

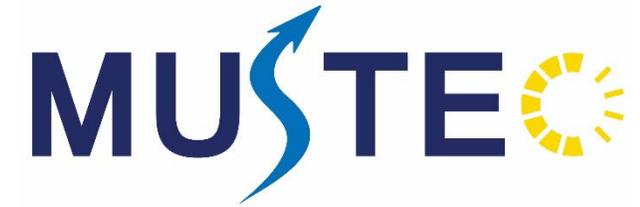
## Market Uptake of Solar Thermal Electricity through Cooperation

# Roadmap & Action Plan for cooperative CSP deployment in Europe

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# Objectives: Roadmap and Action Plan as complementary strategy components



## Roadmap: Long-term vision

- Visualizing relevant framework conditions for the development of CSP cooperation projects in Europe until 2030

- Highlighting crucial steps (milestones) and timing of actions required to allow for this transition



## Action Plan: Actions and instruments

- Providing detailed recommendations on policy actions on Member State and EU level
- Suggesting policy instruments and design elements to address the identified barriers and drivers to enable CSP cooperation

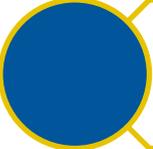
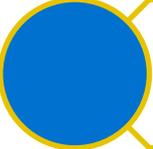
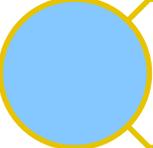


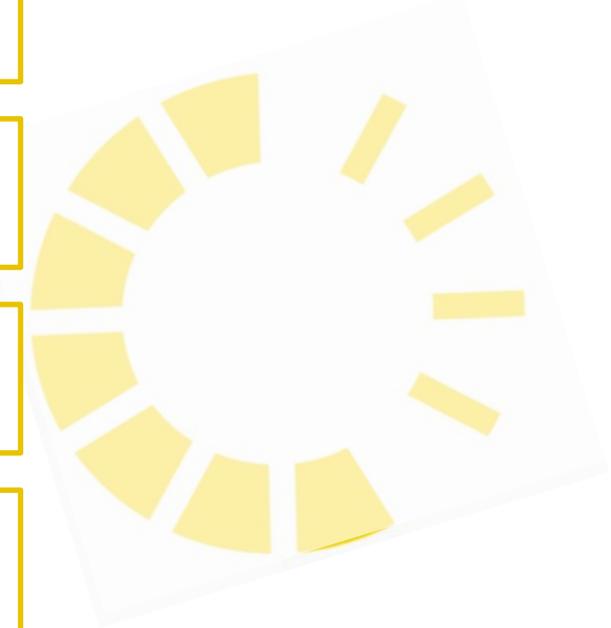
# Roadmap for CSP cooperation: Overview and methodology

## Inputs:

- **Key barriers & drivers** for cooperative CSP deployment → Identified throughout MUSTEC project
- Mapping and **evaluation of existing policies** and measures and their relevance for CSP cooperation
- Feedback on **relevance of suggested measures** → Consultation of CSP stakeholders (online survey)

## Structure:

-  Key issues grouped thematically into **three layers: Major fields of action with respective policy measures detailed in the Action Plan**
-  **Timeframe:** Steps and milestones in the **short (until 2022), medium (until 2025) and long term (until 2030)**
-  **Relevance:** Particularly crucial / **key milestones** are highlighted 
-  **Level of responsibility:** Action to be taken on **MS or EU level**  



## Layers of the roadmap: Three main fields of action to support CSP cooperation projects



- ✓ **Political and regulatory framework:** Definition of ambitious and technology-specific deployment goals, provision of targeted support and a suitable market design that recognize the value of CSP as a dispatchable renewable energy technology



- ✓ **Techno-economic framework:** Enhancing the competitiveness of CSP by further reducing the LCOE, supporting R&D activities, effectively hedging project implementation risks and facilitating project financing



- ✓ **Socio-political framework:** Creating a broad public acceptance and awareness for the benefits of CSP and the importance of collaborative European approaches for renewable energy support



## Political and regulatory framework

### Short-Term

Stronger acknowledgement and clearer statement of the European commission regarding the role of RES cooperation in the European Energy and climate strategy

Clear and binding statement regarding the sufficient availability of funds under the CEF 'c-b projects in RES' program for the period after 2027 to provide a long-term perspective for collaborative RES projects

