# *THE BENEFITS OF USING BENCHMARKS IN AN EMISSIONS TRADING SYSTEM*

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# ABOUT CCAP

*Mission Statement:*

*"To significantly advance cost-effective and pragmatic air quality and climate policy through analysis, dialogue and education to reach a broad range of policy-makers and stakeholders worldwide."*

Since 1985, the Center for Clean Air Policy (CCAP) has been a recognized world leader in climate and air quality policy and is the only independent, nonprofit think tank working exclusively on those issues at the local, U.S. national and international levels. Headquartered in Washington, D.C., CCAP helps policy-makers around the world develop, promote and implement innovative, market-based solutions to major climate, air quality and energy problems that balance both environmental and economic interests.

Current climate and air quality initiatives worldwide include:

- Multi-stakeholder dialogues;
- Education and outreach;
- Qualitative and quantitative research;
- Technical analyses of emission mitigation and climate adaptation options; and
- Policy solutions and recommendations development.

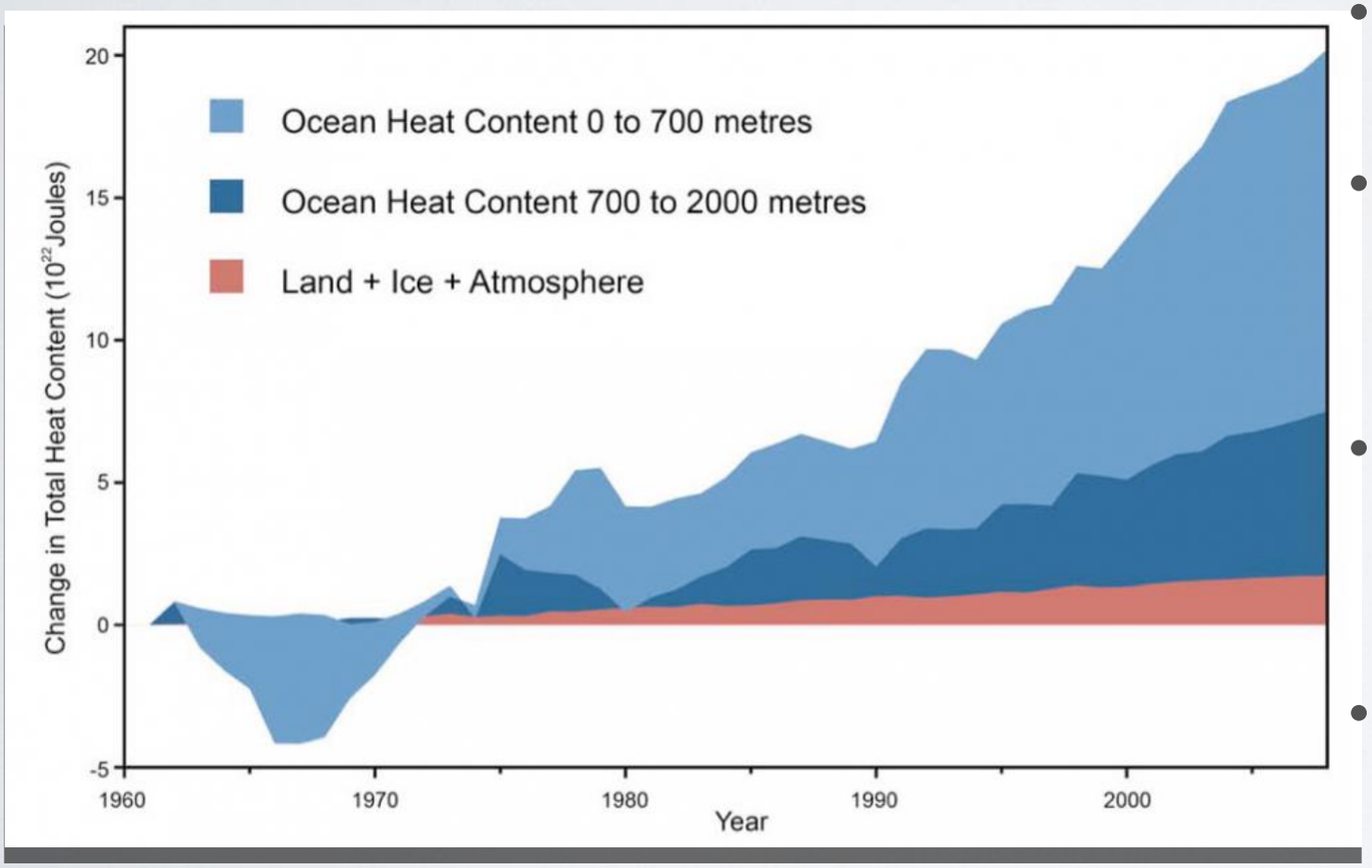

*"Supporting financing of climate action in developing countries"*

*"Implementing U.S. greenhouse gas mitigation policies"*


*"Assisting the United Framework Convention on Climate Change"*

*Latest news from IPCC & EU*

# IPCC 5TH ASSESSMENT REPORT SEPTEMBER 2014




- High certainty mankind is causing global warming
- Impacts are happening sooner
- More frequent extreme weather e vents
- Business as usual emissions will take us far beyond + 2 ˚C
- Cutting CO2 emissions is urgent f or all countries

# EU PREPARES 2030 TARGETS

- EU contribution to 2015 international climate agreement to be decided in 2014 (most likely).
- Ranges under discussion: -35 to -45% reductions in 20 30 compared to 1990. March/June 2014 EU heads of g overnment meetings will give input.
- Possible new 2030 renewable energy goal for EU
- Structural reform of EU ETS: measures announced bef ore end 2013. This can include a Supply Adjustment M echanism

# *The history of benchmarking*

- Benchmarking is a method to assist the comparison of the perfor mance of similar companies/products/processes
- Pioneered in the Refinery sector (e.g. Solomon index)
- Used in the Netherlands and Belgium to improve energy efficien cy of industrial companies/sectors
- Used (sporadically) in the National Allocation Plans (2005-2012) as method to allocate EU ETS allowances especially for new ent rants in the EU ETS
- Essential method for allocation for industrial production installati ons in EU ETS as from 2013

# *Multiple benefits of benchmarking?*

# ADVANTAGES OF BENCHMARKS IN EMISSIONS TRADING

- Grandfathering historical emissions (and certainly without performance correction) does not reward early action
- Using benchmarks for allocation allows rewards early-movers, more efficient installations/companies

# EXAMPLE

Two companies producing same product and same activity but different CO2 efficiency.

| | Performance (t CO2/unit of product) | production (units of product) | Emissions |
|---|---|---|---|
| Company A | 0.9 | 100 | 90 |
| Company B | 1 | 100 | 100 |
| **Total** | | | **190** |

## Case 1: Pure grandfathering

| Pure grandfathering | Historical emissions |
|---|---|
| Company A | 90 |
| Company B | 100 |
| **Total** | **190** |

Most efficient company (A) gets less allowances. Less efficient Company (B) can reduce 10t and sell. It

Benefits from late action.

