Stakeholder participation in infrastructure projects

Bettina Kampman, CE Delft

Marieke Nauta, CE Delft

Emiel van den Toorn, CE Delft

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Responsible author(s):	Bettina Kampman (CE Delft) Marieke Nauta (CE Delft) Emiel van den Toorn (CE Delft)
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Abbreviations

ACER	Agency for the Cooperation of Energy Regulators
ETS	Emissions Trading System
ENTSO-E	European Network of Transmission System Operators for Electricity
GHG	Greenhouse Gas
HV	High Voltage
kV	Kilovolt
PCI	Project of Common Interest
RES	Renewable Energy Sources
TSO	Transmission System Operator
IPCC	Intergovernmental Panel on Climate Change
CCS	Carbon Capture and Storage

Executive summary

The transition towards a climate-neutral energy system by 2050 entails a significant restructuring of the current energy infrastructure network. Adaptations with regard to the existing power grid are needed to facilitate and support an increase in electrification, a changing supply-demand profile and the growth of renewable energy production (mainly wind and solar). In addition, new networks for the transport of green hydrogen and CO_2 need to be developed. The impact of this infrastructure on the living environment is diverse but can be substantial on a local level. The main issues that may create resistance to infrastructure projects are impacts on the landscape and skyline and property issues.

Participation in policy making is an important way of engaging the general public or directly affected stakeholders. Participation can take place at three levels: one-way informing, two-way consulting and two-way empowerment. There is a firm basis for dissemination of information and consultations in relation to key EU legislation on infrastructure. Two-way empowerment, which is most complex to implement, is also the least well embedded in the existing policy framework.

Participation can increase the legitimacy of the process and decision-making and it can improve policy by allowing the integration of public or stakeholder-specific interests. Stakeholders can be included in the decision-making process from an early stage to optimize the balance between local and national/EU interest. Participation can also raise awareness and political engagement and therefore contribute to a higher level of democratic participation.

EU legislation and customary provisions form a framework to implement participation initiatives, the legislation sets a minimum threshold. The success of a participation procedure is furthermore made up of elements like transparency, full information, recognition of (sometimes subjective) concerns, level of empowerment by stakeholders and in some cases financial compensation.

Participation in infrastructure development is and remains an important asset in procedural governance. It creates a procedure that can accommodate and balance the interests of the project overall and of the affected stakeholders. Flexibility is required to accommodate the diverging aspects related to the local context and the difference in infrastructural projects. Shaping and optimizing the conditions for participation procedures with respect for the diversity of the local context and difference among infrastructure projects, may enhance the quality and consistency of stakeholder participation in infrastructure projects.

1. Introduction

Infrastructure is the backbone of the economy and facilitates the functioning of society. It refers to roads, railways, waterways, pipelines, communication cables and electricity grids. It contains the transport network of a society as well as the facilities that transport energy carriers from the generation (or import) source to the consumer. Infrastructure is not only central to the functioning of society, but adaptation and expansion of the current infrastructure is also a central condition in the energy transition towards climate neutrality in 2050.

The transition from a fossil-fuel-based energy system to a renewables-based energy system also entails a reconstruction of the energy infrastructure network and the way it is deployed. This reconstruction might have an impact on stakeholders and citizens at large. In the process, participation of those stakeholders in procedural governance is therefore an important aspect.

In policy making, effective participation of the general public and other stakeholders can increase the legitimacy of the process, improve policy by allowing for input from stakeholders, and raise awareness and political engagement (Willis et al., 2022). Participation is a wide definition and concerns the participation from affected citizens and other stakeholders in the planning process, the physical roll-out of infrastructure, as well as the legislative process that substantiates infrastructure-related policy. Participation can concern three basic forms: one-way information dissemination, two-way consultation and two-way empowerment of communities (IEECP & RGI, 2023). Participation-related governance mechanisms can be specifically focused on climate-related policies or be more general in nature.

In this case study – which is part of a larger project within 4i-TRACTION on procedural governance – the aspect of participation in energy infrastructure projects will be analysed.

1.1 Objective and research question

The objective of this case study is to explore the theme of participation as a function of procedural governance in energy infrastructure projects.

The research question is defined as follows: 'how does participation as a procedural governance mechanism take place in relation to the development of energy infrastructure projects, with a specific view on energy infrastructure in a carbon neutral energy system?'

The scope of this study is the participation function of procedural governance in infrastructure projects related to energy. This case study follows closely the definition of infrastructure as used in 4i-TRACTION WP4.[1] It includes infrastructure for supply, transmission and distribution of energy. It also includes electricity substations, flexibility technologies like batteries, power-to-x

[1] Vendrik, J., de Vries, M., Nauta, M., Scholten, T., van Cappellen, L. (2023): Case Study Integrated Infrastructure Planning. 4i-TRACTION Deliverable 4.2. CE Delft; Delft.

and dispatchable powerplants. However, district heating is not included in this definition. Non-energy-related infrastructure like software for smart energy infrastructure is also out of scope. While energy generation assets, like wind turbines and solar farms are a prime issue of interest in public participation as well, this is not considered part of the infrastructure in this paper (and in 4i-TRACTION in general).

