The ETS in Context

Understanding and Managing EU ETS Policy Interactions **June 2015**

The ETS in Context

The EU Emissions Trading System (ETS) has been widely lauded as a cornerstone of EU Climate Policy. The scale and scope of the ETS is colossal; it regulates over twelve thousand installations in thirty-one countries by capping ~45% of the EU's emissions and putting a price on carbon.

However, the contribution the ETS was expected to make towards the emissions target enshrined in the 2020 Climate and Energy Package (2020 Package) was not realised as emissions fell far faster than the cap.

Policy interactions and exogenous factors have influenced the ETS and created oversupply. To explore this we developed a counterfactual scenario for the period from 2009 to 2013. We found that renewable energy, economic instability, 'frontloading' of generous offset allowances, increased efficiency and industrial decline all contributed to the oversupply, contributing 538m, 522m, 454m, 183m and 121m t/CO_2, respectively. After including the impact of economic instability, the potential abatement required from the ETS to meet the 2020 emissions target halves from 1.2b t/CO_2 to 0.6b t/CO_2 (or 13% of the 5.3b t/CO_2 reduced in total over the period).

The chasm between the potential of the ETS and its actual impact arouses strong antipathies, leading some to call for all over-lapping policies to be abandoned, while others call for the scrapping of the EU's carbon pricing experiment.

Beyond the obvious need for ETS reform and policy coordination, we conclude the EU is right to continue to pursue a portfolio approach. Climate change is caused by multiple market failures, which will require several interventions before they can be solved. We present three factors which explain why a portfolio approach is justified: to overcome non price barriers, to support new technologies and to address high carbon lock in. We also offer recommendations for the 2030 Climate and Energy Package (2030 Package) policy design process to ensure the role of the ETS is clearly communicated, is resilient to policy interactions and exogenous factors, and contributes to the EU Commission's ambition for an EU industrial renaissance.

About Sandbag

Sandbag is a UK-based not-for-profit thinktank conducting research and campaigning for environmentally effective climate policies.

Our research focus includes reform of the EU Emissions Trading Scheme, the EU 2020 and 2030 climate & energy packages, and the persistence of old coal in Europe. The International Centre for Climate Governance ranks us in the top twenty global climate think tanks.

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Key Take Aways

- **Theoretical illustration of how other policies influence the ETS price.** To illustrate how other policies influence the ETS price, we categorise EU policies four ways – 1) energy efficiency; 2) research and development; 3) low carbon deployment; and 4) the ETS – and place each policy on a Marginal Abatement Cost (MAC) curve based on its implicit cost band.
- **Policy interactions and exogenous factors.** Several policy interactions and exogenous factors have influenced the ETS beyond original expectations. Falling technology costs from renewables deployment and energy efficiency policies are examples of policy interactions, while economic instability and low coal prices from changes in the international energy markets are examples of exogenous factors. Many policy interactions and exogenous factors are also multi-dimensional. For example, policy, power prices and austerity, coupled with technological improvements across several key sectors of the economy have contributed to significant gains in energy efficiency. Additionally, the EU Commission permits Member States to go beyond the emissions reduction targets set by the 2020 Package and currently does not monitor or coordinate these actions in terms of how they will influence the ETS.
- **ETS coverage versus impact.** The scale and scope of the ETS is colossal; it regulates over twelve thousand installations in thirty-one countries by capping ~45% of the EU's emissions and putting a price on carbon. When the 2020 Package was proposed in 2008, the EU Commission forecast cumulative reductions of 5.3b t/CO_2 from ETS sectors for the period of 2008-20. After the impact of renewables policies (1.9b t/CO_2), access to UN offsets (1.6b t/CO_2) and energy efficiency policies (0.6b t/CO_2) are taken into consideration only 1.2b t/CO_2 of reductions remain to be address by the ETS. Once the impact of economic instability is included, the potential abatement required from the ETS to meet the 2020 emissions target halves from 1.2b t/CO2 to 0.6b t/CO_2 (or 13% of the 2008 forecast 5.3b t/CO_2).
- **Oversupply is multidimensional.** To understand how policy interactions and exogenous factors have influenced ETS oversupply a counterfactual scenario is developed from 2009 to 2013. We found that renewable energy, economic instability, 'frontloading' offsets, power efficiency and industry decline have had the biggest impact on oversupply, contributing 538m, 522m, 454m, 183m and 121m t/CO2, respectively.
- **Why a portfolio approach is needed.** There are three factors which explain why a portfolio approach is justified. In summary:
    1. **Non-price barriers:** An IEA report on energy efficiency and carbon pricing concluded: "*It appears that not all market failures acting as barriers to optimal energy efficiency in the appliances sector can be addressed by carbon and energy pricing.*" For example, EU Commission modelling placed efficient lighting systems and air conditioning measures in the negative range of the MAC curve, with appliance improvements ranging from €180 t/CO_2 to €200 t/CO_2.
    2. **Technology deployment:** Deployment of technology stimulates economies of scale and innovation in manufacturing which, in turn, helps achieve cost reductions in such technology. Yu et al studied the factors behind the learning curve of solar PV and found that from 1998 to 2006 ~50% of price reductions came from learning-by-doing and scale effects. For the EU Commission the challenge comes down to identifying when to shift financial support from research and development (R&D) to deployment.

3. **Driving the early retirement of coal plants is perhaps best achieved through a combination of carbon pricing and direct regulation.** A carbon price, even a low one, is crucial to discourage coal burn and prevent high carbon lock-in. For example, a carbon price of €5 t/CO_2 reduces the profitability of a 300 MW UK coal, German lignite or Polish lignite plant by €8m per year, increasing to €33m per year with a carbon price of €20 t/CO_2. However, some brown coal to black coal and coal to gas switching in the EU is very resistant to a low carbon price. Driving the carbon price to very high levels by 2030 is unlikely to be politically feasible or desirable. Non-price measures should be introduced to avoid high carbon lock-in from existing coal plants and support existing gas investments.

- **EU Industry Policy and the ETS.** As part of its Europe 2020 strategy, the EU Commission published a communication in 2012 stating: *"… the Commission seeks to reverse the declining role of industry in Europe from its current level of around 16% of GDP [at constant prices] to as much as 20% by 2020."* According to World Bank data, emissions from EU manufacturing and construction peaked in the 1970s and remain 26% below output in 1960, while industry value calculated as a percentage of GDP declined 22% from 1991 to 2013. The failure to stimulate and support the deployment of a broad range of technologies with application to industry including carbon capture and storage (CCS) in the EU has left a large hole in the 2020 Package. This is especially true for industrials facing competition for investments from other countries.
- **2030 Package policy design recommendations.** We offer four recommendations for the future policy design process: (1) improved communication of the role of the ETS; (2) better modelling; (3) better management of the policy portfolio; and (4) supporting EU industry transition policy and the role of the ETS.

1. **Communicating the role of the ETS.** Much of the recent debate about the role of the ETS merely reflects the EU's changing political economy. Discontent about economic growth, energy costs and geopolitical instability have all influenced how the EU views climate policy and the role that the ETS plays within it. The ETS has been at the sharp end of this debate due to its breadth of scope and the direct liability it places on the regulated entities it covers. However, it is an important policy to ensure compliance with emissions reduction targets and create a widely applied carbon price signal. A reformed ETS can continue to play an important role, but within limitations and alongside other flanking policies. The EU Commission needs to better articulate the role of the ETS in the context of other policies and should not use it to block the introduction of other policies.
2. **2030 modelling.** The 2020 Package revealed how EU Commission modelling is vulnerable to error. Estimating emissions will always be challenging as carbon output is determined by complex interactions between energy demand, economic growth, technological change and costs and fuel prices. Translating forecasting uncertainty into inflexible policies is at the heart of the problem with the 2020 Package. The introduction of the MSR (Market Stability Reserve) will introduce a welcome element of flexibility to the ETS. (Detailed briefings are available here and our interactive online MSR modelling tool can be found here.) However, before setting future targets for the traded and non-traded sectors, a robust and transparent review of existing energy models must be undertaken. It is entirely possible that reductions in energy used per unit of GDP will accelerate as technological improvements across several key sectors of the economy

continue to drive significant gains in energy efficiency. To avoid a situation whereby the 2030 Package simply mimics "business as usual", the targets the EU sets for itself must be subject to regular review and compliance periods should be no longer than 5 years.

3. **Managing the policy portfolio.** The legally-binding renewable energy targets placed on Member States as part of the 2020 Package have proven to be an important driving force in reducing emissions and increasing energy security[1]. Energy efficiency improvements are also stimulated by EU and Member State level policies. The decision in the 2030 Package to move away from binding Member State targets reflects changing circumstances. Carbon and energy prices, market liberalisation and the increasing role of interconnection have the ability to improve the competitiveness of renewables and deliver the legally-binding EU target of increasing the share of renewable energy to at least 27% of energy consumption in the most cost-effective manner. The 15% interconnection target and internal energy market provisions should reduce the overall cost of renewable energy deployment. However, the EU Commission will still allow Member States to pursue more ambitious national policies, which could mean renewables and energy efficiency policies continue to interact with the ETS. This reinforces the need to include regular reviews of the 2030 Package and ensure a robust MSR operates alongside other essential reforms to tighten the cap.
4. **EU industry transition policy and the role of the ETS.** Any policy attempt to reverse the declining contribution of heavy industry to EU GDP needs to be couched in the context of the low carbon economy. The NER 300 approach for funding innovation including CCS was not sufficient to the task. A stand-alone policy that mimics the success of renewable energy policies must be adopted to stimulate investment in deep decarbonisation in industry. The focus of this policy should be on deep decarbonisation technologies for industrial sectors, such as CCS, where alternatives are limited and where renewables struggle to penetrate.

[1] See: http://www.eea.europa.eu/highlights/renewables-successfully-driving-down-carbon

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Introduction

The EU has numerous energy and climate policies with different objectives. The EU Emissions Trading Scheme (ETS) has long been referred to as the centerpiece of EU climate policy. In recent years, however, a combination of factors has relegated the ETS to a far less important role. This has led to questions about what the best approach should be going forward. For example, could it be that we need a strong ETS to replace other policies or do we need a strengthened role for other policies, with the ETS playing a minor role or even being abandoned?

As the EU Commission turns the political agreement reached in October 2014[2] on the 2030 Package into reality, this report explores the 2020 Package providing insights into its design and offering recommendations for the policy design process. The approach adopted in the 2020 Package, which was not robust to unexpected economic circumstances and appeared to ignore the interactions between the ETS and other policies, cannot continue.

Too often the debate about the role of the ETS can become polarized: some claim it is the only policy necessary while others argue that it undermines other more targeted policies and should be scrapped. Much of the discontent surrounding the role of the ETS also reflects the EU's changing political economy. Concerns about economic growth, energy costs and geopolitical instability have all influenced how the EU views climate policy and the role the ETS plays within it. The ETS has been at the sharp end of this debate due to its colossal abatement range (i.e. 45% of the EU economy) and the direct liability it places on over twelve thousand installations in thirty-one countries.

The EU and its Member States are unlikely ever to rely on just one policy to meet energy and climate goals. Climate change arose as a result of multiple market failures which require several interventions to overcome both price and non-price barriers and encourage low carbon investment. However, the outcome of the 2020 Package has highlighted how careful the EU Commission must be when designing a portfolio approach that includes instruments with interrelating objectives.

The aim of this report is to help arrive at a better understanding of the role of the ETS and how it relates to other policies, so that the 2030 Package not only carries forward the key principles[3] of the 2020 Package, but also ensures lessons are learned and mistakes not repeated.

The report is split into four main sections. Part 1 gives an overview of the policy portfolio used to deliver the 2020 Package and provides an illustration of how each policy may have influenced the ETS price. Part 2 gives examples of how policy interactions and exogenous factors have influenced ETS oversupply and compromised the role of the ETS. Part 3 explains why a portfolio approach is needed going forward and highlights the fact that the 2020 Package failed to effectively engage EU industry in the decarbonisation effort, creating political opposition to more ambition. Part 4 offers policy design recommendations for the 2030 Package.

This report contains analysis that requires at least a cursory understanding of the ETS and the 2020 Package. An introduction to these topics is provided in Appendix 1 and 2, respectively.

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[2] See: http://ec.europa.eu/clima/policies/2030/index_en.htm

[3] Cost-effectiveness; Flexibility; Internal market and fair competition; Subsidiarity; Fairness; and Competitiveness and innovation. See: http://ec.europa.eu/clima/policies/package/docs/sec_2008_85_ia_en.pdf pp 3

PART 1: The EU Climate and Energy Policy Portfolio: An illustration

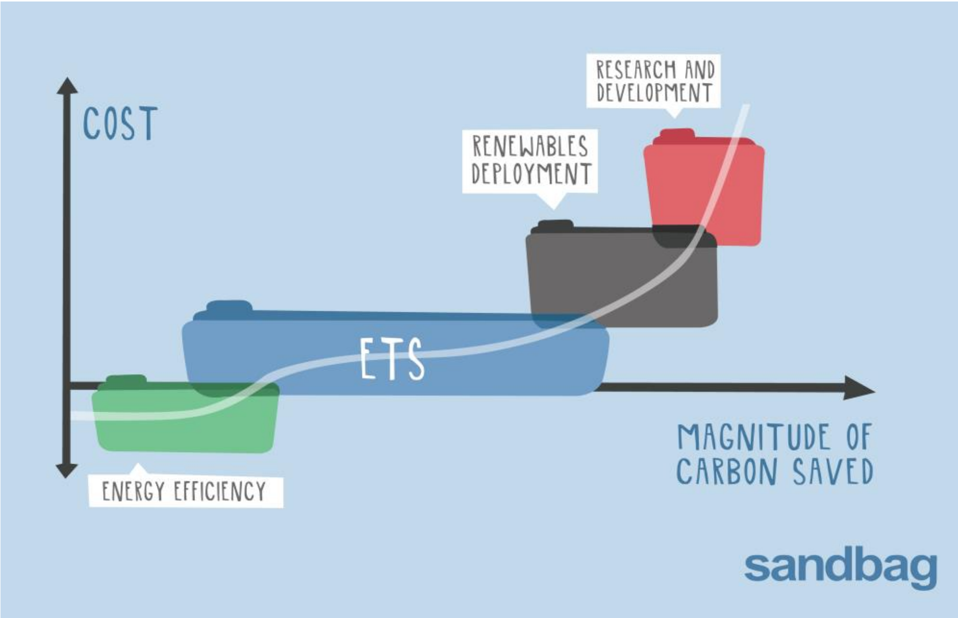
This section gives an overview of the policy portfolio used to deliver the 2020 Package and provides an illustration of how each policy element interacts.

Policies along the MAC curve

A MAC curve is a graph illustrating the marginal costs (i.e. the costs per last tonne of abatement) of different emissions abatement options in order of rising abatement costs. The MAC curve illustrates the level of abatement that would occur for each carbon price point. The MAC curve also shows emissions reduction opportunities across a number of business sectors including power, industry, waste, buildings, transport, agriculture and forestry.

For the purposes of illustrating the 2020 Package, the EU's policy portfolio is categorised four ways: energy efficiency, research and development, low carbon deployment and the ETS. Each policy category is placed on the MAC curve based on its implicit cost band.

