A METHODOLOGICAL APPROACH FOR HOLISTIC ENERGY PLANNING USING THE LIVING LAB CONCEPT: THE CASE OF THE PREFECTURE OF KARDITSA

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ABSTRACT

The development of urban and rural landscapes has entered a pioneering era with novel combinations of energy production and consumption and related changes in the urban and rural fabric including associated socioeconomic issues. Accompanying this change is a realization that newly developing energy initiatives are more viable for development and upscaling and are less vulnerable to failure and resistance from society if they are well integrated into their local and regional contexts. However, institutional questions remain regarding the required mechanisms and levels of integration, while simultaneously sustainable energy planning requires that the stakeholders with diverse and conflicting objectives come to some degree of consensus. Inspired by these findings, a methodological approach for holistic energy planning on a regional/local level was developed within the framework of the INTENSSS-PA project that is funded by HORIZON 2020. The approach provides a holistic energy plan, which goes beyond a blueprint for allocating renewable technologies and is based on the involvement of the wider community. Hence, this approach includes 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 is applied. The case of Karditsa, in Greece, will be presented as evidence of the effectiveness of the proposed planning approach.

Keywords: integrated sustainable energy planning; participatory decision making; regional development; regional living labs; spatial planning

Introduction

Integrated energy planning implies the integration of the energy theme within spatial planning in order to accommodate the integration of energy systems within their physical and socioeconomic landscapes (De Boer and Zuidema 2015). Specifically, integrated energy planning assumes that linking alternative land use functions and the interests associated with them has benefits for exploiting the potential of different renewable energy sources. After all, such linking can accommodate sustainable energy alongside and in direct synergy with alternative societal interests and developments such as agriculture, nature maintenance, mobility or economic development. In doing so, social engagement and participation are required to avoid Not in My Back Yard (NIMBY) and Not in My Front Yard (NIMFY) and allow local self-organization for the development of Yes in My Back and Front Yard (YIMFBY) projects (Owens 1990; Kontogianni et al. 2014).

Integrated energy planning provides a means of identifying and understanding area-based conditions that may enable or accommodate energy initiatives and how these initiatives can be supported by the local society and 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 stakeholders with diverse and sometime conflicting objectives that must come to some degree of consensus. As coping with energy is relatively novel within the realm of spatial planning, there is a current lack of institutional frameworks to support their integration (e.g. De Boer and Zuidema 2016). Hence, creating effective energy-related planning processes presupposes deep changes in the structure and organization of society (Sørensen and Torfing 2007; Crawford and French 2008; De Boer and Zuidema 2015). Notably, local and regional governments are forced to find solutions in a dynamic and changing field where alternative societal partners interact with other stakeholders. Various initiatives have been carried

out to facilitate the more active and systematic participation of stakeholders in integrated energy planning. Such indicative examples are the Country Governance Committees and the Energy Virtuous Living Labs within the framework of the RES H-C SPREAD (2014–2016) and EnergyViLLab projects (2011–2014).

Fig. 1 provides a schematic representation of how integrated energy planning can be represented. It is based on the assumption that the governing of changes in energy systems involves a multi-level and multiple-stakeholder group process of shared governance (e.g. Loorbach 2010). Connecting energy and spatial planning is therefore also a process of connecting various spatial levels and levels of authority. In the meantime, it is a necessary to include various stakeholders in multidisciplinary fields in the development of feasible, viable and bankable energy projects. While these characteristics already contribute to the challenging nature of integration between energy and spatial planning, continuously increasing planning requirements imposed by the European Union and in many regions a relatively stagnant economic environment places governments in a position where social and market participation is not only desirable, but crucial. Hence, an attempt was made to develop an approach not only to guide Public Authorities but also to carry out 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 using this approach in the Prefecture of Karditsa in Thessaly, Greece.

INTENSSS-PA Project Framework

A Systematic Approach for Inspiring Training Energy-Spatial Socioeconomic Sustainability to Public Authorities – INTENSSS-PA project is funded under the 2015 call of the HORIZON 2020 program. 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 to support them in entering a new era of integrated sustainable energy planning through a participatory, multi-level, interdisciplinary decision-making process. A multidisciplinary team of 17 partners from public and private sectors and academia coming from 7 Member States constitute the project's consortium.

To achieve the above-stated objective, INTENSSS-PA considers a four-step approach:

- to build a planning approach-structure including supportive materials and tools for its implementation;
- to build a human (i.e. technical) and institutional (i.e. mainly normative and cognitive) capacity;
- to build proof of concept through experimentation into the different planning contexts and energy-related issues considered in the participating countries;
- to build institutions to explore alternative frameworks, that will ensure the operation of the identified planning concept-structure beyond the project duration.