'EU Renewable Energy Financing Mechanism' established and submission of binding participation commitments from EU Member States including CSP

Continuously ensure policy stability, transparency and continuity of European energy policy measures and regulatory framework

### Mid-Term

Push for collaborative RES deployment through mandatory share for opening of Member States' RES support schemes defined in RED (Art. 5) from 2023 on

Provision of CEF funding under the current (2021-2027) 'c-b projects in RES' program for feasibility study and implementation of at least one collaborative/cross-border CSP project

First technology-specific auction specifically addressing CSP organized under the 'EU Renewable Energy Financing Mechanism'

Provision of Union funds (grants and low-interest loans) under the 'enabling framework' (RED 2018/2001 (Art.3(5))) to first cross-border CSP project

### Mid-Term

Gradual increase of the mandatory share for opening of Member States' RES support schemes based on RED (Art. 5)

Growing experience with the funding scheme and perspective on pipeline of collaborative CSP projects eligible for funding under the CEF 'c-b projects in RES'

Successful construction and commissioning of first European cross-border CSP project ('lighthouse project')

### Long-Term

Clear commitment to and strategy for RES cooperation as a pillar of the European energy and climate strategy reflected by EU regulation

Long-term continuity in CEF funding stream for 'c- projects in RES' and coordination with other policy and financing tools (e.g. enabling framework and EU financing mechanism) provide reliable framework for collaborative CSP projects

Clear and reliable long-term strategy for the development and role of CSP in the European energy system



Stronger acknowledgement of and policy focus on the benefits of RES cooperation on national level

Analyses and acknowledgement of the value of CSP for system flexibility and stability on national level

Continuously ensure policy stability, transparency and continuity of national energy policy measures and regulatory framework

Tangible targets for RES cooperation and CSP deployment included in Member States' NREAP progress reports

Broader implementation of ambitious CSP deployment targets and reliable, technology-specific economic support schemes addressing CSP deployment on national level

Clear representation of RES cooperation in long term national energy strategies and acknowledgment of its value for national & regional energy security

Role of CSP is reflected in national energy strategies for enhancing system flexibility and security of supply (i.e. with clear long-term targets and reliable support schemes)

## Political and regulatory framework

### Short-Term



EU Level

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**'EU Renewable Energy Financing Mechanism' established and submission of binding participation commitments from EU Member States including CSP**

„Gap-filler” instrument if 2030 RE target is missed [Governance Reg. 2018/1999]:

- Competitive tenders across MS
- Support granted as feed-in premiums
- MS decide about RE installations in their territory
- EC provides rules for the implementation (e.g. regarding tender design, participation, maximum premium and duration of the payments)
- Additional support possible through low-interest loans, grants, or a mix of both to joint projects between MS [...]. For this, Union funds, contributions from private sector or MS may complement the financing.



MS Level

Stronger acknowledgement of and policy focus on the benefits of RES cooperation on national level

Analyses and acknowledgement of the value of CSP for system flexibility and stability on national level

Continuously ensure policy stability, transparency and continuity of national energy policy measures and regulatory framework

- Potentially high relevance for CSP cooperation projects depending on auction design → if auctions would be technology-specific and acknowledge the benefits of CSP (i.e. reward dispatchability & storage options)
- Role of CSP determined by MS interests and technology focus
- Collaborative CSP projects could also be supported through low-interest loans and/or grants for feasibility studies or for the actual project implementation

## Political and regulatory framework

- Activities could be of direct relevance to CSP cooperation projects as they explicitly address projects that increase system flexibility, storage options and cooperation.
- Low-interest loans or grants to CSP projects that help increase EU electricity system flexibility.
- Reduction of capital costs could support RES (CSP) cooperation projects by making them more competitive in the cross-border context.
- Costs of financing RE differ substantially between MS. The use of risk-reduction instruments could help to create a more level playing field which would implicitly foster RES cooperation.

**“Enabling framework”** [Recast RED 2018/2001]: 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 [...] to reach the 15 % electricity interconnection target by 2030.
- Promotion of cooperation between MS [...] through joint projects, joint support schemes and opening of support schemes for RES deployment.

