

# Electricity produced from renewable energy sources— What target are we aiming for?

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## Abstract

In 2001, the European Commission (hereafter “EC”) formulated an ambitious target of 21% of total community electricity consumption to be generated with renewable energy sources by 2010. Moreover, national indicative targets per Member State were specified. In practice, the latter are implemented in all Member States as national production targets, achievable exclusively through an increase of the domestic production of electricity produced from renewable energy sources (hereafter “RES-E”). However, in this article it will be shown that this is not in line with the EC’s intent. Looking at the legislative process resulting in the Directive on the promotion of RES-E, it is demonstrated that instead the EC aimed for European trade in renewable electricity through national consumption targets.

It is shown that the legislative process has resulted in confusion on both the nature (absolute or proportional figures) and the subject (consumption or production) of the RES-E targets that are being aimed for. Despite the EC’s attempt to clarify this confusion, the reality of national production targets remains, hindering the attainment of the European RES-E target in the most cost-efficient manner.

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## 1. Introduction

In September 2005, the European Parliament started the debate on post-2010 targets for electricity produced from renewable energy sources (hereafter “RES-E”) by calling for an ambitious mandatory target for RES-E in gross inland electricity consumption of 35% by 2020 (European Parliament, 2005). As input for this debate, this paper discusses how renewable energy source (hereafter “RES”) targets have previously been set and implemented, arguing that lessons should be learned from this past experience. In the light of the conclusions of the Council meeting of 8 and 9 March 2007, which agreed on a “binding” target of 20% share of renewable energies in the overall EU energy consumption by 2020, these lessons could be of importance for the future regulatory framework.

In 2001, a European Directive was adopted to promote RES-E (Directive 2001/77/EC, hereafter “RES-E Directive”). Herein, an ambitious target for RES-E was set for 2010. The aim is to produce 21%<sup>1</sup> of total community electricity consumption with RES by 2010. Moreover, national indicative targets per Member State were specified in the Annex to the RES-E Directive.

In order to attain these targets, the Member States implemented various support schemes. However, despite this multitude of support schemes, the European Commission

<sup>1</sup>The initial target defined in the Directive of 22.1% for the EU-15 has become 21% for the enlarged Union (EU-25). National indicative targets for the 10 new Member States are included in the Accession Treaty. See the Act concerning the conditions of accession of the Czech Republic, the Republic of Estonia, the Republic of Cyprus, the Republic of Latvia, the Republic of Lithuania, the Republic of Hungary, the Republic of Malta, the Republic of Poland, the Republic of Slovenia and the Slovak Republic and the adjustments to the treaties on which the European Union is founded; the Annex II list referred to in Article 20 of the Act of Accession, 12 Energy, A General, 8, OJ L 236 (23 September 2003).

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(hereafter “EC”) reported already in 2004 that the 2010 RES target would probably not be achieved. Currently implemented policies are expected to result in a percentage between 18 and 19 by 2010, instead of the desired 21% (COM(2004)366, hereafter “the 2004 Communication”). The 2004 Communication blames the disappointing growth of the biomass sector, staying far beneath expectations, as one of the main reasons for this failure. In Rowlands (2005), the development of the RES-E Directive was discussed, illustrating that its coming about was a very difficult political process which only resulted in a Directive after many compromises were agreed upon. In this paper, the authors illustrate that this lack of determined choices has left room for misinterpretation. It will be shown that as a result thereof, the national targets were implemented in a manner that is not in line with the spirit of the RES-E Directive, which hampers their attainment.

These targets are defined in the Annex to the RES-E Directive as national indicative targets for the contribution of electricity produced from RES to gross electricity consumption. Consequently, they are implemented in all Member States as national production targets, achievable exclusively through an increase of the domestic production of RES-E. It will be shown in this article that this is not in line with what the EC intended when drafting the RES-E Directive.

First, the importance of RES-E support is demonstrated by a description of its relevance within the ambitions of the EC in the energy field. A theoretical framework on target definition is presented next. Then, the development of the European RES-E target is discussed in view of this framework. Finally, the spirit of the Directive is discussed.

