

A Co-planning Approach for Area-Based Holistic Energy Planning: The Experience of INTENSSS-PA project

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Abstract

Nowadays, we are in an era of pioneering with novel combinations between energy production, consumption and transport on the one hand, and with altering the existing urban and rural fabric and their associated socioeconomic uses for supporting such novel combinations on the other hand. Moreover, the energy initiatives are less vulnerable to failure and societal resistance if they are well-integrated in the local and regional contexts. However, institutional questions remain regarding the required level of integration, while simultaneously sustainable energy planning involves actors with diverse and conflicting objectives that must come to a consensus. Inspired by these findings, a methodological approach has been developed for holistic energy planning on regional/local level within the framework of INTENSSS-PA project that is funded by HORIZON2020. The approach urges for a holistic energy plan beyond a blueprint for allocating renewable technologies, with the involvement of society and the inclusion of aspects such as the development of spatial concepts, new co-creating strategies, business cases, societal alliances and institutional changes and formats. To implement this approach, the Living Lab (LL) concept has been adopted as this constitutes an experiential learning environment facilitating the achievement of the **boundary spanning knowledge transfer and the participatory decision making**. The objective of this paper is to present this methodological approach and demonstrate its application for the establishment of a network of seven (7) Regional Living Labs (RLLs) focused on holistic energy planning. The different characteristics of the established INTENSSS-PA RLLs' networks ensure the transnational experimentation of the proposed methodological framework for holistic energy planning under different levels of governance, physical landscapes and socio-economic, cultural and institutional settings.

Keywords: Holistic Energy Planning, Living Labs, Participatory Decision Making, Spatial Planning, Regional Development.

1. INTRODUCTION

Integrated sustainable energy planning implies the integration of the energy theme in spatial planning and physical and socioeconomic landscapes. Specifically, the integrated energy planning assumes that linking alternative land use functions and the interests associated with them in order to

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exploit the potential of the different renewable energy sources has important benefits, because it will facilitate the pursuit of alternative societal interests and developments such as agriculture, nature maintenance, mobility or economic development. Participation is required to avoid NIMBY and NIMFY and to allow local self-organization for the development of YIMBY projects [1,2].

The integrated energy planning provides direction for identifying and understanding the area-based conditions that may enable or accommodate energy initiatives, which can be supported by the local society and can be connected to the local economy. Nevertheless, integrated energy planning is not merely a matter of spatial design, but also of institutional design as it involves several actors with diverse and sometimes conflicting objectives that must come to a consensus. The conduction of an effective energy related planning presupposes deep changes in the structure and organization of the society [3,4,5].

Figure 1 provides a schematic representation of the identified items regarding energy planning. The need for multilevel and participatory decision making process with interdisciplinary skills is demonstrated in order to lead to feasible, viable and bankable energy projects. Considering the wicked nature of this integration problem along with the continuously increasing planning requirements imposed by the European Union and the relatively stagnant economic environment, an attempt has been made to develop an approach not only to guide the Public Authorities, but to perform a form of experiential learning that will lead to an innovative and acceptable institutional decision making process involving societal and business partners and cross departmental agendas.

The objective of this paper is twofold: firstly to present a holistic methodological approach for integrated sustainable energy planning at regional/local level and secondly to present the results of the application of the first methodological step, i.e. **the context analysis, trust creation and establishment** process of the 7 RLLs [6].