**Provision of Union funds (grants and low-interest loans) under the ‘enabling framework’ (RED 2018/2001 (Art.3(5))) to first cross-border CSP project**

**commissioning of first European cross-border CSP project (‘lighthouse project’)**

Stronger acknowledgement of and policy focus on the benefits of RES cooperation on national level

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MS Level

## Political and regulatory framework

### Connecting Europe Facility (CEF):

2021-'27 budget of 8.7 bn € dedicated to promotion of the clean energy transition in accordance with the "CE4All" package.

Support to cross-border projects in the field of RE (c-b projects in RES) between two MS [...] for technical, preoperational or feasibility studies and/or work.

Eligibility criteria:

- Cooperation between MS (RED2009/28/EC)
- EU-added value
- Existence of a funding gap

- Joint CSP projects could qualify for CEF funding as they 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 cooperation 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".

### Mid-Term

Push for collaborative RES deployment through mandatory share for opening of Member States' RES support schemes defined in RED (Art. 5) from 2023 on

Gradual increase of the mandatory share for opening of Member States' RES support schemes based on RED (Art. 5)

Provision of CEF funding under the current (2021-2017) 'c-b projects in RES' program for feasibility study and implementation of at least one collaborative/cross-border CSP project

Growing experience with the funding scheme and perspective on pipeline of collaborative CSP projects eligible for funding under the CEF 'c-b projects in RES'

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al energy policy measures and regulatory framework

## Political and regulatory framework

### Mandatory opening of RES support schemes (Recast RED 2018/2001):

- Suggested indicative min. share of 5 % from 2023 to 2026 and 10 % from 2027 to 2030.
- By 2023, review of utilization and decision about mandatory opening (RED Art. 5/5).

➤ Mandatory opening of RES support schemes would imply a significant push for RES cooperation in general.

➤ However, the relevance of this measure for cross-border CSP projects would depend on the interests, i.e. the technology focus and policy choices of the individual MS.

### Mid-Term

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## Political and regulatory framework

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### Mid-Term

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### Long-Term

Clear commitment to and strategy for RES cooperation as a pillar of the European energy and climate strategy reflected by EU regulation

Long-term continuity in CEF funding stream for 'c- projects in RES' and coordination with other policy and financing tools (e.g. enabling framework and EU financing mechanism) provide reliable framework for collaborative CSP projects

Clear and reliable long-term strategy for the development and role of CSP in the European energy system

Continuously ensure policy stability, transparency and continuity of European energy policy measures and regulatory framework



Stronger acknowledgement of and policy focus on the benefits of RES cooperation on national level

Analyses and acknowledgement of the value of CSP for system flexibility and stability on national level

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## Techno-economic framework

### Short-Term

Maintain and strengthen European CSP R&D networks through continuous provision of EU research funds and more targeted focus on CSP in the European energy technology research strategy (e.g. SET Plan and technology innovation platforms)

Continuous and targeted support for innovative CSP demonstration projects with a focus on enhancing efficiency and innovative concepts and technology combinations

Continuous support granted to research activities assessing the benefits of collaborative RES deployment approaches among EU Member States

Provision of EU financial support for solar resource (DNI) measurements to facilitate CSP feasibility studies

R&D support granted to cross-border CSP research & demonstration project(s)

Clear and binding statement regarding the sufficient availability of funds under the CEF 'c-b projects in RES' program for the period after 2027 to provide a long-term perspective for financing of collaborative RES projects

Provision of CEF funding under the current (2021-2027) 'c-b projects in RES' program for feasibility study and implementation of at least one collaborative/cross-border CSP project

Provision of Union funds (grants and low-interest loans) under the 'enabling framework' (RED 2018/2001 (Art.3(5))) to first cross-border CSP project

### Mid-Term

Creation of new European CSP research alliances to support innovative CSP technology solutions adapted to European needs

Growing experience with the funding scheme and perspective on pipeline of collaborative CSP projects eligible for funding under the CEF 'c-b projects in RES'

### Long-Term

CSP strongly embedded in European long-term R&D strategy, strong research networks and innovation platforms coordinated with national CSP R&D strategies

Efficiency increases and innovative concepts lower LCOE and increase the economic competitiveness of CSP

Long-term continuity in CEF funding stream for 'c- projects in RES' and coordination with other policy and financing tools (e.g. enabling framework and EU financing mechanism) provide reliable financing framework for collaborative CSP projects



