ASSET

A holistic and Scalable Solution for research, innovation and Education in Energy Transition

D2.1 Research design on societal aspects related to energy transition - methodology and data collection

Work Package	WP2 Training needs identification and societal aspects
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Executive Summary

Energy transition involves an incremental reshaping of the socio-material arrangements featuring local contexts and the related multilevel governance. This complex transformation is performed in a "hybrid world" in which the hard side of facts (objectivity, techno-science) is tightly intertwined with the "soft" one of values (subjectivity, politics). Often sustainability is a problem more than a solution in itself and needs to be investigated in order to grasp how this hybrid configuration performs the transition in practice.

The social science approach aims to explore the "hybrid world" of energy transition retracing the connections between a) the hard side (objectivity, techno-science, materiality) and b) the soft side (subjectivity, politics, values). The involvement of the fields of Social Sciences and Humanities (SSH) aims at extending and translating the energy transition discourse into the 'civic engagement' one because at national as well as local level the energy transition has to cope with several societal challenges, including the following:

- How to manage a case of transition within a conflict framework?
- Is there a case of transition without conflict?
- How politics seek mediation between conflicting interests?
- How the energy transition is framed at the media and societal level?
- What are the social costs of transition in terms of development and employment?

The answer to these questions must be somehow translated into training terms:

- understanding of the challenges
- knowledge and educational needs
- development of soft skills and abilities to cope with societal challenges

In the framework of task 2.1, the research along two directions/strands already started and will be followed:

- Societal challenges in the energy sector
- Energy transition and green skills

The expected results include:

- findings on societal challenges related to the energy transition, social awareness, local cooperation and/or conflict.
- findings on the knowledge, skills and professionalization of the experts operating in the field of the energy transition.
- findings over the mismatch between the competencies' profile of experts and actual skills required on the ground of energy transition projects (training needs).

Table of Contents

List of Tables

List of Figures

List of Acronyms

Abbreviation / acronym	Description
CAWI	Computer-assisted web interviewing
CME	Coordinative Market Economy
LME	Liberal Market Economy
MLP	Multi-level Perspective
SCOPUS	Scopus is the largest abstract and citation database of peer-reviewed literature: scientific journals, books and conference proceedings.
SSH	Social Sciences and Humanities
VoC	Varieties of Capitalism
WOS	Web of Science -The world's largest publisher-neutral citation index and research intelligence platform

1. Introduction

1.1 Purpose & Scope

The purpose of this document is to provide a comprehensive view of the research agenda on societal aspects of the energy transition. First, this document provides a theoretical rationale and motivation of such an interesting research, then gives a better understanding of the connection of societal aspects for energy transition and, finally, outlines the detailed overview of its research design and data collection techniques.

1.2 Structure of the deliverable

This deliverable follows the classical structure of a research design according to the methodology of social sciences. First, the issue has been rigorously defined taking into account the scientific debate developed around the concerning field (chapter 2). Then, research strands and questions are defined and explained in order to highlight the main directions of the research agenda and its objectives (chapter 3). To motivate the research agenda, also a visual model is provided to clarify the connections between research directions and stakeholders (Fig. 2). Chapter 4 responds to the potential privacy concerns of the research subjects and overviews compliance matters. Chapter 5 draws up conclusions. References are listed in the end of the document.

The research design governs the choice of approaches and tools with a multi-perspective and mixed-method. Finally, some concerns are highlighted in order to ensure the confidentiality of data and to translate information into practices.

The deliverable is accompanied by two annexes. The first is the questionnaire prepared for a large and comparative expert survey in Europe, while the second one is the qualitative trace of interviews that will be submitted to certain key-testimonials of the energy transition in the academic and industrial sector as well.

1.3 Relation to other WPs & tasks

This deliverable concerns the work performed in the first 3 months and that will be performed in the rest 19 months within T2.1. The deliverable aims at providing initial findings on knowledge, skills, and professionalization of the experts operating in the field of the energy transition and finding on the mismatch between the profile of experts and actual skills required by energy transition projects. For these aspects, it is strongly connected to *T2.2 Skill shortage, training and education need*s. Moreover, the expected results will lead to the choice and content of educational programmes in WP3 where research reports to the ASSET ecosystem are foreseen (T3.2, T3.3).

2. The Energy Transition Scenario

The evolutionary history of human being is constantly characterized by the need to increase the possibility of acting in the world. According to this need, knowledge and technologies have arisen to produce energy. The current energy transition, therefore, represents a step in a constantly evolving path, and not a point of arrival; a work in progress and not a finite condition.

The energy transition can be defined as a total social fact that involves multiple aspects of society. Since energy is a socio-technical system, fossil fuels elimination (made absolutely urgent due to climate change) requires a holistic approach that should overcome every kind of deterministic and mechanistic vision (Law 1992; Latour 2004). Energy production, distribution and consumption are complex socio-cultural constructions that involve institutional networks (states, regions, municipalities). This multi-level governance is informed by different disciplinary types of knowledge and interests as well.

It is important to establish and evaluate societal factors in the energy transition debate and study its dimensions. To position the research design within the energy transition field discourse, we have done a bibliometric analysis of scientific literature of the years 2013-2018 (based on the query "energy transition" OR "green economy" run in WOS and Scopus) for the purpose of defining a method to realize the Public Outreach Strategy (D1.1 [13]) and to explore the field.

Figure 1: Bibliometric analysis of research publications

We can see that the *socio-technical* (fig.1[1]) aspects of the transition is an emerging topic to consider in the academic discourse. However, looking closer at the graph, its peripheral and rather disconnected position within the smaller cluster of social perspective illustrates that this aspect is still underdeveloped as prominent topic.

It is in relation to this complexity that social sciences move. Indeed, social sciences and humanities are deeply committed to this issue, and the current international debate offers different theoretical and analytical framework developed to unfold the green energy transition. Of course, a particular effort is

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[1] The map shows publication keyword co-occurrence based on the binary counting method, analyzed through fractionalization and visualized with association strength. Color codes denote different clusters

being made to address those challenges that affect the societal sphere. The energy transition towards a more sustainable production and provision systems involves an incremental reshaping of the socio-material arrangements featuring local contexts and the related multilevel governance. This complex transformation is performed in a "hybrid world" in which the hard side (objectivity, techno-science, materiality) is tightly intertwined with the soft one (subjectivity, politics, values). Actually, very often sustainability is a problem more than a solution in itself and needs to be investigated in order to grasp how this hybrid configuration performs the transition in practice.

