



## **D3.3. Public acceptance of joint projects in renewable energies. A survey study in four countries**

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## ABOUT THE PROJECT

In the light of the EU 2030 Climate and Energy framework, **MUSTEC- Market uptake of Solar Thermal Electricity through Cooperation** aims to explore and propose concrete solutions to overcome the various factors that hinder the **deployment** of concentrated solar power (**CSP**) projects in Southern Europe capable of supplying renewable electricity on demand to Central and Northern European countries. To do so, the project will analyse the **drivers and barriers** to CSP deployment and renewable energy (RE) cooperation in Europe, identify future CSP **cooperation opportunities** and will propose a set of concrete **measures** to **unlock the existing potential**. To achieve these objectives, MUSTEC will build on the experience and knowledge generated around the cooperation mechanisms and CSP industry developments building on concrete CSP **case studies**. Thereby we will consider the present and future European energy market design and policies as well as the value of CSP at electricity markets and related economic and environmental benefits. In this respect, MUSTEC combines a dedicated, comprehensive and multi-disciplinary analysis of past, present and future CSP cooperation opportunities with a constant **engagement** and **consultation** with **policy makers** and **market participants**. This will be achieved through an intense and continuous **stakeholder dialogue** and by establishing a tailor-made **knowledge-sharing network**.

Project information	
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## 1 INTRODUCTION

Renewable energy cooperation could play an important role in the energy transition in the EU, taking advantage of trade within the internal market, safeguarding security of energy supply, coordinating climate adaptation measures and optimizing the cost-effectiveness of actions (Caldés et al., 2018). It is for these reasons that the EU wants to promote the use of cooperation mechanisms (such as joint projects) between member states where the resources are most abundant, where the overall system costs would be minimized or where overall social benefits would be maximized. However, despite the expected benefits of these mechanisms, several barriers and, possibly, lack of active support by decision makers and stakeholders have prevented a wide use of the cooperation mechanisms among member states (see Caldés et al., 2018 and Dütschke et al., 2019 for further details).

Socio-political acceptance, including the acceptance by citizens, is considered, as in other related contexts (see Wüstenhagen, R., Wolsink, M., & Bürer, M. J., 2007; Upham, P., Oltra, C., & Boso, À., 2015; Devine-Wright, P., & Batel, S. 2017) a potential critical issue in the future adoption of joint energy projects. As stated by the EC in the Commission staff working document *Guidance on the use of renewable energy cooperation mechanism* “joint projects should enjoy wide societal acceptance and contribute to sustainable development in the host country” (European Commission, 2013). In particular, the acceptance of cooperation projects by the electorate is considered of critical importance, given its potential effects on the political acceptance in the respective countries (host and off-taker countries) of these projects. How does the European electorate perceive the potential benefits and costs of the use of renewable energy cooperation mechanisms? To what extent does the electorate prefer international cooperation to reliance on domestic resources? These questions are critical in understanding the public acceptance of renewable energy cooperation projects.

In this sense, the task covered in this report has been aimed at:

- a) Understanding the perceived benefits and risks (including ethical issues) and the levels of acceptance and support for joint projects in renewable energies (concentrated solar power (CSP) and wind energy projects) among the public in various EU countries;
- b) Understanding the motives for potential rejection of cooperation mechanisms and;
- c) Exploring the determinants of public acceptance and support for cooperation mechanisms.

This deliverable reports on the findings from Task 3.3 which focuses on the public acceptance of the implementation of cooperation projects of the RES Directive. The objective of this task was to provide a comprehensive picture of the views of the public on cooperation mechanisms in renewable energies, in particular CSP. To this end, a survey with members of the public in Spain, Germany, the Netherlands and Romania was conducted in June 2019. This report analyses the data from this survey to describe public attitudes towards cooperation in renewable energy in general and towards two specific joint projects in particular: a) a project to supply electricity from CSP plants in Spain to Germany and b) a project to supply electricity from wind parks in

Romania to the Netherlands (see more details about both projects in the Annex). The specific objectives of the study were:

- To estimate levels of public awareness, familiarity, perception of benefits and costs, global attitude, acceptance, support and related attitudinal dimensions (affect, norms, trust) regarding joint projects
- To identify key individual, attitudinal, socio-demographic and contextual determinants of public attitudes and acceptance of joint projects;
- To examine the individuals' attitudes after having received and evaluated expert information on the consequences of this projects;
- To report on cross-country comparisons in public awareness, attitudes towards and acceptance of joint projects.

## 2 METHOD

A nationally representative, self-administered cross-sectional survey was conducted in four European countries to gain insight into public attitudes towards joint projects for renewable energy. Our research design entailed the development of a specific questionnaire with information provision and the data collection via online panels in the study countries.

### 2.1 Project selection

Two potential cooperation projects were selected. First, a project to supply electricity from Concentrated Solar Power (CSP) plants in Spain to Germany. Second, a project to supply electricity from wind parks in Romania to the Netherlands. Survey respondents were asked to evaluate one of the projects, based upon their country of origin.

### 2.2 Questionnaire

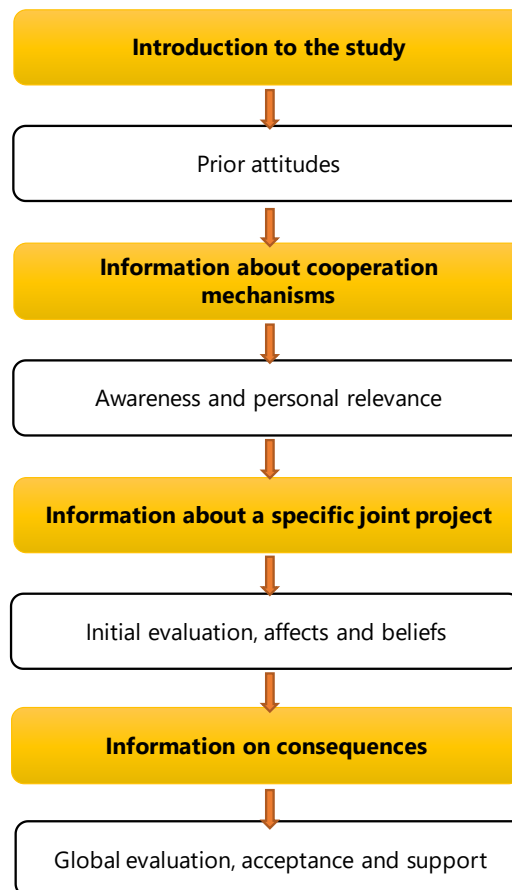
Specific questions and items were derived from previous studies on energy and technology acceptance and environmental and energy attitudes, when possible, in order to ensure the validity and reliability of the measures. Other items were specifically developed for this questionnaire in order to measure specific dimensions related to public attitudes towards cooperation projects. See Annex for question wording.

### 2.3 Structure

The questionnaire combined the presentation of information with items measuring the various studied dimensions (Figure 1). After an introduction to the study, the first questions measured various prior attitudes (problem perception, energy security perception, environmental attitudes and place attachment) that might influence acceptance of joint projects. After this, respondents were provided with very brief information about cooperation mechanisms and were asked about their level of *awareness* and perceived *personal relevance*. After this set of questions, background neutral information on a specific joint project was provided to the whole sample of participants (around 250 words). Then, all participants went through a section including

questions measuring *initial evaluation* of the cooperation project, *affect* and *perceived benefits and costs*. After this section, an exercise consisting on an evaluation of the various consequences of implementing the project was conducted. We provided participants with expert information about six potential consequences of the development of the project (see Annex for this information). To stimulate information processing and to help respondents reach a more stable attitude, they were requested to give a quantitative evaluation of each consequence. After this, participants answered questions measuring *global evaluation* of the project, *acceptance* and *support*.

**Figure 1.** *Design of the questionnaire*



## 2.4 Provision of information

The provision of information was a key element in the building of the questionnaire. We provided to respondents three pieces of information:

- Information about cooperation mechanisms (100 words). Here, we introduced respondents to the basic idea underlying cooperation mechanisms of the Renewable Energy Directive.

- Information about a specific joint project (230 words). We introduced participants to the Solar S3 project and the NERO Project. This information was based on a selection of information materials from websites, reports and personal communications and tried to represent actual information that a citizen could acquire through the media, factsheets and websites.
- Information on the potential consequences of implementing the project. The information on the potential consequences of both projects was produced together with experts from the consortium to guarantee that the information provided was valid and balanced. Two experts checked the final document with all information (background information and information about the consequences).

## 2.5 Sample

The total research sample consisted of around 3.200 European citizens, ages 16 and older. Samples of the general population- citizens aged 16 and older- were recruited from large national panels in the studied countries (see Table 1) in June 2019. The use of panels allowed achieving a representative sample of the general population in terms of sex and age. Other quota (region and education) were taken into account as soft quota.

**Table 1.** *Characteristics of the sample (shares in %)*

	Spain	Germany	The Netherlands	Romania
<b>Sex</b>				
Women	51	48	51	51
Men	49	52	49	49
<b>Age</b>				
18-29	17	16	19	20
30-39	21	14	16	19
40-49	20	20	20	18
50-64	22	25	26	25
65 and older	21	25	20	18
<b>Education</b>				
Non-university	45	78	64	41
University	55	22	36	59
N	800	802	800	800



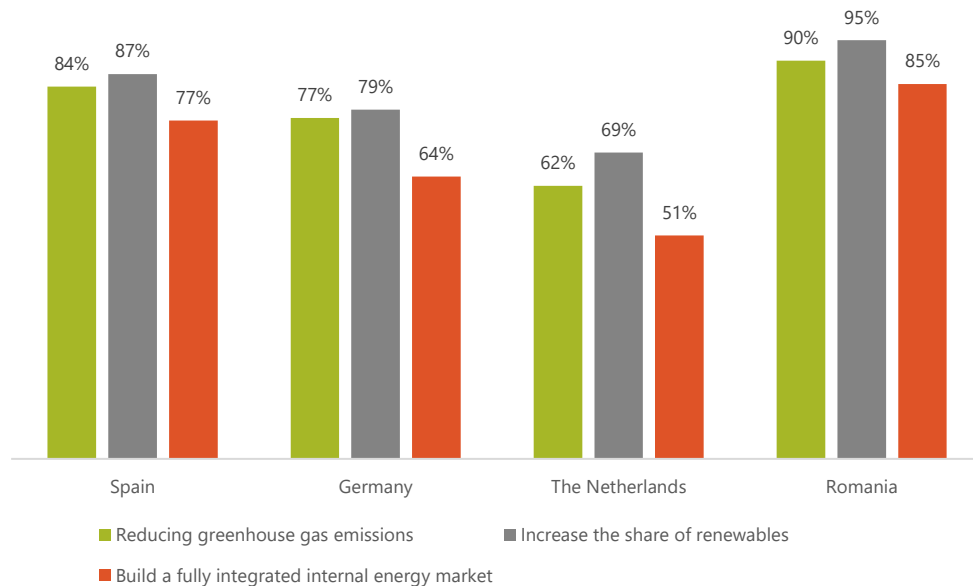
## 3 RESULTS

### 3.1 Problem perception and energy security perception

We first asked respondents in the four countries if they thought there was a need in Europe to a) reduce greenhouse gas emissions, b) increase the share of renewable energy sources in energy consumption and c) build a fully integrated internal energy market (see Annex for the specific wording of the questions posed to respondents). The objective of these questions was to measure problem perception, given that cooperation mechanisms are directly or indirectly aimed at solving these problems facing Europe.

**Figure 2. Problem perception**

(as % of respondents that considered the need as important or very important, four countries)



As shown in Figure 2, the majority of participants in the four countries (between 50 and 95%) considered that there is a big need to respond to the challenges of reducing emissions, increasing the share of renewables and creating an internal market in Europe. Participants in the four countries considered the need to increase the share of renewables and reduce greenhouse emissions as significantly more relevant relative to the need to create a fully integrated internal energy market in Europe. Interestingly, respondents in Romania were the most concerned about the three challenges whilst respondents in The Netherlands were the least concerned about the three problems. The differences between countries were medium to high and statistically significant.

If we focus on the need to build a fully integrated internal energy market, we can observe that this need was perceived as more relevant in Romania and Spain and less relevant in The Netherlands and Germany. It was perceived as a quite and very relevant need by 84% of respondents in Romania, by 77% of respondents in Spain, 64% of respondents in Germany and 51% of respondents in The Netherlands. Around 15% of respondents in The Netherlands

considered that they did not have an opinion about this, as opposed to around 5% in Spain and Romania.

Together with problem perception, we measured energy security perception by asking respondents how concerned they were about the possibility of suffering disruptions of energy supply for hours or days in their countries and about the possibility of prices of electricity being very high in the future.

As shown in Table 2, the percentage of respondents that consider themselves fairly or very concerned about the possibility of suffering disruptions of the energy supply ranged from 17% in The Netherlands to 70% in Romania. The percentage of respondents fairly or very concerned about the possibility of electricity prices being very high ranged from 54% in The Netherlands to 86% Romania and Spain. Energy security, as measured in the survey, was, therefore, perceived as more problematic in Romania and Spain and less problematic in the Netherlands and Germany. The differences between potential host and off-taker countries were strong and statistically significant.