Maintain and strengthen national CSP R&D networks through continuous provision of national research funds and facilitation of innovation activities in public and private institutions

Further facilitate and accelerate procedures for grid access for CSP plants to hedge project implementation risks

Further facilitate and streamline administrative permitting procedures for CSP projects to hedge project implementation risks

Tangible targets for RES cooperation and CSP deployment included in Member States' NREAP progress reports

Broader implementation of ambitious CSP deployment targets and reliable, technology-specific economic support schemes addressing CSP deployment on national level provide a secure financial perspective

CSP integral part of national long-term R&D strategies and embedded and coordinated with European research strategy, strong national and regional R&D networks

Reliable national support schemes, CSP deployment targets and clear administrative frameworks provide a secure framework for project implementation and lower LCOE

## Techno-economic framework

### Short-Term

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R&D support granted to cross-border CSP research & demonstration project(s)

### Mid-Term

Creation of new European CSP research alliances to support innovative CSP technology solutions adapted to European needs

### Long-Term

CSP strongly embedded in European long-term R&D strategy, strong research networks and innovation platforms coordinated with national CSP R&D strategies

Efficiency increases and innovative concepts lower LCOE and increase the economic competitiveness of CSP



Besides the financial support and regulatory measures mentioned on the previous slides, especially continuous and targeted R&D support and hedging of project implementation risks for CSP (cooperation) projects are crucial to reduce LCOE further.

Maintain and strengthen national CSP R&D networks through continuous provision of national research funds and facilitation of innovation activities in public and private institutions

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Reliable national support schemes, CSP deployment targets and clear administrative frameworks provide a secure framework for project implementation and lower LCOE



## Socio-political framework

### Short-Term

### Mid-Term

### Long-Term



Continuous facilitation and funding of research on the benefits of collaborative approaches in RES deployment and economic development and communication of the findings proactively to key stakeholder groups and the general public

Development of strategies and guidelines for the Member States for an equal distribution of costs, benefits and responsibilities among potential host and off-taker countries of CSP collaboration projects

Establishment of best practice guidelines for the Member States on how to implement transparent procedures for stakeholder participation for cross-border RES projects to be able to understand and address local needs and concerns effectively

Showcases of successful (CSP) cooperation or cross-border demonstration projects used by the EC to proactively communicate the benefits of collaborative RES approaches and to win the public interest and support

Broad public acceptance and awareness for the benefits of CSP both in the European energy system

Awareness for the benefits of collaborative approaches (e.g. job effects, cost savings, innovation effects) reflected in European policy narratives



Targeted communication campaigns on the benefits of RES cooperation and CSP adapted to the local country context address relevant stakeholder groups on national level

Showcases of successful (CSP) cooperation projects used on national level to proactively communicate the benefits of collaborative RES approaches and to win the public interest and support

Provision of specific R&D support to innovative CSP concepts with lesser space requirements and a lower visual impact to further increase local acceptance of CSP plants in host countries

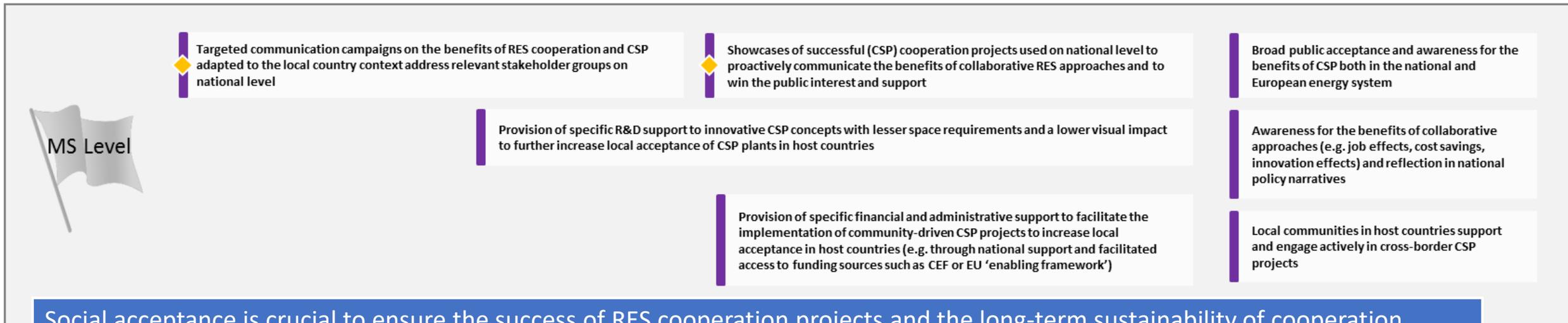
Provision of specific financial and administrative support to facilitate the implementation of community-driven CSP projects to increase local acceptance in host countries (e.g. through national support and facilitated access to funding sources such as CEF or EU 'enabling framework')

