

PEOPLE'S COMMITTEE OF DA NANG CITY
DA NANG INSTITUTE FOR SOCIO-ECONOMIC DEVELOPMENT

Circular Economy Roadmap in Da Nang city

(Updated version)



Circular Economy Roadmap in Da Nang city

The task is assigned by Decision no. 1102/QĐ-UBND dated April 21, 2022 of the People's Committee of Da Nang City and is performed with the coordination and support of the United Nations Development Programme (UNDP).

Da Nang, August 2022



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DISED wishes to send special thanks to UNDP, which the team has sponsored, accompanied and supported DISED throughout the process, especially:

Mr. Nguyen Tuan Luong	Head of Solutions Mapping Accelerator Lab
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for their assistance and expert contributions.

Additionally, DISED would like to highlight Ms. Nguyen Thi Thanh Xuan for her illustrations and Ms. Nguyen Trinh Thien Kim for her design and layout of the Roadmap.

Contributing organizations

DISED also extends our gratitude to the contributing organizations, along with their representatives:

Dr. Lai Van Manh	Institute of Strategy, Policy on Natural Resources and Environment (ISPONRE)
Assoc. Prof. Dr. Nguyen Hong Quan	Institute for Circular Economy Development (ICED)
Ms. Hughes Maria	Finnish Innovation Fund (SITRA)
Mr. Ito Yuichi	Japan Manned Space Systems Corporation (JAMSS)
Mr. Nguyen Dinh Phuc	Da Nang City Union of Science and Technology Associations
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Mr. Nguyen Tien Hiep	Vietnam Chamber of Commerce and Industry - Da Nang (VCCI)

The authority of Da Nang city

DISED also appreciates the comments from the departments, agencies, and districts in Da Nang city, especially:

- the Department of Planning and Investment
- the Department of Agriculture and Rural Development,
- the Department of Science and Technology,
- the Department of Construction,
- the Department of Justice,
- the Department of Industry and Trade,
- the Department of Natural Resources and Environment,
- the Department of Home Affairs,
- the Department of Finance,
- the Department of Tourism,
- the Department of Education and Training,
- the Department of Information and Communications,
- the Department of Culture and Sports,
- the Department of Labor, Invalids and Social Affairs,
- the Department of Transport, Hi-Tech Park and Industrial Zones Authority,
- Danang Women's Union.

The expressed opinions in this publication are those of the authors and do not necessarily represent fully the views of their respective organizations or members.

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Introduction

In Vietnam in general and Da Nang City in particular, economic activities have been adopting the traditional approach, which is called linear economy. Goods are produced from raw materials, sold, used (consumed) and then mostly disposed of as waste. At the same time, many consumer products are not used to their full life cycle, and some are purchased for a single use only. In that context, the concept of circular economy has emerged and encouraged the gradual shift from the linear model to a model of better use of resources, which is not only more sustainable but also opens up new opportunities for transformation to inclusive growth model.

Circular economy is currently becoming a common development trend globally and has been chosen to become the focus of development policies in many countries and cities around the world with the aim toward sustainable development. In Vietnam, the Law on Environmental Protection 2020 specifically mentions the development of circular economy in the Article 142, “*Circular economy is an economic model in which design, production, consumption and service activities aim at reducing the exploitation of raw materials, prolonging the product life cycle, limiting the generation of waste and minimizing adverse impacts on the environment*”. Decree no. 08/2022/ND-CP dated January 10, 2022 of the Government detailing a number of articles of the Law on Environmental Protection 2020 has specified criteria, roadmap and mechanism to encourage the development of circular economy. Decision no. 687/QĐ-TTg dated June 7, 2022 of the Prime Minister approving the Project for development of circular economy in Vietnam has also assigned the People's Committees of provinces and cities to actively develop and implement the roadmap, tasks and solutions to facilitate circular economy models and projects in the localities.



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An assessment of current situation and analysis of opportunities and challenges for the development of circular economy in Da Nang City shows that there are many reasons why it is necessary to transform and apply the circular economy model to Da Nang City: (1) put an end to the situation where the volume of waste has been continuously increasing while there is no effective treatment plan and the economic value of waste cannot be exploited; (2) limit negative impacts on the environment caused by the linear economic model; derive benefits in the context of resource scarcity and climate change; (3) exploit the City's existing high-tech foundation; (4) overcome and correct socio-economic problems such as rapidly aging population, unstable economic growth affected by non-traditional risks, unemployment, low-wage jobs, low skills, income inequality, gender inequality; (5) achieve many targets and indicators required by the SDGs.

To develop circular economy for the City, it is necessary to assess the current situation and specify goals and a roadmap that match the criteria of a circular city. The gap between current situation and future goals will create enormous innovation potential for the City. This proposal is made based on updated content of the Summary Report of the Research on building and developing circular economy in Da Nang City, on the basis of adopting relevant documents associated with the Law on Environmental Protection 2020, supplementing lessons learned from the policy experiment on circular economy in Da Nang City, incorporating gender equity issue and recognizing the importance of an informal waste collection system in the transition to a circular economy model of Da Nang City.

The roadmap for development of circular economy in Da Nang City will be associated with overall and specific visions, goals, tasks and solutions to implement circular economy in Da Nang City within the 10-year national action plan period, from now to 2030.

Part 1:

CURRENT SITUATION OF ECONOMIC DEVELOPMENT IN DA NANG CITY AND SELECTION OF FOCUSED AREAS FOR DEVELOPMENT



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Ling Tang on Unsplash*



Photo by Hoang Hung on Unsplash

1 Overview of Da Nang City

Da Nang City is located in the middle of Vietnam, on the North-South arterial traffic axis. It is an important traffic gateway of both the Central and Central Highlands regions and the end point of the East-West Economic Corridor (EWEC).

Da Nang City has developed infrastructure. Da Nang Port is a modernly equipped container port in the Central region of Vietnam and one of the largest commercial ports in Vietnam. Da Nang International Airport is one of the three largest and most modern airports in Vietnam, operating more than 890 international flights per week. The City is the first place in the country to operate a city-wide wireless network named Da Nang Wi-Fi, providing a safe and convenient communication system for organizations and individuals. Information and communication technology infrastructure in Da Nang City meets international standards.

Da Nang City currently has: 06 industrial parks (1,066.52 hectares with the occupancy rate of nearly 90%) which have come into operation; Information technology infrastructure; Da Nang Hi-Tech Park (1,128.4 hectares) and Supporting Industrial Park for Da Nang Hi-Tech Park (58.53 hectares) under investment; and 03 new industrial parks which are calling for investment.

