Carbon-neutral megacities : Designing the future of regions

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The issue of carbon neutrality is becoming increasingly important globally, and in Korea, there is a growing interest in balanced development and megacities to address the imbalance caused by population decline, population concentration in metropolitan areas, and rural decline. This paper examines the promotion of carbon-neutral megacities as a key strategy to promote regional self-reliant growth in response to the carbon-neutral era.

Characteristics of GHG Emissions and Regions

When looking at the status of GHG emissions(2000-2019), divided into metropolitan areas and non-metropolitan areas, the following characteristics can be found. First of all, the average annual growth rate of GHG emissions is 2.8% in the metropolitan area and 1.9% in the non-metropolitan area, indicating that the increase in GHG emissions in the metropolitan area is relatively high, and the proportion of GHG emissions compared to the nation is also increasing. However, per capita GHG emissions are 3.2 times higher in non-metropolitan areas at 20.6 tons CO2eq/person than in metropolitan areas, and the average annual growth rate of per capita emissions is also higher in non-metropolitan areas. GHG emissions per gross value added decreased in both metropolitan and non-metropolitan areas, but non-metropolitan areas decreased relatively more slowly than metropolitan areas.

If this aspect is taken into account, non-metropolitan areas are in a relatively poor condition for carbon neutrality compared to metropolitan areas, despite having a higher absolute amount of GHG emissions, as they also have higher GHG emissions relative to population and economic growth. If carbon neutrality policies are promoted without considering regional conditions, there is room for new forms of regional disparities due to differences in capabilities between metropolitan areas and non-metropolitan areas, regions and regions, etc.

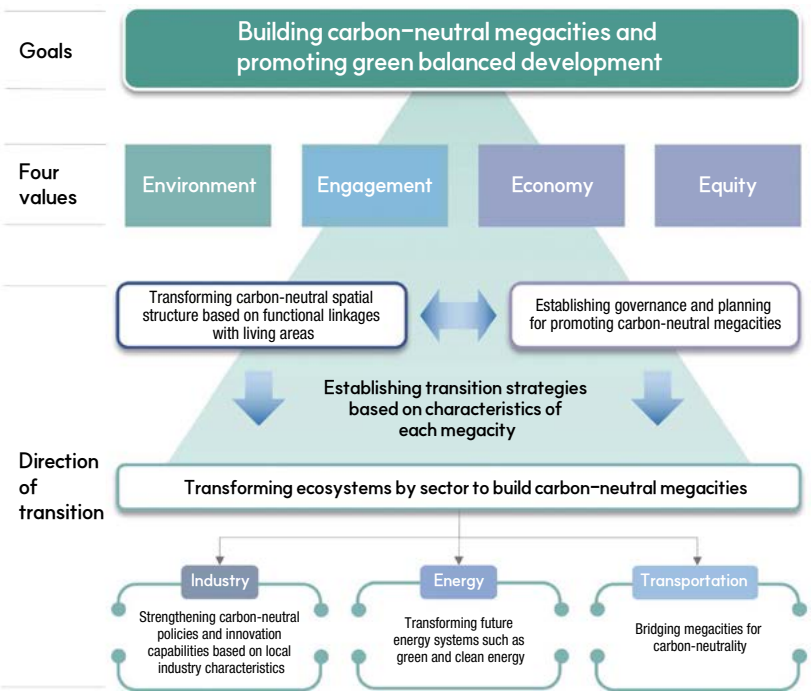
Balanced development and carbon neutrality need to be linked

Balanced development, megacities, and carbon neutrality policies to drive regional self-reliant development and growth are all on the national agenda and require a long breath that cannot be realized in a short period of time. However, until now, balanced development and carbon neutrality policies have been promoted as separate policies, lacking interconnection and an integrated approach. Mega-city construction and other policies such as industry, transportation, and energy for balanced development may cause greenhouse gas emissions, but they can also provide new opportunities for carbon neutrality and regional development. For this reason, policy linkages and cooperation are required for balanced development and carbon neutrality, and strategic efforts are needed to maximize synergies.

Balanced Development Considering Carbon Neutrality: Shifting to a Green Balanced Development Paradigm

A paradigm of 'green balanced development' is required to build a carbon-neutral megacity and promote balanced development through it. The green balanced development paradigm is based on the core values of 4E to achieve the goals of carbon neutrality and national balanced development. The 4Es are to emphasize the value of carbon neutrality and sustainability in the climate crisis based on engagement and consideration of the environment through the construction of carbon-neutral megacities, strengthen local participation and initiative through the construction of locally-led megacities, and achieve economic growth through the transformation of the ecosystem for carbon neutrality, and promote green balanced development (Equity).

