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Emissions Trading and Promotion of Renewable Energy— We Need Both

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Emissions trading and the promotion of the use of energy from renewable sources are key elements of German and European energy and climate policy. However, some critics oppose a targeted promotion of renewable energy, arguing in particular that this is ineffective or even damaging in conjunction with European emissions trading. Yet upon closer examination, the coexistence of emissions trading and promotion of renewable energy is not only possible, it is essential—provided the interactions between them are taken into account. It would be a mistake to discontinue the promotion of renewable energy. Quite to the contrary: A commitment to the continuation and further development of subsidy measures is necessary so that renewable energy—alongside increased energy efficiency—can furnish the foundation for a sustainable energy supply.

In the future, renewable energies such as biomass, hydro power, wind energy, solar energy, and geothermal energy will comprise a greater portion of the energy mix. Renewable energy helps to reduce the environmental impacts of energy use, as well as to conserve non-renewable resources. At the same time, it reduces supply and price risks associated with the importation of energy. As a growth industry with considerable export potential, the renewable-energies sector also offers opportunities for economic development and technological innovation.[1] By replacing fossil fuels such as coal, renewable energy reduces greenhouse gas emissions and helps to curb global warming—particularly from a long-term perspective (see Figure). All in all, the increased deployment of renewable energy serves the perennial aims of energy policy: to ensure secure, clean, and cost-efficient energy supplies.

Many countries provide political support for the expanded use of renewable energy. For this support to be successful, initiatives to encourage R&D are required alongside effective policy instruments to promote the broad adoption of new energy technologies. Promotion measures allow sustainable markets for new technologies

1 See German Federal Ministry of Economics and Technology (BMWi): Konjunkturgerechte Wachstumspolitik. Jahreswirtschaftsbericht 2009. Berlin, January 2009, particularly items 73, 77, and 78. According to this report, in Germany renewable energies helped to reduce CO_2 emissions by approx. 110 million tons in 2007; this was equivalent to approx. 13% of all CO_2 emissions. See also German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU): Erneuerbare Energien in Zahlen. Nationale und internationale Entwicklung. December 2008.

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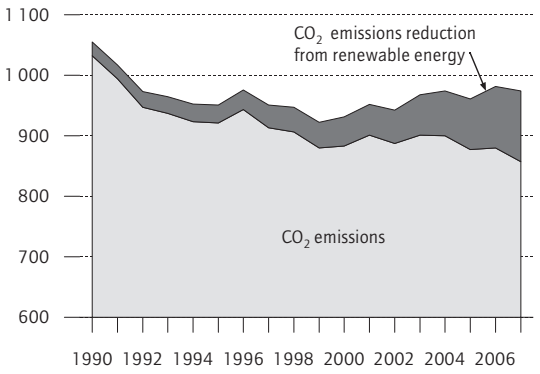
to develop while costs are steadily reduced.[2] Only in this way can new energy technologies be successfully deployed in the near future.

Yet opposition to the targeted promotion of renewable energy has recently gained ground, particularly among economists.[3] The view is often expressed that promotion of renewable energy is ineffective or even damaging when combined with European emissions trading. The proponents of this argument, however, overlook key factors with regard to energy, climate, and technology policy while drawing wide-reaching economic and environmental conclusions from simplified economic models. When various energy and environmental policy instruments are implemented at the same time, the interaction effects between them must naturally be taken into account. Yet an evaluation of their effects should not be confined to static assessments, isolated impact analyses, or the comparison of textbook scenarios rather than real political options.

Figure

CO_2 Emissions and Emissions Reduction from Renewable Energy in Germany

In millions of tons



Source: German Federal Environmental Agency; German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety; Jahrbuch Erneuerbare Energien; calculations by DIW Berlin.