Da Nang City had a population of 1,169,480 people in 2020 with a population density of more than 910 people per square kilometer. It was the locality with the highest percentage of residents living in urban areas in the country (87.7%). The population of working age accounted for more than 51% of the City's population, the rate of trained workers reached 60%. Labor productivity in 2020 reached VND 171.6



1.169.480
people (2020)



910 Density
people/km²

87.7%

highest % of residents
living in urban areas

51%

population of
working age

60%

trained workers

Labor productivity

171,6
million VND/worker

million per worker, which was the highest in the Central Key Economic Region. Da Nang City has 36 universities and colleges, 70 vocational and training institutions¹ and more than 394 schools from preschool to general education². The annual number of graduates from education and training institutions is about 22,000 students.

Da Nang City has a safe and secure living environment. Da Nang City has many appealing tourist attractions with depth of history, culture and heritage such as Marble Mountains, Ba Na Mountain, Son Tra Peninsula and Cham Ancient Institute. The City is surrounded by three World Cultural Heritage sites: Hue, Hoi An and My Son.

The City's GRDP growth rate is higher than the national average, the production value of industrial, agricultural and fishery products is comprehensively developed. Da Nang City's economic structure has changed significantly toward increasing the proportion of industry and service in line with general trend of the whole country and big urban centers. Da Nang City has many humanistic social policies and programs such as "City of Five Nos", "City of Three Yeses" and "City of Four Safeties" which have been being implemented. The integration of action plans for the advancement of women and the implementation of the Law on Gender Equality into the socio-economic development plan receives attention from sectors, localities and unions³.

Da Nang City has been recognized as one of the cleanest cities in Vietnam. The City has initially achieved important goals such as:

- **the air pollution index (API)** in urban areas is **always less than 100**;
- **noise level is less than 60dbA** in residential areas and **less than 75dbA** on the street;
- **urban green space per capita is 6-8 square meter**;
- **the percentage of households using clean water is 97.83%** in urban districts and **76.81%** in rural areas;
- **the rate of industrial wastewater meeting discharge requirements reaches 100%**;
- **the rate of domestic solid waste collection is more than 95%** in urban areas and **more than 70%** in rural areas;
- the total amount of **domestic wastewater collected by 2020 reached over 83%**, **the rate of treatment meeting the standards was more than 50%**⁴.

Thereby, Da Nang City has been recognized and highly appreciated by ministries, agencies as well as domestic and foreign organizations and has won many prestigious awards such as:

- One of the eleven **ASEAN Environmentally Sustainable Cities** (2011);
- A city of **clean air and low carbon emissions of Asia** (2012);
- **Asian Townscape Award** (2013);
- **Excellent city** in the movement of building a green, clean and beautiful city, an excellent city in transformation (2015);
- **National Green City of Vietnam** (2018).

2 Current situation Circular Economic Development In Da Nang City

2.1. Current situation of some development areas relevant to the circular economy model

Review of the current situation of circular economy in Da Nang City in 04 phases, in prominent economic sectors and industries indicates the following characteristics.



1. **Design**

2. **Production** (including production/ manufacturing and distribution, retail)

3. **Consumption**

4. **Waste management and Waste-to-Resource Transformation**



Design

Development practice shows that a number of economic sectors/industries in Da Nang City have paid attention to the design following the principles of circular economy before putting it into practice.

Agriculture

For Da Nang City, the practice of agricultural development has signified some manifestations of circular economy, such as in Hoa Vang District, which has implemented the model of Garden - Pond - Barn and the variants of Garden - Pond - Barn - Biogas, or Garden - Pond - Barn - Forest;

Construction

Currently, FPT Complex is one of the pilot projects applying green - energy saving building standards, adopting 2013 version of QCVN09. It is currently the only project in Da Nang City which has been granted the certificate of Excellence in Design for Greater Efficiencies (EDGE)⁵. In addition, the buildings of Ecogreen Hotel, Nhu Minh Hotel and Cardiology Centre of Da Nang City have complied with the National Technical Regulation QCVN 09:2013/BXD.

In the period 2015-2019, Hoa Khanh Industrial Park was selected to pilot



Production and distribution

Model of eco-industrial park

the construction of an eco-industrial park⁶. During the period 2015 - 2019, Da Nang City cooperated with experts from Vietnam Cleaner Production Centre to support RECP assessment⁷ for more than 29 businesses; experts of the Project have proposed 334 cleaner production solutions; in which 228 solutions have been implemented, helping businesses save more than VND 14 trillion per year, reducing more than 50,000 cubic meters of wastewater, 7,000 tons of CO₂ and 2,700 tons of solid waste per year.

Development of renewable energy, clean energy, efficient use of energy

Among different types of renewable energy, Da Nang City has great potential in solar power. By the end of 2020, Da Nang City had 2,529 customers installing rooftop solar power with the total installed capacity of 81.7 MWp. There are no ground and water solar power projects.⁸

Moreover, in terms of energy audit report, 49 businesses which are key energy facilities (not counting those which are not key energy facilities) have compiled energy audit reports. The number of businesses/facilities having energy managers certified by the Ministry of Industry and Trade is 45. To improve efficiency and save electricity in urban traffic lighting, Da Nang City has also implemented two important projects: The Pilot Project to replace the public lighting system with LED lights and the Project to build a central control system and remote control system of electrical cabinets.

Circular economy model in a number of businesses in Da Nang City

Many businesses in Da Nang City have applied the circular economy model in their production and business activities, including: Businesses which have invested in the production of non fired bricks; companies which have solutions to save energy and achieve high efficiency; Minh Hong Biotechnology Co., Ltd which is one of the typical businesses applying circular economy in production, turning collected organic waste into organic dish washing liquid, organic laundry detergent, floor cleaner, etc., businesses and start-up projects adopting circular economy such as the models of Green Run Series, VietArt, Fuwa Refill Station, Green Building, Green University DUE, etc.

Many agricultural production models applying high technology which is environment-friendly at various scopes (households, cooperatives,

6 The Global Environment Facility and the Federal Department of Economic Affairs of Switzerland have sponsored Vietnam to implement the project "Implementation of Eco-industrial Park Initiative for Sustainable Industrial Zones in Vietnam". The project have conducted pilot construction of eco-industrial parks in 3 industrial zones, including: Khanh Phu Industrial Park (Ninh Binh), Hoa Khanh Industrial Park (Da Nang) and Tra Noc Industrial Park 1&2 (Can Tho). Objective of the pilot component is to select good examples of how low-carbon and resource efficient technological solutions can be implemented.

