

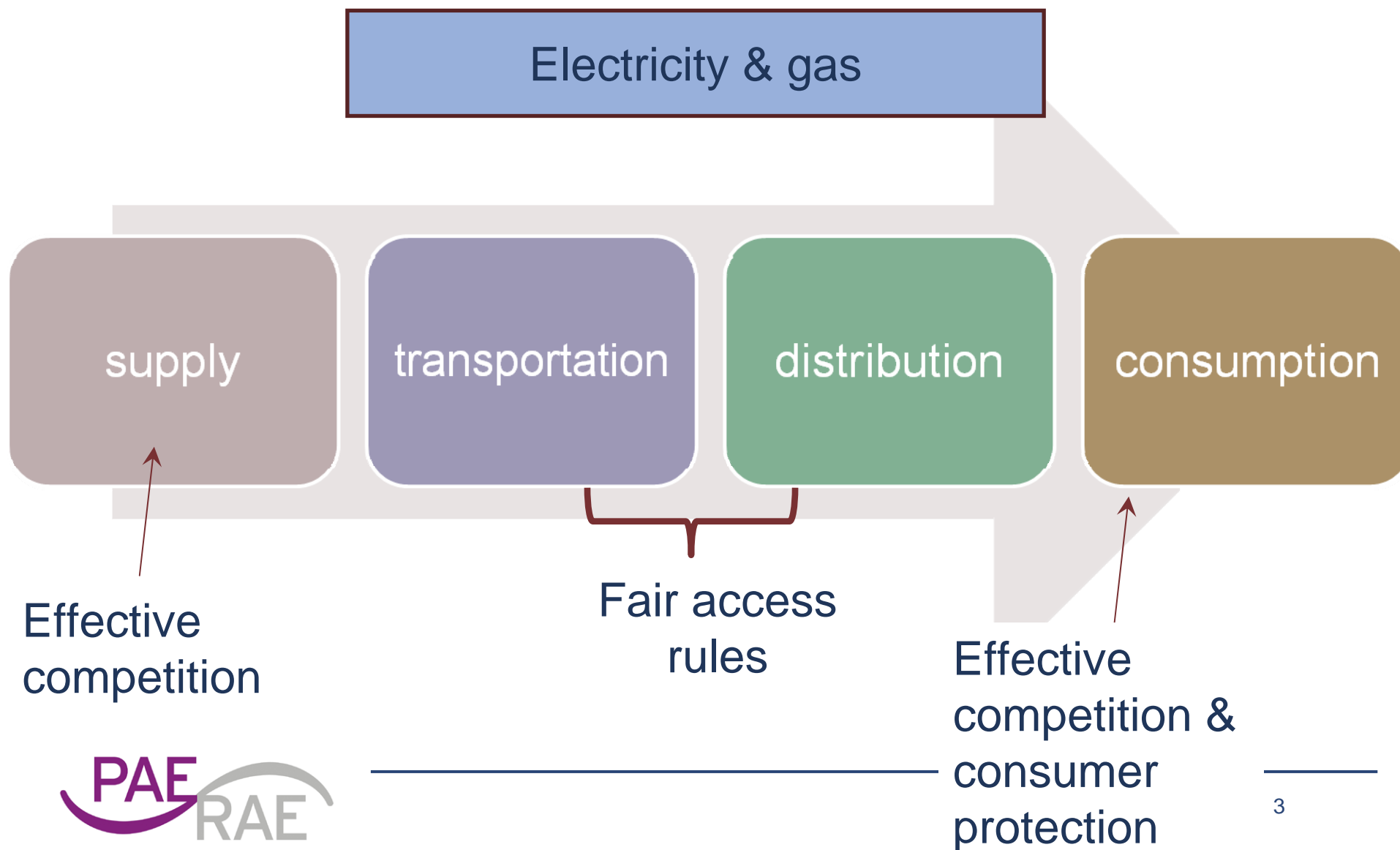
**The innovation impact of
the EU Emissions Trading Scheme :
Past experience and future challenges in
view of 2013**

Katerina Sardi

Outline

- Emissions trading
 - ◆ General background
 - ◆ Emissions trading in Europe : past and future
 - + Framework & numbers
- The liberalised energy market vs centrally planned environmental policies
 - ◆ Effects & implications
- EU ETS and innovation
 - ◆ friends or enemies ?

What is the job of an energy regulator ?



EU energy regulation and tasks

- The regulator's job in summary:
 - Ensure effective competition
 - Stable and clear and transparent regulatory environment
 - Fair access rules to transmission and distribution
 - consumer protection
- EU regulators also work towards the single European market for electricity and gas.
 - The same exact rules for market functionality everywhere!
- March 2011, The Agency for the Cooperation of Energy Regulators (ACER) begins operation.
 - **ACER's mission is to assist National Regulatory Authorities in exercising, at Community level, the regulatory tasks that they perform in the Member States and, where necessary, to coordinate their action.**

Energy Regulators worldwide and their commitment to innovation

- At international level : ICER
 - The International Confederation of Energy Regulators
 - Formed in Athens in October 2009 in the context of the World Forum of Energy Regulation IV
 - A voluntary framework for cooperation between energy regulators from around the globe. with aim ;
 - to improve public and policy-maker awareness and understanding of energy regulation
 - the role of energy regulation in addressing a wide spectrum of socio-economic, environmental and market issues.
 - In the Athens forum, ICER issued the World Energy Regulators' Statement on Climate Change stating their commitment in combating climate change through energy savings, promotion of RES and smart grids and supporting innovation

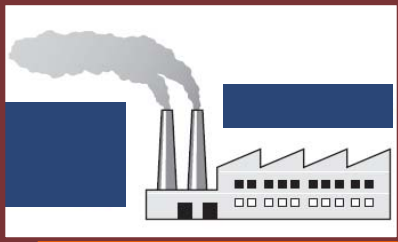
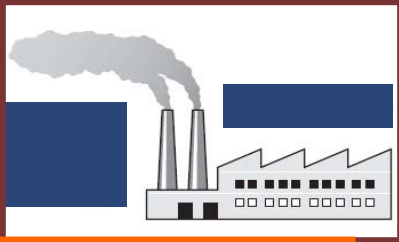
What is emissions trading ?



Innovation and emissions trading

- The emissions trading idea **IS NOT** a new kid on the block !
- Dates back over a century
 - ◆ Alfred Marshall (1842-1924, UK) & Henry George (1839-1897, U.S.)
 - + Need to assign property rights to environment in order to protect it
 - + Unless someone owns the environment, polluting it - in the absence of state regulation - is costless.
 - ◆ Of course, governments can step in and simply outlaw pollution !
 - ◆ In the 1960s, economists Thomas Crocker of the University of Wyoming and John Dales of the University of Toronto revived the idea.
 - + Wasteful to give individuals the same fixed pollution limits, even though this might seem fair.
 - + Setting limits and then enabling individuals to trade their allowances in emissions markets was a better way to protect the environment at least cost.

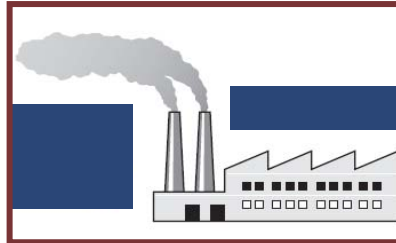
Emissions Trading – an example (1)

	Company A	Company B	
			
	Source A	Source B	Total
Current emissions	50 000 t	100 000 t	150 000 t
Required reduction (10%)	5 000 t	10 000 t	15 000 t
Emissions after reduction	45 000 t	90 000 t	135 000 t

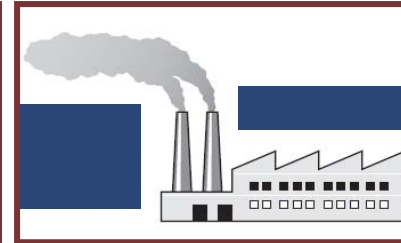
Emission CAP required by the environmental regulator

Emissions Trading – an example (2)

Company A



Company B



Emission reduction cost breakdown with conventional regulation

	Source A	Source B	Total
Emission reduction	5 000 t	10 000 t	15 000 t
Cost per tonne reduced	\$2.00/t	\$5.00/t	
Compliance cost with conventional regulation	\$10 000	\$50 000	\$60 000

Emissions Trading – an example (3)

Emissions trading approach

- Company A which has low-cost emission reduction options—implements reductions over and above the required amount, and sells the surplus to Source B, the facility with higher reduction costs
- Since a reduction of 5% is required the regulator allocates
 - ◆ 45.000 allowances to Company A (originally producing 50.000 t of emissions)
 - ◆ 90.000 allowances to Company B (originally producing 100.000 t of emissions)
- Company A achieves (by implementation of technological enhancements) a reduction of 10000t
- Company A has a surplus of allowances for sale !

