



• **“THINK ALGAE”** (PTT, TISTR, BIOTEC, CU, KMUTT, KU, MU)

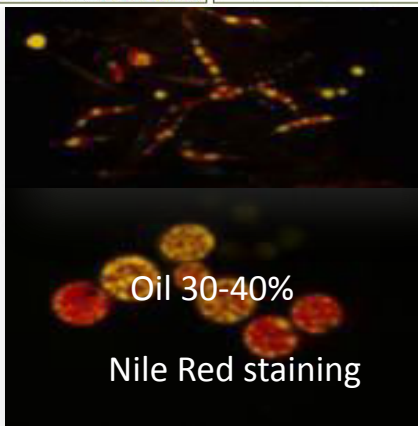
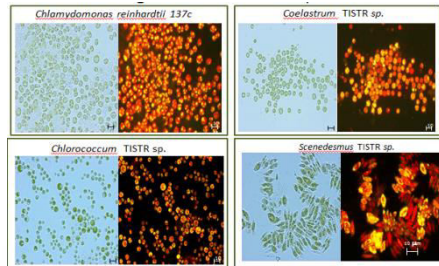
selection → optimization → pilot-scale product<sup>n</sup> → PD from crude oil

champion strain(s)

• medium  
• product<sup>n</sup> system

• batch 5,000-10,000 L  
• continuous 200,000 L  
• automatic controlled

• biodiesel  
• bio-jet  
• BHD



# Innovation : 200,000 L Outdoor Continuous Algal Biomass Cultivation system



SCADA control



IC

20,000 L  
race-way  
pond

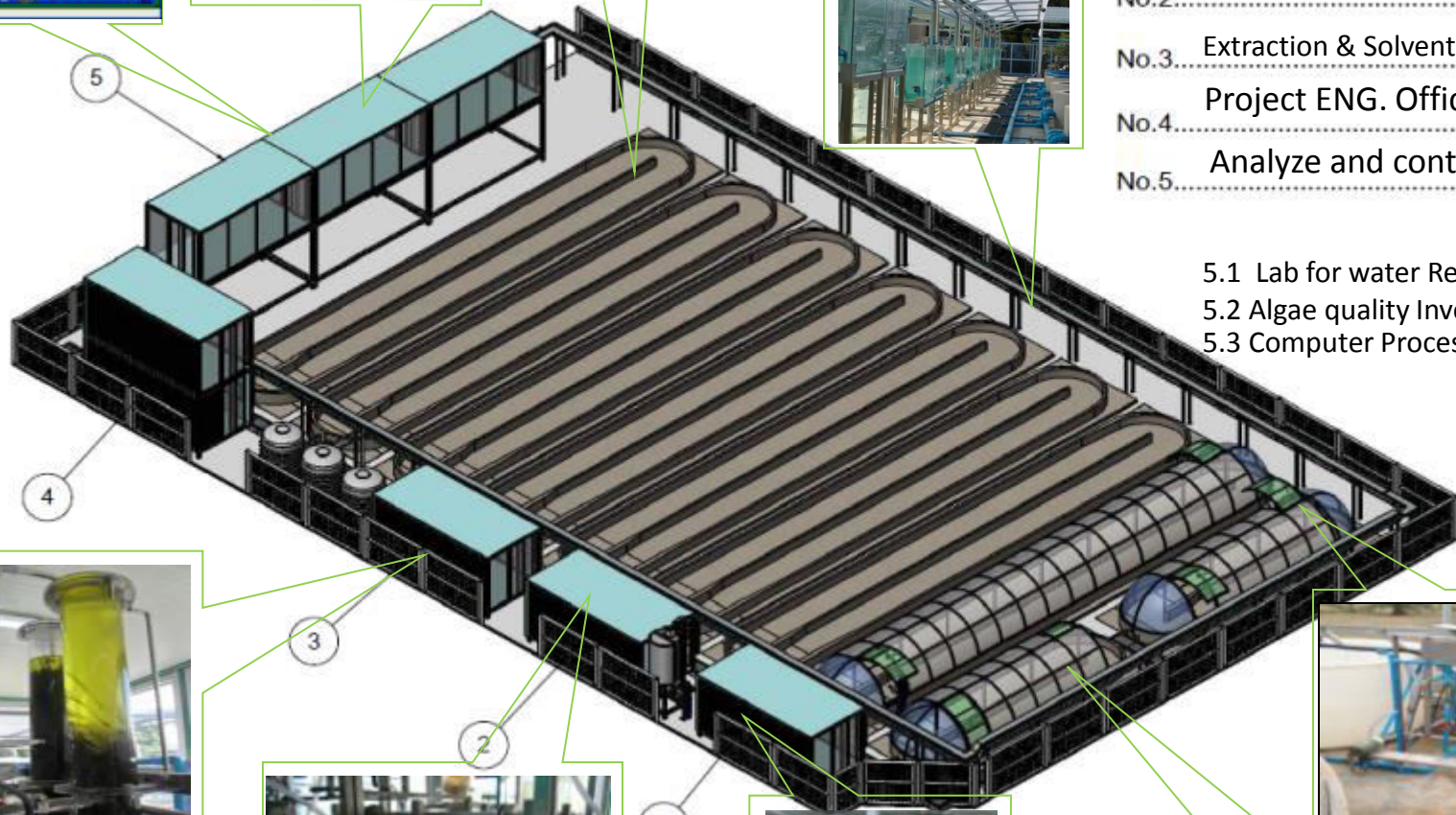
Developing Fully Automated biofuel Plant