The SSH involvement aims also at extending and translating the energy transition discourse into the 'civic engagement' one because at national as well as local level the energy transition has to cope with several societal challenges. ASSET will focus on these issues also from sociology and anthropology epistemological points of view, in particular exploring two research strands:

1. dynamics of participation, public engagement (as well as the controversies) (T2.1) related to the energy transition. In this case, the social costs and benefits of those transition processes replacing the energy systems of production and provision will be studied. The analysis will cover a wider spectrum of variables and analytical dimension, from the institutional strategies to enhance the public debate and to inform, to the socio-territorial analysis (energy poverty, conflicts, technological awareness, energy commodification/commonification[2] trade-offs, territorial controversies, Nimby local conflicts, land grabbing and land degradation experiences, etc.).

2. the role of the experts, professionals and institutional actors in fostering energy transitions and the transformation of the education system providing new green skills in different disciplinary fields.

The research strands (carried out under task 2.1), and the overall ASSET strategy will be effective in composing *Research, Innovation and Education* in a consistent frame. In fact, the results of the research will be needed in order to recognize the educational needs of those professions involved in the energy transition, and to identify the skills profiles of professionals currently involved in the energy sector that are needed to boost the energy transition in this sector.

Since a background desk-analysis of the energy policy framework is a routine activity occurring along the whole research period, we will not devote to it a special section. Official statements, policy documents and action plan at EU level and national level will clearly be integral references for the research project.

2.1 Questioning the energy transition in "hybrid" terms

The energy transition is one of several socio-technical paths currently addressed to foster sustainable arrangements of production/consumption in everyday life. The issue is at the core of the most recent SSH debates questioning different aspects, from the transition governance [11] to the social practices of households and energy users [25].

The ASSET project focuses on the interplay of different dimensions of energy transition that are mainly, on one side, related with the acceptance of local communities, on the other side the new skills and knowledge needed by professionals and workers involved.

The approach of the ASSET project to unfold these dimensions is based on a socio-material perspective, in order to investigate the hardware side of the transition, made of technologies and "facts", jointly with the software side where societal issues and "values" are at stake. The project design is formulated in coherence with this perspective, according an abductive logic of inference that implies a flexible

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[2] These concepts are used according to the complex debate about the translation of essential services in a pure commercial matter against their being perceived as common goods.

(and recursive) relationship between theories, theorizing and empirical research, to produce new understanding about the topic scrutinized [27].

2.2 Gender Role

One recent assessment of gender-workforce imbalances suggest a larger gap in the energy sector than other major industries. Within energy organizations, gender diversity is found to be greater in consumer services and consumer goods, while power and utility entities are less gender-diverse, and infrastructure entities lag the farthest [7][1]. Women's employment rates in wind, solar, wave and other renewable energies are generally estimated to be slightly higher than in the fossil and nuclear industries. Women continue to face barriers to employment in the sector, linked to both personal behaviours towards job applications and recruitment policies. For industrialized countries, female employment in this sector is estimated to be 20–25%, mostly in administrative and public relations positions (IRENA, 2013). **The key question that is laid forward is how we can encourage women to adopt and pursue jobs in the Energy sector and in general how the existing "skills gap" is treated as a whole.** Thus, a part of the research activities will be addressed to gender inequalities. More specifically we will explore gender diversity in the energy workforce and highlight the value of systematic assessment of women's participation in the energy transition processes.

2.3 Research directions

The research strategy is twofold along distinct but interconnected strands addressing the main issue above mentioned and detected as follows: the first strand is devoted to retracing how energy transition impacts on local communities, deepening the conflict/cooperation nexus with reference to the institutional strategies of public engagement featuring energy transition experiences. A socio-territorial analysis will be carried out to deal with this point. The second strand is focused on the role of the experts, professionals and institutional actors in fostering energy transitions. In this case particular attention about the mismatch between the profile of experts and actual skills requested by the energy transition will be paid.

The two strands have to be understood as mutually constituent both in conceptual/theoretical, and methodological terms. Indeed, criticalities and societal challenges of energy transition can be ascribed to a lack of expertise and, vice versa, skills and knowledge can frame very specific paths of energy transitions. Moreover, moving from the conceptual to the methodological argument, both strands will be interlaced by a quali-quantitative strategy of research that is sketched in accordance with the figure depicting the research deployment plan.

3. Research design

The construction and design of the research techniques and the assemblage of the overall methodology will be continuously inspired by a co-production orientation, through the involvement of the consortium partners. Similarly, the research activities will involve a wider population among stakeholders, techno-scientific (and professional) communities, learning communities, institutional actors and decision-makers, local populations "dwelling" the energy transition.

The research will be carried out through both quantitative and qualitative techniques. A stakeholders and expert survey at a European level will be held in order to investigate two main focus areas of inquiry: a) the policy frameworks of energy transitions, b) green professions and educational needs. The qualitative method is based on comparative ethnographic accounts developed on case studies of energy transitions experiences, the conduction of focus groups and in-depth open interviews. These research techniques will be designed taking into account the findings of the survey and will address the following analytical focuses: energy transition "in action and practice"; values, knowledge, ethics and social legitimation of energy transition. Research results will be used to inform the actions foreseen in T2.2 and T2.3.

3.1 Co-construction as an inquiry method

The ASSET project involves several actors which participate in energy transition at a different stage: research, education, field innovation, production. Each of them plays a twofold role: as a project partner, they are asked to perform the assigned tasks, as project stakeholder they can enjoy project results in terms of findings, directions for further field exploration, a valuable partnership to deploy in the future. **From the perspective of social sciences, this double role is not an obstacle but an added value both for the project activities and the research design since it represents an opportunity to implement a constructivist approach of research tools as effective as finalised to the research objectives.** Co-design as an inquiry method allows us to understand how partners use to "frame" the energy transition, what are the most relevant dimensions according to their interests and role, and moreover, how deeply rooted are cultural diversity, institutional influence, personal motivation and interest in negotiation and construction of meaning. The result of this process is, of course, a more comprehensive understanding of stakeholder mindset and perspective, and also a research design that takes into account the declared presence of project stakeholders in the research activities. ASSET industrial partners and networks to which they belong to will be involved in 3 activities: the co-construction of the tools, the submission of questionnaires, and the focus groups. The co-design process started on the 19th of June with a first technical meeting held in Naples and involving ENOSTRA and LS, and representatives of the engineering department of UNINA. A second call for contribution has been made in July to receive feedback from EASE, ECOPOWER and OTEA. However, the process will remain open until the end of September 2019.

3.2 Methods and techniques

The research design is based on mixed methods, merging both quantitative and qualitative techniques. This articulation is needed because of the complexity of the general question addressed by the ASSET project. The general issues, which the questionnaire deals with are directly related to the two strands of research: 1) policy frameworks of energy transitions and 2) green professions and their educational needs.

3.2.1 The questionnaire design

The survey tool is intended both for an exploratory and explanatory aim because of the abductive logic of the overall research project. It is designed to deal with individuals as units of analysis checked by a typology of stakeholders.

