Experience with Emission Benchmarks

ETS ALLOCATION in KOREA

1st October 2015

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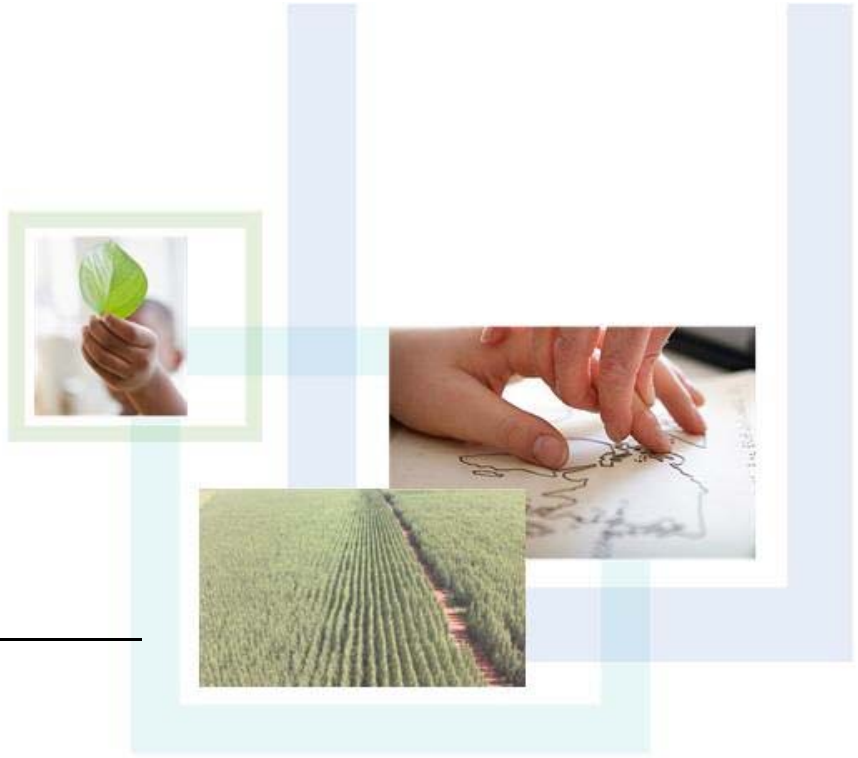

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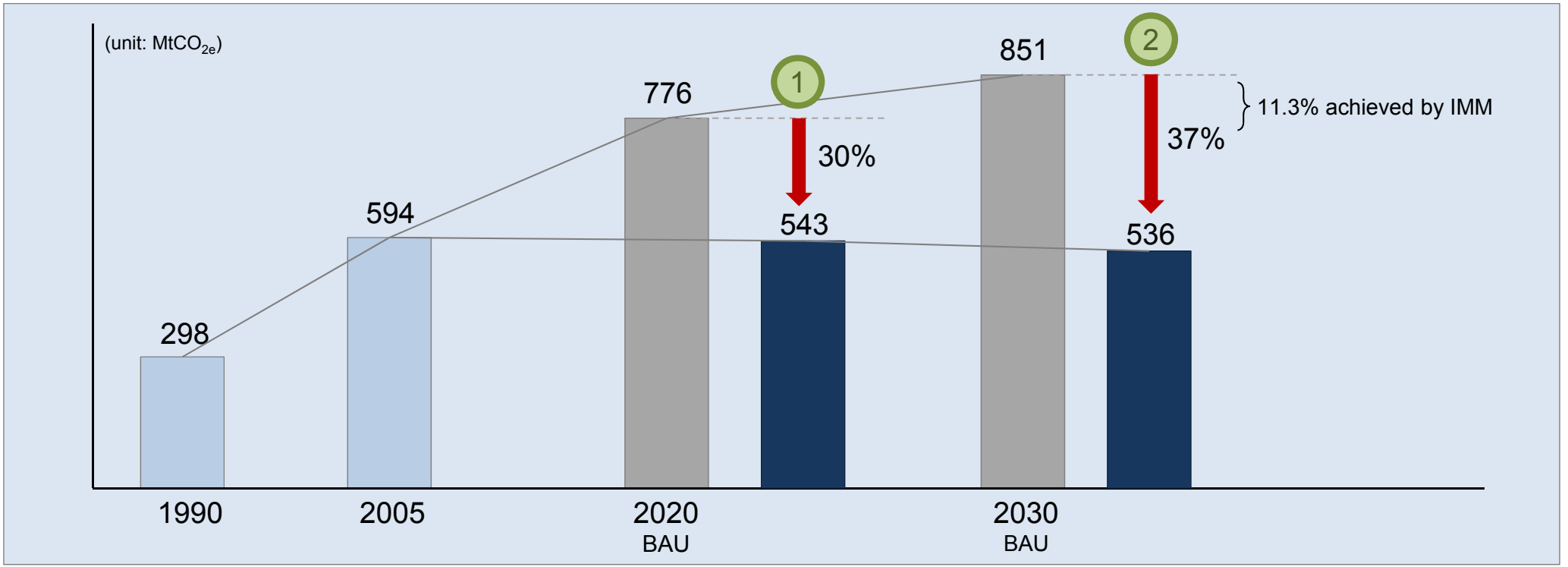
1. National GHG Reduction Target

