SAMPLE PROJECT PROPOSAL

1	PROJECT TITLE	:	Scaling up the conversion of CO2 to methanol and value-added chemicals
2	Name and address of principal implementing agency(s) Name of Project Leader/Coordinator/ Principle Investigator	:	Jawaharlal Nehru Centre for Advanced Scientific Research(JNCASR), Jakkur, Bangalore, Karnataka Dr.Anirban Roy, Senior Scientist,JNCASR
3	Name and address of Sub-Implementing Agency(s) Name of Co-Investigator(s)	:	Singareni Collieries Company Limited (SCCL), Kothagudem,Telangana BREATHE Applied Sciences Pvt. Ltd.,Bangalore,Karnataka Dr. Priya Das, SCCL Dr. Vikas Kulkarni, BREATHE Applied Sciences
4	Definition of the issue	:	Rising CO2 emissions from industrial activities are a major contributor to climate change, demanding urgent mitigation efforts. The capture and conversion of CO2 into methanol and other value-added chemicals present a sustainable and scalable solution. Methanol, a versatile chemical, is widely used as a fuel and feedstock in various industries. However, current CO2 conversion technologies lack commercial viability due to inefficient processes and low yields. This project aims to develop an industrially relevant, integrated technology to convert 500 kg of CO2/day into methanol and other chemicals with improved efficiencies and scalability.
5	Objectives	:	1. Develop and scale up an integrated technology for converting CO2 to methanol and value-added chemicals with commercially viable efficiencies. 2. Establish a robust end-to-end system integrating CO2 capture, hydrogen generation, CO2 reduction, and product purification processes. 3. Achieve a sustainable, economically viable solution for industrial adoption in the coal sector.
6	Justification for subject area	:	This project aligns with India's commitment to reducing carbon emissions under the Paris Agreement. It leverages abundant CO2 resources and transforms them into economically valuable products, contributing to sustainable development goals. The coal industry, a significant source of CO2 emissions, will directly benefit from the adoption of this technology by turning a waste product into a resource.

7	How the project is beneficial to coal industry?	:	1. Reduces CO_2 emissions by converting waste into commercially viable products. 2. Enhances environmental compliance and sustainability for coal-based industries. 3. Opens avenues for alternative revenue streams through the sale of methanol and by-products.
8	Work Plan	:	The project will follow a phased approach with clear milestones for R&D, pilot implementation, and industrial scaling. Each phase includes testing and validation to ensure commercial viability and scalability.
8.1	Methodology	:	The project involves the integration of four key sub-technologies: 1. CO_2 Capture: Employing advanced adsorption methods to capture CO_2 from industrial emissions. 2. Hydrogen Generation: Using electrolysis powered by renewable energy to produce green hydrogen. 3. CO_2 Reduction: Thermo-catalytic reduction of CO_2 into methanol and other chemicals using proprietary catalysts. 4. Product Purification: Separating and purifying methanol and other value-added chemicals for industrial use.
8.2	Organization of work elements	:	Phase 1 (6 months): Research and development of advanced catalysts and CO_2 capture methods. Phase 2 (12 months): Pilot-scale implementation and integration of sub-technologies. Phase 3 (12 months): Industrial-scale testing and optimization of the complete system.
8.3	Time schedule of activities giving Milestones		Activity / Timeline / Milestone Catalyst development / 0-6 months / Advanced catalyst prepared Pilot-scale testing / 6-18 months / Sub-technologies integrated Industrial-scale testing / 18-30 months / System operational at 500 kg CO_2/day capacity
9	Details of proposed outlay	:	(Rs in lakhs)
Sl. No	Items		Total cost estimated

			Total project cost	1st Year	2nd Year	3rd Year
	Capital Expenditures					
9.1	Land & Building		200	100	50	50
9.2	Equipment		600	300	200	100
9.3	Total Capital(9.1+9.2)		800	400	250	150
	Revenue Expenditure					
9.4	Salaries/allowances		300	100	100	100
9.5	Consumables		150	50	50	50
9.6	Travel		60	20	20	20
9.7	Attending or organizing Workshop/Seminar		50	10	20	20
9.8	Total Revenue expenditure(9.4+9.5+9.6+9.7)		560	180	190	190
9.9	Contingency		50	50	0	0
9.10	Institutional Overhead		100	100	0	0
9.11	Applicable taxes/duties/charges etc.		120	120	0	0
9.12	Grand Total (9.3+9.8+9.9+9.10+9.11)		1630	850	440	340

Foreign Exchange Component:

Name of the Foreign Currency: USD (United States Dollar)

Exchange Rate: 1 USD= 83 INR Date: 30.12.2024

10.0 Phasing of fund requirement with respect to activities/milestone

1st Year: 40% - Infrastructure setup, procurement of equipment, and pilot plant establishment.
2nd Year: 35% - Optimization of the CO2-to-methanol process, testing, and scaling laboratory procedures.
3rd Year: 25% - Full-scale pilot demonstration, analysis, and submission of findings.

