Waste Management as a Mechanism for Transitioning to a Circular Economy in Light of Sustainable Development Requirements: United Arab Emirates

Boukhezna Yacine[1]

y.boukhezna@gmail.com

University of Echahid Hamma Lakhdar, Eloued, Algeria

Abdelkamel Maamri

abdelkamel-maamri@univ-eloued.dz

University of Echahid Hamma Lakhdar, Eloued, Algeria

Received: 07/10/2022 Accepted: 05/12/2022 Published: 14/01/2023

Abstract:
The circular economy is an economic system designed to rebuild capital, enhance resource returns, and maximize their utility by minimizing waste through the recycling of products and raw materials at all stages. This approach represents a fundamentally different way of conducting business. The United Arab Emirates (UAE) is rapidly advancing toward the adoption of a circular economy model. In collaboration with the World Economic Forum for the Middle East and North Africa, the UAE government has signed the "Accelerating the Circular Economy 360" initiative, positioning itself as one of the first countries globally to support this initiative. By implementing the circular economy model in its urban areas, the UAE is projected to realize savings of up to $28 billion from 2020 to 2030. The National Energy Strategy targets an increase in the contribution of clean energy to the national energy mix to 50% by 2050 and aims to enhance consumption efficiency by 40%. This strategy encompasses projects for converting waste to energy and transforming industrial waste into resources for other industries within the framework of the circular economy.

Keywords: Waste management, circular economy, United Arab Emirates.

Regul Sci. ™ 2023; 9(2): 3852 - 3866

DOI: doi.org/10.18001 /TRS.9.2. 246

Introduction

The demand for energy and waste generation has noticeably increased in developing countries over the past decades due to rapid urban growth and population expansion. Waste represents a broader challenge that affects human health, livelihoods, the environment, and prosperity. According to a 2018 World Bank report, rapid urban expansion, population growth, and economic development

1 المؤلف المرسل: الاسم الكامل، الإيميل: بوخزنة ياسين _ y.boukhezna@gmail.com

will push global waste to increase by 70% over the next 30 years—reaching 3.40 billion tons of waste generated annually, more than twice the population growth by 2050.

In response, scientists have not only criticized industrial capitalism for the ongoing environmental and climate deterioration threatening humanity's future but have also worked on developing alternatives and finding solutions to balance industrial necessity with environmental preservation. One key solution is the development of the circular economy model.

This research paper aims to address the following problem:
To what extent have the UAE's waste management efforts contributed to the transition toward a circular economy in light of sustainable development requirements?

We will attempt to answer this question based on the following points:

1. The Concept of Sustainable Development

Many definitions of sustainable development have been provided in various ways. The widely accepted definition is based on the "Our Common Future" report published by the Brundtland Commission in 1987. It states: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

The adoption of this term by the UN General Assembly gave it political importance and led to the development of sustainable development principles in 1992 by global leaders and decision-makers during the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil (1).

Sustainable development encompasses seven core concepts (2):

- **Interdependence:** Understanding the interconnected relationships between the environment and the economy at all levels, from local to global.
- **Citizenship and Stewardship:** The responsibilities each individual must bear to ensure a better world.
- **Needs and Rights of Future Generations:** Understanding society's basic needs and the impact of today's actions on future generations.
- **Diversity:** Respecting and appreciating cultural, social, and economic differences.
- **Quality of Life:** Recognizing that global equality and justice are essential elements of sustainability and basic needs to be met worldwide.
- **Uncertainty and Precaution:** Acknowledging various approaches to achieving sustainability, adapting to ongoing changes, and recognizing sustainable and flexible learning methods.
- **Sustainable Change:** Understanding that resources are limited, which may negatively affect human lifestyles.

2. Historical Development of Sustainable Development 1950: The International Union for Conservation of Nature (IUCN) published the first report on the global environmental situation, pioneering approaches to balancing the economy and environment.

