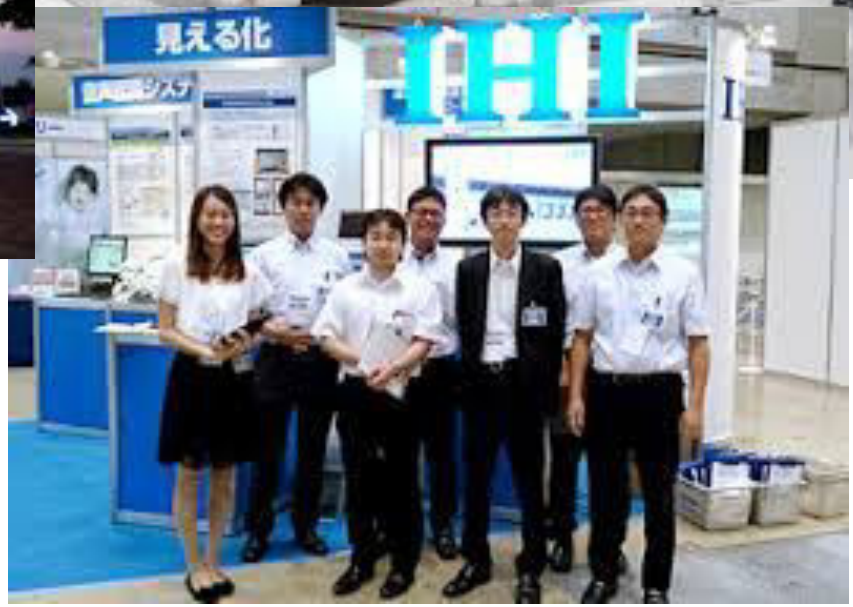
# Friend and Allies

## PTT

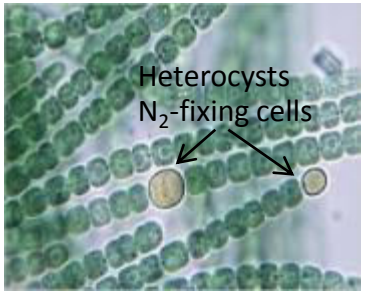




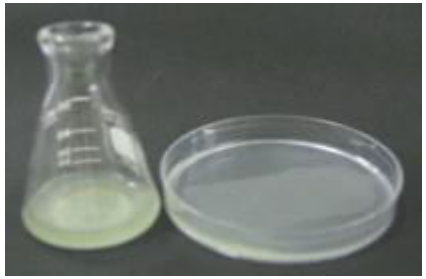

## DENSO & IHI

# Technology Transfer & Service

## Biofertilizer ($N_2$-fixing )




- Soil conditioner
  (polysaccharide-producing)



- Food (edible *Nostoc* ball)

- Testing service

Thai Industrial Standard TIS 2321-2549
"Weather Resistant Emulsion Paints"

# Technology and Co-product Value Chains

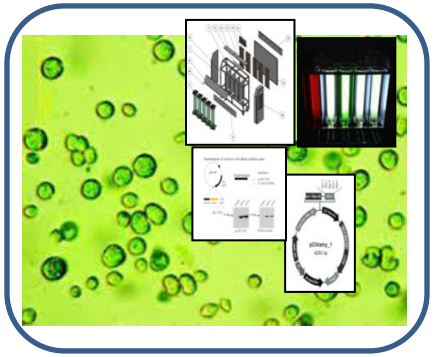
## Algae Conservation

1

Bio-Resources (AEC)