1.2 Relation of this case study to the 4i-TRACTION project

The multiannual 4i-TRACTION project is structured along seven interrelated work packages. This case study is part of work package 5 which develops proposals for an EU climate governance framework that is capable of delivering transformative change.

In 4i-TRACTION, procedural governance is divided into eight functions for climate policy: access to justice, advisory, decision making, implementation/enforcement, monitoring/evaluation, participation, planning, and target setting (Moore et al., 2023). These categories are designed to cover the full range of major functions that the EU's procedural governance architecture would be expected to perform. This paper is about one of the eight functions of procedural governance: participation.

1.3 Reading guide

This paper consists of three chapters, followed by a conclusion.

Chapter 2) Energy infrastructure development and the 2050 climate goals, gives an overview of the modifications that the EU energy system may undergo in the transition towards a climate-neutral energy system.

Chapter 3) Participation in procedural governance, describes the existing basis for accommodating participation in the procedural governance of infrastructure projects.

Chapter 4) Participation in infrastructure development, describes the current practice of how participation is realized in infrastructure projects.

Chapter 5) Conclusions

2. Energy infrastructure development and the 2050 climate target

In the European Climate Law, the EU has set a legally binding target to be climate neutral by 2050 (EC, 2021). In the transition towards climate neutrality in 2050, significant development of energy infrastructure needs to take place. Gradually the infrastructure that accommodated the consumption of fossil fuels will be replaced or complemented. This is not only about physical restructuring of the energy system, but it also entails a restructuring of how energy supply and demand is accommodated.

In this chapter, the energy infrastructure that is required in that transition and may form the subject of participation will be described. We consecutively describe infrastructure that was part of the fossil system and the three elements that form the core of the carbon-neutral energy system: power, hydrogen and CO_2 infrastructure.

2.1 Infrastructure of a fossil energy system

All developed economies of the world are to a greater or lesser extent dependent on fossil fuels. In the EU, reliance on fossil fuels ranges from 31% of total energy consumption in Sweden to 96% in Malta, the average for the EU being 70% (Eurostat, 2023). As a general rule, the more industrialized or developed a country, the higher the share of fossil fuels for transport, electricity generation, heating, cooking and industry. All these sectors make use of infrastructure that supplies the energy carriers to the consumers.

Although Western countries almost completely relied on fossil fuels during their 20th century development, the impact of specific fossil energy supply infrastructure has been modest on society as a whole. Coal mines that were exploited within Europe often supplied their energy to a specific nearby power plant, or made use of inland shipping and sometimes trains. Crude oil and natural gas were mostly imported from non-EU producers or produced offshore. The few pipelines that exist have a large energy supply capacity and the sum total has therefore a relatively low impact on the surroundings.

As a rule, refining of crude oil takes place in ports, or other areas not close to populated areas. Distribution of oil products took place mainly by trucks, railways or underground pipelines that have a low impact on the surroundings. Natural gas was also mainly transported and distributed through an underground distribution network. Above-ground natural gas distribution is, in contrast with former Soviet-Union states, rare in the EU, although it does exist in several locations in Eastern Europe (e.g. Romania). As a result, the main visible and prominent energy supply infrastructure throughout Europe is the power network, from the High-Voltage (HV) network to the low kilovolt (kV) lines, the substations and converter stations. This is displayed in Figure 1.

Figure 1 – Existing high voltage power network in Europe (red is 380 kV, green is 220 kV) (ENTSO-E, 2023)

The construction of the power network reflected a centralised system with concentrated points of energy generation. Hence, the distribution and transmission network went from the point of concentrated generation with high voltage to the point of consumption with low voltage. A characteristic that is not directly in line with RES generation assets.

This infrastructure has – in the developed economies – been constructed in close association with the overall development of the country, with the influence on the surroundings as an element of secondary importance. Inevitably, citizens that lived on or nearby the trajectory of planned energy infrastructure were affected by its development.

However, while this might have had a negative impact on their living space, the general effect for society as a whole was rather positive: infrastructure has delivered energy and heating to households, allowing them to reach a higher standard of living.

2.2 Towards a climate-neutral energy system

Infrastructure supporting a climate-neutral energy system needs to be developed on different geographical levels, from international to local as well as for different sectors. However, regardless of the range of geographical and sectoral aspects, the amount of energy carriers is limited. There are two main energy carriers that will play a major role in the future energy system and require a robust and all-encompassing infrastructure network: electricity and hydrogen.

Therefore, to enable the deployment of these carriers and allow their uptake from end-use sectors, the two cornerstones of the climate-neutral energy system with regards to energy infrastructure are the power grids and the hydrogen network/pipelines. Additionally, CO_2 infrastructure will be needed for CO_2 mitigation, the realization of negative emissions and as a part of the e-fuel production chain.

2.2.1 Power infrastructure

Electricity can be generated by fossil fuels or renewable sources. The EU climate transition – with climate neutrality as its ultimate goal, as laid down in the EU climate law (EC, 2021) – is aiming to decarbonise the power sector by 2040 (when the ETS allowance reduction rate is extended beyond 2030) (EC, 2020b). This will eventually make the whole power infrastructure part of a climate-neutral energy system. In parallel to this decarbonisation of the power sector, demand for electricity is rising and supply and demand is becoming more diversified.

