

ECOFYS



sustainable energy for everyone

Carbon Markets: An introduction

Seattle, WA

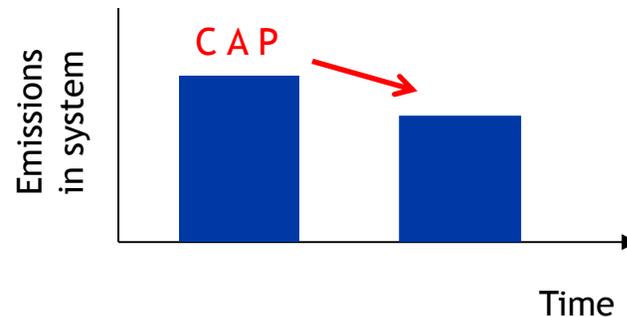
15 May 2015
Alyssa Gilbert

Agenda

1. Cap-and-Trade basics
2. Carbon markets around the world
3. The EU Emissions trading system
4. Design decisions: Cap and allocation
5. The impact on business and consumers
6. Compliance and enforcement
7. Lessons so far from the EU ETS
8. Looking ahead

Emissions trading systems (ETS) aim to reduce emissions cost-effectively by using a market mechanism

Emissions cap guarantees the environmental outcome



Participants can trade allowances; the market therefore finds most cost-effective reductions

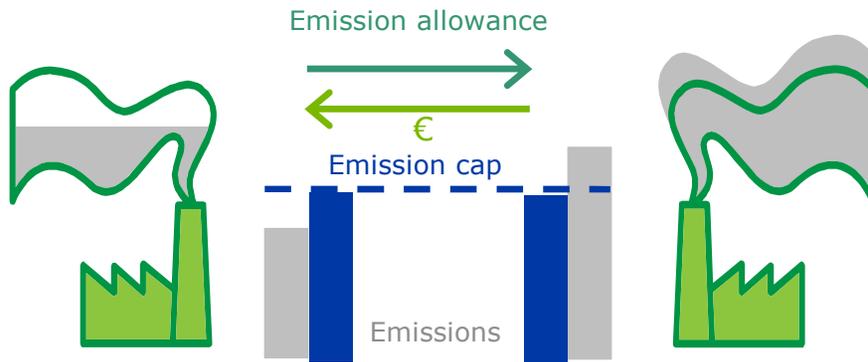


$$\text{Price } (\text{€} / \text{tCO}_2) = f(\text{supply}, \text{demand})$$

The **overall goal** of emission trading is to reduce emissions, emissions trading is chosen to do this at **lowest costs**

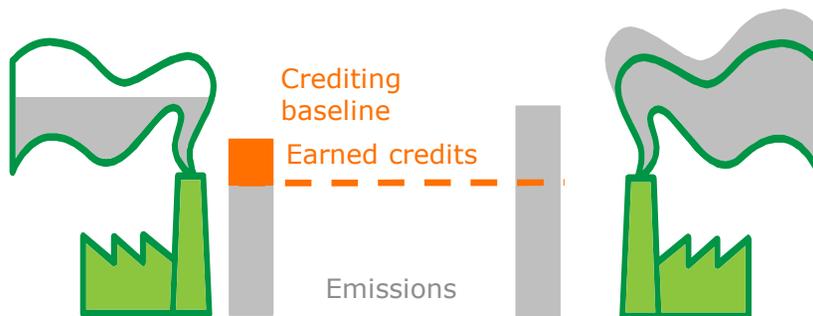
Other forms of carbon pricing

1. Cap-and-Trade / Emissions Trading System



Cap on emissions: entities can trade (EU ETS, California)