CAP & TRADE

1 allowance = 1 t

Emission reduction cost breakdown with emissions trading

	Source A	Source B	Total
Allowance allocation	45 000 t	90 000 t	135 000 t
Reductions implemented	10 000 t	5 000 t	15 000 t
Cost of reductions implemented	\$20 000	\$25 000	\$45 000
Allowances sold	5 000 t	None	
Allowances purchased	None	5 000 t	
Assumed price per allowance	\$3.50/t	\$3.50/t	
Revenue from sale of allowances	\$17 500	No sales	
Cost of purchasing allowances	No purchases	\$17 500	
Compliance cost with emissions trading	\$20 000 <u>-\$17 500</u> \$2 500	\$25 000 <u>+\$17 500</u> \$42 500	\$45 000

Comparison of reduction costs with and without emissions trading

	Source A	Source B	Total
Cost without trading	\$10 000	\$50 000	
Cost with trading	-\$2 500	-\$42 500	
Savings relative to no trading	\$7 500	\$7 500	\$15 000
Savings relative to no trading (%)	75%	15%	25%

- Emissions are reduced because a CAP is always involved.
- Trading can be cheaper than conventional regulation
- Magnitude of the savings and how they are shared between participants will depend on
 - The specifics of each case in terms of actual emission reduction
 - The cost of the allowance
 - The allowance allocation method
- But can emissions trading spur innovation ??????????????

The EU Emissions Trading Legislation



- One original Directive (2003/87/EC), 3 amendments (2004/101/EC, 2008/101/EC, 2009/29/EC)
- Several regulations, commission decisions, explanatory documents.
- 3 Phases :
 - ◆ Phase I : 2005-2007
 - ◆ Phase II: 2008-2012
 - ◆ Phase III: 2013-2020

The EU emissions trading system at a glance

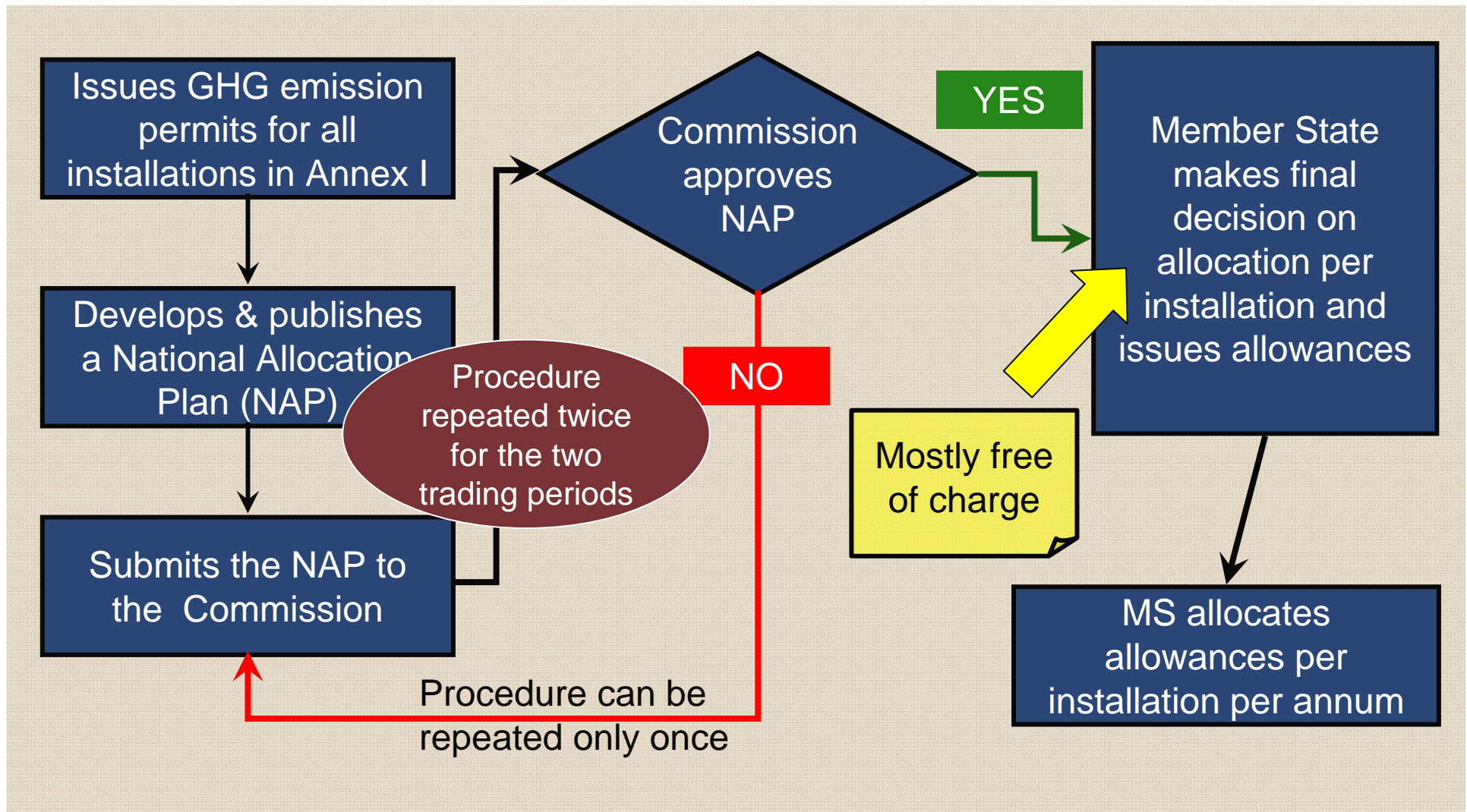
It covers:

- 11,000 power stations and industrial plants
- Almost half of the EU's CO₂ emissions
- 40% of total EU greenhouse gas emissions.
- Variety of sectors :
 - ◆ CO₂ emissions from installations such as power stations, combustion plants, oil refineries and iron and steel works, as well as factories making cement, glass, lime, bricks, ceramics, pulp, paper and board.
 - ◆ Also nitrous oxide emissions and perfluorocarbons from certain processes are also covered
- Airlines will join the scheme in 2012.
- To be further expanded to the petrochemicals, ammonia and aluminium industries and to additional gases in 2013

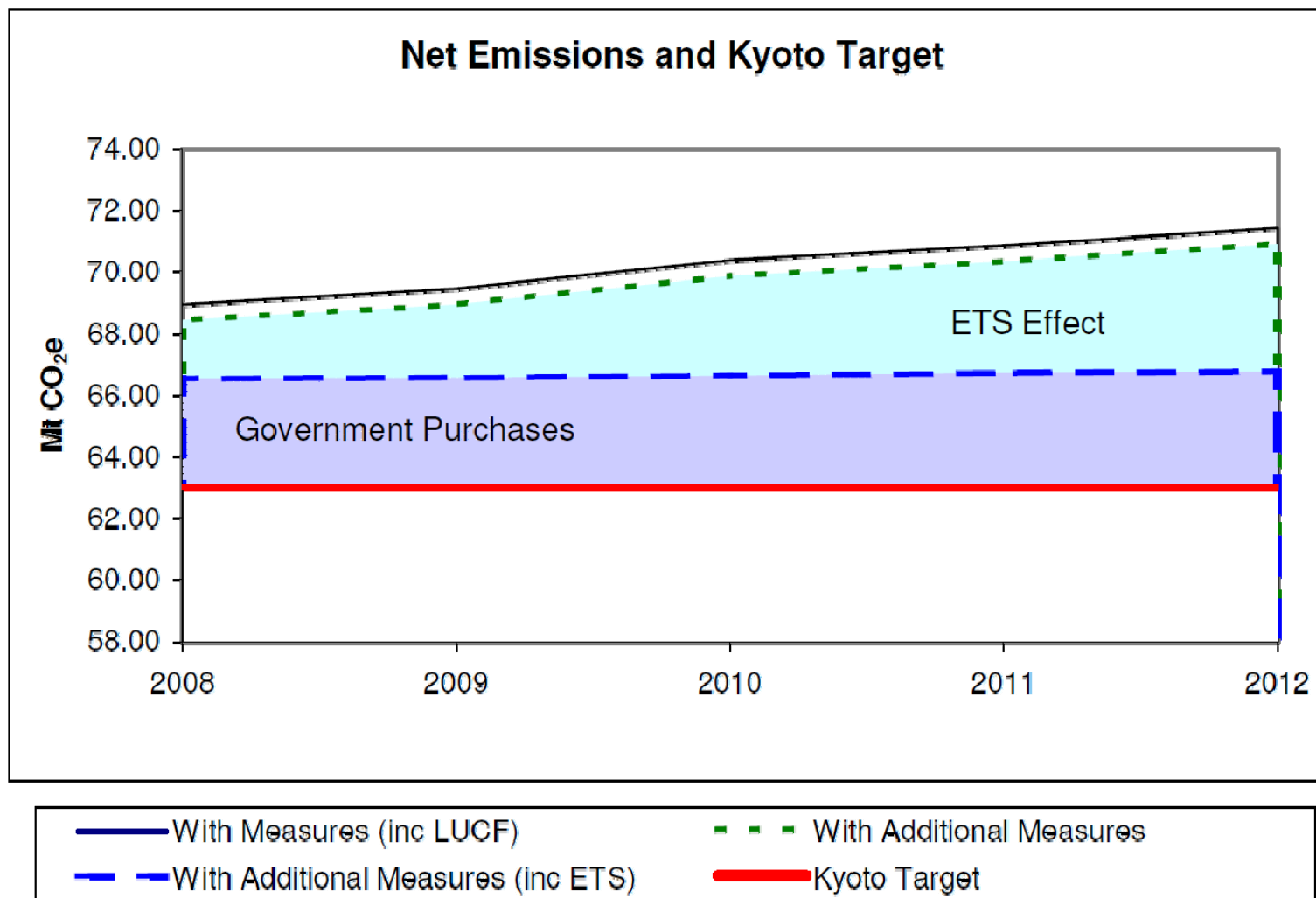
The EU Emissions Trading System : Directive 2003/87/EC (1)