Broad public acceptance and awareness for the benefits of CSP both in the national and European energy system

Awareness for the benefits of collaborative approaches (e.g. job effects, cost savings, innovation effects) and reflection in national policy narratives

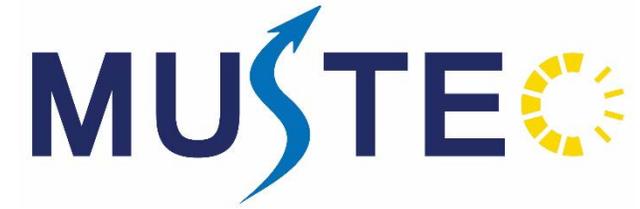
Local communities in host countries support and engage actively in cross-border CSP projects

## Socio-political framework



Social acceptance is crucial to ensure the success of RES cooperation projects and the long-term sustainability of cooperation policies in general. Both on national and EU level, in potential host and off-taker countries, groundwork needs to be done now in order to ensure broad social acceptance and public support for RES cooperation in the long run.

## Action Plan for CSP cooperation - Overview



- Linked to CSP roadmap
- Detailing recommendations how policy makers on European and national level could address the identified key issues preventing CSP cooperation
- Differentiation between policy blocks:

### Framework conditions

- Elements of RES support independent from the RES support scheme

### Instruments

- Specific types of interventions or support to address specific drivers or barriers

### Design elements

- Detailed design options of individual support instruments

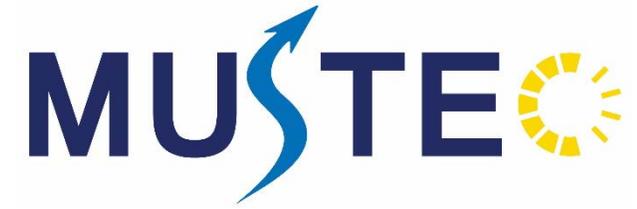
# Description of specific measures – Structure



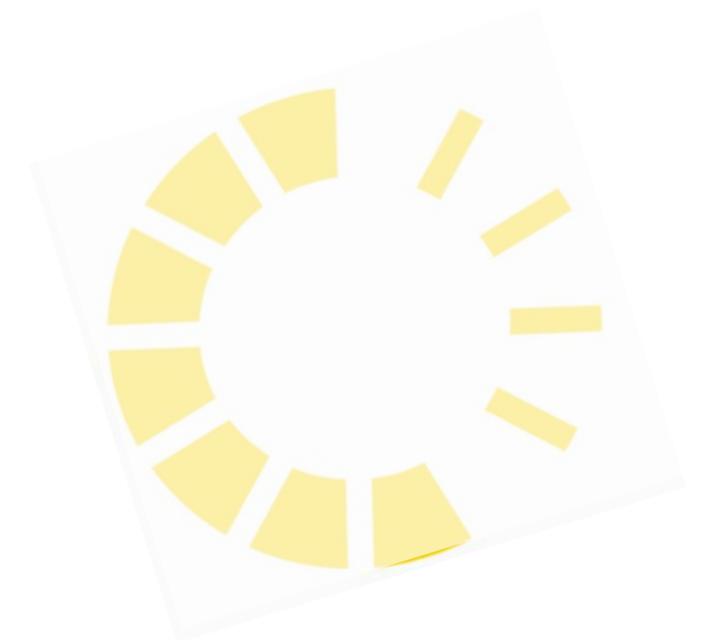
SPECIFIC MEASURE			
<b>Policy block</b>	Framework conditions		
<b>Policy area</b>	• Cooperation mechanisms	• Technology	
<b>Instrument type</b>	Support for the cooperation mechanisms, deployment of CSP		
<b>Possible design elements</b>	✓ A ✓ B ✓ C		
<b>Drivers and barriers addressed</b>			
<b>Timing</b>	Short term	Medium term	Long term
<b>Priority</b>	Low <span style="margin-left: 100px;">Medium</span> <span style="margin-left: 100px;">High ▲</span>		
<b>Administrative level</b>	★ EU: 🏠 MS:		
<b>Potential interactions (synergies or conflicts)</b>			

