RIEEM Research Institute for Environmental Economics and Management

WASEDA University

Key Features and Significance of GX-ETS

Climate Integrate Symposium
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Toshi H. Arimura

Director, Research Institute for Environmental Economics and Management

Professor, School of Political Science and Economics, Waseda University

Carbon Pricing (CP)

1. What is carbon pricing?
   ① **Putting a price on CO_2 emissions**
   ② Incorporating environmental issues (such as climate change) into the market

Environmental issues (market failures) into the market ！

2. Method
   ① **Carbon tax**
   - Using a tax, similar to fossil fuel tax in Japan
   - Revenue can be used for other purposes

CP was not popular among the Japanese industry

   ② **Emission Trading System (ETS)**
   - Create a market for emission allowances, cap & trade
   - Ex: EU ETS, China ETS, Korea ETS, Tokyo and Saitama ETS
   - **Confirmed emission reduction**

CP's strongest argument

   ③ (Voluntary) **Carbon Credit Market**

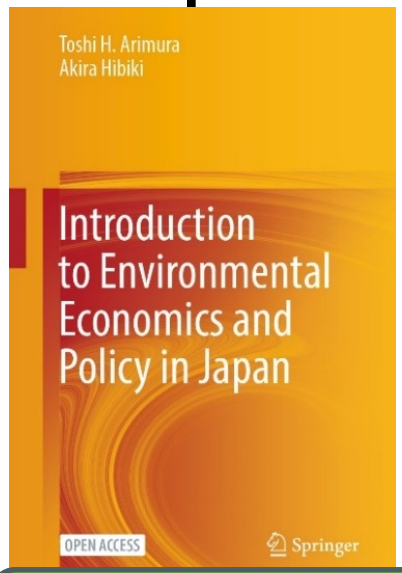
3. **Merits：emission reduction with minimal social costs**
   - Promoting efficient allocation of ressources thanks to pricing incentives.
   - Firms and consumers unconsciously move towards carbon neutrality (CN)!

Green Transformation (GX) Act in Japan (May 2023)

1. Japan Climate **Transition** Bond (FY2023-)

First Transition Bond

✓Funding for R&D and Innovation (**20 trillion** yen in 10 years)



Arimura & Hibiki (2024)

2. **<u>Carbon Pricing</u>**

A) An Emissions Trading Scheme (GX-ETS)

I. Phase I: 2023-2025

II. Phase II: 2026- (Mandatory) (Planned)

III. Auction after 2033 in the power sector (Planned)

B) Carbon Surcharge（carbon tax）

- Charges on the imported fossil fuels (similar to current oil and petroleum tax) after 2028

GX- ETS in Phase II

(*Mandatory Schemes: April 2026*)

- Firm with 100,000-ton emissions or more (300-400 firms)
  - Power, Steel, Chemical, Automobile, (domestic) Airline industry etc.
- Free Allowances (not auction, not emission reduction credit)
  - Benchmark for the energy-intensive sectors and grandfathering for other sectors
- Price Floor and Upper Limit (Safety Valve)
- Allowance & Market Place
- Offset: *J-Credits and JCM*

GX-ETS
Phase II

Features and Significance

- Key features
  - Phase II was designed in a short period by leveraging the advantages of being a late mover
  - Bottom-up approach
  - Builds on and improves experience under the Energy Conservation Act
  - Carbon leakage measures
  - Consideration for R&D
- Significance
  - Promotion of energy efficiency and new technologies
  - Fuel switching
  - Impact on the power sector
  - Potential for industrial restructuring?

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Methods for allocating allowances

1. Paid allocation (auctioning)
   - ① Sold by the government through auctions
     - ➢ e.g., power sector in EU ETS
2. Free allocation
   - ① Grandfathering (GF)
     - ➢ Allocation based on past emissions; used in the early stage of the Tokyo ETS
   - ② Benchmarking（BM）
     - ➢ Allocation based on technology or performance benchmarks; used in the EU ETS and others
     - ➢ Examples: power: CO_2 g/kWh; steel: CO_2 g/ton

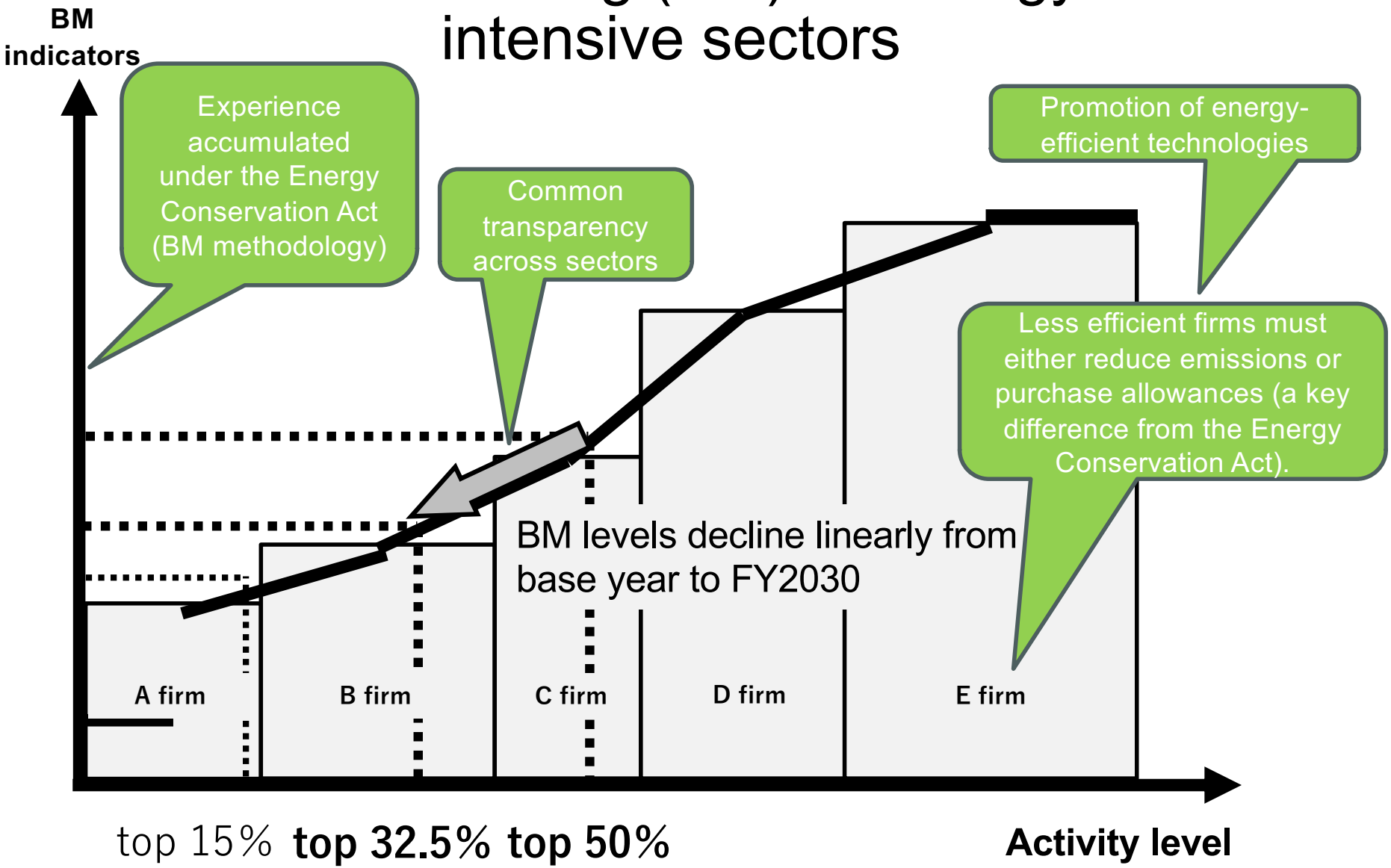
common in the initial stage of introduction

Even in Phase II, allocation is free: energy-intensive sectors use benchmarking. The power sector will shift to auctions (from 2033).

