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Market based instruments: benefits and drawbacks, global state of play of carbon pricing

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Economics of climate change

Setting a carbon price
- Why setting a carbon price
- Definition of market based measures and type of mechanisms
- Limits of carbon pricing

Type of instruments
- Carbon tax
- Emission trading
  - Cap and trade
  - Baseline and credit
  - Uncapped systems
- State of play of the implementation of market based measures

Process for setting up an emission trading system
- Accurate monitoring, reporting and verification
- Secure and reliability

Open questions
- Single price of carbon ?
- Financialization of the environment

Economics of Climate change

- "*Climate change is the greatest and widest-ranging market failure even seen*", Sir Nicholas Stern, The Economics of Climate Change
- The cost of keeping a 77% chance to stay below the 2°C temperature increase is at least 1% of global annual GDP by 2050 (with a range of -1% to +3,5%)
  - Some costs (especially for adaptation) will have to be supported by the public sector
- Climate change is NOT one market failure, but SEVERAL market failures
  - Transaction costs, split of incentives, lack on information, etc.

Main climate change market failures

- Time-inconsistency
  - What we can do now can only have a limited effect on the climate over the next 40 to 50 years.
  - Investments on mitigation : theoretical possible immediate return on financial investments, but long term social benefits;
  - Investments on adaptation: possible immediate social benefits, but uncertain return on investments (if any)
- Transaction cost
  - Financial transaction costs
  - Technical capacity and/or regulatory context
- Information asymmetry
  - Lack of reliable monitoring of GHG emissions
  - No strong awareness on the link between extreme climate events and GHG emissions
- Split of incentives

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Why carbon pricing?

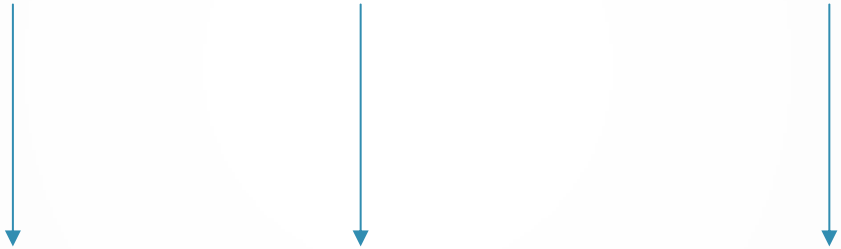
- Raising revenues to unlock market barriers
  - Financial mechanism can be established to overcome time-inconsistency, transaction costs and split of incentives
- Internalisation of externalities
  - Price signal : emitting GHG emissions is not neutral
- Solving the split of incentives
  - Example: housing

Carbon pricing is a market based instrument

- Market-based instruments (MBIs) are policy instruments that use markets, price, and other economic variables to provide incentives for polluters to reduce or eliminate negative environmental externalities

What kind of carbon pricing? (1/2)

$$Revenues = Carbon\ price\ X\ Volume\ of\ GHG\ emissions$$



EUR, USD, CHF, etc.

