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COORDINATION OR HARMONISATION?
FEASIBLE PATHWAYS FOR A EUROPEAN RES STRATEGY BEYOND 2020

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ABSTRACT
With Directive 2009/28/EC, the European Parliament and Council have laid the grounds for the policy framework for renewable energy sources (RES) in the European Union until 2020. The aim of this paper is to look more closely beyond 2020, well in advance, contrasting and analysing potential RES policy options that are currently being discussed. Generally the assessment includes RES in all energy sectors but a topical focus is put on renewable electricity, specifically within the discussion of policy options for a harmonisation of RES support. The results of the policy assessment indicate that cooperation and coordination among Member States appear beneficial to tackle current problems in RES markets, and fruitful for the period beyond 2020. By contrast, “simplistic approaches” to RES policy harmonisation, for example via a uniform RES certificate trading, are not suitable to ensure substantial future RES growth.

Keywords: RES support scheme, long-term strategy, coordination, harmonisation

1. INTRODUCTION
With Directive 2009/28/EC [1], the European Parliament and Council have laid the grounds for the policy framework for renewable energy sources (RES) in the European Union (EU) until 2020. The aim of this paper is to look more closely beyond 2020, well in advance, contrasting and analysing potential RES policy options that are currently being discussed.

RES are expected to provide a significant contribution to a low carbon European energy sector by 2050. “Strong growth in renewables is the so-called ‘no regrets’
option” [2] from the European Commission’s viewpoint for achieving a 80%-95% greenhouse gas (GHG) reduction by 2050.

Throughout recent years, RES have been deployed faster than previously expected across Europe, indicating the positive impact of the strength and stability of the EU’s renewable energy policy. In response to this, in several Member States (MSs), calls for a reform of their RES support framework were made and received growing public attention, sometimes leading to strong cuts in financial support beyond adequate levels [3]. In addition, the ongoing financial and economic crisis moved the topic of investment risks into focus, leading, even without support cuts, to recent decreases of RES-related investments in strongly affected economies. This underpins the need for clarity on the future direction of the EU’s energy policy. In particular, consideration of a RES strategy for the period beyond 2020 is now needed.

1.1. Policy dimensions
Several policy dimensions relate to the debate on a future RES strategy for Europe beyond 2020. These include:

• RES support instruments, including related aspects of financing such support and their attractiveness to investors,
• Electricity market design and impacts on market functioning arising from an enhanced use of (volatile) renewable energy sources,
• Sustainability concerns, particularly those related to the use of biomass,
• Cooperation with third countries particularly EU imports of biofuels, solid biomass and renewable electricity (RES-E).

Generally, future policy choices related to the above dimensions might show a national orientation or could instead incentivise further coordination and cooperation among MSs. The ultimate stage would be a harmonised approach across the EU.

This paper specifically addresses the role of RES support schemes for the electricity sector and related impacts on their financing. More precisely, the following sections will shed light on potential policy approaches for RES support in Europe. Different policy paths ranging from a continuation of national support with varying degrees of coordination, up to a full harmonisation of RES support in the years beyond 2020 will be reviewed. The paper presents interim findings of the “Intelligent Energy – Europe” project beyond2020 and builds on findings gained from previous activities.

1.2. Research aim and structure of this paper
The aim of this paper is to qualitatively and quantitatively assess different policy pathways for RES support, particularly coordination versus harmonisation, in the EU

2 The beyond2020 project is a collaborative action of several European research institutions, policy consultants, and energy companies assessing the design and impact of a possible harmonisation of RES support in Europe beyond 2020. This initiative could be established thanks to the financial and intellectual support offered by the Intelligent Energy – Europe (IEE) Programme of the European Commission, operated by the Executive Agency for Competitiveness and Innovation. For more details on the beyond2020 project, see [5].
for the period 2020-2030. Generally the assessment includes RES in all energy sectors
but a topical focus is put on renewable electricity specifically within the discussion of
policy options for a harmonisation of RES support.

The paper is structured as follows. We start with a concise recapitulation of the
policy debate on harmonising support schemes for renewable electricity in Europe,
illustrating in chronological order the past and ongoing discussions in this topical
text, along with the stakeholders involved. Subsequently, section 3 provides a
classification of potential pathways and an introduction to the terminology of related
concepts. Evaluation criteria against which to assess the pathways are the subject of
section 4. Section 5 comprises a qualitative recapitulation and assessment of the
contrasting arguments in favour of and against harmonisation of RES support that
have evolved from the RES policy debate, taking into account the above-mentioned
evaluation criteria. Complementary to this, section 6 provides a concise summary of
the approach and outcomes of a quantitative assessment of potential RES policy
pathways for the period beyond 2020, focusing especially on the economic evaluation
criteria. Finally, main conclusions and the related discussion on the ways forward are
presented.

