

brew





Presentation

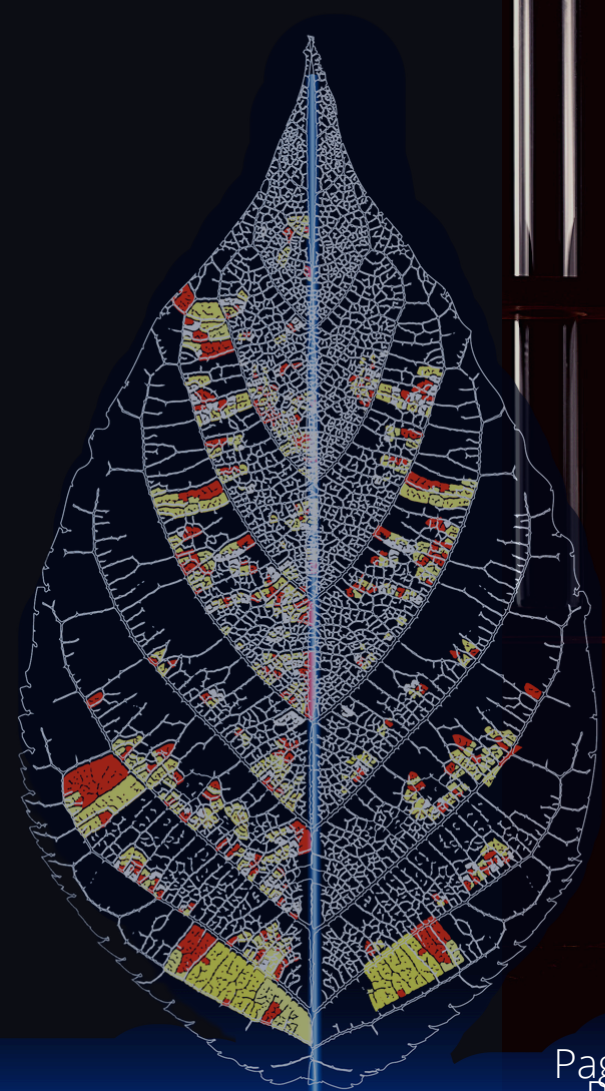
1. Overview
2. Background
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4. Proposed solution
5. Mission
6. Vision
7. Path to innovation





Overview

- Elevator Pitch
- Background
- Problem Statement
- Proposed solution
- Mission
- Vision
- Path to innovation



Elevator Pitch

Brew develops
microbial solutions for
the conversion of
carbon to methane
through
methanogenesis.

To facilitate creation of
multi fuel biogas plants.

To provide end to end
solutions for green
hydrogen from biomass.



IIT Alumni Council conceived of the MegaLab initiative in March 2020 as part of MegaSpheres.

Brew is a part of the biotech consort of the IIT Alumni Startup Incubator.





Current members of the MegaLab family include:



Ayushca
Communes



Digital Twins



Engineered microbes



Autonomous devices

KOTELEO

Novel Materials



Lifestyle disease reversal



Natural extracts

Problem



India's energy transition involves the development of the methane and biogas economy with a focus on cooking gas, transport fuel, fertiliser and green hydrogen production.

Methane is expected to contribute to 15% of the total energy basket.

In addition to production of natural gas from gas wells, India is a large importer of liquified natural gas.

Indicators



India has invested substantially in creating a cross country network of CNG pipelines, local loop networks and dispensing stations.

Biofuels have been identified as one of the 64 advanced critical technologies

Recent global developments in microbe development using biotechnology and AI have demonstrated that it is not just possible, but practical to produce engineered microbes at scale.

Solution



In order to substitute the Rs 2 lac crores pa import of LNG, Biogas production has been decided upon by Indian policy makers as a key national strategy.

This is proposed to be achieved by: producing CNG from coal, biomass, sewage, kitchen waste, city garbage and biogenic carbon dioxide. For large centralised plants, gasification followed by Sabatier reaction is an option. For all other use cases, sole option is microbial conversion.

Vision

Our vision is to redefine the energy basket by creating ecosystems and collaborative cutting edge technologies for the production of methane.

