



Building Energy and Industrial Systems at Scale

**Economics, Technologies and Strategic
Advantage**

Abhijit Sarkar
Executive Vice President

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FORCES SHAPING GLOBAL ENERGY AND INDUSTRIAL SYSTEMS



Electricity and energy growth
to meet growing datacenter and AI needs

↑ up 4-8% p.a.



Balancing of renewables with firm power
to control electricity costs

up 50-200%/kWh



Domestic supply chains
critical minerals, LNG, syngas

~80%
of critical minerals
supply



Decarbonization projects
within the 45Q envelope

<\$85/tCO₂



Project viability with
tariffs and carbon pricing

~100/t CBAM
25-50% duties

TECHNOLOGIES FOR A CHANGING WORLD



Syngas production

From Petcoke, Coal

- Gasifier technology
- Hydrogen & syngas systems
- Methanol and fuel production



Low Carbon Fuels

SAF, Methanol, H2

- Sustainable Aviation Fuel (SAF)
- E-methanol and fuel production



Electricity Dispatch & Optimization

- Grid integration of renewables
- Improved stability and reliability
- Flexible power solutions



Integrated CCUS Projects

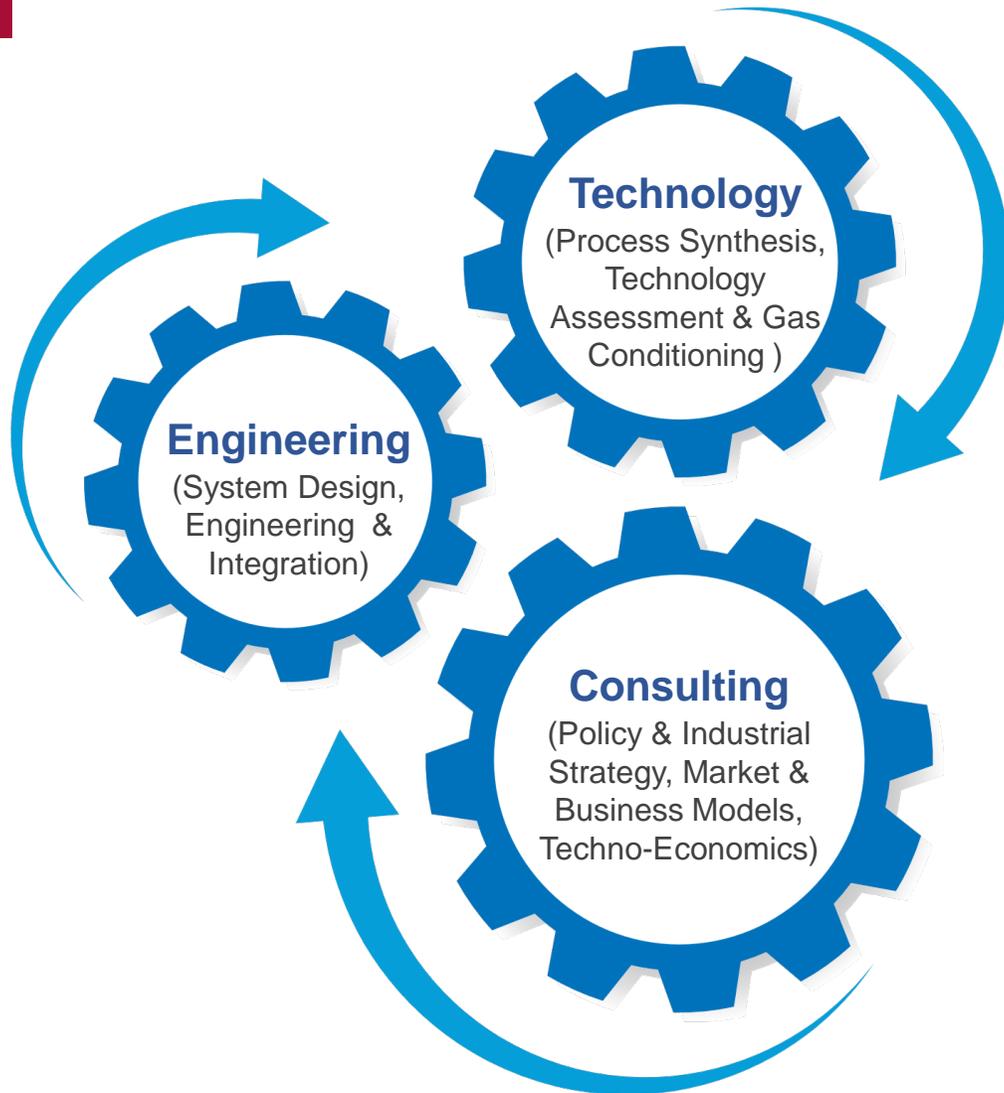
- Carbon dioxide capture technology
- CO₂ utilization and storage solutions