If, as per the Fit-for-55 and REPowerEU packages, energy efficiency principles are effectively applied and end-use sectors are electrified, the overall final energy consumption in the EU between 2021 and 2030 will decrease. At the same time, the absolute consumption of electricity will slightly increase from 200 to 220 Mtoe for the same timeframe (EC, 2022). Due to a projected decline of consumption of other (fossil) fuels, electricity as a share in final consumption will increase from 21% to 32% between 2019 and 2030 (EC, 2022). After 2030 it might further increase when renewable hydrogen production through electrolysis creates significant additional demand for renewable electricity.

Next to an increase in power consumption, the nature of the electricity supply and demand is also changing. Whereas in the fossil system, a few large-scale power stations were producing electricity for a region or country, in a climate-neutral energy system, alongside utility-scale stations, many small, local renewable energy sources will generate electricity at varying volumes in time and location. This creates a need to restructure the way in which the power market works (from large scale power generation facilities towards small-scale consumers and all connecting facilities in between). This restructuring raises the necessity to look at the power market with a changed perspective and hence implement the required adaptations from an integrated and holistic viewpoint. In this process of integrating and aligning supply and demand, spatial aspects related to infrastructure are of great importance because they have direct effects on stakeholders and their perception of the environment. Furthermore, the charging network that is needed for

electric vehicles both alongside corridors and in residential areas brings about a specific spatial demand that will have repercussions on the surroundings.

Both the absolute increase and the change in the nature of electricity generation will result in a different outlook of electricity infrastructure in Europe. It will require electricity grid expansion and reinforcement, a higher density of high, medium and low voltage electricity grids, substations and the deployment of batteries. While large renewable electricity capacity is already planned offshore, onshore wind turbines and solar farms will also need to be connected to the grid. To minimise impacts on citizens and nature and due to low land prices, remote and/or sparsely populated areas might become increasingly appealing for development of RES. This might entail reinforced network capacity in areas that were hitherto not served by an adequate electricity network.

To conclude, the power sector is subject to three developments: decarbonisation of supply, increase in demand and diversification of supply. These three developments have repercussions for infrastructure and the way new infrastructure is planned.

2.2.2 Hydrogen infrastructure

Next to a reinforced and restructured power network, a climate-neutral energy system will need to be complemented by renewable hydrogen for specific industrial processes, transport and possibly high temperature and residential heating, that cannot be electrified. Initially, consumption of renewable hydrogen will take place on sites that already use fossil hydrogen, especially where it is consumed in large quantities. Examples are refineries, high temperature industry, methanol and fertilizer production. Supplying these sectors might take place with existing or moderately expanded and adapted infrastructure. Parts of the existing fossil gas network might need to be adapted for usage by hydrogen, which may affect the location during reconstruction works and expansion of the pipeline network. New industries that might start using hydrogen will entail a more considerable impact when a whole new network needs to be developed.

To enable an EU-wide hydrogen market a European hydrogen backbone is planned (EHB, 2023). The backbone should be partly realised by 2030 and completed by 2040. This backbone will re-use existing natural gas infrastructure, but also many new trajectories are planned, especially in countries that do not have highly developed natural gas networks yet, see .

Figure 2.

Figure 2 – European Hydrogen Backbone. Green lines are repurposed, existing natural gas infrastructure, yellow and orange lines are to be developed (EHB, 2023).

As foreseen, not all hydrogen can be produced in Europe and to supplement EU production, the EU aims to import 10 million tons of hydrogen by 2030 (EC, 2020a). Therefore port infrastructure will need to be adapted or developed. This will mainly take place in existing ports that already are industrial areas, the impact on the surrounding area will probably be relatively low. Construction activities or the presence of pipelines and industrial installations are already quite common there. The impact might relate to safety concerns for ammonia storage and transport facilities.