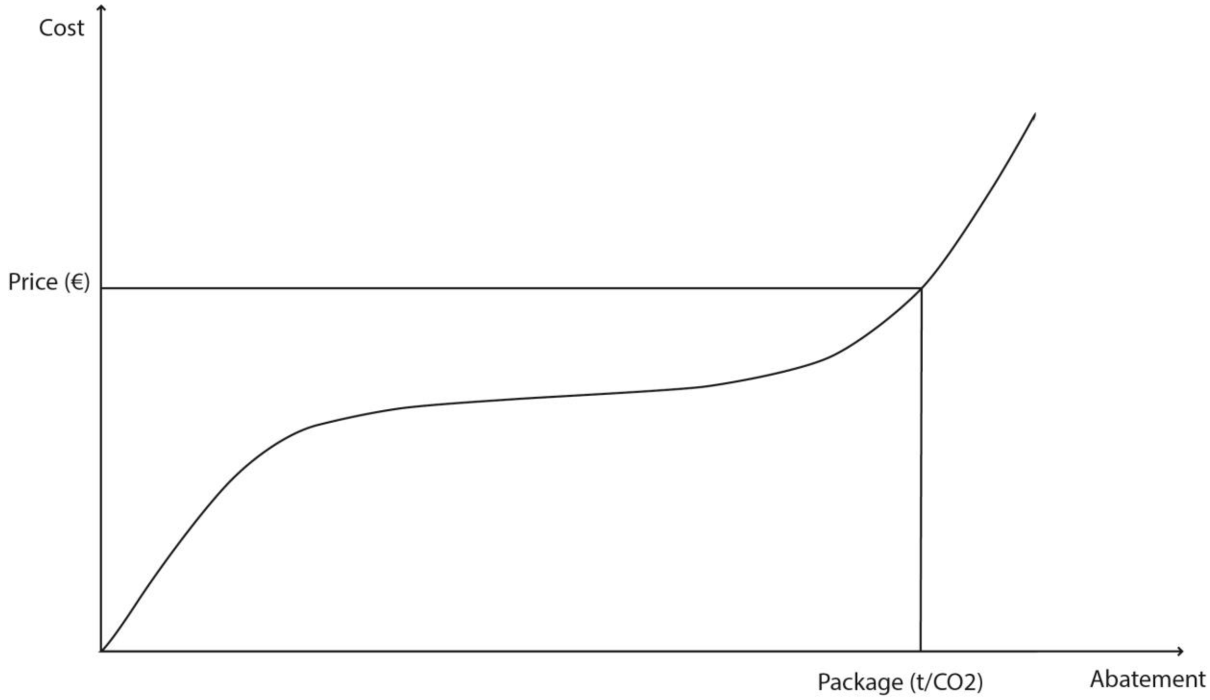
Figure 1. Illustration of the implicit price bands of each policy category on the MAC curve



Source: Sandbag Illustration (produced by www.alexhyndman.co.uk)

The theoretical cost of delivering the emissions abatement element of the 2020 Package with just one policy is illustrated below. The x-axis represents the amount of emission reductions required to meet the GHG abatement targets in the 2020 Package, while the y-axis represents the total cost required to make those reductions.

Figure 2. MAC curve with one policy instrument



Source: Sandbag Illustration

The EU 2020 package however has many objectives and contained many policies. To illustrate how these inter-relate, each policy category is introduced below, explaining its objective and impact.

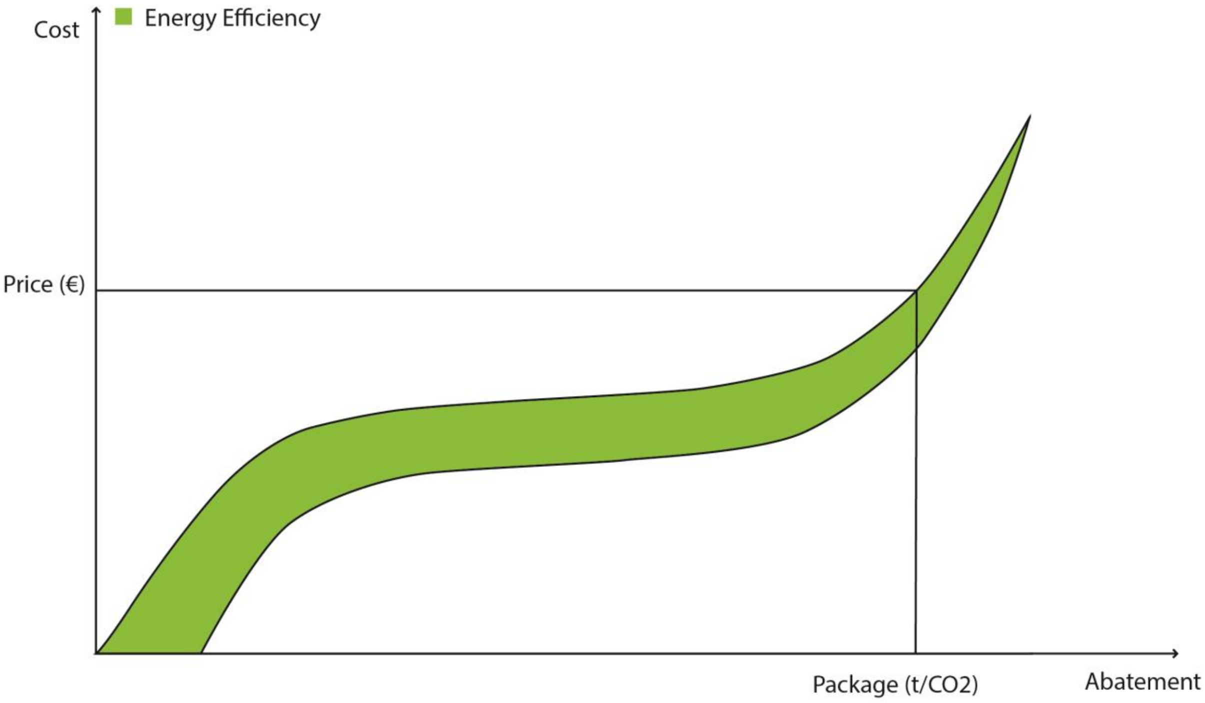
Energy Efficiency

The 2020 Package does not deal with energy efficiency directly. The EU set itself the aspirational objective (i.e. it is not legally binding) of reducing its energy consumption by 20% by 2020 through the auspices of the Action Plan for Energy Efficiency (APEE)[4]. The APEE aimed at improving energy performance and energy transformation, limiting the costs linked to transport, facilitating investments in energy efficiency and changing behaviour. The APEE ran from 2007-12 and has since been legislated through the Energy Services Directive (ESD) and Energy Efficiency Directive (EED). The ESD required Member States to adopt and achieve an indicative energy saving target of 9% by 2016 in the framework of a national energy efficiency action plan.

To reach the EU's 20% energy efficiency target by 2020, the EED also required Member States to set their own indicative national energy efficiency targets[5]. The key requirement of the EED is to ensure each Member State achieves a 1.5% energy saving per year through the implementation of energy efficiency measures. This is achieved by mandating energy distributors and retailers, or by other means such as improving the efficiency of heating systems, installing double glazed windows or insulating roofs. The EED also places requirements on publicly owned buildings, smart metering, energy auditing and monitoring efficiency levels in new energy generation capacities.

[4] See: http://europa.eu/legislation_summaries/energy/energy_efficiency/l27064_en.htm
[5] See: http://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive

Figure 3. MAC curve after energy efficiency policies



Source: Sandbag Illustration

Research and Development

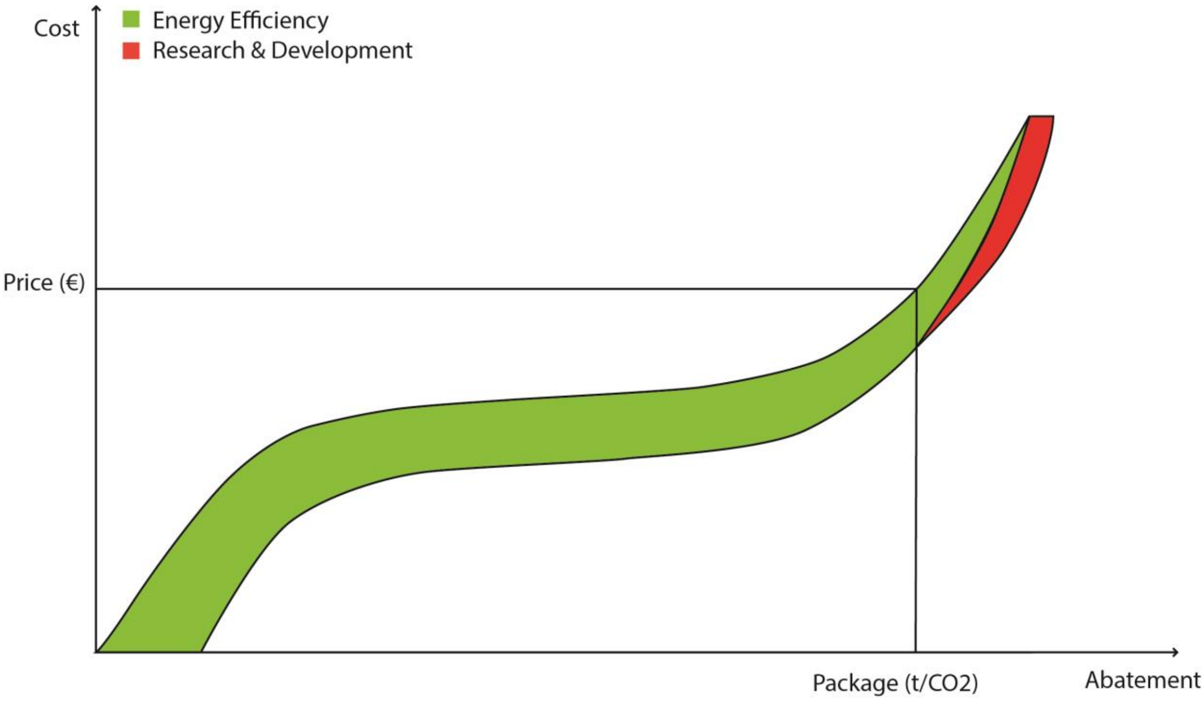
Research and development is one of the EU's key priorities. Scaling up readily available technologies must be coupled with the need to develop and demonstrate nascent technologies that could be rapidly deployed and serve as powerful new sources of future economic growth. The Seventh Framework Programme for Research[6] seeks to stimulate national investment to reach the EU's 2020 goal of 3% of GDP. The main research and development initiative in the 2020 Package is Horizon 2020[7].

The impact of R&D on the cost of abatement is unlikely to have a significant impact on the cost of compliance with carbon targets in the near term since R&D alone rarely enables new technologies to reach significant commercial deployment rates without additional supporting policies.

[6] See: http://ec.europa.eu/research/fp7/index_en.cfm

[7] Horizon 2020 is a research and innovation programme with nearly €80 billion of funding available over 7 years (2014-20). See http://ec.europa.eu/programmes/horizon2020/ for more information.

Figure 4. MAC curve after energy efficiency and research and development policies



Source: Sandbag Illustration

Low Carbon Deployment

Renewables

The legally binding renewable energy targets agreed in 2020 and implemented in the Renewables Energy Directive[8] establishes an overall policy for the EU's production and promotion of energy from renewable sources to meet the climate and energy target of raising the share of energy consumption produced from renewable resources to 20%. This directive requires Member States to submit national renewable energy action plans[9] to meet their legally binding renewables targets. Each action plan is to take into account the relevant Member State's starting point and overall potential for renewables. By way of example, the lowest target is 10% in Malta and the highest target is 49% in Sweden. A report by Ecofys[10] thoroughly reviews each action plan and details the instruments used. These instruments include quota obligations[11], feed-in tariffs[12], feed-in premiums[13] and other instruments[14], as shown in Figure 6 below.

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[8] See: http://ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive
[9] See: http://ec.europa.eu/energy/renewables/transparency_platform/action_plan_en.htm
[10] See: http://www.ecofys.com/files/files/re-shaping%20d17_report_update%202011.pdf
[11] Quota obligations require electricity suppliers to source a specified proportion of the electricity they provide to customers from eligible renewable sources. This proportion (known as the 'obligation') is typically set each year and increases annually.
[12] A Feed-In Tariff (FIT) promotes the use of renewable generation by paying a householder, community or business a tariff for the electricity they generate and a tariff for the electricity they export back to the grid. These purchase agreements are typically offered within contracts ranging from 10 to 25 years and are extended for every kilowatt-hour of electricity produced.
[13] A Feed-In Premium is an alternative to an FIT, whereby payments can be offered as a premium or bonus, above the prevailing wholesale electricity price.
[14] More recently the UK government introduced Contracts for Difference (CfDs). Renewable electricity generators sign CfDs with the government which guarantee prices for each unit of electricity. The CfD sets 'strike

Figure 5. Ecofys figure of main renewable support instruments used by Member States

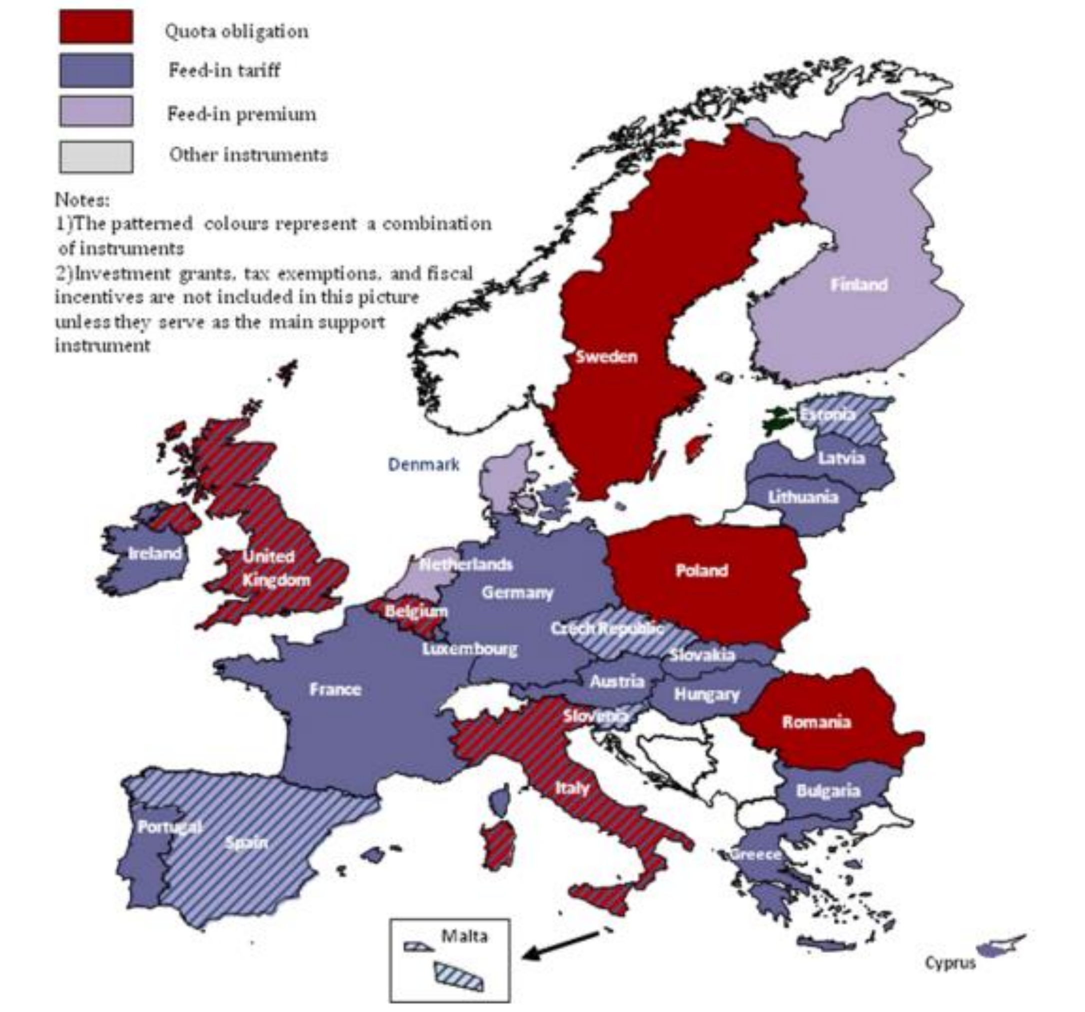

Figure 4-2: Main support instruments applied in EU27 Member States

Source: Ecofys (2011)

NER300

In addition to creating legally binding renewables targets, the 2020 Package also sought to fund more expensive demonstration projects, including CCS, through a funding mechanism derived from the ETS. The so-called 'NER 300' proposal was inserted as an afterthought in the original package. It took 300m t/Co2 of ETS allowances and placed them in a special reserve so that when they were auctioned to participants in the ETS, the revenues were set aside to provide funding for low carbon projects, including CCS demonstration projects. This policy intervention differed in many respects from the policy approach to renewables in that it did not create any legal requirement on Member States to deploy CCS and created a limited pool of money that was further reduced by the crash in the carbon price. So far this policy has failed to stimulate any investment in CCS projects in Europe and must therefore be considered to have failed in one of its objectives.

