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A Conceptual Framework for a Carbon Map to Support Carbon Neutral Society Policies

Eunsun Im & Jae Soen Son

1. Background and Significance

■ Background

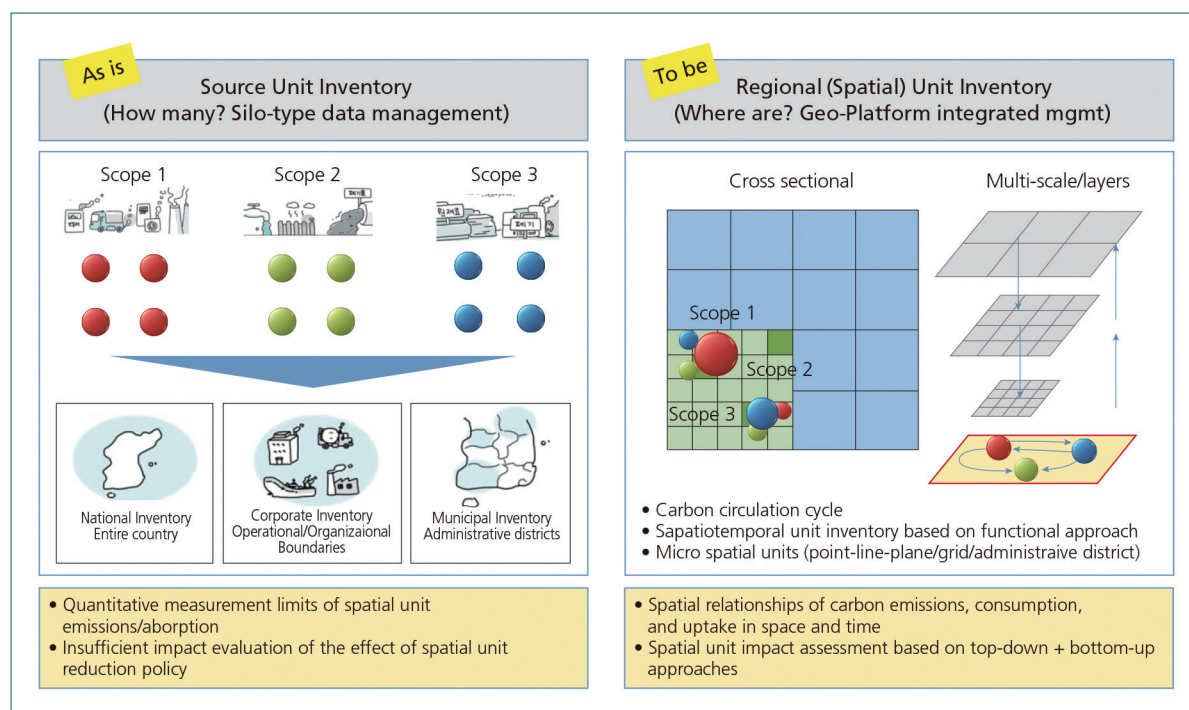
Efforts to realize carbon neutrality will bring about major changes in the international community and economy. Furthermore, the monitoring of carbon emissions in the manufacturing processes of goods will be strengthened, and the “era of carbon commerce” will develop, which will be the basis for trade between countries and companies. South Korea has enacted the Framework Act on Carbon Neutrality and Green Growth at the government level, and is preparing various policies and systems to transition to a carbon neutral society. At the national and city levels, the government is also exploring ways to promote carbon neutral land use and is working with the people to implement them.

To make decisions and solve problems in a society that aims for carbon neutrality, it is necessary to understand the location, distribution, and relationship between social phenomena related to carbon emission and absorption and the natural environment in space and time. Statistical maps at the sub-regional level, preferably in connection with the greenhouse gas (GHG) inventory managed at the national level, are expected to be useful for carbon neutrality policy support.

■ Concept

Carbon neutrality is an economic and social effort to reduce the use of fossil fuels as much as possible and achieve net zero GHG emissions. Maps can be useful for measuring and recording emission and absorption in the complex interplay between nature and human activities.

Figure 1. Significance of building carbon maps



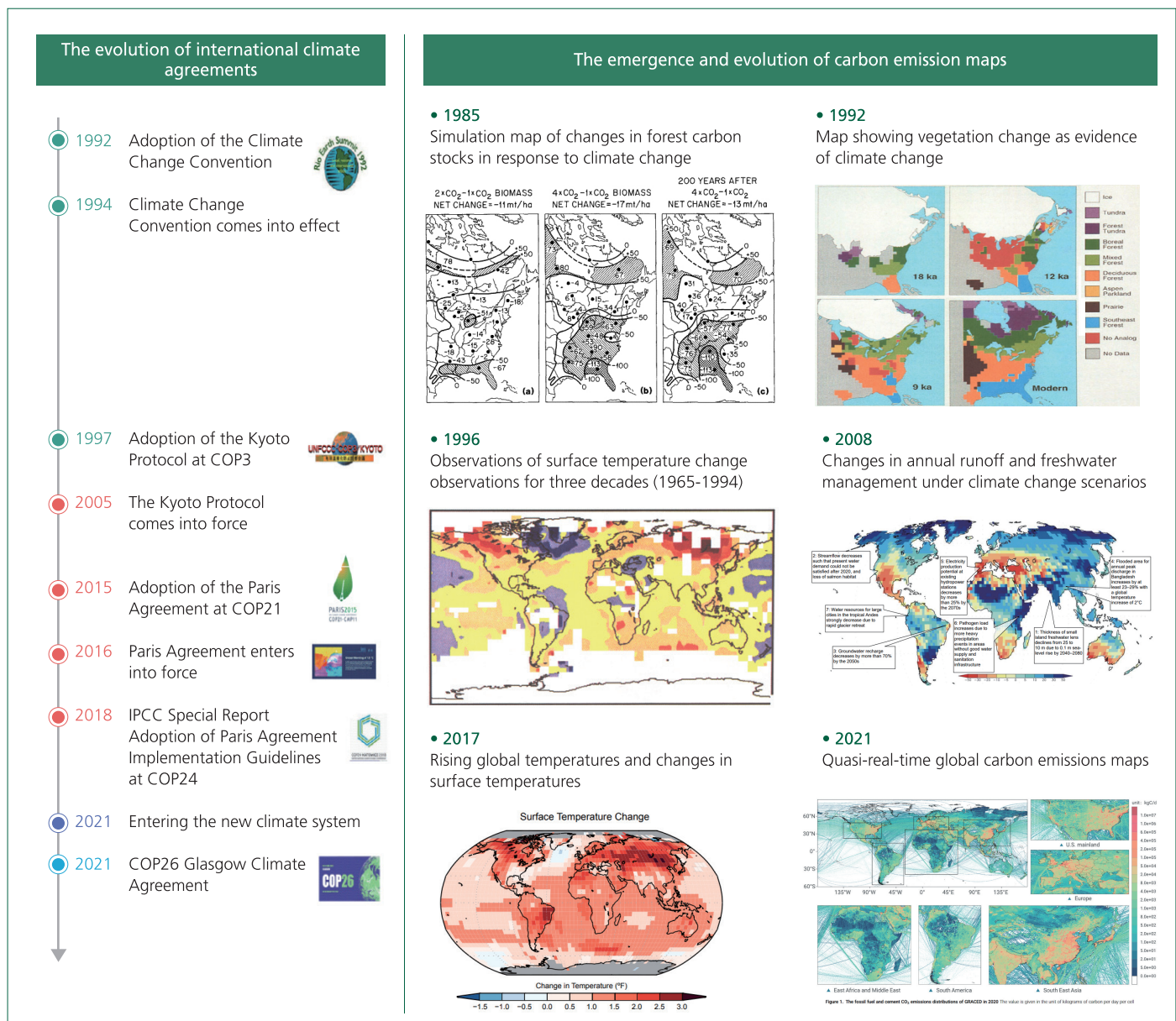
Carbon maps are a type of thematic map that can be used as a tool for understanding carbon emission and absorption. Functionally defined as a geocoding output, a carbon inventory is more of a geographical statistics-integrated map, defined as coordinate values in the spatial and temporal dimensions to measure and aggregate how much carbon is being emitted and absorbed, and to track changes over time.