2.2.3 CO_2 infrastructure

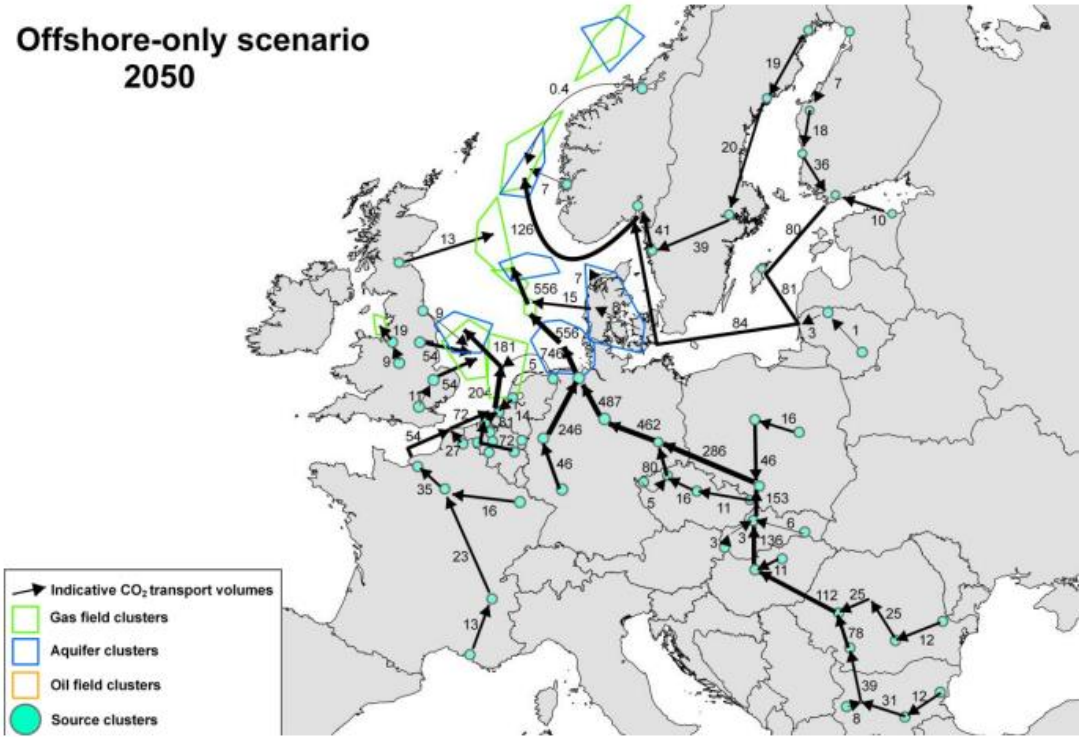
All IPCC climate neutral scenarios for maximum 1.5 or 2 degrees warming have included negative emissions, or carbon removals, in their forecasts (IPCC, 2023). Any energy system that is in line with such a scenario will therefore need CO_2 infrastructure. CO_2 infrastructure might initially be needed to reduce net carbon emissions by capturing fossil CO_2 and storing it in geological formations (CCS). Therefore, they need to be connected to point sources of carbon, where the cost of CO_2 capture is relatively low (industry and electricity generation). Later, when energy sources are increasingly decarbonised, CO_2 transport and storage infrastructure might be used to

capture non-fossil CO2 and thereby realize negative emissions. It will also be useful in the production chain of e-fuels, where CO_2 will be a feedstock for the production process.

For transport of CO_2 (and the subsequent storage in empty gas fields or salt caverns), pipelines would need to operate at higher pressures than natural gas pipelines. Levels of purity are also a concern and would require a higher quality level of pipeline infrastructures. Moreover, CO_2 at high concentrations is hazardous and therefore more safety measures would need to be applied. These considerations suggest that for the transport of CO_2, it is probable that a new pipeline system would need to be established, with different properties and requirements than the natural gas system (Zero Emissions Platform, 2020).

In contrast to hydrogen or electricity, there is currently no EU project to realize a European-wide CO_2 transport system. An example of how such a system might look is given in Figure 3. However, a number of regional or national projects have been or are being developed (including various CCS projects that have received grants from the EU Innovation Fund).

Figure 3 – A possible EU transport corridor for CO_2 (million tons per year) (Zero Emissions Platform, 2020)



2.3 Impact of climate-neutral infrastructure

The three types of infrastructure needed for a climate neutral energy system have different repercussions on the physical environment and it is therefore imaginable that procedural governance might vary depending on the type of infrastructure.

The main issues that can be identified as topics for participation related to these infrastructures are: the extent to which new routes of the infrastructure are needed, and safety, health, degradation of the landscape and property issues. For all three infrastructure systems, the impact on those topics is given in Table 1.

Table 1 – Different aspects of influence for electricity, hydrogen and CO2 infrastructure.

Category	New routes	Safety risks	Health	Degradation of landscape	Property issues
Electricity	Partly	No	Limited	Yes	Yes
Hydrogen	Partly	No	No	No	Yes
CO_2	Yes	Yes	No	No	Yes

New routes may increase the impact of infrastructure significantly, the impact of additions to existing routes is generally much lower. This is partly the case for hydrogen and electricity infrastructure and completely applicable to CO_2 infrastructure. On the other hand, the first two types of infrastructure are of a larger scale than CO_2 pipelines, both as a network and as individual itineraries. A complexity can be that already existing infrastructure does not create additional disturbances, but might still be perceived as highly disturbing to local residents or other users of the public space.

Safety risks are mainly an issue for CO_2 infrastructure. **Health issues** (electro-magnetic fields) might be related to the high-voltage electricity lines, especially when they are constructed nearby housing or other locations that are frequently visited for long periods of time (like offices, shops).

Degradation of the landscape is minimal for underground infrastructure. Still, the continuous space that is needed for an underground infrastructure project and the operational conditions that bring about the need to have easy access to the complete trajectory, may result in a strong but very localized aspect of degradation and impacts on spatial planning. Degradation of the landscape has a wider and more prominent position with regard to electricity infrastructure. The height of the electricity poles entail visibility from a wide area alongside the trajectory. Degradation of the landscape also has an economic aspect, with a decreasing value of land plots and real estate that is located on or nearby the energy infrastructure location. While it is feasible

to measure this aspect with a certain degree of objectiveness, and therefore also create the instruments or policy measures to counteract the effects, it is the subjective aspect that can be a very strong driver for stakeholder resistance to infrastructure projects. Degradation of the landscape might not have the same meaning for everybody, and it is therefore difficult to measure. Participation might be a key instrument to start a beneficial dialogue in this case.

