009: Mess and kitchen wastes

Biogas bag and Compressor Room

CAFETERIA
(COOKING FOOD)

Sequencing Batch Reactor (250 cu.m)

1- Size of the tank

- size of the tank = 4.5 m x 9.2 m diameter
- Total volume = 300 m^3
- Working volume = 250 m^3
- Minimum ht between the water level and the top of the tank = 0.74 m
- Surface of the tank = 64 m^2

2- Loading conditions

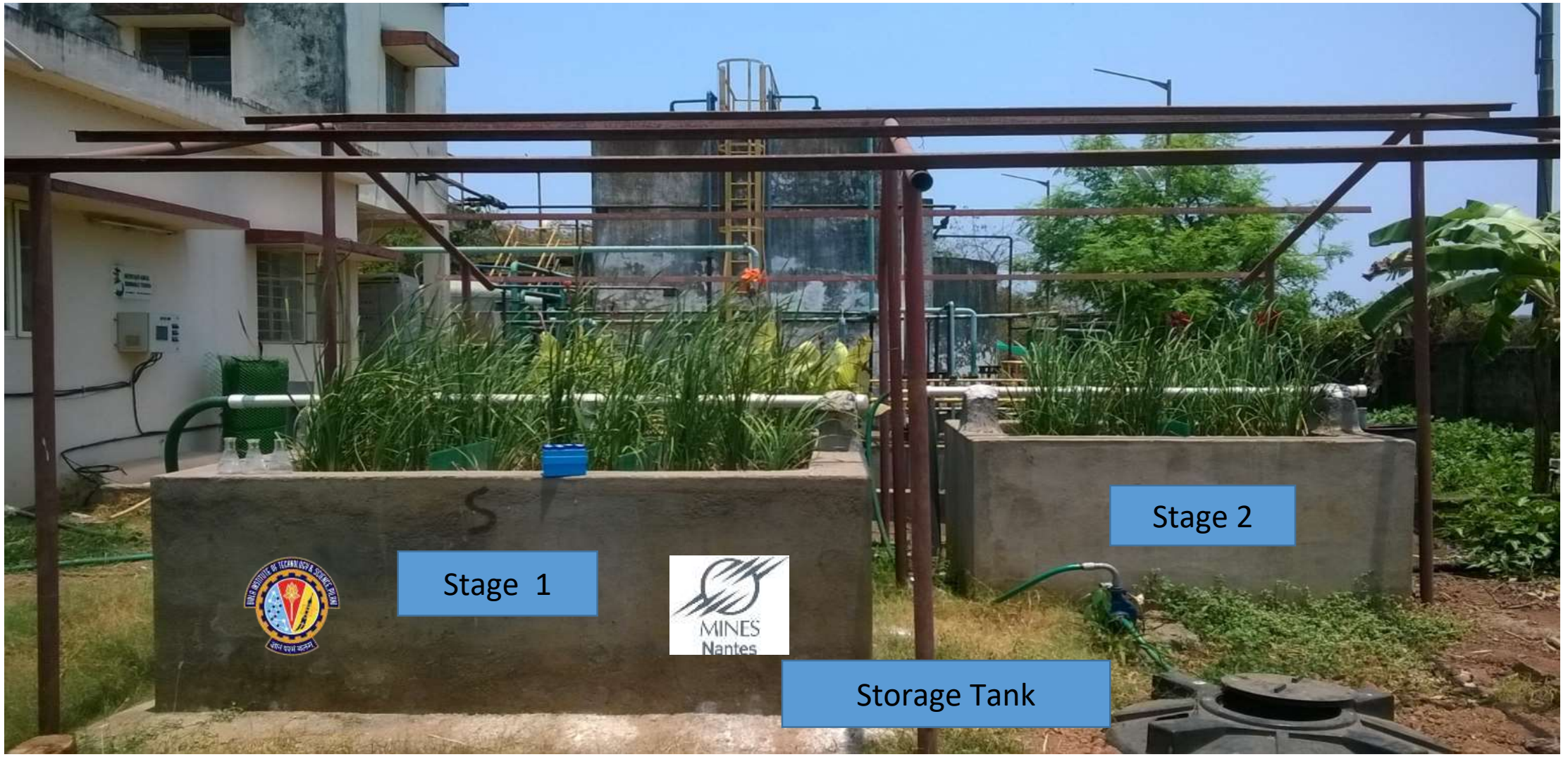
-Hypothesis:

-- Volumetric loading rate = 0.35 kg of BOD5/m^3.d

- VSS concentration = 4 g/l

-Quantity of BOD5 treated in 250 m^3 = 87.5 kg BOD5/d

Vertical Flow Constructed Wetland (French system) for single household



Single Household Empowered Septic tank plant

BITS Pilani
K K Birla Goa Campus

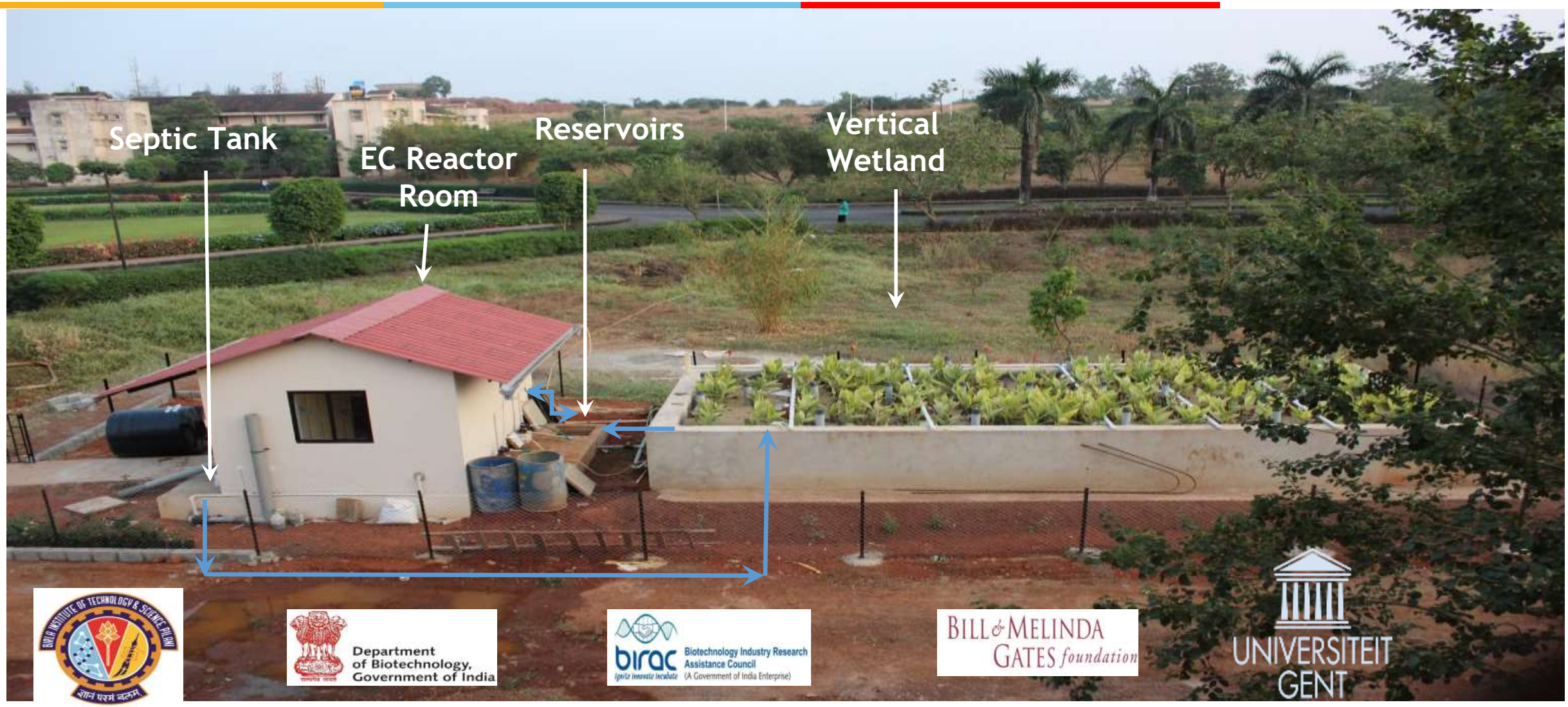
Department
of Biotechnology,
Government of India

birac Biotechnology Industry Research Assistance Council (A Government of India Enterprise)