## 2. Contribution of RES-E to Europe’s energy ambitions

As will be shown in the final section of this article, developing European and national RES-E targets has been a long and complicated legislative process. The necessity of this process is now discussed by demonstrating the beneficial results of RES-E targets for Europe’s ambitions in the field of energy. First, two requirements imposed by the RES-E Directive to promote RES technologies, namely support schemes and guarantees of origin (hereafter “GoOs”), will be described. Next, the heavily debated harmonisation of RES-E support schemes is situated, followed by a discussion of the European RES-E approach within the three pillars of the European energy approach, namely sustainability, security of supply (hereafter “SoS”) and competitiveness.

### 2.1. Support schemes and guarantees of origin

To pursue the national indicative targets, the RES-E Directive states that “Member States shall take appropriate steps to encourage greater consumption of RES-E” (although the national indicative targets are in the end

defined in the Annex as production targets, as will be discussed in Section 5). Therefore, four requirements<sup>2</sup> are laid down in order to contribute to stable investment conditions for RES-E generation. First, Member States are free to implement support schemes by which an RES-E generator receives direct or indirect support, as long as they do not conflict with the state aid principles of the Treaty. Although this requirement is not formulated as an obligation, the legal interpretation can be accordingly. Regarding the choice of support, the EC until now refrained from imposing a harmonised support mechanism. This has resulted in a patchwork of different national support schemes throughout Europe.<sup>3</sup>

In general, a tendency towards the usage of feed-in tariffs and tradable green certificates (hereafter “TGCs”) can be noted. In the first system, network operators pay guaranteed long-term minimum prices to RES-E generators, often combined with an exemption of balancing costs. In a system of TGCs combined with a minimum quota obligation, end-users<sup>4</sup> yearly have to hand in sufficient certificates to prove that a certain share (imposed by the quota obligation) of the electrical energy sold was generated using RES. For each missing certificate a fine has to be paid. Supply of certificates is created by issuing them to RES-E generators. Both systems are said to have advantages as well as drawbacks. The discussion on which support system is best is, however, outside the scope of this article.<sup>5</sup>

Secondly, the RES-E Directive requires that by 27 October 2003 at the latest, producers must be enabled to demonstrate the origin of RES-E as such by the issuance of GoOs. These are said to be necessary in order to facilitate exchanges of RES-E and to increase consumer transparency. GoOs must be mutually recognised by the Member States, exclusively as proof of the electrical energy’s origin (RES-E Directive art 5.4). Consequently, it should be noted that their exchange does not necessarily imply a right to benefit from national support mechanisms established in another Member State. The Directive does not require Member States to recognise foreign GoOs (or the corresponding purchase of electrical energy) as a contribution to the fulfilment of a national target, and so GoOs should be clearly distinguished from TGCs. Nevertheless, GoOs could be used for target counting on condition that the exporting country explicitly accepts on the GoO that the

<sup>2</sup>The two final requirements, namely the removal of administrative barriers on the one hand and guaranteed, possibly even priority, access of RES-E to the transmission and distribution grids on the other hand, are outside the scope of this article.

<sup>3</sup>An overview of the different schemes used for the promotion of RES-E is, for example, given in Egenhofer and Jansen (2006), Meyer (2003) and Reiche and Bechberger (2004).

<sup>4</sup>For practical reasons this obligation is usually not imposed on consumers but on electricity suppliers or distribution companies.

<sup>5</sup>For a discussion of feed-in tariffs versus tradable green certificates, the authors refer to, for example, Butler and Neuhoff (2005), Midttun and Gutesen (2006), Lauber (2004), Menanteau et al. (2003), Mitchell et al. (2006) and Ringel (2006), among many others.

corresponding amount of RES-E will be used to meet the importing country's target instead of its own (COM(2004)366). So far, no Member State has done so and thus GoOs are today not being used for target counting. GoOs are currently only used for two other purposes, namely to identify green power products and for disclosure purposes (Renewable Energy Certificate System (RECS), 2005). The identification of green power products contains both the voluntary green market and labelling, by which suppliers distinguish different categories of RES-E as some RES-E products are considered to be more sustainable than others. Disclosure refers to the requirement imposed on electricity suppliers to disclose the contribution of each energy source to their overall fuel mix on electricity bills (Directive 2003/54/EC).