3.2.1.1 Addressed target groups

Energy transition literature often addressed the issue of the stakeholders, detecting roles, interests and more broadly their participation in the process of social change [28]. Studies adopting a *relational approach* in the understanding of energy transition [20][21], the *social practice theory* [17][24] and the *multi-level perspective* [9][22], have developed different ways to identify the stakeholders and their field of action. The first two, for instance, are deeply context-based and don't provide a general typology. Otherwise, the *multi-level perspective* (MLP) focuses on the socio-technical regimes and detects their analytical dimensions (norms, structures, practices, technologies, innovation trajectories). In doing so some actors can be identified in respect of their role in the transition. Within the MLP argument development [9][11][10] a typology of *stakeholders* can be drawn up:

1. *Market and customers:* all the different clients (individuals, organizations, etc.) are encompassed here. Companies producing and/ or provisioning energy are considered as well, including all the forms of public/private partnership.

2. *Industrial networks:* the companies directly involved in the production/construction and selling of those technologies enabling the transition are considered in this label.

3. *Policy and Administration:* here are considered those actors that are in charge of regulating and managing the energy field along with the multilevel governance of the policy sector. Local agencies are considered here as well ranging from mayors to the Ministry.

4. *Infrastructure managing agencies/authorities*: these actors refer to the energy transmission network. Mainly these subjects are devoted to oversight the national and local infrastructure in order to secure the transmission and dispatching of energy. These organizations can affect the spread of renewables because the development of the net is essential for non-programmable energy sources or storage options (i.e., Terna, RtE, RED Eléctrica, etc.).

5. *Cultural agencies:* Agents of socialization, from ordinary school to environmental associations participate to enact a certain cultural and symbolic vision of energy. These actors are deeply involved in performing the socio-material arrangement of the transition in terms of "alternative" paths of energy understanding and practicing (use).

6. *Science and technological actors:* Universities and Research Centres connect the cultural dimension of the energy transition to concrete technological innovation. These actors, both from the private and public sector, are relevant in the process of legitimation of specific socio-technical paths of the energy transition.

The typology mentioned above seems to be wide enough to be adopted in the questionnaire sampling strategy. Indeed, the high level of abstraction will be consistent (because of its flexibility) with the different national experiences of the transition, as well as with the plurality of the actors' profiles falling into the six categories of stakeholders.

3.2.2 The questionnaire structure

The questionnaire structure will be developed on the basis of the following analytical dimensions:
- Economy and labour market
- Policies and regulatory framework
- Culture and symbols
- Socio-technical innovations

The dimensions are theoretically supposed to be intertwined and consistent with the aim of the research project. In particular, the research will address the relationship between professional and skills shortage and the paths of the energy transition in the near future. So, a network of interrelations can be prefigured between energy policies affecting the future of the energy transition scenario, that in turn requires new and emerging skills and profiles of competences in order to accomplish the socio-

technical and ethical objectives, as negotiated and prefigured by the stakeholders. This line of reasoning represents a very first and partial trace that help us to design and connect the analytical dimensions of the questionnaire.
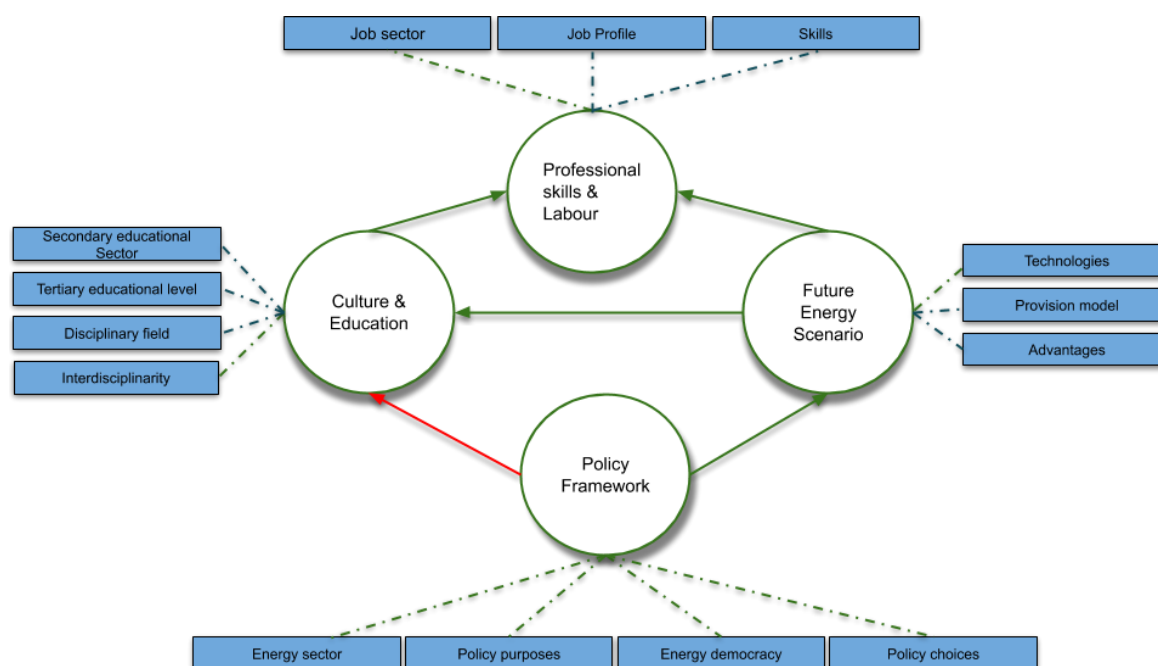

Figure 2: Theoretical map underpinning the ASSET research directions

In order to develop a strategy of stakeholder sampling, it seems useful to draw up a research design that allows us to take into account both the national differences within the European Union and the different actors involved in the energy sector (and in its sustainable transformation). The scientific literature underlines a consistent relationship between the paths of the ongoing energy transition with the *varieties of capitalism* (VoC) which typifies national contexts. Specifically, there is little knowledge about the structural factors that shape national transition/sustainable policies and their pathways[5][19]. A possible solution would be to consider the difference of national contexts proposed by the studies on VoC [14][15]. These works offer a framework for understanding the institutional similarities and differences among the economies in particular comparing the way in which corporates resolve the coordination problems they have to face (industrial relations, vocational training and education, corporate governance, inter-firm relations, relations with employees). They also address the role states play despite convergence process due to Europeanization.

VoC literature identifies, for example, two opposite poles of capitalism, depicting a spectrum along which nations can be arrayed: *coordinative market economy* (CME), the case of Germany or France, and *liberal market economies* (LME), such as the UK or the US. Even within these two types, there are significant variations. In this research field, other works complicate this distinction of capitalism forms in order to fit the differences among nations. In the case of Europe different possible varieties of national capitalism [1][4][3] are detected. In particular, according to this analytical perspective, four types of capitalisms can be identified:

1. Anglo-Saxon (i.e., Ireland, the United Kingdom);
2. Continental (i.e., Belgium, Germany, France);
3. Mediterranean (i.e., Spain, Italy, Greece);
4. Nordic (i.e., Denmark, Sweden, Iceland);

Using this typology, it would be possible to study the energy transition in different socio-economic and institutional contexts improving the analysis concerning the ASSET aim. For any area (or socio-economic and institutional context) stakeholders involved in the incumbent energy system and in its transformation will be selected.

