JUNE 2025

GESH IITB

Advancing Industrial Decarbonization and the Green Economy

Through Academic R&D in Frontier Technologies

Presented by

Dr. Wazeem Nishad

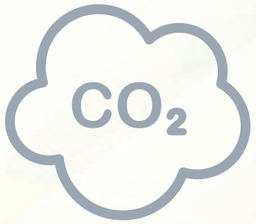
IIT Bombay Research Hub for Green Energy and Sustainability (GESH IITB)

Confederation of Indian Industry

GreenCo Rating System

Why There Is Need For Decarbonization?

Concentration of carbon dioxide in atmosphere??

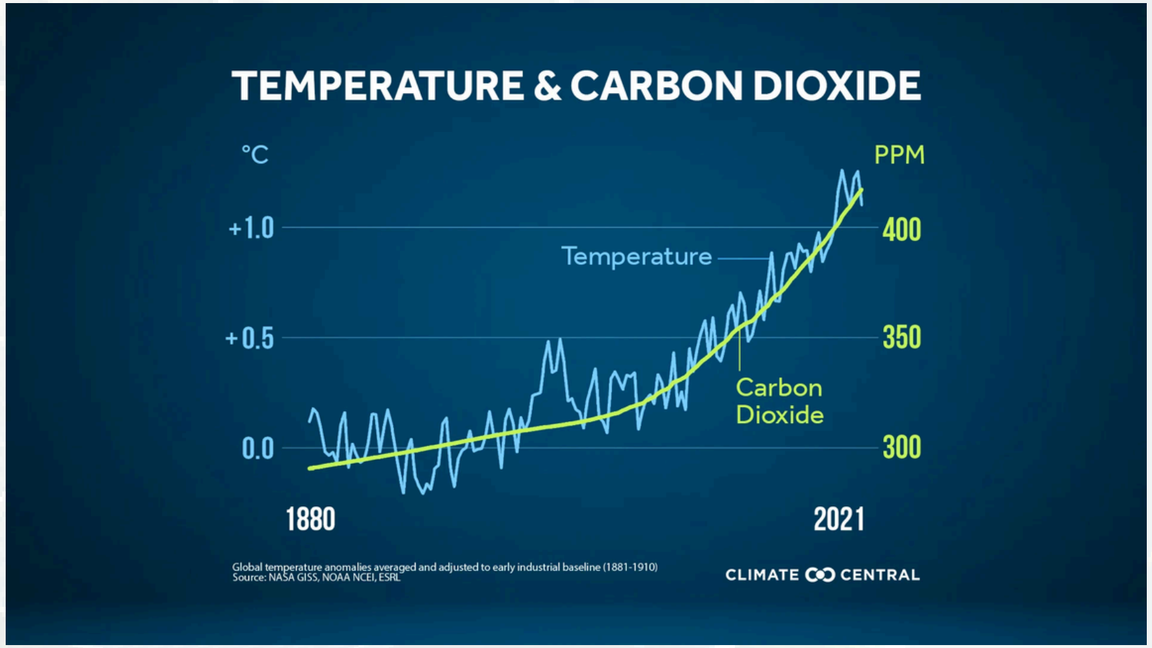


Jun. 11, 2025 **429.36 ppm**

Jun. 10, 2024 **427.59 ppm**

1 Year Change 1.77 ppm (0.41%)

co2.earth/daily-co2



December 2024

+1.55 °C

2nd Warmest December since 1880

2024 becomes warmest year on record, first to breach 1.5-degree Celsius guardrail

According to scientists at the Copernicus Climate Change Service (C3S), 2024 was the hottest year since global temperature tracking began in 1850.

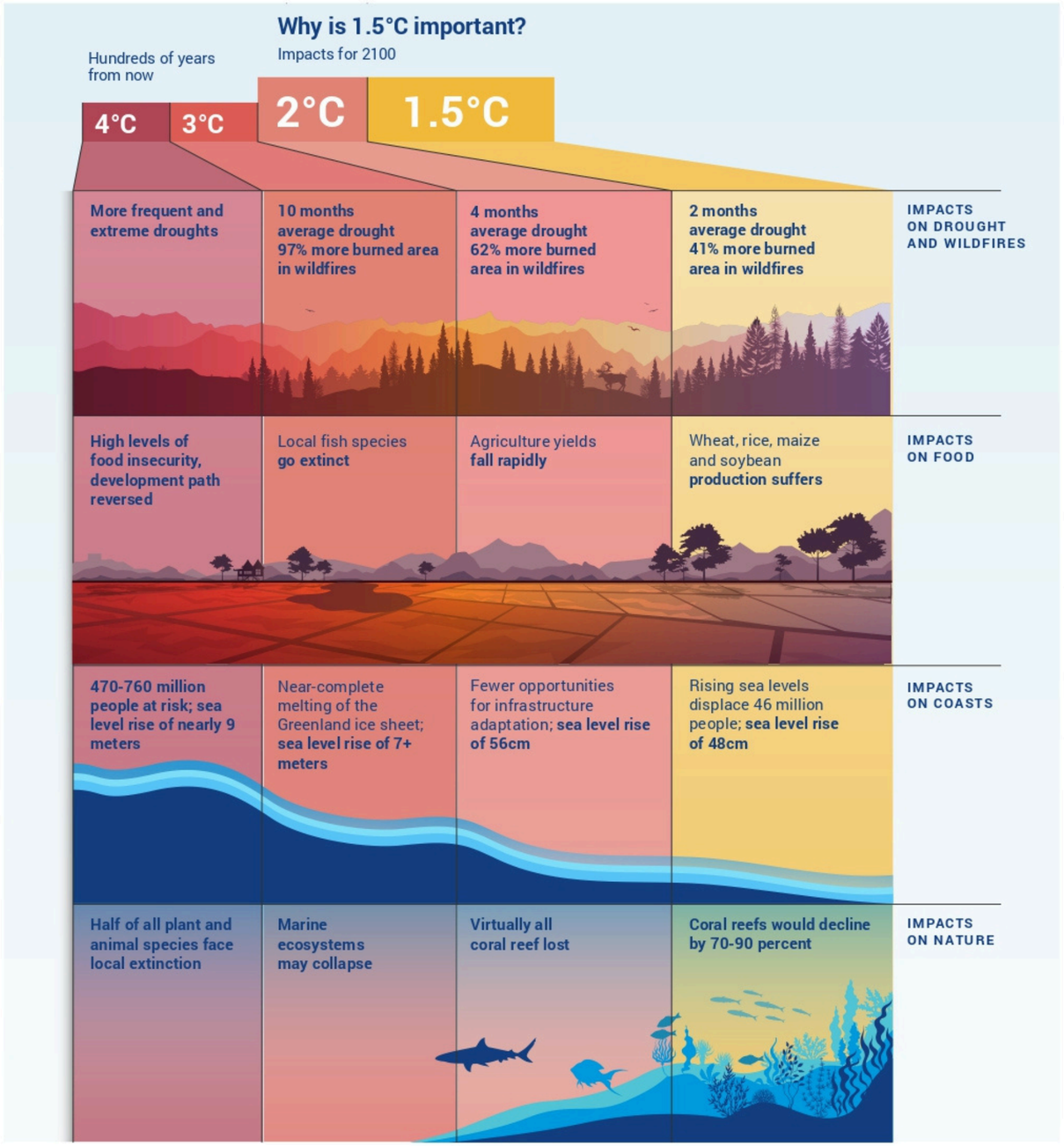
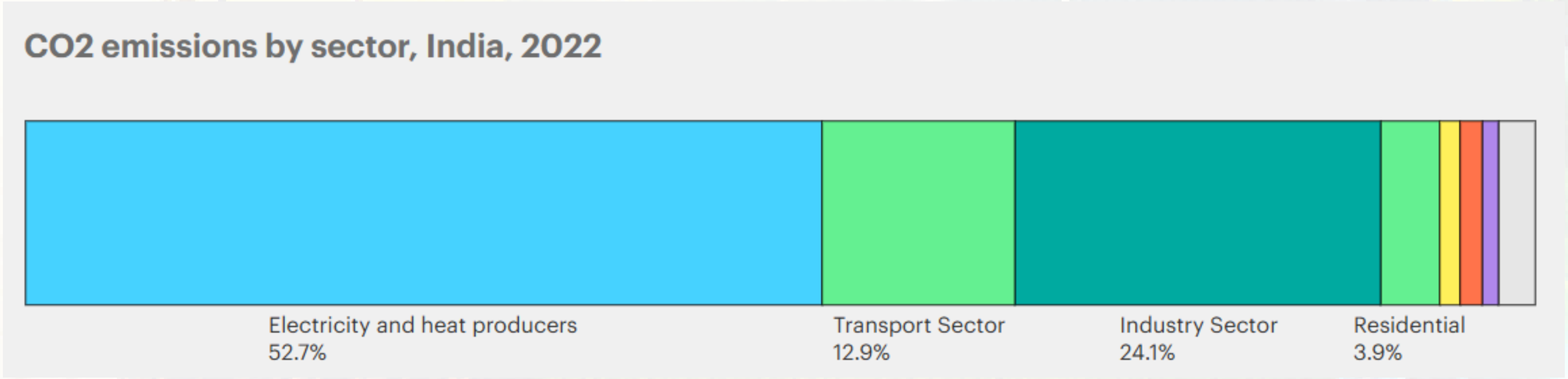


Figure 3. There would be a severe escalation of impacts if the world were to warm above 1.5°C.
Source: United Nations Environment Programme 2021b[8]

Industrial Emissions

- Industrial emissions contribute for ~30% of India's total CO2 emissions
- Major 'hard-to-abate' sectors include : Cement, Steel and Oil & Gas
- Emissions are projected to grow by ~80% by 2040 without intervention



IEA

Decarbonization Pillars

Digitalization
Smart Manufacturing, IOT, AI

Solar, Wind
Green Hydrogen
Bioenergy...