7 Resource Efficiency and Cleaner Production (RECP) is a combination of solutions to reduce resource consumption and emissions in the production process, promote recycling and reuse of resources on-site.

8 The role of energy in circular economy. Nguyen Dinh Phuc. Proceedings of the scientific conference "Research on building and developing circular economy in Da Nang City"

Circular economy model in Agriculture, Forestry and Fishery

enterprises) have initially asserted their economic efficiency such as growing safe vegetables in net houses following VietGAP standards (Hoa Khuong, Hoa Phong, Hoa Tien communes of Hoa Vang District, La Huong, Hoa Tho Dong wards of Cam Le District), growing flowers in net houses (Hoa Chau, Hoa Phuoc communes of Hoa Vang District), raising chickens for eggs using cold barn technology (Hoa Ninh Commune), etc.

Accommodation and food services

For accommodation and food services, the collection of leftover food for resale to livestock production or for processing of organic fertilizer can be considered as a circular economy approach. Many hotels encourage guests to reuse towels, collect and recycle used soap bars, and plastic items (toothbrushes, combs, etc.) are collected and resold to collection and recycling facilities.

Da Nang City has launched the movement to limit the use of non-biodegradable plastic bags at markets and supermarkets in the city. The City has also promulgated and trained the implementation of 01 Code of Conduct for tourism activities in Da Nang City written in many languages (Vietnamese, English, Chinese, Korean, etc.) and 09 sets of professional standards for tourism business activities⁹; which provide instructions and reminders to relevant parties about reducing the use of plastic bags and single-use plastic products, and having solutions for reuse and recycling plastic products to protect the environment.

Administrative activities and supporting services

The movement to say "no" to plastic bottles has been launched and received positive responses from many agencies, businesses and other organizations in Da Nang City. It has partly contributed to changing the long-standing habits in offices of Da Nang City. So far, 100% of meetings and receptions at Da Nang City Administrative Center use glass water bottles instead of convenient plastic bottles.

Development of Sharing Economy in Da Nang City

Services based on the principles of sharing economy are a form of circular consumption. The foundation for the emergence of sharing economy model is the rapid development of Internet and the main element of this model is the connection among consumers. In Da Nang City, the sharing economy model is associated with businesses such as: Bee, Grab, Airbnb; followed by the appearance of many Vietnamese start-ups such as: Ahamove, jupviec.vn, Com me nau, etc.

According to a report of the Department of Natural Resources and

⁹ Including: tourist accommodation, travel, tourist attractions, adventure tourism products, tour guides, dining facilities, shopping facilities, spa-massage facilities, transport vehicles, tourist boats and tourist beaches.

Green consumption behavior of the citizens in Da Nang City

Environment, in the city up to now, 37 models associated with green consumption have been implemented such as waste battery collection bins, green roofs, growing bananas for leaves, civilized garbage collection points, environmentally self-governing residential areas; environment-friendly teams; no garbage villages; no garbage schools, women limiting the use of plastic bags, etc. In general, the trend of green consumption in Da Nang City is spreading and receiving positive responses from the citizens and manufacturers. Women tend to adopt greener and more sustainable practices than men, from sorting waste, saving power and water to buying green products. The emergence of business ecosystems with social impacts or consumption patterns associated with circular economy is mainly driven by women. This indicates the influence of women in changing both consumption and production patterns toward circular economy.¹⁰



Waste management and waste-to-resource transformation

a) Domestic solid waste

Classification of domestic solid waste

Implementing the plan of domestic solid waste classification at source, in 2020, the City completed the arrangement of 250,000 recyclable waste classification bags for households, 110 recyclable waste collection trucks for residential areas, 141 bins for concentrated classification of hazardous domestic solid waste for wards and communes, 731 bins with 2 sorting compartments on main streets and 08 bins with 3 sorting compartments for classification of recyclable solid waste at offices. The above works have initially produced positive results. In 2021, the rate of domestic solid waste classification at source was 77.84% of households, 82.96% of residential groups, 233/233 schools (100%), 67.81% of businesses and 100% of health care facilities.

Collection of domestic solid waste

In 2020, the average total amount of domestic solid waste was about 1,087 tons per day. Compared to 2019 (with an average total amount of 1,177 tons per day), the amount of domestic solid waste decreased by 8% due to Covid-19 pandemic. The average quantity of emissions per capita is about 1 kilogram per person per day. In the past 5 years, the City's waste collection rate has reached about 95%.

The composition of domestic solid waste in the City has changed in the proportion of waste types. Organic waste has the largest proportion, accounting for 55%. The proportion of plastic waste in domestic solid waste of Da Nang City accounts for about 14% to 21% ¹¹.

The amount of solid waste that the City has collected according to statistics

¹⁰ The tactics to drive a gender-inclusive circular economy. <https://climatepromise.undp.org/news-and-stories/tactics-drive-gender-inclusive-circular-economy>

¹¹ WWF: Plastic Smart Cities - National study on the current situation of solid waste and plastic waste in Vietnam, December 2019

is transferred to Khanh Son landfill in a cycle starting from the source of waste (households, markets, commercial and service facilities, offices), to garbage truck, garbage gathering point and finally following the truck to the landfill.

Domestic solid waste recycling

A small portion of recyclable waste is sorted by households and collected by street scavengers or landfill scavengers. Recyclable waste is sold to scrap dealers, then goes from there to recycling facilities. In 2020, the total amount of recyclable waste that Da Nang City collected through pilot programs and projects was 200 tons, equal to the amount of recyclable inorganic waste mixed in the total amount of waste for one day of the City. The remaining 364 days of recyclable waste is either collected by the informal sector or wasted.

Treatment of waste

The management and treatment of solid waste in the City in recent years have undergone many changes, contributing to basically resolving the problems of environmental pollution and public health caused by solid waste. However, the infrastructure for waste collection, transportation and treatment is not synchronous, so the ability to reuse, recycle and circulate waste is not high. Currently, Da Nang City is building two waste incineration plants with the total capacity of 1,650 tons per day in the form of PPP (Build - Lease - Transfer) with minimum contract term of 25 years to resolve the current problem of waste treatment.

Informal circular economy system: informal scrap collectors

In parallel with the solid waste collection process of the Department of Natural Resources and Environment of Da Nang City, informal waste workers are playing a key role in the waste management system¹². This workforce participates in multiple activities including collection, alongside formal workers of URENCO. This workforce is very diverse, including street scavengers, scavengers at Khanh Son landfill, citizens occasionally collecting scraps during a cleanup job or independent waste workers. Informal waste workers buy or collect scraps from households to resell to scrap dealers which provide scraps for recycling facilities.