■ Significance of Building Carbon Maps

According to Article 36 of South Korea's Framework Act on Carbon Neutrality and Green Growth for Coping with

Climate Crisis, information and statistics on GHGs, including GHG emissions and absorption, and emission and absorption factors, must be prepared and managed. Furthermore, according to Article 39 (10) of the Enforcement Decree of the Act, the Minister of Environment and the Minister of Land, Infrastructure, and Transport may create and manage spatial information and maps that reflect the information on GHG emissions and absorption at the regional and spatial levels. This study examined the direction of implementation and necessary tasks for the future based on trends in related studies so that carbon maps can be utilized as a decision-support tool at

Figure 2. The evolution of carbon emissions maps over time



Source Major maps related to carbon based on the development of international climate conventions in Yoon et al. (2022, p. 22)

the town, city, and regional levels in the process of checking the level of implementation and feeding back to policy by establishing carbon neutrality plans led by local governments and residents. The existing source unit inventory is interested in how much carbon is emitted at the national level and is measured by sector from scope 1 to 3, which has limitations when exploring spatial approaches and practical issues such as cities and regions. Carbon maps need to build data on various dynamics and characteristics of carbon, from emission to absorption, in a map form. This requires cross-sectional and multi-scale/layer data models. [Figure 1](#)

2. Carbon Map Building Method

■ Evolution of carbon emissions maps

During the debate on climate agreements, various maps have been produced around the world as evidence of climate change and carbon emissions. The international community has developed various types of data and scientific analyses to provide a basis for policies in response to climate change. From the Rio de Janeiro Climate Change Conference in 1992 to the Glasgow Climate Agreement in 2021, the development of various forms and mapping methods related to carbon emission and absorption can be seen in studies conducted by various scholars. [Figure 2](#)

■ Creating a standard framework for the integration of statistical and geospatial information toward carbon neutrality by the UN

In the process of their development, international protocols have defined how to conduct GHG inventories in regional units. Various efforts are also underway at the United Nations, including the creation of a standard framework for the integration of spatial information and statistics. The UN Statistics Division proposed an international standard framework for linking spatial and statistical information to respond to international issues such as global warming and carbon credits, and emphasized the need to integrate various socioeconomic statistics and ecosystem-related measures to estimate carbon accounts in environmental economic accounts. Research is underway using Europe as an example to integrate various socioeconomic and environmental statistics extracted from remote sensing data such as land cover, vegetation index, and evapotranspiration into a spatially based integration cube, to collect and aggregate hierarchical data on complex objects

in the real world, and to calculate accounts in harmony with different spatial units. In particular, researchers emphasize the importance of designing a standard data model that can become a simulation based on a series of quantitative models such as status surveys, diagnoses, forecasts, and prescriptions necessary for policy decision-making on carbon neutrality. They are exploring how integrated models of spatial and statistical information can be used for issues such as global warming and carbon credits.

3. Development Direction of Carbon Maps

■ Goals and direction

The goal of building a carbon map is “To build a platform that can build and manage an integrated map of carbon emissions and absorption in space and time based on the carbon cycle system”. There are three main directions in building a carbon map. The first is to create a spatial and temporal map of the carbon inventory centered on the decision-making and problem-solving needs of a carbon neutral society. The second is to develop a multi-layered standard model for the construction and convergence of carbon statistical maps at the town, city, and national levels. The third is to build a usability-oriented system to simulate carbon neutrality and sustainability changes in local communities. [Figure 3](#)

■ Building method

Carbon maps can be built using various methods depending on the characteristics of the sector. First of all, the concept of multi-scale/layer carbon maps that reflect the cycling system of carbon emission and absorption should be applied. At the same time, it should be possible to convert carbon emission and absorption into statistical maps that aggregate carbon emission and absorption so that they can be linked to nationally managed carbon inventories, and the appropriate construction method for each spatial resolution should be examined. To support future policy decision-making, it is also crucial to establish a standard for the basic spatial scale of carbon maps, preferably in a fine grid to allow for policy simulation.

