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SEVENTH FRAMEWORK PROGRAMME

INSPIREgrid

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INSPIRE-Grid
Improved and eNhanced Stakeholders Participation In Reinforcement of Electricity Grid

Final publishable summary report

Coordinator:
Stefano MARAN, RSE SpA, Italy

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PROJECT FINAL REPORT

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Name of the scientific representative of the project's co-ordinator[1], Title and Organisation: Stefano Maran, Ricerca sul Sistema Energetico – RSE SpA

Tel: +39 02 3992.5918

Fax: +39 02 39924608

E-mail: stefano.maran@rse-web.it

Project website address: www.inspire-grid.eu

[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the Grant Agreement.

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1 Executive Summary

The INSPIRE-Grid project is aimed at enhancing stakeholders' participation in the development of future grid infrastructures. INSPIRE-Grid aims to increase stakeholders' engagement in grid expansion projects, better manage conflicts, and speed up the permitting process. By way of an interdisciplinary approach, merging competences from social sciences and technical disciplines, methods to facilitate decision-making have been combined with engagement tools and tested with stakeholders from grid development project case studies.

The project has been structured with the following activities:

- the analysis of the needs, concerns, wants and expectations of the stakeholders
- the identification of the existing best practices for the stakeholders' engagement
- the customisation of methodologies for assessing and comparing impacts and benefits
- a series of case studies with a double aim: to give elements to the methodological activities and to allow a proper testing
- a synthesis of the project results and a series of recommendations about the stakeholders' engagement.

The general result of the project is a methodology to interact with stakeholders more effectively, to engage them in the decision-making process and to improve support of development of future grid infrastructure. The methodology is composed of different products that have been integrated in a unifying framework.

As emerged in the analysis, a differentiated stakeholder analysis is essential in order to reach a comprehensive understanding of the situation, to identify possible conflicts, to monitor changes, and to support tailored solutions. To support this task we developed an interactive **Stakeholders Map** that can be accessed on the INSPIRE-Grid web site. Moreover we developed a **decision tree for selecting engagement tools**. Addressing the importance of choosing the appropriate tools to trigger stakeholders' engagement, the decision tree enables the choice of a proper tool for each stage of the project development and according to different levels of stakeholders' participation.

Among the **methods to assess and compare different grid projects**, we highlighted the usefulness of adopting a **Multi Criteria Approach**, which showed the ability to create a reduced set of alternative power line paths by using stakeholder preferences in a ranking of effects and to generate acceptance for the outcome when stakeholders agree on a ranking. Moreover, a **participative Web GIS** has been developed and implemented (http://utopia.rse-web.it), focusing on the functionalities which could support the people involvement in the decision-making process and enhance their participation. Finally, we have shown as **consequential Life Cycle Assessment** can be applied to grid expansion projects in order to provide additional information about the project's environmental impacts (or avoided impacts) along its life cycle, from resources extraction and manufacturing to decommissioning.

All these tools were then put in relation to the processes for stakeholder engagement. Based on the theoretical framework developed in the project, we produced a **handbook** with five overarching principles and ten general steps helping to organize an engagement process in a successful way, focusing mostly on the role of the project manager.

Finally, all the results were integrated into a **set of recommendations**. The recommendations are mainly intended for TSOs and regulators, but also for policy makers and other stakeholders active in the field of transmission line planning. Moreover different documents were produced, targeted to the different audiences: NGOs and the broad public (brochure), practitioners and scientists (technical synthesis), and decision makers and public administrations (three policy briefs).

2 Project context and objectives

The European Union (EU) is tackling the combined challenge of combatting climate change and securing Europe energy supply through an ambitious set of policies aimed at fostering the transition towards a low carbon society. With the adoption of its 20-20-20 targets and the objective of a largely decarbonized power sector by 2050, the European Union has set the stage for a significant increase in the use of renewable energies. These objectives were empowered in October 2014 when EU leaders agreed the 2030 policy framework for climate and energy, aimed to make the European Union's economy and energy system more competitive, secure and sustainable. Specifically it sets a domestic 2030 greenhouse gas reduction target of at least 40% compared to 1990 and a binding objective of increasing the share of renewable energy to at least 27% of the EU's energy consumption by 2030.

In recent years, the increasing number of technical scenarios raised the issue of grid expansions as a key point for the large-scale integration of renewables. The objective of making low-carbon technologies affordable and competitive is the core idea behind the European Strategic Energy Technology Plan (SET-Plan). The expansion has rapidly emerged to the very top of the de-carbonization agenda, as a stand-or-fall issue: if it fails, a very far-reaching de-carbonization based on renewables will be very difficult.

Today, grid expansion in Europe is a complex and time-consuming matter, much due to obstacles encountered during the authorization phase and strong public opposition: often, electricity transmission projects take 5-10 years to pass the permission processes and proceed to the construction phase. This situation is not compatible with the aim of massively and rapidly increasing the share of renewables, but whereas the technical understanding of electricity grids is very good, the understanding of the social processes supporting or hindering the reshaping of the transmission system is very limited.

The present project thus addresses exactly these shortcomings by investigating the grid expansion problems from a social scientific perspective. INSPIRE-Grid, which stands for “Improved and eNhanced Stakeholder Participation In the Reinforcement of the Electricity Grid”, aims to increase stakeholders’ engagement in grid expansion projects, to better manage arisen conflicts, and to speed up the permitting process.

With ten partners from six different countries, the INSPIRE-Grid consortium includes the most relevant institutions and competences for the problem at hand. It comprises both Academia (Research Centres and Universities) and TSOs; moreover, NGOs and one (Norwegian) national agency are involved in the role of observers. Regarding competences and qualifications, specializations in psychology and social sciences, together with engineering and environmental sciences are present among partners.

By way of an interdisciplinary approach, INSPIRE-Grid aims at developing stakeholder-inclusive processes and designing an expert-led European good practice guide. Methods to facilitate decision-making were newly combined with engagement tools and tested with stakeholders from existing or concluded grid development project case studies.

Main objectives of the project are:

1. the analysis of the needs, concerns, wants and expectations of the stakeholders and general public
2. the development or adaptation of methodologies to assess and compare impacts and benefits
3. the development of suitable processes for an effective communication and real participation of the stakeholders and general public
4. a series of recommendations about the stakeholders and general public engagement