Although infrastructure will be partly constructed underground, environmental aspects might also be an issue. For example, when environmentally valuable regions like wetlands, swamps or archaeological sites are crossed. Temporarily disturbance and emissions might occur when trenches are being dug and machinery is used on the site.

Property issues play a role for all types of infrastructure and is a major factor for delay of infrastructure construction. But this is an unavoidable obstacle that needs to be embedded in a fair framework to resolve this in a reasonable and uniform way.

3. Participation in procedural governance

In the climate change literature, governance is often used to refer to the sum total of actions related to climate from governments and other actors like NGO's, companies and the general public (Hölscher & Frantzeskaki, 2020). Governance can be divided into two interrelated categories: substantive governance, which is typically related to policy instruments that directly or indirectly reduce GHG emissions, and procedural governance, which refers to the supporting procedural architecture. Frameworks, instruments and institutions can exist for one type of governance or can serve both types of governance.

Procedural governance is a key component of climate policy. It refers to governance frameworks and institutions that shape the climate-related decision-making processes and support the EU, member states and regional and local authorities in designing and implementing policy instruments. Procedural governance also plays a role in shaping climate policy to engage the general public and ensure an inclusive transition.

In this chapter, we highlight the main basis for participation in procedural governance. The main focus will be on instruments that have a connection to infrastructure, and in particular energy infrastructure.

We will look at EU instruments only, but this might not be a full description of the situation since member states might have individual frameworks as well.

3.1 Existing legal or customary basis for participation

All EU legislative proposals have a consultation round before they are published by the European Commission. During this consultation, stakeholders and citizens can express their point of view which subsequently will be taken into account by the Commission. The consultation round is however more aimed at the overall direction of the legislative proposal. This does not necessarily provide enough room for specific issues that might be linked to participation in climate-neutral infrastructure.

3.1.1 Trans-European energy infrastructure (TEN-E)

The TEN-E Regulation provides a substantial basis for participation of the public in energy infrastructure, starting from the ten-year network development scenarios to which stakeholders such as energy consumer organisations and civil society representatives are invited to contribute. The regulation sets a framework for the permit granting process that aims to be simple, fast and uncompromising towards both environmental protection and public participation standards. It contains guidelines for transparency and public participation. Project promotors are obliged to ensure that consultations take place during a period that allows for open and inclusive public participation. At least one public consultation is required. The public consultation shall inform the stakeholders at an early stage and shall help to identify the most suitable location, trajectory or technology. Furthermore, it needs to address – where relevant – all impacts relevant under EU and national law. It also stipulates the precise information that the project promotor should publish on the project (European Commission, 2022a).

For projects of common interest (PCIs, key infrastructure projects aimed at completing the EU internal energy market), regional groups are established based on each priority corridor and their respective geographical coverage. The Commission and member states are the decision making bodies of these groups, but other representatives are also members of the groups. For electricity projects, ACER, ENTSOE, TSOs and national regulatory authorities are part of the group. The groups must also invite other relevant parties, but invitation needs to take place based on consensus. Consumers might also be included in the process. Each group has the obligation to consult organisations that represent relevant stakeholders (like energy producers, consumers and NGOs). While there is an obligation to consult, the exact implementation of this process is to be decided by the group. (European Commission, 2022b).

3.1.2 Strategic Environmental Assessment (SEA) Directive

A SEA is required for a wide range of public plans and programmes, including on energy projects. The aim of the SEA Directive is to provide a high level of protection to the environment and contribute to integrating environmental considerations into the preparation, adoption and

implementation of plans and programmes. A SEA can for example apply to development of a national grid or to a local project. Member states play an important coordinating role as they must designate the authorities to be consulted and are likely to be concerned. Member states must also identify the public affected or likely to be affected by, or having an interest in, the decision-making, including relevant NGOs and other organisations concerned (European commission, 2001).

3.1.3 Environmental Impact Assessment (EIA) Directive

Under the EU's Environmental Impact Assessment (EIA) Directive large projects in the EU must first be assessed for their direct and indirect impact on the environment. The project developer has to provide the competent authority with information about the project. This will be examined by the authorities together with addition information, like from consultations.

When the competent authority decides that the project has fulfilled the requirements set out by the EIA Directive, its decision should - in order to ensure transparency and accountability - include a consideration of the results of the consultations that were held. Projects may be exempted from provisions relating to public consultations, on the conditions that the objectives of the EIA Directive are met (European Commission, 2014).

The effects that are to be taken into account are:

- the probability, duration, frequency and reversibility of the effects,
- the cumulative nature of the effects,
- the transboundary nature of the effects,
- the risks to human health or the environment (e.g. due to accidents),
- the magnitude and spatial extent of the effects (geographical area and size of the population likely to be affected),
- the value and vulnerability of the area likely to be affected due to:
- special natural characteristics or cultural heritage,
- exceeded environmental quality standards or limit values,
- intensive land-use,
- the effects on areas or landscapes which have a recognised national, Community or international protection status.

