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ÖSTERREICHISCHES INSTITUT FÜR WIRTSCHAFTSFORSCHUNG

Analysis of Options to Move Beyond 20 Percent Greenhouse Gas Emission Reductions

Policy Brief addressing the EC Communication on More Ambitious Greenhouse Gas Reductions

Stefan Schleicher, Claudia Kettner, Angela Köppl (WIFO), Barbara Anzinger, Bernhard Cemper, Andreas Türk (Wegener Center), Andreas Karner (KWI)

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Austrian Institute of Economic Research
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Abstract

The issues addressed in the Communication Analysis of options to move beyond 20 percent greenhouse gas emission reductions and assessing the risk of carbon leakage(COM(2010) 265) opens the discussion about a redesign of the energy and climate policy of the EU. Our analysis of the Communication reveals the following key findings:

- A more ambitious reduction target for 2020 needs to be embedded in a long-term strategy for GHG reductions until 2050.
- The new challenges for international climate policy have shifted from controversies about targets to a competition of technologies.
- In this competition for technological innovation the EU is facing a widening technology gap relative to the USA and China.
- Any future emissions reduction policies should therefore be closely tied to an ambitious technology initiative.
- The estimated costs in the Communication of 0.54 percent of GDP in order to achieve a 30 percent target need a detailed explanation.
- According to our analysis, a supporting technology initiative requires investments beyond 2 percent of GDP each year and new finance mechanisms.

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Analysis of options to move beyond 20% greenhouse gas emission reductions

Policy Brief
addressing the EC Communication on more ambitious greenhouse gas reductions

February 2011

The consultation invited by the Communication

The Communication **Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage** (COM(2010) 265) invites consultation about a redesign of the energy and climate policy of the EU by addressing the following issues:

- Options for a more ambitious reduction target for 2020
- Economic evaluations of these options
- Implications for economic innovation and employment

Our key findings

Responding to the consultation opened by this Communication, our analysis reveals the following key findings:

- A more ambitious reduction target for 2020 needs to be embedded in a long-term strategy for GHG reductions until 2050.
- The new challenges for international climate policy have shifted from controversies about targets to a competition of technologies.
- In this competition for technological innovation the EU is facing a widening technology gap relative to the United States and China.
- Any future emissions reduction policies should therefore be closely tied to an ambitious technology initiative.
- The estimated costs in the Communication of 0.54% of GDP in order to achieve a 30% target need a detailed explanation.
- According to our analysis, a supporting technology initiative requires investments beyond 2% of GDP each year and new finance mechanisms.

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Perspectives for a more ambitious emission reduction target

The need for a long-term roadmap

The need for a roadmap until 2050

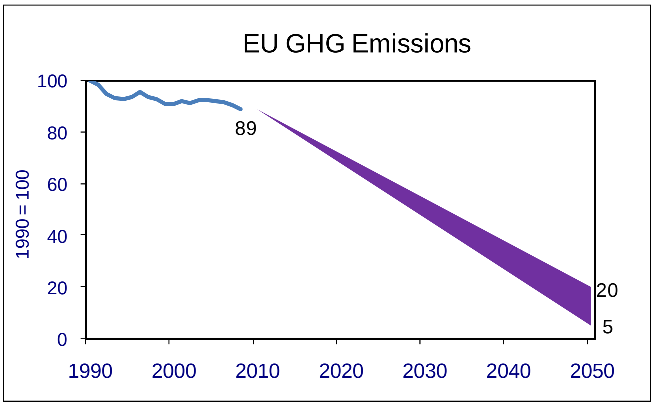
Discussions about a more ambitious EU emission reduction target for 2020 need to be embedded into a long-term roadmap that outlines reduction paths until 2050.

This is necessary because of the impact of current investment decisions on energy demand over many decades.

Perspectives for radical reductions

There is an emerging consensus that limiting the global temperature increase to 2°C would require radical reductions of GHG emissions in the range of 80% to 95% in the industrialised countries by 2050.

Figure 1: EU GHG emission paths up to 2050



Source: Own graph

Searching for feasible reduction paths

Assuming a linear reduction path, the compatible targets for 2020 would be 28% or 32%, respectively, as indicated in Figure 1.

It would be premature, however, to draw conclusions about 2020 targets, since there is not sufficient information available about the dynamics of feasible long-run reduction paths which will depend on

- the diffusion rate of new technologies, e.g. the introduction of electric cars,
- the limits of physical and financial resources, e.g. the availability of renewables and long-term financing, or
- historic decisions, such as the thermal quality of the building stock.