## 2.2. Harmonisation of RES support schemes?

The possibility of a European harmonisation of RES support and the resulting consequences have been heavily debated during recent years.<sup>6</sup> Recently, the EC acknowledged that the overall cost of complying with the RES target could be substantially lower when the support scheme, either TGCs or feed-in tariffs, would be harmonised throughout Europe. Nevertheless, since “competing national schemes could be seen as healthy, at least over a transitional period”, and it is “too early to compare the advantages and disadvantages of well-established support mechanisms with systems with a rather short history”, the EC does not regard it appropriate to present a harmonised European system already at this stage (COM(2005)627). For now, the EC restricts herself to encouraging cooperation between countries and optimising the impact of current national schemes. It remains in the EC's intent, however, to closely monitor the possibilities for harmonisation, and by December 2007, its advantages and disadvantages will again be analysed.

## 2.3. Contribution of RES-E to Europe's energy ambitions

When dealing with energy, the EC has always tried to find a balance between three key objectives, namely sustainability, competitiveness and SoS. These objectives were for the first time identified in a 1995 White Paper<sup>7</sup> (COM(1995)682) and were recently affirmed by the Green Paper<sup>8</sup> on Energy entitled “A European strategy for

sustainable, competitive and secure energy” (COM(2006)105). Promotion of RES-E is labelled a high Community priority (for example, in the RES-E White Paper, which was endorsed by the Council and the European Parliament), as it can contribute to each of the three objectives. In the following, the European RES-E policy will be discussed in view of these three policy objectives.

### 2.3.1. Sustainability

RES-E directly contributes to the achievement of the EU's commitments to reduce greenhouse gasses. In the RES-E Proposal, it is said that “the expansion of RES-E in the EU constitutes an essential part of the package of measures needed to comply with the Kyoto Protocol”. The striving for sustainability directly benefits from an increasing share of RES-E since this in general replaces electrical energy generation by CO<sub>2</sub>-emitting technologies.

RES-E also plays an important role in the process of integrating environmental protection requirements into other European policies, with a view to promote sustainable development, which is reinforced by Article 6 of the EC Treaty.

### 2.3.2. Security of supply

Secondly, the EC strives to improve the security of the energy supply. In all documents constituting the legislative process that resulted in the RES-E Directive, RES-E is said to “contribute to the security of energy supplies”. However, SoS is an issue that can be looked at from either a European or a national perspective. Regarding the whole of Europe, it implies decreasing the EU's import dependency. Currently, 50% of the Union's primary energy requirements are met by import, and this number is expected to rise to even 70% in the next 20 years. RES-E can be of use here in that it increases the possibilities for electrical energy generation within Europe. As such, it makes Europe less dependent on mostly unstable regions for the import of its raw materials necessary to generate electrical energy. This perspective is for instance stressed in the RES-E White Paper, which states that “RES as indigenous sources of energy will have an important role to play in reducing the level of energy imports with positive implications for balance of trade and security of supply”.

SoS can also imply a diversification of the energy supply. This is, for example, put forward on a European level in the RES-E Directive as one of the reasons to attribute high Community priority to RES-E promotion. Moreover, this argument is also used on the national level, by individual Member States arguing a need for diversification of the national domestic energy generation mix and thus implementing national production targets.

(footnote continued)

Both green and white papers are soft law, meaning that they are not binding but have great moral value.

<sup>6</sup>See, for example, Del Río (2005), Nielsen and Jeppesen (2003) and Voogt and Uytendinck (2006).

<sup>7</sup>White papers are documents containing an official set of proposals for Community action in a specific policy area. They can (but do not have to) follow on a green paper. White papers are more specific than green ones and are used as vehicles for the development of new legislation.

<sup>8</sup>Green papers are discussion papers published by the EC, presenting a range of ideas on a specific policy area. They are addressed to all interested parties who are invited to participate in a process of EU-wide consultation and debate. In some cases they provide an impetus for subsequent legislation.