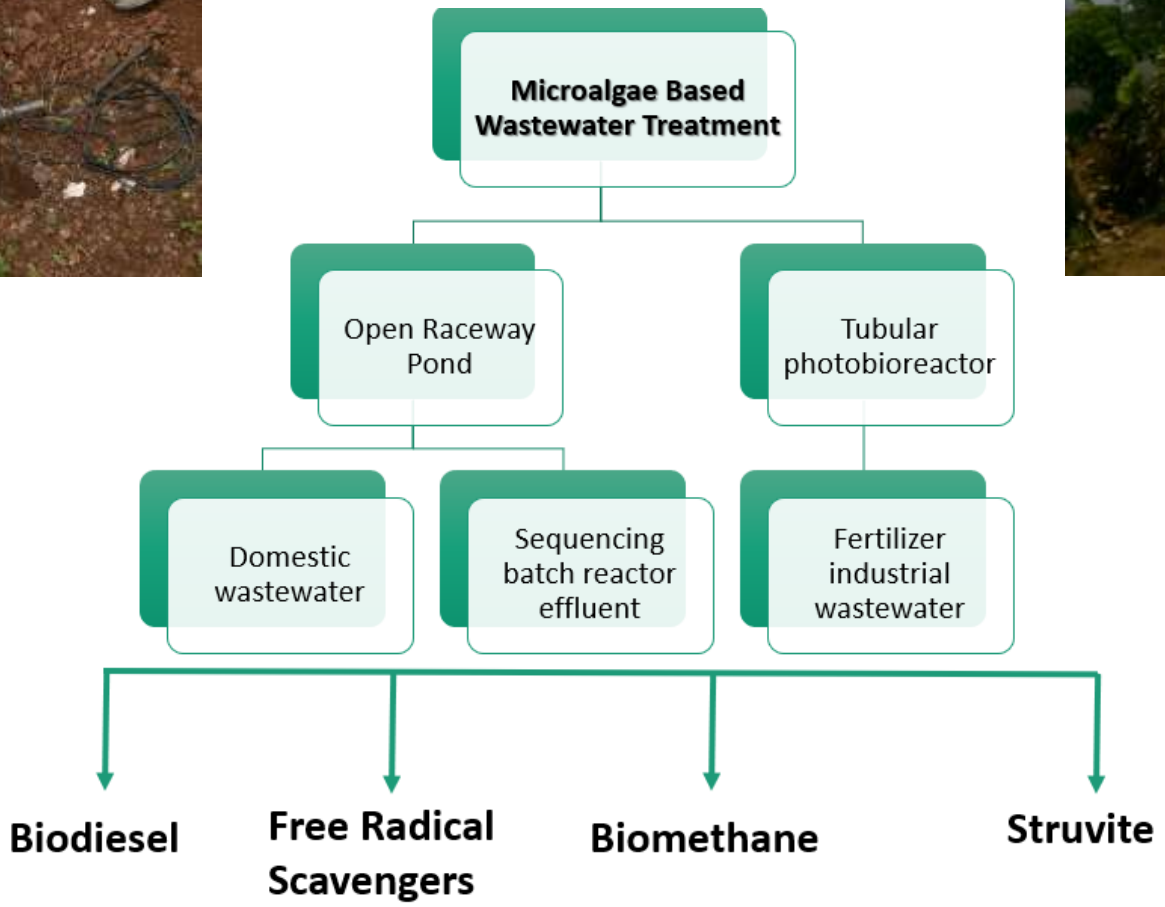
BILL & MELINDA GATES foundation

UNIVERSITEIT GENT