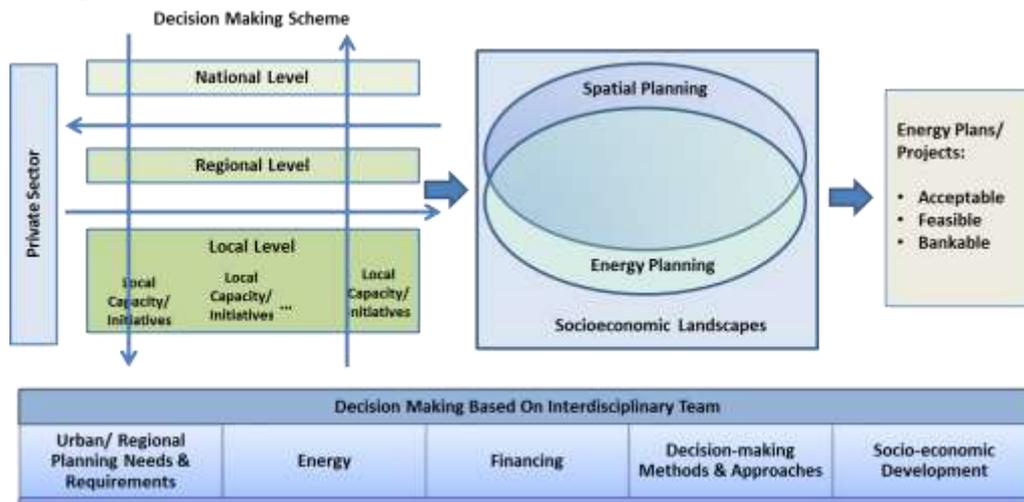


Figure 1. INTENSSS-PA Concept

2. INTENSSS-PA PROJECT FRAMEWORK

INTENSSS-PA project is funded under the 2015 call of HORIZON2020 Programme. The objective of INTENSSS-PA is to develop and implement a human and institutional capacity building process related to sustainable energy planning and energy projects implementation addressed to public authorities and societal stakeholders in order to support them to enter in a new era of integrated

sustainable energy planning through a participatory, multi-level, interdisciplinary decision making process. An interdisciplinary team of 17 partners from both the public and the private sectors as well as the academia coming from 7 Member States constitute the consortium. To achieve the above stated objective, INTENSSS-PA considers a four step approach: (i) to build a planning approach-structure including supportive materials and tools for the implementation of this approach, then (ii) to build human (i.e. technical) and institutional (i.e. mainly normative and cognitive) capacity, (iii) to build proof of concept through experimentation into the different planning contexts and energy related issues considered in the participating countries, and finally (iv) to build institutions that will ensure the operation of the identified planning concept beyond project.

To implement this approach, the Living Lab (LL) concept [7, 8] has been adopted. A LL represents “a user-centric” research methodology for sensing, prototyping, validating and refining complex solutions in multiple and evolving real life contexts. LLs are defined as both an environment and an approach, where innovation process is supported for all involved stakeholders in real-world contexts, not constructed laboratory or project settings. LL concept seems as a very promising approach for INTENSSS-PA since it addresses the characteristics of the decision-making problem providing the capacity to develop an innovative integrated energy planning concept and to implement effective capacity building through experiential learning. Nevertheless, the LL concept itself can contribute to the formulation of an institution in order to support the regional and national integrated sustainable energy planning.

The INTENSSS-PA LLs (i.e. Regional Living Labs–RLL) are defined as emerging People Public Private Partnerships (PPPP) in which all the stakeholders work together to create, experiment and evaluate new innovative approaches and institutional innovation related to integrated sustainable energy planning. INTENSSS-PA aims to develop, evaluate and exploit a Holistic Energy Planning Environment. In particular, the RLL collaborative environment involves the provision of structured expert support with the involvement of: (i) a technical facilitator within each RLL, (ii) an interdisciplinary group of experts in order to develop methodological tools and guidelines and (iii) a Database of Practice that includes training materials and case-studies so as to support and inspire the RLLs. The approach aims to develop the conditions for a transnational thematic network of RLLs as well as the conditions to assess the capacity of the RLL concept to be incorporated in the institutional framework of energy planning of different Member States/Regions [6] RLLs are expected to add value to energy planning by developing planning processes and strategies in relation to a more open and collaborative approach to governance and by making the involved actors more effective and the decisions more legitimate.

