ENVIRONALGAE

Your partner for sustainable effluent treatment

Introduction

The impact of *Climate Change* is well known and gets discussed in perhaps every important international convention of developed and developing nations. Our manufacturing sector is tasked to audit and reduce our *Scope 1*, *Scope 2* and *Scope 3* carbon emissions. For most of the chemical, food, feed, agro-processing, agrochemical, pharmaceutical and fine chemicals industry, *Scope 1* and *Scope 2* emissions from wastewater treatment are significant. Hence, switching to more sustainable wastewater mitigation technologies is a need of the hour for most companies.

Microalgae are the most primary photosynthetic organisms on the planet. Their smaller sizes, robust cell structure and an efficient photosynthesis apparatus make them the most efficient plants on the planet. Microalgae are present abundantly in nature, thereby rendering a "Natural" process for effluent treatment.

Why microalgae for wastewater treatment?

Microalgae provide unique advantages:

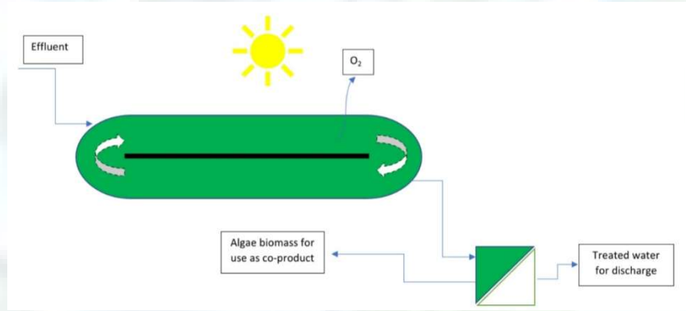
- Utilize sunlight as the primary energy source
- Ensure oxygenation of the discharged effluent
- Metabolize COD with low BOD:COD ratios
- Absorb and metabolize CO_2
- Absorb and utilize ammonia & nitrates
- A single-step process
- Pliable across wide range of pH, TDS COD loading rates, stream compositions and weather conditions
- Opportunity to commercialize algal biomass as a feedstock for food, feed & high-value fertilizers

ENVIRONALGAE

Harnessing the prowess of microalgae for wastewater treatment

What does the process look like?

- Under-the-sun set-up (low civil-work)
- Simple unit operations and processes
- Safe, clean & healthy (O_2 spa!) process



How do we proceed?

This is a niche area of technology for wastewater treatment. We believe in offering a technology solution rather just selling a project or consulting services.

Phase	Phase description	Duration
SCIENTIFIC FEASIBILITY ASSESSMENT	Bioassays at our lab	1 month
TECHNICAL FEASIBILITY ASSESSMENT	Process development at our lab	1½ months
VALIDATION ASSESSMENT	Outdoor validation at our Pilot-plant	1 month
DESIGN	Design of the full-size ETP	2 months
EXECUTION & COMMISSIONING	Execution and Commissioning of the full-size ETP plant	3-4 months

Why work with us?

- Passionate about the environment
- Among the very few across the world to have executed full- microalgae-based effluent abatement at scale!
- Executing microalgae-based effluent treatment projects, two are perhaps among few of the largest of their kind in the world

ENVIRONALGAE

Our ETP emits pure oxygen! Do you want some?

- Team experienced in R&D, technology & business leaders with illustrious corporate careers prior
- Follow a *phase-gate* approach with focus on **demonstrating customer value creation**; *invest CAPEX once recovery is assured*!
- Deliver customized process technology solutions for your needs

Promoter Profile

Ninad Gujarathi PhD; ninadg@gmail.com; +91-9960697725/ 8600140949; www.linkedin.com/in/ninadgujarathi

EXECUTIVE PROFILE

Chemical engineering professional with leadership experience in R&D, Techno-commercial, Manufacturing and Business roles, with proven track record of evaluating, conceptualizing, innovating, developing, scaling-up, delivering process & business solutions, and business growth. Subject matter expertise in climate change mitigation solutions, biofuels, biochemical engineering, bioprocess engineering, wastewater treatment, design & scale-up of unit operations and processes from concept to commercial scale, in bioprocess applications.