2. THE POLITICAL DEBATE ON HARMONISING SUPPORT SCHEMES
FOR RENEWABLE ELECTRICITY IN EUROPE

A possible harmonisation of support schemes for RES has been a central element in
the European RES policy debate since its very beginning in the 1990s. Contextualising
‘harmonisation’ into the political debate shows that it has moved from explicit calls
for a harmonised support scheme towards both a focus on improved national support
schemes, and coordination and cooperation. Nevertheless, one can expect from past
experience and against the backdrop of MSs potentially missing their RE targets that
calls for harmonisation might reappear on the political agenda in the future. One
advocate for harmonisation in this debate has been the European Commission which,
in its capacity to propose new legislative initiatives, has put forward this idea in
several draft Directives, Communications, and reports on the support of RES, as
illustrated further below. However, facing opposition from the majority of MSs and the
European Parliament, the political debate has moved from harmonisation towards
coordination and cooperation between MSs in relation to several identified best
practices.

In the last four legislative periods, the Commissioners for Energy have taken
different positions on the issue of harmonised support schemes. Broadly speaking, two
major considerations have influenced the Commission’s calls for such a scheme: a)
harmonised RES support facilitates the extension of the internal market to renewable
energy; and b) harmonisation increases the (cost-) efficiency of RES support (see
section 5 for details on the pro and contra arguments). The evolution of the political
debate on harmonisation can be divided into four different phases:

1. an intensive discussion about harmonisation between 1996 and 2001, initiated
   by the publication of the 1996 Green Paper on renewable energy (COM(96)567
   final) [6]. The 1999 Communication from the European Commission is a
   representative document of the arguments put forward at that time [7]:
2. a less intensive phase between the years 2001 and 2007, particularly with the release of the communication COM(2005) 627 [8];
3. another intensified phase of the debate between 2007 and 2008, initiated by the discussions on the European Commission proposal for the RES Directive that aimed at introducing a European guarantee of origin (GO) trade system; and
4. a subsidence in the debate after 2009 with the adoption of Directive 2009/28/EC and with the publication of the Commission’s most recent Communication in June 2012 (COM(2012) 271) [2]. This calls for guidance on best practices and cooperation rather than harmonisation.

Figure 1 offers a summary of the debate on harmonised RES support schemes in chronological order.

![Diagram](image)

**Source:** [10]

**Figure 1:** Illustrative overview of the debate on harmonisation

During the last phase of intense debate, after publication of the European Commission’s RES Directive Proposal in 2008, conventional electricity industry associations favoured the idea of a Europe-wide harmonised trade in GOs, while RES industry associations and environmental NGOs were strictly against it. Many MSs, especially Germany, Spain, and later the UK, also had a strong interest in keeping their own national schemes undisturbed. Tradable GOs were finally rejected by both the European Parliament and the Council of the European Union [11 - 13]. From the first publication of the Commission proposal in January 2008 to the adoption of the final

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3 On the discussion surrounding Directive 2001/77/EC which provided a European framework for supporting renewable electricity, see also [9].
version of the Directive in December, stakeholders had changed their positions and various advocacy coalitions had formed and re-formed. This gives some indication as to which views stakeholders will take in the discussion on post-2020 regulation. However, in 2020, the RES sector will have come a long way, and stakeholders may change their positions in the face of new circumstances.

A variety of stakeholders are involved in the policy discussion regarding RES support mechanisms beyond 2020. As the decision concerns a legislative process on EU level, the stakeholders who are directly involved are naturally the EU legislative bodies already mentioned above: (i) the European Commission, mainly via its Directorate General for Energy and the Directorate-General for Competition, (ii) the European Parliament with its 754 members, and (iii) the Council of the European Union, in which the 27 EU MSs meet in different configurations, always represented by those ministers responsible for a given topic. While the Commission has the right of initiative regarding the proposal of new legislation, it is the latter two EU bodies who vote on these proposals [14 - 16].

In addition, the legislative process is influenced by interest groups both at EU and national levels. The literature analysing the policy debate on harmonisation preceding the passing of the 2009 RES Directive mentions a variety of stakeholder groups [12, 17, 18]:

- EU-level RES industry associations such as EREF, EREC, EWEA, AEBIOM, and national associations such as BEE
- Conventional energy industry associations, such as Eurelectric, RECS, and EFET
- Environmental NGOs
- In addition, opposition parties in MSs may shape public opinion and thus influence the actions of the parties in government.