From controversies about targets to a competition of technologies

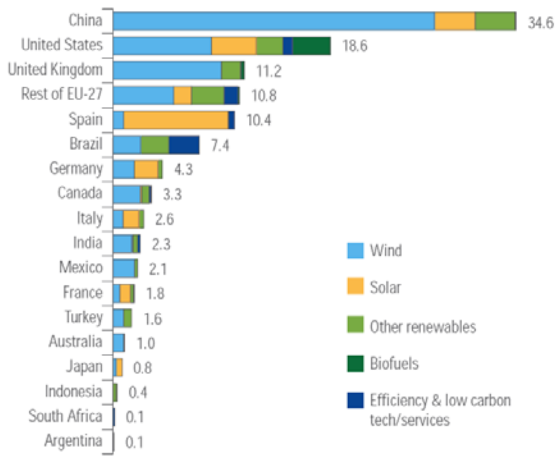
The new architecture of climate policy after Copenhagen

From the Kyoto Protocol to the Copenhagen Accord and the Cancun Agreements

In many ways the Copenhagen Accord of December 2009 marked a departure from the architecture of multilateral climate cooperation, which is chiefly embodied in the Kyoto Protocol.

The Cancun Agreements of December 2010 basically transfer the Copenhagen architecture, which reflects the positions of the United States and China, into a UN-inspired negotiating environment.

Figure 2: Investments in clean energy in 2009 (billions of US$)



Source: PEW Center (2010)

Climate policy shifts from targets to technologies

The architecture of pledges and technology transfer

In a nutshell this new architecture for international climate policy rests on two pillars:

- Individual pledges of countries concerning their emissions efforts are replacing joint reduction targets in a legally binding framework.
- The transfer of technologies with accompanying financial facilities is emerging as a new agenda item, although it is still far from becoming operational and effective.

Modest pledges but strong investments in clean energy technologies

There is increasing evidence that this re-design of the climate policy agenda has already started. There is a striking contrast, however, between the rather modest unilateral emission reduction pledges of some countries and their actual efforts to invest in clean energy technologies.

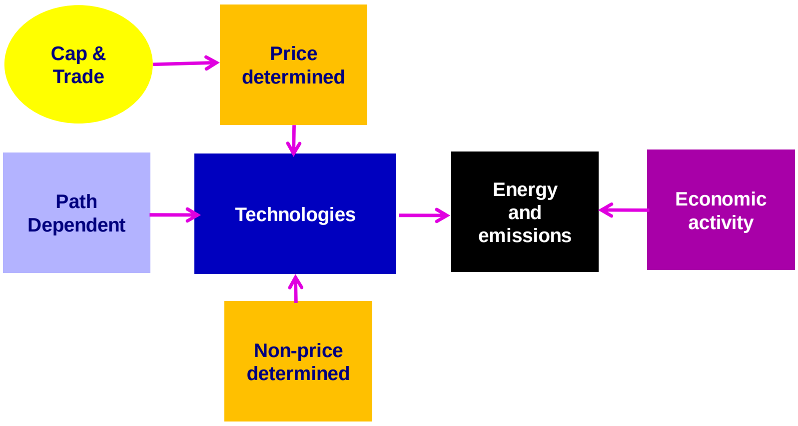
The new geography of clean energy investments

China has become the biggest investor in clean energy

The new agenda in climate policy is reflected to a remarkable extent in China, which has been rather hesitant to commit to reduction targets but highly ambitious with innovative energy technologies. This becomes evident in the new geography of clean energy investments as indicated in Figure 2, which was produced by PEW Center (2010). This demonstrates how China has become the one state with the largest investments in the sector.

Although the EU investments in total still exceeded China in 2009, China expanded its investments by about 30% in 2010 as reported by Bloomberg New Energy Finance, thus probably changing this situation. China now represents about one fifth of total world demand for clean energy investments.

Figure 3: Drivers for the state and change of technologies



Source: Own graph

Understanding the drivers of technological change

Technologies are not only price-determined

Since climate policy discovers the key role of technologies, we need to obtain a better understanding about the technologies' current state and their drivers for change.

As demonstrated in Figure 3, technologies are only to some extent determined by prices, e.g. energy prices. Non-price determined motives, such as strategic considerations, may be more important. In addition we need to realise that current technologies often reflect historic decisions.

The limits of cap-and-trade for inducing technological change

A cap-and-trade based climate policy mainly relies on price incentives to deliver technological change. Such price-induced incentives may not however elicit the radical technological changes sought. For reasons of international competitiveness the emissions cap and the related carbon price signals are restricted and thus may not be sufficient to trigger the switch to a technological change as envisioned in a perspective up to 2050.