Significance of GX-ETS (1): promoting energy efficiency

GX-ETS Phase II

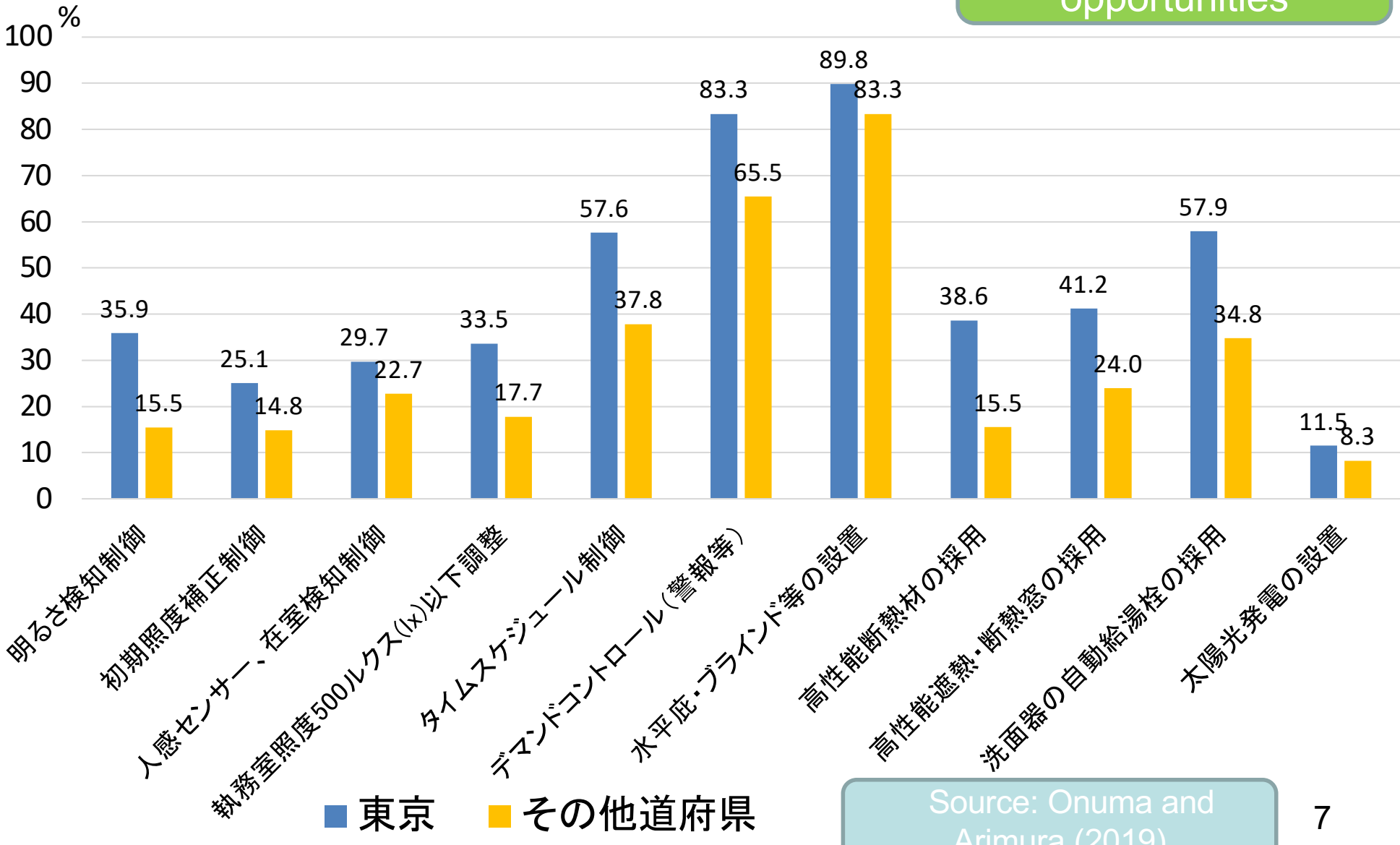
Benchmarking (BM) for energy-intensive sectors



Innovation potential of the Tokyo ETS: promotion of energy-efficiency technologies

Reference

Creation of business opportunities



Source: Onuma and Arimura (2019)

第3回発電BMWG
（2025年10月10日）資料3を一部編集

Allowance allocation calculation method (draft)

Allowance allocation = Reference activity level × Target emissions intensity (power generation BM level)

Power generation BM level = All-thermal BM level × α% + Fuel-specific BM level × (100−α)%

All-thermal BM level: weighted average of fuel-specific BM levels based on the power generation share of each fuel type

Calculated using the latest available power generation shares at present

Fuel-specific BM level: top ○% of power producers' fuel-specific BM indicators

Reference activity level: average power generation output for FY2023–FY2025

For the all-thermal BM level, thermal power generation output is used; for fuel-specific BM levels, power generation output by each fuel type is used

Where non-fossil fuels are co-fired, a certain adjustment is made for the decline in generation efficiency

年度	2026	2027	2028	2029	2030
α	0	0	0	20	40

Weight of the all-thermal BM from FY2029

Fuel-specific BM indicators: for coal, LNG, oil, etc., the direct emissions from power generation for each fuel type divided by the electricity generated from that fuel type

$$\textbf{Fuel-specific BM indicator} = \frac{\textbf{Direct emissions from power generation by fuel type}}{\textbf{Electricity generated by fuel type}}$$