Inoculums



- No.1..... Harvesting Unit
- No.2..... Cell Braking Unit
- No.3..... Extraction & Solvent Recovery
- No.4..... Project ENG. Office
- No.5..... Analyze and control

- 5.1 Lab for water Recovery
- 5.2 Algae quality Investigation
- 5.3 Computer Process Control



Extraction



Cell Disruption System



Dewatering



Dosing unit for reclaimed water

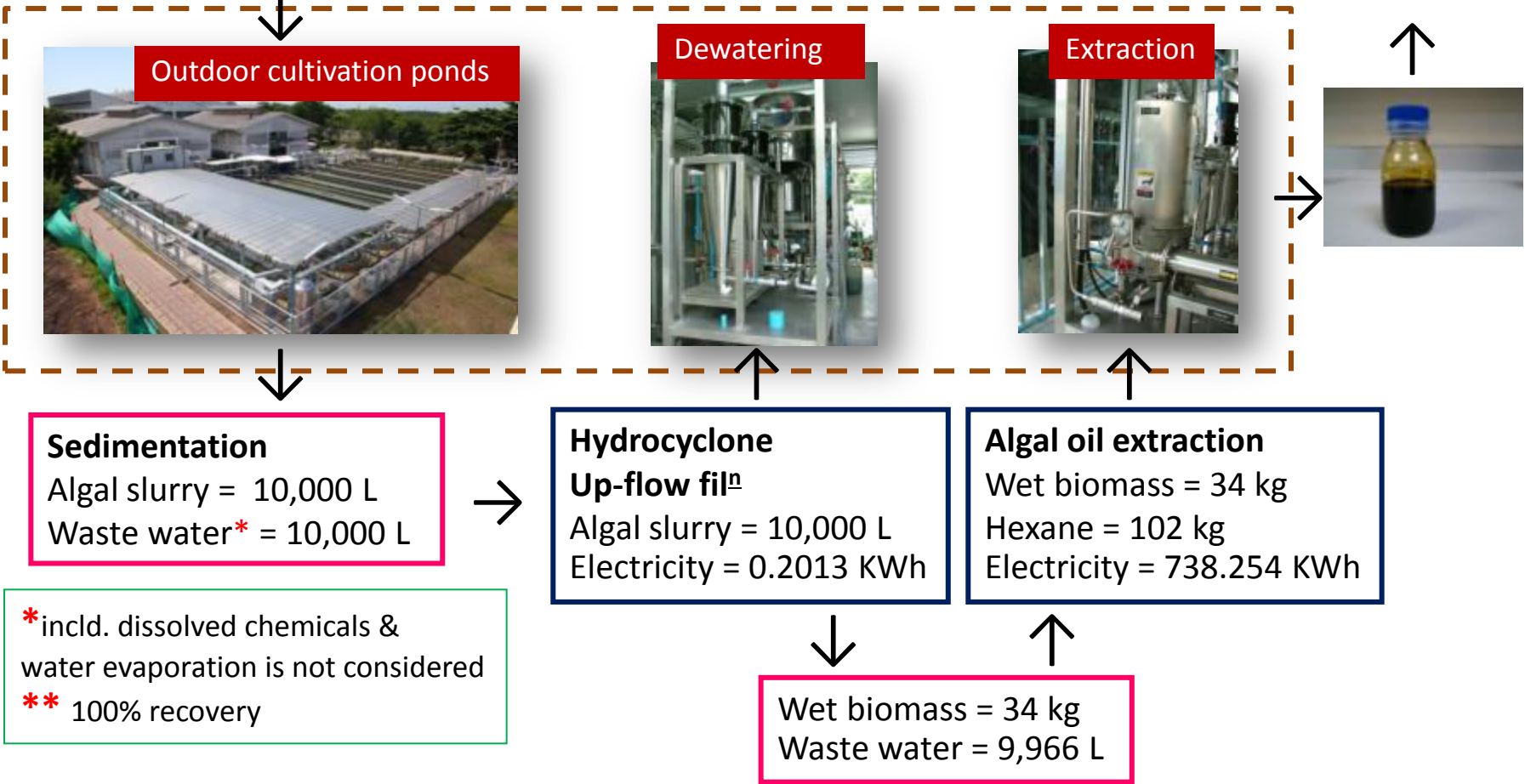
Controlled Dome

# Algal Biomass System for Crude Oil Production

(per day)

**Cultivation**  
 Inoculum = 160 L  
 Water = 19,806 L  
 Chemicals = 34 kg  
 Electricity = 118 KWh

Crude oil = 4.76 kg  
 Wet left-over = 29.24 kg  
 Hexane\*\* = 102 L





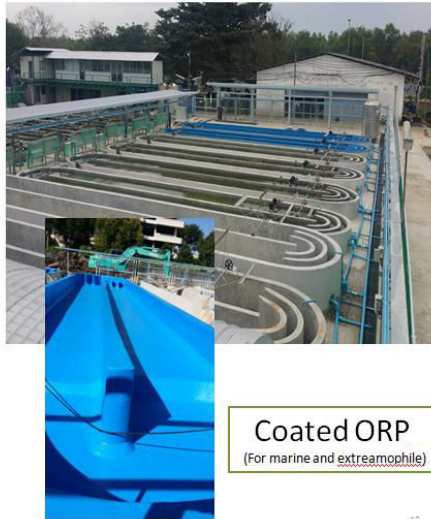
# TISTR 's 4 New Challenge Technology in 2016

1

New Inoculum system



New ORPs



Coated ORP  
(For marine and extremophile)

18

2

UpFlow thin Layer Cultivation system (UFLC)