Engineering Services

- Engineering & feasibility studies
- Front-end engineering design (FEED)

INTEGRATED TECHNOLOGY DESIGN AND ECONOMICS



Energy & Industrial Infrastructure



Power & Energy Systems

Petrochemicals & Chemicals

Metals – Steel & NonFerrous

Oil & Gas

Decarbonization



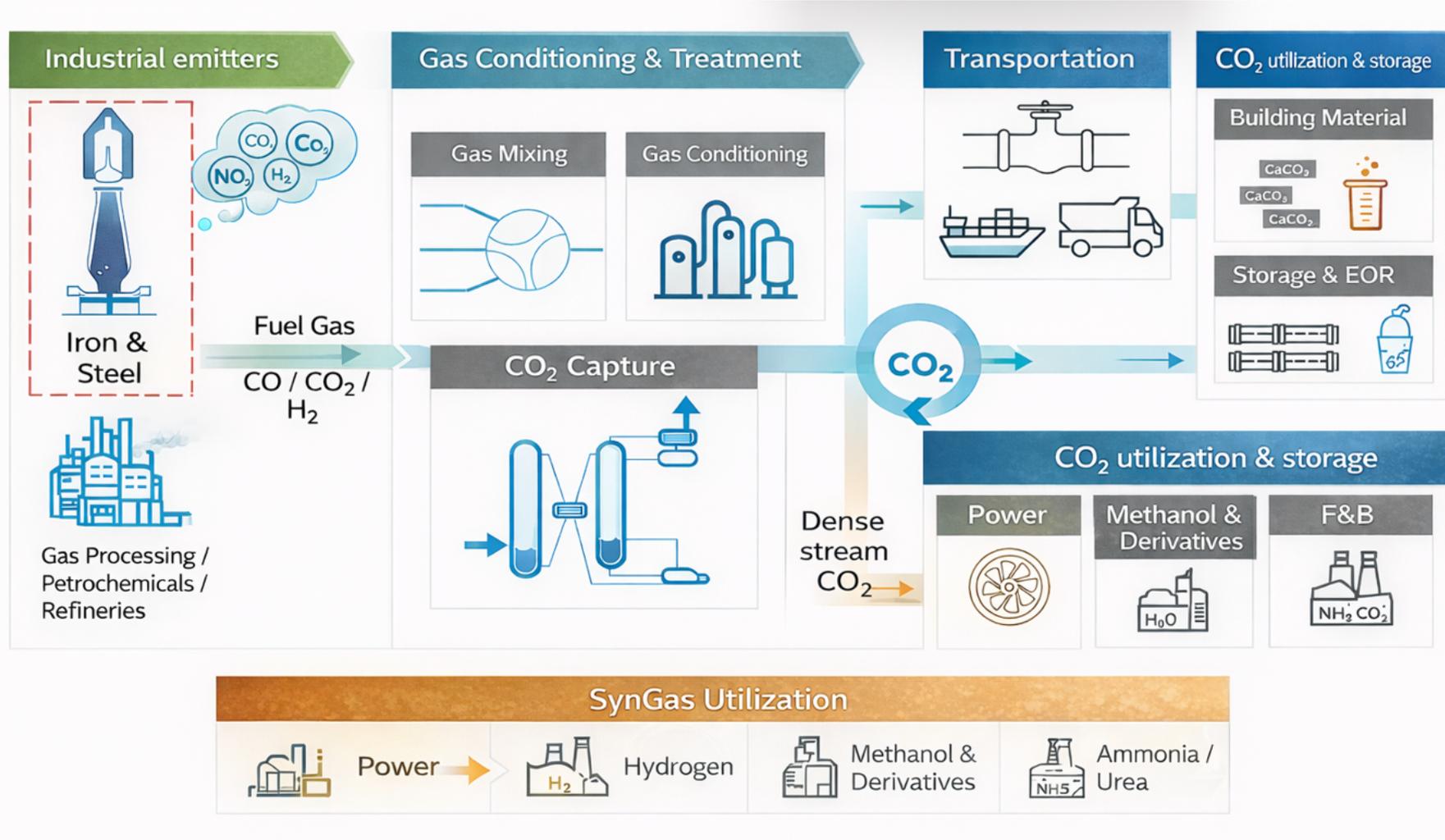
CCUS and EOR

Clean Energy Carriers – H2,
MeOH, NH3

Clean Materials (Steel, Cement)

Petroleum Waste Utilization &
Clean Chemicals

PROCESS ECONOMICS TO INTEGRATED FINANCIALS



RECENT TECHNOLOGIES AND PROJECTS



FEED for 3.6 mtpa CO2 capture

Decarbonization of 618 MW IGCC power plant

Owner's Engineers

Projected cost within 45Q credits



Production of 100 ktpa of clean hydrogen

0.9 mtpa CO2 capture from Merchant SMR

FEED Engineering, Class 3 cost estimate, CO2 Life Cycle Analysis



3 mtpa CO2 capture from a steel plant with H2 production optionality

Pre-FEED Engineering, Class 4 cost estimate, CO2 Life Cycle Analysis

Project status: Pre-FEED completed



Assessment for capture of 1.9 mtpa CO2 capture from 2.3 mtpa cement plant

Technology assessment of PSA + cryogenic capture vs. conventional amine systems

Prelim design basis, cost assessment, TEA, LCA etc.



Roadmap for net negative cement production

Initial conceptualization and analysis for decarbonization through fuel replacement and CCUS

GLOBAL ENERGY PROJECTS/ CHALLENGES



TEFR for internal gas grid of connected fields in Tripura, India

Conceptual plan, capacity estimation, implementation schedule, financial analysis



Decarbonization of Cairn's upstream operations