AI-based design and discovery paradigms - to deliver efficacious and ethical microbial solutions that significantly improve quality of life by avoiding biomass burning and passage of untreated sewage into the water systems.



Mission

To impact on discovery and innovation in development of microbial solutions.

To create innovative collaborations of modern chemical engineering, Bio-sciences and AI.

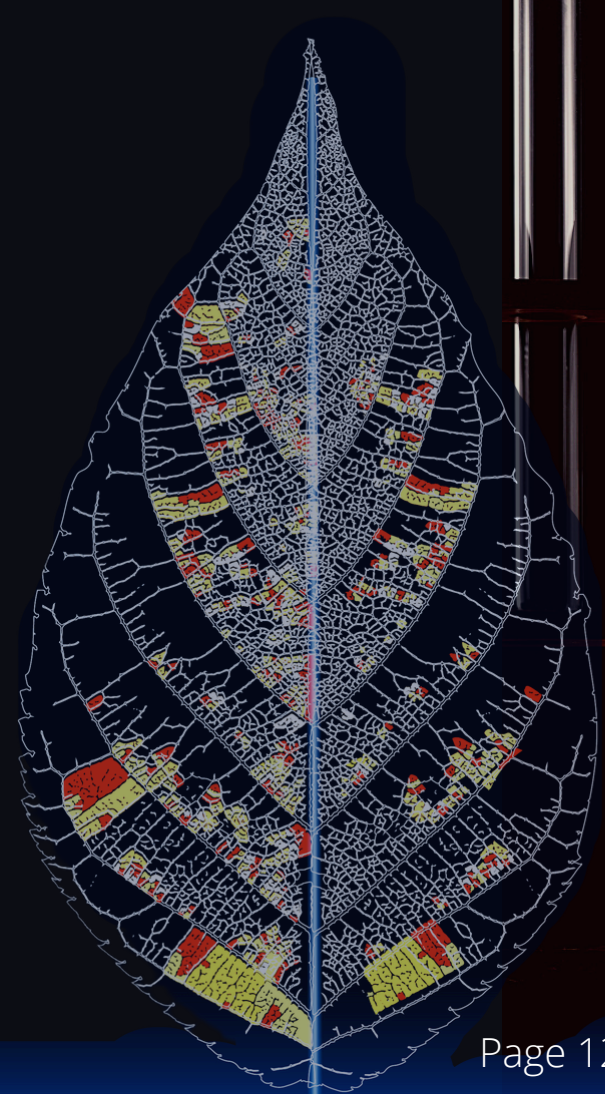
To create ecosystems for production of biogas using distributed manufacturing with multiple fuel options.





Unique Selling Proposition

- Bioaugmentation
- Biostimulation
- Multi fuel systems
- Local consumption
- Zero effluent
- Zero GHG
- Zero import



Quality of life

In some cities such as New Delhi, air quality index has plummeted to dangerous levels. This is primarily driven by biomass burning in Northern India.

Brew will enable availability of suitable microbes which reduce production time and increase yield.



Digital D&D



Brew proposes to use AI to design and develop microbes customised for specific applications and environments. This approach facilitates speedy discovery and low cost manufacturing design.

Multi Fuel

India produces 200 crore quintals of biomass.

However this production is seasonal. Year round production requires a process which can produce biogas with multiple feedstocks.

Cold Chain

Modern biotech products are delicate and need a robust cold chain.

They are thus stored in extreme cold conditions, sometimes needing -80 degC for storage. This makes them impractical for widespread use in emerging markets.

By using a distributed manufacturing model, it is possible to minimize the cold chain requirement by manufacturing the required microbes to the point of consumption.

Enhanced Safety

Brew starter microbes are proposed to be manufactured in cGMP approved facilities for global distribution from India.

Brew has extensive linkages with research organisations, testing laboratories, process developers and contract manufacturers.

Self propagating

Controlled self propagation of the microbes reduces the cost and quantity of microbes that need to be purchased.