Responding to the agenda of the Communication

Developing a shared energy vision for 2050

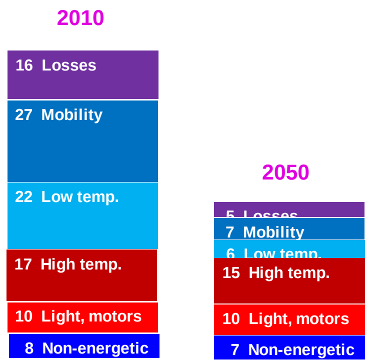
A radical transformation of the energy system by 2050

New reduction targets for 2020 need to be checked for consistency with long-term reduction paths. If the EU is committed to GHG emission reductions between 80% and 95% by 2050, a radical transformation of our energy system will be required.

Emphasising the services of the energy system

The outlines of such a transformation emerge if we look at the current structures of European energy systems in an innovative way that links energy flows to their related energy services. This is done in Figure 4, which uses Austria as an example. Current energy flows are normalised to add up to 100. Typically losses during transformation and distribution, the use of energy for mobility and low temperature services account for two thirds of energy consumption in Europe.

Figure 4: A feasible transformation of the European energy system



Source: EnergyTransition (2010)

Maintaining the required energy services with half of the current energy flows

Switching to high-efficiency co-generation for heat and power, to heat-pumps, to low- and plus-energy buildings standards and to electric vehicles should result in an increase of energy productivity over the next four decades by a factor of at least four.

Envisaging smaller productivity increases in the remaining energy consumption for high temperature processes in manufacturing, the use of electricity for lighting, electric motors and electronics, and the non-energetic use of energy, it is quite reasonable to suggest that Europe could provide all required energy services in 2050 with just half of the energy flows of 2010.

Achieving a GHG reduction of at least 80 %

Achieving emission reductions of at least 80% suddenly appears feasible if the volume of renewables that has been agreed upon for 2020 is doubled in the following three decades up to 2050.

Thus, the transformation to high-efficiency structures for transforming and applying energy is a prerequisite for any radical emission reductions.

Engaging in an ambitious technology initiative

A technology initiative for high-efficiency and low carbon energy systems

The EU has many reasons for engaging in an ambitious technology initiative with a focus on high-efficiency and low carbon energy systems:

- The global competition for these technologies is currently led by China and the United States with the EU threatened with falling behind.
- Energy security for the EU requires a decisive shift to high-efficiency and low carbon technologies.
- Maintaining credibility in the international climate policy negotiations requires demonstrable progress in the development and implementation of innovative energy technologies.

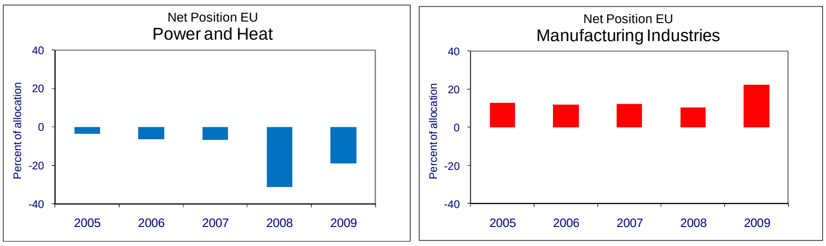
Although the EU already has a broad spectrum of technology programs, these seem to be fragmented and not at the top of the policy agenda.

Targets follow from technologies

Targets emerge from technology decisions

Having agreed upon a shared vision for the long-term energy paths and a supporting technology initiative, any agreements about more ambitious reduction targets for 2020 as well as 2030 should only emerge as a by-product of the preceding technology policy decisions.

Figure 5: Sectoral net positions of EU ETS from 2005 to 2009



Source: CITL, own calculations

Lessons learned from the EU ETS

This of course reverses past EU policy procedures about emission reductions which started with targets and hoped these would induce technological changes. So far, however, this has hardly materialised for the EU ETS, looking at its first five years as depicted in Figure 5. During this period the emission cap was binding for the whole system only in 2008 and the manufacturing sector was always in surplus of emission allowances. Before drawing conclusions for a tighter cap at least two issues need to be addressed.

The first deals with the excess of allowances that result from the economic crisis and not from abatement efforts, the hot air phenomenon in the EU ETS. The second concerns the industrial base in Europe, since extending the current set-up of the EU ETS to a 30% target – as suggested by the Communication – would require the elimination of every third emission unit by 2020.

New targets need a revised effort sharing

The distribution of the emission reduction needs between ETS and non-ETS sectors and the distribution of the efforts in non-ETS sectors among Member States are essential for the effort sharing.