EDUCATIONAL QUALIFICATIONS

- MS, PhD in Chemical Engineering from Colorado State University, USA, 2005
- BTech in Chemical Engineering from Dr. B. A. Technological University, Lonere, India, 2000

KEY PROJECTS/ EXTERNAL REPRESENTATIONS

- Executing some of the largest known microalgae-based effluent treatment projects in the world, with the largest one exceeding 2 Million Liters per day of treatment capacity
- Conceptualized, developed, and designed (process design) the first-of-its-kind algae-based wastewater treatment solution to mitigate all aqueous effluent streams at site. Saved millions of pounds in CAPEX-OPEX and carbon emissions for the manufacturing site.
- Conceptualized & designed (2012-13), commissioned (2016), demonstrated (2017) and operated (2017-Aug'2018) the world's first integrated, end-to-end, large demonstration plant for biocrude production using marine microalgae produced from CO_2
- Successfully secured funding as a co-Principal Investigator from RIL in the United States Department of Energy (US DOE) sponsored PACE (Producing Algae for Chemicals & Energy) project in 2015.
- Participated as a co-Principal Investigator from RIL in the US DOE sponsored NAABB (National Alliance for Algae Biofuels & Bio-products) from 2011-2014.
- In 2009, PRAJ contributed significantly towards the preparations of the Indian Prime Minister's Convoy to Copenhagen Summit. Was a key member of the team that conducted, compiled & presented life cycle analyses studies on a few renewable energy options, to the PM's Convoy.

Contact information

PHONE: +91-8600140949.
Email: ninadg@gmail.com, ninad@environalgae.com
Website: www.environalgae.com
Address:
Environalgae
1101 Millennium Empire
Plot 47, Sector -15
Near D-Mart, Kharghar,
Maharashtra – 410210

An Exciting Clean-Tech for wastewater treatment....

- **Sustainable -** Sunlight, the primary source of energy for our process, is free of cost, non-polluting and plentiful
- **Environment friendly* -** O_2 released by algae, improves overall air and water quality in the environment
- **Effective** (field data collected from one of our pilot-plant sites for treatment of manufacturing effluent streams)

Raw effluent
- COD – 6,000 mg/L
- pH – 4.5
- TSS - ~1,000 mg/L
- Red coloration

Algae pond culture
- DO – 150-500% sat.
- pH – 7-8
- Green algal cells in suspension

Treated water
- COD – 60-120 mg/L
- pH – 7-8
- TSS - < 20 mg/L

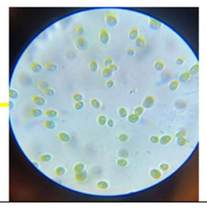
* While the COD of this effluent is ~6,000 mg/L, our process can treat CODs of over 100,000 mg/L; what changes is the effluent volume treated per unit area

ENVIRONALGAE
Your partner for sustainable effluent treatment

1 MLD plant operational at Sahyadri Farms

Up to 1,000 m^3/day
of manufacturing effluent streams including Process effluents, biogas digestate effluent & Condensate from ketch-up manufacturing

Full-scale microalgae ponds where the effluent gets treated
***Drone-shot** of plant executed by us



Microalgae cells love it!!

Microalgae for Aquafeed & Crop Growth Stimulant

Centrifugation

Microfiltration

Treated effluent

ENVIRONALGAE
Harnessing the prowess of microalgae for wastewater treatment

Microalgae-based Effluent & Sewage-water treatment
Sustainability benefits & Revenue potential

Capacity of plant	30 KLD ETP	300 KLD ETP	3,000 KLD CETP	10 MLD STP	150 MLD STP
COD assumed, mg/L	4,500	4,500	4,500	750	750
Ammoniacal-N assumed, mg/L	100	100	100	40	40
Land required, acres	0.33	2.8	28	19	278
Algae# generation, MT/year	134	928	9,281	6,118	92,813
Payback on CAPEX, years	4.3	2.5	0.9	0.7	0.5
Min. RO water generated KLD	17	184	1841	8,500	127,000
CO_2 Eq. Reduction MT/year	888	9,517	95,169	62,996	944,933
O_2 released MT/year	78	653	6,535	4,357	65,350

#Algae wet cake at 10% solids concentration sold at ₹60/Liter; *After accounting for interest on CAPEX @8% and depreciation of CAPEX over 10 years

ENVIRONALGAE
Our ETP emits pure oxygen! Do you want some?