**Table 2. Energy security perception**

*(as % of respondents that considered themselves fairly concerned and very concerned, four countries)*

	Spain	Germany	The Netherlands	Romania
<i>[your country] suffers disruptions of energy supply for hours or days</i>	50%	21%	17%	70%
<i>Electricity prices will be very high</i>	86%	60%	54%	86%

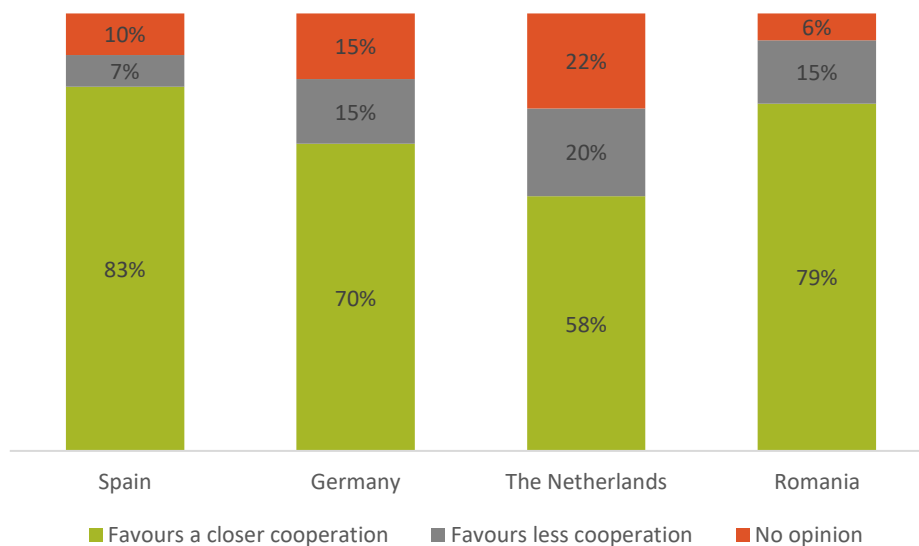
### 3.2 Preference for cooperation over reliance on national resources

We asked respondents to state their preference between two options:

- Closer cooperation in energy production in the EU, resulting in greater dependence on other EU states, but lower energy production costs.
- Less cooperation in energy production in the EU, resulting in lower dependence on other EU states, but higher energy production costs.

As shown in Figure 3, the majority of respondents in the four countries tended to favour a closer cooperation in energy production in the EU over less cooperation. However, we found significant differences between the four study populations: the percentage of respondents in favour of a closer energy cooperation in the EU ranged from around 80% in Spain and Romania to 70% in Germany and 58% in The Netherlands. So around 2 out of 10 in the Netherlands and 1 out of 10 in Spain, Germany and Romania were in favour of less cooperation in energy production in the EU. A significant part of respondents (from 22% in The Netherlands to 6% in Romania) did not have a clear opinion on this.

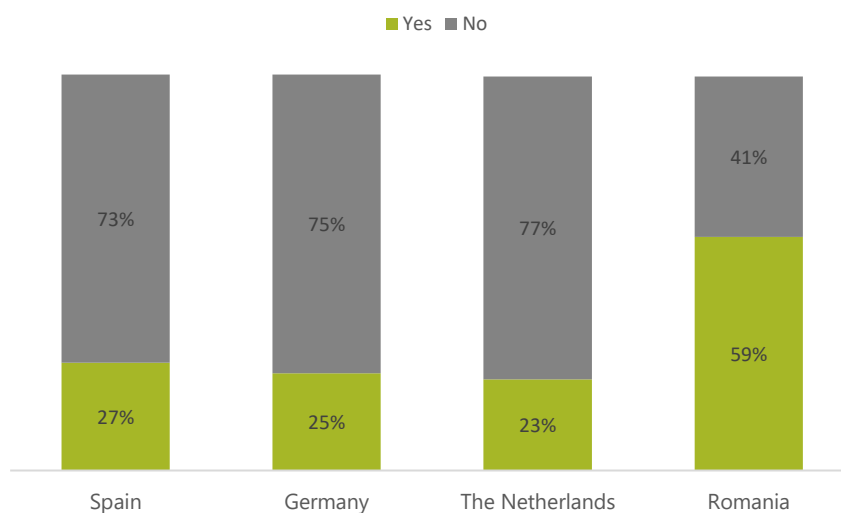
**Figure 3.** Preference of closer cooperation in energy production in the EU versus less cooperation (as % of respondents, four countries)



### 3.3 Awareness and personal relevance of cooperation mechanisms

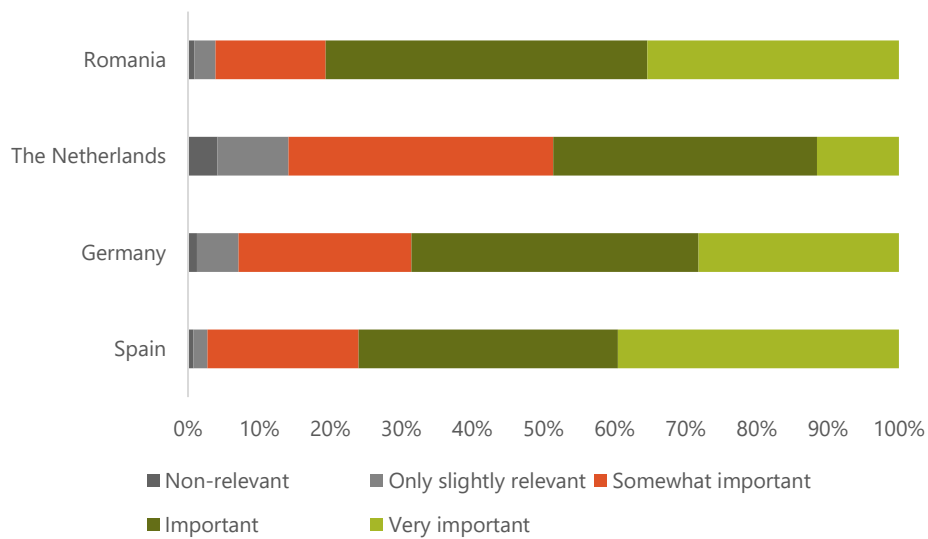
After introducing participants to the concept of cooperation mechanisms as developed in the 'Renewable Energy Directives', we asked them if they had heard about these mechanisms before participating in the study. Awareness of cooperation mechanisms for renewable energies was generally low in the four study populations. Only around 25% of respondents in Spain, Germany and The Netherlands reported having heard about cooperation mechanisms of the RES Directive. This percentage was significantly higher in Romania (see Figure 4).

**Figure 4.** Awareness of cooperation mechanisms as developed in the 'Renewable Energy Directives' (as % of respondents, four countries)



To measure the personal relevance associated to cooperation mechanisms for renewable energy by respondents, we asked participants in the study "how important is cooperation for renewable energy between European countries to you?" Figure 5 shows the personal relevance of cooperation mechanisms in the four countries. The data show that the majority of respondents considered cooperation mechanisms as personally important or very important. This percentage ranged from 81% in Romania to 77% in Spain, 68% in Germany and 50% in The Netherlands.

**Figure 5.** *Personal relevance of cooperation mechanisms (as % of respondents, four countries)*



### 3.4 Initial evaluation of two potential joint projects

After respondents in the four countries were informed about a specific joint project to be potentially developed in their countries (Solar S3 project for participants in Germany and Spain and NERO Project for participants in The Netherlands and Romania), they were asked to provide a first evaluation of the project.

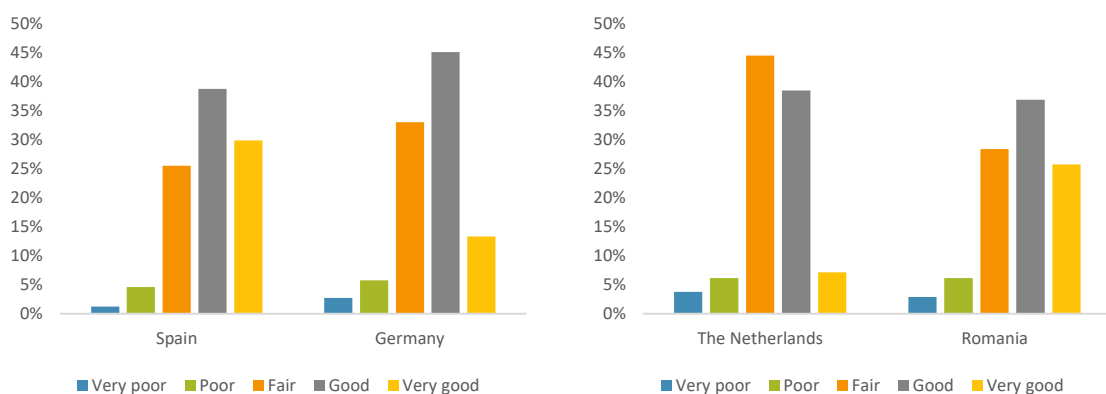
Figure 6 and Table 3 show the distribution of respondents' initial evaluation of the two joint projects in the four countries. Average initial evaluation of the project, in a scale from 1 (very poor) to 5 (very good), ranged from 3.39 in the Netherlands to 3.91 in Spain. The percentage of respondents evaluating the project as "good" or "very good" ranged from 46% in The Netherlands to 58% in Germany, 63% in Romania and 69% in Spain.

**Table 3.** Initial evaluation of the proposed joint project (mean, scale 1-5, and SD, four countries)

Country	Mean	N	Std. Deviation
Spain	3,91	800	,919
Germany	3,61	802	,886
The Netherlands	3,39	800	,854
Romania	3,77	800	,995
Total	3,67	3202	,935

Both projects were evaluated, on average, as fair-good in the four study countries. Interestingly, both projects were initially evaluated more positively in the host country (Spain and Romania) relative to the off-taker (Germany and The Netherlands).

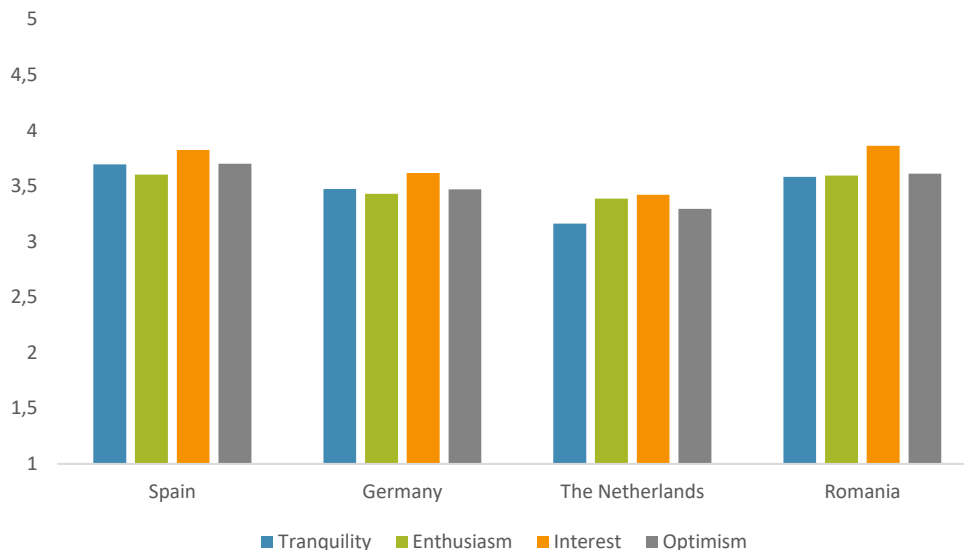
**Figure 6.** Initial evaluation of the proposed joint project (as % of respondents, four countries)



### 3.5 Affect and perceived benefits and costs

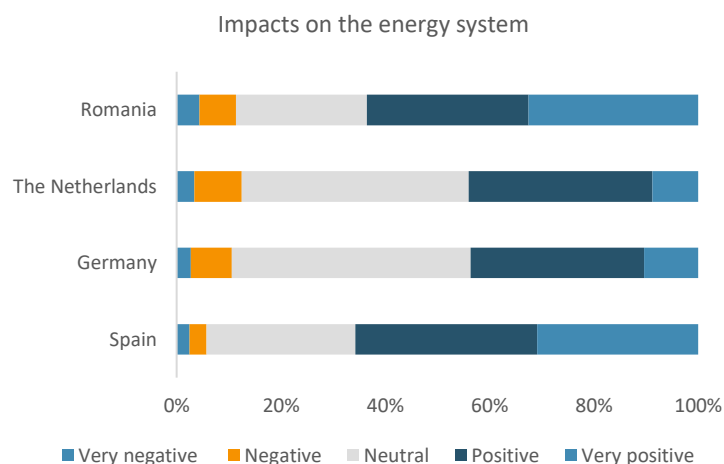
On average, participants in the four countries associated both joint projects with neutral to positive emotions. The projects generated medium to high levels of interest, enthusiasm and optimism. Interest, for instance, was higher in Romania (3.9) and Spain (3.8) and a bit lower in Germany (3.6) and The Netherlands (3.4). Those reporting a significant level of interest in the project were around 65% in Spain and Romania, 57% in Germany and 48% in The Netherlands. On the contrary, between 9% in Spain and 18% in The Netherlands reported a significant level of worry related to the joint project.