- **1968:** The Club of Rome was established to address excessive economic growth and its future impacts.
- **1972:** The UN-hosted Stockholm Conference on the Human Environment emphasized the link between environmental degradation, poverty, and lack of development. The conference criticized governments for neglecting environmental considerations in development planning.
- **1980:** The term "sustainable development" was first used by the IUCN in its report titled "World Conservation Strategy."
- **1987:** The Brundtland Commission officially adopted the concept of sustainable development in its report *Our Common Future,* advocating for a development model that balances environmental and developmental concerns.
- **1992:** The UN Conference on Environment and Development (Earth Summit) in Rio de Janeiro led to significant agreements, including climate change and biodiversity conventions, sustainable forest management guidelines, and Agenda 21 for global environmental and developmental goals.
- **1997:** The Kyoto Protocol aimed to reduce greenhouse gas emissions and promote renewable energy use.
- **2002:** The World Summit on Sustainable Development (Rio+10) in Johannesburg emphasized changing production and consumption patterns and preserving biodiversity and natural resources.
- **2007:** The International Climate Change Conference in Bali focused on global warming.
- **2010:** The Copenhagen Climate Summit addressed global warming but failed to produce binding agreements like the Kyoto Protocol (3).
- **2015:** On September 25, the UN Sustainable Development Summit adopted a landmark resolution titled *Transforming Our World: The 2030 Agenda for Sustainable Development.* The summit brought together 190 world leaders in New York to adopt the 17 Sustainable Development Goals (SDGs), establishing a roadmap to combat climate change and eradicate extreme poverty by 2030. This agenda expanded upon the Millennium Development Goals that had guided global efforts to address poverty and hunger over the previous 15 years (4).

3. Dimensions of Sustainable Development

Sustainable development encompasses multiple dimensions, reflecting the various risks it faces and the resulting impacts. These dimensions include:

A. Economic Dimension

The economic dimension of sustainable development is based on the principle of maximizing societal welfare and eradicating poverty by efficiently and optimally utilizing natural resources.

According to the final report of the "Johannesburg Earth Summit on Sustainable Development" held in September 2002, economic sustainability can be achieved in the following areas (5):

- **Water:** Ensuring sufficient supply and improving water use efficiency in agricultural, industrial, urban, and rural development.
- **Food:** Increasing agricultural productivity and production to achieve food security and enhance export capacity.
- **Health:** Boosting productivity through preventive and curative healthcare and improving workplace health and safety.
- **Housing and Services:** Ensuring adequate supply and efficient use of construction resources and transportation systems.
- **Energy:** Guaranteeing sufficient supply and efficient use of energy in industrial, transportation, and household sectors.
- **Education:** Ensuring the availability of skilled individuals for all key economic sectors.
- **Income:** Enhancing economic efficiency, promoting growth, and providing employment opportunities in the formal sector.

B. Social Dimension

Sustainable development aims to stabilize population growth rates to prevent excessive pressure on natural resources and reduce rural-to-urban migration. This is achieved by improving healthcare and educational services in rural areas and ensuring maximum public participation in development planning (6).

C. Environmental Dimension

The concept of environmental sustainability focuses on leaving the Earth in good condition for future generations. If human activities continue without depleting natural resources or damaging the environment, these activities are considered naturally sustainable. This can be achieved by reducing the consumption of natural materials, using fully recyclable and renewable materials, and collecting resources without harming or depleting the environment (7).

4. Waste Management and Circular Economy: Concepts and Foundations

1. Concept of Waste Management

Although there is no global consensus on the definition, two primary definitions are widely used to describe the concept of waste (8):

- **Basel Convention Definition:** Waste is defined as "materials or elements that are disposed of, intended to be disposed of, or required to be disposed of under applicable local regulations."
- **UN Statistics Definition:** Waste is "materials that are not considered marketable products (i.e., products produced for market consumption) and cannot be used by manufacturers in industrial, production, processing, recycling, or consumption activities, and therefore must be disposed of."

This definition generally includes materials generated during raw material extraction, processing, or product consumption. However, waste reused or recycled at its production site is excluded.

Numerous scientific studies have shown that prevention is at the forefront of the waste management hierarchy and represents the preferred policy approach for managing materials. This approach serves as an alternative to reducing material or resource wastage.