3

New multi-stage oil extraction system



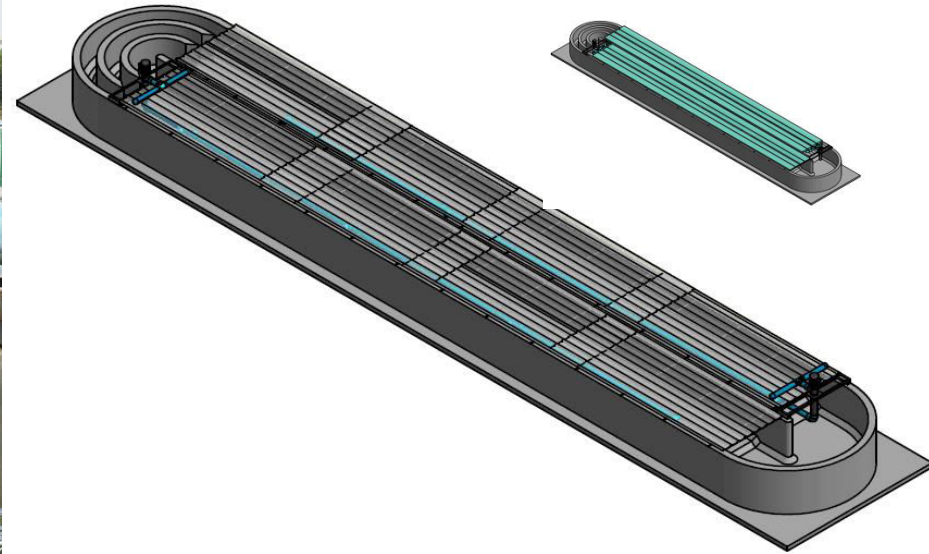
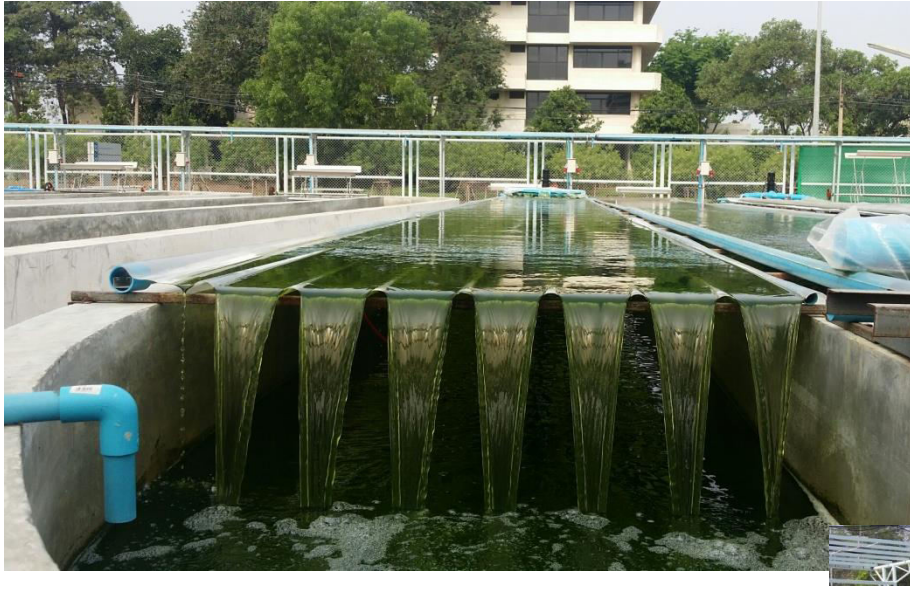
4

Green Energy Approach

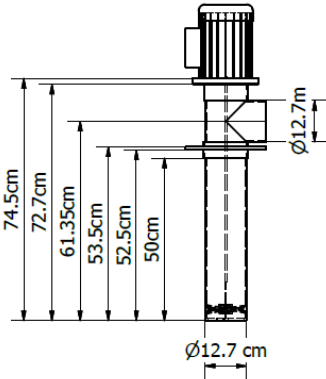
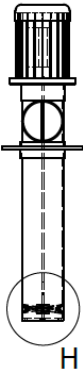




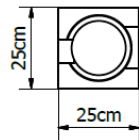
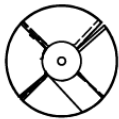
# Upflow Thin Layer Cultivation system (UTLC)



H (1 : 8)



