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Abstract
This non-technical report presents an integral process-approach in order to foster consensus between stakeholders of specific priority transmission system projects, allowing a speed-up of planning and approval procedures. The deliverable offers background information regarding consensus in general and specific aspects regarding consensus at an international level, shows the relationship between the consensus process and the authorization path. The consensus conceptual framework is then adapted to the transmission planning problem. Conclusions and recommendations are provided.

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ACRONYMS AND DEFINITIONS

AC: Alternating Current.
CSC: current-sourced converter
DAS: decision aid system
EC: European Commission
EHV: extra high voltage
EIA: Environmental Impact Assessment
EMF: electromagnetic field
EMI: electromagnetic interference
ENTSO-E: European Network of Transmission System Operators for Electricity
EU: European Union
FACTS: flexible AC transmission system
GIS: geographic information system
HV: high voltage
HVAC: high voltage AC current
HVDC: High Voltage Direct Current
MSD: multistakeholder dialogue
NGO: non-governmental organisation
NIMBY: Not In My Back Yard
OHL: overhead line
RES: Renewable Energy Sources
SEA: Strategic Environmental Assessment
TSO: Transmission System Operator
VSC: voltage-sourced converters

1 EXECUTIVE SUMMARY

Generally speaking, approval procedures for building new transmission lines cover the following stages: the TSO is the initiator of the project and conducts first a feasibility study. The purpose of this study is to plan several route options for building a new transmission line. These options should be feasible in all aspects, namely technical, technical-economical, administrative, social and environmental. The planning authorities are involved in this process – formally or informally – with regard to spatial planning, environmental aspects etc. This study phase is concluded by requesting the respective authority to permit construction of the transmission infrastructure along one of the proposed routes that proves to be optimal. At the centre of this application is the environmental impact assessment (EIA), which has to be performed according to EU and national laws in all member states. In some countries a strategic environmental assessment (SEA) is also performed beforehand at national level for potential new infrastructures, but its results are not used in the EIA. With respect to national environmental legislation, local authorities will be involved. In addition, a public debate or a formal dialogue is compulsory and each stakeholder has a right to express his own opinion. Finally, all other national legal requirements (concerning water rights, protection of the right of property building law, environmental protection, conservation of protected species etc.) will have to be met. Only afterwards, will the approval be given by the authority in charge. For building a new line, licenses also have to be obtained, and this process is done after or simultaneously with the authorization procedures. The expropriation phase is effected in the end via either amicable agreements or legal easements. When all approvals are granted, the construction process can begin.

International projects follow the same steps described above, but these steps are done for each of the involved countries according to their own national procedures. It is important to decide first on a physical interconnection point at the border, before starting the rest of the procedures. If the authorization process takes longer in one country, the whole project will suffer

Concerning specifically the priority projects of European interest, the REALISEGRID research project proposes to combine two synergic actions in order to streamline and facilitate the transmission planning process. In particular, this combination consists of:

- an efficient consensus process that also implies a good information flow from and to the population (bottom-up approach); the main targets are related to:
  - providing a clear vision of benefits and costs related to the new infrastructure. Clearly state the cost for the society deriving from inaction or sub-optimal actions.
  - promoting an educative action meeting all the points of view in the perception of a new line. Clarify the relationship between RES integration and grid development. Clarify the relationship between costs and different technical solutions (e.g. cabling, HVDC).
  - promoting a thorough evaluation of property value, so as to bring about a fair compensation value that can be agreed by all the parties.
- a clear regulatory approach (top-down approach), harmonized throughout Europe. The ground targets are related to:
  - acting on the legal framework: simplify, harmonize, set time limits and rationalize the procedure (number of entities, number of phases, etc.).
  - creating, especially for the most important projects, an “arbiter” (facilitator) to promote shared solutions and to manage the entire procedure in trans-national cases.

The basic targets of a clear and harmonized regulatory approach are related to two main aspects. On the one hand, it is important to act on the legal framework: simplify, harmonize, set time limits and rationalize the procedure (number of entities, number of phases etc.). Clear and harmonised authorization procedures are essential to obtaining a fast implementation of priority projects. On the other hand, facilitators should be appointed for national and EU priority projects, to promote shared solutions and manage the entire procedure in trans-national, but also national cases. Considering European priority projects, their urgency should suggest revising Europe-wide the entire approval mechanism by creating fast (priority) approval pathways at both national and local level.

A key element in the consensus process is a good information flow to all participants. They should be given beforehand both general information about how power systems work and what transmission planning involves, and also background information, such as the costs and benefits of the new transmission project, and any other important information relevant to the problem to be solved. The information flow has to consider all costs and benefits and clearly show the cost of inaction for all stakeholders. For facilitating this interaction, an approach for properly communicating the benefits of transmission projects and the cost of inaction is introduced.

In addition, it is important to have a thorough evaluation of property value, so as to bring about a fair compensation value that can be agreed by all parties. Compensation schemes have to be proportional both to the actual value of the caused damage and to the importance of the project and they should not foster free-riding strategies amongst stakeholders. The creation of a skilled and impartial body to act as project facilitator is generally recommended in such situations. He should be able to engage with all the participants and guide the process towards a supported solution, solving when necessary cases of minority dissent and isolating “continually antagonistic attitudes”.

One should keep in mind that in order to reduce the opposition for a certain project, stakeholders have to be involved in the decision-making process. The public perception of new transmission lines should be considered, and conflict dynamics should be studied as they can change the ratio between the different factors that influence public attitude due to opportunity reasons. Consensus must be sought from early phases of the planning process and also during the authorization phase, and hence the public should be involved at all these stages. In complex infrastructure planning issues, it is very hard to get all the stakeholders to agree, and hence the need for compromise seeking usually arises. Nonetheless, the target should be increasing the public acceptance of a certain project. This can be done at several levels, namely international, national, regional and local. Three consensus processes were suggested between these levels: international-national, national-regional and regional-local. At the regional-local level, the experience of the ESTEEM tool created by the Create Acceptance EU project could be used for managing public acceptance for each individual community that is affected by the transmission project.

Building a new a transmission line problem should be treated as an unstructured problem that needs a high public participation and also involvement of experts, all taking part in the action of problem structuring. Strategies on how to present the background information should be developed in order to emphasize the importance and all benefits that are brought by the new infrastructure. Compromise seeking Decision Aid Systems (DAS) for selecting a power line path could be used during the process. It would be useful if the TSOs were supported in their attempts of obtaining consensus by authorities such as the State, the Regions and Municipalities, users of the grid and other important bodies. For the authorisation phase a simple legal framework and acceleration of procedures is the first help needed from the authorities. Moreover, authorities should give public

support and assume their responsibilities. The sensitivity to political instability/changes should be reduced if possible.

Concrete actions and timelines can be defined on different time horizons as illustrated in Table 1-1.

Table 1-1 Speeding up procedures: concrete actions and time horizons

Time Horizon	Actions
Short-mid term	Transparent and serious communication and information to the public
	Involvement of public in the decision-making from early stages of the planning process
	Utilisation of a neutral cost-benefit analysis
	Communication of inaction costs
	Creation of a skilled and neutral project facilitator
	Set up of a clear, fixed timeline for approval
	Utilisation of innovative transmission technologies
	Exploitation of existing transmission assets
	Development of European wide standards on EMF
	Fair compensation schemes
Mid-long term	Streamlining of authorisation processes
	Pan-European harmonisation of procedures
	Set up of clear incentive schemes
	Transmission planning anticipation with respect to generation planning
	Harmonisation of EU and national legislations
	Implementation of market reforms
	Definition of a merchant investment framework

The short- to mid-term actions can be developed without touching the roles and general principles established by national and European regulations. On the mid- to long-term, actions have to be focused on a general harmonization process that requires revising, at least partially, of the roles and/or the general principles adopted in the national and European regulation (e.g. the principle of subsidiarity).

Last, but not least, it should be kept in mind that each project is different and actions should be tuned based on specific particularities for each situation.

2 INTRODUCTION

2.1 Objectives of this deliverable

This deliverable aims at contributing to the objective of the European Commission to set up national procedures under which planning and approval processes for infrastructure projects should be completed in a maximum time span of five years.

In particular, the goal is to set up a structural approach for reaching consensus for new transmission projects. In order to make this happen, it is important to be able to carry out, in a clear and quantitative way, an inventory of opportunities and barriers for each specific priority project as well as to quantify total (societal) costs and benefits.

Generally speaking approval procedures for building new transmission lines cover the following stages:

- The transmission system operator (TSO) is the initiator of the project and conducts a **feasibility study**. The purpose of this study is to plan a route or several route options for building a new extra high voltage or high voltage (EHV/HV) line. These options should be feasible in all aspects, namely technical, technical-economical, administrative, and environmental. The planning authorities are involved in this process – formally or informally – with regard to spatial planning, environmental aspects etc. This study phase is concluded by requesting the respective authority to permit construction of the HV line along one of the proposed routes that proves to be optimal.
- At the centre of this application is the environmental **impact assessment (EIA)**, which has to be performed according to EU and national laws in all member states. In some countries a strategic environmental assessment (SEA) is also performed beforehand at national level for potential new infrastructures, but its results are not used in the EIA. With respect to national environmental legislation, local authorities will be involved. In addition, a public debate is compulsory and each stakeholder has a right to express its own opinion.
- Finally, all other **national legal requirements** (concerning water rights, building law, environmental protection etc.) will have to be met. Only then will the approval be given by the authority in charge.
- For building a new line, **licenses** have also to be obtained, and this process is done after or simultaneously with the authorization procedures. The expropriation phase is finally performed either via either amicable agreements or legal easements.
- When all approvals are granted, the construction process can begin.
- International projects follow the same steps described above, but these steps are carried out for each of the involved countries according to their own national procedures. It is important first to agree on physical interconnection points at the border before starting with all the national procedures. If for one country the authorization process is lengthier, the whole project will suffer from these delays.

This process takes in average more than 5-10 years, going up to 20 years in some extreme situations. The major reason for these important delays mostly lies with local opposition to the realisation of infrastructure developments in general, and power lines in particular. The reduction of the time needed for the realisation of an infrastructure is an objective clearly stated by the European Commission (EC): it is worth to remember that the Commission envisages that planning and

approval procedures for projects of European interest should be completed in a maximum time span of five years.

Several parties are involved in the different phases of the development of an electricity transmission infrastructure, whose consensus is fundamental for a timely implementation of the project. Political, regulatory and administrative authorities' support is needed especially in the approval and authorization phases. This support is often eroded by local opposition exercising its political influence, thus delaying or blocking the development of the project even during its construction. In order to get the necessary support for infrastructural projects and come to a consensus among the involved stakeholders, it is fundamental to clearly assess and state what are the costs and benefits of the project for each stakeholder. The costs and benefits, which may be economical (market integration, increased competitiveness, price reduction, local property value etc.), environmental (integration of renewable energy sources, better exploitation of thermal generation with reduction of emissions, landscape value etc.), related to the security of supply or else, must be quantified, so that trade-offs can be established balancing the costs and benefits between all stakeholders so that well informed decisions can be taken. Indeed, the opposition to a proposed project has to know as much fairly and exactly as possible what amounts the system loss caused by such a behavior.

2.2 Expected outcome

This non-technical report will present an integral process-approach in order to foster consensus between stakeholders of specific priority transmission system projects, allowing a significant length reduction in the planning and approval procedures. The rest of this document is organized as follows:

- Chapter 3 offers background information regarding consensus in general and specific aspects regarding consensus at an international level
- Chapter 4 shows the relationship between the consensus process and the authorization path.
- In Chapter 5 the consensus conceptual framework is adapted to the transmission planning problem.
- Chapter 6 sums up the main conclusions and recommendations of this work.

2.3 Approach

In order to obtain a good view on how the process of reaching consensus can be improved, firstly the concept of consensus is introduced via a theoretical approach along with its properties. Considering the findings of the REALISEGRID D3.7.1 and the Interim Report produced by REALISEGRID upon request of the EC DG-ENERGY, we outline the implications in the authorization procedures and then we adapt the general consensus theory to the specificities of the transmission planning problems. The final step is to draw conclusions.

The current document was produced in two stages. The first stage was the REALISEGRID Interim Report that was produced at the request of the EC and that created a bridge between D3.7.1 and the current document. The content and problems raised in this document were developed in the light of a constant consultation with the projects' stakeholders and project TSOs in order to keep the paper clear, concise, straightforward and rooted in reality.

3 CONCEPTUAL BACKGROUND OF CONSENSUS

Before talking about how to improve consensus on building new transmission lines, it is important to know what consensus is. Hence the purpose of this chapter is to review the most important aspects regarding the consensus process.

3.1 Typology of policy problems and types of interaction

According to [14] a policy problem can be defined as a gap between a current and a desired situation, being therefore always subjective. It is important to identify a certain problem within a certain structure in order to make the best decision regarding who may effectively participate in the decision process and who will be excluded, and also which issues should be considered and which not in the agenda [17]. The typology of policy problems (Figure 3-1) illustrates very well this idea, that different people can have different visions on problems and how to solve them [15]-[16].

