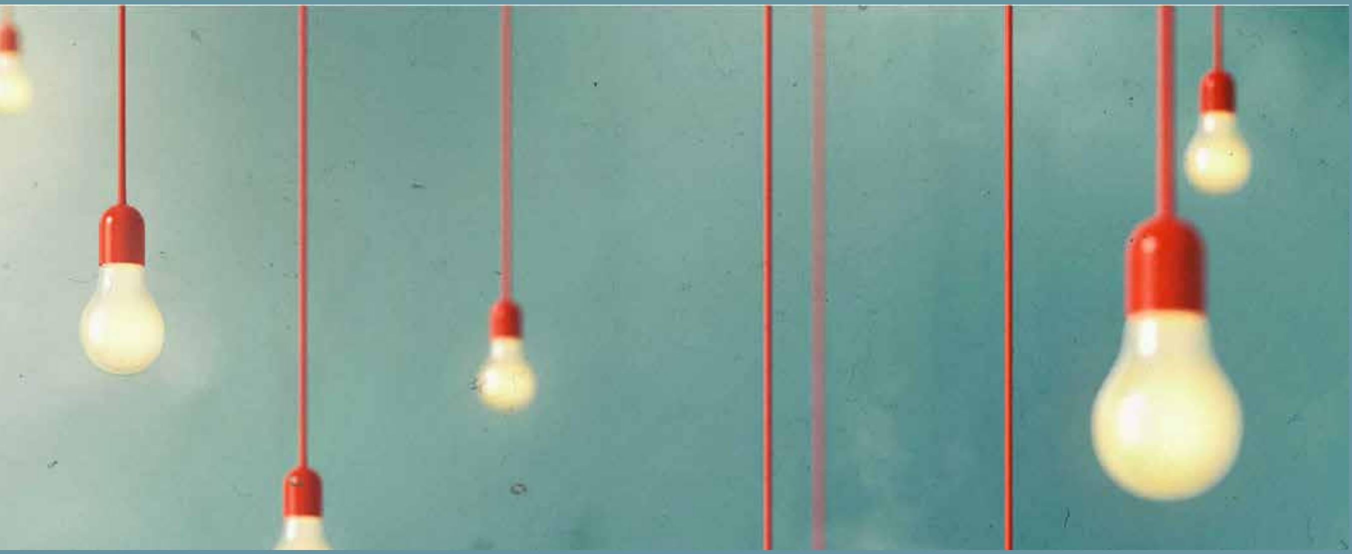

INSPIRE-GRID

Improved and enhanced stakeholder participation in the reinforcement of the electricity grid

INSPIREgrid
emPOWERing people

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INTRODUCTION

The project INSPIRE-Grid

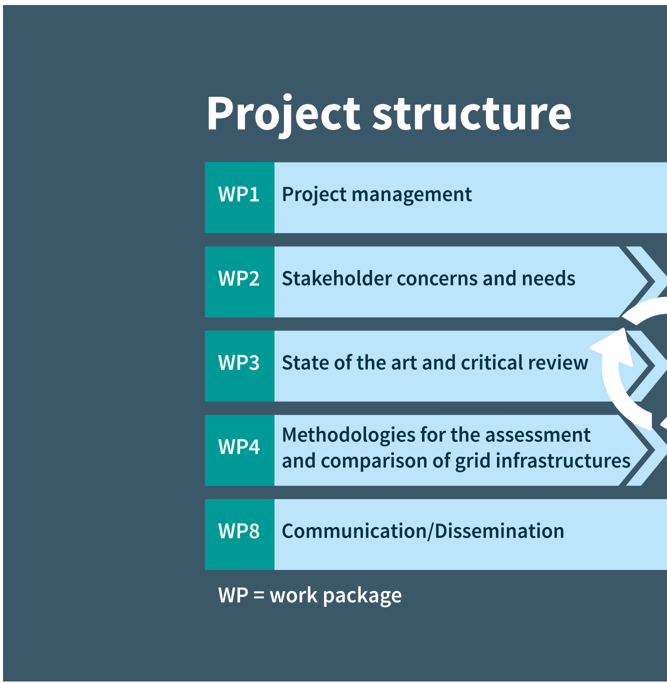
More than three years ago, in October 2013, a consortium of ten partners came together to jointly conduct research on the question: how can stakeholder engagement processes during grid development projects be improved?

2013 was a very interesting year for the development of new power lines: the European Commission had adopted its new legislation on trans-European energy infrastructure ("TEN-E legislation") that introduced a preferred and more transparent permit procedure for so-called "Projects of Common Interest" (PCIs). Public participation and the engagement of different stakeholder groups were on top of the agendas of many project developers and political decision-makers. A perfect point in time to initiate a project that combines practical experience from transmission system operators (TSOs) with theoretical knowledge from research institutes.

Combining theoretical research with practical fieldwork

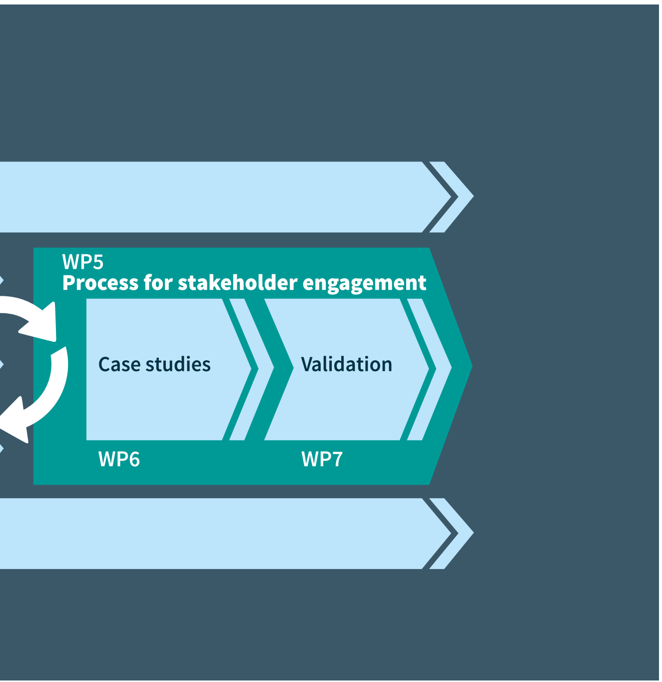
During the project lifespan, the consortium worked on eight different work packages:

At the beginning, the German research institute IZES took a closer look at different stakeholder groups that are normally involved in grid development projects - from citizens to environmental groups, farmers or planning authorities. At the end, the psychologists from IZES came up with a stakeholder map that captures their



main findings (an interactive version can be accessed on the INSPIRE-Grid website: http://www.inspire-grid.eu/index.php/results/analysis-of-stakeholders-concerns-and-needs/).
Also during this early project phase, social scientists from ETH Zurich analysed existing best practices regarding public participation and stakeholder engagement in both electricity infrastructure projects and projects of other industries. And, finally, researchers from Poliedra and RSE looked at methodologies to suport the decision-making during grid projects, namely Multi-Criteria Analysis (MCA) and Web-based Geographic Information Systems (Web GIS) while French-based Armines developed an approach to use the Life-Cycle Assessment (LCA) to evaluate the full environmental impacts and benefits of new power lines.

In a second project phase, researches collaborated closely with the two TSOs Statnett and RTE in order to go out in the field and collect data in three different case studies - Bamble-Rød, Aurland-Sogndal (both in Norway) and Cergy-Persan in France. Social scientists from PIK and engineers from Poliedra jointly conducted interviews and tested assumptions on MCA, Web GIS and LCA.



In the end, researchers from ETH Zurich validated the conclusions drawn in the other work packages with the help of two workshops: one with staff from the British TSO National Grid and one with stakeholders that were previously involved in a grid development project in Southern Germany. This brochure gives you an overview of the different activities undertaken by the Consortium and concludes with some basic lessons learned. **Enjoy reading!**

More information about the project is available on the project website: **www.inspire-grid.eu**

FOREWORD

by Catharina Sikow-Magny, Head of Unit, European Commission - DG Energy

The Commission's core activity in the area of energy infrastructure needs to undergo a major modernization in order to interconnect networks across borders and meet the Union's key energy policy objectives of security, sustainability and competitiveness. Further to this, it foresees increased transparency and public participation. The necessary investments are being made at national level in the form of Projects of Common Interest (PCIs), which are increasing the interconnectivity of Europe and benefiting from a specially designed fast-tracked permitting system.

Many projects promoters encounter opposition from local groups when implementing new infrastructure projects. While it is essential to take local concerns on board in a transparent process, TSOs and other stakeholders (including the Commission) have identified an overall lack of awareness and understanding in the general public regarding the need and the benefits of these projects.

In response to this, the Commission has placed an emphasis on working very closely with environmental and citizen's organisations in order to develop the right solutions and tools to increase the societal acceptance of these key projects, ensuring that the concerns of local communities are understood and projects are sensitive to their needs.

Today, the concept of "stakeholder engagement" is rapidly becoming a vital tool to develop an understanding of what sustainability means for companies and the ways in which it can add value and viability to their operations. In this context, projects like the EU-funded INSPIRE-Grid become even more important in showcasing good examples of collaboration.

The overarching goal of this unique project was to develop methodologies that can manage consultations and the engagement of stakeholders in the decision-making process – and thus improve the support for future grid infrastructure development. By combining competences from social and technical sciences, collaborating with TSOs, researchers, NGOs, authorities, and experimenting with real cases, the project led to the design and development of a European good practice guide written by experts in the fields of grid infrastructure development, and environmental and social acceptance issues.

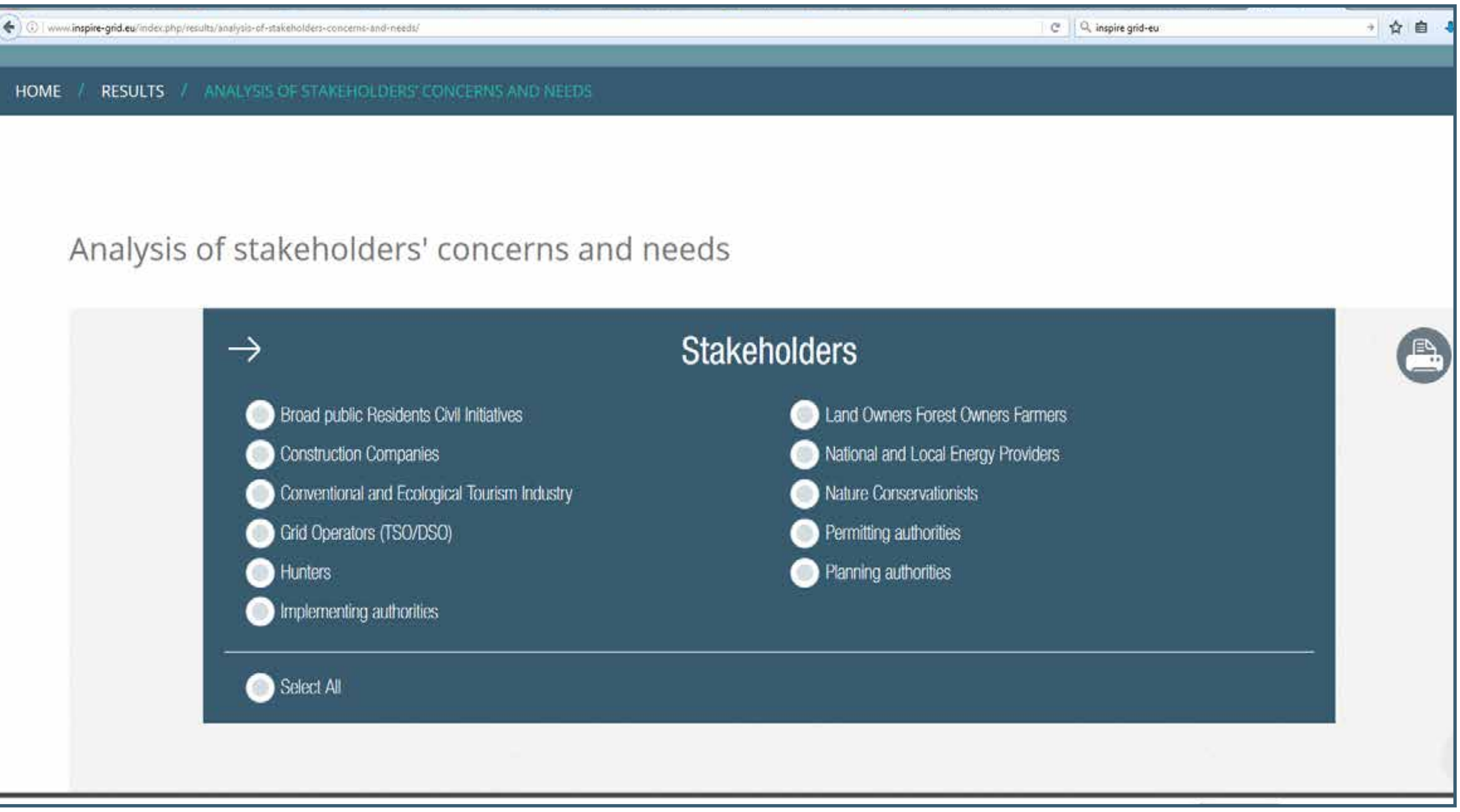
I would like to extend my warmest congratulations to all ten partners who made this project a reality and helped to increase stakeholder engagement in grid expansion projects, provided a better management of conflicts and set the grounds for a smoother permitting process.