3. METHODOLOGICAL APPROACH

The established objectives can be achieved through the constitution of the INTENSSS-PA RLL network based on a unique governance framework and a common repository of methods, tools and experiences between all the involved stakeholders [9] There is a predefined framework for the formation of the RLLs, while the structure and level of governance, the contingent interest and the converging requirements of the actors must be taken into consideration [6, 9, 10].

The overall methodological approach for RLLs on Holistic Energy Planning has been set up on four iterative steps that are presented in figure 2 [10]. The first procedural step provides a structured path for the establishment of a RLL involving the analysis of the contextual factors of the spatial and energy planning process in each region, the identification of the related stakeholders and their role,

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the socio-economic settings, institutional structures and the spatial and energy capacity of each region. The second step is focused on the co-decision of the Planning Focus effort, which consists of the specification of the focus, the vision and the magnitude of the plan including the involvement of the stakeholders. The third step is the actual holistic energy co-planning including the experiential learning within INTENSSS-PA project, while the fourth step is focused on the assessment of the designed holistic energy planning concept and its effectiveness and efficiency through the overall evaluation of the seven plans to be developed.

The performed work will be organized and implemented with a focus on the five key principles of the living lab approach, i.e.: value, influence, sustainability, openness and realism. To achieve these, Living Lab activities should allow stakeholders to elaborate holistic energy planning in their context, determine if it brings value to them and provide insights about how stakeholders perceive value. Moreover, the established decision-making process must go beyond participation, involvement or engagement of stakeholders providing the opportunity to influence the innovation. To this respect, it is important to secure that domain experts' and stakeholders' needs and ideas are clearly traceable in the holistic energy planning environment and approach and to assure that participation, influence and responsibility among stakeholders are balanced and harmonized.