tCO2e/EUR, USD, CHF…

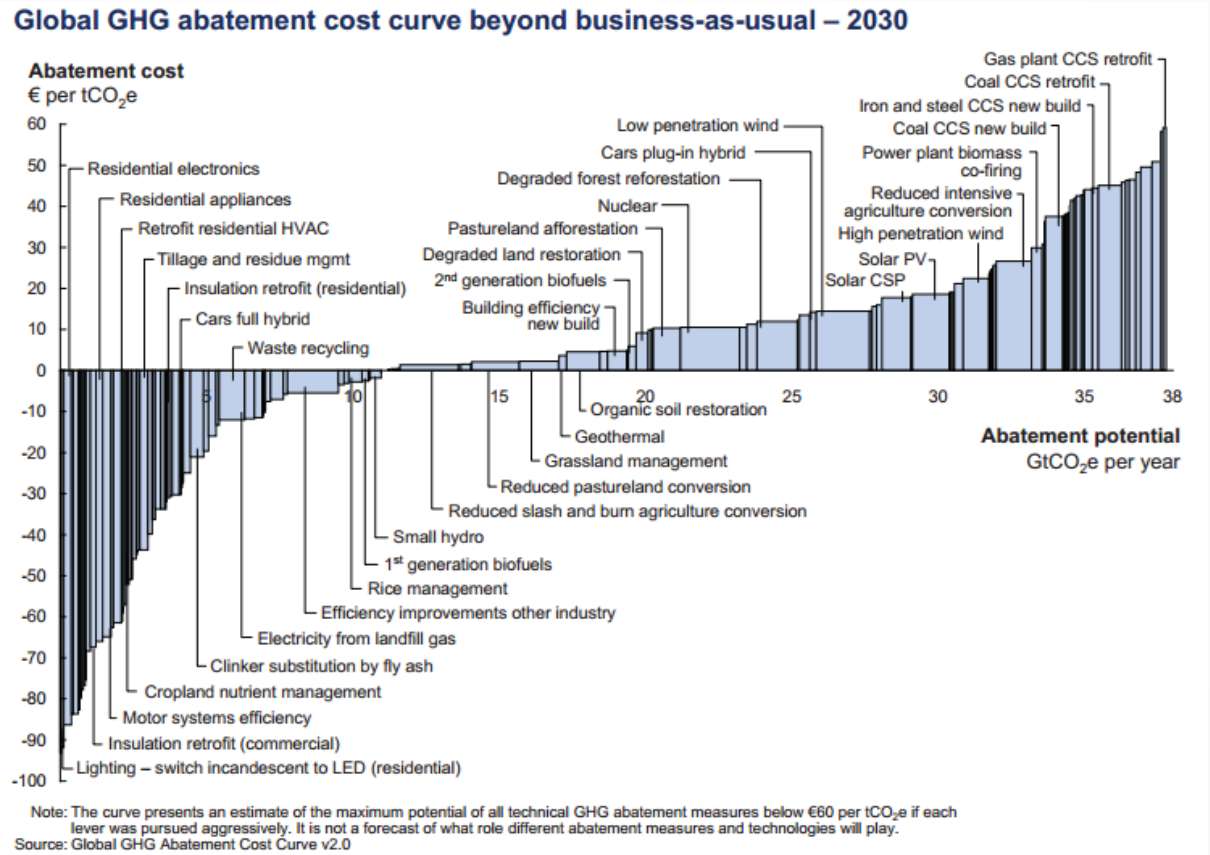
tCO2e

What kind of carbon pricing? (2/2)

$$Revenues = Carbon\ price\ X\ Volume\ of\ GHG\ emissions$$

- Carbon price is fixed => Carbon tax
- Volume of GHG emissions is fixed ex ante => Emission trading mechanism
  - Carbon price is created by the gap between the issuance of "emissions allowances" (i.e. offer) and real GHG emissions (i.e. demand)
  - Several types of emission trading mechanism

Cost-effectiveness of carbon pricing ?