Most commercial organisations would not support such a business model. Natural organisms cannot be patented nor do they need to be purchased repeatedly like genetically modified seeds



Sewage to Coal

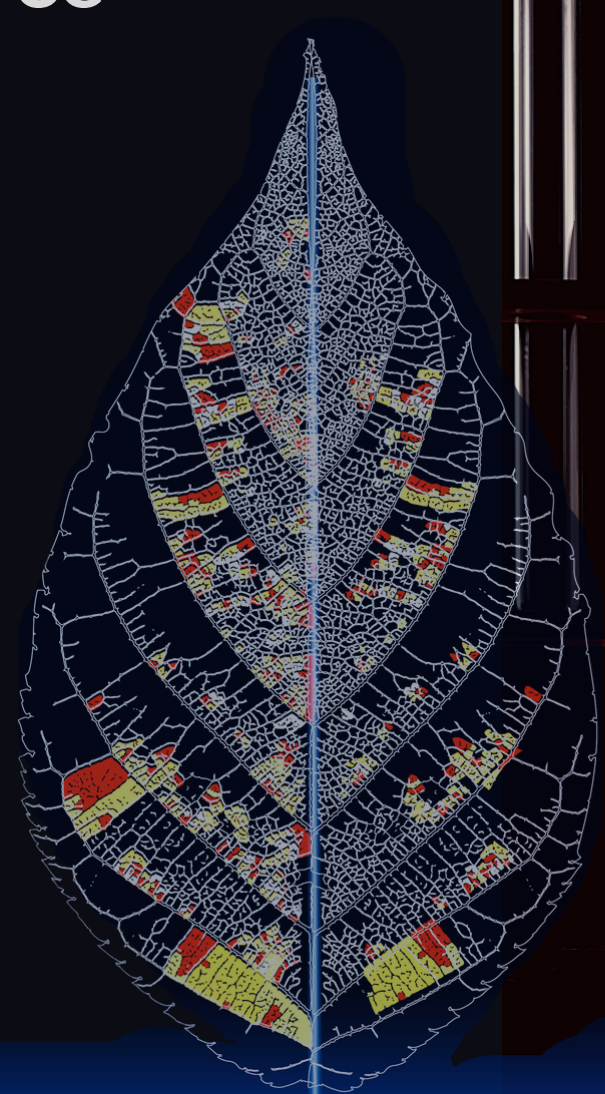
Brew microbial systems are designed to convert all kinds of carbon containing materials into methane rich biogas.

This includes coal, biomass, kitchen waste, sewage, animal dung, city garbage, agricultural waste etc.

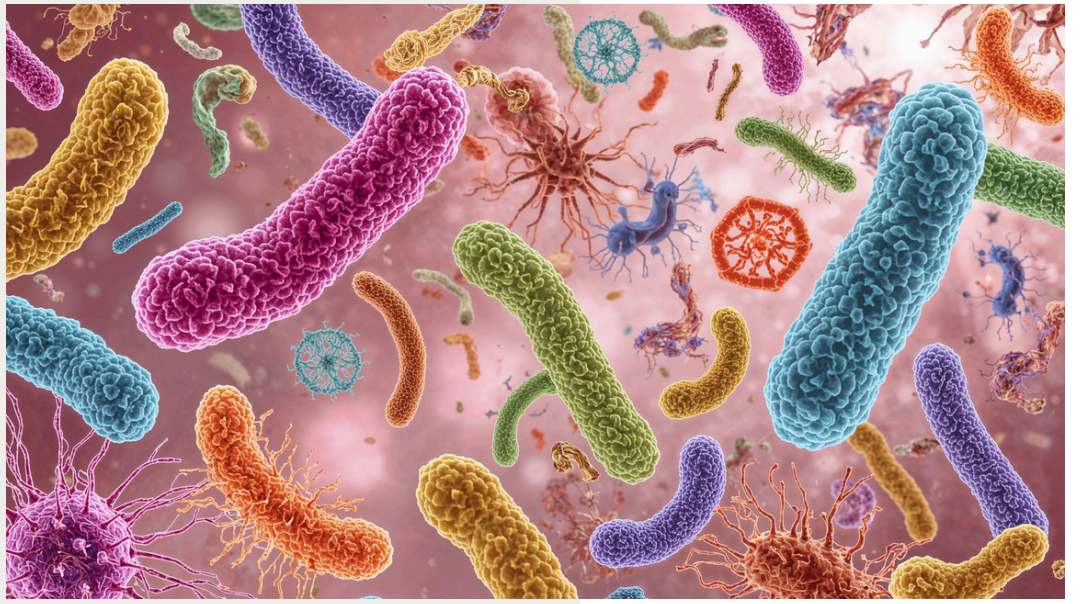


3. Products

- Microbe packs
- How do microbe starters work
- Methanogenesis, how does it work
- Benefit of bio conversion
- Biogas as fuel
- Biogas as hydrogen source
- Biogas as chemical feedstock