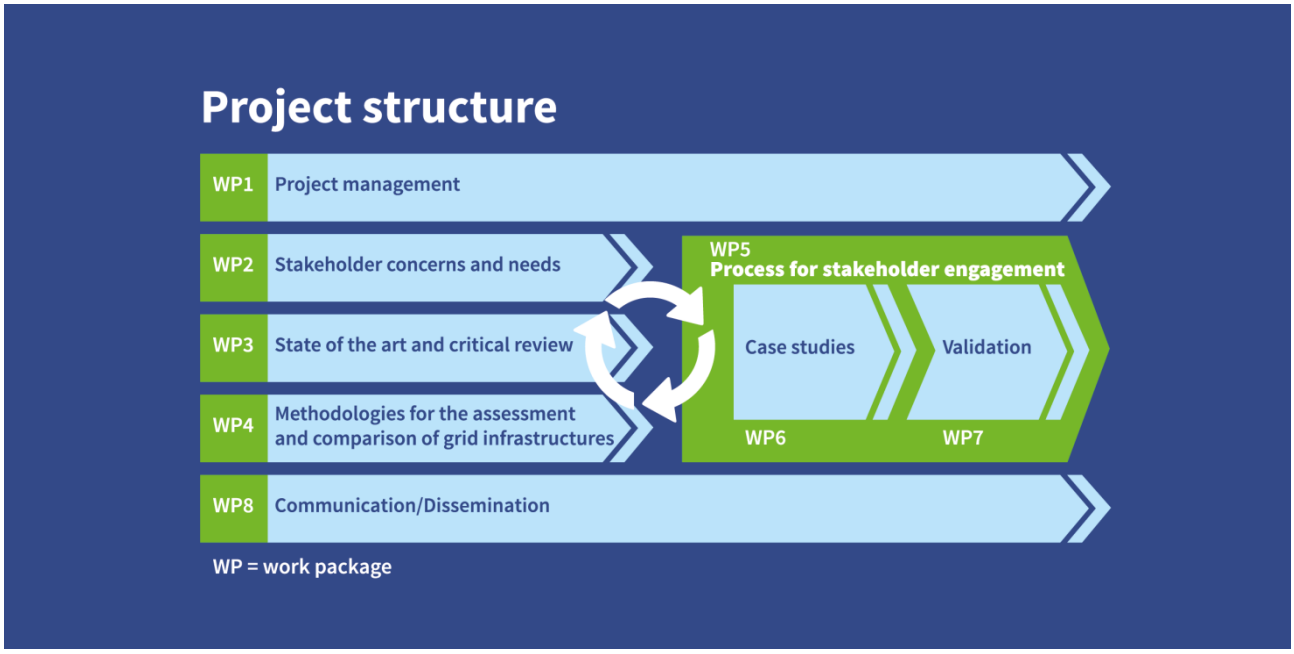
The results developed during the project were tested on different case studies related to real grid development projects.

The INSPIRE-grid consortium

Starting from an analysis of the factors that influence public acceptance or opposition to infrastructure projects, the project is structured in five research workpackages dedicated to specific objectives:

WP2 committed to analyse stakeholder wants, needs, concerns, and expectations and produce a stakeholder map;
WP3 committed to analyse and review past experiences and single out best practices and criteria for good participation practices;
WP4 committed to develop and customise methodologies to assess and quantify benefits and impacts on different temporal and spatial scales;
WP5 committed to analyse and enhance the processes of stakeholders engagement and participation (in the frame of the regulatory context);
WP6 committed to testing hypotheses from the methodological WPs to real cases and implement methodologies derived in WP4 and WP5;
WP7 committed to validate engagement processes, to produce a synthesis of the project results and a proposal for improvement.

These research workpackages are strictly interconnected and are framed into the coordination and dissemination workpackages, resulting in the structure reported in the following figure.



Structure of the INSPIRE-Grid project

3 Main S&T results

While many details of the future European power system remain highly disputed at national and European levels, one parameter seems to be very clear to a vast majority of policy-makers: the modernisation of the current electricity infrastructure is indispensable for the further integration of the European internal energy market as well as the integration of increased shares of renewables. However, grid expansion in Europe is a complex and time-consuming matter, much due to obstacles encountered during the authorization phase and strong public opposition: often, electricity transmission projects take 5-10 years to pass the permission process and proceed to the construction phase. The latest ACER monitoring report on PCIs published in July 2016 showed once again: many projects to further develop electricity grids are delayed – mostly due to challenges related to the permitting procedure. This situation is not compatible with the aim of massively and rapidly increasing the share of renewables, but whereas the technical understanding of electricity grids is very good, the understanding of the social processes supporting or hindering the reshaping of the transmission system is very limited.

In this regard, the central question is:

> *What can be done to better integrate the views, concerns and beliefs of stakeholders into the planning and permitting procedure?*

We grounded the research in a theoretical framework displaying the factors that influence public acceptance or opposition to infrastructure projects. In this framework, there are two primary sets of factors underlying support or opposition: the needs, wants, concerns, and expectations of (local) stakeholders on the one hand; the costs, benefits, risks, and implications of the specific infrastructure project on the other. But other factors can play an influential role as well: the processes through which people learn about, discuss, and ultimately participate in deciding about the proposed project can mediate their perceptions of their own wants and needs, the attributes of the infrastructure, and the fit between the two; the "soft factors", like trust and interpersonal justice, which are acknowledged as important factors in determining the success or the failure of the engagement process. The activities of the project were structured in order to address these issues, test the conclusion by means of real case studies, and develop a unified framework.

3.1 Stakeholders' concerns and needs

The starting point was the analysis of concerns and needs of stakeholders involved in the context of electricity grid extension. First of all, this activity serves to identify and differentiate the stakeholders involved. Especially with regard to the 'broad public', the stakeholder analysis allows to draw a differentiated picture of the individuals and groups. Another objective is to widen the focus, which usually lies only upon grid operators and the broad public.

We carried out a comprehensive literature review on studies about acceptance of renewable energies as well as on grid infrastructures. In addition, we collected data by applying several qualitative guided interviews with members of different stakeholder groups.