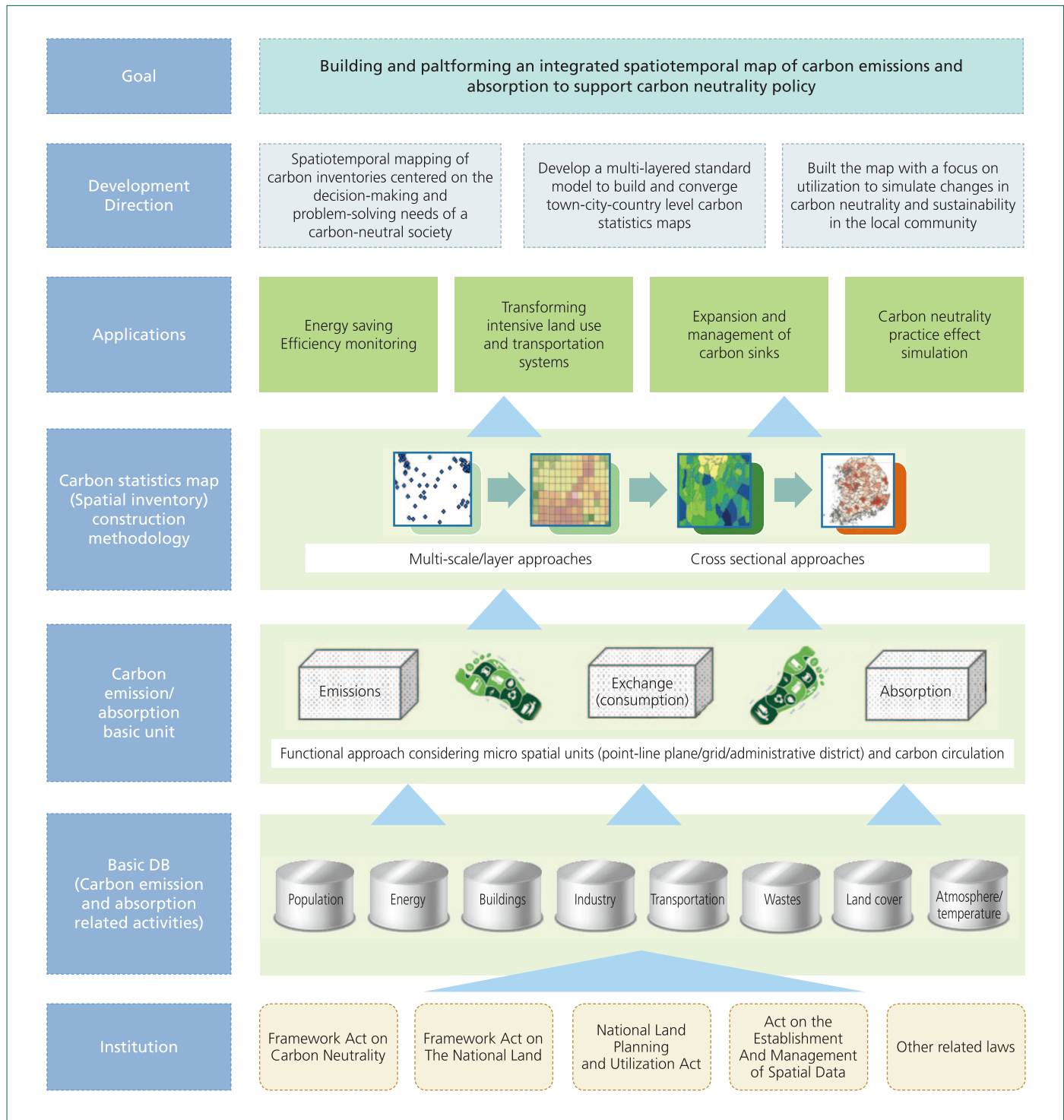
Both bottom-up and top-down methods should be examined to ensure compatibility or consistency with national GHG inventories, followed by a national R&D project to establish a framework for ensuring the accuracy and standardization of carbon maps in the medium to long term. [Figure 4](#)

■ Applications

Once carbon maps are built, they are expected to be applied in the following areas. The effectiveness of spatial policies aimed at energy reduction can be checked locally using a carbon map. Carbon maps can also be used to analyze the

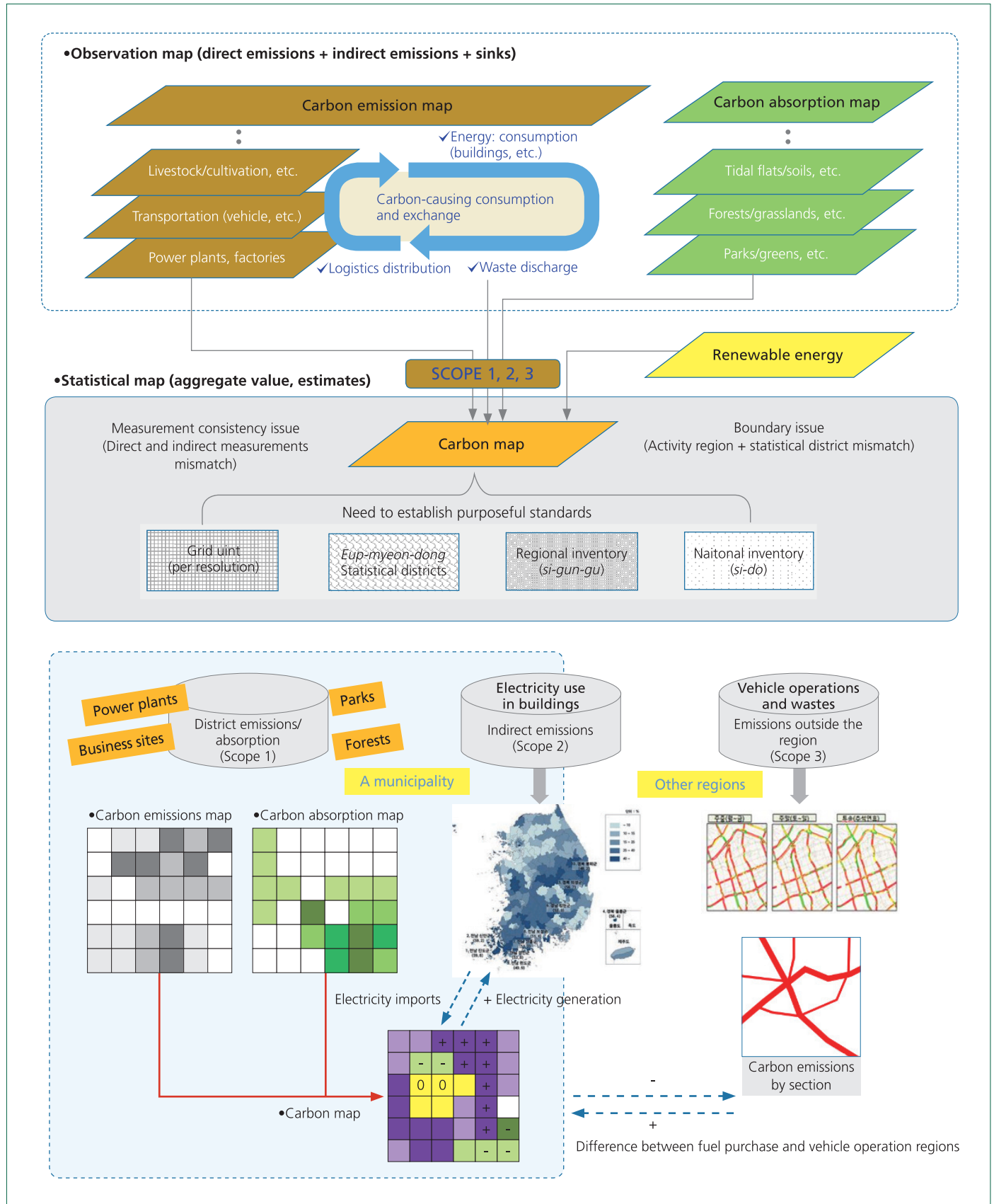
state of intensive land use, determine local carbon emissions hotspots due to traffic congestion, and spatially simulate the effects of various practices for carbon neutrality at the sub-regional level.