3. PATHWAYS FOR A EUROPEAN RES STRATEGY BEYOND 2020 – PRINCIPAL POLICY OPTIONS AND DETAILED CONCEPTS

3.1. Classification of concepts

In the debate on the convergence of support schemes for RES, different concepts such as ‘convergence’, ‘coordination’, ‘cooperation’, and ‘harmonisation’ are used and sometimes conflated. Subsequently we aim to provide further clarification on the terminology, in accordance with [19], classifying and defining the means of the different concepts:

- ‘Convergence’ simply means that policies, and possibly related regulations, become similar in different Member States. The following concepts are means to achieve the overarching goal of convergence.
- ‘Cooperation’ refers to the RES Directive (2009/28/EC) and its inherent possibilities of establishing statistical transfer of renewable energy, joint renewable energy projects (among MSs or with third countries) or joint support schemes (i.e. merged support schemes) as specified in Articles 6, 7, 9, and 11 of the Directive.
- ‘Coordination’ often refers to the “Open Method of Coordination” (OMC), which was first employed under the Amsterdam Treaty (1997) with regard to EU
employment policies, but it was explicitly mentioned only later in the “Lisbon Strategy” in 2000.” We refer to it as knowledge exchange between governments and possible alignment of certain elements of a support scheme, i.e. to a bottom-up process of MS loosely working together. Coordination and cooperation have different implications: e.g. regarding who initiates the convergence (top-down or bottom-up), regarding different levels of the binding nature of a given instrument and different levels of detail.

- ‘Harmonisation’ can be defined as a top-down implementation of common, binding provisions as they affect the support of RES-E throughout the EU [20]. There are many possibilities on what needs to be harmonised, and how, the level of harmonisation which can be along a continuum from “full” to “minimum”, depending on the combination of “what” options (i.e., targets, support scheme, design elements, support level) and “how” options (i.e., whether decisions are taken at EU or MS level) [21].

3.2. The European Commission’s principal policy options


- Business as usual (BAU), implying no new EU policy promoting renewable energy after 2020. RES would continue to benefit from the current EU Emission Trading Scheme (ETS) legislation.
- Decarbonisation without renewable energy targets post-2020. This option implies a strengthened GHG reduction target and/or policies fully compatible with the long-term (2050) EU decarbonisation goals, without setting specific targets for RES in 2030.
- Binding renewable energy targets post-2020 and coordinated support. This option would require an update of the 2008 Climate and Energy Package, by setting EU and national RES targets for 2030, along with EU objectives on GHG emissions and energy efficiency.
- EU renewable energy target and harmonised measures. The fourth option refers to the establishment of an EU-wide RES target backed-up by a harmonised support scheme and electricity system management.

3.3. Detailed implementation concepts based on Commission policy options

A first assessment of these options was undertaken in the Commission’s related impact assessment, analysing their likely economic, environmental and social impacts. For this evaluation process, the beyond2020 project also offered some contribution, assessing the above sketched general policy options according to four specific implementations of their detailed design. Note that the outcomes of this quantitative pre-assessment are discussed in section 6 of this paper while the underlying detailed RES policy concepts are presented next.
### The EC’s principal policy options:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) <strong>Business as usual (BAU)</strong></td>
<td>The key driver at EU level for low carbon technologies in the period beyond 2020.  Two variants are considered: 4</td>
</tr>
<tr>
<td>(B) <strong>Decarbonisation without RES targets post-2020</strong></td>
<td>Low carbon prices reflect a business-as-usual / reference development (according to the PRIMES reference case as of 2011 (see [23]) where no ambitious mid- to long-term climate targets are envisaged.</td>
</tr>
<tr>
<td>(C) <strong>Binding RES targets post-2020 and coordinated support.</strong></td>
<td>Moderate cooperation (Continuation of RES directive approach, with moderate cooperation between MSs)</td>
</tr>
<tr>
<td>(D) <strong>EU RES target and harmonised measures.</strong></td>
<td>Strong coordination (Continuation of RES directive approach, with strong coordination between MSs)</td>
</tr>
</tbody>
</table>

### Detailed RES policy pathways:

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No support</strong></td>
<td>(ETS only)*</td>
</tr>
<tr>
<td><strong>Moderate cooperation</strong></td>
<td>(Continuation of RES directive approach, with moderate cooperation between MSs)</td>
</tr>
<tr>
<td><strong>Strong coordination</strong></td>
<td>(Continuation of RES directive approach, with strong coordination between MSs)</td>
</tr>
<tr>
<td><strong>Harmonised quota system</strong></td>
<td>(Full harmonisation via an EU-wide quota system offering uniform RES support)</td>
</tr>
</tbody>
</table>

Note: *The height of the carbon price reflects the ambition related to (long-term) decarbonisation (i.e. BAU versus strong GHG reduction commitment).*