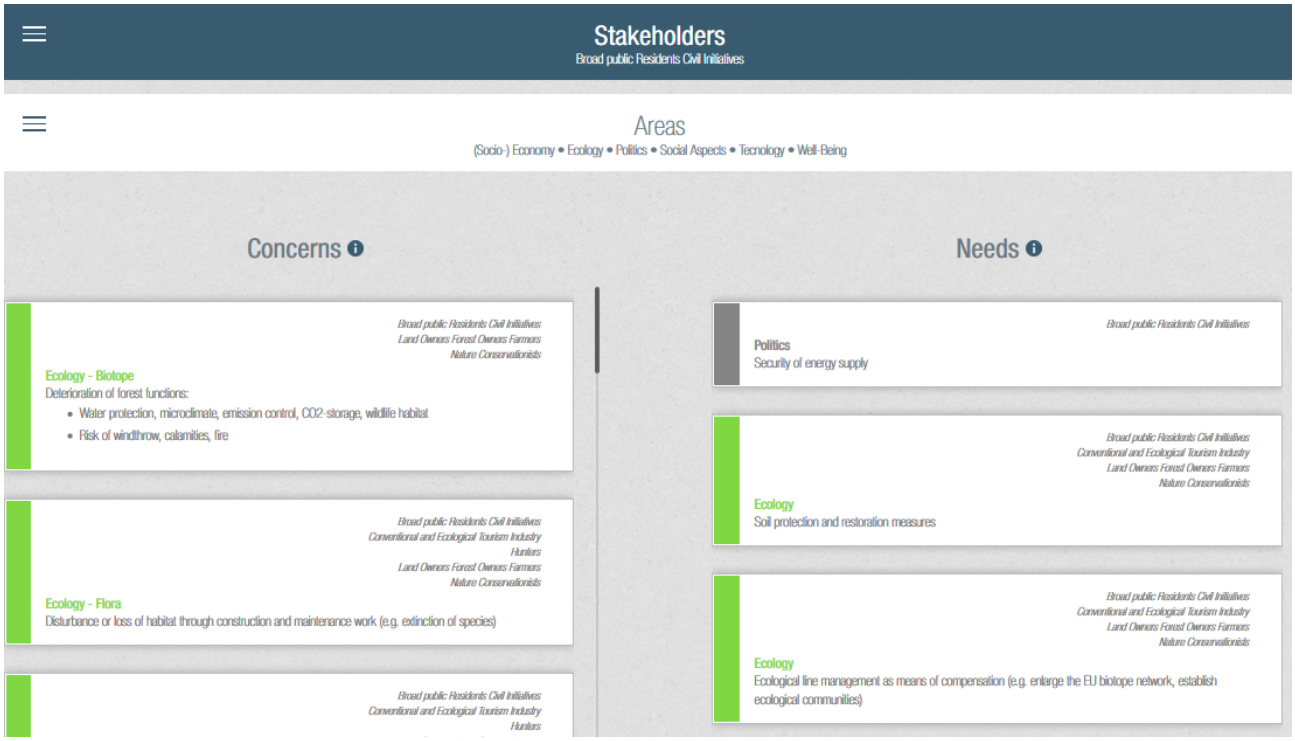


Figure 1: Tool for querying the stakeholder map

The resulted stakeholder analysis takes into account a wide range of affected stakeholders, such as planning, permitting and implementing authorities, energy providers and producers, construction companies, nature conservationists, tourism industry, land owners, farmers and forest owners as well as hunters. In a joint stakeholder map, we show the similarities and differences between stakeholders' concerns and needs regarding grid expansion measures.

The results of the analysis were organised and presented by means of a **stakeholder map.** The map offers indications concerning possible sources of conflict as well as possible entry points for providing tailored solutions. The knowledge base of the map is accessible through the INSPIRE-Grid website using a specific tool.
The map is not meant as a comprehensive collection but a broad picture of the situation that will be updated with the comments and remarks from the users.

3.2 State of the art and critical review

A second starting point consisted in a review of the **current processes for the involvement** of different stakeholders during planning processes for new power lines projects. These stakeholders include NGOs, project proponents, and potentially affected citizens. The activity focused on:

i. The reasons for opposition against power lines and other renewable energy-related infrastructure projects;
ii. Methods of stakeholder participation, including their potentials and limits;
iii. Participatory 'tools' that may be used in power lines planning processes;
iv. Evaluation criteria for participatory processes, with a focus on the suitable criteria for power lines planning.

A way to improve acceptance for power lines is to integrate the affected stakeholders in the planning process. From other renewable energy-related fields like wind power and biogas plants, fairness and transparency in the planning are the two main recurrent factors of procedural justice mentioned as a

guarantee of successful stakeholder engagement. Distributional justice is also a factor of success, mainly in terms of fair distribution of perceived costs and benefits related to the concerned infrastructure. Finally, examples from non-energy related fields like natural hazard management show several benefits and barriers of participation. On one hand, the main benefits are the inclusion of public needs in the decision making process, increased awareness and knowledge of the stakeholders, better credibility and legitimacy of the projects and, as a result of the previous ones, improved policy effectiveness. On the other hand, neglecting power dynamics and failing to integrate stakeholders' perspectives and heterogeneity may lead to bad outcomes of the processes. Indeed, participation may also increase conflicts, if it is not carried out properly.

To include stakeholders in planning processes for power lines, many tools are available and a selection of the most appropriate ones is necessary. We selected some key tools and described their characteristics. Moreover we relied on the experiences of three transmission system operators (TSO)- Rte in France, Statnett in Norway and Swissgrid in Switzerland - to identify strengths and weaknesses of different stakeholders' involvement tools.

Taking into account the criteria identified in the existing literature, we analysed, with TSOs involved in INSPIRE-Grid, the milestones of some planning processes for power lines in France and Norway. The results reveal that, although current processes already fulfil several criteria for good participation, they have two main shortcomings:

1. the discussion of needs for power lines is not always carried out with an analysis and mapping of the relevant stakeholders to involve;
2. inputs from stakeholders, deriving from the participatory process, are often managed without explicit and structured mechanisms.

Although TSOs may work to improve stakeholder engagement on a voluntary basis, changes should happen also at the regulatory level, for instance through regulations or guidelines emitted by the permitting government authority. Furthermore, methods and tools which allow to effectively consider stakeholders preferences and perspectives (including, for example, stakeholder mapping, analysis of their preferences, interests, wants and needs) should be more integrated through all the steps of the decision making process (e.g. definition of needs).

3.3 Assessment and comparison of grid infrastructures

After framing the problem, collecting the basic data and identifying the research gaps in the current processes, the project dealt with the problem of developing methodologies for the assessment and comparison of grid infrastructures. Specifically, attention was focused on methodologies that could contribute to the improvement of stakeholders' engagement.

Methodologies for the life cycle assessment

A grid project results in various environmental impacts. In addition to local environmental impacts nearby the power line, a grid project also indirectly affects the environment. All along its life cycle (material production, construction, maintenance, dismantling, waste treatment), environmental impacts can occur. A grid project will also reduce congestion in the transmission network, which can result in a change in electricity production and, consequently, in changes in its environmental impacts.

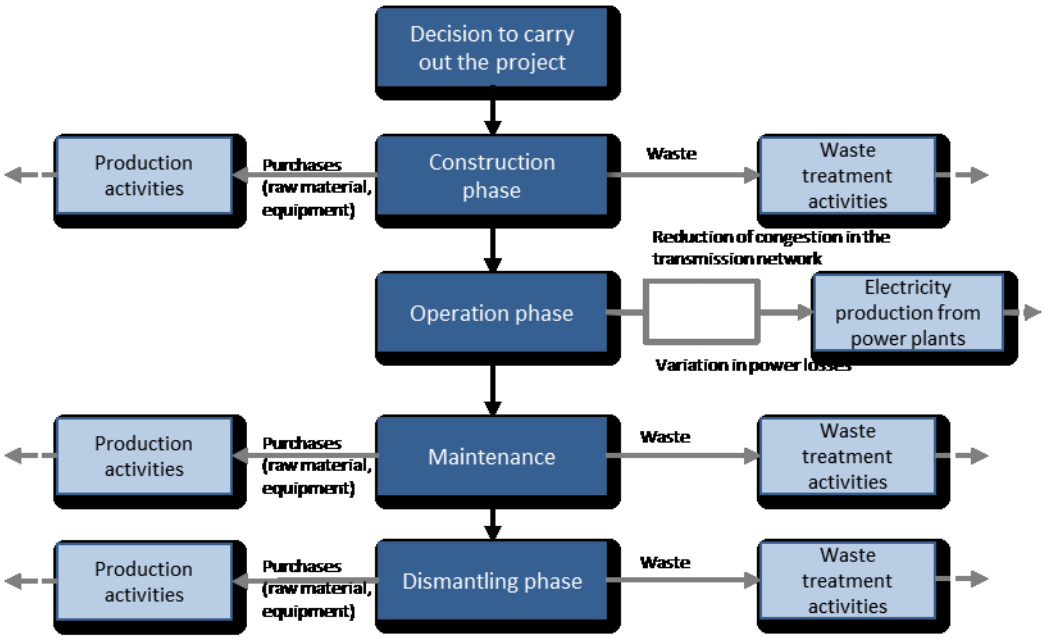


Figure 2: Flow chart of the LCA

A methodology based on life cycle assessment (LCA) was developed to evaluate the **indirect environmental impacts of a grid project**, by modelling the consequences of the decision to carry out the project (consequential LCA). We defined seven indicator related to LCA: climate change; primary energy; abiotic (mineral) resource depletion; water depletion; radioactive waste production; damage to human health; damage to ecosystems.
We applied this methodology on the Cergy-Persan project (France). Results showed that for all impact categories except abiotic resource depletion, the impacts of the project are mainly due to its indirect effect on electricity production. For these categories, the environmental impacts of the project can vary a lot depending on the scenario considered for the evolution of the power system. Impacts due to building, maintenance and dismantling of the overhead line infrastructure are almost negligible for these categories, while it is the main source of abiotic resource depletion, mainly due to the use of galvanic steel. We consider this conclusion to be transferable to any project of high voltage overhead line (transmission network).

