

## **What is the quality of participatory renewable energy planning in Europe? A comparative analysis of innovative practices in 25 projects**

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### **Author declaration**

DS coined the idea with MB, designed the survey, prepared data for analysis, and developed the initial structure of the paper. DS and MS coordinated manuscript writing and conducted qualitative content-analysis of the cases. Together with SMü and MB, they revised theoretical and empirical sections. All authors did the quantitative evaluation of the case studies, have contributed to the interpretation of the results, writing of the manuscript and agreed on its content.

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## **What is the quality of participatory renewable energy planning in Europe? A comparative analysis of innovative practices in 25 projects**

### **Abstract**

There is widespread agreement that society must urgently transition to renewable energy and effective participation is crucial to a sustainable transition. Recent literature highlights that the quality of participatory planning is decisive for the acceptance of renewable energy technologies. However, social science research on the issue is dominated by single case studies and the quality of the participatory processes has been rarely studied across wider regional contexts. We present the results of a comparative qualitative inventory of innovative practices from 25 projects in 12 countries in three supra-national European regions. We assessed participation quality according to three analytical dimensions: rationale, inclusiveness, and participation level. An instrumental rationale, broad inclusiveness, and a participation level of consulting or informing was a combination that was commonly perceived as an innovative participatory practice in most regional contexts. We found a tendency towards more advanced practices in Western Europe, compared to Southern, and Central-Eastern Europe. However, practices that were considered to be innovative in the latter regions still provide important lessons within their geographical contexts.

**Keywords:** assessment; energy transition; inclusiveness; participation level and techniques; rationales; timing

### **Highlights**

- We conducted an inventory of innovative participatory practices.
- We compared practices in 25 projects in three supra-national European regions.
- The quality of top-level participation seems to be high but varies between regions.
- A shift from instrumental to substantive rationales might increase acceptance.
- The regional context is important when assessing projects.

### **1. Introduction**

Social dimensions of renewable energy (RE) research have gained increasing attention during recent decades [1,2] and have been addressed using concepts such as 'public engagement' 'participation', 'social acceptance', and 'energy justice' [3–7]. These concepts are also important for energy policy, management, and implementation practice because the main challenges in achieving public acceptance of RE development are to coordinate different interests [8,9] and to ensure that all people involved are heard [10]. Therefore, planning of RE projects requires the inclusion of multiple stakeholders, such as governments, businesses, local communities, NGOs, and the general public [11] and the key to coordinating the interests of these different stakeholders is their involvement in the process [12]. Moreover, recent literature highlights that the quality of participatory planning is crucial for the acceptance of RE technologies [13–15].

In this paper, we address two main research gaps. Firstly, there is a long research history of evaluating participation in different fields, such as environmental policy and management [16,17], but, despite the relevance to RE [18], systematic research on participation in energy transitions has only recently started to gain importance [2,19]. According to Raven et al. [20], sustainable implementation and acceptability of RE projects can only be achieved when all stakeholders participate in all phases of the project. However, participation in RE planning in Europe often takes place only in the (late) permitting phase, and seldom in the (early) need assessment phase [21]. Moreover, the literature suggests that participation is often limited to one-directional information flow and pursues instrumental goals, such as convincing the public of a particular project or site, rather than open discussions about project development or design [18,22]. This approach of ‘decide-announce-defend’ [23] can be perceived as tokenism and should also be seen as undemocratic [24].

Secondly, most studies on participation in RE transitions have investigated single cases, with little research having been done on RE planning and public involvement on a wider comparative scale [25–28]. There is a broad scientific discourse on differences in planning practices depending on planning culture [29] and participatory RE practices can be expected to differ between countries or wider regions [30] but only a few studies have systematically compared RE participation quality across wider geographical ranges [14,30].

Our inventory was conducted as part of COST Action TU1401 ‘Renewable Energy and Landscape Quality’ (RELY) <http://cost-rely.eu/> [31] in which we explored the uppermost quality level of participatory planning in diverse European contexts [32]. In a first step, we asked RE planning experts about projects in which best and innovative participatory practices were applied in their countries, the rationales behind them, and the lessons learned. Subsequently, we analysed the materials that the RE experts had submitted according to three dimensions: 1) rationales for participation; 2) inclusiveness; and 3) participation level. We aim to answer the following research questions.

- What is the uppermost quality level of participatory RE planning practices that are applied in different European regions?
- Which criteria can best characterize the quality of participatory planning?

In the following, we provide a review of the literature on participation and outline our analysis framework. Next, we describe our method for gathering data on participatory practices in the RE projects and operationalising the analytical framework. As the spatial planning context has been suggested as affecting how participation materialises in RE projects [33], we present and discuss our results in the light of regional differences of participatory planning in Europe. Finally, conclusions are drawn on the implications of our results for enhancing the quality of participation in RE planning.

## **2. Literature review and analytical framework**

### ***2.1. Concept, promise, and pitfalls of participation***

Participation commonly refers to the processes in which the public and other stakeholders are involved in making the decisions that affect them [34]. A relational concept of participation has recently emerged in which participants are expected to be involved as multiple interrelated collectives, the process is co-produced, and ‘good’ participation should thus be emergent and reflexive [2,35]. In this paper, we primarily rely on the definition by Reed et al. [34] p. 2, as it best accommodates the variety of participatory practices while corresponds in time to the RE projects analysed.

Most justifications of participation are grounded in the democratic deliberative theory of Habermas [36]. Dryzek [37] defines a deliberative process as a free and open space of interaction in the political discourse that is oriented towards mutual understanding and trust. He describes the ideal as communicative rationality in which individual actors reflect upon various positions or discourses around an issue in a deliberative environment. Other main theoretical traditions affecting the participatory democracy discourse include radical democratic theory by Mouffe that offers a critique to deliberative theory by pointing at discursive struggles and potential conflicts between stakeholders [38]; Actor-Network theory by Latour and colleagues that calls for identifying ‘stakes’ as a basis for stakeholder inclusion in collaborative processes [39]; and participatory governance by Fung that focuses on re-distributing power and highlights effectiveness, legitimacy, and justice as main values that participation can support [40].

These theories suggest that justifications for participation can be understood differently. Indeed, assessments of participatory practices in environmental domains outside RE suggest that participation, if well-designed, may offer benefits for: the participating citizens, such as gained skills or self-efficacy; the government, such as trust, strategic alliances, or avoidance of litigation costs [41]; and society, such as social learning, more legitimate policies, or better implementation of projects [34]. However, poorly organized participation can bring disadvantages [42], such as causing the public and stakeholders to become disinterested or self-serving, in which case, participation may result in slower, more complicated, or even destructive planning processes [43].

### ***2.2. Assessment of participatory practices***

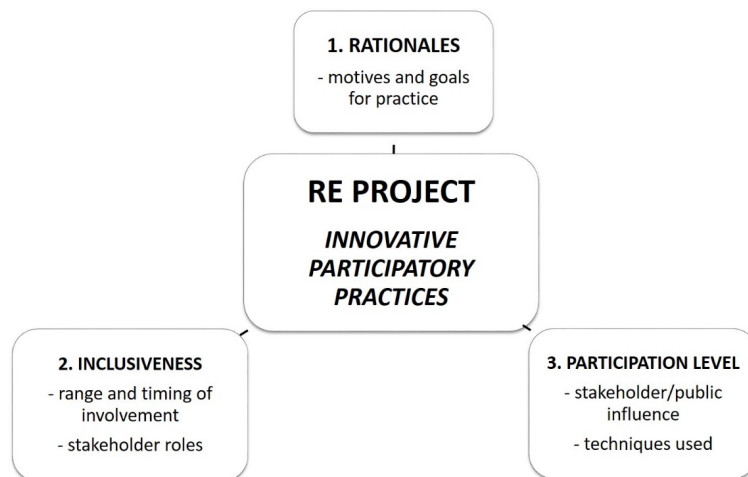
From an academic perspective, assessment of participatory practices raises several methodological questions. These include: why and when to conduct an assessment (e.g. formative assessment, to improve projects in progress; or summative assessment to evaluate long-term impacts); what should be assessed (e.g. process, outcomes, or context); what are suitable assessment criteria; and who should conduct the assessment (e.g. outsiders or participants) [16,44,45].

