TRADE AND ENVIRONMENT WEEK 2022

17-21 OCTOBER

Circularity for a Sustainable Future

WORLD TRADE ORGANIZATION

وزارة الطاقة
MINISTRY OF ENERGY

Agenda

I. What is Circularity?

II. Circularity in Action

III. A step forward

I. CIRCULARITY

3 Rs

REDUCE

Reduce the amount of waste entering the system

REUSE

Convert waste to another useful industrial feedstock

RECYCLE

Recycle waste through natural processes, decomposition and combustion

1970s — The 3 Rs in the context of waste management

1990s — The 3 Rs were used to apply to the broader circular economy

3 Rs + Removal

REDUCE

Reduce the amount of waste + GHG emission entering economic system

REUSE

Converting waste + emissions to useful industrial feedstock

RECYCLE

Recycle waste through natural processes, decomposition + emissions through natural processes, combustion

REMOVE

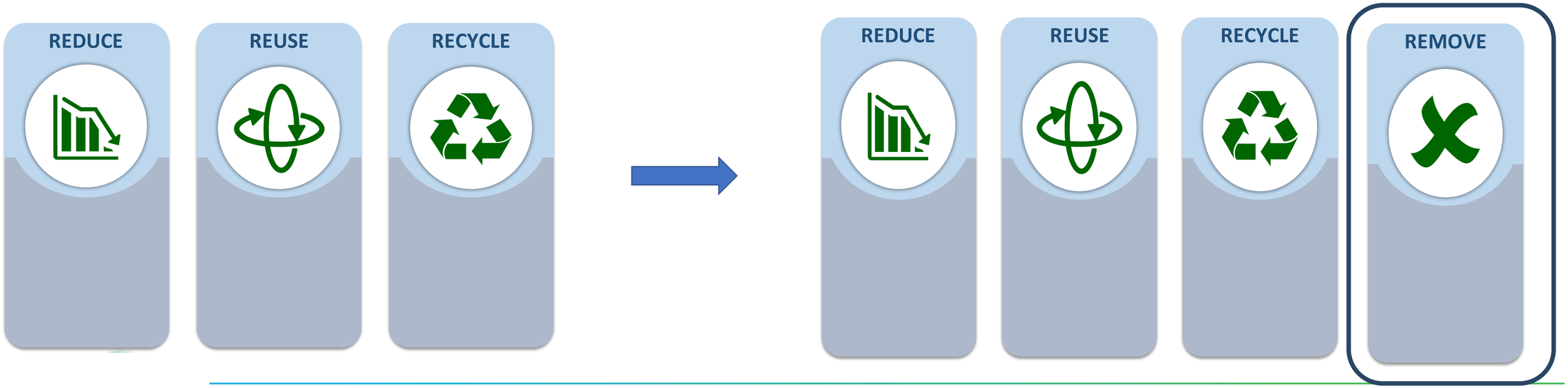
Remove emissions from the system

Before CE

After CCE

- Natural Resources

Material → Activities utilizing HC → Emission



“REMOVAL” PILLAR

Refers to all technologies and innovation that remove GHG emissions: carbon storage, mineralization/alkalinization, soil carbon, direct air capture, eco-system based approaches & nature based solutions, tree planting etc.

“…all of the 1.5˚C scenarios used in IPCC (2018a) deploy carbon dioxide removal technologies… Without these technologies, most models cannot generate pathways that limit warming to 1.5˚C…”

IPCC AR6 WGII Report (28 February 2022)*

*Source: Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the IPCC Sixth Assessment Report