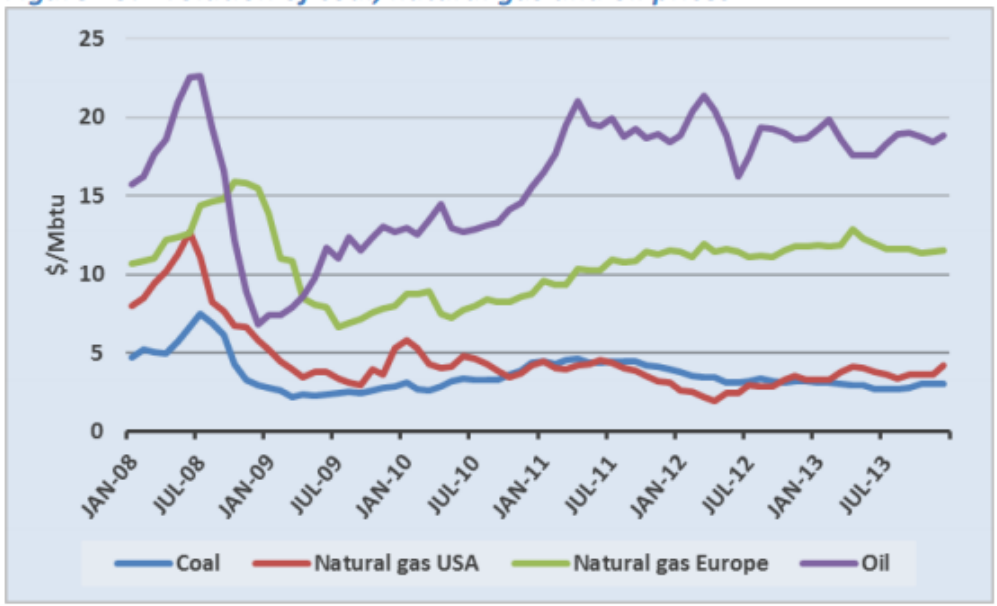


- Mechanisms have to be established to complement the carbon pricing

Importance of switch price

- Carbon price should not be considered as an isolation, but a variable dependent on fossil fuel prices

Figure 15: Evolution of coal, natural gas and oil prices



Coal: European marker, CIF ARA; Natural gas USA: spot Henry Hub

Natural gas Europe: Average import price; Oil: Brent dated

Source: MCR, USDOE, World Bank

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Carbon tax

- Carbon tax can rely on:
  - Direct GHG emissions
    - GHG emissions have to be monitored, reported and verified
  - Indirect GHG emissions (e.g. by being integrated to fossil fuel taxes)

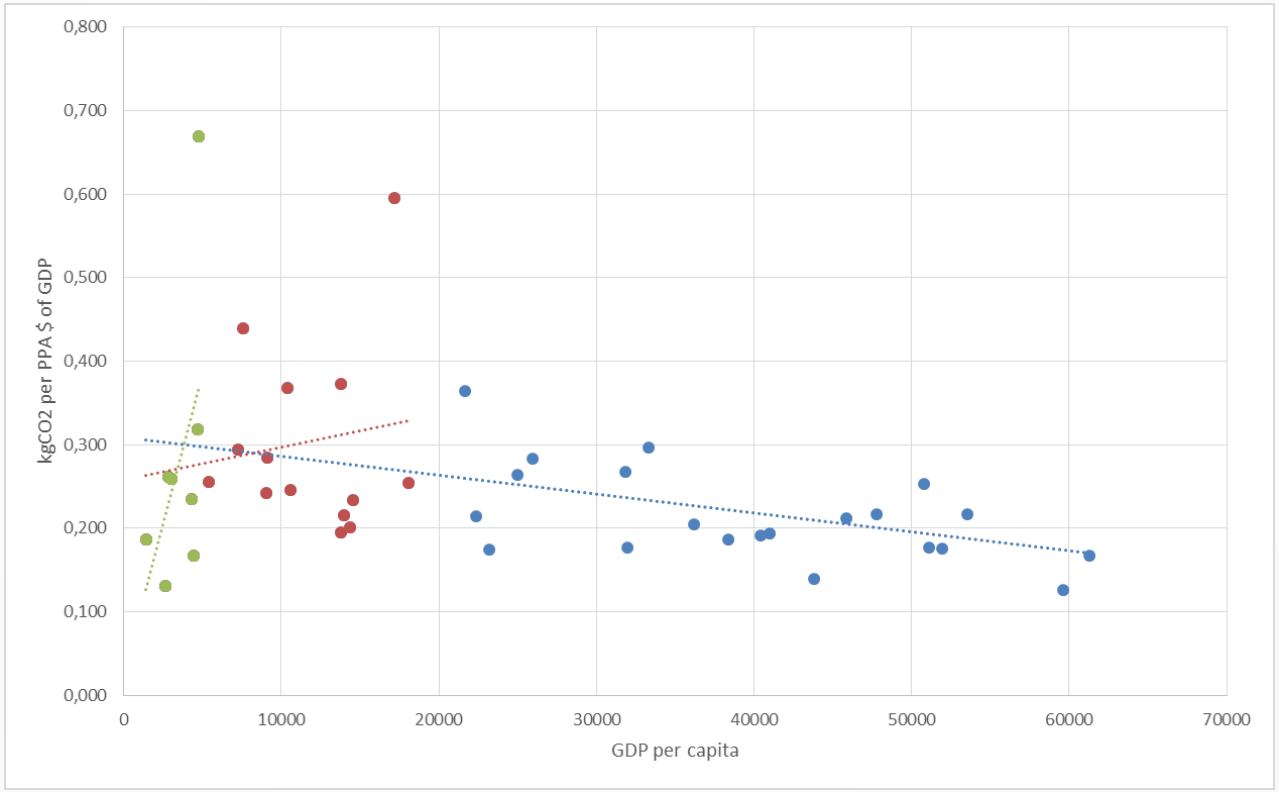
- Possible drawbacks:
  - Environmental integrity is uncertain
    - If the carbon tax is set too low, the abatement measures will be low
  - Issue of earmarking of revenues (same for emission trading)
  - Risk of carbon leakage (same for emission trading)
  - No transboundary measures

