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2024 Congressional Budget Request of
the US Department of Energy and Its
Implications:

Focusing on Climate Technology
Investments in the Building Sector

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2024 Congressional Budget Request of the US Department of Energy and Its Implications: Focusing on Climate Technology Investments in the Building Sector

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Summary

- The fiscal year (FY) 2024 budget for the US Department of Energy (DOE) 's Building Technologies Office (BTO), which supports the decarbonization of the building sector, is \$347.84 million, an increase of approximately \$1.58 million over the Enacted Budget of the FY 2023.
 - Within the BTO programs, the largest budgeted subprogram in FY 2024 is the "Emerging Technologies Program," which accounts for approximately 33.3% (\$115.84 million) of the BTO's budget.
 - The BTO has increased investment in R&D as well as demonstration and deployment of climate technologies in real buildings, with "existing buildings" and "retrofit technologies" that improve the energy performance of existing buildings emerging as one of the keywords in the budget request.
 - For climate technologies to be validated in the field and adopted by consumers, Korea also needs a sufficient review of related budgets and active R&D, demonstration, and deployment of retrofit technologies that can minimize inconvenience to building occupants.
- ★ **Keywords:** The US Department of Energy, President's Budget, Building, Carbon Neutrality, Climate Technology

1 Background

» On March 9, 2023, the Congressional Budget Request of the US Department of Energy (DOE) was released as the White House announced the President's Budget, the federal executive branch's budget request for the Fiscal Year (FY) 2024*.

* The US FY 2024 is the fiscal period from October 1, 2023, to September 30, 2024.

» The US DOE is one of the federal executive departments responsible for strengthening the nation's ability to combat climate change by supporting the development of innovative energy-related science and technology, and the DOE's Congressional Budget Request is an important source of information for identifying the direction of US climate technology policy.

- ◆ The Congressional Budget Request is a type of budget plan that contains the budget and rationale for each ministry's expenditures for a fiscal year. While it shows short-term direction as a one-year plan, it also contains detailed expenditure plans. Thus, it can be used to assess each department's specific policy implementation plans and intentions.
- ◆ Therefore, a review of the US DOE's Congressional Budget Request can provide insights into the specific climate technology investment plans of the U.S, as well as implications for climate technology policy in Korea.

» Accordingly, as part of reviewing climate technology investment plans per sector in the US DOE's FY 2024 Congressional Budget Request, this brief summarizes and organizes the budget for the "building sector" climate technologies, with implications for Korean building sector climate technology policy.

- ◆ The US building sector accounts for 75% of the nation's electricity consumption and 40% of its energy consumption and is responsible for about 13% of total greenhouse gas (GHG) emissions.¹⁾
 - In Korea, the household and commercial/public sectors account for 48% of electricity consumption and 21% of energy consumption (based on 2021 energy balance final consumption),²⁾ and GHG emissions from the building sector account for 7% of total emissions (as of 2018).³⁾
- ◆ The building sector is now a major GHG reduction sector in the US, with President Biden pledging the efficiency of building energy since he had been a candidate⁴⁾ and promising to reduce GHG emissions in the building sector in the Leaders Summit on Climate held at the request of the Biden administration since he took office.⁵⁾

1) US DOE, 2023a, Energy Efficiency and Renewable Energy·Electricity·Nuclear Energy·Fossil Energy and Carbon Management, Department of Energy FY 2024 Congressional Justification, Vol. 4.