Motor 1 HP 380 v



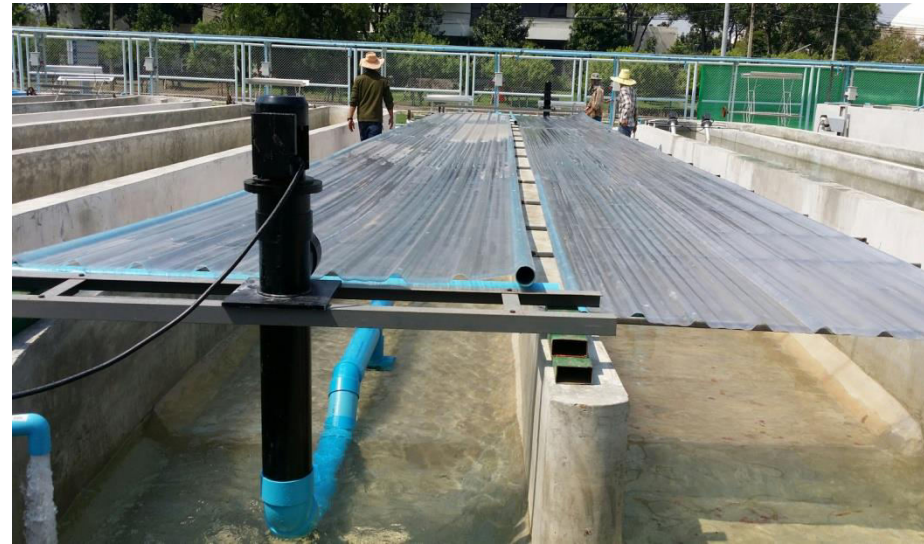
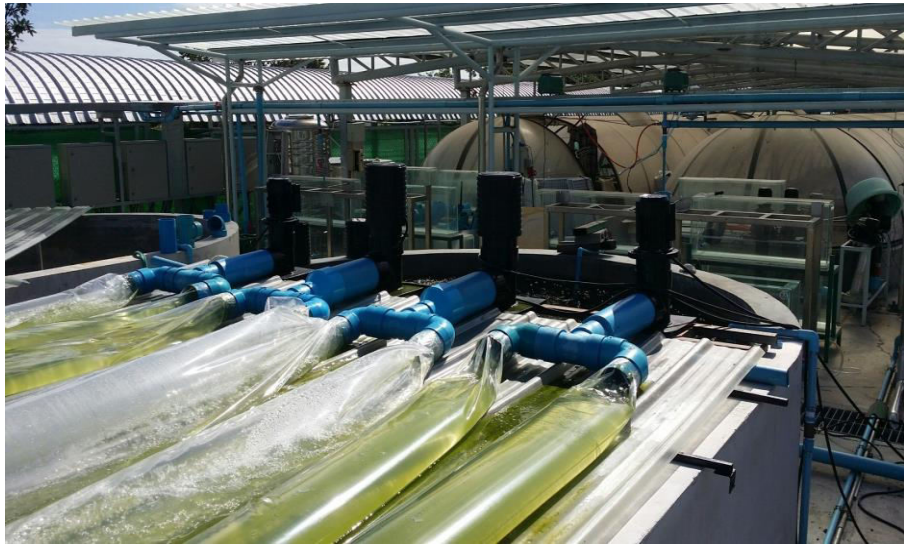
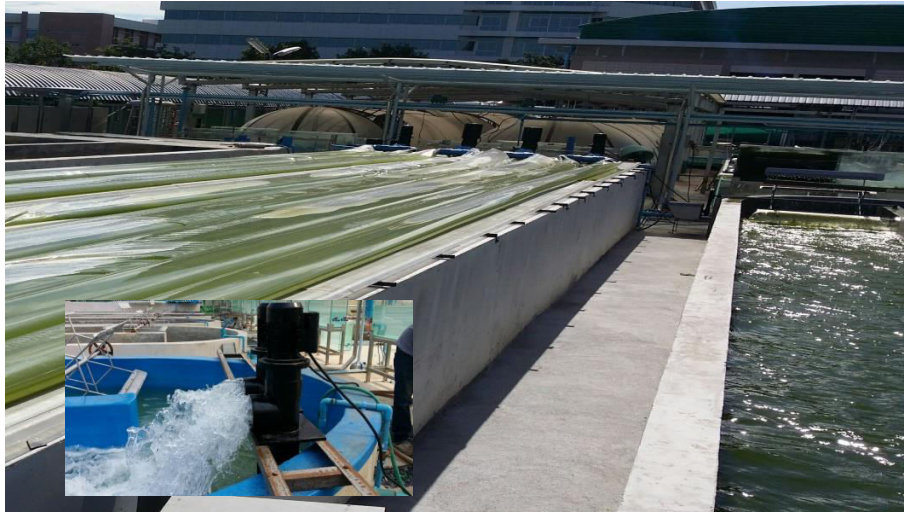






# Upflow Thin Layer Cultivation system (UTLC)

High depth pond : 1.2 M/ 60,000 L





# New Cultivation System





# Contacted researches with national and international counterpart



MOU with **PTT group** on utilization of high potential algae for biofuel production



MOU with **MALEE group** on utilization of high protein content algae for feedstock



