

# Green New Deal for Carbon-neutrality and Open Trade Policy in Korea

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## I. Introduction

This study focuses on Korea's Green New Deal policy and global response measures to climate change that affect international trade. Responding to climate change and achieving carbon neutrality have been placed on the policy priorities of many countries amid the spread of COVID-19. Climate change and carbon neutrality are at the forefront as policy tasks to restore the rapidly shrinking economy due to COVID-19 and prepare for the post-COVID-19 era in which urgent transfer to a low carbon society is necessary.

To take a trade viewpoint to the Green New Deal, this research defines the carbon-neutral policy, the Green New Deal, as a fiscal policy having both environmental and economic growth as its main objectives. A trade policy perspective and approach have been applied

while reviewing the carbon-neutral policy, as both carbon neutrality and economic growth pursued by the Green New Deal are closely linked to the multilateral system and the international trade system. Climate change is a global issue that transcends national borders. There are inevitably limits to the level of greenhouse gas reduction that can be achieved through the efforts of any one region or country. Carbon neutrality also requires an understanding of the international economy and production networks. Production supply chains are expanding all over the world and value chains are intricately connected. The Green New Deal needs to be considered in terms of trade policy. Therefore, this study tries to provide implications in terms of trade policy in relation to the Green New Deal policy for carbon neutrality.

## II. Global Carbon-Neutrality Policy Trends

Under the Paris Agreement, all Member States have a greenhouse gas reduction obligation, and major countries get on board by announcing their targets for achieving carbon neutrality till 2050. Each country's efforts to achieve carbon neutrality have now become a reality as implementation checks begin in 2023. Even allowing for a significant gap

between each country's goal and the necessary amounts of abatement for global carbon-neutral status, the updated National Determined Contribution for carbon reduction already poses significant challenge for each country. Global companies are also voluntarily declaring their goal of achieving carbon neutrality and demanding domestic and foreign companies on the production network to promote carbon neutrality and use renewable energy.

**Table 1. NDC and Carbon Neutral Targets**

	Base Year	Previous NDC (2005)	NDC (after 2020)	Peak Year of Emission	Carbon Neutrality
USA	2005	26~28%	50~52%	2000	2050
EU	1990	40%	55%	1990	2050
Japan	2013	26%	46%	2013	2050
Germany	1990	40%	65%	1990	2050
England	1990	53%	68%	1990	2050
China	2005	-	60~65%	2030	2060
Canada	2005	30%	40~45%	2007	2050
Korea	2018	26.3%	40%	2018	2050

Source: Climate Watch, Historic GHG Emission.

In the process of achieving carbon neutrality, each country is working hard in various ways to set directions and establish policies to respond to climate change, while efficiently supporting the economy depressed by COVID-19 by expanding government fiscal input. The EU's Green Deal is a prime example. It aims at achieving carbon neutrality till 2050, and includes a representative environmental trade policy called the Carbon Border Adjustment Mechanism (CBAM), while investing more than 1 trillion euros in transition to a low carbon society.

Korea also presents the Green New Deal as one of the axes of the Korean New Deal, and the U.S. has introduced the Build Back Better Plan, which also includes budgets related to eco-friendly and low-carbon conversion.

Although major countries used different names such as “Green Deal” or “Green New Deal” to implement policies for greenhouse gas reduction and economic growth, these efforts were not sufficient in reducing greenhouse gas emissions to global net zero. Current policies generally put more emphasis on

short-term domestic stimulus for employment and new industry.

