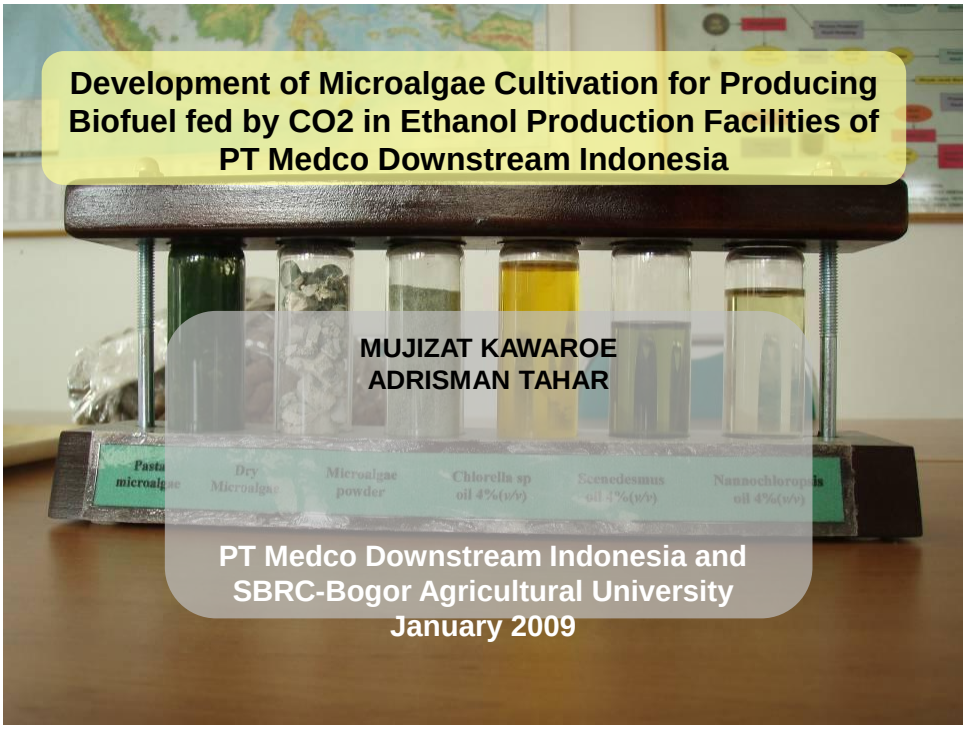

Development of Microalgae Cultivation for Producing Biofuel fed by CO2 in Ethanol Production Facilities of PT Medco Downstream Indonesia

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Introduction

- CO2 effluent from ethanol production facilities at PT Medco Downstream Indonesia (MDI).
- Could we utilize 160 ton/day of generated CO2?
- Tremendous development in microalgae cultivation to convert CO2 into renewable fuels.
- Photobioreactor for develop microalgae cultivation system.
- A pilot plant of microalgae cultivation to utilize CO2 and wastewater in ethanol production facilities of MDI becomes important to consider.

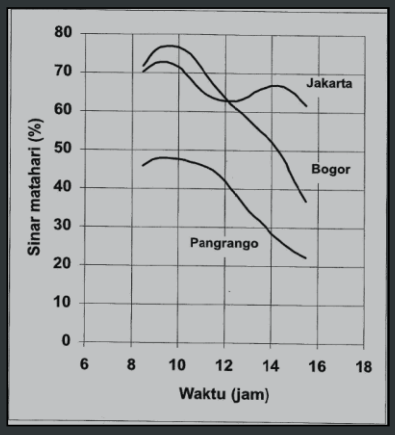
Objective

- to operate medium-scale of cultivation systems that are able to convert a significant fraction of the CO2 effluent from fermentation process in ethanol production and wastewater facilities into renewable fuels.

Scope of Work

- Selection and improvement of algal strains that is able to cultured in photobioreactor with CO2 injection from flue gas and wastewater.
- Development of CO2 scrubber system from flue gas for microalgae cultivation.
- Development of medium-scale photobioreactor for microalgae cultivation.
- Development of low cost algal-harvesting technologies.
- Improvements in the processes for converting microalgae biomass into biofuels.

Why Microalgae: solar radiance intensity in Indonesia



Variance of sun radiance in average (Schmidt, 1950)

Indonesia is enlighted by sun along the year for at least 12 hours a day.

So, Indonesia is being radiated for ±4.380 hours per year

Why Microalgae?