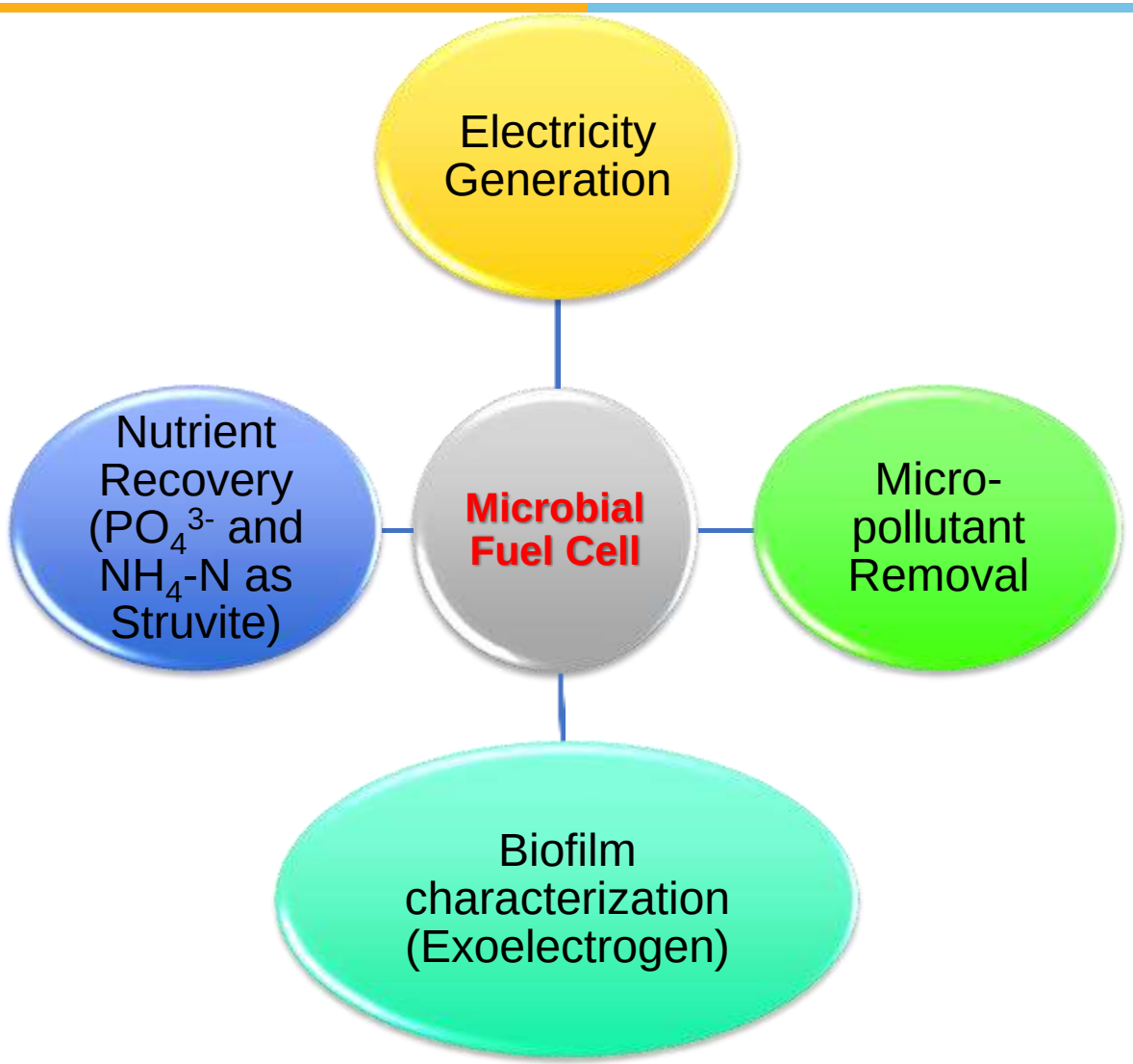
100 people equivalent Empowered septic tank plant