Carbon capture from E&P operations of Cairn

Techno-economic study and market assessment of CO2 utilization options



0.7 mtpa CO2 capture from Refinery SMR

CO2 disposition through CO2 EOR and Food Grade utilization

Market, business case and techno-economic analysis



ASIAN DEVELOPMENT BANK

Carbon capture and utilization for 3 refineries of IOCL in Assam

Techno-economic feasibility study of CO2 utilization

Market, business case and techno-economic analysis

Upstream

Downstream



CO2 capture & blue H2 from petcoke gasification

5 mtpa petcoke gasification and 10 mtpa CO2 capture

Gasification based market hedged product portfolio



CO2 capture & blue H2 from petcoke gasification

1.2 mtpa petcoke gasification to support a multi product portfolio -



Petcoke gasification project for producing blue methanol and blue H2

CO2 capture and sequestration through EOR

Blue MeOH market study for bunker fuel demand



Enabling refining to petchem integration for one of the biggest refineries in India

Feasibility study for different specialty chemicals and pharma APIs



0.3 mtpa equivalent Specialty Chemicals & APIs production

Green Specialty Chemicals & APIs production from industrial emissions

Petroleum Waste to Value

Specialty Chemicals

TAKING ON OUR CLIENTS' BIG CHALLENGES



“The era of predictable, firm, low-cost, low-volatility power and resources is ending. Competitive advantage will go to organizations that secure their supply chains and deal with uncertainty better”

THANK YOU

Abhijit Sarkar

Abhijit.S@dasturenergy.com

(415) 216 8660