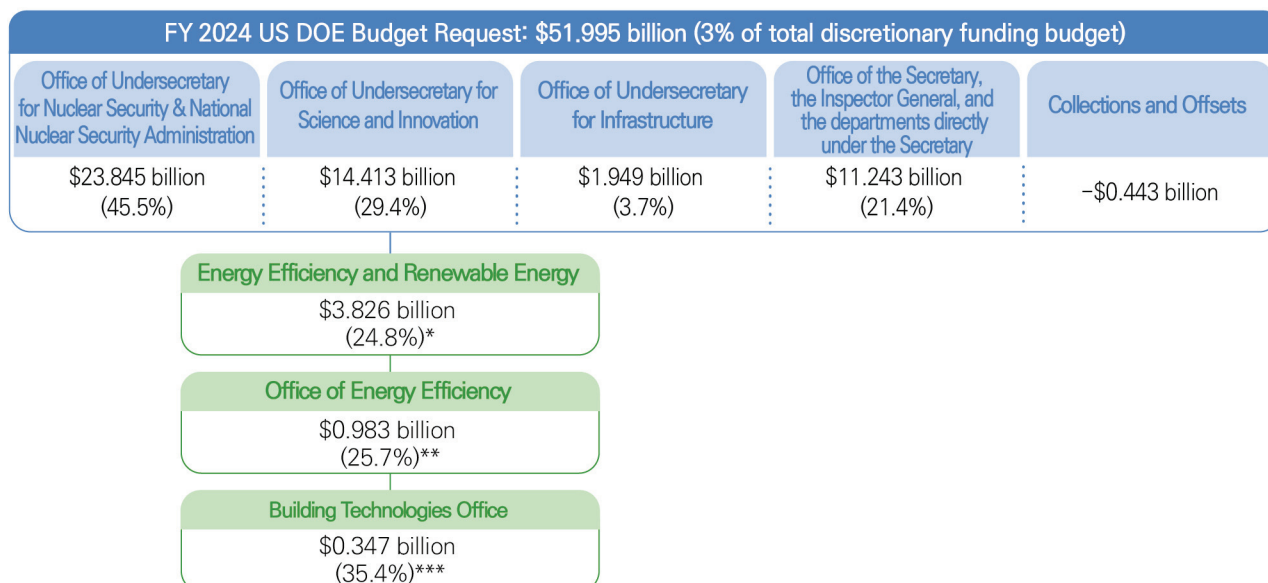
2) Korea Energy Economics Institute, 2022, Yearbook of Energy Statistics.

3) Joint ministries concerned, 2023, National Basic Plan (Proposal) for Carbon Neutrality and Green Growth.

4) Biden presidential campaign homepage, <https://joebiden.com/clean-energy/> (accessed on 2023.4.6.)

2 Overview of the US DOE's FY 2024 Congressional Budget Request

Figure 1 FY 2024 Budget Request of the US DOE, Office of Energy Efficiency & Renewable Energy (EERE) and Building Technologies Office (BTO)



Notes: Parentheses indicate the budget proportion in the parent department's budget; the proportion of the budget at the level of the Office of Under Secretary is the proportion of the budget excluding "Collections and Offsets" (\$52.44259 billion)

Data: Written by the author based on the US DOE (2023a; 2023b)

* Proportion of the EERE budget in the Office of Undersecretary for Science and Innovation budget

** Proportion of the Office of Energy Efficiency (OEE) budget in the EERE budget.

*** Proportion of the BTO budget in the OEE budget

» The US DOE requested \$51.995 billion for the FY 2024 budget, an increase of approximately 13.62% over the FY 2023 Enacted Budget* of \$45.765 billion.⁶⁾

* An enacted budget refers to the budget in appropriations bills passed by the US Congress based on the President's Budget as submitted

※ The US federal government's budget is largely divided into discretionary funding, in which the federal government has discretion in budget execution, and Mandatory Programs, such as Social Security and Medicare.⁷⁾ The FY 2024 discretionary funding budget, which includes the US DOE budget, is \$1.695 trillion.⁸⁾

5) The White House, 2021, FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies, April 22, 2021., <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/> (accessed on 2023.4.6.)

6) US DOE, 2023b, Department of Energy FY 2024 Budget in Brief, FY 2024 Congressional Justification

7) The Washington Briefs, 2021, Highlights of the US "2022 President's Budget (Discretionary Funding)," local information of the Bank of Korea, April 9, 2021.

8) The White House, 2023, Budget of the U.S. Government Fiscal Year 2024

- ◆ Among DOE organizations, the largest budget requests are by the Office of Undersecretary for Nuclear Security and the National Nuclear Security Administration, with a FY 2024 budget request of approximately \$23.845 billion,
- ◆ followed by the Office of Undersecretary for Science and Innovation requesting approximately \$15.40413 billion and then the Office of Undersecretary for Infrastructure requesting approximately \$1.94956 billion.
 - The total budget requested by the Office of the Secretary, the Inspector General, and the departments directly under the Secretary, in addition to each of the Undersecretary's offices, is approximately \$11.244 billion.