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Figure 2 provides an overview of the limited set of policy cases assessed during the interim analysis conducted within beyond2020. It also describes the linkage of principal policy options with detailed implementation concepts, i.e. the defined RES policy pathways. Although the number of assessed cases appears limited they cover a broad spectrum of feasible pathways to contribute best to the ongoing open policy debate. These policy alternatives were chosen as representatives for main options to identify the key implications of different courses of action. The RES policy cases researched can be characterised as follows:

- **No Support**: Under this option no binding RES targets exist for 2030. The ETS represents the key driver at EU level for low carbon technologies in the period beyond 2020. Two variants are considered: 4
  - Low carbon prices reflect a business-as-usual / reference development (according to the PRIMES reference case as of 2011 (see [23]) where no ambitious mid- to long-term climate targets are envisaged.
  - Moderate / high carbon prices in line with a balanced case for meeting ambitious long-term climate targets; the PRIMES scenario of diversified supply technologies of the EC energy roadmap 2050 [23].

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4 Low carbon prices correspond to the EC’s policy option of a “business as usual” development while moderate to high carbon prices reflect a decarbonisation without RES targets post-2020.
In addition to the ETS, national RES support may remain valid but their design and impact may be challenging to predict. Thus, as a default it is assumed that no country applies dedicated support for RES beyond 2020.

- **Extension of the RES directive with either moderate cooperation or strong coordination between Member States.** Both pathways build on the assumption that the current policy framework as given by the RES directive (2009/28/EC) will be extended for the period up to 2030, meaning that national RES targets for 2030 will be established. Similar assumptions are consequently taken for RES support – i.e. a continuation of strengthened national RES policies until 2030. Differences are however assumed with respect to the level of cooperation / coordination:
  - **Moderate cooperation.** The case of moderate cooperation reflects a stronger but still limited use of cooperation mechanisms where MSs primarily aim for a domestic RES target fulfilment and, consequently, only “moderate cooperation” arising from that.
  - **Strong coordination.** A “European perspective” is taken under the second variant which can be classified as “strong coordination”, where an efficient and effective RES target achievement is envisaged at EU level rather than the fulfilment of each national RES target using domestic resources.

- **Harmonised Quota System.** The impact of a harmonisation of RES support is investigated under this policy option, assuming that harmonised RES policies become effective by 2021. The discussion of harmonisation is however reduced to the most prominent option – a harmonised quota system offering uniform support for all RES options across the EU. This can be expected to give a strong incentive for the full exploitation of the least-cost technology options and less emphasis on novel innovative technologies in the short term. The fulfilment of the 2030 RES target at EU level is envisaged in the applied quota obligation accompanied by an EU-wide certificate trading scheme for RES in the electricity sector.5

3.4. Potential policy pathways for a harmonisation of RES support beyond 2020

This section builds on the four implementation concepts shown in Figure 2 but goes into further detail on the conceptual elaboration of potential policy options for the period after 2020. It identifies 15 potential policy pathways, which partly overlap with the previous four, see Table 1. In order to define and substantiate this more comprehensive range of policy pathways, an extensive literature review, including work already performed by the members of the research team were performed. A stakeholder consultation and a consortium-internal cross-check were also conducted during the inception phase of the beyond2020 project.6

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5 Note that within the subsequent assessment generally also for RES in heating & cooling a suitable mixture of support instruments is conditioned. Thereby, a similar conceptual approach is taken as discussed for RES electricity where support instruments are either harmonised or tailored to country-specific needs. In contrast to above, for biofuels in transport within all assessed cases physical trade across the EU is conditioned, meaning that support follows current practices, reflecting a high degree of harmonisation.

6 The aim of the inception phase was not to propose one precise design of each policy instrument, but to open the spread of feasible design options for the later impact assessment within the project.
While being conceptually restricted to "harmonisation", the project introduces the differentiation between "minimum", "soft", "medium" and "full harmonisation", "depending on the combination of 'what' options (i.e., targets, support scheme, design elements, support level) and 'how' options (i.e., whether decisions are taken at EU or MS level)" [21].

Minimum harmonisation refers to the state of integration where the RES target alone is regulated on the EU level and the EU leaves the fulfilment of this target to the individual countries. Soft harmonisation takes place when MSs are additionally obliged to adopt a specific support instrument, which has been decided at EU level, without adopting common support levels or detailed design elements. Medium harmonisation includes the EU-level regulation of these provisions so that there is only one target for the entire EU, disregarding national targets. However, this degree of harmonisation leaves room for a MS to provide additional support (such as investment subsidies or additional tariff payments). Full harmonisation would leave "a very limited role to be played by MSs" [21], since the legal framework as a whole, including regulatory issues, would be decided at the EU level and the cost of the support scheme would be fully shared by all MSs [21].