I encourage all corporations interested in creating value for their organisation – whether they are launching an engagement programme or wish to enhance an existing one – to integrate it into their everyday processes, while remembering that the goal is to embed engagement processes in their strategic decisions by building on dialogue and collaboration with their stakeholders.

As we look at the road ahead, let us remember the famous African proverb: "If you want to go quickly, go alone. If you want to go far, go together."

THE STARTING POINT

The complexity of stakeholder groups and their heterogeneous concerns and needs



Grid development is not only an issue concerning planners, technicians and other experts, but is also a topic of high interest and emotional involvement for many common people from civil society. A large range of different stakeholder groups with different interests is connected to the question of grid development. Therefore, one of the goals of the INSPIRE-Grid project is to identify new ways of planning and implementing new power lines and other infrastructure of the electrical power supply with as much social consent as possible. In order to achieve this goal, the first step is to find out which stakeholders are involved in grid projects, and to learn about their respective concerns and needs.

Suitable methods to get this knowledge are stakeholder analysis and stakeholder mapping. The stakeholder analysis can show which groups of people are affected by the planning and building of new grid infrastructure - be it legally or subjectively, and/or which groups have interests regarding the course and the results of the process.

However, knowing the relevant stakeholders is only half the work. Equally important is trying to find out about special concerns (e.g. doubts, objections or fears regarding technical, socio-economic, health, political or social aspects of the grid developemtn measures) and needs (e.g. desires, interests and necessities whose satisfaction is perceived to be indispensable) of the stakeholders. Some might be quite similar, some might only diverge regarding their focus or importance, and some might be contradictory (at least at first glance). Interviews and standardised questionnaires are among the appropriate instruments to receive information about stakeholders' concerns and needs.

The complexity of the stakeholder structure and the interdependencies between their concerns and needs can be visualised in stakeholder maps. Stakeholder mapping is an efficient method to combine a stakeholder analysis with different topics. For example, a stakeholder map can show the similarities and differences between stakeholders' concerns and needs, can offer indications concerning possible sources of conflict, or possible entry points for providing tailored solutions. Within the INSPIRE-Grid project, a comprehensive overview of stakeholder groups and their respective concerns and needs was developed and is available on the website (http://www.inspire-grid.eu/index.php/results/analysis-of-stakeholders-concerns-and-needs/).

Many of the concerns and needs described refer to the three dimensions of justice: concerns and needs regarding the planning and decision-making process (transparency, opportunities to have a say) relate to the concept of procedural justice. The wish for a respectful interaction and the need for trustful communication refer to the interpersonal justice, and the urge for fair distribution of costs (impacts) and benefits belongs to the level of distributional justice.

Studies show that conflicts and a lack of acceptance in the field of planned energy infrastructure are caused by a form of injustice which is perceived subjectively by involved stakeholders. Thus, if the planning process and the planning outcomes are perceived to be fair they are more likely to be accepted.

Conducting a stakeholder analysis (including a stakeholder map) to learn about the different group's concerns and needs may be a promising step in order to increase transparency and adjust communication levels between the different stakeholders involved. Furthermore, stakeholder analyses as a first step allow to subsequently develop adequate und tailored participation methods - not every method or format of public involvement fits the same situation- sophisticated knowledge about regional stakeholder constellations is needed. A significant improvement of the quality of public participation processes can be reached by these means.

STEP TWO:

Identifying best practices for stakeholder participation

Grid development in Europe is motivated by a constant increase in electricity consumption and by the necessity to integrate intermittent renewable energy sources. However, opposition to grid development causes delays that may compromise electricity supply security and a mid-term integration of renewable energy sources. A way to improve the acceptability of power lines is to enhance stakeholder participation in the planning process. In the past three decades, participation became increasingly important, partially as a reply to a perceived crisis of representative democracy and partially as a new way to deal with public distrust and opposition. Past research already highlighted the potential and limits of participation. On the one hand, there is an inclusion of public needs in the decision-making processes, an increased credibility and legitimation of projects and the identification of new problem solving options, among the main benefits. On the other hand, neglecting power dynamics and failing to integrate stakeholders' perspectives and heterogeneity may lead to bad outcomes of the processes, including decision-making gridlocks.

Our best practice work has been devoted to a review of existing practices for stakeholder participation and an evaluation of current planning processes for two countries, France and Norway. To do so, we identified six main criteria for good participation practices from academic literature:

- Early involvement, in form of discussing stakeholders' needs
- Representativeness, as inclusion of key stakeholder groups
- Task definition, as a clear statement on the purpose of stakeholder involvement
- Structured decision-making, through decision structuration methods
- Influence on the outcome, as formal inclusion of stakeholders' inputs in the decision-making process
- Independence of key participants

In each country, we selected seven to eight projects and evaluated them on the basis of available academic and grey literature, documents provided by transmission system operators (TSO) and interviews with TSO officers. The table below summarises the key results.