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Ambitious Goals Should Be Preserved

In March of 2007, the European Council passed a resolution calling for renewable energy to comprise 20% of Europe's total final energy consumption by 2020. In December of 2008, under its directive for the promotion of renewable energy, the EU set targets for each member state according to feasibility and the fair distribution of burdens. An overall target of 18% by 2020 was set for Germany. To achieve this target, 14% of heating energy and at least 30% of electricity generation are to come from renewable resources by 2020. These targets, which were fixed in law at the end of 2008 under the German government's "Integrated Energy and Climate Program" (EEWärmeG, EEG-Novelle), should be rigorously pursued.[4]

Specific Promotion Instruments Are Necessary

In general, renewable energy can be promoted with broad-based environmental policy instruments (such as emissions trading and taxes) or special policy instruments focused on specific technologies. To date, broad-based policy instruments have done little to promote renewable energy. The European emissions trading system increases the price of electricity generated from fossil fuels between 1 and 2 euro cents/kWh.[5] In this way, emissions trading alone—without additional support—cannot in most cases make electricity generated from renewable resources profitable for private investors.

Germany's ecological tax reform, which went into effect in 1999, has generally improved the profitablility of renewable energy—for example, in the heating sector. Yet it has not improved the situation in the electricity market, as the standard eco-tax of 2.05 euro cents per kWh is also levied on electricity from renewable resources. Germany does, however, have a tool to effectively promote electricity from renewable resources in the form of technology-specific feed-in tariffs of the Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz, or EEG). Similar provisions have also been enacted in most EU member states.

Emissions Trading Still Far From Ideal

While the trading of emissions allowances is theoretically an ideal solution for limiting emissions, in order for the system to work effectively, emission limits, or caps, must be defined appropriately, emissions allowances must be allocated without distortion, and trading must provide the necessary

2 See Diekmann, J., C. Kemfert: Erneuerbare Energien: Weitere Förderung aus Klimaschutzgründen unverzichtbar, DIW Berlin Wochenbericht No. 29/2005.

3 See, for example, Blankart, C. B. et al.: Die Energie-Lüge, in: Cicero 12/2008, pp. 94-95.

4 In addition, at least 12% of all vehicle fuel on the market must be biofuel (the so-called "biofuel quota").

5 At the current certificate price of ten euros per ton of CO_2, this price effect is probably just under 1 euro cent per kWh.

flexibility so that the marginal abatement costs can be balanced among regions, industries, and emitters to ensure overall abatement costs are minimized. The European Emissions Trading System (EU ETS), introduced in 2003, is now a central element of Europe's climate protection policy.

This system has been far from an ideal model, particularly in the first trading period from 2005 to 2007, but also in the second trading period, which began in 2008 and will end in 2012.[6] Conceptually, the system has been restricted to certain branches (segments of the energy and industrial sectors), gases (essentially just CO_2), and regionally to Europe. In this way, coordination with excluded sectors is necessary. The allocation of emissions allowances through National Allocation Plans (NAPs) has—as a result of political processes, the strong influence of lobbyists, and an initially insufficient data basis—lead to complex rules, distorted incentives, and excessively generous emission limits.[7] Intervention by the European Commission has been necessary to ensure the effectiveness of the system and sufficient consistency. Following a review of the system (ETS Review), serious changes were agreed upon and will be implemented with the start of the third trading period in 2013, including a longer trading period, increased auctioning, and the establishment of an EU-wide cap. In this connection, changes have not been implemented piecemeal, but rather consistently and in a single package. This is particularly true with regard to the newly implemented directive regarding renewable energy as well as the decision on effort sharing in sectors currently not covered by the emissions trading system. With these changes, the aim is to reduce greenhouse gas emissions by 2020 in Europe to 20% or 30% below their 1990 levels, depending on the result of international negotiations.

Renewable Energies Curb Demand for Emission Certificates

The main interaction between emissions trading and the specific promotion of renewable energy is the result of a substitutional effect: the generation of electricity from renewable sources reduces fossil fuel consumption, thus lowering the demand from power plant operators for emission certificates.[8] The total amount of emissions allowances (the cap) must therefore be reduced. If this is not done, the result is lowered CO_2 prices and the displacement of CO_2 emissions to other European countries or economic sectors. This, in turn, could seriously impair the environmental effectiveness of the combined use of emissions trading and the promotion of renewable energy.