To implement this approach, the Living Lab (LL) concept (Dutilleul et al. 2010; Ståhlbrost and Holst 2012; Ballon and Schuurman 2015) was adopted. An LL is "a user-centric" research methodology for sensing, prototyping, validating and refining complex solutions in

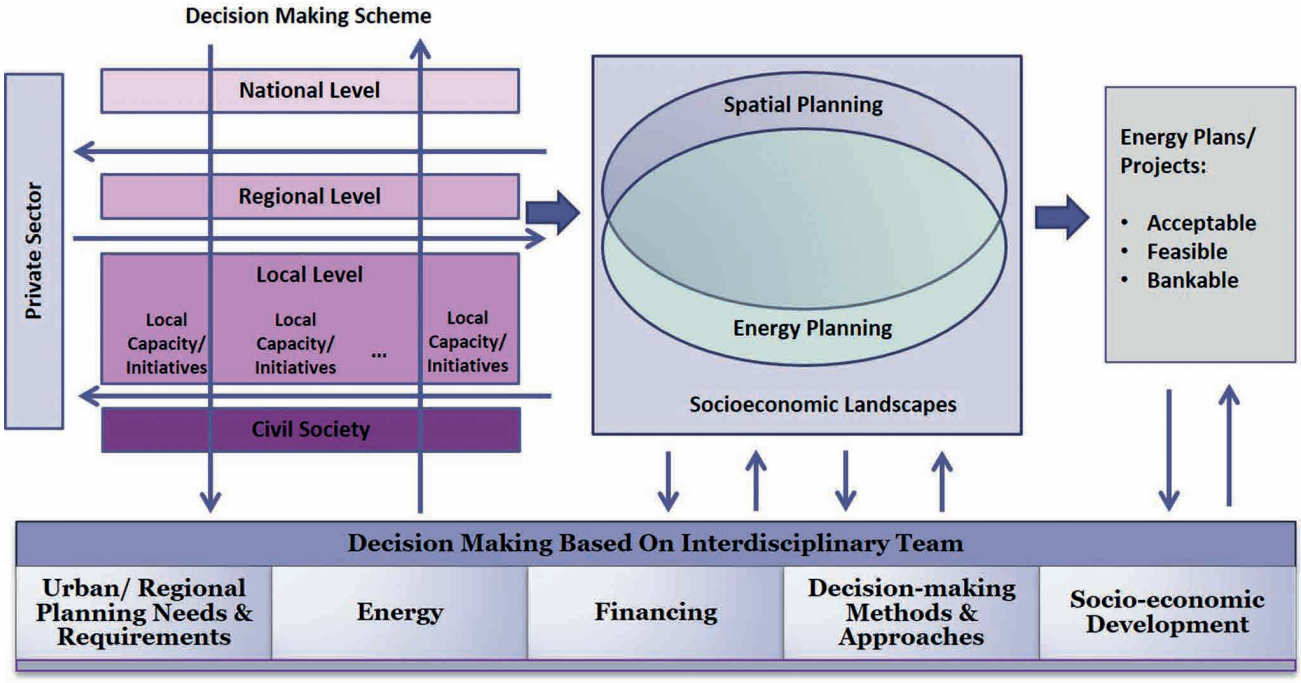

Fig. 1 INTENSSS-PA Concept.

multiple and evolving real life contexts. LLs are defined as both an environment and an approach, supporting innovation processes for all the stakeholders within a real-world context rather than a constructed laboratory or project default setting.

Following its application in other regional or urban governance contexts (e.g. Nevens at al. 2013), the LL concept was identified as a promising inspiration for supporting the INTENSSS-PA approach. The LL-approach, both appreciates the experimental nature of developing and implementing integrated energy plans and the fragmented multi-actor environment in which this development needs to take place. In a way, LLs allow for both the development and experimentation with innovative integrated energy planning concepts and, while doing so, help to create the institutional, technical and economic capacities needed for implementation. That is, the LL concept is both an environment for experiential learning and an institutional framework that might support the process of decision-making and institutional development. In response, the INTENSSS-PA LLs (i.e. Regional Living Labs–RLL) are defined as emerging citizens-public-private partnerships in which all stakeholders work together to create, experiment and evaluate innovative approaches and institutional innovation related to integrated sustainable energy planning.