Figure 3. Goal and directions of building carbon maps



Source Im et al. (2022, p.103)

Figure 4. Conceptualization of the methodology for building carbon maps (top: issues in building a carbon map, bottom: direction of building a local government carbon map)



Source Im et al. (2022, p. 110)

4. Future Projects

Recently, there has been growing interest in mapping and visualizing various activities and phenomena, such as carbon emission patterns and consumption, using public data managed by the government, real-time big data on vehicles and logistics, and satellite or drone images, depending on policy conditions and technological advances. A step-by-step roadmap is needed to build a carbon map with a space-time integrated model.

In the first stage, a standard data model for carbon statistical maps (such as a tens or hundreds of meters standard grid scale) should be developed so that changes in carbon emissions can be monitored at different spatial scales, such as town, city, and region, and the effects of policies and practices for carbon neutrality can be simulated.

In the second stage, a carbon map platform that can be shared and linked by the central government, local governments, and the public should be built around the national GHG inventory. At this time, a plan should be prepared to open and share data so that carbon maps can be created while protecting the privacy of carbon emission sources and workplace data.

In the third stage, simulation models for carbon neutrality impact assessment and decision support will be developed and disseminated. For example, carbon maps can be used to develop various application models for carbon neutral

decision support, such as impact assessments of localized building energy reduction, traffic reduction by expanding public transportation, expanding greening or parks, or monitoring the efficiency of energy-saving policies.

In the fourth stage, similar tasks may be carried out by various agencies to build carbon maps, which may lead to problems of non-standardization and inefficiency. To prevent this, a comprehensive inspection and consultation group should be organized for each ministry or institutional platform that may be promoted individually. The agencies responsible for the backbone of carbon neutrality policy should identify cooperative tasks to ensure the reliability and accuracy of platforms, and share and spread the methodologies developed sequentially.

Finally, efforts should be made to promote education and utilization of the functions and roles of carbon maps to engage people in practicing carbon neutrality.

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References

- Havinga Ivo. 2014. *SEEA accounts for the integration of economic, social and environmental statistics*. Global Forum on the Integration of Statistical and Geospatial Information. https://ggim.un.org/meetings/2014-Global_Forum/documents/SEEA_EEA-%20UNSD%20presentation.pdf (accessed December 1, 2022).
- Im Eunsun, Son Jae Soen, Jung Yaejin, Park Jongsoon, Yoon Eunjo, Park Jonghwa. 2022. *A Conceptual Framework of Carbon Map to Support Carbon-Neutral Society Policy*. Sejong: Korea Research Institute for Human Settlements.
- Kang Hyun-Soo. 2021. [News AS] *The need for a regional greenhouse gas reduction strategy*. The Kyunghyang Shinmun, November 22. <https://www.khan.co.kr/opinion/contribution/article/202111220300045> (accessed December 1, 2022).
- Yoon Soon-Jin. 2022. *South Korea's 2050 carbon neutrality scenario: Content and challenges*. Energy Focus, Vol. 82. Ulsan: Korea Energy Economics Institute.

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1. The Necessity of Supporting Regions Vulnerable to Carbon Neutrality

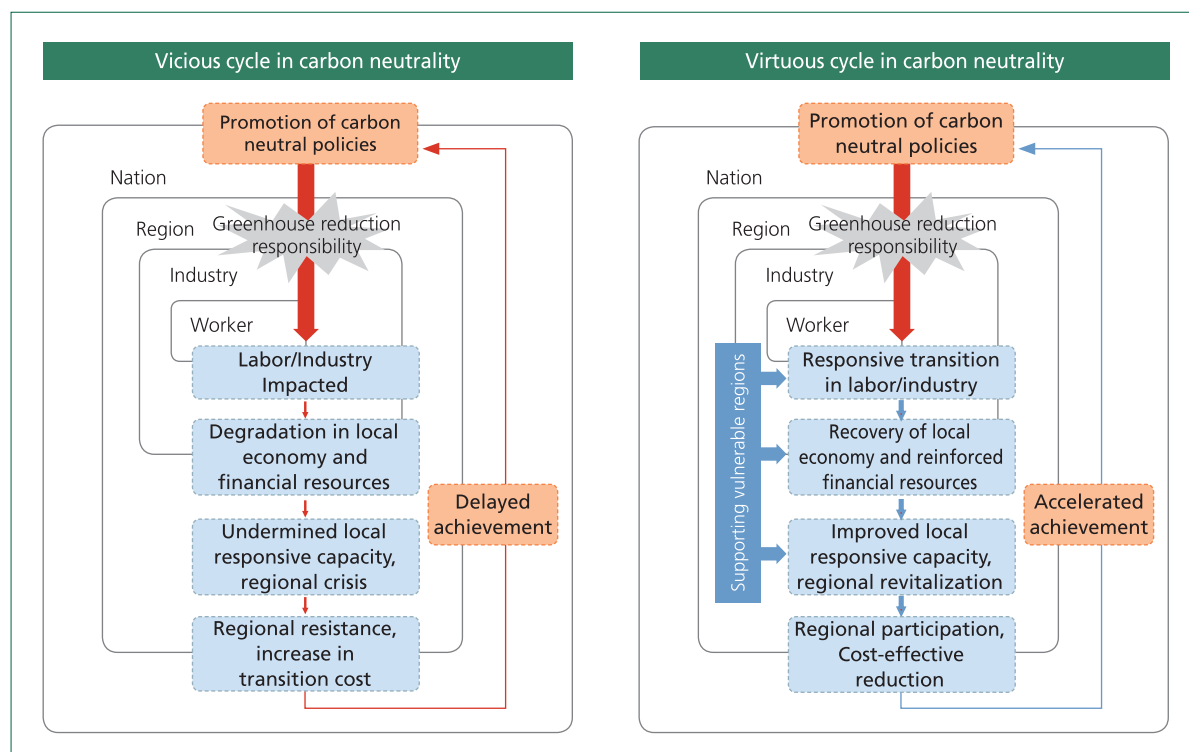
■ Discourse on the Regions Vulnerable to Carbon Neutrality

Communities worldwide are actively pursuing carbon neutrality policies and paying attention to “just transition.” Although the discussions on just transition began as part of labor movements, they have continued to expand to include regional perspectives. Currently, just transition is emphasized as an alternative model of an inclusive society, and the expansion of the relevant discourse shows the need for regional-level responses in achieving a carbon neutrality. Figure 1 shows that it is possible to establish a positive cycle that contributes to the realization of carbon neutrality through regional responses. In

other words, regions vulnerable to the carbon neutrality are the subject of public support, and regional issues require proactive measures from the government. **Figure 1**

Based on related discourses, regions with high local emissions, significant impacts, a burden from a transition to carbon neutrality, and weak local resilience can be considered vulnerable to the transition to carbon neutrality. While the vulnerability to climate change has been addressed in terms of climate adaptation, it is currently associated with climate justice and vulnerability in reducing greenhouse gas emissions. Figure 2 illustrates the vulnerability to climate change in the context of carbon neutralization by combining the regional and climate change perspectives. **Figure 2**

Figure 1. The range and effect of the policies that support regions vulnerable to carbon neutrality



Source
An et al. (2022, p. 72)

■ Introduction of Carbon Neutral Policies in South Korea

South Korea is implementing goals to transition from a low-carbon society to a carbon-neutral society. After planning for “2050 Carbon Neutrality” in 2020, a legal basis for achieving carbon neutrality has been established, and inter-ministerial planning and departmental strategies are rapidly being developed. In this context, there is a need for preemptive measures to address vulnerable groups, industries, and regions that may face difficulties in the transition to a carbon-neutral society. However, while society is currently focusing on its capacity for a transition to carbon neutrality, the policies for a just transition are in the early stages, and there is a significant variance in the capacity and experience of local governments that hinders related policy implementation.

