SRU German Advisory Council on the Environment

An Ambitious Triple Target for 2030

Comment to the Commission's Green Paper "A 2030 Framework for Climate and Energy Policies" (COM(2013) 169 final)

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The Advisory Council on the Environment (SRU) was founded in 1971 to advise on German and European environmental policy. The Council is made up of seven professors from a range of different environment-related disciplines. This ensures an encompassing and independent evaluation from a natural scientific and technical as well as from an economic, legal, and political science perspective. The Council is a member of the network of European Environmental and Sustainable Development Advisory Councils (EEAC). It has currently the following members:

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Key Messages

This contribution to the consultation of the European Commission on the Green Paper "A 2030 Framework for Climate and Energy Policies" is based on recent and ongoing work of the German Advisory Council on the Environment (SRU) in the fields of climate and energy policy (SRU 2008; 2011; 2013). Currently, the SRU is preparing two related statements on (a) options for energy market design reforms required to enable the transition to an energy market dominated by renewable energy sources (RES) and (b) energy efficiency improvement opportunities in industrial sectors.

The key messages in response to the questions raised in the Green Paper are:

- The timely adoption of ambitious mid-term targets for 2030 is indispensible to ensure the transition to a low-carbon economy in a dynamic and efficient manner.
- The EU should maintain a three pillar approach consisting of separate targets for greenhouse gas (GHG) mitigation, RES expansion, and energy efficiency improvements.
- The GHG target for 2030 should be no less than a 45 percent domestic reduction compared to 1990 levels in order to stay on track to meet the EU's 2050 targets and to foster attaining a global climate protection agreement.
- The RES target should be lifted to 40 to 45 percent of gross final energy consumption by 2030. Given the urgent need for infrastructure expansion and the related necessity of investment certainty, the EU might consider a separate RES-E (RES in the electricity sector) target in the range of 50 to 70 percent. This would provide long-term planning and investment security in the sector. The separate RES target for the transport sector should be abandoned in view of the harmful direct and indirect land-use implications.
- The EU should not harmonize RES support schemes. Instead the subsidiarity principle should apply as member states are in different states of RES development and a still more experimental approach enables regulatory learning.
- Estimates of reduction potentials in primary energy consumption amount to up to 50 percent by 2030, with most energy saving opportunities being cost-effective. Energy efficiency targets should strive for tapping this potential and be made legally binding by 2030; responsibility to meet the targets should remain at the member state-level. Only product-related energy performance standards need to be harmonized at the EU-level.
- Ambitious climate policy targets will not do serious harm to Europe's competitiveness. Maintaining a vanguard role will trigger low-carbon innovation, boost competitiveness in future-oriented industries, create sustainable jobs, reduce dependence on imported fuels, attenuate vulnerability to fossil fuel price volatility, and contribute to a reduction of the EU's trade deficit. Thus, large investments in the energy system transition may have

positive macroeconomic impacts especially in the most fossil fuel import-dependent countries.

More detailed responses to the different sets of questions follow below. The headlines and the numbering mirror the clusters of questions posed in the Green Paper.

4.1 General

Lessons from the Past

The most important lesson to be drawn from the EU's 2020 framework is the need for a package of credible and well-tailored targets. EU ETS (European Union Emissions Trading System), renewables deployment, and energy efficiency improvements form a system of interdependent strategies, having ramifications on each other. The three pillars need to be seen as a whole; together they form the basis for the transition towards a low-carbon economy. RES expansion and energy efficiency improvements have effects on the carbon price. This makes it critical that progress in these areas be anticipated and incorporated into the establishment of the climate target. Conversely, achievement of the climate target will require a certain share of renewables and energy savings as no-regret elements. Substantial reductions in energy consumption facilitate achieving high RES shares in the overall energy supply. These interdependencies were partly considered already in the preparation of the 2008 targets.