To combine integrated energy planning and the LL-approach a 'Holistic Energy Planning Environment' was created for INTENSSS-PA to develop, evaluate and exploit, as presented in Fig. 2. The RLL 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 to develop methodological tools and guidelines, and (iii) a Database of Practice that includes training materials and case-studies to support and inspire the RLLs. This environment safeguards and enables the operation of the newly established RLLs as well as facilitating their operation. The approach aims to develop the conditions of a transnational thematic network of RLLs as well as the conditions to assess the capacity of the RLL concept to support and be incorporated in the institutional framework of energy planning of different Member States/Regions (INTENSSS-PA (A) 2017). RLLs are then expected to add value to integrated energy planning by developing and testing planning processes and strategies in relation to a more open and collaborative approach to governance, while making the role of involved stakeholders more effective and the decisions more legitimate.

Methodological Approach

The fulfillment of the established objectives is pursued through the constitution of the INTENSSS-PA RLL network, which is fueled by a common repository of methods, tools and the experience of all stakeholders (ALCOTRA 2013). A methodological approach was developed within the INTENSSS-PA project for the formation of the RLLs, for handling the challenges of integrated energy planning the RLLs were to face, and for creating a process and structure of governance that would effectively promote

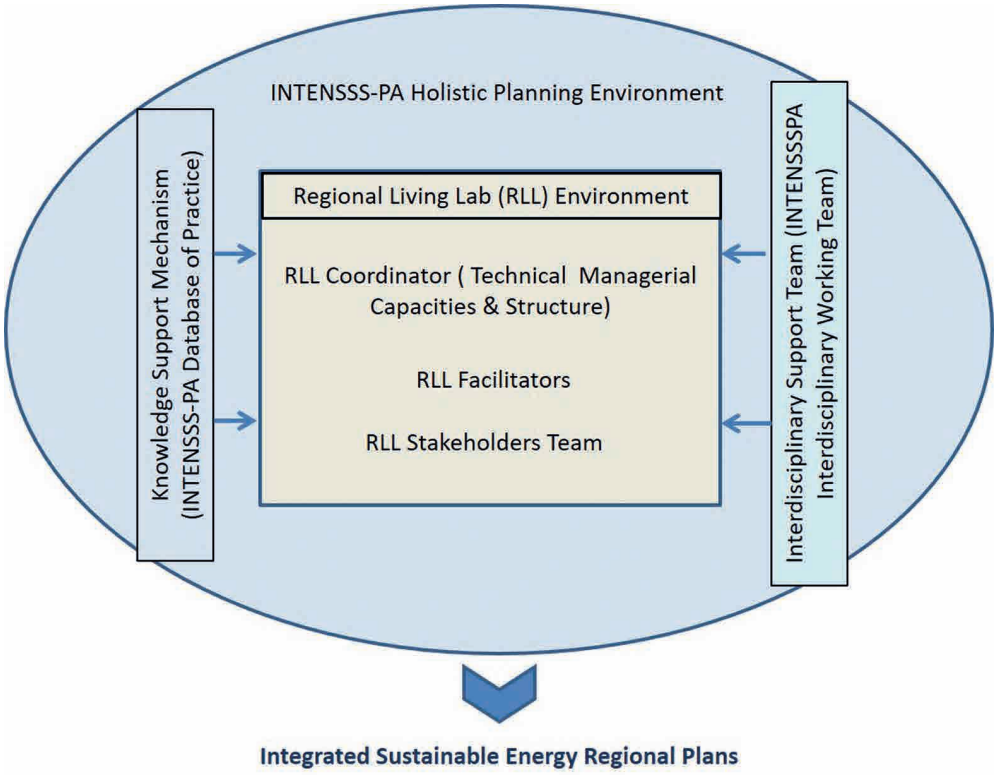

Fig. 2 INTENSSS-PA Implementation Environment.

reliant interest and address the converging requirements of the involved stakeholders (Ståhlbrost and Holst 2012; ALCOTRA 2013; INTENSSS-PA (A) 2017).

The overall methodological approach for establishing and operating RLLs in Holistic Energy Planning includes four iterative steps that are presented in Fig. 3 (Ståhlbrost and Holst 2012). The first procedural step provides a structured path for the creation of an RLL. This step involves 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, the socio-economic settings, institutional structures and the spatial and energy capacity of each region. The second step focuses on the co-decision of the *planning focus* of each RLL. In particular, within this step the focus, the vision and the scope of the plan is decided upon, including specifying the involvement of the stakeholders throughout the process of planning, decision making and implementation. The third step is the actual process of planning, which is specifically based on stakeholder involvement. As such, it is based on notions of co-design and co-creation (e.g. Bergvall-Kareborn et al. 2009; Evans and Karvonen 2011; Leminen 2015). Described as a process of *co-planning*, it is during this step that the holistic energy plan is developed and that actual Experiential Learning Activities take place. Finally, the fourth step is focused on the *overall assessment* of the Integrated Sustainable Energy Plan -ISEP developed, as well as the efficiency and effectiveness each time of the co-planning process.