In contrast to the development of climate justice discourse and the direction of the international community, South Korea's carbon-neutral policy is not sufficiently considering vulnerable areas in the transition to carbon neutrality and lacks a regional approach. Therefore, to maximize the effectiveness of policies, it is necessary to comprehensively review and check for negative impacts on a spatial basis caused by the transition to carbon neutrality.

2. Current State of Vulnerable Regions to Carbon Neutrality

■ Direction of Analysis

A deep understanding of regional characteristics and issues is necessary to develop supportive measures for vulnerable regions. This study analyzes the vulnerability of a transition to carbon neutrality by constructing an analytical framework that

considers the concept of vulnerability to the carbon neutrality, and the limitations of current data and existing approaches to vulnerable regions.

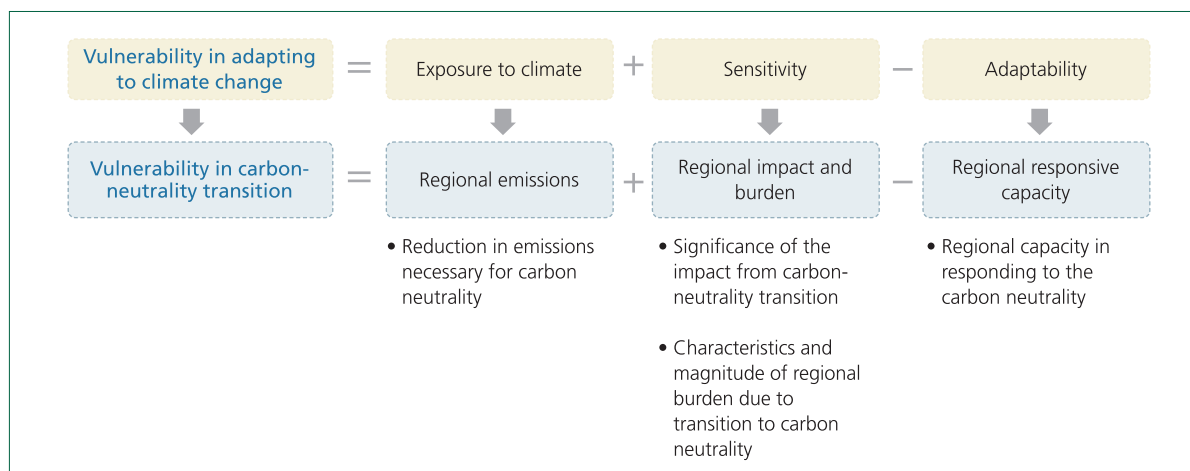
■ Greenhouse Gas Emission Status of Local Governments

First, this study investigated the greenhouse gas emission status of 60 metropolitan and local governments whose greenhouse gas emission data were available and analyzed the regional emission characteristics. The analysis showed that Incheon (65.836 Mt) was the region with the highest total emissions, while the lowest was Yangyang-gun in Gangwon Province (74 kt). Regions with heavy industries and thermal power plants had higher emissions, and population and greenhouse gas emissions were not proportional. In addition, regions with high greenhouse gas emissions per capita compared to Gross Regional Domestic Product (GRDP) included Taejeon-gun (479.7 t/person), and Danyang-gun (401.9 t/person), while regions with low emissions per capita included Seoul-si (5.4 t/person) and Daegu-si (3.5 t/person). In general, the per capita greenhouse gas emissions of large cities were below average, while those of small and medium-sized cities were above average, regardless of GRDP.

■ Analysis Results on Vulnerability to Carbon Neutrality

This study identified vulnerable areas that were high risk and low capacity in multiple sectors by considering regional emissions and the burden of reducing emissions, the impact of emissions, and regional response capacity. This study selected multiple quantitative indicators to evaluate the sectoral vulnerability comprising regional emissions, regional impact and burden, and regional response capacity. The evaluation

Figure 2. The concept of vulnerability to carbon neutrality



Source
An et al. (2022, p. 38)

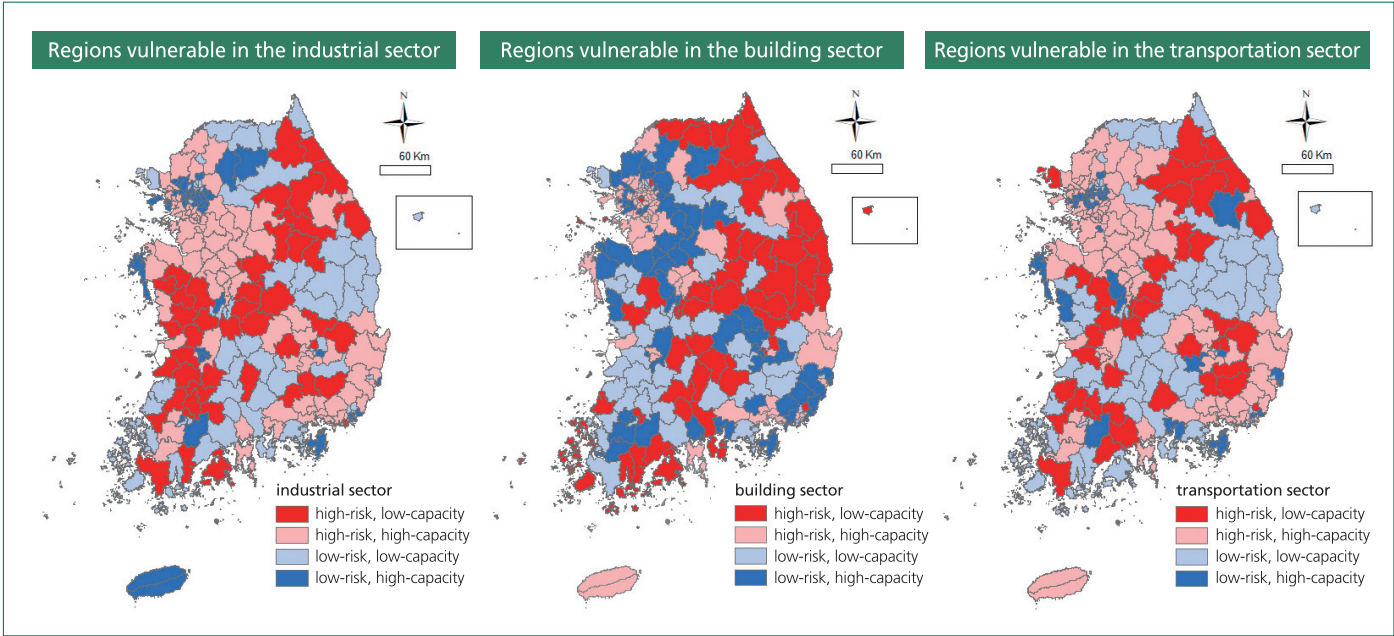
value was calculated by applying the weights of the indicators set through AHP (Analytic Hierarchy Process) on experts to the Z-scores transformed for each indicator. Based on this, the areas were classified into high risk and low capacity, high risk and high capacity, low risk and low capacity, and low risk and high capacity, depending on their risk and capacity levels (Figure 3). In addition, the vulnerability analysis results on emissions, impact, and burden sections of the energy, industry, buildings, and transportation were combined to identify multi-sector vulnerable regions with high risk. Considering regional response capacity, for high-risk and low-capacity cases, 35 regions with 2 vulnerable sectors, 9 regions with 3 vulnerable sectors, and 2 regions with 4 vulnerable sectors vulnerable were identified (Table 1). **Figure 3, Table 1**

