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Policies for CSP deployment by renewable energy cooperation in the EU

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Cooperation mechanisms were introduced by the European Commission in 2009 (with Directive 2009/28/EC) to support the EU Member States in reaching their binding 2020 RES target share. Until today, and even though several Member States will likely miss their 2020 targets, only few countries have engaged in cooperation mechanisms so far.

For the time horizon 2020-2030, the policy landscape changed in so far as the 'Clean Energy for all Europeans' (CE4ALL) package defines an EU-wide RES target of 32% but no more binding national targets are set. In addition to the established cooperation mechanisms, new modes of collaborative RES deployment are now conceivable under the 'enabling framework' and the 'EU financing mechanism', instruments that are supposed to prevent a potential collective delivery gap but are yet to be designed in detail. A further instrument fostering collaboration has been created with the new 'Connecting Europe Facility" (CEF) which now also addresses cross-border RES projects. In general, market premiums allocated through competitive auctions are now the main support instrument for RES deployment in the EU. However, Member States may focus the auctions on specific technologies if a technology-neutral process would lead to suboptimal results. This is particularly relevant for CSP projects since their LCOE is still higher compared to other RES technologies, such as solar PV or onshore wind.

Consequently, the extent to which CSP will benefit from the new measures and instruments will mainly depend on the individual Member States' interest to expand the flexibility of their electricity systems, hence to promote a dispatchable technology, and if costs for CSP can be substantially reduced in the future.

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MUSTEC, Market Uptake of Solar Thermal Electricity through Cooperation

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1. INTRODUCTION

The present Issue of the MUSTEC Policy Brief provides the key outcomes of the recent H2020 MUSTEC report[1] on the political framework for renewable energy deployment in the EU and its relevance for potential future RES cooperation between Member States. More specifically, the analysis was focalised on the role that new policy instruments under the EU energy policy framework 2020-2030 could play for the realization of collaborative Concentrated Solar Power (CSP) projects in the future.

In this context, both the present political framework under the 'Clean Energy for all Europeans' (CE4ALL) package and the national energy and climate plans (NECPs) for the period 2020 to 2030 were taken into consideration. Finally, based on an assessment of the general requirements of CSP projects regarding economic support schemes, the relevance of individual policy instruments for potential collaborative CSP projects in the EU was evaluated.

2. DISCUSSION

Cooperation mechanisms were introduced by the European Commission in 2009 to support the EU Member States in reaching their binding 2020 RES target shares. The basic idea behind collaborative RES development is to generate energy from renewable sources at locations with particularly high potentials and/or low system integration cost, thus minimizing the overall system costs. Therefore, four cooperation mechanisms were included in Directive 2009/28/EC: Joint projects between Member States or Member States and third countries, Joint support schemes and statistical transfers between Member States. Until today, and even though several Member States will likely miss their 2020 targets, the cooperation mechanisms under RES Directive 2009/28/EC have hardly been used: Estonia and Lithuania agreed to statistically transfer renewable electricity to Luxembourg, Germany and Denmark held joint auctions for photovoltaic installations, and Sweden introduced a joint certificate scheme in collaboration with the non-EU country Norway. However, none of these cases involved CSP projects.

For the time horizon 2020-2030, the latest EU policy package **'Clean Energy for all Europeans (CE4ALL)'** that was adopted in May 2019, includes a new EU-wide 2030 target of at least 32% for the share of renewable energies in the gross final energy consumption but does not specify binding national targets anymore. However, the Member States are required to draft National Energy and Climate Plans (NECPs) which specify their envisaged (non-binding) RES share in 2030. The major documents under CE4ALL that are relevant for RES cooperation, including potential collaborative CSP projects, are the Recast Renewable

[1] http://mustec.eu/sites/default/files/reports/D6-2_Policy%20mapping%20for%20CSP%20cooperation_FH-ISI.pdf

Energy Directive 2018/2001[2], which defines the binding RES target on European level and sets guidelines for renewable energy support schemes and cooperation, and the Governance Regulation 2018/1999[3], which establishes a governance system for the implementation of energy and climate strategies on national level (i.e. the NECPs) and introduces mechanisms and instruments in case that a delivery gap with respect to the collective EU RES target should occur.

Regarding the **support for electricity from renewable sources**, the post-2020 EU policy framework defines that if economic support is granted it has to be allocated through technology-neutral, competitive procedures and must be provided in the form of fixed or sliding market premiums. However, Member States may still focus their RES support auctions on specific technologies if a technology-neutral process would lead to suboptimal results. This is particularly relevant if CSP projects are concerned, since the Levelized Cost of Electricity (LCOE) of CSP is still higher, compared to other RES technologies, such as solar PV or onshore wind. The selling point of CSP installations is their dispatchability, meaning that the thermal energy generated by sunlight can be stored for several hours before it is converted into electricity. Consequently, the success of CSP projects in competitive tendering processes depends critically on the auction design in particular on whether the energy storage option is valued in the evaluation criteria of the tender.