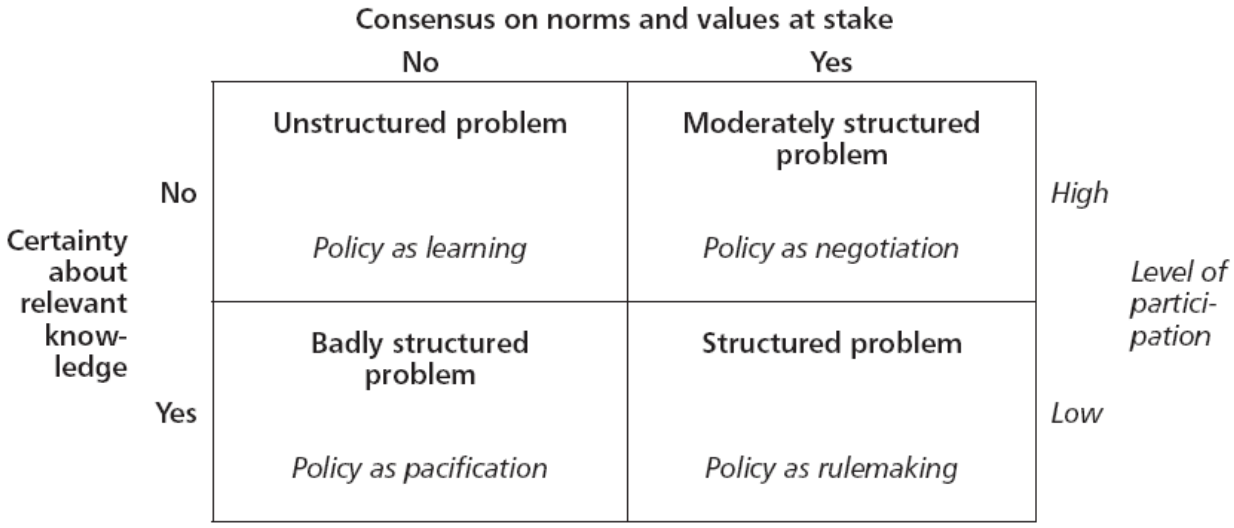


Figure 3-1 Typology of policy problems and types of interaction [15]-[16]

The typology of policy problems is based on two dimensions. The first dimension concerns the question whether there is consensus on the relevant norms and values. This dimension refers to the *goal* of policy. The other dimension concerns the question whether there is certainty with regard to the knowledge that is needed for dealing with the problem. This dimension refers to the *means* of policy.

Based on the two dimensions, four types of policy problems can be distinguished: a structured problem and three types of complex problems. The complex problems are referred to as the moderately structured, the badly structured and the unstructured problem.

Each problem type implies a particular type of policy process, with either a high or a low level of stakeholder participation. The types of policy processes are printed in italics in Figure 3-1. When there is no certainty about relevant knowledge, participation of stakeholders is high (policy as

learning and policy as negotiation). When there is certainty about the relevant knowledge, participation of stakeholders is low (policy as pacification and policy as rulemaking).

The four problem types are all linked to specific strategies for political solution [14] [17] as explained below.

A structured problem is generally technical by nature and it envisions a large role for experts in the policy process. The experts defend the general interest, while the non -experts are considered to have no useful input regarding the issues at stake. Therefore public participation or stakeholder involvement in the policy process is very low and policy takes the form of rulemaking. Structured problems are characterized by consensus on the relevant values and on the knowledge needed to solve the problem.

The moderately structured problem is characterized on the one hand by consensus on overall goals (the values at stake) and on the other hand by dissent the means for solution (the relevant knowledge). In fact, there is consensus on what the problem is, but not on the solution to the problem. This is more regarded as a conflict of interests where the conflicting parties are willing to negotiate, as there is some common ground value for a trade-off. Experts play a smaller part than for structured problems, and they become involved as advocates of one particular position. In this case, participation is high and takes the form of negotiation, and actors should be willing to accept a trade-off within a given range of solutions.

The badly structured problem is characterized by dissent on the values at stake (what the problem is) and by consensus on the relevant knowledge (on the means of solving the problem). The conflict regarding the values at stake is much more intense than in the case of the moderately structured problem. Policy actors usually do not recognize each other's views and objectives as reasonable. However, because of the need for political stability, they feel a need for compromise. The conflict is depoliticised by involving many experts that have to transform the political issue into a technical one. Hence, public participation is low, and policy takes the form of pacification in order to resolve the conflicting value-orientations on the level of solutions (hence "policy as learning").

A problem is unstructured when there is no certainty with regard to both dimensions of the typology. Not only the means, but also the goals of policy are subject to discussion. Solving an unstructured problem requires problem-structuring, which is to produce new insights on what the problem is about by engaging multiple stakeholders in an open dialogue. In contrast to negotiating, problem-structuring means that the participants redefine their notion of self-interest and, consequently, their vision of the problem. In this case, participation is high and takes place in order to learn about the problem and its potential solutions.

The typology of policy problems illustrates the importance of distinguishing between problems so that their relation to solution strategies is highlighted. If decision makers exclude information (such as participant knowledge) a problem may shift to an incorrectly structured one, and this leads to later regret when they realize that they were trying to solve the "wrong" problem. Hence this typology is a dynamic one, a problem being able to shift from initially structured to one of the other 3 types of problems. Moreover, this way of thinking about types of problems is meant to be used more as an orientation and it should be kept in mind that all policy problems have these 2 dimensions, namely relevant knowledge and values at stake. As the gap between moderately structured, badly structured and unstructured problems can be very small and unclear sometimes, it

is indicated to treat from the beginning more complex problems as an unstructured problem in order to avoid missing important aspects from the picture.

3.2 What is consensus?

In [20], Lawrence Susskind develops very detailed the topic of building consensus, while in [19] Larry Dressles addresses the same subject but in a more concise, clear and accessible way. However, the message is the same and has the same main ideas. The following pages will present these main facts about the consensus process.

Consensus is a collaborative process where all participants develop and agree to support a decision that is in the best interest of the whole. During the consensus process it is of high importance that the opinions and ideas of all stakeholders are carefully considered and that there is a care to address all legitimate concerns [19].

Hence consensus is a very powerful tool as it implies that all the stakeholders are committed to a decision and that they are engaged to their own task in making the decision work. Commitment is the result of consensus. Moreover consensus is a process of discovery where people try to combine the collective wisdom of all stakeholders and to produce the best possible decision in which everyone wins by serving shared interests.

It is important to note that consensus is not a tactic to convince stakeholders to conform to something already decided in advance. In achieving consensus, the stakeholders are actually participative. Just appearing participative without really agreeing with the decision can lead to "false consensus" that implies resentment, cynicism and inaction.

Consensus is a decision-making method and it is based on four main beliefs that guide any consensus-building process:

- ***Searching for solutions through cooperation***: common ground solutions are searched through cooperation and not through competition. A condition is that the participants feel committed to a common purpose. Participants have to be open to share their ideas, accept the ones of other stakeholders and develop and discuss any idea put on the table.
- ***Using disagreement as a positive force***: as long as it is constructive and in a respectful tone, disagreement is desired. In consensus, the tension created by our differences is used to move towards creative solutions. Compromise is not wanted. Participants should voice their own views and criticize the ones of others in order to produce a robust solution.
- ***Every opinion should be considered***: power differences should be balanced. It is the responsibility of the group to make sure legitimate questions, concerns and ideas are expressed and fully considered no matter what the source is.
- ***Decisions serving the interest of the group***: in consensus decision makers agree to leave behind their own subjective preferences and to support the values and targets of the group. All personal concerns can consider a matter of discussion but the final decision should serve the collective interest.

The consensus process might take longer than other types of decision making approaches (such as unanimous voting, compromise, deferring to an individual leader or expert) but one should think whether he wants to decide quickly or to implement quickly. Often a speedy decision may have a slower implementation due to resistance and unanticipated consequences. In the case of consensus,

the implementation phase is supposed to go smoothly due to all stakeholders being committed to the group's interest.

Consensus meetings have the purpose to make a decision or to prepare a group to make a decision.

3.2.1 Preparing for decision-making

In order to have a successful decision-making group, it is important to prepare the meeting(s) rigorously in advance. There are a few preparatory steps to create a basis of a good consensus process [19]:

- ***Determine whether consensus is the right decision-making tool*** for this kind of a problem. Firstly one should determine if consensus makes sense and secondly if the stakeholders are willing and ready (with the right skills) to take part in such a process. Otherwise, other decision tools have to be chosen.
- ***Decide who to involve in the decision*** by determining the appropriate group members (people affected by the decision, people who will implement the decision, people whose support is vital for implementing the decision, important stakeholders that should be represented, useful experts, people that can give credibility to the decision) and determine different kinds of roles such as group leader, decision steward, decision makers, advisors, observers, alternates.
- ***Enlist a skilled facilitator*** who is a neutral party that has the role of helping participants to navigate successfully through the consensus process. In consensus, a good facilitation experience can make the difference between having at the end of the meeting stimulated and committed people or having tired, frustrated and defeated people.
- ***Clarify the group's scope and authority.***
- ***Educate group members*** about the principles of consensus.
- ***Develop an agenda*** of the meeting or meetings needed during the consensus process. More complex decision processes involve more meetings with various purposes such as learning about consensus and agreeing on a work plan, studying the problem and arriving at a common understanding, establishing criteria that will be used to develop and select an alternative, generating creative alternatives to address the issue, deliberating and reaching a decision, developing a plan for implementing the decision.
- ***Gather the relevant information*** that can be useful in the group's discussion of the issue. It is preferable to make available this information to the meeting participants in advance. When the group is in an early phase of understanding an issue, a simple "background briefing" is useful. Facts and information can be provided through expert advisors and fact-finding sub-groups belonging to the big consensus group. An issue briefing should be comprised by the following sections: clarify the problem, determine the current impact, determine future implications, describe the ideal outcome, and identify any preliminary alternatives.
- ***Start the meeting on the right foot*** by making sure that all participants share a common idea of what will be accomplished and the means of doing that. This can be done by addressing 7 key questions in the first minutes of the meeting: Why are we here? What are we authorized to decide? Who is in the room? What special roles will people be playing? Do we understand the consensus process? Do we understand the agenda? Are we willing to commit to the ground rules?

3.2.2 The consensus process

In [19] a five-step approach for consensus decisions is presented. This process is illustrated in Figure 3-2.

- The first step is to define the problem that has to be solved. This is an informative phase involving presentations of related history and background knowledge and prepares the consensus group for the following steps.

- Next it is important to establish explicit decision criteria in order to make it easier to shape good solutions. The group discusses the main requirements that any solution must meet and the outcomes that any solution should produce. These are the *must* criteria. Also additional desired *want* criteria can be found. Must criteria are compulsory for a solution to be adopted while want criteria are not.

- The third step is the proposal (solution) crafting. At the beginning a draft solution is sketched. Consultation of people with a stake in the decision can play an important role as in the end a clear and to the point preliminary proposal should be produced. After that it comes the refining of the proposal during which the group ownership (and not individual) for the proposal should be built. After the proposal has been developed it is presented to the whole consensus group and clarifying questions should be put and answered.

- The most critical step is the test for consensus. Here every group member is asked to state his level of comfort with and support for the solution, based on the shared goals and criteria the group previously established. After this there are four possibilities:
  - Everyone agrees with the solution, and consensus can be reached.
  - Some people agree, and some have some concerns and questions. These are discussed, the solution is refined and consensus is reached.
  - Some member oppose the proposal (this attitude is called also “block”). This opposition determines creative dialogue where the group looks for a new solution. If this is found and all participants are happy with it consensus can be reached.
  - Worse case scenario, when a proposal supported by every member cannot be found and consensus is not reached. When contrasting interests are at stake, this scenario can easily arise.

- The last step is of course reaching agreement. Consensus is obtained when all (ideally) or almost all stakeholders think that the proposal is the best thinking of the group at that time and it considered all raised legitimate concerns. When this is impossible, a best compromise solution has to be adopted.

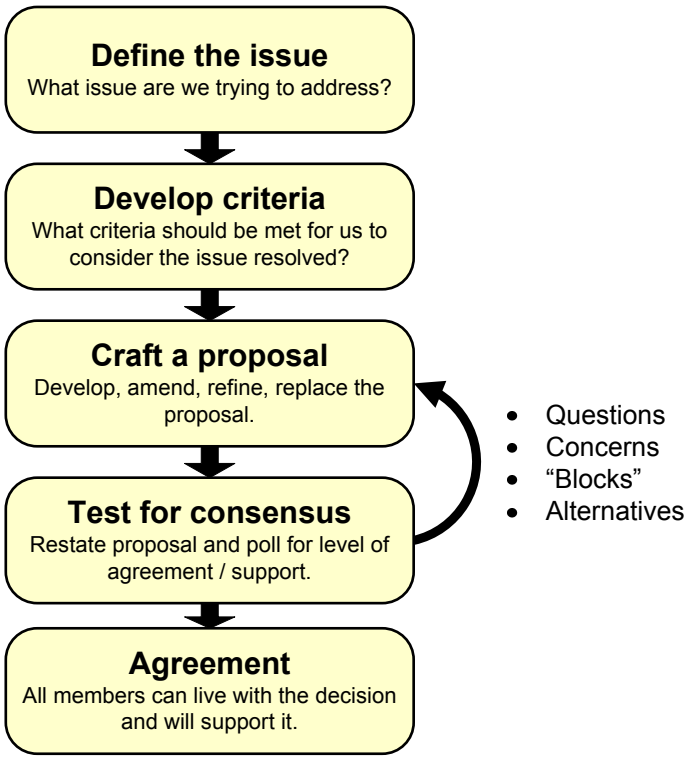


Figure 3-2 The basic steps of the consensus process (source [19])

It is opportune that at the end the consensus decision is formalised by having every participant sign as a proof of supporting the future implementation of the chosen solution.

