Project no. 608472

INSPIRE-Grid

IMPROVED AND ENHANCED STAKEHOLDERS PARTICIPATION IN REINFORCEMENT OF ELECTRICITY GRID

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Abstract
This report synthesizes the results generated through the whole INSPIRE-Grid project. The main focus of this synthesis is to concisely and vividly point to several issues related to stakeholder participation in planning processes for power lines and to provide recommendations to tackle them. The recommendations provided in this synthesis are directly related to the results of the different case studies and workshops carried out in work packages WP2 to WP7 and are mainly intended for process owners, TSOs or regulators, but also for policy makers and other stakeholders active in the field of transmission line planning. In this deliverable, we classify the issues in three main challenges to be addressed: 1. Addressing Stakeholder expectations and the importance of trust, 2. Using participatory decision-making methods and 3. Untapping the potentials of stakeholder participation. The main recommendations of this synthesis are related to the approaches, methods and tools used in INSPIRE-Grid: perceived justice and trust, Multi-Criteria Analysis (MCA), Web Geographic Information System (Web GIS) and Life-Cycle Assessment (LCA). Additionally, beyond the use of engagement methods, planning processes can also substantially gain from an early and fair involvement of stakeholders, a clear communication on what is to be discussed, and an inclusion of planning processes in a broader dialogue on the whole energy system and its transition toward a more sustainable electricity production. This Deliverable is complementary to a shorter Policy Brief (Deliverable 8.2) and a Final Report (Deliverable 8.5).

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EXECUTIVE SUMMARY

Due to evolving consumption patterns and an increasing share of renewable electricity sources, the extension of an aging grid is today a critical issue in most European countries. Stakeholder opposition often delays new projects and this undermines the achievement of the European goals in matter of greenhouse gases emission reduction in the electricity sector. To alleviate this tension, we consider that improving and enhancing stakeholder participation is a way to reduce opposition to grid projects and thus to accelerate grid extension. Our results provide additional evidence that:

An early and fair engagement of stakeholders through appropriate engagement methods for a broader dialogue on the energy transition can increase acceptance for grid extension projects.

The issue of enhancing stakeholder participation can be tackled from many perspectives, through many levels and by many actors. Therefore, basing on a multidisciplinary approach carried out in the INSPIRE-Grid project, this deliverable synthesizes 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 and 3. Untapping the potentials of stakeholder participation. Each of these challenges entails a description of the problem, several recommendations on how to tackle it and their substantiation through the findings of the project. We address these findings and recommendations mainly to process owners of grid extension projects, for instance Transmission Grid Operators (TSO) or regulators and planning authorities. Nevertheless, these results are also highly relevant for policy-makers and civil-society actors involved in grid extension projects.

Challenge 1: Addressing Stakeholder expectations and the importance of trust 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 and their respective most relevant recommendations are provided below:

a. Recommendations to address stakeholders' needs and concerns, and handling values

- *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.*

b. 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.*
- *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 is necessary in planning processes to engage stakeholders. However, it is still unclear what methods are effective to increase acceptance of power lines. Therefore, we address three aspects related to stakeholder engagement methods and provide following recommendations:

a. 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.*
- *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.*

b. 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 support 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.*
- *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.*

c. 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.*
- *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 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 and provided following recommendations:

a. 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 neighboring*

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.*

b. Recommendations to address future trends and challenges

- *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.*

While today the largest part of the stakeholder engagements, additional to legal requirements, is carried out by the TSOs in order to accelerate grid extension, the findings of this project go beyond regular line-related projects. Our results suggest that grid extension projects should be put in a broader context, including stakeholders in a dialogue on the whole energy system and its transition toward a more sustainable European electricity supply.

This synthesis is complementary to a shorter Policy Brief (Deliverable 8.2) and a Final Report (Deliverable 8.5).

1 SOCIAL ACCEPTANCE OF POWER LINES: THREE CHALLENGES

Aiming to achieve a massive implementation of renewable energies while ensuring the security of supply of its citizens and pursuing its market integration, the European Union set an ambitious roadmap. Targeting a share of 35% electricity produced from renewables sources by 2020 and more than 90% by 2050, important changes in the grid have to be undertaken to reach these goals (EC, 2011a; 2011b). Additionally, new lines and upgrades of existing lines are required to fulfill an evolving electricity consumption and production. However, stakeholder opposition to power line projects slows down the necessary grid extension to reach the European goals in renewable production (Roland Berger, 2011). The reasons of stakeholders to oppose to a project might differ and be very specific to the projects and the affected regions. However, general causes to oppositions are a fear of the health effects of transmission lines. Additionally, transmission lines are perceived as a landscape disruption and citizens may fear a reduction of real estate value due to the presence of a transmission line (Cain & Nelson, 2013). Finally, the way stakeholders are involved in the process also plays a role, as stakeholders may see an unfair involvement in the process negatively (Wolsink, 2007). However, while technical understanding of the grid is relatively good, we know substantially less about social processes in the planning process for transmission lines.

While the reasons why stakeholders oppose to power line projects are quite well known, there are still many gaps of understanding as to how a planning process that takes into account stakeholder needs and concerns might look like. Therefore, the INSPIRE-Grid project is designed to i. develop a theoretical and methodological framework to analyze social aspects in planning processes, ii. identify and test improved approaches to engage stakeholders in the planning process in a clear and transparent way, and iii. suggest measures to increase stakeholder support for grid extension projects. For this, we formulated three main challenges related to stakeholder participation in planning processes:

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

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 other actors like NGOs, citizen's initiatives or the general public. We generated the information summarized and synthesized in this deliverable throughout the whole INSPIRE-Grid project. In the various topic addressed in this report, we refer to the different Deliverables for more specific results related to the challenges we addressed in this project. Additionally to this report, the results and the recommendations are also summarize in a short and concise way in a Policy Brief, Deliverable 8.2, and we also made available the results from a technical perspective in the Final Report, Deliverable 8.5.

2 SYNTHESIS AND RECOMMENDATIONS

While grid extension is necessary to install high shares of renewable electricity capacity in Europe, evolving consumption and production patterns also justify the need to either upgrade or to build new transmission lines. However, stakeholder opposition delays grid extension projects and while technical understanding of electrical grid is high, understanding of social aspects hindering or supporting grid extension is incomplete. Additionally, the inclusion of social aspects related to affected stakeholders is still open and there is limited evidence today on what works and what does not works. Therefore the aims of the INSPIRE-Grid project are:

- Develop a theoretical and methodological framework to analyze the social processes of acceptance (and opposition) of grid expansion projects;
- Identify and demonstrate new or improved approaches to engage stakeholders in the permitting process in a way that clearly and transparently accounts for their views;
- Suggesting practical measures to build stakeholders' support in order to facilitate the deployment of new grid infrastructures.

For our answer to these aims, we identified three main challenges and their main components to be addressed by stakeholders involved in grid extension issues:

Challenge 1: Addressing Stakeholder expectations and the importance of trust 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 and their respective most relevant recommendations are provided below:

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

Challenge 2: Using participatory decision-making methods is necessary in planning processes to engage stakeholders. However, it is still unclear what methods are effective to increase acceptance of power lines. Therefore, we address three aspects related to stakeholder engagement methods:

a. The functional use of stakeholder engagement tools in planning processes
b. Using participative decision-making methods: outcome and process
c. Evaluating the global impact of power lines

Challenge 3: 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

While the details or the results generated through the whole project are thoroughly described in the various deliverables, we summarize here the different findings, their implications and the

recommendations that may be drawn from it in a very succinct way. Therefore, in this synthesis, the different elements resulting out of our project are structured in the following way: i. the description of the challenge and its associated problem, ii. the recommendations related to the implication of the findings, and iii. a background and illustration of the findings from the INSPIRE-Grid project to substantiate our recommendations.

2.1 *Challenge 1:* Addressing Stakeholder expectations and the importance of trust

Existing regulatory frameworks determining the stakeholders' engagement in decision-making processes about transmission power lines represent a tension between different forms of public participation. The way in which stakeholders are involved into the decision-making process to a large extent influences their attitudes towards the new power line, ranging from support to resistance. Therefore one of the challenges identified in INSPIRE-Grid project is the integration of formal and informal participation of stakeholders.

Since the formal and informal participation can be an ambiguous term itself, we distinguish two perspectives on this issue, which adequately address different challenges. The first perspective concentrates on the differentiation between legally binding and not-legally binding measures in the planning and permitting procedures. The second one refers to cultural aspects of participation, like rules, conventions, roles or routines, no matter whether they are part of the legally or not-legally binding measures. It also considers the participation independently from the stage at which the project is located.