In Da Nang City, informal waste workers play an important role in the recovery of recyclable waste in general, with the total collection rate of 6-7.5% of the total amount of waste brought to the landfill (about 1,000 tons per day). They buy recyclable scraps and pay money to households (and other waste sources) when the recyclable materials are sorted at source. Their activities are spontaneous and partly help to ensure public services in urban areas.

b) Solid waste in economic sectors

Agriculture, forestry and fishery

Solid waste in agriculture mainly includes waste from cultivation, animal husbandry and slaughter, aquaculture, fishing, seafood processing and nursery-cutting of trees.

In Da Nang City, straw from rice cultivation has been used to produce mushrooms and feed livestock. At the slaughterhouse, waste has not been treated in a circular approach; most slaughterhouses in the City have not met the national technical regulations in the field of veterinary medicine. In seafood processing, by-products such as shrimp heads, fish heads, fish intestines at seafood processing factories have been used to make animal feed. Despite the positive aspects, the amount of plastic waste in agriculture is increasing (pesticide packaging, plastic bags, mushroom growing bags, tree nursery bags, fishing nets, etc.). The amount of plastic waste leaked into the environment is relatively large, while the amount collected is still treated by landfill.

Manufacturing and processing industry

IT solid waste is sorted by businesses into recyclable - reusable waste such as: cardboard, plastic, metal, etc. and non-recyclable, non-reusable waste. For recyclable, reusable waste, most businesses have separate contract to sell it to on-site collectors. For normal waste that cannot be recycled - reused (containing organic compounds, leaf litter, etc.), businesses contract with functional units to collect and treat as regulated.

Table 1. Percentage of normal industrial solid waste collected and treated by method (2018 data)

No.	Treatment method	Share (%)
1	Reuse	29.14
2	Sell as scrap	25.48
3	Hire a collection and treatment unit	45.36
4	Other	0.02
	Total	100

Source: Report no. 2506/BC-BQL of Da Nang Hi-tech Park and Industrial Zone Authority dated November 5, 2019

Construction

The average amount of construction solid waste in Da Nang City is estimated at 919 tons per day; equal to one third of the amount in Hanoi and Ho Chi Minh City; and twice the amount in Hai Phong City. Construction waste includes soil, sand, bricks, tiles, concrete, stone, wood, iron and steel, plastic, cement packaging, paint, interior packaging, etc. While scrap is collected by informal waste workers and some kinds of construction solid waste are reused for ground leveling, the remaining are gathered at temporary construction landfills or illegally disposed to vacant land lots. SATREPS¹³ project indicates that 06 construction solid waste landfill sites in Da Nang City are operating illegally.

According to a survey conducted in 2021 within the framework of SATREPS project activities,¹⁴ construction works in Da Nang City are currently using natural materials. Recycled construction materials are rarely used.

c) Wastewater

Summary of the project "Building Da Nang City into an environment-friendly city" in 2008 only evaluated the achievement of indicators in terms of quantity. Accordingly, the percentage of households using clean water was 97.83% in urban districts and 76.81% in rural areas; the rate of industrial wastewater meeting discharge requirements was 100%. The total amount of domestic wastewater collected by 2020 reached over 83%, the rate of treatment meeting the standards was 50%.

2.2 Current situation of some activities supporting the development of circular economy

For activities to support the development of circular economy, Da Nang City has promulgated a number of important projects, regulations and action plans that have the guiding role and also directly affect and contribute to the development of circular economy in Da Nang City. In other words, many goals and tasks to develop circular economy have been determined for implementation in Da Nang City. In addition, other activities (such as promotion to raise awareness, capacity building, business support in research and application of technology and innovation, green credit through Da Nang City Environmental Protection Fund, innovation ecosystem relevant to circular economy, rewarding good models relevant to circular economy, acting as the focal point for sharing circular economy initiatives in the City, database on environmental protection) have been initially formed, which can become a driving factor in the development of circular economy.

¹³ Standing for Science and Technology Research Partnership for Sustainable Development, which is co-sponsored by Japan International Cooperation Agency (JICA) and Japan Science and Technology Agency (JST).

¹⁴ Report at the Workshop in Da Nang City on November 26, 2021

1. Decision no. 1099/QD-UBND dated April 2, 2021 of the People's Committee of Da Nang City approving the project **"Building Da Nang city into an environment-friendly city"** for the period 2021-2030;

2. Implementation Plan No. 5637/KH-UBND dated August 24, 2020 of the People's Committee of Da Nang City of the **"National Action Program on Sustainable Production and Consumption for the period of 2021-2030 in Da Nang City"**;

3. Decision No. 4929/QD-UBND dated December 16, 2020 of the People's Committee of Da Nang City promulgating the implementation plan of the **National Program on Economical and Efficient Use of Energy in Da Nang city in the period of 2020 -2030**;

4. Decision No. 1737/QD-UBND of the People's Committee of Da Nang City approving the **Project on developing the use of renewable energy and new energy in Da Nang city by 2025, with a vision to 2035**; According to the Project, Da Nang city will develop and use renewable energy sources, new energy that are recently surveyed, evaluated, planned, and put into planning. The proportion of these energy sources in the city's total primary energy supply will reach about 9.17% by 2025; and 9.69% by 2035.

5. Decision No. 3442/QD-UBND dated September 15, 2020 of the People's Committee of Da Nang City promulgating the **Action Plan for the 2030 Agenda for Sustainable Development and the roadmap for the implementation of sustainable development goals to 2030** of Da Nang city.

6. Decision No. 33/2018/QD-UBND dated October 1, 2018 of the People's Committee of Da Nang City promulgating the **Regulation on environmental protection in Da Nang city**;

7. Decision No. 1577/QD-UBND dated April 11, 2019 of the People's Committee of Da Nang City promulgating the **plan for domestic solid waste separation at source in Da Nang city by 2025**;

8. Resolution No. 204/NQ-HDND dated December 19, 2018 of the People's Council of Da Nang City on the **management of domestic solid waste in Da Nang city**;

9. Plan 122/KH-UBND dated June 24, 2021 of the People's Committee of Da Nang city on **ocean plastic waste management in Da Nang city until 2025, with a vision to 2030**.

10. Resolution No. 324/2020/NQ-HDND dated December 9, 2020 of the People's Council of Da Nang City stipulating the **policy of industrial promotion and souvenirs producing development for tourism in Da Nang city** (according to the policy encouraging the application of cleaner production in industry).

11. Decision No. 2778/QD-BTNMT dated October 31, 2019 of the Ministry of Natural Resources and Environment promulgating a set of **criteria to evaluate and rank environmental protection results of provinces and centrally-run cities**.