3.3 Multistakeholder dialogue at international level

Lawrence Susskind is a recognized expert in the field of international multi-stakeholder dialogue and consensus building. One of his interesting publications on this topic is [21], namely multi-stakeholder dialogue at the global scale.

Multi-Stakeholder Dialogues (MSDs) ensure a forum where official and unofficial stakeholders can discuss face-to-face with a certain objective. Often MSDs are organized in order to create proposals for solving some pressing problems. MSDs have four objectives, namely: relationship building, gathering and exchanging information, brainstorming and consensus building. According to the possible objectives, MSDs can be divided in: relationship building, information sharing, agenda setting, brainstorming and problem solving, and consensus building.

The less ambitious objective is the relationship building, while the most ambitious is the consensus building. In general more ambitious MSDs include also the objectives of the less ambitious MSDs. Hence a consensus seeking process also will reinforce relationships, produce new information and brainstorm a set of creative proposals before actually reaching consensus. This was also shown in the previous sections.

Hence, some multi-stakeholder processes want to achieve consensus among the participants. Usually consensus is not used to make formal decisions. The most general usage is for getting a set

of recommendations that can be included in the official policy making, and that is likely to meet very little resistance due to a high level of commitment among the consensus participants. Consensus is achieved when almost all participants agree that they can "live with" a proposed solution after every effort has been made to address the interests of the participants. MSDs seek unanimity, but in real life a point is usually reached when most of the participants agree and only a very small number of people oppose as they have more to gain by that behaviour. If after trying to solve and address all the concerns of the opposition it is discovered that there is nothing more that can be done to satisfy the interests of those who do not agree, they agree in the end to reach consensus.

3.3.1 Stakeholder groups

In the view of Carlson stakeholders are "key individuals, groups, and organizations that have an interest in the issue at hand. They may be responsible for seeing a problem resolved or a decision made, they may be affected by a problem or decision, or they may have the power to thwart a solution or decision" [28]. Hence, the stakeholder involvement means to have the participation of individuals and groups with specific interests and values that may be at risk.

The relationship between different stakeholders and a decision may vary in terms of nature and intensity. While some can be officials that participate in official decision-making processes outside the MSD, others do not have such official status but have a strong influence on official decisions, on other stakeholder bodies or on the citizen perception. Therefore, stakeholders can be divided into different categories considering the values or interests that they represent. These classifications can be very simple such as government, business, and civil society, or can be complex as defined during the 1992 Earth Summit [29]: Women, Children and Youth, Indigenous People, Non-Governmental Organizations, Local Authorities, Workers and Trade Unions, Business and Industry, Scientific and Technological Communities, and Farmers.
Multi-stakeholder not only means that representatives of more than two stakeholders' categories participate in the MSD, but it also means that amongst the included stakeholders the key ones are represented, in order to attain the legitimacy of the decision. Hence the inclusion of key stake holding groups is very important and can also be done at different levels of the MSD.

A successful MSD must establish itself throughout the whole process as a legitimate process. Susskind observed that MSD participants connect legitimacy to fairness, wisdom and efficiency [21].

3.3.2 MSDs facilitation

Good facilitation is usually essential for the success of a MSD. According to Susskind [21], there are four main facilitation requirements that have to be met by MSD facilitators or chairs.

- Conflict or issue assessment has to be prepared by an independent or "neutral" party. The purpose is to bring together the right people and to have them focused on the correct problems. Hence a written conflict or issue assessment has to be prepared by the facilitating team in order to start framing the dialogue. The assessment is performed on the basis of off-the-record interviews with a wide range of potential stakeholders and they should give to the facilitator a wide view of how the problem is perceived.
- Facilitators must ensure that all participants are provided with relevant and sufficient background information. They are in charge of the distribution of key documents that

summarize the already available information and that produce a neutral synthesis bringing new ideas into the light. This is more important when facilitating dialogues that include unofficial participants with a reduced technical background.

- Facilitators should assist participants if needed to produce documents that can help in understanding disagreements or can offer a basis for generating new agreements that participants can take back to the members of their stakeholders' group. More than one facilitator is usually needed in such situations. Hence a team of facilitators is recommended, that can handle the dialogue coordination, that can follow the points of agreement and disagreement and that can be in charge with the meeting logistics.
- A good facilitator should search and emphasize the weak points that exist in the efforts made by the decision group and should offer assistance according when it is needed, even outside the meetings. Therefore, sub-groups of the MSD participants can meet separately between formal meetings of the full decision group in order to shape options that proved difficult to handle at the full group level.

In order to be successful facilitation requires the involvement of skilled professionals with both process-management skills and substantive background in the issues under discussion.

3.3.3 The cultural aspect in facilitation

At international level, facilitation reaches an extra dimension, namely the cultural one. Hence, besides the previously defined principles the importance of culture and cultural differences should not be neglected. Ethnicity, nationality, cultural behaviour and norms are only a few of the cultural factors that should be considered during a MSD.

The alleged cultural dynamics can affect various aspects of MSD design and management, such as:

- the work pace of people;
- the importance of relationship issues and necessity of addressing them
- the degree to which ideology seem to win over factual analysis
- the need for translation

According to Susskind the biggest challenge in a multicultural dialogue is to create an effective communication. According to the difficulty of the situation, facilitators may have to adjust the pace of the meetings in order to allow enough time for the development of ground rules and terminology clarification.

4 CONSENSUS AND THE AUTHORIZATION PATH

4.1 Approval procedures

The aim of D3.7.1 [10] was to review existing approval procedures in a number of European countries and to identify different methods that are adopted to overcome the barriers to transmission system development. Hence, real case studies, based on the experience of TSO partners, were analyzed in order to generalize and pin-point the main strengths and weaknesses and to select the best practices from the current approaches. Fig 4-1 illustrates the stages and average durations of the transmission planning process in Europe [6].

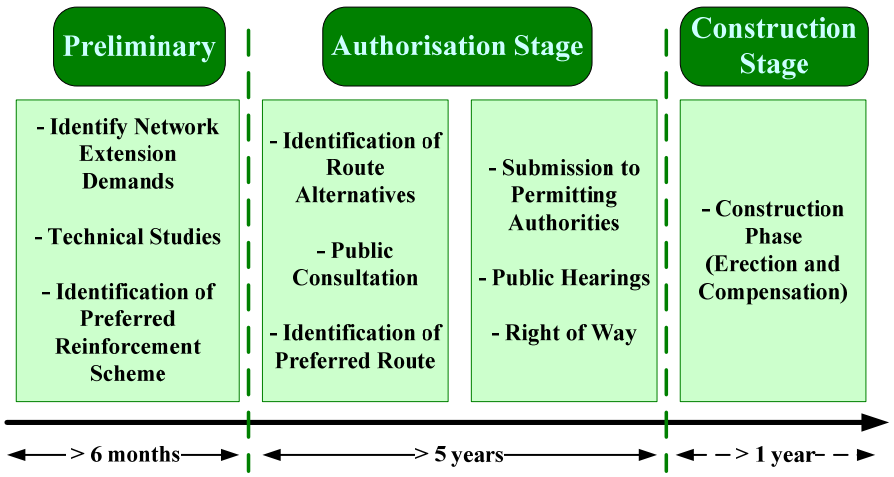


Figure 4-1 Stages and average durations of the transmission planning process [6]

Generally speaking, approval procedures for building new transmission lines cover the following stages [10], [5]: the TSO is the initiator of the project and conducts first a feasibility study. The purpose of this study is to plan several route options for building a new transmission line. These options should be feasible from all aspects, namely technical, technical-economical, administrative, social and environmental. The planning authorities are involved in this process – formally or informally – with regard to spatial planning, environmental aspects etc. This study phase is concluded by requesting the respective authority to permit construction of the transmission infrastructure along one of the proposed routes that proves to be optimal. At the centre of this application is the environmental impact assessment (EIA), which has to be performed according to EU and national laws in all member states. In some countries a strategic environmental assessment (SEA) is also performed beforehand at national level for potential new infrastructures, but its results are not used in the EIA. With respect to national environmental legislation, local authorities will be involved. In addition, a public debate or a formal dialogue is compulsory and each stakeholder has a right to express their own opinion. Finally, all other national legal requirements (concerning water rights, protection of the right of property building law, environmental protection, conservation of protected species etc.) will have to be met. Only afterwards, will the approval be given by the authority in charge. For building a new line, licenses also have to be obtained, and this process is done after or simultaneously with the authorization procedures. The expropriation phase is effected in the end via either amicable agreements or legal easements. When all approvals are granted, the construction process can begin.

International projects follow the same steps described above, but these steps are done for each of the involved countries according to their own national procedures. It is important to decide first on a physical interconnection point at the border, before starting the rest of the procedures. If for one country the authorization process is longer, the whole project will suffer.

A. Obstacles to building new transmission lines

In [10]-[11] existing approval procedures in a number of European countries were reviewed with the purpose of identifying different methods that are adopted to overcome the barriers to transmission system development. Hence, real case studies, based on the experience of TSOs from Austria, France, Germany, Italy, and the Netherlands, were analysed in order to generalise and pinpoint the main strengths and weaknesses and to select the best practices from the current approaches.

After a thorough examination, various obstacles in the process of obtaining authorization for a new transmission line project have been identified and are summarised below.

The approval procedures are lengthy due to their inefficient structure. In Austria, Italy and France, stakeholders can object at any time, bringing complaints that need to be investigated and thus cause delay. In the first two countries the authorization process does not follow the schedule set by law, while in France such a schedule does not exist. Not all the countries have clearly defined time steps for the authorization procedures. All surveyed TSOs recognize a failure to meet the schedule for the permitting procedures. Moreover, delays can be encountered also because of interdependencies between the licensing process and the EIA in Italy and respectively the National Fitting-In Plan in the Netherlands. In addition, approval procedures have a high planning and permit risk due to legal and bureaucratic issues.

There is a low social acceptance of new transmission line projects. Projects are not recognized by the Local Authorities and the population as essential. “Market” has sometimes a negative association in the public eye and the public most of the times does not see any benefits coming from the liberalized electricity market. In France and the Netherlands the population increasingly refuses the “traditional” energy supply model claiming that they prefer distributed generation and local integration of renewables (RES), which allegedly should obviate the need for “big” transmission lines. Furthermore, there is insufficient support from politicians for transmission line projects.

There is a growing fear for public health because of EMF (electromagnetic field) and other environmental concerns. As there are no standardised EMF limits at European level, the subject of EMF effect on human and animal health is a cause of concern for the population.

It is difficult to build new lines. In populated areas the NIMBY (Not In My Back Yard) effect is very high, as people oppose to having lines passing through or close by their properties. On the other hand, it is also extremely difficult to build new lines in natural protected areas. In countries like France where the Natura2000 protected areas are many in number and big in surface this is indeed a problem. There are lengthy discussions on the use of other transmission technologies such as underground cables in order to avoid overhead lines (OHLs) passing through populated areas.

There is general agreement that the differences in regulations and approval procedures between countries constitute a problem when dealing with international projects. Moreover, gold-plating and

overshooting of European legislation by the national laws can create difficult conditions for the approval procedures by setting unreasonably high constraints and by giving space and reasons for the population to complain about or appeal authorisations. Authorities are not suitably prepared for a project involving many parties. It often happens that the manpower is insufficient and the personnel have to work simultaneously on more than one EIA. There is also concern that manpower within authorities is insufficiently trained for tackling increasingly complex and tangled permitting procedures.

The EIA report is usually too detailed and implies high costs (in Austria this takes up to 4% of the total project cost). Some of the TSOs (in the Netherlands and Italy) complain of extra delays caused by too many detailed optimizations that have to be done during the environmental research. Additionally, some TSOs state that there is no appropriate trade-off performed by the authorities between environmental issues and the public interest for security of supply. The public interest of the project is justified at the beginning of the approval procedure and then forgotten in the following stages.

B. Recommendations

Considering the problems identified in the reviewing process, the following recommendations for possible solutions have been elaborated.

Support and integration are needed. Support from national and local political bodies for projects of national and European importance should be mandatory and defined by law. The priority projects of the European Union should be integrated with the TSOs' strategic projects and vice-versa.

Communication with politicians and the local population should be intensified. To that purpose working groups with local politicians should be organised. These improvements have been recently adopted by all studied countries and they prove to be successful in reducing the public opposition. Shared solutions should be promoted through dialogue with regional and local stakeholder organizations. In France, Italy and Netherlands this has been introduced.

EU and national legislation should be harmonised and overshooting through national laws (gold-plating) should be eliminated. Moreover, European-wide standards on EMF to define exposure limits should be developed.

All the steps of the approval procedures including the necessary documents should be clearly defined. There should be only one moment in time when parties can object; the Dutch experience proves this is a good solution. Legal consequences should be defined in case of deliberately obstructing the schedule of the approval procedures. A simplification of the authorization procedures for projects of high national and international interest should be considered. In such cases the number of authorities in charge of the authorization procedures should be reduced, preferably to the national level. The Dutch and Italian examples prove that such an approach can speed up the approval process. The process of obtaining licenses should be done after the route for the new line has been approved. In this way, delays caused by repeatedly modifying reports and obtaining new licenses can be avoided.

The manpower in charge of infrastructure projects at the authorities' level should be sufficient and knowledgeable. Parallel work on different projects should be avoided in order to speed up the approval procedures.