3.1.4 European Climate Pact (ECP)

The European Climate Pact is part of the European Green Deal and aims to support a European Climate movement, made up of citizens, to grow. It should become a lively space to share information, debate and act on the climate crisis. It furthermore aims to raise awareness of climate issues and EU actions and connect citizens and organisations. The ECP encourages the engagement of different stakeholder with policy makers on various levels, but the subjects of engagement (as set out in the founding document) are mainly related to energy consumption and not energy supply. However, this does not exclude the ECP from engaging in issues related to energy supply; its mandate is open and evolving (European Commission, 2021b).

3.1.5 Aarhus Convention

The Aarhus Convention is a UN environmental agreement from 1998 signed by all EU member states. It aims to protect every person's right to live in a healthy environment and it guarantees the public three rights on environmental issues: access to information, public participation and access to justice. The second aspect – as subject of this case study - refers to the right of citizens to participate in environmental decision-making. Public authorities have the obligation to let the general public and NGOs participate in decision-making in a meaningful way when projects are undertaken that can affect the environment or plans and programmes are developed that relate to the environment (European Commission, 2021a). The Aarhus Convention resulted in the European Aarhus Regulation in 2006 that implemented the objectives of the convention for the EU.

3.2 Diversity in participation

Differentiation is a central aspect of participation. This is also reflected in the existing legal and customary basis for participation in procedural governance. Whereas on higher levels of policy making (EU, national) participation is generally about overall policy targets and the design of legislation, on the lower levels of government it is more about the consequences of the implementation of legislation and practical issues that might affect stakeholders.

As described above, several legal and other documents of the EU provide a framework for participation in energy infrastructure projects. It amounts to an obligation of member states to inform the affected stakeholders, consult with them about the project and publish information about the impact of the project. Different forms are possible, ranging from informing to consulting and to empowering (IEECP & RGI, 2023). If participation can take place at three levels (information, consultation and empowerment), empowerment – which is also the most difficult to implement because it requires an advanced insight in the possibilities of the project – is the least well represented in the key EU documents. There is a firm basis for dissemination of information and consultations across the EU key documents.

Not only the way participation is embedded in EU mechanisms and practices produces a diverse image. This is also true for the forms of participation chosen by the public. A recent report by the Institute for European Energy and Climate Policy (IEECP) and Renewables Grid Initiative (RGI) mentions three important motives that can drive participation from the perspective of the public: when people are affected, when they are empowered to influence decision making and when they can financially benefit. Also from the perspective of the project developer, different ways of engaging with the public can stimulate public participation: an early and continuous approach to address the concerns, a timely and transparent way of communication and delegating a part of decision-making to the public (IEECP & RGI, 2023).

Notwithstanding the existing framework to engage with stakeholders, infrastructure projects can still lead to opposition. This may be related to an insufficient implementation of procedural governance mechanisms related to the project. Therefore, a lack of information, insufficient consultation or feelings of being excluded from the decision-making process can still result in low trust with regard to energy projects (Intrasoft international S.A., 2022).

4. Participation in infrastructure development

Both for pipeline infrastructure and the electricity grid, member states have throughout the 20th century found a way to develop this infrastructure. Apart from official participation from national, regional or local institutions, participation has often been limited. Mostly, citizens that found their property in a trajectory of an energy infrastructure were expropriated and financially compensated. No role was allocated for participation in infrastructure for people affected in a more general sense, for example the general public living outside the directly affected area. Basic regulations for disturbance, safety and health issues applied, but for example high voltage grid lines were still constructed above neighbourhoods before 2005 (RIVM, 2023).

In recent decades, perception of the impact of energy infrastructure on the physical environment has gained a more prominent role in governance. Initiatives are deployed to engage citizens and to find an acceptable solution (European Commission, 2023), although the last resort remains expropriation and financial compensation. Most procedures of participation however apply to energy producing facilities like wind, solar and biogas facilities.

4.1 Existing practices

Currently, many environmental and general impact criteria apply to development of infrastructure and these also offer the possibility of participation from the public. It will depend on the nature of the project, the outcome of the environmental impact assessment and the local circumstances, how this role of governance is integrated in the development process.

It is assumed that participation has a higher appreciation when the impact of a project on the physical environment is high. This also entails the understanding of stakeholders that are involved in the development of infrastructure that a trajectory for infrastructure should not only follow the basic legal prescriptions, but it is beneficial for the timeline of the project and the overall success that impact on the physical environment is reduced to a minimum.

It this way, the threat of a legal procedure – which can be considered a final form of participation of a citizen in decision procedures – influences the way a project is developed. A last resort for a citizen in a country where the rule of law is upheld is always to start a legal procedure and this is detrimental for any project (because of delays, cost, etc.).

The difference in character between the power, hydrogen and CO_2 infrastructure means that no uniform procedure is likely to be developed. However, as described in the previous chapter, participation is as a general rule a diverse process that can differ depending on the specifics but can be enhanced or stimulated by upholding certain standards. These standards include transparency, timely provision of information, addressing the concerns of stakeholders and where possible empowering stakeholders in the decision-making process. This implies that the project developer also needs to make an effort to gain knowledge of citizens viewpoints and it is needed to set up satisfactory public engagement processes (IEECP & RGI, 2023).