Legally binding targets for the expansion of renewables have triggered dynamic developments in this sector, bringing some technologies close to market maturity. It is doubtful whether GHG targets alone could have triggered a comparable technological leap. In contrast, current energy efficiency policies will not result in a fulfilment of the 2020 targets according to the Commission's preliminary analysis. The indicative targets of the climate and energy package as well as the Energy Efficiency Directive of 2012 appear to be insufficient to motivate substantial cuts in energy consumption.

The Case for a Three Pillar Approach

The European Commission identifies substantial energy efficiency improvements and a strong renewables expansion as no-regret options on the pathway to a low-carbon energy system; they are fundamental building blocks for any energy transition strategy. In order to realize their large potentials, energy efficiency and renewables expansion necessitate a stable regulatory framework beyond 2020. Yet, the development of a policy framework for 2030, one based on the three pillars discussed above – a target for overall GHG reduction, a RES target, and an energy efficiency target – has been called into question.

Sceptics claim that three separate targets that interfere with each other would create inconsistencies and economic inefficiencies. According to this line of reasoning, a mere GHG target would achieve climate targets in the economically most efficient manner; a common

carbon price would be the allocation mechanism of choice. Sceptics either argue that the rationale for separate targets is no longer valid, or they fundamentally deny this rationale altogether. There are, however, a number of counter-arguments why a one-pillar approach will not deliver.

Market Failure

Most of the well-founded justifications for explicitly defined targets for the expansion of renewables and energy efficiency improvements will still apply in the years to come. The essential reasoning for targeted policies is that price signals can be efficient as a short- and medium-term clearing mechanism for mature abatement options, but they will not be sufficient to steer a dynamically efficient transition over the long-term due to a number of barriers. These barriers that need to be addressed by specific policy instruments include (SRU 2011, ch. 8; MATTHES 2010; GILLINGHAM and SWEENEY 2010, ch. 5; GILLINGHAM and PALMER 2013; LEHMANN and GAWEL 2013):

- Lock-in effects caused by increasing returns (economies of scale, learning-curve effects, network effects, adaptive expectations), irreversibility, and the longevity of energy investments
- Non-internalized positive spill-overs of energy R&D (research and development) and technology roll-out
- Negative externalities of the nuclear-fossil energy system
- Regulatory uncertainty, implying high investment return demands
- Capital constraints and insufficient access to funding
- Boundedly rational and myopic consumer behavior and negative positionality externalities, hampering energy-efficient choices
- Risk-averse, insufficiently informed, and rather short-sighted investment strategies of firms with regard to energy efficiency
- Adverse incentive structures
- Merit-order effects, inhibiting the recovery of investment costs in an energy-only market

Need for a Transformative Approach

Some of these barriers (e.g. increasing returns) are characteristic of almost any emerging technology market and they do not necessarily justify (ongoing) policy support as innovative products can develop in market niches. Yet their effect is particularly strong in the energy market because energy products – especially electricity – are very homogeneous goods, whose competitiveness is determined almost entirely by their prices (KALKUHL et al. 2012). Although substantial scale economies and learning-curve effects have been realized in

recent years, further potential remains. Moreover, (renewable) energy technologies differ in their further cost reduction potential. Limiting options to mature technologies will be insufficient to bring about the targeted deep emissions cuts. Furthermore, a technology mix with differing supply profiles can mitigate overall system costs through reducing the requirements for balancing capacities. As the development of (still infant) technology options cannot be achieved by the market alone via carbon price signals – due to the aforementioned barriers –, (technology-specific) support is warranted even beyond 2020. Certainly, some technology options will prove to be uncompetitive in the long-term and involve stranded investments. Yet societies as a whole have a greater risk bearing capacity than single market actors; hence, policies that provide continued support for promising innovative technologies, even though they are still in their infancy and fraught with uncertainties, can be justified on grounds of overall risk cost minimization.