Historically, assessment of participation has focused either on processes or their outcomes and to a lesser extent, on context [16,44,46]. Criteria have commonly included different sub-criteria, such as public acceptability, equity, fairness, representativeness, transparency, or influence [44]. Analysis and assessment are commonly aimed at determining “what works best when?” [47] p. 551. The latest advancements in assessing participation have focused on reframing and social learning or on finding shared and best solutions for participatory practices [2,17,19,35]. In this

study, we address our research questions using a retrospective, expert-based assessment of a selection of participatory practices according to three, mainly process-based criteria: rationales for participation; inclusiveness, and level of participation.

### 2.3. Analytical frame

Studies on the effectiveness and quality of public participation aim to explore whether, and to what extent, the expectations and critiques of participatory processes are valid. In this study, our focus is on assessing quality levels using existing criteria. A literature review revealed evaluation criteria for public participation that we further applied to design our inventory. **Figure 1** illustrates our analytical framework that includes three dimensions; **Rationales**, which focus on the motivations of public agencies to organise participation in practice; **Inclusiveness**, which addresses the range and timing of stakeholders or the public involved in the planning process; and **Participation level**, which focuses on the power given to participants as part of the process, and on the main techniques that are applied.



**Figure 1.** Analytical dimensions for assessing the quality of participatory practices.

#### 2.3.1. Rationales for participation

Rationales for participation have been used to assess participatory practices in several studies outside the RE context [32,48,49]. They are fundamental principles or motives that guide participatory approaches by defining ‘who’ and ‘what’ are included in a process and ‘for which reasons’ [50,51]. This first dimension in our framework – ‘rationales’ – is categorised as follows [49–51].

- Substantive rationale: lay judgments are as sound as, or sounder than, those of experts; lay people see issues and solutions that experts might miss and improve the quality of decisions; policy goals can be changed.

- Normative rationale: the public is competent enough to be involved in decision making that affects them; the participation process is maximum open and fair.
- Instrumental rationale: effective participation makes decisions more legitimate and is oriented towards improving the results; values are to be implemented into the decisions; policy goals are not open for discussion.
- Legalistic rationale: participation is organized only to meet formal legal requirements with no conditional effort to improve outcomes.

No prescription for ideal participation can be done before the process because participation is complex and ideal choices are not always possible [49,51]. Furthermore, contextual factors, such as socio-cultural, institutional, or political factors are important (ibid.). However, scholars drawing on ideals of deliberative democracy consider participation rationales as normative scales with the substantive rationale being superior to the instrumental or normative rationales [52,53]. In complex, uncertain, and ambiguous risk or problem situations, which clearly applies to energy transitions, substantive approaches to participation should be encouraged because these consider a diversity of potential solutions [54]. All rationales inherently refer to the power dimension [2] (cf. ‘participation level’).

### **2.3.2. Inclusiveness of stakeholders and the general public**

In evaluations of participatory approaches, inclusiveness, or scope of involvement, is often used as a criterion [34,48,55]. This means that the involvement of a broad range of different stakeholders and members of the public is considered beneficial. Ideally, all groups and individuals who are willing to participate should be able to participate [48]. Stakeholders are groups or individuals who are affected by, or can affect, decision-making [34]. Stakeholder identification can aid decision-making by identifying those parties who are most affected by a decision or who are most, or least, influential in choosing appropriate techniques for involvement. In RE planning, developers, authorities, NGOs, or local communities are the stakeholders who are usually involved [56], but the general public is also important. In our study, experts provided us with information about the parties who were involved and the project phases in which participation occurred (i.e. timing of involvement). Subsequently, we have analysed the participatory practices in the RE projects according to our second criteria ‘inclusiveness’: the diversity of stakeholders and timing of involvement.

### **2.3.3. Participation level and techniques applied**

Much literature uses *a priori* criteria to describe and classify the level of participation in planning. The level of participation is often classified using Arnstein’s [57] ladder of participation. A ladder is used as a metaphor for the power of the public on the decision-making in the planning process. The power of the stakeholders and the public is thereby often defined based on the participatory techniques applied in the planning procedures, such as public hearings, attitude surveys, and focus groups [34,47,58]. Arnstein’s ladder of participation has become the basis of several practice-oriented guidelines such as those from the International Association for Public Participation [59].

However, the level of participation is complex to evaluate because it is connected to power and other aspects, such as trust or social learning [60]. Thus, some modifications of Arnstein's ladder have evolved. For instance, Hurlbert and Gupta [17] suggest a 'split ladder of participation' which also distinguishes between policy problems and case contexts. In this study, we differentiate levels of participation similar to Arnstein [57] and IAP2 [59] into five groups and define them as follows. At the end of each definition, an example of a respective technique is given.

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- Information: aims to provide the public and stakeholders with reliable information, which helps them to understand the problems, opportunities and alternative solutions (example technique: websites).
- Consultation: obtains feedback from the public and stakeholders on analysis, alternatives and decisions (e.g. via public meetings).
- Involvement: works directly with the public and stakeholders constantly during the decision-making process, aiming to understand and consider their input adequately (e.g. via workshops).
- Collaboration: partners with the public and stakeholders in every aspect of decision-making, including development from the alternatives to the identification of the preferred solution (e.g. via advisory committees).
- Empowerment: final decision-making power is in the hands of the public and stakeholders (e.g. via citizen juries).

We rated and analysed the participatory practices in the RE projects based on stakeholder/public influence and participatory techniques. To receive a more accurate picture, we qualitatively described the range of participatory techniques that were applied. For a better comparison, we also differentiate techniques by categories: a) information sharing; b) consultation (e.g. surveys, focus groups), and c) collaborative techniques (e.g. consensus conferences).

### 3. Methods

#### 3.1. Collection of innovative participatory practices

We conducted an inventory, cf. [32], of best or innovative RE participatory practices as perceived by national experts. Firstly, we developed a questionnaire [61] aimed at gathering information on these practices in RE projects throughout Europe. An initial draft of the English language questionnaire was tested in September-October 2015 and revised according to the responses and comments received. The final questionnaire was subsequently distributed to all ca. 200 COST RELY Action Members from academic and governmental sectors as well as NGOs in 37 European countries in February 2016. The professional backgrounds of Action Members typically included environmental sciences, geography, and related disciplines such as landscape planning. Two reminders were sent, and the collection of responses was finalized in January 2017.

The experts were asked to select and describe participatory practices that '*rely on best and innovative, non-ordinary practice as compared to the national context regarding the design of the participatory planning process, the tools used, the composition of stakeholders and technologies*



*applied for public participation.*’ The practices collected should thus describe participatory RE planning practices that represent the uppermost quality level in the respective national contexts.