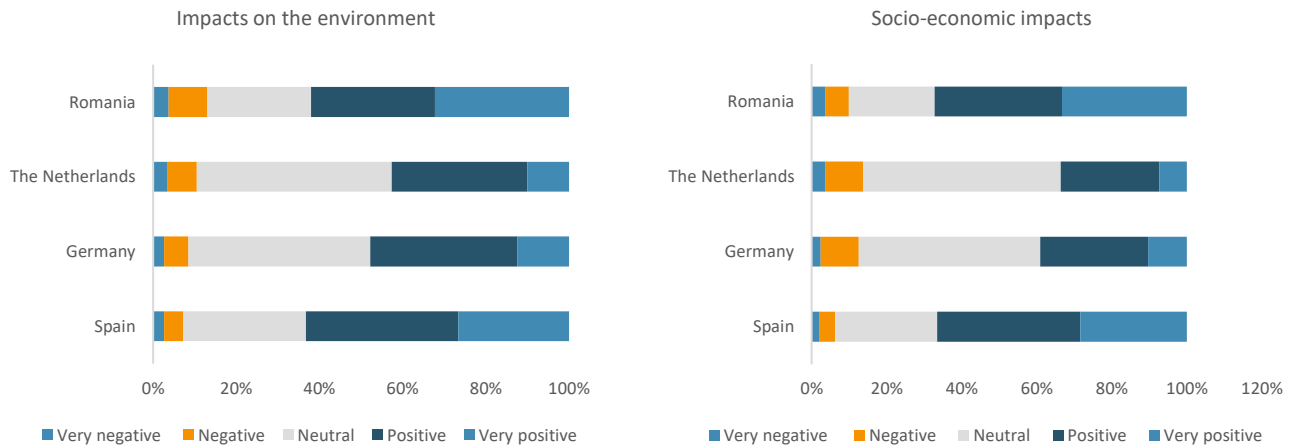
**Figure 7.** *Affect associated to the proposed joint project (as % of respondents, four countries)*



Regarding the perception of benefits and costs, the joint project under evaluation was associated, in general, with positive impacts on the energy system, the environment and the economy in the four countries. Less than 10% of respondents in the four nations considered that the project would have negative impacts. We found significant differences among countries (see Figure 8). Respondents had a more positive perception of the impacts of the joint project in the host countries relative to participants in the off-taker countries. So, whilst around 65% of respondents in Spain and Romania perceived the economic, energy and environmental impacts of the project as positive or very positive, only between 40 and 45% perceived the impacts as positive or very positive in Germany and The Netherlands.

**Figure 8.** *Perceived impacts of the proposed joint project (as % of respondents, four countries)*





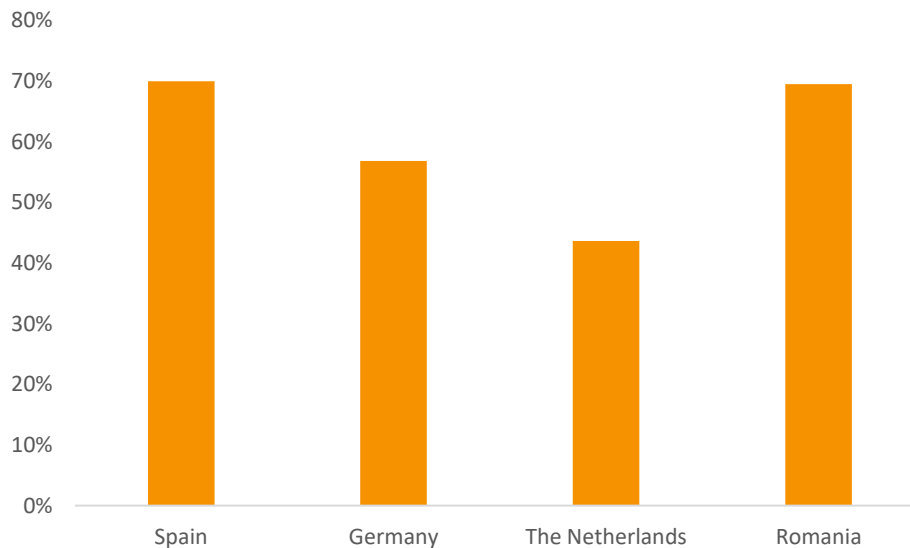
On average, participants in the potential host countries tended to perceive that the projects would have more positive impacts on the environment and the economy (see Table 4).

**Table 4.** *Perceived impacts of the proposed joint project (mean, scale 1-5, four countries)*

	Total	Spain	Germany	The Netherlands	Romania
Energy system	3.62	3.88	3.41	3.37	3.80
Environment	3.61	3.80	3.49	3.39	3.77
Socio-economic	3.58	3.87	3.34	3.24	3.87

We also asked respondents about their perception regarding the potential contribution of the joint project under evaluation to the Energy Union's success. As shown in the figure below, around 70% of respondents in Spain and Romania believed that the project would contribute positively or very positively to the Energy Union. This percentage decreased to 57% in Germany and to 44% in The Netherlands. Respondents providing a neutral or undecided response regarding this impact ranged from 22% in Romania to 44% in The Netherlands.

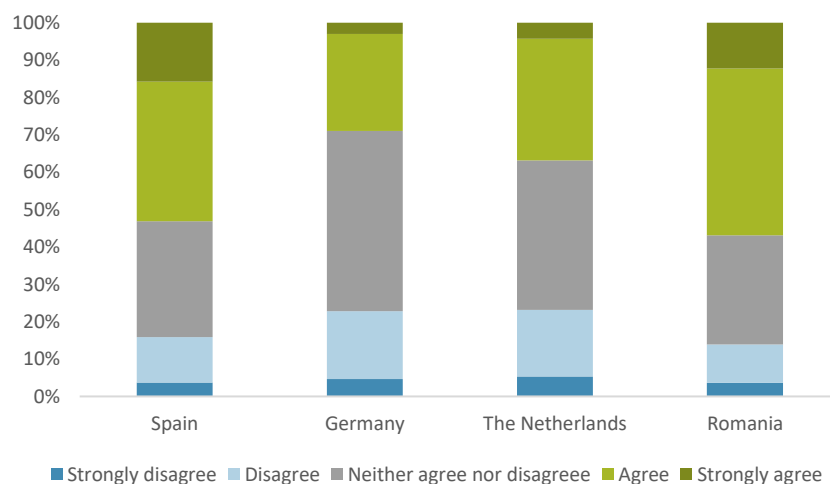
**Figure 9.** *Perceived contribution of the proposed joint project to the Energy Union (as % of respondents who think that it would contribute positively or very positively, four countries)*



### 3.6 Perceived equity of the impacts

A relevant dimension of our analytical framework regarding the acceptance of joint projects by the public was the perception of the distribution of the potential benefits and costs of joint projects among the host and the off-taker country.

**Figure 10.** *Perceived equity of the impacts of the proposed joint project (as % of respondents who believe that the impacts of the project would be equally distributed, four countries)*





As shown in Figure 10, agreement with the statement “the potential benefits of the project will be balanced among Germany/The Netherlands and Spain/Romania” varied significant between countries. 57 and 54% of respondents in Romania and Spain respectively agreed with the statement as compared to 29 and 37% in Germany and The Netherlands. In sum, respondents in Germany and The Netherlands tended to be unsure or neutral about the potential equity of the impacts of the project, whilst in Spain and Romania, a majority of participants perceived that the impacts would be balanced between the host and the off-taker country.

### 3.7 Evaluation of consequences

Spain: Solar S3

Table below provides the average evaluation of seven potential consequences of implementing the joint project and correlations to the average overall evaluation analyses for Solar S3 in Spain. The data show that all these consequences were evaluated as advantages (values higher than 3) by the Spanish participants. The potential consequences on “regional development” (4.14) and on the “development of the European CSP industry” (4.10) were rated as the most positive consequences of developing Solar S3. The “need of new installations” (3.40) and the likely increase in the “price of electricity” (3.52) were considered as consequences having a neutral impact.

The “single” correlations between the evaluations of the consequences and the overall evaluation of the option were medium to high and statistically significant. The majority of consequences had a strong correlation with evaluation, indicating that these consequences had a relevant association with the overall evaluation of the option. The consequence that correlates lowest with the overall evaluation were “price of electricity” and “new installations needed” ( $r = .50$ ). This indicates that the consequence had a lower influence on the overall evaluation.

<b>Concentrated Solar Power (CSP) technology and industry</b> The implementation of the project would allow the Spanish and European CSP industry to be again active in Europe and potentially contribute to further decline the technology costs and improve its technical performance.	<b>Mean evaluation</b>  ( 1 – 5)	<b>Correlation</b>  (- 1 to 1)	<b>Overall evaluation of the joint project</b> ( 1 – 5)
<p><b>Price of the electricity</b> If electricity was generated in a concentrated solar power (CSP) plant in Spain, this could slightly increase the wholesale price of electricity in Germany. We cannot really say how much the costs would increase, but if Germany imports less than 1% of their power from a concentrated solar power in Spain, the impact would be negligible.</p> <p><b>Decarbonization of the European Energy System</b> Saved CO2 emissions from this project could be allocated to Germany. The 700 GWh/year generated in Spain would displace about 175 million kg of CO2, or 0.02% of the German CO2 emissions.</p> <p><b>Reliability and stability of the energy supply</b> This project would slightly improve the stability of the energy system. Compared to alternative variable technologies such as wind or PV, there are no relevant supply risks of Concentrated Solar Power (CSP).</p> <p><b>A more interconnected Energy Union</b> This project would contribute to create a more interconnected Energy Union through renewable energy regional cooperation.</p> <p><b>New installations needed</b> The environmental impacts associated with additionally built solar power plants — land use and habitat loss, water use, and the use of hazardous materials in manufacturing — is usually limited, but can vary largely depending on the project. Solar plants generally require a large land area (around 2000 acres for a 200MW power plant). Depending on the technology, CSP plants can consume a significant amount of water.</p> <p><b>Regional development</b> The deployment of new plants in the rural and sunniest parts of Spain would likely contribute to generate economic and employment opportunities. It is estimated that a new facility can generate around 150 new jobs during the construction phase and around 50 during the maintenance and exploitation.</p>	<p>4.10</p> <p>3.52</p> <p>4.01</p> <p>4.08</p> <p>4.06</p> <p>3.40</p> <p>4.14</p>	<p>.58</p> <p>.50</p> <p>.57</p> <p>.58</p> <p>.60</p> <p>.50</p> <p>.57</p>	<p>3.85</p>

### Germany: Solar S3

The data for Germany show that all these consequences were, on average, evaluated as having a neutral to positive impact (values around 3). The potential contribution of the joint project to the "development of the European CSP industry" (3.95), "a more interconnected Energy Union" (3.94) and "regional development" (3.95) were rated as the most positive consequences of developing Solar S3. The "need of new installations" (2.96) and the likely increase in the "price of electricity" (3.09) were, on average, considered as consequences having a neutral impact.

The "single" correlations between the evaluations of the consequences and the overall evaluation of the option were medium and statistically significant. The majority of consequences had a significant correlation with evaluation, indicating that these consequences had a relevant association with the overall evaluation of the option. The consequence that correlated highest with the overall evaluation was the contribution to "Decarbonization of the European Energy System". The consequences that correlates lowest with the overall evaluation were "the impact on regional development" ( $r = .47$ ) and "new installations needed" ( $r = .40$ ). This indicates that both consequences had a lower influence on the overall evaluation.

<b>Concentrated Solar Power (CSP) technology and industry</b> The implementation of the project would allow the Spanish and European CSP industry to be again active in Europe and potentially contribute to further decline the technology costs and improve its technical performance.	<b>Mean evaluation</b>  ( 1 – 5)	<b>Correlation</b>  (- 1 to 1)	<b>Overall evaluation of the joint project</b> ( 1 – 5)
<p><b>Price of the electricity</b> If electricity was generated in a concentrated solar power (CSP) plant in Spain, this could slightly increase the wholesale price of electricity in Germany. We cannot really say how much the costs would increase, but if Germany imports less than 1% of their power from a concentrated solar power in Spain, the impact would be negligible.</p> <p><b>Decarbonization of the European Energy System</b> Saved CO2 emissions from this project could be allocated to Germany. The 700 GWh/year generated in Spain would displace about 175 million kg of CO2, or 0.02% of the German CO2 emissions.</p> <p><b>Reliability and stability of the energy supply</b> This project would slightly improve the stability of the energy system. Compared to alternative variable technologies such as wind or PV, there are no relevant supply risks of Concentrated Solar Power (CSP).</p> <p><b>A more interconnected Energy Union</b> This project would contribute to create a more interconnected Energy Union through renewable energy regional cooperation.</p> <p><b>New installations needed</b> The environmental impacts associated with additionally built solar power plants — land use and habitat loss, water use, and the use of hazardous materials in manufacturing — is usually limited, but can vary largely depending on the project. Solar plants generally require a large land area (around 2000 acres for a 200MW power plant). Depending on the technology, CSP plants can consume a significant amount of water.</p> <p><b>Regional development</b> The deployment of new plants in the rural and sunniest parts of Spain would likely contribute to generate economic and employment opportunities. It is estimated that a new facility can generate around 150 new jobs during the construction phase and around 50 during the maintenance and exploitation.</p>	<div> <div>3.95</div> <div>3.09</div> <div>3.64</div> <div>3.88</div> <div>3.94</div> <div>2.96</div> <div>3.95</div> </div>	<div> <div>.52</div> <div>.53</div> <div>.56</div> <div>.54</div> <div>.54</div> <div>.40</div> <div>.47</div> </div>	<div> <div>3.55</div> </div>

#### The Netherlands: NERO

The data for The Netherlands show that all the consequences were, on average, evaluated as being slightly positive (values between 3 and 4). The potential contribution of the joint project to “regional development” (3.76), the “Decarbonization of the European Energy System” (3.72) and the “Reliability and stability of the energy supply” (3.71) were rated as the most positive consequences of developing the NERO Project. The “need of new installations” (3.00) was rated as a non-positive consequence.