Good integration and compensation schemes should be defined in order to envisage: a) the improvement of the integration into the landscape of the new line (this is currently adopted in all the four studied countries); b) the improvement of the integration into the social environment of the new line by compensating the local population for inconveniences and accompanying local economic development proportionate to the actual caused damage (in France and Italy such an approach is already used); and c) the compensation for visual and audio pollution and any other important inconvenience caused during the construction work of a new line. This would increase public acceptance and reduce the opposition to other new projects in the long term.

A legal basis should be created for allowing construction of new transmission lines in natural protected areas, provided that the environmental effects can be reduced and good compensation measures are taken. The possibility of reserving "infrastructure corridors" for important projects should be created. Infrastructure planning should be coordinated. In Italy and Netherlands such corridors already exist. Innovating technologies should be taken into account, and the existing grid should be optimised by extending the lifetime of assets and by using the existing grid to its full potential.

The SEA can be seen as an opportunity and a tool for preventive discussion with stakeholders for locating new transmission infrastructure. However, only some countries perform such an assessment. In Italy it is done explicitly, while in the Netherlands the SEA is included in the National Zoning Plan for Electricity Supply. Where both a SEA and an EIA are performed it would be important to incorporate the results of the SEA into the EIA.

The German Experience

The case of Germany was also briefly reviewed, notably because since 2009 a new law has come into force, namely the EnLAG (Transmission Line Expansion Act) [32]. Before this law, administrative procedures were very lengthy, reaching 10-12 years. The EnLAG targets the acceleration of approval procedures for new transmission lines and it makes use of two instruments, namely procedure simplification and usage of innovative technologies for exploiting and expanding the grid. The simplification of procedures refers to three aspects: planning of needs by identification of priority projects; simplification of legal procedures by applying to only one instance; approval of plans for connecting offshore wind power plants by procedures aiming to focus the development in territorial maritime areas. However, the experience with EnLAG is still limited in order to notice the decrease in the time needed for approving a project.

4.2 Consensus in relation to the transmission planning process

This section is based on input from the partner TSOs in the REALISEGRID project (RTE-France, Verbund-Austria, TenneT-Netherlands, Terna-Italy). They were asked to answer questions regarding consensus and the planning process. Their replies were structured in the following paragraphs.

What is consensus (when applied to building a new transmission line)?
"Consensus is a process that seeks not only the agreement of all / most participants (involved in the realization of a new transmission line), but also the resolution of minority objections."
In France, the term "processus de concertation" is used: it is also a process seeking the agreement of most participants. However, it differs from "consensus" in that the aim of "concertation" is to prepare a decision, not to make a decision. There is generally a decision-maker who is the responsible party (in this case, the TSO or the government). All stakeholders do not have the same role or responsibility. It also differs from consultation in that "concertation" is a process which includes discussion, exchanges of views, attempts to create consensus.

Can consensus be created during the lifetime of a project?
The TSOs believe that consensus is not actually possible exactly as given by the above definition (not 100%). It is hard to make all the parties agree, and the challenge is to make as many parties as possible agree. However we shall still refer further to this decision-making process as consensus. It is important that consensus is created during the planning phase and before the line is constructed.

When should consensus be obtained?
The TSOs were asked when consensus should be obtained in relation to the three phases of the transmission planning process illustrated in **Errore. L'origine riferimento non è stata trovata.**. It was agreed that it is important to obtain consensus starting from the preliminary (planning) phase, but this is also necessary during the authorisation phase. In the construction phase consensus is not needed since this is only a matter of implementing decisions agreed upon at earlier stages. During the preliminary phase it is essential to have debates around programmes and scenarios in order to foster a common comprehension of needs and possible solutions.

Responsibility - Who should take the lead?
Usually the organization in charge of obtaining consensus is the TSO whether this is written in the law or more informally agreed. For example in France, even though the state is in charge of the "concertation" process, the TSO is the one who takes the lead. In Austria the TSO is responsible for achieving consensus. During the authorization phase, political coordinators are also sometimes involved. In the Netherlands, the governement, more special the Ministry of Economic Affairs, is officially in charge of the "concertation" process, and TenneT gives support to the ministry.

Should there be support for the TSOs during the consensus process?
It would be useful if the TSOs were supported in their attempts of obtaining consensus by authorities such as the State, the Regions and Municipalities, users of the grid and other important organizations. In Austria for example, the federal government must offer support due to the laws that were passed in the parliament. Local politicians could support but they usually behave

strategically by staying on the voters' side. In France, the TSO finds itself often alone in the battle. In the Netherlands, TenneT is the one actually who supports the Ministry of Economic Affairs.

What does a TSO do for consensus?
In the process of obtaining consensus the TSO is leading an open communication with all the involved parties. In Austria the TSO cannot do more that that, and laws that give higher priorities to strategic transmission projects and more legal tools to the TSO for the preliminary planning phase are needed. In France, during the "pre-concertation" phase of a 400 kV overhead line project, in order to discuss the need, the project and to identify areas of study, 400 meetings were needed; in the final phase of route adjustments, 4000 meetings were needed over a period of 6 months (see http://cotentin-maine.com).
In the Netherlands, TenneT gives technical information to the Ministry of Economic Affairs and gives support when the ministry organizes information meetings.

What information should be presented to stakeholders in the informative phase of the consensus process?
The experience of the TSOs shows that giving as much as possible information helps to lower resistance and to achieve a consensus earlier. Hence questions such as "Why?", "How?", "Where?", "What are the benefits and what are the impacts for each stakeholder?" have to be answered during this phase.

What instruments should be used for creating consensus?
Planning phase
During the planning phase direct contact with regional authorities is needed. Communication must be intensified and stakeholders' consultation can be useful. Debates on programs and scenarios are helpful as long as building long-term relationships with NGOs.
Authorisation phase
In the authorisation phase direct contact with the local authorities, residents and farmers becomes very important. Also the relationship with NGOs plays an important role. The instrument of public debate should be used as well as the consultations from the preliminary planning phase. External studies, political coordinators and continual open communication are a plus.

How can the authorities help the TSO during the authorisation phase?
A simple legal framework and acceleration of procedures is the first help needed from the authorities. Moreover, authorities should give public support and assume their responsibilities.

4.3 Compromise and consensus

This section discusses the issues of compromise and consensus. As stated in the previous theory in Chapter 3, consensus and not compromise have to be strived for, at least beforehand. However, in complex infrastructure planning issues, it is very hard to get all the stakeholders to agree, and hence the need for compromise seeking becomes important.

In Section 3.1 the typologies of policy problems and types of interaction needed for solving them were briefly presented (Figure 3-1). Building new transmission lines is a complex problem that revolves around the technical, economic and social spheres. Reaching consensus is subject to a conflict of interests between the people and organizations that have a stake in this problem but values at stake can also be a source of dissent. Hence, this problem should be treated as an unstructured problem, requiring structuring, which is to produce new insights into what the problem is about by engaging multiple stakeholders in an open dialogue. Both high public participation and participation of experts are needed for problem structuring.

Research on the topic of compromise-seeking for selecting the power line path is reported in [33]. A multi-criteria decision aid system (DAS) to obtain acceptable paths with the integration of various socio-economic interests of stakeholders involved in the planning process is presented. Geographic information systems (GIS) are used together with multi-criteria weighting techniques that should realistically reflect the interests of all stakeholders (e.g. utilities, environmental organizations or local and regional authorities). By using this tool the effect of various preferences on the path chosen for the transmission line can be visualised or investigated, and different conflict of interests could be reduced. Hence attention should be given to such aids in the consensus process.

4.4 Managing social acceptance: the ESTEEM TOOL for new energy projects

The EU project Create Acceptance [34] was finalised in 2008 and had as a main targets studying cultural influences on renewable energy acceptance and developing tools for the development of communication strategies to promote acceptance among key actor groups. The main outcome of this project was the ESTEEM tool (engage stakeholders through a systematic toolbox to manage new energy projects*)*. This tool is developed for projects managers of new energy projects who want to improve the societal acceptance of their project by stimulating the participation of stakeholders. The ESTEEM tool, including the complete manual and background information is freely available via [36].

ESTEEM is designed as a process methodology consisting of six subsequent steps. One of its main goals is the beginning or the improvement of a communication process between the project manager and relevant stakeholders such as NGO's, policy actors and the local citizen community. The second target is to develop several action plans that the project manager can undertake to improve societal acceptance of the project. The process is facilitated by a “consultant”, who is in charge of organizing the reflective practice of the project manager. Esteem is a method that is used to shape other “tools” and interactions for enabling reflection in action and on action [35]. In Create Acceptance, consultancy plays three roles: namely of an evaluator, of a consultant and of a mediator. Figure 4-2 presents an overall view of the process used by the ESTEEM tool. This process has 6 main steps.

- **Step 1: project past and present**. Communicating the project to other players and stakeholders is essential to getting their support. The first actions taken with the ESTEEM tool aim at formalising a few documents accounting for the project’s story, rationale as well as the context in which it was developed. Such accounts serve a double objective: they help the project manager and his team to take some distance, identify opportunities and barriers and list key players for the project; they also provide a first communication tool between the project manager and the project stakeholders.

- **Step 2: vision building**. This step has the purpose of facilitating the identification of the different visions and expectations of the project's main actors and stakeholders.
- **Step 3: identifying conflicting issues.** This step facilitates the identification of the major issues associated with a project that could lead to conflicts or alliances.
- **Step 4: portfolio of options.** This step helps in the identification of which parts of hardware, software and context of the future installation are likely to be modified for increasing stakeholders support. It also clarifies which choices the project manager prefers for the following negotiation rounds.
- **Step 5: getting to shake hands**. This step proposes to assist in testing/evaluating stakeholders' acceptance of a limited number of options that were developed in step 4. To this purpose a 'workshop' structure with different representation and participation forms is recommended.
- **Step 6: recommendations for action.** The final step of ESTEEM is action-oriented and it provides an overview of the most acceptable options available for the project. Recommendations and an action plan on how to enhance the project's acceptance and help the decision making process are built.

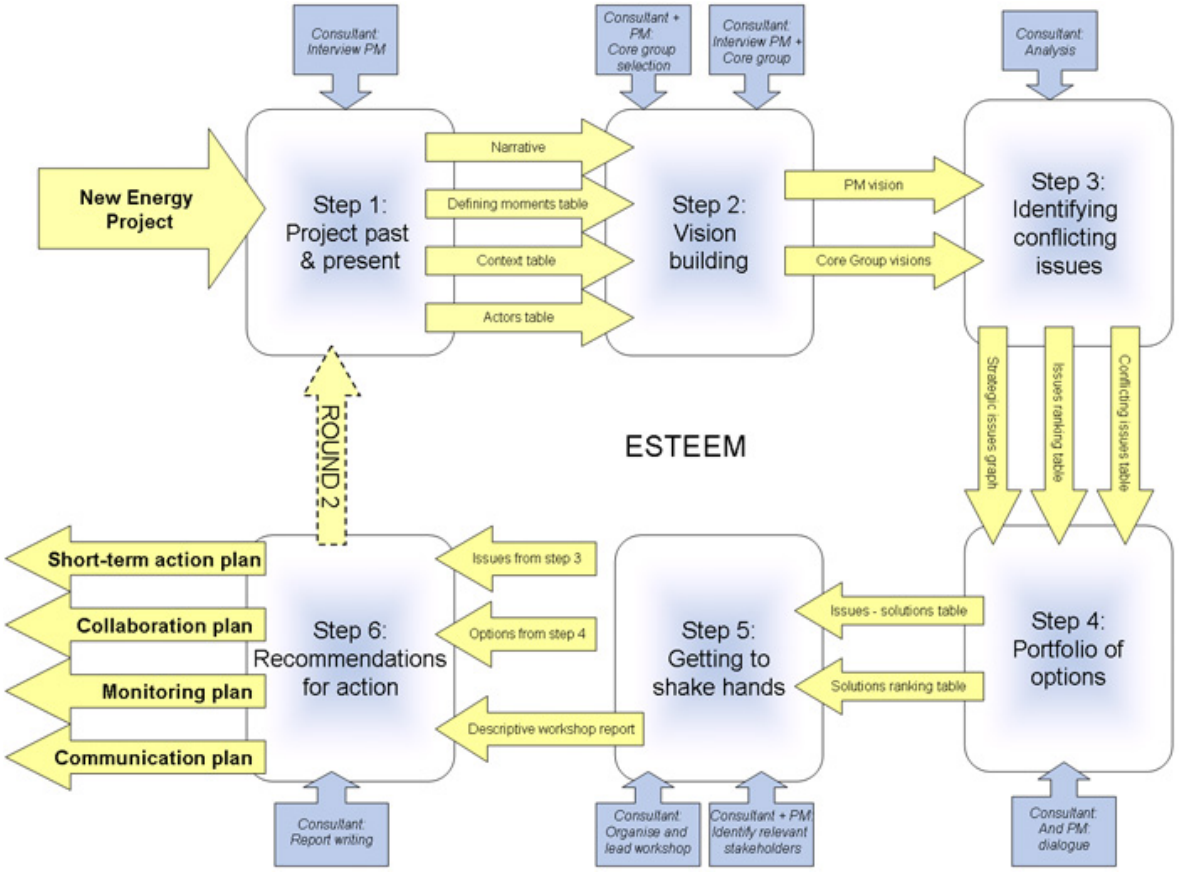


Figure 4-2 The six steps of the ESTEEM tool [36]

The "Create Acceptance" project dealt with the problem of a new energy project as with an unstructured problem. It can be also noticed that the consensus process as described in Chapter 3 and the steps of the ESTEEM tool are somewhat similar. Both processes in the end seek for an increased public acceptance regarding the solution to a problem. The ESTEEM tool tries to consider

for each individual project the particularities given by the type and location of the project and address them in its process. As ESTEEM focuses on local projects it cannot be directly used for large transmission infrastructure projects, but it can be considered as a good example, and even adapted for those parts of an infrastructure project where local conflicts are likely to arise (for instance during the authorization phase).