# Case 2: Pure grandfathering under absolute cap (180t)

| Grandfathering with correction | Historical emissions | correction factor | Corrected historical emissions |
|---|---|---|---|
| Company A | 90 | 0.9474 | 85 |
| Company B | 100 | 0.9474 | 95 |
| **Total** | **190** | | **180** |

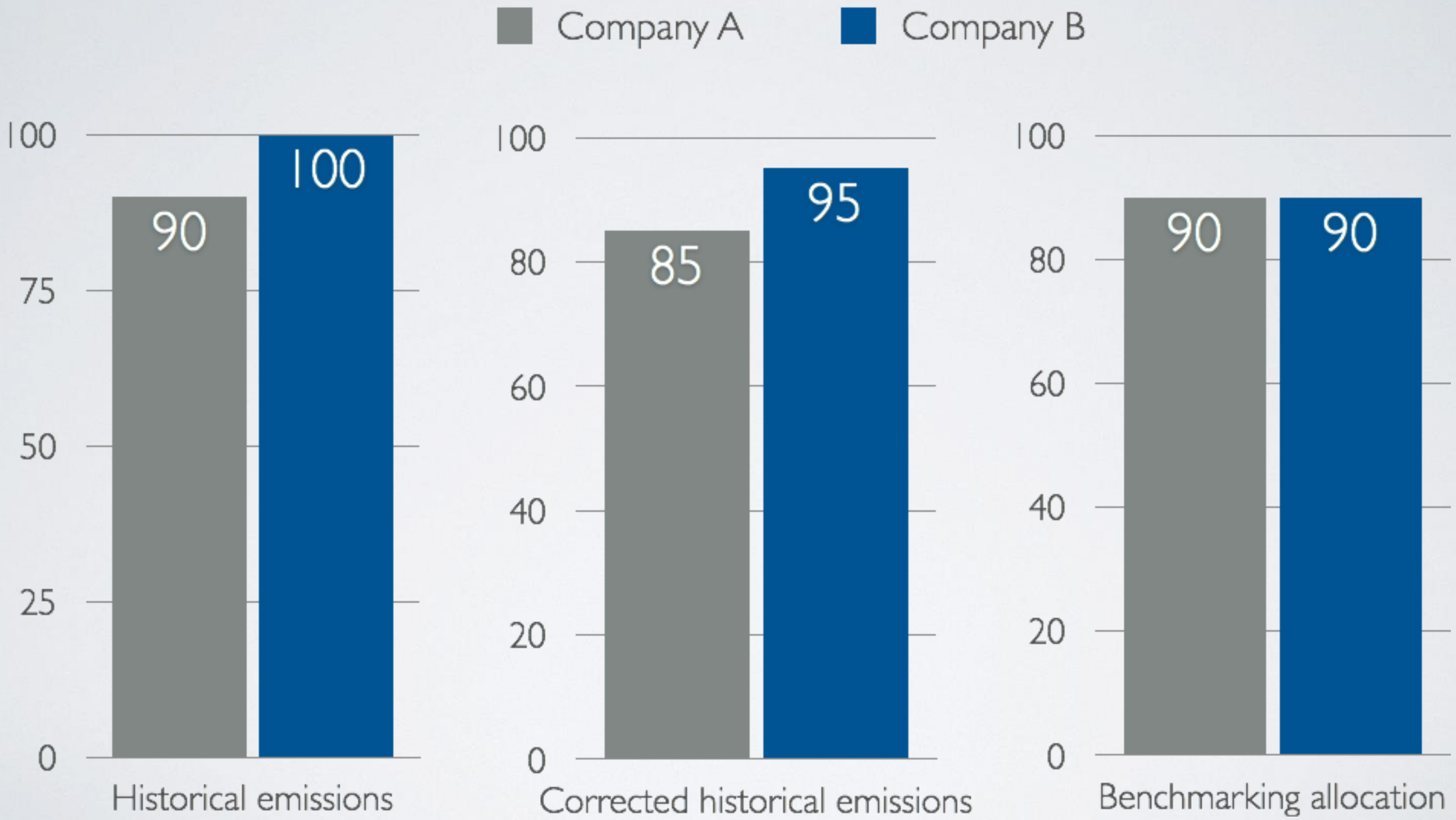
Most efficient company (A) gets even less allowances.