Within the context of INTENSSS-PA, the notions of co-creation and co-design are used as interchangeable terms. Co-creation and co-design are concepts for the interactions between public, private and civic sectors (Sleeswijk Visser et al. 2005; Sanders and Stappers 2008). Co-creation acknowledges that these three sectors are interdependent: that means that all three sectors are necessary to develop and implement policies and measures. Therefore, in co-design processes these three sectors should always collaborate. A co-design process should bring together professionals/practitioners, governmental organizations, "ordinary" citizens and market representatives (network companies, SMEs, etc.) to make better use of each other's assets to achieve better outcomes and/or improve the efficiency of the process.

Within each of these four steps, work is organized and implemented focusing on the five key principles of an LL approach, i.e.: value, influence, sustainability, openness and realism (Ståhlbrost and Bergvall-Kareborn 2008; Ståhlbrost 2012). To achieve these principles, the RLL activities should allow stakeholders to develop holistic energy planning in their context, to determine if it brings *value* to them and provide insights about how they perceive value. Moreover, the established decision-making process must go beyond participation, involvement or engagement of stakeholders by providing them with the opportunity to *influence* the innovation. In this respect, it is important to make sure that the needs and ideas of domain experts and stakeholders are clearly traceable in the holistic energy planning environment and approach, and to ensure that the participation, influence and responsibility among stakeholders are balanced and harmonized. In other words, the processes of co-creation and co-planning go hand in hand with ensuring that the key principles to which an LL approach should adhere, are met. Within the realm of an LL, sustainability is less about environmental sustainability and more about the development of institutional relationships for the present and the

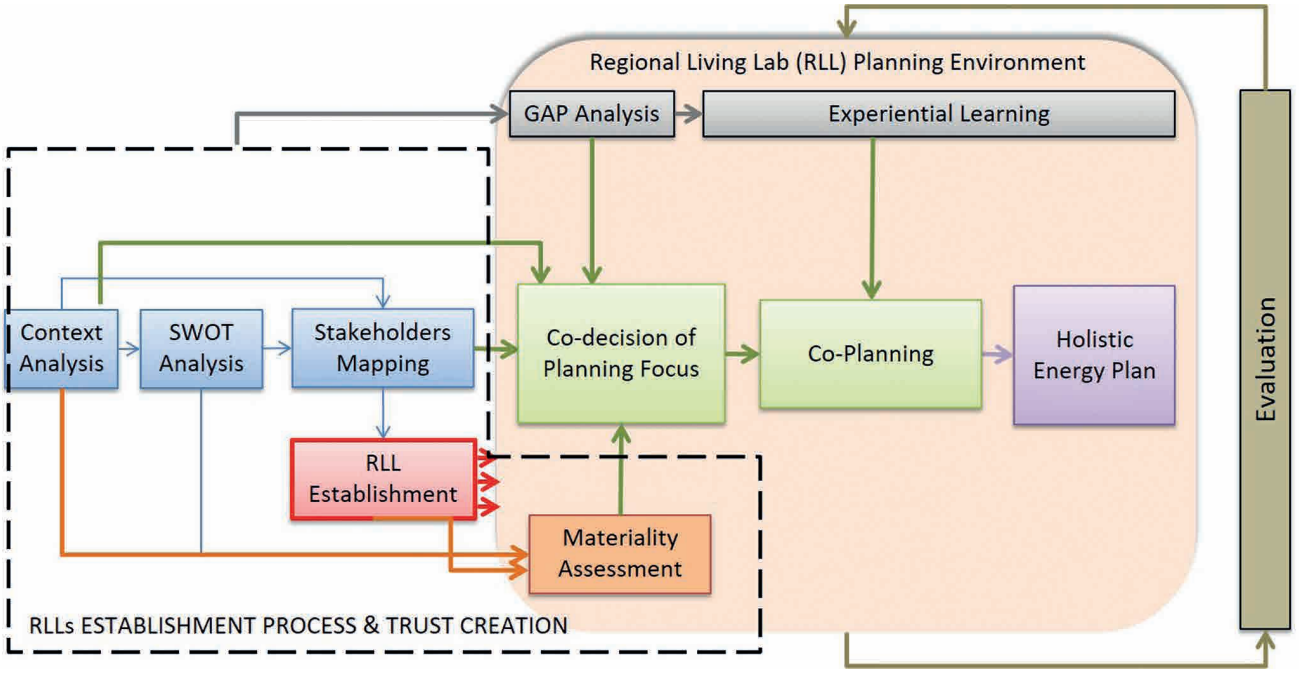

Fig. 3 INTENSSS-PA Implementation Methodological Approach.

future. Trust, collective ownership and continuous learning are then the driving forces for policy development and implementation. In such a context, *openness* seems to be a requirement for sustainable relationships and collaboration among people of different backgrounds, perspective, knowledge and experience to secure faster and feasible integrated sustainable energy planning. Finally, *realism* is a cornerstone of an LL-approach since innovation should be carried out in a realistic, natural, real-life setting. Since all stakeholders have their individual local reality, everyone has a potentially useful view of how the current situation can be improved (Krogstie and S¢lvberg 1996).