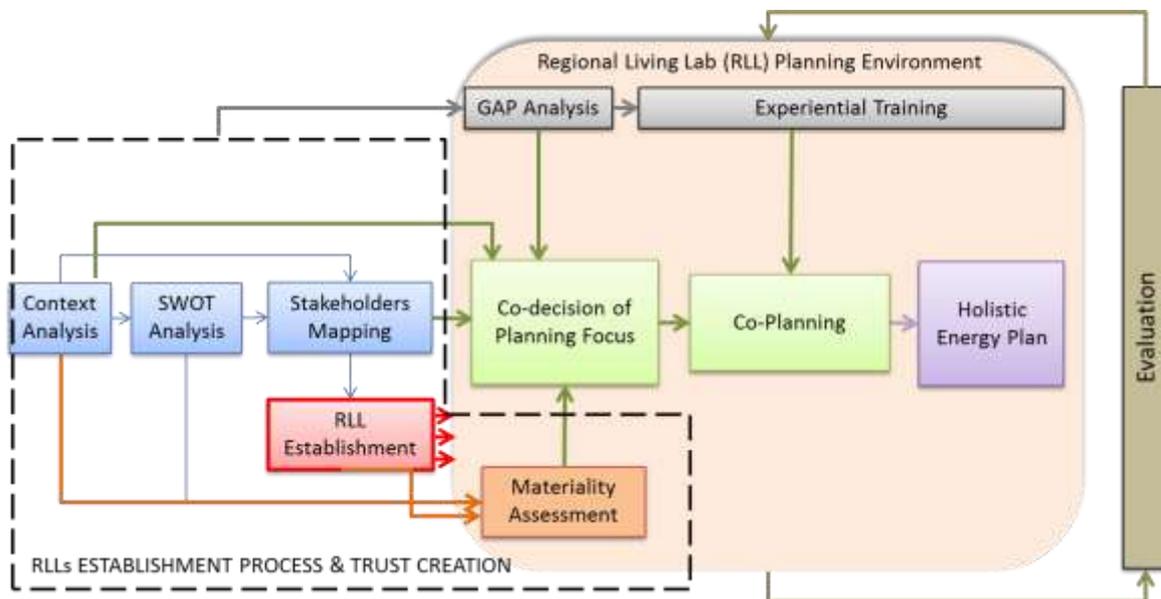


Figure 2. INTENSSS-PA Implementation Methodological Approach

Considering sustainability, the LL process goes beyond environment and resources and builds on creating relationships for the present and the future, which entails the development of networks and trust including the continuous learning and development over time. Openness within Living Lab process seems then to be a requirement for sustainable relationships and collaboration between people of different backgrounds, perspective, knowledge and experience that secure faster and feasible integrated sustainable energy planning. Finally, realism is a cornerstone of Living Lab approach since innovation activities should be carried out in a realistic, natural, real life setting. Since all stakeholders have their individual local reality, everyone has a potential useful view of how the current situation can be improved.

4. THE INTENSSS-PA NETWORK OF RLLs

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A major objective of INTENSSS-PA is not only to develop and validate the RLL concept as an efficient and effective decision making structure for participatory multilevel governance (i.e. a People Public Private Partnership) but also to test and identify a framework to embed the RLL concept for integrated sustainable energy planning in an appropriate institutional framework that will provide to the RLL an empowering role. To this direction local/regional organizations originated from the public sector were selected to act as the coordinators and hosting organizations of the RLLs.

One RLL has been established in each Member State (regional area) participating in INTENSSS-PA project by implementing the developed methodological approach. Table 1 presents the network of the 7 RLLs. The fact that the chosen RLL Coordinators are not at the same administrative level provides the capacity to validate the effectiveness and efficiency of the RLL concept within different administrative structures and increase the transferability of the concept.

According to the approach (part in dashed lines in Figure 2), the context framework of each region leads to the identification of the major opportunities and threats deriving from the socio-economic, political, technological and institutional environment, as well as to the identification of the strengths and shortcoming of the organizations assigned the role of RLLs' Coordinators. Nevertheless, this analysis provided a more clear view of the authorities, policy makers, societal actors and other groups from the public and the private sectors whose cooperation within the LL collaborative environment could lead to an actual holistic energy planning approach.

Table 1. INTENSSS-PA RLLs Network

RLL	Coordinating Partner	Facilitator(s)
Calabria (Italy)	Calabria Regione (CaR)	ALESSCO, CeNSU
Pomurje (Slovenia)	Association of Slovenia Municipalities (SOS)	LEAP
Groningen (The Netherlands)	Gemeente Groningen	RUG
Karditsa (Greece)	Development Agency of Karditsa (ANKA)	BPM, SEMPXPA, GT
Middelfart (Denmark)	Middelfart Kommune	EcN
Zemgale (Latvia)	Zemgale Planning Region (ZPR)	BEF
Castilla y León (Spain)	Junta Castilla y Leon (JCYL)	IUU

To this respect, the systematic stakeholders mapping approach considered within the proposed methodological approach facilitated the identification of the core group of each of the RLLs (power – interest matrix), i.e. public authorities/institutions, energy & spatial planning research and industry, as well as a wider group that involves societal and economic factors that could be impacted by energy planning, while they may have an impact on the implementation of the energy plan (quadruple helix design model). The role of these actors is central since it varies from drivers of the plan to supportive or prohibiting enablers of the plan.

To mobilize and convince stakeholders to participate in the RLL initiative, bilateral meetings providing information on the scope and objectives of a RLL in Holistic Energy Planning were held. Initial RLL meetings and workshops were organized, while substantial local publicity was arranged in order to provide a formal character to the establishment of the RLLs. Initial discussions within each RLL aimed to: (i) shape the planning problem in the area, (ii) create commitment and (iii) create the basis for compromise solutions and collaboration spirit. The task of shaping the local

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energy issues and the creation of commitment were supported through the implementation of a materiality assessment. Through the materiality assessment and concretely capitalizing on its results, the local authorities will be able to shape their Sustainable Energy Plans vision and gain the trust of all stakeholders and thus to increase their acceptability and support to the RLL initiative. Generally, materiality analysis can shed light on what is important and can serve as a basis for improvement measures, strategy, ambitions, prioritization, and so on.