Table 1: Overview of harmonisation pathways for RES support beyond 2020 analysed in the beyond2020 project

<table>
<thead>
<tr>
<th>Characterisation</th>
<th>FIT (feed-in tariff)</th>
<th>PIP (premium premium)</th>
<th>QUO (quota)</th>
<th>QIO (quality)</th>
<th>ETS (emission trading system)</th>
<th>TEN (transport for large projects)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>2a</td>
<td>3a*</td>
<td>4a</td>
<td>5*</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>1b</td>
<td>2b</td>
<td>3b</td>
<td>4b</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>1c</td>
<td>2c</td>
<td>3c</td>
<td>4c</td>
<td></td>
<td></td>
<td>4</td>
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<tr>
<td>7*</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>*Sensitivity to 7 (national support, but harmonisation for selected technologies)</td>
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<td></td>
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<td>2</td>
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<tr>
<td>*National targets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>*National targets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
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<tr>
<td>*Cooperation mechanism</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>*With minimum design standards for support instruments</td>
<td></td>
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<td>0</td>
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<tr>
<td>*No minimum design standards for support instruments</td>
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<td>0</td>
</tr>
</tbody>
</table>

Note: *overlaps with the four implementation concepts shown in Figure 2 and assessed quantitatively.

Source: [21]

The policy pathways that will be analysed in a detailed manner during the beyond2020 project are illustrated in Table 1. The list of identified pathways has
become significantly longer than the limited set of four main options discussed above and analysed during the quantitative interim assessment of the project (see section 6). The wide range of potential pathways results from the combination of different levels of harmonisation with different support instruments, as follows (for a detailed description, see [21]):

- Fixed Feed-in tariff;
- Feed-in Premium;
- Quota with uniform Tradable Green Certificates (TGC);
- Quota with banded TGC;
- EU Emission Trading System (EU ETS);
- Tendering.

4. EVALUATION CRITERIA AND STAKEHOLDER PREFERENCES

The political fate of each of the above-mentioned policy pathways is of course not only determined by objective features, but also by the subjective preferences of political decision-makers and stakeholders. A decision-maker’s opinion on any pathway, promoting either harmonisation or any other form of convergence, will depend on (i) how well the pathways perform against a set of suitable evaluation criteria and (ii) on how much importance the decision-maker attaches to each criterion. National RES support schemes have been evaluated against a number of criteria in the literature. Effectiveness, efficiency, and equity are frequently mentioned [18, 21, 24, 25, 34]. As part of the beyond2020 project, del Rio et al. [21] have defined a set of assessment criteria based on literature research, which are both relevant in assessing the harmonisation pathways, and measurable:

**Effectiveness** refers to the extent to which a promotion strategy is capable of triggering RES deployment, either measured in increased generation or increased installed capacity. To make the increase comparable between different countries, it can be measured against a reference quantity, for instance a RES target, or nationally available RES potentials [21]. Targets can be set in absolute or relative terms – for instance as a share of final energy demand, as is currently the case under the RES Directive. This in turn influences how effectiveness is measured and how actual deployment is fostered by governments [35].

**Static efficiency (or cost-effectiveness)** refers to the achievement of a given RES-E target at the lowest cost to society. Maximum efficiency, in accordance with the equimarginality principle commonly applied in environmental economics, is reached when those firms with the lowest RES deployment costs are encouraged to deploy more RES, while those with higher costs deploy less [21, 35].

**Dynamic efficiency** refers to the extent to which a promotion strategy incentivises continuous technical improvements and cost reductions in RES. This is a key aspect in a long-term challenge such as climate change mitigation. RES, and especially the more costly technologies, may not be the most cost-efficient greenhouse gas mitigation options today, but may be needed to achieve more ambitious targets in the future. Strategies which simultaneously promote several RES technologies usually fare better in this regard [36, 37]. This may be in conflict with the above-mentioned static efficiency criterion, which favours technology-neutral support strategies under
which least-cost technologies are deployed while less mature ones are unsupported [35, 41].

Equity refers to whether a support strategy’s distributive impacts on consumers, citizens, sectors, or firms, are considered “fair” by policy makers and citizens. For instance, RES support may lead to a concentration of costs among certain consumer groups, or to a concentration of investments, and the resulting benefits, in certain regions [21]. Verbruggen [35] sees the realisation of the polluter-pays-principle as an indicator for this criterion, along with the avoidance of excess producer profits. On the other hand, windfall profits are covered under the static and dynamic efficiency criteria according to del Rio et al. [21].