Microalgae can be used for :

1. **Producing Oil** which can be converted into biofuel

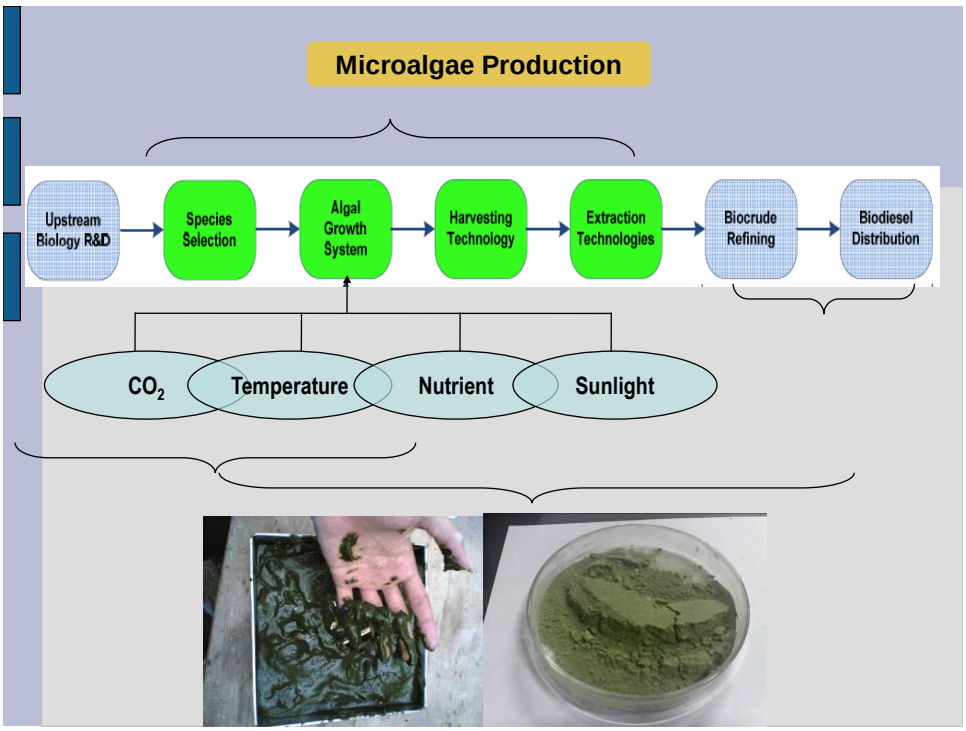
2. Utilization of **CO2 waste that can be used for algae cultivation. This process can get the CDM.**