### 2.3.3. Competitiveness

When aiming at an increased competitiveness of the European energy industry, the objective should be to reach the RES-E target on a European scale in the most cost-efficient manner. In the short term, this implies investing in RES-E generation in those areas in Europe where this can be done the most cost-efficiently. This is known as static efficiency, which implies that no other allocation of generation capacity among different RES technologies would yield a lower overall cost of ensuring a given share of RES-E, or supporting those technologies with the lowest cost to reach the RES target. Member States where RES-E generation is relatively expensive could then import excess RES-E production from countries with abundant, relatively cheap, RES-E potential. By such cooperation and RES-E trade, the overall cost of complying with the RES target could be significantly reduced (Voogt and Uyterlinde, 2006; Huber et al., 2004; Del Río, 2005), which would naturally be beneficial for the competitiveness of the European industry.

One of the main arguments of such a system, however, is that it would result in the “low-hanging fruits” being harvested and the long-term perspective being missed (SEC(2005)1571). Lowering costs through technological innovation, referred to as dynamic efficiency, should be encouraged and this would be neglected in such a system. On the one hand, it is shown by, amongst others, Menanteau et al. (2003) that indeed incentive systems are required in order for renewable energy technologies to progress on their learning curves and achieve cost reductions. Midttun and Gautesen (2006) on the other hand argued that, although this is true in the early innovative phase of a technology, for mature technologies regulation should be static efficiency oriented.

### 2.3.4. Necessity of action on the European level

The promotion of RES-E, as stated above, is an important part of measures aimed at meeting the three core objectives of the Community of sustainability, competitiveness and SoS. It is therefore important that in all the Member States the consumption of RES-E continues to increase significantly and that Member States take an active role in pursuing this objective. In order to ensure such a development, in line with the above energy and environmental objectives, and because these objectives could not be sufficiently achieved by the Member States, it was necessary to adopt a framework on the European level, namely the RES-E Directive.

To allow Community action in the RES-E area, which does not fall within the exclusive competence of the Community, the EC Treaty requires the Community to comply with the principle of subsidiarity of paragraph 2 of Article 5 of the EC Treaty. This provisions states that: “In areas which do not fall within its exclusive competence, the Community shall take action, in accordance with the principle of subsidiarity, only if and so far as the objectives of the proposed action cannot be sufficiently achieved by

the Member States and can therefore, by reason of scale or effects of the proposed action, be better achieved by the Community”. This principle formulated in Article 5 of the EC Treaty is a guide on how powers at the Community level have to be exercised and it tests Community action against both a decentralisation and an efficiency criterion (Lenaerts and Van Nuffel, 2005). On the basis of this principle the EC adopted the RES-E Directive which contains the necessary provisions to ensure the development of RES-E in all the Member States. However, the detailed implementation to obtain the RES-E targets is left to the Member States and allows each Member State to choose the regime that corresponds best to its particular situation.

### 2.3.5. Summarising remarks

At the moment, Member States are individually pursuing production targets, even though this is not in the spirit of the Directive as will be discussed in Section 3.3. The arguments in favour of this approach are that this way learning effects and a more balanced generation mix are achieved by all Member States. However, it is generally accepted that it is not the most cost-efficient way to achieve the European RES-E target.

## 3. Defining RES-E policy targets—theoretical framework

As shown in the previous section, an increasing share of RES-E is highly beneficial for the global European energy situation. Consequently, targets should be imposed on the Member States to ensure that RES-E develops. The starting point to determine concrete figures for future RES-E consumption or production is simulations using energy market models. Examples of such market models used to model the RES sector are the SAFIRE (Safire, 1995), ADMIRE-REBUS (Daniëls and Uyterlinde, 2005) and the ElGreen model (Huber et al., 2004). Such models help policy makers to decide on the trade-off between the beneficial consequences of an increasing share of RES-E on the one hand, and the associated costs on the other hand. As explained before, RES-E contributes in a positive manner to sustainability and SoS. Naturally however, this comes with a price, which can be assessed using energy market models. This allows policy makers to judge the feasibility of an RES-E target, and to be aware of the financial consequences when ambitious RES-E targets are laid down. Next, starting from a figure obtained by energy market models, several issues remain to be decided upon. In this theoretical framework on target definition, an overview will be provided of all the issues to be considered.

