



Taskforce 2

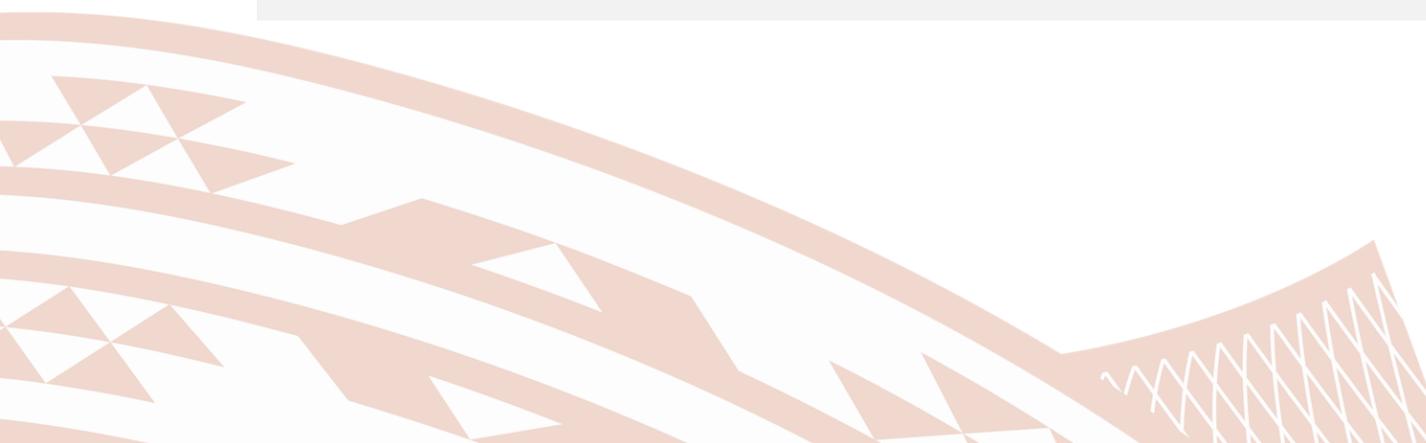
Circular Economy:

Holistic Solutions for our Environment



**SAUDI ARABIA 2020
SCIENCE**

Need for Action – Critical Transitions

- 1** Endangering natural resources (water, food, energy and materials) due to unsustainable and environmentally damaging use driven by population growth, urbanization and unwise consumption.
 - 2** Increasing disruption of global supply chains due to system shocks (health, environmental, technological or financial)
 - 3** Unstable weather and deterioration of environmental systems due to climate change
 - 4** Approaching a tipping point where regeneration of biosystems is hindered.
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Need for Action – Challenges

- 1 **Technological immaturity**, with many technologies not commercially viable at present
- 2 **Insufficient economic incentives for circularity** in current market and industrial value chains
- 3 **Lack of indicators** to assess circular economy
- 4 **Limited awareness & consciousness** among consumer and policy makers on benefits of circular economy leading to weakened resolve to voluntary adoption
- 5 **Limited collaboration** between governmental, private and academic institutions as well as between countries
- 6 **Insufficient funding and investment** devoted to sustainable production & consumption
- 7 **Limited availability of data** (technological, market, social) for promoting the circular economy

Theme
Specific
Challenges

Common
Challenges

Policy Recommendations

The G20 Academies of Sciences call for:

- 1 **Developing an integrated and efficient closed-loop systems** approach to natural resource production, distribution, consumption, disposal and recycling to close the circle.
- 2 **Promoting carbon circularity** through advancing the 4Rs (Reduce, Reuse, Recycle and Recovery).
- 3 **Developing indicators, values and track progress** to facilitate the transition towards circular economy.
- 4 **Increasing awareness** on opportunities for circular economy from environmental, social and economic perspectives.
- 5 **Encouraging cross-sectoral, bi-lateral and multi-lateral collaboration** to advance economy systems and policies.
- 6 **Creating funding and support** for circular economy technologies.
- 7 Developing methods for **generating, collecting and sharing data.**

Theme
Specific
Recommendations

Common
Recommendations

1 Integrated and closed-loop systems

POLICY RECOMMENDATION 1

Develop an integrated and efficient closed-loop systems approach to natural resource production, distribution, consumption, disposal and recycling to close the circle.