- Policy area: Measures can address deployment of CSP and/or the use of RES cooperation mechanisms
- Details on design elements
- Identified barriers and drivers addressed by the measure
- Timing: Suggested timing (in line with roadmap)
- Priority: Particularly crucial measures should be targeted with a high level of priority
- Administrative level of measures
- Synergies or conflicts with other measures can be relevant for policy planning

## Specific measures – Overview of topics covered in the Action Plan



- Framework conditions (RES targets and stability)
- **Auctions**
- Support for RD&D
- Support for engaging in cooperation mechanisms (collaborative CSP projects)
- Measures to enhance social acceptability
- Improving grid interconnections
- Mitigate administrative and grid-access barriers
- Opening of support schemes
- Support for the costs of financing



## Focus on auctions – Auctions can be highly relevant for CSP cooperation

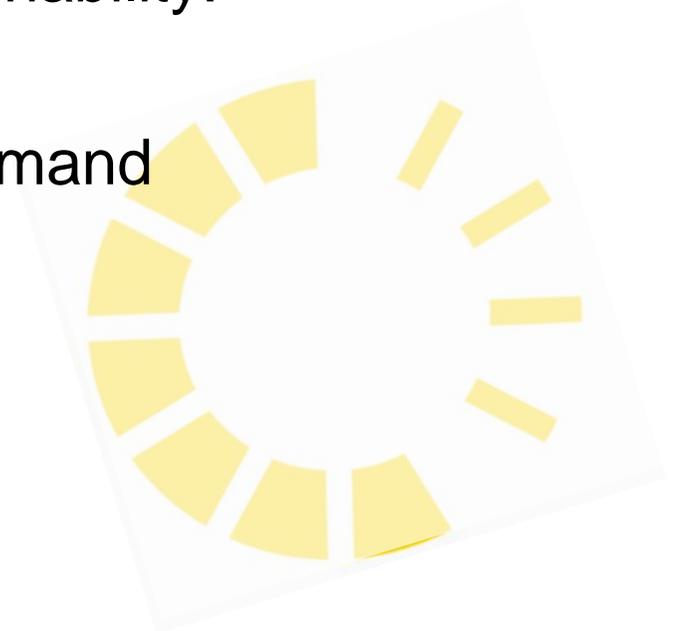


- Auctions are the key instrument to support RES deployment in the EU
- Art. 4.4 of RES Directive 2018/2001 states that “Member States shall ensure that support for electricity from renewable sources is granted in an open, transparent, competitive, non-discriminatory and cost-effective manner”
- Auctions are also defined as requirement for state aid in the EU Commission Guidelines on State Aid for environmental protection and energy 2014-2020 (2014/C 200/01)
- Auctions will be the key instrument for the “gap filler” (European Union financing mechanism)
  - **EU-wide auctions organized by the European Commission**
- Cross-border auctions for RES support could be a key instrument under the RED cooperation mechanisms
  - **Open auctions between two MS**
  - **Joint auctions between MS**



### ✓ FAVOURABLE FOR CSP

- Technology-specific auctions
  - facilitate the deployment of the technology
- Design elements which allow the valuation of dispatchability:
  - time-diverse generation profile
  - offering higher remuneration at times of higher demand
  - requiring a dispatch profile
- Other: auction schedule, long realization periods...