Environmental and economic effects can be positive side effects such as an increase in employment, a strengthening of export industries, or a reduction in local pollutants. It can also refer to negative effects on the environment and biodiversity, or on landscape aesthetics.

Social acceptability and political feasibility are closely linked, assuming that policy preferences of the electorate translate into actions by political decision-makers. This criterion also overlaps with the equity, efficiency, and environmental and social effects criteria, but focuses more on how these issues are perceived by the general population. Furthermore, some countries may have a historical preference for certain types of policy instruments [42].

Legal feasibility includes two aspects: legislative competence of the EU versus MSs in the field of energy, and compatibility with other EU primary and secondary law. The former is addressed in Article 194 of the Treaty on the Functioning of the European Union. The latter refers to consistency of RES-related policies with other existing EU laws and policies [21].

Early 2012, the Council of European Energy Regulators (CEER) held a public consultation regarding the implications of non-harmonisation of RES support schemes [43]. Stakeholders’ preferences regarding future support schemes diverged significantly. The reasons for this may partly lie in how much importance they allocate to each of the above-mentioned assessment criteria. Criteria weightings for different stakeholder groups will be the subject of further research in the beyond2020 project in order to provide a nuanced picture of their preferences regarding the above-mentioned policy pathways.

5. QUALITATIVE pre-Assessment: major Arguments in favour of and against Harmonisation derived from the RES policy debate

5.1. General pros and cons of a RES policy harmonisation
Political and other stakeholders have put forward several interlinked arguments that support the harmonisation of support schemes and the extension of the internal market to RES-E:

- The internal market and the objective of its extension is a fundamental part of the ‘Acquis Communautaire’ and it is the EU’s goal to work towards its completion. It is therefore a logical step forward to create an internal market for energy, including renewable energy. Deviations from this overarching goal
could pose not only economic, but possibly also legal challenges.

- The creation of the internal market generally facilitates cost savings in various ways, which to a large extent also holds true for renewable energy. The following arguments are often used [20, 44]:
  - The internal market leads to an optimised allocation of resources, that is, electricity would be produced at the best places with, for example, high solar irradiation or wind speeds. This in turn would result in cost savings [45] [46].
  - An internal market leads to more competition between sites and technologies and fosters innovation [47].
  - A larger market with converged regulations reduces transaction costs for investors in renewable energy and leads to economies of scale. This triggers additional investments in renewable energy [48].

- Harmonised European support schemes and/or targets are more effective and easier to enforce, at least compared to national support schemes of countries which are lagging behind.

Others have either criticised these assumptions or pointed to challenges in, and limits to, realising an internal market for renewable energy.

- Uniform support payments across Europe could lead to higher rents for those producers which make use of least-cost technologies and sites. This could lead to a substantial increase in target achievement related costs for society (taxpayers or consumers) [38, 39, 49, 50].

- Each MS has different geographical, legal, political, and market conditions in which renewable energy support schemes operate. These contextual conditions would either need to be harmonised (which is not completely possible) or the remaining differences would need to be sufficiently reflected in a harmonised support scheme. A lack of context-specificity could decrease the effectiveness and efficiency of support, which is the opposite of the aim for harmonisation (and thus the internal market) [51].

- In order to obtain public acceptance in MSs for a harmonised support scheme, politically accepted distribution of costs and benefits would have to be achieved. This is likely to pose a significant challenge, given the large number of MSs and their national preferences. Neglecting domestic costs and benefits could lead to (local) opposition and loss of public acceptance [52, 53].

- Domestic energy policy and different policy interests make harmonisation difficult to achieve. In line with the principle of subsidiarity, MSs have developed their own tailor-made energy policies, which include different goals and ambitions: that is, different preferences. At the moment, not all MSs share a comparable ambition towards renewable energy, and they are not willing to transfer the required competences to the European level [28, 52, 54].

5.2. Pre-assessment of beyond2020 policy pathways

The 15 pathways developed in the beyond2020 project as shown in Table 1 reflect the
different harmonisation approaches discussed in the past. Accordingly, many of the arguments summarised above can be applied to these pathways. Several issues arise that are related to the potential instrument chosen for a harmonised support scheme:

- Quota without banding and ETS would give priority to static cost-efficiency (least-cost technology approach) over effectiveness, dynamic efficiency and technology development. From the current perspective, this would probably prevent the further development of less mature technologies, like offshore wind and more expensive biomass technologies. ETS could even threaten further RES development as a whole. Furthermore, uniform support would either lead to very limited RES deployment or to substantial rents for producers of least-cost RES-E. Given the strong interest in certain, less mature technologies and the public and political sensitivity to support costs, both pathways currently appear rather dysfunctional.