5 TUNING OF THE CONCEPTUAL FRAMEWORK WITH THE SPECIFIC TRANSMISSION PLANNING PROBLEM

5.1 The consensus related findings of D3.7.1

As it was noticed in D3.7.1, the authorization process for building new transmission infrastructure is influenced by more factors such as regulations, procedures and also opposition that comes in more forms. This opposition is directly related to the consensus process.

Looking at the conclusions of D3.7.1 which were also reminded in Chapter 4, we can identify the obstacles to building new lines and the recommendations of how to overcome these problems that are related to the consensus process. All these are summarized in Table 5-1.

Table 5-1 Summary of consensus related findings of REALISEGRID D3.7.1

Obstacles
low social acceptance of new transmission line projects
fear for public health because of EMF and other environmental concerns
difficult to build new lines in natural protected areas
very high NIMBY effect
lengthy discussions on the use of other transmission technologies
insufficient support from politicians for transmission line projects
no appropriate trade-off performed by the authorities between environmental issues and the public interest for security of supply
Recommendations
support and integration
intensified communication with politicians and the local population
good integration and compensation schemes
Strategic Environmental Assessment (SEA) - an opportunity and a tool for preventive discussion with stakeholders for locating new transmission infrastructure

5.2 Proposal for an effective consensus process for new transmission lines

As already recognized in e.g. [25], it is important to include all the affected stakeholders – without forgetting those who would suffer from electricity supply deterioration – in the transmission planning process. Moreover, they should be involved timely enough in order to exert some influence over the proposed solutions that are supposed to solve the problem at stake. Citizen participation even from early stages of the planning process could reduce opposition by increasing acceptance and easing the implementation of a solution.

The consensus tool should be used at various stages of the planning process, and not only in the authorization phase in order to achieve a good and accepted implementation of infrastructure projects. At present, in some countries there is a certain involvement of the local authorities and population in early stages of defining the trajectory of transmission projects. In Italy, this is an "unofficial" phase that is defining a preliminary project in consultation with the local authorities. It consists of making technical and environmental preliminary feasibility studies and identifying preferential routes for the new transmission lines, and the areas potentially affected by the lines on the basis of the existing constraints (such as landscape, protected or urban areas and so on). The preliminary study is submitted to the Regional and Local Authorities in order to establish a prior agreement on the location of the line. Also at a later stage, after the authorisation request has been

submitted, a public hearing is carried out with all the concerned parties and objections can be expressed during this stage.

REALISEGRID D3.7.1 [10] showed that at present in some countries there is a certain involvement of the local authorities and population in early stages of defining the trajectory of transmission projects. In Italy this is an "unofficial" phase that is defining a preliminary project in consultation with the local authorities. It consists of making technical and environmental preliminary feasibility studies and identifying the areas potentially involved by the lines (called "corridors") on the basis of the existing constraints (such as landscape, protected and urban areas and so on) and preferential routes for the new transmission lines. The preliminary study is submitted to the Region and local Authorities for any observation in order to previously agree with them the location of the line. Also at a latter stage, after the authorisation request has been submitted, a public hearing is carried out with all the concerned authorities, and objections can be expressed during this stage.

The strengthening of regional and local dialogue is one of RTE's (the French TSO) commitment with the French State since 1992, which has been renewed in 1997, 2001 and 2005 in order to give a response to a strong environmental and social requirement of public, associations, local economics and policies actors and elected representatives. Increasingly, local and regional actors seek to influence decisions as earlier as possible in the land planning process. The *concertation* – leaded by the regional government's representative (Préfet) – alows to:

- Submit the transmission line project to the local actors,
- Identify the specific environmental features and cultural identity of the region,
- Define with the local actors the best route environmentally speaking for the new transmission line, so that it fits perfectly in the landscape,
- Define mitigation measures with regards to the new constraints brought by the project in order to reach an environmental well-balanced route,
- Build step by step the "environmental impact assessment "which will be submitted to the "public administrative inquiry"

Consensus is a collaborative process where all participants develop and agree to support a decision that is in the best interest of the whole. During the consensus process it is of high importance that the opinions and ideas of all stakeholders are carefully considered and that there is a care to address all legitimate concerns [19], [20]. Hence, consensus is a powerful tool as it implies that all the stakeholders are committed to a decision and that they are engaged to their own tasks in making the decision work. Moreover, consensus is a process of discovery where people try to combine the collective wisdom of all stakeholders and to produce the best possible decision in which everyone wins by serving shared interests. It is highly recommended that the consensus process is supervised by an impartial, knowledgeable and experienced facilitator who is able to engage with all the subjects and guide the process towards a fully supported solution, solving when necessary cases of minority dissent. The successful EC coordinator approach has proved to work at transnational level on strategic projects, but the EC can be perceived as a subjective party. The involvement of EC and national representatives is a key aspect, but the facilitator should be a neutral body.

It is important to note that consensus is not a tactic to convince stakeholders to conform to something already decided in advance. In achieving consensus, the stakeholders are actually participative. Just appearing participative without really agreeing with the decision can lead to "false consensus" that implies resentment, cynicism and inaction. Thus, when talking about building new transmission lines it is important to have a supported solution before starting the

authorization procedures. The French and Italian initiatives are a good start for improving consensus.

The following sub sections will focus on building consensus for easing the authorization phase of a new transmission line. However the previous phases in the planning process should not be disconsidered as they have direct impact on the authorization phase duration regarding the stakeholder reaction to the proposed projects.

5.2.1 When and how to define consensus for easing the authorization process?

In chapter 3, the most important facts about consensus were summarized. In order to proceed we need to keep in mind that consensus is a collaborative process and not a tactic to convince participants to conform to something already pre-decided. Consensus has the target not necessarily to make a formal decision, but mostly to produce a legitimate solution to which most participants are committed, and that due to this high level of support will face a reduced opposition at a later formal stage.

Thus, when talking about building new transmission lines it is important to have a supported solution before starting the authorization procedures. The French and Italian initiatives are a good start for improving consensus.

By looking at Table 5-1, we can deduce that there can be 4 levels between which a consensus can be defined: international, national, regional, and local, as illustrated in Figure 5-1. While the first three levels are more oriented towards support and integration, intensified communication with politicians and local population and the SEA, at local level the focus is more on issues like refining the integration of the project in the local environment, and creating good compensation schemes for the affected population.

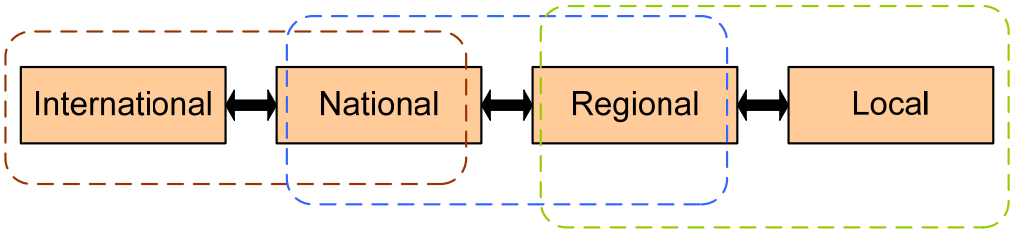


Figure 5-1 Levels between which consensus can be defined for new transmission lines

In Europe, at international level, the European Union defines priority projects to meet the strategic interests of Europe as a whole. Similarly at national level, each member country defines its own projects based on national interests. EU priority projects are not necessarily recognized by the member countries as a priority and therefore may meet even more delay because of this. Hence, the support from national and local political bodies is very important in order to ease the implementation of EU projects. Of course, there is a need for a better legal instrument that should define a mandatory support of EU priority projects, but also there is a need to reach consensus between European and national bodies, in order to meet all interests at stake. This means that EU priority projects should be integrated with the national TSOs' strategic projects and vice-versa. The result should be a list of projects that are highly supported at national level, opening doors for the next steps. We shall refer to this consensus process as the international-national one.

After the consensus at international level is reached, at national level there is a list of strategic projects that meet international and/or national interests and which are supported by national political bodies. Each of these projects affects one or more regions of a given country and there needs to be a consensus that should bring together both regional and national interests into a legitimate solution. This consensus process should preferably take place before starting the official authorization phase in order to submit to authorization only solutions to which all stakeholders feel highly committed. The support of local political bodies becomes important at this level. The outcome should be a common solution in terms of technology and trace. The concerns of all stakeholders should be considered at this stage. Compensation schemes for the affected communities can be defined here too. This consensus process will be referred to as the national-regional one.

The last critical moment in the authorization path takes place at the local level and has to do with the licenses for building the line. The last consensus process should be built here. Usually, at this level there is no direct benefit from building the new transmission infrastructure, thus the definitions of good compensation and integration schemes are crucial. These schemes have to be proportional both to the actual value of the caused damage and to the importance of the project and they should not foster free-riding strategies. The support of local politicians and also of key national political figures is very important. This consensus process will be referred to as the regional-local one. At this level, the ESTEEM tool presented in Chapter 4 could be adapted and used for promotingacceptance of the different communities that are affected by the new line.

5.2.2 Preparing for decision making

5.2.2.1 Determine whether consensus is the right decision-making tool

In the case of transmission line planning experience shows that consensus has to be obtained but many times it fails. This is because the process is not a real consensus process. The rules of consensus have to be understood and known by all participants (as explained in the following sections). Actual consensus is needed for building new transmission lines and can be obtained if the game is played by the book and all decision-making parties are engaged in producing a common legitimate solution.

5.2.2.2 Facilitation

Good facilitation is essential for the success of a consensus process. Hence skilled facilitators that are supervising and guiding the dialogue have to be engaged in the consensus process. They should be in charge of scanning the existent stakeholder groups and choosing the right participants for the consensus meetings; editing and distributing relevant and sufficient background information needed for a better understanding of the issues under discussion, guiding others in producing documents that can help clarify disagreements or produce new agreements, point out the weak points in the consensus process and assist the decision group when needed.

It is important to choose adequate facilitators. They should be neutral or independent bodies that have no stake in the decision. The other key features of a facilitator are process-management skills and solid background knowledge of the problems under discussion. In addition, at international level, the facilitator should also have the tact and intelligence of handling cultural differences and principles. At European level it is difficult to find a completely impartial body for facilitation, that

is able to manage the "against everything behaviour". The successful EC coordinator approach has proved to work at transnational level on strategic projects, but the EC is not actually completely impartial. ACER would be another possibility, but their impartiality should be investigated. ENTSO-E also is not impartial so has to be disregarded. Another solution would be to create a new, independent body to act as a mediator for infrastructure projects.

The steps described next will be supervised by the facilitators.

5.2.2.3 Who takes part in the consensus process?

One of the preparing steps of a decision making process is to decide who will be involved in the decision. Hence at each of the three consensus processes defined earlier the appropriate group members have to be determined and after that their roles in the process should be decided. The participants should be people that are affected by the decision, people and organizations who will implement the decision, people whose support is vital for implementation, important stakeholders, useful experts and people who give credibility to the decision.

Some general outline of the participants can be made as follows:

- At international-national level, participants that should be included are representatives of the European Commission, representatives of ENTSO-E, representatives of national TSOs and national political and regulatory bodies, other relevant experts and stakeholders, environmental groups.
- At national-regional level, the essential players are the national and local political bodies, the TSO, representatives of the potentially affected communities, environmental groups, any other relevant experts and stakeholders.
- At regional-local level, the important participants are the TSO, the affected communities, local authorities, relevant experts and other local stakeholders, environmental groups, if needed national political bodies.

The issue of who to include in the dialogue is a very sensitive and important one, and as shown in previous sections, the presence of a skilled facilitator or team of facilitators is highly recommended. The facilitators should make a thorough analysis of all existent stakeholder groups and choose the ones suitable to participate in the consensus meetings for a specific project. As each transmission line project has its own particularities, the stakeholder categories that are chosen for the consensus process may differ from case to case.

For example, environmental groups are a very important stakeholder group as they can have a major influence in the development of a transmission project. Improving the relationship between TSOs and environmental groups can be important and play a key role in obtaining a positive outcome at the end of the consensus meetings. However, it is important that their presence is balanced with the other key stakeholders.

5.2.2.4 Clarify the decision group's scope and authority

The group's purpose, authority, values and operating agreements have to be decided before the meeting starts and written down in a group agreement. A priori the consensus meetings, the facilitator should create this agreement by answering more questions that can help define the scope and authority of the group [19].

5.2.2.5 Agenda setting

In all cases an agenda has to be established, in order to make a plan of the consensus process. All key aspects that could help reaching an effective consensus should be envisaged. As the problem of building a new transmission line is a complex one, several meetings will be necessary during the consensus process. Aspects such as educating the participants regarding the principles of consensus and arriving at a common understanding of the problem at stake are very important. Future actions and deliberations should be therefore framed and planned as indicated in chapter 3.

There are many issues that influence the public perception of new transmission lines, and they should all be treated during the consensus meetings and if possible in the information sharing phase. Some of the most important concerns are reminded later in section 5.2.3

5.2.2.6 Education of consensus participants and information sharing

It should be kept in mind that the knowledge that people have about a certain issue might influence directly their attitudes towards that issue [26]. Hence, before starting with the meetings of the consensus process, it is essential that all participants have a common understanding of what consensus is and what the problem at hand is.