- **The Korean government has announced it will reduce greenhouse gas emission by 30 percent(543MtCO_{2e}) from the business-as-usual(BAU, 776 MtCO_{2e}) for 2020**
  - The strategy is underpinned by the Framework Act on Low Carbon, Green Growth, passed by Korea's National Assembly in 2010
- **The government submitted its INDC to the UNFCCC, putting forward a post 2020 climate target to reduce is greenhouse gas emission by 37%(536 MtCO_{2e}) below BAU emissions of 851 MtCO_{2e} by 2030**
  - According to the Ministry of Environment, reduction of 11.3% will be achieved by IMM (international Market Mechanism)



2. K-ETS: Implementation Phase

- **In January 2015 an emission trading scheme(ETS) was launched in accordance with ACT ON THE ALLOCATION AND TRADING OF GREENHOUSE-GAS EMISSION PERMITS (2012) which is based on Framework Act on Low Carbon, Green Growth**
- **In its first phase (2015-2017), the Korea ETS will rely on free allocated credits only, with auctions being introduced in increasing increments in the second (2018-2020) and third phases (2021-2026)**

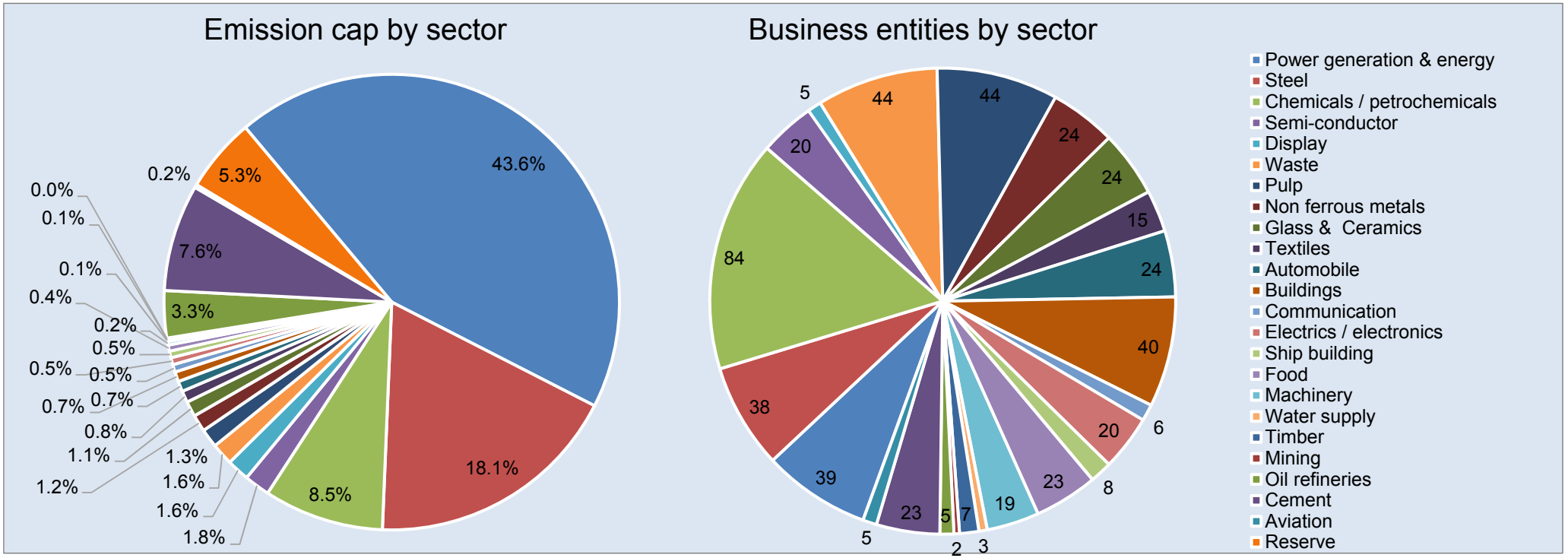
Implementation Phase

Phase I (2015~2017, 3years)	Phase II (2018~2020, 3years)	Phase III (2021~2025, 5years)	…