Infrastructure Planning: The Hen and Egg Problem

The interplay of renewable electricity generation and grid/storage expansion deserves special attention. Accounting for the lead time and longevity of investments in energy infrastructures, milestones beyond 2020 have to be set soon in order to provide planning and investment stability. This holds not only, but especially for the pivotal expansion of transmission and storage capacities needed to absorb increasing shares of intermittent electricity sources. If potential investors are uncertain about the future extent and speed of renewables development, due to a lack of targets or uncertainties about their credibility, they will remain reluctant to invest and/or demand high-risk premiums. At the same time, investors in RES-E generation capacities need certainty with respect to the timely connection of their facilities to the grid. In short, without clear targets for the expansion of renewable electricity generation, the expansion of transmission capacities will slow down due to a lack of investment certainty, which again constitutes a barrier to investments in renewables. While RES targets for 2030 are essential to incentivize timely grid investments, they are not enough. In order to ensure coherent development of generation and transmission capacities, they have to be accompanied by an institutionalized, anticipatory, and flexible planning of grid and storage expansion, involving strong coordination across member states.

Key Role of Energy Efficiency

Generally, all types of energy production cause some kinds of negative externalities, including renewables. Particularly, the large-scale cultivation and use of biomass for energy purposes can entail, directly and indirectly, serious harmful environmental and social effects. Thus, reducing the economy's energy demand is the most straightforward way to minimize any adverse local or global energy-related impacts on the environment and society. Consequently, ambitious and mandatory energy efficiency policies are indispensible to realize energy savings without compromising economic objectives. Providing EU-level guideposts by means of legally binding energy efficiency targets is essential to that end.

Moreover, most energy efficiency potentials are economically beneficial to investors and society even before accounting for effects on externalities.

Resilience

EU-level guideposts providing a medium- and long-term framework are of particular importance in times of economic crisis. Economically struggling countries tend to act rather short-sightedly whereas the longevity of most energy investments calls for farsighted decisions made in accordance with long-term decarbonization goals. In the context of crisis-induced political disturbances, a further merit of a multi-impulse approach based on the three coordinated energy policy pillars (GHG reduction target, RES target, and energy efficiency target) is its enhanced resilience against political stalemate and vetoes compared to policy relying on only one – seemingly omnipotent – instrument (i.e. GHG target implemented through emissions trading) (JÄNICKE 2012; MIDTTUN 2012).

Interdependencies and Consistency

Obviously, a policy framework, which rests upon three separate pillars that are highly intertwined, poses challenges in terms of consistency (MATTHES 2010). Ambitious RES and energy efficiency targets must not relieve emitters that are regulated solely by the EU ETS from taking own GHG mitigation efforts. The ambition levels of the distinct targets require synchronization such that the carbon price signal is sufficiently strong to stimulate innovation and abatement progress in those sectors not subject to targeted policy instruments. Yet, the task of ensuring consistency across targets does not provide serious arguments against maintaining the three pillar approach. Nevertheless, improved communication in this regard is strongly recommended in order to increase acceptance and invalidate the claims of sceptics who contend that three separate, but interdependent, targets are incompatible and will harm the efficient working of the EU ETS. It has to be pointed out that well-concerted targets are complementary and mutually supportive.

4.2 Targets

With regards to the EU target for overall GHG reduction by 2030, the Low-carbon Economy Roadmap has set 40 percent as a point of reference for the internal negotiations. Any target below this would severely conflict with the EU's agreed on long-term objectives for 2050 as it would require an extremely steep GHG reduction path after 2030. Delayed action shifts mitigation responsibility into the future and may risk excessive costs at later stages. This holds true even though the EU is only striving for an 80 percent reduction in GHG by 2050, the lower boundary of the corridor of necessary GHG reductions by developed countries to maintain an increase in global average temperature below 2°C.

In the context of the international negotiations on a legally binding global treaty on GHG mitigation commitments, a 40 percent reduction target will with high probability be insufficient

to secure a path that is consistent with achieving a 2°C climate target. If equal relative effort – in terms of costs as a share of gross domestic product (GDP) – across countries is considered a fair footing for such a treaty and in order to be on track with the 2°C climate target, the contribution of the EU would need to be in the range of 45 to 47 percent (HOF et al. 2012). A domestic EU reduction target of 40 percent with other countries making contributions based on the same effort-sharing principle (that is, costs representing equal shares of GDP) would be inconsistent with a 2°C target.