12. Decision No. 2870/QD-UBND dated August 28, 2021 promulgating the **Digital Transformation Project in Da Nang city to 2025, with an orientation to 2030**.

13. Decision No. 1219/QD-UBND dated March 6, 2017 of the People's Committee of Da Nang City approving the project on "Developing Startup Ecosystem in Da Nang City by 2020, with a vision to 2030".

2.3 Overall assessment



Achievements

Da Nang City has introduced important projects, regulations and action plans related to and directly affecting its circular economy development roadmap, especially the Scheme to develop Da Nang City to become an environmentally friendly city in the period of 2008-2020 and 2021-2030. Da Nang City has so far achieved important initial results as a favorable premise for the development of a circular economy such as:

- Different environmental indicators are achieved.
- There are numerous good practices and initiatives on circular economy, especially in the fields of agriculture, forestry and fishery development, water supply and wastewater treatment, manufacturing, and accommodation and catering services, etc.
- The piloted eco-industrial park model delivered positive results for potential replication in the future.
- The awareness of citizens, enterprises and organizations on environmental protection is improved, in addition to active engagement of associations such as women's union, veterans' union and youth union in environmental protection programs.
- Waste collection for reuse and recycling started very early in Da Nang City, partly addressing the recycling needs.
- There have been initial actions to support the development of the circular economy, which is a driving factor for the development of the circular economy.

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Limitations

However, in order to move towards a circular economy in some areas or, in the future, in all economic sectors in Da Nang City, many limitations shall be addressed:

- The awareness, knowledge and skills of citizens, businesses, government agencies and relevant parties are inadequate.
- Many public works and assets have not been exploited and used effectively.
- The current solid waste management system in Da Nang City does not support waste circulation, with poorly organized waste collection plus a low recycling rate. There are no recycling and composting plants.
- Women are in precarious work situations and exposed to hazardous substances and chemicals in the textile, agricultural or waste sectors, which has not been acknowledged for support provision.
- Many enablers deemed necessary for the development of the circular economy are not currently in place in Da Nang city, such as: Public procurement has not really been used as a lever for circular economy projects; Existing capacity of both public and private players is insufficient to transition toward a circular economy; R&D programs and training programs to implement projects related to circular economy are not in place; there is a lack of circular economy related training programs at all educational levels; circular economy initiatives have been launched or piloted, but public awareness is low and such initiatives have not been replicated.
- There is no clear vision, goals and roadmap for implementation.
- An overall review has not been performed to select areas of focus for investment as an enabler to drive development of other sectors in the economy.



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Kiril Dobrev on Unsplash*

Causes of limitations

- Resources for the transition toward a circular economy are missing or inadequate:
 - + Developing a circular economy must be linked with innovation, adoption of advanced technologies, creativity, new idea piloting and risk-taking.
 - + Develop a circular economy requires excellent experts who can help solve problems, from the start to the final stage of the process.
 - + Enterprises shall have large and sustainable financial resources to be able to transition toward a circular economy. In fact, converting linear production to circular economy will require a large initial investment to replace equipment and processes, optimize the whole system as well as deal with environmental problems. Meanwhile, businesses in Da Nang City are mostly small, medium and micro enterprises or start-ups, with limited resources.
- Communications and capacity building efforts are not really effective.
- Mechanisms, policies and legal systems on circular economy are in place but have not been implemented in practice; the concept of circular economy is quite new and its integration into existing plans is absent or limited. There is no framework to guide the application, assessment and certification of circular economy practices.
- Deployed or piloted circular development models are on a small scale, most of which have not been evaluated for possible replication.
- Citizens and the private sector have not been strongly engaged in waste management while the market for environmental services has not yet developed.
- The access to concessional and green loans to invest in green and eco-friendly production lines and technologies is quite limited, requiring time and performance of different procedures.
- Many businesses define short-term goals only, without a long and sustainable vision; the market demand for green and environmentally friendly products is low.
- The role of female scrap collectors in the waste value chain and in sustainable consumption and production models is yet to be fully acknowledged; gender mainstreaming in policy development is poor while access to financial and technical resources is limited.
- Data integration and sharing platforms for a circular economy are yet to be developed.

3

Selection of **focused areas** for circular economy development in Da Nang City

For Da Nang city, the areas of focus are selected based on assessment of level-1 economic sectors that meet 04 criteria: (1) Important role of the sectors/areas in Da Nang City's economy; (2) High circular development potential and high resource use; (3) Relevance with Da Nang City's existing policies and goals and finally (4) Good status of circular economy development. Secondary data are sourced from available DISED studies and statistical data. Primary data are collected by expert assessment.

Table 2. Criteria for selection of key sectors/areas for circular economy development

Criterion	Indicators	Methodologies	Units of measurement
I. Sector's significance to the economy	Having a large contribution to GVA (as one of the five sectors with the largest contribution to GVA)	DISED data	0 - No; 1 - Yes
	Having a large contribution to GVA growth (as one of the five sectors with the largest contribution to GVA growth)	DISED data	0 - No; 1 - Yes
	Being a main sector to produce jobs in the economy (as one of the five sectors that create the most jobs)	Statistical data	0 - No; 1 - Yes
	Competitiveness (as one of the five highly competitive sectors)	Expert assessment	0 - No; 1 - Yes
II. High circular development potential and high resource use	Resource and energy intensive	Expert assessment	0 - No; 1 - Yes
	Large volume of waste generated	Expert assessment	0 - No; 1 - Yes
	Great potential and opportunity in adopting circular economy	Expert assessment	0 - No; 1 - Yes
III. Relevance with Da Nang City's existing policies and goals	Being one of the main economic sectors that drives Da Nang City's development	DISED data	0 - No; 1 - Yes
	Being indicated in the Environmental Protection Scheme	DISED data	0 - No; 1 - Yes
	Being indicated in other related schemes, regulations and plans	DISED data	0 - No; 1 - Yes
IV. Good status of circular	Having good practices, initiatives or models on circular economy or which are close to a circular economy	Expert assessment	0 - No; 1 - Yes
	High possibilities to scale up current circular economy models in the sector	Expert assessment	0 - No; 1 - Yes
	Circular economy models in the sector can be replicated to other sectors	Expert assessment	0 - No; 1 - Yes

Source: Consultant team tasked for developing the Circular Economy Development Roadmap

Based on 04 criteria for selecting key sectors/areas for circular economy development, we collected data for evaluation and selection purposes. To collect primary data, we collected expert opinions (including representatives of departments in each sector) for 14 relatively important level-1 economic sectors of Da Nang city. In the 21 level-1 economic sub-sectors, some sectors have been dropped before consultation (due to failure to meet the criteria at the start), including: mining industry; activities of Party’s committees and socio-political organizations, government management and security and defense activities; Arts and entertainment; Other services; Activities of households as employers of domestic personnel; Activities of international organizations and agencies.