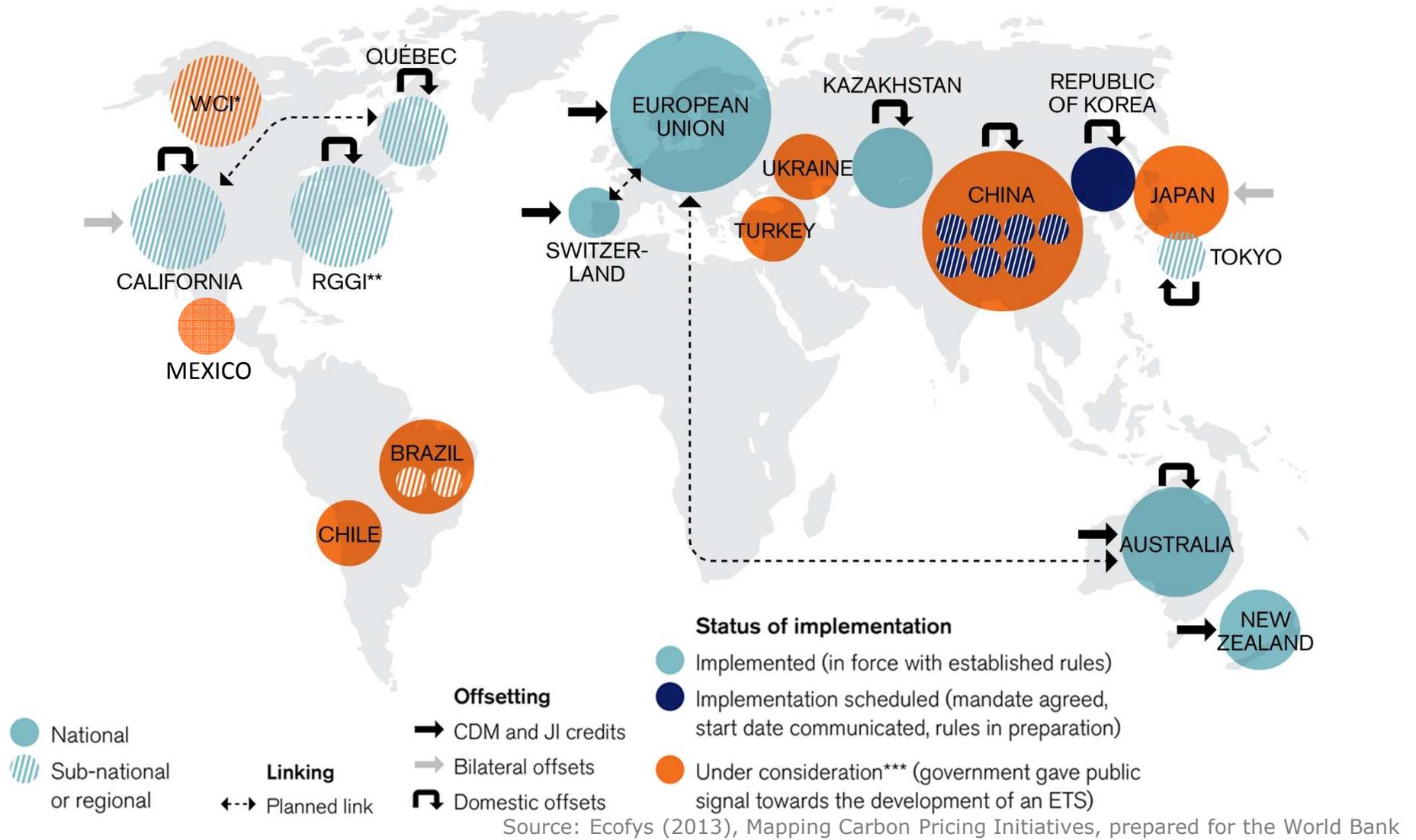
2. Baseline-and-crediting System



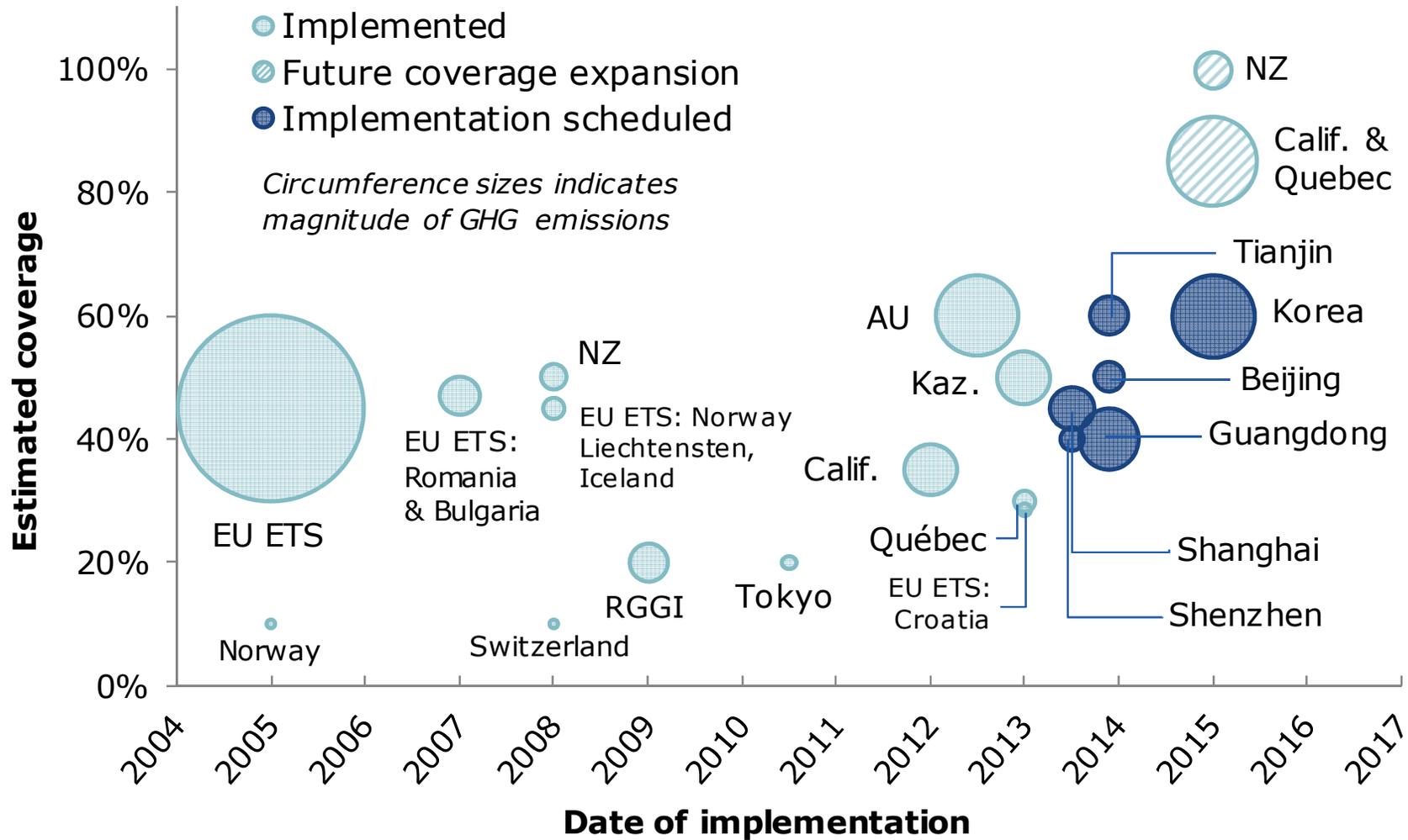
No cap on emissions: but credits can be traded to those under a mandatory or voluntary cap

3. Carbon tax: price per tCO₂ independent of amount emitted, no trading

Carbon pricing development go faster than ever



Scope of systems vary greatly



Setting up a carbon market is not simple.....