In summary, the proposed Holistic Energy Planning Approach using an RLL environment provides the capacity to experiment and develop new forms of social innovation, which are sustainable and well-balanced regarding representative participation on the side of society and a public-private partnership. Furthermore, it relies on strong networks of stakeholders that can increase and upscale the benefits of LLs about energy-related innovation by ensuring the necessary critical mass for its continuity while considering jointly the effect of a globalized economy and local daily needs.

With co-creation central to INTENSSS-PA a key question early on was how to secure a true participatory process based on co-creation. To accommodate this, the RLLs all followed a similar format that was directly linked to steps 2 and 3 of the general methodology. Following step 1, all RLLs would have gained awareness of the key stakeholders, the relevant (policy and economic) context and the strengths and weaknesses of the region (SWOT). Subsequently, the RLLs were to be established with the first objective of working towards steps 2 (vison and concept development) and 3 (experimenting in practice) being a 'gap-analysis'. The gap analysis was to be conducted by all RLL partners in workshops and through iterative rounds of communication. The gap-analysis allows RLL partners: (a) to identify gaps in their current institutional capacities and ways of working (tools, techniques, and practices) and (b) to identify inspirational examples of useful technical, spatial and institutional practices and tools they might use to fill these gaps or add to their current practices and tools. The gap-analysis was thus instrumental in gaining a deeper understanding of regional challenges by explicitly recognizing what was possible (reference cases) and what was lacking (current institutional capacities). In doing so, it also improved the mutual understanding among stakeholders of defining a common-problem and the kind of skills, tools and resources they would have to use.

Following the gap-analysis, the RLL would move on to steps 2 and 3. A boundary between steps 2 and 3 of the methodological approach, that is, the idea close to original LL studies, where testing with a concrete product is an underlying issue, because it was considered "artificial" by all RLLs. Therefore, the methodological approach was subsequently adjusted (i.e. the LL concept) to achieve a flexible approach for RLLs to implement steps 2 and 3 that would: (a) allow conceptual thinking and plan that development continuously interact and (b) focus specifically on those substantive or institutional gaps identified in their current energy planning. After the gap-analysis, based on a shared understanding of problems and opportunities, the RLL partners can decide where they want to focus (step 2). Such planning contains a substantive focus, as is expressed in, for example, a vision for developing bio-based heat networks, electrifying transport or full-scale regional energy plans. But this planning focus also contains an institutional focus, expressed in the kind of tools and organizational formats relied on and developed, ranging from covenants, regional partnerships or community initiatives. Overall, a planning focus thus sets an agenda for action that is directly inspired by local realities: i.e. it is tailor-made for the identified needs of each regional area.

Step 3 is supported by a framework for plan development (Fig. 4) that explicitly tries to accommodate the desired flexibility for each RLL without losing the core values of INTENSSS-PA: co-creation in an LL environment and integrative working to identify synergies between energy and other regional priorities. Work on setting a planning focus fluently translates into the co-creation in the RLL of a substantive vision suiting the RLL (Phase 1 of step 3). Central to Phase 1 is the development of a vision of the future energy system of a regional area or targeted elements of it, which will be the central reference point and inspirational guidance for both forward and backward mapping. The vision is the substantive (content) driver for the plan, while the plan itself also suggests pathways and actions to pursue this vision. There should be social (civic) and political support for the process of co-creating a vision. The vision initially does not need to be highly specific, but should contain a picture of the long-term future (30 years) of the regional energy system or target parts of it in relation to the physical and socio-economic landscape. It should include general energy goals and identify useful technologies to achieve them, while also identifying land-use functions (e.g. housing areas, villages, agricultural lands) or specific spatial areas in a more general sense, where certain measures and technologies are prioritized. It should also include an expression of how energy goals link with other regional priorities, which include agriculture, nature management, industry, services and offices, mobility and housing. As such, the vision is focused on creating a sustainable energy system or specific targeted parts, while recognizing how this system links with and can support other regional developments. This also implies that the vision should be a meaningful guide for the policy for development in other sectors within which the relevance of the vision is shared.