Potentially negative interaction effects can be reduced by opening up the trading system—for example, by incorporating international credit systems such as the Clean Development Mechanism from the Kyoto Protocol—yet they cannot be fully eliminated. CO_2 abatement projects in other countries would be unavoidably impaired as a consequence. In this case, as well, cap levels must be coordinated with policies that promote the adoption of renewable energy.

Policy Coordination is Key

A lack of coordination between emissions trading and the promotion of renewable energy can produce negative effects if the emission reductions achieved with renewable energy are not properly anticipated in the setting of emission caps. Even in this case, however, it is unjustified to conclude that promotion of renewable energy is ineffective. One could, by the same token, argue that emissions trading is ineffective. Yet mutual accusations of ineffectiveness are of no assistance when both policy instruments are deployed in unison. Efforts to achieve policy coordination are instead required, in order to assure that the best possible overall effect is obtained. This also applies to the interaction between emissions trading and other policy measures—for example, those aimed at reducing electricity consumption.

If one is to adequately assess policies for the promotion of renewable energy, it is also necessary to understand that the danger of insufficient coordina-

6 Kemfert, C., J. Diekmann: Europäischer Emissionshandel—Auf dem Weg zu einem effizienten Klimaschutzinstrument, DIW Berlin Wochenbericht No. 46/2006; Kemfert, C.: Versteigern statt Verschenken! Warum es sinnvoll ist, eine vollständige Versteigerung der Emissionsrechte anzustreben, in: Zeitschrift für angewandte Umweltforschung, 18 (2007), 1, pp. 9-17.

7 DIW, Institute for Applied Ecology, Fraunhofer ISI: Entwicklung eines nationalen Allokationsplans im Rahmen des EU-Emissionshandels, UBA texts 17/07. Berlin 2007. Diekmann, J., J. Schleich: Auktionierung von Emissionsrechten—Eine Chance für mehr Gerechtigkeit und Effizienz im Emissionshandel, in: Zeitschrift für Energiewirtschaft, 30 (2006), 4, pp. 259-266.

8 For an analysis of the interaction effects between emissions trading and other policy instruments, see Sorrel, S., J. Sijm: Carbon Trading in the Policy Mix, in: Oxford Review of Economic Policy 19 (2003), 3, pp. 420-437. Río González, P. d.: The Interaction Between Emissons Trading and Renewable Electricity Support Schemes: An Overview of the Literature, in: Mitigation and Adaptation Strategies for Global Change 12 (2007), 8, pp. 1363-1390. Diekmann, J., M. Horn: Analyse und Bewertung des EEG im Zusammenhang mit anderen Instrumenten des Klima-, Umwelt- und Ressourcenschutzes, in: DIW, DLR, ZSW, IZES: Wirkungen des Erneuerbare-Energien-Gesetzes (EEG) aus gesamtwirtschaftlicher Sicht. Studie im Auftrag des Bundesministeriums für Umwelt, Naturschutz und Reaktorsicherheit, Berlin 2008 ; English summary: DIW, DLR, ZSW, IZES: Economic Analysis and Evaluation of the Effects of the Renewable Energy Act. Study on Behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. Berlin 2008 (download: www.erneuerbare-energien.de/inhalt/41491/40870/).

tion between emissions trading and promotion of renewable energy exists irrespective of the type of promotion policy and is therefore not solely inherent to the German Renewable Energy Sources Act. For example, it is also necessary under a quota system with tradable green certificates—such as that in the UK—to take emission reductions into account when calculating cap levels. Experience in the UK shows that the forecast risks under such a system are not any lower than under Germany's Renewable Energy Sources Act.

Varied Interaction Effects in Different Trading Periods

A distinction must be drawn between each trading period when evaluating the interaction between emissions trading and the promotion of renewable energy.