Rationale

Unlike the traditional linear economic model based on a 'take-make-consume-throw away' pattern, a circular economy is based on sharing, leasing, reuse, repair, refurbishment and recycling, in an (almost) closed loop, where products and the materials they contain are highly valued. In practice, it implies reducing waste to a minimum. Moving towards a more circular economy could deliver opportunities including reduced pressures on the environment; enhanced security of supply of raw materials; increased competitiveness; innovation; growth and jobs.

POLICY ACTIONS

- 1.1** Encourage research, development and use of innovative technologies to reduce pollution as well as generate value from waste.
- 1.2** Establish legal and economic incentives to promote large scale acceptance and application of recovered resources and products by end-users in different sectors.
- 1.3** Leverage advanced digital technologies such as IoT, AI, big data and blockchain, to improve efficiency and resiliency of natural resource utilization as well as enhancing synergies of circularity in energy, water, materials and food.
- 1.4** Invest in technologies to allow for closed loop systems, especially for key sectors such mining, manufacturing, agriculture and urban dwellings by conducting and leveraging a holistic assessment of each nation's needs, resource availability, waste generation and technological capacity.
- 1.5** Promote closed-loop systems toward zero waste of business operations and extending the boundary of sustainability.
- 1.6** Adopt smart approaches for curbing consumerism and overconsumption and pursue demand management scenarios. Enhancing the shift from efficiency to sufficiency, maintaining responsible consumption without sacrificing social welfare.

Critical Transitions

- I** Unsustainable use of natural resources
- II** Increasing disruption of global supply chains
- III** Growing climate change impacts
- IV** Tipping point for regeneration of biosystems

Challenges

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- V** Lack of collaboration
- VI** Limited funding
- VII** Limited availability of data

2 Promote carbon circularity

POLICY RECOMMENDATION 2

Promote carbon circularity through advancing the 4Rs (Reduce, Reuse, Recycle and Recovery) to remove carbon from the atmosphere

Rationale

Rising greenhouse gas emissions are driving rising atmospheric carbon levels. Carbon circularity will support global commitments and responsible development while reducing pressures due to hyper growth in urbanization. Advancing the principles of reduce, reuse, recycle and recovery will help with the adoption of carbon circularity.

POLICY ACTIONS

- 2.1** Conduct techno-economic feasibility studies and lifecycle assessment to determine how to optimally combine renewable and fossil energy sources coupled with 4Rs related technologies in an integrated power generation system that leads to carbon neutrality goals.
- 2.2** Promote investment in carbon capture, utilization and storage R&D and standardization of technologies such as CCUS, BECCS, CO₂-to-X, based on their merits.
- 2.3** Encourage deployment of emerging technologies that support carbon circularity at testbed sites.
- 2.4** Encourage research, development and use of innovative technologies, such as Carbon Capture Utilization & Storage (CCUS, BECCS, CO₂-to-X), to reduce as well as generate value from GHG emissions in the energy sector.
- 2.5** Promote forest and marine plants restoration as a method for carbon capture and reuse while simultaneously restoring biodiversity.
- 2.6** Promote renewable energy and affordable storage in general as a means of reducing dependence on carbon.

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3 Develop indicators

POLICY RECOMMENDATION 3

Develop indicators, values and track progress to facilitate the transition towards a circular economy.

Rationale

Tracking circular economy topics in a consistent manner globally is needed to support the transition towards a circular economy. Standards for measurement need to be adopted and indicators identified to best track progress. Indicators will be needed to track all critical transitions.