(two trading periods 2005-2007, 2008-2012)

Member State

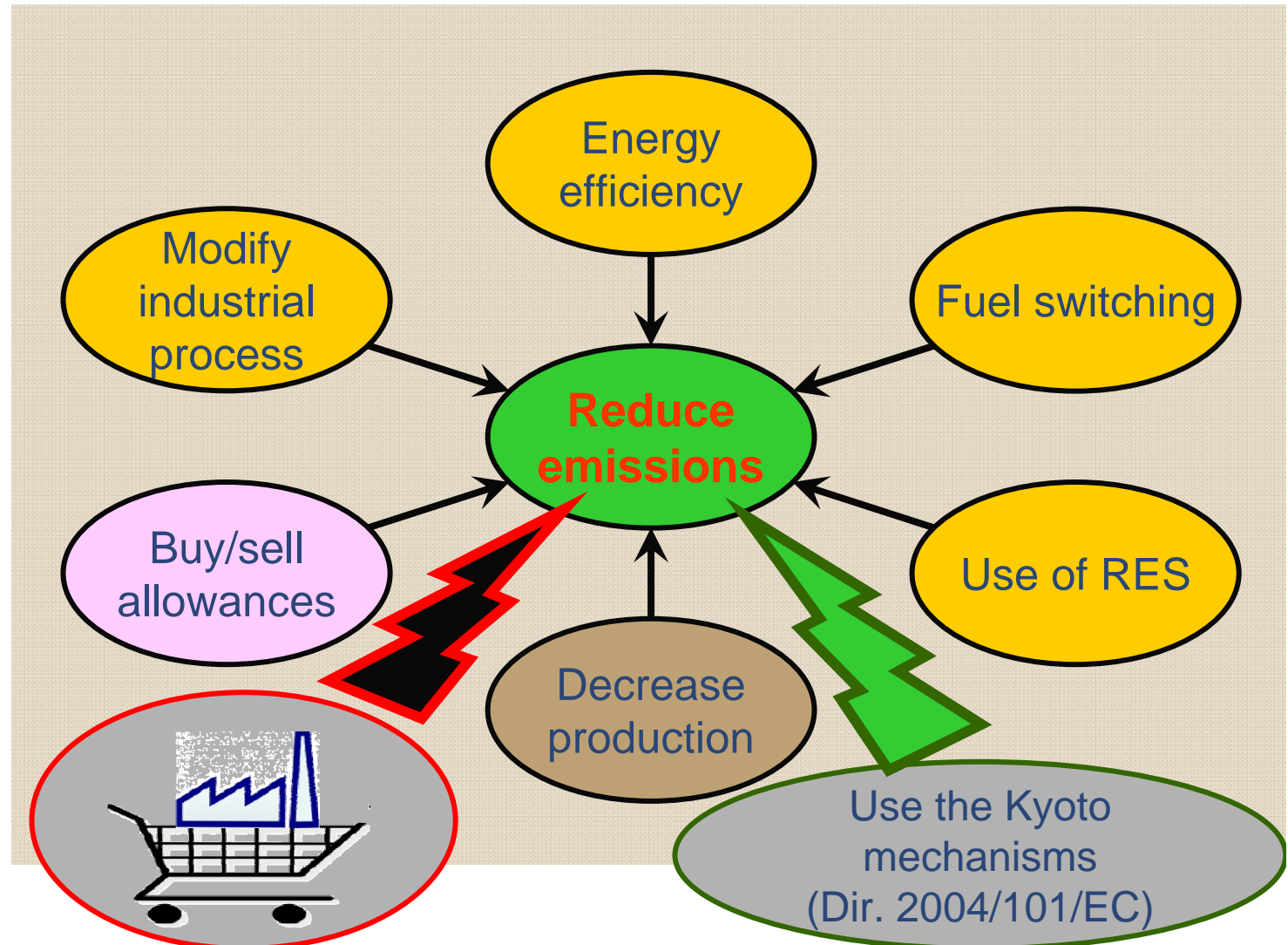
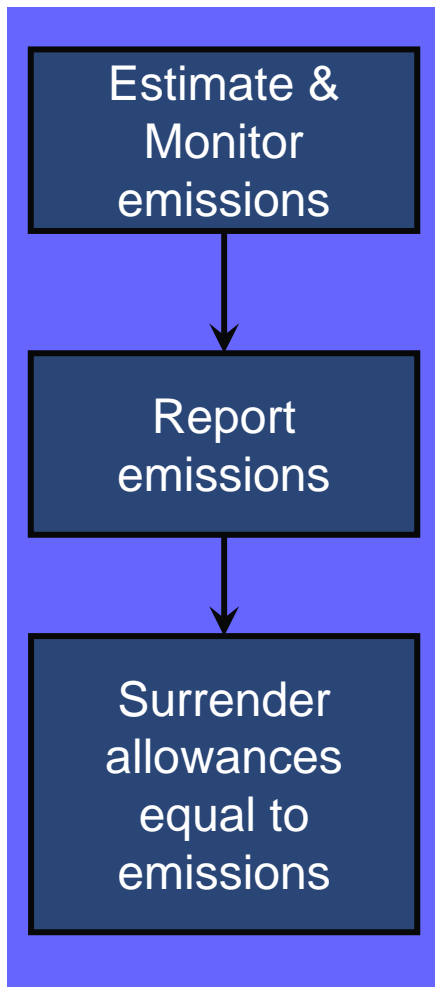


Introducing the cap in the NAP !



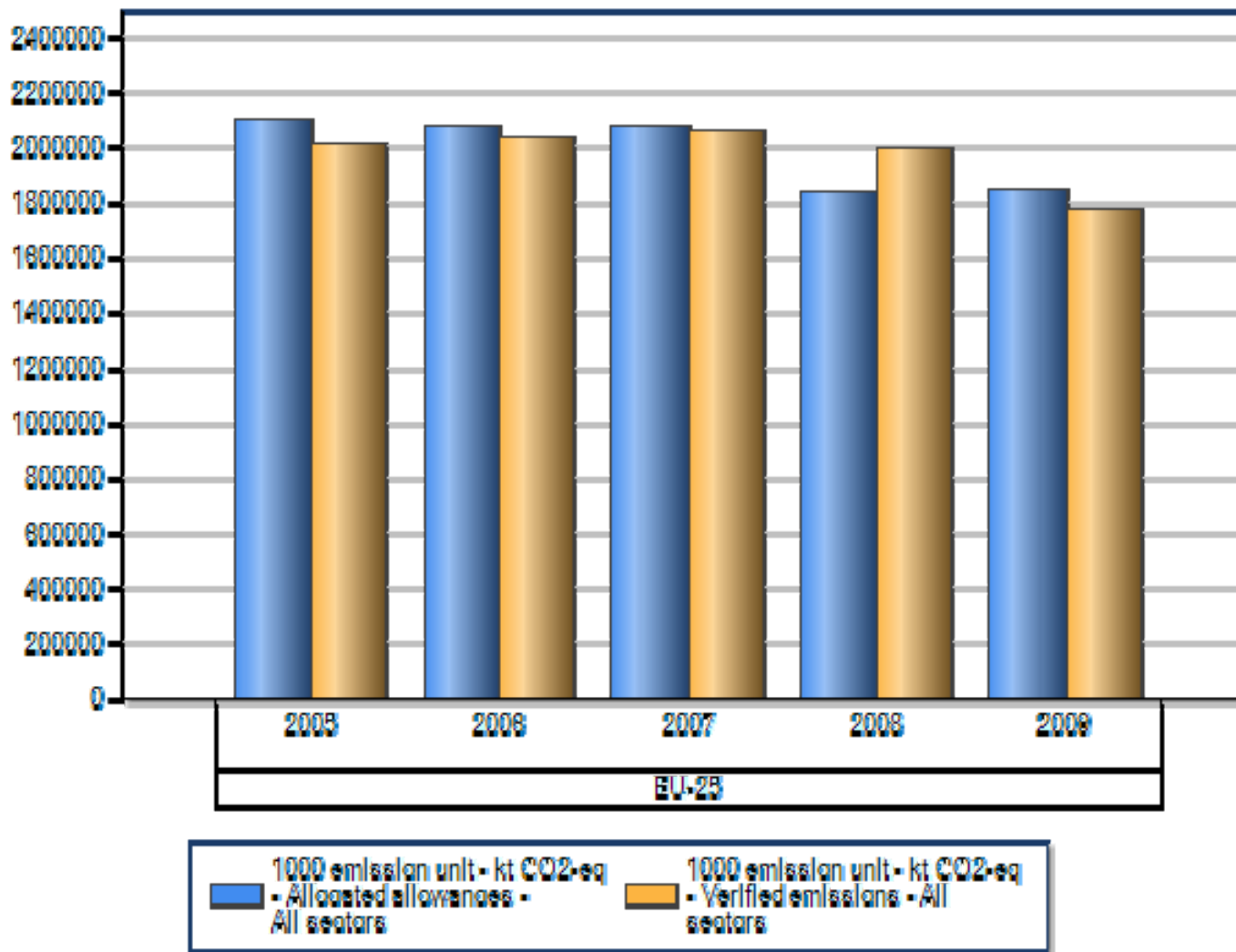
The EU Emissions Trading System : Directive 2003/87/EC at a glance (2)