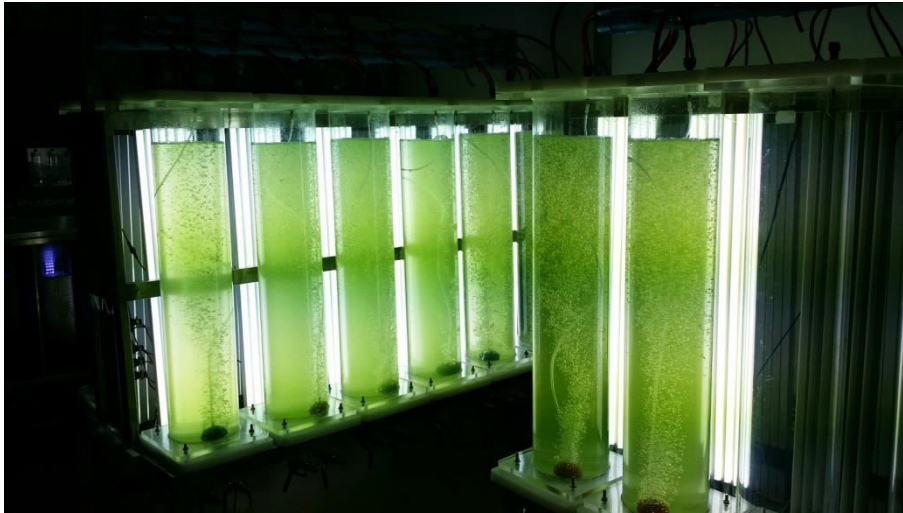
Meijo University (Japan) : Genetics and Metabolics engineer. Tokyo Institute of Technology (Japan) : Hydrothermal process for the residue algae biomass.



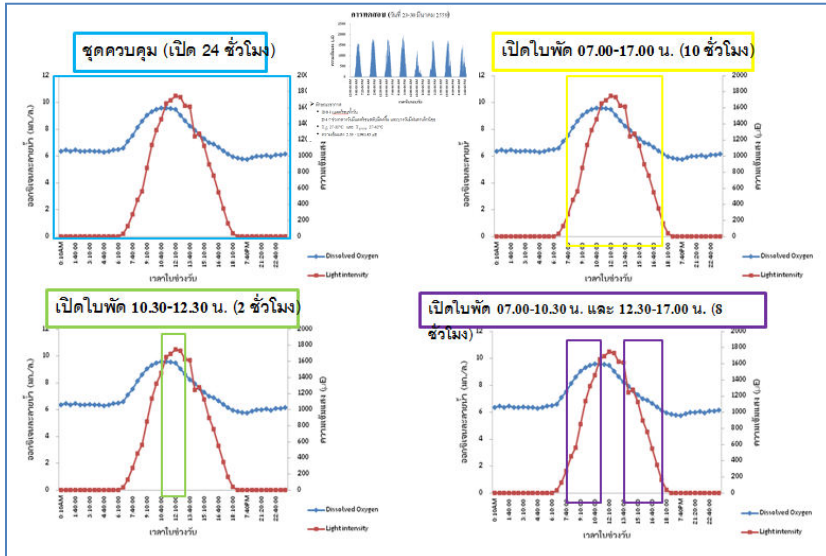
With **Denso corporation** (Japan)