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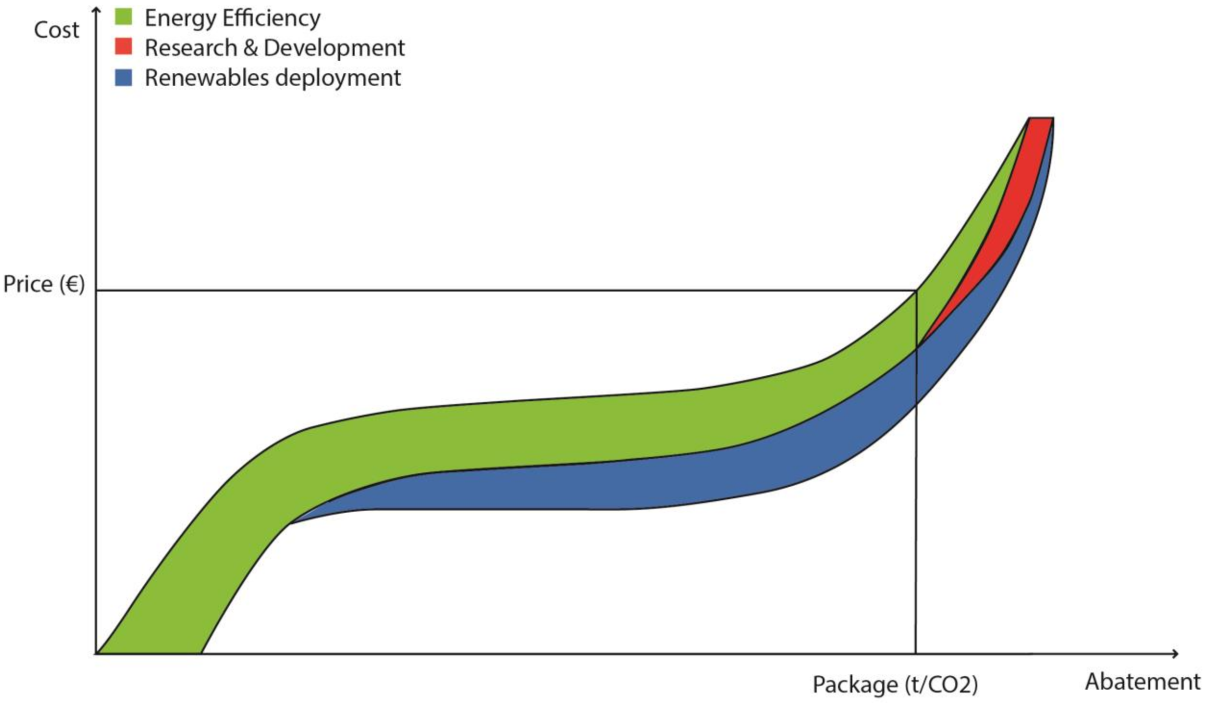
prices' for each unit of electricity. Electricity generators receive and pay the difference between the strike price and the wholesale price.

Figure 6. MAC curve after energy efficiency, research and development and renewables policies

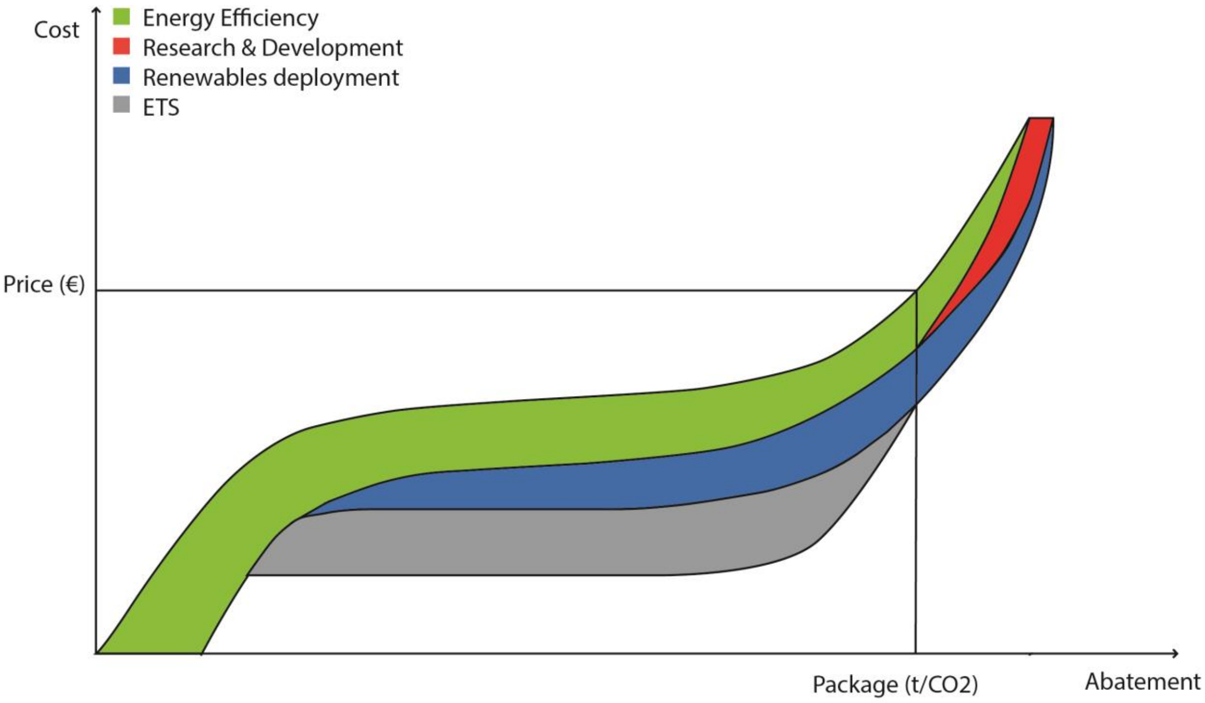


Source: Sandbag Illustration

The ETS

Finally, the impact of the ETS can be incorporated into the MAC curve. The first element to be delivered by the ETS was the use of overseas offsets thanks to a price differential between the EU market for allowances and the cheaper overseas credits. This further reduced the price. To the extent any price signal remained in the ETS it worked to encourage fuel switching between marginal plant. Emissions from the electricity sector fluctuate with fossil fuel prices, availability of existing nuclear capacity and weather conditions for renewables. Electricity supply is prioritized in terms of cost. Since fuels used to produce electricity have different emissions factors, carbon pricing increases the operating costs of some fuels more than others, thus helping to prioritize electricity supply in terms of least emissions. This process most commonly occurs by generating electricity by burning gas instead of coal. Carbon pricing also helps industry improve the efficiency of their processes.

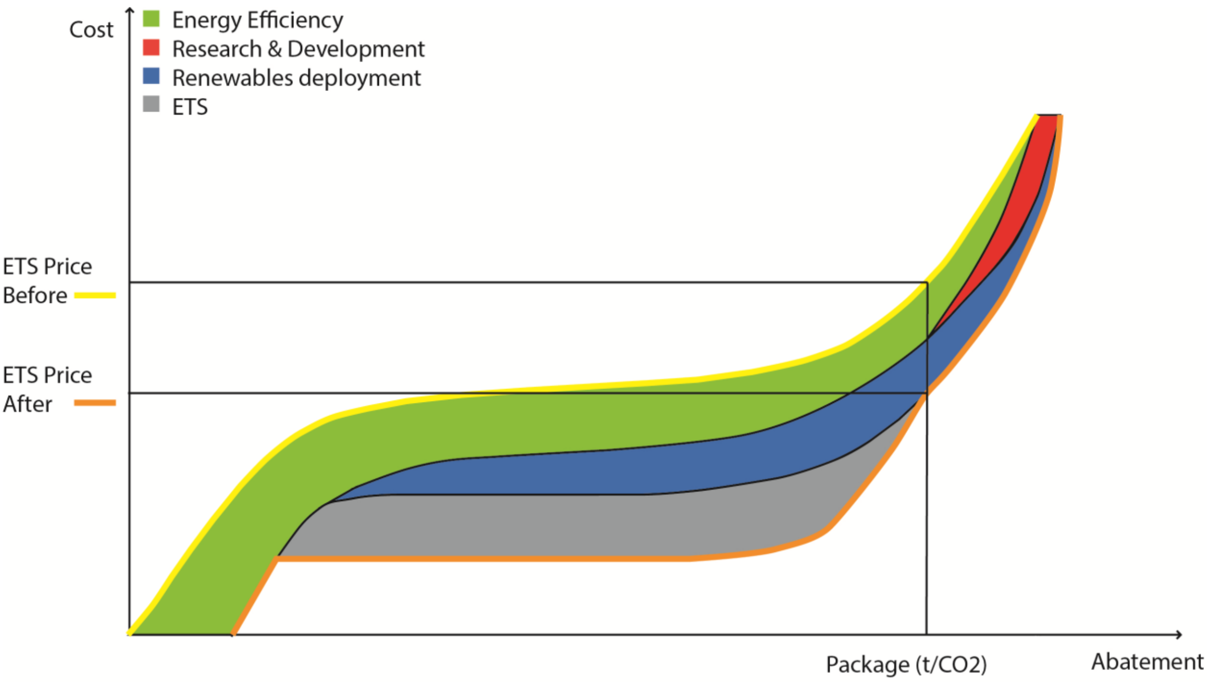
Figure 7. MAC curve with all policies



Source: Sandbag Illustration

As can be seen in Figure 8 below, once all four policies are introduced, the ETS price required to meet the 2020 Package reduces significantly from the price required if the ETS is the only policy instrument used.

Figure 8. The ETS price before and after complementary policies



Source: Sandbag Illustration

PART 2: Portfolio Interaction and ETS Oversupply

This section explores in more detail how policy interactions have influenced ETS and also introduces additional exogenous factors that have compromised the role of the ETS.

Endogenous Interactions

Renewable Energy

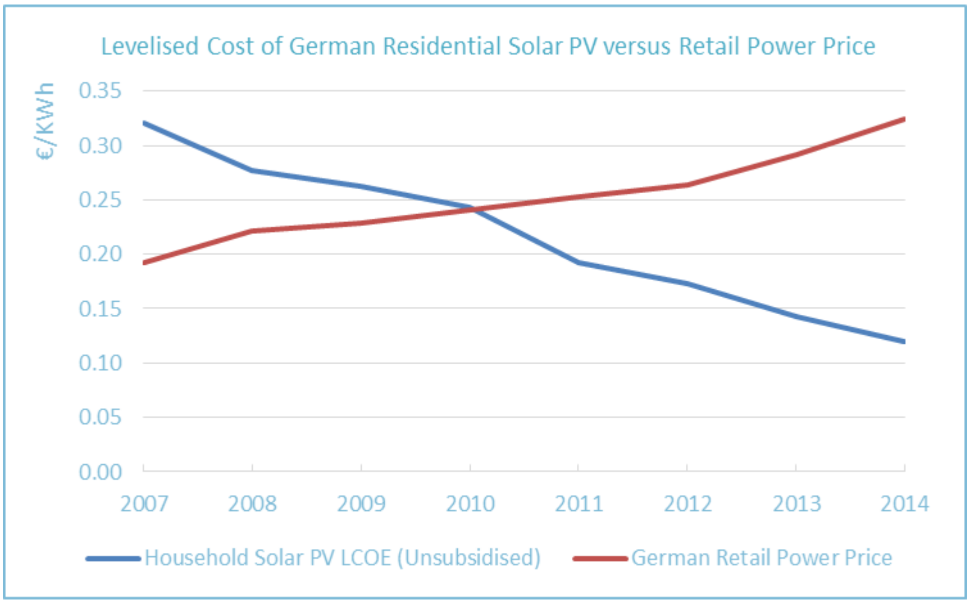
Renewable energy technologies are available for power generation that are, or are likely to become, cost effective (i.e. cheaper than fossil fuel generation facing a rising carbon price). Understanding grid decarbonisation is complex: grid connectivity and flexibility, the proximity to the coal and gas producers and availability of nuclear capacity all influence the carbon intensity of the grid. However, how renewable energy costs are evolving over time can be demonstrated by considering the Levelised Cost of Energy (LCOE) of different technologies contributing to electricity generation. The LCOE is the price at which electricity must be generated from a specific source to break even over the lifetime of a project.

The real cost of some renewable energies continue to fall as the two benefits of improving technology and deployment at an ever greater scale further enhance efficiency. As the cost advantages enjoyed until now by incumbent fossil fuels relative to nascent renewable energies are inverted in line with a range of geological, technological and policy factors, future electricity costs will see a series of cost inflection points.

This dynamic is already influencing EU power costs. For example, strong renewables deployment policies coupled with high retail electricity prices have dramatically increased deployment and reduced the manufacturing costs of solar PV. As depicted in Figure 9, German households have a strong economic incentive to generate their own power rather than purchase it from a power supplier. Although ~50% of the German retail power price is made up of taxes, levies and VAT[15] (and therefore is not a true comparison of the wholesale price and the transmission, distribution and metering costs) Figure 9 still serves to illustrate how the real cost of renewable energy has fallen over time.