To encompass these different views on the formal and informal participation, we based our considerations on the theoretical framework developed in the Deliverable 5.4, which allows a better understanding of stakeholders' attitudes towards grid extension. It enabled us to identify the main determinants of stakeholders' responses: values (determined by concerns and needs), distributive fairness, procedural fairness and trust (reflected in its three dimensions, see Figure 1). All these primary preconditions of stakeholders' attitudes, except the distributive fairness and the procedural fairness that were comprehensively discussed in Deliverable 2.3, have been addressed in following challenges: addressing stakeholder needs and concerns, handling stakeholder values and understanding the role of trust. The simplified version of the stakeholders' attitude framework is presented below.

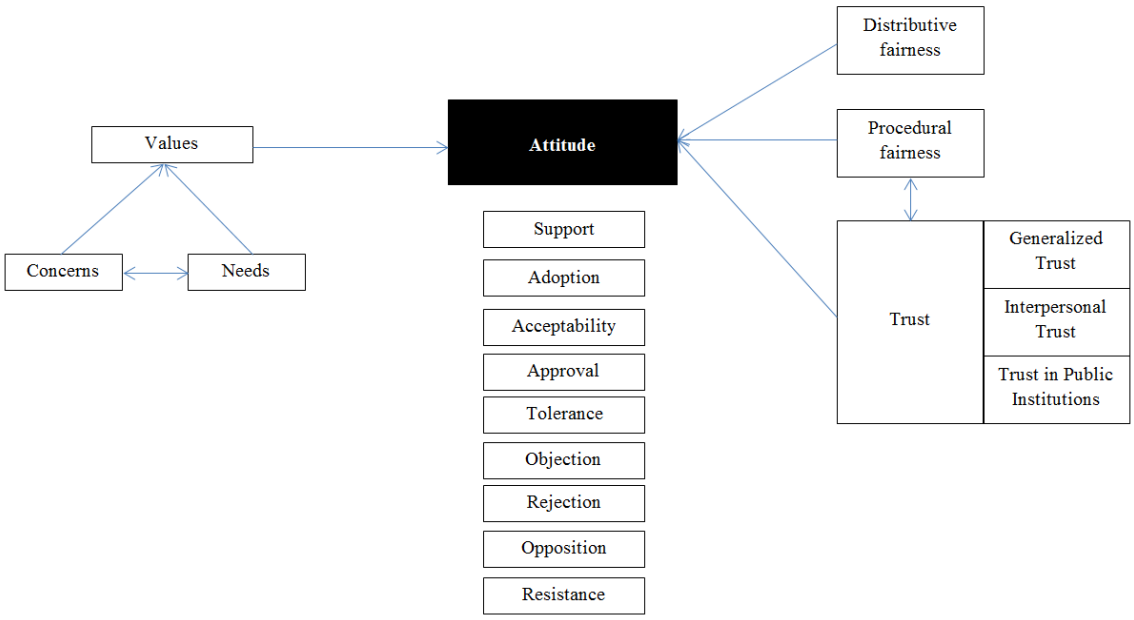

Figure 1: The simplified version of the improved stakeholders' attitude framework. For the full version see INSPIRE-Grid Deliverable 5.4.

2.1.1 Addressing stakeholders' needs and concerns, and handling their values

2.1.1.1 The problem

Within the planning of new grid infrastructure, many stakeholder groups feel affected due to different reasons. The formal planning and permitting procedures and, by this means, the formal public involvement, aim at including all relevant issues that may cause impairment to human and nature and to eliminate, or at least to reduce them, before giving permission to build. During the last years it became clear that not all relevant concerns and needs being relevant are part of or covered by formal procedures. This counts especially for rather emotional, but nevertheless relevant issues like e.g. questions of place attachment or place identity, which is threatened or negatively influenced by new power lines. These aspects demonstrate different stakeholders' needs and concerns, which affect their values and in consequence influence their attitudes towards grid extension. Needs and concerns represent a broad area of issues, have complex dimensions and may create conflicting areas between different groups of stakeholders.

2.1.1.2 INSPIRE-Grid findings

Affected stakeholders, mostly residents and civil initiatives, are complaining that some of the formal planning and permitting procedures do not cover some of the issues being relevant for them. Relevant examples in this context are the feeling of place attachment: newly built transmission lines negatively influence the sense of place. People who have lived in a certain region for years report that they lose the feeling of home as new transmission lines change their characteristic views. But when they made their objection in the formal procedure, this point was not considered due to the fact that the planning authorities decides on base of formal environmental planning parameters like e.g. bundling or spatial relevance excluding this soft or 'fuzzy–like' aspects of 'feelings of home'.

Therefore, in order to face these challenges stakeholders' needs and concerns can be investigated in a detailed way. The first necessary step is to know with whom to engage. Both individual stakeholders and stakeholder groups should be identified and their roles and positions understood. In projects analyzed in INSPIRE-Grid, we identified nine constellations of stakeholders, which might be affected by the project (see Deliverables 2.1, 5.1, 5.2): planning, permitting and implementing authorities; grid operators; energy providers and producers; construction companies; broad public, residents and civil initiatives; nature conservationists; tourism industry; landowners, farmers and forest owners; and hunters. Although these constellations may vary among regions and countries, the nine cited above can be taken as a generic set that is illustrated through most cases.

The second step is the identification of stakeholders' needs and concerns regarding different aspects they deal with. The figure below (Figure 2) shows the juxtaposition of concerns and needs without allocation to a specific stakeholder.

CONCERNS		NEEDS
• Exclusion and intransparency of planning and decision-making process • Untrustworthy TSOs and authorities • Perceived as assistant for TSOs and not independent institution • TSOs perceive themselves as the only advocate for grid extension on the local level • No traceability of necessity of grid expansion - Insufficient consideration of alternatives - Misuse of grid (e.g. power trading, transmission of power from conventional sources) - Dependencies of TSOs (e.g. funding of studies, no accessibility of load flow data)	Social Aspects	• Fairly planning process (Early Involvement, Information, Consultation, Cooperation) • Transparency of planning process (Planning procedures, Participation procedures, Opportunities and limits of participation) • Transparency of information (early, regular, free, easily accessible and comprehensive information on controversial issues of grid extension): - impacts on health and well-being - environmental impacts - technical alternatives (ground cable, overhead line, smart grid, AC/DC; costs; pilot projects; scientific research) • Development of trust with affected stakeholders and enhancement of credibility of own institution • Provide sufficient information to affected stakeholders about technical alternatives (ground cable, overhead lines, smart grid, AC/DC; costs; pilot projects; scientific research)
• Violation of legal guidelines (e.g. Recommendation of the Council 1995/519/EC on the limitation of exposure of the general public to electromagnetic fields) • Health impact: - EMF (e.g. higher risk of leukaemia among children, cancer, cardiac arrhythmia) - Other emissions (e.g. noise, harmful substances) • Intrusion of landscape: - Impaired aesthetics (e.g. through bundling of infrastructure) - Reduced recreation and amenity	Well-being	• No health impact • Health impact assessment • No visual intrusion • Comply with legal guidelines (e.g. Recommendation of the Council 1999/519/EC on the limitation of exposure of the general public to electromagnetic fields) • Decrease of EMF threshold (e.g. Recommendation of the Council 1999/519/EC on the limitation of exposure of the general public to electromagnetic fields)
• Violation of legal guidelines (e.g. European Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, European Directive 2009/147/EC on the conservation of wild birds) • Disturbance or loss of habitat: - Construction and maintenance of HVTLs during breeding season of wildlife, - Impairment through immissions (e.g. noise, EMF) - Disturbance of predator-prey-relationship (e.g. pest infestation, changes in population size), - Disturbance of ecological communities - Threat to unprotected and protected species (e.g. IUCN Red List) • Bird collision with and electrocution on overhead lines (e.g. migratory birds, species with poor stereoscopic vision, medium- and large-sized birds) • Disturbance or loss of habitat through construction and maintenance work (e.g. extinction of species) • Fragmentation or impairment of: - Protected areas (e.g. Natura 2000, Nationalparks, UNESCO biosphere reserves) - Water protection areas and watercourses (e.g. through pollution or siltation) - Sensitive (unprotected) areas (e.g. swamps) • Change of light conditions: - Change of growth behavior of woods - Deformation of high grade woods - Unwished succession species • Deterioration of forest functions: - Water protection, microclimate, emission control, CO_2-storage, wildlife habitat - Risk of windthrow, calamities, fire • Deterioration of soil conditions: - Irreversible compaction (e.g. through construction machinery) - Contamination (e.g. oil, flaking colour from pylons) - Erosion, especially on slopes • Deterioration of soil conditions through ground cables - Soil warming and dry out - Disturbed hydrology - Emissions from plastic material - Impairment of soil biota and quality	Ecology	• Compliance with legal guidelines (e.g. European Directive 2009/147/EC on the conservation of wild birds, Natura 2000) • As little impact as possible through construction and maintenance work of HVTLs regarding fauna, flora, biotope and abiotic factors • Ecological line management as means of compensation (e.g. enlarge the EU biotope network, establish ecological communities) • No consumption of arable land as means of compensation for conservation purposes • Soil protection and restoration measures
• Collapse of pylons due to snow load or storms • Disturbance of navigation systems (GPS) (e.g. wrong dosing of herbicides or pesticides) • Bundling of infrastructure objects (e.g. with existing power lines, highways etc.) • Insufficient consideration of possible technologies to reduce grid extension (e.g. smart grid)	Technology	• Limitation of error-proneness (e.g. underground cables) • Entrance and track planning for machinery • Bundling of infrastructure objects (e.g with existing power lines, highways etc.) • Intense and complete consideration of alternatives (e.g. installation of ground cables)
• Impacts due to public opposition - Additional costs through prolonged processes (e.g. extensive environmental testing) - Additional costs through court - Delay or refusal of projects • Loss of income due to: - Health impact: EMF (e.g. higher risk of leukaemia among children, cancer, cardiac arrhythmia), other emissions (e.g. noise, harmful substances) - Intrusion of landscape: Impaired aesthetics (e.g. through bundling of infrastructure), reduced recreation and amenity • No benefits for transit regions • Devaluation of property • Delay or refusal of projects • No planning security • Restricted land use for construction or production purposes along the lines • Requirement of grounding due to electric charging of fences (in order to protect livestock) • Profit for TSOs through misuse of the grid (e.g. power trading, transmission of power from conventional sources) • Unfair distribution of costs and benefits of energy system transition: - high charges for citizens and beneficial charges for companies - economic benefits only for TSOs	(Socio-) Economy	• Planning security regarding energy politics • Secure energy supply • No loss of income • Fair distribution of costs and benefits of energy system transition • Efficient resource management (e.g. time, funding, staff) • Land use under HVTLs (e.g. traditional orchards, livestock, meadows) • Forest use under HVTLs (e.g. short rotation, coppice, production of Christmas trees) • Reliable economic profits • Financial compensation: - Shareholding (e.g. dividends, loans) - Electricity at reduced or no charge
• Grid extension adapted to ecologically reasonable infeed of renewable energies (e.g. sacrifice of feeding in the last percent of wind energy) • No reelection • No planning security due to changed energy politics	Politics	• Secure energy supply • Reelection • Transition of energy system (use of renewable energies) • Support by politicians within planning process and regarding compensation measures • Reformation of compensation policies (e.g. regular loan) • Comply with legal guidelines • Decentralized energy supply instead of large-scale grid expansion • Grid extension adapted to ecologically reasonable infeed of renewable energies (e.g. sacrifice of feeding in the last percent of wind energy)