Microbe



Microbe starter packs are discovered or designed depending on the application using ai.

Microbe discovery is based on the specifics of the methanogenesis reaction.

Microbe design uses Cripr C9 type gene editing platforms for design of microbes which are not readily found in nature.

How microbe starters work ?

Traditional microbes develop on their own. For example, Gobar gas or gas from cow dung has been made in India for the last 50+ years using a fermenting mix of cow dung, biomass etc. No external microbes are added.

The Brew System envisages bio augmentation and bio stimulation of naturally occurring microbes with designer self propagating microbes.

Methanogenesis



Methanogenesis is the direct production of methane from a single reactor vessel using multiple feedstocks.

For example, the conversion of coal into methane involves a number of complex reactions going on in parallel within the same reaction vessel. These finally result in the reaction broth emanating methane directly from coal.



Development of reactors for methanogenesis is non trivial.

The reactors have a large number of variables under control including feed rate of microbes and nutrients as well as changing reaction liquid composition.

The reactors need self learning, self programming controllers.

Bioconversion



Traditional chemical engineering processes in the oil and gas industry such as coal gasification require high temperature and pressure.

On the other hand, most processes in nature occur at room temperature and atmospheric pressure. The Brew bioconversion systems are based on biomimicry.



Brew's nature inspired microbial conversion platform is based on self amplifying microbes fed into the reactor through a controlled and continuously monitored liquid feed.

As the feed comprises of live microbes, both the quantity and health of the microbes have to be monitor

Biogas



The principal advantage of biogas or methane or cng as a fuel is that it can be transported by pipeline at room temperature and low pressure.

Biogas can also be used as a feedstock to produce green hydrogen through pyrolysis using plasma techniques or with molten tin as a catalyst. The activated carbon which is produced as a byproduct has valuable applications.

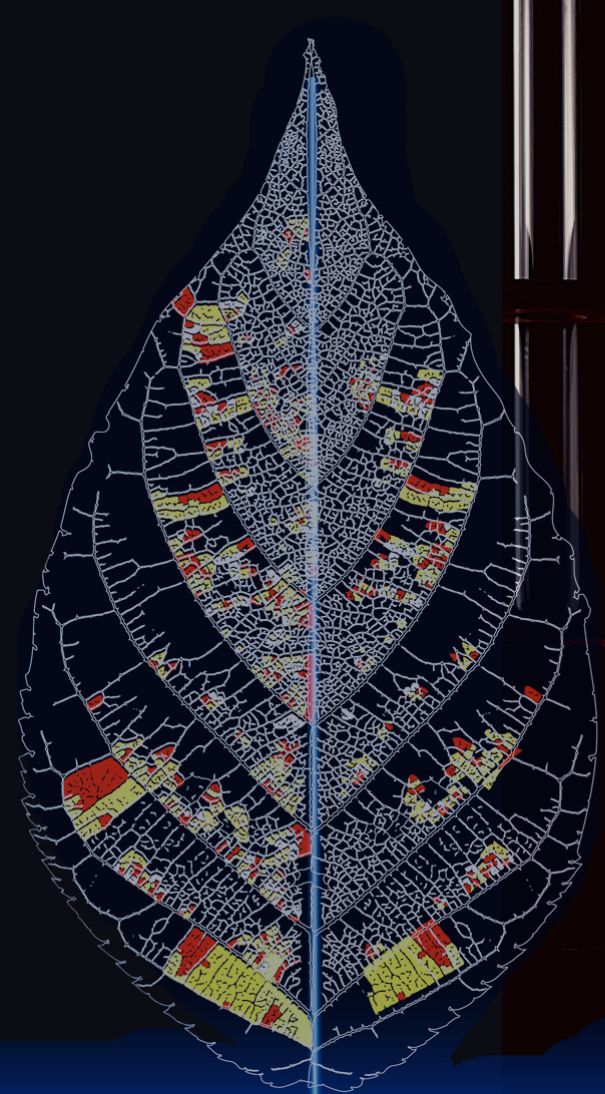


Brew's mehtanogenesis solution is an end to end system from "multi fuel input handling systems" to "gaseous fuel production" in the form of - clean, cheap and green - methane or green hydrogen.