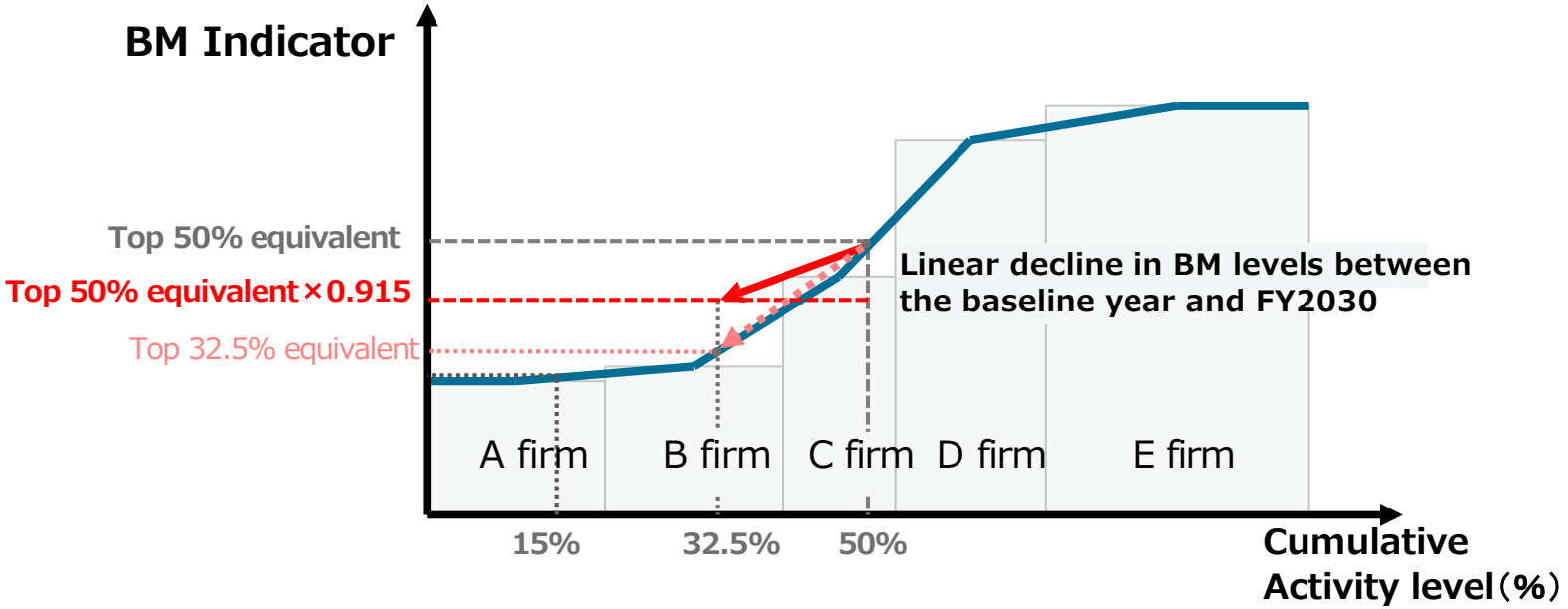
→この算定式を用い、排出量取引制度小委員会で議論されている上位X%からY%への段階的な引き下げの考え方と整合的な水準に設定

METI GX Group, ETS Subcommittee, "On specific benchmark levels for the power sector" (December)

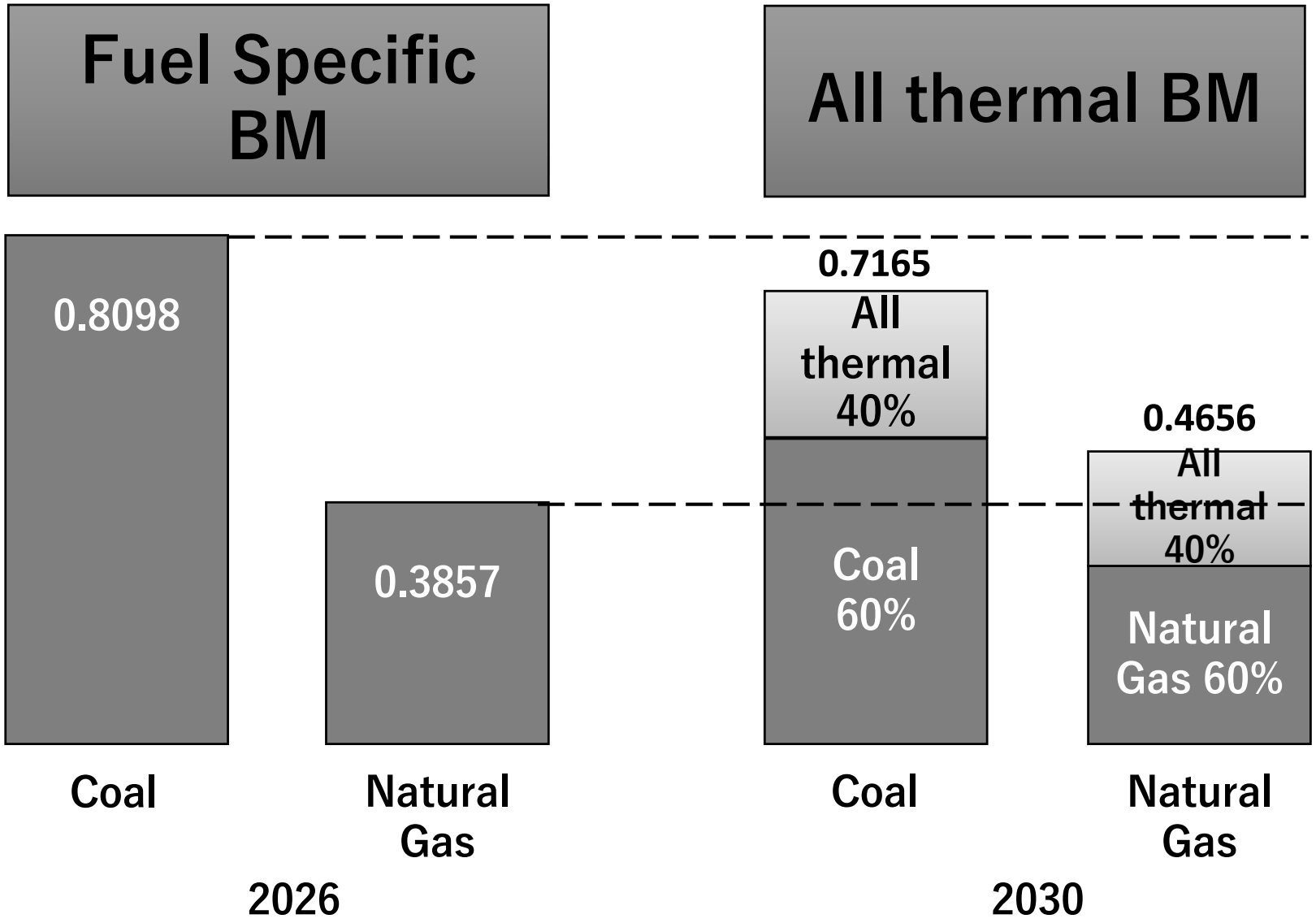
Allocation levels for BM target industries with Large Gaps between top and middle tiers

- **Setting the BM reference level (to which top %)** affects how difficult it is for each industry to achieve its BM. From the standpoint of fairness, across BM target industries, **a uniform benchmark level should be applied across all sectors.**
- However, during FY2026-FY2030, several industries are not subject to BM **due to data limitations. Instead, they receive allocations under GF.**
- To prevent excessive disparities in target reduction rates between GF target industries**, for the first five years immediately after system launched**, it is proposed that the 2030 BM level be set at **the higher value between top 32.5% or top 50%*×0.915(※)for each industry.** The other years BM level is then calculated based on this.