Detailed description of each step of the Methodological Approach for context analysis and trust creation including mapping of stakeholders and materiality assessment within the context of RLLs has been developed and provided to RLLs coordinators, including instructions and templates in order to facilitate the implementation of the approach as much as possible [6]. In the following section, the implementation of the above described process for the 7 RLLs considered within INTENSSS-PA project is summarized.

4.1 RLLs Context & Stakeholders Analysis and Establishment

As already explained, context analysis and SWOT analysis for each of the 7 RLLs took place. The synthesis of the overall analysis performed revealed several commonalities and differences within them. In particular, there are substantial differences regarding the official role of the involved regional areas in the energy and spatial planning. Specifically, the regional governance is authorized to design and implement energy policies and measures in the case of Castilla y Leon (Spain) and Calabria (Italy) regions, while the corresponding responsibilities for the case of Greece and Slovenia have been undertaken at national level. Furthermore, the role of the local level is critical for the energy and spatial planning in Netherlands and Denmark. Therefore, it is important to assess the contribution of the RLLs in completely different governmental and administrative structures. The different cultural characteristics of the involved regions constitute an additional parameter for the efficacy of the RLLs. Context analysis made clear that collaboration between the energy and spatial planning is at very low level, making the improvement of the existing planning framework (i.e. institutional framework) a necessity.

Considering the **strengths**, RLL coordinators seem to have both the willingness and the technical capabilities to support the development of the energy plans. Moreover, the existence of skilled and trained staff and the acquired high level of experience constitute significant advantages ensuring the fulfilment of the 7 RLLs objectives. Generally, the current level of awareness and cooperation is relatively high, while the energy issues are considered as a priority for all the involved regions focusing mainly on further penetration of RES and the promotion of energy efficiency. Consequently, the potential integration of the most critical energy issues into a common policy framework is perceived as an essential challenge, which must be confronted effectively. The contribution of the RLL members is vital towards this direction, while the official role of some of the involved institutions is expected to facilitate the compilation of the foreseen energy plans.

Nevertheless, the fact that some of the RLL coordinators do not have officially the authority to organize the required actions constitute a significant **weakness**. Furthermore, the lack of sufficient staff in order to support additional initiatives than the foreseen within the institution and the incapability to introduce changes smoothly to the existing legislative framework due to the slow response of the political systems can hinder the aim of the RLLs. In some cases, the complex administrative structure of the involved authorities impedes the effective coordination of the required actions for the design and implementation of integrated sustainable energy planning that incorporate spatial considerations and societal needs. Even if the existing level of knowledge can be

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assessed as satisfactory, there is lack of specialized know-how on topics such as: (i) the participatory decision-making procedures, (ii) the regulatory requirements on energy planning and opportunities, (iii) the feasibility studies for specialized renewable technologies, (iv) the techniques and approaches on influencing/managing social acceptability, etc. Last but not least, the limited financial mechanisms for the realization of the foreseen energy policies and measures within the energy plans can hamper their effectiveness, while the continuous deterioration of the economic conditions and the respective increase of the energy poverty can add additional ambiguity.

Almost all the involved regions are characterized by a high potential of RES and energy efficiency priorities depicting the significant **opportunities** for the implementation of the energy policies into the developed plans. The conditions are auspicious in cases that the high potential is accompanied by the political will for the deployment of specific policies and measures. Generally, the local authorities are strongly interested in further RES exploitation and promotion of energy efficiency for a variety of reasons, such as: (a) to reduce the energy cost and to support the competitiveness of the local economy, i.e. farmers, livestock breeders, small industries and tourism, (b) to comply with the imposed targets from the EU legislation and (c) to formulate social trends and framework of sustainability in order to reduce the existing levels of consumption. Moreover, the economic recession has led to the increase of awareness, improving the receptiveness of the society towards more sustainable technologies and more energy efficient patterns. To this context, the understanding of various stakeholder groups regarding the necessity of the participatory decision-making for the planning and implementation of projects directly related to the local socio-economic wellbeing has been improved, fostering the potential implementation of energy policies. The legislative requirements regarding the spatial sitting of the RES units can facilitate the design and conduction of energy policies/implementation pathways, while the existence of specialized initiatives and innovative actions such as First Energy Co-operative in Karditsa and the promotion of ICT solutions can enhance the existing level of knowledge and expedite the replication of the identified best practices. Finally, the proposed policies into the energy plan can be combined with the economic development of specific sectors such as agricultural and cultural tourism.