5.2.2.6.1. Education on consensus principles:

The consensus principles should be made clear and understood by all participants:

- The solutions are searched and obtained through cooperation of all participants
- Disagreement is allowed as long as it takes place in a respectful tone and it brings constructive ideas.
- All participants have the right to express their opinions and concerns and have the same weight.
- The proposed solution(s) must serve the interest of the group and not subjective preferences.

5.2.2.6.2. Education on the problem to be solved and its background:

This step is a process of gathering and sharing of information that is relevant to the problem under study.

Firstly, informative documentation and maybe also meetings should be arranged for the participants who have no technical knowledge of the problem. The participants should all have at the end of this phase knowledge of how power systems work and their evolution in time, and the challenges planners and operators are facing today. They should learn not to take for granted the fact that when they turn on a switch a light bulb will shine.

Secondly, a more focused informative phase should follow by presenting the problem under study and its background. Experts can help to provide and clarify this sort of information. All facts should be presented and analyzed, as well as the values of the stakeholders. All costs and benefits associated to the project should be presented in a clear way to the participants. In section 5.3 the REALISEGRID approach on how to present these costs and benefits is presented. This approach is based on the cost-benefit analysis introduced in deliverable D3.3.1 [7]. At the end of this phase it should be clear what the problem is and its impact, including future implications. An ideal outcome and some preliminary alternatives for realizing the project could also result in this phase.

5.2.2.7 Start the meeting on the right foot

At the first consensus meeting it has to be checked whether all participants share a common idea of what will be accomplished and the means of doing that. This can be done by addressing 7 key questions in the first minutes of the meeting: Why are we here? What are we authorized to decide? Who is in the room? What special roles will people be playing? Do we understand the consensus process? Do we understand the agenda? Are we willing to commit to the ground rules? The consensus meetings should not effectively start before these issues are 100% clear.

5.2.3 The consensus meetings/process

As mentioned in section 4.2.3, the consensus meetings should go over all possible concerns of the participants and they should consider all opinions in the process of finding a common solution.

The ideas are to be built on the relevant studies such as:

- Topographic studies, flora, fauna, natural protected areas.
- Geological and hydrogeological studies,
- Crossing issues (eg, crossing railroads, roads, rivers ...)
- Location of cables/conductors and impact on the magnetic field produced by the transmission line.

The process should follow the steps indicated in Figure 3-2. Hence after educating the participants and making sure they all understand the purpose of the consensus meetings and the subject under discussion, it is important to establish the explicit decision criteria that will help them to shape good solutions. The *must* and the *want* criteria will be defined as indicated in Chapter 3. *Must* criteria are compulsory for a solution to be adopted while *want* criteria are not. The *must* and *want* criteria are very important as the solution crafting and support will revolve around them. The section on public perception of power infrastructures will give an indication of elements that could also affect these decision criteria.

The solution crafting is a next natural step of the process and it starts with shaping a draft proposal through consultation of stakeholders. After that, the solution is tuned and during this process the group ownership (and not individual) for the proposal should be built. After the proposal has been developed, it is presented to the whole consensus group and clarifying questions should be put and answered.

The most critical step is the test for consensus after which there are four possibilities:

a Everyone agrees with the solution, and consensus can be reached.

b Some people agree, and some have some concerns and questions. These are discussed, the solution is refined and consensus is reached.

c Some member oppose the proposal (this attitude is called also “block”). This opposition determines creative dialogue where the group looks for a new solution. If this is found and all participants are happy with it consensus can be reached.

d Worse case scenario, when a proposal supported by every member cannot be found and consensus is not reached. With good facilitation this possibility can and should be avoided. Good compensation schemes will be essential at the regional-local level.

In case of a-c, the following and last step is reaching agreement. Consensus is obtained when all (ideally) or almost all stakeholders think that the proposal is the best thinking of the group at that time and it considered all raised legitimate concerns. It is good that at the end the consensus decision is formalised by having every participant sign as a proof of supporting the future implementation of the chosen solution. This could avoid some unwanted opposition in the authorisation phase.

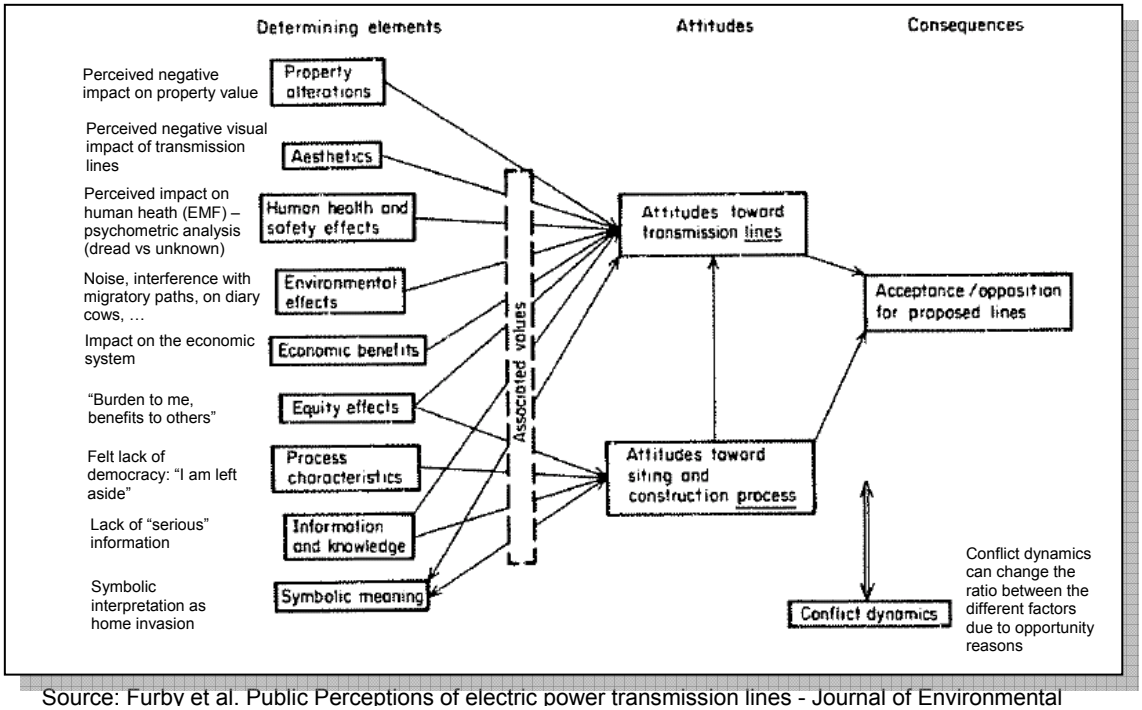
The next sections will develop issues that are important during the consensus processes for building new transmission lines.

5.2.3.1 Public perception of power infrastructures

One of the main elements impacting on the authorization path to new electrical infrastructures, i.e. transmission assets specifically is related to the social acceptance and the public perception towards these elements.

The scientific literature (see for example [25]) has investigated in detail the different issues, also called determining elements, which directly or indirectly influence the public perception and attitude towards new transmission infrastructure. These elements determining the resulting behaviour (acceptance or opposition to the new asset) are listed below and should be taken into account during the consensus processes:

a. property alterations (impact on property value)
b. aesthetics (visual impact of transmission lines)
c. human health and safety effects (impact on human health due to EMF; and audible noise due to the line's corona effect)
d. environmental effects (impact of lines on plants and animals like birds and diary cows)
e. economic benefits (impact on the economic system)
f. equity effects (impact on the community burdened by a new line as compared with the benefits of neighbouring communities not directly addressed)
g. information and knowledge (poor or ill information of public with respect to the new infrastructure to be built and to power system issues in general)
h. process characteristics (lack of or reduced public participation in the planning process)
i. symbolic issues (interpretation of a new line in the neighbourhood as a "home invasion")



Source: Furby et al. Public Perceptions of electric power transmission lines - Journal of Environmental

Figure 5-2 Public perception of new infrastructure

It is therefore important to address the above listed issues in order to remove any potential obstacle to transmission network expansion. The visual, acoustic and EMF impact can be opportunely minimised by using different measures, including new advanced, yet costly, technologies and components. Elements a.-e. are directly affecting the public perception towards a new transmission line, while elements listed as f.-i. have an indirect effect and refer to management-related issues. The combination of these elements defines the public attitude: it is important to note that conflict dynamics [25] can change the ratio between the different factors due to opportunity reasons. If at the beginning of a conflict the focus of the opposition is not directed to health issues, in later stages of the conflict there is a shift to an increased focus in this direction. Researchers [25] consider that this is more likely due to people learning that negative health effects weigh more than any other concerns in legal and regulatory fights, than to actual increased education and awareness regarding health issues. Hence the opposition makes use of the best "weapons" it can use. Research in this direction is therefore important for understanding how conflict dynamics work and to find ways of minimizing future conflicts over transmission lines. If we consider the types of policy problems presented in Chapter 3, we notice that conflict dynamics can play an important role in shifting a structured problem to one of the other types of problems. If in the beginning there is no opposition, at a later stage due to increased awareness stakeholders can start creating dissent and thus more effort and strategy is required in solving the problem.

Coming back to the three consensus processes previously defined, the level of detail of the issues affecting public perception are different. At the international-national level the dimension is mostly the national and the international impact of a project. For example, concerning the equity of building a transmission line from country A to country C that has to cross country B without any direct benefit for country B, the problem of equity will be raised undoubtedly. Elements listed a.-d. are less probable to be discussed at this level.

At the national-regional level all elements will probably be under discussion and need to be clarified and adequate solutions have to be proposed. Here the equity problem is downsized at regional and community level. And lastly, at the regional-local level usually there is no direct benefit from any new transmission line. Here the symbolic meaning will be very important, the equity effect and the impact on property value will be very high, and hence it is important to find the right way to compensate the locals for all the negative effects of the new infrastructure and afferent works.

If a consensus cannot be reached, a compromise-seeking strategy has to be used instead. In this case the involvement of national authorities or mediators is essential for reaching a solution to which a majority of parties can agree and managing the minority dissent.

5.2.3.2 General "electrical" measures for reducing the impact on the environment

There are various electrical measures that can be defined from preliminary phases of projects and they can refer to:

- Rationalization (dismantling of part of line, reducing right of way...);
- Using technology more environmentally friendly (special pylon, ...);
- Optimization of the route of the new and existing lines;
- Adoption of techniques for reducing electromagnetic field (EMF) (eg optimization phases, raising pylon, etc.);
- using cable (at lower voltages and in urban areas).
- Other.

5.2.3.3 Improving the integration of installations into the landscape

It is important to keep the impact of new overhead lines to a minimum, by systematically looking to group together infrastructures, either with other installations, or in existing line corridors. More generally, integrating an overhead line means identifying the best possible route, taking into account factors such as geography, residential areas, the natural environment, zones of economic activity (agriculture, existing infrastructures), landscapes and sites. In France, RTE (the national TSO) draws on all its expertise to successfully integrate its installations into the surrounding landscape, whilst taking account of all these factors [10].

During the consensus meetings, 3-D simulation techniques can be used to identify the "route of least impact" for installations at the design stage. This enables each party involved in the consultation to visualise the different possibilities for camouflaging towers offered by the surrounding terrain, and thereby to choose the most suitable location, as far as possible from residential zones. The digital simulation provides a precise depiction of the local geography and terrain, so that each party is able to gauge the actual impact of the line on its environment, accurately and in complete transparency.

Current technology is now able to digitise the topography of potential line sites with a very high degree of accuracy. A digital model of the terrain is created based on aerial shots. It takes account of every feature of the existing terrain: roads, bridges, water courses, and so on. The model can then be used to simulate various installations, which are subsequently compared to determine which of

them is most appropriate for the local landscape. Technicians can alter the type, height or layout of towers in the scenarios, to display the set-up that best suits the terrain.

The model is dynamic, allowing a true and accurate depiction. It is intended to help with discussions and decisions during the consensus meetings. As a result, every party to the consultation plays a part in deciding where and how the towers are going to be positioned, and can therefore gain an accurate idea of what impact the line is likely to have on its immediate environment.

Natural environments should also be taken into account when looking for a route, and when selecting tower types and installing special systems to protect bird life.

5.2.3.4 Improving the integration of installations into the social environment

It is important to support network development projects by taking into account what the inhabitants really expect in terms of territorial planning, economic development and environmental protection, Shared solutions should be built with regional and local actors, and a regulating tool which upholds high environmental, social and economic requirements, in an adequate economic framework should be created.

5.2.3.5 Compensation schemes

Compensations are all the measures/actions to reduce the impact of new infrastructures that may be linked to a specific development project of the National Transmission Grid. These measures can be defined at community level or at individual level (compensation of property value or for other caused inconveniences). Also compensation for the inconveniences related to the works at the new infrastructure can be defined at both levels.

5.2.3.5.1. Compensation schemes at community level

As shown by the Italian experience in [10], compensatory measures may include the following types of local development support, provided as compensation for the impacts of the new infrastructures: environmental development support, urban development support requalification, and EMF Monitoring Systems. These measures have to be defined together with the local communities during the regional-local consensus process.

The environmental development support refers to actions such as:

- vegetation interventions (planting);
- devices for the birds monitoring;
- extraordinary maintenance of rural road;
- funding for monitoring the environmental impacts (relatively EMF);
- interventions to mitigate the effects of road infrastructure;
- accommodation of the woods
- restoring forest tracks;
- etc.