Emission trading

- The carbon price is created by a gap between the offer of "emissions allowances" and the demand
- The demand is usually the real GHG emissions
  - Regulator must defined who is committed to surrender emission allowances
- The offer can be:
  - Capped ex ante (ex: EU-ETS)
  - Defined according to a benchmark (baseline and credit system)
  - Uncapped (ex: CDM)
  - Allocated for free or not (e.g. auctioning)

Emission trading – general benefits and drawbacks

- Cost effectiveness : emissions reduction will take place where it is the cheapest => Offseting
- Only work on a large scale (market liquidity)



Source: Author, from WorldBank 2012

Cap and trade

- The regulator set the cap ex ante
  - The absolute amount of GHG emissions is known ex ante
- Advantages
  - Environmental integrity
  - Correct visibility for investors
  - Possibility to carry forward unused allowances
- Drawbacks
  - No fine tune of the emission reduction pathway: emissions reduction may not be related to real improvement of carbon intensity (e.g. economic crises), leading to a postponing of action

Baseline and credit

- The regulator set the a baseline (benchmark)
  - Benchmark can be. tCO2e/kWh, tCO2e/t, etc.)
  - Emissions allowances are calculated according to the benchmark

$$Carbon\ cost = Carbon\ price\ x\ (volume\ of\ GHG\ emissions\ -\ volume\ of\ production\ x\ benchmark)$$

- Advantages
  - Excellent visibility for investors
  - Easier allocation
  - Possibility to carry forward unused allowances
- Drawbacks
  - No cap on emissions
  - More complex monitoring and reporting