4. Biogas as feedstock

- Ammonia production
- Hydrogen production
- Carbon nanotubes
- Graphene
- Graphite
- Carbon filters



Targets

- coal bed methane
- coal mines
- sugar factories
- napier grass farms
- goshalas and livestock
- urban waste
- sewage treatment

Delivery Mode

Retail packs

Bulk packs

Tankers

Cultures

Deactivated



Microbes are primarily of around twenty types from a natural origin perspective. Gene edited versions could run into thousands of variants

Efficacy

Brew is a multifuel methanogenesis platform. Brew proposes to deploy a prudent combination of multiple microbes, suitable nutrients and traditional high potency, fast acting, natural strains. Brew also provides reference design and controllers for the reactor vessels.

This approach leads to higher yield of methane in a shorter time.

Geographies

Brew is primarily targetting the Indian market for coal methanogenesis and the global market for waste management.

Brew products are targeted at both government and private sector buyers. The system is fully compatible with proven platforms like Jalasya for water management, Ayushca for habitat design and Barefoot golf for organic zero water/effluent golf courses.

Advantage

The sustainable comparative advantages of Brew include:



- Understanding of emerging market needs
- Low cost and high volume manufacturing ecosystem in India with existing infrastructure and ecosystem in place.
- Access to cutting edge and low cost research sources
- Ability to integrate with ancient wisdom.
- Operation under the SEZ framework facilitating unhindered imports of capital goods and exports of vaccines

Competition

Brew intends to cooperate with its competitors so as to meet the emerging market need for cost effective methanogenesis solutions.

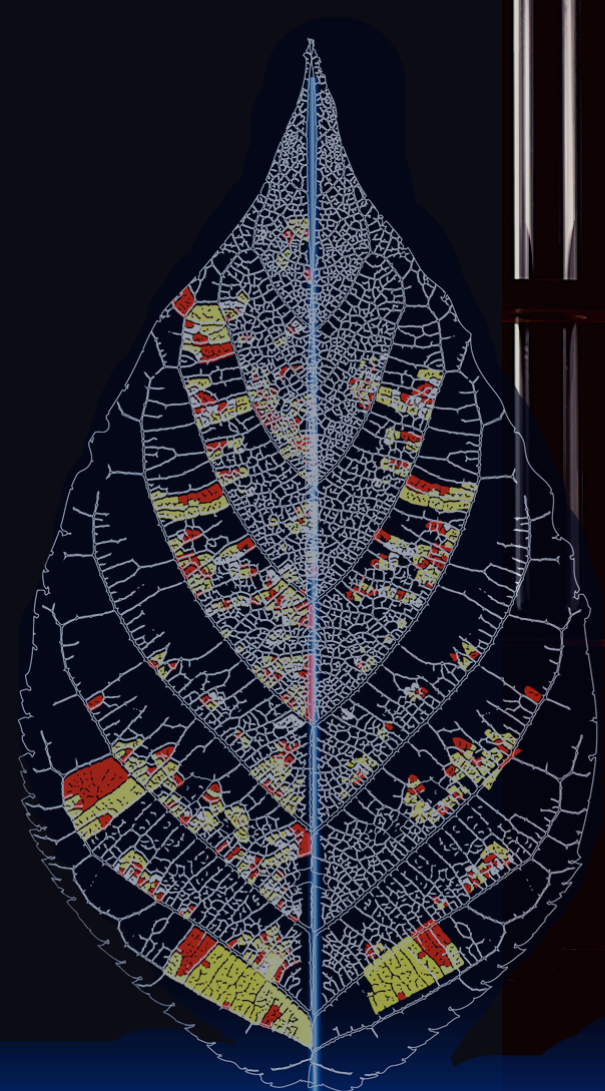
There are several established players in the microbial conversion industry globally such as Lanza Tech. Lanza Tech has set up pilot plant in IOCL Mathura Refinery.