Installation



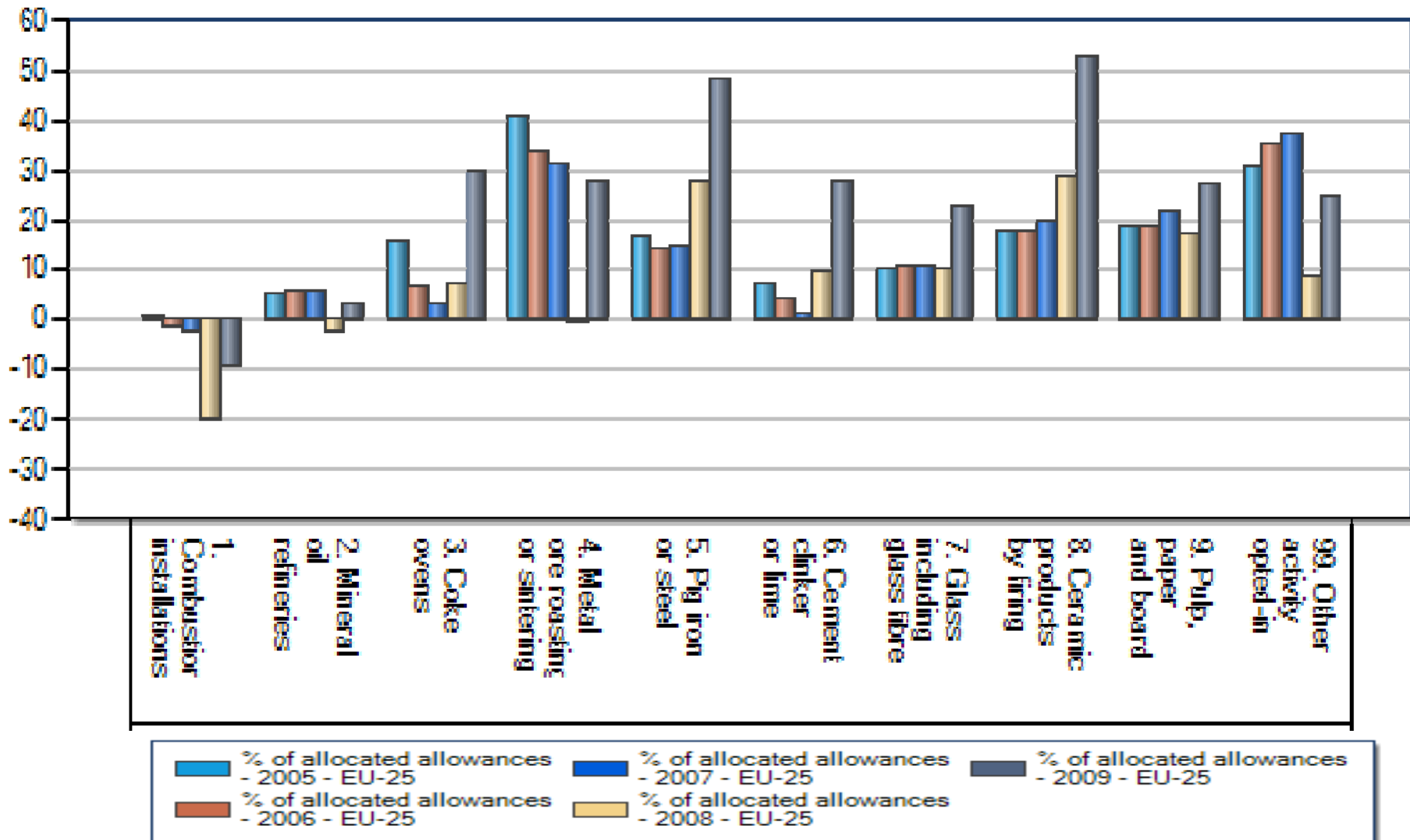
EU ETS in numbers :

Difference between allowance allocation and verified emissions in EU-25

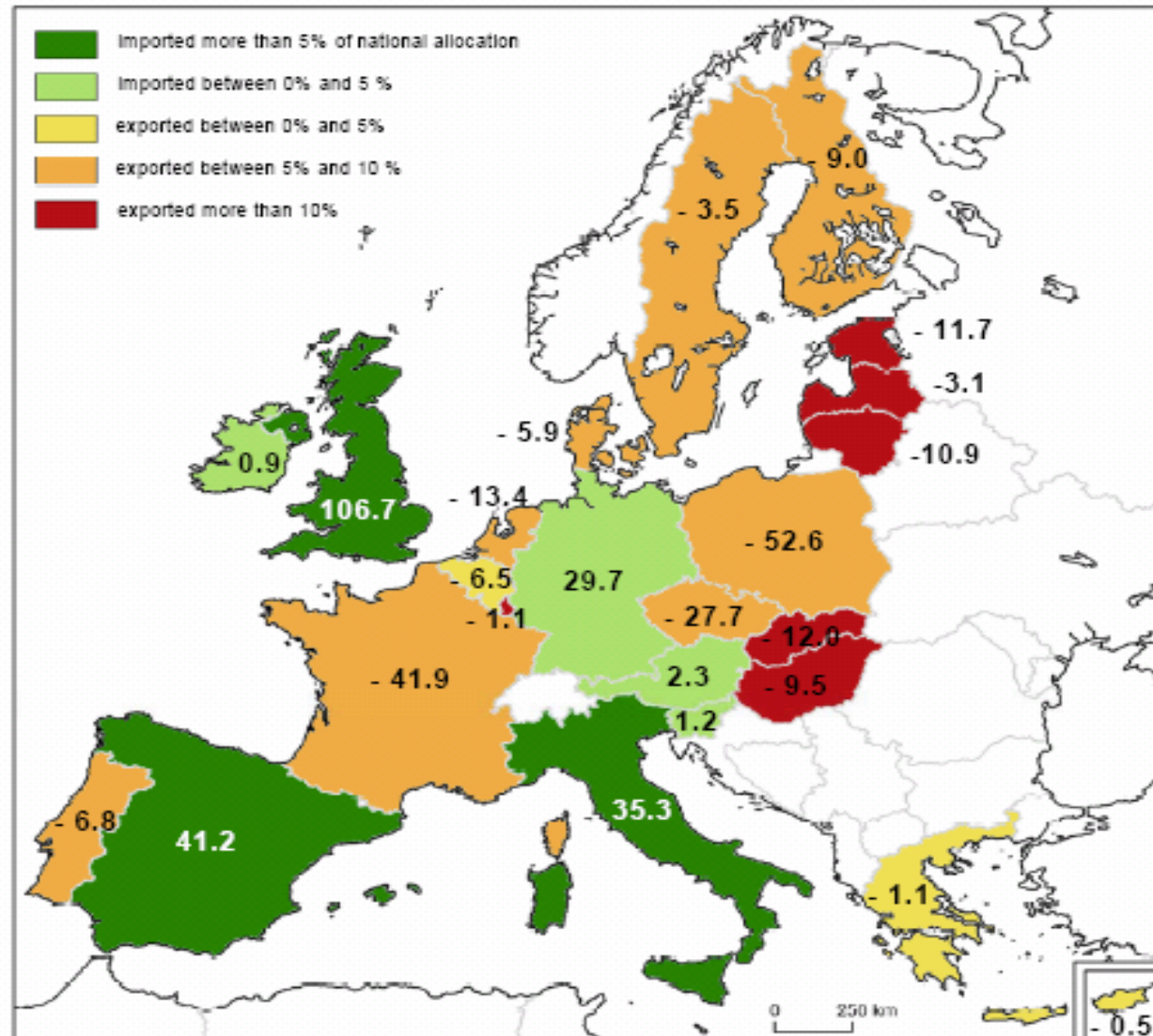


EU ETS in numbers :