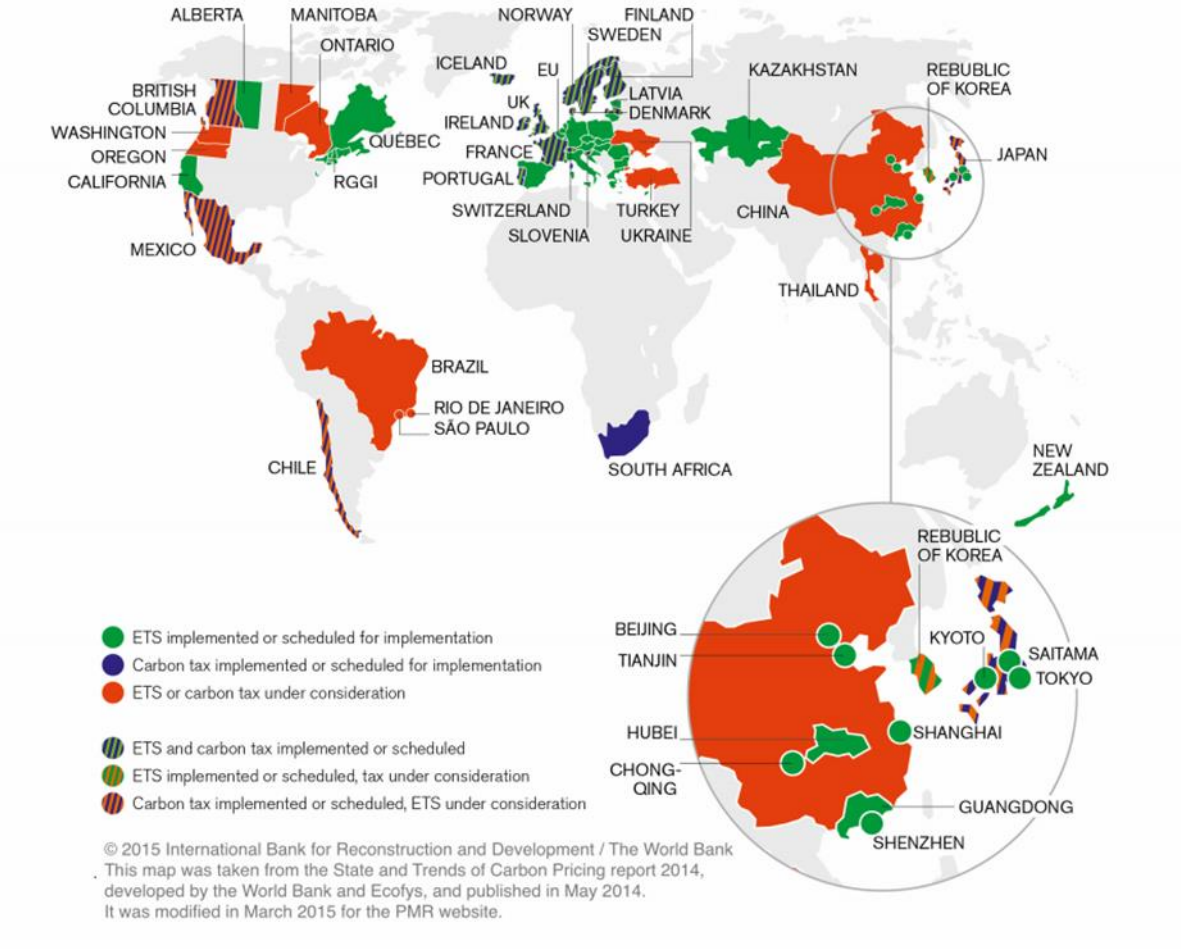
Other uncapped systems

- The regulator set
  - an obligation to surrender allowances
  - eligibility criteria of allowances to be surrendered (like the assessment of the CDM Board)
- Existing systems :
  - Kyoto Protocol Mechanisms
  - Japan Joint Crediting Mechanism (JCM)
- Drawbacks
  - No cap on emissions
  - No link between the offer and the demand
  - Technical complexity (eligibility criteria may be biased, e.g. N2O projects)

An interesting experience from NOx

- Norway set different type of market based mechanism for reduction of NOx : the NOx fund
- Norway set a tax on NOx emissions, but enterprises have the possibility to be exempted if they contribute to the NOx Fund
- The NOx Fund is a non-profit association managed by a consortium of business associations
  - The government has a multiannual agreement with the Fund on NOx emissions target
  - If the Fund fails to achieve the target, all Members have to pay a penalty as high as the tax
  - The Fund is using the membership fee to support projects where it's the more cost-efficient
- Advantages
  - No administrative burden for the State
  - Industry driven emissions reductions
  - Environmental integrity garantee