# New formulation



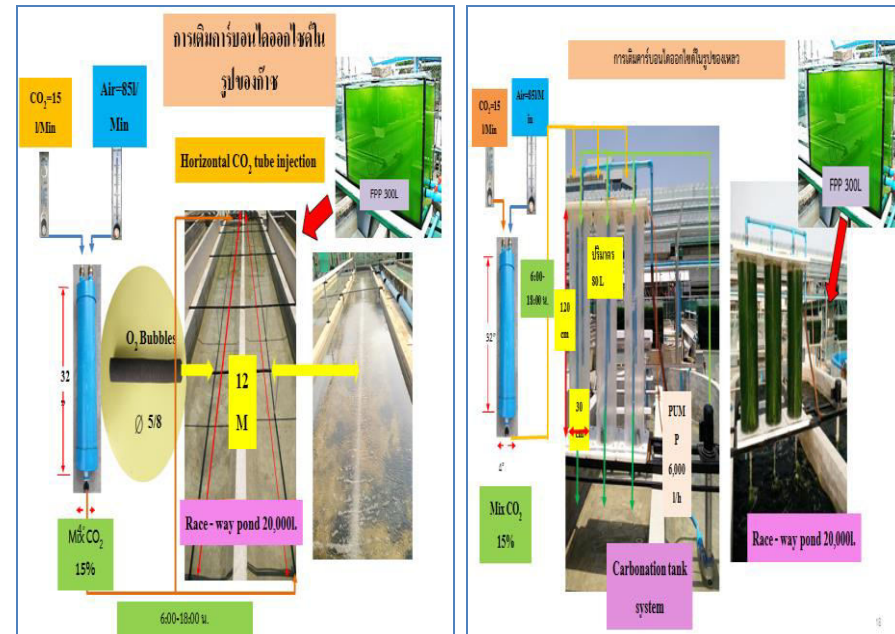
# New cultivation pattern



# High value product

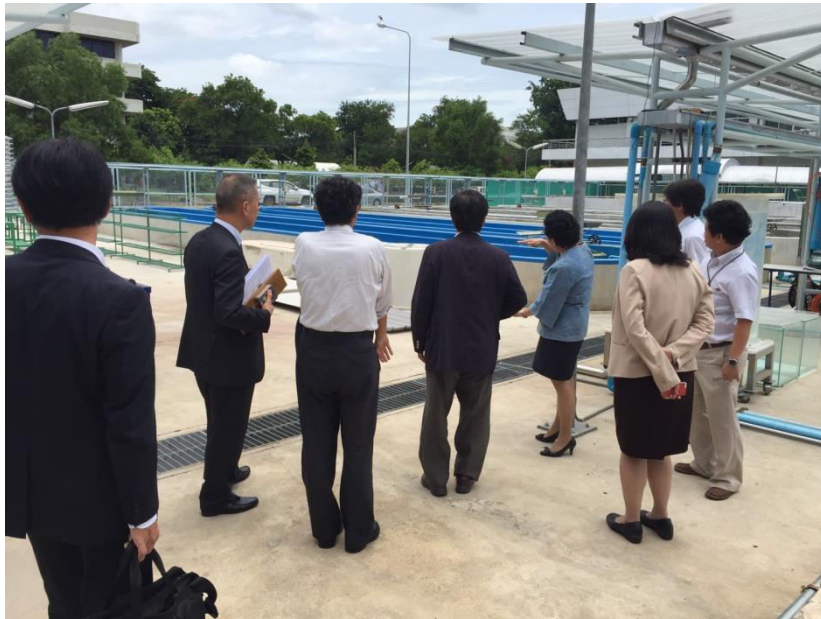
<p>Medium : CR Co2: 5% Biomass : 26X @ t24</p> <p><i>Chlorococcum</i></p>	<p>Medium : AR Co2: 5% Biomass : 