[15] See: http://www.theccc.org.uk/wp-content/uploads/2014/12/Energy-Prices-and-Bills-report-v11-WEB.pdf

Figure 9. The economics of residential solar PV has become overwhelmingly positive

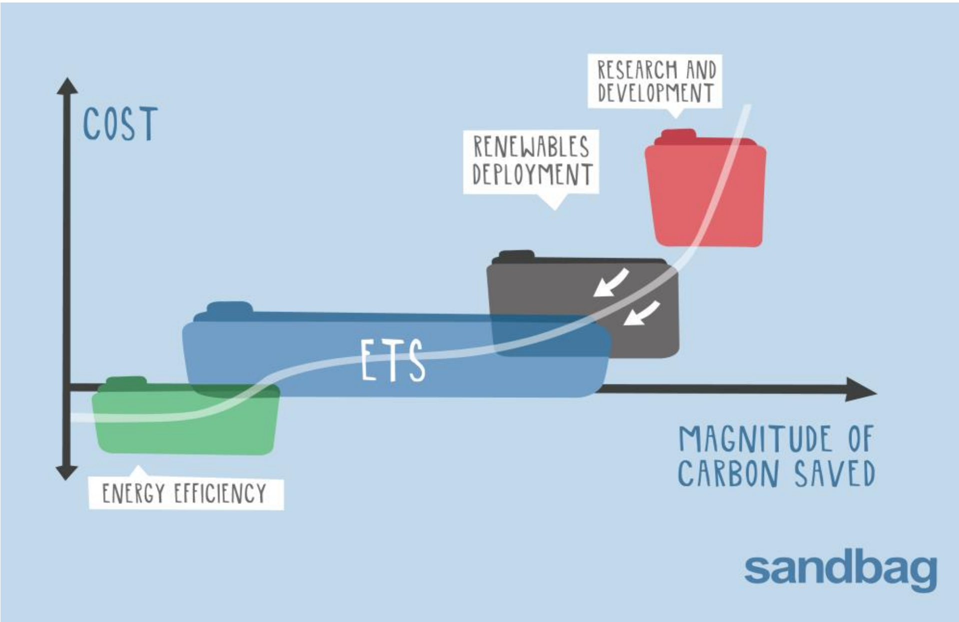


Source: German Solar Industry Association data, DECC data, Sandbag analysis (2015)

Decentralised PV build-out has created a reinforcing cycle: the more electricity generated on-site, the fewer customers there are to share grid maintenance costs, which pushes the retail price of electricity even higher and thus further incentivises the uptake of self-generation.

Falling clean technology costs are an expected outcome of renewables deployment policy. When the cost of renewable energy falls, as has been the case with solar PV, it moves down the abatement curve and abates carbon in the area where the ETS operates.

Figure 10. An example of endogenous policy interaction



Source: Sandbag Illustration (produced by www.alexhyndman.co.uk)

CCS support via the NER 300

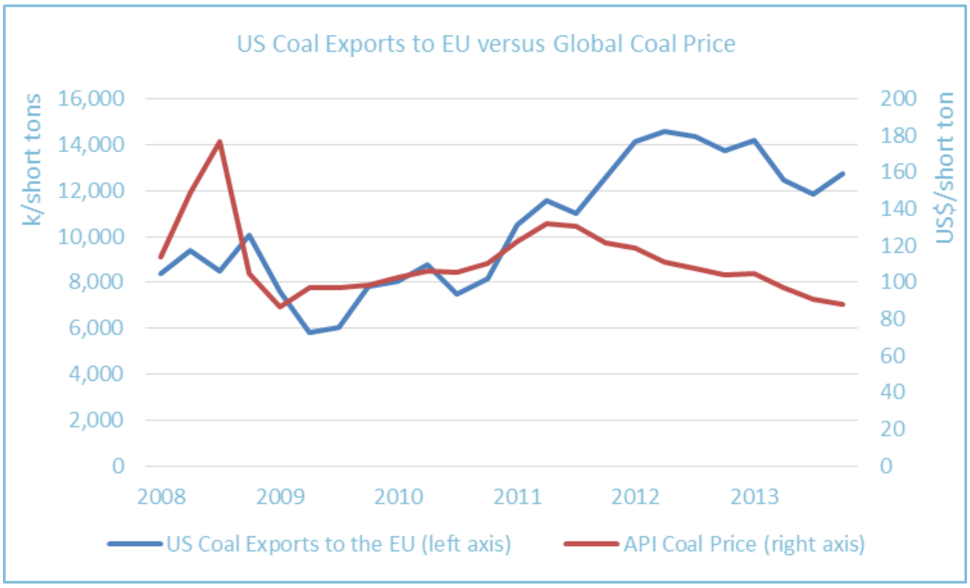
The main source of non-renewable deployment support, the NER 300, did not just interact with the ETS it flowed from the ETS. As a result, a feedback loop was created in the 2020 Package, whereby fears about competitiveness locked in generous supply curves in the ETS due to over-allocation. This, in turn, led to low carbon prices, which reduced the amount of money available to deploy towards CCS. This could be seen as a sensible outcome since the deployment support reduced according to the reduced need, but it sits in stark contrast to the approach taken to renewables, which existed separately from the ETS and continued delivering results, relatively insulated from the macroeconomic situation. Where the majority of renewables investment was for power generation, CCS potentially had applications for industrial emissions so the failure to deliver any projects at scale to date has diminished potential decarbonisation support that would have been of relevance to industry.

Exogenous Factors

Fuel Costs

Exogenous factors are unintended events that occur outside the policy package. These interactions can often occur due to changes in the global energy system. The EU economy is increasingly powered by a globalised energy market, which makes its climate policy vulnerable to complex interactions between technology costs, fuel availability and capital markets. This vulnerability was exposed with the onset of the US shale gas boom. Since the US shale industry started producing significant volumes of gas, the EU has increased its imports of US coal by ~50%.

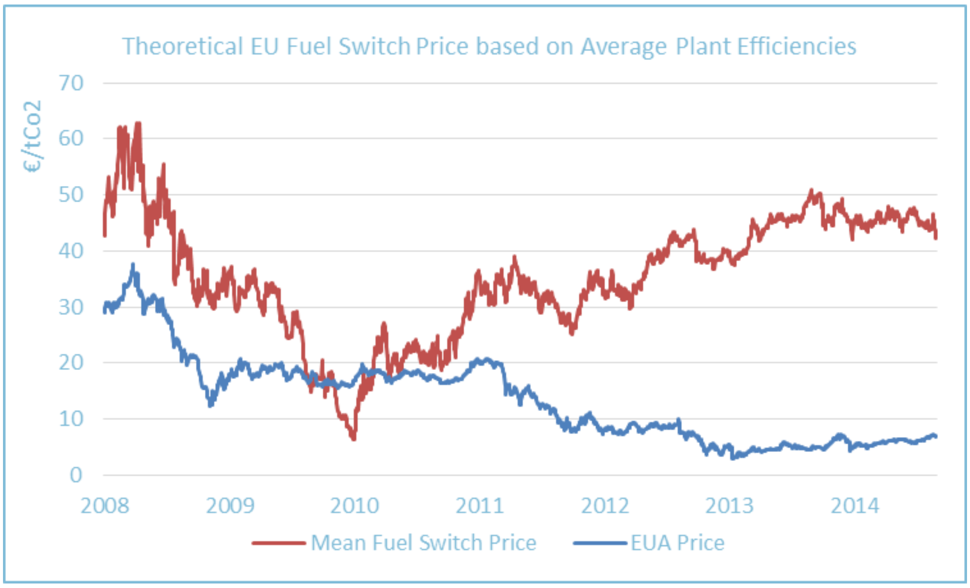
Figure 11. The EU has increased it consumption in US coal exports since 2010



Source: EIA data, Bloomberg LP data, Sandbag analysis (2015)

As US shale gas supply diverted coal towards the EU, the profitability of EU coal-fired electricity generation increased relative to gas. This dynamic happened concurrently with decreases in the EU carbon price. Taking average hard coal and gas plant efficiencies, we can identify the theoretical carbon price required to incentivise short term fuel switching from hard coal to gas in EU electricity generation.

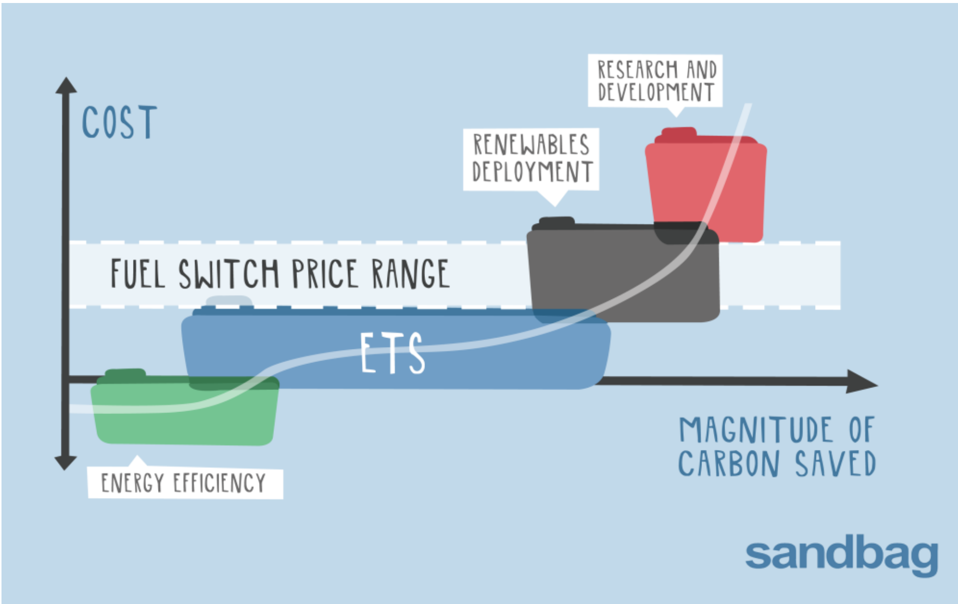
Figure 12. Since 2008 the average fuel switch price in the EU has ranged from €5-€60 t/Co2



Source: EIA data, Bloomberg LP data, Sandbag analysis (2015)

As illustrated in Figure 13, high gas prices and low coal and carbon prices have meant the fuel switch price is currently outside the ETS cost band.

Figure 13. Coal to gas switch price is currently outside the ETS cost band

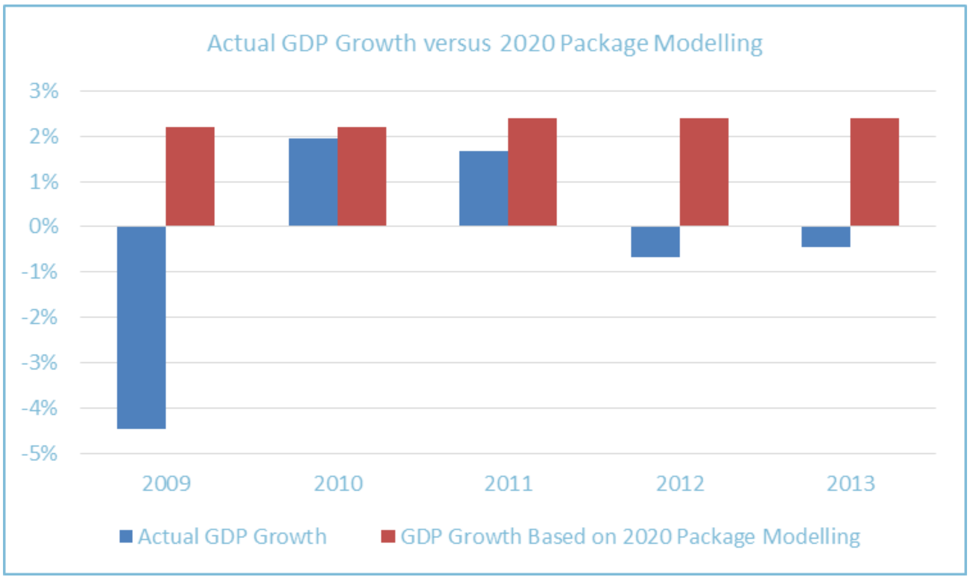


Source: Sandbag Illustration (produced by www.alexhyndman.co.uk)

Economic Instability

During Phase II of the ETS the EU economy was affected by the Global Financial Crisis (GFC) and Eurozone Debt Crisis (EDC). The GFC and EDC caused the EU economy to underperform relative to GDP forecasts. These forecasts informed the emissions cap prescribed under the auspices of the 2020 Package and the overall design of the ETS. As shown in Figure 14, the 2020 Package assumed GDP growth of 2-3% per annum from 2009 to 2013.

Figure 14. Actual GDP Growth versus 2020 Package Modelling



Source: Eurostat data, EU Commission data

Member State Policies

Interactions also arise from Member State policy decisions, which may or may not be related to their climate goals. The EU Commission permits Member States to go beyond the targets set by the 2020 Package and does not monitor or coordinate these actions in terms of how they will influence the ETS. For example, Germany aims to reduce its emissions to 40% below the 1990 base by 2020. To help meet this target, KfW, a government-owned development bank, loaned a staggering €10b for energy efficiency construction and refurbishment in 2012[16]. To put this figure into perspective, total investment from the UK Green Investment Bank, a funding institution created in 2012 by the UK government, has amounted to £1.9b to date[17]. Furthermore, Member State energy policymaking is often driven by concerns over fuel security, balance of trade, tax revenues, affordability, industrial strategy and numerous other social and political concerns that can often be magnified by the media. The UK introduced a carbon price floor (CPS) to encourage investment in lower carbon infrastructure, such as gas and nuclear, and raise government revenues. Any impact on fuel switching in the UK further reduces demand for allowances in the ETS.

Multi-dimensional Impacts

There are some factors, which can be considered both endogenous and exogenous. Increasing energy efficiency is the most obvious example. Energy efficiency promoted by policy and exogenous factors has strongly influenced the role of the ETS. The EED impact assessment[18] stated that if the legislation is binding, the additional emissions reductions from the BaU scenario will be 69m t/CO_2 in 2015 and increase to 123m t/CO_2 in 2020.

Additionally, high energy prices and the EU's political shift towards 'austerity' are also driving households and businesses to take energy conservation more seriously and make non-subsidised energy efficiency investments. From 2010 to 2013 power prices (excluding taxes and levies) increased

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[16] KfW (2013). Presentation: Promotional Programmes for Energy Efficiency in the Housing Sector.
[17] See: http://www.greeninvestmentbank.com/media/44665/gib_ar_transactions_020215.pdf
[18] See: http://ec.europa.eu/energy/sites/ener/files/documents/sec_2011_0779_impact_assessment.pdf

by 12% and 3% for households and industry, respectively. Over the same period, Net Lending/Net Borrowing[19] nearly halved, as Member States reduced budget deficits by decreasing spending and increasing taxation.

Overall, energy efficiency policies, power prices and austerity, coupled with technological improvements across several key sectors of the economy have contributed to the 5% decrease in gross energy consumption from 2010 to 2013.