The “single” correlations between the evaluations of the consequences and the overall evaluation of the option were medium to moderate and statistically significant. The consequence that correlated highest with the overall evaluation was the contribution to “regional development” and to a “more interconnected Energy Union” (.56). The consequence that correlates lowest with the overall evaluation was “new installations needed” ( $r = .38$ ).

**Price of the electricity**

If electricity was generated in three wind parks in Romania, this would not influence significantly the wholesale price of electricity in the Netherlands. The cost of generating energy from onshore wind technologies is similar or even lower than the cost of generating it from natural gas.

**Decarbonization of the European Energy System**

CO2 emission reductions induced by this project would be allocated to the Netherlands. The 1 GW generated in Romania would displace more than 200 million kg of CO2, less than 2% of the Dutch CO2 emissions.

**Reliability and stability of the energy supply**

This project will slightly improve the stability of the energy system. Compared to alternative technologies such coal or natural gas, there are no relevant supply risks of wind energy.

**A more interconnected Energy Union**

This project will potentially contribute to create a more interconnected Energy Union through renewable energy regional cooperation.

**New installations needed**

In order to implement this project, three new wind parks would have to be built in Romania. Although wind power plants have relatively little impact on the environment compared to fossil fuel power plants, concerns have been raised over the land use (around 25.000 acres per wind park), the noise produced by the rotor blades, visual impacts, and deaths of birds and bats that fly into the rotors (avian/bat mortality).

**Regional development**

The deployment of new plants in the rural parts of Romania would likely contribute to generate economic and employment opportunities in Romanian rural areas. It is estimated that a new facility can generate around 150 new jobs per wind park during the construction phase and around 50 during the maintenance and exploitation.

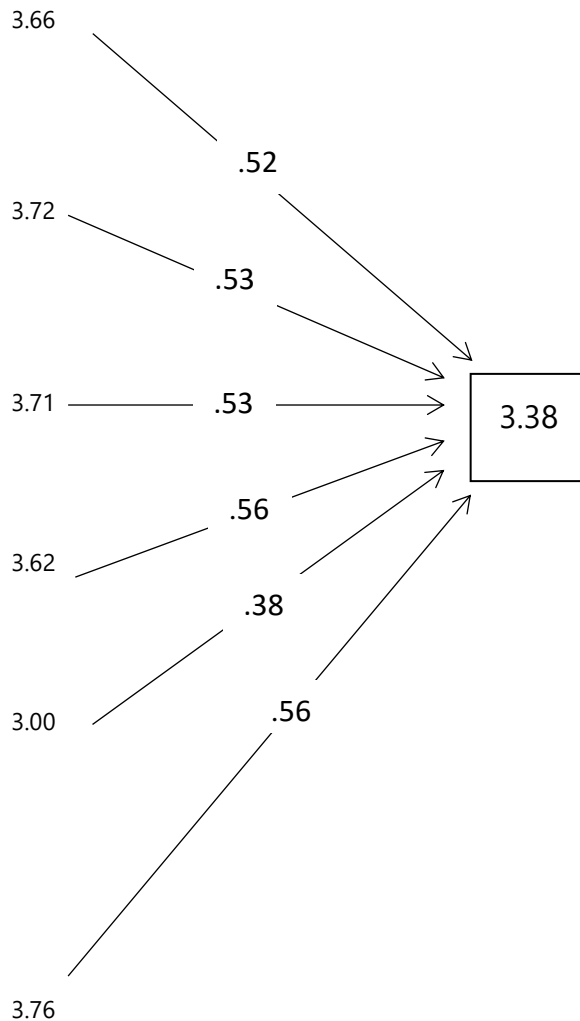
**Mean  
evaluation**

**( 1 – 5)**

**Correlation**

**(- 1 to 1)**

**Overall  
evaluation of  
the joint  
project  
( 1 – 5)**



#### Romania: NERO

The data for Romania show that all the consequences were, on average, evaluated as positive. The contribution of the joint project to the "Reliability and stability of the energy supply" (4.06), to "regional development" (4.05) and to "a more interconnected Energy Union" (4.02) were rated as the most positive consequences of developing the NERO Project. The "need of new installations" (3.53) was rated as a consequence having a neutral impact.

The "single" correlations between the evaluations of the consequences and the overall evaluation of the option were strong (values around .60) and statistically significant. All the consequences had a similar association to overall evaluation. This indicates that the six consequences had a relevant influence on the overall evaluation.

**Price of the electricity**

If electricity was generated in three wind parks in Romania, this would not influence significantly the wholesale price of electricity in the Netherlands. The cost of generating energy from onshore wind technologies is similar or even lower than the cost of generating it from natural gas.

**Decarbonization of the European Energy System**

CO2 emission reductions induced by this project would be allocated to the Netherlands. The 1 GW generated in Romania would displace more than 200 million kg of CO2, less than 2% of the Dutch CO2 emissions.

**Reliability and stability of the energy supply**

This project will slightly improve the stability of the energy system. Compared to alternative technologies such coal or natural gas, there are no relevant supply risks of wind energy.

**A more interconnected Energy Union**

This project will potentially contribute to create a more interconnected Energy Union through renewable energy regional cooperation.

**New installations needed**

In order to implement this project, three new wind parks would have to be built in Romania. Although wind power plants have relatively little impact on the environment compared to fossil fuel power plants, concerns have been raised over the land use (around 25.000 acres per wind park), the noise produced by the rotor blades, visual impacts, and deaths of birds and bats that fly into the rotors (avian/bat mortality).

**Regional development**

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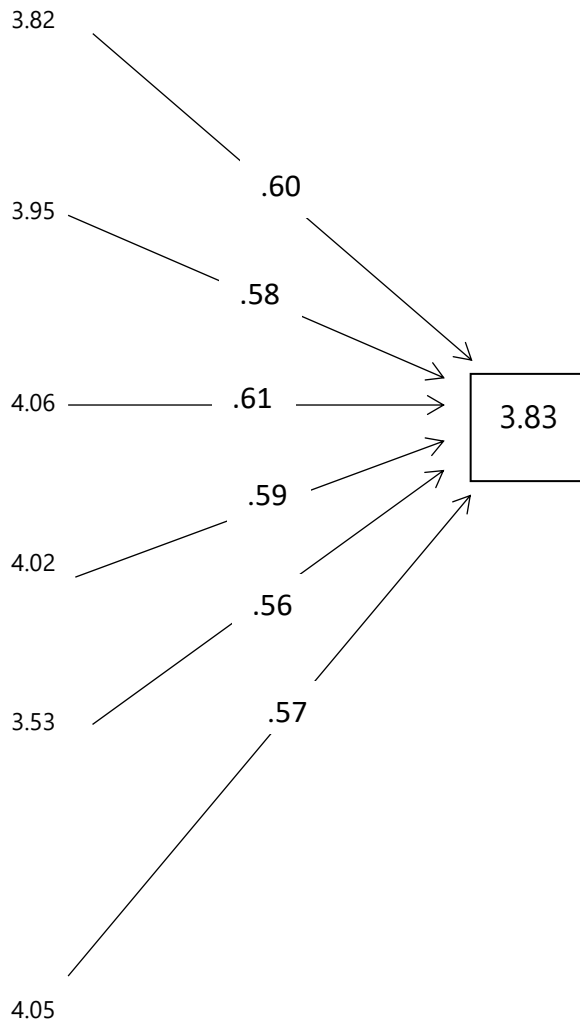
**Mean  
evaluation**

( 1 – 5)

**Correlation**

(- 1 to 1)

**Overall  
evaluation of  
the joint  
project  
( 1 – 5)**

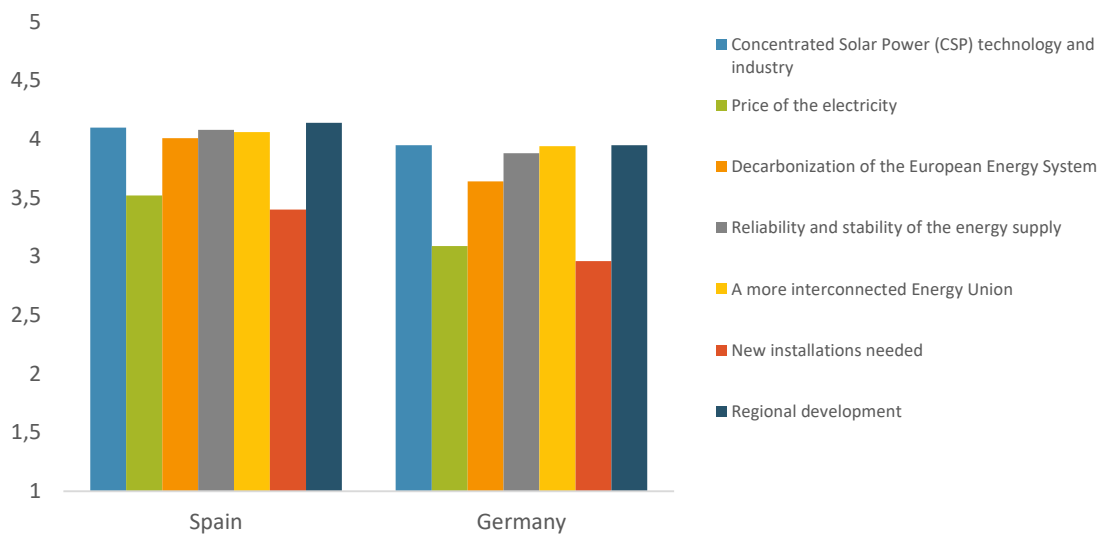


Comparison

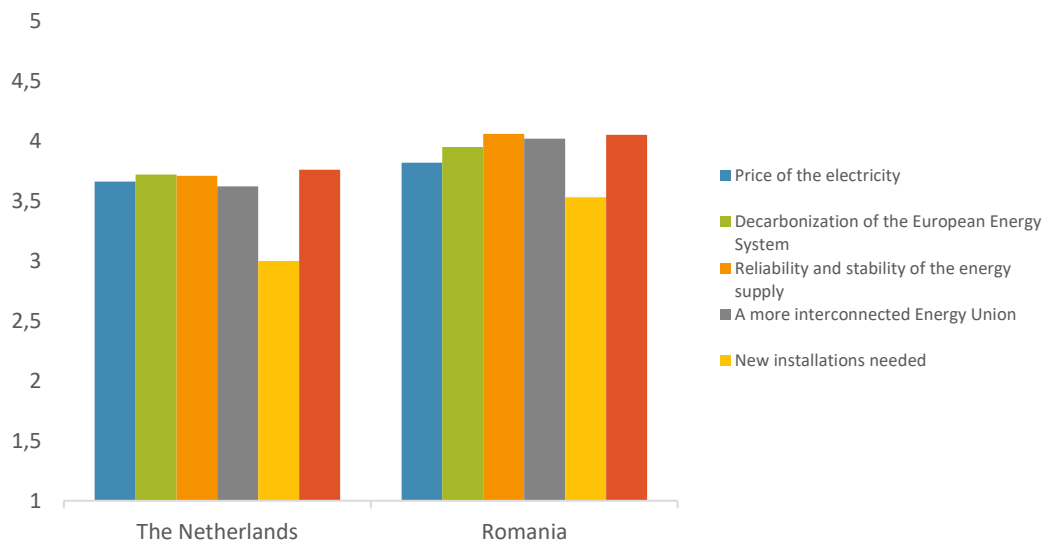


The evaluation of consequences differed slightly among respondents in the four countries (see Figures 11 and 12). Respondents in Spain tended to perceive the consequences of developing Solar S3 as more positive, on average, than in Germany. However, generally, respondents in both countries were very similar in their evaluation of the various consequences.