Many developing countries have adopted strategies based on waste management systems (see Figure 1) to increase waste-related returns in the form of energy, fuel, heat, recyclable materials, value-added products, and chemicals, as well as job opportunities. Consequently, waste is no longer seen as mere garbage but as a resource. It helps reduce landfill volume while also decreasing dependence on fossil fuels by generating eco-friendly energy sources.

Figure 01: Waste Management Sequence

(Source: Mohamed Rehan & Abdelsattar Nizami, *Integrated Waste Management to Enhance Economic Development: Achieving Returns from Waste Management*, Issue 19 – January 2018, Environment Center for Arab Cities, www.envirocitiesmag.com)

2. Concept of the Circular Economy

- The interest in the concept of the circular economy gained momentum through the "Cradle to Cradle" movement, championed by the Ellen MacArthur Foundation, which focuses on addressing resource scarcity and the need to reduce waste. It also emphasizes building supply chains that increase recycling, reuse, and remanufacturing rates (9).
- The term "circular economy" was first introduced in the book *Economics of Natural Resources and the Environment* (1989) by David Pearce and R. Kerry Turner, published by Johns Hopkins University Press. The authors distinguish between the linear economy, where resource consumption is open-ended, and the circular economy, where resources are recycled and reused multiple times.

- A circular economy produces minimal waste and has limited negative environmental impacts. It revolves around recycling components and products, ensuring high-quality reuse. Goods are designed from the outset to be repairable and renewable, enabling their use multiple times for optimal and efficient resource utilization, thereby promoting sustainable development (10).
- **Definition:** The circular economy is a system of production, exchange, and consumption that aims to optimize resource use throughout the lifecycle of a product or service in a circular model, reducing the environmental footprint and contributing to individual and community well-being (11).
- **Key Concept:** The circular economy is an industrial economy designed to avoid waste and pollution from its inception. It involves two types of material flows:
  - **Biological Nutrients:** Designed to safely re-enter the biosphere.
  - **Technical Nutrients:** Designed for high-quality recycling within the production system without entering the biosphere and can be repaired and renewed from the design stage (12).

The concept encompasses more than just the production and consumption of goods and services. It also includes:

- Transitioning from fossil fuels to renewable energy sources.
- Emphasizing diversity as a characteristic of resilient and productive systems.
- Discussing the role of finance and funding within the broader economic conversation (13).

Some proponents of the circular economy have called for updated tools to measure economic performance. Notably, in 2014, the European Commission established a monitoring framework for the circular economy. This framework aims to track the progress of the circular economy across various dimensions throughout the lifecycle of resources, products, and services. The framework consists of ten indicators grouped into four key stages and aspects:

- **Production and Consumption**
- **Waste Management**
- **Secondary Raw Materials**
- **Competitiveness and Innovation**

This framework follows a comprehensive action plan that integrates all dimensions of the circular economy (14).

3. Importance of the Circular Economy: From Linear to Circular Economy

Numerous studies highlight that the circular economy will revolutionize the utilization of massive waste resources, which exist in every society. It will transform waste into one of the most valuable sectors for national economies, given that it is the only productive sector where inputs are abundant and inexpensive. According to a 2015 report by the *World Economic Forum* and the *Ellen*

MacArthur Foundation, the circular economy is expected to save the global economy $1 trillion by 2025 and create 100,000 new jobs within five years (15).

The circular economy plays a crucial role in sustaining limited economic resources by optimizing their use. It drives innovation in the reuse of materials, components, and products, while minimizing waste during both manufacturing and post-production processes.

As a new economic model, the circular economy aims to change unsustainable production methods and consumption patterns. It seeks to maintain the value of products, materials, and resources in the economy for as long as possible, significantly reducing waste. It also promotes efficiency, reduces electricity consumption, and lowers carbon dioxide emissions while modernizing the economic system and creating sustainable employment opportunities.