Figure 15. EU power prices and government spending versus EU energy consumption

Parameter	2010	2011	2012	2013	10-13 CAGR
Household Power Prices, excl. taxes (€/KWh)	0.123	0.130	0.136	0.138	12%
Net Lending/Net Borrowing (m/€)	-817,807	-591,471	-569,140	-436,721	-47%
Gross Energy Consumption (k/TOE)	1,760,454	1,697,969	1,685,778	1,666,196	-5%

Source: Eurostat data

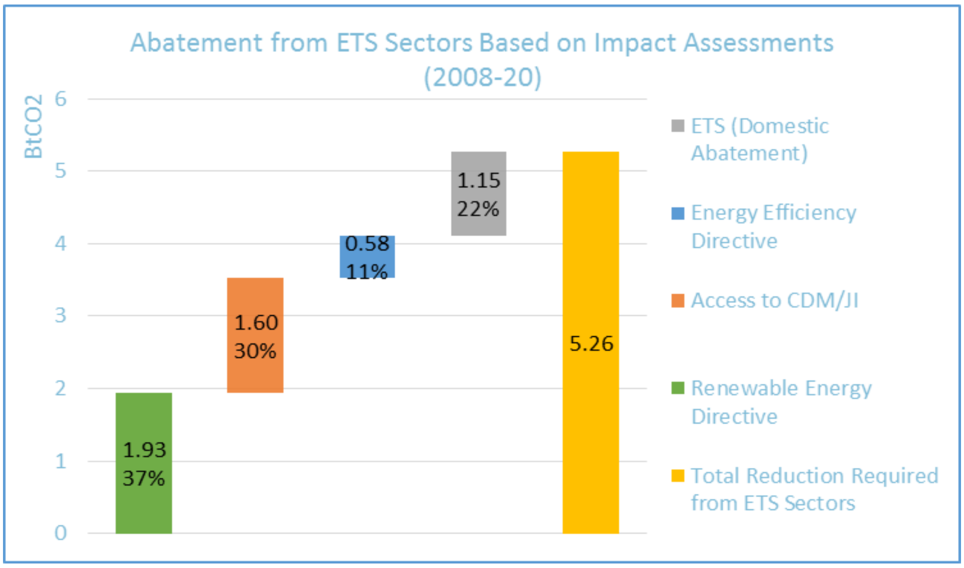
[19] Net Lending/Net Borrowing of the government sector is derived by calculating the difference between the sum of all general government revenues and the sum of general government expenditures. A negative figure shows that expenditure exceeded revenues, while a positive figure indicates that revenues exceeded expenditure in the reference period.

Oversupply in the ETS

Policy interactions within the portfolio and exogenous factors beyond policy control have contributed to the oversupply of allowances in the ETS. Here we use an illustrative model to explore the make-up of the oversupply in more detail.

Using the EU Commission's BaU scenarios, the impact of the 2020 Package policies on total emission reductions required from ETS sectors can be forecasted from 2008 to 2020. The 2020 energy and climate package modelling[20] forecasts that ETS sectors will emit ~2.5b t/CO_2 by 2020 on a BaU basis, creating ~5.3b t/CO_2 of emissions reductions between 2008 and 2020. After the renewables target, EED target and access to the Clean Development Mechanism (CDM) and Joint Implementation (JI) are subtracted, the 5.3b t/CO_2 is reduced to ~1.2b t/CO_2. The ~1.2b t/CO_2 figure is established by separating the EU Commission's BAU scenario from the impact of the 2020 Package. The renewable energy roadmap impact assessment[21] forecast 430m t/CO_2 and ~600m t/CO_2 for the BaU scenario and the 2020 Package, respectively. As mentioned above, the EED impact assessment stated that if the target is binding, the additional emissions reductions from the BaU scenario will be 69m t/CO_2 in 2015 and will increase to 123m t/CO_2 in 2020. Finally, based on regulation determining installations' international credit entitlements[22], 1.6b t/CO_2 is discounted to leave ~1.2b t/CO_2 of domestic ETS abatement for ETS sectors over Phases II and III (2008-20). As depicted in Figure 16, the composition of the renewable energy target, the CDM/JI, the energy efficiency target and the ETS (domestic abatement) is 37%, 30%, 11% and 22%, respectively.

Figure 16. Impact of policies on total emission reductions in ETS sectors based on the Commission's baseline scenarios



Source: EU Commission data, *Sandbag analysis (2015)*

[20] See: http://www.e3mlab.ntua.gr/reports/analysis.pdf
[21] See: http://www.ipex.eu/IPEXL-WEB/dossier/document/SEC20061719FIN.do
[22] See: http://ec.europa.eu/clima/policies/ets/linking/docs/c_2013_7261_en.pdf

CDC Climat[23] evaluated the drivers behind emission reductions in ETS sectors from 2005 to 2011**.** Using a BaU scenario and actual data, CDC Climat found emission reductions of around 1.1b t/CO_2 are likely to have been achieved within ETS sectors from 2005 to 2011. The study attributed relative shares of the different drivers and found that 600-700m t/CO_2 resulted from two policies in the 2020 Package: the renewable energy target (~500m t/CO_2) and the energy efficiency target (100-200m t/CO_2). The economic downturn also played a significant role in driving emission reductions and was estimated at 300m t/CO_2. CDC Climat also found that fuel substitution from changes in coal and gas prices affected emissions by ~200m t/CO_2. Although the aforementioned study did not enable any impact created by the carbon price to be identified, an updated study by CDC Climat[24] found that total ETS emission reductions from 2005 to 2011 was 1.1-1.2b t/CO_2, with 450-650 (50%) from renewables, 300-350 (30%) from the economic crisis, 135-235 (10-20%) from energy efficiency, 0-100 (0-10%) from the carbon price and 260 (10-20%) from changes in coal and gas prices.

Oversupply Composition Estimates

The ETS has been oversupplied since 2009. As of 2013, oversupply is 2.1b t/CO_2, the equivalent of over one years' worth of ETS emissions. To understand the factors responsible for oversupply, we developed an illustrative counterfactual scenario from 2009 to 2013. Developing a BaU scenario, which offers an alternative path to the one actually observed is based on assumptions and therefore is open to criticism. Appendix 3 provides the assumptions used in the BaU scenario and gives an explanation of the BaU assumptions and calculations used.

The factors we consider are: renewable energy, economic stability, 'frontloading' offsets, power efficiency and industry decline. 'Frontloading' offsets requires an explanation. The offset scenario aimed to understand the extent offsets were frontloaded (i.e. purposefully submitted over a shorter period of time than would otherwise be anticipated). The EU awarded itself generous access to the UN's CDM and JI, fearing high carbon prices would raise energy bills and inhibit competitiveness. In 2012, the EU Commission threatened to ban offsets from certain JI projects, causing regulatory anxiety amongst market participants. This situation, coupled with existing bans on offsets from industrial gas projects and the difference between ETS and offset prices, caused installations to frontload their offset submissions rather than spreading their quota equally over Phases II and III. High offset use from 2009 to 2013 could be interpreted as economically efficient behaviour, as the spread between ETS allowances and UN credits widened in Phase II. However, all other things being equal, presuming the ETS supply and demand balance will gradually tighten, the holding on to UN offsets for future phases should be considered the most cost efficient strategy as the price difference should be expected to increase over time.

Figure 17 shows the breakdown of oversupply from 2009 to 2013 based on the aforementioned BaU scenario. Renewable energy, economic instability and 'frontloading' offsets had the biggest impact on oversupply, contributing 538m (25%), 522m (24%) and 454m (21%) t/CO_2, respectively. It is important to note that this analysis does not enable any impact created by changes to fuel prices or the EUA price to be identified. However, the remaining amount of oversupply (319m t/CO_2 or 15%) that is not categorised could be partially due to price impacts.

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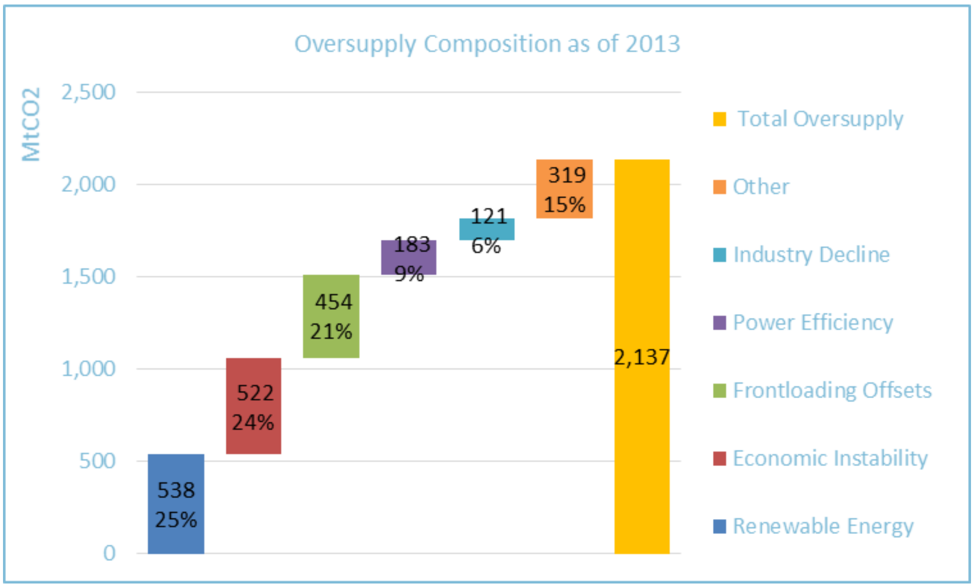
[23] See: http://www.cdcclimat.com/IMG/pdf/13-10_cdc_climat_r_wp_13-15_assessing_the_factors_behing_co2_emissions_changes.pdf
[24] See: http://www.ieta.org/assets/Reports/ieta%202014%20ghg%20report.pdf

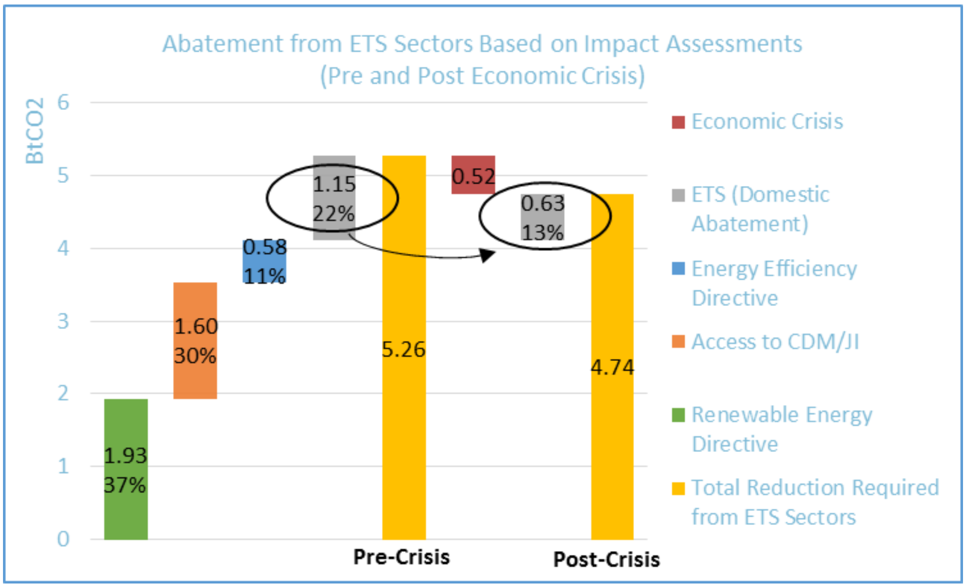
Figure 17. Oversupply composition based on 2009-13 "business as usual" scenario



Source: EU Commission data, Sandbag analysis (2015)

After including the impact of the economic crisis on EU emissions output, the abatement required from the ETS falls from 1.15b t/CO_2 to 0.63b t/CO_2.

Figure 18. Abatement from ETS Sectors Based on Impact Assessments (Pre and Post Crisis)



Source: EU Commission data, Sandbag analysis (2015)

If the GFC and EDC had not occurred and the EU had not allowed itself access to the CDM/JI, the residual abatement required within ETS sectors to meet the 2020 Package would have been ~2.6b t/CO2 (or 50% of total abatement from 2008-20). The ETS is an instrument based on reducing emissions volume, whereas the policies underpinning the renewables directive and EED are based on renewables deployment and energy consumption targets, respectively. While renewables deployment and energy efficiency policies are largely agnostic to external factors that reduce emissions output, the ETS automatically adjusts.

The analysis in Figures 17, 18 and 19 illustrates how the ETS has operated as a residual instrument rather than a 'centrepiece'. This is because the ETS has a fixed level of effort prescribed to it, which has been displaced by external factors (i.e. economic crisis) and other policies (i.e. renewables deployment and energy efficiency). In terms of scale and scope, the ETS remains a core EU climate policy as it regulates over twelve thousand installations in thirty one countries, but its prominence is entirely dependent on the ambition ascribed to it relative to the performance of other policies and external factors.

PART 3: Looking to the Future

Why a Portfolio Approach is Needed

Climate change is the result of multiple market failures[25]. Economists have consistently argued that when there are multiple market and policy failures, several policies are needed to tackle them efficiently and cost effectively, with each policy targeting a particular failure[26]. Existing literature suggests that an optimal portfolio of policies can achieve emissions reductions at a significantly lower cost than any single policy, but also contends that most reductions are brought about by the pricing element of the policy package[27]. In the context of the EU, the reasons why a portfolio approach can be justified are briefly discussed below.

Overcome Non-Price Barriers

An IEA report[28] has found that there are several non-price barriers preventing the uptake of energy efficiency measures including: imperfect information, principal-agent problems, externalities and behavioural failures. These barriers to energy efficiency can be considered market failures as they imply more energy is being consumed for the associated level of service than a rational allocation of resources would justify. The IEA report concluded:

> *"It appears that not all market failures acting as barriers to optimal energy efficiency in the appliances sector can be addressed by carbon and energy pricing. In particular, market failures such as principal-agent problems relating to asymmetric information and split incentives, behavioural failures (such as bounded rationality), and transaction costs can be better addressed by appliance MEPS, labelling, and other informational tools."*

This helps explain why the EU opted to include energy efficiency instruments in its policy portfolio. In 2007, the McKinsey Global Institute[29] reported that efficient lighting systems and air conditioning had a negative cost if implemented. The EU's GAINS model confirmed McKinsey's findings by placing these measures in the negative range of the MAC curve, with appliance improvements in the range of -€180 t/CO_2 to -€200 t/CO_2[30].

Renewables Target and Financial Support

There have been several studies[31] highlighting how technology deployment influences manufacturing costs. Deployment stimulates economies of scale and innovation in manufacturing, which helps achieve cost of production reductions. Yu et al[32] studied the factors behind the learning curve of solar PV and found that, from 1998 to 2006, ~50% of price reductions came from learning-by-doing and scale effects. Yu et al also found that R&D played a significant role at the early stages of solar PV – and highlighted the challenge of identifying when to shift financial support from R&D to deployment.

[25] See, e.g., http://www.cambridge.org/us/academic/subjects/earth-and-environmental-science/climatology-and-climate-change/economics-climate-change-stern-review
[26] See, e.g., http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2014/02/PB_case-carbon-pricing_Bowen.pdf
[27] See, e.g., https://fds.duke.edu/db/attachment/477
[28] See: http://www.iea.org/publications/freepublications/publication/EE_Carbon_Pricing.pdf
[29] See: http://www.mckinsey.com/insights/energy_resources_materials/curbing_global_energy_demand_growth
[30] See: http://ec.europa.eu/energy/sites/ener/files/documents/sec_2011_0779_impact_assessment.pdf
[31] See e.g., http://goo.gl/FNNrgL
[32] See: http://www.sciencedirect.com/science/article/pii/S1364032110002881

Despite this challenge, by prioritising renewables deployment today, the EU is increasing the chances of greater cost reductions tomorrow.