The review of sectors/areas against selection criteria shows that there are 5 level-1 selected economic sectors, including: Agriculture, forestry and fisheries; Manufacturing; Water supply and wastewater treatment management; Construction and Accommodation and catering services.

However, based on past lessons learned in selecting priority areas for circular economy development in different cities globally and the view that an interdisciplinary approach to selection is needed to promote the circular economy in different sectors and build linkages among them (SITRA), the following areas have been selected:

1. solid waste management (including domestic solid waste, construction solid waste and plastic waste);

2. raw materials

3. energy

4. eco-industrial parks

5. food circulation

6. water circulation

7. green consumerism

Part 2:

CONTENTS OF CIRCULAR ECONOMIC DEVELOPMENT ROADMAP IN DA NANG CITY

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ROADMAP FOR DEVELOPMENT of CIRCULAR ECONOMY in DA NANG

VIEWPOINTS

Citizens must raise their awareness
sense of responsibility and
convey that community
responsibility



EU Strategy
the 2030
agenda

Enterprises
Establish and implement
governing system and
comply with legal regulations

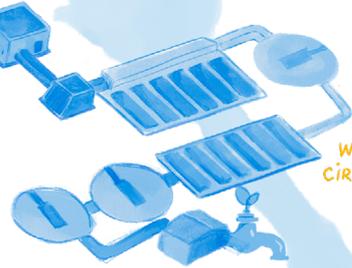
Social justice



ENERGY



RAW-MATERIALS



WATER CIRCULATION



ECO-INDUSTRIAL PARKS



FOOD CIRCULATION



SOLID WASTE MANAGEMENT

GREEN CONSUMERISM



GOALS

- ★ ENVIRONMNTS: Reduce exploitation and use of non-renewable resources and water resources; Extend the use time of materials; equipment, products, goods and components; reduce waste and minimize adverse impacts on the environment
- ★ STATE MANAGEMENT: Enhance capacity and raise awareness, knowledge and skills about circular economy
- ★ ECONOMY & BUSINESS: Improve the productivity and profit of business and the economy
- ★ INFRASTRUCTURE: Improve the productivity and profit of business and economy
- ★ SOCIETY: Create more green job and improve living quality



CIRCULAR ECONOMY

HUMAN RESOURCES

DEVELOPMENT PHASE

2025 - 2030

PREPARE INITIAL BASIS

3+3

Roadmap



POLICIES

CAPITALS

LAUNCHING PHASE

2022 - 2025

RAISE AWARENESS, KNOWLEDGE, SKILLS

EMPHASIZES COMMUNICATION

1 Viewpoints, scope



1.1 Viewpoints



Establish and develop circular economy in Da Nang city based on **a cohesive, systematic and inclusive approach**; center people and social justice in policies; promote the role of the informal sector and maintain gender equality



Develop circular economy mobilizing the **engagement of all stakeholders**, specifically: The State takes the leading role, creates the environment and makes policies; enterprises establish and implement a governing system, and comply with legal regulations; citizens must raise their awareness, sense of responsibility, and carry out community supervision.



Establish and develop circular economy based on **science and practice; incorporate key principles and refer to local and foreign experiences** selectively and creatively; promote and replicate the existing circular economy practices and models of Da Nang city on larger scale; go abreast with the city's development orientation and relevant legal documents.



Implement **regional, domestic and international linkages, and linkages among localities** in the city to create a systematic circular loop.

The circular economy development roadmap needs to be **updated every five years** or when new policies with crucial impact on the roadmap are introduced.



In the period of 2022-2030, **priority should be given** to the circular economy development of the following areas: (1) solid waste management (including domestic solid waste, construction solid waste and plastic waste); (2) raw materials, (3) energy, (4) eco-industrial parks, (5) food circulation, (6) water circulation, and (7) green consumerism.

1.2 Scope

The roadmap is implemented until 2030 in association with the 10-year national action plan:

Focus on communication, education, training, and capacity building; deploy and form a basis for implementing pilot projects and models in prioritized areas of the circular economy replicate these models to the entire economy.

Along with the approved tasks and solutions, the tasks and solutions set out in this Roadmap will help Da Nang city achieve 05 general goals of circular economy development by 2030.



FPT Complex Đà Nẵng

2 Goals

2.1 General goals

The proposed five general goals include:



1. Environment

Reduce exploitation and use of non-renewable resources and water resources;

Extend the use time of materials, equipment, products, goods, and components;

Reduce waste and minimize adverse impacts on the environment.



2. State management

Enhance capacity and raise awareness, knowledge and skills about circular economy.



3. Economy and businesses

Improve the productivity and profit of businesses and the economy.



4. Infrastructure and technology

Develop a circular economy based on digital technology and transformation.



5. Society

Create more green jobs and improve living quality.

2.2 Specific goals

For each general goal, specific objectives in establishing and developing circular economy are proposed, targeting different specific interventions (see Table 3).

TABLE 3. SPECIFIC OBJECTIVES OF CIRCULAR ECONOMY DEVELOPMENT IN DA NANG CITY BY 2030

	Objectives	Unit	Current situation	By 2030	Lead agency	Notes
I	 REDUCE EXPLOITATION AND USE OF NON-RENEWABLE RESOURCES AND WATER RESOURCES; EXTEND THE USE TIME OF MATERIALS, EQUIPMENT, PRODUCTS, GOODS, AND COMPONENTS; REDUCE WASTE AND MINIMIZE ADVERSE IMPACTS ON THE ENVIRONMENT					
1	Number of eco-industrial parks qualified for national standards of eco-industrial parks	Eco-industrial parks	0	2-3	Da Nang Hi-tech Park and Industrial Zone Authority	1099/QD-UBND
2	Number of new construction projects complying with national engineering regulations on energy efficient projects	Projects	4	50	Department of Construction	
3	Reduction in per capita greenhouse gas emissions	Tons of CO ₂ equivalent/person	-	-	Department of Natural Resources and Environment	
4	Percentage of solid waste treated with advanced technologies	%	-	>85	Department of Natural Resources and Environment	
5	Percentage of households implementing source separation of domestic waste	%	-	100	Department of Natural Resources and Environment	1099/QD-UBND
6	Percentage of organic waste recycled	%	-	100	Department of Natural Resources and Environment	Decision No. 687/QD-TTg dated June 7, 2022
7	Percentage of urban wastewater collected and treated according to standards and regulations before being discharged into the receiving source.	%	-	95	Department of Construction	1099/QD-UBND