The continuous economic recession can be considered as the most important **threat** leading to a gradual reduction of the investments required for the achievement of the established energy targets. Moreover, various obstacles considering the further RES exploitation hinder the completion of the energy plans such as the land uses, the existence of protected areas, the triggered ecological impacts etc. The slow response of the decision-making procedures and the lack of specialized personnel and know-how in order to identify and support innovative solutions were identified as additional threats. To this context, the ineffective harmonization and implementation of the EU legislation differentiates the fulfilment of the established energy targets. Furthermore, the political instability and the continuous changes in the governance structure of some involved regions can be considered as additional obstacles, while the bureaucracy and the complicated administrative structures can detain the implementation of the energy plans. Finally, the societal resistance towards specific RES technologies and the installation of new infrastructures as well as the potential conflicts between some groups of stakeholders when their interests are contrary should be taken into consideration during the identification of RLL constellation (i.e. early involvement of societal actors and politicians) and the preparation of the foreseen energy plans.

Based on the SWOT and the context analysis a number of stakeholder groups were identified as leading to contradictory outcomes. Specifically, regions with high and low number of stakeholders were depicting the role of the different structures of the decision-making procedure (i.e. the

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complexity of administration and of the currently used planning procedures) and the energy markets, as well as the cultural settings.

A base set of stakeholders exists that is common in all regions, i.e. public authorities at different levels, RES companies, energy producers (i.e. mainly local initiatives), NGOs and representatives of the citizens. In other worlds analysis revealed that a quadruple helix decision-making model should be at least in place in order to address integrated, sustainable energy planning. Apart from these common categories, each region has identified other stakeholders that respond to their specific conditions and the physical and cultural characteristics. These stakeholder groups are consistent with SWOT analysis' results, especially in relation to threats and opportunities identified. It should be noted that different categories of stakeholders will be involved at different phases of a RLL, while participants with different role from each type of stakeholders will be engaged in the different stages of a RLL.

The establishment process in all RLLs involved a number of bilateral and small meetings with the different stakeholders in order to explain them the idea of the RLL and their role in it. In total during the establishment period of the 7 RLLs almost 80 small team meetings took place and around 60 in person discussions and Skype calls to mobilize the stakeholders. Depending on the nature of the Coordinator's organization the establishment process varied in efficiency and effectiveness leading to different time frames and sizes of RLL constellations. Regions and regional development companies like ANKA, where more efficient since their role in "asking" or "organizing" respectively is part of their core business. In cases like the Association of Slovenian Municipalities or single municipalities it was more difficult and less efficient. The graph that follows presents the validation of the degree of ease of the RLLs establishment process.

According to figure 3, RLL establishment for Italian and Spanish Regional Governments was much easier than the rest. The difference in ease to mobilize stakeholders between Calabria and Castilla y Leon is due to the increased familiarity and experience that Castilla y Leon has on RES investments since it is one of the Regions with the highest RES production in Spain, while they have already realized that ad-hoc investments do not necessarily ensure socio-economic development.