To avoid a RES delivery gap on EU level, different **'gap-filler' measures** can be applied by those Member States that fall below the reference points indicated in their NECPs. Besides the implementation of national support schemes, these include the option to contribute to the new 'European Union Financing Mechanism' or to engage in RES cooperation mechanisms with other EU Member States.

With respect to renewable energy cooperation, the recast RES Directive (2018/2001) includes some new instruments in addition to the cooperation mechanisms set out in the 2009 RES Directive. Firstly, statistical transfer of RES electricity shall be facilitated by the creation of a **Union Renewable Development Platform (URDP**), which acts as a match-maker and aims to reduce administrative hurdles for RES cooperation. Secondly, the Commission encourages the **opening of support schemes for electricity generated from RES** to producers located in other Member States. So far, the suggested opening of RES support schemes is voluntary (with an indicative share of min. 5 % from 2023 to 2026 and min. 10 % from 2027 to 2030) but the Commission will assess the option of a mandatory opening by 2023. This would imply a

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EN

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R1999&from=EN

significant push for cross-border RES deployment and might also create new opportunities for collaborative CSP projects.

The **'EU Financing Mechanism'** is a new instrument that will be established by January 2021 and will likely become the main instrument to close a potential RES delivery gap in the EU. Once a delivery gap is identified, Member States with deficient RES deployment can make a financial contribution to the fund. The fund will then be used to support RES projects through EU-wide auctions for feed-in premiums organized by the European Commission. Prior to a tender, host countries of potential RES projects would specify the capacities and RES technologies with which they would like to contribute and off-takers would indicate their demand and the maximum price they are willing to pay. The detailed design of the mechanism is, however, still to be defined.

Another new element in the recast RES Directive 2018/2001 is the so called **'Enabling Framework'** for renewable energy. The 'Enabling Framework' stipulates the use of Union and other funds to enhance the integration of RES technologies and storage facilities in the EU electricity system, to reduce cost of capital for RES, to increase system flexibility and interconnection capacities and to promote cooperation between Member States. The support could be provided in form of low-interest loans, grants, or a mix of both to joint projects between Member States. Depending on the detailed implementation of these measures, the enabling framework could play a relevant role for the expansion of CSP as a dispatchable RES technology.

Moreover, CSP expansion in Europe could benefit from the **'Connecting Europe Facility' (CEF**). In the new line of CEF funding 2021-2027, an amount of 8.7 billion Euro will be dedicated to support cross-border projects in the field of renewable energy (cross-border projects in RES) which includes technical or feasibility studies for collaborative RES projects. In this context, it is conceivable that a RD&D CSP project with thermal storage, for example proposed by Spain and another Member State, would have high chances to be eligible for funding under the CEF.

However, the extent to which collaborative CSP projects might benefit from the cooperation mechanisms and the new instruments in the post 2020 EU policy framework strongly depends on the interests of the individual Member States, i.e. their willingness to foster dispatchable RES technologies. On national level, CSP deployment has only been included in the draft NECPs of Spain, Portugal, Italy, Greece and Cyprus, whereby the existence of a national CSP industry in Spain represents an additional driver for this country's ambition . To assess the potential future role of CSP in cooperation projects among EU Member States also the likelihood that they reach their RES targets as well as the resource potential for the technology are relevant factors. Against this background, Spain and Italy are the Member States that are most

likely to engage as host countries in future CSP cooperation projects. Several Member States that are at risk of missing their national RES targets could serve as off-taker countries for statistical transfer of electricity generated by RES. However, the higher LCOE of CSP compared to, e.g. PV or wind energy onshore, will likely only be accepted if the off-taker benefits from the dispatchability of CSP, which is only possible if physical transfer of electricity can take place (e.g. from Italy to Malta, or from Spain to France). In case of statistical transfer, the off-taker country will aim at minimizing support costs and has no benefit from the dispatchability.

Thus, if RES cooperation is based on a purely economical optimization, CSP projects will most likely not have the winning bid. The situation would change, however, if electricity could be physically transferred between the cooperating parties, e.g. enabled by joint projects, joint support schemes or open RES support auctions. In those cases, CSP with storage could contribute to an increased flexibility in the host and off-taker countries' electricity systems, thus being instrumental to energy security.