※ Calculated based on the reduction rate required by 2030 for GF target industries(1- 0.017 × 5 = 0.915)。

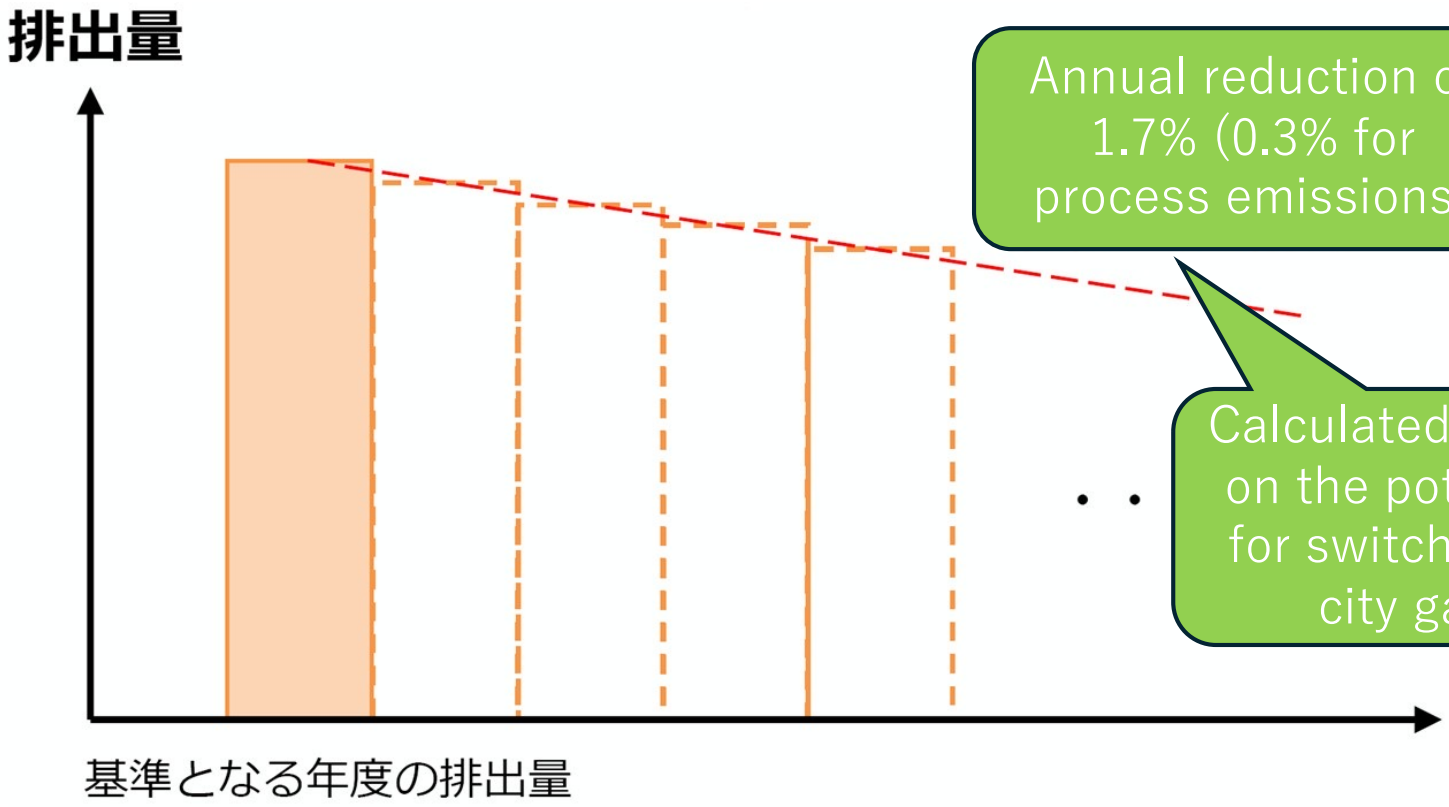


Benchmark for the power sector



GX–ETS Phase II

Grandfathering (non-energy-intensive sectors)



Annual reduction of 1.7% (0.3% for process emissions)

Calculated based on the potential for switching to city gas

Average emissions over the three fiscal years (FY2023–FY2025)

Use of Phase I information

Prepared by the author based on materials from METI's Emissions Trading Subcommittee

My comments

Ministry of Economy, Trade and Industry (METI), GX Group, ETS Subcommittee on ETS 2025/08/07

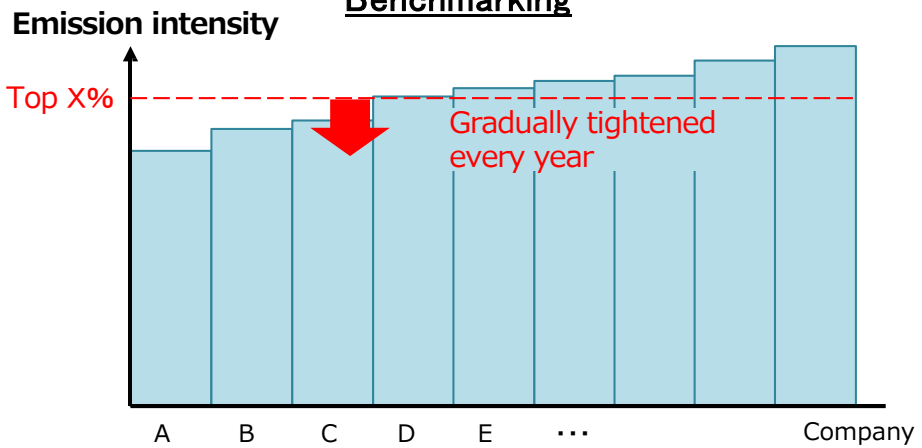
Benchmarking v.s. Grandfathering

- Benchmarks are established primarily for energy-intensive sectors, where it is particularly important to consider industry-specific characteristics. Allowance for each company then calculated based on these benchmarks.
- Benchmark levels are set for each *industry* by comparing the emission intensity per unit output among *companies in the industry.* Benchmark level then defined corresponding to the top X% within the *industry*.

  This approach reflects the cleaner technology adoption level within each industry.
- **For industries where setting benchmarks are difficult, allowances are determined using grandfathering method that applies a fixed reduction rate to the base year emission level.** 。

Annual reduction for energy is 1.7% and 0.3% reduction for process emission.