# Case 3: Benchmarking based allocation

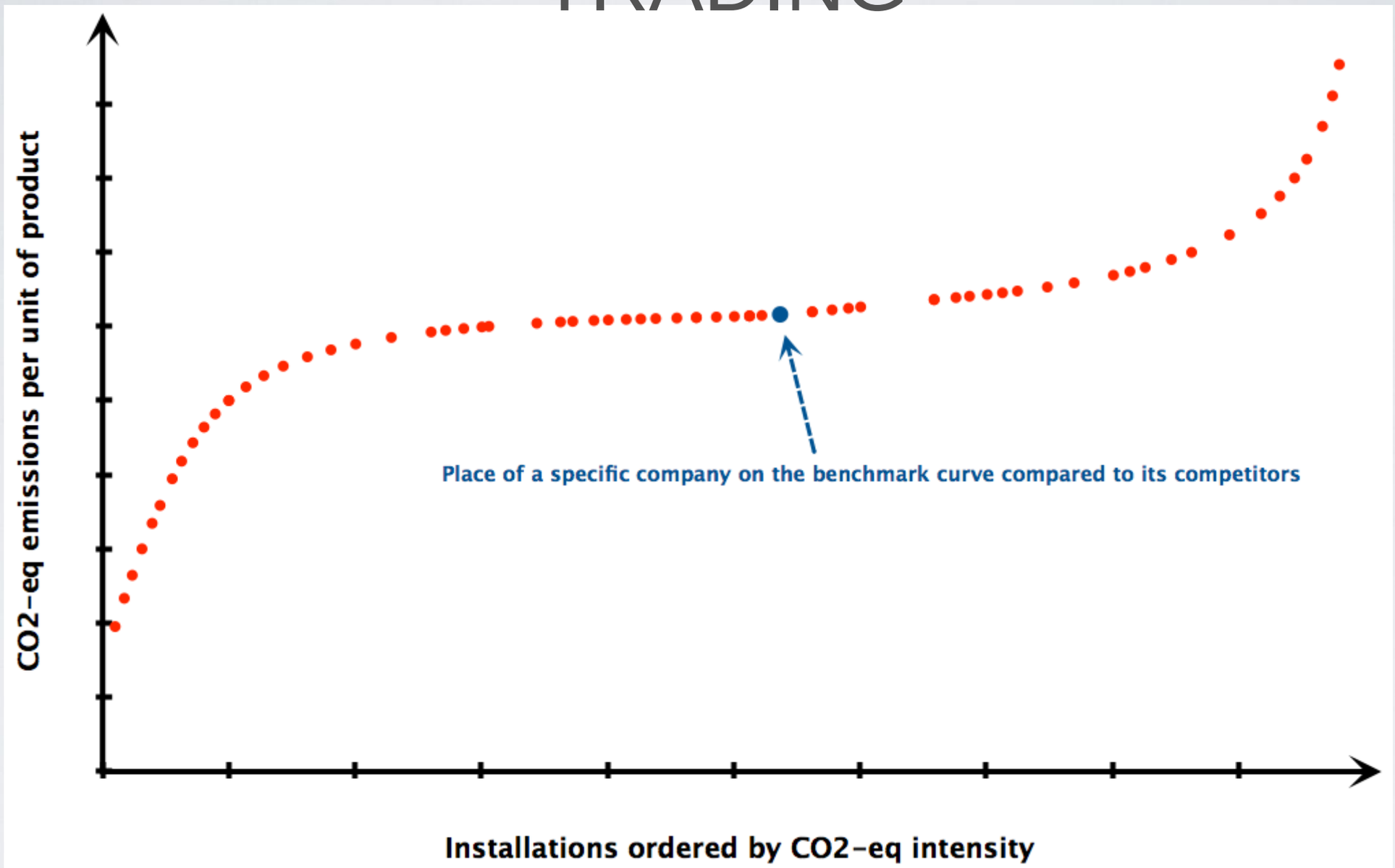
| Benchmarking based allocation | Performance (t CO2/unit of product) | benchmark (t CO2/unit of product) | production (units of product) | Allocation (benchmark x production) |
|---|---|---|---|---|
| Company A | 0.9 | 0.9 | 100 | 90 |
| Company B | 1 | 0.9 | 100 | 90 |
| **Total** | | | | **180** |

Fair allocation for company A and B

# EXAMPLE: SUMMARY



# OTHER ADVANTAGES OF BENCHMARKS IN EMISSIONS TRADING




Benchmarking informs companies about their (energy/CO2) performance compared to competitors

# OTHER ADVANTAGES OF BENCHMARKS IN EMISSIONS TRADING

- Benchmarks inform policy makers about the energy- and CO2 efficiency of companies and sectors their region/province

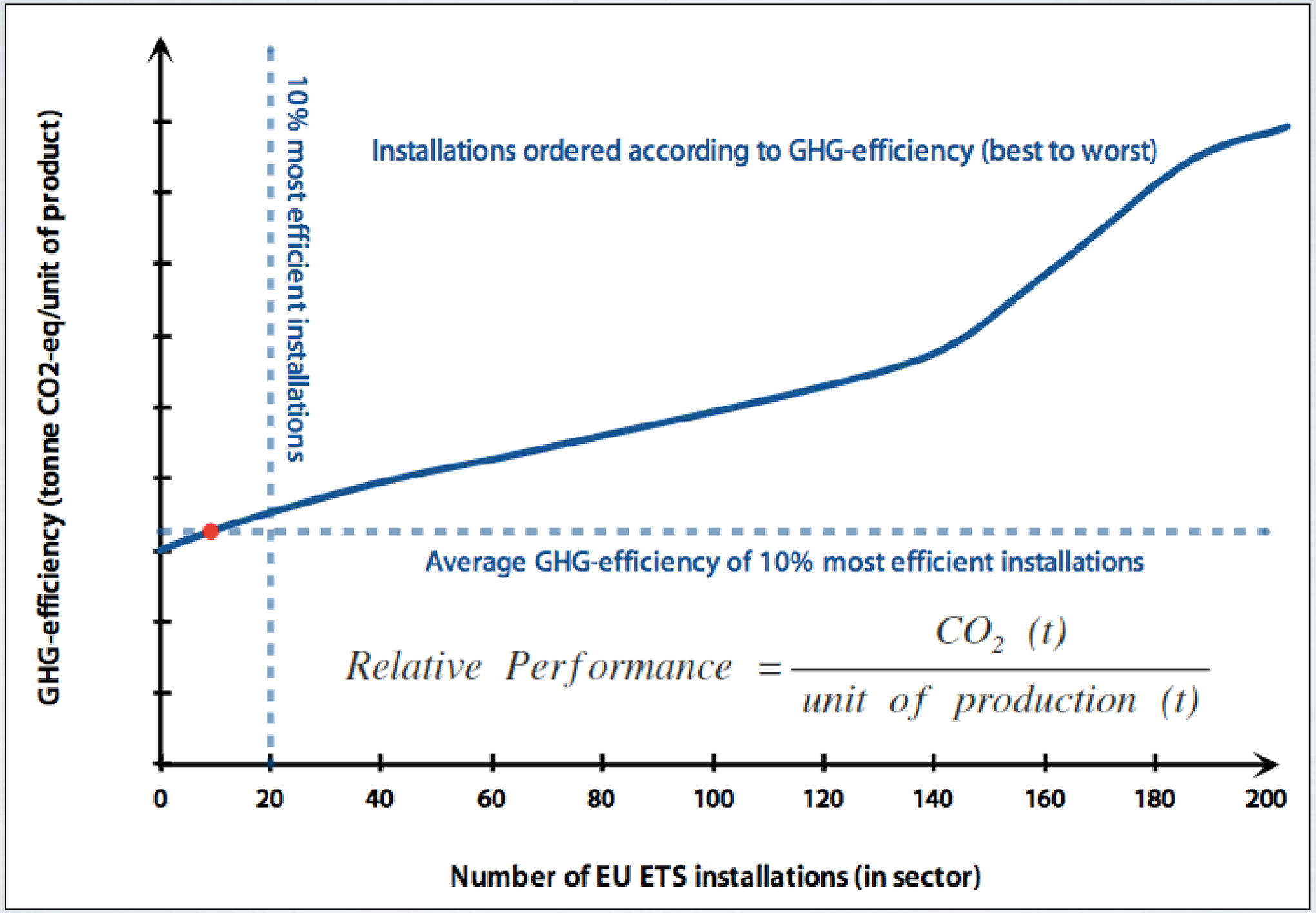
- Benchmarks can help compare performance of companies/sectors with other regions/countries