If the vision is socially and politically endorsed, the next step is to move towards the development of the ac-

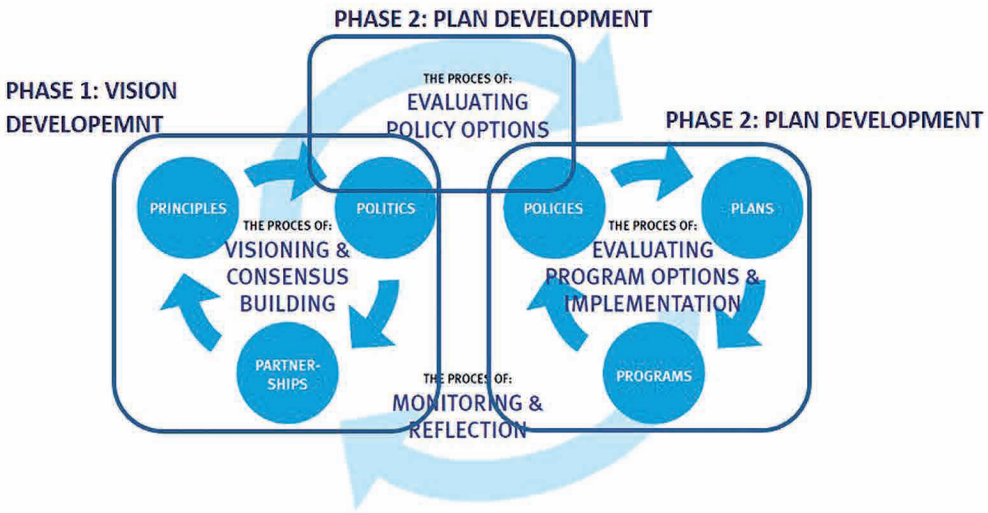

Fig. 4 INTENSSS-PA Sustainable Plan Development (based on Creedy et al. 2007).

tual Plan (i.e. Phase 2 of step 3). Central elements for the phase of Plan Development are:

- the creation of pathways to achieve the vision along with the identification of current potentials and barriers (forward mapping);
- the development of institutional infrastructure to pursue these pathways (backward mapping);
- the identification of the resources needed for the short-, mid- and long-term processes, including human resources and expertise (backward mapping);
- the initial identification of short- and mid-term projects, possible policy choices, plans or programs (combined forward and backward mapping).

The pathways are based on the technologies, investments, regional developments and existing local projects and potentials identified. These pathways are meant to be inspirational and trigger the development or coalitions of possible investors and projects. They are not yet meant to have clear-cut contracts or budgets. Rather, they form a general roadmap to inspire and evaluate alternative projects, plans and policy choices. It is possible to develop one pathway to pursue the vision, while it is also possible to identify different pathways. Shifting between pathways might become necessary if, for example, (inter)national policies change, if ongoing learning shows new technologies or choices are more sensible, if new opportunities for subsidies or investments become available, or if some preferences change. Hence, it is advisable to be able to change if needed. It is nevertheless also advisable to keep the number of pathways limited to ensure a degree of coherency. The overall approach proposed and presented within INTENSSS-PA is considered as an overview of a wider and long-term process of Strategic Sustainable Energy Planning (Steidle et al. 2000; Lund et al. 2013). It specifically targets, on the one hand, the need to focus on seeing energy as integrated with the region's physical and socio-economic landscape and thus requiring a cross-sectoral and participatory approach. While this focus requires the creation of a coherent framework, which is based on co-creation in an RLL approach and in particular on identifying synergies between energy and other regional priorities, it also needs to be flexible. On the other hand, the INTENSSS-PA methodology does not *prescribe* plans. Instead, it merely provides a structure and helps to highlight substantive considerations. Within this process, it is up to each RLL (i.e. regional area) to identify its ambitions; that is whether they are interested in following the entire trajectory for developing a plan, or whether they recognize specific elements in the plan that reflect their current needs. This choice guides their RLL Planning Focus, which can be the development of a vision, an institutional body or covenant, a partnership, a specific planning tool, a roadmap, etc.

The Case of the Karditsa RLL

The RLL of Karditsa is coordinated and hosted by the Development Agency of Karditsa (AN.KA SA), which has a significant role in the energy and spatial planning of the Prefecture. It was established by Local Authorities in 1989 and currently is a "local partnership" that focuses on projects of social interest and environmental protection.

The context analysis and SWOT analysis revealed that currently there are three prevailing positive circumstances that can support and be supported by INTENSSS-PA:

- the existence of a Cooperative Bank and its healthy financial situation that reduces to some extent funding uncertainty,
- the fact that the Energy Cooperative Body of Karditsa (ESEK) seems to perform well, being a success story in the Prefecture in terms of energy cooperative schemes, and
- the existence of a substantial biomass stock (i.e. municipal waste, forest residues, agricultural and farming residues) in the Prefecture owned/produced by local stakeholders.