The Coal2gas initiative of the IIT Alumni Council is considered the global technology and thought leader in this domain.

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5. Differentiators

- Cost reduction
- Logistics
- Distributed mfg
- Impact over profit



Cost Reduction

Affordability is key to widespread deployment. And that requires a total cost approach - including administration, logistics, supply chain and tracking.



Logistics

By using distributed manufacturing, criticality of extreme cold chains is being avoided. This enables direct delivery through drones or air drops for remote areas where it is impossible to transport conventional fuels.



Pilot Plants

Brew is assembling an end to end ecosystem for speedy construction of pilot plants. The chain includes small kitchen waste processing units as well as large city sewage treatment plants.

Plant sizes range from 1 TPD to 500 TPD



Factory on wheels

By miniaturising the production facility, Brew is able to compress the entire manufacturing facility into a mobile bus.



Brew Lab on the go

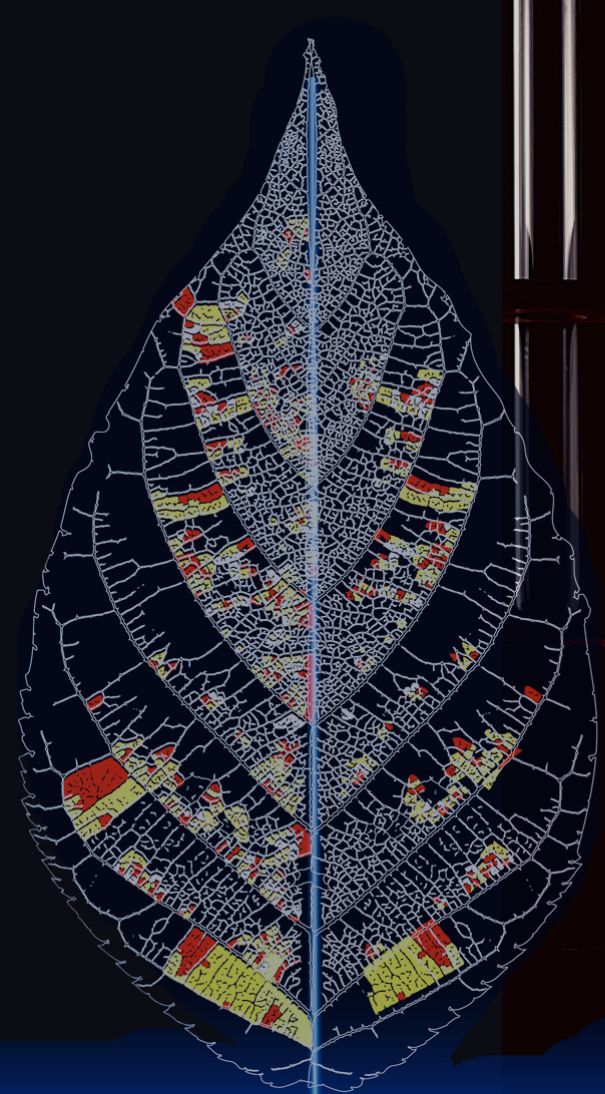
Brew has also assembled a complete lab on a mobile bus to handle research and development work on the project sites for applications like coal to gas.





6. Softpower

- Chief Mentor
- Background
- Project Director
- Background
- Mentor Panel
- Governance



Dr Arindam Bose

Chief Mentor



"I graduated with a BTech in Chemical Engineering from IIT Kanpur in 1975. I have spent my entire career in the biologics space. Prior to retiring from Pfizer, I played a key role in assembling the talent and capabilities needed to develop the monoclonal antibodies as therapeutics: some of the same skillsets were more recently harnessed to bring PfizersCovid-19 vaccine to patients in record time.