- Benchmarks can help with assessing the state of techniques and technologies used

- Benchmarks at regional level can help development of national policies (e.g. ETS)

# *The use of benchmarks in the EU ETS*

# THE EU ETS BENCHMARKS



# BASIC PRINCIPLES FOR DEVELOPING BENCHMARKS IN EU ETS

- Do not use technology-specific benchmarks for technologies producing the same product

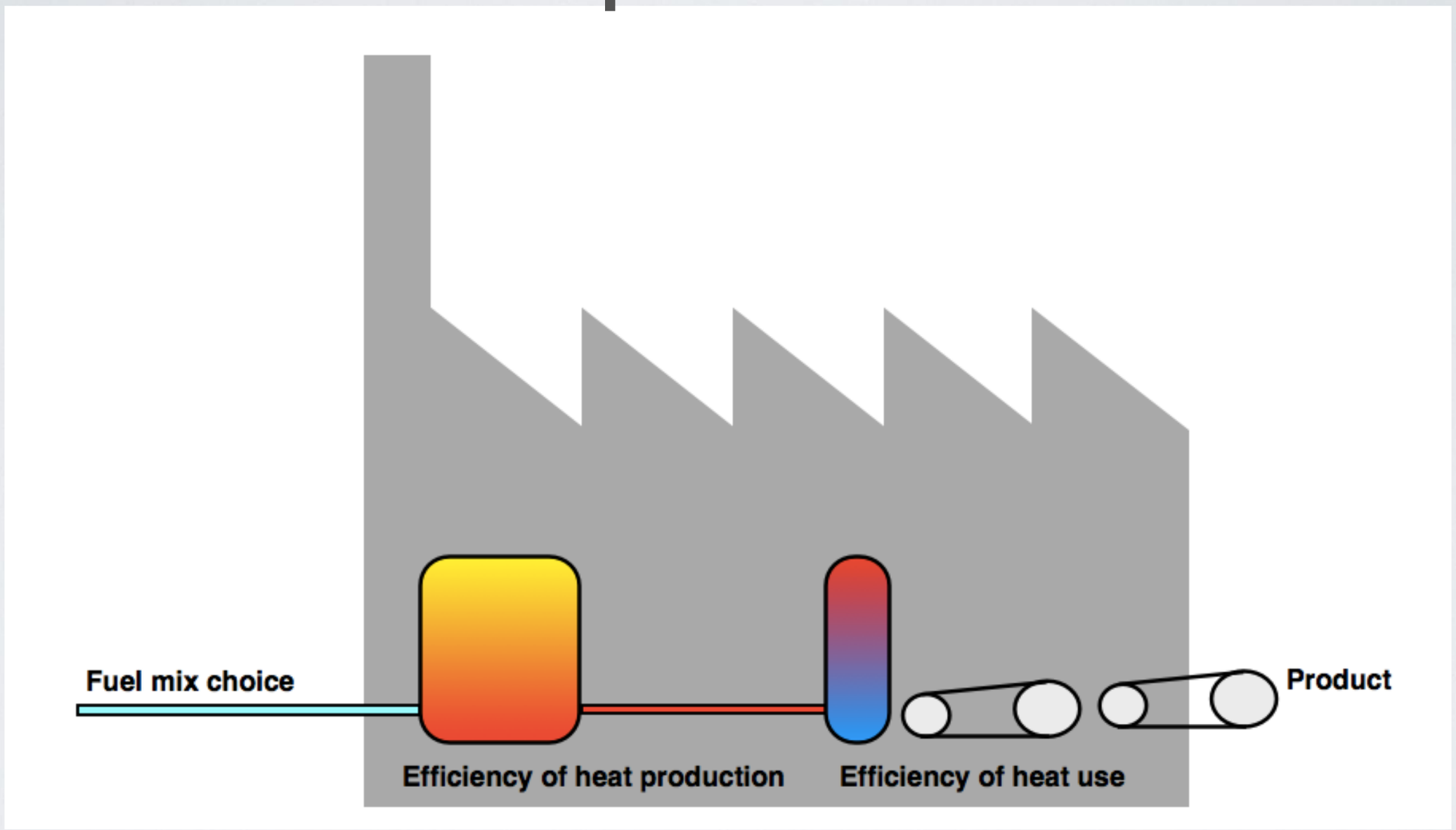
- Do not differentiate between existing and new plants

- Do not apply corrections for plant age, plant size, raw material quality and climatic circumstances

- Only use separate benchmarks for different products if verifiable production data is available based on unambiguous and justifiable product classifications

- Use separate benchmarks for intermediate products if these products are traded between installations

# EU ETS benchmarks cover full production



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# DEFAULT AND FALL-BACK BENCHMARK METHODS