• Set ETS • Flexible Operation • Accumulate infrastructure and Experience • 100% Free Allocation • **Absolute Emissions Cap of 1,687 $MTCO_{2e}$**	• Considerable Emission • Reduction • Expand Application Sectors • Advance Allocation Method • 97% Free Allocation	• Proactive Emission Reduction • Expand Allocation Auctioning • Expand Flexibility • Set Allocation Method • Less Than 90% Free Allocation	

* The ETS emission cap is larger than national target in accordance with double counting of indirect emission such as power sector.

2. K-ETS: Emission Caps by Sectors

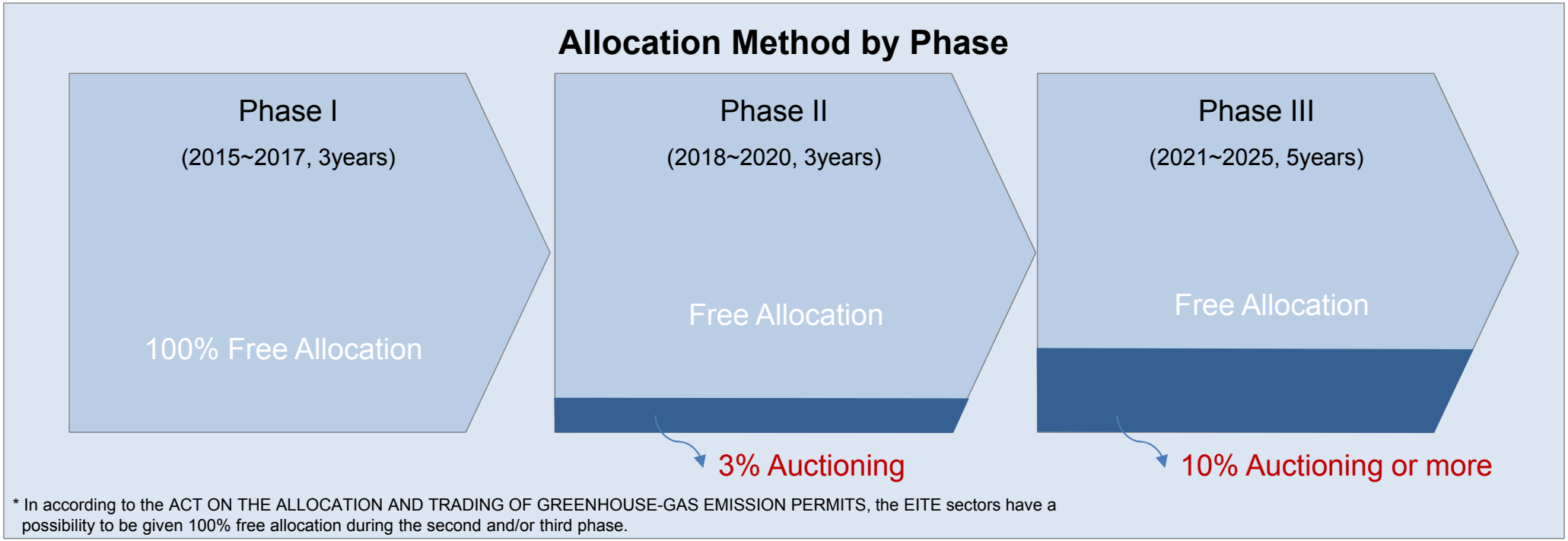
- **In Phase I of ETS absolute emissions cap is 1,687 $MtCO_{2e}$,and will decrease from 573 $MtCO_{2e}$ in 2015, to 562 $MtCO_{2e}$ in 2016 and 550 $MtCO_{2e}$ in 2017 based on 2% reduction rate of each year. Coverage for the ETS will extend to 522 companies from 23 different sectors (5 categories)**
  - Threshold: Business entity over 125,000 tCO2, business entity with a place of business(site) over 25,000 tCO2
- **Further, About 44% of total emission cap is accounted to power generation & energy sector, followed by steel, chemicals, and cement sectors**



* An emergency reserve of 88 MtCO2e may be made available if there is a need for market stabilization.