## Active algae

2



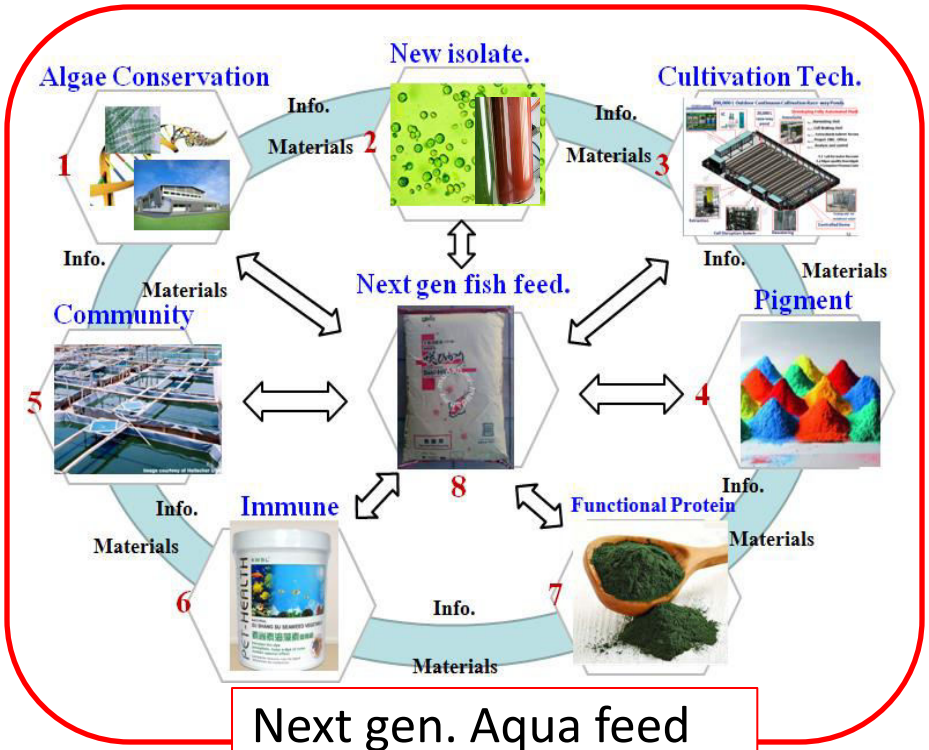
Bio-Technology

## Cultivation Tech.

3


Pilot/Indus. Demonstration Scale


Next gen. bio-fertilizer




Next gen. Aqua feed

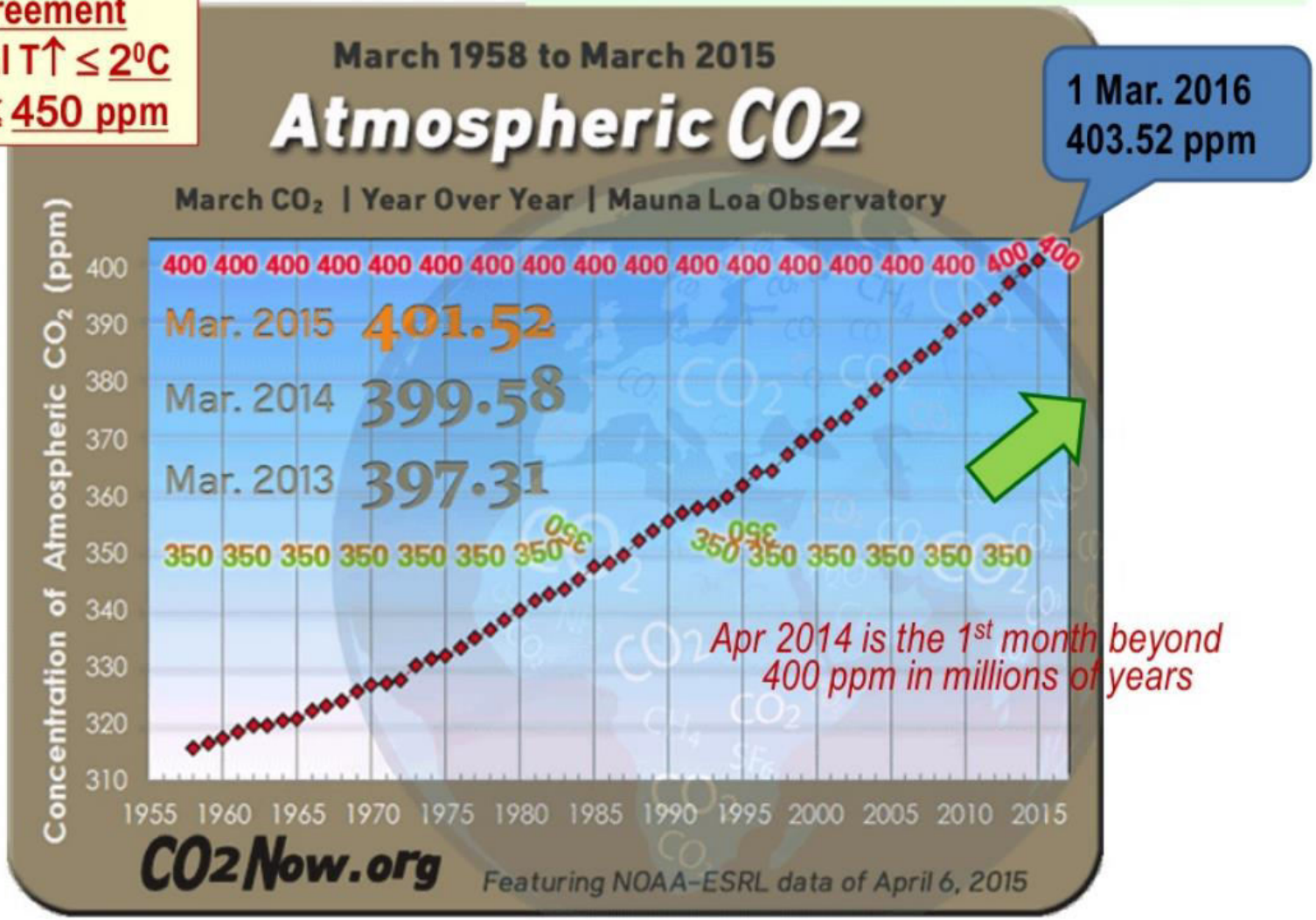

Thank
You

# Driving Force

## Unsustainable Earth

**Agreement**
Global T↑ ≤ 2⁰C
$CO_2$ ≤ 450 ppm

**350 ppm in 1985 & 400 in Apr14**



# Commitment

## Significant Global Agreement in 2015 (1/2)

**1972** — UN Conference on the Human Environment (Stockholm, Sweden)
- Our Common Future

**1992** — UN Conference on Environment & Development (UNCED) (Rio de Janeiro, Brazil)
AKA: The Earth Summit or The Rio Conference