The typology of *stakeholders* can be described as in the following table.

Table 1: Stakeholder typology

Stakeholder type	Description
1. Market and customers	Energy companies & their associations, consumer associations, condo associations, an association of large energy users, energy cooperatives & their associations, etc.
2. Industrial networks	Manufacturing/component industries & their associations, trade unions, etc.
3. Policy and Administration	Local representatives & association of municipalities, national representatives & national regulatory authorities, etc.
4. Infrastructures managing agencies	Infrastructures managing agencies/transmission system operators, local energy agency or authorities, etc.
5. Cultural agencies	Heads of high schools & teachers / school associations, local & national environmental associations *etc.*
6. Science and technological actors	Universities and their associations, research centres both public and private, etc.

This typology seems to be wide enough to be adopted in the questionnaire sampling strategy. Indeed, the high level of abstraction will be consistent (because of its flexibility) with the different national experiences of the transition, as well as with the plurality of the profiles falling into the six categories of stakeholders. At a later stage, the necessity of translating the questionnaire items into the national languages of the respondents will be verified.

Specifically, for each socio-economic and institutional area, 6 persons will be interviewed — altogether, 42 stakeholders (see table 2). This purposive sampling is based on a non-probability method, and population will be chosen by those ASSET partner involved in this stage of the project. The sampling will be implemented as reported in table 2.

Table 2: Sample of stakeholder for socio-economic & institutional contexts

Socio-economic & institutional area	Stakeholder typology for ASSET partners						Tot.
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	Policy and Administration	*Market and customers*	*Industrial networks*	*Infrastructures managing agencies*	*Cultural agencies*	*Science & technology*	
Anglo-Saxon	7	7	7	7	7	7	**42**
Continental	7	7	7	7	7	7	**42**
Mediterranean	7	7	7	7	7	7	**42**
Nordic	7	7	7	7	7	7	**42**
Tot.	**28**	**28**	**28**	**28**	**28**	**28**	**216**

In general terms, partners are involved both in the co-construction of the sample (through the identification of stakeholders according to the indications given above) as well as in the process of improving this technique during the testing and tuning phases as refining processes to make research tools perfect instruments of inquiry.

Through this sample, the partner mentioned in the table will select and invite relevant actors in each stakeholder group to participate in the survey assigned for all the 4 geographical contexts. The compiling of the questionnaire will be self-administered by stakeholders through a CAWI system. Respondents will be urged by the partners who will contact the stakeholders, monitoring the compiling and submission of the questionnaire hosted on an online platform. The sampling strategy here depicted is aimed to reach 216 respondents. In the case of criticalities with the feedback from the partners in order to reach the quota of respondents, the numerosity assigned for each type of stakeholder will be diminished by one (out of two) units. **The general goal is internally set to target more than 100 questionnaires in total and a homogeneous number of answers in each category. The cooperation with SMAGRINET will be explored in order to attract actors from the countries they cover.**

3.2.3 Focus groups

On a general scale, from the qualitative side, an ethnographic account of the energy transition "in action" will be used to observe apparatuses and stakeholders from different point of view and a comparative approach. By placing the observer in a different point of the socio-material assemblage enacted by and within the energy transition, we will try to retrace epistemologies and logics of action behind a policy decision. The output of the analysis consists of an account of how the social legitimation of energy transition is shaped and claimed. A focus group using in-depth open interviews with corresponding stakeholders will be put in place in order to inform correctly the ASSET project in-action.

Design of the focus group sessions: The findings of the survey will guide the design of the focus group sessions and in-depth interviews and will address the following analytical foci: *energy transition "in action and practice"*; values, knowledge, ethics and social legitimation of energy transition. The methodological design of the focus group sessions will be developed further, in accordance with the activities related to the ethnographic case studies and to 'control' that the project path is right.

Sample and subjects under study: Main research subjects will be defined from stakeholders and be drawn from Professional Associations of expertise performing energy transition. These organizations represent the interests of a specific professional group and, at the same time, manage the self-jurisdiction over the professional behaviours of the associates. This institutional arrangement makes the liberal professional groups a very specific (and "close") kind of social organizations. The involvement of Professional Associations will enhance the research activities aiming at recognizing the role of experts in energy transition with a particular focus on the ethical dimension and the professional values at stake. At the same time, the ethical issue will represent a bridge between the research activities and the educational ones provided within ASSET. For this reason, a training programme will be dedicated to green professionalization and ethics, dealing with the theoretical and empirical knowledge consistent with the issues. A qualitative analysis based on an abductive strategy of coding both on empirical findings and theoretical reasoning as well will be applied.

3.2.4 In-depth open interviews

This research technique will be designed and used to involve experts and, in general, key informants that will be able to reconstruct some pivotal features of the energy transition, both in terms of field of socio-technical practices and in terms of diachronic process. This technique of data collection is based on a very unstructured procedure. Indeed, the tool aims to a "general direction" and it consists of a list of narrative items to be investigated by a dialogical approach [18]. This narrative / dialogical strategy of data production will help to explore both the issues that were detected ex-ante by the researcher, and the arguments and emphasises emerging from the interviewed experts. In other

words, this technique allows to not "suppressing" respondent initiative because of the asymmetric relationship between the subject (researcher) and the object (interviewed). Key informants will guide the researchers within the cultural and semiotic space[3] of the energy transition [12].

The very first set of interviews are planned to be conducted in September 2019, involving mainly the Advisory Board. The aim of this first stage of interviewing is twofold: a) to register feedback on the project design; b) to collect information about the dynamics of the energy transition in relation to the labour market, the job profiles, the educational/competence emerging needs. So far, the interview guideline is designed along the following analytical dimensions:

- Energy transition and labour market
- Education, training, career
- Involvement in the energy transition field
- Energy transition and ethics.

The second stage of interviews will be conducted after the analysis of the first insights coming from the survey, and the guideline will be modified and adapted to the emerging cognitive needs of the research. The sample will be shaped on the basis of the first insights of the research. This point needs to be formalized further because: a) it could be that we need to go more in depth about specific issues; b) it could be that the qualitative interviews have to cover some lacks and/or lack emerging from the survey.

3.2.5   Ethnographic account

Ethnographic research is a qualitative method which consists of multiple techniques for data collection. Founded and popularised by anthropologists since the 19th century with a view to understanding cultural groupings, the ethnographic methodology is now used across a wide range of social sciences. Over the last few decades, ethnography has been analysed from an epistemological point of view with the aim of capturing its strengths. An extensive specialist literature has shown the usefulness of this approach to study several social phenomena to penetrate and understand the local world.