In contrast, the **linear economy** operates on a traditional model where raw materials are extracted, manufactured into products, consumed, and then discarded as waste (produce, use, dispose). The circular economy, on the other hand, manages the product lifecycle from design and production to consumption and waste management, following the "cradle to cradle" approach (16).

The importance of the circular economy also lies in creating new opportunities for growth. It leads to waste reduction, increased resource productivity, and a more competitive global economy. It strengthens countries' ability to address future resource security challenges while minimizing the environmental impacts of production and consumption.

Transitioning from the **current unsustainable linear economic model**, which operates on the fragile assumption of unlimited resources and follows a "take, make, dispose" approach, represents a transformative step. For example, Germany accelerated this shift by adopting a policy to eliminate landfill dumping by 2005 and embraced the sustainable circular economy model.

The European Parliament Research Service noted that the circular economy "preserves the value of materials and products at the highest possible level for as long as possible" through the cyclical use of materials in the economy. This model "minimizes the need for new material and energy inputs, thereby reducing the environmental pressures associated with the lifecycle of products, from resource extraction through production and consumption to the end of life. (17)"

The following figure illustrates this concept:

Figure 02: Concept of the Sustainable Circular Economy

Source: Peter Heck and Michael Knaus, *Circular Economy: Turning Burdens into Resources*, Issue 19 – January 2018, Arab Cities Environment Center.

The circular economy operates on four levels: products, companies, networks, and policies.

1. **Products:** Products should be designed to be recyclable and reusable, relying on environmentally friendly supply chains and pollution-free manufacturing methods.
2. **Companies:** New business models are necessary for both private and public benefit.
3. **Networks:** There should be collaboration between business networks that manufacture essential products, such as automobiles, and consumer networks that use these products.
4. **Policies:** Supportive policies are essential for fostering circular economy markets.

Despite the absence of comprehensive international policy efforts integrating circular economy methodologies, these approaches can significantly contribute to achieving many UN Sustainable Development Goals (SDGs), including those related to water, energy, economic growth, and climate change (18).

The **World Bank** warns that global waste is projected to increase by 70% by 2050 unless urgent action is taken. Annual global waste generation is expected to rise from 2.01 billion tons in 2016 to 3.4 billion tons over the next three decades due to rapid urban expansion and population growth. Laura Tuck, Vice President for Sustainable Development at the World Bank, emphasized that poor waste management harms human health and the environment while exacerbating climate challenges. "Unfortunately, the poorest people in society often suffer the most from inadequate waste management. We must use and reuse our resources continuously to prevent them from ending up in landfills," she stated.

The report highlights that effective waste management systems are critical to building a circular economy, where products are designed and optimized for reuse and recycling. As national and local governments adopt the circular economy model, smart and sustainable waste management practices will help foster efficient economic growth while reducing environmental impact (19).

Ede Ijjasz-Vásquez, Senior Director for the Social, Urban, Rural, and Resilience Global Practice at the World Bank, remarked: "Solid waste management is everyone's responsibility. Effective and proper waste management is essential for achieving sustainable development goals. (20)"

4. Goals of the Circular Economy

The circular economy aims to decouple economic growth from the consumption of natural resources and ecosystems by using resources more efficiently. It drives innovation in reusing materials, components, and products while promoting new business models. The circular economy seeks to keep raw materials and products in productive cycles for as long as possible, eliminating waste in industrial systems. This reduces dependence on finite resource reserves, enabling companies to unlock new value sources and create resilient, sustainable supply chains and markets.

Benefits of transitioning to a circular economy include (21):

- **Cost savings:** Optimizing resource use reduces operational expenses.

- **Efficient resource utilization:** Maximizes resource value throughout their lifecycle.
- **New revenue streams:** Identifying opportunities for circular business models.
- **Enhanced stakeholder relationships:** Strengthened engagement with partners.
- **Crisis mitigation:** Reduced vulnerability to resource shortages or disruptions.
- **Market development:** Creation and expansion of sustainable market opportunities.
- **Improved competitiveness:** Strengthening market position and job creation.
- **Corporate sustainability:** Enhancing brand reputation through sustainable practices.
- **Preservation of stock value:** Maintaining the relevance of existing technologies.
- **Small-loop profitability:** Facilitating product reuse, repair, and remanufacturing.
- **Innovation driver:** Encouraging eco-friendly production, responsible consumption, and recycling.