- UNFCCC
- UNCBD
- UN Declaration
- Agenda 21

**2000** — UN Millennium Summit (New York City, USA)
- MDGs (8 goals) (2001-2015)

**2002** — The Rio+10 (Johannesburg, South Africa)
- Johannesburg Declaration
- Johannesburg Plan of Implementation

**2012** — The Rio+20 (Rio de Janeiro, Brazil)
- The Future We Want
- Green Economy

**2015** — UN Sustainable Development Summit (193 countries) (New York City, USA)
- Transforming Our World: The 2030 Agenda for SD
- SDGs (2016-2030) 17 goals 169 targets

25 Sep.


Ref.: NESDB(18 Dec.2015)

MDG ⇨ SDG

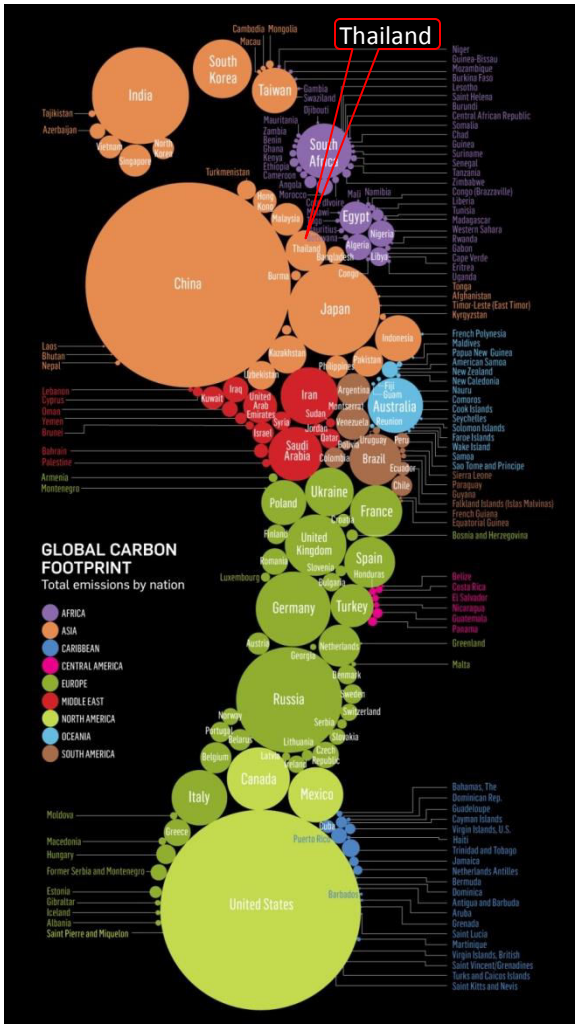
# Unstable earth and Sustainable energy development approaches