The questionnaire contained 23 questions and was subdivided into three sections.

- First, we asked the respondents for a narrative of the project and some basic characteristics such as title, location, timeline, RE type, area size, source of financing, landscape type, and functions.
- The following section of semi-structured questions focused on participation practice: the inclusiveness of the general public; reference to usual decision-making practice; goals of participation; identification of stakeholders, their role and level of influence; previous experiences on energy issues; and the timeline and techniques of participation.
- Finally, open questions asked about the actual outcomes of participation, innovative aspects, and lessons learned. Also, we asked respondents to provide supplementary materials, such as media files, that illustrate or document participation.

### 3.2. Selection of innovative practices and analysis steps

We received 31 completed questionnaires and used these to prepare a project summary sheet (see example in **Appendix A**). The project team of six scientists from diverse disciplinary backgrounds evaluated that 25 of the responses were suitable for analysis (**Table 2**).

The analysis comprised of two steps. First, we rated each project via group discussions in a dedicated meeting, based on written summaries of the projects, and according to our three analytical dimensions. The discussion was first done in pairs and then brought into the plenum, to compare individual scores, and resolve potential differences in ratings. The quality of participatory practices was rated according to the following scales (**Table 1**).

**Table 1.** Scales for assessing innovative participatory planning practices.

Analytical dimension	Basis of assessment (from the questionnaire)	Assessment scores
Rationale of participation	main party included (public/stakeholders), motivations and goals for participation (questions 9–11)	(1) legalistic (2) normative (3) instrumental (4) substantive
Inclusiveness	range of involvement of stakeholders and the public (questions 12–15)	(1) narrow (2) broad
Level of participation	techniques used for participation (questions 16–17)	(1) information (2) consultation (3) involvement (4) collaboration (5) empowerment

With regard to the rationales and the level of participation, we identified the top scores accomplished during the participatory process.

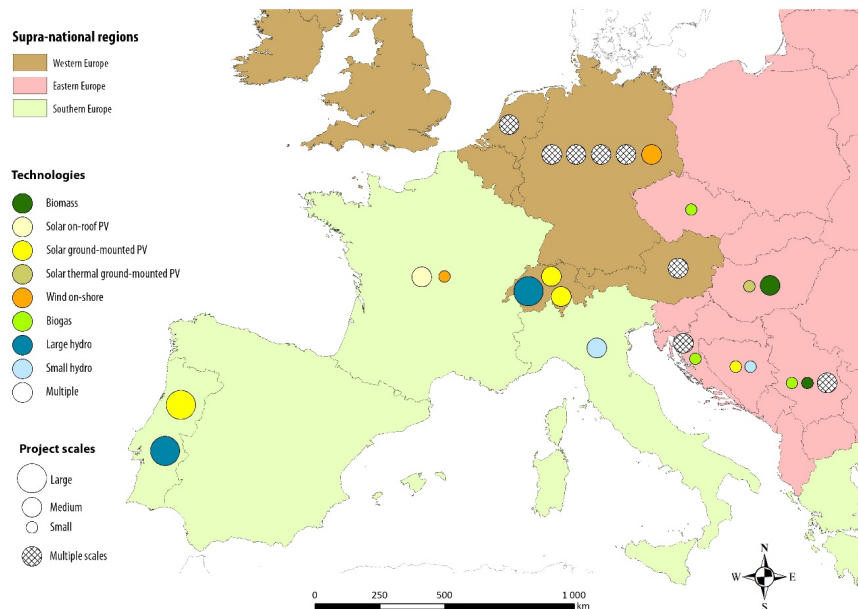
Second, we analysed the materials provided about the participatory practices with qualitative content analysis [62] by line-by-line coding of relevant themes and organizing the codes into higher-level categories according to our analytical framework. This enabled us to better uncover the reasons behind similarities and differences.

### 3.3. Overview of the 25 projects including innovative participatory practices

Raven et al. [20] introduce four aspects that shape the context for new energy projects: government policies, socio-economic processes, cultural factors, and spatial factors. As the focus of the COST Action was on RE and landscape quality, we added the following contextual aspects: a) project location; b) project scale; c) project type (RE technology); d) timeline; and e) landscape characteristics to the general project description (Table 2).

**Location.** The 25 projects are located in twelve countries (Figure 2), situated in three supra-national European regions: Western (German and Celtic cultural traditions) (10), Eastern (Slavic and Balkan culture) (10), and Southern Europe (Latin culture) (5). Our regional division results from a literature review (e.g. spatial planning, innovation literature) and we use this division as a background to depict our results, to contribute to the discussion of how different spatial planning cultures relate to participatory RE practices [29,30,33]. These regions mostly refer to cultural and spatial planning traditions and to Suškevičs et al. [14], who explored similarities and differences in participatory planning contexts of wind energy. Similar to [14], France is considered as belonging to Southern Europe because, in terms of spatial planning characteristics, France can be viewed as being in an intermediate position between Western and Southern Europe [63]. Furthermore, according to the EU Compendium for Spatial Planning Systems and Policies, public involvement at the local level in France tends to be similar to Italy, Spain, Greece, and Portugal [64], p. 71. For instance, in these countries, national governments start participation only after the official publication of proposals, while in Western European countries, participation is initiated earlier.

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- flyttet opp [1]: We use the regions as a background to depict our results and to contribute to the discussion of how different spatial planning cultures relate to participatory RE practices [29,30,33].



**Figure 2.** Characterisation and national affiliations of RE projects. Note: symbols do not display project locations within countries.

**Project scale.** We assigned each project to one of three scale levels: small, medium, or large [65] (Table 2). The ‘large’ level was assigned to two hydropower plants (CH2, PT1) and one solar power plant (PT2). All other projects were classified as small-scale (8), medium-scale (6), or multiple scales due to several RE technologies being involved (8).

**Timeline.** A majority of projects (16) had been implemented already. The planning phases mostly lasted between 2 and 6 years and had taken place within ten years before our study. Three projects had only reached the planning phase and were then stopped due to a change of government (HR, BIH, and HU) but, concerning participation in an early phase, they represent innovative examples in their countries.

**Technology.** Similar to e.g. [9,66], different RE technologies were present in our selection of projects. Fifteen projects included one RE technology, the other ten projects included two or more different RE technologies.

**Landscape context.** Most projects with innovative participatory practices are situated in agricultural landscapes, followed by urban landscapes, including industrial settings. Four projects deal with a rather unique site or geographical feature: namely an island landscape (HR1); an ecological corridor (HU2); a seismic area (IT); and a flooded settlement (PT1).