Methodologies to support the decision making process

Within INSPIRE-Grid project we propose a **comprehensive approach**, following the whole decision-making process through its stages (see D4.3): Strategy (necessary and often in some way disregarded), Determination of need, Project preparation and Spatial planning and Permitting.
In particular, we recommend the use of a **tiering approach,** including participation and environmental considerations in the assessments done at all the different stages in the overall process. Tiering is the process by which 'higher-tier' or strategic decisions influence and set the context for other, subsequent 'lower-tier' or more detailed decisions. There are many important advantages by preparing a sequence of linked environmental assessments at different decision-making levels, primarily because process owners can give the appropriate amount of attention and detail at the right time, in line with the project maturity level.
Participation is essential at all stages, although **the roles of different stakeholders will be different at different levels**: for instance, supranational institutions will have a more relevant role at the *Strategy* stage and a minor one for the *Spatial planning*, while the opposite will be true for citizens.

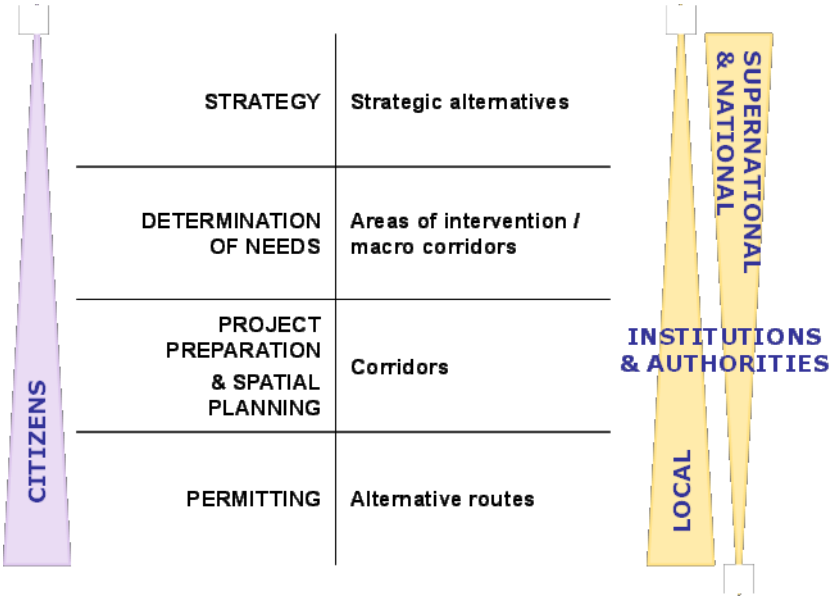


Figure 3: Tiering approach and participation

The use of a **formalized Multi-Criteria Analysis (MCA) method** can support the decision maker in the selection of the most suitable alternative in integrated and participated way. This has been tested in INSPIRE-Grid by means of three validation workshops and two case studies, verifying that:

- A proper use of MCA can foster stakeholder participation.
- MCA can be used to properly manage conflicts and support the choice of a compromise **alternative**, possibly reducing times and costs necessary to reach a satisfactory decision.

MCA may and should allow participants to structure the debate and facilitate participation and negotiation, especially by helping to establish a climate of confidence and by providing a common understanding of the problem.
We finally gave methodological and effective suggestions on characteristics that **environmental compensation** should have, based on the consideration that the aim of the compensation is to rebalance the residual negative impact of a project, in particular the environmental damages that could not be avoided or mitigated.

Implementation of the web-GIS tool
We developed and implemented a prototype of a participative Web GIS (http://utopia.rse-web.it) within the INSPIRE-Grid project, focusing on the functionalities which could **support the involvement of the population in the decision-making process**, enhance their participation, enable them to interact with the decision makers, and to express their own opinion about possible alternative routes or solutions.
Particularly, three functionalities that are not available in standard Web GIS applications, have been implemented:

1. Improvement of standard **exploration functionalities**
2. A tool for **sending comments** and documentation related to a specific location
3. Elicitation of **people preferences** about the landmarks to be protected and computation of an interference indicator, measuring **how much the different options could interfere with the people preferred points**.

These extensions could be used in different ways to involve people during a decisional process: as an information tool, as a consultation tool and to foster a more active involvement of people who want

to explicit their preferences. In this respect, the interference indicator can be used as an input for a Multi Criteria Analysis.

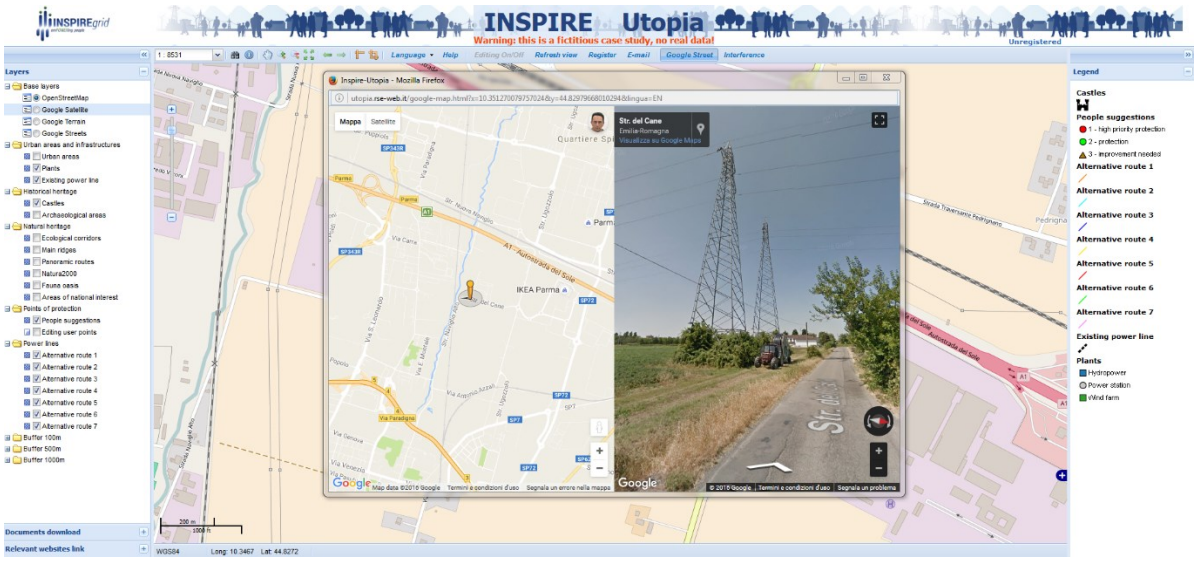


Figure 4: Snapshot of the Web-GIS tool

We presented and discussed the tool in five workshops held in four different countries, with a quite varied audience. The participants of the workshops appreciated the Web-GIS for its functionality of **capturing geographic information data in an easy and fast way.** Additionally, workshops' participants discussed in detail and raised some doubts on its use as an effective tool to elicit people preferences and to implement active participation. For this reason, its usefulness is worth of further investigations and some experience in real case studies would be necessary, with the collaboration not only of the proponents but of the permitting authority as well. In INSPIRE-Grid, we could not thoroughly consider this aspect because of the inconsistency of the duration of the spatial planning and permitting phases with the project duration.