### 3.1. Absolute or proportional targets

It should be decided whether an absolute or a proportional figure is aimed for. When opting for the latter and thus aiming at a percentage, two variables can be modified in order to reach the target, namely numerator and denominator.

### 3.2. Subject of the target: production or consumption

Next, it should be decided and clarified to all market players what the figure aimed for represents: consumption or production of RES-E. When a proportional target is put forward, this decision has to be made and communicated for both numerator and denominator.

“Electricity consumption” of a region then refers to all electricity consumption within that region, being domestic electricity production, including autoproduction, plus imports, minus exports. Consequently, targets based on consumption will indirectly imply a target for production and vice versa. The main difference between consumption and production targets is whether imports and exports are taken into account, which can nevertheless constitute a significant difference.

### 3.3. From a global energy target to targets for different energy sectors

Regarding energy, the EC has always defined targets per sector. Also in the RES sector, the global target for energy originating from RES is translated into specific targets for the electricity sector (RES-E), the transport sector (biofuels), and RES for heating and cooling.

### 3.4. From a European target to national RES-E targets

Finally, the European-wide RES-E target is redistributed among the Member States. Therefore, the energy market models mentioned before can again play a significant role, as they allow assessing the costs for the different Member States associated with different distributions of the EU-wide target. Several possible distributions of the target are identified in Voogt et al. (2001):

- *Flat rate*: An equal target for all Member States, similar to the average EU-wide target.
- *Related to potential*: Individual targets set according to the total RES-E potential in a country.
- *Equal share per capita*: Each European citizen should have a similar share of its electricity consumption based on RES.
- *Equal growth RES-E*: Starting from the 1995 situation, the growth in total electricity production from RES should be similar in each Member State.

Moreover, national RES-E targets can be derived from redistributing the total costs of achieving the EU target over the different Member States according to a certain burden-sharing rule. Therefore, again three options are identified (Voogt et al., 2001):

- *Least cost division*: The cheapest division of targets over the Member States at the costs of achieving the overall EU target.

- *Equal costs per GDP*: The costs to achieve RES-E targets are divided over the Member States according to the gross domestic product of each Member State.
- *Equal costs per capita*: The costs to achieve RES-E targets are divided over the Member States according to the population of each Member State.

## 4. Development of European RES-E targets

Following the conclusion that RES-E significantly contributes to the three pillars of the European energy approach, targets for its promotion were imposed on the Member States. In this section, the evolution of the European as well as the national RES-E targets throughout the legislative process is discussed, in view of the theoretical framework developed in the previous section. It is shown that confusion currently exists on two aspects of the RES-E targets: whether absolute or proportional figures are aimed for on the one hand, and the subject of the RES-E targets, being consumption or production, on the other hand.

It is clarified in this section that although the EU-wide target in the final RES-E Directive is formulated as a percentage, Europe is in fact aiming for an absolute figure of RES-E. In contrast, on the national level the targets in terms of percentage are relevant. Regarding the subject of the targets, the EC has regrettably remained vague in the final text of the RES-E Directive on whether it concerns production or consumption, on the European as well as on the national level. This has resulted in all Member States interpreting the national indicative RES-E targets as domestic production targets. The final section of this paragraph will clarify that this is, however, not in line with what the EC intended when drafting the RES-E Directive.

### 4.1. The European RES-E target

The debate on identifying objectives for RES-E was opened by the 1996 Green Paper on RES (COM(1996)576). The EC's 1997 White paper on RES (COM, (1997)599, hereafter “RES-E White Paper”) initiated the legislative process, finally resulting in the RES-E Directive of 2001. Concerning the electricity sector, the RES-E White Paper states that “if appropriate measures are taken, electricity production from RES could grow significantly by 2010, from the present 14.3% to 23.5%”. No further clarification on the subject of this target is provided. The former formulation emphasising the potential growth of “electricity production from RES” suggests, however, that production of electricity from RES is in the numerator of the proportional target. One can assume the same for the denominator since the origin of the projected total electricity production for 2010 is added for clarification. Moreover, Table 3 of the RES-E White Paper, in which the electricity figures are specified, concerns electricity production by RES. The number for total 2010 electricity production is based on the projections from the pre-Kyoto

(or “conventional wisdom”) scenario of the “European Energy to 2020” study (EC, 1996).