Hence, the EU should commit to GHG reduction targets that maintain its vanguard role, pave the way towards an ambitious global climate protection agreement, and – not least – ensure a consistent and long-term cost-minimizing path towards its own energy system transition objectives. This would imply a reduction target of no less than 45 percent. Less ambitious targets would inevitably lead to problems in obtaining a low-carbon energy system transition in a widely frictionless manner and could require future technology leaps.

Given the further cost degression potentials of RES and recognizing the low levels of acceptance (and technological problems) of both CCS (carbon capture and storage) and nuclear energy in several countries, a reasonably ambitious EU-wide 2030 target for the share of renewables in the energy consumed reflects a no-regret approach on the way towards meeting the 2050 targets. There is little realistic alternative to high shares of renewable energies as the backbone of the transition to a low-carbon economy. Decarbonization strategies that substantially rely on additional nuclear power or significant CCS deployment appear infeasible under present economic and political conditions in most member states (HEY 2012).

Thus, in order not to damage the credibility of Europe's low-carbon agenda, mid-term targets for RES deployment have to be set at a level that under realistic assumptions on nuclear power and CCS is sufficient to meet Europe's climate targets. Certainly, even more would be technically and economically possible as shown by a number of scenarios, which demonstrate the economic feasibility of a 100 percent renewables-based electricity system (for an overview see SRU 2011, Table 3–1). The Energy Roadmap 2050 finds that for 2050 there are hardly any differences in overall energy system costs among scenarios reaching from 55 to 75 percent RES in gross final energy consumption – with up to 97 percent RES-E in electricity consumption.

Under the precondition of the setting of ambitious energy efficiency policies and the steady electrification of sectors that have been based on fossil fuels (transport, buildings), a RES target of 40 to 45 percent seems achievable in an overall economically efficient manner. A target for renewable energies in the overall energy mix combined with National Renewables Action Plans allows for some flexibility to take into account different national conditions.

Alternatively, the EU could consider establishing a separate RES-E target (FISCHER and WESTPHAL 2012). Accounting for the enormous grid and storage infrastructure expansion

needs as well as their long lead times, a separate target might be especially helpful to coordinate RES-E expansion and grid development, and to provide the required planning and investment stability. For the electricity sector, a renewables share of 50 to 70 percent is within reach (SRU 2011, p. 46; WHITE and ANDERSON 2013; EREC 2013), which can serve as a benchmark for determining a RES-E target.

Separate RES targets for other sectors, particularly for the transport sector, should be abolished. First, they are inconsistent with the flexible approach of the NRAPs (National Renewables Action Plans), giving member states the freedom to find the right balance of RES among sectors. Second, in particular first-generation biofuels have serious direct and indirect social and environmental impacts and hence only shift problems. The electrification of the transport sector based on renewable sources – alongside with energy efficiency improvements – seems to be a more promising strategy.

For energy efficiency, the third pillar of a comprehensive 2030 framework, recent estimations suggest a primary energy saving potential of up to 50 percent between 2010 and 2030 (BOßMANN et al. 2012). Whereas there is some variance across studies in terms of the estimated energy efficiency potential, they widely agree that most energy saving opportunities are cost-effective or can be taken at low additional costs. Thus, mandatory energy efficiency targets should strive for fully tapping these energy saving potentials. Effectively tapping the potentials for energy efficiency improvements is indispensable to achieve high RES shares in the energy mix and to enable compliance with 2050 targets at costs acceptable to society.