Dr Arindam Bose
Chief Mentor, Brew
Distinguished Alumnus
Purdue University, 2018

Sanjay Nagi

Project Director



"I graduated with a BTech in Mechanical Engineering from IIT Roorkee in 1983. I have spent most of my career in project management and decision support. The covid pandemic has been an eye-opener for many of us. It is exhilarating to be part of a startup that aspires to prevent infectious diseases and is gearing up to prevent the spread of diseases in future pandemics. "



Sanjay Nagi, Project Director
Life Fellow, IIT Alumni Council

"Brew draws on the 100+ mentor team of the MegaLab initiative which has been drawn from among the 32,000+ members of the IIT Alumni Council. This pool represents among the world's best talent in foundational, frontier and exponential technologies - complemented by deep rooted competencies in venture capital, marketing and regulatory matters."



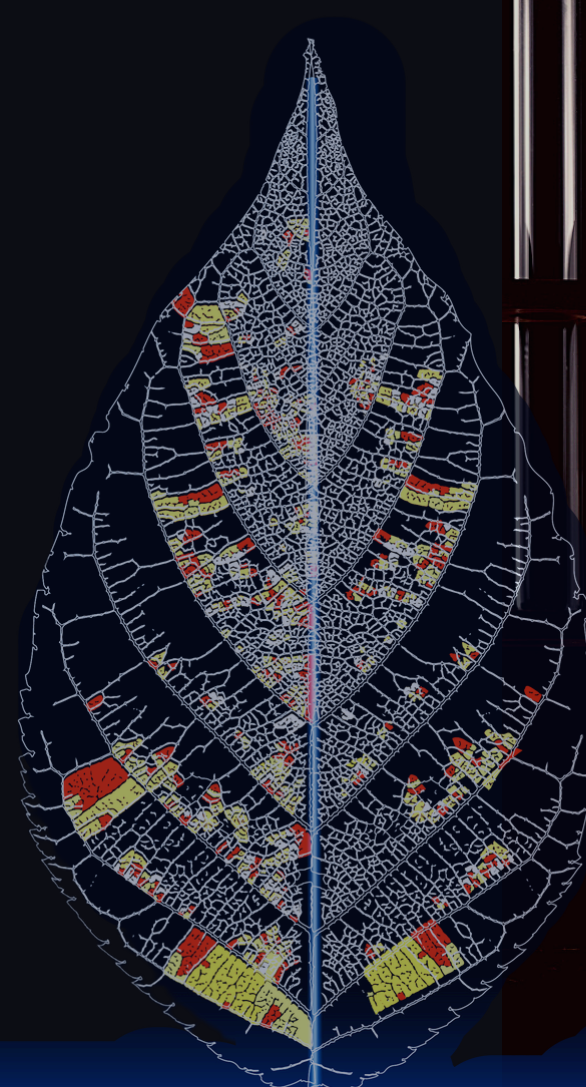
"A core team of over 500 volunteers from the IIT Alumni group, leading academicians, industry researchers, venture capital veterans, biotech experts, pharmacists, doctors, virologists..... from a wide variety of institutions ranging from the IITs to CSIR to ICMR to DRDO to UDCT and Mumbai University contributed in whatever way possible to make the MegaLab and Brew vision a reality."



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7.Funding

- Acquisition
- Glidepath
- Series A



Acquisition

MegaLab anchor acquired a majority controlling stake of 70% in July 2020 and pivoted the business model from bioengineered microbes.

MegaFund has committed to subscribe to 33% of all pre IPO rounds (with an upper bound of Rs 100 crores)



Glidepath

Brew is pursuing an asset light model which focuses on market needs rather than on core research. The glidepath involves setting up an in-house pilot facility and research centre with captive manufacturing units in the NCR area, contract manufacturing in the Bangalore/ Hyderabad belt, packaging units in the Baddi area and product development resources in the Mumbai Pune belt.



Governance

Brew is built around a promoterless paradigm with a three way separation of shareholders, board and management. The organisation is being structured to be professionally managed and board run without any identified promoter group. In keeping with the MegaFund term sheet, the company would be listed on a stock exchange on a pre revenue basis.



Venture Debt

Brew is currently raising a venture debt round of Rs 10 crores to meet working capital requirements for commercialisation of the Brew microbial conversion systems.