Difference between allowance allocation and verified emissions per sector in EU-25



EU ETS in numbers : Importers & exporters of EU Allowances



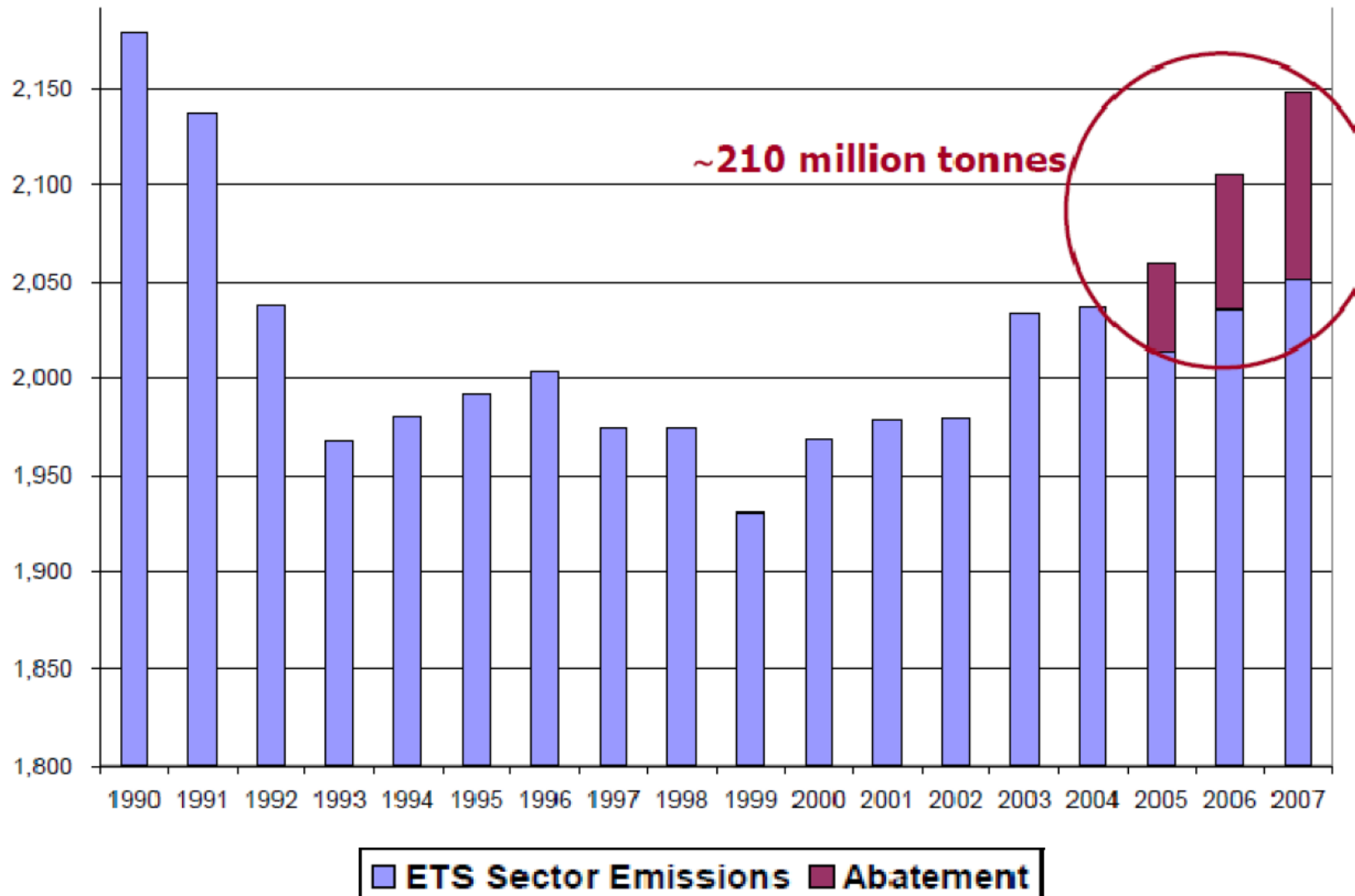
Source WEC Europe-Regional Meeting in Brussels 20th February 2009

Source: CITL, authors' calcul

Summary of the EUA trade in 2009-2010

- In 2010, 5.12 billion EUAs were handled by the 7 major european exchanges (source: point carbon)
 - ◆ ICE (former European Climate Exchange), Bluenext, European Energy Exchange (EEX), Nasdaq OMX Commodities (former Nordpool), Climex, Greenx, LCH Clearnet
 - ◆ This figure includes spot & forwards, excludes options
 - ◆ For the sake of comparison, the annual allocation of allowances for the period 2008-2012 is 2.08 bn.
- In 2009, a total of €89 billion worth of allowances and derivatives changed hands (source: world bank)
 - ◆ ~ 1% of the EU-27 GDP in 2009

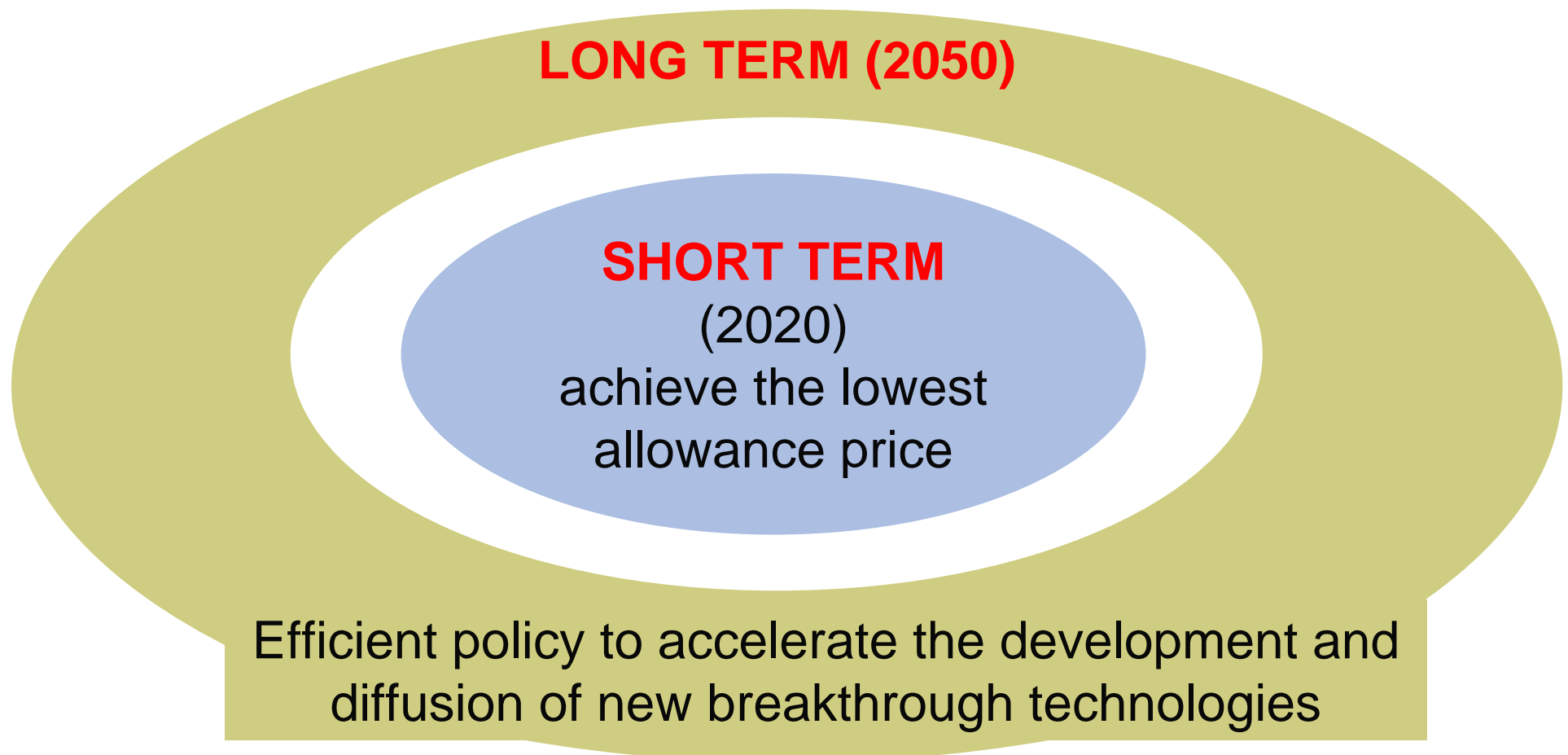
Abatement in the EU ETS sectors vs a BAU scenario



Source: Figure 6.2. p. 165, Ellerman Convery and de Perthuis (2010), as presented by Buchner (2009).