The epistemological framework of ethnography encompasses a lot of topics, such as: meaning and behaviour in any situation and how these are linked; the awareness of changes in behaviour that occurs understanding others; the many perspectives existing in situations; the need to understand behaviour and beliefs in the context of the culture of organizations and the need to study the group or culture 'as it is'. Above all, in relation to this research, the ethnographic methodology is important to understand the elements that favour or slow down and block cultural change, of which the technological one is just an example.

The Ethnographic research is articulated at several levels:

A first level is based on direct interactions between the scholar and different people in their real-life environment. In this case, it is customary to employ many techniques, such as the formal and informal interview (with or without the use of a questionnaire); dialogue around a list of topics carefully prepared; the collection of life stories to bring out the salient points of the problem under analysis; focus group etc. In this case, dialogues and conversations, which were carried out in the habitats of the current residence (offices, companies, etc.) are used to understand many aspects of the social world that characterizes people's lives.

To improve interviews directly in the field, it is possible to integrate them with telephone or online tools, even usable to proceed when people are not directly available. It is useful to clarify that interviews may be done with opinion leaders, such as company directors, politicians, engineers and specialized technicians. In addition to these people, it is important to meet various social actors who

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[3] The semiotic space refers to the space of meanings, values and social representations inscribed in the energy transition argument.

animate the community, as association leaders, ordinary citizens that showed interest or disappointment with regard to the energy companies.

Many topics are not easily assessable through simple face-to-face interviews. Ethnographic research, therefore, attains **the second level of analysis that concerns the possibility of obtaining information through direct observation.** It is possible to observe the physical and environmental contexts. In this case, it is crucial to focus attention on the salient features of the places, to understand the relationships between the parts, the specificity of the urban and rural landscape, the elements of memory and the past that is again present and the openings towards modernity.

Careful observation, therefore, helps to understand how modern facilities and structures can be integrated into the urban and rural community context. The landscape is the product of a cultural relationship that communities establish with physical space. People "use" the territory on the basis of variables concerning the cognitive, affective and perceptive level. A multi-institutional ethnographic observation provides the complexity of the territory as a socio-cultural construction. To optimize the observation, it is useful for the ethnographic research to plan the use of audio-visual recording tools, which make it possible to analyse the documents later. Writing notes in the field and preparing a photo-list to standardize the survey in a comparative perspective is an important methodological aid. In some cases, in order to penetrate the meanings that social actors give to actions, to contexts and to different social phenomena, detached observation is not enough. In fact, in these cases, it is necessary to start a relationship of greater involvement that may be assured by the participant observation, which means developing a dense and immersive approach. The ethnography manuals refer to this research technique when the scholar actively participates in a certain aspect of social life, to be able to overcome an external point of view. For example, in order to understand the way in which a new structure is perceived and judged, it is useful to conduct an intensive observation to understand attitudes and emotions.

The third level of ethnographic research concerns the collection of documents. Many aspects of reality can be understood analysing official documents, such as laws and regulations, others by reading unofficial sources, such as newspapers, prints, petitions, etc. The identification of documentary sources of a legislative, legal, journalistic, iconographic nature, to be done online and off-line, effectively represents an important method ethnographic research may resort to.

The different levels of ethnographic research must be employed according to an integrated and complementary approach. In fact, each partner will contribute to understanding some aspects of social and cultural complexity of the phenomena. Different methods will be used to understand different aspects of the studied phenomenon, embedded actions and behaviour; points of view and opinions, norms and values that guide the action. Furthermore, precisely the partner involvement will allow us to access the dimension of collective representations and symbolic elaborations, which constitute an important dimension of social reality. Moreover, one of the main advantages associated with ethnographic research is that ethnography can **help identify and analyse unexpected issues**. The choice of locations where performing ethnographic research is a complex operation, which requires the analysis of many variables. Since in Italy the official report on renewable sources returns a very different distribution of the plants, it is important to choose the case studies after having clarified some general aspects. However, at present, pending further clarification, it is important to specify that the research will be aimed at understanding which technical and managerial, social and cultural factors favour or hinder the development of renewable sources.

In any case, we will give particular attention to the comparative study of innovative experiences in which the planning, the realization and the fruition of the plants support the participation of local communities, according to different models of involvement.

3.2.6   Research deployment plan

Overall research agenda is put on the timeline of activities. Table 3 details the deployment plan according to research phase, project period, consortium partner involvement and required actions. Periodically a phase of triangulation has been planned in order to validate the research progress and

to prepare the next step. The triangulation phase is intended, in fact, to enhance the validity of the overall research through a systematic comparison of results from qualitative and quantitative tools. It is relevant to clarify, once again, that the questionnaire will be submitted to people selected by the industrial partners represented in the ASSET project and their networks according to stakeholders table, while open interviews and focus groups will be submitted to specific testimonials to cope with very specific research needs. They will be identified by UNINA according to the field exploration, the survey results, and the emerging needs from the ethnographic analysis. Figure 3 presents the major stages of ASSET' research agenda and their interrelations. In terms of outcomes, internal research reports will be provided periodically as already detailed in D6.2 [23].
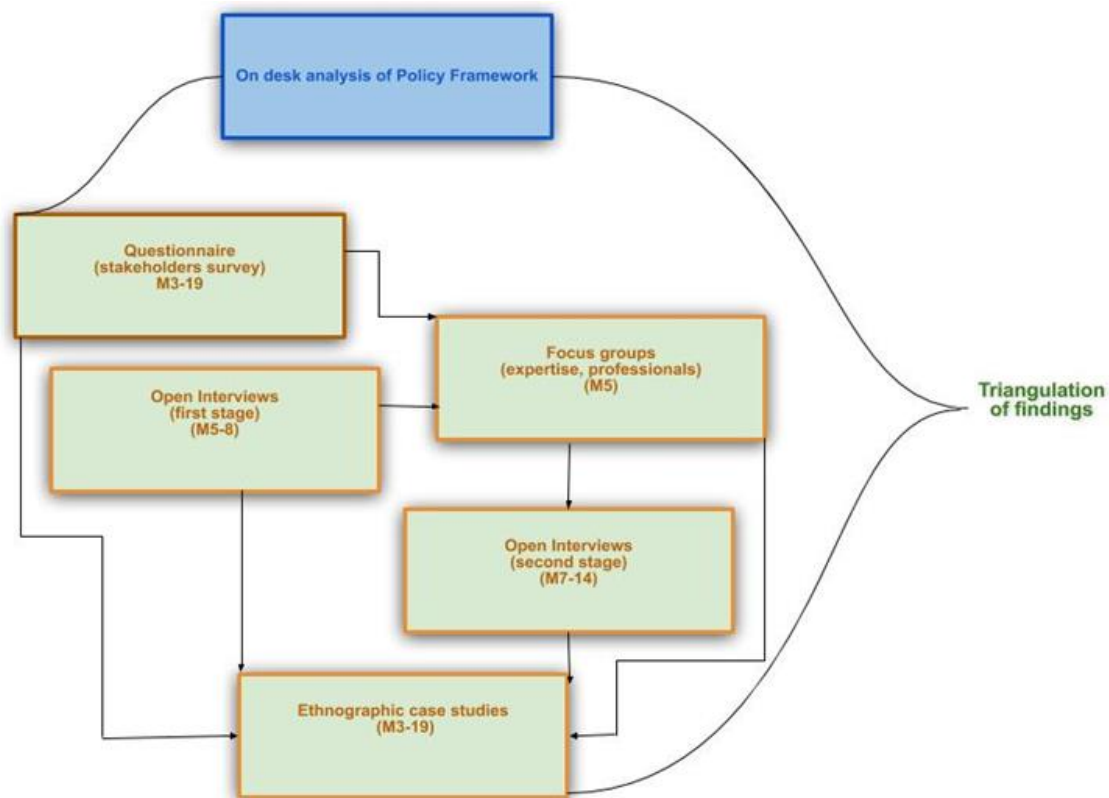