State of play of emissions trading



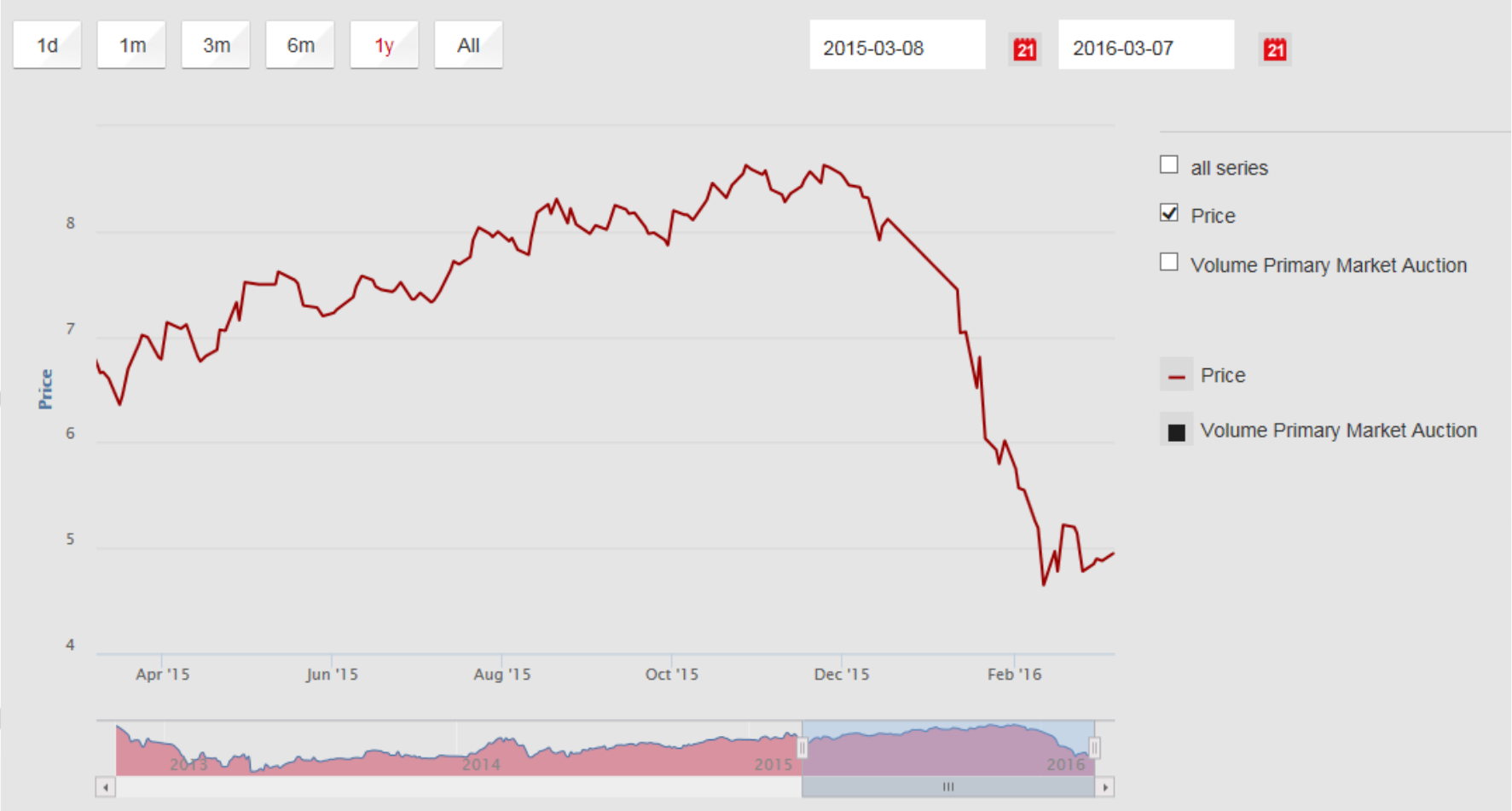
The EU-Emission Trading System (1/3)