First Trading Period: Emissions Trading Only Effective to a Limited Extent

The first trading period was conceptualized as a learning phase. It revealed a number of deficiencies in the Emissions Trading System (ETS) and National Allocation Plans (NAPs). The overall system was only effective to a limited extent due to excessively high national caps. Numerous special regulations that varied from country to country for cost-free allocation also led to unintended distortions.[9] Cornerstones—for example, those of the German NAP I—were eventually established in a political compromise. In defining the cap, the forecasted expansion of renewable energy between the baseline period (2000-2002) and the end of the trading period (in 2007) was not sufficiently taken into account. Yet regardless of this fact, the cap levels were far too high. Most member states did little to heed the guidance on allocation plans from the Commission. According to estimates by the German Institute for Economic Research (DIW Berlin), the growth in renewable electricity generation stimulated by the Renewable Energy Sources Act may have resulted in a CO_2 price reduction of approximately one euro per ton.[10] Prices on the CO_2 market were very volatile between 2005 and 2006, however, ranging between 10 and 30 euros per ton. In 2007 the spot market for CO_2 certificates virtually collapsed, with prices below one euro. For this reason it is doubtful that emission reductions achieved under the Renewable Energy Sources Act resulted even in a partial displacement of emissions to other economic sectors during the first trading period, particularly considering that a large number of emissions rights were cancelled unused.

Second Trading Period: Improvements Lead to Increased Effectiveness

In the run-up to the second trading period, as well, the German National Allocation Plan (NAP II, June 2006) was not drafted to explicitly take emission reductions resulting from the increased use of renewable energy into account. To the extent that its quantity structure was based on the approach in the NAP I, forecasted CO_2 reductions from renewable energy were largely ignored, despite the fact that implicit allowances were made to account for emission increases resulting from the declining use of nuclear energy. Following formal notification of the plan, the European Commission, which had only approved Germany's NAP II on the condition that drastic changes be made, called for even more serious amendments. The annual emissions cap was ultimately set at a level much lower than in the first trading period. The caps were also reduced further for other member states. The repeated over-allocation of emissions rights was thus avoided—even when expanded power generation from renewable sources is taken into account. In 2001 the EU issued a directive with targets for the generation of electricity from renewable resources by 2010. A target of 22% of gross electricity production was set, a figure that includes new EU member states. Even if it is likely that these targets won't be fully reached, they can be used as a forecast. In this way, it cannot be assumed that the promotion of renewable energy will lead to a systematic impairment of emissions trading in the second trading period.

Third Trading Period: EU-Wide Coordination of Emissions Trading and the Promotion of Renewable Energy

In the third trading period, the interaction effects will differ as a consequence of fundamental modifications to the Emissions Trading System, in particular the centralized coordination of an EU-wide ETS cap (for the EU as a whole: -21% compared to 2005, instead of 27 separate national caps) with national abatement targets for the non-ETS sectors and ambitious targets for renewable energy (20% of total final energy consumption). While the consistency of these elements has been reviewed by the

9 See DIW, Institute for Applied Ecology, Fraunhofer ISI: Wirkungsanalysen des Emissionshandels in der ersten Handelsperiode (2005–2007) sind mit erheblichen Unsicherheiten behaftet. See also: Ellerman, A. D., B. Buchner: Over-Allocation or Abatement: A Preliminary Analysis of the EU ETS based on the 2005-06 Emissions Data, in: Environmental and Resource Economics 41, 2, 2008, 267–287; Ellerman, A. D., S. Feilhauer: A Top-Down and Bottom-Up Look at Emissions Abatement in Germany in Response to the EU ETS. Center for Energy and Environmental Policy Research (CEEPR), 08-017, November 2008; Deutsche Emissionshandelsstelle (DEHSt) im Umweltbundesamt: Emissionshandel: Auswertung der ersten Handelsperiode. Berlin 2009.

10 See Diekmann, J., M. Horn, l.c.

EU in its assessment report,[11] some uncertainties remain. For example, the precise extent to which the member states will fulfill the overall targets for the use of renewable energy in the electricity or heating sectors is not clear. This allocation will first take place in the middle of 2010 once the member states have presented their national action plans for the development of renewable energies. Unintended price-lowering effects on the CO_2 market will only be triggered, however, to the extent that the actual emissions reductions achieved with renewable electricity exceed the anticipated reduction amounts. Yet regardless of the outcome in this connection, European emissions trading is subject to a number of future uncertainties. The setting of more aggressive abatement targets depending on the results of international negotiations is one prime example.