Direction for building carbon-neutral megacities and promoting green balanced development



Direction of carbon-neutral megacities

Green balanced development through the construction of carbon-neutral megacities requires the following policy changes compared to the existing balanced development.

First, it emphasizes the value of carbon neutrality and sustainability amid the climate crisis. Until now, balanced development policies have focused on industrial and economic growth after independence and the Korean War. As a growth-oriented policy, the value of the environment was relatively neglected. Recently, environmental values such as carbon neutrality by 2050 have become globally important, and as a developed country, Korea should strengthen its policy approach to promote carbon neutrality. The climate crisis is an important factor for the survival of humanity, and it is expected to be a very important factor in the construction of megacities in the future.

Second, strengthening local participation and initiative by building regionally-led megacities. Currently, Korea is facing a major crisis of population decline and rural decline in areas other than the capital region. This is not just a local crisis, but the existence of the entire country is at stake. One of the important values of the 4Es, the core values of green balanced development, is cooperation. We need a policy shift that promotes regionally-led innovation and growth through the establishment of megacities, which are inter-regional cooperative organizations, and elicits government support and cooperation.

Third, ecosystem transformation for carbon neutrality. In the future, the value of carbon neutrality and sustainability will become indispensable globally, and the system of corporate management such as ESG management will be transformed, and the carbon neutral industry and economic system will be transformed into a low-carbon economic base. In addition, the market in related fields will expand and new industries will emerge, resulting in significant growth.

Carbon-neutral megacity promotion strategy

To build a carbon-neutral megacity, it is necessary to derive a spatial structure of a carbon-neutral megacity optimized for carbon neutrality based on living areas and functional linkages, and based on the regional characteristics of each megacity, ecosystem sectors such as industry, energy, and transportation should be transformed into a carbon-neutral system based on the principle of self-reliance, symbiosis, and linkages.

Specifically, in the case of megacity spatial structure, the current administrative structure centered on

the city and province, the living area centered on the metropolitan area, and a number of segmented spatial structures persist. In order to build a carbon-neutral megacity, it is necessary to transform it into a multi-nuclear structure by strengthening the spatial structure and functional linkages of the super-metropolitan area based on the living area, and the base function of the local living area needs to be strengthened. In the case of rural areas with declining population and declining vitality, it is necessary to transform them into spaces where people can experience high-quality environmental services to enjoy abundant greenery and tourism culture, maintain and strengthen carbon absorption functions, and supply renewable energy.

In the industrial sector, it is necessary to strengthen the promotion of carbon-neutral policies based on the characteristics of local industries to protect local jobs, and to strengthen innovation capabilities based on the characteristics of local industries and energy structures. Ultimately, carbon neutrality should be promoted by strengthening the ability to reduce greenhouse gases through technological innovation such as ICT. In the energy sector, the centralized energy system and fossil fuel-based energy supply system should be transformed into an integrated green energy system and a self-reliant decentralized clean energy supply system. In the case of energy demand management, it has been led by the government, but private and price-driven energy demand management needs to be realized in the future. In the transportation sector, a transition to a rail-oriented transportation system and eco-friendly mobility must be made to achieve carbon neutrality. To implement this, it is necessary to improve the investment and financing system for megacity public transportation and establish a legal framework.

In order to build sustainable megacities and achieve carbon neutrality, it is necessary to establish a promotion system through strengthening and improving governance and related plans. In order to build megacities and achieve carbon neutrality, an institutional foundation should be established for smooth linkages with the industry, energy, and transportation sectors for carbon neutrality in the planning of megaregions. In particular, the Basic Act on Carbon Neutrality and Green Growth in Response to Climate Crisis states that the national comprehensive plan should reflect the national carbon neutrality plan, and it should be improved to reflect carbon neutrality in balanced development and megacity planning.

Chang Sug Park received his Ph.D. in engineering from Seoul National University, majoring in landscape architecture in a cooperative program. He is interested in policy research on environmental planning, carbon neutrality, and climate resilience for sustainable land and urban environments, and has conducted research on the establishment of the 5th National Environmental Comprehensive Plan, carbon neutrality implementation strategies at the regional level, and smart scaled-down models for sustainable cities. ✉ plade290@kei.re.kr