3.4 Processes for public engagement

In order to address the reasons for public opposition to the development of new electric infrastructures, we carried out an activity to analyse and enhance the stakeholder engagement and participation process. To achieve this objective we identified four phases:

1. Development of a theoretical framework to improve the understanding of actors involved in participation and engagement processes
2. Stakeholder interaction
3. Improvement of the theoretical framework
4. Guidelines on the design of the communication and participation processes

In the first phase we designed a theoretical framework to assist the understanding of **stakeholder attitudes** regarding new electric power system infrastructure development. This framework distinguishes two primary categories – project characteristics and stakeholder characteristics – each of which contains a number of factors and a third, cross-cutting, category that relates to the temporal characteristics of the project.
In the second phase, we developed a set of preliminary guidelines for engaging stakeholders in transmission development projects. We propose the following five overarching principles for stakeholders' involvement:

- Consistency
- Transparency
- Timeliness
- Proportionality
- Inclusiveness

and ten general steps helping to organize an engagement process in a successful way.

In the third phase, we produced a **handbook of guidelines** on the design of the communication and participation processes in order to increase public acceptance of transmission grid projects. It focuses mostly on the role of the facilitator of the engagement process, namely the project owner. It does not aim to present the engagement process as successful, but rather as trustworthy. This deliverable is based on insights gathered from the whole INSPIRE-Grid project.

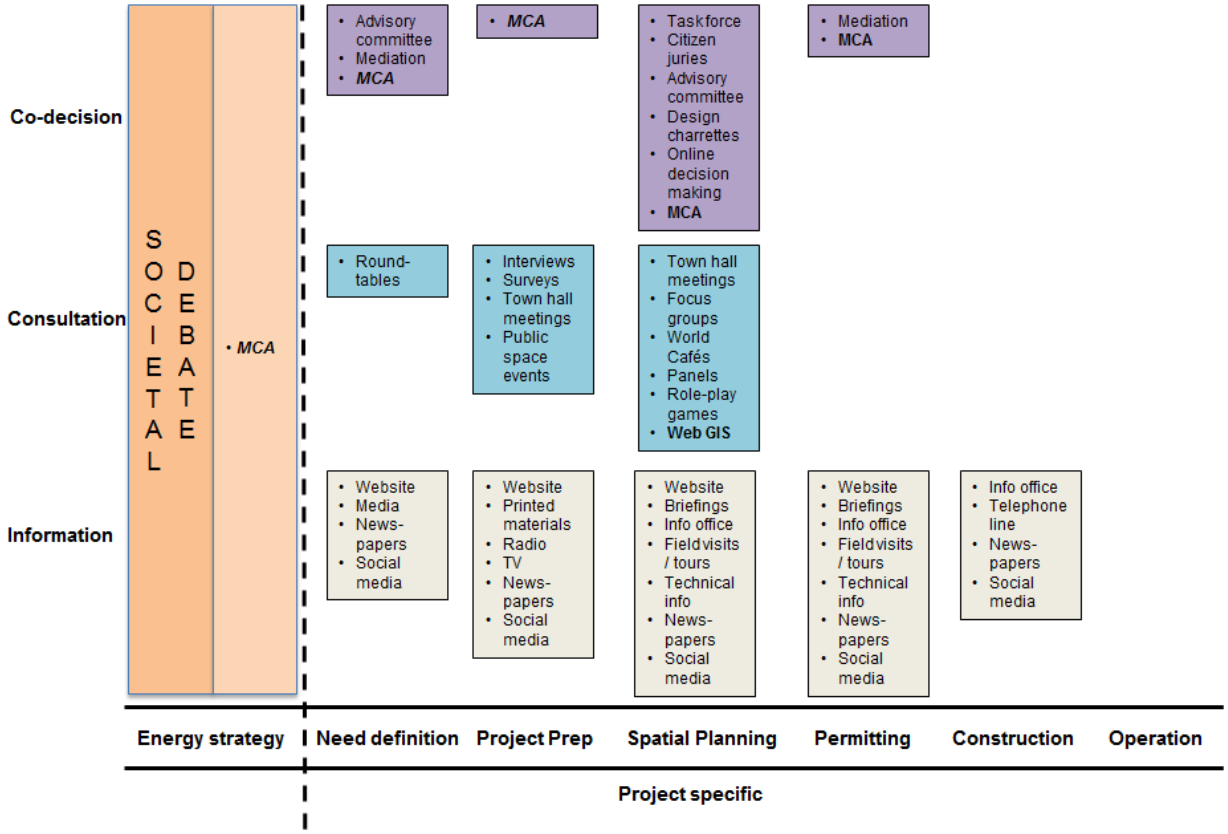


Figure 5: Functional dynamic model for stakeholder engagement

The last phase produced an improved theoretical framework, which concentrates directly on the **soft factors influencing the public acceptance** of the grid extension. It helps to better explain the relation between values (which were the starting point of INSPIRE-Grid theoretical considerations) and attitudes that stakeholders present towards transmission lines. It is a result of an extensive literature review from other disciplines, as well as the outcome of the data gathered during the fieldworks in three INSPIRE-Grid case studies. This theoretical framework does not replace the conceptual work developed in the first phase but is complementary to it.

3.5 Synthesis and recommendations

The purpose of this final activity was to use methodologies and translate insights gained during the INSPIRE-Grid project into plans for improved and enhanced stakeholder communication and

engagement in the reinforcement of electricity grid. Starting with the assumption that improving and enhancing stakeholder participation in planning processes is a way to reduce stakeholder opposition, we tested stakeholder engagement two methods: Multi-Criteria Analysis (MCA) and Web-based Geographic Information Systems (Web GIS). Starting from the findings of the case studies, we tested these stakeholder engagement methods in more interactive settings and observed their potential effects on some steps of the power lines decision-making process.

The results of the validation workshops show that **current decision-making processes can be improved through the use of additional stakeholder engagement methods**.
MCA showed the ability to create a reduced set of alternative power line paths by using stakeholder preferences in ranking the environmental, social and economic effects and to facilitate the general acceptance for the outcome when stakeholders agree, even only partially, on a ranking. However, MCA did not necessarily foster systematic stakeholder acceptance of the outcomes.
The other method tested, Web GIS, showed to be useful for stakeholders to communicate spatially-related points of view with the process owners and to contribute to the process with relevant information and data. However the method showed some limitations regarding the representativeness of the affected population.
Nevertheless, our results suggest that using tools like MCA and Web GIS, making the process more transparent and shared, potentially **increase perceived justice by the stakeholders.** However, the results related to justice are not robust enough due to a relatively low amount of participants we had at the validation workshops. Therefore, more research is needed to robustly confirm this link between additional methods and perceived justice.