**Table 2.** The 25 RE projects and participatory practices applied.

Project ID	Scale*	Technology	Time	Project name and a brief description
AU	Ø	Multiple technologies	Since 2011	<b>Energiekultur Kulmland.</b> The Kulmland region has adopted the goal to reduce CO <sub>2</sub> emissions. To achieve this goal, an Energy Culture Manager was employed. An information event, a seminar, and four workshops involving the population to elaborate an implementation strategy were envisioned. In a first workshop, a SWOT-analysis on the situation in Kulmland was conducted and a vision for the future energy culture brainstormed. Finally, a solar park was initiated based on a private initiative.
BIH <sub>1</sub>	S	Small hydropower	2011–2015	<b>Micro hydropower plant Čajdraš.</b> This is an example of multiple uses of water by installing equipment for the production of electricity in the system of drinking water supply. The public company provided the decision-making process for establishing a small hydropower plant according to the laws on the public interest - protection from floods (responsibility of Zenica-Doboј Canton) and the production of electricity from RE sources.
BIH <sub>2</sub>	S	Solar PV ground-mounted	2012	<b>Solar power plant Kalesija.</b> The solar power plant is the first PV plant in BIH. The construction of the plant by an individual investor was motivated by financial incentives by the Federal government. Solar panels were installed on the roof of the City Hall after the Municipal Council issued a decision on granting a lease of the hall's roof for this purpose and provided necessary permits. There are no data about a broad citizen's participation in the decision-making process. The private investor pays the municipality to rent their roof.
CH <sub>1</sub>	M	Solar PV ground-mounted	2010-2013	<b>Solar modules on avalanche barriers.</b> The project envisioned to install solar modules on avalanche barriers of the southern slopes of the municipality of St. Antönien. Innovative is the idea to use existing infrastructure for producing solar energy, but also that the small municipality had initiated this project and hoped to increase with this project its attractiveness for tourism.
CH <sub>2</sub>	L	Large hydropower	2005–2015	<b>Linthal 2015.</b> The project includes the extension of a large hydropower plant in the high Alps. A key factor for the successful consensus-building was the well-designed involvement process with clearly agreed rules and goals. The goal of the participatory process was given and not open, but the stakeholders were given the option to shape the project, even if this implicated disadvantages for energy production.
CH <sub>3</sub>	M	Solar PV ground-mounted	2013–2015	<b>Solar-park La Boverie.</b> The main innovative element of the project is the focus on multiple uses of the area: the solar panels were installed on metal carriers two meters above the ground and the area below is used as a meadow for sheep. The solar park is envisioned to be productive for 25 years and will then be de-installed or reused on roofs of buildings. The project will provide half of the households of Yverdon with electricity from solar energy.
CZ	S	Biogas	2007	<b>Biogas station in Pustějov.</b> A local farm owns and operates the station. The public and the local mayor initially opposed the construction of this station. Acceptance was increased after a trip to the nearby biogas station for the local population. During the planning process, the operator promised cheaper electricity for the population but this was not achieved. The process has laid behind a perception of insufficient participation.
DE <sub>1</sub>	Ø	Multiple technologies	2011–2104	<b>Energy strategy Zellertal.</b> The communities of Arnsbruck and Drachselsried developed a common energy strategy. The main focus was on public participation in decision-making. In cooperation with the universities of Deggendorf and Passau, a new concept for public participation in the field of wind energy planning was developed and tested in practice. The idea was to involve citizens in the planning process by conducting a GIS-based site location for possible areas for wind power plants in several workshops.
DE <sub>2</sub>	Ø	Multiple technologies	2008–2011	<b>GIS-based Visual Landscape Assessment.</b> This is an example of public participation in early RE planning stages. An online photo-assessment survey was conducted by the Dortmund University of Technology. Over 3300 participants submitted ca. 500 photo views in the federal state. A model showing the interrelations between the participants' photo-based ratings and the landscape components was computed. The model of different scenic qualities was applied to the whole area of the federal state. The approach enabled to depict public opinion about scenic landscape quality, and areas potentially (not) suitable for RE.
DE <sub>3</sub>	M	Wind onshore	2014	<b>Interactive visual landscape assessment to create a RE atlas.</b> Web-based participatory approaches were used besides GIS-methods of visual impact analysis, to determine the most suitable locations for wind turbines and provide an empirical region-specific basis for designing wind parks in the federal state of Saarland. Experts and laypeople living in the affected area were involved. The resulting atlas of renewable energies aims to inform the public and decision-makers about existing and potential sites for RE. Interested citizens can use it to get information about potential future planning processes.
DE <sub>4</sub>	Ø	Multiple technologies	2013–2016	<b>Reconciling RE conflicts in Dezent Zivil.</b> This research project has investigated different planning and approval procedures of wind power and biomass plants to reduce the conflict potential in these planning processes. Selected practical examples, formal procedures, forming of opinions and acceptance, and communication patterns in the course of the conflict were analysed. To support public participation, 3D-simulations of environmental effects were performed and the citizens were invited to a walk to choose the viewpoints for the 3D-visualizations.
DE <sub>5</sub>	Ø	Multiple technologies	Since 1999	<b>Energy village Wildpoldsried.</b> The energy concept <i>Klimaschutz-Leitbild</i> of the Wildpoldsried village (about 2500 inhabitants) aims at producing 100% of the local energy consumption from renewable sources by 2020. From the beginning, the local population was strongly involved in implementing the energy concept. Wildpoldsried is a good example of the successful participation of the local population in RE projects. All main decisions (e.g. types of renewable energies, location, extent) are made in cooperation with the citizens.
FR <sub>1</sub>	S	Wind onshore	2001–2015	<b>Ailes des Crêtes wind farm.</b> Participation occurred in the hybrid region (community of communes), with innovative wind power charter (2002), within a process of participative democracy broader than energy. One of the main innovative elements was the sharing of benefits and looking for ways of having citizens invest in the wind project. Strong and clear financial sharing of benefits and capital for investment open to citizens, businesses, NGOs, or local authorities' investment existed. The project was partly designed based on a model from Belgium (wind turbines funded by children, by their grandparents for the future of grandchildren) and in addition to financial participation, it also serves as a social learning example.
FR <sub>2</sub>	M	Solar PV on-roof	Since 2012	<b>Energ'Éthique 04.</b> This social enterprise has been created via a citizens' initiative, who were willing to re-appropriate the production of renewable energy. The enterprise aimed at: (1) locally produced RE, financed by citizens; (2) offer support for the reduction of energy consumption, (3) organise energetic solidarity and reduce precarious situations. Energ'Éthique offers an equitable distribution of benefits between the employees, enterprise, and shareholders. The enterprise functions on a democratic governance principle: it is open to all, it works based on 'one person is one voice' and it includes long-term partnerships with local actors.
HR <sub>1</sub>	Ø	Multiple technologies	since 2011	<b>Island Krk – Energy Independent Island.</b> The island of Krk, with its municipal operator, is the front-runner for environmental and climate protection in the region. The aim to become an energy-independent island gathered citizens of Krk around financial participation and democratic activity. 19 founders – environmentally conscious individuals, representatives of island administration, local government, and local service company – established the cooperative. To achieve the vision, the cooperative has launched a series of training workshops for the residents and the importance of RE was promoted.

