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The EU ETS and its Interactions with other Climate and Energy Policies

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Highlights

- The current EU climate end energy package includes several policies to reduce greenhouse gas (GHG) emissions by 2020. The main instrument is the EU Emission Trading System (EU ETS). The complexity of this policy package flags up synergies and interactions among different climate policy instruments, in particular, between the EU ETS and energy policies such as those to support Renewable Energy (REN) or energy efficiency.
- The EU ETS is, in theory, the most effective way to reduce GHG emissions and any additional climate policies would increase abatement costs. There are, however, several important factors that justify the use of additional instruments, in particular, market, regulatory and policy failures. Moreover, some climate policies have also other objectives such as improving the security of energy supply or the reduction of other pollutants.
- There are only a few studies that have empirically analysed the interactions of the EU ETS with other energy and climate policies. They showed that REN policies brought about significant emission reductions in the power sector, but at a higher cost compared to EU ETS carbon prices. Renewable policies also had a negative, though probably limited, impact on carbon prices.
- In a recent workshop organised by the Florence School of Regulation Climate (FSR Climate) on this subject, most stakeholders agreed that the presence of market failures justifies additional climate policies, first of all, state support for R&D. However, many of them were also concerned at the negative impact that policies had on carbon prices and welcomed the Market Stability Reserve (MSR) as a positive instrument to mitigate these effects. Regarding REN support schemes, views were mixed. Some stakeholders suggested a gradual phasing out given the recent cost decrease in REN technologies and the negative impact on carbon prices. Others were for continuing REN support, pointing out that REN policy had only limited negative effects on the EU ETS.

1. Why Discuss Policy Interactions within EU Climate Policies?

The main goal of climate policy is to reduce greenhouse gas (GHG) emissions to 'a level that would prevent dangerous anthropogenic interference with the climate system'. This requires a severe reduction in GHG emissions in almost all human activities and, therefore, a number of policy instruments are likely to be implemented in the next decades. Policy proliferation may be positive in terms of mitigation, through synergies and complementarities. However, it may also bring about cost-inefficiencies (negative interactions). With this in mind, any public policy instrument that significantly reduces GHG emissions should be considered a climate policy, though there are 'explicit' and 'implicit' climate policy instruments. Explicit climate policy instruments are those that are specifically designed for GHG abatement, such as carbon pricing schemes (e.g. the European Union Emission Trading System (EU ETS). Implicit climate policy instruments are those that do not directly target GHG reductions but where climate change mitigation is a welcome side effect. Many implicit climate policies relate to the energy sector, such as the various instruments for supporting renewable energy, for increasing energy efficiency and the taxation of energy goods. Yet it is important to note that not every energy policy instrument belongs to this group as some, such as incentives for fossil fuel use, actually lead to increased GHG emissions.

The energy sector has the highest share of GHG emissions and is, thus, a primary candidate for mitigation over the short and medium term. This explains how, since at least the 2009 energy and climate package, the EU has designed and implemented energy and climate policies together. The current climate and energy package (frequently called 20-20-20) has a number of targets and policy instruments in the 2020 horizon. The first target is a 20% GHG emission reduction with respect to 1990 levels, with the main policy instrument being the EU ETS: an EU instrument applied in all member states (MS). The second target is to reach 20% of all energy consumption from REN, which would be implemented through national targets that take account of differences across MS. These national targets have been pursued through different policies, most of them in the form of feed-in tariffs or premiums, which have been very successful in increasing renewable installed capacities, especially in wind and solar technologies. The third and last target is for energy efficiency, namely a non-binding objective of 20% reduction in total energy consumption with respect to a business-as-usual scenario. Many different policies have been implemented to increase energy efficiency both at the EU and the MS level. The main EU policy is the 2012 Energy Efficiency Directive that sets several binding MS and EU measures in different areas.

This kind of climate policy proliferation in the EU and the complexity of these policies have fostered an intense debate among academics, policymakers and the regulated sectors on synergies and interactions among climate policy instruments. Given the importance and the central role of the EU ETS, the main explicit instrument within EU climate policies, the debate has mainly focused on the impact of other climate and energy policies on the EU ETS price. This is particularly relevant as the price signal would be crucial for long-term mitigation, given its effects on innovation and investment: see the LIFE SIDE policy brief on those matters.