Energy Efficiency

Industrial Electrification

Low Carbon Fuels, Feedstocks, Energy Sources and Storage

CCUS

Li-ion, Na-ion, Zn-ion
Flow Batteries
Thermal Storage

Circular Economy

Policy and Management

Roadmap

Green Procurement

Financing

IITB

National Centre for Photovoltaic Research and Education (NCPRE) & POTIC

Technocraft Centre for Applied Artificial Intelligence (TCAAI)

Centre for Machine Intelligence and Data Science (CMInDS)

Centre of Excellence in Oil, Gas and Energy (CoE-OGE)

TIH Foundation for IoT & IoE

Centre of Excellence in Steel Technology

GESH IITB

Centre for Semiconductor Technologies

Ashank Desai Centre for Policy Studies (ADCPS)

National Centre of Excellence in Carbon Capture and Utilization (NCoE-CCU)

Industrial Energy Assessment Cell (IEAC)

EV Power Train Lab

Centre for Climate Studies

EV Power Train Lab

Advanced Batteries and Ceramics Lab

Hydrogen Storage and Applications Lab

National Centre of Excellence in CCU

सत्यमेव जयते
Department of Science and Technology
Ministry of Science and Technology
Government of India

NCoE-CCUS

URJANOVAC
Clean Energy & Net Zero Solutions

XPRIZE CARBON REMOVAL | MUSK FOUNDATION

- Nanofluid amine based solutions
- Modified membrane based CO_2 separation
- Aqueous solution-based CO_2 capture

- CO_2 valorization
- Methanol production
- High value organics
- CO/CH_4 generation

- Country-wide capacity assessment
- Source-sink matching
- Enhanced oil recovery
- Enhanced CBM recovery

- CO_2 transportation
- Life-cycle analysis
- Bioenergy based CCS
- Techno-economic analysis
- Environmental Assessment

Carbon Capture

CO_2 utilization

CO_2 sequestration

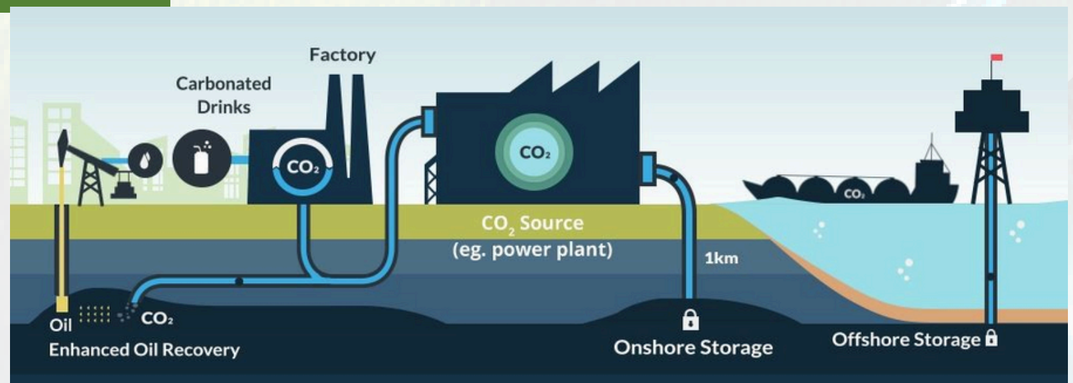
Cross-cutting systems

XCarb™

Indian Patent No : 538214
Arnab Dutta and Vikram Vishal

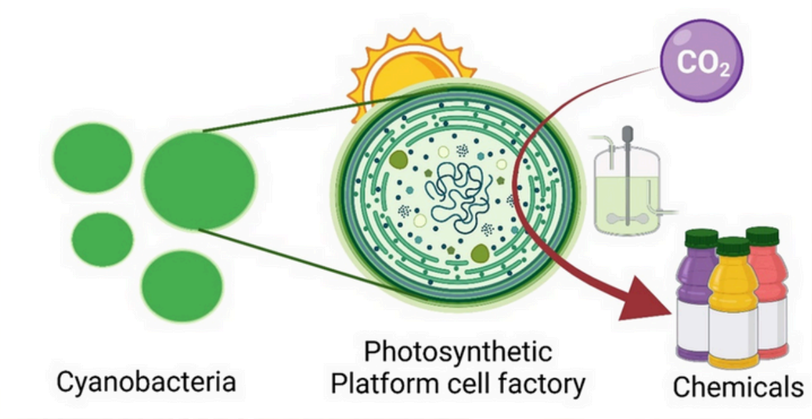
OPENAIR

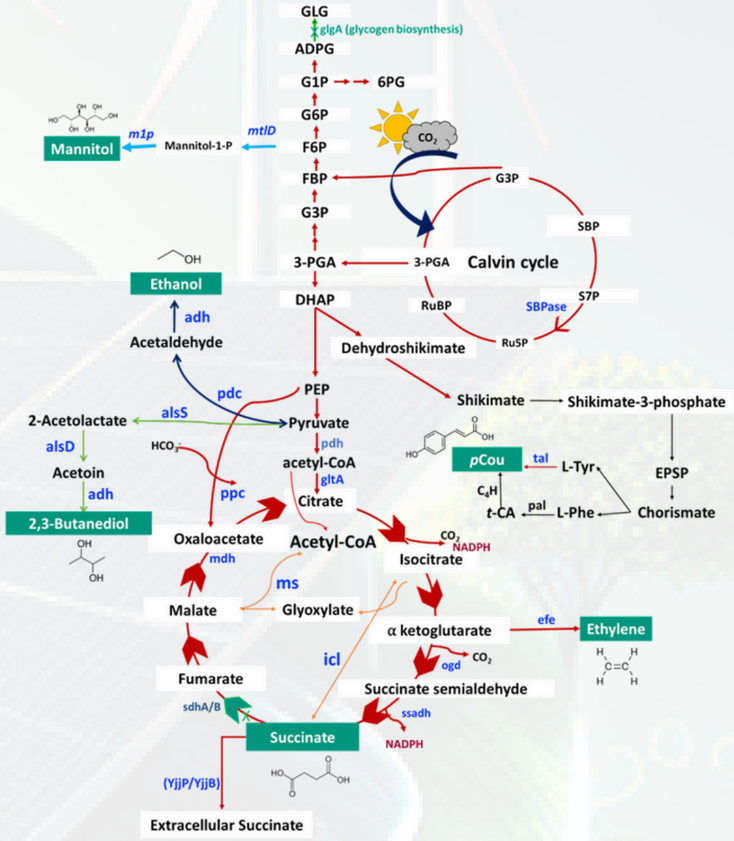
Indian Patent No. 435947
Arnab Dutta, Vikram Vishal et al.



National Peroxide Limited
ONGC
NTPC
SAIL
slb
SYRMA SGS
Geological Survey of India
Dalmia Bharat Cement
Coal India
TATA
TATA CONSULTING ENGINEERS LIMITED
TATA STEEL
HIRA
GODAWARI POWER & ISPAT
AM/NS INDIA
HSBC
HALLIBURTON
Oil India Limited
Baker Hughes
WACKER
JINDAL STEEL & POWER

Engineered cyanobacteria for sustainable biomanufacturing and carbon capture

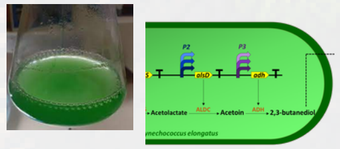




- Photosynthetic cell factories that can enable sustainable production of chemicals and biofuels from CO2
- **Fast-growing and environmentally robust *Synechococcus elongatus* strains from Powai lake**
- **Promising leads for tech translation and scaleup**

Translation to TRL: 7 (Demonstration in photobioreactor)

Current TRL: 3/4 (Lab scale validated PoC process)



Strain engineering and process optimization to further increase product yield

Potential collaboration/Industry support (Reliance, TATA Power, Praj Industries) for scaleup

पेट्रोलियम एवं
प्राकृतिक गैस मंत्रालय
MINISTRY OF
PETROLEUM AND
NATURAL GAS
सत्यमेव जयते

Centre of Excellence in Oil, Gas & Energy (CoEOGE)

IIT Bombay

Initiated by MoPNG

Bimodular CCUS technology based on bio-inspired catalysts (Collaborators: ONGC, BPCL, IOCL, HPCL, EIL)

Objectives:

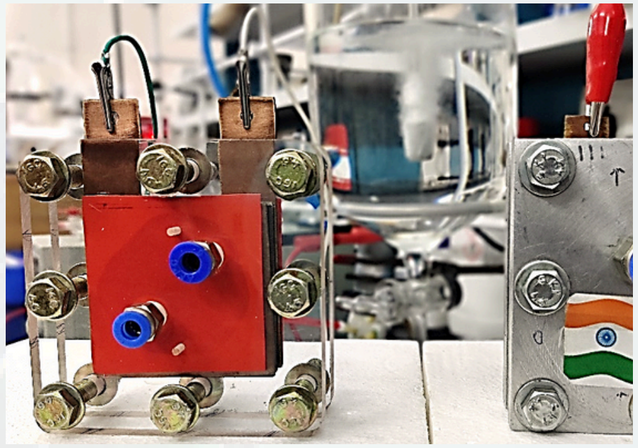
- Develop and fine-tune low-cost and efficient bio-inspired catalysts for CO_2 capture and Utilization (CCUS)

Outcome:

- Fine-tuned a bio-inspired catalyst for CO_2 capture from refinery flue gas and demonstrated in a 1 kg CO_2/hr lab-scale unit.
- Developed an energy-efficient, bio-inspired catalyst for the CO_2/CO converter
- Demonstrated a 1 kg CO_2 to CO/hour converter

Commercial relevance and implementation status:

- The developed process can be applied for the removal of CO_2 from Coal Bed Methane (CBM) and utilizing the CO_2 for the synthesis of $CaCO_3$. $CaCO_3$ can be sold to cement manufacturers and other commercial purposes for an additional revenue stream.