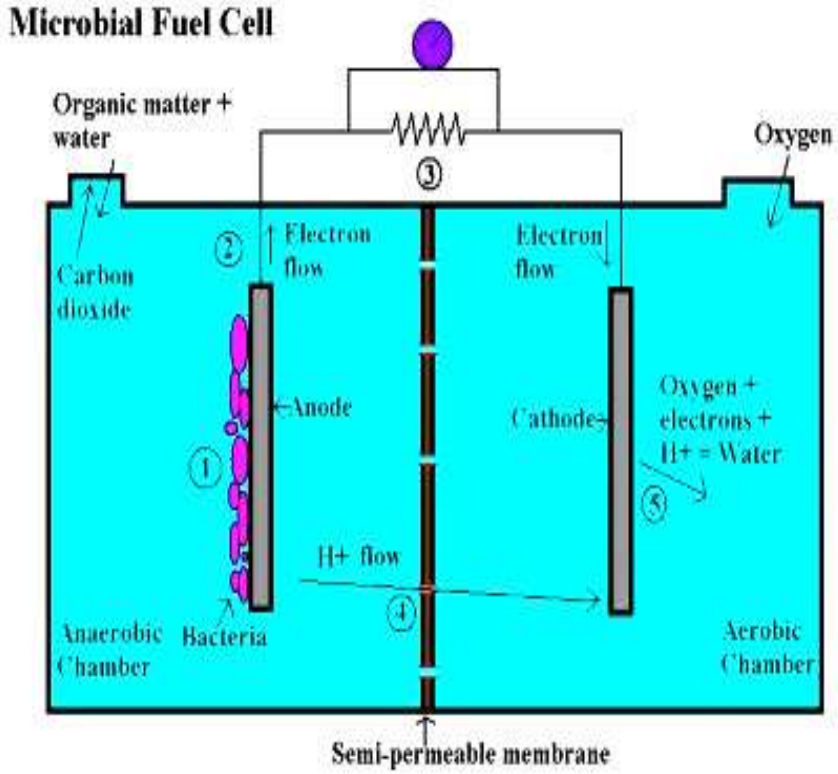


Open raceway pond for microalgae cultivation



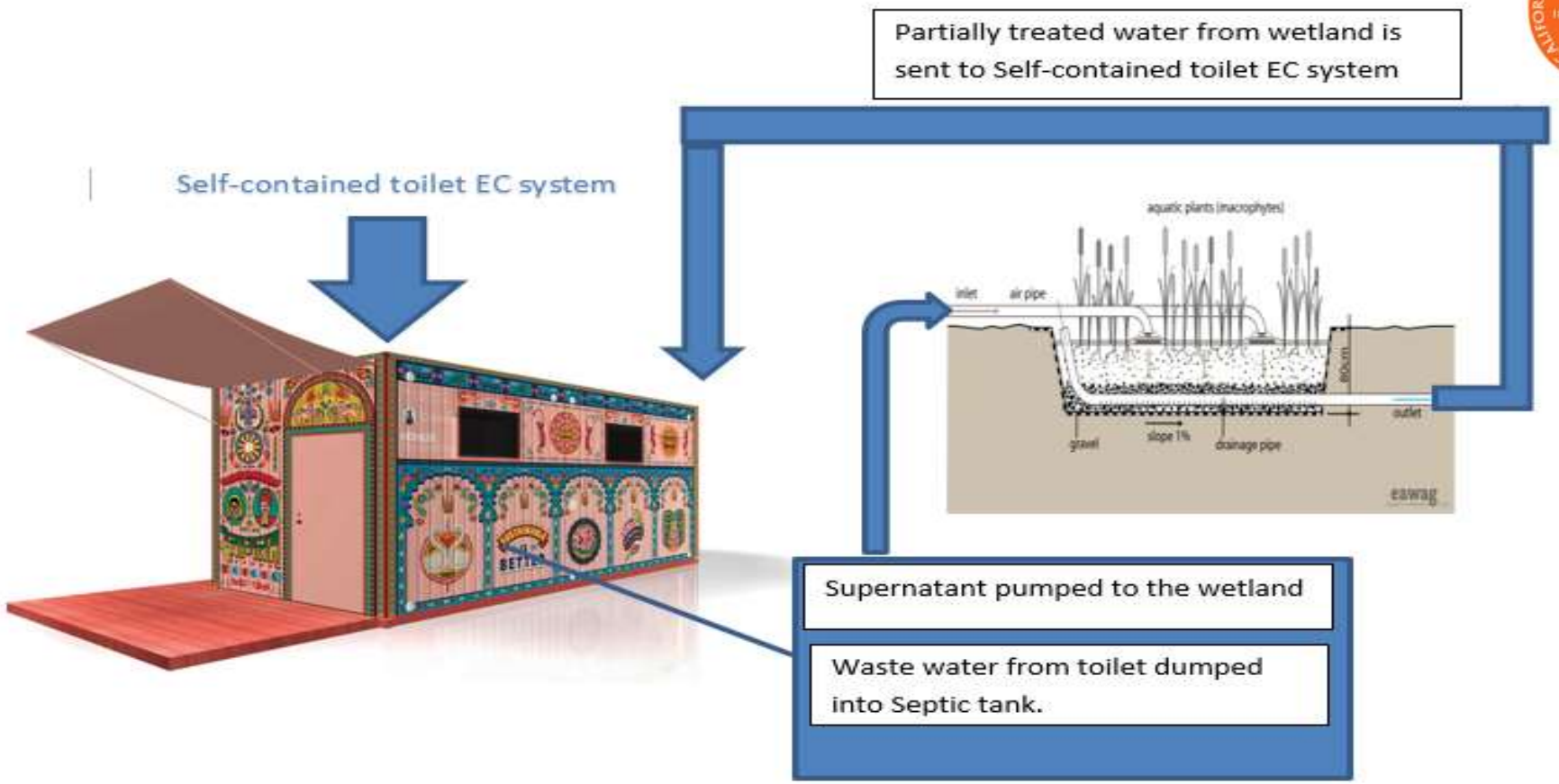
Microbial Fuel cell for nutrient recovery