The EU ETS objective

- To “promote greenhouse gas (GHG) reductions in a cost-effective and economically efficient manner”.



Emissions trading in Europe : past and future

Past

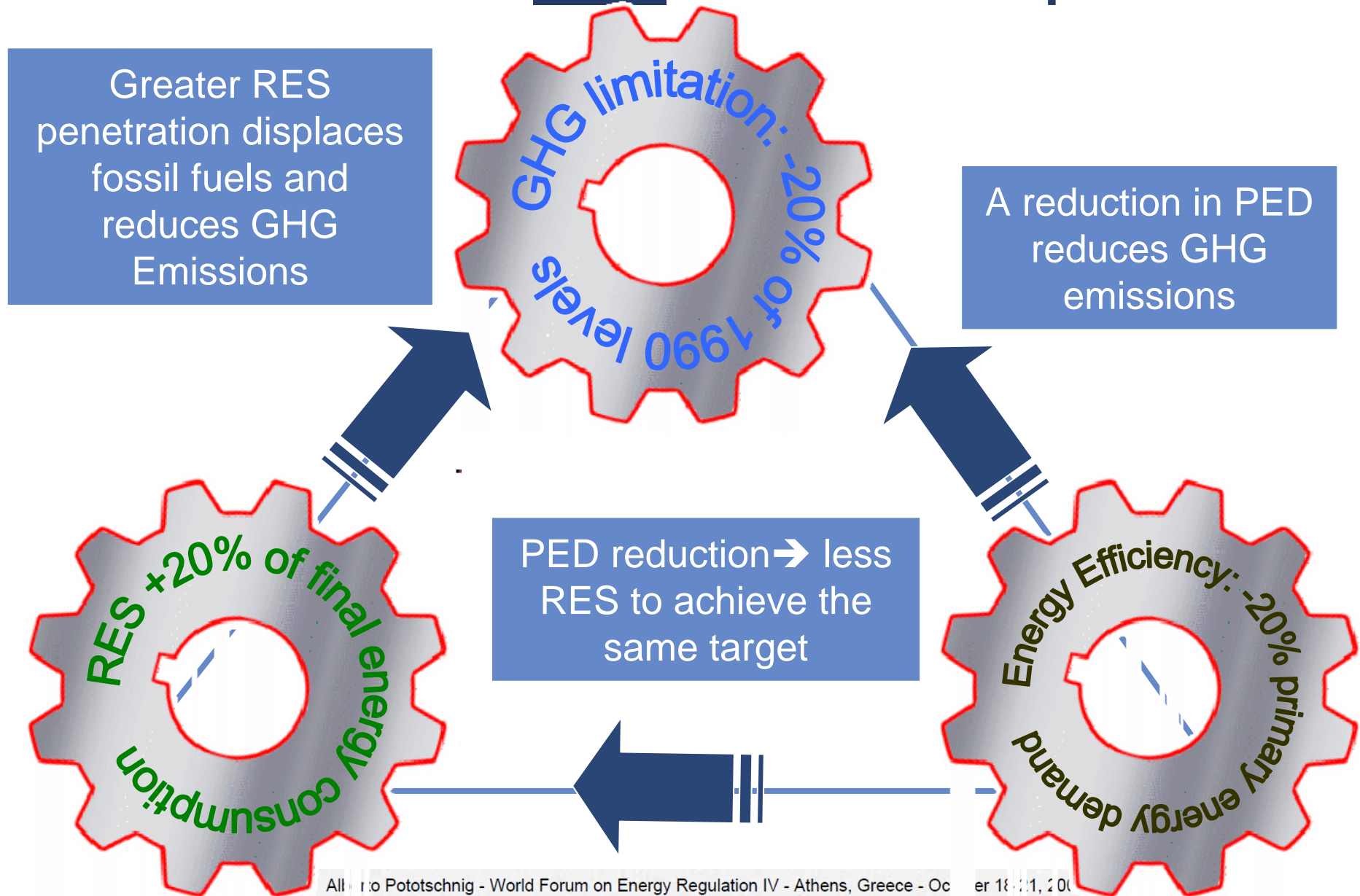
- Phase I (2005-2007) & II (2008-2012)
 - 3 & 5 years trading periods
- National Cap annually modified to meet Kyoto target
- Obligation for a national allocation plan (NAP) drawn by the Member State and approved by the Community
 - Free allocation for industry + electricity generation
 - Limited auctioning

Future

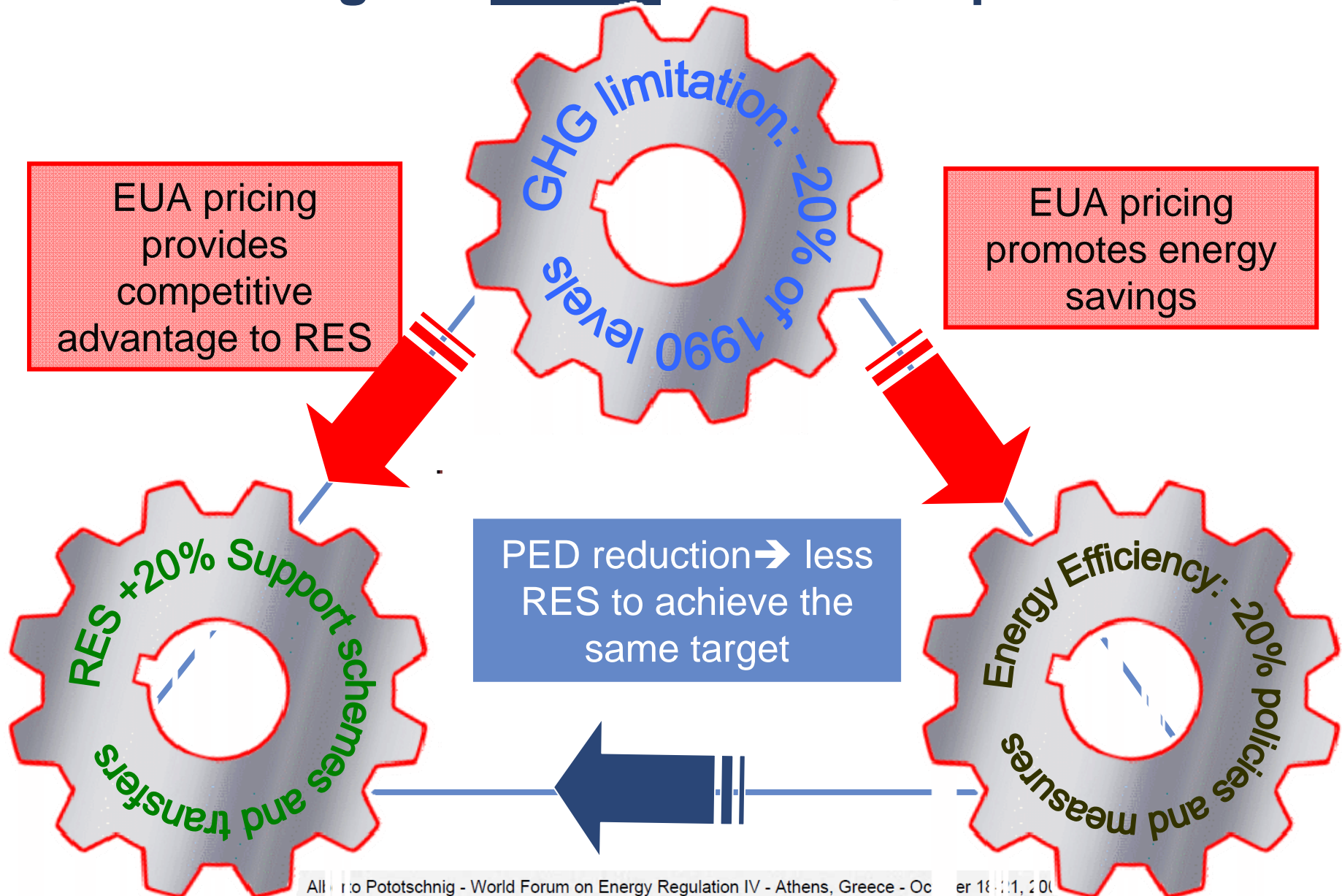
- Phase III (2013-2020)
 - 8 years trading period
- Single EU-wide cap
 - Decreasing annually in a linear way by 1.74%, starting in 2013
- No NAP obligation
 - No free allocation for electricity
 - Transitional free allocation for the remaining sectors (20% auctioning in 2013 increasing to 70% in 2020)
 - Substantial auctioning
 - ◆ Rules for auctioning determined by regulation
 - ◆ Rules for free allocation determined by a second regulation, benchmark approach.
- Up to the Member States to determine the use of revenues generated from the auctioning of allowances