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	Represenlation of stakeholders groups	+/–	+
Task definition	Stated task definition	+	+/-
Structured decision making mechanisms	Participatory decision-walring methods	–	–
Influence on outcome	Stakeholders' influence on outcome	+/–	+/–
Independence of participants	Independence of key participants	+/–	+/–

One of the main shortcomings is the lack of an early involvement of stakeholders. Open discussions on the needs of potentially affected stakeholders as soon as bottlenecks for transmitting electricity in the grid are identified are missing in the planning processes. Another shortcoming is related to the decision-making mechanism and, more precisely, to the inclusion of stakeholders' inputs into the process. Although today TSOs and regulators gather a large amount of inputs from potentially affected stakeholders, the way these inputs are taken into account in the decision-making process is often not explicitly stated. Other aspects of participatory processes are not entirely fulfilled. For instance, stakeholder mapping is missing in France and the expected outcome is not explicitly stated in Norway. Nevertheless, several criteria are fulfilled in current processes, for example stakeholders' tasks during the engagement process are clearly stated.

Today, TSOs are often aware of the shortcomings of current planning processes and thus continuously improve them. Several cases, still at the stage of pilot projects, show how the increased involvement of stakeholders - in particular those who are potentially affected - may improve the acceptability of power lines by ways of a better integration of their needs and perspectives. However, even though TSOs may work to improve stakeholder engagement on a voluntary basis, changes should also happen at the legal level. For example, there are conflicts between consumer protection - e.g. to guarantee the well-being of those living nearby power lines - and electricity service provision rights, which generate tensions between the authorities involved in the decision-making process. Therefore, to reduce opposition to grid development in Europe there is a need to design not only new stakeholder engagement methodologies, but also to re-think regulatory frameworks.

MULTI-CRITER

Evaluating different altern
debate and facilitate partic

Multi-criteria analysis (MCA) is a methodology to structure and solve decisions and choices among different alternatives, characterised by conflicting objectives or needs. Typical examples of possibly conflicting objectives or needs for grid infrastructure are: integration of renewable energy sources, increase of security of supply or the minimisation of bird collisions with overhead power lines.

Although MCA could be used without any participation, it is well suited for participatory processes involving many actors with different viewpoints and priorities. For instance, the priorities of a TSO will certainly be at least partially different from those of a public authority or an environmental association. MCA allows showing margins of subjectivity and conflicts, as well as areas of agreement, and it helps to manage these conflicts.

MCA also favours participation because it gives a rational framework to the decision process, making it possible to transparently communicate the principles of the decision-making process and how the different viewpoint have been considered and integrated in the decision.

In the INSPIRE-Grid project, we therefore wanted to test MCA not only as an assessment method, but also as a viable option for stakeholder engagement.

The core elements of the methodology

Any MCA technique can be seen as a three steps methodology:

1. In the first step, scenarios, objectives and needs, criteria, as well as alternatives and stakeholders are identified.

RIA ANALYSIS

natives to structure the cipation

2. In the second step, all the positive and negative effects of the alternatives are measured. Each effect is measured according to its "natural" units, which can be quantitative (e.g. million Euros for cost effects) or qualitative (e.g. landscape effects). The stakeholders state their preferences with respect to the effects, thus revealing their value system and their subjective point of view.

3. In the third step, the information previously gathered is used by means of analytical computations, to compare the alternatives and synthetise information to support the decision process. Whichever MCA technique has been chosen, some synthetic assessment of the alternatives is reached in order to facilitate the comparison among them. Even if this third step is not always possible or appropriate in some cases (i.e. lack of information), structuring the decision problem in a rational way to make stakeholders' preferences explicit and transparent can already hugely support the decision process. In INSPIRE-Grid, we were able to do this third step in all our case studies, resulting in useful suggestions for conflict management and for the choice of an alternative.

Use of MCA techniques to support the decision process

The different MCA techniques are designed to support decision-makers in different contexts deriving different outputs. Some techniques generate a ranking of the projects (i.e. attribute to each of them a numerical score) and some generate a rating of the projects (i.e. sort them in meaningful classes). Techniques also differ in terms of kind and intensity of stakeholder interaction.

For any new case, we propose to select and use the most appropriate technique. The process will also include an analysis of the robustness of the outcome.

MCA can also be used to highlight the impacts for single stakeholders, in order to take them into account and measure possible conflicts. Depending on the level of stakeholder interaction the following issues required to find a common position can be highlighted: convergence and greater contrast as well as entity and typology of accepting the others' positions. The objective is to provide information that helps to manage the conflict and support the negotiation, for instance by exploring new reasonable options, or identifying subgroups of actors with strong agreement.

LIFE-CYCLE ANALYSIS

Analysing the overall impact of power lines

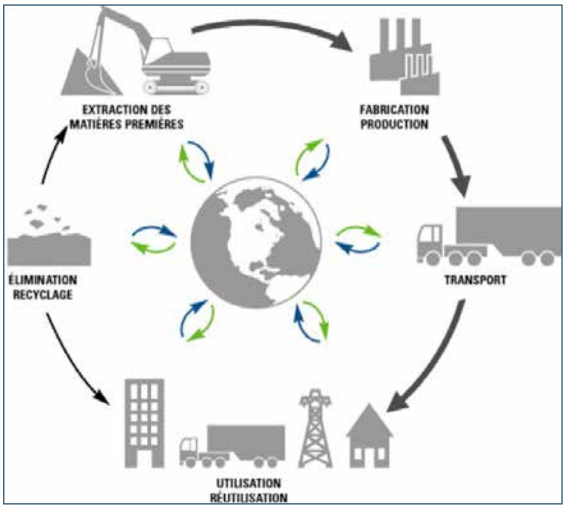
Core elements of the LCA methodology
The environmental impacts of a grid project are evaluated against a reference situation where the project would not be commissioned (zero alternative).