Coverage and policy interaction	Cap setting and general design features	Allocation and carbon leakage protection	MRVA, registries trading
<ul style="list-style-type: none"> • Coverage • Policy interaction <ul style="list-style-type: none"> - Local - National - International • Linking systems • Alternative policy instruments <ul style="list-style-type: none"> - Tax - Standards 	<ul style="list-style-type: none"> • Target • Trading period • Flexibility • Eligible trading units • Off-sets • Banking/borrowing • Enforcement / penalties 	<ul style="list-style-type: none"> • Competitiveness and leakage concerns • Distribution of allowances <ul style="list-style-type: none"> - Auctioning - Free allocation 	<ul style="list-style-type: none"> • The compliance cycle • MRVA • Regulatory bodies • Registries • Market platform • Trading instruments • Market security

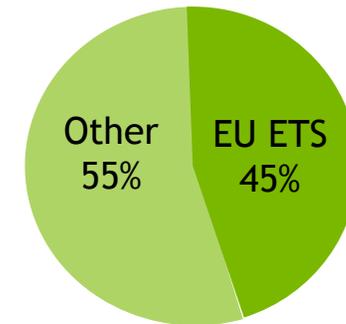
A carbon price in Europe for almost 10 years now!



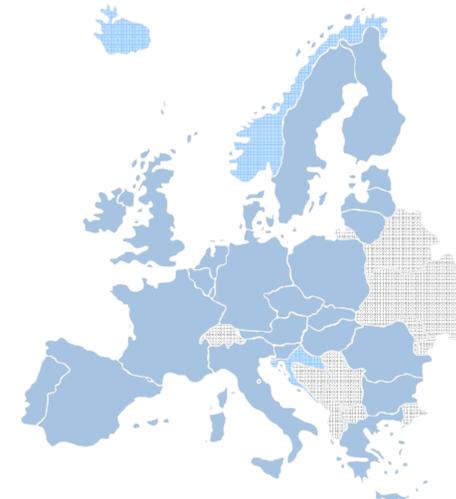
An example: the EU ETS covers ~ 11000 installations and 2 Gt CO₂-eq.

Phase 1 (‘05-‘07)	<p>CO₂ emissions from:</p> <ul style="list-style-type: none">▪ Power stations and other combustion plants (>20MW)▪ Oil refineries▪ Coke ovens
Phase 2 (‘08-‘12)	<ul style="list-style-type: none">▪ Iron and steel plants▪ Cement producers,▪ Glass producers▪ Lime producers▪ Ceramics producers▪ Producers of pulp, paper and board
Phase 3 (‘13-‘20)	<p>Added in Phase 3:</p> <ul style="list-style-type: none">▪ CO₂ emissions from petrochemicals, ammonia and aluminum▪ N₂O emissions from the production of nitric, adipic and glycolic acid production▪ Perfluorocarbons from the aluminum sector▪ The capture, transport and geological storage of all greenhouse gas emissions▪ Aviation (as of 2012)