Figure 19. Factors behind cost reductions in solar PV

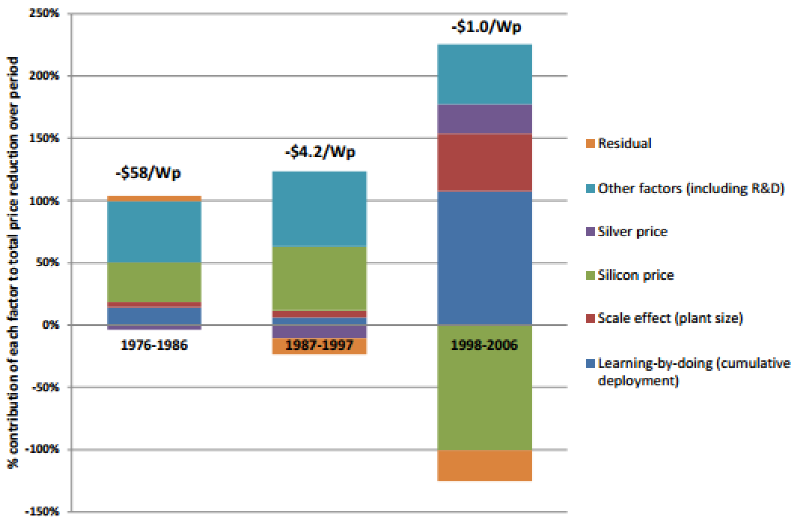


Figure 5: Factors responsible for c-Si solar PV module price reductions [35]

Source: Yu et al (2011)

The deployment of renewable energy, with its mostly upfront capital costs and low operating costs, is changing the way that wholesale electricity markets operate. To give new entrants the confidence and certainty they need to invest in renewable electricity generation, financial incentives have been developed to help stabilise the revenues from wholesale prices. This in turn reduces the risks new entrants face, and ensures that the eligible technology receives a price for its power that supports investment. Another justification for continued deployment support for capital intensive low carbon technology is an increase in energy independence and a reduce balance of trade deficit to the extent that technologies are able to make use of indigenous resources.

Non-Price Regulation of Coal to Avoid Windfall Profits

A portfolio approach is perhaps the most effective way to address the EU's long-term coal problem while also avoiding windfall profits for low carbon incumbents.

Before justifying this statement, it is important to reinforce the importance of carbon pricing. A carbon price – even a low one – is crucial to discourage coal burn and prevent high carbon lock-in. For example, a carbon price of €5 t/CO_2 reduces the profitability of a 300 MW UK coal, German lignite or Polish lignite plant by €8m per year, increasing to €33m per year with a carbon price of €20 t/Co2. (NB: Figure 20 only considers plant OPEX; the carbon price required to compromise overall plant economics depends on the age, technology and financing of each individual asset.)

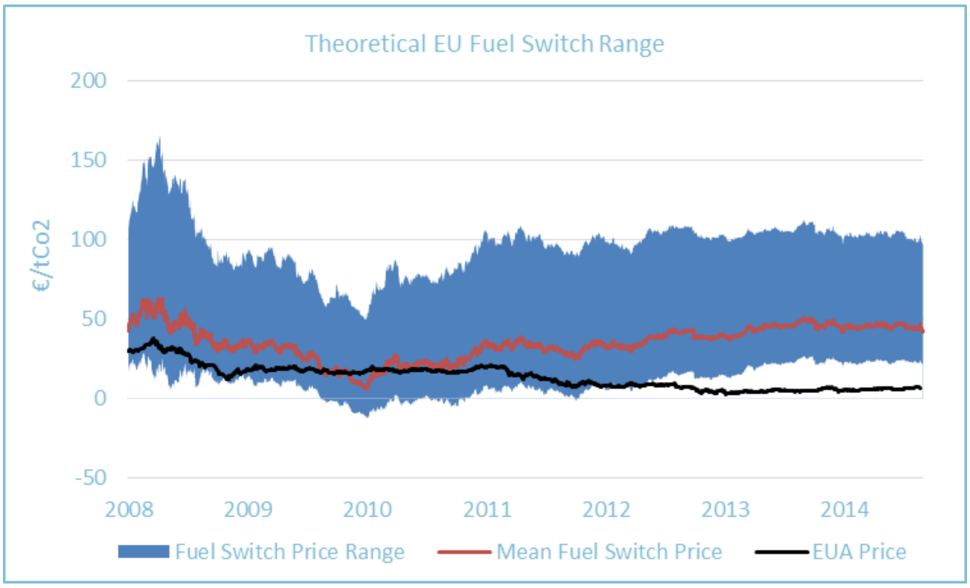
Figure 20. Carbon price impact on UK coal, German lignite or Polish lignite plant OPEX

Carbon Price	Impact on Plant Profitability
€/tCo2	m/€ per year
5	8.3
10	16.6
15	24.8
20	33.1
Plant Assumptions	
Capacity	300 MW
Efficiency	35%
Load Factor	70%
Impact Assumptions (€/MWh per €1 t/Co2)	
Co2	0.9
Power	0.4
Profit	0.5

Source: Sandbag analysis (2015)

In addition, in relation to the short-term switching price shown in Figure 12, each electricity market in the EU has an implicit fuel switching range based on the differing efficiencies of their coal and gas plants. By comparing the most inefficient hard coal plants with the most efficient gas plants, we can identify a low fuel switching range, and vice versa, for the EU electricity market as a whole. (NB: Figure 21 does not include opencast lignite coal mines, which have much lower marginal costs than hard coal.)

Figure 21. The EU fuel switch range currently varies from €15-€100 t/Co2

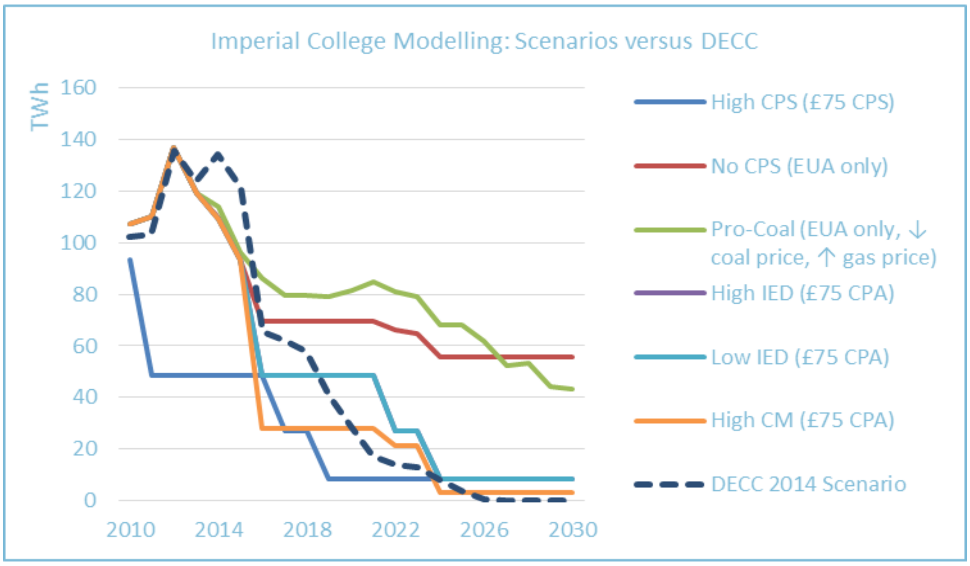


Source: Bloomberg LP data, Sandbag analysis (2015)

As depicted in Figure 21, temporary fuel switching will occur if the carbon price is above €15 t/CO_2. This is why the UK experienced fuel switching throughout 2014. As mentioned above, in 2013, the UK Government introduced a CPS. The CPS is not a floor price per se, but rather an additional levy on emissions from electricity generation. This is because the price level is set based on the anticipated ETS price to achieve a predetermined target price trajectory. The CPS, coupled with the ETS price, made the UK's implicit carbon price periodically increase above €15 in 2014, creating favourable economics for fuel switching. Fuel switching in the UK will become more pronounced in 2015, as the CPS increases to £18.08 t/CO_2, boosting the UK implicit carbon price to ~€30 t/CO_2 (presuming the ETS price remains at current levels).

Despite the importance of carbon pricing, evidence suggests a very high price is needed to curtail all existing coal across the EU. As shown in Figure 21, if the policy objective is to put gas-fired generation "in-the-money" relative to hard coal, the carbon price may need to rise as high as €100 t/CO_2 to make all existing hard coal-fired generation in the EU unviable. This claim is echoed in the findings of an ICL study[33] of existing UK coal plants. ICL employed a cost optimising model to explore how policy and market conditions might affect investment in existing coal beyond 2020. The model incorporates a range of factors: OPEX of existing plants; fuel costs; carbon prices; Industrial Emissions Directive costs; Capacity Market payments; technology costs; and the CPS. Despite DECC's expectation that coal will leave the system permanently by 2026, in all the ICL scenarios, coal remains in the system until 2030. It is important to note that the ICL modelling is based on DECC carbon price projections. Assuming a GBP/EUR rate of 1.27, DECC projects the UK's implicit carbon price to be €24 t/CO_2 in 2015, increasing to €97 t/CO_2 in 2030.

Figure 22. Under all scenarios UK coal remains in the system in 2030

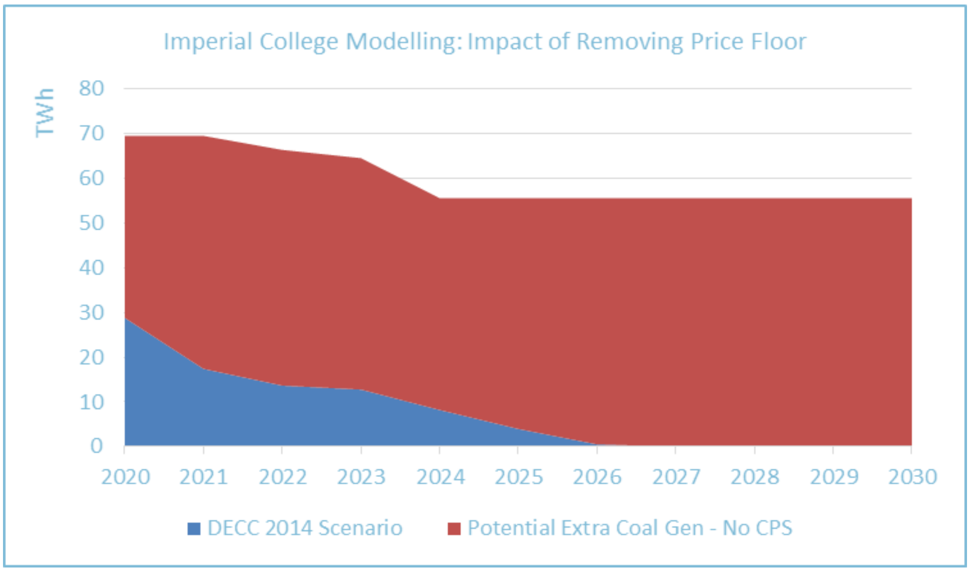


Source: DECC data, Imperial College data, Sandbag analysis

It is important not to conflate the UK's circumstances with the rest of Europe. However, given a carbon price gradually approaching €100 t/CO_2 might not close all of the UK's relatively old plants, a low EUA price will do little to permanently stop other, younger and more efficient, plants across the EU. To put this predicament in perspective, if the UK scraps their CPS after 2020 and relies on the EUA price, an extra 574 TWh of coal could be burned between 2020 and 2030. This equates to approximately 550 Mt/CO_2 or five years' worth of UK electricity sector emissions at today's levels.

[33] See: http://assets.wwf.org.uk/downloads/wwf_coal_report_imperial_college_final.pdf

Figure 23. If the UK scraps its price floor another 550 Mt/CO_2 could be burnt from 2020-30

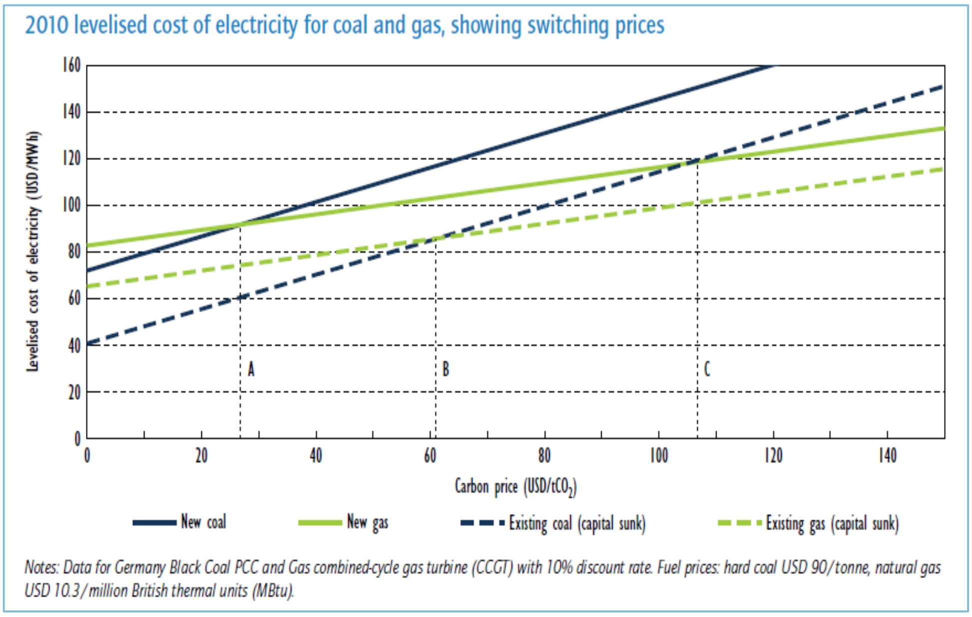


Source: DECC data, Imperial College London data, Sandbag analysis

Additionally, an IEA study[34] based on Germany hard coal and CCGT plants in 2010 found that a carbon price of USD ~$30-60 t/$CO_2$ would make a new gas plant more cost-effective than a new hard coal plant over the lifetime of the plants. Whereas a carbon price of USD ~$110 t/$CO_2$ is needed to allow a new gas plant to compete with an existing hard coal plant. This perhaps explains why only one new CCGT plant qualified[35] under the UK's capacity market auction, which allowed a number of the UK's existing hard coal plants to bid.

[34] See: http://www.iea.org/bookshop/490-Energy,_Climate_Change_and_Environment
[35] See: http://www.sandbag.org.uk/site_media/pdfs/reports/Capacity_Mech_19-Dec-14.pdf

Figure 24. 2010 levelised cost of electricity for coal and gas, showing switching prices



Source: IEA analysis

The above analysis suggests the EU might not have enough control of coal consumption within its power sector, despite the need to avoid high carbon lock-in. The Intergovernmental Panel on Climate Change[36] recently concluded that most of the world's electricity must be produced from low-carbon sources by 2050. The New Climate Economy – an independent initiative commissioned by several governments, including the UK, to report to the international community – also specified that high-income countries should commit now to end the building of new unabated coal-fired power generation and accelerate early retirement of existing unabated capacity[37].

Driving the carbon price to the aforementioned levels (i.e. €100 by 2030) is unlikely to be politically feasible or desirable. Evidence suggests that the impact of carbon pricing on real incomes via consumer prices is regressive – that is, lower income groups take a proportionately larger hit[38]. The degree to which this is regressive is particularly acute for emissions associated with domestic energy usage, food and housing[39].