	Objectives	Unit	Current situation	By 2030	Lead agency	Notes
8	Rate of ensuring travel demand of public passenger transport	%	-	10-25	Department of Transport	
II	STATE MANAGEMENT: ENHANCE CAPACITY AND RAISE AWARENESS, KNOWLEDGE AND SKILLS ABOUT					
1	Increase in the number of sessions/events (and participants) disseminating knowledge of circular economy	-	-	-	Department of Information and Communications	
2	Increase in the number of workshops and seminars on circular economy	-	-	-	Department of Information and Communications	
3	Increase in the number of civil servants - public employees - workers trained on circular economy principles and models	-	-	-	Department of Natural Resources and Environment	
4	Increase in the number of students participating in training programs related to circular economy	-	-	-	The University of Da Nang	
5	Increase in the number of schools and universities whose curriculum contains circular economy	-	-	-	Department of Education and Training	
III	ECONOMY AND BUSINESSES: IMPROVE THE PRODUCTIVITY AND PROFIT OF BUSINESSES AND THE ECONOMY					
1	Increase in the localization rate of the city's products	%	-	> 20	Department of Industry and Trade	Decision No. 687/QD-TTg dated June 7, 2022
2	Increase in the number of energy or eco-labeled products of the city	%	-	100	Department of Industry and Trade	

	Objectives	Unit	Current situation	By 2030	Lead agency	Notes
3	Rate of renewable energy over total final energy supply	%	-	-	Department of Planning and Investment	
4	Energy consumption rate for production compared over GRDP	%	-	Reduce by 1.0-1.5%/year	Department of Planning and Investment	
5	Rate of green public procurement over the total public procurement	%	-	> 35	Department of Planning and Investment	
IV	INFRASTRUCTURE AND TECHNOLOGY: DEVELOP A CIRCULAR ECONOMY BASED ON DIGITAL TECHNOLOGY AND TRANSFORMATION					
1	Proportion of added value of the digital economy in GRDP	%	-	30	Department of Planning and Investment	Decision No. 288/QD-TTg dated 28/2/2022
2	Number of recycling and composting plants	-	-	2	Department of Planning and Investment	
3	Percentage of online public non-business services level 3, 4	%	-	90	Relevant departments, sectors, agencies	
4	Rate of total social investment in R&D activities over GRDP	%	-	2	Department of Planning and Investment	

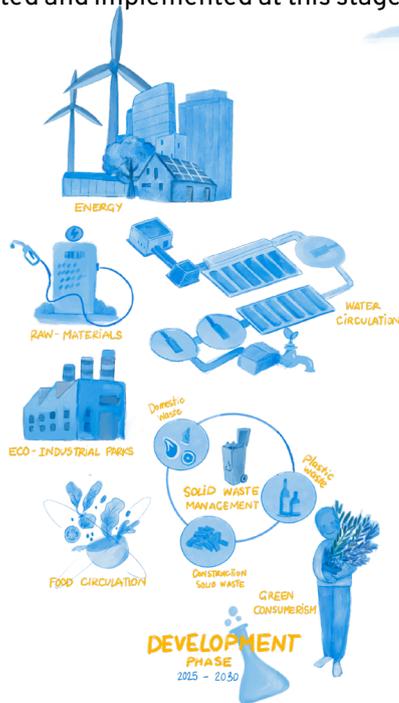
	Objectives	Unit	Current situation	By 2030	Lead agency	Notes
V	 SOCIETY: CREATE MORE GREEN JOBS AND IMPROVE LIVING QUALITY					
1	Share of contribution of total factor productivity (TFP) to economic growth	%	-	55	Department of Planning and Investment	
2	Number of employment created from circular economy-based activities	Thousand people/year	-	3.2-3.5	Department of Labour, Invalids and Social Affairs	
3	Percentage of female employees	%	-	60	Department of Labour, Invalids and Social Affairs	
4	Increase in the number of recognized circular economy initiatives	-	-	-	Department of Natural Resources and Environment	

3 Direction of the roadmap

The roadmap for circular economy development in Da Nang city for the period of 2022-2030, with a vision to 2045 includes the following phases:

Launch (2022-2025)

The launching phase emphasizes communication, education to raise awareness, knowledge, skills and prepare initial basis (in terms of policies, capital, human resources, roadmap, tasks, etc.) to enter the development phase. During this period, the potential and benefits of the circular economy must be widely demonstrated. Some simple circular economy models can begin to be piloted and implemented at this stage.



Development (2025-2030)

In this phase, the City needs to take action and implement pilot projects in priority areas to show the impacting and inspiring extent when applying circular economy. Priority areas for development at this stage include: (1) solid waste management (including domestic solid waste, construction solid waste and plastic waste); (2) raw materials, (3) energy, (4) eco-industrial parks, (5) food circulation, (6) water circulation, and (7) green consumerism.

City-scale deployment and acceleration (2030-2045)

From 2030, circular economy will become a mainstream trend. Pilot projects/programmes are evaluated and applied in the remaining sectors. By the end of 2045, the city will essentially meet the criteria of a circular city.

4 Key tasks, solutions

The key tasks expected to be financed for implementation are summarized in Appendix I attached.

APPENDIX I. TASKS, ROADMAP FOR DEVELOPMENT OF CIRCULAR ECONOMY IN DA NANG CITY

No.	Content	Explanation	Lead agency	Roadmap
1	 REDUCE EXPLOITATION AND USE OF NON-RENEWABLE RESOURCES AND WATER RESOURCES; EXTEND THE USE TIME OF MATERIALS; REDUCE WASTE AND MINIMIZE ADVERSE IMPACTS ON THE ENVIRONMENT			
1	Research on solutions to recover nutrients from organic waste separated from domestic solid waste in Da Nang city		Department of Natural Resources and Environment	2023-2024
2	Develop and pilot a domestic solid waste management plan		Department of Natural Resources and Environment	2023-2024
3	Promulgate a Regulation on solid waste management at schools in Da Nang city	Schools should be the pioneering entity to thoroughly implement the regulation on waste separation at source, plastic waste reduction, single-use packaging ban, and organic waste treatment.	Departments of Natural Resources and Environment, Education and Training, and related departments and agencies	2023-2025
4	Amend and supplement domestic solid waste management criterion into the set of cultural household criteria	Aim to ensure that cultural households strictly implement waste separation at source according to regulations, use reusable bags to go to markets, supermarkets, participate in cleaning the residential environment, etc.	Department of Labor, Invalids and Social Affairs	
5	Formulate and implement the Project on Management and Recycling of Construction Solid Waste in Da Nang city		Department of Natural Resources and Environment	Construction: 2023 - 2024