5. Core Principles of the Circular Economy

- **Waste as Resources:** There is no waste in a circular economy. Biological and technical components are intentionally designed to enter material cycles.
- **Diversity as Strength:** Diverse products, materials, and systems with multiple connections and scales are more resilient to external shocks than those built solely for efficiency.
- **Renewable Energy:** Energy must come from renewable sources.
- **Systems Thinking:** Viewing elements as interconnected parts of a whole and considering their relevance in the contexts of infrastructure, environment, and society.
- **True Cost Reflection:** Prices and other feedback mechanisms should reflect the full cost, including negative externalities.
- **Recycling Principle:** Recycling involves reprocessing waste into products or materials for their original purpose or other uses. Recycling provides an opportunity to utilize still-usable resources and reduce the amount of waste requiring processing and/or disposal (22).

Figure 03: Sustainable Circular Economy through Waste Management

Source: Mohamed Reihan, Abdul Sattar Nizami, *Integrated Waste Management for Economic Development: Achieving Returns from Waste Management*, Issue 19 – January 2018, Arab Cities Environment Center.

Effective waste management must be tailored to the specific social and economic context of each country, considering local waste sources, composition, and market availability for energy and recovered final products.

The **linear model** (production, consumption, disposal) leads to the depletion of natural resources. Therefore, transitioning to a different economy is essential—one where consumption is rationalized, products have longer lifespans, and waste is converted into new resources. This shift involves three main areas:

1. **Optimal Production:** Maximizing resource efficiency in manufacturing.
2. **Optimal Consumption:** Promoting responsible consumption patterns.
3. **Optimal Waste Exploitation:** Ensuring efficient waste management.

Optimal Waste Management (Recycling)

The circular economy loop cannot be completed without proper waste sorting and recycling to reintegrate waste into new products while ensuring their performance and safety.

Currently, waste management often suffers from neglect, improper disposal, and environmental pollution, leading to adverse effects on both the environment and human health. Therefore, strategies must shift in line with circular economy principles and sustainable development.

Recycling can be defined as the process of **reprocessing waste materials or used items**, such as empty bottles, plastic bags, and damaged devices, transporting them to production or sales facilities, and earning monetary returns while reducing environmental problems. The process also benefits from raw materials and turns them into new products.

Recycled products and recyclable materials must bear specific labels to inform customers that the product is made from recycled waste and can be reused after consumption (23).

Fifth: International Experiences in Waste Management Within the Transition to a Circular Economy

1. The European Union Experience

The European Union (EU) developed an action plan to support the circular economy, providing billions of euros to increase resource efficiency. By 2020, structural and cohesion funds were set to invest billions in improving resource use, promoting research and innovation, transitioning to carbon-neutral technologies, and supporting small and medium enterprises. Additional measures included attempts to change waste legislation and set specific targets to encourage recycling by companies.

A report by the European Commission indicates that the circular economy in the EU is expected to generate returns of approximately **€14 trillion by 2030**, while reducing carbon emissions by

nearly **450 million tons annually**. Additionally, **5.8 million jobs** could be created by focusing on the circular economy, and each household could save around **€500 per year** on energy costs.

David Palmer-Jones, President of the European Recycling Federation, highlighted that approximately **800 million tons** of waste are discarded in landfills annually. These waste materials and the energy they hold are essentially buried. Palmer-Jones emphasized the need to provide local equipment and infrastructure to help both residents and industries reuse materials. He also stressed the importance of **eco-design**, where products are designed to last longer, potentially reducing waste by **80%**.

Measures Adopted by the EU to Support the Circular Economy (24):

- **Recycling Target for Packaging Waste:** A common European target of **75% by 2030**.
- **Recycling Target for Municipal Waste:** A goal to recycle **65% by 2030**.
- **Landfill Reduction Target:** The maximum amount of waste disposed of in landfills must not exceed **10% by 2030**.
- **Ban on Landfilling Separately Collected Waste:** Prohibiting the disposal of separately collected waste in landfills.