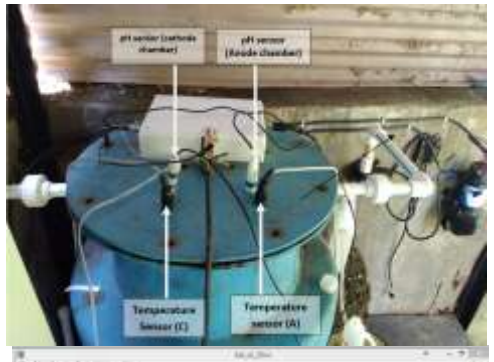


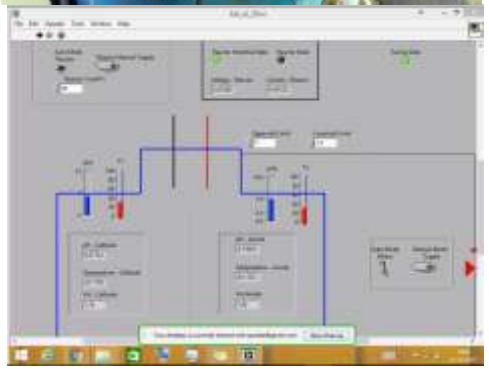
BIOGAS PLANT AT MADGAON FISH MARKET

Electrochemical Waste Water Treatment & Recycling Technology



Analytics Sensor Test-Kit for Advanced Process Control





Selection of a treatment system for sensor integration

Design of automated control scheme for the process for realtime online monitoring

Analytics Sensor Test-Kit for Advanced Process Control

Time based control and pH based control schemes development

Online Monitoring of automated control with the developed UI

Implementation of pH based automated process control

Enzymes for Lignocellulosic waste

Recovery Of Lignocellulolytic Enzyme from various types of Waste

Recovery of Enzymes

- Optimization of suitable buffer for enzyme extraction
- Optimization of working parameters

Screening of Enzyme Activity

- Analysis of Crude Enzyme Extract for presence of Lignocellulolytic Enzyme
- Enzymes activity checked against their specific substrate

Purification of the Enzymes

- Optimization of the Purification Process
- Quantitative, Qualitative & Stability Test of Enzyme Activity

Field Application

- Enzymatic pre-treatment of the lignocellulosic waste followed by Anaerobic Digestion
- Other Industrial Application

Waste to Energy project - Anaerobic Co-Digestion of food Waste and Septage

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Input material

Food waste : 10 to 15 metric tons per day (from 1350 Hotels)

Blackwater : 10 to 20 m^3 per day (from 200 community toilets)

Volumes

Digester : 1300 m^3 including storage capacity (retention time is 35 days)

Biogas-generation: approx. 2,100 m^3/per day

Combined Heat and Power Unit (CHP)

60 kW (24 hours per day) for Anaerobic Digester-Plant

200 kW (15 hours per day) for external use (up to 3,000 kWh per day)

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

TERRA PRETA & PROM for improving agricultural productivity

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giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

IWMI International Water Management Institute

TUHH Technische Universität Hamburg-Harburg

Wastewater treatment system for Hegdewar School, Cujira, Goa

Programme of Open Studies (POS) “Water Sanitation and Solid Waste management”.

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BIO F216 – Course on Water Sanitation and Solid Waste Management

Online 4 MOOCs → If pass: → On-site exam for all MOOCs (at partner university) → If pass: → 

Certificate allows students to qualify for capstone project work

BIO F217 – Laboratory on Water Sanitation and Solid Waste Management

BIO F216 → Basic science module | Capstone project work & Lab experiments → Graded first by local supervisor, final grades given by Eawag → 

eawag aquatic research

Collaborators & Funding agencies

Start ups


Sustainable Biosolutions LLP.
• Waste Water Treatment
• Solid Waste Management
• Consultancy & Contract Research
• Nutrient recovery from waste
Bactreat Environmental Solutions LLP
• Decentralized wastewater systems and waste to energy projects (Biogas)
• Anaerobic digestion systems for solid waste management
• Carbon dioxide sequesteration using microalgae
• Bioremediation solutions for different pollutants

Proposed Centre for Water, Sanitation and Hygiene

Objectives

Education and Training

▪M.Tech programme in Sanitation Science and Engineering – On campus and off campus – in collaboration with UNESCO IHE Netherlands, GIZ, DBT and Gates foundation.

Research and Innovation

▪ To capitalize on national and International collaborations

▪To carry out research at different levels – Basic research, Applied Research, Technology Transfer & Entrepreneurship.


THANK U