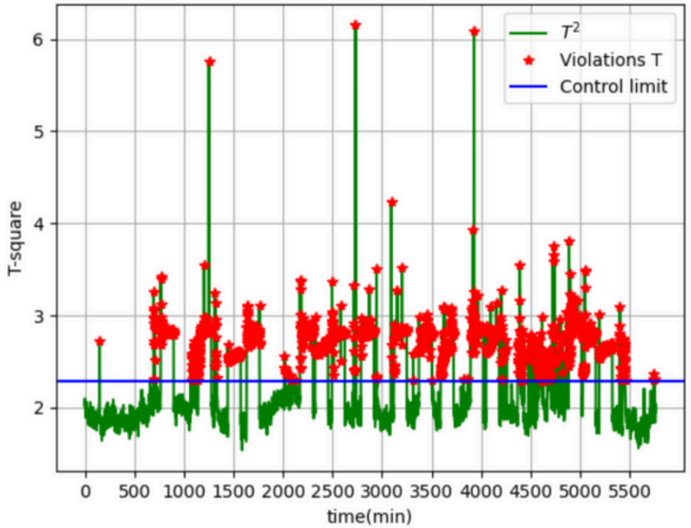
Anomaly Detection and Root Cause Identification in Refineries (Collaborator: HPCL)

Objectives:

- To enhance root cause detection in a refinery using operational data in real time

Outcome:

- An advanced software product developed and tested in collaboration with **HPCL**, Mumbai refinery - Real-time using DCS data



Commercial relevance and implementation status:

- This technology helps achieve operational excellence in refineries through early detection of faults the root cause.
- Improves system reliability, prevents failures, and enables optimal operations, thereby improving process efficiency

Digitalization

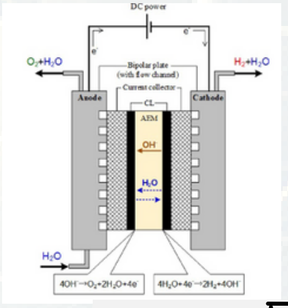
- Early prediction of flare events and prognosis of possible sources
- Toolchain for oil and gas leakage through drones
- Software tool development for pinch analysis based targeting for oil and gas industry

Solar Photovoltaics

Areas

- Si and Perovskite solar cells and materials
- Power electronics for grid integration
- Photovoltaic deployment and reliability

Green Hydrogen



Indigenous development of
end-to-end solution for water Electrolyser in India

Development of AEM water electrolyser

- Catalyst design & development
- Anion exchange membrane
- Scale-up of AEM stack
- Balance of plant

Accelerated Testing and development Routines

Production, Utilization & Storage

Biomass to Hydrogen

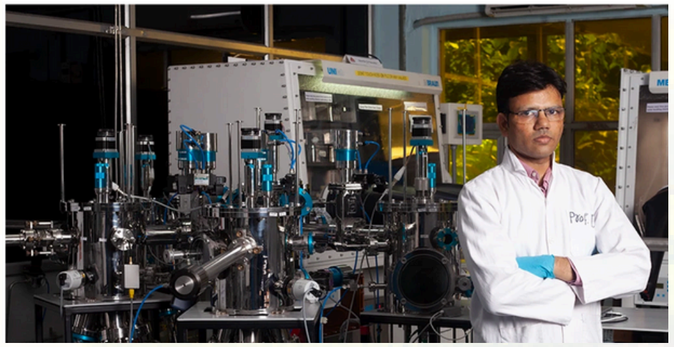
4T- Silicon-Perovskite Tandem Solar Cell

Nature team profile coverage

Unconventional materials that do more with light

Dinesh Kabra is working with the next generation of optoelectronic materials for solar cells and display technologies.

James Mitchell Crow



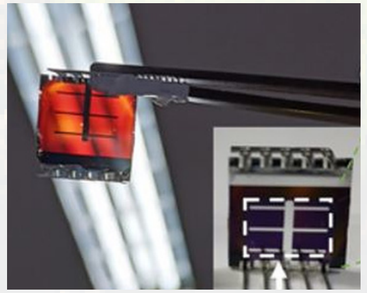
New solar cell tech by IIT Bombay to sharply cut costs, enhance efficiency

The Maharashtra government and ART-PV India Pvt Ltd, a start-up founded at IIT Bombay are working to provide a complete commercial wafer size solution for this technology by December 2027

Vertically stacked RGB Tandem OLEDs: Lighting
High resolution Displays

Silicon/perovskite Tandem Solar Cell: PCE> 30%
Efficiency gain per unit area!

PV Global magazine Coverage!
May 2023



Public Funds:
IOE, MoE-India
DST-India
MNRE-India
MEITY-India

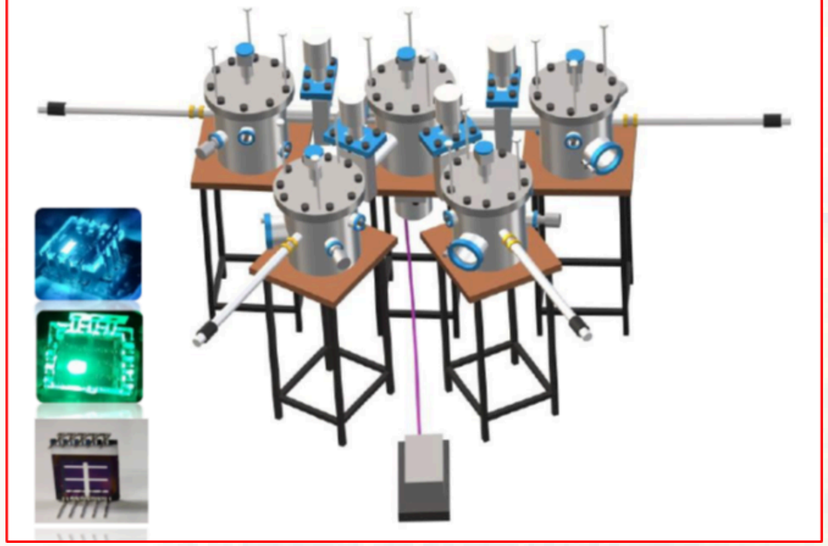
Technology Transfer and licensing of IPs

Optoelectronic device fabrication tool

Excel Instruments
Design to Excel

SubSem+

Sublimation system for semiconductors plus metal/inorganic evaporator

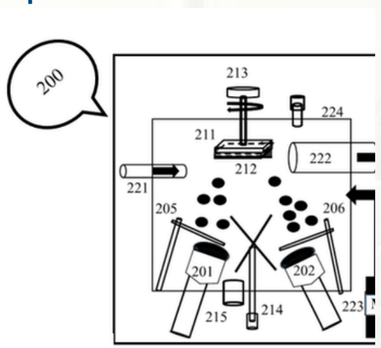


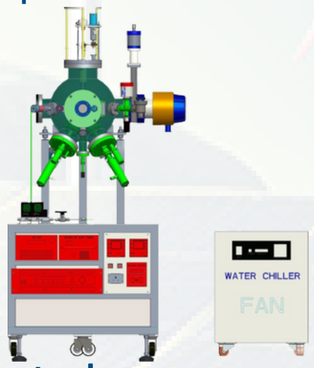
Patent granted

Patents filed
Countries includes: India, US, China, Japan, Taiwan, South Korea, Europe

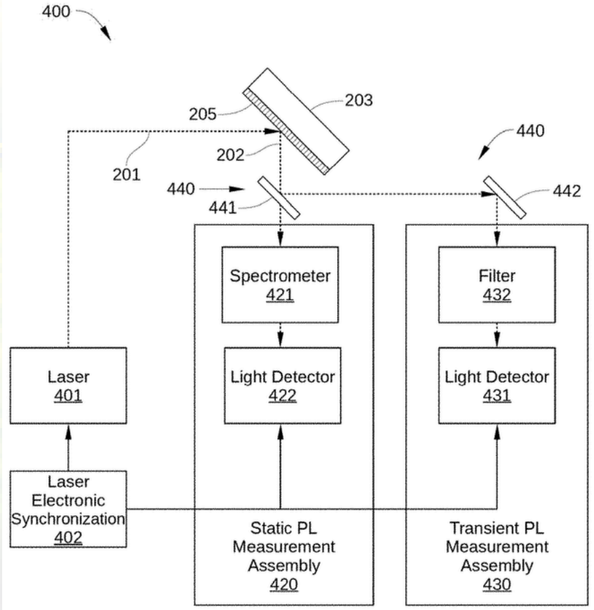
TCE on soft materials fabrication tool

Optoelectronics and bio-photonics





OLED manufacturing meteorology tool



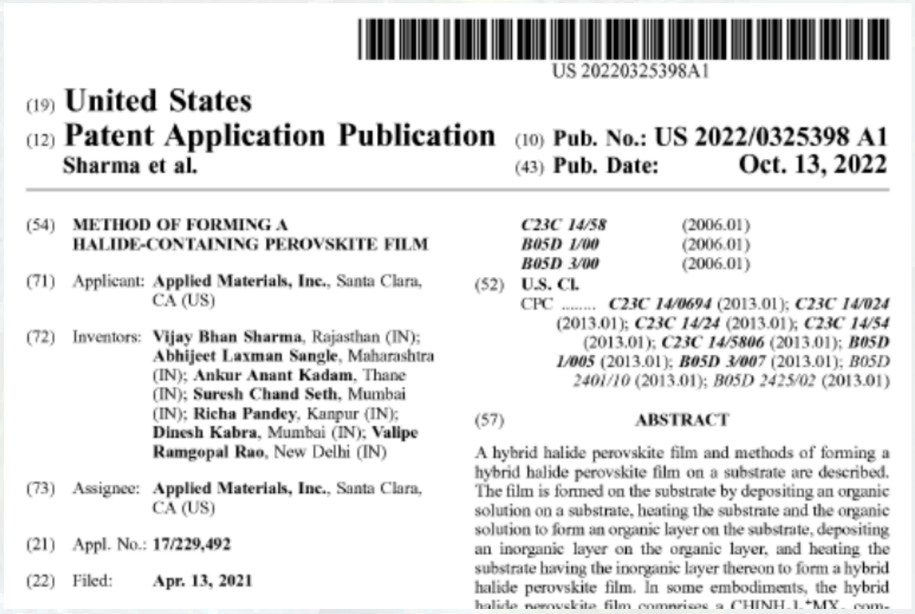
Applied Materials Inc., USA

FIG. 4

Research Highlights

Nature – where I work
IOP – Physics world
AIP- SCIlight x 2
Global PV Magazine

Method of forming perovskite film via vacuum approach



US 20220325398A1

(19) **United States**
(12) **Patent Application Publication**
Sharma et al.