A more detailed evaluation regarding the potential relevance of the individual instruments for the implementation of collaborative CSP projects among EU Member States is given in *Table 1*.

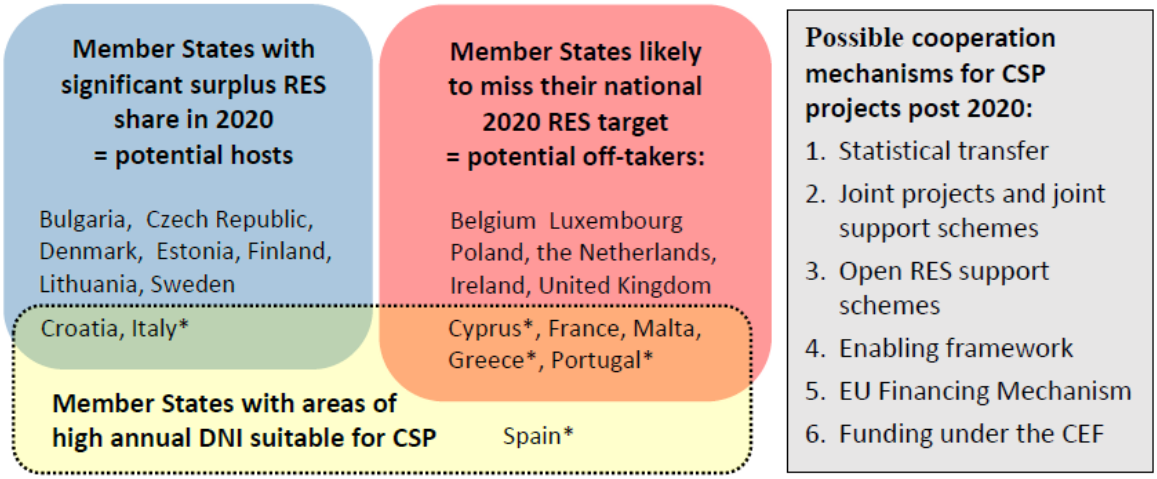

Figure 1: Summary of potential host countries, off-taker countries and policy instruments potentially relevant for CSP cooperation 2020-2030

*Overview of potential host countries (blue box) and off-taker countries (red box) for cooperation, and Member States with areas of high DNI values beneficial for CSP projects (yellow box). The * indicates countries which included CSP in*

their draft NECPs from December 2018. Spain is expected to just meet the 2020 target. The grey box summarizes the potential instruments that might promote CSP cooperation projects in the 2020-2030 timeframe.

Table 1 Assessment of the potential relevance of policy instruments for future CSP cooperation projects in Europe

Legal document	Instruments potentially relevant for EU CSP cooperation	Assessment of potential implications and level of relevance for CSP cooperation
Renewable Energy Directive (2009/28/EC)	• **Cooperation mechanisms:** ○ Joint Projects (Article 7) ○ Joint Support Schemes (Article 11) ○ Statistical transfers (Article 6)	**No impact on CSP cooperation** - Hardly any use of cooperation mechanisms in general and no application to CSP in the past.
Recast Renewable Energy Directive 2018/2001	• **Cooperation mechanisms:** Statistical transfer and establishment of Union Renewable Development Platform (URDP) for facilitated matchmaking (Article 8): Member States can publish their expected excess or deficient amount of RES energy and a tentative price for a statistical transfer of RES.	**Impact on CSP cooperation unlikely** - Additional elements to promote coordination and cooperation among Member States have been introduced, especially through the establishment of the URDP. - However, the impact of statistical transfer on potential CSP cooperation projects in the future will likely be very limited as statistical RE transfer does not value the dispatchability of CSP and thus makes it less competitive compared to RES technologies with lower LCOE.
	○ Joint Projects (Article 9) Joint Support Schemes (Article 13)	**Impact on CSP cooperation highly unclear** - The relevance of joint projects and joint support schemes, likely realized in the form of cross-border auctions, strongly depends on the auction design (in particular the technology specification) and the level to which the dispatchability of CSP is valued in the detailed auction design.
	• **Opening of RES support schemes:** Suggested indicative share of a minimum 5 % from 2023 to 2026 and a minimum 10 % from 2027 to 2030 (voluntary). By 2023, review of utilization and decision about the possibility of a mandatory opening (Art. 5/5).	**Potentially relevant for CSP cooperation** - A mandatory opening of support schemes after 2023 would imply a significant push for cross-border cooperation in RES deployment. - The opportunities for cross-border CSP projects, however, depend on the interests, i.e. the technology focus of the individual countries.