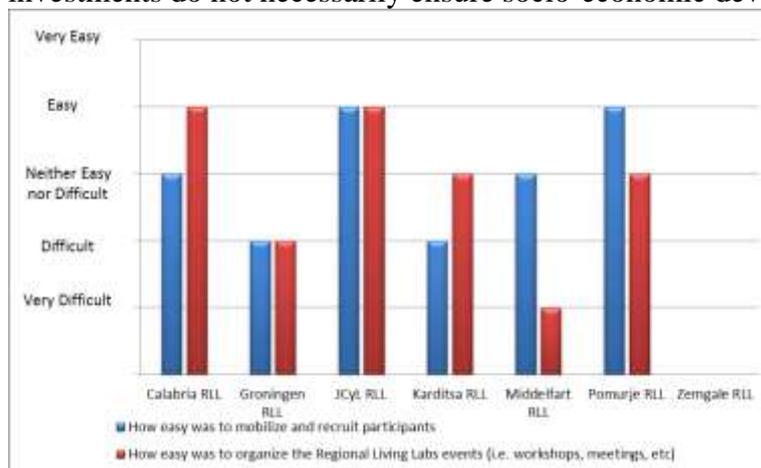


Figure 3. Ease in Mobilizing Stakeholders & Organizing Events within INTENSSS-PA RLLs

Figure 4 provides a comparison of participations between RLLs. An important note that should be made is that considering the level of governance within which a RLL is being established, the public authorities involved and their role in the planning process may vary. For instance, in the case

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of Castilla y Leon and Calabria that are at a regional level, planning and decision making requires central authorities and organizations. Municipalities and institutions at municipal level take a role closer to the role of “People” that need to be involved in the co-planning in order to provide requirements and build acceptance. In the cases of ANKA, the Development Agency of municipalities in Karditsa regional area or of SOS, the association of municipalities of Slovenia, an increased number of public authorities is required since they have to co-plan with the support of “People”.

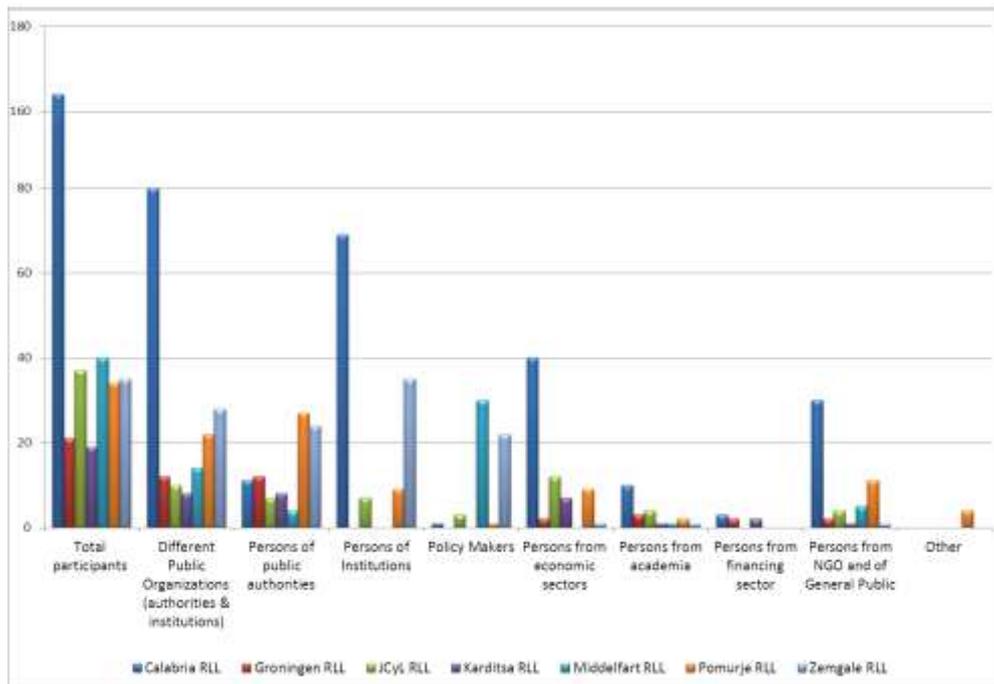


Figure 4. Total participants within INTENSSS-PA network of RLL

Therefore, conclusions in relation to the successful establishment of LLs should not be drawn by comparing their size and number of public authorities involved but rather by comparing these figures along with the level of governance and the nature and characteristics of the theme each LL is focused on.