http://www.kroobannok.com/article-76582-

UN sustainable development summit, New York, 2015

Global Carbon Footprint by nations

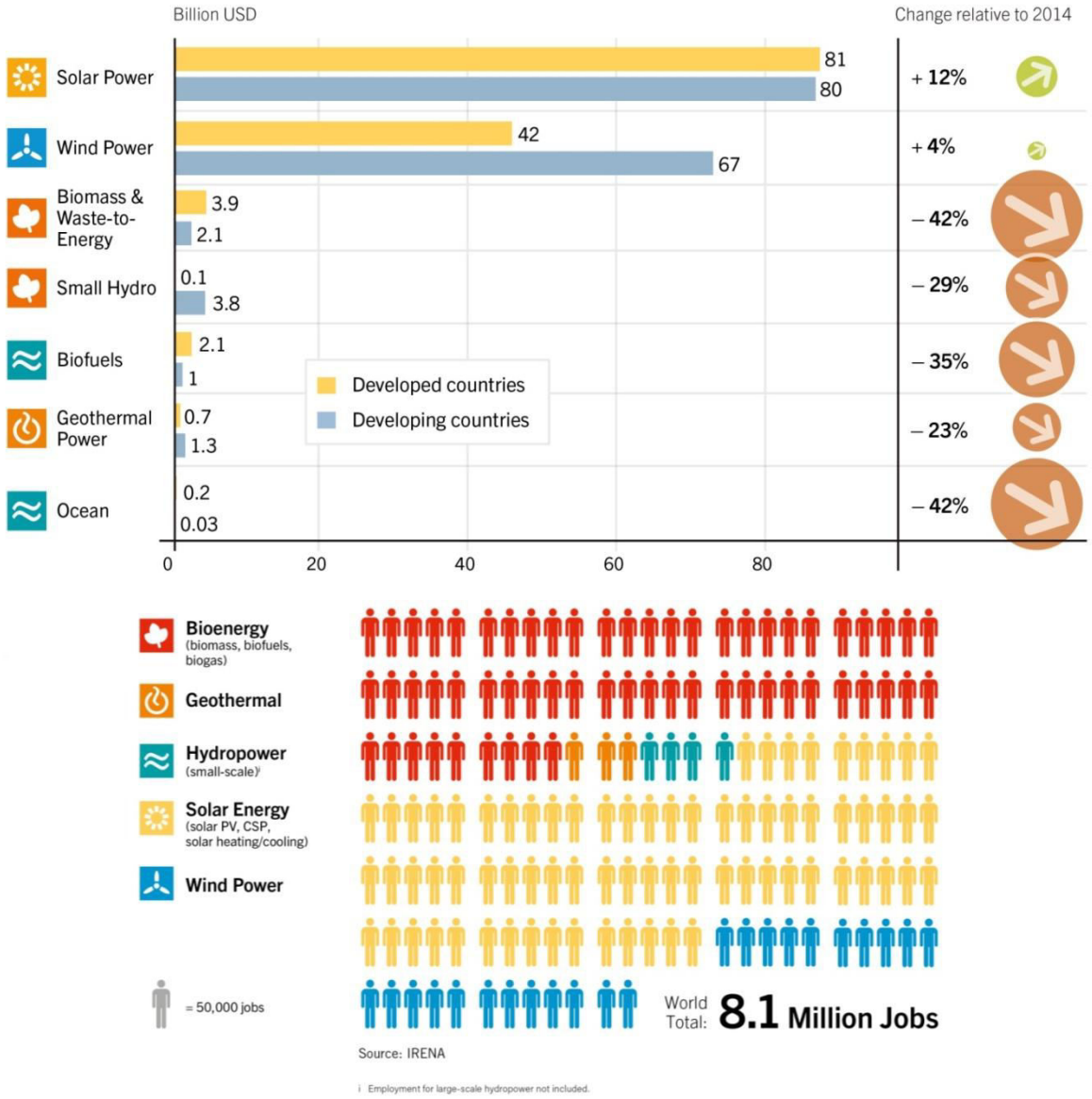



http://www.sustainablecitiescollective.com/130531/global-carbon-footprint-nation

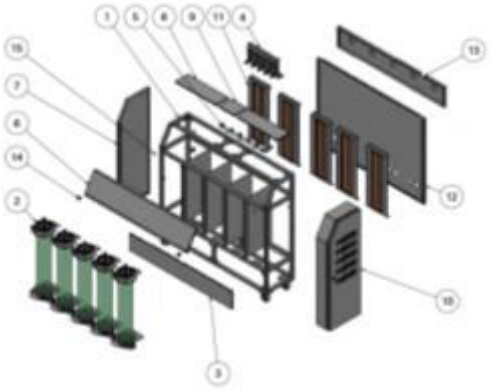
# Global trends

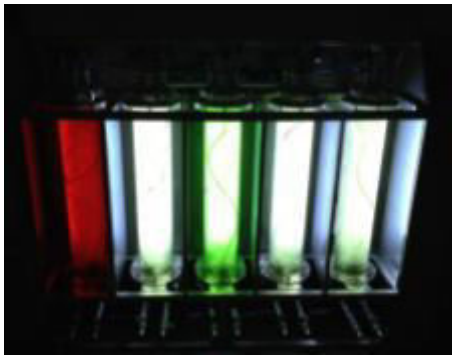

http://www.thegreenmechanics.com/2014_01_01_archive.html


http://greenenergy.blogspot.com/



# Improve Strain Performance





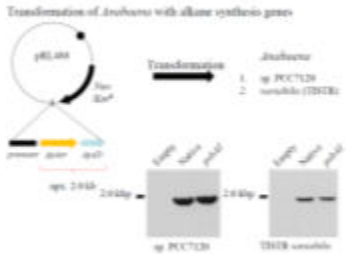