While the theoretical guidelines list several potential stakeholder participation tools and the context of their use in planning processes, the results on a specific workshop session on the validation of the locally specific plans (see D5.2 and D7.2) suggest that although stakeholder engagement forms may remain at a relative low level (*information* or *consultation*), there is a large potential to increase their quality through a **better implementation of existing engagement methods**. Additionally, from a process perspective, the results suggest that there is room for improvement at lower levels of participation, information and consultation, and therefore an emphasis should be put on the quality of these engagements.

The issue of enhancing stakeholder participation can be tackled from many perspectives, through many levels and by many actors. Therefore, basing on the multidisciplinary approach of the INSPIRE-Grid project, the results of the implementation of methodologies in case studies, and the outcomes of the workshops, we synthesize the main findings of the projects through **three main challenges** related to power line planning to be addressed:

1. Addressing Stakeholder expectations and the importance of trust
2. Using participatory decision-making methods
3. Untapping the potentials of stakeholder participation.

Each of these challenges entails a description of the problem, recommendations on how to tackle it and their substantiation through the findings of the project. Addressing these three challenges through the project made it possible to formulate recommendations for actors involved in grid planning, especially TSOs, regulators and policy makers, but also for non-institutional actors such as NGOs, citizen's initiatives or the general public.

Challenge 1: Addressing Stakeholder expectations and the importance of trust

This challenge addresses the tension between processes that are defined in planning regulations and informal aspects existing along with these process, carried out mainly by the process owners (TSOs or regulators). This challenge is composed of two main issues that we addressed in the project:

a. Addressing stakeholders' needs and concerns, and handling values
b. Understanding the role of trust

Recommendations to address stakeholders' needs and concerns, and handling values:

- Giving opportunities to address and discuss also emotional or personal aspects of stakeholder concerns and needs helps to avoid negative attitude toward the process owner.
- Bindingly clarifying and clearly communicating what is part of the formal and what is part of the informal procedure helps to create innovative approaches to deal with stakeholders.
- Indicating where and how the results of the informal process can be integrated into the formal procedure of the decision-making process might improve the attitude of stakeholders toward the process.
- Dealing with stakeholders' needs and concerns only in regard to the specific (national, regional, social, political, environmental, technical) context of the project helps to identify substantive values and crucial issues, which might be decisive for the engagement process.
- The identification of stakeholders in a transparent and open way helps to ensure that all interested parties can participate.
- Enabling conflicting stakeholders' groups a possibility to exchange their views and understand their positions early in the process helps to prevent potential conflicts with specific engagements.

Recommendations to understand the role of trust and to increase it, for TSOs:

- Investing in project manager's training including not only technical or economic skills, but also soft skills, like (intercultural) communication, negotiation, or context comprehension helps to gain trust from stakeholders.
- Focusing on trust-building activities such as making phone calls to affected stakeholders when new information arrives helps to sustain trust. Relating answers to relevant stakeholders directly, remembering issues that came up during previous meetings and present their answers also help to sustain trust.
- Allowing enough resources for stakeholders' engagement to a project manager in order to deal sufficiently with the variety of the context issues and broad geographical range of the project avoids stakeholders feeling only instrumentally engaged in the process.
- A high staff turnover during the project (especially project managers) requires building trusted relationships again, which is a fragile and time-consuming process.

Specifically, for planning authorities:

- Making a clear statement about the purpose of the project, indicating the technical, economic, political and public interests helps avoiding confusions among stakeholders and makes the process more transparent.

Challenge 2: Using participatory decision-making methods

Participatory decision-making methods are necessary in planning processes to engage stakeholders. However, it is still unclear what methods are effective to increase acceptance of power lines. Therefore, we addresses three aspects related to stakeholder engagement methods:

a. The functional use of stakeholder engagement tools in planning processes
b. Using participative decision-making methods

c. Evaluating the global impact of power lines

Recommendations for a functional use of stakeholder engagement tools in the process:

- Involving stakeholders during the definition of needs for grid expansion before potential corridors are selected contributes to better subsequent process steps, as stakeholders better understand the needs for grid extension.
- The use of participatory structured decision-making methods to make decisions contributes to a more transparent decision-making process.
- The existing large range of engagement tools makes it possible to engage stakeholders in very specific ways to reduce conflicts according to their amount and nature.
- Ensuring a high quality of the already existing stakeholder engagements forms like informing and consulting, before pursuing higher forms of stakeholder participation like co-decision, helps to keep a clear stakeholder engagement frame on what is to be discussed and decided at each stage of the process.

Recommendations to use participative decision-making methods:

- The use of a tiering approach to planning, where 'higher-tier' or strategic decisions set the context for other, subsequent 'lower-tier' decisions, gives the appropriate amount of attention and detail at the right time, in line with the project maturity level.
- The use of a Multi-Criteria Analysis (MCA) helps to manage conflicts and supports the choice of a good alternative.
- When evaluating path alternatives, the selection of all reasonable alternatives including the zero-alternative is a key point to obtain a good result. The zero-alternative represents the projection of the current situation in the future if you 'do nothing'. Therefore, as the planning process goes on, the choice of the zero-alternative over the project might become less attractive.
- An MCA can be used to decide about compensation measures to rebalance the residual negative impact of a project in a transparent and participatory way.
- Using Web GIS to communicate power line route alternatives and to collect local topographical information can be useful to elicit people's spatial preferences compared to previous paper-map based methods.

Recommendations for evaluating the global impact of power lines:

- The use of LCA in the early phases of the project to evaluate and communicate the global impacts of future power lines can help to explain the need for grid extension.
- Carrying out LCA in the most neutral way, for instance through researchers, is better for the perception of the results, as TSOs are likely to be considered 'judge and party' by stakeholders.
- Exchanging on LCA's results with stakeholder groups who have the technical resources to deal with it helps the understanding of needs for grid extension. However, communicating results to stakeholders that cannot process this information might have detrimental effects on the process.

Challenge 3: Untapping potentials of stakeholder participation

Untapping potentials of stakeholder participation are the expected results of more inclusive planning processes through enhanced stakeholder participation, mainly through the methods we tested in the INSPIRE-Grid project. For this, we inquired the two following issues:

a. Enabling a better perceived justice of planning processes
b. Future trends and challenges

Recommendations to improve the perceived justice of planning processes:

- Putting more effort into building knowledge, initiating and maintaining a broad and continuous societal dialogue about energy transition – not only sector specific but on the system question in a comprehensive way – including the aspects of decentralized vs. centralized energy production or the high degree of interconnections to the neighbouring countries, fosters a better grasping of the need for grid extension among affected stakeholders.
- Stronger efforts in communication and education measures focusing on the 'consciousness of society' where infrastructure is a fundamental condition of people living together might reduce the maximization of individual benefits compared to the needs of society.
- Starting trust building measures and positive communications already in the preplanning-phase, before the formal procedure starts, might prevent later crystallization of stakeholder opposition.
- Favouring local level and smaller groups as a communication format instead of large-scale public hearings makes communication more personal and less anonymous, improving perceived fairness.