Benchmarking

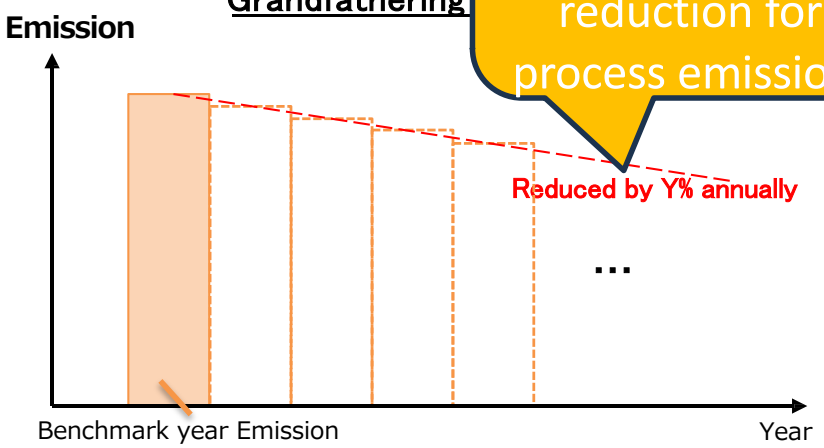


- Set the **benchmark** at the emission intensity level corresponding to the top X% (※) within each industry。
- Multiply the benchmark emission intensity by the **reference activity level** (average production level over the three years immediately before the system starts, FY2023-FY2025)

Allowance = Reference Activity level × Target Emission Intensity for each year

※The top X% level is determined based on data from the base year. The benchmark level will be gradually tightened each year, strengthening the allowance standard over time.。

Grandfathering

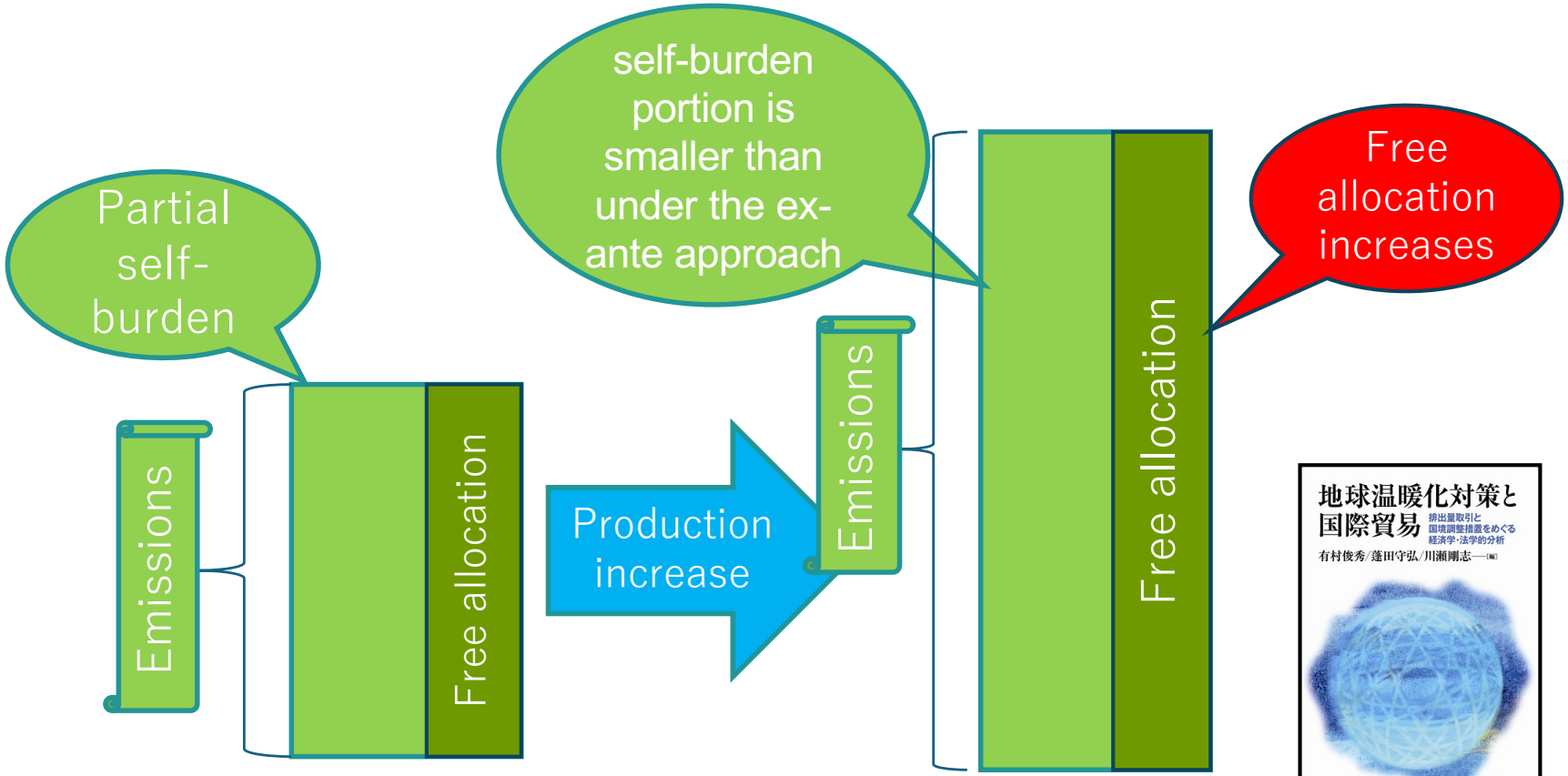


- **Allowance** decreases each year at a **fixed rate**, based on **historical emission data**.
- The **reference emissions** are calculated as the average emissions over the three years immediately before the system starts (FY2023-FY2025).。

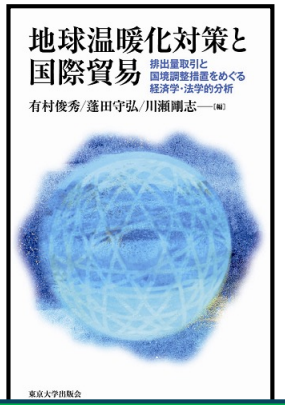
Allowance＝ Reference Emission level ×

(1−Target Reduction Rate × Number of Years after Baseline)

Economic approaches to leakage prevention
Ex-post approach: output-based allocation (OBA) / rebate program