3

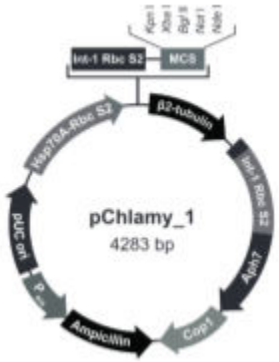
Pilot scale

Photosynthesis & Cultivation

2

Lab and semi-pilot scale optimization






Synthetic biology

MOU : TISTR & Japan
Green Innovation Biotechnology
(R&D on microalgal strain for biofuel)

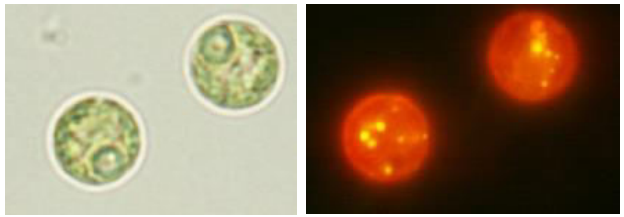
1

Genetic & Metabolic engineering

Algal strain (s)

# 1 Improvement of strain performance using synthetic biology

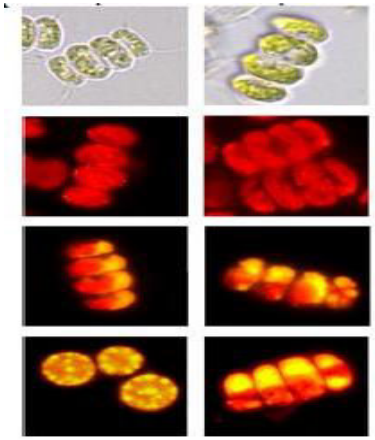
Potential strains for TISTR ACC were selected.