No.	Content	Explanation	Lead agency	Roadmap
6	Develop and implement the Project on developing technical infrastructure, works complying with National Technical Regulation on Energy Efficiency Buildings in Da Nang City		Department of Construction	Construction: 2023 - 2024 Implementation: 2024-2030
7	Develop and maintain an online exchange for building materials	Through the online marketplace, the building material supply and demand for local construction projects can be adjusted. Project information, material quantities and quality are saved and queried for easy exchange, increasing recycling and reuse of materials	Department of Construction	Construction; 2023-2024 Maintenance: Annually
8	Build a Utility Library Model and implement it on a large scale	Set up a utility library that allows citizens in a neighborhood or ward/commune to borrow and co-pay for expensive, bulky items with a small fee	Department of Natural Resources and Environment, the People's Committees of districts	Construction: 2023-2024 Large-scale implementation: 2024-2030
9	Research on social norms and operation methods of residential communities in Da Nang city		Da Nang Institute for Socio-Economic Development	2022-2024
10	Form and maintain "Green Consumption Collaboration Center" and "Green Consumption Network"	A place to provide knowledge and practical skills on green consumption for the citizens	Department of Natural Resources and Environment	2023-2030
11	Organize on-site instruction and support citizens to practice organic waste treatment and waste separation at source	Practicing the theory of practice will raise people's awareness and change their behavior	Department of Natural Resources and Environment	2023-2024

No.	Content	Explanation	Lead agency	Roadmap
12	Deploy the model of “garage sale”	A place where people sell (or give away) used household items that are still valuable or buy second-hand items that fit their needs.	People's Committees of districts	2023-2030
13	Research and assess the barriers in the use of electric vehicles by the citizens to come up with solutions to promote the use of electric vehicles in Da Nang city		Department of Transport	2023-2024
14	Review and put into temporary or long-term use (by refunctioning or repurposing) of vacant buildings and projects		Department of Finance	Annually
II  STATE MANAGEMENT: ENHANCE CAPACITY AND RAISE AWARENESS, KNOWLEDGE AND SKILLS OF INDIVIDUALS, ORGANIZATIONS, BUSINESSES				
15	Develop a system of simple and accessible guidances for applying technical regulations and standards, and disseminate knowledge of circular economy to stakeholders.		Relevant departments, sectors, agencies	2023-2030
16	Organize communication, education, and training for people and businesses by various means		Relevant departments, sectors, agencies	2023-2030
17	Prepare Design Manuals for Zero Waste, Material Use Reduction and Energy Efficiency		Relevant departments, sectors, agencies	

No.	Content	Explanation	Lead agency	Roadmap
18	Provide training and re-training to regularly supplement knowledge and skills for state management officials		Department of Natural Resources and Environment	2023-2030
19	Launch contests and exhibitions on environmentally friendly initiatives and technology applications for circular economic development		Department of Natural Resources and Environment	Annually
III	 ECONOMY AND BUSINESSES: IMPROVE THE PRODUCTIVITY AND PROFIT OF BUSINESSES AND THE ECONOMY			
20	Organize investigation and assessment to determine the tasks and roadmap for deploying circular economy for each sector prioritized for circular economy development.		Department of Natural Resources and Environment, departments and agencies	2023-2024
21	Organize pilot application of the circular economy model in raw materials and energy fields		Department of Industry and Trade	Development: 2024-2025 Maintenance: 2025-2030
22	Organize pilot application of the circular economy model in solid waste, water and green consumerism.		Department of Natural Resources and Environment	Development: 2024-2025 Maintenance: 2025-2030
23	Organize pilot application of the circular economy model in food sector		Management Board of Food Safety	Development: 2024-2025 Maintenance: 2025-2030
24	Implement solutions associated with the goal of building an eco-industrial park in Da Nang city		Management Board of Hi-tech parks and industrial clusters	Development: 2024-2025 Maintenance: 2025-2030

No.	Content	Explanation	Lead agency	Roadmap
25	Develop and maintain an online transaction channel on raw material market	Aim to create an online marketplace for businesses to sell used and unnecessary materials for those that can use them as new inputs	Department of Industry and Trade	Development: 2023-2025 Maintenance: 2025-2030
26	Implement schemes and projects related to the reduction of greenhouse gas emissions in industry, commerce, cleaner production, energy efficiency in industry and development of clean and renewable energy in Da Nang city		Department of Industry and Trade	Development: 2023-2025 Maintenance: 2025-2030
27	Organize trade promotion events, consumer development activities related to circular economy products	Aim to introduce and promote products related to the circular economy of Da Nang city	Department of Industry and Trade	Development: 2023-2025 Maintenance: 2025-2030
IV	INFRASTRUCTURE AND TECHNOLOGY: DEVELOP A CIRCULAR ECONOMY BASED ON DIGITAL TECHNOLOGY AND TRANSFORMATION			
28	Remote sensing application used in waste management in Da Nang city	The timely and regular detection of waste pollution hotspots (wastewater, garbage) by satellite observation data will help management officers easily monitor, identify causes and propose suitable solution. The app can also help with plant management, climate change management and monitoring (deforestation, land cover surveys, drought studies), and flood detection.	Department of Natural Resources and Environment	Annually

No.	Content	Explanation	Lead agency	Roadmap
V	 SOCIETY: CREATE MORE GREEN JOBS AND IMPROVE LIVING QUALITY FOR CITIZENS			
29	Develop and implement the Gender Responsive Circular Economy Promotion Program	The program to promote the circular economy associated with the tasks of the Association and the women's movements, meet their legitimate and appropriate needs and aspirations aiming at the circular economy embracing gender equality.	Da Nang City Women's Union	2023-2030
30	Organize and form community centers at local cultural institutions (culture houses, cultural centers) into reused Labs	This is a place to exchange second-hand goods and become a gathering point for social groups to share knowledge, trade and sell recycled, repaired, and reused products.	People's Committees of districts; Department of Culture and Sports	2023-2030



CIRCULAR ECONOMY Roadmap in Da Nang city

*The task is assigned by Decision no. 1102/
QD-UBND dated April 21, 2022 of the **People's
Committee of Da Nang City** and is performed
with the coordination and support of the **United
Nations Development Programme (UNDP).***