3. K-ETS Allocation: Allocation Method by Phase

- **The participating companies will be given 100% of their emissions allowance for free during the scheme's first phase, and 97% during the second phase. From 2021, at least of 10% of allowances will be auctioned**
- **Energy-intensive and trade-exposed (EITE) sectors will receive 100% free allocation regardless phases. The EITE sectors are defined along the following criteria:**
  - > 30% of carbon intensity ; or
  - > 30% of trade-exposed intensity ; or
  - > 5% of carbon intensity and > 10% of trade exposed intensity



* In according to the ACT ON THE ALLOCATION AND TRADING OF GREENHOUSE-GAS EMISSION PERMITS, the EITE sectors have a possibility to be given 100% free allocation during the second and/or third phase.

3. K-ETS Allocation: Benchmarking during Phase I (1/3)

- **Most sectors will receive their free allowances based on "grandfathering" method, and some business will be allocated free allowances following "benchmarking" method during phase I. The types of business under benchmarking are below:**
  - Aviation facility services for domestic private aircraft in aviation sector ; or
  - Combustion facility for gray cement clinker in Cement sector ; or
  - Oil-refined facility include relevant utilities in same installations in Oil-refinery sector

Eligibility for benchmarking

- **Considered availability and definitude of boundary, three business are allocated free allowances following benchmarking method.**
  - (Availability) The business entities with reliable data of fuel consumption, product output, and other which is directly related to the calculation for benchmark.
  - (Definitude) The business entities with handful products in same business area and clear boundary.

3. K-ETS Allocation: Benchmarking during Phase I (2/3)

- **The starting point for the benchmark during phase I is determined by Weighted Average Efficiency of business entities eligible. The calculation is considered the balance and fairness of all participants include GF applied entities in same sector. (The correction factor will applied to all entities in same sector regardless allocation methods)**

Benchmark Calculation

$$\text{Benchmark} = \frac{\text{Total GHG emissions from BM boundary of business entities eligible for Benchmarking}}{\text{Total activity(production) from BM boundary of business entities eligible for Benchmarking}}$$

3. K-ETS Allocation: Benchmarking during Phase I (3/3)

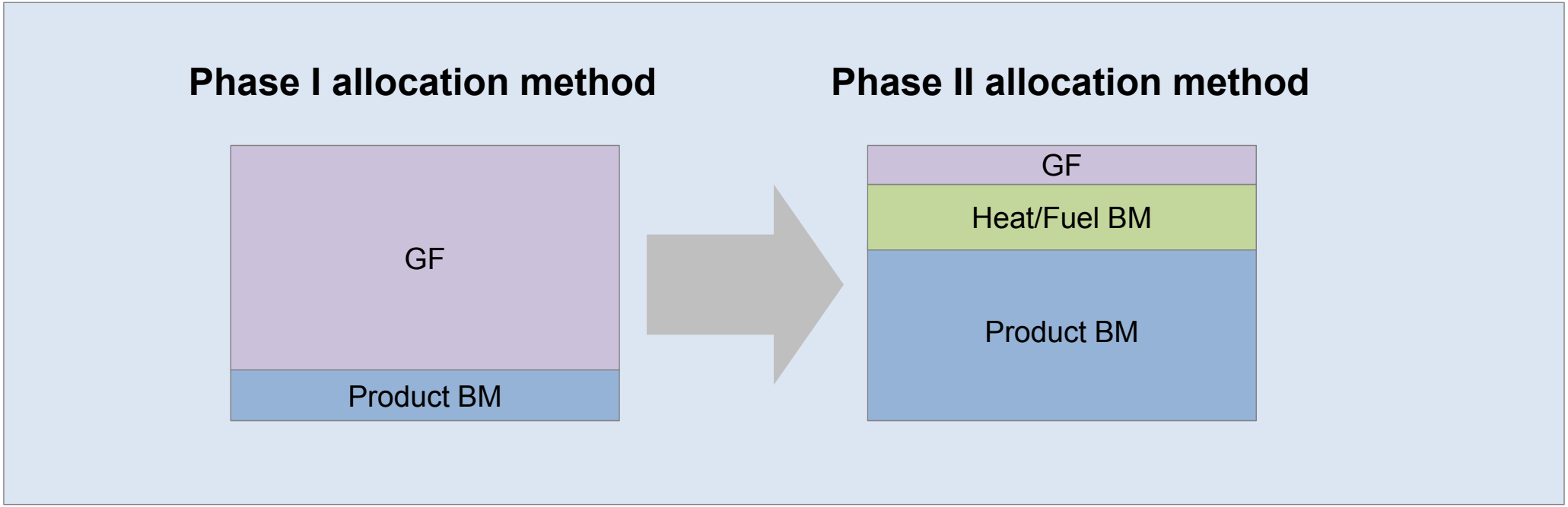
- **The allocation of three types of business are following benchmarking method during first phase.**