Ultimate goal :

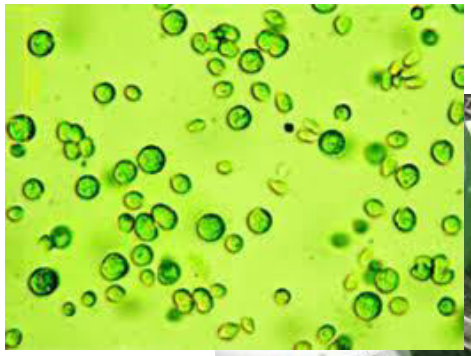
Oil production yield

%Oil



Yield

Physiology change



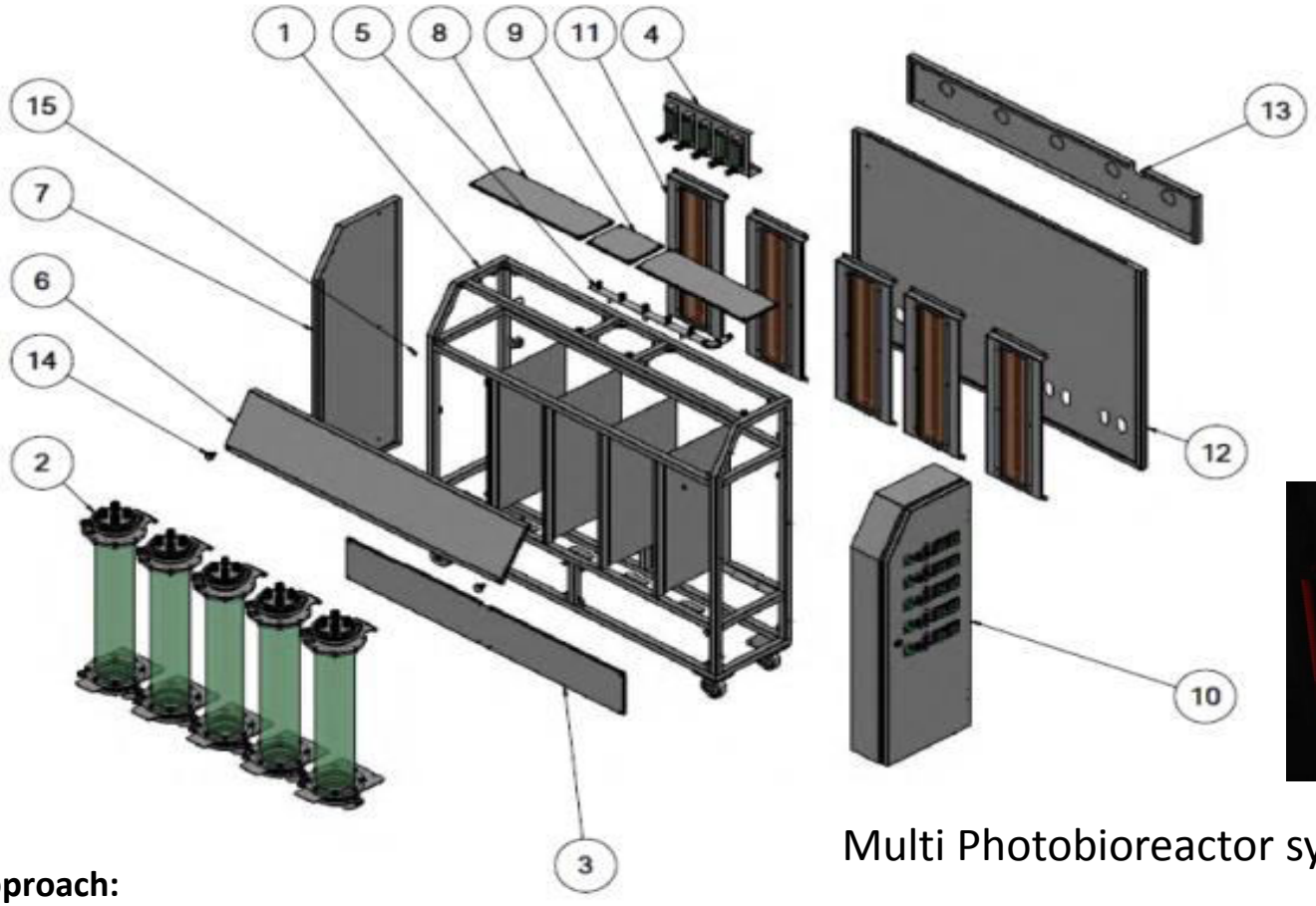
Separation

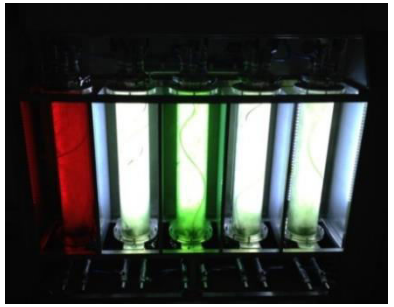
Technical goal :

- Oil content > 40%
- Easy for harvesting and extracting by TISTR innovation processes
- Abiotic stress tolerance strains

## 2 Capacity building of TISTR on genetic and metabolic engineering research

TISTR : Design and Construction of MPBR