In the space between the mandatory procedures (SEA, EIA, etc.) and the looming threat of legal procedures, a few initiatives are known that relate to participation in energy infrastructure. TSOs for example engage on a project-by-project basis with landowners and people in the surroundings (TenneT, 2023). They inform and involve the stakeholders in infrastructure development procedures, the exact nature of which depends on the project. There are information events, where all private stakeholders can have their say and all official stakeholders are involved. Viewpoints are taken into account during the development of the project (50Hertz, 2023; TenneT, 2023). This type of engagement is studied and structured by the Renewables Grid Initiative.

4.2 Renewables Grid Initiative

The Renewables Grid Initiatives (RGI) is a collaboration of NGOs and TSOs from across Europe engaging in an energy transition ecosystem of actors. They promote fair, transparent and sustainable grid development to enable the growth of renewables (Renewables Grid Initiative, 2023). It is mainly funded by fees from member organisations, the Mercator Foundation and the European Commission. It was established in 2009 and most TSOs and around 15 national and international environmental NGOs are involved. It has three main objectives:

- Exploring and communicating how grids enable the transition to a decarbonised energy system.

- Promoting and initiating innovative approaches that can enable grid development on a fair, transparent and environmentally sensitive basis.

- Bringing together different perspectives and creating the possibility for learning and sharing among actors active in the transition. This includes providing policy, regulatory and societal support for grid development.

NGOs and TSOs, in the framework of RGI, work on improving local public acceptance for grid development processes. They try to enhance transparency and public participation and they encourage the implementation of constructive public engagement in permitting procedures for European Projects of Common Interest (PCIs). This takes place in various phases of grids and renewables projects, from early planning to operation and sometimes the end-of-life phase. RGI works also on finding the right approach to community payments, the development of nature conservation under grids and on the aesthetics of the electricity grid.

RGI is mainly working on the electricity grid, but in the future when other climate neutral infrastructure will become more prominent, RGI will preferably address them also in one way or another.

4.3 Assessing the participation function

In 4i-TRACTION, EU climate governance is assessed by three main criteria: overall effectiveness, adaptability and implementation effectiveness. Additionally, the relation to other procedural governance functions and the place of participation in the liberal-democratic state system is relevant with regards to stakeholder participation.

Participation in infrastructure is not limited to a structure that is applicable for all types of infrastructure, all geographical areas and all stakeholders. It is a flexible and evolving process that might take different routes. As stressed before, diversity is a central element in participation, both from the perspective of the public and from the perspective of the project developer. It is situated between the baseline, defined by a legislative minimum of engagement from the developing party with the stakeholders, and the point where participation ends and a legal procedure starts. In between a balance can be found between addressing the concerns of citizens in a meaningful way, even to the extent of empowering them with a certain level of decision making, and the general interest of the project that has relevance for the climate targets and the energy system as a whole, surpassing individual interests of directly affected stakeholders.

The criteria '**overall and implementation effectiveness'** and 'adaptability' are very dependent on the exact circumstances. A large share of the infrastructure of a climate-neutral energy system still needs to be developed, and it is therefore still in the future how effective and flexible participation will be. However, the framework on EU level that as a minimum gives a certainty of participation procedures means that the overall and implementation effectiveness can be judged

satisfactory. While the minimum criteria for participation provides a flexible basis to develop meaningful mechanisms for public participation, effectiveness still depends on the exact design of those mechanisms and the way a project developer engages with the public. A more specified outline about how to concretely implement the necessary conditions depending on the type of infrastructure, might be a helpful addition to the already existing framework. This may be beneficial to the overall and implementation effectiveness of participation. Furthermore, regular monitoring and evaluation of the effectiveness of the policies can help further develop and improve the policies.

Adaptability which is discouraged by a very rigid procedure, can in the current situation be seen as satisfactory, for the exact reason that current legislation and customary provisions are flexible and give room for diversity. Even when stricter procedures with regard to certain types of infrastructure will be proposed to enhance the effectiveness, it is important to maintain a high level of adaptability in order to be able to take into account the local context and local particularities that may be different in objectively similar locations.

Relations to other procedural functions are extensive. The other procedural governance functions as defined in 4i-TRACTION are access to justice, advisory, decision making, implementation/enforcement, monitoring/evaluation, planning, and target setting. Among these functions, the main types of procedural governance that have a relation to participation are access to justice and planning.

Access to justice is a last resort for affected stakeholders and can result from a participation mechanism is not well implemented and carried out. In this regard, participation is an important asset in the development of energy infrastructure to resolve conflicting viewpoints in a smooth and agreeable manner. It is more beneficial for the stakeholder and for the project to address concerns through participation rather than legal action. This then implies that participation should take into account the possible benefits that access to justice might bring to an affected stakeholder. By engaging citizens in the decision making process, certain concerns they have can be eliminated, but participation should also not rule out the potential benefits a citizen may receive by starting a legal procedure.

Therefore, planning is another governance function that has a strong connection to participation. In the process of planning of new or restructured energy infrastructure, project developers and policy makers should not only take into account the consequences that participation may have on the project, but also pro-actively seek input from stakeholders that might be affected in the planning and coordination, without hampering the interest that a project has for the energy system as a whole.