Recommendations to address future trends and challenges:

- Quantity and quality of participation measures: improving the quality of the existing stakeholder engagement practices keeps a clear frame on what is to be discussed and decided, while doing more participation might potentially deceive stakeholders when they realize they cannot change or decide what they want.
- Monitoring stakeholder engagements is useful to ensure a minimal level of engagement quality.
- Fostering exchanges on participation models, experiences and cultures, between sectors (e.g. rail and road planning) and between countries can contribute to the development of new ideas on the way stakeholders might be engaged in the future.

4 The potential impact

For what concern the dissemination activities and the exploitation of the knowledge achieved within INSPIRE-Grid after the end of the project itself, several means are planned and some have been already in operation.

The first means to disseminate project results is the **project website** (www.inspire-grid.eu). It will be maintained for at least five years and it will be updated continuously. The main documents that will be used to spread the INSPIRE results are the three summaries targeted to different kinds of audience: the INSPIRE-Grid brochure, the summary for policy makers and the Final Synthesis Report. We have received a lot of interest at the occasion of the workshop in January on the project in general. In addition, the publications related to the project will be inserted in the "Publications" section of the website, where an updated list of publications will be maintained.

In this regard, several **publications in specialised and scientific journals** are already planned. In fact, due to the delays that were experienced in the development of case studies, the reporting activity was postponed at the very end of the project and this implied a related rescheduling in the production of scientific papers after the end of the project. It is worth noting that this condition is not rare in research projects and, in fact, the EC launched in 2015 a pilot to fund, through the OpenAIRE project, Open Access publications for finalized FP7 projects up to two years after their end[2]. Unfortunately, the EC FP7 Post-Grant Open Access Pilot will come to a close by Apr 30th, 2017 and manuscripts accepted beyond that date will not be eligible for funding anymore. This means that the INSPIRE-Grid project publications will not be able to exploit this funding source for open access publications.

At the time when the present report is produced, INSPIRE-Grid researchers plan to produce six papers to be submitted by September 2017.

Table 1: List of planned publications

Main author	Number of possible IG partners	Topic	Status	Expected submission time	Suggested Journal
L. Späth	2	Stakeholder participation for MCA	in production	March, 2017	Journal of Environmental Planning and Management
A. Ceglarz	1	The role of trust in power lines development projects	in production	March, 2017	Energy Policy
A. Luè	1	Multi-criteria decision aiding to support stakeholder engagement in the electric transmission planning	in production	April, 2017	European Journal of Operational Research (or Journal of Multi-Criteria Decision Analysis)
S. Maran	6	INSPIRE-Grid overview	in production	April, 2017	Energy Research & Social Science
S. Maran	2	Web GIS	planned	June, 2017	Applied Geography
L. Späth	2	INSPIRE-Grid soft factors	planned	August, 2017	TBD

Additionally, papers in scientific journals focusing on Inspire-Grid project results regarding especially the interdependencies of procedural and interpersonal justice are planned.

Notwithstanding the lack of financial support, partners will do their best to make the publications accessible, choosing, at least, the green open access option. In addition, all partners are committed to bring the main results of the project in workshops, conferences, public and/or scientific debates. For instance, three partners are going to present the activities carried out in the project at the 1st International Conference on Energy Research and Social Science[3], to be held on 2-5 April 2017 in Spain. Moreover, two partners have submitted a joint abstract to the conference 'International Transdisciplinarity Conference 2017' that will be held in September in Lüneburg.

[2] https://www.openaire.eu/postgrantoapilot
[3] https://www.elsevier.com/events/conferences/international-conference-on-energy-research-and-social-science

Another powerful means to disseminate the results of the project towards some most interested stakeholders are **RGI institutional activities**. RGI partners include ten TSOs and eight environmental NGOs from nine different countries: France, Germany, Norway, Italy, the Netherlands, Belgium, Spain, the UK, and Switzerland. Many of the NGO partners are themselves umbrella organisations with a wider network. Birdlife Europe, for example, has a network with 49 European and Central Asian partners. Climate Action Network (CAN) Europe has 130 member organizations in more than 30 European countries. Moreover, RGI has a wider network with good contacts to other TSOs and ENTSO-E (RGI and ENTSO-E signed a Memorandum of Understanding for further collaboration in 2016), robust relationships to the philanthropic world (RGI's work is partly funded by the European Climate Foundation and Stiftung Mercator). Similarly, RGI has established a strong link to the European Commission, in particular DG Energy and DG Environment, for example through joint events at the European Sustainable Energy Week in 2016 and RGI's Good Practice of the Year award ceremonies at Energy Infrastructure Forums; moreover Catharina Sikow-Magny, Head of Unit B1 at DG Energy agreed to write a foreword for the INSPIRE-Grid brochure.

RGI will use its access to these organisations, companies and people via newsletters, internal RGI and external bilateral meetings, public events and advocacy activities (e.g. evaluation and public consultation of TEN-E legislation) to spread the findings of INSPRIRE-Grid further. Publications will be distributed at events, via the RGI website (RGI sent a press release that is also published on the website[4] and has a dedicated sub-page for INSPIRE-Grid[5]) and via personal mailings. Presently, RGI is developing a Q&A document on how to deal with stakeholders in answering questions on 'the Need for Grids' and this document makes reference to INSPIRE-Grid results. Similar occasions to build upon the work will come up in the future.

It is worthwhile to mention that INSPIRE-Grid was considered in a survey that ENTSO-E carried out at the end of 2015 about past and ongoing research projects relevant for TSOs. The survey had two purposes: to guide the update of the ENTSO-E R&D roadmap, and to monitor and facilitate the adoption of the projects' key achievements into TSOs' daily work. Similarly, INSPIRE-Grid results are going to be inserted in the **ENTSO-E application report 2016** to be published in 2017. The aim of the ENTSO-E Application Report is to show the most remarkable examples of the excellence of innovation activities performed by TSOs.

In general, it is expected that the main results will be used and elaborated within **national research projects** and customized for national specific contexts or specific project proposals in which the partners, and in particular TSOs, will be somehow involved.

As a specific example, RSE is going to apply some of the INSPIRE-Grid tools and methods in the framework of the Italian Ricerca di Sistema RdS[6], a public funded research of general interest on the electric sector. Collaborations are already established with the project Evolution and Development of the Transmission Grid. Poliedra will use INSPIRE-Grid advancement on stakeholder engagement in on-going projects, i.e. in: *Sharing Cities* (H2020, SCC1) where Poliedra is the local leader for the activities stakeholder engagement activities; *CARE - Empowering climate resilience* (Erasmus+) where Poliedra will co-develop collaborative tools; *PROMETEUS* (Interreg Europe) where Poliedra, as advisory partner, will promote the acceptance of e-mobility services and infrastructures.

In particular, as regards Multi-Criteria Analysis (MCA) development and application to real-cases, Poliedra will reinforce the position in the academia world, which will lead to new research

[4] http://renewables-grid.eu/publications/press-releases/detail/news/project-inspire-grid-on-stakeholder-engagement-in-electricity-infrastructure-projects-ends-with-fina.html
[5] http://renewables-grid.eu/activities/inspire-grid.html?L=0
[6] http://www.ricercadisistema.it

opportunities. IZES will use the results directly within its work in scientific projects: acceptance towards energy infrastructure and participation processes are core fields of IZES-research and the project results regarding stakeholder mapping and dimensions of justice will be transferred and applied in other national and international projects.