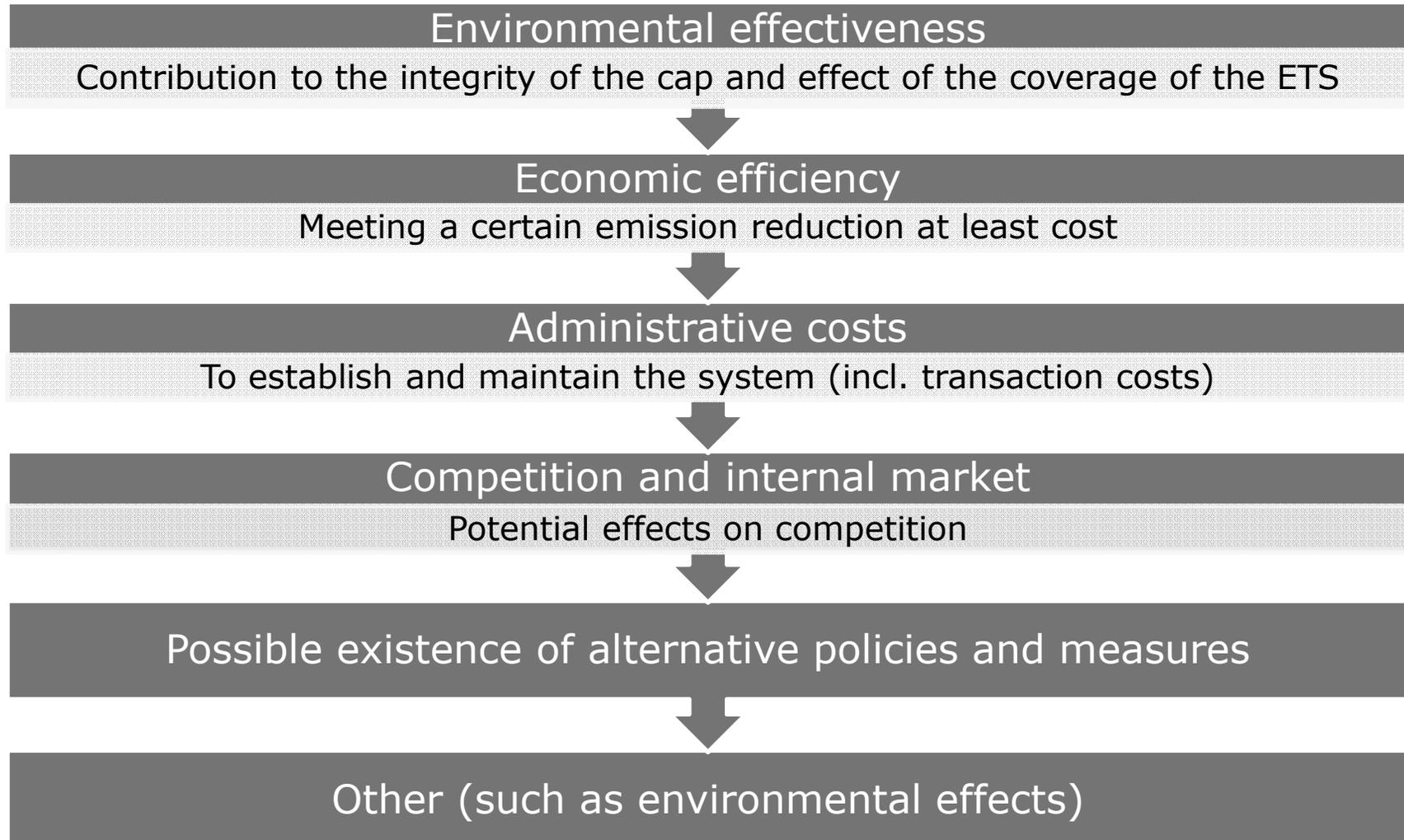
EU Emissions



Geographic coverage



Possible criteria to determine coverage



Source: Dutch ministry of Environment

Cap setting is not easy – as the European example shows

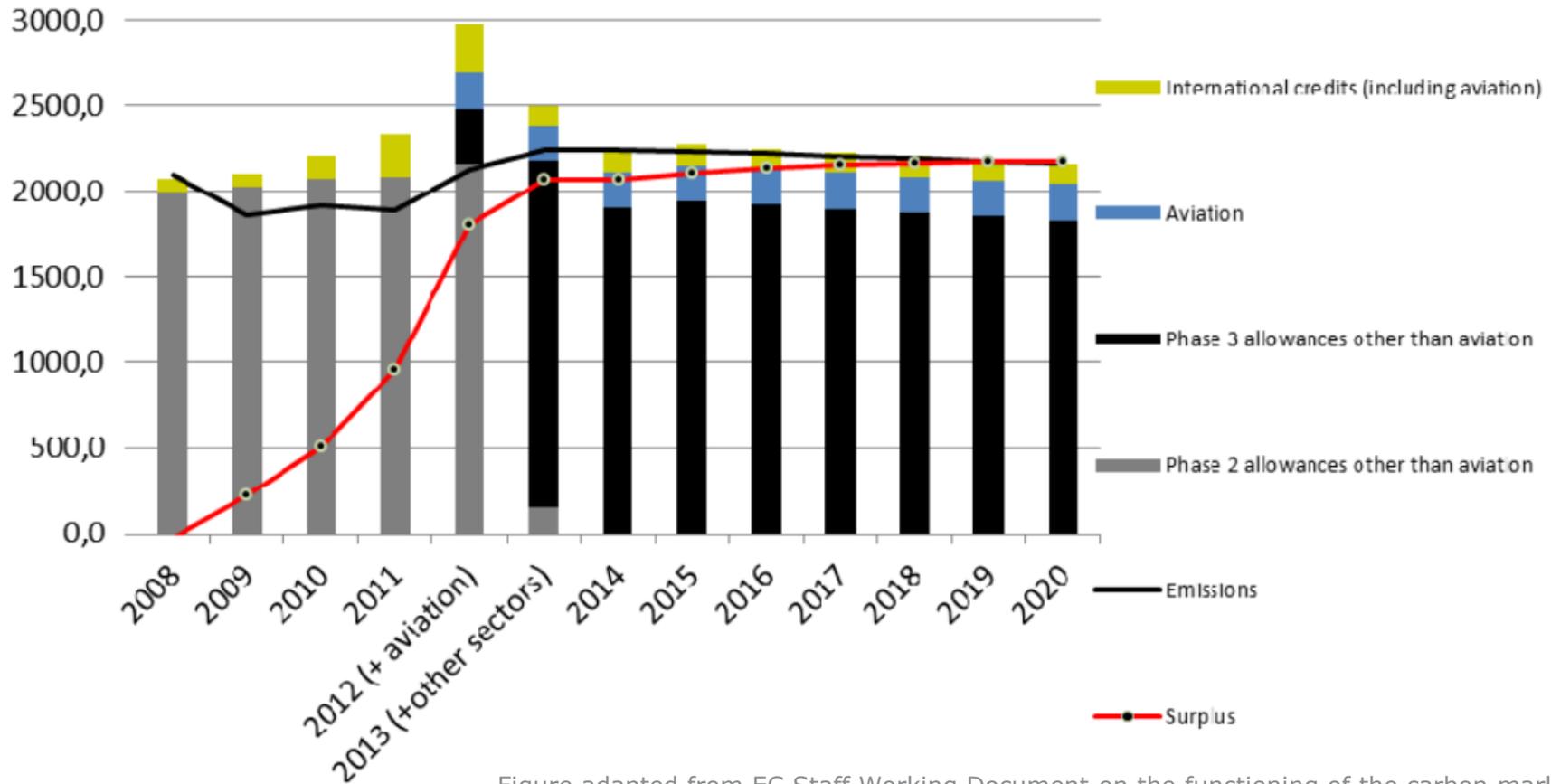
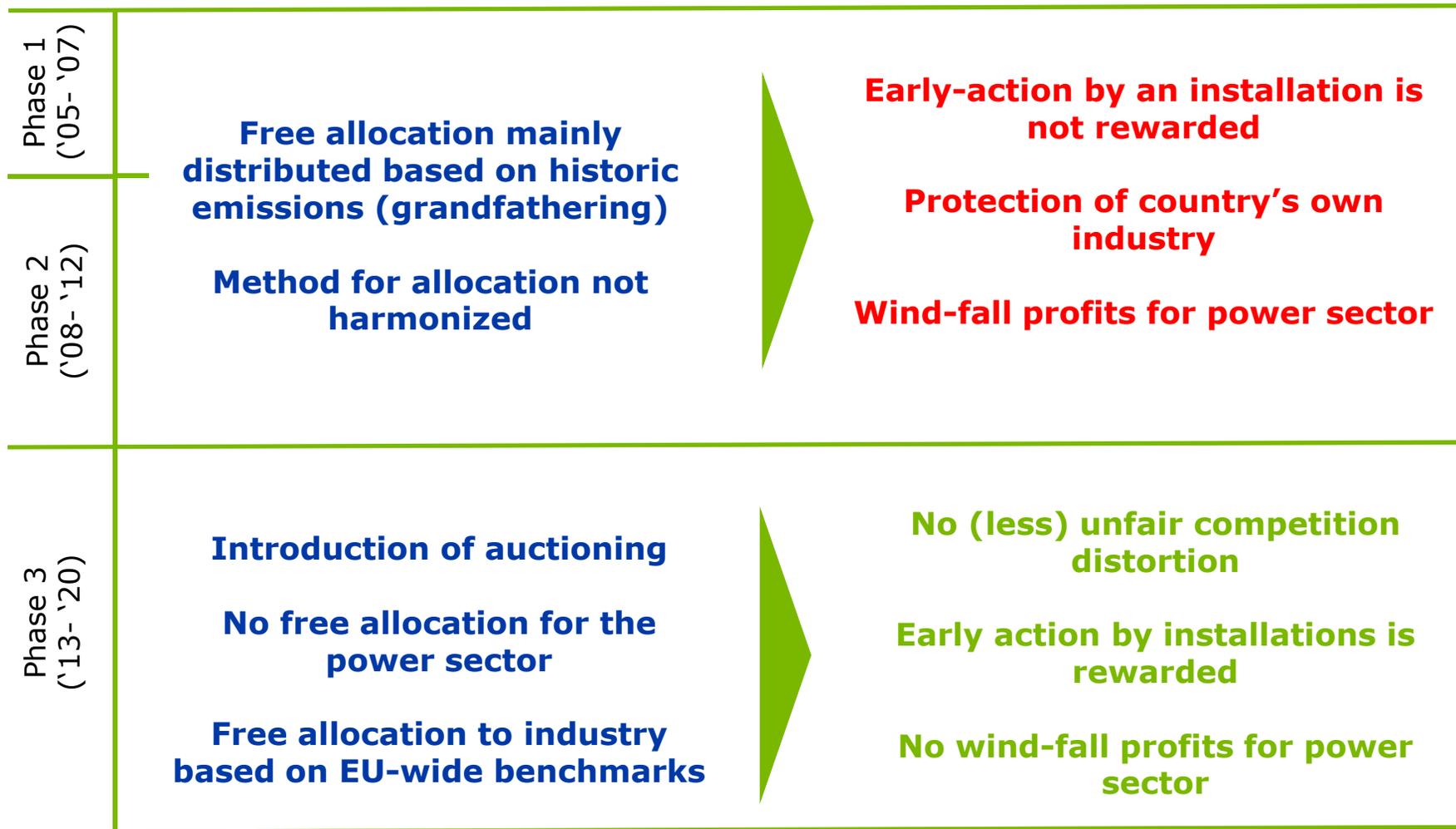