**Figure 11.** *Perceived consequences of the joint project  
(Mean, Spain and Germany)*



**Figure 12.** *Perceived consequences of the joint project  
(Mean the Netherlands and Romania)*



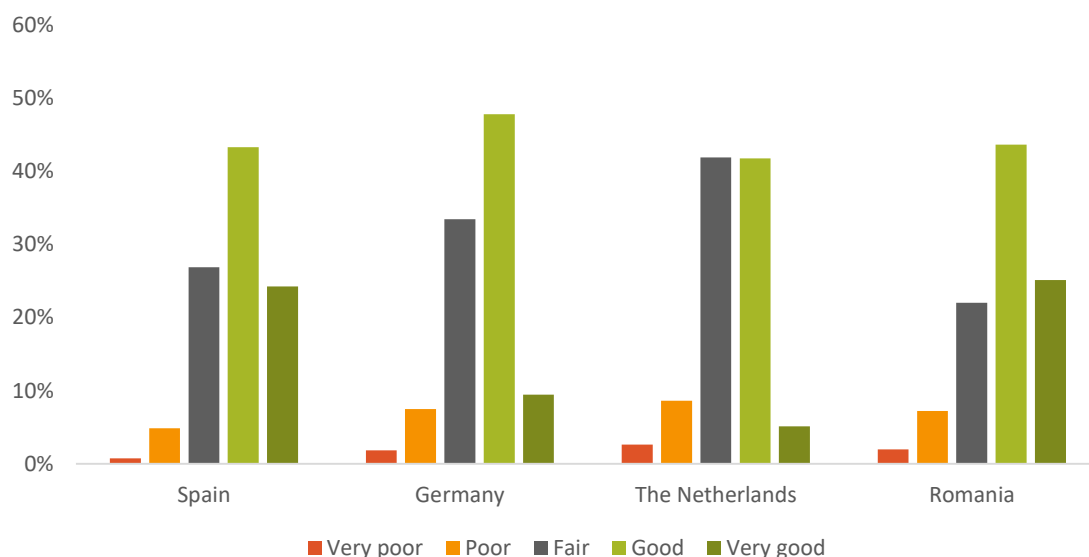
### 3.8 Overall evaluation

After evaluating the various potential consequences of developing both joint projects, we asked respondents to provide a new evaluation of the joint project. Overall, respondents evaluated the joint projects rather positively, grading it with a 3.65 (see Table 5). This indicates that respondents in the four countries considered, on average, both projects as a fair to good idea. For Solar S3, Spanish respondents were moderately more positive about the project than German respondents, providing an overall evaluation of 3.85 as compared to 3.55. Regarding the NERO Project, respondents in Romania were significantly more positive about the project (average evaluation of 3.83) than respondents in The Netherlands (average evaluation of 3.38).

**Table 5.** Overall evaluation of the proposed joint project (mean, scale 1-5, four countries)

95% confidence interval				
	Mean	Lower	Upper	SD
Spain	3.85	3.80	3.93	.868
Germany	3.55	3.49	3.64	.836
The Netherlands	3.38	3.33	3.44	.818
Romania	3.83	3.77	3.89	.955
<b>Total</b>	3.65	3.62	3.68	.892

**Figure 13.** Overall evaluation of the joint project  
(as % of respondents, four countries)



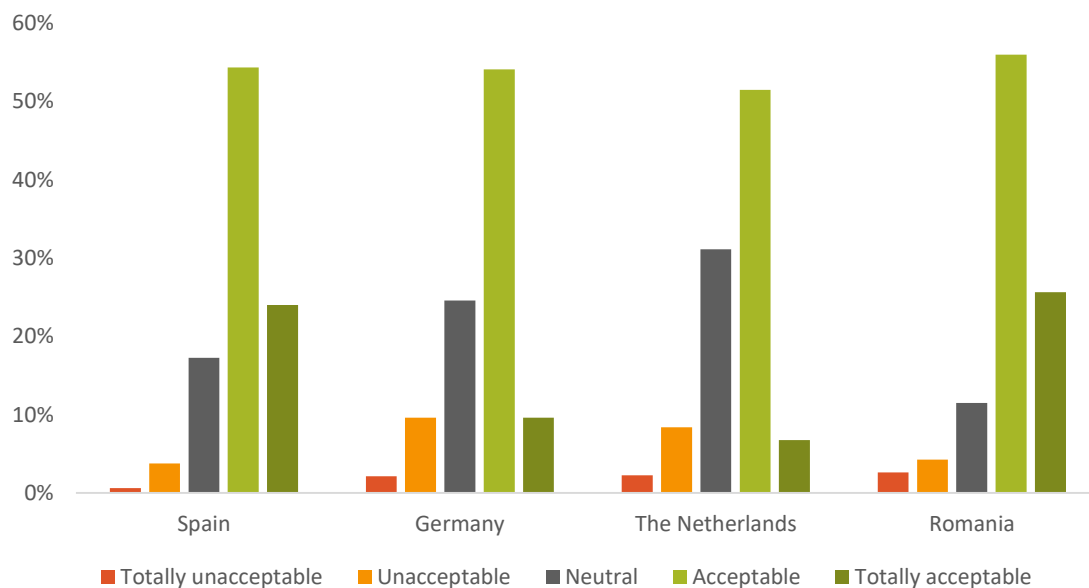
The majority of respondents (69% in Romania, 67% in Spain, 57% in Germany and 47% in The Netherlands) rated the project as a “good” or “very good” idea (Figure 13). Respondents were significantly more enthusiastic about the project in Romania and Spain, where the percentage of respondents that rated the project as a “very good” idea was of 25%, as compared to 9% in Germany and 5% in The Netherlands. Overall, a low percentage of respondents in the four countries provided a negative evaluation of the joint project. Only 12% in The Netherlands, 9%

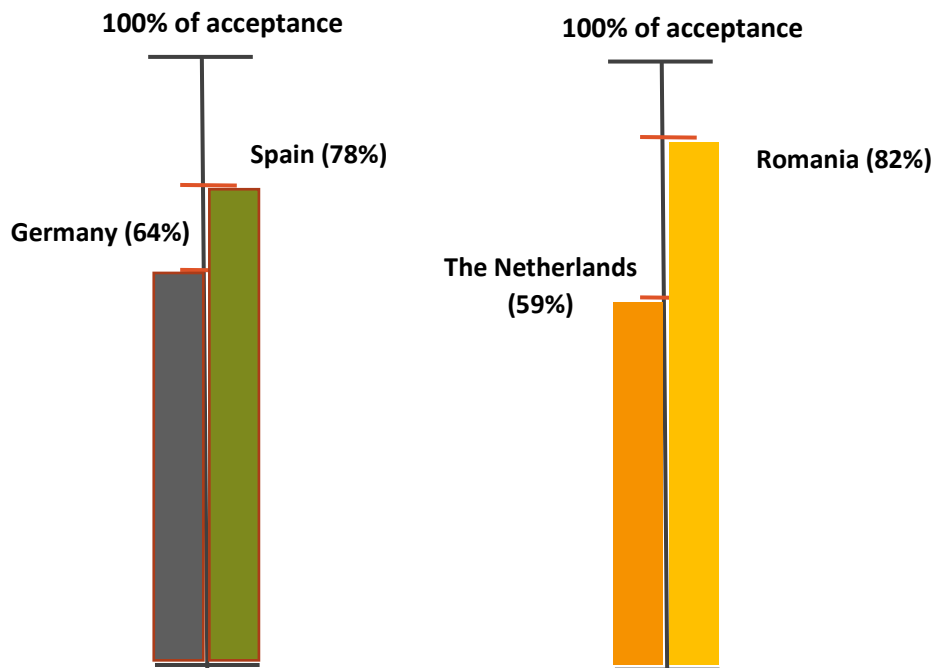
in Germany, 9% in Romania and 6% in Spain evaluated the project as a “poor” or “very poor” idea. Respondents in The Netherlands were more neutral about the joint project. The percentage of respondents providing a neutral evaluation of the project ranged from 42% in The Netherlands to 33% in Germany, 27% in Spain and 22% in Romania.

### 3.9 Acceptance and support

The majority of respondents in the four study populations, as shown in Figure 14, would accept the development of a joint project. In particular, 78% of respondents in Spain considered the development of Solar S3 as acceptable relative to 64% of respondents in Germany. Regarding the NERO Project, 82% of respondents in Romania considered the project as acceptable, as compared to 59% of respondents in The Netherlands.

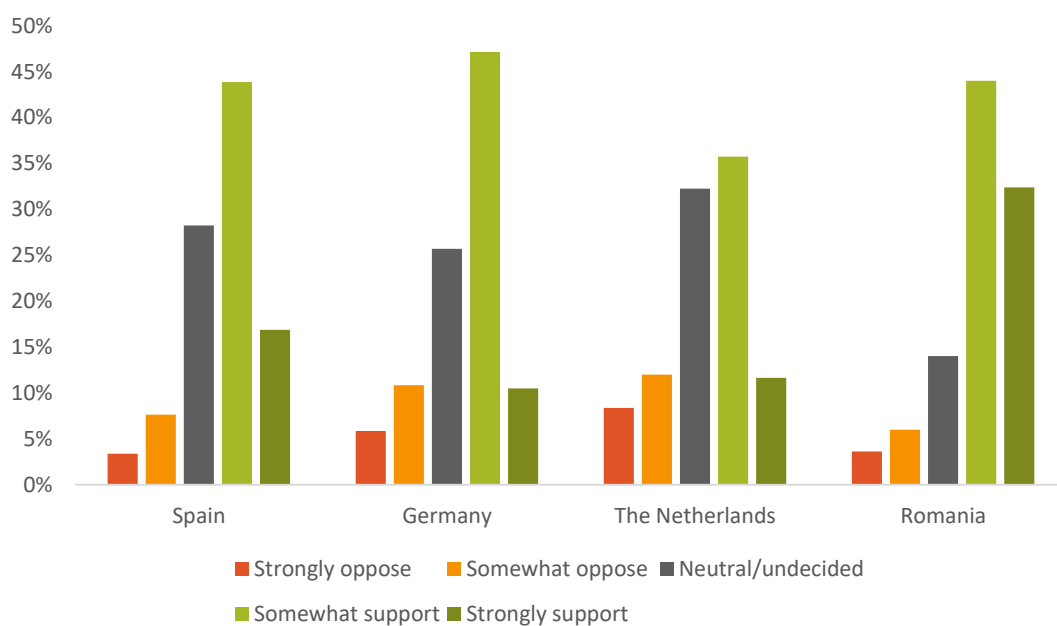
**Figure 14. Acceptance of the joint project**  
(as % of respondents, four countries)





The percentage of respondents that were undecided about the acceptance of the joint project ranged between 12% of the surveyed population in Romania to 17% in Spain, 25% in Germany and 30% in The Netherlands. Only 5% in Spain, 7% in Romania and 12% in Germany and The Netherlands considered the project unacceptable.

**Figure 15.** *Support for public investment in the joint project  
(as % of respondents, four countries)*



Levels of support for the project were also very high in the four countries (see Figure 15). 61% and 57% of respondents would support public financial investments in their country for the development of Solar S3 in Spain and Germany respectively. Regarding the NERO project, 76% and 48% of respondents would support public investments in the project in Romania and The Netherlands respectively.

In sum, in the four study populations, between 5 and 7 out of 10 respondents would support the joint project, around 3 out of 10 would remain undecided and less than 2 out of 10 respondents would definitively oppose the project.

Regarding the differences in support for joint projects by socio-demographics, the data shows that male respondents, those aged 65 or older and those having an university degree reported a higher level of support relative to female respondents (63% vs. 58%), those aged 18-64 (66% vs. 59%) and those not having an university degree (68% vs 43%). The differences were statistically significant (Table 6).

**Table 6.** *Support for public investment in the joint project by socio-demographics (as % of respondents, total sample)*

	% of support
<b>Sex</b>	
Women	58%
Men	63%*
<b>Age</b>	
18-29	59%
30-39	59%
40-49	58%
50-64	60%
> 65	66%*
<b>Education</b>	
Did not graduate from high school	43%
High school graduate	56%
Vocational education	57%
University	68%*

\* the difference between categories is statistically significant,  $p < 0.01$

### 3.10 Determinants of support to joint projects

With the aim of examining the direct and indirect **determinants** of **support** for **joint projects**, a path analysis was estimated for the whole sample. Figure 16 displays the causal model. Table 7 shows the direct and indirect standardized effects<sup>1</sup> of the explanatory variables (overall evaluation, problem perception, affect, perceived benefits/costs, perceived equity, place attachment, environmental self-image and preference for cooperation) over the main dependent variable (support for public investments in the project).

Results show, first, that, according to the model presented, variables not directly related to the attitude such as place attachment, environmental self-image and preference for cooperation have a significant but weak effect on support for a joint project. Interestingly, place attachment had the strongest effect on support for joint projects (.12). Those respondents reporting a higher level of attachment to the European Union had a significantly more positive attitude towards the proposed joint project (they reported a more positive perception of the impacts as well as more positive affect) and therefore expressed a higher level of support for public investments on the joint project. Environmental self-identity was also positively associated to support (.07) via problem perception, perceived benefits-costs, affect and perceived equity. Expressing a preference for cooperation over self-reliance on natural resources (.03) was also positively but very weakly associated to support for joint projects.