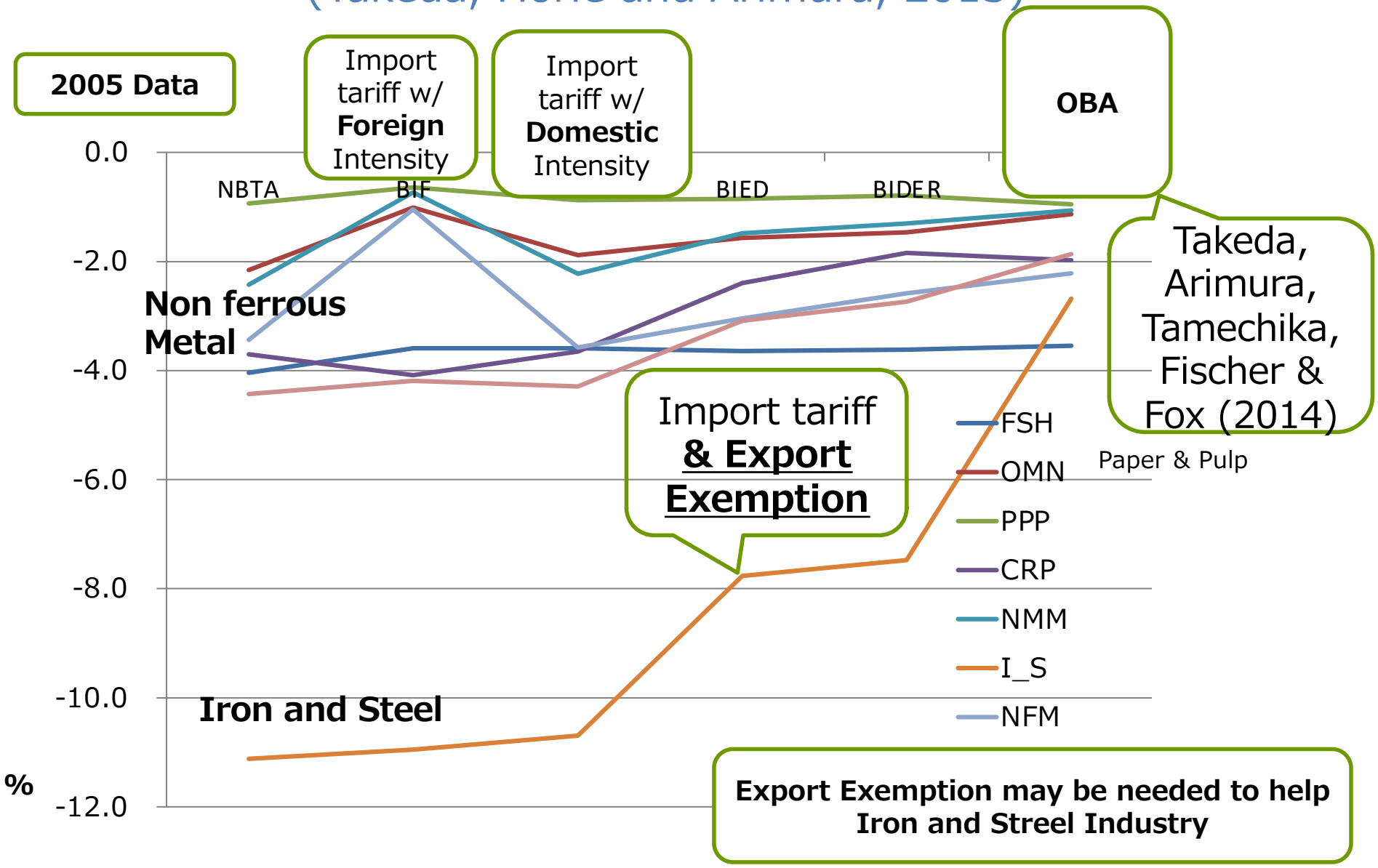
Fischer & Fox (2007)



有村・川瀬・蓬田 (2012)

Takeda, Arimura, Tamechika, Fischer and Fox (2014)

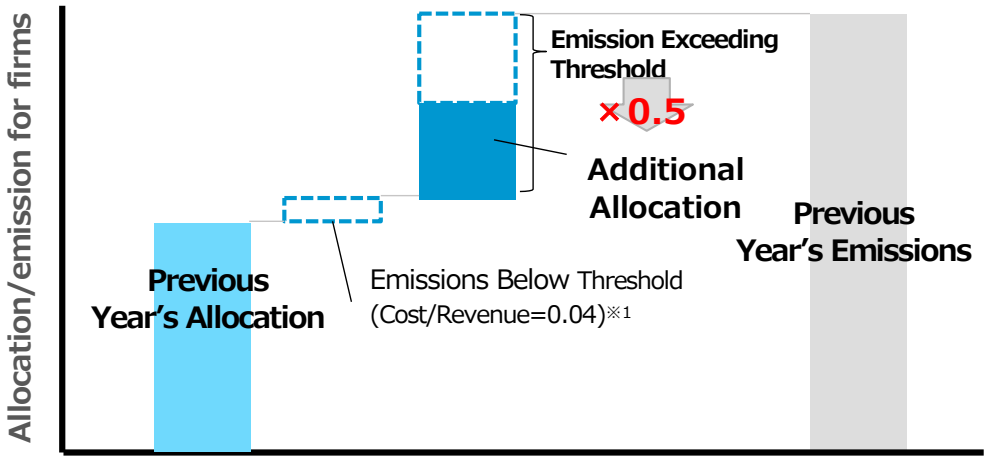
Impacts of CBAM on Output among Energy Intensive Trade Exposed Sectors (Takeda, Horie and Arimura, 2013)



②Mitigation Rate for Emission Exceeding the Threshold

- **The level of mitigation rate** should ensure firms paying capacity and investment capability, while preserve the incentive from the system to invest in decarbonization technologies.
- To prevent the additional allocation from exceeding **half of the shortfall**, a **mitigation rate of around 50%** is proposed.
- If the mitigation measure leads to an excessive decline in allowance demand, it could weaken trading incentive for firms that have made active reduction efforts. With a 50% mitigation rate, **additional allocation** under conservative estimates accounts for **only 2~3% (※), results limited impact to overall supply and demand of the system**

Example of the Measure



※1　閾値以下の排出として、緩和率を乗じずに調達を求められる排出枠の量は、各社の営業利益によって異なる。例えば、営業利益500億円の企業の場合は、20億円÷前年度の炭素価格として算出される。なお、営業利益の額が負の値となる場合は、不足した排出枠の量に0.5を乗じた量を割当量とする。

※2　上図において、BM水準を1、業種内で最も原単位の小さい事業者の原単位が0.5、最も大きい事業者の原単位が1.5であり、各社の分布が一様分布と仮定。コスト／収益の閾値は考慮せず、不足が生じた場合には一律で当該不足量の0.5倍の排出枠を追加的に割り当てるものとして、追加割当量を保守的に算定。SHK制度の報告値等から、制度対象者全体の排出量に占める製造事業者の割合は4割程度と考えられることから、追加割当量は最大でも2.5%と計算される。

GX-ETS Phase II

R&D considerations

- Concern that the purchase of emission allowances may hinder R&D
- As a countermeasure, if a purchasing company is conducting GX-related R&D, additional allocation of allowances will be considered
- Japan-specific institutional proposal