Figure adapted from EC Staff Working Document on the functioning of the carbon market

The **principle problem** of the EU ETS is the inflexibility to control the supply of allowances to the market in case the economy develops different than expected

Auctioning would be the default in a perfect world



Grandfathering

- > Future allocations are based on historic emissions:

$$\begin{aligned} \text{Allocation} &= \text{total cap} \times (\text{installation's historical emission} / \text{total historical emission}) \\ &= \text{installation's historical emission} \times \text{emission reduction rate\%} \end{aligned}$$

- > Relatively simple approach, requires historical data, and define provisions for new entrant/capacity expansion etc.
- > But, can provide a perverse incentives as reducing emissions negatively affect future allocation and can lead to delaying of emission reductions till after allocations have been made
- > And is, unfair, as it does not reward early action, installations that have reduced emissions in the past are 'punished' by receiving less allowances compared to competitors that have not undertaken action

Benchmarking

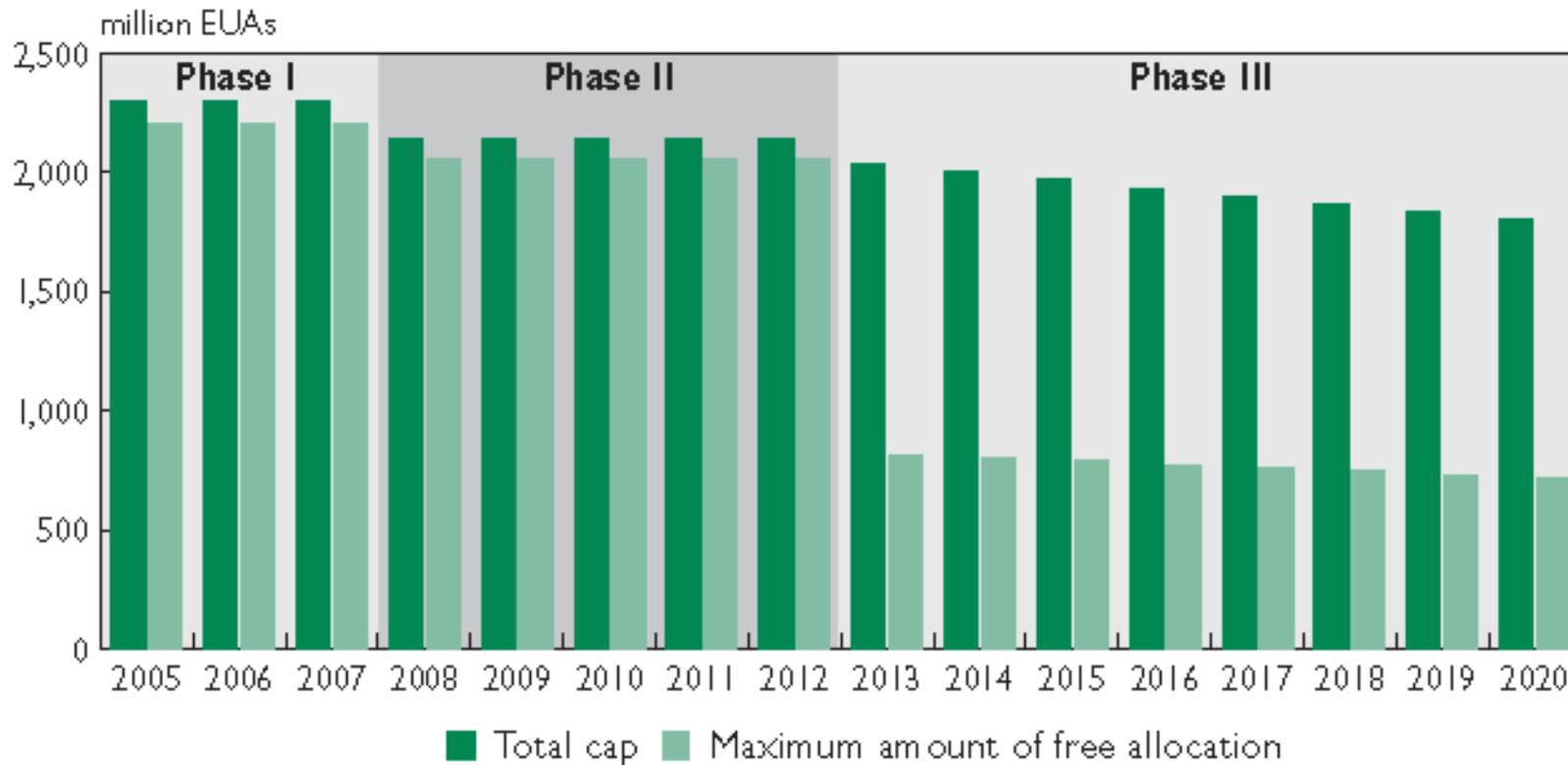
- > Comparison of performance using performance indicator, e.g.
 - TJ/ton cement;
 - tCO₂/ton flat glass.