The EU 20/20/20 Climate Policy :

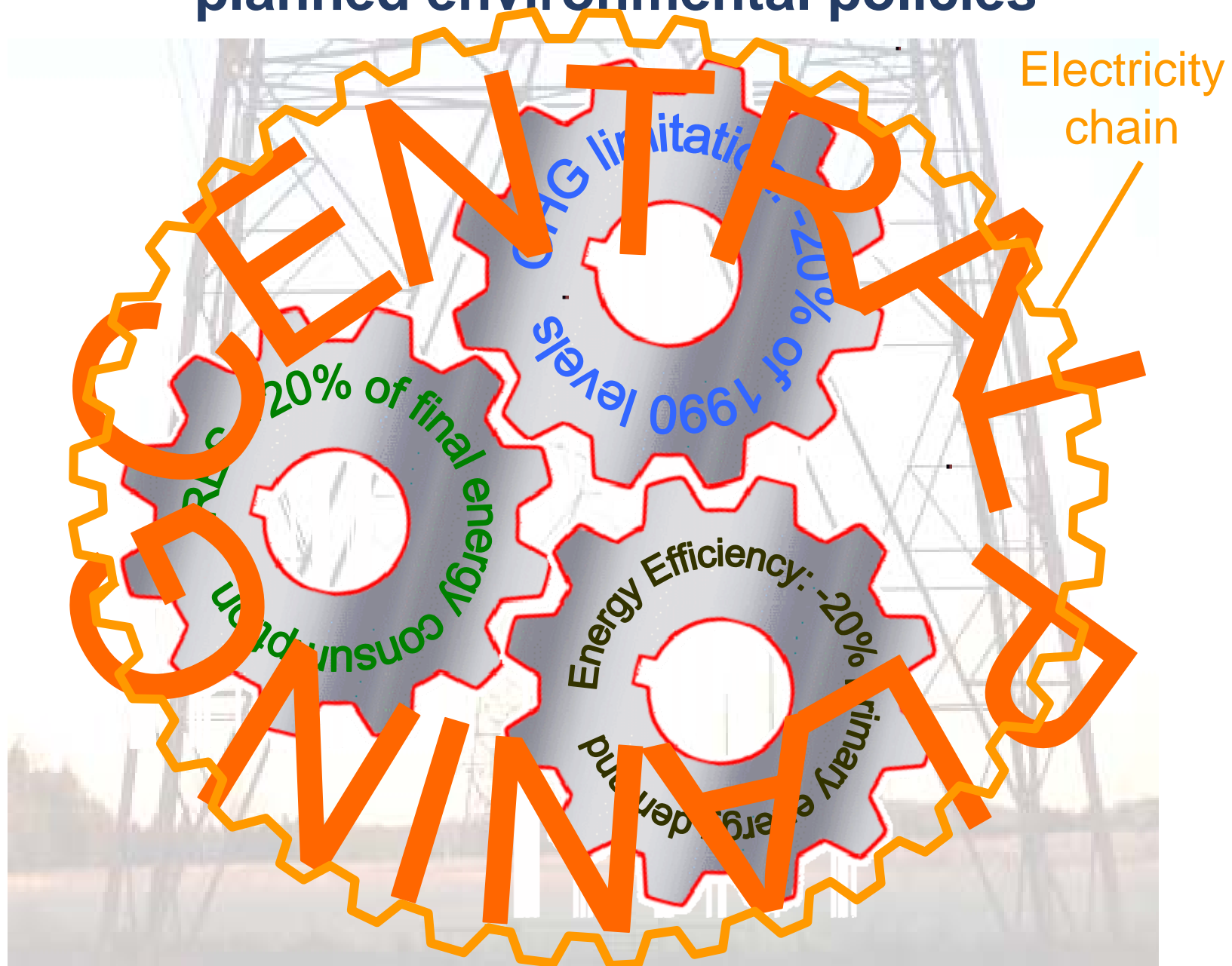
EU ETS receives input from all other policies



The EU 20/20/20 Climate Policy : EU ETS gives output to all other policies



The liberalised energy market vs centrally planned environmental policies



Electricity from plant to consumer

production



transportation



distribution



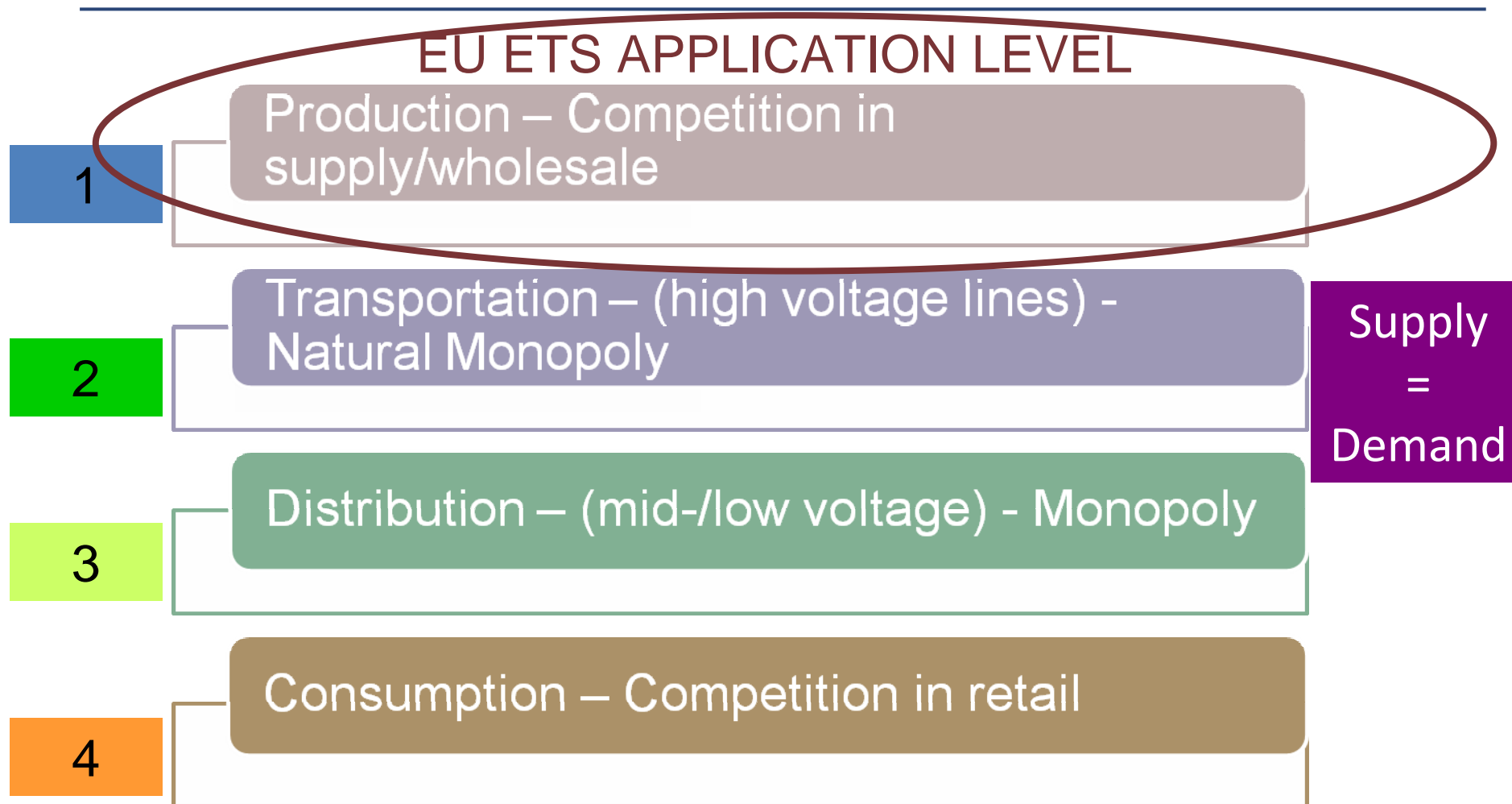
consumption



consumption



Electricity : from production to consumer : practical & regulatory aspects



The liberalised energy market vs centrally planned environmental policies : Effects & implications