Figure 3: Research phases and their interrelations

Table 3: Research deployment timeline

Research Phase	Period	Partners involved	Actions required and main outcomes
On desk analysis of Policy Framework	M1-10	UNINA	Official statements, policy documents and action plans analysis at EU and national level **Outcome: internal report on policy and literature analysis**
Research Design Workshop	M2-M6	All	ASSET partners involvement for feedback and insights
Questionnaire Design	M2-M3	UNINA	Analytical dimension detection and operationalization

Questionnaire Co-construction	M2-M3	EASE, ECOPOWER, ENOSTRA, LOGICAL SOFT, OTEA, RWTH	ASSET industrial partners involvement for co-creation
Questionnaire Testing	M5-M7	All	ASSET partners involvement for feedback and insights
Questionnaire Tuning & Finalization	M7-M9	UNINA	Improving of questionnaire effectiveness Setting questionnaire online forms on Survey Monkey controlling variables, multiple answer structure and privacy disclosure **Outcome: questionnaire final release**
Questionnaire submission	M10-M14	UNINA EASE, ECOPOWER, ENOSTRA, LOGICAL SOFT	Preparing invitation letter to present the research. Inviting ASSET partner to submit a questionnaire to their network
Questionnaire Data input	M14-M16	UNINA	Data, collection, preparation and entry
Questionnaire Data analysis	M16-M19	UNINA	Evaluation of data-set and exploring the statistical relationship. **Outcome:** **at least 100 questionnaires** **Internal research report**
Open Interviews	**M5-M8**	**UNINA**	**Collecting information and data from key informants**
Open Interview Co-construction	M7-M8	EASE, ECOPOWER, ENOSTRA, LOGICAL SOFT, OTEA, RWTH	Analytical dimension detection and issues list development
Open Interviews Testing	M8-M9	UNINA	Detection of criticalities and biases of the qualitative technique
Open Interviews Tuning	M8-M9	UNINA	Improving issue list effectiveness **Outcome: open interview final release**

Open Interviews Conduction	M10-M15	UNINA	Assessment of the sampling of key informants and data collection **Outcome: at least 20 people interviewed**
Open Interviews Data analysis	M14-M17	UNINA	Qualitative analysis of data **Outcome: internal research report**
Focus groups	M11-M17	UNINA	Prepare introduction, design the context, define roles and rules, identify and invite to participate leading people in the target group, prepare introductory videos and focus script
Focus Group Co-construction	M11-M12	UNINA	
Focus Group Testing	M11-M12	UNINA	
Focus Group Tuning	M11-M12	UNINA	Questionnaire refining, after testing **Outcome: Focus Group design final release**
Focus Group Conduction	M13-M15	UNINA	Setting the context, create a comfortable climax, define concepts, start conversation following the prepared script
Focus Group Data analysis	M15-M17	UNINA	**Outcome: max 3 focus groups**
Triangulation of research findings (ongoing)	M15-M17	UNINA	Comparison of results and findings from qualitative and quantitative tools.
Ethnographic case studies identification (general issues)	M1-M3	UNINA	Mapping the country, identify research directions, preliminary discussions on sampling strategies
Sampling and case studies definition (general issues)	M3-M5	UNINA	
Case studies detection (detailed design)	M4-M6	UNINA	
Fieldwork negotiation and access	M6-M8	UNINA	
Fieldwork data collection	M9-M15	UNINA	Contacting Energy Departments at the national and local level

Case studies data analysis	M14-M19	UNINA	**Outcome: internal research report**
Triangulation of research findings	M19-M20	UNINA	Comparison of results and findings from qualitative and quantitative tools.
Triangulation of research findings (final)	M20-M24	UNINA	Exploring the new line of interpretation/explanation emerging from the research results.
Research results & second workshop (evidence for road map)	M16-M21	UNINA	Research reports to partner Guidelines for policy document and roadmap

4. Data privacy, ethical issues and compliance

Since research is clearly about collecting data and information, privacy and ethical issues should be carefully studied. External data could come from different databases and official policy documents. This external data will be useful to contextualise the research. Data from the partner institutions and/or other associated partners can be considered as external although the processes for dealing with data are already established through the project´s Consortium Agreement. Access data collected autonomously by the online tool Survey Monkey[4] will be under the responsibility of the tool and its privacy policy.

Internal data can be of different types:

- Research data: answers to surveys and interviews, information from focus group discursive analysis, etc.
- Personal information: such as email addresses, phone numbers to recall respondent to action

For this kind of data and information, ethical as well privacy issues will be properly focused, devoting a special information section on data security, data treatment and confidentiality, describing who is involved at what level, who is responsible for data gathering and management, raising awareness on the project objectives and use of data. In order to avoid - also incidentally - a possible crossing of data with personal information, the process of selecting expert stakeholders has kept separate by the process of submission, so that involved partners will be only responsible to send the letter of invitation to selected stakeholders, while data gathering through anonymised questionnaire will be managed by UNINA only. None of the processes of data gathering and elaboration will allow going back on the respondent. Data transfer among partners is not allowed in any case. Involved partners will have the right to access aggregated information and research reports as any ASSET partner. Data generated in the project will be as open as possible. External data will be subject to the original policy rules of the database. Where possible, data will be delivered - at the end of the ASSET project - in the format following the indication of the OpenAIRE portal, the OA infrastructure integrating and linking entities from a wide range of scholarly resources so to automatically comply with the EC's policies on Open Access.