(10) **Pub. No.: US 2022/0325398 A1**
(43) **Pub. Date: Oct. 13, 2022**

(54) **METHOD OF FORMING A HALIDE-CONTAINING PEROVSKITE FILM**

(71) Applicant: **Applied Materials, Inc.**, Santa Clara, CA (US)

(72) Inventors: **Vijay Bhan Sharma**, Rajasthan (IN); **Abhijeet Laxman Sangle**, Maharashtra (IN); **Ankur Anant Kadam**, Thane (IN); **Suresh Chand Seth**, Mumbai (IN); **Richa Pandey**, Kanpur (IN); **Dinesh Kabra**, Mumbai (IN); **Valipe Ramgopal Rao**, New Delhi (IN)

(73) Assignee: **Applied Materials, Inc.**, Santa Clara, CA (US)

(21) Appl. No.: **17/229,492**

(22) Filed: **Apr. 13, 2021**

C23C 14/58 (2006.01)
B05D 1/00 (2006.01)
B05D 3/00 (2006.01)

(52) **U.S. Cl.**
CPC ***C23C 14/0694*** (2013.01); ***C23C 14/024*** (2013.01); ***C23C 14/24*** (2013.01); ***C23C 14/54*** (2013.01); ***C23C 14/5806*** (2013.01); ***B05D 1/005*** (2013.01); ***B05D 3/007*** (2013.01); *B05D 2401/10* (2013.01); *B05D 2425/02* (2013.01)

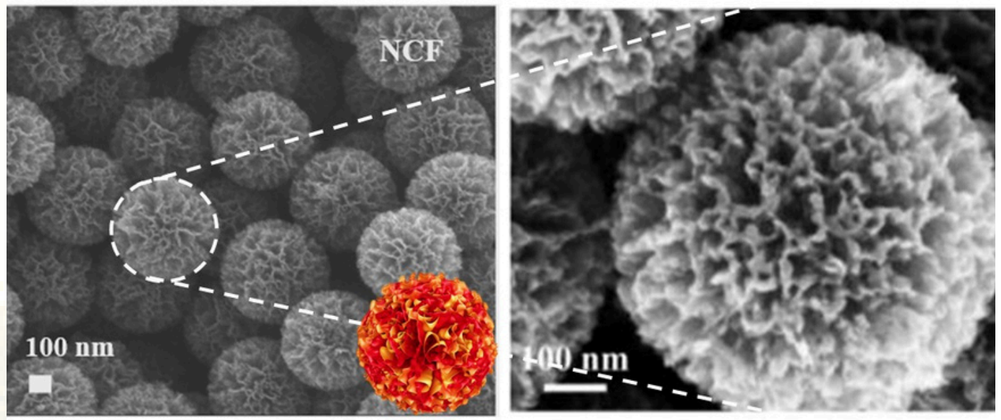
(57) **ABSTRACT**

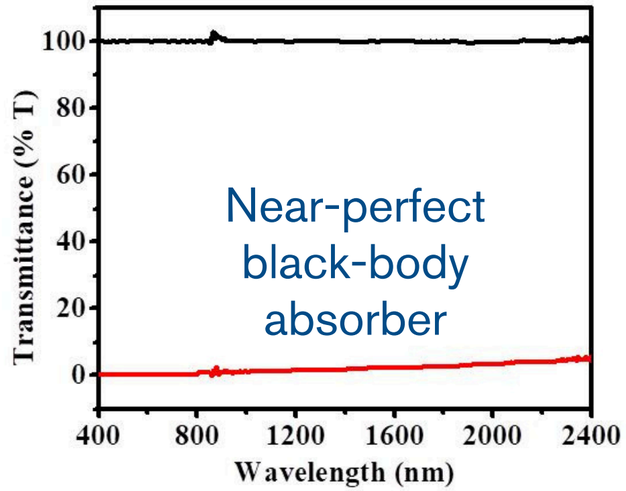
A hybrid halide perovskite film and methods of forming a hybrid halide perovskite film on a substrate are described. The film is formed on the substrate by depositing an organic solution on a substrate, heating the substrate and the organic solution to form an organic layer on the substrate, depositing an inorganic layer on the organic layer, and heating the substrate having the inorganic layer thereon to form a hybrid halide perovskite film. In some embodiments, the hybrid halide perovskite film comprises a CH[NH2]2MX3 com-

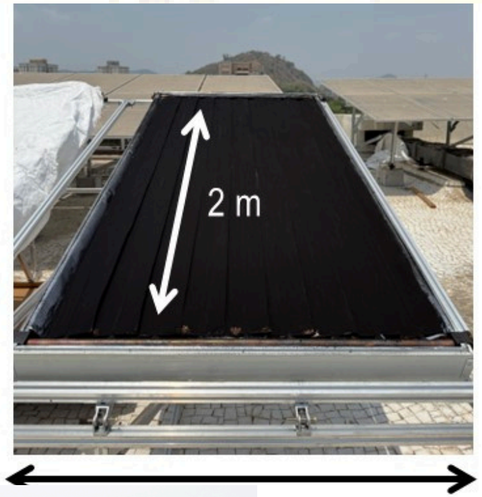
Applied Materials Inc., USA

Solar Thermal

Material :
Porous hard-carbons (NCFs)







- 22 lit/m² of clean water output in a day (3 x of conventional solar-stills)
- Inlet : 5000 – 7500 ppm TDS
- Output TDS < 10 ppm
- Single step comprehensive purification
- 150 lit/day capacity pilot plant in a govt school through Arid Communities & Technologies.

Tiny carbon 'flowers' turn light to heat at unrivalled efficiency, IIT team finds Premium

Carbon nanoflorets made by IIT Bombay researchers can convert incident sunlight to heat with 87% efficiency.

Published – October 30, 2023 10:30 am IST – Sri City

ncf Labs

Solar-water purification

Space heating for Indian army

Decarbonising Rural Industries:
Solar Hydrodistillation (SHD) for Rosewater Production

Characteristic	Value
Production Ratio	1 kg petals to 3 liters
Daily Production	4-5 liters
Revenue	INR 50–60 per 100 ml
Monthly Profit	INR 2,000–12,000
Payback Period	Approximately one year
Impact	Scalable economic opportunity

Technology developed and disseminated by:

Centre for Technology Alternatives for Rural Areas (C-TARA)
Indian Institute of Technology Bombay, Mumbai, India

EV Powertrain Lab: Objectives & Deliverables

C1973 EV LAB
IIT Bombay

Vision: Excellence as **R&D lab** for **EV** Technology, **L&D hub** for **E-mobility** Talent, **Centre** for **Innovation**

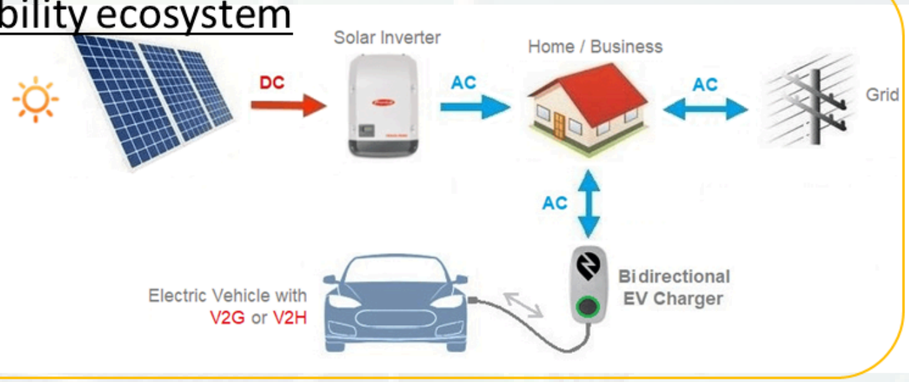
Aim: Indigenous & robust **products** for EV powertrain and world-class **talent** for E-mobility ecosystem

Goals: EV powertrain products for e2w/e3w/e4w

- **G Genteel:** good QRD (**Q**uality, **R**eliability, **D**urability)
- **O Optimal:** hi power:weight ratio, versatile, compact
- **A Affordable:** frugal, cost-effective, value-for-money
- **L Local:** indigenous, scalable, import-free
- **S Sustainable:** lean-green, energy-efficient

Innovation in E-mobility ecosystem

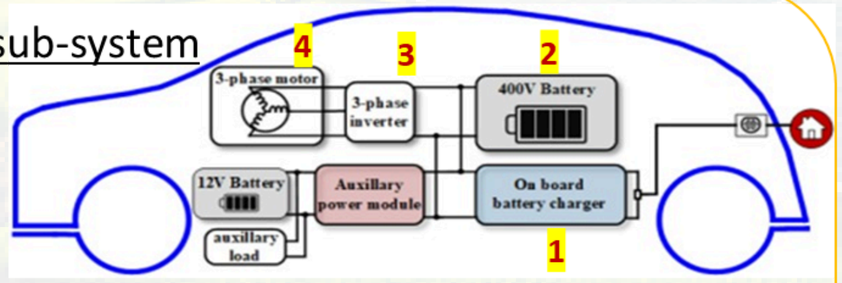
Energy devices:
- Generation
- Storage
- Conversion
- Distribution

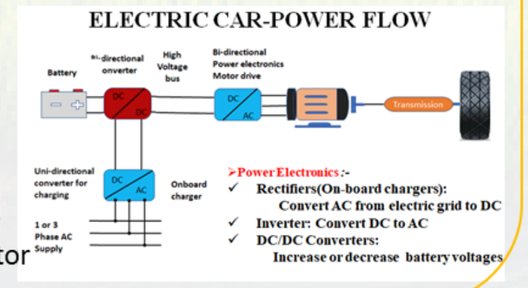


R&D in EV powertrain sub-system

1) Charger: OBC, V2G
2) Battery: BMS, Na-ion
3) Inverter: WBG, SiC/GaN
4) Motor: BLDC, PMSM