The preliminary proposals of the RES-E White Paper resulted in the Proposal for a Directive (COM(2000)279, hereafter “RES-E Proposal”) and finally, after over 4 years of negotiations, in the 2001 RES-E Directive. The 2010 target for electricity was finalised as a “22.1% indicative share of electricity produced from RES in total Community electricity consumption”. The lowering to 22.1%, compared with the RES-E White Paper projection of 23.5%, was explained in the RES-E Proposal as the result of a new 1999 electricity consumption scenario (EC, 1999) being used in the projections, resulting from the use of the energy model SAFIRE. Since electricity consumption is in the denominator of the target, this clarification indicates that instead of aiming at a pure proportional target, the EC is in fact pursuing an absolute figure of RES-E in the numerator. Indeed, the RES-E Proposal further explains the descent of the proportional target as due to the new projection of 2010 total gross electricity consumption of 3.058 TWh in the denominator. Meanwhile, the numerator of 675 TWh RES-E remains the same. However, it is remarkable that in the RES-E White Paper this absolute target of 675 TWh is referred to as projected electricity production, whereas on the contrary in the RES-E Proposal, it is denoted as “a consumption of 675 TWh”. It is regrettable that as a result, for this absolute European goal of 675 TWh, no clarity exists on whether it concerns a production or a consumption target. Finally, with the accession of the 10 new Member States, the 22.1% was altered into the 21% share that is currently aimed for. This was the result of negotiations on individual target figures with each of the 10 new Member States (Werring et al., 2006).

It can be concluded that, surprisingly, an absolute figure instead of a percentage is being aimed for at the European level, resulting in adaptations needed to the target in terms of percentage when new scenarios are being used. Regrettably however, this absolute European goal of 675 TWh was not unambiguously defined as being either a production or a consumption target.

#### 4.2. From European to national RES-E targets

The EU-wide RES-E target is then redistributed among the Member States. For the first time in 2002 and every 5 years thereafter, Member States are required by the RES-E Directive to set national indicative targets for a 10-year period. It should be noted that although no decision has yet been made on European post-2010 RES targets, the Member States are thus obliged already in 2007 to set targets until 2017. The national indicative targets have to be based on the reference values provided in the Annex to the RES-E Directive and are to be compatible with any national commitments under the Kyoto Protocol. The distribution proposed by the reference values of the Annex is said to be “based on the technological and economical

potential of the Member States and is the result of a political process”<sup>9</sup> (RES-E Proposal). Most of the targets adopted by the Member States to be attained by 2010 are consistent with these national reference values, and only Sweden has deviated from it.

This is due to the high share of hydropower in Sweden, which is highly dependent on climatic factors such as variations in pluviometry, timing of rainfall during the year and inflow. Consequently, electricity produced from hydropower can vary substantially and should thus, as argued by Sweden and also Austria, be calculated with a long-range model based on scientific facts on hydrology and climatic change. Sweden states in the footnotes to the Annex of the RES-E Directive that “during extremely dry years, production may amount to 51 TWh, whereas in wet years it could amount to 78 TWh. [...] Thus, according to the Swedish methodology and based on conditions during the period 1950–1999, [...] average hydropower production amounts to 64 TWh which corresponds to a figure for 1997 of 46%, and in this context Sweden considers 52% to be a more realistic figure for 2010”. These values deviate from the reference values of the RES-E Directive, where Sweden was described as having a 1997 RES-E production of 72.03 TWh, corresponding to 49.1%, and assigned a 2010 target of 60% RES-E.