3. **Producing Animal Feed**

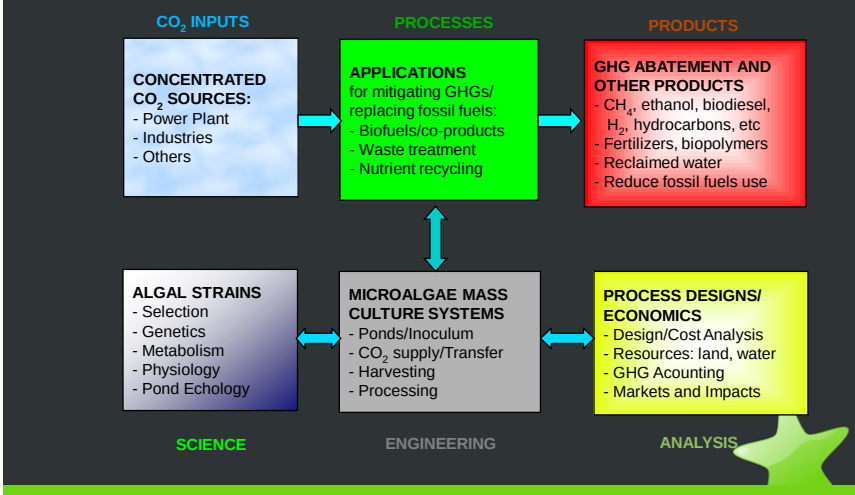
4. Pharmaceutical products

Strain potential for biofuel

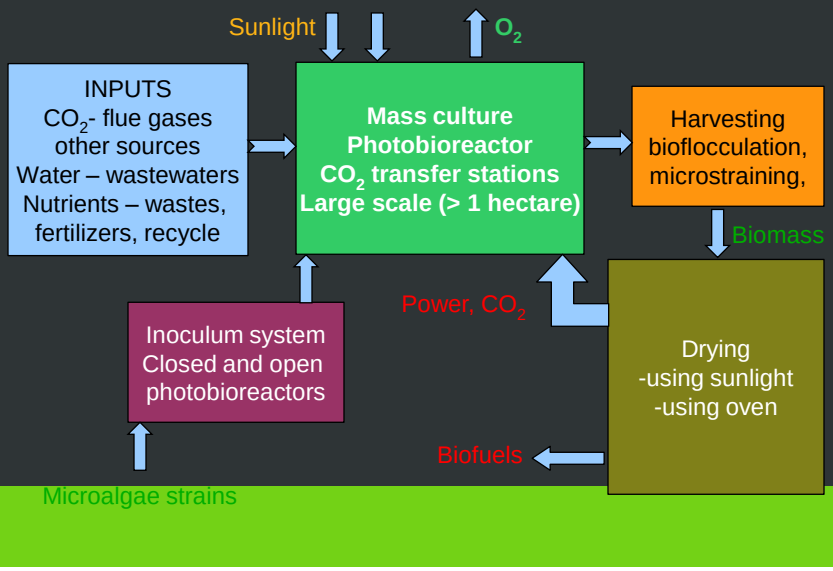
Chlorella sp	*Scenedesmus* sp
Dunaliella salina	*Nannochloropsis oculata*
Spirulina sp	*Tetraselmis chuii*
Nitzschia sp	*Chaetoceros* sp
Chaetoceros chalcitris	*Porphyridium cruentum*
Isochrysis sp	*Phaeodactylum tricornutum*
Botryococcus sudeticus	



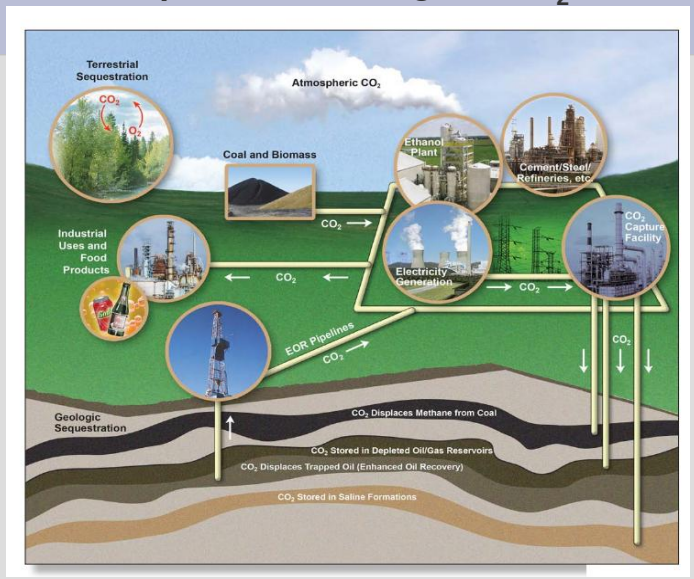
Schematic of Microalgae Biofixation of CO2



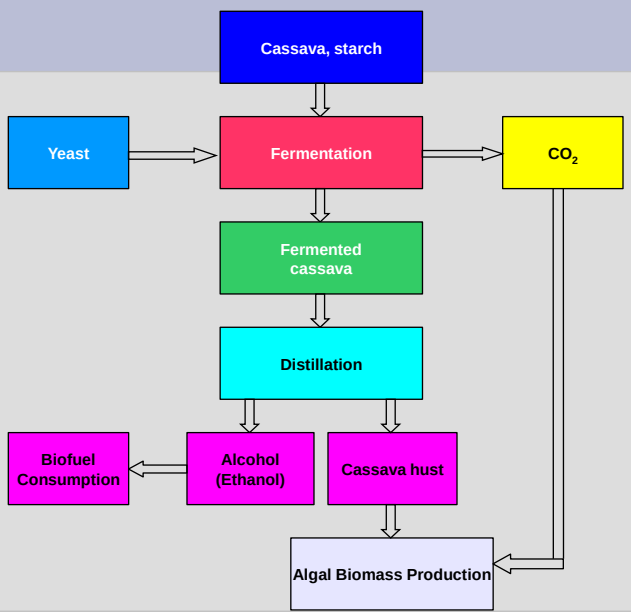
Process Schematic for Biofixation of CO2 and Greenhouse Gas Abatement with Microalgae