A positive attitude of the community is expected because the economic crisis has resulted in increased energy costs and unemployment.

Major threats identified are those from the legislative framework in relation to the process of granting permission for energy production facilities and land-use constraints. It is also interesting to mention the lack of know-how and inability for consensus that recognize the threats along with the scarcity of available and accessible capital.

Stakeholder mapping revealed 25 different stakeholder groups in Karditsa involved in or significantly affected by integrated sustainable energy planning. Stakeholders were prioritized and grouped in terms of their importance for the planning and their capacity/power to influence the planning process and plan implementation at a later stage. In addition, an analysis of collaborations, synergies or conflicts among the stakeholders or other community groups has been conducted creating a stakeholder relationship canvas and providing a set of scenarios (INTENSSS-PA (A) 2017).

Based on the above analysis, the constellation of the RLL in the different stages of project development was identified. The main groups of Karditsa RLL participants are as follows:

- Local Authorities: Regional Authority of Karditsa, the six Municipalities of the Prefecture, the Association of Municipalities of Thessaly Region
- Forest Management Service
- Energy Cooperative Body of Karditsa ESEK
- Oikosfaira NGO
- Technical Chamber of Greece (Regional Department of Central and Western Thessaly)
- Chamber of Commerce of Karditsa
- The Technological Institute of Thessaly through the Department for wood and furniture, and the Department of Forestry
- Cluster of businesses – construction sector: ROMVOS
- Sawmill Industry PINDOS FORESTRY
- Cooperative Bank of Karditsa

It must be mentioned that further to these 17 stakeholders there are more groups to be considered during the different planning phases, such as farmers' associations, forest owners and cooperatives, depending on the decision for the Planning Focus and co-planning needs.

Prior to the formal invitation to participate in the RLL assembly and activities, informal meetings were organized in order to inform each stakeholder about the project's concept, and request their support and commitment. During the formal initiation meeting of the RLL in Karditsa in June 2016 the context analysis, the SWOT analysis and the stakeholder mapping were presented, discussed and revised/enhanced in certain cases providing in this way an initial validation process for this analysis. Nevertheless, a number of major energy-related issues for the regional area were identified and discussed based on the implementation of a materiality-assessment process. Twenty-five issues related to regional conditions, people, funding capacity, awareness, land use, legislation and the structure of renewable sources and energy market in Greece were identified. After implementing the materiality assessment, a hierarchical list of the 10 most relevant issues affecting the regional energy planning were identified, which prompted further discussion at a second RLL meeting.

The most relevant issues with highest scores were "Residues and waste from farming, agriculture and forestry (biomass) management", followed by "High costs for equipment conversion from conventional energy to renewable energy" and "Lack of public awareness of actual RES and RET application costs and benefits".

A gap-analysis was carried out with the support of the project team, which provided useful input that was discussed at several meetings of the RLL in order to co-decide on the Planning Focus of the RLL. These meetings were sectoral (i.e. forest sector, agricultural sector, etc.) or held at the request of the main RLL assembly. In the case of Karditsa, the gap-analysis merely confirmed the materiality assessment and the co-decision of the RLL, which was to focus its planning effort on the development of a "Strategic Plan on the energy exploitation of the biomass in the Regional Unit of Karditsa". This strategic plan will attempt to provide the big-energy picture for Karditsa and focus the planning effort on the currently mature socio-economic development of the regional area pathway, i.e. the pathway of biomass (INTENSSS-PA (B) 2017).

The biomass energy exploitation brings together several characteristics, which form a fruitful environment in which to pursue sustainable energy planning and outcome:

- it is participatory in nature since it includes the public and private sectors as well as the citizens (Public-Private-People partnership);
- it is mature and tangible since the local energy cooperative has already constructed a plant, supported by the local authorities and (partially) financed by the Cooperative Bank of Karditsa;
- it is largely feasible since the social opposition to the biomass energy projects is low;
- it has a strong spatial aspect, given that the plan has to indicate the most appropriate placement of the biomass plants, which is a multi-criteria decision-making problem;
- it has a strong socio-economic aspect, given that biomass exploitation could provide financial benefits to many different groups in the local population (farmers, cooperatives, wood industries-traders, municipalities, end-users);
- it has an important environmental benefit, given that biomass collection will reinforce the fire-protection system of the region, preserve natural landscapes and contribute to the replacement of fossil fuels.