3. Case Analysis of Domestic Responses to Carbon Neutrality

■ Direction of Analysis

For the case analysis, the regions that had high emissions, impacts, and burdens in each sector were selected based on the expert recommendations, the possibility of obtaining in-depth interviews and data from stakeholders, and the usefulness of political implications. Boryeong-si, Danyang-gun, Jeonju-si, and Jeju-do were selected and a comparison was made between the response status and current issues in each region to identify implications.

Figure 3. Sectoral vulnerability analysis outcome



Source An et al. (2022, p. 162, 164, 166)

Table 1. High risk, low-capacity regions with multi-sectoral vulnerability.

Category	Regions	Count
4 Sectors	Gangneung-si, Samchoek-si	2
3 Sectors	Gwangju Buk-gu, Pyeongchang-gun, Inje-gun, Jecheon-si, Boeun-gun, Okcheon-gun, Danyang-gun, Gongju-si, Gunwi-gun	9
2 Sectors	Busan Geumjung-gu, Daego Dong-gu, Daego Buk-gu, Incheon Dong-gu, Incheon Ongjin-gun, Daejeon Dong-gu, Hongchun-gun, Hoengseong-gun, Goseong-gun, Yangyang-gun, Goesan-gun, Jeungpyeong-gun, Geumsan-gun, Buyeo-gun, Seoecheon-gun, Yesan-gun, Iksan-si, Gimje-si, Imsil-gun, Damyang-gun, Gokseong-gun, Goheung-gun, Boseong-gun, Jangheung-gun, Haenam-gun, Hampyeong-gun, Jangseong-gun, Yeongju-si, Yeongcheon-si, Sangju-si, Seongju-gun, Mirayng-si, Changnyeong-gun, Hadong-gun, Hamyang-gun	35

Source An et al. (2022, p. 170)

■ Case Analysis Outcome

After analyzing the four cases, the transition to carbon neutrality was found to have diverse impacts depending on the spatial scope, and the perceptions and expectations regarding regional carbon neutrality policies differed between stakeholders (e.g., stakeholders, such as industrial workers, companies, residents, and local governments). First, there is a need to enhance awareness and understanding of the carbon neutrality policies of local policy executors. While sector coupling is being attempted for efficient carbon reduction, the level of response by local governments or communities has led to differences in the acceptability among residents, characteristics, and efficacy in policy implementation. However, when plans have been established and implemented for regional transition, related policies have continuously been promoted with a consistent direction for carbon neutrality. Certain local governments face issues of regional degradation such as population decline or a lack of alternative industries,

and there are concerns regarding reverse discrimination for areas marginalized during the transition to carbon neutrality. Local government officials in the case study raised issues with the fragmented implementation system without an overseeing organization to coordinate and manage carbon neutrality policies. The outcome of the case analysis for the four case areas is summarized in Table 2. [Table 2](#)

4. Supportive Measures for Regions Vulnerable to Carbon Neutrality

■ Basic direction and tasks

A SWOT was conducted in this study to provide directions in supporting the vulnerable regions based on the research outcome. Furthermore, the analyzed factors were cross-referenced to derive four main directions in supportive measures (Figure 4). Specific tasks are presented based on the

Table 2. Summary of case analysis on the response to the Carbon Neutrality

Categories	Summary of the analysis outcome
Boryeong	Necessity of in-depth analysis on the impact of transition, necessity for continuous discourse with local communities, importance of building credibility, proactive response by local governments, and basic infrastructure.
Danyang	Necessity of adaptive transition that considers industrial characteristics, possibility of technological solution and conflict among local communities, necessity of perspective from balanced development, and necessity of cooperation across corporations, local government, and local communities.
Jeonju	Importance of the cumulated experience of local government and participation of the local community, prioritized consideration on vulnerable civilians, adverse effects from interdepartmental lack of communication, and necessity of cross-sectoral approaches.
Jeju	Possibility of undesired effect of fragmented approaches, necessity of integrated approach in transition to carbon neutrality and necessity of plans for proactive industrial transition.

Source

An et al. (2022, p. x)

Figure 4. Directions in supportive measures

SO Strategy	ST Strategy
Mainstreaming climate justice policies in national carbon neutrality initiatives Mainstream climate justice policies in departmental carbon neutrality policies to establish an intra-ministerial mid- to long-term roadmap and an inter-ministerial program incorporates strategies and tasks related to vulnerable regions.	Improving the efficiency of support through sector-coupling Overcome the limitations in sectoral approaches to improve the efficiency of supportive measures by promoting sector-coupled transition plans and implementations of packaged actions for hot spots.
WO Strategy	WT Strategy
Improving the local capacity and acceptability through place-based approaches Improve the efficacy and acceptability of policies by benchmark external cases that apply place-based approaches to promote the participation of local communities.	Establishing an evidence-based, scientific support system for vulnerable regions Establish a foundation that allows for consistent supportive measures, without being affected by political trends, through a scientific approach.