\+ Ancillaries: VMU





1) On-Board Charger, Vehicle-to-Grid charging
2) Battery Mgmt. System, (Na) Sodium ion battery
3) Wide Band Gap devices, Silicon-Carbide/Gallium-Nitride
4) Brush-Less Direct Current, Permanent Magnet Sync. Motor

\+ Vehicle Monitoring Unit

L&D and HR (Human Resource) talent nurturing

E D U

- Instructor-led webinar series – *Evolution*: E-mobility/EV themes
- Short-term courses - *EVolve*: Tutor-led online technical training
- MOOC eLearning – *EVoke*: Topic-specific recorded class via LMS
- ePost-Graduate Diploma Program (ePGD*): *E-Mobility* (1.5 yrs)
- Masters of Engineering (M.Engg): Approved by IITB; 2 years PG
- Technical Workshop / Seminar / Webinar – *EV* Tech-Day ’24-‘25
- Corporate L&D: Customised training for R&D and Sr. Mgmt.
- Student internships, PhD and M.Tech fellowships

EV Powertrain Lab: Associations & Achievements

C1973 EV LAB
IIT Bombay

अनुसंधान नेशनल रिसर्च फाउंडेशन
Anusandhan National Research Foundation

E-RIDES *Empowering Research in Indigenous Development of EV Sub-systems*

Government: Govt of India (**ANRF** – MAHA EV: *E-RIDES*), **DST** (Sustenance project): **Product** innovation, **Patent**

Industry*: **I**ndustry-**A**cademia **P**artnership **P**rogram, **TRL** L.4/5/6 & Technology-Transfer **project**, Lab service

Agency: **GESH, SINE, ASPIRE, ACR, EO** - **Training** course, **Incubation** aid, **CSR** initiative, **L&D** program, **Talent**

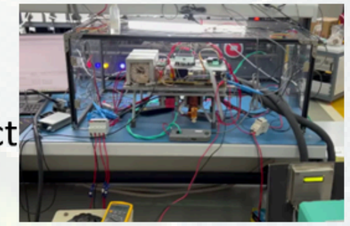
ANRF: Anusandhan National Research Foundation (Rs.65cr, '25-'28), MAHA: Mission for Advancement in High-impact Areas @ Power Electronics, Machines, Drives
IITB bodies: Green Energy Sustainability Hub, Society for Innovation & Entrepreneurship, Research Park, SemiX, Alumni & Corporate Relation, Educational Outreach

Technology projects in E-mobility: success showcase

EV powertrain functional areas:

R & D

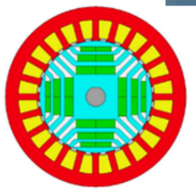
Charger: *Cummins* – high efficiency & temp range, compact



Battery: Na-ion perfo. model dvpt., optimal charging, capacity-fed mechanism

Inverter: *Kinetic* - Si MOSFET motor-controller, frugal, compact

Motor: Ferrite based IPM synchro reluctance motor



Idea > Concept > Design > Simulation > Proto > Validation >> PRODUCT

Facilities: instrument, machine, measuring device

E V Lab

- Active Dynamometers, 50kW
- Tesla / Gauss Meter
- High end Oscilloscopes (1GHz)
- High power DC source
- High response Thermal imager
- Wire-cut EDM & CNC milling M/c
- Temperature chamber
- Battery cycler
- Potentiostat
- Motor design & CAD-CAE s/w

***Industry:** I-APP partnership, R&D project alliance

1) John Deere
2) Hella Forvia
3) Dana
4) Matter Motor
5) Hioki
6) Nayak Power
7) Techtronix
8) TapFin

I-APP Partners: John Deere, Matter, TAPFIN
CSR Partners: DANA, FORVIA HELLA
Sponsor Partners: SAN Instruments Tektronix, Nayak Engineering Power, HIOKI

Battery Research

Advanced Li-ion & Li-metal (regular, solid-state, printed) battery

Lithium-Sulphur & Sodium-Sulphur battery

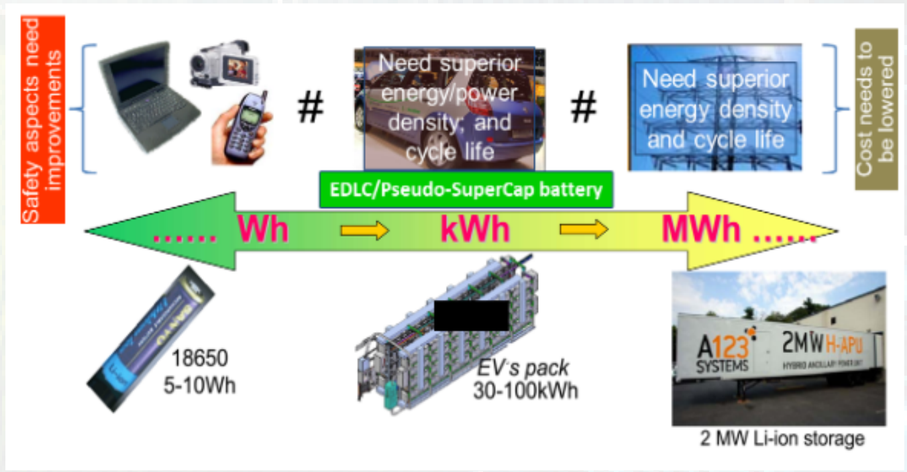
Potassium-ion & multi-valent battery chemistries

Sodium-ion battery, including solid-state, battery

Metal-air & Redox flow battery

Areas

- Concepts
- Chemistry
- Electrode
- Cell
- Prototype
- Diagnostics/Predictions
- Recycling



High-performance and air/water-stable cathode materials for high energy density and low-cost Na-ion batteries

Development of high capacity, stable and highly rate-capable Na-ion battery cathode.

Trials underway for technology translation to Indi Energy

INDI ENERGY
Empowering Energy Independence

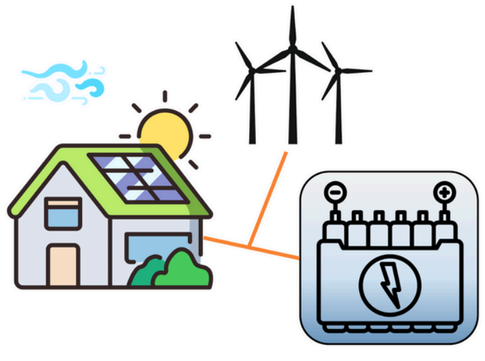
[**Patent granted**; Indian Patent No.: 406595, dated: 14/09/2022]

Development of Na-ion battery cathode via health/environment friendly and cost-effective ‘aqueous processing'.

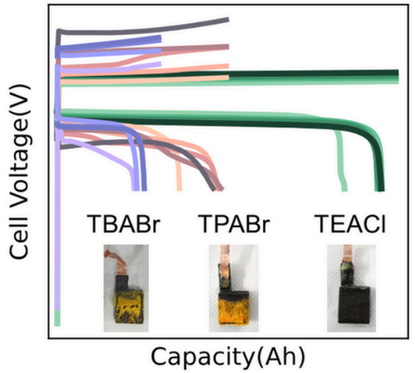
Scalable Sn-based high-performance and safe anode materials for high volumetric energy density Na-ion batteries

Trials underway for technology translation to KPIT (now, Trentar Energy Solutions)

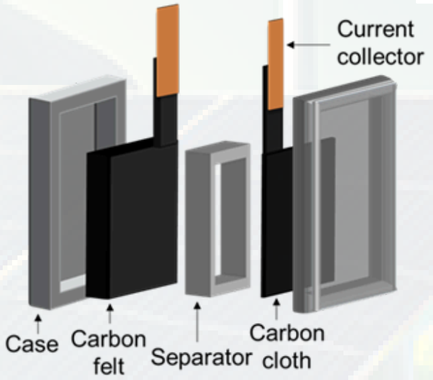
Zn Batteries for Stationary Storage

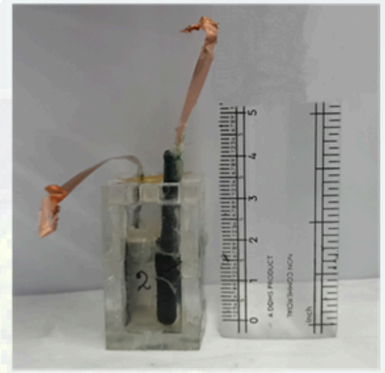


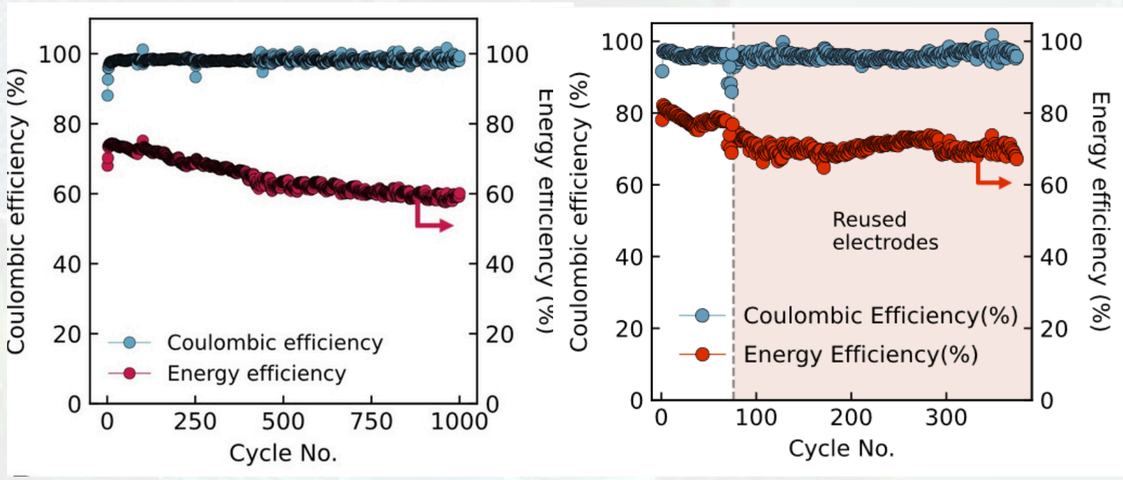
- ✓ ***Low-cost ZBB for Grid Storage***
- ✓ ***High Energy Density (154 Wh/kg)***
- ✓ ***Low overpotential***
- ✓ ***Stackable design***
- ✓ ***Refurbishable Components***



Through a solubility product based screening methodology, we report an energy-dense, non-flow Zn-Br_2 battery (154 Wh/kg) for low-cost grid scale energy storage.