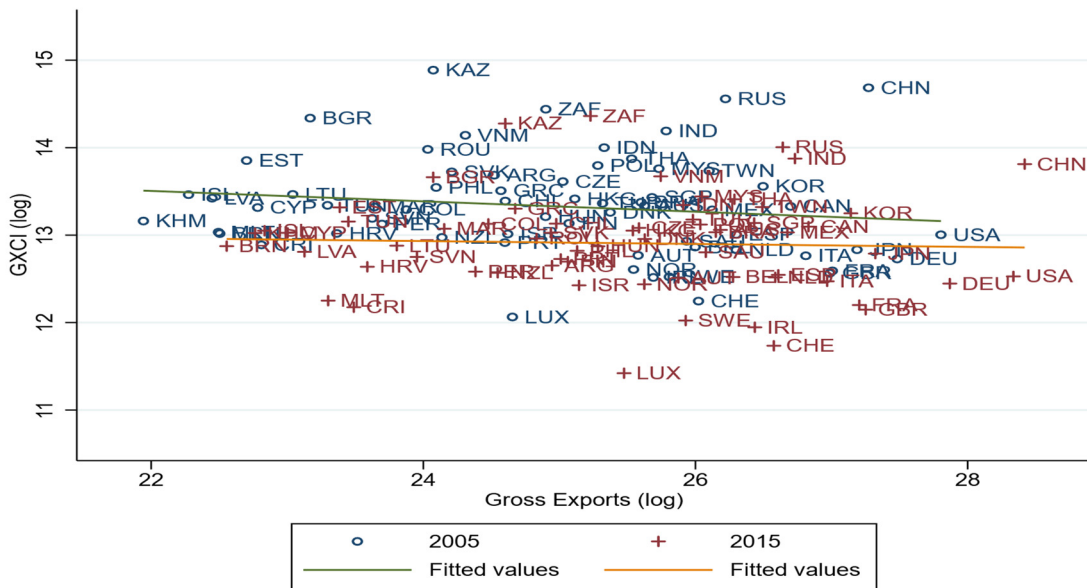
The reasons why major countries are imposing independent carbon neutral policies ultimately converge into one – the weakened multilateral system. As with carbon policies, multilateral cooperation is more effective than individual countries’ independent strategies for environmental policy. However, multilateral discussions at the UN, WTO, and APEC, or even at the G20 or G7, have not made much progress over the past 20 years in terms of ensuring successful cooperation, and as a reaction, major advanced countries are increasing-

ly adopting individual policies to try to solve the issues on their own.

### III. Open Trade Policy and Carbon Emission

This chapter argues that despite the recent global order disruption, the multilateral cooperation that enables free and open trade based on WTO rule has helped reduce carbon intensity. To support this, we present several stylized facts and regression results based on OECD global inter-country input-output tables and global carbon emission data.

Figure 1. Changes in Carbon Intensity (‘05 vs ‘15)



Source: OECD ICIO.

The first stylized fact is that carbon intensity is reduced in most countries with the pass of time. It can be understood that the inherent carbon emission decreases for the same export scale. In most countries, such as the United

States, China, etc., although the total export volume increased in 2015 compared to 2005, the change in carbon emission intensity did not increase at a one-to-one ratio. Figure 1’s vertical axis is the degree of carbon intensity

(carbon emissions in tons) embedded in exports of \$1 million and gross export in horizon. This figure confirms that the overall carbon intensity in 2015 fell compared to 2005. By country, carbon emissions from China and the United States are the highest among comparable countries. Despite a significant increase in exports by China since 2005, carbon intensity has decreased significantly in 2015 compared to 2005.

Based on stylized fact we empirically analyzed the effect of GVC participation along with trade openness on the change in carbon intensity of exports (XCI; total exports: GXCI, intermediate goods exports: IXCI, final goods exports: FXCI) under the following regression equation,

$$XCI_{ct} = \alpha_0 + \alpha_1 PRD_{ct} + \alpha_2 GDPPC_{ct} + \alpha_3 TRADE_{ct} + X'\beta + \sigma_c + \theta_t + \eta_{ct}$$

*PRD* denotes the total production of country *c* in time *t*. *GDPPC* denotes the GDP per capital. *TRADE* denotes openness or global value chain (GVC) participation. GVC backward participation (GVC BW) refers to the proportion of overseas value added to a country's total exports. GVC forward participation (GVC FW) represents the exported products or services to third countries through additional processes or consumed as final goods, following the method of Koopman, Wang and Wei (2014). *X* denotes the other control variables.

**Table 2. Trade Openness and Carbon Intensity**

	(1) GXCI	(2) IXCI	(3) FXCI
OPENness	-0.00236	-0.00296	-0.00105
GVC BW	0.00523	0.00572	0.00291
GVC FW	-0.0133***	-0.0172***	-0.00402
N	693	693	693

Notes 1) Each shell is the result from different linear fixed effect panel regressions.

2) \*p<0.10, \*\* p<0.05, \*\*\* p<0.01

Table 2 shows the main results of regression. As a result of the analysis, it was found that the expansion of openness and participation in trade contributed to lowering the export carbon intensity. Regarding GVC participation, it was found that the expansion of forward participation rather than backward participation helped to lower the carbon intensity of

intermediate goods. In particular, the carbon intensity of intermediate goods exports shows a statistically significant negative correlation with forward participation in GVC. While research on the relationship between trade and carbon emissions and carbon leakage in the literature has not been fully concluded, this study supports the positive direction that trade

expansion (particularly forward participation) helps reduce carbon emissions and does not actually increase statistically significantly.