It should be noted that, in contrast to the EU-wide absolute target of 675 TWh, the RES-E Proposal clearly states that regarding the indicative targets per Member State, figures in TWh are put as a reference only. These indicative targets are based on figures relating to each country’s gross electricity consumption from the baseline scenario of the 1999 scenarios (EC, 1999). It is added in the RES-E Proposal that “this baseline scenario predicts an increase in final energy demand of 1.2% annually between 1995–2010. If Member States achieve a lower gross electricity consumption than in the baseline scenario, the same percentage target would lead to a smaller consumption of RES-E in TWh”. This confirms that indeed on the national level the targets expressed as percentages are relevant, and not the absolute number in TWh. Moreover, it can thus be assumed that in the RES-E Proposal, the national indicative targets had RES-E consumption in both numerator and denominator.

The final RES-E Directive is, however, much less clear on whether absolute or relative figures are being aimed for. Nevertheless, based on the RES-E Proposal, it can be assumed that at the national level the figures in terms of percentage are relevant, contrary to the European level. Also, again based on the text of the RES-E Proposal, the proportional national indicative RES-E targets can be interpreted as pure consumption targets. However, as will be illustrated in the next section, the vague text of the

<sup>9</sup>Based on public information, it remains unclear, however, how exactly this distribution was carried out, in view of the possibilities presented in Section 3.4.

Annex to the final RES-E Directive has resulted in a reality of national domestic production targets.

### 5. The spirit of the European RES-E directive

Today all Member States have implemented the national indicative RES-E targets as domestic production targets. This is the result of the lack of clarity of the RES-E Directive on whether the national indicative targets are to be interpreted as consumption or production targets. By refraining from unambiguously defining the subject of its targets, the EC has opened the door for confusion. All Member States used this confusion to set up systems aiming at an increase in national domestic production, refusing to allow their exported RES-E to be taken into account in the importing countries' target counting. However, looking at the legislative process resulting in the RES-E Directive, it becomes clear that this is not in line with the intentions of the EC.

The misinterpretation of the national indicative targets is possibly caused by the inconsistency between the RES-E Proposal and the text of the RES-E Directive on the one hand, and the definition of the national indicative targets in the Annex to the Directive on the other hand. Contrary to the text of the final Directive, in the Annex to the RES-E Proposal the national indicative targets were clearly defined as “RES-E consumption as % of total gross electricity consumption”, and thus as consumption targets. In its first reading (EP, 2000), the European Parliament (hereafter “EP”) approved the RES-E Proposal with some amendments, two of which related to the consumption or production subject of the national indicative targets (amendments 12 and 30). There, the EP proposed to set national production targets in addition to those for consumption. According to the EP, adding production targets would “ensure that each Member State makes the effort to make maximum use of the sustainable energy potential” and “presenting production target figures gives an indication of anticipated trade in sustainable energy”. However, in its amended proposal (COM(2000)884), the EC takes into account several of the EP's amendments but does not respond to the two mentioned here. Also in the remainder of the legislative process, no reference to the subject of the targets could be found. In the final text of the Annex to the RES-E Directive however, the reference values in terms of percentage for the national initiative targets are defined as “national production of RES-E divided by gross national electricity consumption”. The reason for the change from consumption targets in the RES-E Proposal to production targets in the Annex to the final RES-E Directive remains unclear. Moreover, the production definition in the Annex seems to be in contrast to the text of the RES-E Directive itself. In article 3 of the RES-E Directive in particular, it is stated that “Member States shall take appropriate steps to encourage greater consumption of RES-E” by “setting national indicative targets for future consumption of RES-E”.

Finally, hidden in a footnote to the Annex to the RES-E Directive, it is stated that “in case of internal trade of RES-E [...], the calculation of these percentages will influence 2010 figures by Member State but not the Community total”. This seems to suggest that the EC encourages such internal trade, even if this results in deviations from the national indicative proportional production targets defined in the Annex, as long as the EU's global target of 21% (and in fact 675 TWh, as explained above) is reached. This presumption is affirmed by the discussion of this footnote by several EC officials, where it is said that “the targets were calculated by dividing national production by national total consumption and in case of import and export, the production figure will be adapted” (Werring et al., 2006). This statement again suggests that national production figures are of minor importance to the EC and that Member States are allowed, or even encouraged, to take import and export into account in their target counting.