A high carbon price also exacerbates the potential for windfall profits. The idea of windfall profits first emerged in Phase I of the ETS. Critics[40] pointed to rising power prices during the first phase of the ETS and alleged that energy suppliers improperly included the market value of free allowances, instead of zero cost, thereby generating windfall profits for some energy suppliers. Besides the potential for suppliers to manipulate the cost of power prices, a high carbon price provides windfall profits for low carbon incumbents that are already operating on an unsubsidised basis, such as large hydro.

For the above reasons, introducing another measure into the EU's portfolio to deal with coal appears to be more desirable, both economically and politically, than pushing the ETS price to excruciatingly

[36] See: http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml
[37] See: http://newclimateeconomy.report/
[38] See e.g., http://www.nber.org/papers/w13554
[39] See e.g., http://sticerd.lse.ac.uk/dps/case/cp/CASEpaper152.pdf
[40] See e.g., http://www.thecornerhouse.org.uk/sites/thecornerhouse.org.uk/files/carbonDDlow.pdf

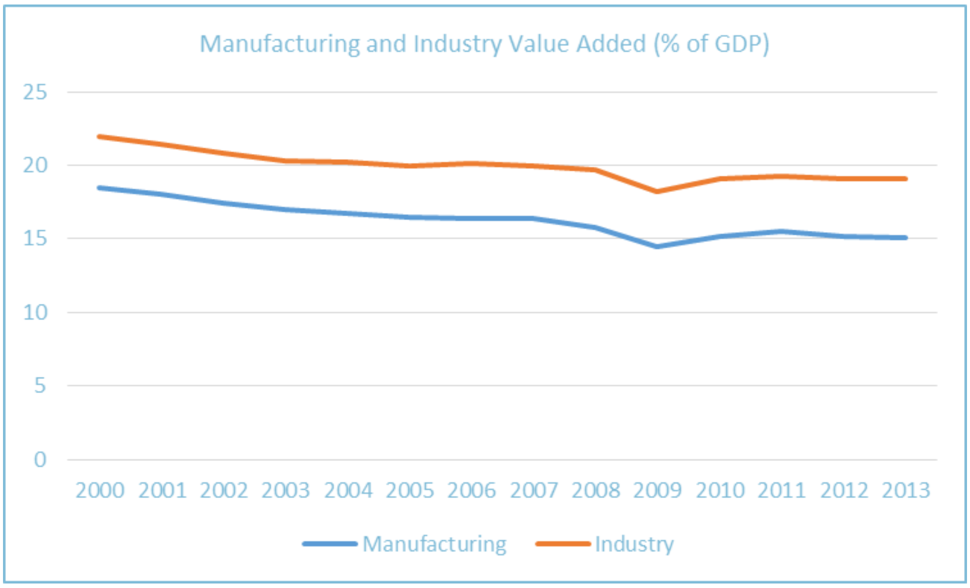
high levels. An article in Nature Journal[41] shared this notion and concluded that ambitious climate targets can be kept within reach until 2030 despite a sub-optimal policy mix (i.e. a carbon price of US $7 t/$CO_2$ flanked by support for low carbon energy technologies and a moratorium on new coal-fired power plants). Their modelling also showed that such a mix limits the efficiency losses compared with an optimal policy and at the same time lowers distributional impacts.

EU Industry Policy and the ETS

Following the long-term promotion of the transition to a service economy in many Member States, the EU 2020 package attempted to usher in a form of renaissance. For example, as part of its Europe 2020 strategy, the EU Commission published a communication[42] in 2012 stating: *"… the Commission seeks to reverse the declining role of industry in Europe from its current level of around 16% of GDP [at constant prices] to as much as 20% by 2020."*

According to the latest Eurostat data, gross value added (at basic prices) of manufacturing and industry is currently 15% and 19% of total GDP, respectively. This represents a decline of 18% and 13% from 2000 levels.

Figure 25. Manufacturing and Industry value added as % of GDP

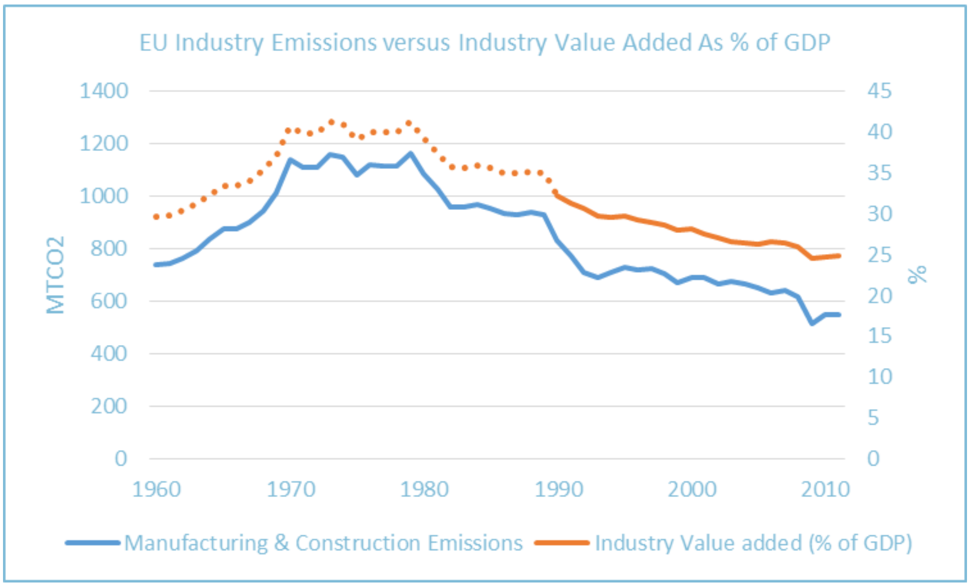


Source: DECC data, Imperial College London data, Sandbag analysis

Exploring World Bank data reveals the long-term trend in EU manufacturing and industry. For example, emissions from EU manufacturing and construction peaked in the 1970s and remains 26% below output in 1960. Similarly, industry value added as a percentage of GDP has declined 22% from 1991 to 2013 and currently represents 24% of GDP (NB: the World Bank definition of industry defers from the Eurostat definition and comprises value added in mining, manufacturing, construction, electricity, water, and gas). World Bank industry value added data ranged from 1991-2013. To give an indication of industry value added from 1960-1990 a simple linear regression was used (with manufacturing and construction emissions the co-efficient). Importantly, amongst the decline from EU manufacturing and industry, total EU GDP increased 325% from 1960 to 2013.

[41] See: http://www.nature.com/nclimate/journal/vaop/ncurrent/full/nclimate2514.html
[42] See: http://publications.europa.eu/resource/cellar/2da99804-f6b6-428e-b290-1f50e5dbd148.0013.02/DOC_1

*Figure 26. EU manufacturing and construction emissions versus EU industry value added**



Source: World Bank data, Sandbag analysis

The recession has highlighted the need for a strong manufacturing and industry base. Whereas only ten years ago Germany was regarded as the 'sick man of the euro'[43], its recent economic proficiency has gained respect from many quarters – partly due to the competitiveness of its industry[44]. The 2020 Package may have set out to reverse the long trend away from heavy industry in the EU, but it introduced few firm policies to achieve it. The ETS was perceived as a threat to industrial investment and generous compensations had to be agreed. These compensations, which included generous free allocations, acted as a lifeline during the recession, as declining industrial output was translated into cash through the sale of spare allowances. The subsidies for renewables that flowed from the legal targets provided another source of income for the few industrial sectors, such as pulp and paper, which could readily convert to a biomass fuelled process. For those unable to do so, the absence of a policy to support the deployment of proven, affordable decarbonisation technologies for industrial processes has proven problematic, resulting in strong resistance from many towards greater climate ambition in the EU.

The failure of CCS policy in the EU has also left a large hole in the 2020 Package. The combustion or power sector – the sector with the most abatement potential and widest number of available technologies – receives dedicated funding support to deploy low carbon transition strategies in the form of legally binding targets. Whereas the industrial sector (with the exception of a few such as pulp and paper which could benefit from renewable targets) were left with little or no additional support at an EU level for decarbonisation investment. This mattered little in Phase II, however, since generous allocations and carbon leakage provisions more than compensated industry for their participation in the ETS. In Phase III with the introduction of benchmarked allocations and with declining allocations, not all industrial players will be fairing quite so well. If they wish to remain in the EU they will

[43] See: http://www.economist.com/node/209559
[44] See: http://www.economist.com/news/special-report/21579145-ingredients-german-economic-success-are-more-complex-they-seem-dissecting

eventually have to invest in decarbonisation or else face rising costs due to the ETS. Many will of course remain comfortably insulated by the surpluses they have built up, but this is not true for all.

PART 4: Recommendations for Reform

There are many lessons to be learned from the 2020 Package. Sandbag offers the following recommendations for the policy design process of the 2030 Package.

Communicating the role of the ETS

1. **The political economy of the ETS.** Much of the recent debate concerning the role of the ETS merely reflects the EU's changing political economy. Discontent in relation to stalled economic growth, energy costs and geopolitical instability have all influenced how the EU views climate policy and the role that the ETS plays within it. The ETS has been at the sharp end of this debate due to its colossal breadth of scope and the direct liability it places on the regulated entities it covers. The ETS will naturally attract more political resistance compared to other policies. Other policies have a far narrower abatement range than the ETS and will therefore influence fewer companies and impact a smaller volume of carbon. The ETS also covers both new and incumbent emissions sources, whereas a subsidy aims to avoid future emissions through incentivising investment. Since many more people have a direct liability to the ETS, compared to the number who might be expected to benefit from a technology subsidy, it is politically easier to introduce a subsidy than increase the carbon price. Additionally, the ETS directly prices carbon while a technology subsidy embeds a far higher indirect cost of carbon in the retail price of electricity. All of these factors should be taken into account when assessing and communicating the role of the ETS in the EU's decarbonisation effort.

2. **ETS Scope versus Impact.** The ETS has been widely lauded as the centrepiece of EU climate policy. Although the ETS covers 45% of the EU economy and regulates 12 thousand installations, its actual impact relative to other policies has been limited. The ETS has been placed alongside technology deployment and energy efficiency policies; these instruments have reduced a large portion of the abatement required to meet the emissions goal stipulated in the 2020 Package. This situation has been magnified by the granting of generous offsetting provisions and unexpected economic instability, which has impacted ETS emissions since 2008. While renewables deployment and energy efficiency policies are agnostic to external factors that reduce emissions output, the ETS automatically adjusts. Due to the political economy of the ETS and the chasm between its coverage and impact, the EU Commission needs to better articulate the role of the ETS and be more honest with regard to its limitations.

ETS Reform and 2030 Package

1. **Addressing the surplus.** As part of the 2030 Package, the EU Commission proposed to reform the ETS. These reform proposals included increasing the linear reduction factor from 1.7% to 2.2% per year at the start of Phase IV, as well as introducing a Market Stability Reserve (MSR). The mechanism establishes a set of rules for adjusting the volume of auctioned allowances (although would not impact on levels of free allocation to industry). This important new feature of the policy is a necessary but in no way sufficient response to the troubles besetting the ETS. Further reforms are needed including tighter future caps and the permanent retirement of part of the growing surplus. Much more detailed briefings on our key tests for this next phase of reforms, including our policy recommendations are available here.

Modelling

The 2020 Package revealed how EU Commission modelling is vulnerable to error. Estimating emissions will always be challenging, as carbon output is determined by complex interactions between electricity demand, economic growth, technology costs and fuel prices. Translating forecasting uncertainty into inflexible policies, is at the heart of the problem with the 2020 Package. The introduction of the MSR will provide a welcome element of flexibility to the ETS. However, before setting future targets for the traded and non-traded sectors in stone, a robust and transparent review of existing energy models must be undertaken. It is entirely possible that reductions in energy used per unit of GDP accelerate as technological improvements across several key sectors of the economy continue to drive significant gains in energy efficiency. To avoid a situation whereby the 2030 Package simply mimics BaU, the targets the EU sets for itself must be subject to regular reviews and future compliance periods shortened to no longer than 5 years.

2. **Renewables Deployment.** The legally-binding renewable energy targets placed on Member States as part of the 2020 Package have proven to be an important driving force in reducing emissions and increasing energy security[45]. The decision in the 2030 Package to move away from legally binding Member State targets reflects changing circumstances as countries seek to develop energy policies to suit their circumstances. A higher, more stable carbon price, together with other 2030 climate and energy package, measures such as market liberalisation and the increasing role of interconnection will help to deliver the legally-binding EU target of increasing the share of renewable energy to at least 27% of energy consumption. Many Member States are also likely to continue to use dedicated policies to support energy efficiency and low carbon deployment. As costs come down and market reforms are introduced, new technologies could have a considerable positive impact on EU emissions and it will be important to closely monitor this and calibrate ambition in the ETS accordingly.

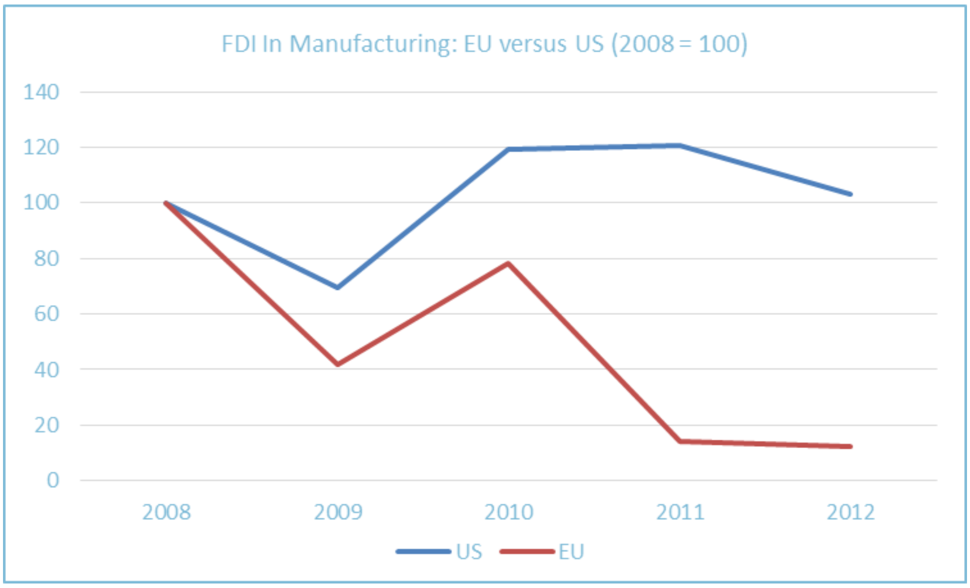
3. **Targeted Action on Coal.** The ETS will decrease coal use if gas prices decline and carbon prices rise. However, the ETS alone will not guarantee a phase out of existing coal in the EU. Nor will tightening air quality standards, as previous analysis from Sandbag has shown[46]. The very high carbon price needed to close or retrofit some already constructed coal infrastructure in Europe will be politically challenging. Interventions could be made at EU level, but could equally be done at Member State level since the bulk of emissions from coal arise in just three countries: Germany, UK and Poland. Germany and the UK have already given political commitments to act on coal, although detailed policy proposals are not yet finalised. If Member States do act, as the UK already has in introducing a carbon price top-up policy, the already vast surpluses in the ETS will grow greater still. As such, the most important action at an EU level will be to make the ETS more responsive to out-turns in the real world, enabling it to ratchet up ambition if targets are consistently over-delivered on.