In general, manufacturing, assembly, packaging, and processing are concentrated in the backward industries, while raw materials, material parts, R&D, and financial services are concentrated in the forward industries. Excluding the raw material industry, expanding the proportion of front-line industries means expanding the material parts and service industries. One possible inference from the analysis results is that in the case of the rear industry, carbon emissions themselves may not be large, but the reduction effect due to technological development seems to be low. On the other hand, the expansion of service industries such as technology development and finance means the expansion of participation into front-line industries, and it is judged that there is a natural carbon emission reduction effect according to changes in the industrial structure at the national level. In the end, it can be said that the expansion of participation in the production of high-tech intermediate goods and the transition of the industrial structure to the high-value-added service industry are also in line with the reduction of carbon emissions.

#### IV. Unilateral Carbon Policy and Its Economic Impact

This chapter tries to answer whether the ongoing unilateral carbon policy of individual countries is efficient in terms of trade and economics. Basically, by introducing a multi-

national and multi-industrial model proposed by Caliendo and Parro (2015), we analyze how independent environmental trade policy such as the EU CBAM affects the global economy under the global production network. In addition, counter fiscal policy such as the Green New Deal could offset the negative economic effects of other countries' unilateral environmental trade policies. In this analysis, we select the case of the EU's CBAM as a unilateral trade policy and Green New Deal as a counter policy for real-world analysis. To be specific, the amount of financial support from Korea's Green New Deal needed to offset the negative economic effects of CBAM was derived by selecting hypothetical industrial support scenarios.

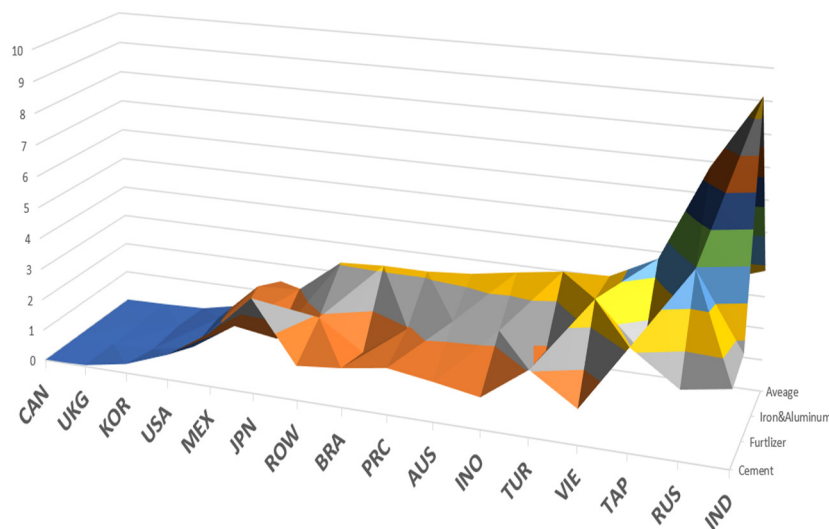
The EU CBAM is contained in the "Fit for 55" bill for carbon neutrality 2050 and was proposed by the EU Commission in 2021. If CBAM is applied as scheduled, importers of steel, aluminum, cement, fertilizer, and electricity will have a mandatory obligation to purchase carbon border adjustment certificates corresponding to the carbon content of each product at a price linked to the EU carbon trading system. In the legislation, the EU stipulates that the deduction can be applied to the carbon price paid in the country of origin of the product.

We reflect these features to calculate the tariffed CBAM certificate price. We multiply the difference between the ETS transaction price in Europe (*ETS*) and the effective carbon price (*CarbonPrice*) in the country *i* and the amount of carbon contained in the product *j* in

export ( $e$ ), after which we divide this by the mean export value to EU ( $\overline{Import}$ ) in 2015-2019, as follows.

$$CBAM_{EU,i}^j = \frac{e_i^j \times (ETS_{EU}^j - CarbonPrice_i^j) \times Import_i^j}{\overline{Import}_i^j}$$

Figure 2. Tariffed CBAM Certificate Price



Source: Author's calculation

The calculated result for tariffed CBAM certificates is displayed in Figure 2. As we can see, the countries with high carbon prices get a reduction and the anticipated CBAM certification would be lower than countries lacking a proper carbon pricing system.

The simulation model analyzes the economic impact of introduction of the CBAM. The results show that implementing the CBAM causes a decrease in welfare in countries around the world (Table 3). Korea's welfare (GDP) is projected to drop by 0.22%. Since Korea's population is around 50 million and its per capita GDP is around \$30,000, a 0.22% decrease in Korea's welfare means that per capita GDP will decrease by about \$60. The purchase amount of carbon credits calculated without

considering changes in trade volume, which is a short-term burden due to carbon border adjustment, may be relatively small, but considering the long-term balance and extension of carbon border adjustment system, it could have larger impact.