- > Uses of benchmarks include:
 - Gives an indication of potential for improvement;
 - Used within companies to compare performance and set targets;
 - Used in policies to reward better performers.

- > Development of benchmarks demand:
 - Understanding of industrial processes and market;
 - Good data;
 - Interaction with experts.

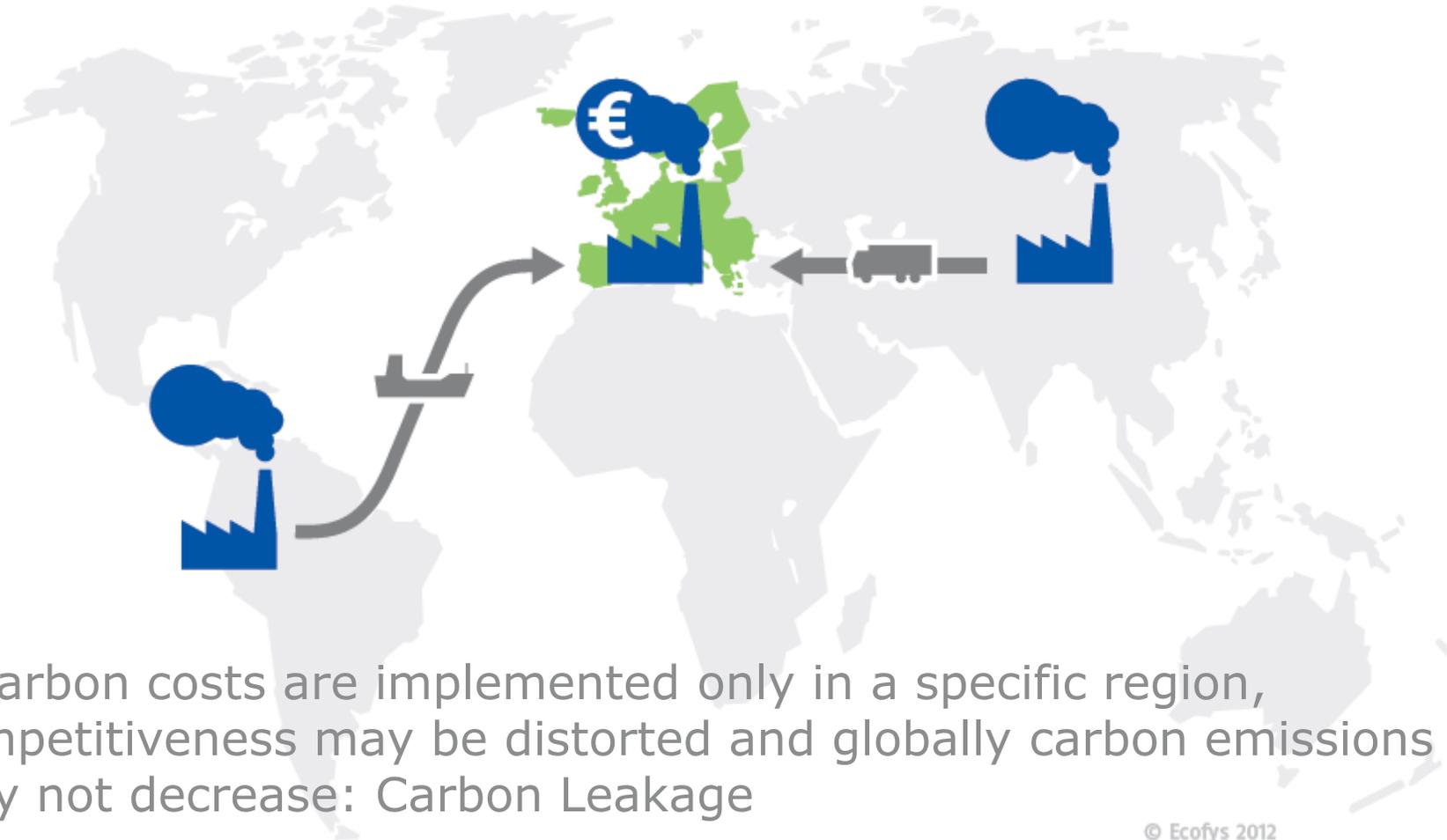
Auctioning for rest of emissions

- > In Phase 2 maximum 10% for auction, primary method is free allocation through grandfathering
- > In Phase 3 primary method is auctioning