Figure 2: The overview of all Concerns and Needs. For a more detailed version see INSPIRE-Grid Deliverable 2.1.

The last step of the stakeholder analysis attributes respective stakeholders with different needs and concerns. This is visualized on the example of Nature conservationists in the figure below (Figure 3). The stakeholder mapping and assignment of different concerns and needs are a powerful tool that can increase the understanding of which issues are important to which stakeholders. It can allow identifying the potential conflict areas, as well as the creation of coalitions between stakeholders. Thus, it can enable undertaking adequate actions to prevent such conflicts or reactions to provide tailored solutions if a conflict already has occurred. Such an analysis provides also a solid basis for understanding stakeholders' values, which can determine their behavior during the engagement process, especially when concerns and needs can diverge significantly in detail and between different stakeholders.

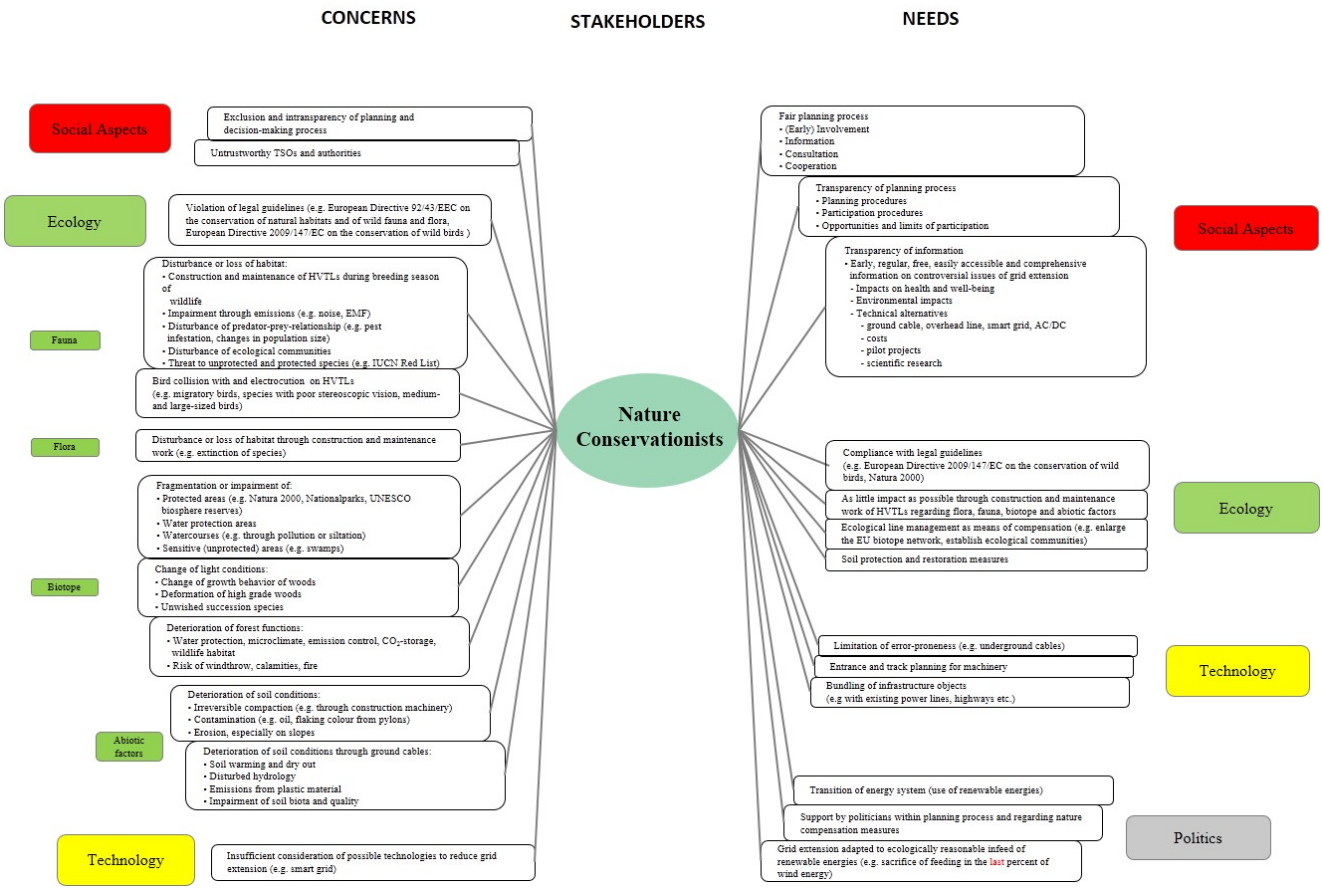

Figure 3: Example of Concerns and Needs of nature conservationists as highlighted in INSPIRE-Grid Deliverable 2.1.

Informal participation possibilities are free in choosing the context of discussion. In this framework also emotional aspects could be addressed and discussed in order to create potential solutions or innovative approaches to deal with them. An elementary step in this context is to bindingly clarify and clearly communicate what is part of the formal and what is part of the informal procedure and where and how the results of the informal process can be integrated into the formal procedure of decision-making processes. Otherwise, informal participation procedures which can endure over years and where people spend much effort in can lead to frustration and can be seen as a fake-participation with only pretended intention to have an influence on the final outcome.

2.1.1.3 Recommendations to address stakeholders' needs and concerns, and handling their 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.**
- **Indicate 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.**

2.1.2 Understanding the role of trust

2.1.2.1 The problem

In the grid extension projects, affected stakeholders address their concerns and needs not only in relation to the power line itself, but also to the decision-making process, the reasoning behind the new infrastructural project or the legitimization of proposed solutions. All these aspects influence the attitudes of the stakeholders at the same time. Moreover during the official, 'mass' public hearings they can stay hidden if a stakeholder does not want to speak up. Therefore it can be difficult to distinguish what issue specifically bothers a stakeholder at a certain point of the project planning. It is also challenging to detect if the already addressed issue that was raised by a stakeholder, is sufficiently covered or whether it will be raised once again in the future. Sometimes even if certain stakeholders' demands are fulfilled or specific doubts are explained, there still remains a buffer of uncertainty and suspicions that affect the engagement process.