The urban development support is done through activities regarding:

- accommodations and road works (maintenance, foundations, sidewalks, road signs);
- urban requalification of the historic centre;
- requalification municipal park;

- installation photovoltaic plants
- etc.

5.2.3.5.2. Fair compensation of property value

An interesting analysis on the subjective perception of the property value is carried out in [24]. Property rights permit specified uses of a physical asset. Disputes arise whenever an action generates externalities (unintentional effects on third parties' activities).

A typical conflict is between private and social usage of a resource. Burdening a property with an encumbrance (electrical line) entitles owners for compensation, typically defined as the difference of property price with and without the burden. However, owners of adjacent lands are usually not compensated.

Appraising the impacts of transmission lines is difficult. This is usually done by watching market sales of "similar" properties, but this can be controversial. A fair market value of a property should reflect its economic worth when employed in the highest and best use. Changes to its use due to a transmission infrastructure may cause obsolescence of the property and should be compensated (e.g. damage to wilderness image in a tourist area, alteration of tax basis of an area or its future development capability). The market value of a property should reflect the willingness to sell it by an owner in normal conditions and not under abnormal pressure. Many properties have a special value for their owner, beyond what others would pay for it (environmental amenities, family memories, etc). Therefore, properties of equal value are rarely equally desirable. Considering that the reservation value is the minimum amount of money that would entice the owner to sell a property voluntarily, unwilling sellers have a reservation value exceeding the offered one. A "plus" can be acknowledged in the negotiation, but is not disclosed (as disguisable with a bribe).

In some cases the owner refuses to negotiate not for a difference of perceptions but for a bargaining strategy. In some other cases he does not accept any compensation. Compulsory seizing can happen, even if this process is usually lengthy and more expensive than negotiated agreements [10], [24].

5.2.3.5.3. Compensation for other caused inconveniences

Compensation to individual parties can also be defined for other types of caused inconvenience by the new infrastructure which is not related to land usage and property value deterioration. This can be agreed during the regional-local consensus meetings.

5.2.3.5.4. Strategic behaviour and fairness of compensation schemes

It should be kept in mind that compensation schemes have to be proportional both to the actual value of the caused damage and to the importance of the project and they should not foster free-riding strategies amongst stakeholders.

5.3 Communicating benefits of transmission projects and the cost of inaction

5.3.1 Combination of two approaches

In D3.7.1, different experiences and issues that TSOs have to face nowadays when planning the expansion of their networks, together with first elements and options for potential solutions from the TSOs' viewpoint, have been introduced.

Furthermore, Section 4.2 made a structural proposal on how to improve the consensus process for building new transmission lines. The need of presenting clearly to the consensus participants the costs and benefits of transmission projects was underlined. Hence the current section will detail this aspect of how to communicate benefits of transmission projects and what is lost by delaying their implementation.

The view of the project REALISEGRID is that in order to obtain support by public opinion, two synergic actions should be combined in order to streamline and facilitate the transmission planning process. In particular, this combination has to take account of:

- an efficient consensus process that also implies a good information flow to the population (bottom-up approach); the ground targets are related to:
  - Providing a clear vision of benefits and costs bound with the new infrastructure. Clearly state the cost for the society deriving from inaction or sub-optimal actions.
  - Promoting a cultural action meeting all the points in the perception of a new line. Clarify the relationship between RES integration and grid development. Clarify the relationship between costs and different technical solutions (e.g. cabling).
  - Promoting a thorough evaluation of property value, so as to bring about a fair compensation value that can be agreed by all the parties.
- a clear regulatory approach (top-down approach), harmonized throughout Europe. The ground targets are related to:
  - Acting on the legal framework: simplify, harmonize, set time limits and rationalize the procedure (number of entities, number of phases, etc.).
  - Creating, especially for the most important projects, an "arbiter" to promote shared solutions and managing the entire procedure in trans-national cases.

The basic targets of a clear and harmonized regulatory approach are related to two main aspects. On the one hand, it is important to act on the legal framework: simplify, harmonize, set time limits and rationalize the procedure (number of entities, number of phases etc.). Clear and harmonised authorization procedures are essential to obtain a fast implementation of priority projects. On the other hand, facilitators should be appointed for national and EU priority projects, to promote shared solutions and manage the entire procedure in trans-national, but also national cases. Considering European priority projects, their urgency should suggest revising Europe-wide the entire approval mechanism by creating fast (priority) approval pathways at both national and local level.

A key element in the consensus process is a good information flow to all consensus participants. Hence the participants should be given beforehand both general information about how power systems work and what transmission planning involves, and also background information, such as the costs and benefits of the new transmission project, and any other important information on the

problem to be solved. The information flow has to consider all costs and benefits and clearly show the cost of inaction for all stakeholders. The ground targets are related to providing a clear vision of benefits and costs related to the new infrastructure, by stating the cost for society deriving from inaction or sub-optimal actions. For facilitating this communication, in the current section of the present report, an approach on how to communicate the benefits of transmission projects and the cost of inaction is further introduced.

5.3.2 The REALISEGRID options

5.3.2.1 Clear view of expansion benefits

The enhancement of transmission capacity is the general benefit provided by transmission expansion, which, as said, impacts on the sustainability, competitiveness and security of energy supply of the European power system. This general benefit can be further detailed in various particular benefits provided by transmission expansion. The assessment of these effects, especially in today's liberalised power systems, generally represents a rather complicate stage as the evaluation strongly depends on the viewpoint of the different players - TSOs, producers, customers- for each considered benefit. Within REALISEGRID, deliverable D3.3.1 [7] proposed a cost benefit analysis approach starting from a list of benefits derived from transmission expansion. The approach is described in the above mentioned document.

As suggested also in the REALISEGRID Interim Report [11] the time variable has to be considered for the evaluation of the benefits via the application of an indicator like the Net Present Value (NPV).
The NPV is the income generated by an investment after deducting the costs and repaying the debt. The NPV is given by the summed present value of the expected future cash flows minus the cost of the investment. In this case, considering the multi-criteria analysis and the investigation of different expansion options respect to the base case (no investment), the NPV can be expressed as a differential indicator ΔNPV:

$$\Delta\mathrm{NPV} = \sum_{t=1}^{n} \frac{-I_t}{(1+R)^t} + \sum_{k=1}^{m} w_k \sum_{t=1}^{n} \frac{(\Delta CF_k)_t}{(1+R)^t}$$

where I_t represents the costs related to the investment under study at year t, $(\Delta CF_k)_t$ is the operating (differential) cash flow related to the generic benefit k at year t respect to the corresponding base case, w_k is the weighting factor related to the generic benefit k, R is the actualization (interest) rate, m represents the amount of benefits considered in the analysis and n is the project lifetime (years). For each benefit $(\Delta CF_k)_t$ is the respective indicator of impact assessment evaluated as additional gain provided by the analysed expansion option respect to the base case without investment.
It has to be remarked that the NPV criterion is the most common one, though when comparing two or more investments it results effective if the investments are considered for an equal interval of years. Then, in these conditions, among more investment options the one with the highest value of ΔNPV has to be selected as top-ranked and proposed [7].
The usage of the NPV allows to take into account the typical investment timing, that can be grouped in three subsequent phases (**Errore. L'origine riferimento non è stata trovata.**):

- **Authorization phase** – this phase is substantially characterized by a delay due to the authorization procedures. Here, investments are negligible and normally limited to the preliminary studies carried out by the TSOs.

- **Building phase** – the infrastructure investments (I) are taken here and can be, for simplicity sake, be thought as concentrated at the starting point of the phase. At the same instant, capital (C) is lent from the bank system. The two amounts C and I reciprocally cancel themselves. Then the capital is then given back to the bank system in a certain number of rates (CC), that also incorporate a cost of capital rate.
- **Amortization phase** – when the new infrastructure is put in service, the increase in the benefits for the system begins to be apparent with respect to the situation without this infrastructure. Every year t and for each benefit i, a quantity $\Delta B_{i,t}$ will be collected.

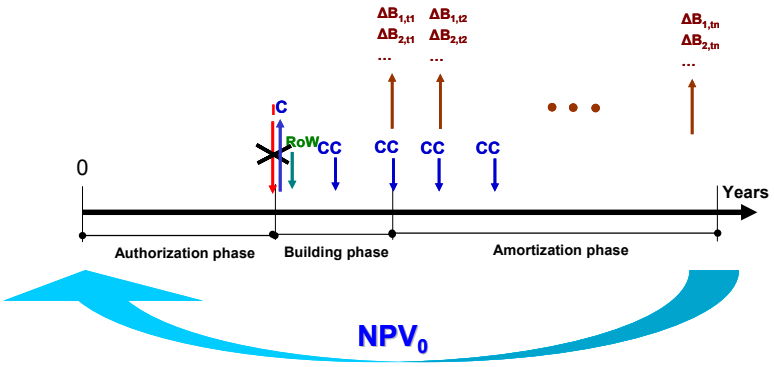


Figure 5-3 Phases of the authorization procedure

The use of NPV and the application of the above described multi-criteria methodology for transmission expansion cost-benefit analysis can be also an effective instrument to evaluate the **cost of inaction** due to a delay in one or more stages of the transmission planning process. Then, in case of lengthy or prolonged authorization path, the change (loss) in the ΔNPV, calculated for an equal interval of years, can be a measure of the cost that a postponement of the realization of a transmission option has caused to the society, as it is shown in Figure 5-4.

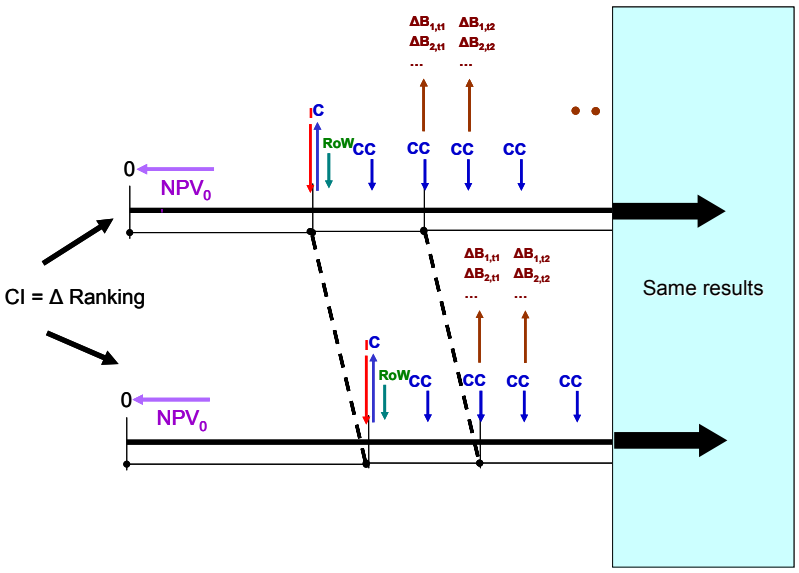


Figure 5-4 Cost of Inaction

5.3.2.2 Transmission planning anticipation

Power generation and transmission are complementary activities that need to be coordinated, both in the short-run and in the long term, to ensure an optimal use and development of the transmission network.The coordination between generation and transmission is more and more a critical issue in a liberalised power system, due not only to the unbundling of these activities but also to the investors' choice for generation technology. The power reform has prompted the generation investors to build mainly power plants that can be built in a reasonably limited time, such as Combined Cycle Gas Turbines or wind farms. At the same time, building new transmission lines faces increasing oppositions, prolonging the time needed to build transmission lines. There may then be a gap between the time to build a power plant (1-5 years) and the time to build the new transmission line needed to evacuate the power (5-10 years) [22].

These differences in construction duration create uncertainty for the network planning. Indeed, these differences in construction time can create several criticalities if the generation capacities of these new plants are significant compared to the transmission lines capacities. The connection of these power plants can thus lead to congestion and be costly. A solution to this problem could be that the TSO anticipates the connection of these new generation plants and the congestions that they may create. By anticipating the connection of generation plants, the TSO can adapt the network planning. To implement this process, the TSO must anticipate the administrative procedures required before the network upgrading. But if the network is not eventually upgraded, this anticipation is costly because of these administrative procedures. The efficiency of anticipating the generation connection and of the required transmission investment thus depends on this cost, on the uncertainty on the effective generation connection and on the required transmission investment.

In [22] the efficiency of the strategy of anticipating the connection of power plants for the TSO is evaluated in terms of the minimization of the network cost. The question is then to know if it is efficient for such a TSO to plan the development of its network in advance of the request of connection so that there is sufficient planned transmission capacity to accommodate these new generation investments. In [22] a model is built in order to measure the efficiency of anticipating the connection of generation. In this model, the connection of a generator is assumed to be like a probabilistic event. Even in areas where there are primary energy sources, the connection of a generator remains uncertain being influenced by market uncertainty and also due to the administrative agreements that the generator may not receive. In such situation, the TSO can choose to anticipate the connections or not, having respectively a proactive approach or a reactive one, despite the fact that anticipation may be costly if the anticipated event does not eventually occur. In fact, if the power plant is not connected, the TSO has meanwhile engaged some costs through administrative procedures for building a new asset without recovering such costs.

Comparing then the proactive approach with the reactive one, the efficiency of these behaviours can be measured in terms of social cost. In [22] it is proved that there exists a limit of probability for the connection of generators beyond which a proactive TSO is more efficient than a reactive one.