The EU has recently proposed a new energy and climate package, with a 2030 horizon and a similar structure and baselines, but with stronger targets than the 20-20-20 package. These are: 40% GHG emission reductions; a 27% renewable share of energy consumption; and a 27% increase in energy savings. Notable differences with the current packages include a single EU level target for renewable energy and a new energy governance structure that should ensure that the new objectives are attained. With these stricter goals, the debate on the interactions between the EU ETS and other (EU and MS) climate and energy policies has gained momentum. As part of the LIFE SIDE project, FSR Climate has contributed to this debate through the organisation of a workshop on this topic with academics, policymakers and other stakeholders in attendance.[1] This policy brief reflects upon the contents and the debates in the workshop. We outline the reasons behind the use of multiple climate policy instruments, summarising the most relevant economic research in this area and, finally, we present different stakeholder views on this matter.

2. Rationale for Multiple Climate Policy Instruments

There is a strong consensus among economists on the superiority of pricing emissions (through ETS or taxes) as a cost-effective GHG mitigation system that equalises the marginal abatement costs of emitters. A carbon price system is able to tackle market failure due to the negative externality of emissions and, thus, to allocate resources in an efficient manner (Baranzini *et al.*, 2017). Put simply, with a carbon price, those who emit pay for the damage that GHG emissions cause. In this sense, (additional) non-pricing mitigation policies would increase the cost of GHG abatement as they would impose additional costs compared to the cost-effective outcome. Within sectors covered by an ETS, additional climate policies would shift GHG emissions to sectors with higher abatement costs with no impact on total GHG emissions (as these are determined by the cap). In particular, policies to promote renewable energy technologies in the electricity sector would lead to a higher share of renewables than an ETS alone would induce through cost-effective GHG abatement: e.g. potentially substituting abatement through fuel switching or through demand reductions. Moreover, those additional policies have the effect of depressing carbon prices, as they would reduce the demand for allowances. Lower carbon prices could also hamper ETS's capacity to promote low-carbon technologies over the medium and long term; thus locking us in to a reliance on polluting technologies. A similar rationale, both in terms of cost-effectiveness and price effects, would apply to energy efficiency policies.

Despite these points, the use of additional policy instruments in climate policies could be justified on several grounds:

- First, non-pricing approaches may be necessary for mitigating additional market failures that exist in sectors that are crucial for GHG mitigation. This is clear in the case of investments in low carbon technologies, which may be negatively affected by the fact that firms, due to knowledge spillovers, are not able to retain all the benefits from accumulating knowledge through R&D or learning by doing. This reduces the incentives for private investments in R&D and in the deployment of technologies, like renewable energy, that have significant scope for improvements through learning by doing. Indeed, this justifies policies such as public investment in R&D or policies to promote technological deployment through, for example, REN feed-in tariffs. Other market failures might include: asymmetry of information; landlord-tenant arrangements; or myopic behaviour, leading to sub-optimal energy efficiency investments, even if these investments are economically and environmentally desirable.
- Second, ETS usually do not cover all sectors (only around 50% of GHG emissions are subject to the EU ETS). Therefore, additional, complementary policy instruments are needed to guarantee overall cost-effectiveness: e.g. equivalent carbon taxes on ETS sectors that are not covered.
- Third, some policies with indirect effects on GHG mitigation may actually be designed to attain other policy objectives such as the security of energy

1. The programme and contents of the workshop are available from http://lifesideproject.eu/event/eu-ets-and-its-interaction-with-other-climate-and-energy-policies

supply, or to foster innovation. This is clearly the case with REN policies and, therefore, interpretations of GHG policy interactions should be incorporated into a larger setting.

3. Research on Interactions among Climate and Energy Policies

There is an extensive literature (not only academic: see below) on policy interactions within climate and energy policies. Most of it follows an *ex-ante* simulation approach and focuses on the interaction between GHG prices and REN energy policies. With respect to empirical research, there are limited *ex-post* results and, in general, what results we have are sub-products of wider research inquiries. It should also be noted that sizeable research projects have been financed by different public institutions, which reflects the importance given by policymakers to this topic. The EU has recently funded two large research projects on climate policy interactions, ENTRACTE[2] and CECILIA 2050[3], within its FP7 programme. The OECD has, also, devoted significant efforts to analysing the interaction of different climate policy instruments and has produced a number of papers and reports on the same (Hood 2011, 2013; OECD, 2011; Philibert, 2011).