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[4] https://www.surveymonkey.com/

5. Conclusions

Researching on energy transition from the perspective of SSH requires a 'facet methodology' for exploration of the multidimensionality of phenomena and for the emergence of significant and independent results at a different level. The concerning research design is then the result of multi-stakeholder analysis based on a hybrid approach, which takes into account a selection of mixed-methods that attempt to consider multiple points of views and perspectives. Proposed tools are the legacy of the methodology of social sciences, they lie in fact on a long-standing tradition in empirical and applied research.

Stakeholders have been identified according to the research strands and simplifying the debate occurred among the ASSET partners in order to fit both the exploration of the field and the project tasks to perform. Different types of both structured and unstructured data will be used, ranging from survey to ethnographic accounts and focus group interviews.

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Annex I: The stakeholder questionnaire

SECTION 1: RESPONDENT PRELIMINARY INFORMATION

1.1) Gender: - M ■   - F ■   - Prefer not to say ■

1.2) Age (indicate): -Prefer not to say ■

1.3) Nationality (indicate) _____

1.4) Education:

- Less than high school degree ■
- High school degree or equivalent ■
- Bachelor's degree, higher or equivalent ■
- PhD, Master, etc. ■
- Prefer not to say ■

1.5) Disciplinary field of your education

- Arts and humanities ■
- Engineering and technology ■
- Life sciences and medicine ■
- Natural science ■
- Social sciences and management ■
- Prefer not to say ■

1.6) Your organization/company/institution is featured by:

1.6.1) Multilevel-governance position

- Local ■
- Regional ■
- National ■
- European ■
- Global ■

1.6.2) Type of organization

- Public sector (*i.e., public administrations, public authorities, etc.*) ■
- Private sector (*i.e., companies, professionals, etc.*) ■
- Public-private partnership ■
- Third Sector / NGO / Unions (*i.e., association, foundations, etc.*) ■
- Other (specify): _____

1.6.3) Sector

- Manufacturing industry (*i.e., assembling & installing industries, R&D, etc.*) ■

- Energy production (*i.e., energy supplier*) ■

- Consumption (*i.e., an association of consumers*) ■

- Environment sector (*i.e., environment association, grassroots movement, etc.*) ■

- Education agency (*i.e., schools, universities, etc.*) ■

- Regulatory / infrastructure agency or authority (i.e., *transmission system operator*) ■

- Policy body (*i.e., municipalities, Ministers, etc.*) ■

1.7) Position held

- The top manager or person in charge (*mayors, CEO, trade unions key people, etc.*) ■

- Management position with high responsibilities (*department chief, area officer, etc.*) ■

- Technical and admin staff with responsibilities (*professional, admin assistant, etc.*) ■

- Employee ■

- Prefer not to say ■

- Other (specify): _____

SECTION 2: VIEWPOINT ON THE ENERGY TRANSITION

2.1) In your opinion, which technology is most prominent in the current energy transition process in your country?

2.1.a) Dimension (Please, indicate the first option).

- Big scale concentrated plants ■

- Small scale distributed plants ■

2.1.b) Technological field (Please, indicate the first two options).

a) Energy production system (solar, wind, hydro) ■

b) Energy storage (electrical and thermal) ■

c) Energy management (smart grids, energy districts) ■

d) Energy efficiency and energy consumption reduction (net zero buildings, heat pumps, cogeneration) ■

2.2) In your opinion, which technology *should be developed mainly* in the next 5-10 years in your country?

2.2.a) Dimension (Please, indicate the first option).

- Big scale concentrated plants ■

- Small scale distributed plants ■

2.2.b) Technological field (Please, indicate the first two options).

a) Energy production system (solar, wind, hydro) ■

b) Energy storage (electrical and thermal) ■

c) Energy management (smart grids, energy districts) ■

d) Energy efficiency and energy consumption reduction (net zero buildings, heat pumps, cogeneration) ■

2.3) In relation to the *desirable* development of the technological options above pointed, what do you think it will be the most urgent priorities? *Please, order the first 5 options.*

1. Greater reduction of climate-changing emissions ■

2. Reduction of the impact on the landscape ■

3. Improving the security of energy supply ■

4. More job opportunities ■

5. More opportunities to develop local businesses along the energy chain ■

6. Improving technological competitiveness ■

7. More socially redistributed energy production ■

8. An easier energy development program ■

Other_____

2.4) In your opinion, what kind of organizational form of the energy sector is going to be adopted in the future? *Please, positioning your opinion along this continuum.*

Some large players own distributed medium to big facilities	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	Many small to medium facilities owned by cooperatives / citizens
A centralized-controlled smart grid to an efficient energy system	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	A decentralized smart grid for symmetrical exchanges
Users who can choose commercial offers	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	Prosumer involved in the energy supply

Section 3: Professional skills and labour market

3.1) Which of these subjects should be mainly involved in the next 5-10 years processes of the energy transition? Maximum 2 answer per sector.

a) Economic agents

- Manufacturing sector (*i.e., wind turbines, solar panels, etc.*) ■

- Component industries (*i.e., inverters, wind blades, etc.*) ■

- Designer and installers ■

- Plant developers (*i.e., wind farm developers*) ■

- Sales agents (*i.e., agents who propose commercial contrasts*) ■

Other_____

b) Political / regulatory actors

- Municipalities   ■

- Ministries   ■

- Energy agency / authorities   ■

- Nets systems (*i.e., transmission system operators*)   ■

- Transnational   ■

- Other_____

c) Research & educational sector

- Universities & public research centres   ■

- Schools (*i.e., trade & technical schools*)   ■

- Private/corporate research centres & academies   ■

- Media (*i.e., advertise companies*)   ■

- Other_____

d) Civil society

- Cultural associations   ■

- Environmental associations   ■

- Grassroots movements   ■

- Citizens   ■

- End Users   ■

- Other_____

3.2) Considering the *sector in which you are directly involved* (public administrations, a private company, trade union, etc.), what *skills should be trained in the near future to foster* the energy transition?

Maximum 4 answer for each list (hard/soft skills).

Hard skills		*Soft skill*	
Language knowledge		Communication skills	
Degree, certifications (specific for each sector)		Adaptability /creativity	
Accounting		Decision-making	
Logistic		Problem-solving	
Machine operation		Team-working	
Software knowledge		Networking/intermediation	

Digital skills		Learn to learn	
Local context analysis		Time management skills	
Big Data analysis		Awareness of territorial contexts	
Management		Conflict resolution	

3.3) Compose the *"ideal job profile"* for the value chain of the renewable energy / energy efficiency sector.

	Education[5]	Disciplinary field[6]	Soft skills[7]	Hard skills[8]
Equipment manufacture and distribution				
Project development				
Construction and installation				
Operation and maintenance				

3.4) Is it possible through a lifelong learning strategy to re-employ workers from traditional energy sectors?