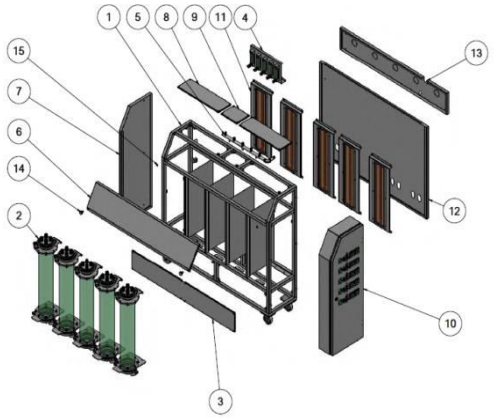
Multi Photobioreactor system (MPBR)

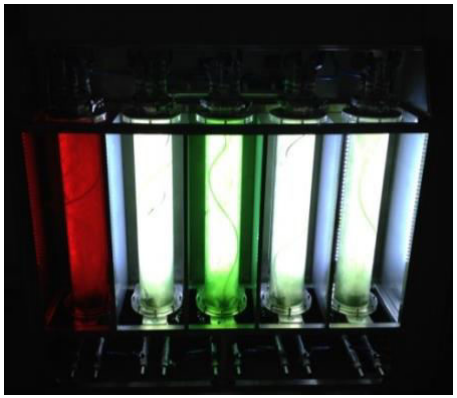
**Approach:**

**Design concept is considered for strain improvement and biorefinery research**

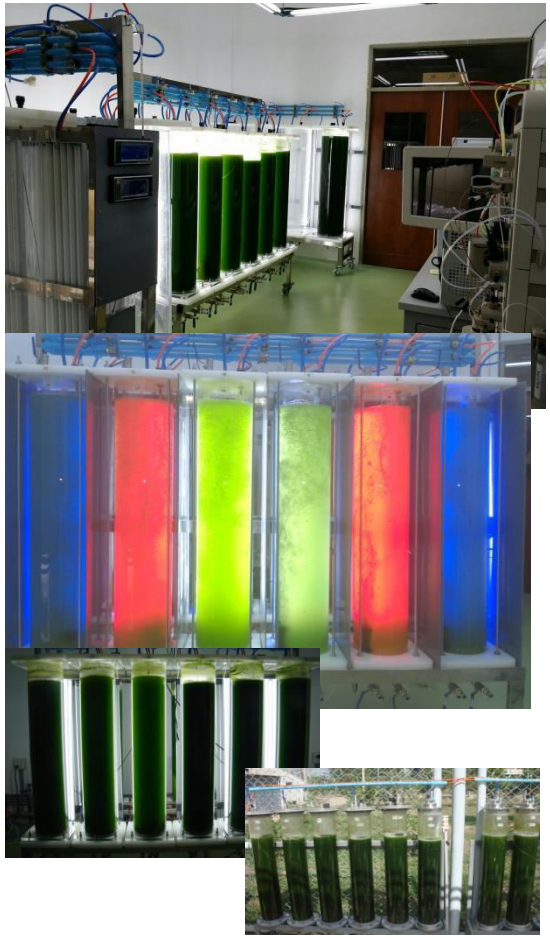
# Series of PBR has developed for synthetics GM Algae

## 5 L : F/LED



## 30 L : F/LED



## 80 L : F