4. **Industrial Transition Policy.** The potential impact the ETS can have on the companies it regulates is the reason why its effectiveness has been compromised by generous allocations

[45] See: http://www.eea.europa.eu/highlights/renewables-successfully-driving-down-carbon
[46] See: http://www.sandbag.org.uk/site_media/pdfs/reports/Europes_failure_to_tackle_coal.pdf

and overly extensive carbon leakage protections for industrial sectors. A substantial body of evidence[47] finds no proof of carbon leakage, as defined by the ETS Directive. Likewise, with regards to international efforts to internalise the cost of carbon, a recent World Bank report[48] found that globally, 39 national and 23 sub-national jurisdictions have implemented, or are scheduled to implement, carbon pricing instruments, including emissions trading systems and taxes. The carbon leakage provisions applied to the ETS in Phase II and III – and those included in the 2030 Package – appear to be a guise for 'investment leakage' concerns. Although evidence of carbon leakage is entirely unconvincing, Foreign Direct Investment or FDI in EU manufacturing has essentially collapsed and remains 90% below 2008 levels.

Figure 27. FDI in EU manufacturing has collapsed 90% since 2008



Source: OECD data, Sandbag analysis

Concerns about EU industry and its ability to obtain access to affordable capital are warranted. However, these concerns need to be put into context. The decline in EU industry is part of a trend that was in motion long before the ETS and the economic calamity of 2008. Clearly, any policy attempt to reverse this trend needs to be couched in the context of the low carbon economy. The 2020 Package dealt with the inclusion of industry in the ETS by granting generous carbon leakage provisions. The introduction of a carbon price in heavy industry has likely stimulated some investment in energy efficiency while also providing cash flows through allowance repurchase agreements with financial institutions.

However, the ETS did not overcome the high cost of capital to facilitate investment in increased capacity and could not be expected to reverse the trend towards decreased heavy industrial activity in Europe. The NER 300 was intended to create an incentive to invest, but this policy failed in its goal of financing CCS demonstration projects and is no substitute for deployment support. This has contributed to a highly charged political situation. Benchmarks

[47] See, e.g., http://ec.europa.eu/clima/policies/ets/cap/leakage/docs/cl_evidence_factsheets_en.pdf
[48] See: http://www.worldbank.org/en/news/feature/2014/05/28/state-trends-report-tracks-global-growth-carbon-pricing

have now been introduced for industry and, in the not too distant future, some participants will be facing shortfalls. Industry has lobbied hard for the inclusion of carbon leakage provisions in the 2030 Package, where a number of influential stakeholders have blocked reform of the ETS. To break this destructive impasse, the EU must develop proposals for incentives to invest in deep decarbonisation technologies such as CCS in industry. The same arguments used to promote fuel security, balance of trade and job creation through renewable energy investment can, and should, be made for CCS. The failed NER 300 approach should be abandoned in favor of a stand-alone policy mechanism that mimics the success of renewable energy policies. The focus of this policy should be on industrial sectors where renewables struggle to penetrate.

Concluding Remarks

This report seeks to out the ETS in its proper context. Clearly, a broad based carbon pricing policy has an important role to play in creating a widely felt carbon price and uncovering least cost abatement. However, it is very unlikely that it will ever exist in isolation. Interactions with other policies are inevitable and the EU needs to develop a better set of tools for managing this situation. All advocates of carbon pricing should acknowledge that though theoretically attractive, a single carbon price is unlikely ever to unlock the changes we need to see to move swiftly to a low carbon economy. We hope that some of the evidence and ideas discussed in this report will help to inform the debate about carbon pricing policy going forward.

Appendix 1: An Intoduction to the 2020 Package

In January 2007 the EU Commission adopted a Communication and Energy policy for Europe and issued an accompanying Communication: "Limiting Global Limiting Global Climate Change to 2 degrees Celsius"[49]. The targets were set by EU leaders in March 2007 and were enacted through the 2020 Package in 2009[50]. The 2020 Package set binding legislation to ensure the EU's meets it climate and energy targets for 2020. The package has six key principles[51]:

- Cost-effectiveness;
- Flexibility;
- Internal market and fair competition;
- Subsidiarity;
- Fairness; and
- Competitiveness and innovation.

Targets

As a result of the 2020 Package the "20-20-20" targets were developed, which set three key objectives for 2020:

- A 20% reduction in EU emissions from 1990 levels;
- Raising the share of EU energy consumption produced from renewable resources to 20%; and
- A 20% improvement in the EU's energy efficiency.

As the EU's contribution to a global and comprehensive agreement for the period after 2012, the 2020 Package also sought to increase the EU's emissions reduction to 30% by 2020, provided that other developed and developing countries commit themselves to comparable emission reductions.

Policies

The 2020 Package comprises three pieces of legislation which are intended to deliver on the 20-20-20 targets. This legislation is briefly outlined below.

Carbon

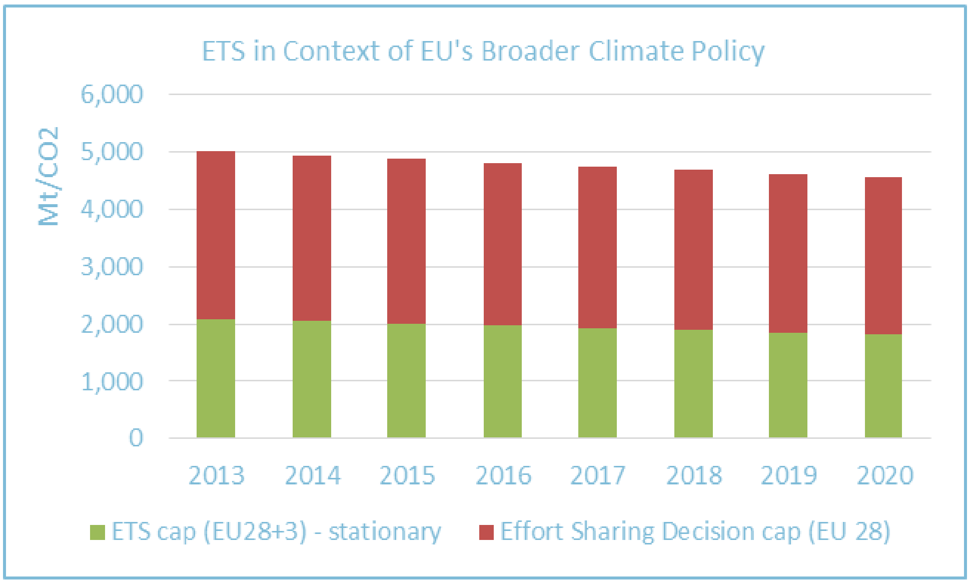
To meet the objective of reducing EU emissions from 1990 levels, the EU Emissions Trading System (ETS) Directive was revised. These reforms were implemented from 2013 and included:

- An EU-wide cap, reducing by 1.74% per year, to achieve its policy objective of emissions being at least 21% below 2005 levels by 2020;
- Auctioning of at least 50% of allowances is capped at 43% of the 2013 annual cap, with free allowances to industries subjected to international competition; and
- Coverage expanded to include metals sectors and aviation emissions from intra-EU flights.

[49] See: http://www.eea.europa.eu/highlights/renewables-successfully-driving-down-carbon
[49] See: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0002:FIN:EN:PDF
[50] See: http://ec.europa.eu/clima/policies/package/documentation_en.htm
[51] See: http://ec.europa.eu/clima/policies/package/docs/sec_2008_85_ia_en.pdf

The ETS cap covers ~45% of the EU's total emissions. To ensure non-ETS sectors – such as transport (with the exception of aviation and shipping), buildings, agriculture and waste – contribute to the 2020 energy and climate package, the Effort Sharing Decision[52] was implemented. This established binding annual emission targets for Member States for the period 2013–2020. The individual Member State targets were differentiated according to relative wealth[53].

Figure 28. ETS in Context of EU's Broader Climate Policy



Source: EU Commission data, Sandbag Analysis

Renewable Energy

To increase the share of EU energy consumption produced from renewable sources to 20% by 2020, Member States were obligated to take on binding national targets for raising the share of renewable energy under the Renewable Energy Directive[54]. The targets reflect Member States' different starting points and potential for increasing renewables production. The targets also help to cut emissions and reduce the EU's dependence on imported energy.

Carbon Capture and Storage

The last element of the 2020 Package is a directive for carbon capture and storage (CCS)[55]. The CCS Directive covers CO_2 storage in all geological formations in the EU and lays down regulatory requirements for storage sites.

Energy Efficiency

The 2020 Package does not address energy efficiency directly. To ensure a 20% improvement in the EU's energy efficiency, the Energy Efficiency Plan (EEP) and the Energy Efficiency Directive (EED) were introduced in 2011. To reach the EU's 20% energy efficiency target by 2020, Member States have set national energy efficiency targets which can be based on primary or final energy consumption, primary or final energy savings, or energy intensity.

[52] See: http://ec.europa.eu/clima/policies/effort/index_en.htm
[53] See: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2009.140.01.0136.01.ENG#page=12
[54] See: http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009L0028
[55] See: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0031

Progress in Meeting 2020 Targets

According to a European Environmental Agency Report[56], the EU is likely to cut emissions by at least 21% of 1990 levels by 2020, surpassing the 20% target. The EU is also ahead of the planned trajectory to hit 20% renewable energy by 2020. The EU's energy consumption is also falling faster than would be necessary to meet the 2020 energy efficiency target.

[56] See: http://www.eea.europa.eu/publications/trends-and-projections-in-europe-2014

Appendix 2: An Intoduction to the ETS

Rationale

Several studies have suggested that an ETS reduces emissions at least cost[57]. According to Vivid Economics[58], the efficiency gains from an ETS are both spatial and temporal. Spatially, the ETS equalizes the marginal abatement costs among distributed sources (i.e. the installations) with different abatement costs (i.e. varying costs of abatement). Temporally, the ETS equalises marginal abatement costs and spreads these costs over time. Due to economic cycles, technology costs and fuel availability, carbon prices can be low in one particular period of time and high in another. If the cumulative emissions budget remains constant, and it does not matter in which period emissions are reduced, the ETS allows for temporal flexibility through the banking and borrowing of allowances within phases, and banking of allowances across phases.

Coverage

The ETS regulates over twelve thousand installations in thirty one countries by capping ~45% of the EU's emissions and putting a price on carbon. The installations regulated under the ETS are electricity generators and companies whose net heat exceeds 20 MW. The installations whose emissions are currently capped under the ETS are from the following sectors:

- Combustion;
- Cement and lime;
- Mineral oil;
- Iron and steel;
- Chemicals;
- Pulp and paper;
- Coke ovens;
- Glass;
- Non-ferrous metals;
- Ceramics;
- Aviation (intra-EU); and
- Metal ore roasting.

The 28 EU Member States plus Iceland, Norway, and Liechtenstein are included in the ETS.

Cap and Carbon Price

Installations receive or buy a set amount of allowances – one for each t/CO2 that they are allowed to emit. The total amount of allowances reduces over time to meet a specific environmental goal. As further detailed below, the goal of the Phase III of the ETS is to reduce emissions to below 21% of 2005 levels by 2020. Installations are encouraged to trade with each other to promote emissions reductions at the least possible cost. Installations cannot emit more than their allowance budget unless they purchase additional allowances from other installations that have emitted less than their allowance budget. Those installations who cut their emissions more aggressively will have spare allowances,

[57] See, e.g., http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.322.2609&rep=rep1&type=pdf
[58] See: http://www.vivideconomics.com/uploads/reports/carbon-markets-in-space-and-time/Vivid_Econ_Carbon_Markets.pdf

which can be sold to companies who did not cut their emissions sufficiently. The linking Directive[59] also makes it possible for installations to buy Clean Development Mechanism (CDM) and Joint Implementation (JI) offset credits gained from cutting emissions abroad.

The ETS is designed to meet the EU endeavour to develop a single market through a standardized system of laws that apply to all countries. EU Member States plus Iceland, Norway and Liechtenstein are subjected to the same trading regulations.

Phases

The ETS started in 2005 and has had three phases to date:

1) **Phase 1 (2005-08):** This was a three-year pilot period to ensure the necessary infrastructure for monitoring, reporting and verifying emissions was in place.

2) **Phase II (2008-12):** This phase coincided with the commitment period of the Kyoto Protocol. During Phase II, every Member State developed a National Allocation Plan, distributed allowances in accordance with the cap and required installations to monitor and report verified emissions. Each installation was obliged to surrender the correct number of allowances to cover their emissions and could buy additional allowances or sell any surplus. Installations could surrender a portion of credits from the UN's flexible mechanisms: the Clean Development Mechanism (CDM); and Joint Implementation (JI).

3) **Phase III (2013-20):** The current phase of the ETS differs from the previous phases in the following ways:
    - There is an EU-wide cap reducing by 1.74% per year to achieve its policy objective of emissions at least 21% below 2005 levels by 2020.
    - The auctioning of at least 50% of allowances, with free allowances to industries subjected to international competition, is capped at 43% of the annual cap in 2013.
    - Coverage is expanded to include metals sectors and aviation emissions from intra-EU flights.

[59] See: http://ec.europa.eu/clima/policies/ets/linking/index_en.htm

Appendix 3: Oversupply Composition BaU Assumptions

Figure 29. Baseline assumptions vs. actual for oversupply composition calculations

BaU Scenario					
Parameter	**2009**	**2010**	**2011**	**2012**	**2013**
Renewables (% chg.)	3.1%	3.1%	3.1%	3.1%	3.1%
GDP (% chg.)	2.2%	2.2%	2.4%	2.4%	2.4%
Power Production (GWh)	3175	3238	3291	3269	3255
UN offsets (mtCo2)	123	123	123	123	123
ETS Industry excl. Power (% chg.)	-4.5%	2.0%	1.7%	-0.7%	-0.4%
Actual					
Parameter	**2009**	**2010**	**2011**	**2012**	**2013**
Renewables (% chg.)	15%	16%	21%	15%	14%
GDP (% chg.)	-4.5%	2.0%	1.7%	-0.7%	-0.4%
Power Production (GWh)	3155	3295	3226	3138	3134
UN offsets (mtCo2)	83	82	137	254	505
ETS Industry excl. Power (% chg.)	-16.3%	7.7%	4.8%	-2.7%	-0.7%

Source: EU Commission data, Eurostat data, ECB data, Sandbag Analysis

Figure 30. Assumptions and calculations behind ETS oversupply estimates

Parameter	Assumption	Calculation	Source
Renewables	2020 Package BaU	Baseline minus actual (ETS modelled)	Eurostat
GDP	2020 Package BaU	Baseline minus actual (ETS modelled)	Eurostat
Power Efficiency	Power production tracks GDP	Baseline minus actual * 0.65	Eurostat
UN offsets	Balanced use over PII & PIII	Baseline minus actual	CITL
ETS Industry (excl. power)	Industry output tracks GDP	Baseline minus actual (ETS modelled)	ECB

Source: EU Commission data, Eurostat data, ECB data, Sandbag Analysis

About This Briefing

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