Series A

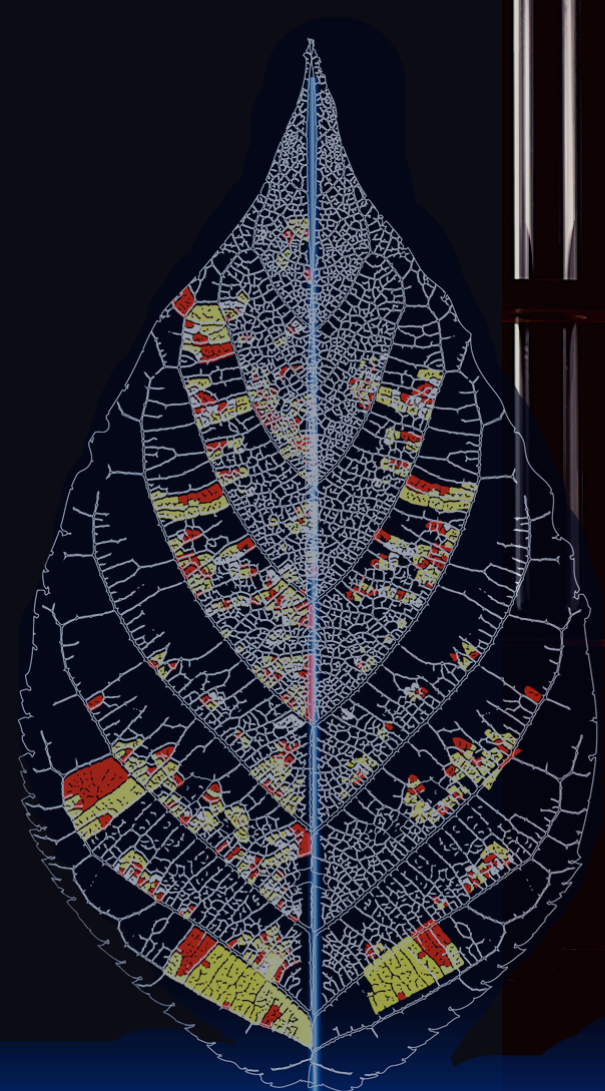
Brew is currently raising a pre-Series A round of Rs 30 crores, of which 33% has been pre-committed by the MegaFund. These funds will be used to launch Brew turnkey systems for biogas manufacturing plants.



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7. Contact Details

- Communications
- Location



Communications

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partnership@brewfactory.in

Telephone:

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www.brewfactory.in



Location

Brew is building a 25,000 sqft pilot plant and R&D centre at the outskirts of Delhi in a SEZ location with a drone port for direct connectivity to the airport.

R&D Centre building as on 30.9.20





Brew is closely aligned with the various climate change initiatives of the IIT Alumni Council. This includes the Go Mobility initiative for serial hybrid electric drivetrains based on methane.

Disclaimer:

This is not a prospectus for the purpose of raising equity funds. The objective of this document is to share a vision and plan with committed donors. This document is an internal document and is strictly confidential. This document is not meant to be shared with any external agency with or without a non-disclosure agreement.

The vision and mission of Brew is in various stages of deployment and we would not like any of our intent and activity to be construed as implemented. These are in the nature of intent and it is entirely possible that none of these plans would every be implemented or funded or executed. This document is not a prospectus.

Brew is structured as a commercial company with stated objectives of being listed on a stock exchange. However, this is not a conventional company as it targets impact over profit. It is unlikely that the company will make any profits in the medium term. The focus of the company is to help its shareholders and members to prevent infectious diseases. Whilst it is possible to monetise sickness, it is extremely difficult to monetise prevention.

Whilst Brew aspires to partner with disruptive startups and technologies at an early stage, it is highly unlikely that all or even most of the products taken to market will be profitable investments for the company. Any investments in Brew must thus be looked at highly risky investments with very high uncertainty of returns - either through dividends or through capital appreciation. They are thus only meant for highly qualified investors with the ability and appetite for the inherent risk in the same. Anyone accessing this document should not assume that a high risk business does not mean high reward.



Engineering microbes