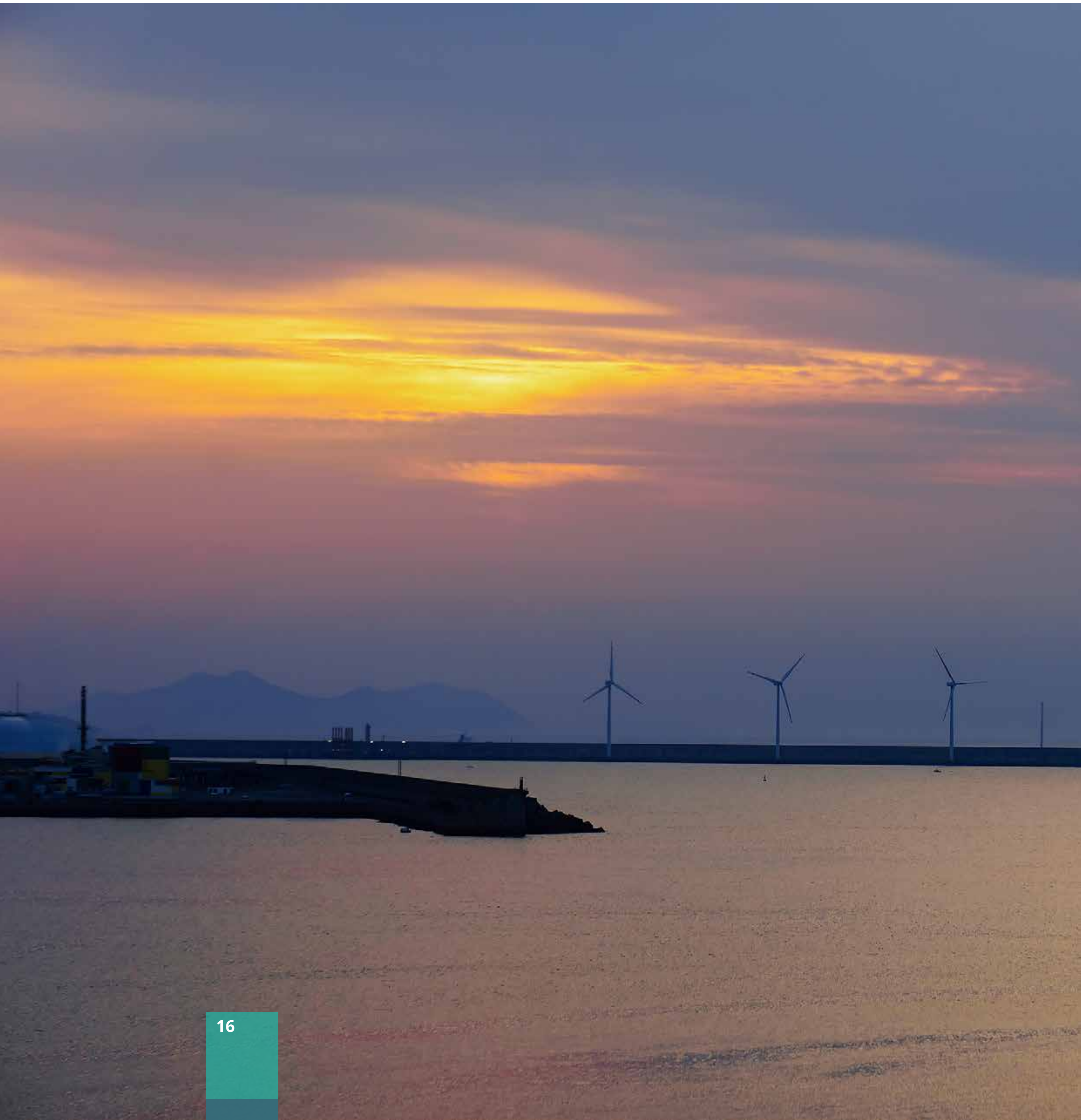
A grid project has three main stages: 1. construction, 2. operation and maintenance, 3. dismantling. Each of these stages has direct and indirect consequences resulting in environmental impacts being caused or avoided:

- For building the overhead line and substation infrastructures, components such as lattice towers, conductors or circuit breakers must be manufactured, which causes impacts.
- During its operation, a grid project can have an indirect effect on electricity production. Indeed, commissioning a project can remove bottlenecks in the transmission network, and therefore enable lower cost power plants to run. For instance, a grid project can result in reduced renewable energy loss.
- At the end of life, waste generated during the dismantling work must be treated and recycled.

Use of LCA to support the decision process
Communicating LCA results to stakeholders presents several challenges. Indirect environmental impacts are difficult to understand, as most stakeholders have no knowledge of their existence. Results should be accompanied with explanations on the impact categories considered (what is measured, why it is important) and on the main sources of impacts caused or avoided. Transparency on assumptions made to assess these impacts is critical. Including all the necessary information in a comprehensive way is a challenge. Moreover, the amount of information to be communicated is high. Indeed, impacts are scenario-dependent. For each indicator, results obtained for several contrasted scenarios should be presented.

The use of LCA is deemed more appropriate to guide choices made during the need definition phase, rather than comparing alternatives at a later stage. For instance, LCA indicators could be used to assess projects in strategic network development plans such as ENTSO-E's Ten-Year Network Development Plan.



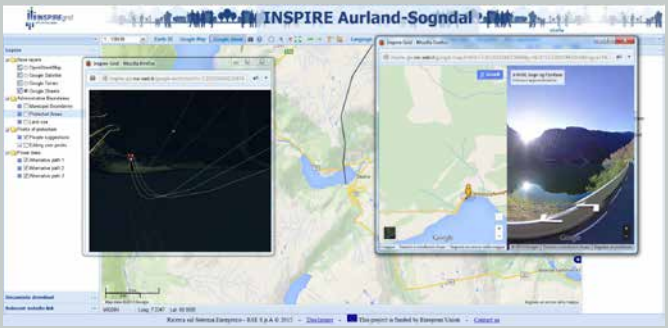


WEB GIS

Geographic Information Systems to present geographical data in an interactive web interface

Geographical Information Systems (GIS) are a fundamental tool for the study and the assessment of spatial relationships and are commonly used in spatial planning and environmental impact assessments. GIS are used to acquire, process, analyse, store, and return data related to a particular territory in a graphical and alphanumeric format. A GIS processes spatial data (entities with spatial properties such as rivers, roads, buildings etc.) stored on spatial databases and allows the user to understand spatial relationships and possible interactions among elements placed in a specific area. Elements can be, for instance, the proposal of a new infrastructure, populated areas, important landmarks, land contours, existing infrastructures, and so on.