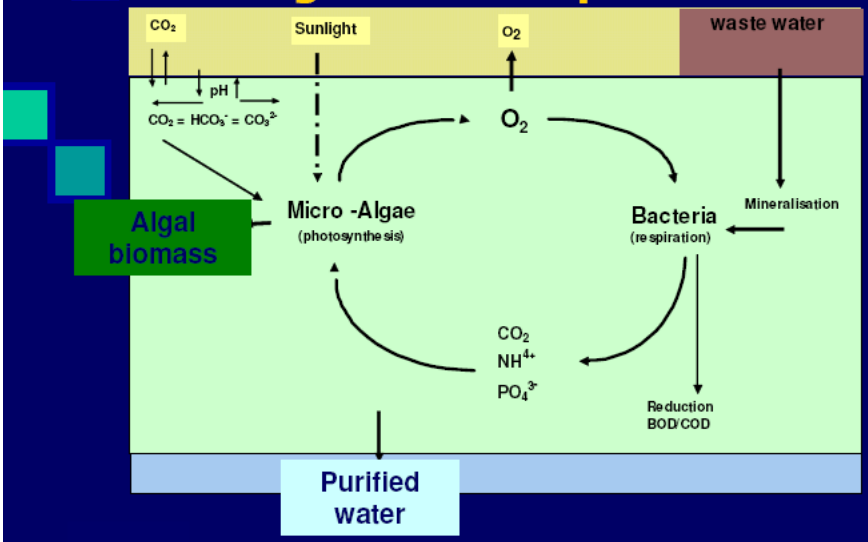
Carbon sequestration encompasses the process of capture and storage of CO_2



Process to produce CO2 from bioethanol fermentation of cassava



Microalgae in water purification

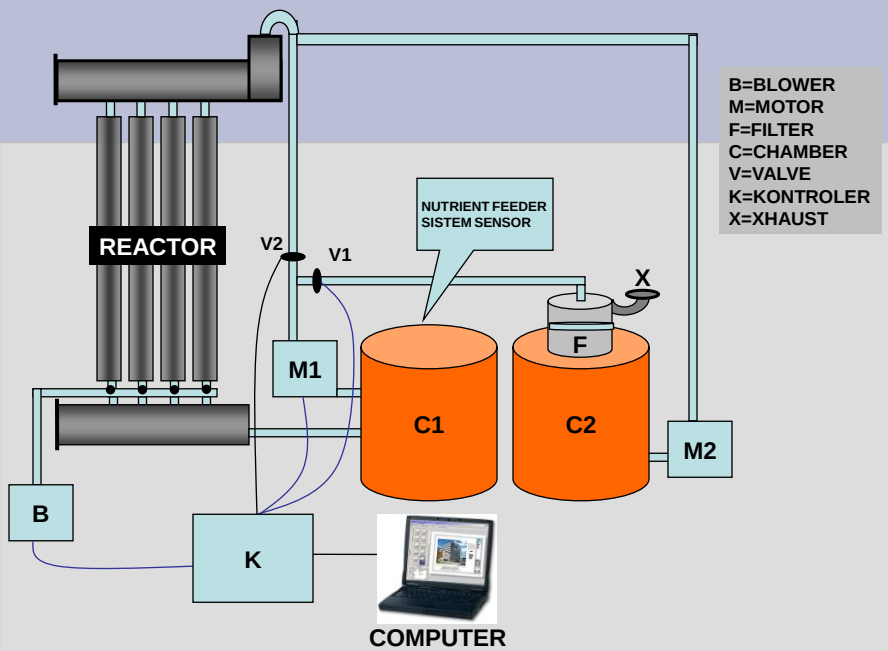


Power Plant to Produce Power and CO2 at Cyanotech Facility in Hawaii

Photobioreactor system

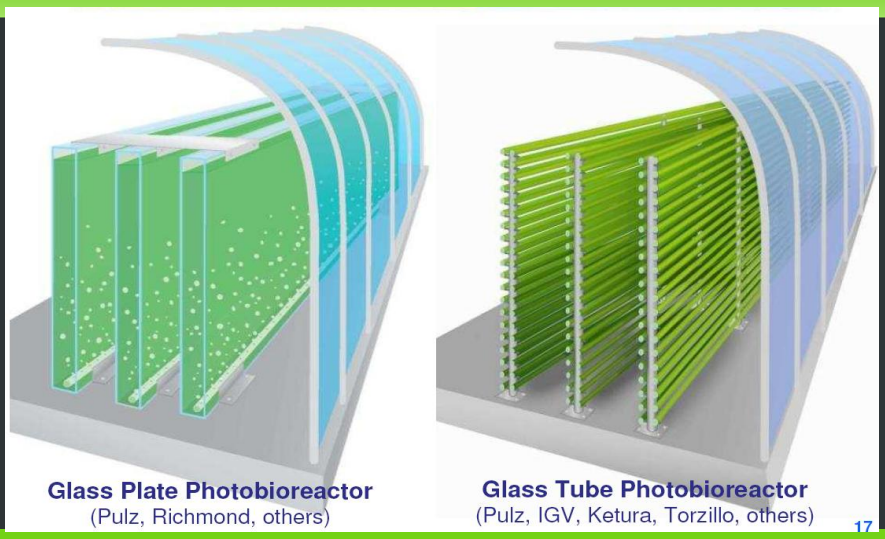
- Control System
- Reactor Chamber
- Nutrient Feeder system
- Sensor system
- Harvesting System