[5] Options: lower than secondary education (*less than high school degree*); secondary & post-secondary education (*high school degree or equivalent*); first stage of tertiary education (*bachelor's degree, higher or equivalent*); second stage of tertiary education (*PhD, Master, etc.*).

[6] Options: arts and humanities; engineering and technology; life sciences and medicine; natural science; social sciences and management.

[7] Options: communication skills; local conflict analysis; adaptability / creativity; problem-solving / decision-making; team-working; networking / intermediation; willingness to learn; time management skills.

[8] Options: language knowledge; degree/certifications (specific for each sector); accounting; typing techniques; machine operation; software knowledge; digital skills; local context analysis.

- No, energy transition needs completely new skills & competencies ■

- Yes, but if they are too elder it could be difficult ■

- Yes, but they need to acquire specific competencies & skills ■

- Yes, traditional knowledge can add value in the energy transition ■

SECTION 4: CULTURE AND EDUCATION

4.1) In your opinion, what level the educational system supported most of the energy transition in your country? *Please, indicate from 1 (not at all) to 10 (definitely).*

a) High Schools   1-2-3-4-5-6-7-8-9-10

b) Universities   1-2-3-4-5-6-7-8-9-10

c) Private education agencies   1-2-3-4-5-6-7-8-9-10

e) Energy companies (learning on job)   1-2-3-4-5-6-7-8-9-10

4.2) In your opinion, on what aspects should be focused on the educational system in your country in order to support the next energy transition?

Please, indicate from 1 (not at all) to 10 (definitely).

a) High Schools

technical/engineering aspects   1-2-3-4-5-6-7-8-9-10

management/economic aspects   1-2-3-4-5-6-7-8-9-10

social aspects   1-2-3-4-5-6-7-8-9-10

environmental aspects   1-2-3-4-5-6-7-8-9-10

ethical aspects   1-2-3-4-5-6-7-8-9-10

gender aspect   1-2-3-4-5-6-7-8-9-10

b) Universities

technical/engineering aspects   1-2-3-4-5-6-7-8-9-10

management/economic aspects   1-2-3-4-5-6-7-8-9-10

social aspects   1-2-3-4-5-6-7-8-9-10

environmental aspects   1-2-3-4-5-6-7-8-9-10

c) Private education agencies

technical/engineering aspects   1-2-3-4-5-6-7-8-9-10

management/economic aspects   1-2-3-4-5-6-7-8-9-10

social aspects   1-2-3-4-5-6-7-8-9-10

environmental aspects   1-2-3-4-5-6-7-8-9-10

d) Energy companies (learning on job)

technical/engineering aspects   1-2-3-4-5-6-7-8-9-10

management/economic aspects   1-2-3-4-5-6-7-8-9-10

social aspects   1-2-3-4-5-6-7-8-9-10

environmental aspects   1-2-3-4-5-6-7-8-9-10

4.3) Which disciplinary fields would be reorganized to fit the current challenges the energy transformation has to face?

Please, ordinate from the most to the last urgent field (use numbers: 1, 2,3).

-Arts and humanities   -Engineering and technology   -Life sciences and medicine

-Natural science   -Social sciences and management   -Other _____

4.4) Thinking on *interdisciplinarity,* in the next energy transition for subjects involved in, *please, indicate from 1 (not at all) to 10 (definitely).*

How important interdisciplinarity is? (1-10)

How difficult is it to acquire interdisciplinarity competences? (1-10)

How difficult is it to practice interdisciplinarity in the fieldwork? (1-10)

4.5) How important is diversity management/gender education in your country?

Please, indicate from 1 (not at all) to 10 (definitely).

SECTION 5: POLICIES AND REGULATORY FRAMEWORK

5.1. Which policy sectors need to be more supported in the energy transition process in your country?

Please, indicate the first three sectors.

- Industry and production   ■

- Mobility and transport   ■

- Heating and cooling   ■

- Storage   ■

- Energy planning   ■

- Gender diversity   ■

- Buildings eco-efficiency   ■

- Energy infrastructures & smart grids   ■

- Technological innovation and Research ■

- Energy poverty   ■

- Other_____

5.2. Do you agree or disagree with the following statements?

Please, indicate from 1 (totally disagree) to 10 (totally agree).

- Big plants/facilities are needed to pursue economies of scale in the sustainable energy sector 1-10

- European policies have to reinforce the national levels of decision making about the energy strategies 1-10

- Citizens have a relevant role in supporting energy transition 1-10

- The EU regulatory framework on energy transition needs to be simplified 1-10

- The national financial support to energy transition is consistent with the policy goals 1-10

- Public actors have to avoid negative environmental side-effects for the development of green facilities 1-10

- Companies have to pursue the energy transition according to free market logic 1-10

- Other_____

5.3 How policies can contribute to strengthening a democratic energy transition process?

Please, indicate from 1 (not at all) to 10 (definitely).

- Supporting the incumbent companies to optimize the redistribution of costs/benefits of the transition 1-10

- Financing the local initiatives of energy cooperatives (decentralize arrangement) 1-10

- Promoting education and new professional training 1-10

- Developing awareness campaign about energy efficiency in everyday life 1-10

- Involving a wider range of stakeholders in the co-construction of actions and strategies 1-10

- Channelling women into the energy sector 1-10

- Supporting energy citizens project 1-10

- Contrasting energy poverty 1-10

- Other_____

5.4. The current policies on the energy transition your country are too much focused on?

Please, ordinate from the most to the last important.

1. Economic and financial instruments

2. Agencies and bureaucratic reforms

3. Information and communication campaigns

4. Skills shortage and educational programs

Other_____

Annex II: The Expert Interview schema

Interview Guideline

Energy transition and labour market
- Features and relationship with another occupational field
- Statistics and sources of data about the field
- The role of the professional/technical associations
- The role of the companies
- The role of the institutions
- Gender diversity

Education, training, career
- Trajectories, theoretical and practical knowledge
- The role of educational/training agencies
- The training on the job and the experience
- Tricks of trade
- Cooperation and competition. The areas of exclusive "jurisdiction"
- Accountability and evaluation of the professional quality
- Job profiles and "institutionalization" processes
- Prestige and hierarchies among different job profiles
- The gender gap. Discrimination and the "green" glass ceiling

Involvement in the energy transition filed
- Education
- Work experience
- Competences and skills endowment (trajectory)
- The labour "culture" of the energy transition
- Citizen energy, new business model, policy leverage

Energy transition and ethics
- The values of the professional/expert/worker of the energy transition
- The relationship with the logic of the market
- The issue of the local territory's interests
- Technologies, contexts, communities
- Competences, skills and ethical sphere of the job
- Energy transition, gender and values

Anagraphic data
- Age
- Gender
- Educational qualification
- Professional field
- Professional position
- Institution/Organization/Company
- Current project involvement (local/global; urban/rural)