» **Within the US DOE budget, climate technology investments to reduce GHGs in the building sector are highlighted in the budget of the BTO, affiliated with the Office of Energy Efficiency in the Office of Energy Efficiency & Renewable Energy (EERE) under the Office of Undersecretary for Science and Innovation.**

- ◆ The EERE supports the decarbonization of the conversion, transportation, industrial, buildings, and agricultural sectors to achieve carbon neutrality across the US economy; the BTO is the EERE sub-organization responsible for the buildings sector.
 - ※ The agriculture sector the EERE is in charge of focuses primarily on the energy–water nexus.⁹⁾
- ◆ As of the FY 2024 Congressional Budget Request, the EERE's budget is approximately \$3.826 billion, or 24.8% of the Office of Undersecretary for Science and Innovation's budget, and BTO's budget is approximately \$347.84 million, or 9.1% of EERE's budget.¹⁰⁾

9) US Department of Energy's Office of Energy Efficiency and Renewable Energy homepage, <https://www.energy.gov/eere/about-office-energy-efficiency-and-renewable-energy> (accessed on 2023.4.7.)

10) US DOE, 2023a, Energy Efficiency and Renewable Energy·Electricity·Nuclear Energy·Fossil Energy and Carbon Management, Department of Energy FY 2024 Congressional Justification, Vol. 4.

The US DOE's Climate Technology Investments in the Buildings Sector: BTO's Congressional Budget Request¹¹⁾

» The BTO aims to reduce energy use and on-site emissions in the building sector to achieve net zero by 2050 and operates five main programs to accomplish this goal.

- ◆ The five programs run by the BTO are ① Emerging Technologies, ② Commercial Buildings Integration, ③ Residential Buildings Integration, ④ Appliance and Equipment Standards, and ⑤ Building Energy Codes*.

* Building Energy Codes are intended to reduce energy use and GHGs over the life of a building by establishing minimum efficiency requirements for new and retrofitted buildings¹²⁾ and are translated in Korean as building energy codes, building energy conservation design standards, etc.

Table 1 Composition of FY 2024 Budget Request of the BTO, US DOE

Programs	Detailed Programs	Key Technologies	FY 2023 Enacted Budget	FY 2024 Budget Request	Year-over-year Increment
Emerging Technologies	HVAC-Water Heating-Refrigeration R&D	Heat pumps, HVAC, refrigerants	51,000,000	51,000,000	–
	Thermal Systems and Energy Storage	Battery and thermal energy storage, envelope retrofits	27,000,000	27,000,000	–
	Electrical and Whole Building System	Energy modeling	39,000,000	37,841,000	▽ 1,159,000
	Subtotal	–	117,000,000 (35.2%)	115,841,000 (33.3%)	▽ 1,159,000
Commercial Buildings Integration	Technology Validation and Demonstration	Energy efficiency, heat pumps, grid flexibility, envelope, equipment	23,000,000	34,000,000	△ 11,000,000
	Technology Adoption and Technical Assistance	Retrofit, energy efficiency, demand flexibility, electrification	37,000,000	37,000,000	–
	Enabling Tools and Resources	Evaluation-analysis	10,000,000	10,000,000	–
	Subtotal	–	70,000,000 (21.1%)	81,000,000 (23.3%)	△ 11,000,000