11.0 Outlay for land & Building:

Building

Sl. No	Item	Plinth Area	Type of Bldg.	Estimated Cost
1.	Laboratory Space	2000 sq. ft.	Research Facility	75
2.	Pilot Plant Space	3000 sq. ft.	Industrial Setup	120
Total				195

12.0 Justification for land & building:

The laboratory space is required for R&D activities, specifically to optimize the catalytic conversion of CO2 to methanol.
The pilot plant space is essential for testing scaled-up processes and analysing economic feasibility before commercialization.

13.0 Outlay for Equipment:

Generic Name of equipment and accessories with major specifications		Number	Imported/Indigenous	Estimated Cost (Rs. In lakhs)	Foreign Exchange Component
1.	High-Pressure Reactor System	2	Imported	150	100
2.	Gas Chromatograph with FID/TCD	1	Imported	80	60
3.	CO2 Purification & Storage System	1	Indigenous	50	0
Total				280	160

14.0 Justification for Equipment:

The high-pressure reactor is crucial for testing methanol synthesis under varying pressures and temperatures.
Gas chromatographs are required for precise analysis of product composition and yields.
The CO2 purification system ensures high-quality input gas, which is vital for experimental consistency and scalability

15.0 Outlay for consumable materials:

Head	Particular	Outlay			
		1st Year	2nd Year	3rd Year	Total
Catalysts and Chemical Reagents	Q	100kg	200kg	1200kg	1500kg
Utilities (Gas, Water, Electricity)	B	1500 kWh	1000 kWh	1400 kWh	3900 kWh
Miscellaneous Laboratory Supplies	F	50 sets	55 sets	35 sets	140 sets
Safety and Maintenance Equipment	E	25 units	50 units	30 units	105 units

16.0 Curriculum Vitae of Project Proponents

Principal Investigator: Dr. Anirban Roy
Educational Qualifications: Ph.D. in Chemical Engineering, IIT Madras
Past Experience: Over 15 years in CO_2 capture and conversion technologies
Number of Research Projects Handled: 10
Commercial Application of Research Findings: Developed a commercially viable CO_2-to-ethylene process
Papers Published: 25 (International and National Journals)

Co-Investigator: Dr. Priya Das
Educational Qualifications: Ph.D. in Environmental Science, IISc Bangalore
Past Experience: 12 years in environmental impact assessment and sustainable technologies
Number of Research Projects Handled: 8
Commercial Application of Research Findings: Implemented sustainable waste management systems in coal mines
Papers Published: 20 (International and National Journals)

17.0 Past Experience

The Principal Implementing Agency (JNCASR) has extensive expertise in catalytic processes and CO_2 conversion. Sub-implementing agencies SCCL and BREATHE Applied Sciences have previously collaborated on industrial-scale sustainability projects, ensuring effective execution and timely delivery.

18.0 Others

1. Literature/Web Survey:
Recent advancements in CO_2 conversion technologies show promising results globally, particularly in Europe and the US, focusing on green hydrogen integration and efficient catalysts. In India, efforts have centered on low-cost CO_2 capture methods, offering a competitive edge in industrial applications.

2. R&D Components:
The project focuses on novel thermo-catalytic processes and advanced adsorption technologies exclusive to this proposal.
Integration of multiple sub-technologies ensures a holistic approach to CO_2 conversion.

3. Field Trials and Collaborations:
SCCL's industrial emissions will serve as a field trial source for testing CO_2 capture technologies.
Collaborations with national and international experts ensure high-quality execution.

FUND REQUISITION

Name of the project: Scaling up the conversion of CO2 to methanol and value-added chemicals Project Code: CO2-Methanol-2024 Name of the Company/Institution: XYZ Research Institute Statement of fund requirement for the (year/period): FY 2024-2025							
Items	Total approved Cost	Total Fund Received as on 12.12.2024	Interest Earned	Expenditure incurred till date	Balance fund available as on date 30.12.2024	Fund provision in corresponding Year	Fund required for the FY 2024-2025
	(1)	(2)	(3)	(4)	(5)=(2)+(3)-(4)		
Land & Building	50.00	10.00	0.50	5.00	45.50		
Capital equipment	100.00	50.00	1.00	30.00	71.00		
Manpower	30.00	15.00	0.20	10.00	20.20		
Consumables	20.00	10.00	0.10	5.00	15.10		
Travel	10.00	5.00	0.05	2.00	8.05		
Contingencies	5.00	2.00	0.01	1.00	4.01		
Attending/organizing workshop/seminar etc.	15.00	5.00	0.02	3.00	12.02		
Total	230	97	1.88	56	175.88		

Fund received till date:
₹50,00,000

Signature of Associate Finance Officer:
Name: Rajesh Sharma
Designation: Senior Finance Officer
Seal: [Official Seal]

Signature of Project Leader/Coordinator:
Name: Dr. Priya Mehra
Designation: Project Leader
Seal: [Official Seal]