Source

An et al. (2022, p. 233)

Table 3. Overall tasks for supporting vulnerable regions

Direction	Task	Specific tasks	Institutions	Term
Mainstreaming climate justice policy in national carbon neutrality initiatives	Establish a comprehensive plan and mid- to long-term roadmap for just transition	Comprehensive diagnosis for vulnerable regions and roadmap	PCCNKG ⁰¹	Short
		Reflect ministry-specific strategies and basic plans of local gov.	PCCNKG·Dept.·Local Governments	
	Conduct inter-ministerial programs in conjunction with balanced development	Design the inter-ministerial program	PCCNKG·PCBND ⁰² ·Local gov.	Short-Mid
		Design and modify ministry-specific tasks	Dept.·Local gov.	
		Implement and expand pilot policies	Dept.·Local gov.	Mid
Evidenced-based scientific supportive systems for vulnerable regions	Develop tools for selecting vulnerable regions	Design and develop tools	PCCNKG·Dept.·Local gov.	Short-Mid
		Assess regions and utilize tools	PCCNKG·Dept.·Local gov.	
	Impact analysis for vulnerable regions	Select vulnerable regions	PCCNKG·Intra-ministerial consultative body	Short-Mid
		Impact analysis for vulnerable regions	PCCNKG·Dept.·Local gov.	
Improving efficiency of supportive measures by sector-coupling	Establish a system for integrated transition for vulnerable areas	(Alt 1) Revise the guideline for the basic carbon neutrality plans (Alt 2) Implement the vulnerability analysis for transition (Alt 3) Implement guidelines for just transition	PCCNKG·Ministry of Environment PCCNKG·Ministry of Land, Transport and Maritime Affairs PCNKG·Ministry of Economic Development and Technology·Ministry of Employment and Labor	Mid
		Execute alternative measures (Establish basic plans for carbon neutrality.)	Local gov·Ministries	
	Institutionalize the spatial supports for integrated transition	(Alt 1) Expand and revise special districts for just transition (Alt 2) Revision of zoning regulations on urban planning	PCCNKG·Ministry of Economic Development and Technology·Ministry of Employment and Labor PCCNKG·Ministry of Land, Transport and Maritime Affairs	Mid-Long
		Implement a packaged pilot policy	PCCNKG·Ministries·PCBND·Local gov.	
Place-based approaches to improve local capability and acceptability	Participatory supportive policies for local gov.	Implementing the participatory supportive measures	Related Ministries·Local gov.·Civil	Short-Mid
		Expanding pilot policies	Related Ministries·Local gov.·Civil	
	Establishment and utilization of community revitalization funds	Establishment	Local gov.·Civil	Short-Mid
		Utilization	Local gov.·Civil	

Source An et al. (2022, p. 255)

Table 4. Integration of implementing structure to support vulnerable regions to carbon neutrality

Categories	Mean	Roles
Sectoral integration	Strengthening the subcommittees of the 2050 PCCNKG	Intra-ministerial task completion
	Operate intra-ministerial consultative body	Comprehensive participation on spatial-basis support
Vertical integration	Institutionalize of central government and local government consultation	Participate in the decision making of local government
	Operate consultative bodies for local government and civilians	Discover and deliver the local demands
Horizontal integration	Establish or strengthen local carbon-neutralization support centers	Mediate consultation, and formulate alternative, raise awareness
	Establish a new organization or local government task force	Correspondence on issues, mutual learning

Source
An et al. (2022, p. 263)

01. The Presidential Commission on Carbon Neutrality and Green Growth
02. The Presidential Commission on Balanced National Development

proposed directions (Table 3). **Figure 4, Table 3**

Measures to Enabling Environment

Finally, this study proposed measures to establish an implementation infrastructure in terms of the implementation system, funding, and legal framework. First, there is a need to establish a sectorally, vertically, and horizontally integrated implementation system (Table 4). **Table 4**

In addition, to diversify and expand the financial resources, relevant funding systems must be constructed and utilized. First, the Climate Response Fund should be enlarged, and its purposes should be diversified. Moreover, rules for benefiting vulnerable regions must be specified. Second, PCBND should be utilized and an establishment of separate funding dedicated to

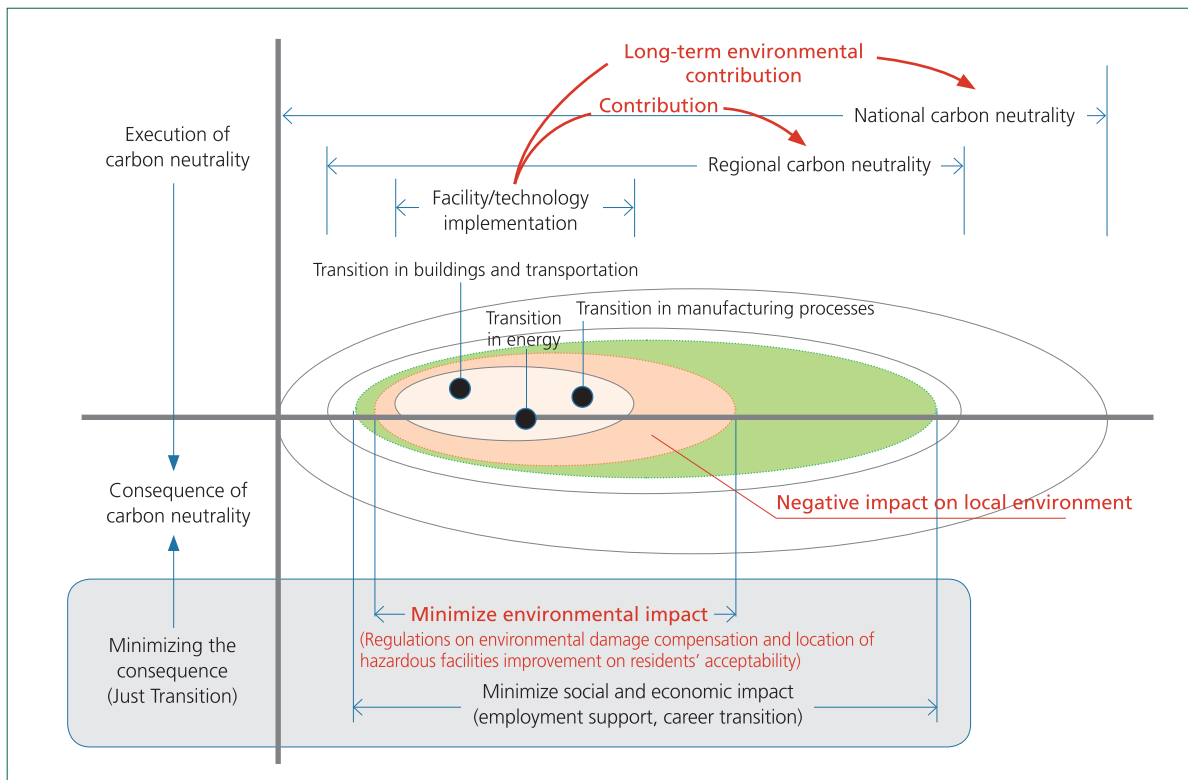
just transition must be considered. Lastly, the regional Climate Response Fund should be revitalized and linked to private markets.