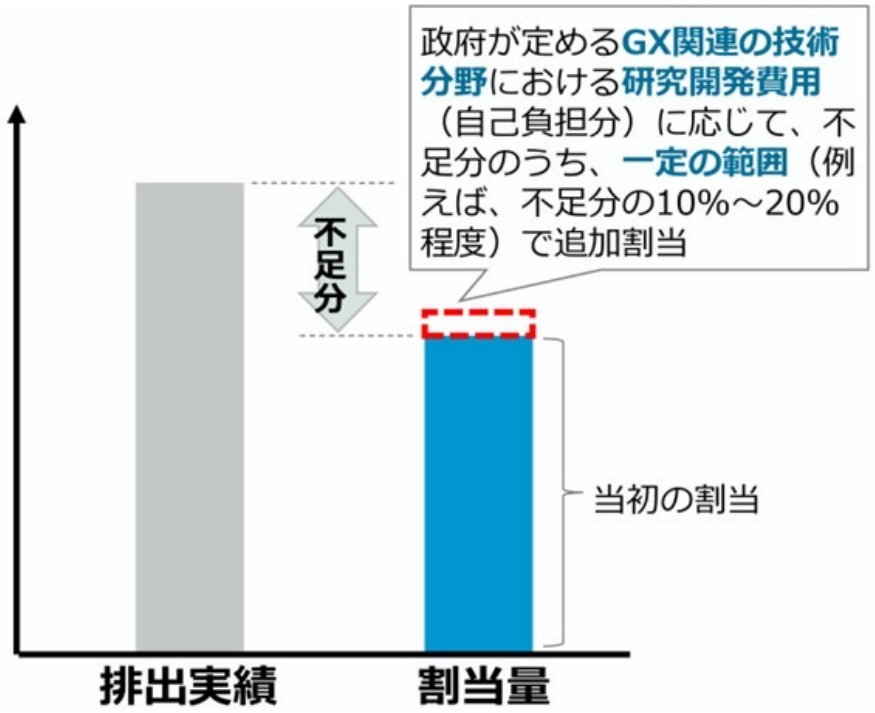


Figure from materials of METI's Emissions Trading Subcommittee

Price of GX-ETS Phase II

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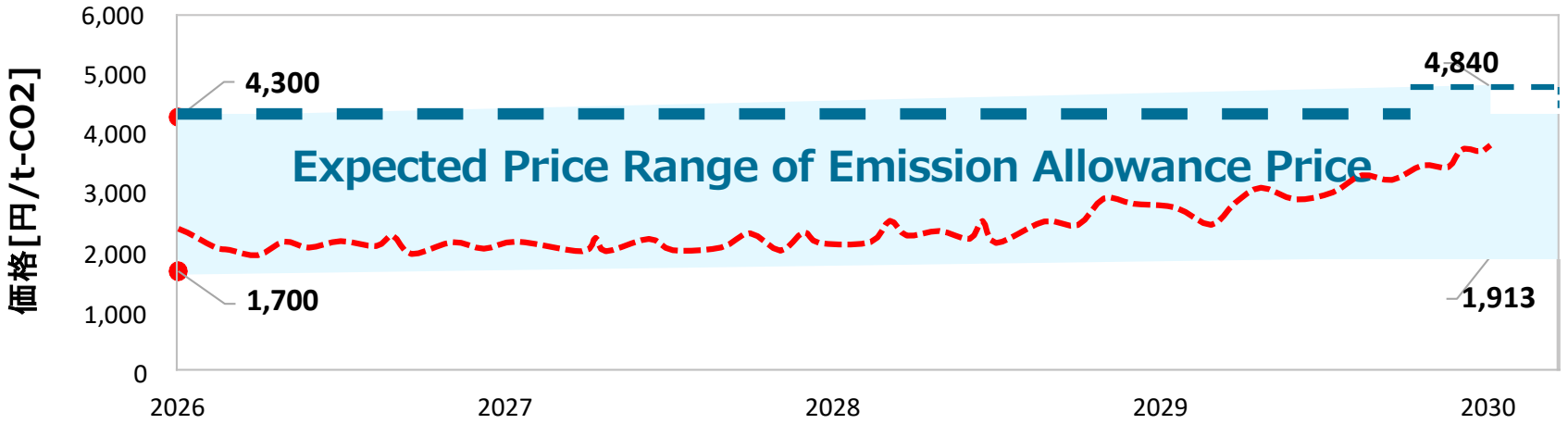
- **Price Ceiling**
  - A cost-containment mechanism under which the government issues emission permits at a fixed price.
- **Price Floor**
  - Careful design is required, particularly in the context of free allocation.
  - A reverse auction mechanism is currently under consideration.
- **Transition from a Reduction Credit System to an Allowance-Based System**
- **Market Creation and the Role of the Financial Sector**
  - To be discussed after April 2026.

METI, GX Group, ETS Subcommittee（Dec.9）

Price Ceiling and Floor (Proposal)

- Based on the discussion above, the projected price ceiling and floor for the period 2026-2030 are as follow
- Measures such as restrictions on banking will be examined separately to mitigate the risk that allowance prices remain at the price ceiling because covered entities' abatement costs are not appropriately reflected in the market price.
- To avoid excessive short-term fluctuations in transaction prices, the appropriate level of price limits in market trading will be examined in the next fiscal year

Projected Price Ceiling and Floor for Each Year※



	2026	2027	2028	2029	2030
Reference Upper Limit Price [円/t-CO2] (Ceiling Price)	**4,300**	4,429	4,562	4,699	4,840
Adjustment reference trading price [円/t-CO2] (Floor Price)	**1,700**	1,751	1,804	1,858	1,913

※ The above outlook reflects only real price increases. Each year, the nominal price that adjusted taking into account the projected inflation rate as of the previous year will be announced as the years' price ceiling and floor 。

Conclusion

- GX-ETS is a bottom-up system
- Phase II was designed in a short period by leveraging the advantages of being a late mover
- Expected to drive emissions reductions through energy efficiency and energy transition
- takes carbon leakage measures into account
- gives consideration to innovation
- A role for carbon credit markets
- “Economic Analysis of Carbon Pricing: Perspectives on GX-ETS” (tentative title), forthcoming from Nikkei BP (this June)

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- 金星姫(2024)「豪州セーフガードメカニズム」 IIEJ　2024年2月掲載
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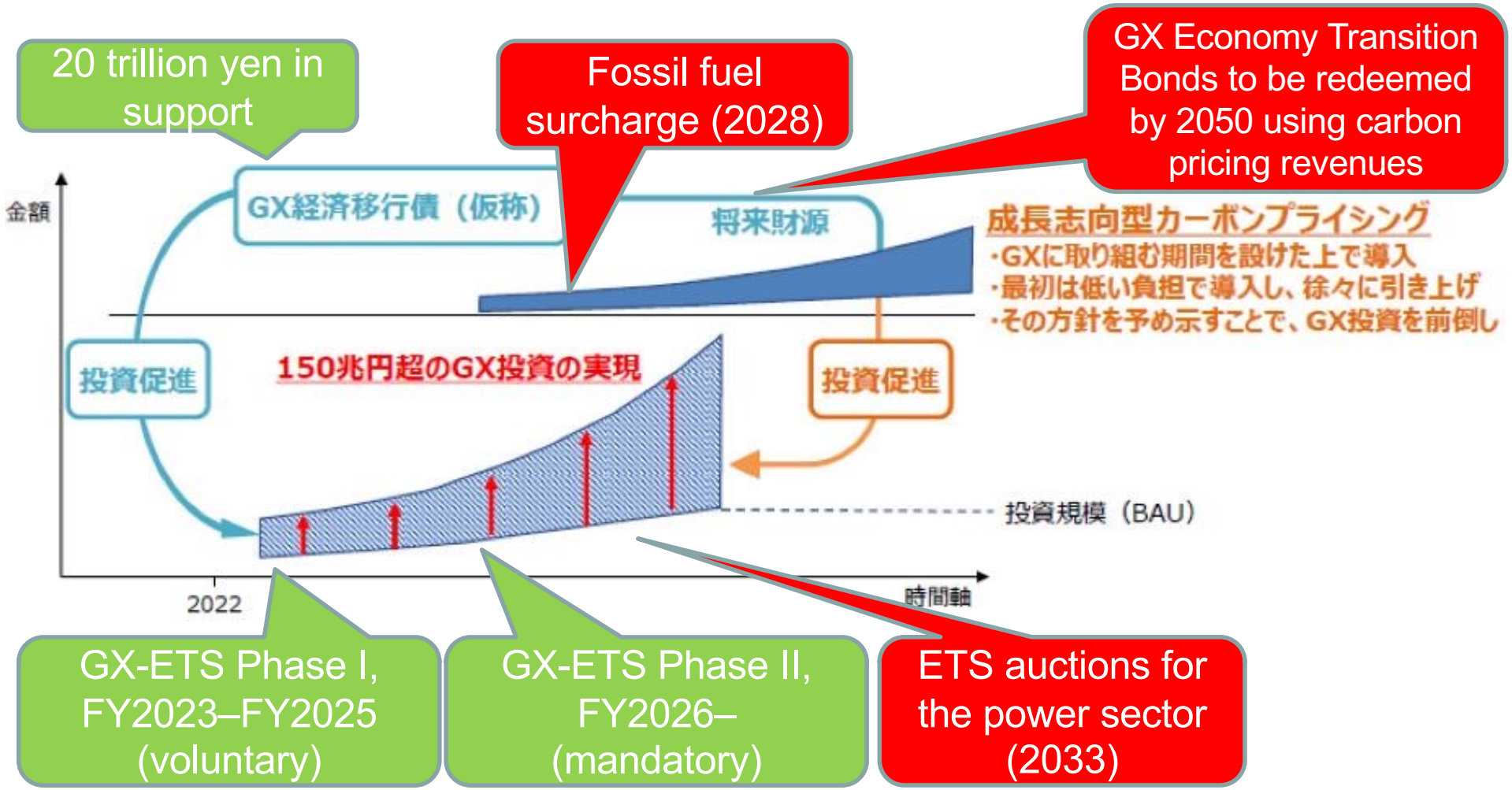
GX-ETS Phase II