Assuming the Green New Deal is implemented to an extent that can offset the reduction in welfare under the CBAM, scenario 1 estimates the amount of subsidy needed for firms exporting iron and related metal products, cement, and fertilizer to the EU those who directly affected by the current scheme. To support those industries, trade costs faced by the company must fall by about 36% to offset the decline in domestic welfare, which is equivalent to 0.11% of nominal GDP. Under

scenario 2, the Green New Deal needs to require approximately 12% trade cost reduction to offset the welfare reduction caused by the CBAM when the support is implemented in major domestic industries, including steel cement, aluminum, and fertilizer. It was analyzed that it costs about 0.4% of nominal GDP in 2019. Because carbon emission levels and marginal costs vary by industry, the scale of green new deals might increase. In scenario 3, a Green New Deal budget of about 0.28% of

GDP was required when supporting the entire manufacturing industry. If the Green New Deal focuses on the service sector, which has a relatively small direct contribution to exports (non-tradable goods in the model), it shows relatively less efficiency in economic terms. Scenarios 4 and 5 show that subsidies to green sectors with small carbon emissions, such as the service sector, need relatively more budget than gray sectors with high carbon emissions.

**Table 3. CBAM and Welfare Change**

(Unit: %)

	(1) Selected Industry	(2) Entire Manufacturing Industry
AUS	-0.16036	-0.17933
BRA	-0.23071	-0.24445
CAN	-0.01374	-0.00782
CHN	-0.05948	-0.07065
EU	-0.11783	-0.02844
IND	-0.31609	-0.35493
INO	-0.17390	-0.18436
JPN	-0.11764	-0.11869
MEX	-0.25201	-0.26605
RUS	-0.24155	-0.36516
TAP	-0.06615	-0.08809
TUR	-0.11943	-0.19501
UKG	-0.05457	-0.0085
USA	-0.1631	-0.16824
VIE	0.79491	0.69971
KOR	<b>-0.21748</b>	<b>-0.21699</b>
RoW	-0.25558	-0.29405

Source: Author's calculation

The government budget is constrained and this is limiting the resources that can be put into the Green New Deal. In order to increase the effectiveness of the Green New Deal under a situation where a unilateral CBAM reduces economic welfare, both the environment and trade aspects need to be considered in policy measures. Also, this chapter's results highlight

the need to balance carbon intensity by industry, export competitiveness, and cost effectiveness of investment in designing the current Green New Deal. At the same time, since the input of the Green New Deal causes a significant financial burden, it leads to concerns about the need for a plan to reduce the government's fiscal input by using a more market-friendly system.

Table 4. Required Green New Deal

	(1)	(2)	(3)	(4)	(5)
	Gray Sector			Green Sector	
Support for	Firms subject to EU's CBAM	Major Export Industry	All Manufacture Industry	Green Sector	Service Sector
Tarrified Subsidy	36%	12%	0.79%	20%	7%
% of GDP	0.11%	0.4%	0.28%	5.18%	8.48%

Source: Author's calculation

## V. Recommendations for Korea's Green New Deal

Environmental policy has been basically recognized as a domestic policy, but as carbon-neutral policy has recently become a major part of environmental policy, it is also affecting the direction of government policy, such as the Green New Deal. At the same time, as the world economy is closely connected through global production networks and carbon moves to countries around the world through carbon-connected networks, carbon policy is inevitably linked with trade policy. Our research does not cover all the contents of the Green New Deal, nor does it claim that all economic problems related to carbon policy can be efficiently solved through trade policies. However, trade policies should be considered and fully utilized as one of various policy alternatives within the comprehensive policy platform of the Green New Deal policy. This study finally suggests that the effect of the Green New Deal can be expanded through the restoration of openness and global cooperation. More specifically, first, the Green New Deal should be pursued beyond

protectionism. To this end, it is necessary to consider recognizing the expansion of openness as one of the measures to reduce carbon intensity, and also consider the structural transformation to a carbon reduction-friendly GVC downstream industry. Second, it is necessary to achieve a Green New Deal that conforms to the norms of trade. To this end, reorganization of the Green New Deal into basic technology investment in climate technology, and securing the autonomy of the Green New Deal through improvement of multilateral trade rules can be considered. Third, the recovery of global cooperation can lead to synergies. Thus, Korea could consider participating in a climate club for joint response to climate change, and propose a Green New Deal that contributes to the establishment of a global carbon market. **KIEP**