The EC itself acknowledged this incoherence in its 2004 Communication: “In the Directive (Article 3), national targets are defined in terms of the consumption of RES-E as a percentage of total national electricity consumption. [...] In the Directive's Annex I, reference values for national targets are determined solely as percentages of national production. The question that arises is under what conditions a Member State can consider that imported renewable electricity is contributing to the achievement of its target under the Directive.”

In an attempt to clarify, the EC continues by stating the following: “A Member State can only include a contribution from import from another Member State if the exporting state has accepted explicitly, and stated on a guarantee of origin, that it will not use the specified amount of renewable electricity to meet its own target and thereby also accepted that this electricity can be counted towards the importing Member State's target. [...] In the absence of the agreement of the exporting country, the production will be counted towards the target of this exporting country.” Until today however, no Member State has applied this possibility and thus abandoned its right to count all domestic RES-E generation in order to achieve its national indicative target. Consequently, all Member States report domestic generation only in their target counting and do not include imported RES-E, since the permission of the exporting country would therefore be needed (RECS, 2005). In practice, the national indicative targets are thus interpreted as national production targets, contrary to the EC's intent. In the 2004 Communication, the EC emphasises that “trade in renewable electricity should occur”, and although it is argued by some authors (e.g. Centre for European Policy Studies (CEPS) Energy Research Centre of the Netherlands (ECN), 2005) that the production target interpretation can be considered compatible with cross-border trade, others make a strong case to “change the basis for the national targets to a target for consumption [...]” (RECS, 2005).

Thus, a similar principle as that applied in the European Emissions Trading Scheme,<sup>10</sup> namely to produce more RES-E where this can be done more efficiently and sell the surplus of efficient countries to those with less potential, clearly seems to have been in the EC's line of thought when drafting the RES-E Directive. Why the national targets were finally put down as production targets in the Annex to the RES-E Directive is unclear. The EC has made multiple attempts to clarify the confusion caused by this definition in the Annex. However, despite these attempts national production is what currently is being aimed for, contrary to the EC's intent.

## 6. Conclusions

In this article, the development of the European RES-E targets was looked at. It was illustrated that increasing the share of RES-E contributes in a positive manner to the EU's ambitions in the field of energy. To materialise these benefits, targets for the share of RES-E have been imposed on the Member States. To define such targets, energy market models are started from. These allow policy makers to weigh the beneficial consequences of more RES-E against the costs necessary to increase the share of RES-E.

In this article, the development of the European and the national RES-E targets is evaluated in view of a theoretical framework developed. It is shown that the legislative process has resulted in confusion on both the nature (absolute or proportional figures) and the subject (consumption or production) of the RES-E targets that are being aimed for.

It was clarified that on the European level, surprisingly, an absolute figure instead of a percentage is being aimed for. This absolute target results in adaptations to the target in terms of percentage whenever new scenarios are developed. In contrast, at the national level the figures in terms of percentage are relevant. The evolution of the national RES-E targets showed that the final text of the RES-E Directive resulted in ambiguity regarding the subject of the national RES-E targets.

Despite various attempts of the EC to clarify this confusion, it has resulted in all Member States restricting themselves to domestic RES-E in their target counting. Looking at the entire legislative process resulting in the RES-E Directive however, especially rather minor details such as the footnote to the Annex of the RES-E Directive, it becomes clear that national consumption targets and European RES-E trade were undoubtedly in the EC's intent. Why national production targets were then finally put down in the Annex to the RES-E Directive is unclear.

Nevertheless, Member States are given the possibility to create European RES-E trade by allowing importing countries to account the imported RES-E to their national target. Their refusal to do so is disadvantageous for the

competitiveness of the European industry. After all, it rules out the option of attaining the European RES-E target in the most cost-efficient manner, by producing RES-E where this can be done the most efficiently. Consequently, this reality of national production targets should without delay be rectified by the Member States.

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<sup>10</sup>For a discussion of the economic aspects of climate change policy, see Willems et al. (2005).

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