CO₂ CAPTURE AND UTILIZATION AT SABIC

UPDATE ON 2015 CSLF RECOGNIZED PROJECT: CO₂ NETWORK PROJECT

Pieter Smeets
CSLF Technical Group meeting, Riyadh, Saudi Arabia, September 30, 2020
SABIC 2025 STRATEGY & SUSTAINABILITY GOVERNANCE

GLOBAL LEADERSHIP IN CHEMICALS

FINANCIAL
MARKET
FEEDSTOCK
TECHNOLOGY

LEVERAGING KSA ADVANTAGE
GLOBALIZATION
TOP QUARTILE PERFORMANCE

SUSTAINABILITY
ORGANIZATION AND CULTURE
TALENT DEVELOPMENT

CHAIRMAN
BOARD OF DIRECTORS
SUSTAINABILITY COUNCIL
(Chaired by CEO)
CORPORATE SUSTAINABILITY
(Chaired by leader of Corporate Sustainability department)

STEERING COMMITTEE
(Manufacturing footprint, reporting team, product qualification, energy and resource efficiency)

OPERATING COMMITTEE

Sub-teams may include members from throughout SABIC as approved by the Steering Committee and Sustainability Council
SABIC SUSTAINABILITY PRIORITIES

**Resource Efficiency**

SABIC has ambitious goals to reduce Material Loss intensity by 50% and Water Intensity 25% by 2025 since 2010.

**Innovation & Sust. Solutions**

Sustainability is the guiding light for SABIC’s product and process innovation to support the development of effective solutions to some of the world’s greatest challenges.

**Climate Change & Energy**

SABIC has ambitious goals to reduce GHG and energy intensity by 25% by 2025, from 2010 levels.

**Circular Economy**

Circular economy inspires SABIC to adapt our processes to the use of renewable and recycled feedstock, and to create durable, recyclable product design solutions for our customers.

**Environment, Health, Safety**

SABIC is committed to our core EHSS values, with a supportive culture and focus on continuous performance improvement.

**Governance & Integrity**

Integrity is a core value and helps to maintain stakeholder trust. SABIC Code of Ethics provides guidance to meet stakeholder expectations.

* Baseline is year 2010 / Retain intensity targets 2010-2025 based on external Sales
OUR SUSTAINABILITY STRATEGY:
MAIN FOCUS AREAS AND ACHIEVEMENTS IN 2019

Innovation and Sustainability Solutions

- **88**
  - Total Sustainability Solutions

Human Capital Development

- **15,000+**
  - Training program participants

EHSS and Product Safety

- **33%**
  - Total Recordable Incident Rate

Supply Chain

- **93% solids**
  - Safety and Quality Assessment System (SQAS)
- **100% liquids**

Resource and Energy Efficiency*

- **13.57%**
  - GHG Emissions Intensity
- **9.45%**
  - Energy Intensity
- **41.54%**
  - Material-loss Intensity
- **47.83%**
  - Reduction in Flaring Emissions
- **12.62%**
  - Water Intensity
- **3.44 million MT**
  - Total Current CO₂ Utilization

* Assured by KPMG

Learn more about SABIC’s sustainability facts and figures.

Access Report here
CO₂ UTILIZATION, AN OPPORTUNITY FOR CO₂ FROM EO

Ethylene oxide reaction:

Unwanted side reactions:

Converting waste CO₂ into valuable products:
CO₂ CAPTURE AND PURIFICATION PLANT

- Drying
- Compression
- Contaminants removal
- Distribution to integrated CO₂ network

CO₂ capture plant

UNITED, Jubail, Saudi Arabia
WORLD’S LARGEST CO2 PURIFICATION AND LIQUEFACTION PLANT

BUILT AT SABIC’S AFFILIATE, UNITED

Supplying CO₂ for converting into valuable chemicals
• Urea
• Methanol
• Oxo-alcohol

For applications in the food and beverage industry

500,000 MT

annually of CO₂ can be purified

Continues to recover more CO2 as feedstock for valuable products such as urea, methanol and liquid CO2 for the food industry
CONVERTING CO₂ WASTE INTO VALUABLE PRODUCTS, LEVERAGING AN INTEGRATED NETWORK FOR CO₂ DISTRIBUTION

Al-Bayroni, Ibn Al-Baytar, Ibn Sina, SAFCO and United are affiliates and subsidiaries of SABIC.
CO₂ REACTION PATHWAYS FOR CHEMICAL INDUSTRY

**Fuels, hydrocarbons and alcohols**
- CH₃OH
- CH₃OCH₃
- CHOHH, CH₄

**Syngas**
- H₂
- RWGS
- CH₄ DRM

**CO₂**
- ODH
- CₓHᵧ

**Urea**
- NH₃
- H₂O, hv
- H⁺, e⁻

**Renewable fuels and chemicals**
- CH₄, C₂H₄, CH₃OH, HCOOH

**Epoxides**
- Renewable fuels and chemicals
- Carbonates, carbamates and carboxylates for high-added value polymers

**Chemicals**
- Olefins, Styrene

**INNOVATION IS NEEDED**
- Catalyst design for high activity and stability
- Process Design for integration in existing processes
- Cheap H₂ from renewable source
THANK YOU