The proper use of a GIS requires specialized software, specific skills, and dedicated human resources, which normally prevents the general public the use of the tool. In order to overcome these limits, a Web GIS can be used. A Web GIS is an application that enables the visualisation of geographically referenced data through a web interface available online. In short, it can be defined as the presentation of the results of GIS elaborations through the internet. It does not require any knowledge in geographical data analysis. A web browser and a working internet connection are enough, users are allowed to build their preferred visualisation and to access



easily relevant information. For instance, the routes of proposed overhead lines can be visualised and intersected with protected areas or the distance between lines and inhabited centres can be measured.

Therefore, Web GIS can be an effective tool to be used to promote public engagement in the development of the grid, supporting participatory processes in different phases and with different possibilities of practical implementation and application. Referring to the main kinds of participatory processes, three different functions of Web GIS can be identified:

- **Web GIS supporting public communication:** this is the simplest form of Web GIS. Firstly, it provides a geographical representation of the relevant features, for instance: the line route, protected areas, cultural and historic landmarks, urban areas, orography, land use, EMF etc. This representation and the included basic tools (zoom, pan, search) allow the user to grasp immediately the possible spatial interferences (for instance the intersection between the lines and protected areas) and to produce his or her preferred views (for instance near their hourse). Moreover, this kind of Web GIS can make basic information available to the user, for instance on the number of inhabitants in a particular urban area or valuable species in a protected area. It is possible to insert also some basic tools, such as the measurement of distances and areas. The user can measure the distance between the power line and his or her house. Finally, the Web GIS can be used as an access point for other documents, such as educational web pages, informative sheets, and so on. In summary, it is often hard for a citizen to find the information of interest in the Environmental Impact Assessment report; Web GIS can provide a complementary, customisable, and more convenient access point for data and information relevant for the project;
- **Web GIS supporting public consultation:** in this case, the Web GIS can be used to improve the process of collecting comments from stakeholders and the general public. The added value of Web GIS is that users can use a geographical interface to select the point of interest and to attach their comment. This can be useful, for instance, when the user wants to recommend the acknowledgment of a landmark or to point out an undetected critical situation. The system automatically gathers the geographical coordinates and open a form to insert further information. It is then sent to the project coordinator in order to process the recommendation.
- **Web GIS supporting public participation:** the European Landscape Convention (ELC), defines landscape as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors." The term "landscape" is thus defined as a zone or area as perceived by local people or visitors, whose visual features and character are the result of the action of natural and/or cultural factors. In order to implement these principles in practice, a strong feedback from the general public is needed and, as the physical support of the landscape is space, Web GIS is one of the most appropriate tools for this purpose. With this aim, the Web GIS can be used also to elicit and share public preferences and opinions about land characteristics, cultural or traditional aspects, elements with a specific social relevance, or even merely opinions from the local resident community. This way, the general public and stakeholders are actively involved in defining the most prominent landmarks, the elements which characterise the territory or which are worthy to be protected. For instance, it is possible to ask the website user to identify the three outstanding points for different typologies and different protection levels, such as places to be fully protected or to be preserve unaltered; points of affection, important to preserve; places where mitigation measures are appropriate. Collecting and storing the preferences expressed by the website users allows the researchers to identify the most sensible points and to compute the score of the different alternatives routes according to their possible interference with these points of interest. The aim is to build a shared knowledge on a region that

might be affected by overhead lines in order to better assess impacts of the different options and to provide customised maps that can be used by stakeholders to better represent their main concerns on a spatial basis.

For the INSPIRE-Grid project, a Web GIS has been developed for the Norwegian case-study Aurland-Sogndal, to spatially represent the alternative paths of the project and its context.

During the project, other Web GIS tools have also been realised for the second Norwegian case-study Bamble-Rød and to fictitious case-studies specifically created to test the tool and its effectiveness in actively involving stakeholders during workshops and in dissemination events.

Research activities have shown that Web GIS can be an effective tool to disseminate the results of spatial analysis regarding different possible spatial alternatives of the planned infrastructures as well as both the negative impacts and the benefits related to each alternative solution to the general public. This approach is also particularly useful for the communication of the problem, its spatial definition and its possible alternatives. It can help to involve stakeholders in the decision-making process, to understand where the main conflicts lie and to find out the best possible solution. ■

CASE STUDIES:

The project Bamble -Rød in Norway

The Bamble-Rød project consist of the construction of a new 34-km long, 420 kV power line and the upgrade of an existing 300 kV line by taking down 5 km of an old line and rerouting it in parallel with the new one. It also includes the construction of two new substations in Bamble and Grenland. The main purposes of this project are to improve the security of supply in Southern Norway, to facilitate increased power exchanges and to favour the development of renewable energy.

At the time of our INSPIRE-Grid activities the decision-making process was already finished: all the decisions regarding the project had been taken, and the construction phase was almost finished.

In this case study, a Multi-Criteria Analysis (MCA) was implemented. The objective of this was to verify if it was applicable at all, and which added value it would bring in terms of stakeholder involvement, transparency of the processes, and conflict management. In addition, the data for qualitative research was collected in order to understand the influence of "soft" factors in the decision-making process. These factors include cultural and organisational settings, framings of the process, role of the individuals engaged, stakeholder values and personal networks. All these aspects are often underestimated in understanding the public responses towards the development of transmission lines.

The interaction with stakeholders in the Bamble-Rød case study was jointly carried out by PIK, Poliedra and Statnett. During the fieldwork, ten semi-structured interviews combined with a "ranking exercise" (dedicated to MCA) were conducted. This interaction encompassed different categories of stakeholders, from energy providers and local authorities to affected citizens. They were interviewed about participation opportunities in the decision-making process, interactions between stakeholders, and the need to build the new power line (and decommissioning the old one). Stakeholders were also asked to group the MCA criteria according

to three classes of importance and, if possible, to rank them from the most important to the less important, in relationship to the range of variation of each criterion.

The results were satisfying because the stakeholder involvement in this case study has indeed brought an added value of the new instrument (MCA) in the decision-making process. It helped to elicit stakeholders' preferences for alternative routes, which could be verified by comparing the compatibility of stakeholder preferences with the final routing decision. By means of using the software Variable Interdependent Parameters Analysis ("VIP Analysis"), a ranking of alternatives has been obtained for both: each stakeholder and the whole group, respectively. These computations are usually used to obtain information about the conflicts raised by the project and the conflict potential of different alternatives. All interviewed stakeholders seemed to be satisfied enough with the final solution adopted by Statnett even if that was not their "most liked" alternative.