2.1.2.2 INSPIRE-Grid findings

The stakeholders' engagement in the decision-making process about new transmission lines takes place not only in formal frameworks of institutionalized structures. The data gathered in interaction with stakeholders in three INSPIRE-Grid case studies in Norway and France revealed the importance of processes existing in informal settings and contexts, which in the literature about grid planning processes has been unacknowledged for a long time. They enhance "day to day" relations between the decision-making process' representatives and the stakeholders, in which the latter are allowed input into decisions and the process itself. These non-formalized parts of the communication allow stakeholders to exert influence over the condition they would endure when the power line is built. But more importantly, they can create trust that can be understood as a condition sine qua non for the acceptance of a participation process (not necessarily for the decision in the end).

In our conceptual work, we differentiated three dimensions of trust: trust in institutions, trust in society and interpersonal trust. In grid planning participation processes, all three elements are important. Institutional trust is needed to lower conflicts about the need definition. When stakeholders have the impression the regulator and the TSO are legitimized by democratic control and acting for the public good or that there are sufficient democratic possibilities to influence the direction of energy policy, the engagement process for a specific project is less likely to become an arena for competing visions of the energy system. General trust in society is seen to be crucial especially for the willingness of affected people to support the idea of the "public good" (understood as wealth, security of electricity supply or climate protection), which in turn increases

the motivation of stakeholders to desist from own interests in the name of the collective interest. However, the most important form of trust is interpersonal trust, developed mainly between the project manager and the stakeholders.

The analysis of our data shows, that if stakeholders do not a have huge trust in institutions or general trust in society, a trustful relationship with the project manager can partially (but of course not necessarily) compensate it. Moreover, building trust relations can minimize the feeling of asymmetrical power relations between stakeholders and a TSO, which is usually endowed with more resources and information. In consequence, this can turn a beforehand negative stakeholders' impression of the company into something positive. If stakeholders do not feel taken seriously and as equal partners, if the project manager does not work in a transparent and reliable way or communication cultures differ widely between the actors, mistrust might arise and hamper a good, acceptable participation process. The same is true for the communication about the purpose of a project. Giving different reasons depending on the type of stakeholder might create an uncoherent picture and mistrust. Also should stakeholders be able to understand the decision that is made in the end, how different factors have been weighted and how their input into the process has been used.

2.1.2.3 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.**

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.**

2.2 *Challenge 2:* Using participative decision-making methods

The realization of new grid infrastructures involves disparate risks, costs, and benefits for stakeholders, affected populations, and surrounding environments. The asymmetric distribution of project impacts has often emphasized intense local opposition and compounded already complex technical and economic considerations. Therefore, siting difficulties are frequently associated with

the familiar acronym NIMBY (not in my backyard) and even more extreme acronyms like BANANA (build absolutely nothing anywhere near anything). INSPIRE-Grid theoretical framework assumes that the factors that influence public acceptance or opposition to infrastructure projects are related to:

- Different stakeholders (having different points of view);
- Effects associated with different kinds of infrastructure (presenting different risks and benefits);
- Communication and participation practices.

Approaching these factors with a scientific method could help to make the decision-making process related with the expansion of the transmission lines clear, transparent and more acceptable by all the stakeholders.

2.2.1 Functional use of stakeholder engagement tools in the planning process

2.2.1.1 The problem

Legal and administrative procedures differ substantially between countries (RGI, 2012). Considering so different legal frameworks, it is impossible to propose "one-size-fits-all" solutions that would determine the optimal stakeholders' engagement process. Moreover, each project is very context-dependent and we observed substantial differences between projects in one national legal system. Since the stakeholder engagement faces many challenges it is important to understand why the engagement is needed, what to engage on, who should be involved in the process and when to engage stakeholders.

To include stakeholders in planning processes for power lines, many tools are available and there is already a vast literature available on tools, methods and methodologies to improve stakeholder participation in decision-making. However, it is unclear how do current planning processes for power lines fulfill state of the art practices related to participation. Additionally, the way a project developer should use different stakeholder engagement methods should be adapted according to the aims, the desired level of engagement and the stage of the project, is very present in grey literature but in need empirical validation.

2.2.1.2 INSPIRE-Grid finding/s

We evaluated current planning procedures through a set of criteria for good participation found in academic literature (see Deliverable 3.2). Through a document analysis, we evaluated the planning processes in France and Norway according to six main criteria. We evaluated the criteria for current processes through three levels: + consistently observed; +/– inconsistently observed; – not observed (see Table 1 below).

Table 1: Summary of the evaluation of participatory practices in the planning processes for power lines in France and Norway (+ consistently observed; +/– inconsistently observed; – not observed)

Criteria	Variable	France	Norway
Early involvement	Early discussion of stakeholders' needs	–	+/–
Representativeness	Representation of stakeholders groups	+/–	+
Task definition	Stated task definition	+	+/–
Structured decision making mechanisms	Participatory decision-making methods	–	–
Influence on outcome	Stakeholders' influence on outcome	+/–	+/–
Independence of participants	Independence of key participants	+/–	+/–

Our analysis highlighted that most of the criteria used for the evaluation are already at least partially fulfilled (see INSPIRE-Grid Deliverable 3.2). However, two major points bear potential for improvement:

1. ***Early involvement:*** planning processes should enable an early involvement of stakeholders, especially in the need definition phase.
2. ***Participatory and structured decision-making methods:*** the planning process should provide clear participatory mechanisms to structure and display the decision-making.

These results suggest that planning processes for transmission lines may gain from an early involvement of stakeholder, especially in the need definition phase when the grid extension as such does not exist yet. Additionally, planning processes may gain from participatory decision-making mechanisms to make the decision-making process more open to a broad scope of stakeholder input and where the different positions can be systematically embedded in the decisions in a structured and transparent way.

The suggestion of the early stakeholders involvement combined with the need of participatory decision-making mechanisms' inclusion have led us to design a functional dynamic model for stakeholder engagement (see Figure 4 below; INSPIRE-Grid Deliverable 5.2 & 7.1), which helps in the selection of assessment methods and engagement tools. It combines stages of the project development (Determination of need; Project preparation; Spatial planning; Permitting; Construction; Operation) with different levels of stakeholders' participation possibilities (Information; Consultation; Co-decision; Empowerment). This model is intended to show which tools are best used when, and the specific choice of tools will depend on the available resources and the composition of the stakeholder group.

While the theoretical guidelines list several potential stakeholder participation tools and the context of their use in planning processes, it is still unclear how realistic it is to apply these theoretical guidelines in existing processes (see INSPIRE-Grid Deliverables 7.1 & 7.2). Therefore, we carried out one validation workshop with TSO's, addressing the possibility to have higher levels of participation (*co-decision*). The results show that although stakeholder engagement forms may

remain at a relative low level (*information* or *consultation*), there is a large potential to increase its quality through a better implementation of engagement methods. Additionally, from a process perspective, the results suggest that planning processes would not highly benefit of higher forms of participation like *co-decision*, as there is room for improvement at lower levels of participation, *information* and *consultation*, and an emphasis should be put on the quality of these engagements (see INSPIRE-Grid Deliverable 7.2). Therefore, the empirical validation of the functional plan suggests that participative decision-making methods like MCA should be applied through a rationale of higher quality involvement instead higher levels of empowerment (see Figure 4 below).