**Table 7.** Direct and indirect effects on support of public investments on a joint project of distinct variables (standardized coefficients  $\beta$ )

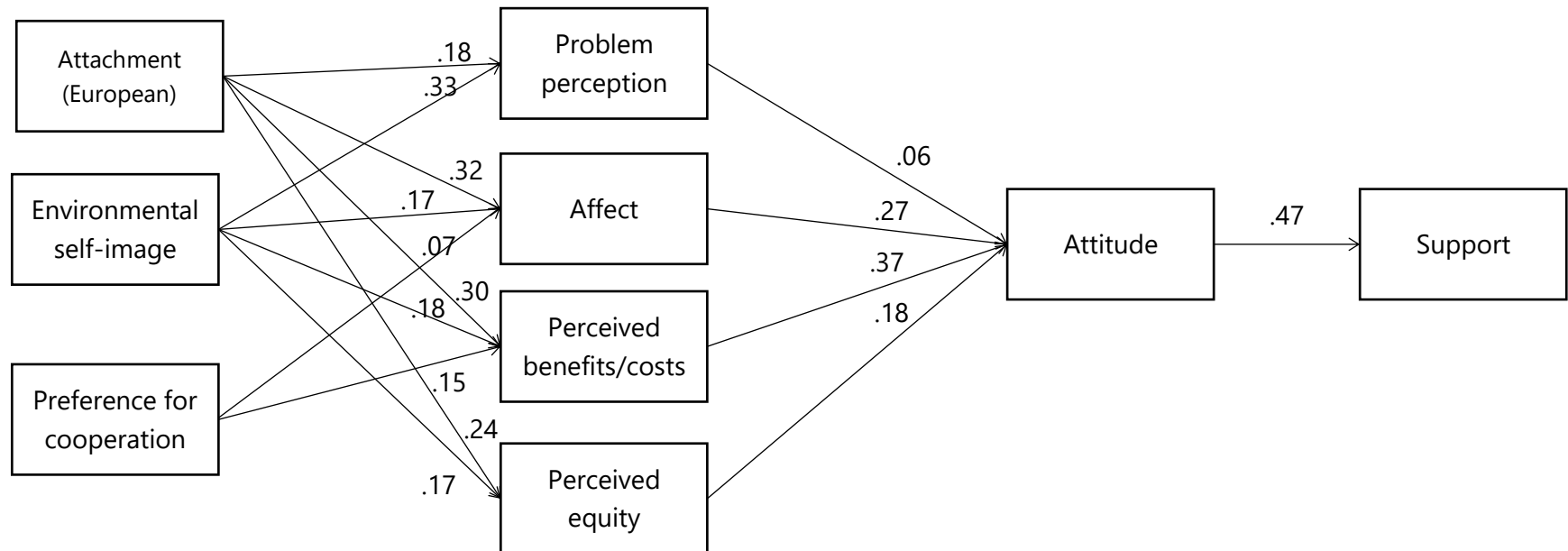
	Direct effect	Indirect effect (one step)	Indirect effect (two steps)
Overall evaluation	.47		
Problem perception		.03	
Affect		.13	
Perceived benefits/costs		.17	
Perceived equity		.08	
Place attachment			.12
Environmental self-image			.07
Preference for cooperation			.03

Second, according to the model and the data analysed, and as expected, perceived benefits and costs and affect were the most influential variables in the model. The perception of the impacts (environmental, energetic and socio-economic) associated to the project was the strongest predictor of support (.17). Those participants that perceived the project as having more positive impacts tended to show a higher level of support for public investments on the project. The affect associated to the project also played a role in support (.13). Those who reported more positive emotions regarding the joint project tended to have a more positive attitude towards it

<sup>1</sup> The effect of each variable drawn from the multiple regression beta coefficient and expressed in standard deviations. Effects lower than 0.10 express a very weak to non-relevant effect.

and to show a higher level of support. Perceived equity of the impacts also had a significant but weak positive effect on support (.08). Those participants that considered that the impacts of the joint projects would be equally distributed between the host and the off-taker country were more likely to support public investments in the project. Problem perception was very weakly associated to support for the project (.03). Finally, attitude had a positive medium association (.47) with support.

**Figure 16.** Path analysis with direct and indirect effects on support of public investments for a joint project of distinct variables (standardized coefficients)





## 4 CONCLUSION

### 4.1 Summary of results

Some of the key results of the study regarding the public perception of joint projects for renewable energy are:

- The majority of participants in the four study populations agreed that there is a need to reduce greenhouse gas emissions, to increase the share of renewable energy sources (like wind and solar) in energy consumption and to build a fully integrated internal energy market (where energy flows freely between countries across the European Union without any technical or regulatory barriers). The need to build a fully integrated energy market in the European Union was perceived as a less relevant problem relative to the need to reduce emissions and to increase the share of renewable energy sources. Respondents in Spain and Romania were significantly more concerned about the need to create an integrated energy market than participants in Germany and The Netherlands.
- Closer cooperation in energy production in the EU vs less cooperation was clearly favoured by respondents in Spain, Romania and Germany and less favoured by Dutch respondents.
- Awareness of joint projects was, as expected, generally low in the studied populations (with the exception of Romania, possibly reflecting a social desirability bias). Respondents tended to consider joint projects as personally relevant.
- When participants initially evaluated the project, they tended to perceive it as a fair to good idea. Initial evaluation of the joint project presented to participants (in a scale from 1 to 5, 1 being 'very poor' and 5 being 'very good') ranged from 3.39 in the Netherlands to 3.91 in Spain.
- Respondents reported neutral to positive emotions linked to the project. Respondents usually reported higher levels of interest relative to other emotions.
- Both joint projects were perceived as having neutral to positive impacts on the energy system, the environment and society in the four study populations. The joint project was perceived as more beneficial in the potential host countries Spain and Romania and less beneficial in the potential off-taker countries The Netherlands and Germany.
- The six potential consequences of implementing the joint projects were generally perceived as positive in the four countries. The potential impacts of the projects on regional development, the stability of the energy supply, the industry or the Energy Union were generally regarded as very positive by respondents. Significant differences were found among respondents in the four countries.
- The overall evaluation of the joint projects ranged from 3.38 for respondents in The Netherlands to 3.85 for respondents in Spain (the average evaluation of the project was 3.55 in Germany and 3.83 in Romania). The majority of participants provided a positive or a neutral evaluation of the joint project. Respondents were significantly more enthusiastic about the joint project in the host country (Spain and Romania), relative to respondents in the off-taker country (Germany and The Netherlands).
- The majority of participants in the four study populations (between 59% and 82%) would accept the development of the proposed joint project. Between 48% and 76%

would support public investments in the projects. Respondents were, on average, more supportive in Romania and less supportive in The Netherlands.

- Proximal variables such as perceived benefits, affect and perceived equity, together with the overall evaluation of the project and the evaluation of its consequences, were the strongest predictors of support for the joint projects. Other more distal attitudinal factors positively associated to support were place attachment (feeling of belonging to the European Union), environmental self-identity and preference for cooperation. Being male, older than 65 and having a university degree were also positively associated to support for the joint project.

## 4.2 Discussion and conclusion

We examined public perceptions of two potential joint projects set up under the Renewable Energy Directive and based on CSP and wind technologies in Spain, Germany, The Netherlands and Romania. By means of a survey study with members of the general population in the four countries, we measured public awareness, perception of benefits and costs, overall evaluation, acceptance and support for joint projects.

The data clearly show that although the general public attitude towards joint projects in the four study populations is relatively positive, support was significantly higher among respondents in the potential host countries (Spain and Romania) as compared to respondents in the potential off-taker countries (Germany and The Netherlands). This is the most consistent result of this report. Participants in Spain and Romania, relative to participants in Germany and The Netherlands tended to perceive the joint projects as more personally relevant, to express higher levels of interest and optimism about the projects, to perceive the national consequences of these projects as more beneficial and to report higher levels of acceptance and support for public investments in these projects. Participants in Germany, and especially in The Netherlands, tended to be more neutral in their evaluations of the proposed project.

After examining the determinants of the attitude towards joint projects, we can conclude that proximal attitudinal variables such as perception of the benefits and costs of the projects and affect play an important role in support for joint projects. In addition, that more distal attitudinal variables such as place attachment (belonging to the European Union), environmental self-identity or preference for a closer cooperation in energy production in the EU play a significant role in public support for joint projects. Socio-demographics also played a role in support for joint projects.

The study suggest that respondents in some countries might be initially more reluctant to invest public resources in the implementation of joint projects. In our study, respondents in the off-taker countries (The Netherlands or Germany) were significantly less positive about the proposed joint project. They expressed a more neutral affect towards the project and perceived the project as less beneficial -to their country- relative to respondents in the potential host countries. They were, on average, a bit less positive about cooperation in energy production in the EU, less concerned about energy security issues, less concerned about the need to create an internal energy market in the EU and less attached to the European Union. Our data suggest that all these personal level factors (possibly connected to broader issues such as income per

capita or public attitudes towards the European integration) help explain a significant variance of personal support to joint projects.

Emphasizing the potential benefits of the joint projects (e.g. in terms of the creation of a more interconnected Energy Union or in terms of regional development) as well as the equal distribution of these benefits among host and off-taker countries might be needed to promote higher levels of public support for joint projects in some countries. In addition, affective factors, such as those related directly to the project as well as broader attitudes towards the European Union and the preference for cooperation in the EU should be taken into account. Specific segments of the population should be more actively engaged in the development of joint projects to increase public support for cooperation in some countries.

## 5 ANNEX 1: QUESTIONNAIRE FOR THE GENERAL PUBLIC

### Presentation of the study

*Dear participant,*

*Through this survey, we want to know your first impressions of an **energy project** that could bring important changes to the European energy sector in the future.*

*During your progression through the survey—which should last no longer than 10 minutes—you will receive information that will introduce you to the project, after which you will be asked to provide answers to some questions about your opinions.*

*Although the topic might seem complex, we just want to know **your personal view**. No prior experience in the topic is necessary.*

***The data will be used exclusively for research purposes.** You can withdraw from the study at any time.*

*Your participation is much appreciated. Thanks in advance!*

The research team



## Demographics

You are:	1. Woman 2. Man
Please indicate your age range	18-29 30-39 40-49 50-64 65 and above
What is the highest level of education that you have completed or you are studying at present?	Did not graduate from high school\ High school graduate\ Technical or vocational education or 2-year college degree\ 4-year college degree or postgraduate degree [adapt for specific country]
You live in:	[adapt regions for specific country]

## Prior questions

Before introducing the **project**, we would like to know your opinion on the following issues:

<i>Construct</i>	<i>Item</i>	<i>Scale</i>
<i>Problem perception (Energy Union)</i>	<p>Q1. Do you think there is a need in Europe to ___?</p> <ul style="list-style-type: none"> <li>Reduce greenhouse gas emissions (emissions from energy, transport, industrial processes and agriculture responsible for climate change)</li> <li>Increase the share of renewable energy sources (like wind and solar) in energy consumption</li> <li>Build a fully-integrated internal energy market (where energy flows freely between countries across the European Union without any technical or regulatory barriers)</li> </ul>	<p>1. There is no need 2. A little 3. Something 4. Quite a lot 5. A lot</p>
<i>Energy security perception (Adapted from Demski et al, 2014)</i>	<p>Q2. How concerned are you, if at all, that in the future...</p> <ul style="list-style-type: none"> <li>Germany suffers disruptions of energy supply for hours or days?</li> <li>Electricity prices will be very high?</li> </ul>	<p>1. Not at all concerned 2. Not very concerned 3. Somewhat concerned 4. Fairly concerned 5. Very concerned</p>

<i>Preference for alternatives. Sonnberger and Ruddat (2016)</i>	Q3. In general, which of the following two options would you prefer? (select one) c. Closer cooperation in energy production in the EU, resulting in greater dependence on other EU states, but lower energy production costs. d. Less cooperation in energy production in the EU, resulting in lower dependence on other EU states, but higher energy production costs.	•
<i>Environmental attitudes &amp; environmental self-identity</i>	Q4. To what extent do you agree with the following statement:  ▪ Climate change is not really a problem. ▪ I think of myself as someone who is very concerned with environmental issues.	▪ Strongly disagree (1) ▪ Disagree (2) ▪ Neither agree nor disagree (3) ▪ Agree (4) ▪ Strongly agree (5)
<i>Place attachment</i>	Q5. To what extent do you feel a weak or a strong sense of belonging to the European Union?	1- No sense of belonging 2- Weak 3- Medium 4- Strong 5- Very strong sense of belonging.

### First section

Have you ever heard of European Cooperation Mechanisms for Renewable Energies?

While all EU countries have domestic renewable energy resources to exploit, **some areas of Europe have a greater potential for renewables than others**. For instance, some countries may have more rivers suitable for hydroelectric power, while others may have more yearly sunshine better suitable for solar.

In 2009, when the EU member states agreed on the 'Renewable Energy Directives', it was already clear that some member states would face difficulties reaching their intended quotas of renewable energy. To help member states reaching their 2020 targets, **cooperation mechanisms were introduced**. Countries in the EU can **enter into mutual agreements to cover their need for renewable energy**.

Construct	Item	Scale
<i>Awareness</i>	Q6. Most people have never heard about European cooperation mechanisms for renewable energies developed in the Renewable	▪ Yes (1) ▪ No (2)  [If No (2), filter to Q6]

	Energy Directive. Before participating in this study, had you ever heard of these mechanisms?	
<i>Personal relevance</i>	Q7. How important is cooperation for renewable energy between European countries to you?	Five-point scale: <ul style="list-style-type: none"> <li>▪ Non-relevant (1)</li> <li>▪ Only slightly relevant (2)</li> <li>▪ Somewhat important (3)</li> <li>▪ Important (4)</li> <li>▪ Very important (5)</li> </ul>

## Second section

In this section we will provide you more information about a **cooperation project** between Germany and Spain that is being promoted by various organizations. Currently, this is just a proposal, no negotiations are underway. But we would like to know what features you like and dislike in this project.