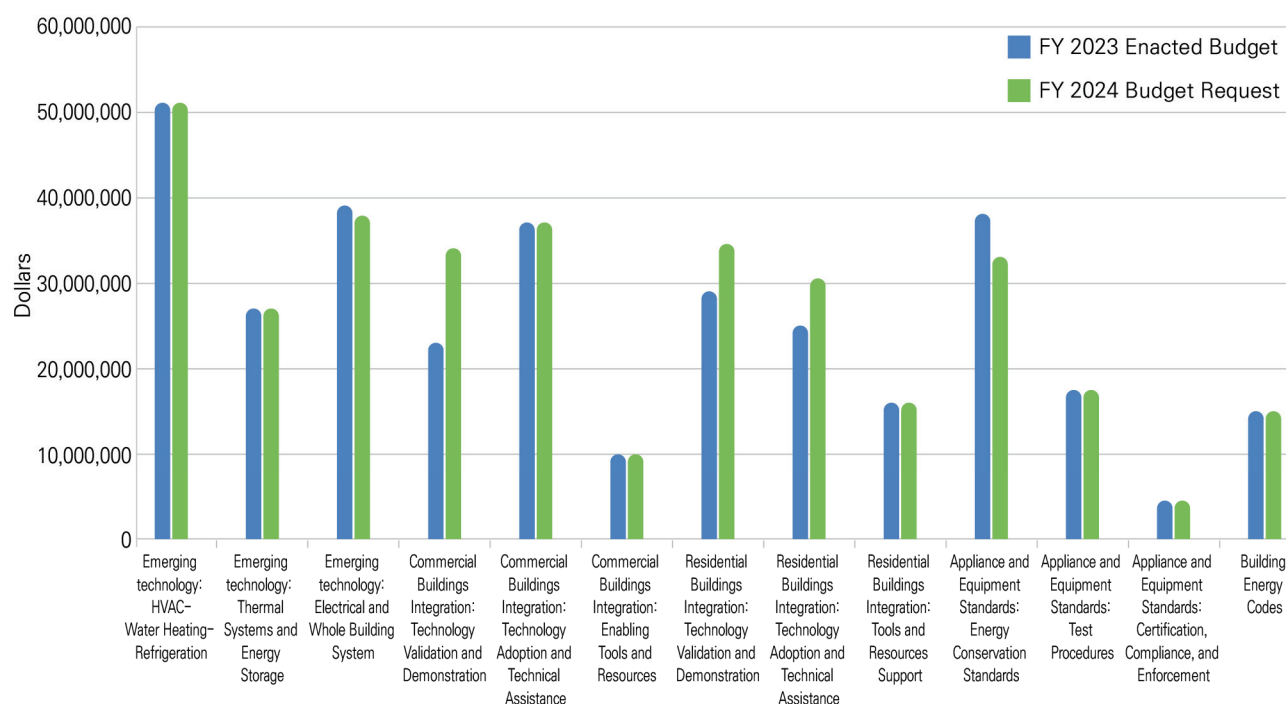
11) Ibid.

12) US Department of Energy, Building Energy Codes Program homepage, <https://www.energycodes.gov/why-building-energy-codes> (accessed on 2023.4.10.)

Programs	Detailed Programs	Key Technologies	FY 2023 Enacted Budget	FY 2024 Budget Request	Year-over-year Increment
Residential Buildings Integration	Technology Validation and Demonstration	Retrofits, envelopes, and equipment	29,000,000	34,500,000	△ 5,500,000
	Technology Adoption and Technical Assistance	Retrofit, energy efficiency, demand flexibility, electrification	25,000,000	30,500,000	△ 5,500,000
	Enabling Tools and Resources	Evaluation-analysis	16,000,000	16,000,000	–
	Subtotal	–	70,000,000 (21.1%)	81,000,000 (23.3%)	△ 11,000,000
Appliance and Equipment Standards	Energy Conservation Standards	–	38,000,000	33,000,000	▽ 5,000,000
	Test Procedures	–	17,500,000	17,500,000	–
	Certification, Compliance, and Enforcement	–	4,500,000	4,500,000	–
	Subtotal	–	60,000,000 (18.1%)	55,000,000 (15.8%)	▽ 5,000,000
Building Energy Codes	Subtotal	–	15,000,000 (4.5%)	15,000,000 (4.3%)	–
Total		–	332,000,000	347,841,000	△ 1,584,000

Data: Written by the author based on the US DOE (2023a)

Figure 2 Comparison of the FY 2024 Budget Requests by Detailed Programs of the BTO, US DOE



Data: Written by the author based on the US DOE (2023a)