In order to take into account the "risk of anticipation" within the cost-benefit analysis, the extra costs for the TSO can be estimated as:

$$\Delta NPV = p * \Delta NPV_{wg} + (1 - p) * \Delta NPV_{wog}$$

where ΔNPV gives the differential NPV of the actualised net benefits by the analysed expansion option with respect to the base case (no expansion), ΔNPV_{wg} and ΔNPV_{wog} represent ΔNPV respectively in presence and in absence of the considered generator; *p* provides the estimated probability of generator connection. The term ΔNPV_{wog} includes also the sunken costs for the authorization procedures of new transmission line

5.3.2.3 Correct evaluation of intangible assets

The cost-benefit analysis should take into account external costs due to the environmental impact of the new transmission infrastructures.
However, a certain care is necessary for such an evaluation as costs bound with landscape alteration show typical "intangibility" characteristics of public goods that make monetary assessment subject to personal views (it is a matter of opinion). Criteria have to be assumed to extract an unbiased evaluation.
In the literature two evaluation methodologies referred to as collected preferences and declared preferences are reported [23].

5.3.2.4 Use of new transmission technologies

As seen, the environmental fitting of an electrical power transmission system is of increasing importance. Due to political restrictions and public environmental awareness, environmental considerations have become an important part of approval procedures and project planning.

In this subsection, the focus is on the main environmental features offered by advanced transmission technologies, in particular FACTS device and HVDC systems, as compared with conventional transmission technologies. The scope of the investigation of environmental features for both FACTS and HVDC technologies is limited to the surface occupation and to the visual profile since these two impacts are considered to have a notable public perception. Additionally, having both a low surface occupation and visual profile is a fundamental requirement during the approval process. References for electromagnetic radiation and acoustic emission are also provided.

Table 5-2 reflects the land use for selected transmission system components, in particular HVDC and HVAC. In case of overhead lines the term land use refers to the surface area occupied by the tower footing and the span, while in case of cables this term quantifies the surface area over the underground cable run. For both the span and the surface area of the cable run, the usability is constricted after construction of the line. For HVDC terminals and reactive compensation the term land use refers to the area occupied by the facility buildings [9].

The information in Table 4-2 confirms hat, in equal conditions of power transfer and voltage, HVDC provide environmental advantages with respect to HVAC. This gain increases with the power and the length of the link.

Table 5-2 Typical surface occupation for selected transmission system components

System component	Voltage level	Power rating	Land use		Unit
			Min	Max	
HVAC OHL, single circuit	400 kV	1500 MVA	40000	60000	m^2/km
HVAC underground XLPE cable, single circuit	400 kV	1000 MVA	5000	15000	m^2/km
Reactive power compensation unit for HVAC cable line	400 kV	1000 MVA	2000	3000	m^2
HVDC OHL, bipolar	±150..±500 kV	350..3000 MW	20000	40000	m^2/km
HVDC underground cable	±350 kV	1100 MW	5000	10000	m^2/km
HVDC undersea cable	±350 kV	1100 MW	0		m^2/km
HVDC VSC terminal, bipolar	±150..±350 kV	350..1000 MW	5000	10000	m^2
HVDC CSC terminal, bipolar	±350..±500 kV	1000..3000 MW	30000	60000	m^2

In addition, Figure 5-5 gives an indication of the visual profile that comes along with the transmission of 5 GW of electrical power by different transmission technologies and transmission media. Figure 5-5 shows the clear environmental advantage of HVDC transmission: its ability to go underground by the use of HVDC cables. The use of cables minimizes the visual impact of the transmission line since the surface area over the cable run can be renaturalized with e.g. bushes or shallow root trees, as long as the cable can be made accessible for maintenance or repair purposes at short notice. In case of overhead lines, the width of right-of-way can be significantly reduced by approximately 30 to 50% when choosing HVDC instead of HVAC transmission [9].

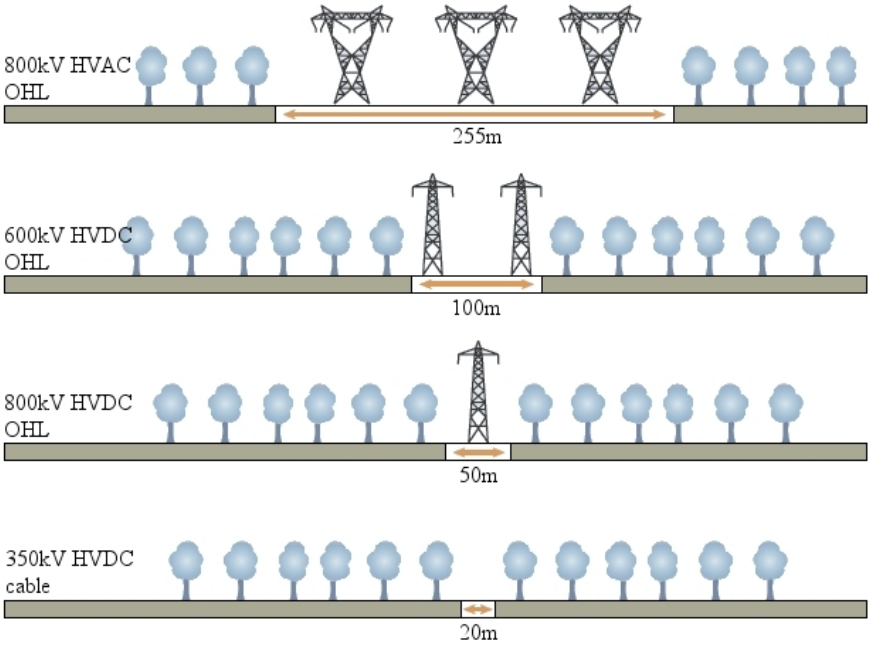


Figure 5-5 Width of right-of-way needed for the transmission of 5 GW of electrical power

Furthermore, the electromagnetic field emission of HVDC lines is not pulsating and can be forced to a minimum value in case a dedicated return conductor is used and the conductor arrangement is selected accordingly. The result is a significantly lower electromagnetic pollution compared to the electromagnetic emissions by conventional HVAC transmission, especially when overhead lines are used. However, it shall be stated clearly that today all HVAC overhead and cable lines comply with all legal requirements in terms of electromagnetic compatibility. The acoustic emission of HVDC stations has to be considered but can be reduced to comply with the legal requirements by an indoor station design [9].

It is expected that the public acceptance of electrical power transmission is improved by the use of HVDC instead of HVAC transmission systems due to its smaller environmental impact. This is especially true for the very promising VSC-HVDC, whose converters footprint is much lower with respect to the one of conventional HVDC.

Concerning FACTS, it is known that FACTS devices have an environmental impact in terms of increased surface occupation in the substations.

The usual range of surface occupation (or land use) due to the installation of FACTS devices lies between 3 and 20 m^2 per MVAR (see Table 5-2), depending on the type of device, the power rating and whether the device is relocatable (prepared to be moved to a different location) [9].

Device	Surface occupation
SVC	5-20 m^2/MVAR
STATCOM	3-5 m^2/MVAR
TCSC	3-10 m^2/MVAR
UPFC	3-20 m^2/MVAR

Table 5-2: Surface occupation of selected devices

If the device is relocatable, it usually takes 3 to 6 months to move it from one location to another. Some other aspects need or can also be evaluated, such as the potential increased noise, or the electromagnetic interference (EMI) emissions. In terms of the materials used, FACTS devices do not use hazardous materials, as they are based on the semiconductors technology, i.e. on the same element (silicon) that is the second most abundant element on the Earth crust and the major constituent of most sand in the planet.

In terms of advantages, FACTS technology has the potential to reduce/postpone the need and the dimension of new lines and cables. In a world where there is a social unrest regarding the environmental impact of new high voltage lines, this is quite an important feature. This is achieved through the increased efficiency of the electric system that FACTS devices promote, allowing a transmission capacity increase of 30-40% depending on the characteristics of the system. However, the other features and advantages of FACTS that could increase further the transmission capacity of existing lines and cables are to be taken into due account.

Furthermore, FACTS controllers are not subject to mechanical wear, having here also an impact in environmental terms, for instance, concerning a lower need of manufacturing spare parts and lower need of travelling to perform the maintenance required [9].

The advantages provided by the advanced technologies like FACTS or HVDC have however a price, since these devices are still costly.

6 CONCLUSIONS AND RECOMMENDATIONS

This chapter presents conclusions and recommendations regarding the different issues discussed in the previous chapters.

Concerning specifically the priority projects of European interest, the REALISEGRID research project proposes to combine two synergic actions in order to streamline and facilitate the transmission planning process. In particular, this combination consists of:

- an efficient consensus process that also implies a good information flow from and to the population (bottom-up approach); the main targets are related to:
  - providing a clear vision of benefits and costs related to the new infrastructure. Clearly state the cost for the society deriving from inaction or sub-optimal actions.
  - promoting an educative action meeting all the points of view in the perception of a new line. Clarify the relationship between RES integration and grid development. Clarify the relationship between costs and different technical solutions (e.g. cabling, HVDC).
  - promoting a thorough evaluation of property value, so as to bring about a fair compensation value that can be agreed by all the parties.
- a clear regulatory approach (top-down approach), harmonized throughout Europe. The ground targets are related to:
  - acting on the legal framework: simplify, harmonize, set time limits and rationalize the procedure (number of entities, number of phases, etc.).
  - creating, especially for the most important projects, an "arbiter" (facilitator) to promote shared solutions and to manage the entire procedure in trans-national cases.

The basic targets of a clear and harmonized regulatory approach are related to two main aspects. On the one hand, it is important to act on the legal framework: simplify, harmonize, set time limits and rationalize the procedure (number of entities, number of phases etc.). Clear and harmonized authorization procedures are essential to obtaining a fast implementation of priority projects. On the other hand, facilitators should be appointed for national and EU priority projects, to promote shared solutions and manage the entire procedure in trans-national, but also national cases. Considering European priority projects, their urgency should suggest revising Europe-wide the entire approval mechanism by creating fast (priority) approval pathways at both national and local level.

A key element in the consensus process is a good information flow to all consensus participants. Hence the participants should be given beforehand both general information about how power systems work and what transmission planning involves, and also background information, such as the costs and benefits of the new transmission project, and any other important information relevant for the problem to be solved. The information flow has to consider all costs and benefits and clearly show the cost of inaction for all stakeholders. For facilitating this communication, in section 5.3, an approach communicating the benefits of transmission projects and the cost of inaction was introduced.

In addition, it is important to have a thorough evaluation of property value, so as to bring about a fair compensation value that can be agreed by all parties. Compensation schemes have to be proportional both to the actual value of the caused damage and to the importance of the project and they should not foster free-riding strategies amongst stakeholders. The creation of a skilled and

impartial body to act as project facilitator is generally recommended in such situations. He should be able to engage with all the participants and guide the process towards a supported solution, solving when necessary cases of minority dissent and isolating "continually antagonistic attitudes".

One should keep in mind that in order to reduce the opposition for a certain project, stakeholders have to be involved in the decision-making process. The public perception of new transmission lines should be considered, and conflict dynamics should be studied as they can change the ratio between the different factors that influence public attitude due to opportunity reasons. Consensus must be sought from early phases of the planning process and also during the authorization phase, and hence the public should be involved at all these stages. In complex infrastructure planning issues, it is very hard to get all the stakeholders to agree, and hence the need for compromise seeking usually arises. Nonetheless, the final goal should be increasing the public acceptance of a certain project. This can be done between several levels, namely international, national, regional and local. Three consensus processes were suggested between these levels: international-national, national-regional and regional-local. At the regional-local level, the experience of the ESTEEM tool created by the Create Acceptance EU project could be used for managing public acceptance for each individual community that is affected by the transmission project.

The building of new a transmission line problem should be treated as an unstructured problem that needs a high public participation and also involvement of experts, all taking part in the action of problem structuring. Strategies of how to present the background information should be developed in order to emphasize the importance and all benefits that are brought by the new infrastructure. Compromise seeking decision aid systems (DAS) for selecting a power line path could be used during the consensus process. It would be useful if the TSOs were supported in their attempts of obtaining consensus by authorities such as the State, the Regions and Municipalities, users of the grid and other important bodies. For the authorisation phase a simple legal framework and acceleration of procedures is the first help needed from the authorities. Moreover, authorities should give public support and assume their responsibilities. The sensitivity to political instability/changes should be reduced if possible.

Concrete actions and timelines can be defined on different time horizons as illustrated in Table 6-1.

Table 6-1 Speeding up procedures: concrete actions and time horizons

Time Horizon	Actions
Short-mid term	Transparent and serious communication and information to the public
	Involvement of public in the decision-making from early stages of the planning process
	Utilisation of a neutral cost-benefit analysis
	Communication of inaction costs
	Creation of a skilled and neutral project facilitator
	Set up of a clear, fixed timeline for approval
	Utilisation of innovative transmission technologies
	Exploitation of existing transmission assets
	Development of European wide standards on EMF
	Fair compensation schemes
Mid-long term	Streamlining of authorisation processes
	Pan-European harmonisation of procedures
	Set up of clear incentive schemes
	Transmission planning anticipation with respect to generation planning
	Harmonisation of EU and national legislations
	Implementation of market reforms
	Definition of a merchant investment framework

The short- to mid-term actions can be developed without touching the roles and general principles established by national and European regulations. On the mid- to long-term, actions have to be focused on a general harmonization process that requires revising, at least partially, of the roles and/or the general principles adopted in the national and European regulation (e.g. the principle of subsidiarity).

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