Participation has a varying **place in the liberal-democratic state system**. On the one hand, individual rights are protected, but on the other hand, for fundamental elements that support the basic functioning of society, it might be legitimate that property (and views) of the individual are subordinate to the national interest. A liberal-democratic society characterizes itself by making the process of expropriation and bringing about other forms of disturbance into a democratic

procedure. The democratic procedure includes participation, consideration of the views of the stakeholders, integrating their view in the best way possible in the development of the project, addressing their views, possibly empowering them with decision-making and, if no other option is left, a just and appropriate compensation (financial or other) might be given.

5. Conclusions

The transition towards a climate-neutral energy system by 2050 entails a significant restructuring of the current energy infrastructure network. The infrastructure for a carbon-neutral economy is mainly made up of the electricity grid, a hydrogen network and a CO_2 network. Adaptations with regard to the existing system include an increase in electrification, a changing supply-demand profile and a new network for the transport of green hydrogen and CO_2. The impact of this infrastructure on the living environment is diverse but can be substantial on a local level. It is present throughout the whole continent but can locally result in significant impact. In this case study, participation in relation to energy infrastructure was described. A preliminary exploration was made into how participation is funded in EU legislation and customary provisions and how it relates to the energy infrastructure projects that are needed for building a climate-neutral energy system.

Infrastructure for a carbon-neutral energy system is essential for the realization of climate targets and generates advantages on a high systemic level, but on the local level it can have significant negative impacts. Major issues that may create resistance to infrastructure projects are impacts on landscape, skyline (which may be subjective, but nevertheless important) and property issues, which can be dealt with on a more objective basis. Lack of local benefits and (subjective) resistance makes the participation of the affected stakeholders more difficult. Furthermore, the systemic character of infrastructure generally leaves few possibilities for adaptation at local level.

Participation in policy making is an important way of engaging the general public or directly affected stakeholders. Participation could take place at three levels (one-way informing, two-way consulting and two-way empowerment). Two-way empowerment, which is most complex to implement, is also the least well embedded in the policy framework.

Participation can increase the legitimacy of the process of decision making and it can improve policy by allowing the integration of public or stakeholder-specific interests. Stakeholders can be included in the decision-making process from an early stage and thereby the balance between local and national/EU interest can be optimized. Participation can also raise awareness and political engagement and therefore contribute to a higher level of democratic participation.

Participation is an additional mechanism in a democracy that gives citizens the opportunity to engage in policy making in addition to regular elections and focussed on a specific theme. Participation can take place on all levels of public policy making, from EU to local level, but the subject is mostly connected to the geographical coincidence of project and stakeholder. Whereas

EU legislation lays a foundation for participation, it is often dependent on the geographical location, the stakeholders involved and the exact project to determine how participation will take place.

Participation remains however the best option to integrate the position of affected citizens with the interests of society overall. Not only to effectively represent their points of view in the development process of infrastructure, but also to uphold the standards of the liberal-democratic system, where all infringements on individual rights and position, need to be well reasoned, supported by arguments and dealt with in a democratic manner. Whereas local energy producing installations (wind farms, biogas facilities) offer the opportunity for locals to share in the financial benefits, this is much more complicated in infrastructure and not to be recommended. Development of infrastructure does not only require a short as possible timeline, the overarching character also makes it an asset of the whole economy. Moreover, if such a policy was pursued, also older infrastructure that still causes nuisance would need to be taken up in this scheme.

In conclusion, participation is and remains an important asset in procedural governance. It creates a procedure that can accommodate the interests of the project overall and of the affected stakeholders. Flexibility is required to accommodate the diverging aspects related to the local context and the difference in infrastructural projects. EU legislation provides a framework to implement participation initiatives, with a minimum threshold. The success of a participation procedure is furthermore made up of elements like transparency, full information, recognition of (sometimes subjective) concerns, level of empowerment by stakeholders and in some cases financial compensation. Because notwithstanding the (in principle) sufficient basis to set up meaningful procedures of participation, a favourable result depends to a large extent on the way procedures are implemented.

The success of participation reduces the threat of legal procedures, creates legitimacy for the project and the transition and gives a legitimate concern to the interest of affected stakeholders. However, large energy infrastructural projects always come with a risk that undesirable steps for stakeholders are required, like expropriation or increased nuisance. Whenever this is unavoidable, participation can embed this in a fair framework to resolve the issue in a reasonable and uniform way.

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About the project

4i-TRACTION – innovation, investment, infrastructure and sector integration:
TRAnsformative policies for a ClimaTe-neutral European UnION

To achieve climate neutrality by 2050, EU policy will have to be reoriented – from incremental towards structural change. As expressed in the European Green Deal, the challenge is to initiate the necessary transformation to climate neutrality in the coming years, while enhancing competitiveness, productivity, employment.

To mobilise the creative, financial and political resources, the EU also needs a governance framework that facilitates cross-sectoral policy integration and that allows citizens, public and private stakeholders to participate in the process and to own the results. The 4i-TRACTION project analyses how this can be done.

Project partners

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