- ◆ As of the FY 2024 Congressional Budget Request, the Emerging Technologies Program has the largest allocation of the five programs at \$115.84 million, accounting for 33.3% of the BTO budget.
- ◆ The Commercial Buildings Integration and Residential Buildings Integration Programs are the only two of the five programs to receive budget increases, each with a budget of \$81 million, an increase of \$11 million over the FY 2023 Enacted Budget.
 - ※ The FY 2023 Enacted Budget for the Commercial Buildings Integration and Residential Buildings Integration Programs was \$70 million, an increase of \$12.5 million (Commercial Buildings Integration Program) and \$15 million (Residential Buildings Integration Program), respectively, over the FY 2022 Enacted Budget.
- ◆ The Appliance and Equipment Standards and Building Energy Codes Programs have budgets of \$55 million and \$15 million, respectively, which are 15.8% and 4.3% of the BTO budget.

» (Emerging Technologies) The Emerging Technologies Program focuses on RDD&D* to address the challenges of the most impactful technologies that can reduce emissions in the building sector (cost, installed space, impact on the electrical grid, etc.). It comprises the following subprograms: (1) HVAC–Water Heating–Refrigeration R&D, (2) Thermal Systems and Energy Storage, and (3) Electrical and Whole Building System.

* Research, Development, Demonstration, and Deployment

** Heating, Ventilating, and Air Conditioning

- ◆ Among the Emerging Technologies Programs, “HVAC–Hot Water–Refrigeration R&D” has the largest budget of \$51 million, and investments will be made in ▲ cold district heat pump and high-temperature heat pump technologies, ▲ HVAC technology structures that can reduce factory release costs, ▲ affordable residential heat pump technologies, and ▲ low GWP*–non-HFC**–natural refrigerant technologies, etc.
 - * Global Warming Potential
 - ** Hydro Fluoro Carbon
- ◆ “Thermal Systems and Energy Storage” is allocated \$27 million in FY 2024 and will invest in ▲ optimization technologies for batteries and thermal energy storage, and ▲ building envelope retrofit* technologies using advanced technologies such as robotics and digitalization.
 - * Retrofit means improving the energy performance of an existing building by replacing its envelope or less energy-efficient equipment, fixtures, etc., and is distinct from demolishing an existing building and constructing a new building with higher energy performance.
- ◆ “Electrical and Whole Building System” is allocated approximately \$37.84 million in FY 2024 to invest in ▲ energy modeling and analysis of heat pumps in commercial and residential buildings, and ▲ promoting integrated energy efficiency and renewable energy elements in connected communities.

» **(Commercial Buildings Integration)** The Commercial Buildings Integration Program focuses on the demonstration, deployment, and market creation of technologies needed to support energy efficiency and emissions reductions in commercial buildings and comprises the following subprograms: ① Technology Validation and Demonstration, ② Technology Adoption and Technical Assistance, and ③ Enabling Tools and Resources.

- ◆ “Technology Validation and Demonstration” is a program that works with a broad group of industry representatives and third-party verifiers to support ▲ the validation and deployment of energy efficiency, heat pump, and grid flexibility technologies; ▲ identify technical barriers and validate technical solutions; and ▲ testing of envelope and equipment technologies in new and existing buildings, with \$34 million allocated for this purpose.
- ◆ The “Technology Adoption and Technical Assistance” Program will leverage a total budget of \$37 million to ▲ provide technical assistance to retrofit of existing buildings, and to ▲ partner with utility companies to accelerate the adoption of energy efficiency, demand flexibility, and electrification technologies.
- ◆ The “Enabling Tools and Resources” Program will leverage \$10 million to ▲ maintain and improve a product range of related packaged tools and ▲ develop decision-making support tools to assess energy use, emissions reductions, and performance investments in commercial buildings at an affordable price.

» **(Residential Buildings Integration)** The Residential Buildings Integration Program focuses on improving energy efficiency and reducing emissions, as well as minimizing inconvenience to owners and occupants of residential buildings, and comprises the same subprograms as the Commercial Buildings Integration Program: ① Technology Validation and Demonstration, ② Technology Adoption and Technical Assistance, and ③ Tools and Resource Support.