Product benchmarks not always feasible, fall-back methods are required

Product Benchmark

*t CO2/unit product*

Heat Benchmark

**Fall-back #1**

*t CO2 /TJ*

Fuel Benchmark

**Fall-back #2**

*t CO2/TJ of fuel*

Process Benchmark

**Fall-back #3**

*97% of historical emissions*

# DEFAULT AND FALL-BACK BENCHMARK METHODS

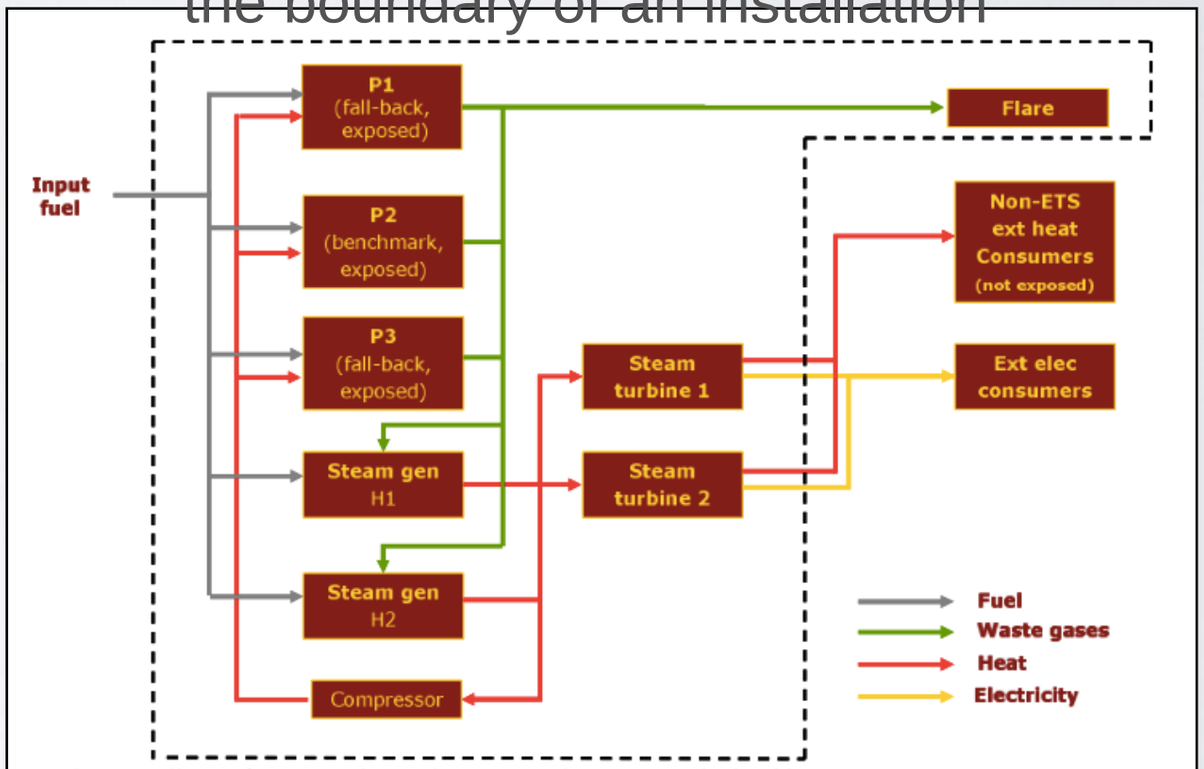
| Methodology | Value | Unit | Conditions | Relevant emissions |
|---|---|---|---|---|
| **Product benchmark** | depending on product | t CO2/unit product | If a product benchmark is available | Emissions within the system boundaries of the product |
| **Heat benchmark** | 62.3 | t CO2/TJ | •If no product benchmark is available<br>•Heat is measurable | Emissions relating to production of the consumed measurable heat, not covered by a product benchmark |
| **Fuel benchmark** | 56.1 | t CO2/TJ of fuel | •If no product benchmark is available<br>•Heat is not measurable<br>•Fuel is combusted | Emissions originating from the combustion of fuels, not covered by product or heat production benchmark |
| **Process emission approach** | 97% of historical emissions (tCO2) | | •If no product benchmark is available<br>•Heat is not measurable<br>•Emissions are not resulting from combustion of fuel<br>•Emissions are “process emissions” | All emissions with the installation not covered by the previously mentioned approaches |

# EXAMPLES

Some examples of product benchmarks used in the EU ETS (Coke production, Hot metal, Aluminium, Grey cement clinker)

| Product benchmark | Definition of products covered | Benchmark value (allowances/t) |
|---|---|---|
| **Coke** | Coke-oven coke (obtained from the carbonisation of coking coal, at high temperature) or gas-works coke (by-product of gas-works plants) expressed as tons of dry coke. Lignite coke is not covered by this benchmark | 0.286 |
| **Hot metal** | Liquid iron saturated with carbon for further processing | 1.328 |
| **Aluminium** | unwrought non-alloy liquid aluminium from electrolysis | 1.514 |
| **Grey cement clinker** | Grey cement clinker as total clinker produced | 0.766 |

Implementing benchmark allocation can be challenging due to the sometimes complex nature of installations and heat/energy/fuel flows outside the boundary of an installation




- The installation's permit boundaries are shown as a dashed line.
- Each box depicts a physical unit where one or more industrial processes take place
- To avoid a crowded figure, greenhouse gas emissions are not shown in this example, but are relevant for and should be attributed to each process unit.
- The colored lines depict energy flows to and from process units.

# EU ETS ALLOCATION FORMULA FOR INDUSTRIAL INSTALLATIONS

$$Allocation = \sum_{i=2013}^{2020} BM * P * CLF_i * CSCF_i$$

Sum over years in period 2013-2020

Benchmark (CO2/t product)

Historical Production (t)

Carbon leakage factor: if a sector is price and trade exposed this factor is set at 1. If not this factor goes down from 0.8 to 0.3 in period 2013-2020

Over-all correction to keep total allocation under total EU ETS cap

*"Carbon leakage" implies the risk that an EU company moves production outside EU in the absence of climate policies outside Europe*

| Year | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|
| Significant risk for carbon leak age | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No Significant risk for carbon leakage | 0.8 | 0.7286 | 0.6571 | 0.5857 | 0.5143 | 0.4429 | 0.3714 | 0.3 |

# *Possible benchmarking approaches for Hubei ETS*

# USING BENCHMARKS TO ALLOCATE ALLOWANCES UNDER AN EMISSIONS TRADING SYSTEM

**Allocation (1) = Activity Level (2) * Benchmark (3)**

With:

Allocation (1) = Allocation of allowances given out for free in t CO2 / year

Activity level (2) = Activity level the benchmark refers to (e.g. t product / year)

Benchmark (3)= Benchmark for the activity indicator (e.g. t CO2 / t product)

# POSSIBLE METHODS

**The Region Method**

**The Best Practice Method**

**The Auditing Method**

**The EU ETS approach**

# THE REGION METHOD

- Find at a list of regions which are comparable to the Hubei province when it comes to the number and size of process installations.
- Determine for these regions the average greenhouse gas intensity for comparable processes and process installations.
- The benchmark value can be the greenhouse gas intensity of the region with the (best/average/…) greenhouse gas intensity for a specific process.
- This can be with other countries Chinese provinces, …

This method requires upfront data collection but can use existing data from previous research

# THE BEST PRACTICE METHOD

Find the most greenhouse gas efficient process installation (at a global scale) and determines the benchmark to be X% less efficient than the one found to be best practice.

This method requires upfront data collection but can use existing data from previous research

# THE AUDITING METHOD

- Method uses company auditing by a independent expert to determine benchmark/allocation
- The expert identifies all possible measures that can be taken to reduce the greenhouse gas intensity in the installation and lists these together with the associated investments costs and internal rates of return or payback times.
- Policy makers can next decide that the allocation shall be derived from the greenhouse gas intensity following the implementation of all measures with an internal rate of return of x%.
- A common applicable rate of return for cost effective measures could be 15%, implying a payback time of 3-5 years with initial investments written off over a period of 10 years.