The *ex-ante* literature can roughly be divided into three groups. The first group includes theoretical models, often complemented with numerical applications that are useful for understanding the dynamics of policy interactions: e.g. Fischer and Newell, 2004; Pethig and Wittlich, 2009; Böhringer and Rosendahl, 2010. The second group uses computable general equilibrium (CGE) models to study the dynamics of policy interactions in a context of heterogeneous sectors: e.g. Böhringer *et al.*(2009); Boeters and Koornneef, (2011); Flues *et al.*, 2014. The third group focuses on the power sector, typically using partial equilibrium models with detailed data on generation: e.g. Palmer and Burtraw, (2005); De Jonghe*et al.*, (2009). The results of this *ex-ante* literature strongly depend on model assumptions and the data used. They usually have, moreover, difficulties in incorporating and assessing market failures. In general, they show that GHG pricing tends to be the most cost-effective way to reduce emissions. However, in the presence of market failures (particularly knowledge spillovers for renewable technologies), an energy policy portfolio can reduce emissions more efficiently than a single pricing option. In this case, subsidies for R&D are usually seen as the best complementary policy. Yet the OECD (2011) recommends that policymakers in countries with ETS should carefully consider the addition of other policies. The ENTRACTE and CECILIA 2050 projects confirmed the preceding findings and highlighted the difficulties of building an optimal cost-effective policy package and, consequently, the importance of aiming at the best feasible climate policy mix.

There is now a large empirical literature on the EU ETS. However, as indicated above, only a handful of studies have a specific focus on *ex-post* empirical analyses of the interactions of the EU ETS with other energy and climate policies. Nonetheless, some interesting results on policy interactions can be drawn from the body of empirical literature on the EU ETS and REN:

First, the impact of REN policies on emission abatement. The literature shows that REN development, which was largely supported by REN policies, was the primary driver in emissions reduction in the power sector in Phase I and II of the EU ETS. Van der Berg *et al.* (2013) and Weigt*et al.* (2013) showed this through power sector modelling, and Berghmans *et al* (2014) and Gloaguen *et al.*(2013) through econometric analysis. Yet, there is also a consensus on the positive effects of abatement from the EU ETS, despite existing REN policies, at least in Phase

2. http://entracte-project.eu.

3. http://cecilia2050.eu.

I and at the beginning of Phase II: e.g. Ellerman and Buchner (2008), Anderson and di Maria (2011), Egenhofer *et al*. (2011).

Second, there is the question of the impact of REN on carbon prices. A significant number of papers attempt to quantify how EU ETS prices are driven by market fundamentals related to the marginal abatement costs of emissions. Specific to the interactions with renewable policies, Koch *et al*. (2014) show that the renewable policies had only a modest impact on EU ETS price reductions, with the most important determinant being the variation in economic activity. This is in line with analysis conducted by the European Commission (COM (2012) 652 final; SWD (2016) 416 final).

Third, there is the abatement cost of complementary policies. Several papers found that the implicit carbon price of renewable policies is considerably higher than the EU ETS price, particularly in the case of Solar Photovoltaic (PV): Marcantonini and Ellerman (2015), Marcantonini and Valero (2017), Rey *et al*. (2013).

4. Stakeholders Insights from the Workshop

The LIFE SIDE workshop on EU ETS and its interactions with other climate and energy policies brought together about 25 experts. These included analysts from universities and other research institutions, policymakers and representatives of regulated industries and of NGOs. A selection of relevant points that were made on that occasion are reported below[4]:

Many stakeholders considered that there are various reasons for non-ETS policies to be justified: by the scale and compexity of the abatement effort needed; by the presence of market failures additional to the emissions externality; and by the partial coverage of EU ETS emissions. They also agree that phasing out policy instruments that foster high-carbon technologies, such as fossil fuel subsidies, is a must for coherent and effective climate and energy policies. Additional climate policies should be targeted to mitigate specific market failures, and gradually be phased out when those market failures are solved. High investment in R&D was seen by many stakeholders as a priority for policy support.