In this regard, the European strategy to ambitiously expand its use of renewable energy—alongside emissions trading—can be seen as a political signal with which the EU can solicit trust for cooperative efforts to address international climate protection. Here, as well, there is no contradiction between emissions trading and the promotion of renewable energy.

The Renewable Energy Sources Act is a Necessary Instrument for Promoting Renewable Energy

In order for the EU's targets to be attained, the promotion of renewable energy is needed alongside an emissions trading system. The basic model furnished by the Renewable Energy Sources Act has proven its worth. This is particularly true with regard to the effectiveness of its minimum feed-in tariffs and the high investment security afforded by its purchase guarantees. The Act also fares well in an international comparison of similar policies. The Act's varied tariffs enable the introduction of cutting-edge technologies—such as offshore wind parks—while avoiding undesired high profits in other areas. The gradually declining feed-in tariffs (degression) provided under the Act send a clear signal to market participants that cost reductions are necessary (particularly with regard to the oft-debated high feed-in tariffs for photovoltaic electricity). In addition, the undesired burdening of individual electric supply companies and energy-intensive firms is for the most part avoided (thanks to a nationwide equalization scheme and special hardship provisions, respectively). The financial burden borne by electricity consumers not privileged under the Act is approximately one euro cent per kWh. This burden will initially increase as the use of renewable energy is expanded, but will fall in a few years as the cost differential declines and more power producers wean themselves from the promotion scheme. This process will be supported by the emissions trading system, which will play an increasingly important role over the mid- to long-term in determining the competitiveness of renewable energies.

Alongside the necessary cost reductions, a key challenge at present is the need to improve the integration of renewable electricity into the power grid and markets. First, there are problems associated with the rapidly increasing share of electricity from fluctuating sources of supply (particularly wind energy). This has a number of effects on the electricity grid and other power stations. Second, it would be expedient—irrespective of the first point—to create increasing incentives for the more demand-oriented provisioning and marketing of electricity. Modified promotion provisions could create greater risks—but also greater opportunities—for power plant operators and future investors. Improved support schemes can also help to make new green energy technologies commercially viable as early as possible.

Conclusion

There are many good reasons for the increased use of renewable energy. It limits environmental impacts, conserves non-renewable resources, and decreases energy-supply risks. As these external benefits have not been taken sufficiently into account in market prices up to now, government efforts to promote R&D as well as the market for renewable energy are, as a rule, justified. In addition, investment in renewable energy is creating a growth branch with considerable export potential. Promotion policies accelerate technological innovations and their adoption. They also induce cost reductions that improve the economic efficiency of energy supply over the mid- to long-term.

Renewable energies are increasingly replacing fossil fuels and are thus making a significant contribution to minimizing the emission of greenhouse gases such as CO_2. Some critics, however, reject the targeted promotion of renewable energy by claiming that it is incompatible with European emissions trading. They justify this argument on the grounds that, with emission caps in place, the promotion of renewable energies merely lead to lower CO_2 certificate prices and the displacement of emissions. On the one hand, this argument is flawed in its overestimation of the

11 Commission of the European Communities: Annex to the Impact Assessment. Document accompanying the Package of implementation measures for the EU's objectives on climate change and renewable energy for 2020. Commission Staff Working Document, SEC (2008) 85, Vol. II, Brussels, 27. Feb. 2008.

previous effectiveness of European emissions trading. On the other, the possibility of coordinating emissions trading and the promotion of renewable energy in an expedient manner—particularly with regard to the setting of goals—is underestimated. Yet the coordination of policy instruments lies at the very heart of the integrated energy and climate policy pursued at the national and European level. As long as anticipated CO_2 reductions from renewable energy are taken into account in the determination of emissions caps, undesired displacement effects can be avoided. In this way, the argument that the promotion of renewable energy is ineffective for climate policy is rendered groundless. In any event, the current support for renewable energy is also improving future opportunities for climate protection, thanks to the practical experience gained.

The use of renewable energy must be promoted not only in the electricity sector, but also in the transportation and heating sectors. Furthermore, it is essential to improve the efficiency of energy conversion while encouraging greater conservation among consumers. These goals continue to require a mix of energy and environmental policy instruments that are coordinated at a national and international level—of which emissions trading forms one part.

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