Mollick, Mandal, Srinivasan J. Electrochem. Soc. **2025**, 172 010503; Indian Patent #560510, Granted, **2025**: *Currently being translated by Industry Partner (up to 30 Ah)*

Circular Economy @ IITB Diverse sectors and Multiple Approaches

Process/Technology Development

Circular bio-economy

- Recovery of value added chemicals from fruit processing waste
- Garden waste to produce fuels for domestic cooking
- Biomass gasification for production of hydrogen and methane as fuels

Plastics and polymers

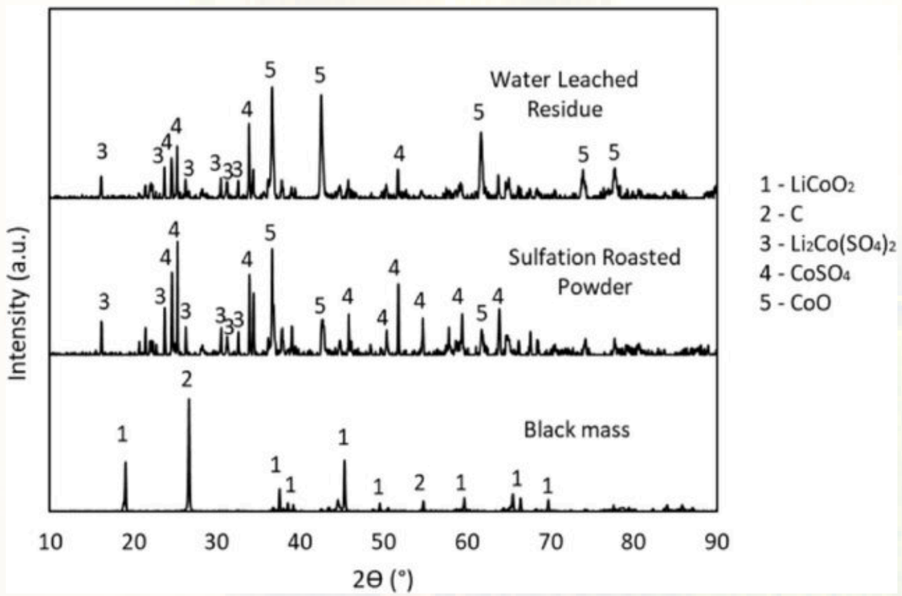
- Thermo-chemical recycling of waste plastics for fuels
- Design of bio-composites for sustainable and circular materials
- Development of biodegradable and reusable polymers

Industrial wastes

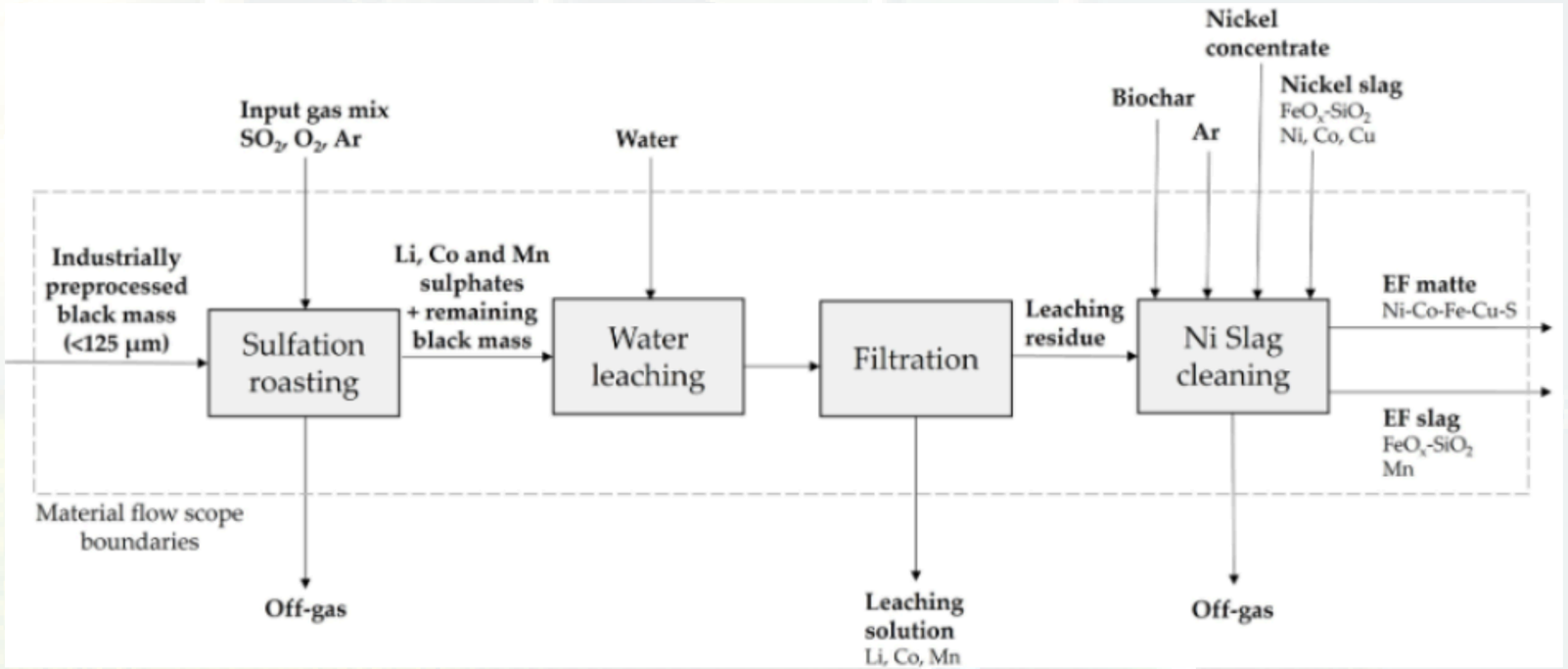
- Sustainable handling of tyre waste
- CO2 capture and conversion to fuels and chemicals
- Construction and foundry waste recovery and management
- Recovery chemicals from waste water
- e-waste

Critical Materials Recovery

Roasting-Water Leaching-Slag Cleaning Process for Recovery of Valuable Metals from Li-ion Battery Scrap

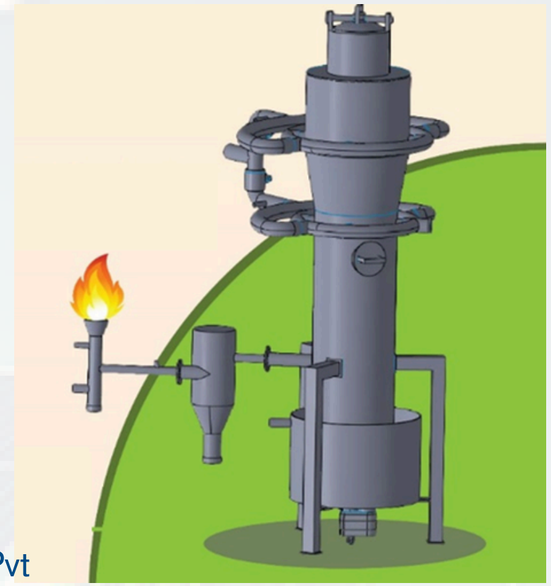


XRD patterns of black mass, sulfation roasted powder, and leach residue after water leaching



General Process

Waste Biomass-Plastic Gasification and Combustion based systems for Thermal Applications and Waste Management



- Gasifier – Designed to operate with
  - Feed upto 20% ash
  - Co-gasification with Plastic/Paper/Cloth mix upto 20%
  - Menstrual Waste upto 4% as co-feed
- Efficient burner for low CV fuel
  - Low emission
  - High temperature
  - High efficiency
  - Flameless burner with ultra low emission

Potential areas (any thermal process requiring heat upto 1000 deg C)

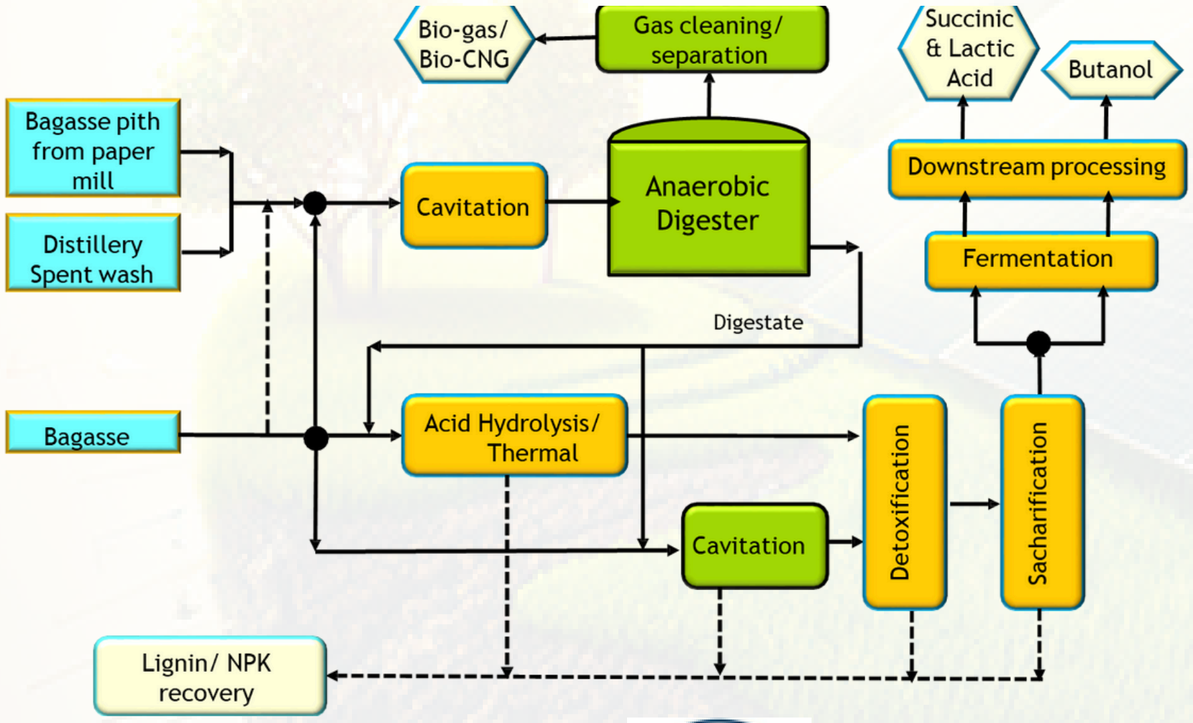
- Steam Boiler
- Aluminium Melting
- Powder Coating
- Community Cooking/Kitchen
- Drying/Baking/Process heat