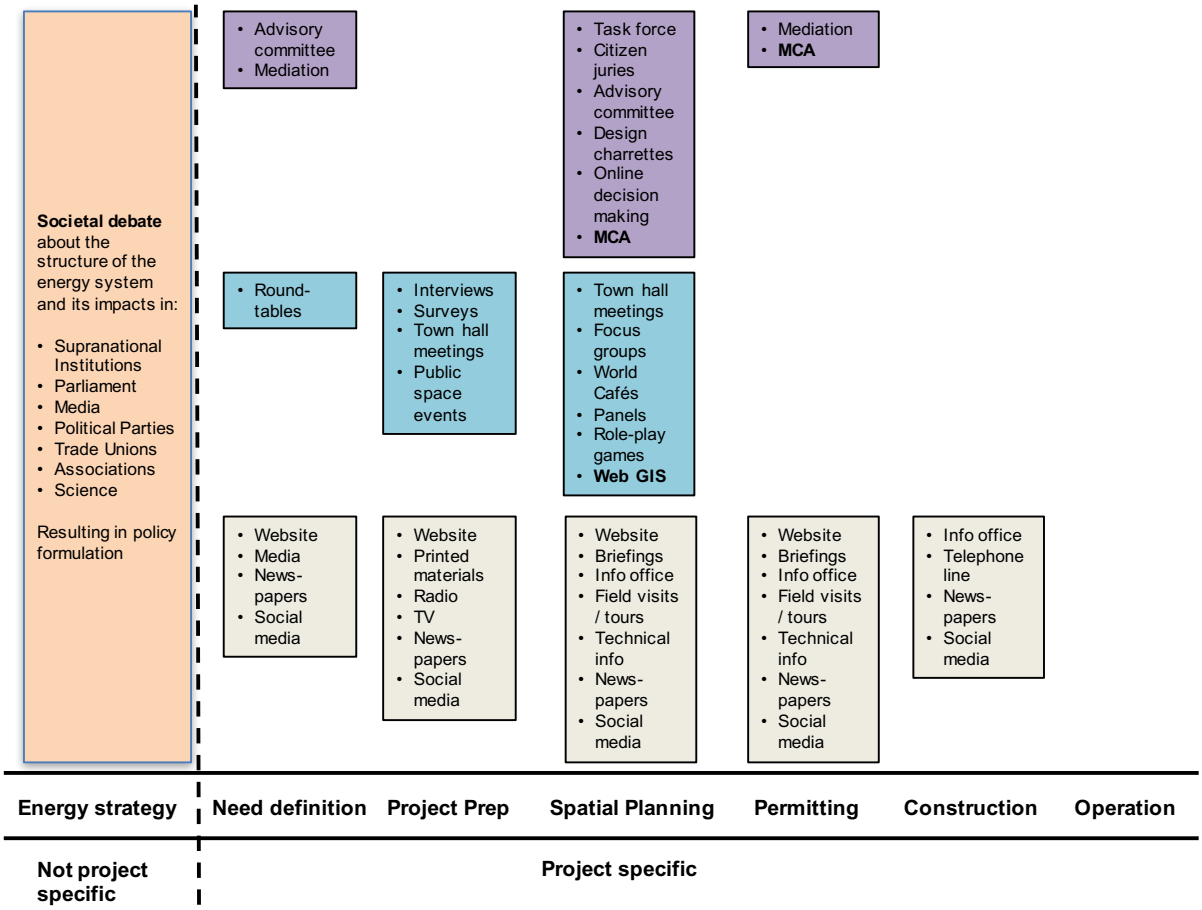

Figure 4: Functional dynamic model for stakeholder engagement, tailored to standard steps of procedures for power line planning and the results of the validation workshops (see INSPIRE-Grid Deliverables 5.3 & 7.2). The whole planning process is embedded in a larger societal debate (on the left side). This is illustrated in Challenge 3 'Untapping the potentials of stakeholder participation' in Point 2.3.1.

Moreover, the data collected during the fieldworks (see Deliverable 6.3) suggest that independently from the officially implemented engagement processes and tools used, the perception of the decision-making process depends to a large extent on the overall performance of one specific person responsible for the process' leadership (see Deliverable 5.4). These results suggest that in parallel to the regulated decision-making process, informal elements of stakeholders' engagement play very important role. Therefore, more attention should be given to the "soft factors" of the stakeholders' involvement, like trust-building activities, face-to-face communication or facilitation of existing stakeholders' networks.

2.2.1.3 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.**

2.2.2 Using participative decision-making methods: outcome and process

2.2.2.1 The problem

Similarly to any other significant infrastructures, planning processes for transmission line projects always go through a progressive refinement and definition, starting with a need and ending with an executable project. However, very often the process is not carried out in a completely structured way; in particular some of the criteria that need to be considered, because they represent the interests of some of the stakeholders (typically the environmental criteria), tend to be considered only at late stages of the process. This can make difficult finding a good answer to the need, and can easily create dissatisfaction among those stakeholders, who perceive their interests as not sufficiently taken into account. Consequently it generates possible delays and obstacles to the realization of the project.

2.2.2.2 INSPIRE-Grid findings

Structured approach through all the stages of the planning process through Multi-Criteria Analysis (MCA)

Within INSPIRE-Grid project we proposed a structured approach, following the whole decision-making process through its stages (see D4.3): Strategy, Determination of need, Project preparation and Spatial planning, Permitting (see Figure 5). The *Strategy* stage, in particular, is necessary and often in some way disregarded. It concerns the energy strategic vision at the national and supranational level that justifies the electric need that gives rise to the process we are discussing. 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 strategic stage and a minor one at the *Permitting* stage, while the opposite will be true for citizens (see Figure 5 and Figure 6).

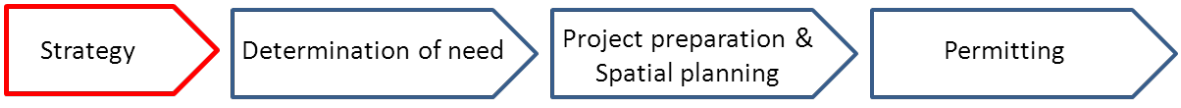

Figure 5: Generic decision-making stages for planning processes for power lines.

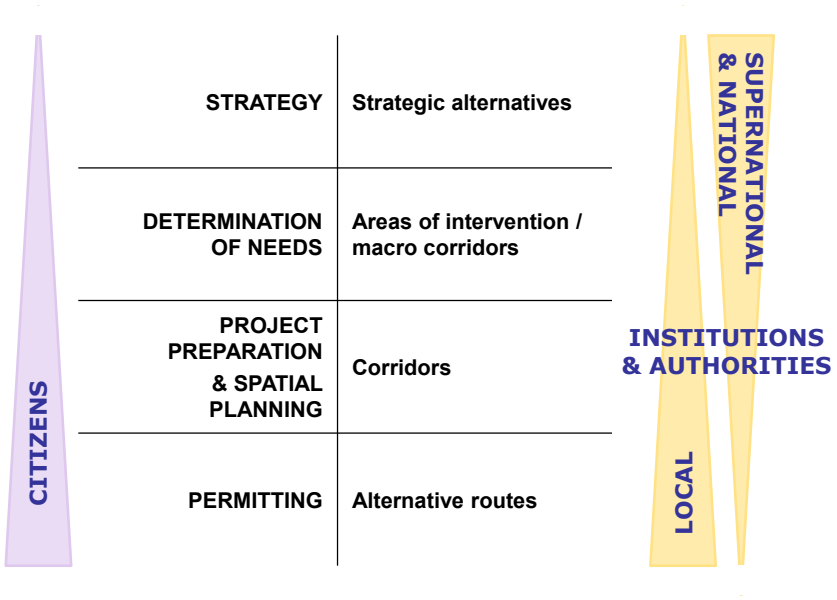

Figure 6: Participation at the different stages of the decision making process

We propose to structure methodologies to make power line siting decisions more transparent, consistent and quantifiable, to internalize environmental criteria in the generation of the alternatives, to favor participation and the achievement of decisions accepted by all stakeholders. An example of how this can be done is presented in INSPIRE-Grid Deliverable 4.3 through a methodology composed by two main steps:

1. Generation of alternative corridors through a semi-automatic line siting methodology, based on Least Cost Path (LCP) algorithms
2. Assessment of the alternatives and their comparison through Multi-Criteria Analysis (MCA), with the main goal to select the most sustainable alternative.

The assessment process coming out from this approach, in particular with the use of Multi-Criteria Analysis (MCA), is integrated and participative, and it takes into account all the socio-economic, environmental and technical aspects of the project and its alternatives. MCA methods allow to create a formalized decision-making process allowing for more input, when multiple criteria have to be considered. However, an objective method that takes the best decision does not exist for siting issues because there are margins of subjectivity and uncertainty that cannot be eliminated. Simply using MCA is not the solution of the problem. Important is which form of MCA is used, and, even more, how it is used. For instance, discussing the criteria among stakeholders, and considering all the feasible alternatives in the evaluation process is in general more important than using a formalized MCA process.

We tested the use of a formalized MCA method in INSPIRE-Grid, verifying that:

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

In particular, these effects are the result of:

- Structuring the problem in a clear, rational and transparent way that allows stakeholders
  - to understand the case and the underlying conflicts
  - to express their value system within the proposed logical framework
- Making computations, according to the chosen MCA method and based on the data obtained in the structuring phase, to highlight
  - which alternative(s) certainly do not constitute a good choice
  - which alternative(s) are more/less conflictual
  - possible margins of negotiations

Additionally, we stress – using the words of Roy (1999) and Clímaco (2004) – that the role of decision-aiding (and in particular of MCA) is not to discover hidden truths, but rather to contribute to constructing individual convictions, collective decisions and compromises between multiple, and often conflicting, rationalities, stakes and values. Although MCA cannot be expected to solve all problem, it may and should allow participants to structure debate and facilitate participation and negotiation, especially by helping to establish a climate of confidence and by providing a common understanding of the problem.