- ◆ “Technology Validation and Demonstration” is allocated a budget of \$34.5 million, which will support ▲ the development and demonstration of retrofit technologies, ▲ field validation of technologies and installations in existing buildings, and ▲ testing of envelope and equipment technologies in new and existing buildings.
 - ◆ The “Technology Adoption and Technical Assistance” Program will spend \$30.5 million to ▲ promote best practices to public and private organizations; ▲ provide technical assistance to implementers of projects such as heat pump deployment; ▲ support accelerated adoption of energy efficiency, demand flexibility, and electrification technologies with utility companies; ▲ support retrofitting of existing buildings; ▲ host the Solar Decathlon Design Challenge*, etc.
- * The Solar Decathlon Design Challenge is an international competition to design and build high-performance, low-carbon buildings powered by renewable energy, organized by the US DOE and held since 2002.¹³⁾

13) US DOE Solar Decathlon homepage, <https://www.solardecathlon.gov/about.html> (accessed on 2023.4.10.)

- ◆ The “Enabling Tools and Resources” Program supports ▲ improvements to analytical tools and models to characterize the US housing stock, ▲ analytical tools to support state and local governments, etc., with a budget of \$16 million in FY 2024.
- » (Appliance and Equipment Standards) The Appliance and Equipment Standards Program comprises the following subprograms: ① Energy Conservation Standards (\$33 million), ② Test Procedures (\$17.5 million), and ③ Certification, Compliance, and Enforcement (\$4.5 million). The program develops new or revised energy standards and test procedures as directed by statute.
- » (Building Energy Codes) The Building Energy Codes Program provides technical assistance to the enactment of new regulations to be applied to buildings and the building energy codes and building performance standards of state and local governments.

- » The US DOE's BTO is expanding its budget for the demonstration and deployment of climate technologies applicable to the building sector, and Korea also needs to review its budget to ensure that climate technologies in the building sector are sufficiently verified in the field and adopted by consumers.
- » There is also a need to integrate the development and demonstration of technologies with the adoption and support of technologies that can be practically applied in the field and to provide efficient and unified support at the national level through the provision of relevant foundations, such as the US DOE BTO's Enabling Tools and Resources.
- » Active RDD&D of retrofit technologies that can minimize the inconveniences of building occupants is needed to improve energy performance and reduce GHG emissions in existing buildings.
 - ◆ In the BTO's FY 2024 Congressional Budget Request, existing buildings and retrofit are two of the keywords, and improving the performance of existing buildings, which make up the majority of the building stock, is essential to achieving carbon neutrality in the building sector.
 - ◆ In particular, as pointed out in the BTO's Residential Buildings Integration Program, retrofit technologies that can improve the performance of existing buildings while minimizing inconvenience to building owners and occupants, such as air and cost, must also be addressed in priority in Korean R&D.

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- 5) The White House, 2021, FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies, April 22, 2021., <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/> (accessed on 2023.4.6.)
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※ This article summarizes and organizes part of the content being analyzed for the National Institute of Green Technology's (NIGT) major project, “A Study on Regulation Improvement and Innovation Ecosystem Revitalization to Realize Carbon-Neutral Green Growth”

✓ Publication List of Institutional Innovation Insight

Issue No.	Title	Author's name (affiliation)
No. 1 (2023.08.31.)	2024 Congressional Budget Request of the US Department of Energy and Its Implications: Focusing on Climate Technology Investments in the Building Sector	Gobong Choi, Researcher Ji-Hee Son, Director of the Center for Institutional Innovation
No. 2 (2023.08.31.)	2024 Congressional Budget Request of the US Department of Energy and Its Implications: Focusing on Climate Technology Investments in the Transportation Sector	Surim Oh, Researcher Ji-Hee Son, Director of the Center for Institutional Innovation
No. 3 (2023.08.31.)	Highlights and Outlook for the EU Carbon Border Adjustment Mechanism (CBAM)	Jisun Ku, Senior Researcher Taeyoon Kim, Researcher Surim Oh, Researcher Ji-Hee Son, Director of the Center for Institutional Innovation
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