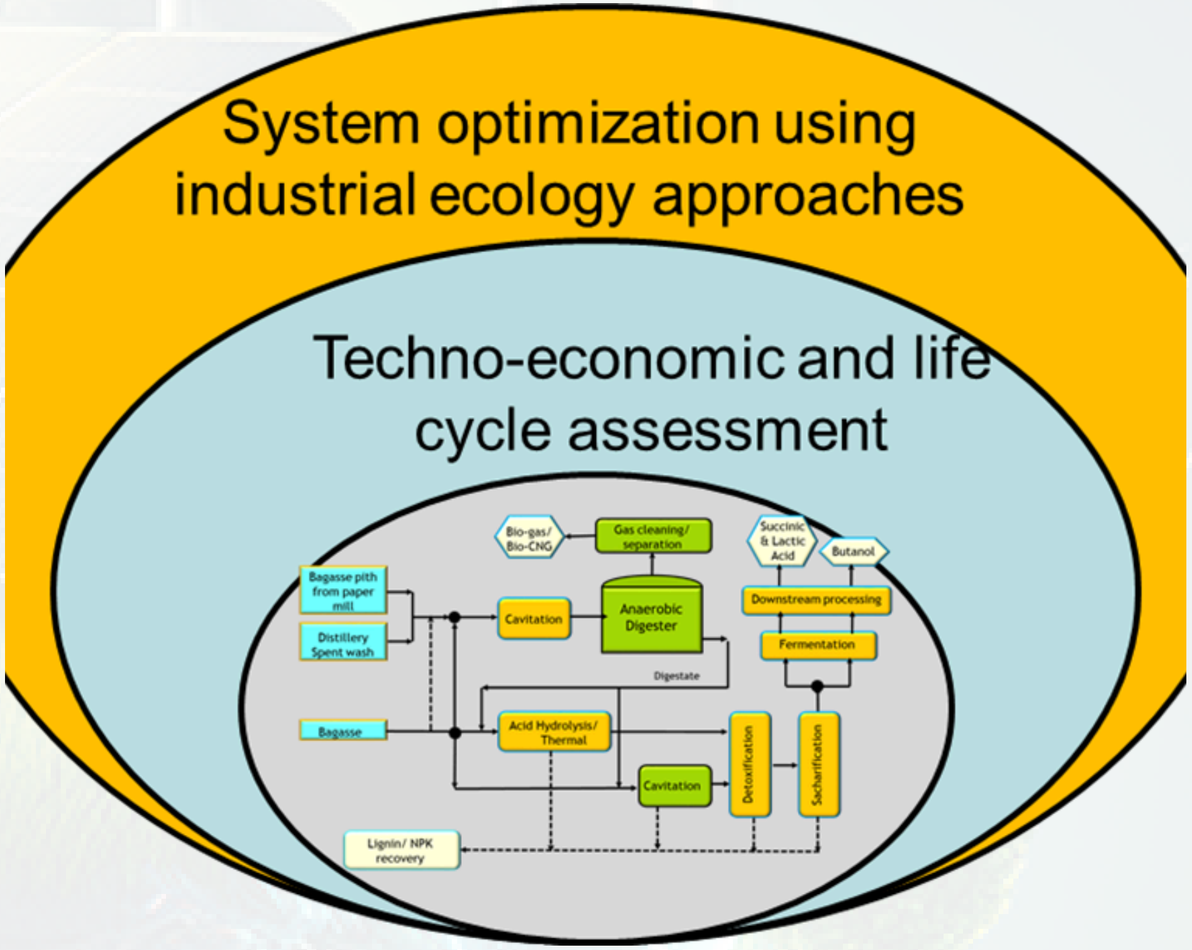
Sand drying/Sand Reclamation for casting industry - Deccan Crest Pvt Ltd. Kolhapur

IITB Living Lab

Waste Biomass-Plastic & Waste Heat based Gasification system for H_2 production

Integrated sugar industry complex for waste valorization: Decarbonization and Circular Economy Adoption





Inventory and Low Carbon Pathway

ELSEVIER

Energy

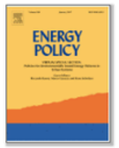
Volume 195, 15 March 2020, 116949

A framework for analyzing trade-offs in cost and emissions in power sector

ELSEVIER

Energy Policy

Volume 100, January 2017, Pages 41-50



Low-carbon growth for Indian iron and steel sector: exploring the role of voluntary environmental compliance

Springer Link

Research Article | Published: 06 November 2021

Emission inventory for road transport in India in 2020: framework and post facto policy impact assessment

Research Article

Temperature change and mitigation potent of Indian cement industry

Transportation Research Record: Journal of the Transportation Research Board

NATIONAL ACADEMIES

TRANSPORTATION RESEARCH BOARD

Impact Factor: 2.019

5-Year Impact Factor: 2.005

Available access | Research article | First published online September 15, 2021

Analysis of Retrofit and Scrappage Policies for the Indian Road Transport Sector in 2030

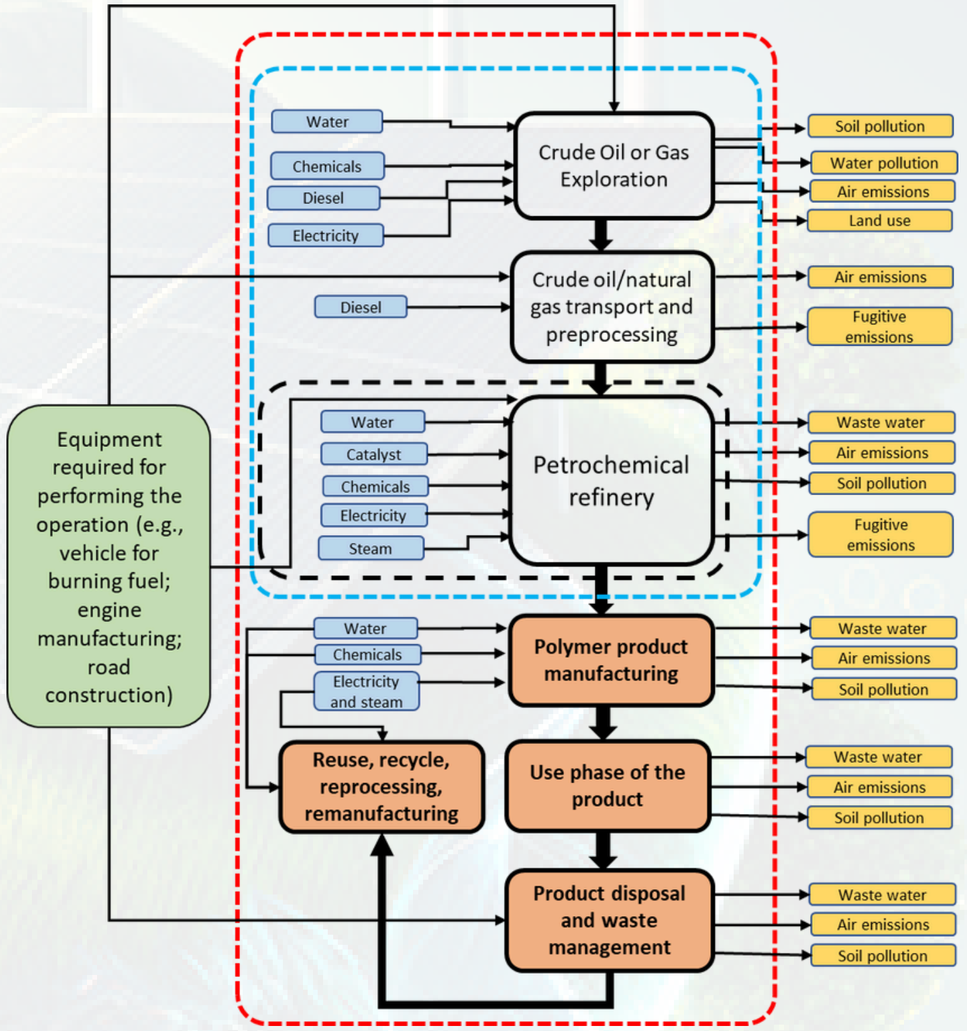
Detailed life-cycle assessment of GAIL gas processing facility in Pata (Collaborator: GAIL)

Objectives:

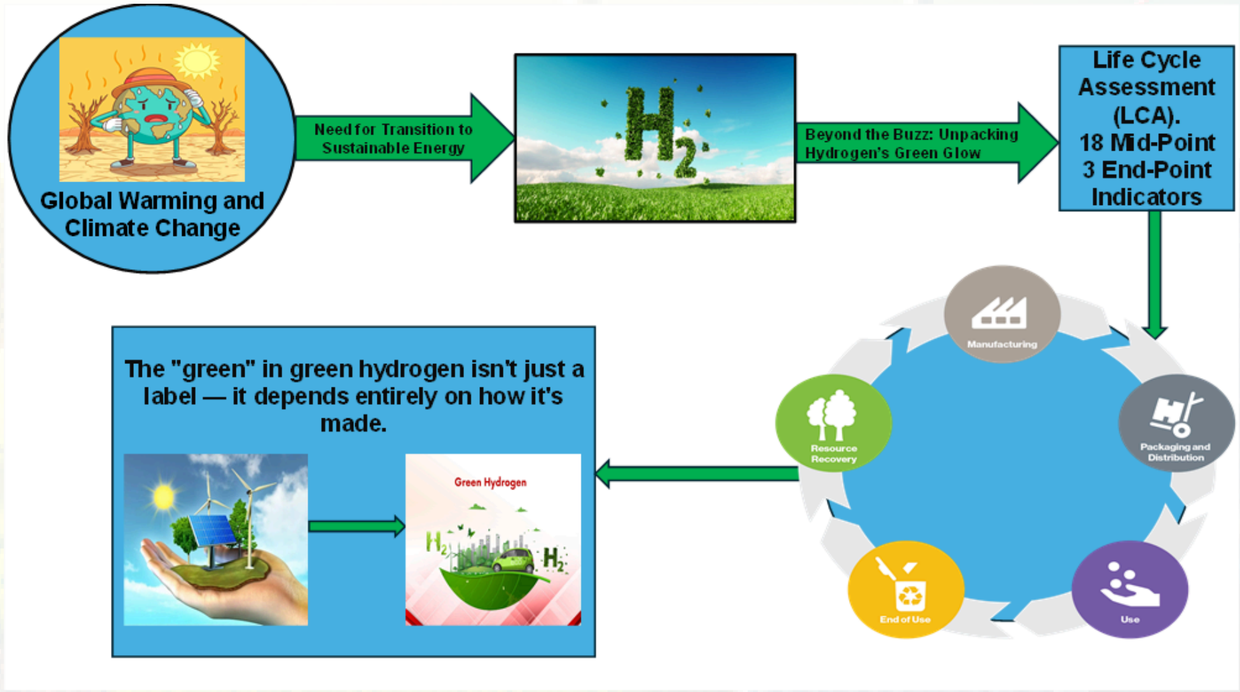
- Determine detailed product-wise impacts and emission hotspots
- Use detailed process data to provide decarbonization possibilities
- Identify the impact of the electrification of gas processing on carbon emissions

Outcome:

- Carbon footprint of HDPE and LLDPE
- Section wise impact details of complex plant
- Impact of electrification of operations



Life Cycle Assessment of Hydrogen Production via Electrolysis Technologies: Insights from India for a Sustainable Energy Transition



Need for LCA in hydrogen production technologies

- Evaluates environmental impacts across hydrogen value chain.
- Identifies sustainable production pathways.
- Supports informed policy and investment decisions.
- Reveals hidden environmental hotspots.

Student Semester Program - SLP

Predictive capability in UPL sustainability data tracker

To design a process to separate the CO_2 from flue gases of the coal-fired boiler

UPL LIMITED

No of Audit Completed
58

No of Industry verticals Covered
14

Monetary Savings Identified (Lacs)
8126

Monetary Savings Implemented (Lacs)
2413

Reduction in Carbon Emissions	SCOPE-01 (tCO_{2eq})	SCOPE-02 (tCO_{2eq})	SCOPE-03 (If Any)
Opportunity Identified	2,58,556	22,984	-
ECMs Implemented	19,592	4,934	-

Sustainability Education for Industry Leaders and Managers: Sector-Specific Courses

Industry	Industry Sector
Oil and gas	Petroleum and Petrochemicals
Plastics and polymers	
Cement	Heavy Industries
Steel (broadly metals and alloys)	
City/Urban regions	Urban infrastructure
Buildings	
Transport	
Power	Energy

- **Course for industry leaders:** ESG reporting, climate/green finance, circular economy models, climate policies, and targets
- **Course for industry managers:** Material flow analysis, Life cycle assessment, footprint calculations, software training, green engineering, and chemistry principles

Options: One-off courses, Professional certificate (three courses), Shared/joint courses with industry

IITB StartUp

Integrated, end-to-end Zwilling Labs Digital Twin Platform

Zwilling's twin platform enables every step of your journey from connecting disparate data sources, creating and visualizing your digital twin machines and factory, to analyzing data and prescribing corrective actions. We actively support our customers in this journey.
Our comprehensive platform enables manufacturing industries to operate efficiently, paving the way for a sustainable future and advancing the global effort towards decarbonization.

Accelerating Experimentation in Industries with AI-Powered Digital Twins

Machine Condition Monitoring: Enhancing Machine Health & OEE through Various Maintenance Strategies

Achieve real results with precision-engineered & AI-enabled solutions

- Monitor real-time data from all connected machines.
- Simulate operational scenarios for predictive maintenance.
- Visualize plant processes with interactive 3D models.
- Track and analyze equipment performance and efficiency.
- Optimize workflows with AI-driven operational insights.
- Receive instant alerts for system anomalies and failures.

Sustainability Action Lab

The Sustainability Action Lab focuses on; action learning for students and dissemination of sustainability research findings with stakeholders.

Problem Statement: 900+ Companies GreenCo certified but few have Platinum+ rating.

Solution: Sustainability action lab in partnership with CII can help companies improve their GreenCo rating.

Methodology:

1. Identifying the low scoring categories.
2. Identifying the professor with expertise and students to work on the project (1 or group of students).
3. Work on specific deliverables that can result in strategies and measures to improve the GreenCo rating.
4. Create whitepapers that can increase domain knowledge, credibility and branding for GreenCo ratings.

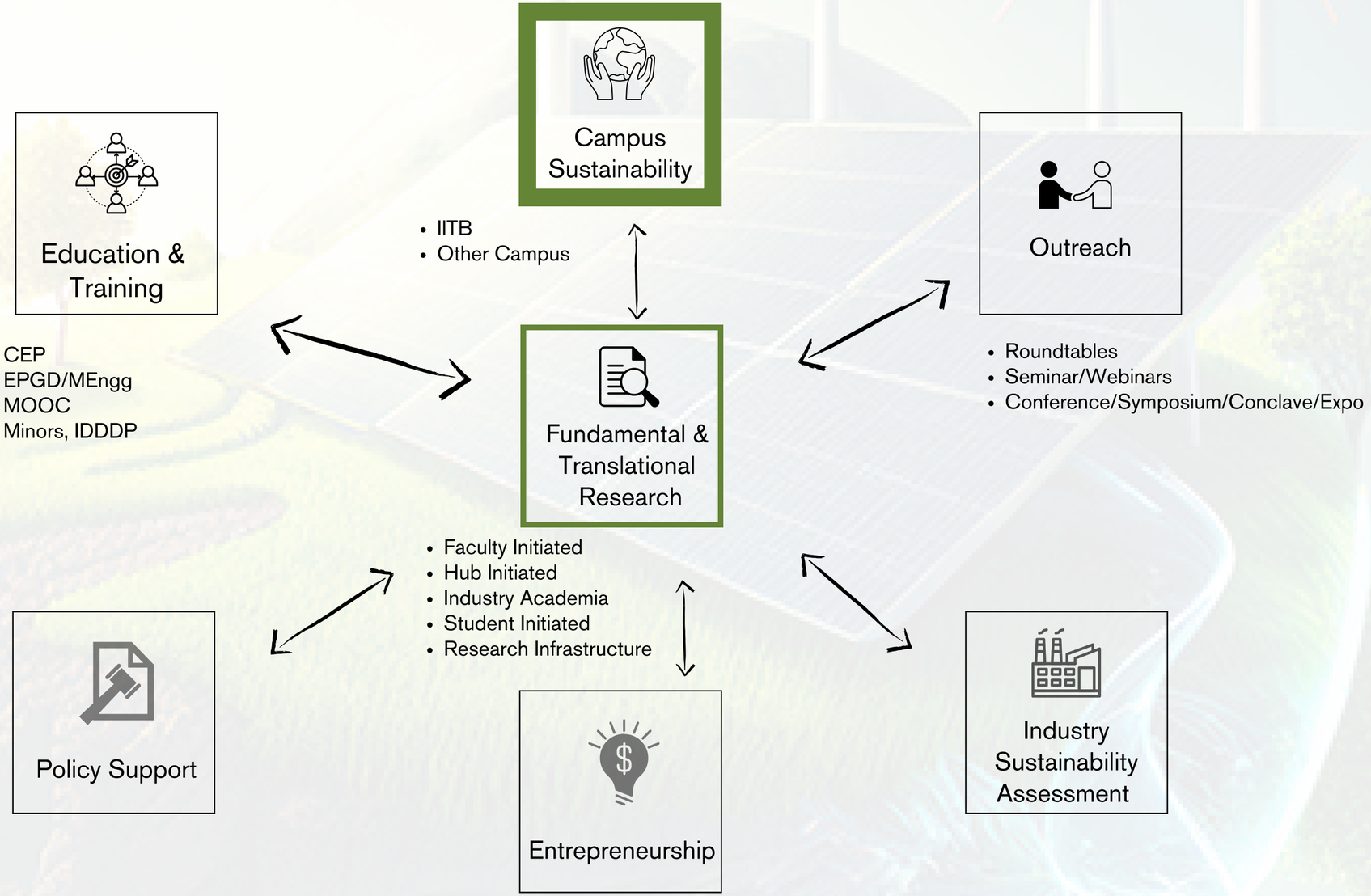
IITB Sustainability Action Lab Deliverables

- Domian Expert as Mentor and students to work on the project.
- Details of project and output to be shared with CII.
- Improvement in CII rating/score as a criteria (performance standards).

Exploring CII Partnership

IIT Bombay Research Hub for Green Energy and Sustainability

"To enable research and education for sustainable development"



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Ministry

NGOs/NPOs


17
PARTNERSHIPS
FOR THE GOALS

Thank You

IIT Bombay Research Hub for Green Energy and Sustainability

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Reach out!

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ज्ञानम् परमम् ध्येयम्