In case of only very modest targets for GHG mitigation, energy efficiency improvements, and the expansion of renewables, investments will be steered in assets that suffice to comply with these modest milestones, but are incompatible with the deep emissions cuts required by 2050. Incompatibility may arise not only from insufficient GHG reduction potentials in the long-term, but also from a lack of the necessary technical and economic flexibility to act as a complement to intermittent RES. This holds true particularly for large-scale electricity generators, such as nuclear and coal-fired power plants, that require relatively continuous or at least a large number of operating hours. Given the longevity of most energy system investments, in later decades either a costly sharp turnaround which implies stranded investments will be necessary or achievement of the 2050 targets will be at jeopardy. The latter may represent a case of political lock-in as a consequence of technological lock-in: unambitious interim targets in early transition stages can trigger a revision of former mitigation objectives due to steeply rising abatement costs.

4.3 Instruments

Basically, the current set of instruments employed for achieving the 2020 targets is deemed widely appropriate. Whereas these instruments should be moderately adjusted to new 2030 targets, major revisions seem not warranted.

GHG Mitigation: Revitalizing the EU ETS

In the realm of general GHG reductions targets, the current division of mitigation responsibilities should be kept: Centralized regulation by means of emissions trading for large emitters in the electricity and industry sectors, and national responsibilities as well as regulatory leeway for achieving the remainder of required GHG reductions. In view of the UK carbon price floor and emerging similar debates in other member states, it becomes evident that a substantially smaller carbon budget is required for the survival of emission trading as the key climate policy tool of the EU; the carbon price signal sent by the EU ETS must be sufficiently strong to induce technological innovation and effective CO_2 mitigation measures of captured firms. This necessitates GHG targets for the EU ETS sectors that re-establish a real scarcity of allowances.

RES: Regulatory Learning under the Subsidiarity Principle

With regards to the promotion of renewables differing national support schemes may involve inconsistencies with the objective of a liberalized internal energy market. In theory, a fully harmonized European support system might be more consistent with the internal energy market. In practice, however, we see fundamental obstacles to a fully harmonized RES support scheme, particularly to a European system of tradable renewables quotas (SRU 2011, ch. 6). First, feed-in tariffs have proven to be the most effective and efficient remuneration system for “new” renewable, such as solar and wind, as illustrated by the wide diffusion of those systems throughout the EU. Second, the harmonization of well-established national support schemes tailored to member states’ specific circumstances will engender temporary regulatory uncertainty that can decelerate the growth of renewables. Third, a harmonized approach must be less flexible and is not suitable in a situation of experimental transitions of the support schemes in several member states. Fourth, a harmonized quota-based approach would require consensus among member states on the energy mix and the speed of renewables deployment. As long as member states have different preferences and favour different speeds in the transition, they also need the means to do so. So neither a fully harmonized quota system nor a fully harmonized European feed-in tariff scheme is suitable for the present constellation. Harmonized feed-in tariffs that avoid windfall profits in countries with conditions conducive to renewable electricity generation would imply a severe impediment to own ambitious renewables expansion plans in member states with less favourable site conditions. Moreover, the concentration of RES-E generation sites that will likely result from a harmonized set of feed-in tariffs may not necessarily be cost-optimal from

a broader energy system perspective, which takes account of balancing and transmission needs.

Therefore, the subsidiarity principle and its current application – consisting of binding but different RES expansion targets for each member state and national support schemes – should be the strategy of choice; it appears most promising in assuring an effective and efficient renewables development, while being able to reach consensus among member states at the same time. This approach allows member states to adapt individual support policies to their – foreseeable still very heterogeneous – specific state of renewable energy development. Moreover, the contrast of different national support schemes fosters ongoing policy innovation and provides guidance on best practices. Regulatory learning from different policy approaches in a framework based upon the subsidiarity principle is of particular value with regards to new electricity market design forms, given the need to cope with ever-rising market shares of renewables.

While not calling for a harmonization of support schemes, the EU's renewables framework for 2030 has to serve as coordination mechanism among member states for their RES expansion strategies. This can be ensured through strengthening provisions that permit and promote voluntary cooperation concerning support schemes for renewables and their integration into the energy market. Cooperation and flexibility mechanisms as well as learning from each other will likely lead to stepwise convergence of the renewables policies across Europe, thereby increasingly tapping efficiency potentials. Relative to widely uncoordinated action within a framework merely setting GHG targets, the coordination of intermittent renewables, grid, and storage capacity expansion inherent to such a subsidiarity principle-based RES policy approach can considerably contribute to cost reductions for given objectives in terms of GHG reduction and RES shares. Further harmonization efforts of member states' RES policy appear to be less pressing until renewables become the dominant force in the electricity market and an extensive trans-European transmission network has been established.