- Currently, the largest Emission Trading System in the world:
  - Operates in the 28 EU countries and the three EEA-EFTA states (Iceland, Liechtenstein and Norway)
  - Covers around 45% of the EU's greenhouse gas emissions
  - Limits emissions from more than 11,000 heavy energy-using installations in power generation and manufacturing industry and aircraft operators performing aviation activities in the EU and EFTA states
- Started in 2005; 4th trading period starts in 2021
- Covers mainly CO2, but also N2O and PFC
- Allocation is done for free or by auctioning generating revenues for States to invest in low-carbon technologies

The EU-Emission Trading System (2/3)

- First market for CDM globally
- Highly centralized
  - Single EU registry
  - Common auctioning platform
  - Strong legislative backup from the European Commission
- No administrative burden for States (covered by the auctioning revenues)
- Trading volume (in 2012): 7.903 MtCO2e
- Current price of EUAs: 4,95 EUR/tCO2e (end of the day report EEX, 07/03/2016)

The EU-Emission Trading System (3/3)



China Emission Trading System

- China set 5 pilot ETS since 2013
- Current five-year-plan (2016-2021) set the target to establish a nation-wide ETS by 2017
  - Launch date between 2018 and 2020
  - Offset credits will be allowed within China's ETS.
- Bilateral cooperation with the EU to set up the system, linking foreseen ?

Other important ETS

- Regional Greenhouse Gas Initiative (RGGI) :
  - First market-based regulatory program in the United States to reduce greenhouse gas emissions.
  - Covers the power sector of the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont

- Korean ETS
  - Operational since 2015
  - Covers 66% of Korean emissions
    - Emissions threshold : 125,000 tCO2 at company level and 25,000 tCO2 at installation level
    - Gas coverage: CO2, CH4, N2O, HFCs, PFCs, and SF6
    - Distribution of free carbon allowances: 100% in Phase I, 97% in Phase II and 90% in Phase III.
  - Discussion for linking with the EU-ETS on-going

- Swiss ETS, New Zeeland, Japan, etc.

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Setting up an Emission Trading System

- Takes several years
  - Preparation of the legislation
  - Setting up the system: registry, contract with auctioning platforms, etc.
- Iterative process
  - Trading cannot start before monitoring, reporting and verification is in place
- Joining/Linking with existing system have to be carefully assessed
  - Convergence period may be needed

MRV is key

- Reliable and accurate monitoring, reporting and verification (MRV) of GHG emissions is key
  - Regardless the market based measure in place
  - Verification is essential to avoid frauds and ensure market trust
- MRV can be seen as a burden for installations
  - Derogation for small emitters have to be considered
- IT systems for MRV are already available (but cost-effectiveness have to be considered)

Security and reliability

- An Emission Trading System is a financial markets with all the risks it involves (speculation, market abuse, etc.)
  - Strong market oversight is necessary, especially considering the small size of the current markets
- Registry recording ownership of allowances have to be secured, like any banking systems
  - Cf. hacking of the EU-ETS market

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Open questions

- Single carbon price?
  - Linking of ETS is a strong will of OECD countries and market players (especially for offsetting) to have one global price signal
    - Is it really relevant ? Price switch differs according to fossil fuel markets
  - Asymmetric linking between markets to prevent market speculation
    - Cf. Aviation sector and other activities under the EU-ETS
  - Different carbon price could be set for CO2 avoided and CO2 emitted ?
- Financialisation of the environment