Project ID	Scale*	Technology	Time	Project name and a brief description
HR <sub>2</sub>	S	Biogas	2011-2013	<b>Biogas Gundinci.</b> The UNDP Croatia office initiated and planned the project. UNDP and NGO shared the same goal – to develop energy cooperatives in Croatia. The municipality of Gundinci had been chosen as a potential pilot project due to its intensive livestock husbandry and available resources for biogas development. The project reached the planning phase successfully introducing financial participation from the local community as an innovative aspect but failed in development due to political instability.
HU <sub>1</sub>	S	Solar thermal ground-mounted	2010–2011	<b>Coach-BioEnergy.</b> The activity was led by the research team of the Szent István University, where a participative energy planning methodology was developed and tested. It aimed to engage the whole municipality and start a renewable energy development movement. Diverse ways of engagement were used – invitation letters, news blocks in the local newspaper, posters, forums, transect walks, and study trips. The biggest challenge was to motivate people for participation and initiate investment in renewable energy. The legal representatives formed an energy subcommittee, who dealt with energy-related topics in the municipality. As a final output, the scientific team submitted the RE Strategy for the municipality.
HU <sub>2</sub>	M	Biomass	Since 2007	<b>Tiszatarján Bioenergy feedstock production.</b> WWF Hungary has initiated an innovative pilot project next to the Tisza River in north-eastern Hungary. Its goal was to develop and test innovative Payment for Ecosystem Services schemes to restore the area's natural floodplains while increasing and diversifying local income streams. WWF deployed a participatory approach to implement a landscape based bioenergy project in the Tiszatarján village. The resulting improvements to landscape and biodiversity aim to make the area more attractive to tourists.
IT	M	Solar PV on-roof	2009–2010	<b>L'Aquila Progetto C.A.S.E.</b> In 2009 a strong earthquake struck the historical city of L'Aquila. The constructions in the historical center were propped but not realized, so for the displaced inhabitants' new neighbourhoods around L'Aquila were built. These new neighbourhoods incorporate RE, e.g. solar power. Local participation in project design was weak, so the population protested for not being involved in rebuilding project development. The new homes do not recall Italian tradition or the social structures in the old city and do not have the basic urban infrastructure, although they are seismically and energetically very efficient.
NL	Ø	Multiple technologies	2015–2019	<b>Energiewerkplaats Fryslân – The Energy Atelier Friesland.</b> This experimental, community-led project aimed to develop a framework for communities to design their process or work with the practical method. The Energy Atelier facilitates with knowledge, the organisation of the Community of practice, offers financial support for communities, and provides expert input. The Energy atelier developed a new method called: 'the Energy mix method' that helps communities to develop a location-specific spatial energy plan, which integrates vision, finances, scenario design, and historical knowledge.
PT <sub>1</sub>	L	Large hydropower	1957–2004	<b>Barragem de Alqueva.</b> The construction of the Alqueva hydroelectric plant was developed by the Portuguese government through the utility company, supported by national and EU funds. The construction was a fertile ground for conflicts since it entailed land expropriation; a huge negative environmental impact and the submersion of many cultural heritage items. The Alqueva project underwent several Environmental Impact Assessments, including a public consultation with continuous interaction with the directly affected population, ca. 350 people. A team of anthropologists designed a museum to preserve the memory of the submerged village.
PT <sub>2</sub>	L	Solar PV ground-mounted	2000–2008	<b>Central Solar da Amareleja.</b> Amareleja is the largest solar power plant in Portugal. According to national legislation, no Environmental Impact Assessment was needed. Thus, there was no formal public consultation but zoning regulations required a public consultation (with very meager participation). The municipality voluntarily ordered an Impact Assessment that was presented in a public meeting and promoted several public debates in city Moura and other parishes. Also, the municipality developed several other events (local fairs) to promote solar energy. Some conflict arose during the process, as it required dismantling of a small, disused aerodrome that was regarded as 'local heritage' by a group of inhabitants.
SR <sub>1</sub>	Ø	Multiple technologies	2010–2015	<b>Energy Efficient Kindergartens in Belgrade.</b> The Belgrade City Assembly and the Agency for Investment and Housing, in cooperation with the Belgrade Association of Architects, Serbian Association of Architects, and Secretariat for Child Protection of the City of Belgrade have carried out the architectural and urban planning competition for the five energy-efficient kindergartens. The Competition aimed at conducting a broad survey, to increase public choices, to offer optimum quality solutions, and to obtain professional design with accurate cost estimates.
SR <sub>2</sub>	S	Biogas	2009–2010	<b>Small biomass power plant.</b> This privately initiated RE project was about the building of a co-generative plant producing biogas from corn silage. Other participants in this project were local farmers, who own agricultural fields where corn silage comes from. In this way, local people are financially supported. Also, other resources can be digested in this facility, e.g. different types of manure. This project is the first small biomass power plant of such kind installed in the Republic of Serbia presenting private investment and shared benefits.
SR <sub>3</sub>	S	Biomass	Since 2011	<b>Ecoremediation of degraded areas by energy crop production.</b> The project team chose the location in Sadzak because it is a degraded land, and close to a protected natural resource. Crops were planted on about 20 hectares. After three years since the establishment of the plantations (in 2014) biomass was harvested and pulverized to the size of 10cm and transported to a power plant in Vrsac. Residents were interested in participating in establishing and monitoring the development of the plantation. Their crucial goal was to establish in a given area the possibility to use chain "soil-crop-power plant". No conflict arose that would threaten the realization of the project.

\* Scale [65]: S - small; M - medium; L - large; Ø - multiple scales (due to multiple technology-projects)

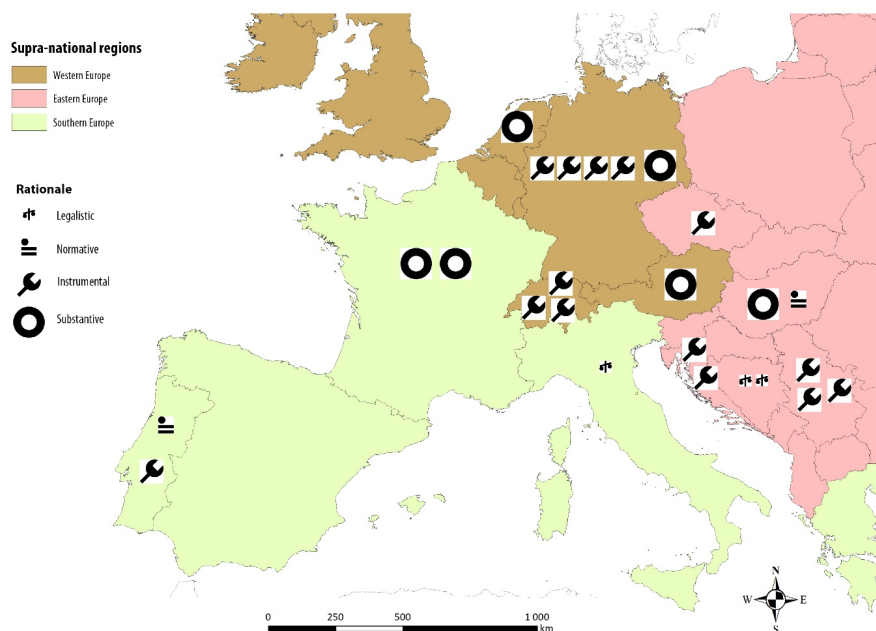
## 4. Results

### 4.1. Rationales

Slightly over half of the projects (14 out of 25) were assessed to have pursued an instrumental rationale for participation (**Figure 6**). This means that the main goals of applying participatory approaches were to validate assessments (AU; DE2), support decision-making (PT1; SR1), or to improve the overall acceptance of the projects (CH2; CZ; DE3; DE5; HR2). These projects originated almost equally from West- and East-Europe (**Figure 3**).

Relatively few projects (6), mostly from West-Europe, were based on substantive rationales for participation. Several projects pursued multiple purposes and the outcomes of the projects often had spillover effects on domains other than RE. For instance, DE5 aimed at elaborating a concept for developing a so-called energy village, in which the local population was actively engaged from the beginning of the project. FR1 created a social enterprise via a citizens' initiative and aimed at multiple goals. The enterprise relies on an equitable distribution of benefits and it functions on the principles of democratic governance. The NL project also had a wide, encompassing goal of supporting communities in reaching their RE ambitions and achieving broad acceptance among stakeholders.