POLICY ACTIONS

- 3.1** Develop science-based circular economy indicators capturing micro and macro scales and describing the net resources used.
- 3.2** Develop internationally accepted guidelines and standards for circular economy principles, systems and technologies.
- 3.3** Develop circular economy indicators for organizations considering sustainability and business models on materials and for monitoring and promoting circularity.
- 3.4** Promote science-based circular economic targets and policies for public and private institutions, including local authorities and municipalities to reduce inefficient resource utilization while promoting environmental conservation, management and restoration.
- 3.5** Develop global, regional and national circular economy models and foresight scenarios to perform prospective, integrated assessment to better understand the impacts and challenges of Circular Economy

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4 Awareness

POLICY RECOMMENDATION 4

Increase awareness on opportunities for circular economy from environmental, social and economic perspectives.

Rationale

Awareness of circular economy technologies and principles are limited among policymakers and the general public. Increasing awareness will support in the adoption and widespread deployment of circular economy principles.

POLICY ACTIONS

4.1 Develop programs to raise public awareness and literacy on the need for circularity to achieve sustainability and environmental protection to accelerate voluntary adoption of circular economy.

4.2 Develop programs to raise awareness among decision makers in different stakeholders at all levels on how to achieve Circular Economy and reap its benefits

4.3 Develop educational materials and programs on Circular Economy to be included at all educational levels in order to raise awareness and open career paths to innovation, startups and jobs in all aspects of Circular Economy

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5 Collaboration

POLICY RECOMMENDATION 5

Encourage cross-sectoral, bi-lateral and multi-lateral collaboration to advance economy systems and policies.

Rationale

The circular economy will require collaboration across multiple stakeholders within and across countries, as global systems are highly interconnected. Collaboration will be needed on research, standards and technologies to enable the success of circular economies.

POLICY ACTIONS

5.1 Encourage international collaboration through establishing a global platform on circularity.

5.2 Establish cross-industry partnerships, in collaboration with scientific community to advance R&D of circular economy systems.

5.3 Collaborate and assist technically & economically to promote circular economy technologies.

5.4 Support early and mid-career Circularity researcher and entrepreneurs thru visitations, events and platforms for businesses (both large and MSM enterprises).

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6 Funding

POLICY RECOMMENDATION 6

Create funding and support for circular economy technologies

Rationale

Circular economy technologies are new and require financial support to advance from concepts to commercially viable systems. Given the immaturity of technologies support will be needed to incentivize companies and countries to transition towards a circular economy.

POLICY ACTIONS

6.1 Support funding for multidisciplinary research into circular economy technologies

6.2 Identify technical, socio-economic and administrative problems that needs to be solved to achieve circular economy and realize its benefits by conducting holistic assessments of each nation's needs, resource availability and technological capacity.

6.3 Promote public investments in shortlisted technologies and focus areas, particularly those that allow for closed loop systems by conducting and leveraging a holistic assessment of each nation's needs, resource availability and technological capacity.

6.4 Provide incentives to private sector firms for undertaking required R&D and investment initiatives to change to circular economy.

6.5 Establish legal and economic incentives to foster acceptance and application of recovered resources and products by end-users in different sectors such recycled combustion emissions, recycled wastewater, recycled materials and recycled foods.

6.6 Encourage public private partnerships to invest, collaborate and benefit economically from circular economy R&D.

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7 Data Sharing

POLICY RECOMMENDATION 7

Develop methods for generating, collecting and sharing data globally

Rationale

Sharing data in a secure and transparent manner will be vital to achieving the goals of the circular economy given the global interconnectedness of systems.

POLICY ACTIONS

7.1 Encourage open-access and standardization of circular economy data, to promote collaboration between government, utilities, academia and other stakeholders within and across countries.

7.2 Guide the development of digital systems for data gathering and sharing, including on secure protocols for ensuring data is protected.

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