- Given deeply embedded differences between MSs regarding strict market orientation vs. more state interventionist approaches, a harmonisation of either FIT or quota schemes seems politically difficult to achieve, even beyond 2020, and therefore perform weakly in the socio-political acceptability criterion. A FIP and/or a combination of instruments for small- and large-scale RES might be considered the most feasible option, since they are accepted and applied in both types of countries. Other issues are independent of the instrument, but relate to the degree of harmonisation:

- Medium and full harmonisation would either abolish additional RES policy efforts by MSs (full harmonisation) or would put them under pressure (medium harmonisation), because the internal market would not allow (or at least would require strong justification) for market distortions through additional explicit RES support. This would probably lead to low socio-political acceptability.

- Medium and full harmonisation would create substantial challenges regarding a fair and, more importantly, politically acceptable distribution of costs and benefits. In particular, the effect on indirect costs and benefits (such as local added value, but also grid integration costs, etc.) would be likely to create opposition by MSs.

Against this background, we argue that both pathways, i.e. medium and full harmonisation, seem politically challenging and partially dysfunctional with regard to the envisaged increase in RES-E deployment.

The choice and harmonisation level of a support instrument by itself will not yet determine the effectiveness and efficiency of RES-E support. Several best practices and design criteria have emerged during recent years (see [56] and [57]) and these would have to be taken into account, many of them regardless of the support instrument or the level of harmonisation.

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8 An exception to this is the reference case that also includes an optional minimum harmonisation. Note further that this reference track is excluded from the subsequent pre-assessment.

9 For further reading, see [54, 55].
6. A QUANTITATIVE PRE-ASSESSMENT OF POLICY OPTIONS

6.1. Background and approach

The quantitative pre-assessment of policy options, analysing the impacts of four concrete RES policy concepts as outlined in section 3.2, was done by application of the Green-X model. Green-X is an energy system model that offers a suitable representation of RES technologies in Europe and indicates the consequences of RES policy choices in a real-world energy policy context. The model allows conducting in-depth analyses of future RES deployment and corresponding costs, expenditures and benefits arising from the preconditioned policy choices on country, sector and technology level.\(^\text{10}\) While the above qualitative assessment of 15 pathways takes into account all of the assessment criteria described in section 4, including social, political, and legal implications, the more detailed quantitative assessment of four selected policy options focuses on their performance regarding effectiveness, and static and dynamic efficiency. Conclusions on equity and environmental and economic effects can also be drawn using Green-X results, but are not described further here.

This policy assessment complements and partly updates previous related modelling activities – e.g. the quantitative assessment of RES policy options as conducted within the IEE project futures-e (see e.g. [39]) in the 2020 context. The detailed RES assessment also complements other recent work conducted in this topical area, for example the European Commission’s “Energy Roadmap 2050” [23] containing recent PRIMES modelling of feasible energy pathways for achieving long-term carbon commitments. Note that in order to assure consistency with other related studies at EU level, key assumptions on the conventional reference system, energy and carbon prices as well as energy demand were based on these general energy scenarios, in particular on the PRIMES “high renewables” case [23]. Moreover, in common with this PRIMES case, the targeted deployment of RES (as a share of gross final energy consumption) at EU level by 2030 was set at 31.2%\(^\text{11}\) for all Green-X scenarios, see Figure 3.\(^\text{12}\)

As shown in Figure 2 and Table 1 the number of scenarios assessed at this interim stage of the project is limited but the range of policy options can be classified as sufficiently broad, ranging from no dedicated RES support to national policy approaches with more or less intensified cooperation / coordination to a full harmonisation across the EU.

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\(^\text{10}\) For more details on the Green-X model, see [58].

\(^\text{11}\) According to the European Commission’s energy roadmap 2050 [23] the assumed 2030 RES target can be classified as ambitious, reflecting a decarbonisation pathway for Europe where RES are expected to become the major contributor, compare Figure 3.

\(^\text{12}\) In the Green-X scenario of “no (dedicated RES) support” no RES target was assumed for 2030 since, under this policy variant deployment only represents an outcome, not a precondition.
6.2. Interim results – RES-E deployment and related support expenditures

In this section we provide a brief overview of the results of the interim assessment, indicating key outcomes on the RES policy assessment at EU level for the electricity sector only, compare Figure 4 and Figure 5.

More precisely, Figure 4 illustrates the feasible RES-E deployment over time (left) as well as more specifically for 2030 (right), indicating the penetration of new RES-E installations in the observed time frame. It becomes evident that, without dedicated support, RES-E deployment would stagnate after 2020, reaching a RES-E share of 35.5% by 2030. This indicates that an ETS alone does not provide sufficient stimulus for RES-E deployment. In contrast to the “no support” case, the expected deployment of RES in the electricity sector by 2030 ranges from 55.2% to 55.4% for all other policy variants. If total RES are taken into consideration, “no (dedicated RES) support” would lead to a RES share in gross final energy demand of 24.6% by 2030, while it appears feasible for all other policy paths to reach the required RES deployment target for 2030 of 31.2%.