Three projects (BIH1,2; IT) followed a predominantly legalistic approach to participation. Participation was considered mainly as a *pro forma* matter, and public input did not have any substantial impact on decisions. Only two projects (HU1; PT2) were considered to apply a normative rationale for participation.



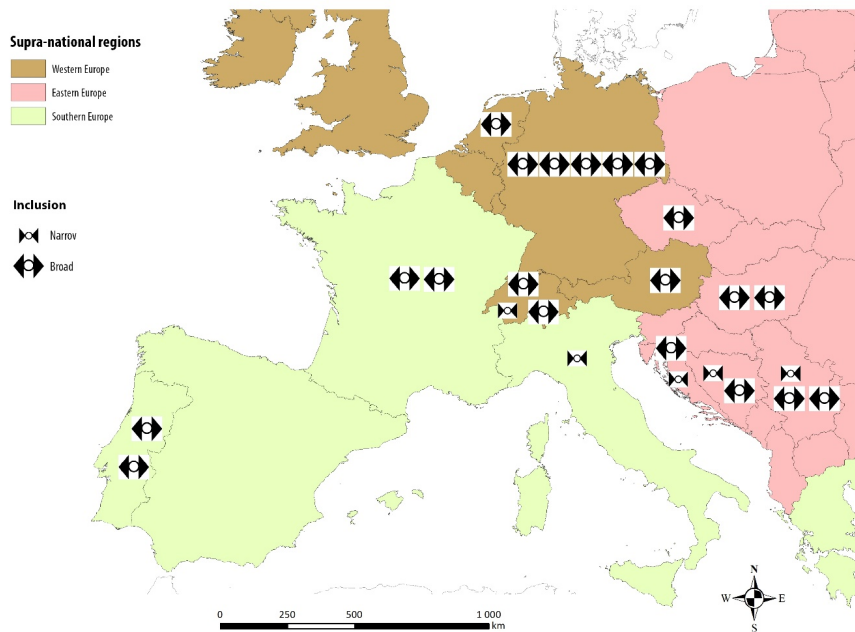
**Figure 3.** Rationales for participation in the 25 projects across three European supra-national regions. Note: Symbols do not display the project locations within the countries.

#### 4.2. Inclusiveness

Practices in a large majority (20) of projects were classified as including broad participation, whereas in the remaining five, mostly Eastern European projects, inclusiveness was considered to be narrow (**Figure 4; 6**). A total of 104 stakeholders were identified in all projects. The most frequently identified stakeholder groups were local, regional, or national authorities (22 projects). Their role was mainly to provide funding, but they also initiated RE policies or projects, provided administrative and technical support, or licensed the projects. Public authorities were followed by energy companies, residents, environmental organizations, and other local groups based on interests, such as farmers and second-home owners. All of the identified actors were group members with the exceptions of a local mayor (HU1) and an energy manager (AU) who were rated as having high individual influence in the planning processes. The projects with the highest diversity of stakeholders were AU; BIH1; CH1; FR1; HU1,2 and NL, which included different sets of stakeholders (beyond authorities and energy companies) and the public.

In 17 out of 25 projects, participation occurred in the preparatory phases. These were also the phases for which participation was rated as most intensive. Only eight projects (BIH2; DE1,2,3,4; PT2; SR1; SR2) did not include participatory activities in the preparatory phases, and only one of them (SR2) was assessed as being of narrow inclusiveness. In the planning and realization phases

(i.e. spatial planning, permitting, construction, operation) participation occurred in sixteen projects but was not rated as intensive as it was in the preparatory phases.



**Figure 4.** Inclusiveness of participatory practices in the 25 projects across three European supra-national regions.

#### 4.3. Participation level and techniques

According to power-sharing or degree of stakeholder influence, the projects were assigned to levels of participation: fifteen projects were rated as having a low level of participation (eleven projects ‘consultation’, and four projects ‘information’); six projects were assessed to have applied a medium level of participation (‘involvement’ or ‘collaboration’), and just four projects were found to have achieved the highest level of participation (‘empowerment’) (**Figure 5**).

The in-depth content analysis revealed a slightly more differentiated picture of the participatory techniques applied. All 25 projects applied information-sharing techniques. The most frequent forms of sharing information were ‘local and regional newspapers’, ‘newsletters’ and ‘direct mail letters’, as well as ‘websites’, and ‘information kiosks’ at fairs and events. A best-practice participatory technique was brought forward for the NL project, where a digital application and a movie were distributed via e-mail. In five projects (FR1; HR2; HU1,2; NL), academics supported the setup and organization of participatory techniques for information sharing.

In fifteen projects, consultation techniques were applied. In most of these, inputs from the public or stakeholders were acquired via common forms of information collection: namely individual or



focus group interviews, or questionnaires. More innovative consultation techniques were applied in four German projects (DE1,2,3,4), such as visual responses via 3D-analysis, or scenario planning. Some other projects had applied practices such as field trips and study excursions (CZ; HU2), or ethnographic studies and community voting methods (PT1,2).

Nineteen projects also applied techniques of collaborative and empowering forms of participation. Most of them meant 'face-to-face meetings with interest groups or the public', such as bilateral negotiations with interest groups (CH3), workshops and field-trips (CZ; DE1,4; HU2; NL; SR3), public debate and fair (FR1), or a conference for sharing experiences (HR1,2).

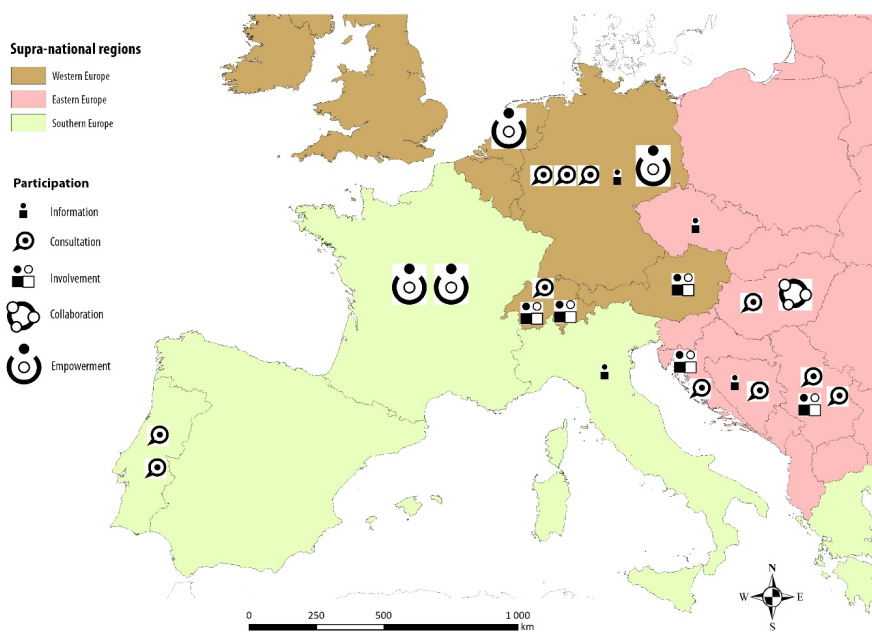
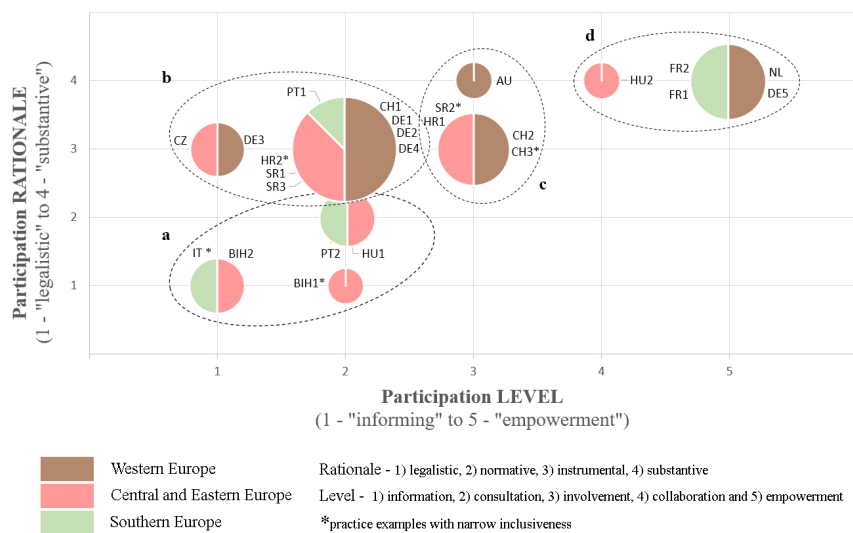