4Rs of CIRCULARITY

REDUCE

Reduce material, GHG emission entering economic system

- **Reduce demand**
- **Renewables**
- **Energy efficiency**

REUSE

Convert waste, emissions to useful industrial feedstock

- **Carbon Capture and Utilization (CCU)**
- **Reuse of materials**

RECYCLE

Recycle waste, emissions through natural processes, combustion

- **Waste flow re-entering production**
- **Bio-energy with CCS**

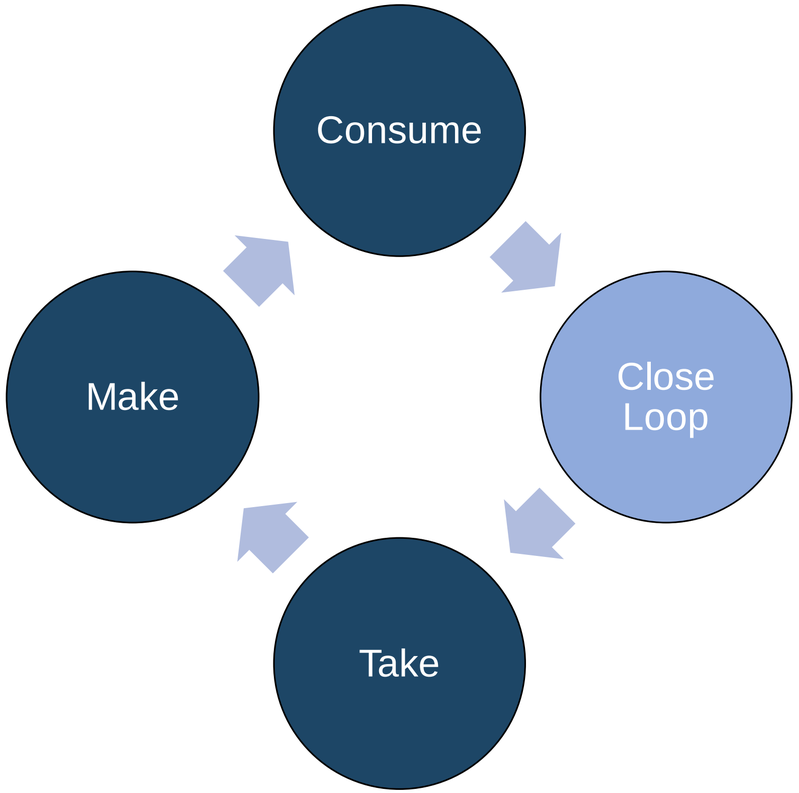
REMOVE

Remove emissions from the system

- **Carbon Capture and Storage (CCS)**
- **Direct Air Capture**

CIRCULARITY

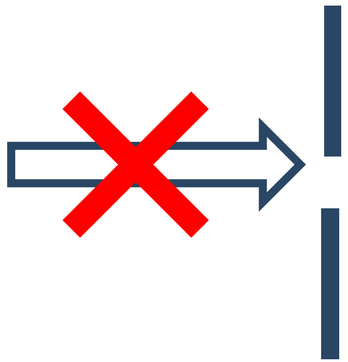
With 4Rs Circularity closes the loop on material & GHG emission flows.
Therefore, it effectively addresses **Negative Externalities.**



4Rs:

- Reduce
- Reuse
- Recycle
- Remove

Negative Externalities



Waste

GHG

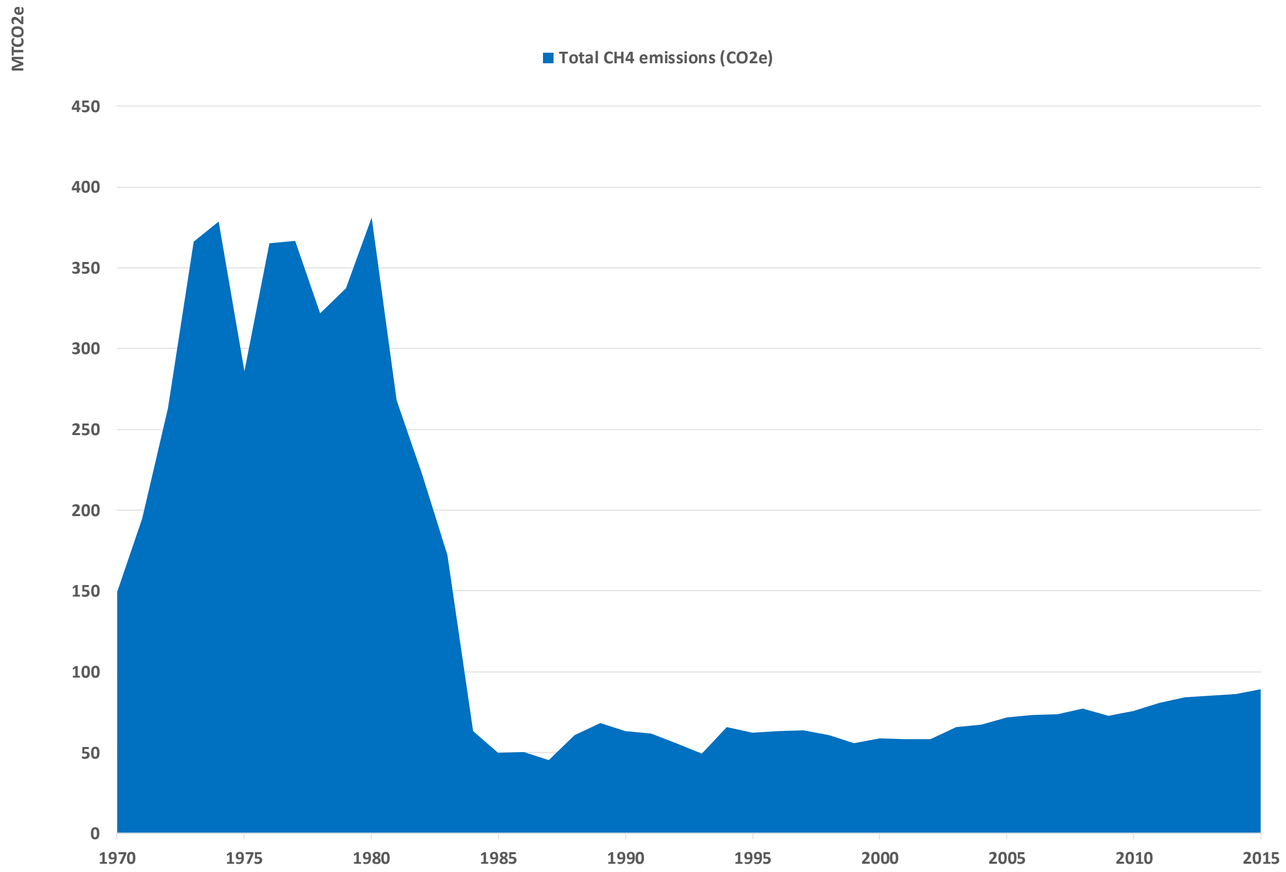
I. CIRCULARITY

II. CIRCULARITY IN ACTION

KSA MASTER GAS SYSTEM: CIRCULARITY in ACTION

Converting methane emmissions to value:

- created jobs;
- Added approx. 40% to industrial national GDP;
- slashed emissions;
- diversified economy.



Sources: KAPSARC - Saudi Arabia's Climate Change Policy and the Circular Carbon Economy Approach

CCE DEPLOYMENT IN SAUDI ARABIA

البرنامج الوطني للاقتصاد الدائري للكربون
Circular Carbon Economy National Program

CCE National Program Strategy

Reduce | **Reuse** | **Recycle** | **Remove**

	Energy Efficiency	Renewable Energy	Low Carbon Fuels	Carbon Usage	Carbon Capture	Carbon Sinks
Oil & Gas						
Utilities	Combined Cycle Gas Turbine	Solar PV	Hydrogen	Polymers	Direct air capture	Forestry
Manufacturing	HVAC	Wind	Nuclear	Methanol	Carbon capture at stack	Mangroves
Transportation	Efficiency standards	Biogas		Enhanced Oil Recovery	Mobile carbon capture	Mineralization
Agriculture						

Program enablers

- Engagement & communication
- Financial
- Policy/ Legal
- Infrastructure
- Human capital
- Technical information

CCE Deployment: Pillars

Technology

- Prioritize solutions based on abatement potential, cost, and maturity
- Advance CCE technologies with sustained R&D and pilot projects

Policy

- Provide enabling mechanisms for investment & technology deployment, and prompting trade
- Develop robust measurements, reporting, and verification systems

Communication & Capacity Building

- Capacity building at private and public sector levels
- Stakeholder engagement

>260 INITIATIVES

	Reduce	Reuse	Recycle	Remove
Initiatives	218	10	15	20
Commercial stage	78%	50%	47%	45%
Stakeholders	27	7	15	8