In both the phases of generation of alternatives and assessment and comparison among them, we recommend the use of a tiering approach, applying environmental assessments 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 (policies set the context for plans, and plans in turn set the context for programs and then projects). There are many important advantages by preparing a sequence of environmental assessments at different planning levels, and linking these environmental assessments to each other and to the project level. This because assessment issues can be given the appropriate amount of attention and detail at the right time, in line with the project maturity level. At each stage, all the reasonable alternatives have to be generated. "Reasonable" means that the alternative is feasible and it is of interest for at least some stakeholders. Clearly, the generation of reasonable alternatives requires stakeholders' engagement, because a single actor will not be able to interpret correctly and enact other stakeholders' interests. Further, it is important that at each stage the do-nothing alternative, usually called zero-alternative, is considered. The zero-alternative represents the projection of the actual situation in the future, if you "do nothing", e.g. if the project under study is not carried out. The zero-alternative is particularly important at the first stages of the decision process: as the process goes on, the choice of the zero-alternative over the project becomes usually more costly and possibly unrealistic.

There are several MCA methods that could address the problem of structuring the decision process in order to consider the different criteria in the final decision. Different methods are likely to give at least partially different results and recommendations, because they work according to different logics (Løken, 2007) and therefore point out different aspects. Each of the methods has its own advantages and drawbacks, and it is not possible to claim that any one of these methods is better than the others. The choice of the method mostly depends on the preferences of the decision-maker and the analyst. It is important that the decision-makers understand the logical structure of the methodology, in order to trust the recommendations obtained and at the same time understand their limitations. A method that reflects the user's 'true values' in the best possible way should be chosen;

even better, sometimes the problem could be studied with two different methods, to compare results obtained with different approaches. It is important to consider the suitability, validity and user-friendliness of the methods.

Although the use of a MCA may facilitate a planning process, there is still a need to rebalance the residual negative impact of a project, i.e. the negative impacts that could not be avoided or mitigated. In practice, however, the compensatory approach is often the result of a negotiation process between the involved actors, taking place once the project leaders define the definitive design, the outcome of which is mainly monetary and not aimed to rebalance the environmental damage. The environmental compensation could instead be designed and built with the project. The environmental benefits of compensations could be equivalent to the negative residual impacts of the project. The benefits due to the compensation could consist in the solution of environmental problem of the project area, even if not dependent by the project. A MCA approach is particularly suitable to support the assessment process, and could also be used to evaluate the compensation appropriate to offset its environmental impacts. MCA could allow: to design a project taking into account its inclusion in the environmental context, to decide about compensation measures through a transparent and participative process (that for example allows to address the issue of the acquisition of the areas before the project is done), to untie the compensation from the outcome of local negotiations, and to minimize the risk of not implementing compensatory measures, enhancing their quality and significance.

Use of Web-based Geographic Information Systems (Web GIS) to promote the general public's engagement

In the INSPIRE-Grid project we investigated the use of Web GIS, in particular in the spatial planning phase. We focused on the functionalities that could support the involvement of stakeholders in the decision-making process. As a result, we developed and implemented a prototype of participative Web GIS (http://utopia.rse-web.it). In this prototype, we inserted additional functionalities that are not available in standard Web GIS applications. Specifically, we implemented three kinds of extensions:

1. Improvement of standard exploration functionalities to visualize the areas affected by the power line.

2. A tool for sending comments and documentation related to a specific location

3. An 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 are related to the three main forms of participation: information, consultation, and co-decision in the decision making process. In this respect, the interference indicator can be used directly and compared in a Multi-Criteria Analysis together with all others selected criteria.

The tool was presented and discussed in five workshops held in four different countries (United Kingdom, Germany, Norway and Italy). The audience was composed of representatives from Transmission System Operators in two cases, of local stakeholders in other two cases, and of students from a master course in Environmental Assessment in the last case. The Web GIS was appreciated for its functionality of capturing geographic information data in an easy and fast way.

Its use as an effective tool to elicit people preferences and to implement active participation was discussed in detail and raised some doubts. For this reason, its usefulness is worth of further investigations and it would be necessary some experience in real case studies, with the collaboration not only of the proponents but of the permitting authority as well. This test was prevented in the present project because of the inconsistency of the duration of the spatial planning and permitting phases with the project duration.

2.2.2.3 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.**

2.2.3 Evaluating the global impact of power lines through a Life-Cycle Assessment (LCA)

2.2.3.1 The problem

Many life-cycle assessments have been conducted on electric power systems. However, most of the available studies are focused on electricity generation, and only a few are related to power transmission. A specific concern was the evaluation of the environmental impacts of consuming one kWh of electricity. As a result, we made rough estimates of the contribution of the whole transmission network in a country. Described by two international standards (ISO, 2006), LCA is a methodology that aims at evaluating the full environmental impacts and benefits of a product (a power line, in the case of INSPIRE-Grid) at the successive stages of its life cycle, from raw material extraction to disposal and recycling of the product. In the INSPIRE-Grid project, we studied LCA in order to determine to which extent this methodology and the results it produces could be used to improve dialogue with stakeholders. To do so, we experimented LCA in relation with a power line project in France, which consisted in upgrading to a higher voltage an existing power line.

2.2.3.2 INSPIRE-Grid findings

The transmission grid is part of a more complex power system that is formed by many components interacting with each other, such as power plants producing electricity or the distribution grid. In this power system, evolutions of one of its components, resulting for instance from contextual evolutions such as changes in energy policies or consumption behaviors, may have an influence on the others. In consequence, we deem LCA as appropriate to deal with such complexity. However,

still being at a research stage, methodological developments were necessary in order to specify how this approach would be applied to the assessment of a grid project. In INSPIRE-Grid, we used various scenarios to that end, each bringing a certain vision of the evolution of the power system in the future, including the expected evolutions of power generation and power demand as well as future changes in the transmission grid.

The purpose of LCA is to cover the largest possible spectrum of environmental effects through environmental impact indicators. The difficulty to communicate these indicators to stakeholders, due to the complex phenomena that are considered, was taken into account. Therefore, in the case of the INSPIRE-Grid LCA and when the methods were reliable, we aggregated several impacts categories into a single indicator through the use of damage-oriented characterization models. At the end of this process, we chose seven indicators, assessing environmental impacts at a worldwide scale:

- Climate change;
- Primary energy consumption;
- Damage to human health;
- Damage to ecosystems;
- Radioactive waste production;
- Mineral resources depletion;
- Water consumption.

Expressed through indicators and tendencies (either receding or rising), results of the LCA were given for each scenario and detailed for each impact category. Two energy-development scenarios, proposed by RTE, the French TSO, were used in INSPIRE-Grid. We developed each scenario in two variations depending on the expected level (low/high) of demand-side management, as results showed a high influence of this hypothesis (see Figure 7).

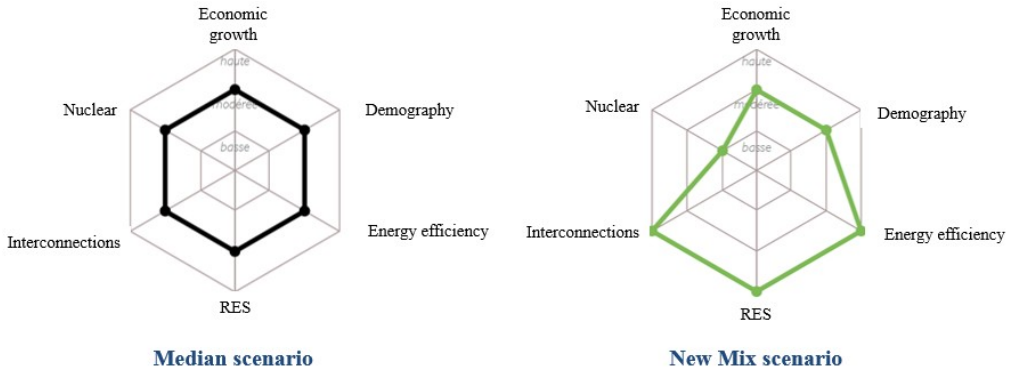

Figure 7: The two scenarios and their assumptions used for the LCA in INSPIRE-Grid.

The main contribution of LCA is to provide a global overview of environmental benefits and impacts resulting from a power line in relation with the other components of the power system, for the entire life of the power line. This information, that is usually not provided to stakeholders in power grid projects as such global and long-term impacts are not quantified in common, can complement the assessments of local environmental impacts. Nonetheless, LCA could not replace local environmental analyses, which, because they answer more directly to stakeholders' concerns,

remain of utmost importance. Therefore we considered the need definition phase as the most appropriate time to present LCA to stakeholders. Results on the global environmental impacts and benefits of a power line project could in fact shed a light on its justification and its public utility. This is particularly true when LCA describes how the project is connected to a broader power system and would make possible, for instance, the development of renewable energies with consequences on resource depletion, energy consumption and climate change, among others. Finally, at the need definition phase, LCA and its results could interest stakeholders that may feel otherwise not concerned by grid projects due to the local character of their impacts. Yet, both its complexity and the way it focuses on global environmental effects make it more appropriate for institutional stakeholders and NGOs than for private stakeholders and local inhabitants.