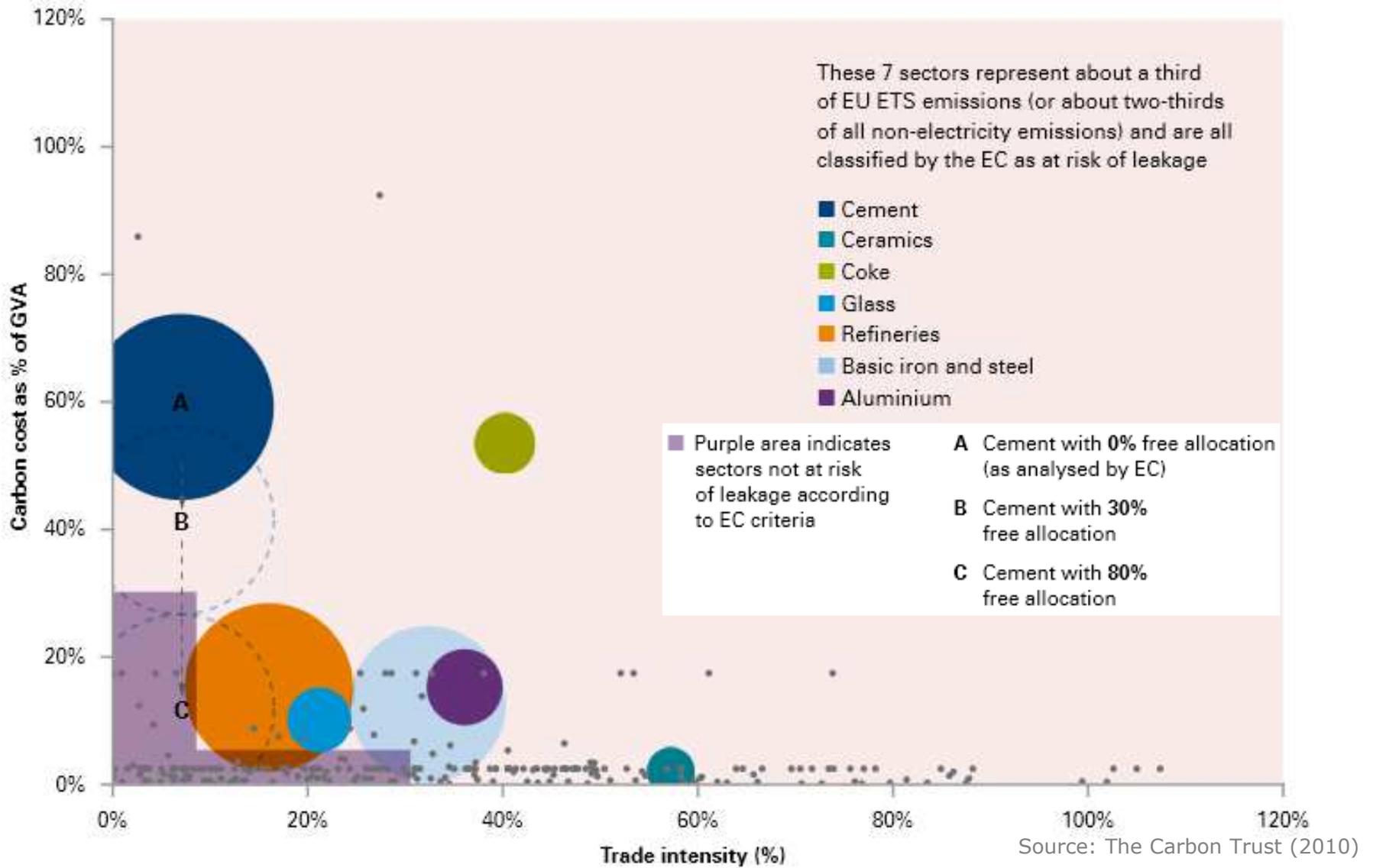


Source: Neelis & Borkent, Carbon Finance, Nov 2010, excluding change in scope

A perfect world, however, does not exist (yet)



Some sectors more vulnerable than others



There are various ways carbon leakage can be limited, each with their pros and cons

		Output-based free allowances	Exemptions	Border carbon adjustments	Compensation
Leakage	Carbon leakage				
Environmental effectiveness	Global emissions				
Efficiency	Cost to Europe				
	Cost global				
Feasibility	Domestic				
	International				
	Institutional				
Administrative cost	Admin cost				

Source: Vivid Economics and Ecofys (2013)

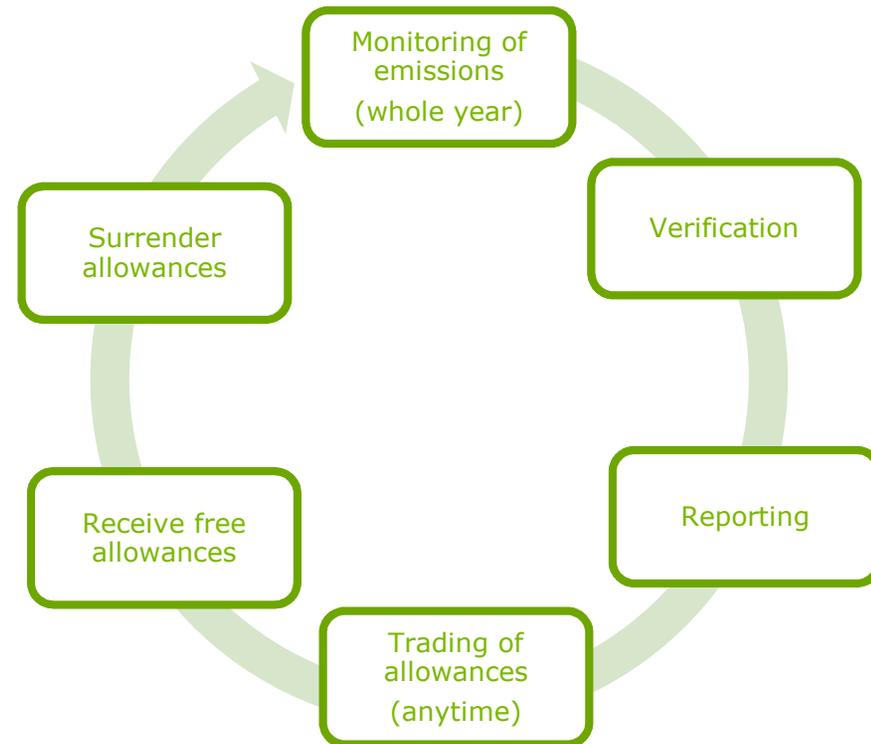
Auction revenues play an important role and can help compensate consumers

To be determined by Member States, but minimum 50% to one or more of the below:

- > Reduce GHG emissions
 - Including contributing to Global Energy Efficiency and Renewable Energy Fund and the Adaptation Fund
- > Develop RE and low-carbon technologies
- > Carbon Capture & Storage
- > Low-emission and public transport
- > R&D in clean technologies in ETS sectors
- > Buildings efficiency and fuel poverty
- > Increase sinks in EU, developing countries
- > Technology transfer
- > Facilitate adaptation in developing countries
- > Admin cost of EU ETS

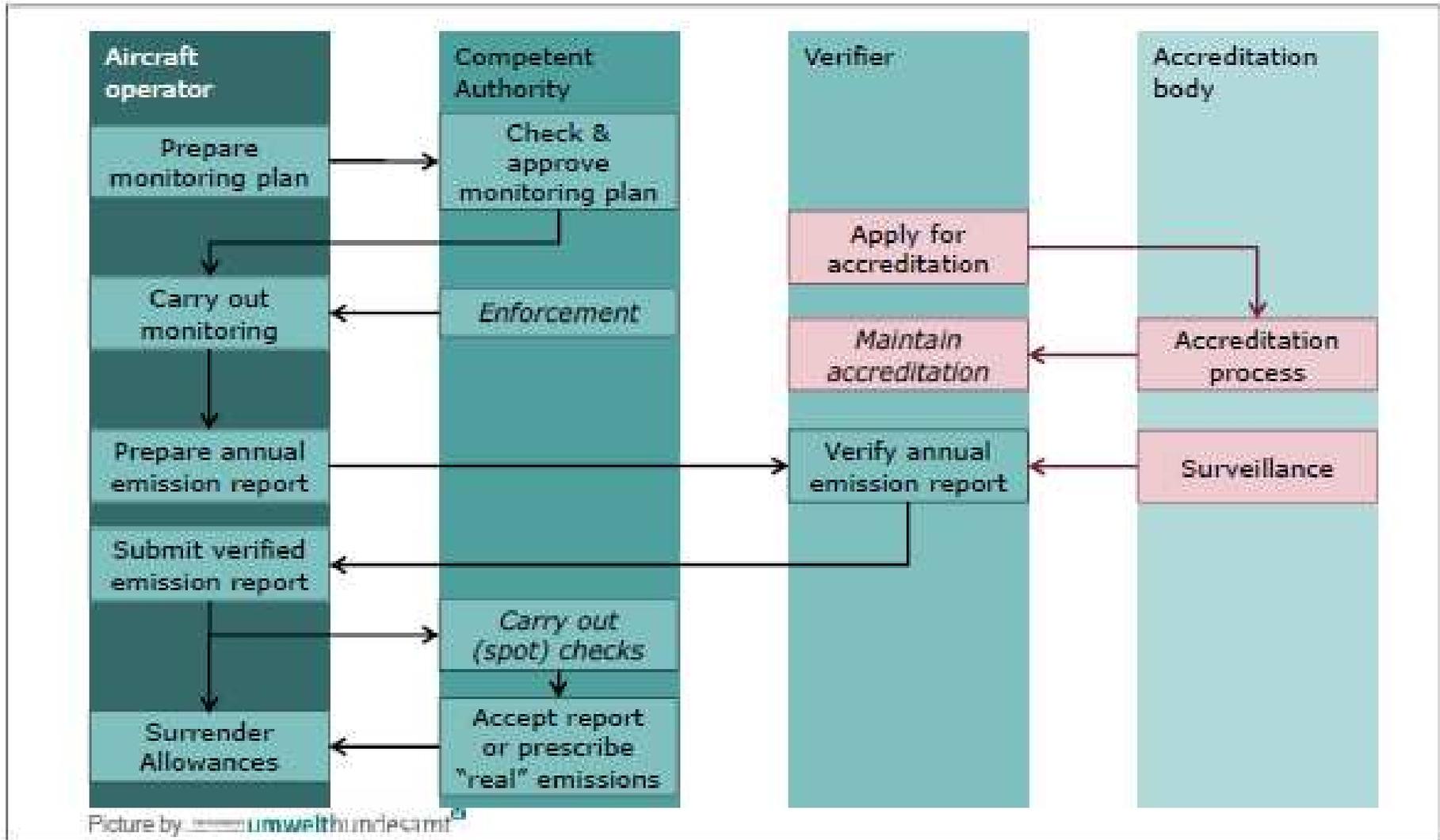


The compliance cycle is at the heart of an ETS



Emissions trading comes with the obligation for each entity under the trading scheme to surrender allowances for the emissions that occurred

A good MRVA system vital for functioning of ETS



The EU ETS: Has it worked?

- > Supply/demand imbalance
- > Price expectations differ from reality
- > Financial crisis but also...
 - Actual abatement
 - Use of offsets
 - Overlap of policies...

- >is change needed?

- > A sophisticated market has developed
- > The EU ETS is here to stay

EU ETS reform

The growth of the economy is unpredictable

Models are nice, but inaccurate by definition

Reform options for EU ETS gives good insights into options to control supply

- a) Increasing the EU reduction target to 30% in 2020
- b) Retiring a number of allowances in phase 3
- c) Early revision of the annual linear reduction factor
- d) Extension of the scope of the EU ETS to other sectors
- e) Limit access to international credits
- f) Discretionary price management mechanisms
- g) *Market stability reserve (add later by the European Commission)*

Looking ahead...

- > A chance to innovate and design something bespoke for Washington!

Today's speaker



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sustainable energy for everyone

Mission, Vision & Values – Facts & Figures

Mission

sustainable energy for everyone

Vision

Based on our deep expertise in energy & carbon-efficiency, renewable energy, energy systems & markets, and energy & climate policy, we develop smart policies and solutions and bring them to life.

We know that, if we act now, by 2050 our global energy system can be sustainable, secure, affordable and fully based on renewable sources.

We aim to create a sustainable energy system for everyone.

Values

Dedication Originality Impact Trust

Facts & Figures

- Founded in 1984
- Over 250 professionals, 7 offices in 6 countries
- Over 500 clients served across 50 countries
- Leading experts: the Nobel Peace Prize 2007, awarded to Al Gore and the IPCC, was supported by 10 Ecofys experts
- Eneco Shareholder since 2009