Future direction of GX-ETS (for reference)

- In FY2027, the market will be established and allowance trading will begin
- In the design of Phase II, the relationship with the NDC (national emissions reduction target) was not discussed
  - A review is needed in light of the supplementary Diet resolution adopted at the time of the GX Promotion Act amendment
- For the direction of decarbonization, what matters is the update of the system five years later and what follows after that
  - The importance of price signals for expanding decarbonized energy beyond energy efficiency, renewable energy deployment, and switching to natural gas, including ammonia, hydrogen, and CCS

Carbon pricing policy under the GX Promotion Act



Author's annotations added to materials from the GX Executive Meeting, December 2022

GX-ETS Phase II

Considerations in GX-ETS Phase II

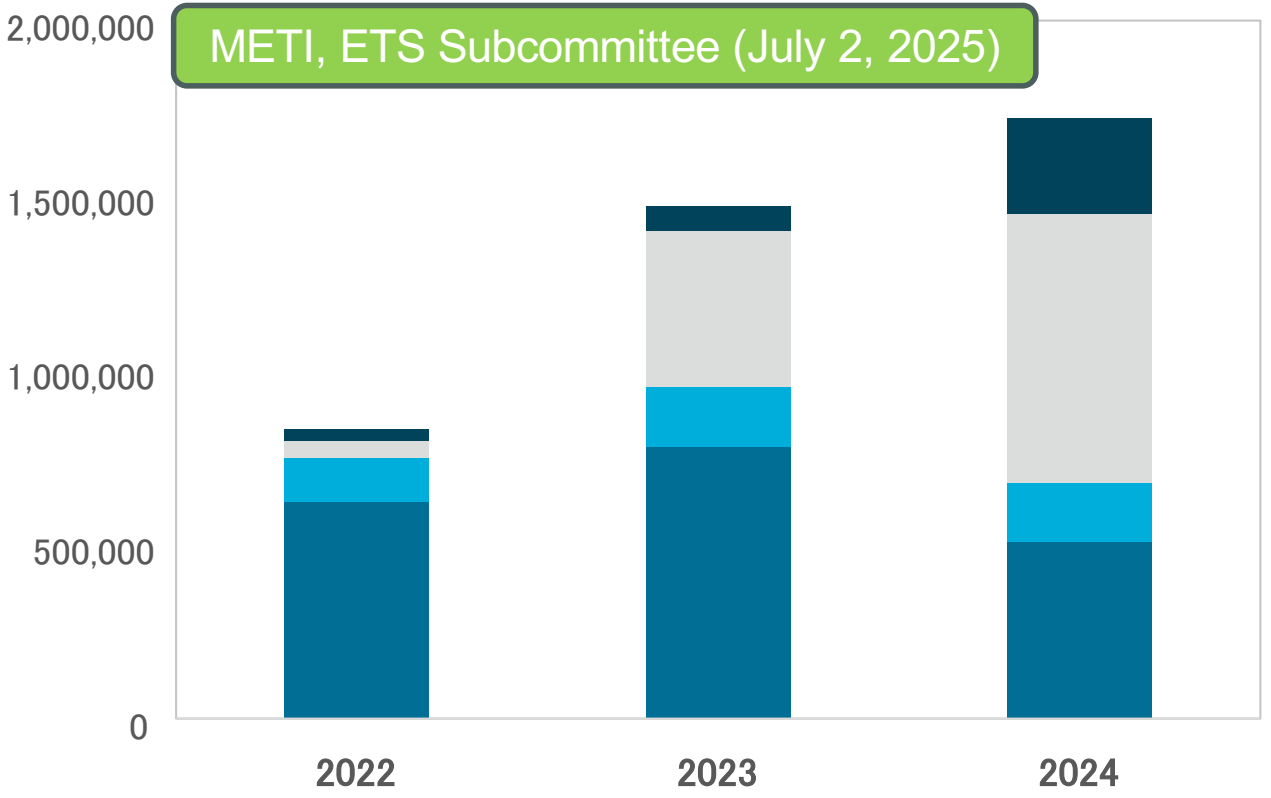
- Early reductions
  - For emission sources subject to grandfathering, emission reductions achieved before the start of the system in excess of the baseline reduction rate are added to base-year emissions when calculating allocation.
- Carbon leakage
  - For sectors deemed at risk of carbon leakage: if the cost of procuring allowances exceeds a certain share of profits, a certain proportion of the shortfall is added to the allocation.
- R&D — **Unique to Japan**
  - Depending on the amount invested in GX-related R&D in the previous year, additional allowances are granted within the range of the allowance shortfall
- Consideration is also given to changes in activity levels (new facilities, closures, major changes, etc.)

Trends in J-Credit issuance and new methodologies

- J-Credit Scheme: Total number of credit certifications (including transfers) 1,209
- Total volume of J-Credits certified under the J-Credit Scheme (including transitions): 11.03 million t-CO_2
- Over the past three years, the volume has been increasing, driven by the expansion of forest credits and others

Ministry of the Environment, Central Environment Council, Global Environment Committee (March 26, 2025)

METI, ETS Subcommittee (July 2, 2025)



「水稲栽培による中干し期間の延長」もメタン削減の方法論として認定。

https://www.kubota.co.jp/news/2023/management-20230629.html

At present, J-Credits are the main form of offsets.