There were mixed views on REN support schemes. Some stakeholders recommended their gradual phasing out, in particular for solar PV and on-shore wind, given the recent cost decrease in these technologies and their negative impact on the EU ETS price. However, other participants noted that other factors had a bigger impact on the EU ETS price (particularly the economic crisis) and that the effect of REN was limited and foreseen because REN and GHG targets were part of a single package. Some stakeholders indicated that the high capital costs of REN projects constitute an additional reason for continuing REN support.

Many stakeholders highlighted the desirability, from an investor's perspective, of stability in relation to the incentive provided by the carbon market, and expressed concerns about possible negative impacts of other climate and energy policies on the EU ETS price. In this context, the MSR was seen as a positive mechanism for allowing the supply of allowances on the carbon market to respond to unexpected changes in demand. The MSR will mitigate supply and demand fluctuations, which is particularly relevant in the case of unforeseen shocks.

Impact forecasts of the MSR on carbon price were presented under different scenarios. It was estimated that, with the targets under debate for 2030 and with the presence of the MSR, the carbon price would be around 20-25 €/tCO_2. However, with a higher energy efficiency target of 40%, the EU ETS price could be lower even with the MSR. Forecasts should be taken with caution. However, this analysis suggests that, in case of significant divergences from the initial policies for 2030, the MSR may not always be able

4. The workshop was held under Chatham House rules and, therefore, no names can be revealed in this section.

to address the impact of policy interactions on the demand for allowances without a change in its initial parameters.

Some stakeholders called for more coherence between MS and EU level energy and climate policies.

Some stakeholders supported the use of a price corridor to stabilise the price, while others highlighted the political difficulties with setting such a policy. Some other participants indicated their preference for the EU ETS prices to be fully determined by market forces.

Many stakeholders highlighted the importance of rigorous empirical analysis in these matters, something which is seen as being in rather short supply at the moment.

5. Concluding Remarks

A carbon price system, such as the EU ETS is, in theory, the most cost-effective way to reduce emissions, and additional climate policies in the EU ETS sectors have a negative impact on the carbon price. There are, however, several reasons that justify the use of additional instruments in the reduction of GHG emissions. In particular, in the presence of market, regulatory and policy failures, a set of energy and climate instruments can reduce emissions more efficiently than a single pricing option.

Despite the importance of the subject and the long-running debate on the same, only a few studies have empirically *ex-post* analysed the interactions of the EU ETS with other energy and climate policies. They showed that the REN policies brought about high emission reductions in the power sector, but at a higher cost with respect to the EU ETS price. REN policies also had a negative, though probably limited, impact on carbon prices.

Most stakeholders participating in the LIFE SIDE workshop agreed that the presence of market failures justified additional climate policies, above all public support for R&D. However, many of them were also concerned with the negative impact that these policies had on EU ETS prices and welcomed the MSR as a positive instrument for mitigating these effects. Regarding REN support schemes, there were mixed views. Some stakeholders suggested a gradual phasing out, given the recent cost decrease in REN technologies and the negative impact on carbon prices. Others were for continuing REN support, pointing out that REN policy had limited negative effects on EU ETS.

A significant conclusion from the workshop was the importance of having a larger set of rigorous empirical analyses on these questions. Understanding how different policies have interacted with EU ETS in the past will be important in designing better coordinated climate policies for the future.

References

Anderson, B. and Di Maria, C. (2011). *Abatement and allocation in the pilot phase of the EU ETS*. Environmental and Resource Economics, 48, 83-103.

Baranzini, A., van den Bergh, J., Carrattini, S., Howarth, R., Padilla, E. and Roca, J. (2017) *Carbon pricing in climate policy: seven reasons, complementary instruments, and political economy considerations*. WIREs Climate Change, 8 (4).

Berghmans, N., Chèze, B., Alberola, E. and Chevallier, J. (2014). *The CO2 emissions of the European power sector: economic drivers and the climate-energy policies' contribution*. Working paper 2014-17, CDC Climat Research.

Boeters, S. and Koornneef, J. (2011). *Supply of renewable energy sources and the cost of EU climate policy.* Energy Economics, 33, 1024–1034.