Both distribution parameters need to be revised in a more ambitious target.

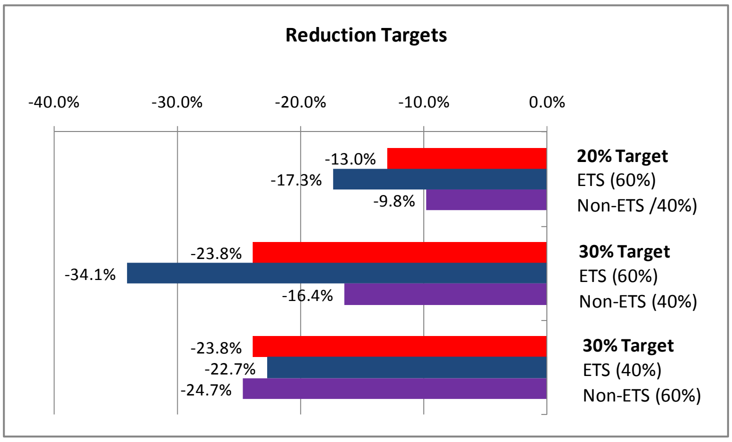
Distributing the reductions between ETS and non-ETS sectors

A comparison of different reduction scenarios for 2020 yields the following conclusions, summarised in Figure 6.

- Compared to a 20% reduction target for 2020 over 1990, the total reduction requirements increase from 13% to 24% over 2005 when moving to a 30% target.
- The distribution of the reduction requirements between ETS and non-ETS sectors is essential for determining the relative reductions efforts.
- Extending the current 60 : 40 distribution between ETS and non-ETS sectors requires a 34% reduction effort for the ETS sectors compared to 16% for the non-ETS sectors.

Since there is not sufficient evidence to justify this asymmetry in effort sharing, reversing this distribution yields a 23% reduction for the ETS sectors and a 25% reduction for the non-ETS sectors, and thus comes closer to equal relative reduction efforts and available reduction potentials.

Figure 6: Distributing the reductions between ETS and non-ETS sectors



Sorce: Own calculations based on EC documents

Distributing the reductions of non-ETS sectors among Member States

Similarly an extension of the current modulation of non-ETS sector reductions would require at least a stabilisation of emissions even in countries such as Bulgaria and Romania, which under the current agreements are allowed to expand their emissions by up to 20%. Meeting such a stringent cap would only be feasible with a massive inflow of technologies and financing.

A thorough economic evaluation

The additional costs suggested in the Communication for a 30 % target

The Communication proposes that the costs of stepping up the reduction target from 20% to 30% will be close to the cost reductions caused by the economic crisis. Thus, in 2020 the costs of a 30% reduction target are estimated 0.54% of GDP or 0.2% up for a 20% target. These costs are supposed to be inclusive of the measures for the 20% renewables target.

Why the economic impacts need to be re-evaluated

There are a number of reasons to call for a thorough re-evaluation of the economic impacts both of a 20% and a 30% target, mainly flowing from two issues:

- There is a need to differentiate between investments and user costs for energy services. Only the latter are relevant for cost comparisons. This analysis is still missing.
- The investments needed for meeting both a 20% and a 30% target should be described in more detail, e.g. broken down for buildings, mobility, and restructuring energy supply.

Estimating investments and user costs of energy services

Based on the research project EnergyTransition, which is led by the Austrian Institute of Economic Research, we make two suggestions:

- We estimate that achieving a target beyond 20% requires additional investments amounting to at least 2% of GDP each year until 2020 if economic activity returns to pre-crisis growth rates.
- We emphasise, however, that many investments will have a useful life span beyond 2020, therefore the corresponding user costs of energy services will not necessarily be higher, depending on assumptions about investment cost reductions, depreciation rates, capital costs and energy prices.

Mobilising new finance

New financial instruments and their distribution between old and new Member States

The transition to high-efficiency and low carbon energy systems requires investments that seem thus far to have been underestimated. We support, however, all arguments that call for an ambitious technology initiative by the EU for engaging in this emerging competition for innovative technologies. Such a commitment poses at least two challenges for financial resources:

- First, there is a need for new finance instruments that deal in particular with long-lasting infrastructure, such as buildings and energy transformation units.
- Secondly, given the inequalities in economic welfare and investment opportunities between old and new Member States, the issue of an adequate distribution of financial resources will become more significant.

Thus, the credibility of any emissions reduction commitments will hinge crucially on a supporting technology initiative and an accompanying mobilisation of financial resources.

This Policy Brief is based on the research project

Analysis of options to move beyond 20% greenhouse gas emission reductions

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