2. The Netherlands (Amsterdam) Experience in the Circular Economy

The circular economy plays a crucial role in achieving the sustainable development goals adopted by the Netherlands. It is expected to generate **€7 billion annually** and create **54,000 jobs**. The Deputy Mayor of Amsterdam emphasized, "Thanks to its growth, cities provide a new opportunity to stimulate innovation and transition from a linear to a circular economy. This opportunity is essential because without tangible economic impact, the transition may not happen as quickly as desired."

By incorporating the circular economy into the construction sector, the municipality expects to gain an additional **€85 million annually** and increase productivity by **3% by 2040**. One example is the **Park 2020** project.

Amsterdam aims to recycle **30% of household waste** this year and **65% by 2020**, making it a pioneer in reaching the common European target, which was originally set for 2030. The Netherlands has also achieved the EU target to reduce landfill waste to **10% by 2030**, having completely banned landfill disposal since **2010** (25).

Sixth: The UAE Experience in the Circular Economy

The UAE is rapidly adopting the circular economy model. In collaboration with the World Economic Forum for the Middle East and North Africa, the UAE signed the **"Circular Economy 360 Acceleration" initiative**, becoming the first global supporter of this initiative. This reflects the country's position as a global hub and open laboratory for economic and technological innovation and a leading model in sustainable development. The initiative aims to apply sustainability concepts to existing and future projects to preserve resources, increase reliance on clean energy, and implement sustainable development standards.

The UAE's Ministry of Community Development, Ministry of Climate Change and Environment, and the **Alliance for Global Sustainability** signed a memorandum of understanding regarding the circular economy. This makes the UAE the first global supporter of the initiative, aiming to enhance cooperation between these parties and achieve the UAE's sustainable development goals (26).

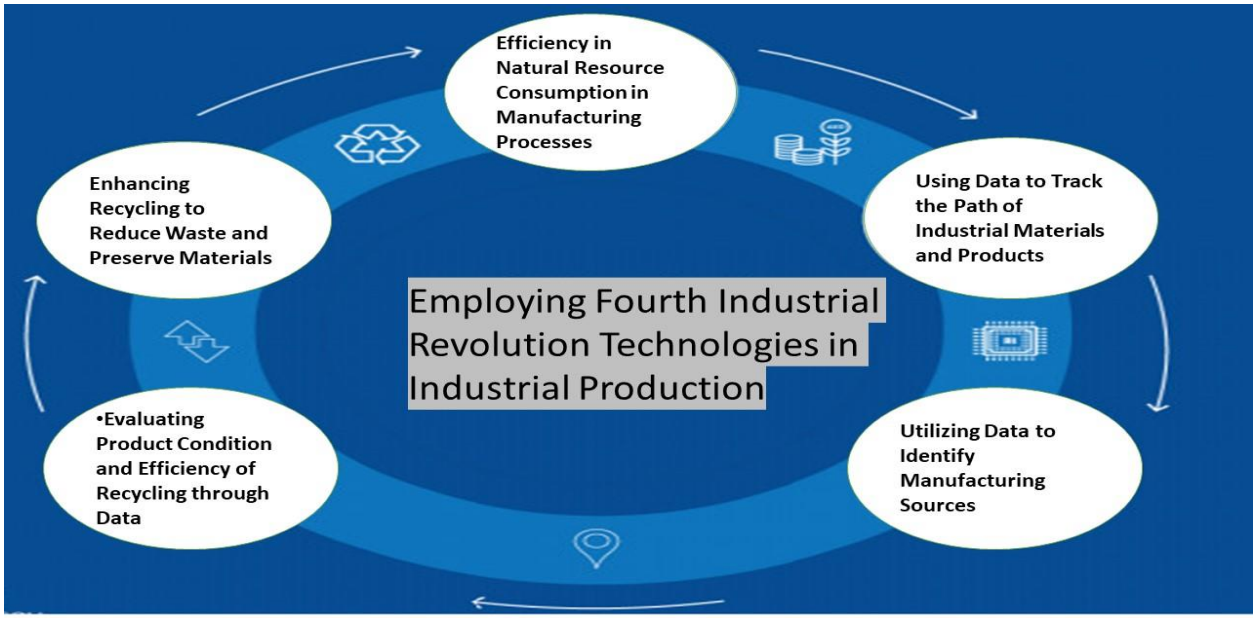
The innovative economic concept focuses on waste reduction by designing recyclable and renewable products, ensuring their continued usefulness even after their lifespan ends while achieving efficient resource use. The initiative seeks to employ **Fourth Industrial Revolution technologies** to achieve an efficient and effective circular economy, which will revolutionize resource management and make waste one of the most valuable sectors contributing to national economies.