3X@t12</p> <p><i>Haematococcus</i></p>	<p>Medium : AR Co2: 5% Biomass : 18X@t28</p> <p><i>Elakatothrix</i></p>
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# New Co2 inject



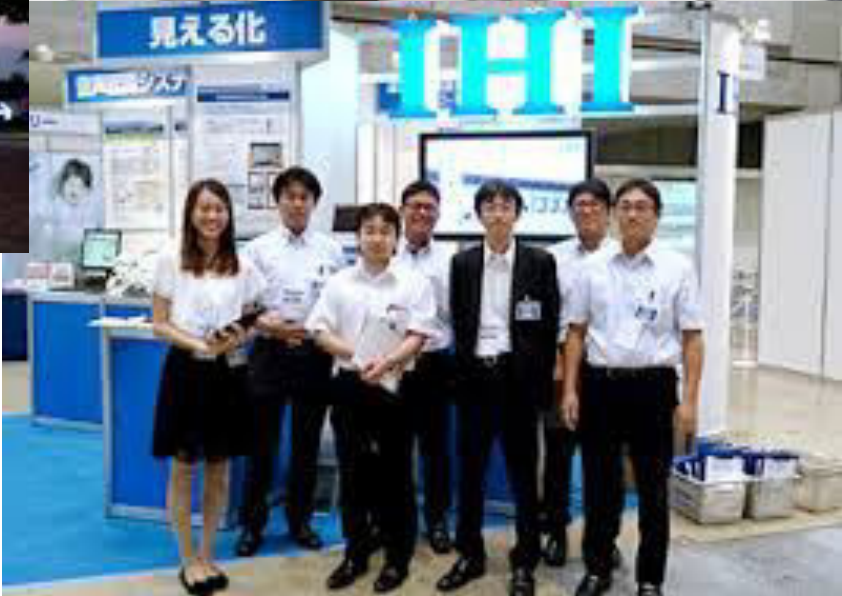


# DENSO



# Friend and Allies

PTT



DENSO & IHI