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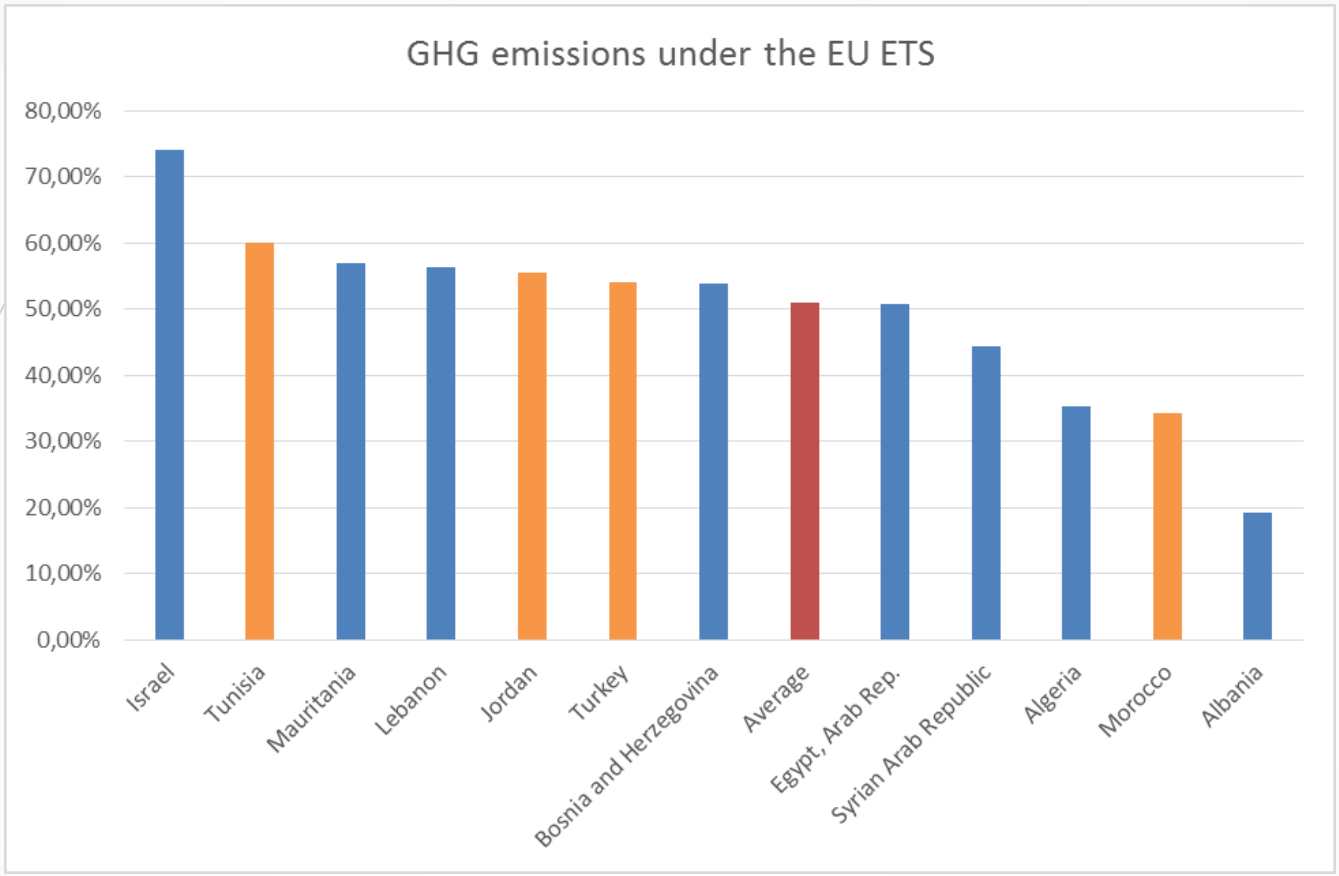
ETS and the UfM Member States



Share of GHG emissions of Southern Mediterranean States that would be covered under the EU ETS; Source: UNFCCC National Communications and GHG Inventories; Caution: The base year used is usually 2000, except for Bosnia (2001), Israel (2010), Jordan (2006), Mauritania (2012), Syria (2005) and Turkey (2012); The GHG emissions are usually from all gases expressed in CO2 equivalent, except for Israel, Egypt, Jordan, Mauritania and Syria, where only CO2 emissions where considered; The countries involved in the World Bank Partnership for Market Readiness are in orange.