# Specific measure: Auctions for CSP

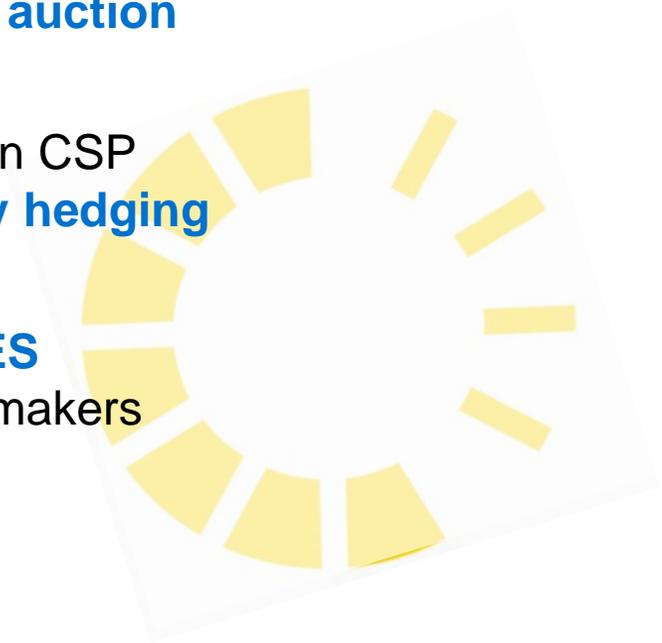


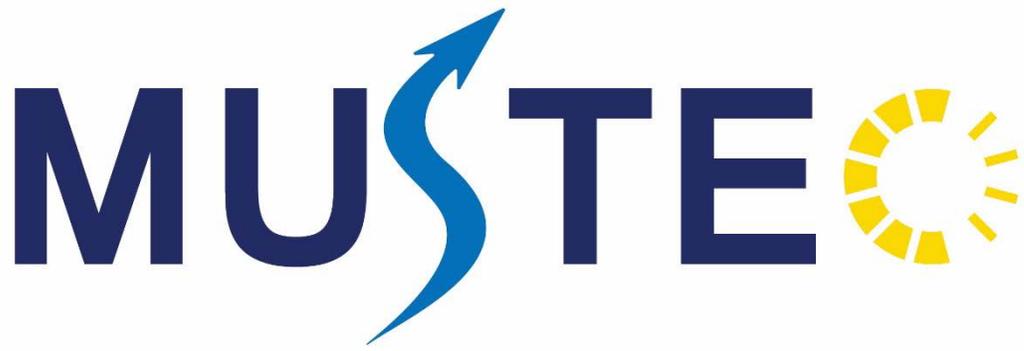
SPECIFIC MEASURE	AUCTIONS		
<b>Policy block</b>	Instruments, design elements		
<b>Policy area</b>	• Cooperation mechanisms	• Technology	
<b>Instrument type</b>	Support for the cooperation mechanisms, deployment of CSP		
<b>Possible design elements</b>	Various possibilities (see text). Three alternatives of auctions: ✓ MS auctions (MS responsible for design) ✓ Cross-border auctions (involved MS responsible for design) ✓ EU-wide auctions under the EU Financing Mechanism (EU responsible for design)		
<b>Drivers and barriers addressed</b>	High LCOE, value of dispatchability, costs of engaging in the cooperation mechanisms		
<b>Timing</b>	<b>Short term</b>	<b>Medium term</b>	Long term
	MS auctions (very short term) Cross-border auctions (short term). EU-wide auctions under the EU Financing Mechanism (short/medium term)		
<b>Priority</b>			
	MS auctions (very high) Cross-border auctions (medium) EU-wide auctions under the EU Financing Mechanism (low)		

<b>Administrative level</b>	★ <b>EU:</b> EU-wide auctions under the EU Financing Mechanism 📄 <b>MS:</b> MS auctions, Cross-border auctions (with support by the EU)
<b>Potential interactions (synergies or conflicts)</b>	Synergies with RD&D support, support for engaging in the cooperation mechanisms (see text)

# Key conclusions

- **Coordinated policy action on both national and EU level is urgently needed now** to allow for the formation of a niche for (collaborative) CSP projects in the future.
- This implies the creation of a **clear mission statement and plan for the deployment of CSP and for the use of RES cooperation mechanisms** across the EU.
- RES support schemes must recognize the value of CSP as a dispatchable RE technology that can support system flexibility and stability → **Crucial role of auction design**
- Enhancing the competitiveness of CSP is key for the survival of the European CSP industry → **Provision of R&D support and financing tools and effectively hedging project implementation risks**
- **Social acceptance is crucial to ensure sustainability and success of RES cooperation policies in the long term** and should be addressed by policy makers immediately.





## Market Uptake of Solar Thermal Electricity through Cooperation

# Thank you!

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