Working on a regional basis with the involvement of the national team and the project's interdisciplinary

team, ANKA prepared a preliminary vision for the region, based on the current energy and societal profile, followed by the preparation of alternative development scenarios, including, notably, measures and technologies on biomass exploitation. The energy profile and the alternative scenarios were presented to the RLL's participants during a workshop, where an assessment of alternative scenarios was conducted by means of a questionnaire. Karditsa's RLL is currently in the process of analysing the data collected in order to proceed with the co-development of the plan for the most preferred biomass development scenario.

The focus on the biomass pathway in Karditsa, i.e. the co-planned integrated sustainable energy plan, will be more integrative and less sectoral, which is a novel outcome of the INTENSSS-PA approach. It will be combined with other policies affecting local development and there will be a clear effect on forestry, agriculture (especially of certain crops) and wood-processing, providing opportunities to increase income and decrease energy costs by developing models of circular economy. Positive relations are also foreseen concerning the waste management sector and industry sector.

ANKA initiated a number of meetings with all the technical and economic partners related to the regional area and the project under consideration. Of paramount importance for the plan's acceptability is to identify a compromise solution for the location of the biomass facilities that will ensure the investment's cost-effectiveness with minimum compromises, if any, over the quality of the landscape and life of the inhabitants. An important parameter for Karditsa will be the contribution of the proposed energy projects to the local economy. Meetings and discussions planned for the near future will focus on identifying and selecting alternative implementation approaches, i.e. identify an implementation instrument, liaisons with other planning initiatives and programmes, requirements to be fulfilled, revision and update of the stakeholder groups to be involved, financing aspects, risks, etc.

Since June 2016, the RLL has held five assemblies, four sectoral workshops and several meetings and Skype meetings with local and national stakeholders and the INTENSSS-PA multidisciplinary team. In addition, several articles have been published in the local press and presentations made at local events. More publicity and organized involvement of the society is planned for the remaining co-planning period since citizen participation is of a paramount importance at the co-planning phase.

Concluding Remarks

Integrated energy planning is a necessary approach especially important for regional areas where the need to transform their energy system is currently very obvious. The case of Karditsa clearly proves this need but due to the lack of existing policies and financial instruments a lot of progress needs to be made and prerequisite steps to be taken to realise integrated energy planning. Indicatively, the regulatory framework of biomass exploitation is outdated and complicated. Responding to this gap in the policies and regulations, INTENSSS-PA aims to add value by promoting a process of co-creation set in a LL-environment.

What was learned from the case of Karditsa is that the added value of co-creation in an LL-environment is recognized and appreciated by regional/local partners. The expected added value from the formulated energy plan as an outcome and the RLL as a process will be significant for Karditsa. In particular, the development of an energy plan including tangible proposals and actions will provide strategic guidance, necessary to face the planning requirements stemming from the national law and/or to take advantage of future funding opportunities for energy projects. The most important challenge for Karditsa's RLL is to ensure its continuity. The core team of stakeholders is currently committed to the project, whereas some key-stakeholders have to be encouraged to take part more intensively. Over the past few months, there has been a moderate decrease in the willingness of some stakeholders to participate in RLL activities. This fact is linked to: a) the lack of familiarity with long-term planning approaches and collaborative practices, b) the sense that such decisions fall into the competencies of national authorities and c) practical barriers (e.g. differences in the working hours of the participants).

On open-ended questions, stakeholders acknowledge that the RLL provides a "sense of shared responsibility", it supports "a more active approach" and "fosters stakeholders' willingness to provide new ideas and solutions for particular issues". Public authorities and different departments understand and realize "the power of their mutual collaboration" and the RLL's contribution "to the reinforcement of mutual trust". Hence, the Karditsa RLL is now recognizing that effort should be devoted to identify an appropriate institutional structure for the RLL. This is to facilitate participatory co-planning and multi-level governance that will provide the RLL with the power to endorse developed energy plans and projects or to coordinate and offer public bodies the power to endorse these plans and projects.

Karditsa also confirms a common outcome from the preliminary internal assessment of the perceived effectiveness of the seven INTENSSS-PA RLLs in performing Integrated Sustainable Energy Planning conducted in October 2017. It revealed that the impression of almost all RLLs' coordinators on the perception of the participants of the RLL concept is that it is quite meaningful. However, it also shows that only those RLLs that unite a group of committed and knowledgeable partners seem to make a difference in developing and implementing visions and plans.

Despite the premature stage of INTENSSS-PA RLLs, it is apparent that RLLs both as an approach and an environment provide a meaningful and fruitful concept for regional development and energy transition where different sectors and levels of governance cooperate in the search for a commonly agreed vision and objectives. The involvement of multilevel governance structures is essential for the successful implementation of integrated sustainable energy planning. Such an approach accommodates the creation of trust in relation to scope and continuity as well as providing a good balance of top-down and bottom-up approaches.

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