Legal document	Instruments potentially relevant for EU CSP cooperation	Assessment of potential implications and level of relevance for CSP cooperation
	• "**Enabling framework**": Use of Union funds and additional funds, for different activities to foster RE deployment: ○ Reduction of the cost of capital for RE projects; ○ Implementation of projects and programs for enhanced integration of RES into the energy system and to increase system flexibility; ○ Development of the electricity grid including storage facilities and other grid related actions to reach the 15 % electricity interconnection target by 2030. • Promotion of cooperation between Member States [...] through joint projects, joint support schemes and opening of support schemes for RES deployment.	**Potentially high relevance for CSP cooperation** - Actvities under the enabling framework could be of direct relevance to CSP cooperation projects as they explicitly address the support of projects that can contribute to increasing system flexibility and storage options. - Support may be granted in form of low-interest loans or grants for CSP projects that help to increase the EU electricity system flexibility. - Reduction of capital costs for RES projects could support RES cooperation projects by making RES more competitive in the cross-border context as costs of financing renewables differ substantially between the EU Member States. The use of risk-reduction instruments could substantially decrease the investment needs for CSP projects and help to reduce differences in the competitive market environment among Member States. This would help to create a more level playing field that would implicitly foster RES cooperation. - The enabling framework explicitly foresees the enhancement of regional cooperation and joint projects in RE, which implies that in particular cooperation projects (including CSP) would be in the focus of the measures.
Governance Regulation 2018/1999	• **Union financing mechanism:** To be established by January 2021, no detailed design yet, main characteristics: ○ Competitive tenders ○ Support granted as feed-in premiums on top of the market prices. ○ Member States have the right to decide about RE	**Potentially high relevance for CSP cooperation** - The financing mechanism could be relevant for CSP cooperation projects if auctions on EU level would be technology-specific and would be targeted specifically on the benefits of CSP (i.e. dispatchability / storage options). - If auctions would be technology-neutral CSP would likely not be

Legal document	Instruments potentially relevant for EU CSP cooperation	Assessment of potential implications and level of relevance for CSP cooperation
	installations in their territory. ○ Commission will provide rules for the implementation (e.g. regarding tender design, participation, maximum premium and duration of the payments). ○ Financing mechanism shall promote RES deployment irrespective of a delivery gap and support the enabling framework. Hence, it may also provide low-interest loans, grants, or a mix of both to joint projects between Member States […]. For this, Union funds, contributions from private sector or Member States may complement the financing.	competitive, unless a distpach profile is required (as in Dubai) or a dispatch profile is auctioned (as in Chile). - Collaborative CSP projects could also be supported through low-interest loans and/or grants for feasibility studies or for the actual project implementation.
Connecting Europe Facility (CEF)	• **Support to 'cross-border projects in RES'**: 2021-2027 budget of 42.3 billion Euro of which 8.7 billion € are dedicated to the promotion of the clean energy transition in accordance with the "CE4All" package. • Support to cross-border RE projects [...] for technical, preoperational or feasibility studies and/or work. • Eligibility for grants requires: ○ Cooperation between countries as set out in Directive 2009/28/EC ○ EU-added value ○ Existence of a funding gap.	**Potentially high relevance for CSP cooperation** - Based on the preliminary information it is well conceivable that CSP cooperation projects would qualify for funding, as a joint CSP project could add flexibility to the EU energy system (EU added value) and would depend on additional support due to the high LCOE (funding gap). - CSP coopertaion projects could receive grants covering up to 50% of the costs and/or funding for feasibility studies. - Support could be complementary and synergetic to the mechanisms under the 'gap-filler' and the 'enabling framework' as it would complement actions taken at bi- or multinational level as well as at EU level on cross-border RES cooperation. - However, due to the high installation costs for CSP and competition with other technologies/projects the limited CEF fund will likely only be able to support very few cross-border CSP projects.

3. CONCLUSIONS

Although cooperation between EU Member States could enable countries with low RES potential or high LCOE for RES to reach their renewable energy targets, under the EU RES framework up to 2020 there was very limited use of cooperation mechanisms and no collaborative CSP projects were realized so far. In the 2020-2030 framework, the increasing ambition and target to increase the share of RES energy in the EU will lead to the expanded growth and deployment of RES technologies and will most likely also increase the use of collaborative approaches in RES deployment. Especially the EU Financing Mechanism could be an important instrument in this regard but also the support to cross-border RE projects under the CEF could potentially play a role for CSP cooperation projects. However, eventually the extent to which CSP will benefit from the new measures and instruments will mainly depend on the individual Member States' interest to expand the flexibility of their electricity systems through cooperation, hence to promote a dispatchable technology, as well as on the future cost development of CSP.

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