[See text 1 in Annex]

<i>Overall evaluation t1</i>	Q8. Based upon what you have just read, how would you rate this project?	<ul style="list-style-type: none"> <li>▪ Very Poor (1)</li> <li>▪ Poor (2)</li> <li>▪ Fair (3)</li> <li>▪ Good (4)</li> <li>▪ Very Good (5)</li> </ul>
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<i>Affect</i>	Q9. To what extent does this project evoke the following feelings in you? <ul style="list-style-type: none"> <li>▪ Worry---Tranquility</li> <li>▪ Aversion---Enthusiasm</li> <li>▪ Disinterest---Interest</li> <li>▪ Pessimism---Optimism</li> </ul>	Scale 1 to 5 for each affect
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<i>Perceived costs, risks and benefits</i> (perceived effects)	Q10. What are your beliefs and expectations regarding this project?  I think that this project will... <ul style="list-style-type: none"> <li>• Be unviable-- Viable</li> </ul>	Scale 1 to 5
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	<ul style="list-style-type: none"> <li>Cost too much to develop (in terms of the investments)-- Have acceptable costs</li> </ul>	
	<p>Thinking about the impacts in your country, the project will...</p> <ul style="list-style-type: none"> <li>Contribute very negatively--very positively to the energy system in your country (in terms of energy security, diversification of the supply, etc.)</li> <li>Have a very negative--very positive effect on the environment in your country (thinking about potential impacts on landscape, the atmosphere, water, etc.)</li> <li>Have very negative--very positive socio-economic impacts in your country (in terms of the effect on the population, employment, investments)</li> </ul>	
	<p>In general terms, it will...</p> <ul style="list-style-type: none"> <li>Contribute very negatively---very positively to the Energy Union's* success</li> </ul> <p>* The initiative of the European Commission to provide EU consumers secure, sustainable, competitive and affordable energy</p>	

<i>Fairness</i>	<p>Q11. To what extent do you agree with the following statement:</p> <ul style="list-style-type: none"> <li>The potential benefits and costs of the project will be balanced among Germany and Spain</li> </ul>	<ul style="list-style-type: none"> <li>Strongly disagree (1)</li> <li>Disagree (2)</li> <li>Neither agree nor disagree (3)</li> <li>Agree (4)</li> <li>Strongly agree (5)</li> </ul>
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### Third section

<i>Evaluation of consequences</i>	<p>Q12. Please read the following potential consequences of developing this project. How would you rate each consequence? [see text 2 in Annex] [show one consequence per screen. Randomize]</p>	<p>For each consequence:</p> <p>Very negative (1), Negative (2) Not important (3) Positive (4), Very positive (5)</p>
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Construct	Item	Scale
<i>Overall evaluation t2</i>	Q13. Based upon what you have just read, how would you rate this project?	<ul style="list-style-type: none"> <li>▪ Very Poor (1)</li> <li>▪ Poor (2)</li> <li>▪ Fair (3)</li> <li>▪ Good (4)</li> <li>▪ Very Good (5)</li> </ul>

<i>Acceptance</i>	Q14. Overall, do you personally consider the development of this project to be...?	1 – Totally unacceptable 2 – Unacceptable 3 – Neither acceptable nor unacceptable 4 – Acceptable 5 – Totally acceptable
	Q14b. [filter If answered totally unacceptable or unacceptable] Why is this?	(open answer)
<i>Conditions for acceptance</i>	Q15a. [filter If answered totally acceptable or acceptable] What do you like most about the project?	(open answer) (optional)
	Q15b. [filter If answered totally unacceptable or unacceptable] Under what conditions would you consider the project acceptable?	(open answer) (optional)

<i>Support</i>	Q16. Finally, would you support or oppose public financial investments in your country in this cooperation project?	<ul style="list-style-type: none"> <li>▪ Strongly Oppose (1)</li> <li>▪ Somewhat Oppose (2)</li> <li>▪ Neither support nor oppose/undecided (3)</li> <li>▪ Somewhat Support (4)</li> <li>▪ Strongly Support (5)</li> </ul>
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Many thanks for your time!

This study is part of the MUSTEC project. The data you have provided will be exclusively used for research purposes. If you have any query please contact us at [christian.oltra@ciemat.es](mailto:christian.oltra@ciemat.es).

For more information on the project you can visit our website:

<http://mustec.eu>

<https://www.nero.jp.nl/project/>

**[TEXT 1]**

*[For German-Spanish study only]*

*Please read the information carefully before proceeding*

**The idea of Solar S3 is to build a solar power plant (see photo below) in South-West Spain and transfer the electricity generated to the onshore network and ultimately to German consumers**

The **Solar S3** partnership is exploring the possibility of building a concentrated solar power (CSP) plant in Extremadura, Spain. The solar plant, that would produce around 700 GWh/year, would be directly connected to the Spanish grid. Although the actual electricity flow is not traceable, the renewable electricity generated in Spain could be allocated to Germany and count towards its renewable energy targets.

The amount of electricity from this CSP plant would correspond to less than 1% of the total German electricity production. Adopting the electricity produced by the **Solar S3** project could help Germany to achieve its renewable energy targets.



Solar S3 proposal is based on the 'Joint Project' mechanism, which means that **Spain and Germany would enter into a one-off agreement to co-finance the solar power plant in Extremadura (Spain)**, and that the renewable energy generated would count for the German national renewable energy target during the entire lifetime (25 years or more) of the project.

Besides supporting Germany to reach its renewable energy target, it is expected that the adoption of the project will bring benefits for the CSP industry in Europe as well as economic development of the region hosting the project (Extremadura).

*Photo: Concentrated solar power plant. A concentrated solar power plant generates solar power by using mirrors to concentrate a large area of sunlight into a small area to produce heat.*

*[For Netherlands-Romania study only]*

*Please read the information carefully before proceeding*

**Nero Renewables plans to install 362 wind turbines at 3 different sites in South-East Romania and transfer the electricity generated to the onshore network and ultimately to consumers in The Netherlands**

**NERO**, which stands for 'Netherlands – Romania', is in the process of realizing three wind farms in Romania. They will be directly connected to the national high voltage grid and will annually inject 3 terawatt hours (TWh) of renewable energy into the European grid. Although the actual electricity flow is not traceable, the renewable electricity generated in Romania could be allocated to The Netherlands and count towards its renewable energy targets.

The amount of electricity from the wind turbines would correspond to 2.6 % of the total Dutch electricity production. Adopting the 1 GW of wind energy produced by the NERO project would help the Netherlands to achieve its renewable energy targets.



NERO 's proposal is based on the 'Joint Project' mechanism, which means that **the Netherlands and Romania would enter into a one-off agreement to co-finance the wind farms in Romania**, and that the renewable energy generated will count for the Dutch national renewable energy target during the entire lifetime (25 years or more) of the project.

Besides supporting the Netherlands to reach its renewable energy target, it is expected that the adoption of the project will bring social benefits that will contribute to the welfare of the local Romanian people living in the sparsely populated areas where the wind farms will be built.

*Photo: Wind farm in Europe*

## **[TEXT 2. Evaluation of consequences]**

*[For German-Spanish study only]*

### **Solar S3 Project**

#### **Concentrated Solar Power (CSP) technology and industry**

The implementation of the project would allow the Spanish and European CSP industry to be again active in Europe and potentially contribute to further decline the technology costs and improve its technical performance.

#### **Price of the electricity**

If electricity was generated in a concentrated solar power (CSP) plant in Spain, this could slightly increase the wholesale price of electricity in Germany. We cannot really say how much the costs would increase, but if Germany imports less than 1% of their power from a concentrated solar power in Spain, the impact would be negligible.

#### **Decarbonization of the European Energy System**

Saved CO<sub>2</sub> emissions from this project could be allocated to Germany. The 700 GWh/year generated in Spain would displace about 175 million kg of CO<sub>2</sub>, or 0.02% of the German CO<sub>2</sub> emissions.

#### **Reliability and stability of the energy supply**

This project would slightly improve the stability of the energy system. Compared to alternative variable technologies such as wind or PV, there are no relevant supply risks of Concentrated Solar Power (CSP).

#### **A more interconnected Energy Union**

This project would contribute to create a more interconnected Energy Union through renewable energy regional cooperation.

#### **New installations needed**

The environmental impacts associated with additionally built solar power plants — land use and habitat loss, water use, and the use of hazardous materials in manufacturing — is usually limited, but can vary largely depending on the project. Solar plants generally require a large land area (around 2000 acres for a 200MW power plant). Depending on the technology, CSP plants can consume a significant amount of water.

#### **Regional development**

The deployment of new plants in the rural and sunniest parts of Spain would likely contribute to generate economic and employment opportunities. It is estimated that a new facility can generate around 150 new jobs during the construction phase and around 50 during the maintenance and exploitation.

*[For Netherlands-Romania study only]*

## **NERO Project**

### **Price of the electricity**

If electricity was generated in three wind parks in Romania, this would not influence significantly the wholesale price of electricity in the Netherlands. The cost of generating energy from onshore wind technologies is similar or even lower than the cost of generating it from natural gas.

### **Decarbonization of the European Energy System**

CO<sub>2</sub> emission reductions induced by this project would be allocated to the Netherlands. The 1 GW generated in Romania would displace more than 200 million kg of CO<sub>2</sub>, less than 2% of the Dutch CO<sub>2</sub> emissions.

### **Reliability and stability of the energy supply**

This project will slightly improve the stability of the energy system. Compared to alternative technologies such as coal or natural gas, there are no relevant supply risks of wind energy.

### **A more interconnected Energy Union**

This project will potentially contribute to create a more interconnected Energy Union through renewable energy regional cooperation.

### **New installations needed**

In order to implement this project, three new wind parks would have to be built in Romania. Although wind power plants have relatively little impact on the environment compared to fossil fuel power plants, concerns have been raised over the land use (around 25.000 acres per wind park), the noise produced by the rotor blades, visual impacts, and deaths of birds and bats that fly into the rotors (avian/bat mortality).

### **Regional development**

The deployment of new plants in the rural parts of Romania would likely contribute to generate economic and employment opportunities in Romanian rural areas. It is estimated that a new facility can generate around 150 new jobs per wind park during the construction phase and around 50 during the maintenance and exploitation.

## 6 ANNEX 2: DETAILED RESULTS PER COUNTRY

### Prior questions

Q1. Do you think there is a need in Europe to \_\_\_?

% within Country							
	Q1A.Reduce greenhouse gas emissions (emissions from energy, transport, industrial processes and agriculture responsible for climate change)						Total
	There is no need	A little	Something	Quite a lot	A lot	Don't Know	
Spain	1,3	1,4	11,9	19,8	64,4	1,4	100
Germany	2,7	4,1	13,6	26,2	50,9	2,5	100
The Netherlands	3,8	8,1	21,8	28,4	33,4	4,6	100
Romania	1,3	1,8	5,8	25,3	64,8	1,3	100
Total	2,2	3,8	13,2	24,9	53,3	2,4	100

% within Country							
	Q1B. Increase the share of renewable energy sources (like wind and solar) in energy consumption						Total
	There is no need	A little	Something	Quite a lot	A lot	Don't Know	
Spain	0,6	1,9	8,3	20,8	66,3	2,3	100
Germany	2,6	2,9	13,0	33,9	45,0	2,6	100
The Netherlands	2,0	8,5	16,6	29,9	39,4	3,6	100
Romania	0,5	0,8	3,4	21,1	73,5	0,8	100
Total	1,4	3,5	10,3	26,4	56,0	2,3	100

% within Country							
	Q1C. Build a fully-integrated internal energy market (where energy flows freely between countries across the European Union without any technical or regulatory barriers)						Total
	There is no need	A little	Something	Quite a lot	A lot	Don't Know	
Spain	1,1	3,0	13,6	32,0	44,5	5,8	100
Germany	1,9	3,5	21,2	36,3	27,6	9,6	100
The Netherlands	5,3	7,0	22,8	27,5	23,0	14,5	100
Romania	1,0	1,6	9,0	34,4	50,4	3,6	100
Total	2,3	3,8	16,6	32,5	36,4	8,4	100

Q2. How concerned are you, if at all, that in the future...

% within Country						
	Q2A.Your country suffers disruptions of energy supply for hours or days					Total
	Not at all concerned	Not very concerned	Somewhat concerned	Fairly concerned	Very concerned	
Spain	3,6	14,0	32,1	33,0	17,3	100
Germany	14,0	37,2	27,8	14,0	7,1	100
The Netherlands	9,0	39,5	34,4	14,0	3,1	100
Romania	0,9	5,6	23,4	41,4	28,8	100
Total	6,9	24,1	29,4	25,6	14,1	100

% within Country						
	Q2B.Electricity prices will be very high					Total
	Not at all concerned	Not very concerned	Somewhat concerned	Fairly concerned	Very concerned	
Spain	0,8	3,0	10,3	34,6	51,4	100
Germany	1,5	7,7	30,3	36,3	24,2	100
The Netherlands	2,1	11,3	32,6	35,1	18,9	100
Romania	0,4	2,1	11,1	37,5	48,9	100
Total	1,2	6,0	21,1	35,9	35,8	100

% within Country				
	Q3. In general, which of the following two options would you prefer?			Total
	Closer cooperation in energy production in the EU, resulting in greater dependence on other EU states, but lower energy production costs.	Less cooperation in energy production in the EU, resulting in lower dependence on other EU states, but higher energy production costs.	Don't know	
Spain	83,3	7,3	9,5	100
Germany	70,2	14,8	15,0	100
The Netherlands	58,3	20,0	21,8	100
Romania	79,4	14,5	6,1	100
Total	72,8	14,1	13,1	100

Q4. To what extent do you agree with the following statement:

% within Country						
	Q4A.Climate change is not really a problem.					Total
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	
Spain	56,8	21,0	11,6	5,9	4,8	100
Germany	50,0	22,3	14,2	8,2	5,2	100
The Netherlands	31,3	30,0	20,5	13,8	4,5	100
Romania	50,1	23,1	7,0	9,5	10,3	100
Total	47.0	24.1	13.3	9.3	6.2	100