Diagram of Photobioreactor System



SBRC'S PHOTOBIOREACTOR

Photobioreactor



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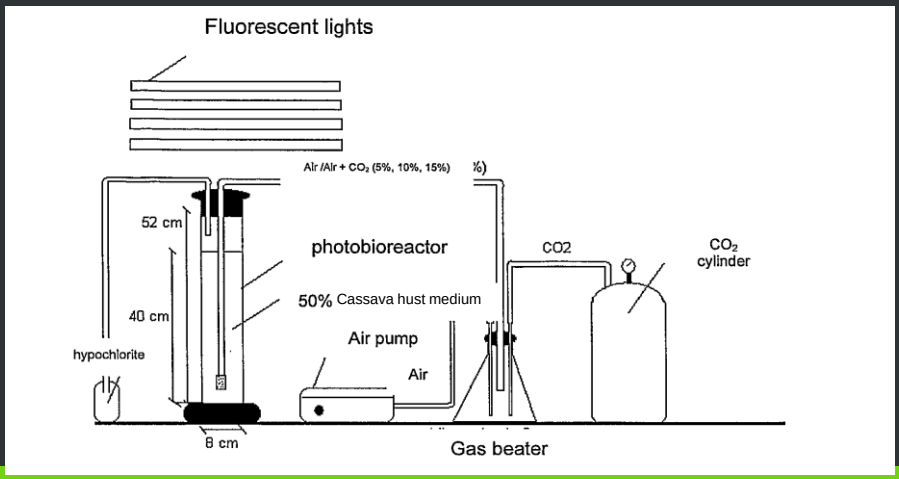
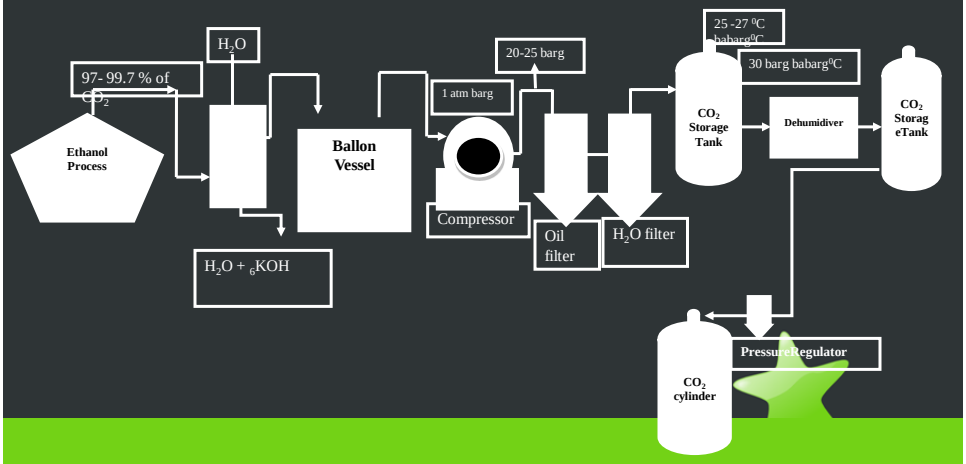
Wilson (2008)

Scheme model of Photobioreactors with pure CO2

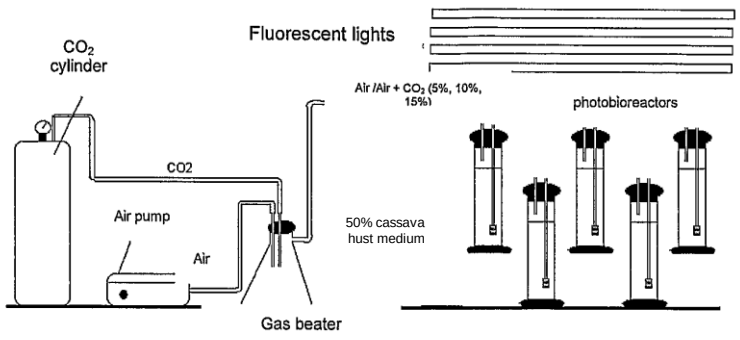


Pure CO2 Mixing Chamber

CO2 Scrubber system



An Arrangements of photobioreactors on the oven shelves with photoperiod



Expected Benefit

1. Problem solving of actual situation in ethanol production
2. Greenhouse gases mitigation
3. Energy resilience

THANK YOU

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