Sector	Item	Note
Aviation Service	Eligibility	Aviation facility services for domestic private aircraft (excluded international airline) ※ Other installations (building, mobile combustion, etc) are applied GF method.
	Benchmark	0.001667110 tonCO_2-eq/ton-km
	Data	Average emission of aviation facility services for domestic private aircraft during 2011~2013 (per ton-km)
Cement	Eligibility	Combustion of grey cement clinker (Kiln) ※ Process emissions from grey cement clinker, and other installation (white cement clinker, building, electricity, etc) are applied GF method.
	Benchmark	0.30121 tonCO_2-eq/ton
	Data	Annual average of grey cement production in base year of emission statement (ton)
Oil Refinery	Eligibility	Oil-refined facility include relevant utilities in same installations
	Benchmark	0.003925 tonCO_2-eq/CWB
	Data	The sum of annual average of an amount used in base year multiply by CWB* factor

* Complexity Weighted Barrel: metric of GHG efficiency for petroleum refineries developed by Solomon Associates

3. K-ETS Allocation: Further Allocation Plan

- **In accordance with the issues on rewarding early action within a grandfathering approach, the government plans to expand benchmarking approach from second phase**
  - The allocation plan should be released before June 2017 according to the law. The list of business entities eligible and benchmark will be determined before the publication of allocation plan
- **The ministry of environment is working on benchmarking allocation but the information yet to be opened to the public. The allocation will be based on product benchmarking, but heat or fuel benchmarking is also considered as a fall-back approach**



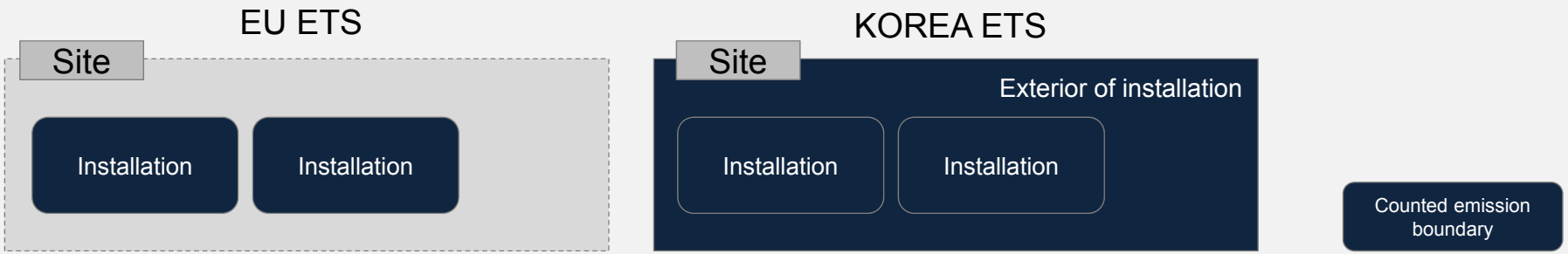
4. Major Obstacles to Apply Benchmarking Allocation

✓ **Electricity usage cannot be measured by sub-installations**

- Most of Korea entities are measuring electricity by site. Thus, many entities are having trouble with measuring electricity usage separately by sub-installations.
- It is inevitable to combine of grandfathering and benchmarking method.

✓ **The exterior of installation cannot be applied Benchmark**

- Unlike EU ETS is based on installations, Korea ETS is based on the site of business. Thus, the emissions from exterior of installation are exist, and it cannot be applied Benchmarking method.



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