The UAE's commitment to this economic and developmental transformation aligns with its national and strategic economic visions, particularly **UAE Vision 2021**, **Abu Dhabi Economic Vision 2030**, **Dubai Industrial Strategy 2030**, **UAE Future Foresight Strategy**, and **Abu Dhabi Environmental Vision 2030**.

UAE Vision 2021 Circular Economy Goals:

- **Waste Management:** Ambitious goals to reduce waste and develop renewable energy sources and water recycling.
- **Sectoral Requirements:** Waste management is a key component, with efforts focused on maximizing material efficiency and optimizing resource inputs at the national level, particularly in Abu Dhabi.
- **Value Creation:** Improving production efficiency and resource management to foster a robust circular economy model.

Figure 03: Circular Economy 360 Acceleration Initiative for the UAE



Source: Ministry of Climate Change and Environment - United Arab Emirates, www.moccae.gov.ae

The **National Energy Strategy** aims to increase the contribution of clean energy to **50% of the national energy mix by 2050** and improve consumption efficiency by **40%**. The strategy includes projects for waste-to-energy conversion and utilizing industrial waste as resources in other industries within the concept of the circular economy.

Forecasts indicate that adopting the circular economy model in UAE cities could result in savings of **$28 billion (102.8 billion AED)** between 2020 and 2030. These savings are distributed as follows:

- **$7.2 billion** in the urban environment
- **$11 billion** in transportation systems
- **$9.8 billion** in homes

Additionally, the model is expected to reduce **23 million tons of carbon emissions** during the same period, distributed as:

- **1.3 million tons** in the urban environment
- **4.5 million tons** in transportation systems
- **17 million tons** in homes

Figure 04: Economic Returns of the UAE Circular Economy Model

Source: Amro Adel, *The Circular Economy: UAE's Path to Sustainable Development*, *Al Bayan Economic Magazine*, March 17, 2019. Available at: www.albayan.ae

Conclusion

The circular economy will create new job opportunities in sectors such as remanufacturing, repairing old goods, and maintaining buildings, bridges, and other infrastructure facilities. It will also help preserve natural and financial capital, reduce construction and development costs, and foster innovation in sustainability and resource conservation.

Policymakers and stakeholders must select appropriate mechanisms to activate the circular economy. They need to innovate new methods to achieve long-term sustainable growth in line with global sustainable development trends. The UAE has demonstrated a strong commitment to this transformation by signing the "Circular Economy 360 Acceleration" initiative, becoming the first country globally to support the initiative. This reflects the UAE's position as a global hub and open laboratory for economic and technological innovation and a leading model for sustainable development. Forecasts indicate that implementing the circular economy model in its cities could yield savings of **$28 billion** during the period **2020–2030**.