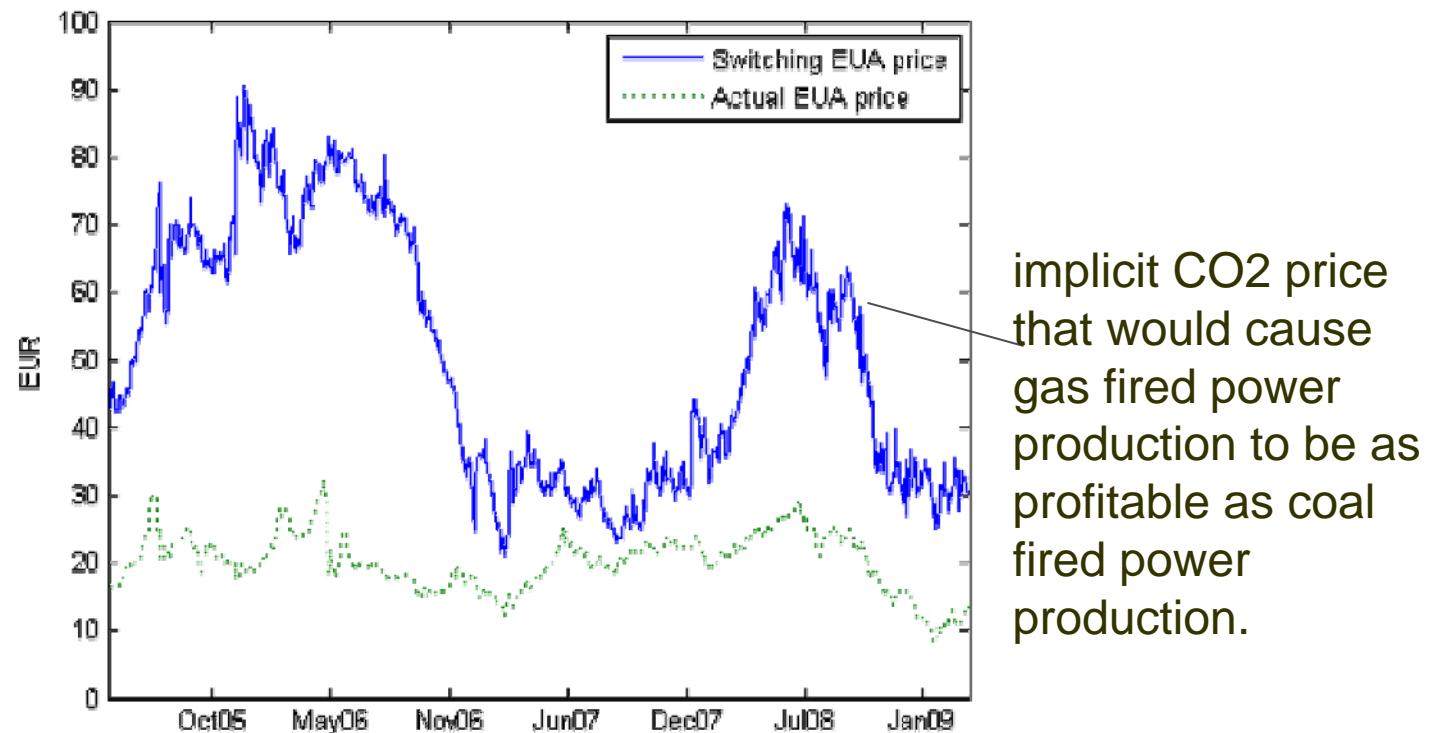
- EU ETS affects the production level
 - Wholesale prices
 - ➔ Competition in wholesale & retail
 - ➔ A cause for windfall profits due to free allocation:
 - ➔ Rough estimates of 19 bil. Euros so far
 - In the short & long term
 - ◆ The fuel mix (coal vs gas, combustion vs nuclear)
 - ◆ Energy imports from less carbon intensive countries to higher carbon intensive countries
- Climate change policies in general affect both production (RES) but also the remaining parts of the energy chain
 - ◆ Transportation & distribution (smart grids, demand side management, smart metering)

EU ETS and Energy Regulation

- Market monitoring & Consumer protection
 - ◆ Aim to avoid/control/limit windfall profits
 - + Occurring mostly as a result of inefficient competition
 - + Convergence (& integration) of the national market to the single internal market (as part of the 3rd energy package) and auctioning of allowances from 2013 onwards, is expected to enhance the situation.
- The Council of the European Energy Regulators, the recently established (March 2011) Agency for the Cooperation of Energy Regulators (ACER)
 - ◆ smart grids
- ICER : International Confederation of Energy Regulators
 - ◆ Acknowledged the need of innovation
 - ◆ Work and report on regulatory practices for energy efficiency (task undertaken in the G8 meeting in Rome in 2009)

EU ETS and innovation : friends or enemies ? (1)

- Diverging opinions for the 2005-2012 period
 - Some deplore the apparent failure of the ETS to induce innovation, while others point out that additional innovation policies are required to induce technological change.



EU ETS and innovation : friends or enemies ? (2)

- Innovation depends on whether a company assumes that an investment in general but also in R&D (including demonstration) will become profitable
- Decisions on whether to invest in innovative low-carbon technologies depend:
 - ◆ On the number of allowances which are allocated for certain
 - ◆ The CO2 price
 - ◆ But also on life cycle analysis, the total cost of ownership (TCO), investment years and cash issues, including access and the cost of capital etc
 - ◆ Obviously investors will go those investments which are almost immediately generating benefits.
- Stable rules are necessary but
 - ◆ Allocation certainty is provided for eight years.
 - ◆ This would not matter if certainty existed on the future rules but it doesnot.
 - ◆ Absence of legally binding, enforceable global climate change agreement.

Source : Egenhofer, C., Alessi, M., Georgiev, A., Fujiwara, N. (2011) The EU Emissions Trading System and Climate Policy towards 2050 Real incentives to reduce emissions and drive innovation?, CEPS Special Report

EU ETS and innovation : friends or enemies ? (3)

- The question of whether the EU ETS is leading to innovation would most likely not exist if there were a global CO2 price or other mechanisms such as a carbon bank, for example, sufficient to make currently expensive technologies such as renewables or CCS profitable.
- Levels of required CO2 prices, exceeding €100 per tonne of CO2, possibly by a wide margin, however do not seem to be a realistic option, unless one assumes good chances for other emissions trading schemes being implemented in other OECD or emerging economies.
- This has raised two issues.
 - What is the right price to provide incentives for innovation and investment ?
 - ◆ Levels of required CO2 prices, exceeding €100 per tonne of CO2 (instead of the current values of about 17 €/tonne) could provide a signal but highly unlikely
 - How to curb excessive price volatility ?
 - ◆ Price volatility is an integral part of any market, if it is 'high', it has a detrimental effect on investment.
 - ◆ So far volatility – after 2005-2006 – has been rather limited



In the absence of a comprehensive and legally global climate change agreement, EU allowance prices most likely remain too low to drive innovation to the extent required.

Emissions trading in Europe : the future (1)



- **50 %** of the revenues generated from the auctioning of allowances should be used amongst others also for the following:
 - (a) by contributing to the **GEEREF Fund** and to the **Adaptation Fund** to fund R&D as well as demonstration projects for reducing emissions and for adaptation to climate change in developing countries and economies in transition.
 - (b) to develop RES and other technologies towards the 20 RES/20 Energy Efficiency commitment of the Community;
 - (c) Capture and geological storage of CO₂, in particular from solid fossil fuel power stations and a range of industrial sectors and subsectors, including in third countries;
 - (d) encourage a shift to low-emission and public forms of transport;
 - (e) finance R&D in energy efficiency and clean technologies in the EU ETS sectors

Emissions trading in Europe : the future (2)



- Up to **300 mil.** allowances from the new entrant reserve shall be made available until 31 December 2015 to help stimulate the construction and operation of up to **12 commercial demonstration projects.**
- The allowances shall be made available for support for demonstration projects that provide for the development, in geographically balanced locations, of a wide range of CCS and innovative renewable energy technologies (such as wind energy, concentrated solar power, or smart grids).
- EU NER 300 programme : €4.5 billion from the sale of the allowances which will leverage matching funding of another €4.5 billion from Member States and industry.

Emissions trading in Europe : the future (3)



- The European CCS Demonstration Project Network : the world's first network of demonstration projects, all of which are aiming to be operational by 2015.
- European Industrial Initiative on CCS and the co financing of up to seven large-scale projects through the European Energy Programme for Recovery
- Also the EU recently proposed the so called “innovation/technology accelerator” to early investors in top performing low-carbon technologies by rewarding them with additional free allowances
- rely on surplus allowances left over within the maximum available amount, i.e. after the allocation is complete

Conclusions



For more information on the Agency for the Cooperation of the Energy Regulators (ACER) and the International Confederation of Energy Regulators (ICER)

http://www.icer-regulators.net/portal/page/portal/IERN_HOME/ICER_HOME

http://www.acer.europa.eu/portal/page/portal/ACER_HOME