

**An Indian-Australian research partnership**

**Project Title:**

Investigations on CO<sub>2</sub> sequestration with algae under dry and hot ambient conditions

**Project Number**

IMURA0300

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**Research Academy Themes:**

**Highlight which of the Academy's Theme(s) this project will address?**

(Feel free to nominate more than one. For more information, see [www.iitbmonash.org](http://www.iitbmonash.org))

1. Advanced computational engineering, simulation and manufacture
2. Infrastructure Engineering
3. **Clean Energy**
4. Water
5. Nanotechnology
6. **Biotechnology and Stem Cell Research**

**The research problem**

*Define the problem*

To understand :

- Carbon captures efficiency and characteristics of microalgae species tolerant to low humidity and higher ambient temperatures (25o-45oC).
- Mechanism of carbon capture by microalgae species tolerant to higher ambient temperatures.
- Issues related to direct use of purified and desulphurized flue gas in algae cultivation system.
- Optimum process parameters for operating algae cultivation system under ambient climate conditions prevailing in India especially around Vijayanagar area i.e. Torangallu, Karnataka (Latitude : 15o18'N and Longitude : 76o42'E)

## Project aims

Identification and characterization of algae species suitable for carbon capture at low humidity and elevated ambient temperatures at a faster rate (lower doubling time) with special emphasis on use of "Diatom" group of algae

- Assessment of carbon capture efficiency and biomass productivity of identified algae species under typical operating conditions
- Effect of flue gas toxicity on algae growth kinetics
- Studies on maximization on lipid accumulation during the growth of algae in the cultivation system
- Optimization of process parameters for algae cultivation system with direct and indirect use of purified and desulphurized flue gas at higher ambient temperatures

## Expected outcomes

*Highlight the expected outcomes of the project*

Identification of species of algae that are optimised for biomass and lipid production under high temperatures and are capable of growing at a high rate in the presence of flue gases. Such algae should be capable of sequestering CO<sub>2</sub> from flue gases and use this to support production of lipids for biofuel.

## How will the project address the Goals of the above Themes?

*Describe how the project will address the goals of one or more of the 6 Themes listed above.*

By using algae and the process of photosynthesis to produce biomass/lipid, which can be converted into biofuel, this project will address the aim of Clean Energy. Algal based biofuels allow us to by-pass fossil fuel usage and hence minimise anthropogenic CO<sub>2</sub> emissions to the atmosphere.

## Capabilities and Degrees Required

*List the ideal set of capabilities that a student should have for this project. Feel free to be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.*

- Ideally, BSc (Hons) or equivalent with some experience in microbiological and/or biochemical techniques.
- Students without this background but with a demonstrated capacity to learn new approaches and techniques would also be considered.
- Students should also have studied basic chemistry as part of their degree.
- Experience of Microbial technology or Mathematical Modelling