Figure 5. Participation level in the 25 projects across three European supra-national regions.

#### 4.4. Cross-case analysis and interrelations between quality criteria scores

Figure 6 and Table 3 categorize the analysed practices in four groups, according to different participation quality, and highlight the three supra-national regions.



**Figure 6.** Overall quality levels based on the interrelation between participation levels and rationales (cf. Tab. 3). Note on groups: a - low quality; b - intermediate quality; c - high quality; d - highest quality.

Practices within group ‘a’, i.e. characterised by a legalistic or normative rationale combined with narrow or broad inclusiveness, and a low level of participation, are located in Central-Eastern or Southern Europe. Practices within nearly half of the projects belong to group ‘b’, which includes an instrumental rationale combined with narrow or broad inclusiveness, and a medium level of participation. Projects in this group were considered ‘best practice’ in all three supra-national regions. In group ‘c’, projects pursue an instrumental or substantive rationale with either narrow or broad inclusiveness and a medium or higher level of participation (‘involvement’). Group ‘d’ contains the most intriguing practices by following a substantive rationale and including broad inclusiveness and the highest participation level. These projects are mostly located in Western and Southern Europe although one is in Central-Eastern Europe.

**Table 3.** Interrelationships between quality levels and characteristics of innovative participatory practices (cf. Fig. 6).

Quality range	No. of projects; regions	Rationale, inclusiveness, participation level	Innovative practice characteristics
a - low quality	5 projects: Central-East- & South-Europe	legalistic or normative rationale; narrow or broad inclusiveness; low level of participation	short project timeframe; new actors as investors; no sharing of benefits; low local motivation and external manager of the process; low local capacity; technology benefit spillover

<b>b - intermediate quality</b>	10 projects: West-, Central-East- & South-Europe	instrumental rationale; narrow or broad inclusiveness; low level of participation	large environmental and cultural impact; medium to high local concerns; late inclusion of public; new participation techniques; focus on mitigating conflicts; high local motivation and external process manager; indirect technology and financial benefit spillover; cultural benefit spillover
<b>c - high quality</b>	5 projects: West- & Central-East-Europe	instrumental or substantive rationale; narrow or broad inclusiveness; a medium level of participation	umbrella goal defined and linked to culture; strategic goals; designed and managed participation process; transparency of participation goal; financial participation and new participation techniques; new actors as investors plus sharing of benefits; technology, land use, and direct financial benefit spillover
<b>d - highest quality</b>	5 projects: West-, Central-East- & South-Europe	substantive rationale; broad inclusiveness; high level of participation	multiple benefits and effective future goals; comprehensively designed process; financial participation, clear benefit-sharing; new participation techniques; social learning effect; cultural benefits spillover; landscape attraction; social benefit spillover (energy solidarity)

The participatory practices in the two groups with high ('c') and highest quality ('d') share common characteristics in terms of applying wider goals (e.g. common regional ideas: BE, FR, HR) and enabling spillover effects (**Table 3**). So, bottom-up participatory approaches and wide goals of projects appear to be promising innovations to enhance participation quality in RE projects.

The dimensions 'rationale' and 'participation level' seem to be most closely interrelated, although this result was not found in all projects (**Figure 6**). Narrow inclusiveness could only be observed in projects that, at best, achieved the level of consultation, and pursued not more than the instrumental rationale. Broad inclusiveness, however, also occurred in projects pursuing only legalistic rationales and applying the lowest participation level (information). Thus, the interrelationships between these two dimensions appear to be looser.

## 5. Discussion

Recent literature highlights that participation plays a pivotal role in the energy transition [2,15] but the general quality of participatory RE planning is not sufficient to find widely shared solutions [18,21]. We focused on 'best' or 'innovative' practices in 25 RE projects in 12 European countries, and thereby examined which uppermost quality level of participatory RE practices can be found in different regional contexts, and how these practices are characterized. The results can be used to inform the creation of future strategies for RE planning to foster participation and thereby enhance acceptance.

### **5.1. Uppermost quality levels of participatory practices in three European regions**

A combination of the instrumental rationale, involving a broad range of stakeholders at the level of consultation or information sharing is the most common upper-quality level of participation in our selection of practices. This can be attributed to the overall pragmatic approach of public officials as process organisers [18,32,49]. It means that, in large parts of Europe, promoting an energy transition still focuses on acceptance building for single projects rather than on reflecting on more comprehensive future strategies.

Practices in a few projects: five from Western, Southern and Central-Eastern Europe, were rated exceptionally high in all three analytical dimensions of participation quality. Most of these projects are focussed on developing multiple RE technologies and are community-led, in which the local community and the authorities cooperated closely, such as cooperating to create social enterprises and energy cooperatives, and to enable financial participation of residents and other stakeholders. Additionally, these projects pursue relatively broad goals that transcend the specific project aims, such as by achieving local or regional energy autonomy.

Practices in another five projects; from Central-Eastern and Southern Europe, were given low ratings in all dimensions. These projects show some best practice elements, such as using participatory techniques such as workshops or field-trips, but they are all characterised by one or more of the following shortcomings: an overall *pro forma* (legalistic) approach to participation; weak sharing of power and benefits between stakeholders; and either narrow or late-stage participation.

Practices in ten projects; from Western, Central-Eastern and Southern Europe, exhibit an 'intermediate' participation quality. Thus, there is no clear geographical pattern in terms of quality of participation, but rather tendencies of regional differences. The reasons for regional differences could be that participatory spatial planning has a long history in West-Europe [29], which leads to higher expectations of the public to be involved in RE planning. Alternative explanations could be that skepticism towards technocratic approaches is more widespread in Western Europe [12] or that the differences reflect the disparate economic situation between the regions. Some Central-Eastern or Southern European projects are nonetheless important in their national or regional RE planning contexts. For example, in several Eastern European projects, partnerships between private actors and public stakeholders seem to be a key for participation and implementation. Also, local community initiatives seem to be highly important for effective participation and implementation of RE projects [18]. For instance, some community-driven projects potentially act as national showcases from which future initiatives can learn, although they were not rated highly in terms of participation quality. Such projects can also create positive outcomes with spillover effects. Spillover is a concept that is originally derived from innovation literature [67] but in the context of deliberative democracy, it can be defined as "effects that are not directly related to the deliberation topic" [68]. Our study includes projects in which innovative RE participatory practices provide spillover effects, in terms of environmental (e.g. biodiversity conservation), social, or economic benefits, such as creating long-term partnerships between enterprises and local actors, reducing energy poverty, or creating new jobs.