Figure 5 complements this depiction, also indicating the cost impact, in particular the resulting support expenditure for new RES-E installations. More precisely, Figure 5 offers a comparison of both overall deployment of new RES-E plants (installed 2021 to 2030) by 2030 as well as the corresponding support expenditures (on average per year for the period 2021 to 2030) for all the assessed cases. Apparently, strengthened national RES policies complemented by moderate to strong cooperation and coordination would lead to a RES share in gross final energy demand of 24.6% by 2030, while it appears feasible for all other policy paths to reach the required RES deployment target for 2030 of 31.2%.

This figure refers to the variant of low carbon prices. If moderate to high carbon prices are expected, a RES-E share of 37.8% can be achieved.

Again, this figure refers to the case of low carbon prices, as described in section 3.2. In the case of moderate / high carbon prices a RES share of 26.6% appears feasible.
coordination appear to keep RES deployment well on track for reaching moderate to strong targets to be achieved by 2030. Related support expenditures can then be maintained at a comparatively low level (22.8 to 23.5 billion € as yearly average for new RES-E installations) while uniform RES support as determined in the case of a harmonised RES trading regime (without banding) may lead to a consumer burden almost twice as high (38.3 billion €). Considering this strong negative consumer / societal impact a uniform RES certificate trading does not appear to be a suitable candidate for harmonisation, neither in the short- nor long-term (compare also [59]).

In the case of “no (dedicated RES) support” there are obviously no support expenditures for RES. If long-term climate targets are taken seriously, with Europe striving for the 80%-95% GHG reduction by 2050, a policy of no dedication to RES may however possibly cause side effects: a comparison of the two variants of “no support”, characterised by either low (in the case of no strong carbon commitment) or moderate / high carbon prices (reflecting a continuous long-term carbon commitment) indicates that in the absence of a strong RES deployment, a rise of electricity prices may lead to an indirect consumer burden of almost similar magnitude to that of the case of perfectly tailored RES policies. This happens in the absence of continuous RES support and related expansion; on the one hand, there is a reduction of the so-called “merit order” effect that usually goes hand in hand with RES deployment, and on the other hand, a lower level of RES-E penetration results in higher carbon prices and, thus, electricity prices. This is because more alternatives have to enter the (common) carbon market in order to comply with the carbon target.

Source: [60]

Figure 4: Comparison of the resulting RES-E deployment over time for all RES-E (left) as well as by 2030 for new installations only (either from 2011 to 2030, or from 2021 to 2030) (right) in the EU-27 for all assessed cases
7. CONCLUSIONS AND WAYS FORWARD

The RES Directive (Directive 2009/28/EC) lays the ground for the RES policy framework until 2020, but a strategy and clear commitment to RES beyond 2020 is needed if RES is to deliver what is expected. The initial results of both the quantitative and qualitative policy assessment indicate that cooperation and coordination among MSs appears beneficial and, indeed, is required to tackle current problems in RES markets. Thus, both policy options would also appear to be fruitful for the period beyond 2020. By contrast, “simplistic approaches” to RES policy harmonisation (e.g. via a uniform RES certificate trading) cannot be recommended – neither in the short- nor in the long-term.

There has been a complex interplay of coordination, cooperation and selective harmonisation, which appears to be a functional and politically feasible way forward, even beyond 2020. The continuation of a mixture of top-down and bottom-up processes would focus on harmonised minimum design criteria (top-down) and intensified coordination and cooperation between MSs (bottom-up). This option would foster policy convergence and market integration, while respecting the MSs’ different preferences, which should increase the political feasibility and public acceptance of such an approach.

The ultimate choice of the policy option will depend on the weighting of evaluation criteria given by different stakeholders in the EU energy sector. Initial results in this respect indicate that the criteria effectiveness and dynamic efficiency are considered very important across all groups. Environmental and economic effects were also seen as relevant, but less so by MS governments/ministries and by the conventional energy industry respondents. Not surprisingly, however, it was the most important criterion.
for environmental NGO representatives. Further research should analyse how the
different options for coordination/harmonisation put forward in this paper could better
cope with the risks associated with the current financial crisis which have led to
reductions in RES investments. Moreover, the expectation that in the case of
decentralised PV systems grid parity may be reached in the near future deserves
further attention, indicating that for certain technologies discussions on future support
may become obsolete.

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