As for the use and implementation of some of the developed methodologies, single partners interested in the engagement activities plan to:

- Take over the role as moderator and/or process facilitator in 'real' grid projects/ planning procedures
- Assist real planning processes and environmental procedures, as scientific consultant
- Design advanced training workshops for administrative bodies/ planners / engineers / students as well as in-house education
- Act as a political advisor for public involvement issues

Results will be possibly transferred to other public infrastructures. Poliedra will exploit INSPIRE-Grid framework, tools, results and advancement as regards policy analysis at Lombardy, with particular regards to achieving sustainability targets in policy making through our role as Technical Assistance to the Environmental Authority of Lombardy. In particular, Poliedra will participate in the process where Lombardy Region is introducing guidelines to reduce stakeholder conflict for the realization of significant infrastructures (e.g. highways). RGI is moving towards designing directly new processes especially for TSOs present in its network and the knowledge gathered via INSPIRE-Grid will be useful.

Furthermore, it appears relevant to put in evidence that RSE and the **Joint Research Center** - Institute for Energy and Transport Energy Security, Systems and Market (JRC) - have signed an agreement aiming, among others, to contribute more effectively to understand and resolve scientific issues in the field of power systems and markets, in their prospective evolution towards smart grids. In particular, for what concern the INSPIRE-Grid issues, the collaboration between RSE and JRC aims to deepen the understanding of the scientific, economic and social issues related to a proper assessment and share among beneficiaries and stakeholders of the costs and benefits of grids deployment. A JRC representative was present and held a presentation in the second General Assembly (Zurich, 26th November 2015) and participated also at the TSOs' workshop held at RGI premises (Berlin, 11th October 2016).

Some TSOs have expressed their will to take into consideration in the development of their grids the possible use of the methodologies studied in INSPIRE-Grid project and of the lessons learned in their implementation in the case studies.

For instance, Statnett plans to invest remarkable resources in new power lines, subsea cables and sub stations during the next decade. They intend to take the learnings and experiences from the InspireGrid project into their communications and dialogue processes when applying for licenses to develop the Norwegian Main Grid.

Another example is the on-going cooperation between **ETH Zurich and Swissgrid**, a Helvetian TSO, not involved in INSPIRE-Grid, but interested in the project results to implement new communication strategies for the disclosure of strategic Grid 2025 (10 year development plan). IZES plans to use the results of Inspire-Grid in further cooperation with German TSO. Specifically IZES foresees to give scientific accompaniment of public participation procedures applied by TransnetBW, focusing on evaluating participation strategies and investigating the extent of reaching stakeholder complexity. Finally, in addition to taking advantage of the theoretical knowledge developed in INSPIRE-Grid, RTE is more precisely willing to study further Web GIS and the possibility to use such a methodology in order to get a more precise knowledge of territorial issues and stakeholders' expectations in relation with power grid projects.

It is also worth mentioning the participation of some partners at some relevant **working groups** of international organization.

The project coordinator is member of the **Joint Program e3s - Economic, environmental and social impacts – in the EERA** (European Energy Research Alliance). The EERA is an alliance of European public research centres and universities. It is one of the cornerstones of the European Strategic Energy Technology Plan. EERA brings together more than 175 research centres and universities. Actively working together on 17 joint research programmes, they build on national research initiatives. In a Joint Programme (JP) a research organisation joins institutions in other European countries on shared priority setting and research projects. The EERA Joint Programmes are aligned with the priorities for low carbon technologies defined in the SET-Plan. More specifically, e3s is aimed to give methodological support to research activities addressing the non-technological factors, which are often essential for innovation processes, such as consumer acceptance and engagement, R&D policies, tools for life-cycle assessment, systems modelling and transition management. Additionally, multidisciplinary analysis are undertaken to support decision making in transitioning the EU towards sustainable low carbon economy. The improvement of tools and methodologies, along with a better understanding of long-term trends in the energy sector, will complement the research activities in other JPs working on a given energy technology and give support to related initiatives, such as the revision of the EU SET plan, and other decision-making processes in the Europe. In collaboration with e3s, the project coordinator have already organised the workshop "Stakeholder Engagement for the Energy Transition" (Lisbon, 7 October 2016) where INSPIRE-Grid results were presented and discussed with qualified scientists.

RSE is also member of **ISGAN - the International Energy Agency (IEA) Implementing Agreement for a Co-operative Programme on Smart Grids (ISGAN)** – and the project coordinator take part actively in the activities of the so called Annex 7, dedicated to the Smart Grid Transition. Its aim is to investigate institutional change associated with Smart Grid deployment. Using the framework of transition management, this Annex shall aim at sparking off an international, coordinated trans-disciplinary research activity in the social sciences supporting and complementing technology oriented Smart Grid activities. This Annex aims at supporting policymakers in the field of Smart Grids by focusing on the direction, efficacy and efficiency of the energy system transition. In order to complement other ISGAN Annexes, non-technical aspects and framework conditions conducive to Smart Grid deployment are at its focus, by addressing societal needs, political governance, policies, regulatory aspects and human behaviour taking into account the diversity of institutional structures and governance traditions of ISGAN countries. The INSPIRE-Grid project was presented in an internal meeting in Linz on 10th May 2016; in the future, we are going to transfer main results of the project, and specifically the three policy briefs, to the topic of the Annex 7.

IZES is participating the **IEA Task 28 "Social acceptance of wind energy projects"** which is about to continue for a third period from 2017-2020. As grid extension is closely linked to the question of wind power generation and there are parallels in planning and siting procedures where participation, public involvement and justice issues play an important role, Inspire-Grid project results can be used and disseminated through the international scientific community via the IEA Task.

Another occasion for transferring INSPIRE-Grid results will be the Italian Electrotechnical Committee (CEI[7]). CEI is responsible at national level for **technical standardisation in the electrotechnical, electronic and telecommunication fields**. It participates, with a mandate by the Italian State, to the activities of the corresponding European standardisation organisation

[7] http://www.ceinorme.it/en/

(CENELEC) and international one (IEC). It is organised in Technical Committees (CT), which are the technical bodies in which the normative documents (CEI Standards and technical guides) are discussed, according to the relevant competences, elaborated and approved. Among them, it is relevant for ISPIRE-Grid the CT 307 – Environmental aspects of electrical system, whose secretary is Stefano Maran. INSPIRE-Grid results will be discussed within the Committee in order to possibly develop guidelines for stakeholder engagement in the processes of Environmental Impact Assessment and Strategic Environment Assessment.

Poliedra will carry out a dissemination within Politecnico di Milano departments, exploiting their network. Politecnico's membership in the **Euro-Mediterranean Centre for Climate Change** (CMCC) will also allow the dissemination of mitigation-related INSPIRE-Grid results and framework. Moreover, Poliedra will disseminate INSPIRE-Grid results and tools, via meetings and targeted communications, among fellow members within Lombardy's Cluster for Smart Cities and Communities and the Milano Smart City Community.