Energy Efficiency: EU-level Product Standards and Customized National Solutions

Analogously to the EU's past RES policy, the indicative energy efficiency targets laid down in the Energy Efficiency Directive should be advanced towards legally binding targets in the 2030 framework. The EU should apply a dual approach to effectively achieve its overall energy saving targets in a manner that ensures economic efficiency and compliance with the internal market: EU-wide harmonized sectorial measures should be taken for widely standardized energy-consuming products (e.g. vehicles, household appliances) as is the case already today in the EU's broader eco-design framework. In realms that call for more customized solutions (such as industrial processes), an approach is warranted that follows the subsidiarity principle and allows countries to find their own ways to improve energy

efficiency. In order to ensure that these measures are actually taken, member states are to be made legally responsible and effective monitoring and enforcement mechanism must be established. Care has to be taken that energy performance standards drive innovation and that today's top-runners set the standards for tomorrow.

The recommendations outlined here would be in line with the energy policy strategy pursued by the EU institutions in recent years: to enable policy progress (that is, decarbonization of the EU economy) by means of a sequence of incremental reform steps (SRU 2011). This strategic approach seems most suitable for setting milestones on the way to finally achieving ambitious 2050 goals.

4.4 Competitiveness and Security of Supply

We share the Commission's argument that ambitious climate targets do little harm to the overall competitiveness of the EU economy, even in the case of failure to establish a binding global GHG reduction agreement that aligns international mitigation efforts (European Commission 2011a; 2011b; 2011c; 2011d). In the case of only unilateral action by the EU, fossil fuel prices would – given the rising global demand – considerably increase with high probability. Thus, the climate policy-induced relief from fossil fuel import costs would make good much of the difference in (capital) costs between low-carbon and business-as-usual pathways. In the case of globally coordinated action, fossil fuel costs are lower, but a global level playing field is created. The key difference between modest and ambitious mitigation ambition is the structure of costs: The transition to a low-carbon economy requires considerably higher capital investments, resulting in subsequently substantially lower running costs of the energy system. In times of financial and economic crisis in Europe, this relatively high level of initial investments is seen by sceptics as a major obstacle to ambitious GHG targets.

However, there are good reasons to turn this argument on its head – just in times of economic crisis. An investment strategy directed towards energy system transformation may rather be interpreted as means of anti-cyclical economic policy, providing a strong economic stimulus through unfolding multiplicator effects. This reasoning is underpinned by the fact that imported fossil fuels would be substituted for widely domestic added value, having the positive side effect of reducing the EU's trade deficit, which is largely caused by Europe's fossil fuel bill. Furthermore, a maintained vanguard role in climate policy would trigger innovations, strengthen Europe's competitiveness in the market for low-carbon technologies, and attenuate its vulnerability to fluctuations of fossil fuel prices (SPENCER et al. 2012; JAEGER et al. 2011; Oxford Economics 2011). Lastly, energy investments will be privately financed to a large extent – as far as it is ensured that the costs are borne by infrastructure users or energy consumers; this implies that these investments do not strain public budgets excessively. These arguments strengthen the case for both ambitious renewables and

energy efficiency targets. Therefore, the coordinated transition to a low-carbon economy should become a major pillar of the emerging European governance of the economy.

In order to address security of energy supply concerns, the focus should shift towards the realization of a Trans-European grid rather than on maintaining significant shares of conventional energy sources. Enabling balancing of supply fluctuations across Europe through coordinated grid expansion – alongside with growing integration of storage capacities – can achieve a high degree of supply security even with an energy mix that is dominated by renewables.

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