This method requires upfront data collection and analysis (auditing)

# APPLYING THE EU ETS

## METHOD (I)

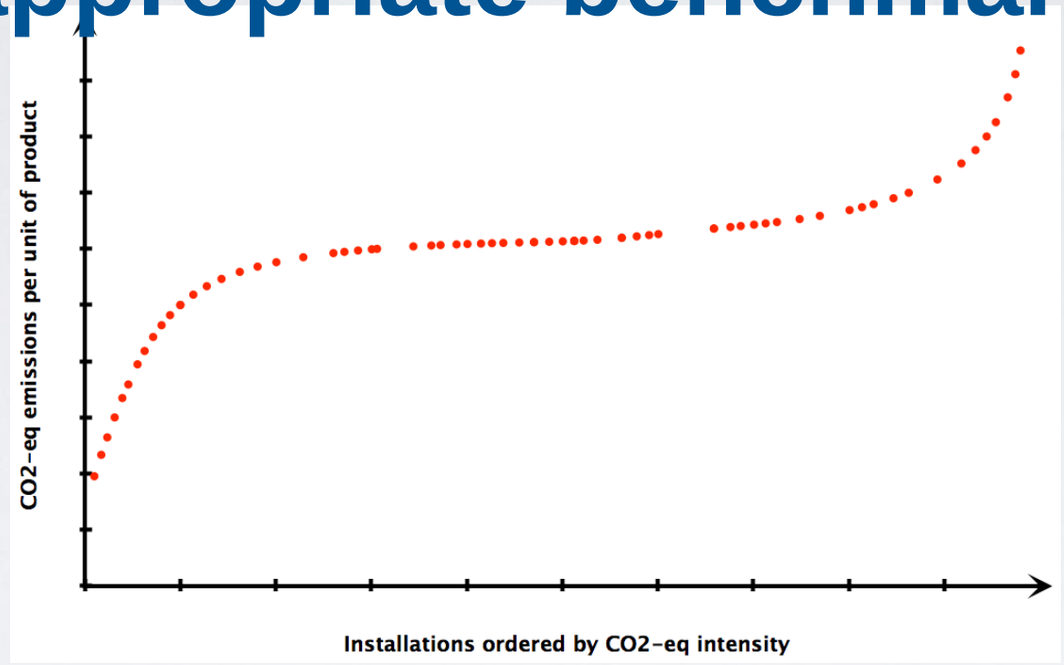
To develop an EU ETS type benchmarking system in the Hubei province the following steps need to be considered:

a) the definition of the appropriate benchmark
b) the data acquisition and data quality
c) the appropriate use of fall back methodologies
d) the rules on how to deal with complex industrial installations

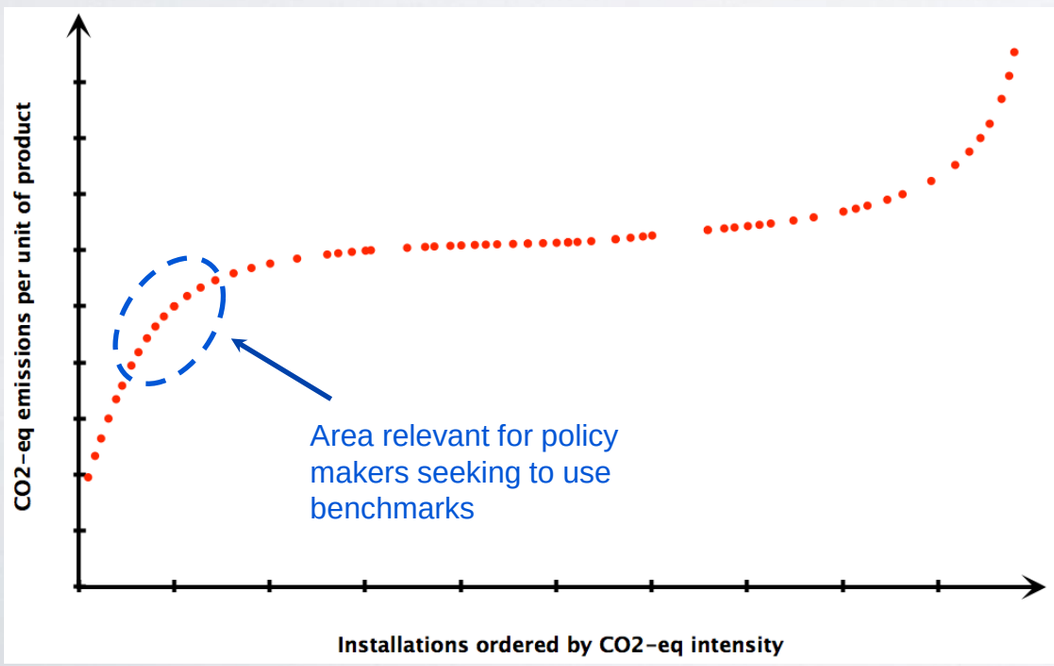
# APPLYING THE EU ETS METHOD (IA)

## Definition of the appropriate benchmark

A




B

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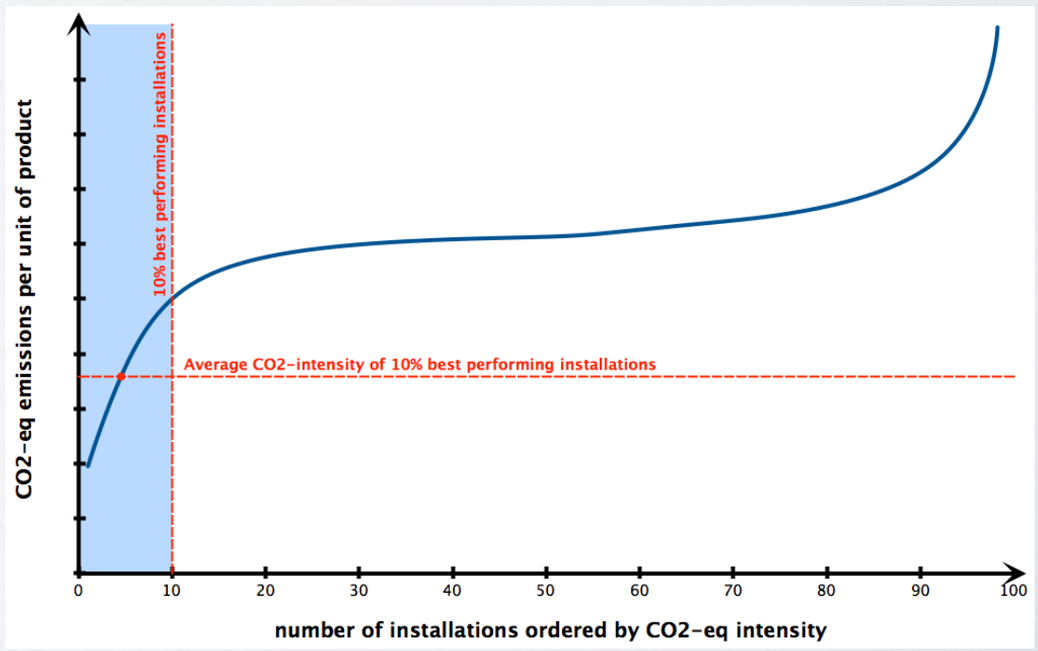


# APPLYING THE EU ETS METHOD (IB)

## Data needs to develop benchmarks

- Clear mapping and definition of the specifics (intermediate) pr oduct (e.g. EU type NACE code)
- Consistent mapping/description of the production processes
- Historical production data
- Historical verified emissions (heat measurements, fuel use, ...)