The MCA is a method to support the decision-maker and not to substitute it with an automatic mechanism. The later MCA computations showed that the degree of conflict of the alternative actually chosen by Statnett was low. In addition, the initial results derived from the semi-structured interviews presented an interesting picture of non-formal and non-administrative factors influencing the involvement of stakeholders in the decision-making process. In general, stakeholders were very satisfied with the engagement process organised by the TSO and how it was realised. They appreciated that a lot of different opinions were taken into account. In particular, one side-effect of the project was mentioned in a positive way: the construction of a new road, which makes travelling between different places easier. Many interviewees underlined the positive role of Statnett's project manager. This proves how big the influence of single individuals on the engagement process can be.

The project Aurland-Sogndal in Norway

The second case study looked at the Aurland-Sogndal project of building a new 420 kV overhead transmission line between the Aurland hydropower station and the Sogndal substation. This new line will replace a 300 kV power line that exists between Aurland, Fardal and Sogndal. The current line will be decommissioned and removed at the end of the project. In addition, 6-7 kilometres of another 300 kV power line will also be removed where the future 420 kV power line will run in parallel with the current one. This upgrade is expected to improve the transmission capacity across the Sognefjorden and to connect the 420 kV grid in Aurland to the new Ørskog-Sogndal power line, which is currently under construction. To date, the Aurland-Sogndal section is considered the main bottleneck in the regional grid. The project will furthermore contribute to providing the necessary capacity to accompany the development of renewable energy production in the region. Our case study focused in particular on the crossing of the Sognefjorden, which turns out to be critical in many respects. At the time of our INSPIRE-Grid interaction with stakeholders the project was still ongoing.

In this case study two methodologies were implemented: the Multi-Criteria Analysis and the Web GIS. As in the Bamble-Rød case study, the objective of using the MCA as an experimental methodology was to check if it could be applied and which added value it would bring in terms of stakeholder involvement, transparency of the processes, and conflict management. It was supposed to simulate parts of an ideal participation process, aimed at involving stakeholders in the decision-making by giving them the opportunity to express their preferences and to contribute to the siting decision. Likewise as in the Bamble-Rød case study, the collected data for the qualitative research should help to understand the influence of "soft" factors in the decision-making process and to enable a comparative perspective within both Norwegian case studies. In the context of the Web GIS, the aim was to check whether it could contribute to the improvement of public engagement in the decision-making process of grid development projects. In particular, WebGIS could represent an alternative entry point to the project documentation: instead of working through lengthy reports, the user can access relevant information by means of geographical criteria and can carry out simple analyses, extract data and produce customised maps. Moreover, several functionalities were inserted in the tool in order to improve the participation of the general public to the permitting process. Among them were: the possibility to submit comments and suggestions, specifying the location they refer to very precisely, and the computation of a numerical measure defining the impact level of different alternatives with the local landscape based on the preferences expressed by local residents. This allowed local residents to influence directly the assessment of the different alternatives.

PIK, Poliedra, RSE and Statnett jointly carried out the interaction with stakeholders in the Aurland-Sogndal case study in the form of a workshop, during which seven stakeholders had a chance to test and discuss both experimental methodologies. Workshop participants were representatives of different stakeholder categories, from local officials and affected citizens to NGO members. First, stakeholders tried different functionalities of the Web GIS regarding a possible use for stakeholder engagement processes. The second methodology tested was the MCA, where similarly to the Bamble-Rød case study, stakeholders were asked to carry out a "ranking exercise", in which they grouped the criteria of the transmission line's effects according to three classes of importance. The novelty in testing this method was the group discussion on ranking the criteria. Involved stakeholders had the opportunity to discuss potential effects of different alternatives and rank them collectively. The last part of the interaction with stakeholders was dedicated to conducting semi-structured interviews in order to get a deeper understanding on the specific participation opportunities and involvement in the decision-making process, the role of the TSO or the need to build the new power line. ■

The project Cergy-Persan in France

Launched in 2013, the Cergy-Persan project aims to prevent congestion between the North of Ile de France where new renewable power plants are implementing and Ile de France where there is a lack of production (due to the density of population and decommissioning of classis thermal power plant). The project consists in upgrading to 400 kV an existing 225 kV of 20-km long overhead line, in addition to two existing 400 kV power lines. To that end, most of the existing pylons will be reused and upgraded – either heightened or strengthened – when necessary, in accordance with the technical requirements related to 400 kV.

Schematically, the line to be upgraded crosses two distinct areas, namely a densely populated urban area – around the city of Cergy – and a regional nature park – the Vexin Français regional nature park. In such a context, the main siting issue consists in identifying a route that would enable the proper achievement of the project while both contributing to the development of the urban area and avoiding and mitigating any possible negative externalities, particularly regarding the natural area.

LCA in the Cergy-Persan case study

The Cergy-Persan grid project from RTE was used as a case study for the LCA methodology. RTE collected data on construction activities, and performed power system simulation with and without the grid project, in order to calculate how power plants would be affected by the project for the year 2030, in different scenarios. Other indirect effects were modelled using data from the ecoinvent life cycle inventory database (http://www.ecoinvent.org/), completed with data available in literature.

Environmental impacts were calculated for seven impact categories:

- climate change,
- damage to human health,
- damage to ecosystems,
- cumulative energy demand,
- radioactive waste,
- water consumption,
- abiotic resource depletion.

Results for the Cergy-Persan project show that indirect changes induced in electricity production are the main source of the environmental impacts. Impacts related to the grid infrastructure have a significant contribution only on abiotic resource depletion. For the other categories, impacts from electricity production are several orders of magnitude higher than the ones from the grid infrastructure. Moreover, these indirect changes induced in electricity production can result in impacts being caused or avoided, depending on how the production from power plants change: if production from coal decreases while the one from wind power increases, impacts are likely avoided in most categories.

Hence, design choices regarding the infrastructure have little influence on most of the life cycle environmental impacts of the grid project. The most determining decisions happen at the need definition phase of the project, when substations to be connected are chosen.