% within Country						
	Q4B.I think of myself as someone who is very concerned with environmental issues.					Total
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	
Spain	3,4	4,9	20,5	45,5	25,8	100
Germany	3,6	10,5	40,1	36,7	9,1	100
The Netherlands	6,1	15,8	34,9	33,3	10,0	100
Romania	0,8	3,0	17,4	52,9	26,0	100
Total	3,5	8,5	28,2	42,1	17,7	100

% within Country						
	Q5. To what extent do you feel a weak or a strong sense of belonging to the European Union?					Total
	No sense of belonging	Weak	Medium	Strong	Very strong sense of belonging	
Spain	3,8	8,5	33,1	38,3	16,4	100
Germany	6,2	12,5	34,4	33,7	13,2	100

The Netherlands	14,6	21,0	43,6	18,0	2,8	100
Romania	4,1	11,5	40,5	29,0	14,9	100
Total	7,2	13,4	37,9	29,7	11,8	100

### First section

% within Country						
	Q6. Most people have never heard about European cooperation mechanisms for renewable energies developed in the Renewable Energy Directive. Before participating in this study, had you ever heard of these mechanisms?					Total
	Yes		No			
Spain	27,3		72,8			100
Germany	24,6		75,4			100
The Netherlands	23,5		76,5			100
Romania	59,5		40,5			100
Total	33,7		66,3			100

% within Country						
	Q7. How important is cooperation for renewable energy between European countries to you?					Total
	Non-relevant	Only slightly relevant	Somewhat important	Important	Very important	
Spain	0,8	2,0	21,3	36,5	39,5	100
Germany	1,2	5,9	24,3	40,4	28,2	100
The Netherlands	4,1	10,0	37,3	37,1	11,5	100
Romania	0,9	3,0	15,5	45,3	35,4	100
Total	1,7	5,2	24,6	39,8	28,6	100

### Second section

% within Country						
	Q8. Based upon what you have just read, how would you rate this project?					Total
	Very Poor	Poor	Fair	Good	Very Good	
Spain	1,3	4,6	25,5	38,8	29,9	100
Germany	2,7	5,7	33,0	45,1	13,3	100
The Netherlands	3,8	6,1	44,5	38,5	7,1	100
Romania	2,9	6,1	28,4	36,9	25,8	100
Total	2,7	5,7	32,9	39,8	19,0	100

Q9. To what extent does this project evoke the following feelings in you?

% within Country						
	Q9A. Worry---Tranquility					Total
	1 Worry	2	3	4	5 Tranquility	
Spain	2,8	6,4	32,0	36,3	22,6	100
Germany	2,5	8,6	42,3	32,2	14,5	100
The Netherlands	5,0	12,5	49,9	26,5	6,1	100
Romania	4,8	8,3	33,0	31,8	22,3	100
Total	3,7	8,9	39,3	31,7	16,4	100



% within Country						
	Q9B.Aversion---Enthusiasm					Total
	1 Aversion	2	3	4	5 Enthusiasm	
Spain	5,3	8,1	30,9	32,4	23,4	100
Germany	3,6	10,1	39,3	33,7	13,3	100
The Netherlands	2,4	6,5	50,6	30,9	9,6	100
Romania	5,6	9,0	30,1	30,9	24,4	100
Total	4,2	8,4	37,7	31,9	17,7	100

% within Country						
	Q9C.Disinterest---Interest					Total
	1 Disinterest	2	3	4	5 Interest	
Spain	4,9	5,4	23,5	34,8	31,5	100
Germany	4,0	8,5	30,9	34,9	21,7	100
The Netherlands	3,9	9,9	38,8	35,1	12,4	100
Romania	4,3	6,3	23,8	30,5	35,3	100
Total	4,2	7,5	29,2	33,8	25,2	100

% within Country						
	Q9D.Pessimism---Optimism					Total
	1 Pessimism	2	3	4	5 Optimism	
Spain	6,3	6,5	26,8	31,8	28,8	100
Germany	4,4	10,6	35,5	32,4	17,1	100
The Netherlands	5,0	12,4	41,1	31,0	10,5	100
Romania	6,4	12,9	24,4	25,8	30,6	100
Total	5,5	10,6	31,9	30,2	21,7	100

Q10. What are your beliefs and expectations regarding this project?

I think that this project will...

% within Country						
	Q10A.Be unviable—Viable					Total
	1 Be unviable	2	3	4	5 Viable	
Spain	2,8	3,8	29,1	36,8	27,6	100
Germany	3,7	9,5	31,0	34,4	21,3	100
The Netherlands	5,5	12,1	39,6	33,0	9,8	100
Romania	4,1	7,6	22,4	31,8	34,1	100
Total	4,0	8,2	30,5	34,0	23,2	100

% within Country						
	Q10B.Cost too much to develop (in terms of the investments)-- Have acceptable costs					Total
	1 Cost too much to develop	2	3	4	5 Have acceptable costs	
Spain	9,3	16,3	33,3	26,5	14,8	100
Germany	10,6	21,2	36,8	21,8	9,6	100
The Netherlands	10,8	20,5	44,8	17,6	6,4	100

Romania	4,4	10,1	33,9	28,0	23,6	100
Total	8,7	17,0	37,2	23,5	13,6	100

Thinking about the impacts in your country, the project will...

% within Country						
	Q10C. Contribute very negatively--very positively to the energy system in your country (in terms of energy security, diversification of the supply, etc.)					Total
	1 Contribute very negatively	2	3	4	5 Contribute very positively	
Spain	2,5	3,3	28,5	34,9	30,9	100
Germany	2,7	7,9	45,8	33,3	10,3	100
The Netherlands	3,4	9,1	43,5	35,3	8,8	100
Romania	4,4	7,0	25,1	31,0	32,5	100
Total	3,2	6,8	35,7	33,6	20,6	100

% within Country						
	Q10D. Have a very negative--very positive effect on the environment in your country (thinking about potential impacts on landscape, the atmosphere, water, etc.)					Total
	1 Have a very negative effect on the environment	2	3	4	5 Have a very positive effect on the environment	
Spain	2,6	4,6	29,5	36,6	26,6	100
Germany	2,6	5,9	43,8	35,4	12,3	100
The Netherlands	3,5	7,0	46,9	32,6	10,0	100
Romania	3,8	9,3	25,0	29,8	32,3	100
Total	3,1	6,7	36,3	33,6	20,3	100

% within Country						
	Q10E. Have very negative--very positive socio-economic impacts in your country (in terms of the effect on the population, employment, investments)					Total
	1 Have very negative socio-economic impacts	2	3	4	5 Have very positive socio-economic impacts	
Spain	2,0	4,3	27,3	38,1	28,4	100
Germany	2,4	10,2	48,4	28,7	10,3	100
The Netherlands	3,6	10,1	52,6	26,3	7,4	100
Romania	3,6	6,3	22,9	34,0	33,3	100
Total	2,9	7,7	37,8	31,8	19,8	100

In general terms, it will...

% within Country						
	Q10F. Contribute very negatively---very positively to the Energy Union's success					Total
	1 Contribute very negatively	2	3	4	5 Contribute very positively	
Spain	1,9	3,6	24,5	41,5	28,5	100
Germany	2,1	6,7	34,3	39,9	17,0	100

The Netherlands	3,5	8,8	44,1	33,8	9,9	100
Romania	2,9	6,0	21,6	34,6	34,9	100
Total	2,6	6,3	31,1	37,4	22,5	100

Q11. To what extent do you agree with the following statement:

% within Country						
	Q11A. The potential benefits and costs of the project will be balanced among Germany and Spain					Total
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	
Spain	3,8	12,1	31,0	37,4	15,8	100
Germany	4,6	18,2	48,3	25,9	3,0	100
The Netherlands	5,4	17,8	40,0	32,6	4,3	100
Romania	3,6	10,3	29,3	44,6	12,3	100
Total	4,3	14,6	37,1	35,1	8,8	100

### Third section

Q12. Please read the following potential consequences of developing this project. How would you rate each consequence?

% within Country						
	Q12A. Concentrated Solar Power (CSP) technology and industry					Total
	Very negative	Negative	Not important	Positive	Very positive	
Spain	1,0	1,5	12,6	56,3	28,6	100
Germany	0,6	3,2	14,8	62,8	18,5	100
Total	1,4	4,5	17,5	57,5	19,1	100

% within Country						
	Q12B. Price of the electricity					Total
	Very negative	Negative	Not important	Positive	Very positive	
Spain	2,1	11,4	32,0	41,4	13,1	100
Germany	5,5	24,3	32,3	31,4	6,5	100
The Netherlands	1,9	8,5	22,0	57,0	10,6	100
Romania	2,0	4,9	20,6	54,0	18,5	100
Total	3,0	11,9	25,0	45,5	14,7	100

% within Country						
	Q12C. Decarbonization of the European Energy System					Total
	Very negative	Negative	Not important	Positive	Very positive	
Spain	1,4	4,6	16,0	47,3	30,8	100
Germany	1,6	9,7	23,6	53,2	11,8	100
The Netherlands	1,8	6,4	23,3	55,9	12,8	100
Romania	2,8	5,4	12,3	53,3	26,4	100
Total	1,5	6,1	17,5	55,3	19,6	100

% within Country						
	Q12D. Reliability and stability of the energy supply					Total
	Very negative	Negative	Not important	Positive	Very positive	
Spain	1,1	2,3	12,1	57,0	27,5	100
Germany	1,1	4,5	15,7	62,6	16,1	100
The Netherlands	1,8	7,1	20,6	59,4	11,1	100
Romania	1,3	2,9	9,6	61,4	24,9	100
Total	1,5	4,5	15,9	59,0	19,1	100

% within Country						
	Q12E. A more interconnected Energy Union					Total
	Very negative	Negative	Not important	Positive	Very positive	
Spain	1,6	2,9	12,4	54,6	28,5	100
Germany	0,7	4,0	14,7	61,8	18,7	100
The Netherlands	2,0	6,9	27,0	55,1	9,0	100
Romania	1,6	4,4	8,8	61,4	23,9	100
Total	2,8	13,8	17,5	49,4	16,5	100

% within Country						
	Q12F. New installations needed					Total
	Very negative	Negative	Not important	Positive	Very positive	
Spain	3,1	20,3	23,0	40,8	12,9	100
Germany	5,4	36,0	21,4	31,5	5,6	100
The Netherlands	5,6	31,0	25,8	33,3	4,4	100
Romania	3,3	17,3	17,3	47,9	14,4	100
Total	2,9	16,2	18,4	49,0	13,5	100

% within Country						
	Q12G. Regional development					Total
	Very negative	Negative	Not important	Positive	Very positive	
Spain	1,0	1,9	11,5	53,3	32,4	100
Germany	1,1	3,2	13,1	64,6	18,0	100
The Netherlands	1,5	5,1	19,6	63,5	10,3	100
Romania	1,5	3,4	9,6	60,1	25,4	100
Total	1,1	2,6	12,3	58,9	25,2	100

% within Country						
	Q13. Based upon what you have just read, how would you rate this project?					Total
	Very Poor	Poor	Fair	Good	Very Good	
Spain	0,8	4,9	26,9	43,3	24,3	100
Germany	1,9	7,5	33,4	47,8	9,5	100
The Netherlands	2,6	8,6	41,9	41,8	5,1	100
Romania	2,0	7,3	22,0	43,6	25,1	100
Total	1,8	7,1	31,0	44,1	16,0	100

% within Country						
	Q14. Overall, do you personally consider the development of this project to be...?					Total
	Totally unacceptable	Unacceptable	Neither acceptable nor unacceptable	Acceptable	Totally acceptable	
Spain	0,6	3,8	17,3	54,4	24,0	100
Germany	2,1	9,6	24,6	54,1	9,6	100
The Netherlands	2,3	8,4	31,1	51,5	6,8	100
Romania	2,6	4,3	11,5	56,0	25,6	100
Total	1,9	6,5	21,1	54,0	16,5	100

% within Country						
	Q16. Finally, would you support or oppose public financial investments in your country in this cooperation project?					Total
	Strongly Oppose	Somewhat Oppose	Neither support nor oppose/undecided	Somewhat Support	Strongly Support	
Spain	3,4	7,6	28,3	43,9	16,9	100
Germany	5,9	10,8	25,7	47,1	10,5	100
The Netherlands	8,4	12,0	32,3	35,8	11,6	100
Romania	3,6	6,0	14,0	44,0	32,4	100
Total	5,3	9,1	25,0	42,7	17,8	100

## WHO WE ARE

The MUSTEC consortium consists of nine renowned institutions from six European countries and includes many of the most prolific researchers in the European energy policy community, with very long track records of research in European and nationally funded energy policy research projects. The project is coordinated by Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas-CIEMAT.

Name	Country	Logo
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas – <b>CIEMAT</b>	ES	
University of Piraeus Research Center – <b>UPRC</b>	GR	
Eidgenössische Technische Hochschule Zürich – <b>ETH Zürich</b>	CH	
Technische Universität Wien – <b>TU WIEN</b>	AT	
European Solar Thermal Electricity Association – <b>ESTELA</b>	BE	
COBRA Instalaciones y Servicios S.A – <b>COBRA</b>	ES	
Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. – <b>Fraunhofer</b>	DE	
Agencia Estatal Consejo Superior de Investigaciones Científicas – <b>CSIC</b>	ES	
Fundación Real Instituto Elcano de Estudios Internacionales y Estratégicos – <b>ELCANO</b>	ES	



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