4.2 Materiality Assessment Results and Experience

As already discussed, materiality assessment was implemented within the 7 RLLs in order on the one hand to gain commitment through involvement of the stakeholders participating in each RLL and on the other hand to initiate the process of visualizing what a holistic energy planning should address in their regional area. All RLLs capitalized on the results driven by their SWOT analysis and introduced to the involved stakeholders the procedure of materiality analysis during the RLL kick off meeting. However, the implementation approach and scope of the assessment varied in each RLL according to governance structures, power to influence and cultural characteristics.

The main differences noticed in the implementation of the materiality assessment by the RLLs, are related to the first step of the procedure, i.e. “Define purpose and scope of the materiality for each region”. More specifically, some RLLs took advantage of the more strategic aspect and capitalized on the materiality assessment’s results in order to start building their energy strategy, while in

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others materiality assessment was used mainly as a stakeholder engagement tool in order to complete or further implement already existing energy strategies and/or plans.

Furthermore, different means of communication were used and different procedures were implemented for conducting materiality assessment and discussing the derived results. In some cases, stakeholders were brought together in a meeting and had the chance to interact and exchange ideas throughout the whole procedure, while in other cases part of the materiality procedure was conducted via interviews, surveys or smaller group meetings.

The most important issues, as resulted by the ranking procedure, is the need to exploit the available RES in each region based on the existing local resources in a way that supports emerging socio-economic priorities of the regional area. A wide range of RES technologies were recorded, while energy efficiency interventions and smart technologies deployment also seemed as attractive options. The existing political and legal framework as formulated by the corresponding EU legislation facilitates the deployment of the above-mentioned options. Furthermore, the additional issues can be categorized in the following topics:

- **Political:** Actual capacity for effective decisions - Conflict of interests - Opposition to changes
- **Administrative:** Administrative barriers - Limited resources
- **Societal:** High rate of unemployment and low incomes - Energy Poverty - Opposition to changes - Low engagement - Lack of awareness
- **Financial:** Lack of available funds and mechanisms - Low profitability - Low energy prices
- **Technical:** Low density in large regional areas - Difficulties in replacing the various types of heating systems - Old infrastructures
- **Economic:** Development of agrotourism - Integration and added value of the entrepreneurship by the energy projects - Energy cooperative

The substantial variation of the topics is rather expected and fully justified by the following facts:

- RLLs have been developed at different administrative levels
- The coordinating organizations are of different nature
- Legal and institutional framework on energy and spatial planning varies substantially
- Different culture regarding RES exploitation and regional development priorities, collaboration practices
- Different landscapes.

It is important to note that through the materiality assessment a validation of context analysis findings takes place. Actually, issues identified should be consistent with the opportunities and up to a point also with threats identified in the SWOT analysis. Finally, the majority of RLLs concluded that through the materiality assessment and especially through the brainstorming and structured discussion on energy related issues within the RLL stakeholders, an increased understanding on the region's energy related needs and stakeholders' expectations was gained.

5. CONCLUDING REMARKS

A comprehensive methodology for integrated sustainable energy planning through the implementation of the Regional Living Lab concept has been presented. The proposed methodology recognizes all the difficulties associated with the integration of the energy theme in spatial planning and physical and socio-economic landscapes in a participatory, multi-level governance decision-

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making environment. The proposed methodology was applied in 7 regional areas within 7 different European Member States. Currently 7 RLLs have been established, while work under way includes the development of:

1. The co-decision of the planning process within each RLL.
2. The implementation of this process along with an experiential learning process in order to co-plan integrated sustainable energy plans.
3. The evaluation of the efficiency and effectiveness of the overall approach and the feasibility and overall acceptability of the integrated sustainable energy plans developed through the RLLs.

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