### **5.2. Criteria most suitable to assess the quality of participatory RE planning practices**

RE research has mostly focused on exploring the acceptance of technologies or sites, and participation has been included as a potential driver for achieving higher levels of acceptance in some studies (e.g. [13,21]). Assessing RE participation *per se* has only recently become the focus [2,15,56,69] and few studies have used a combination of criteria to analyse participation quality [2,18,70]. Our research suggests that the three dimensions: ‘rationale’; ‘inclusiveness’; and ‘participation level’, which have been used in other domains such as environmental governance, are also useful to analyse participation in the RE domain as they allowed us to evaluate participation from different perspectives. Rationales are perhaps the most comprehensive dimension associated with several further aspects, such as goals, inclusiveness, and participatory mechanisms [51]. At the same time, rationales have rarely been used to evaluate participation [32,49].

The dimensions ‘rationale’ and ‘participation level’ seem to be considerably, but not systematically, interrelated. Therefore it is reasonable to recommend combining different dimensions when assessing participation quality. To increase local acceptance of RE projects, considering participation rationales is clearly desirable because involvement is only meaningful if the decision power goes beyond a ‘yes’ and ‘no’. Furthermore, in terms of fostering justice in energy transitions, a broad understanding of participation might be useful: not just as a fixed procedural notion but as a systemic endeavour which better accounts for diverse political and planning cultures [2].

### **5.3. The role of empowerment in participatory practices**

A key question for ensuring high-quality participation is how to empower stakeholders. Empowerment refers to increasing the scope of participants’ influence in their lifeworld [71]. In this sense, providing two-way communication formats on an equal level (high level of participation), and in particular, deliberating about the design of the project (substantive rationale), are certainly key conditions for achieving empowerment in participatory practices. From the established evidence, empowering practices essentially implicate spillover effects, thereby moving beyond the implementation of RE for the sake of energy capacity. But for spillover effects to materialise, shifts should occur. Our qualitative analysis of the projects revealed that, similar to earlier studies, participation pursuing instrumental rationales already allows for spillover effects, such as trust-building, regional identification, and financial or land use benefits (e.g. [32]). However, to initiate regional processes of energy transition and to stimulate a more comprehensive social empowerment, participation pursuing substantive rationales appears to be needed. Among the practices assigned to the highest quality level, participatory processes were designed to fulfill multiple goals. This implies that participation as part of the energy transition in national, supra-national or regional contexts might address, if accurately designed, complex ideals, such as energy decentralization [7], procedural justice [61], shifts in democracy or energetic solidarity [72], and comprehensive process design [73]. Propagating substantive rationales in participatory RE planning might, therefore, be a promising strategy for all of Europe, while the choices of particular participatory techniques can take regional differences into account, such as those related to planning culture.

#### **5.4. Methodological, theoretical and geographical limitations of the study**

Our findings are based on the pooled knowledge of European experts, but several limitations have to be considered. Expert assessments may be biased to some extent [74]. Our comparative approach attempted to balance between providing an in-depth look into individual projects and maintaining a general picture of the situation in European regions. In such an analysis, some nuances are inevitably lost, which might be important to keep in mind when interpreting an individual project's results [56]. Furthermore, our sample of projects is not representative in quantitative terms. No Northern European projects were included and the three supra-national regions were not included in a balanced way as there were fewer projects from Southern Europe. To achieve a more comprehensive overview of participatory RE planning in Europe, future research might target all relevant regional agencies of European countries. Finally, our theoretical approach combines three analytical dimensions of participation quality, but there might be other important dimensions, which we did not assess, such as fairness, social capital, learning, or the interactivity of the process [16,48].

#### **6. Conclusions: Implications for RE planning and research**

Recent literature suggests that insufficient public involvement, and a consequent lack of quality of participatory practices, is the main reason for unsuccessful RE project planning and implementation. We studied a rich diversity of approaches to participation: each of which is valid in its context and therefore none of them are inherently 'right' or 'wrong'. Our study is based on a broad geographical scale so the implications are relatively general.

- To increase local acceptance of complex environmental governance issues such as energy transition, a shift from the instrumental to the substantive rationale in participatory RE planning might be a promising strategy for Europe. This would require a stronger consideration of public participation in strategic planning.
- To implement the energy transition in a region, a concept of the entire planning process should be developed in an early phase. For designing participatory RE planning, all three dimensions should be equally considered: 'rationale', 'inclusiveness', and 'participation level'.
- Most high-quality participatory planning practices were found in bottom-up or community-level RE planning. Community RE planning might, therefore, be supported by national agencies and the EU.

Future research could also combine qualitative methods, such as interviews and analyses of policy documents, with quantitative surveys to gain a more balanced representation of all European regions, to test our assumptions, and to grasp an even more accurate picture of the status.

#### **Author declaration**

DS coined the idea with MB, designed the survey, prepared data for analysis, and developed the initial structure of the paper. DS and MS coordinated manuscript writing and conducted qualitative content-analysis of the cases. Together with SMü and MB, they revised theoretical and empirical

sections. All authors did the quantitative evaluation of the case studies, have contributed to the interpretation of the results, writing of the manuscript and agreed on its content.

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**Appendix A. Example of a project summary sheet.**

1		CASE TITLE	GENERAL DESCRIPTION
AU	Energiekultur Kulmland Oststeiermark		The Kulmland region has adopted the goal to make the reduction of CO2 Emission as a part of its culture. To achieve this goal, they employed an Energy Culture Manager who first analysed the status quo of the regional energy situation and organised first project to sensualise the population for the topic (energy path). Furthermore, an information event, a seminary and first 4 workshops involving the population to elaborate an implementation strategy were envisioned. In a first workshop, a SWOT-analysis on the situation in the Kulmland was conducted and a vision for the future energy culture was brainstormed. Finally, a solar park was initiated based on a private initiative. The project is funded by the federal ministry of environment under the program Climate and Energy Model foundation (KEM).
GOAL		The goal is the calibration and validation of an area-wide assessment of scenic landscape quality.	
MAIN CONCERN		How to achieve autonomous energy provision in the region?	

STAKEHOLDER	ROLE	INFLUENCE	
Federal ministry of environment	National authority	Funding	Medium
Authorities of municipalities	Local authority	Initiative	High
Local energy manager	Local energy manager	Management	High
Private project group	Private project group	Project initiative and financing	High
Population	Regional public	Participation in workshop	Medium

INFORMATION SHARING MEASURES	
Awareness Campaigns	Information event
Information/Education Programs	Seminar Website
Feedback Mechanisms	Local project manager
MEASURES FOR COLLECTING & COMPILING INPUT	
Individual Inquiries	Data analysis SWOT analysis
MEASURES FOR BRINGING PEOPLE TOGETHER	
Specialized Processes	Workshops

ROJECT PHASE	TYPE OF PARTICIPATION	INTENSITY
Before the project started	Collaboration of involved municipalities	High
Determination of need	Workshop	High

Summary of the project	
OUTCOME	Projects were initiated, visions elaborated, local ownership created.
BEST PRACTICE & INNOVATION HIGHLIGHTED	One innovative element is the local energy manager who organises the process. The other element is a participatory swot analysis of the energy situation in the region and the development of a local energy vision.
LESSONS	Shared visions and a local management is an optimal basis for implementing renewable energy projects.



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