Despite specific communication efforts to make it understandable to stakeholders, LCA remains a complex methodology with numerous hypotheses and scientific choices that could be hardly tackled by a non-expert public. Similarly, impact categories used in LCA must be well understood by stakeholders, as they cover numerous and multifaceted environmental themes. Although endpoint indicators, translating environmental impacts into issues of concern such as human health, natural environment and natural resources, could favor this understanding, the units chosen to express the results could represent a difficulty (e.g. disability adjusted life years lost; potentially affected fraction of species; kg antimony equivalents). For all these reasons, LCA is mostly aimed at stakeholders such as State services and NGOs. These categories of stakeholders benefit in fact from resources they could rely on to grasp properly LCA as a methodology and its results. Conversely, individual stakeholders could suffer from both a lack of technical knowledge and time to delve into the analysis. In that case, there is a risk that LCA, instead of favoring stakeholder engagement, generates frustrations and distrust toward LCA itself, the power line project and the engagement process. Finally, the global character of LCA results and their relevance at the need definition phase of a project also make this methodology more suited to these categories of stakeholders, and not to individual stakeholders. That is in line with the participation paradox (Albrecht et al, 2013) that states that individual stakeholders generally tend to feel interested in power grid projects under the condition that it is related to a certain extent to their local territory and interests (and not, as a consequence, at the definition phase of projects where LCA is the most relevant).

During the INSPIRE-Grid project, three main issues were raised about LCA and how it could contribute to the decision-making process and improve stakeholder engagement. The first one is about who could be legitimate enough in the eyes of stakeholders to perform such an environmental analysis. TSOs are likely to be considered judge and party. Yet, there is also a risk that LCA, when performed by researchers, is criticized because the analysis would rely on many data provided anyway by TSOs (regarding the position of power lines in the power system and the energy scenarios in particular). The second issue concerns the difficulty in both articulating the various methodologies that exist to assess the environmental and socio-economic effects of power grid projects, and guaranteeing consistency between these different methodologies so that they could eventually feed the decision-making process. This is particularly true when putting into perspective the global environmental effects assessed by LCA and the local ones assessed by EIA. Finally, the time-consuming character of LCA limits the possibility of generalization to power grid projects. Performing a single LCA of the entire national transmission network could be considered, in particular since the global results LCA produces could be more significant at such a larger scale. In this case, LCA would provide explanations regarding how the transmission grid is embedded into the power system and has an influence (either positive or negative) on general environmental

impacts. Yet, the feasibility of such an LCA applied to the national power grid, considering its expected complexity, needs to be evaluated.

2.2.3.3 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.**

2.2.4 Additional considerations regarding integration of the methods

During the INSPIRE-Grid project, given the constraints of the case studies and time limits, we did not have the opportunity to thoroughly explore and test an integration of the three methodologies/tools (LCA, MCA, Web GIS). Despite this, through the deep exploitation of the three instruments in the case studies, and thanks to the fruitful interactions among partners expert in the different tools, we identified the added value that their integration could give, in particular the integration between LCA and MCA and between Web GIS and MCA. LCA can contribute to MCA by generating criteria and indicators, in particular, with regard to global impacts. Web GIS would provide a significant support to the whole decision-making process allowing the visual analysis of the problem and of its alternative solutions in space, representing them in a direct and more understandable way.

2.3 *Challenge 3:* Untapping the potentials of stakeholder participation

Despite many hurdles in planning processes for power lines for participation, improving it may improve planning processes in many ways. While increasing the justice aspects of a planning process may greatly improve its acceptance among affected stakeholders, new challenges will appear through higher resources needed to achieve it and on the scope posed by line planning in the general process of electricity supply transition.

2.3.1 Enabling a better perceived justice of planning processes

2.3.1.1 The problem

Issues of perceived justice are highly relevant in the context of grid extension on different dimensions: regarding the planning process (procedural justice), regarding the allocation of costs and benefits (distributional justice) and in terms of the relationship between involved stakeholders (interpersonal justice).

2.3.1.2 INSPIRE-Grid findings

Achieving Procedural Justice – the level of need definition

Procedural justice as the subjectively perceived fairness of the planning process is a critical element in terms of new grid extension measures (see also INSPIRE-Grid Deliverable 3.2). Already in 1980, Leventhal developed six essential criteria that need to be satisfied in order to create a fair decision-making process and which are still valid for current participation procedures:

- *First criterion*: A decision-making process is perceived as fair when the allocation procedures are consistent across persons and over time (consistency rule).
- *Second criterion*: A decision-making process is perceived as fair when domination by individual self-interests in the allocation process is prevented (bias suppression rule).
- *Third criterion*: A decision-making process is perceived as fair when decisions are based on accurate information (accuracy rule).
- *Fourth criterion*: A decision-making process is perceived as fair when there are opportunities to modify decisions (correctibility rule).
- *Fifth criterion*: A decision-making process is perceived as fair when the allocation process represents the concerns, motives and views of all stakeholders (representativeness rule).
- *Sixth criterion*: A decision-making processes is perceived as fair when the allocation is based on prevailing moral and legal standards (ethicality rule).

Additionally, for the purpose of ensuring transparency in the planning procedure, all (potentially) affected stakeholders should be informed about the steps within the procedure, the time limits and the people in authority. One of the most critical criteria of procedural justice is the aspect of early information as a first step for involvement (i.e. Nanz & Fritzsche, 2012; Zoellner & Rau, 2010). Choosing the "right point in time" to start the information process is a complex function of when information is available and seen as an authoritative forecast on the side of TSO or planning authorities, as well as the subjective need and feeling that something is already going on of affected stakeholders like residents or NGOs. Rottmann (2013, p.14) gives a possible definition on a qualitative level: [The right point in time is to] "Involve stakeholders and the broader public at the earliest stage possible *when their arguments can still be taken into account.*" For a transparent and trust building communication process it might be useful to agree upon measurable periods for giving specific information and decisions. The main challenge in this context is to overcome the 'participation paradox' (Albrecht et al., 2013), which describes the anticyclical relation between affectedness and degree of influence. This phenomenon gains even more importance in the context of grid planning and the distinction between the need definition phase (if-question) and the on later stage subsequent spatial planning and permitting (how-question).

Within the conducted interviews with involved stakeholders as one central result, it became evident that one significant conflict factor is the wish of residents or other affected stakeholder groups to discuss the need of a planned power line on the level of spatial planning (when people feel concretely affected) and the disappointment and high level of frustration when they realize that the need is not subject anymore in this phase of the whole formal planning procedure. On the one hand, this is a question of knowledge about formal procedures and the matching between information measures and target groups. On the other hand, this finding documents the powerful effect of the participation paradox and raises the question how procedures can be shaped more flexible to

address the societal needs for discussion while securing planning security at the same time for the TSO. One approach to tackle this challenge is to put more effort into initiating and maintaining a broad and continuous societal dialogue about energy transition - not only sector specific as it is happening right now (e.g. on RES, grid, mobility, consumption) but on the system question in a comprehensive way – including the aspects of decentralized vs. centralized energy production, defining the *system* perspective which means a high degree of interconnections also to the neighboring countries etc. (see Figure 4). As energy transition means a significant transformation process of society and influences the way of living, it should be paid more attention to the societal discourse about potential consequences and which possible ways are feasible and preferred. For the German case, while defining the need for grid extension, the drafts of the scenario framework and National Grid Development Plan are put on consultation to the public. However, due to the complexity of the topic and the relatively short time to insert objections, there are primarily organizations and well-organized stakeholder groups participating compared to residents. Thus, the proposed societal dialogue can help to activate participation of private persons also in complex early stages. As a relevant precondition, knowledge transfer, education about energy systems and its components and financial resources have to be provided in order to enable broad levels of society to participate.

Achieving Distributional Justice – Trend to be less society-oriented in terms of public infrastructure

The fair distribution of costs or impacts (e.g. change in landscape, perceived health risks, changed property values) and benefits (e.g. security of supply, transport of own-produced electricity) is a matter of distributive justice. The question of who is benefiting through the construction of transmission lines is essential for the evaluation of the changes that are associated with it. Distributive justice is not just an aspect of a monetary cost-benefit analysis. It is also a consideration of appreciation, a positive image and the balanced distribution of, for example, pollution and its consequences (i.e. Devine-Wright, 2012). Equity between two persons or parties is given when the ratio of input and output of oneself (or one's party) is perceived to be similar to the input and output of another person or party, leading to a subjective perception and evaluation of an outcome (Adams, 1965). Consequently, this means that every stakeholder (e.g. person, council, federal state, association for ecological conservation) perceives and evaluates the outcome of a process differently. Distributive justice can be perceived regarding a balance of the individual benefits & costs and also on the balance of the regional benefits & costs. As a consequence, not only individuals but also municipalities or even federal states have a perception of distributional justice compared to other units in society.