References:

1. Moussa Bahy, "Sustainable Development and Economic Diversification in Oil-Rich Arab Countries," PhD Thesis, Knowledge Economy and Globalization Department, University of Annaba, 2018/2019.
2. Fatima Mubarak, "Sustainable Development: Its Origins and Emergence," Accessed: 26/07/2019.
3. Dounia Khenchoul, "The Reality of Sustainable Development in Algeria," Economic Studies Journal, Vol. 5, Issue 1, June 2018.
4. Maritza Vargas, "Sustainable Development Goals: 'Transforming Our World' Through Innovation,"
5. Mohamed Taher Kadri, "Sustainable Development in Arab Countries: Between Theory and Practice," Hussein Al-Asriah Publishing and Distribution Library, Lebanon, 2013, p. 80.
6. Khaled Mustafa Qasim, "Environmental Management and Sustainable Development in the Era of Contemporary Globalization," University Press, Alexandria, 2007, p. 158.
7. Dounia Khenchoul, "The Reality of Sustainable Development in Algeria," Economic Studies Journal, Vol. 5, Issue 1, June 2018.
8. Peter Hick, Michael Knauf, "Integrated Waste Management to Enhance Economic Development: Circular Economy: How to Turn Burdens into Resources," Issue 19 – January 2018, Arab Cities Environmental Center,
9. Iman Aman, "Circular Economy... A Global Trend to Apply Sustainability Standards," Saudi Magazine, 03 November 2017,
10. Bassam Samir Al-Ramidi, "Circular Economy as a Creative Approach to Reduce Environmental Footprints and Achieve Sustainable Tourism Development," Journal of Economics and Business, Vol. 2, Issue 4, December 2018, University Center of Mila.
11. Fatima Zahra Kandouz, Ali Al-Zoubi, "Requirements for the Transition from Linear to Circular Economy to Protect the Environment," Journal of Business Sciences, School of Graduate Business Studies, Issue 17, December 2018.
12. Taqrart Yazid, Kzeiz Nisreen, Kzeiz Amal, "Circular Economy and Its Role in Enhancing Sustainability Standards as a New Trend in Urban Development," Journal of Financial and Economic Studies, University of Al-Wadi, Issue 1, December 2018.

13. Magdy Said, "Circular Economy... A More Sustainable Industrial Economy," 09 May 2016, Available at:
14. Sara Al-Jazzar, "Opportunities and Available Fields to Apply Sharing Economy and Circular Economy in the Arab World to Achieve Sustainable Development," Arab Chambers Federation, 2018.
15. Asaad Hamoud Al-Saadoun, "Circular Economy... Its Concept, Importance, and Position in Gulf Culture (2)," Gulf News Magazine, 28 December 2018, Available at:
16. Manuel Hidalgo, "Integrated Waste Management to Enhance Economic Development: Achieving Revenues and Economic Growth from Waste Management," Issue 19 – January 2018, Arab Cities Environmental Center,
17. Peter Hick, Michael Knauf, "Integrated Waste Management to Enhance Economic Development: Circular Economy: How to Turn Burdens into Resources," Issue 19 – January 2018, Arab Cities Environmental Center,
18. Young Jing, Joseph Sarkis, Raymond Bleischwitz, "Globalizing the Circular Economy," Nature Journal, 20 May 2019, Available at:
19. World Bank, "World Waste Will Grow by 70% by 2050 Unless Urgent Action is Taken," Press Release, 20 September 2018, Available at:
20. World Bank, "What a Waste: An Updated Look at the Future of Solid Waste Management," 20 September 2018, Available at:
21. Shamia Ben Abbas, "Circular Economy: A New Industrial Ecosystem for Applying Comprehensive Sustainability Standards," Milaf Journal for Research and Studies, Vol. 5, Issue 1, June 2019, University Center of Abdul Hafidh Boulssawaf, Mila.
22. Jaafar Saadi, Rashid Menassaria, "Green Supply Chain Management as an Approach to Activate Circular Economy," Journal of Financial and Accounting Studies, University of Al-Wadi, Issue 8, 2017.
23. Fatima Zahra Kandouz, Ali Al-Zoubi, "Refer to Previously Mentioned Source."
24. Euronews, "Circular Economy or How to Turn Waste into Raw Materials," 25/01/2016,
25. Euronews, "Circular Economy or How to Turn Waste into Raw Materials," Previously Cited Source.
26. Ministry of Climate Change and Environment - United Arab Emirates,