*For reliable and functional (product)benchmarks data from a significant number of companies need to be useable and used*

# APPLYING THE EU ETS METHOD (II)

1) The first step is to generate an unambiguous list of the products that will be covered by the benchmark (e.g. cement, steel, …).

2) The next step is the construction of a complete list of all production installations (not companies) in the sector that will be covered by the ETS.

3) Each identified installation will have to be linked to a specific product or production process as mentioned in the first step. It is of course possible that installations produce more than one product and are therefore link to more products on the list.

# APPLYING THE EU ETS METHOD (III)

4) Once all installations are identified a technical description of each installation has to be developed.

- This is similar to the monitoring plans that are developed for the reporting and verification of emissions but developed **at the installation level** not company level.
- The technical description including types of fuel used and the way to measure these should allow for the identification of heat/energy flows between different installations producing different products or of heat/energy flows between installations covered by the ETS and one that aren’t.

# APPLYING THE EU ETS METHOD (IV)

5) The main data to be collected for each installation are the greenhouse gas emissions and the production volumes related to these emissions from the same installation.

- Preferably this data is collected following the rules established in the monitoring plan.
- The data has to be independently verified and approved.
- It is possible to use historical installation level data that did not follow the rules in a monitoring plan, however this should be exceptional and still follow a consistent and transparent methodology.
- The methodology has to be applied consistently across all production installations.
- Furthermore the data has to be replaced with more accurate information following the rules of the monitoring plan as soon as possible when available.

# APPLYING THE EU ETS METHOD (V)

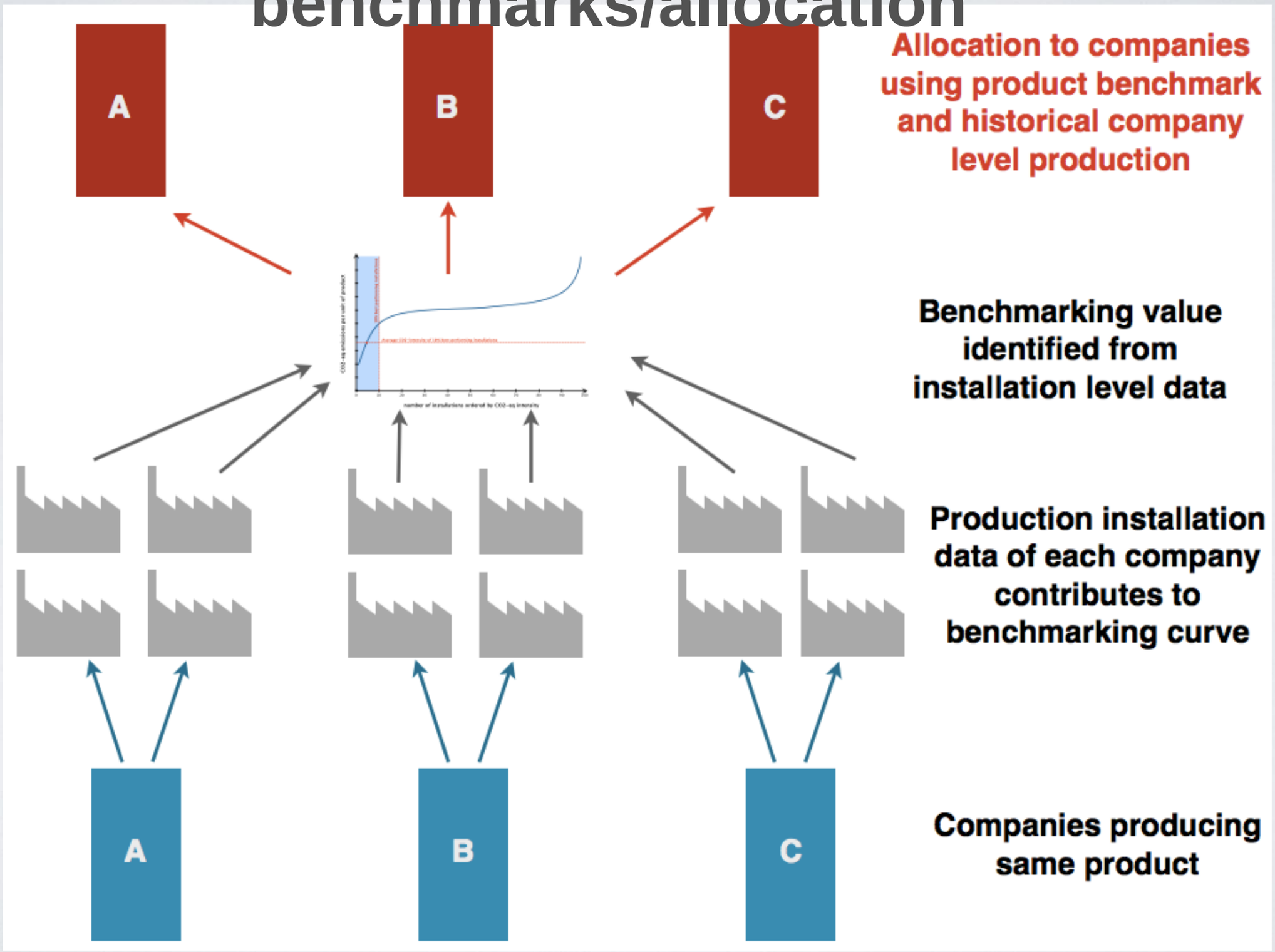
During the before mentioned data collection process, operators of the installations will need to provide the following reports:

- **A baseline methodology report** presenting how specific data was determined. A template should be made available by the competent authority.

- **A baseline data report**, including the emissions and activity data relating to their installation. It is important that the competent authority provides a the data collection template to the operators of the installations;

- **A verification report**, proving that the data has been verified and validated by a third-party. A template should be made available for verifiers by the competent authority.