Böhringer, C., Löschel, A., Moslener, U. and Rutherford, T.F.(2009). *EU climate policy up to 2020: An economic impact assessment*. Energy Economics, 31, S295–S305.

Böhringer, C. and Rosendahl, K.E. (2010). *Green promotes the dirtiest: on the interaction between black and green quotas in energy markets*. Journal of Regulatory Economics, 37, 316-325.

Commission of the European Communities, *Report from the Commission to the European Parliament and the Council*, COM (2012) 652 final (November 2012).

Commission of the European Communities, *REFIT evaluation of the Directive 2009/28/EC of the European Parliament and of the Council*, SWD (2016) 416 final (November 2016).

De Jonghe, C., Delarue, E., Belmans, R. and D'haeseleer, W. (2009). *Interactions between measures for the support of electricity from renewable*. Energy Policy 37, 4743–4752.

Edenhofer, C., Alessi, M., Georgiev, A. and Fujiwara, N.(2011). *The EU Emissions Trading System and climate policy towards 2050: real incentives to reduce emissions and drive innovation?* CEPS Special Report.

Ellerman, D. and Buchner, B.(2008). *Over-allocation of abatement: a preliminary analysis of the EU ETS based on the 2005-06 emissions data*. Environmental and Resource Economics, 1, 267-287.

Fischer, C. and Newell, R.(2004). *Environmental and technology policies for climate mitigation*, DP 04-05, Resources for the Future.

Flues, F., Löschel, A., Lutz, B.J. and Schenker, O. (2014). *Designing an EU energy and climate policy portfolio for 2030: Implications of overlapping regulation under different levels of electricity demand*. Energy Policy, 75, 91–99.

Gloaguen, O. and Alberola, E.(2013). *Assessing the factors behind CO2 emissions changes over the phases 1 and 2 of the EU ETS: an econometric analysis*. Working paper 2013-05, CDC Climat Research.

Hood, C., (2011), *Summing up the parts: combining policy instruments for least-cost climate mitigation strategies*, OECD/IEA, Paris.

Hood,C. (2013), *Managing interactions between carbon pricing and existing energy policies, Guidance for Policymakers*, Insights Series 2013, OECD/IEA, Paris.

Koch, N., Fuss, S., Grosjean, G. and Edenhofer, O.(2014). *Causes of the EU ETS price drop: Recession, CDM, renewable policies or a bit of everything? New evidence*. Energy Policy, 73, 676–685.

Marcantonini, C. and Ellerman, D.(2015). *The implicit carbon price of renewable energy incentives in Germany*. Energy Journal, 36, 205-239.

Marcantonini, C. and Valero, V. (2017). *Renewable energy and CO2 abatement in Italy*. Energy Policy, in press.

OECD (2011), *Interactions between emission trading systems and other overlapping policy instruments, environment directorate,* OECD, Paris.

Palmer, K. and Burtraw, D. (2005). *Cost-effectiveness of renewable electricity policies.* Energy Economics, 27, 873–894.

Pethig, R. and Wittlich, C.(2009). *Interaction of carbon reduction and green energy promotion in a small fossil-fuel importing economy.* CESifo Working Paper Series 2749.

Philibert, C. (2011). *Interactions of policies for renewable energy and climate.* Working Paper, IEA, Paris.

Rey, L., Markandya, A., González-Eguino, M. and Drummond, P.(2013). *Assessing interaction between instruments and the 'optimality' of the current instrument mix. CECILIA2050* WP1 Deliverable 1.3. Bilbao: BC3.

Van den Bergh, K., Delarue, E. and D'haeseleer, W.(2013). *Impact of renewables deployment on the CO2 price and the CO2emissions in the European electricity sector.* Energy Policy, 63, 1021–1031.

Weigt, H., Ellerman, D. and Delarue, E. (2013). *CO2 abatement from renewables in the German electricity sector: Does a CO2price help?* Energy Economics, 40, S149-S158.

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- *Free allowance allocation in the EU ETS;*
- *The EU ETS and its interaction with other climate and energy policies;*
- *Low carbon investment and innovation in the EU ETS;*
- *The International dimension.*

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