In terms of the legal system, in “Framework Act on Carbon Neutrality” it is necessary to create ‘Chapter 7 Just Transition’ (Figure 5). Most importantly, regulations on the location of new facilities for the transition to carbon neutrality are needed. Additionally, it is necessary to stipulate environmental effects that locally arise from carbon neutrality and specify means to improve the acceptance of residents. **Figure 5**

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Figure 5. Directions in responding to the environmental effects due to carbon neutrality



Source

An et al. (2022, p. 260)

References

- An, Yehyun, Yoon, Eunjo, Park, Jonghwa, Kim, Eunhwa, and Hong, Naeun. 2022. *A Study on Policies for Vulnerable Regions by the Transition to Net Zero*. Sejong: Korea Research Institute for Human Settlements.

Towards Carbon Neutrality: Development Cooperation in the Urban Sector

Youn Hee Jeong

1. Background and Purpose of the Study

In the era of climate crisis, achieving carbon neutrality is no longer an optional goal, especially in the context of sustainable urban development. The international community has been developing integrated approaches to address climate change and development cooperation with a focus on supporting low-carbon development and the transition to a carbon-neutral society in developing countries. However, the proportion of efforts made for development cooperation aimed at reducing carbon emissions in South Korea is still relatively low compared to major donor countries. Therefore, this study proposes policy directions and strategies for South Korea's development cooperation efforts in the land and urban sectors, considering the accelerating global discussions on achieving carbon neutrality and mainstreaming integrated approaches to climate change and development cooperation.

2. International Organizations Strategies for Achieving Carbon Neutrality

Since the Paris Agreement (2015), the focus of international organizations' strategies for development cooperation has shifted from climate adaptation to climate mitigation through carbon reduction, with sustainable urban development and environmentally friendly transportation infrastructure emerging as priority areas. Major international organizations are prioritizing the expansion of funding for an effective climate change response and are working to establish strategies for resource mobilization, including utilizing diverse funding sources. In terms of governance, the emphasis is on creating comprehensive governance that includes multidimensional stakeholders, including various levels of government, private entities, and civil society. In particular, a holistic approach that intervenes in various sectors,



including public space, transportation, waste management, and administration at the city level, is emphasized to enhance resilience across all dimensions of a city and to develop and spread programs that transition growth paths to green ones. The accumulation and utilization of urban data have also been emphasized, and discussions on establishing and utilizing evidence-based quantitative indicators and management are expanding. The OECD and World Bank have established data platforms to track the current status of international society's responses to climate change. The OECD's Climate Response Data Platform evaluates whether each country's ODA (Official Development Assistance) aligns with the Paris Agreement's goals, based on various data. International organizations are focusing on collecting and spreading best practices for climate change responses and emphasizing the establishment of multi-dimensional partnerships, including city governments.

3. South Korea's Development Cooperation Strategy for Sustainable Urban Development and Carbon Neutrality

This study applied multiple research methodologies to diagnose the current situation and provide policy directions for the future. The research methods used included policy trends and discourse analysis based on media coverage and policy documents over the past ten years, analysis of international organizations and major donor countries' strategy documents, and analysis of the status of climate cooperation funding using OECD CRS (Creditor Reporting System) data. Additionally, a country-specific characteristic analysis was conducted based on the strategies and data of South Korea's priority cooperation countries, and a survey was conducted to analyze the current status and demand for carbon-neutral development cooperation in priority cooperating countries.

Based on these analyses, it was found that, despite the importance and role of the urban sector in responding to climate change, it is not included as a major sector in the development cooperation strategy, and there is a lack of specific sector strategies. Although the government's major policies and international development plans mention the need for international cooperation to achieve carbon neutrality, specific measures and criteria for identifying and supporting projects in the urban sector are insufficient and poorly enunciated.

In terms of policies related to responses to climate change within development cooperation, several strategies and projects

related to smart cities and smart transportation have the potential to create synergy through an integrated approach. However, the current approach is fragmented, and a more integrated approach is required to improve its efficiency and effectiveness. Therefore, it is necessary to plan and identify key programs in the urban sector to enhance the effectiveness of strategies for development cooperation.

4. Advanced Donor Countries' Strategies for Development Cooperation for Carbon Neutrality

Among the major advanced donor countries that are OECD DAC members with high levels of climate-related aids, the trends and characteristics of climate change policies and strategies were examined in the United States, Japan, Germany, France, and Sweden. The levels of climate-related aid and their shares were also analyzed, and specific features and implications were derived from these five countries. These countries adopt an integrated approach involving all departments of participating institutions and a cross-sectoral approach that considers climate issues in all areas of development cooperation to efficiently establish and implement climate strategies. In particular, advanced donor countries strategically identify and disseminate initiatives in the land and urban sectors by utilizing the experiences and capabilities of each country. To plan and implement a global initiative in the land and urban sectors, based on an analysis of key partner countries' demands and priority strategic areas, Korea must introduce a strategy for planning and implementation. In addition, there is a need to plan tailored programs for partner countries that encompass technology support, capacity building, and environmental management through cross-sectoral and cross-ministerial approaches, rather than individual and single-sector projects. As local governments are the main actors in responding to climate change and addressing issues, including reducing carbon emissions and increasing urban resilience, it is necessary to support the establishment of partnerships that include financial institutions, policymakers, research institutes, companies, universities, and civil society organizations to strengthen the policy capacity of local governments. It is important to establish a framework for managing project performance, which will help identify potential risks associated with development cooperation project regarding climate change. This framework should also be designed to respond to crises and ensure that

performance objectives are met, thereby improving the overall effectiveness of development cooperation projects in the land and urban sectors.

5. Policy Recommendations for Development Cooperation Efforts in the Urban Sector in Korea

Several measures are recommended to integrate the goal of carbon neutrality effectively into strategies for development cooperation. First, the Green New Deal ODA strategy should explicitly support low-carbon urban development and carbon reductions in developing countries. In addition, support for climate change objectives should be prioritized in the Ministry of Land, Infrastructure, and Transport's basic ODA plan for the land and city sector strategy. Concrete objectives and means for achieving carbon neutrality should be defined, including specific targets for reducing carbon emissions and annual support levels. These objectives should be accompanied by development criteria, support methods, and performance-management measures.

It is important to identify and propose models of development cooperation projects for major areas with a high potential for carbon reduction, including urban planning, buildings, and transportation, and utilize them as guidelines for planning projects. Specific Urban sector initiatives that leverage Korea's experience, technology, and capacity should be developed and promoted. Additionally, a comprehensive and holistic low-carbon urban development strategy should be proposed for partner countries' cities, including the implementation of large-scale projects in strategically selected areas.

To improve program planning and establish partnerships, it is necessary to collaborate with international organizations, promote private sector involvement, and ensure inclusive governance that involved academia and research institutions, are required. Establishing a cooperative mechanism between departments at all stages of project development for carbon neutrality is crucial to secure various climate funds and expand the participation of private sector.

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References

- Jeong Youn Hee, Lee Jin Hui, Lee Cheonjae, Park Hye Jung, and Kim Minjee. 2022. *Towards Carbon Neutrality: Analyzing Korea's Development Cooperation Strategies in the Urban Sector*. Sejong: Korea Research Institute for Human Settlements.



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