MAIN RECOMMENDATIONS

The multidisciplinary approach of our project has led to a variety of insights that are publicly available to inform future grid development projects. Once again, the findings show that an early and fair engagement of stakeholders through appropriate engagement methods for a broader dialogue on the energy transition can increase the acceptability of grid development projects.

We divided the main recommendations based on three challenges:

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 codecision, 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 decentralised vs. centralised energy production or the high degree of interconnections to the neighbouring countries, fosters a better grasping of the need for grid development 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 maximisation 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.

WHERE CAN YOU FIND MORE INFORMATION?

A more detailed depiction of these recommendations can be found in the report “Synthesis and recommendations” (D7.3) and - summarised for a non-scientific audience - in three different policy briefs: “Stakeholder expectations and the importance of trust”, “Participatory decision-making methods” and “Potentials of stakeholder participation” (D8.2).

If you would like to get the comprehensive overview of all research activities and results, please take a look at the “Final synthesis report” (D8.5).

All documents are available on our project website: **www.inspire-grid.eu**

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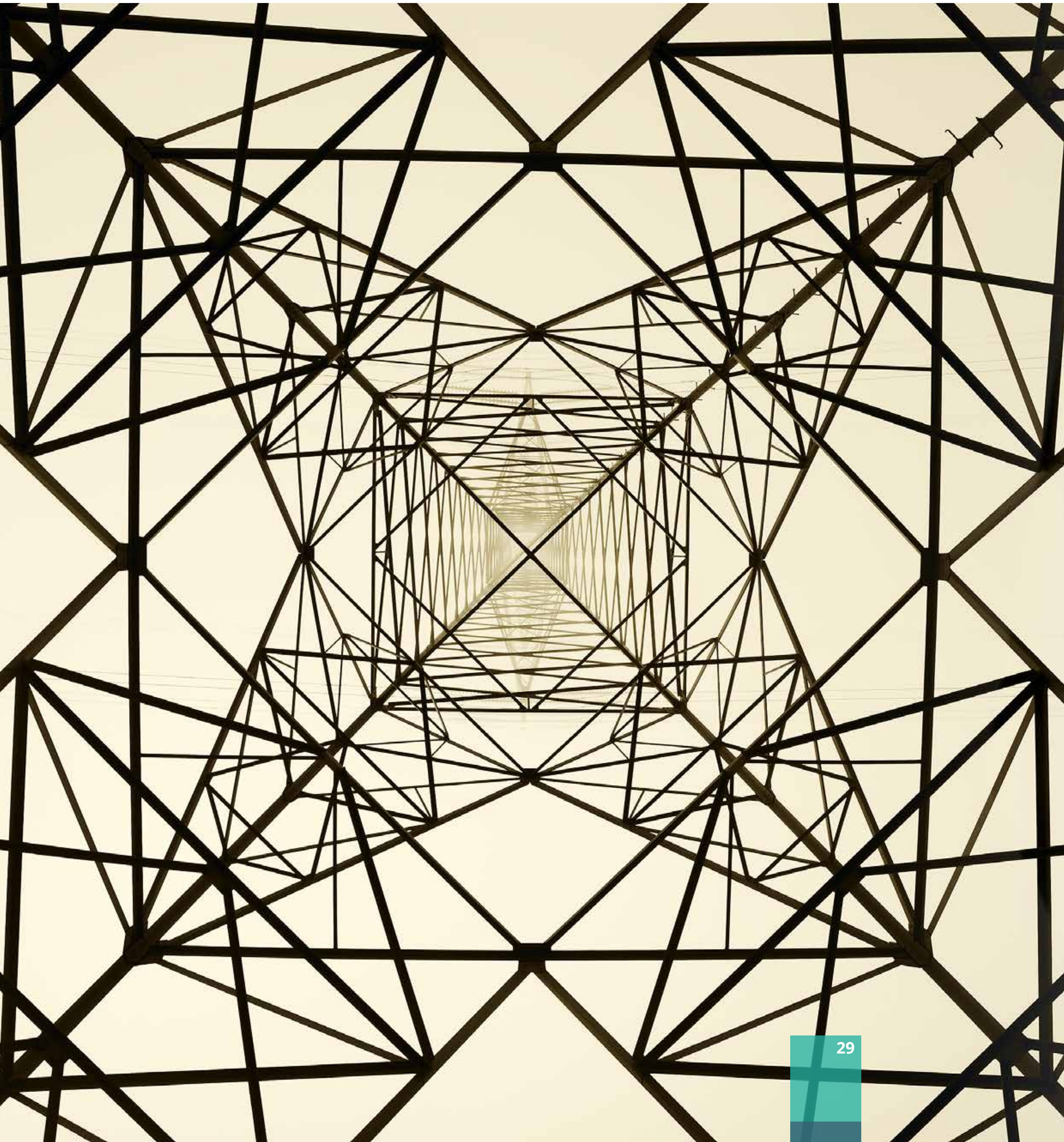

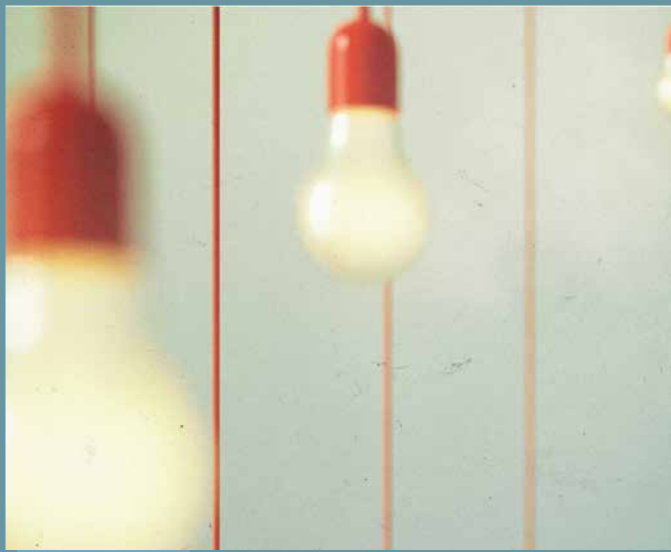

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