While working with the stakeholders on their concerns and needs, it turned out that on both the individual and the regional level tendencies regarding a decreasing distributional justice perception can be observed. All in all, individual residents as well as regions or even Federal states (the Federal state of Bavaria in Germany is a prominent example) are progressively less willing to bear costs of public infrastructure such as transmission lines. The objection of public infrastructure goes along with a stronger focus on the maximisation of individual benefits compared to the needs of society. This rising conflict is of particular importance for the further development on future energy systems: On the one hand, more renewable energies have to be integrated into the system in future – as a consequence, more transmission lines are needed, especially with the look on the European Energy Union which will require increasing levels of interconnection and integration between national electricity grids, in order to effectively manage the increasing deployment of variable

renewable energy technologies across countries (and to guarantee security of supply in each and every member state). To tackle this challenge, it can be valuable to put stronger efforts in communication and education measures focusing on the 'consciousness of society': infrastructure is a fundamental condition of people living together (see Figure 4). In this context, besides balanced national financial compensations schemes, it seems valuable to focus also the non-material dimension in the sense of strengthen the culture or social norm of appreciation for people who are working for society - such as residents of crucial infrastructure.

Achieving Interpersonal Justice

Interpersonal justice is closely linked to procedural justice, especially considering its ethical rule (Leventhal, 1980). Appropriate communication and interaction processes are highly relevant aspects for a positive perception of participation procedures but are nevertheless often neglected. Interpersonal justice refers to the relationships between stakeholder groups (Greenberg, 1993). The perception of interpersonal justice arises through the perception of the social interaction of stakeholders within the decision-making process (Bies, 2005; Bies & Moag, 1986), leading to a certain quality of the relationship. Interpersonal justice is not a unidirectional concept. It is possible that civil initiatives do not communicate or act politely and respectfully towards the staff of the TSO. This could lead to a negative perception of interpersonal justice from the TSO's staff perspective, concerning the residents organised in the civil initiative. Therefore, the interaction and communication within the whole decision-making processes of new transmission lines should be polite, appreciated and respectful.

Interviews with stakeholders (TSO, civil initiatives) concerning their experiences in past participation procedures show that there was often a lack of interpersonal justice observed, namely a respectful communication. Due to highly emotionally loaded situations people are more likely to lose countenance. Such reactions become critical if they develop to a persisting general attitude or habit. In this context, the trust between stakeholder groups as well as the trust of affected residents into the grid planning system and its representatives is of particular importance. During the workshops, some reasons for distrust and connected negative perceptions were named: In one region, there appeared in the communication between the TSO and the residents a changing reasoning for the need of a proposed transmission line which influenced significantly negative the trustful relation-ship. After a civil initiative had documented failures of the official reasoning in a traceable way, the TSO changed to another justification for the need of the line. This happened three times, one consequence was that the consulting institutes of the TSO were in interviews exclusively named as "institute of liars". Another factor seems to be the regional biography: The TSO was a former part of a large energy provider and developed to an independent company in the phase of unbundling. Nevertheless, in the subjective perception of many residents it is still strongly associated with the energy provider and as a consequence negative experiences are transferred. This goes in line with an observed increasing distrust in the political system, in officially provided information, and authorities. There should more efforts be taken to establish a comfortable and personal valuing atmosphere/ relation-ship between the stakeholders as well as to develop and keep positive communication patterns also and especially for conflicting situations in context of grid extension. This can be supported by starting trust building measures and positive communications already in the preplanning-phase before the formal procedure starts. The advantage of getting in touch early lies in the fact that people feel not negatively affected yet and are more likely to pay attention to a positive relationship. Another supporting factor participants of the INSPIRE-Grid

Workshops mentioned is the presence on local level and smaller groups as a communication format instead of large-scale public hearings: by this means, communication is made more personal and less anonymous and top-down. Last but not least, clear communication rules in the sense of a code of conduct – which has to be bindingly signed and fulfilled by all involved stakeholders – seems to be one promising approach to support a constructive communication.

2.3.1.3 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 neighboring 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.**
- **Favoring 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.**

2.3.2 Future trends and challenges

2.3.2.1 The problem

While the results of the INSPIRE-Grid project show that processes can gain from better quality of stakeholder engagements and from the use of methods like an MCA or Web GIS, it is still unclear how these improvement will be implemented in the future and what newer challenges can emerge. While new positive trends will appear, newer challenges may again threat planning processes for power lines.

2.3.2.2 INSPIRE-Grid findings

Aiming to appraise the effects of increased participation in planning processes for power line planning, we designed one session of one validation workshop for this purpose. In the validation workshop carried out in Birmingham, we used a 'Story Wall' technique. In this session, the participants, mostly TSOs, discussed future issues to come regarding stakeholder participation for power line planning. After the discussion, the participants put the main future issues coming out of the discussions on a board representing a road with several time-horizons (see INSPIRE-Grid Deliverable 7.2). Finally, the participants discussed the results of the 'Wall' in a final discussion. The participants highlighted several issues on the Story Wall, where the most relevant were:

- ***Reducing time and costs***: The right investments in and implementation of appropriate stakeholder engagement methods and the introduction of competition in the application process for several operators could reduce the overall planning cost and time.
- ***Fostering the integration of different planning models:*** Planning processes could benefit from the integration of several stakeholder participation models (e.g. other fields like rail or highways), better integration of different actors (national regulators, planning bodies, etc.) and better integration of research and practice.
- ***Bridging the local-national divide:*** Planning processes could benefit from an integration of European, national and local plans because conflicts can be harsh locally due to decisions made at higher levels.

Additionally to the input to the wall, the participants highlighted three additional challenges on participation in planning processes through the subsequent discussion: i. there is much room for improvement on the quality of stakeholder engagements, ii. monitoring the engagement will be more and more relevant and iii. there is a lack of exchanges on different participation models, experiences and cultures between sectors and countries.

Stakeholder engagements have several levels of engagement: *information*, *consultation* and *co-decision* (see INSPIRE-Grid Deliverables 5.2 & 7.2). However, the participants of the validation workshops did not concede that striving to achieve high levels of participation (*co-decision*) is appropriate for planning process. The quality of the engagement roles also plays a role and project owners can carry out stakeholder engagements of relative low levels like *information* or *consultation* in higher quality. The motto 'the more the better' might be therefore not be suitable for power lines, as there is also an issue on quality.

While project owners can substantially improve the quality of planning processes in the future, this also requires a quality control of stakeholder engagements carried out in the processes. For this, the process owner may be required to put monitoring mechanisms and tools in place through following questions:

- Did the stakeholders understand the information provided by the process owner?
- Was the scope of the stakeholder consultation well communicated?
- Before presenting possible line path alternatives, did the project owners consider all the alternatives, including cabling or under-sea?

Finally, the participants highlighted an additional main element: the need for synergies between different sectors and their respective participation models. Although other sectors like rail or road planning are embedded in a very different legal context than transmission lines, fostering exchanges on experiences between different stakeholder engagement cultures may foster cross-pollination effects to improve current planning practices. Additionally, practitioners can carry out these exchanges also across different countries, mainly through information exchanges between project owners or through experience's databases.

2.3.2.3 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.**

3 CONCLUSION

Through the INSPIRE-Grid project, we developed a theoretical and methodological framework to analyze social aspects in planning processes, identified and tested new approaches to engage stakeholders in the planning process in a clear and transparent way. Additionally, we recommended measures to increase stakeholder support for grid extension from the results of the workshops and cases studies we carried out through the project. Although these recommendations can increase acceptance, our findings also generated new questions, which also require further research, especially on further refinement on the use of the different stakeholder engagement methods we tested in the project.

Nevertheless we highlight through our results two already known key elements that should be stressed:

- Early and fair involvement of stakeholders is a key aspect for constructive subsequent steps in the planning process.
- A clear communication on what is to be decided and a careful selection of stakeholder engagement methods are the key for a streamlined planning process.

While today the largest part of the additional stakeholder participation to the legal requirements is carried out by the TSOs in order to accelerate grid extension, the findings from this project go beyond regular line-related grid projects. Our results suggest that grid extension projects should be put in a broader context, including stakeholders in a dialogue on the whole energy system and the transition toward a more sustainable electricity supply. As long as power line planning is not fully embedded in a broader scope of energy transition, we might assume that opposition will continue to slow down a necessary grid extension for a decarbonized European electricity supply.

Therefore, considering the initial rationale of the INSPIRE-Grid project, Improved and eNhanced Stakeholders Participation In Reinforcement of Electricity Grid, our results provide additional evidence that an early and fair engagement of stakeholders through appropriate methods for a broader dialogue on the energy transition can increase acceptance for grid extension projects.

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