Sample program and initiatives

Renewable Energy Program

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Energy Efficiency Program

كفاءة
المركز السعودي لكفاءة الطاقة
Saudi Energy Efficiency Center

Carbon sequestration project

أرامكو السعودية saudi aramco

Eastern Province (Uthmaniyah)
Capture & store
~ 800,000 t of CO_2 per year

CO_2 Capture & Utilization

500,000t of CO_2 per year

سابك sabic

CO_2 to olefins

أرامكو السعودية saudi aramco

سابك sabic

CO_2 conversion Electrochemical and photochemical

أرامكو السعودية saudi aramco

Conversion of CO_2 into high value end products

(e.g. Novomer polyols)

أرامكو السعودية saudi aramco

Reforestation Project

وزارة البيئة والمياه والزراعة
Ministry of Environment Water & Agriculture
Kingdom of Saudi Arabia

Carbon adaptation

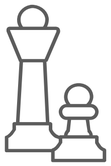
King Abdullah University of Science and Technology

I. CIRCULARITY

II. CIRCULARITY IN ACTION

III. A step forward

To take forward the CCE program, we have mobilized teams from several entities across the Kingdom's energy ecosystem



Technical

- Assess **key CCE technologies and applications**
- Identify **priority technologies** and develop the national **strategies and roadmaps** e.g. hydrogen and CCUS
- **Prioritize initiatives** for accelerated implementation supporting key stakeholders with **required enablers**

Enablers

- **Monitor and project emissions** in the Kingdom by sector and expected impact of launched CCE initiatives
- Design **business models** and **enabling mechanism** for priority CCE technologies and applications
- Define CCE **regulation, policy and standard requirements**

Engagement

- **Showcase CCE framework** in key global conferences, bilateral engagements with industry, international organizations, etc.
- **Provide technical and policy information** related to CCE framework through **online engagements** e.g. website, social media

The Saudi Green Initiative

SAUDI GREEN INITIATIVE

60+ initiatives

Raise protected areas to more than 30% of marine and terrestrial areas

Reduce Carbon emissions by more than 278 MTPA by 2030

Plant 10 billion tress across Saudi Arabia

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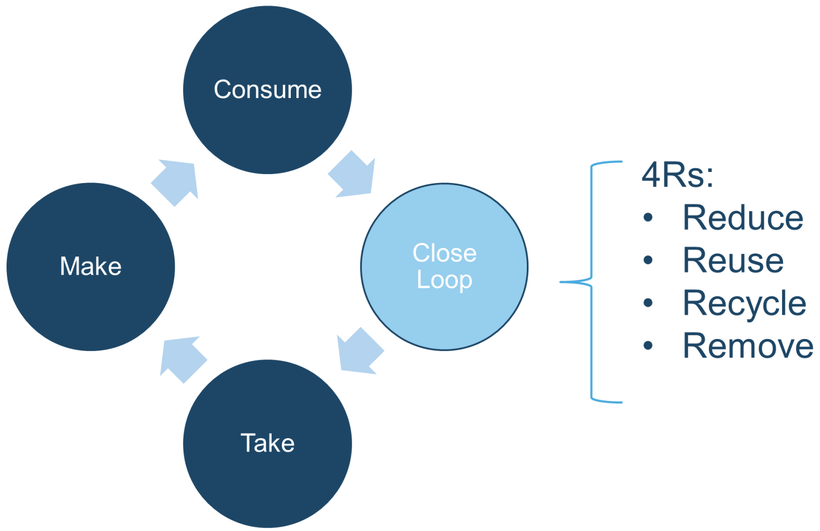
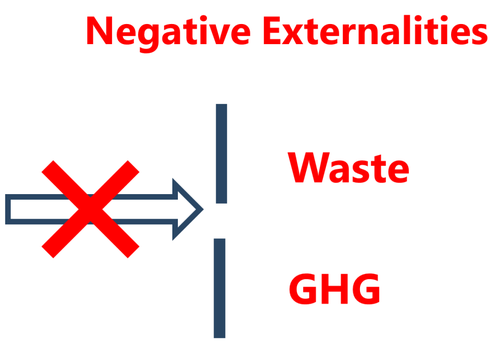
SUMMARY

Circularity:

1. Address negative externalities (sustainability and Economic value)





SUMMARY

Circularity:

1. Address negative externalities (sustainability and Economic value);
2. Unlocks new opportunities for global economy;
3. Promotes global trade;
4. Tools and deployment experience.

Thank You

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