# From installation level data to company benchmarks/allocation



# *Short and long term benchmarks for the Hubei province*

# SHORT TERM APPROACH

- Look for data in studies/reports that can be used as benchmarks for sectors in Hubei province

- Use of data from research reports focussed on Chinese industry is possible (e.g. power sector, cement, steel, …)

- These short term benchmarks can be used for new entrants and/or incumbents

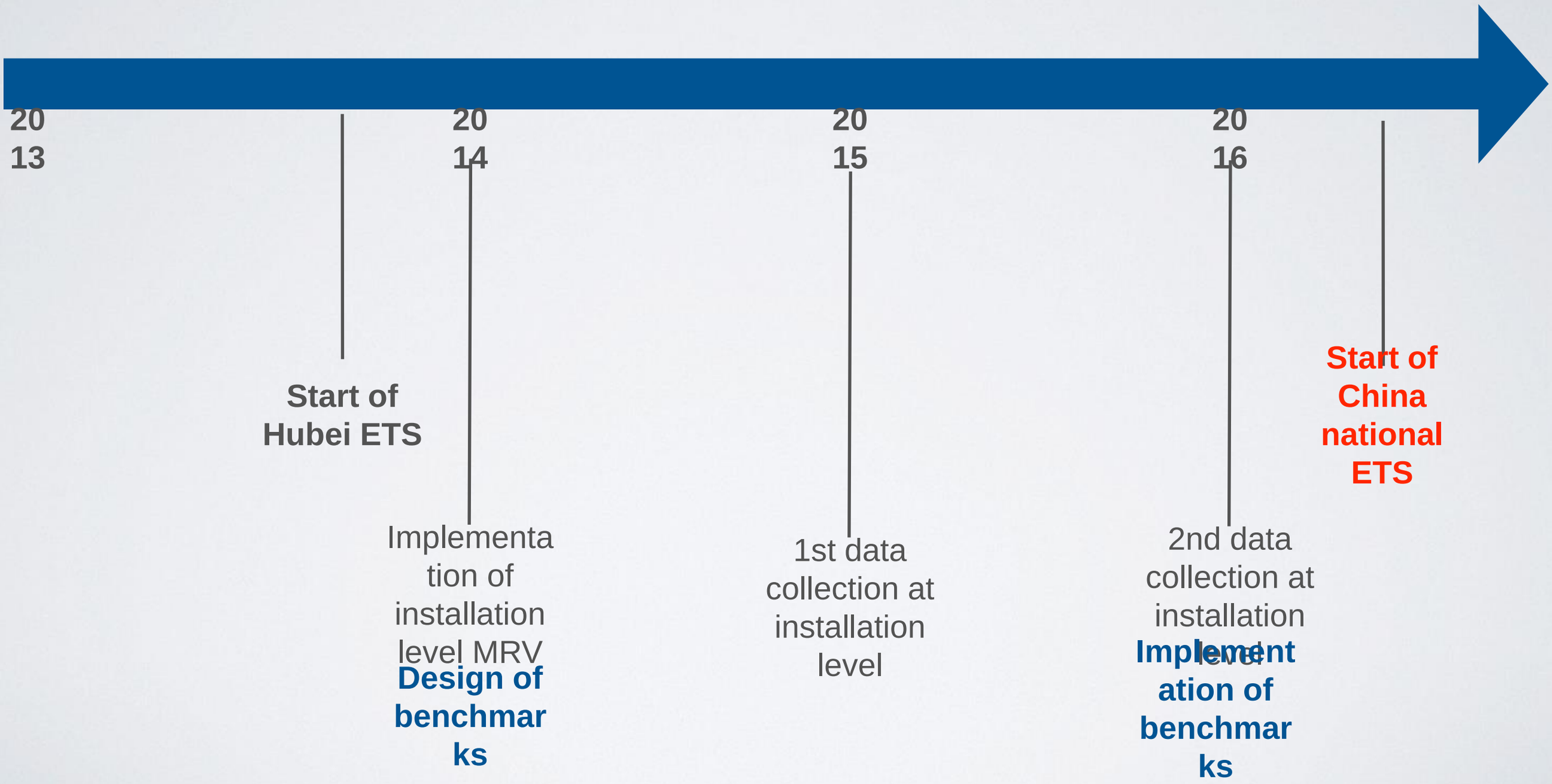
- Implement installation level monitoring, reporting and verification to gather data for future EU ETS type benchmarks

# LONG TERM APPROACH

- Establish Hubei specific benchmarking methodology
- Implement installation level monitoring, reporting and verification of emissions and activity data.
- Gather relevant/comparable data outside of Hubei province.
- Verify installation level emissions and activity data and construct benchmarking curves
- Establish benchmark figures for specific sectors

**At least 2 years of installation level data is required**

# POSSIBLE TIMELINE



# *How Hubei ETS benchmarks can help Chinese ETS*

# MAIN OPTIONS

| National level | Provincial level | comments |
|---|---|---|
| **(absolute) cap setting and allocation rules** | | |
| *Option I* | | |
| National cap for ETS sectors and common allocation rules | implementation of common rules | This is similar to current EU ETS approach |
| *Option 2* | | |
| National cap for ETS sectors but implemented through differentiated caps (e.g. using GDP/capita effort sharing) among provinces and common allocation rules | implementation of common allocation rules (e.g. benchmarks, auctioning, ...) | This would be hybrid form of EU ETS 2005-2012 and EU ETS 2013-2020 |
| *Option 3* | | |
| National cap for ETS sectors but differentiated caps among provinces and common allocation guidance | Development of provincial allocation rules | This would be similar to EU ETS 2005-2012 |
| *Option 4* | | |
| Intensity targets at National and provincial level with linked provincial cap and trade systems. National rules for linking provincial systems | Development of cap and allocation rules at provincial level | Similar to further development of current pilot ETS in China. |

# CONCLUSIONS (I)

- It is possible that allocation rules will still be determined at provincial level or
- It is possible that provincial level data will be used for national harmonised allocation rules (e.g. benchmarking data)

In both cases the upfront development of Hubei based benchmarks or collection of Hubei based industrial data is highly relevant

# CONCLUSIONS (II)

- Hubei based benchmarks will give relevant information to companies and policy makers
- The use of benchmarks is a fair allocation method since it rewards early action
- The Hubei benchmark design can influence the Chinese National ETS and be useful for the implementation thereof
- Installation level data collection (emissions/activity level) needs to start soon as to be ready by 2016

# 谢谢你!

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