

ACTION PLAN

Partner: **REGIONE BASILICATA**

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INDEX

BACKGROUND	3
A. STRATEGIC APPROACH	5
A.1 <i>Adopted strategy</i>	5
A.2 <i>Objectives</i>	7
A.3 <i>Expected Impacts</i>	8
A.4 <i>Local context background</i>	9
A.5 <i>Direct and Indirect Beneficiaries</i>	10
B. VISION, GOALS AND RESULTS	11
B.1 <i>Structure of the Action Plan</i>	11
B.2 <i>Preparation of tools & support</i>	12
B.3 <i>Applied research</i>	12
B.4 <i>Demonstration projects</i>	13
B.5 <i>Results dissemination/information campaign</i>	15
B.6 <i>Training</i>	16
C. IMPLEMENTATION PROCEDURE	21
C.1 <i>Stakeholder identification and responsibilities</i>	22
D. INPUTS ANALYSIS	26
E. INDICATORS AND SOURCES OF VERIFICATION	29
F. EXTERNAL CONDITIONS ASSESSMENT	32

Background

This Action Plan presents the strategic aims of the region Basilicata in the scope of sustainable development, rational use of energy, renewable energies and the reduction of greenhouse gases emissions by the diffusion of pre-commercial procurement (PCP) procedures.

PCP is a tool for the prototyping of new products and/or services not on the market. The basic requirement of the PCP is the interest of a public authority to equip itself with new products and/or services in order to respond effectively to a proven and justified need for innovation, usually related to a public service that needs to be improved and made more efficient from both a technical and economic point of view.

The procedure involves the envelopment of companies and research centres, generally associated in partnership, which are progressively selected by the PA on the basis of a multi-stage process (briefly reported on this link <https://ec.europa.eu/digital-agenda/en/innovation-procurement>).

Referring to TRLs (Technology Readiness Levels), the range of intervention of the PCP is included from a TRL equal to 2-3 up to a TRL of 8 to be obtained with a final phase of qualification and validation of the prototype system.

The process is characterized by an active participation, dialogue and confrontation between public and private subjects, as well as by the sharing of risks that usually accompanies R&D activities, with reference both to the objectives to be achieved and to the results to be progressively obtained up to the development of prototype solutions.

The PCP thus becomes a useful means of piloting the potential supply of technological innovation from companies and research centres towards the development of solutions capable of improving energy and environmental performance in different contexts, including, of course, urban ones.

Through the calls for proposals of PCP, the PA can obtain, for example, new validated and qualified prototypes with the technological peculiarity of reducing the energy intensity of a sector or a productive activity or within a sector such as construction, promoting the transition to a low-carbon economy.

In this case, it is the demand for innovation expressed by the PA that intervenes to orient research institutions and technologically more advanced companies towards the study of new systems and devices that are technologically more efficient. In particular, reference is made to innovative solutions based on the use of ICT in energy management systems in the built environment as well as in other areas of interest for energy and environmental policies of the Region. These innovations can also make it easier and more effective for energy consumers and the general public to change their behaviour.

Thereby, it is coherent with the political ambition of the Region and with the regional and national strategic and operational programmes and laws defined to promote the transition towards a low carbon economy, such as: Regional Operative Program ERDF Basilicata 2014-2020, Regional Strategy for Innovation and Smart Specialization (S3), Basilicata Carbon Free (Project on Law n. 114/2016); National Strategy to Adaptation to Climate Change, etc.

The Action Plan was developed within the framework of the LOCARBO project, which is an interregional cooperation project for improving low-carbon economy policies, focused on exploring policy instruments improvement combined with innovative practices on three strongly interrelated thematic pillars:

- Supplementary services and products offered by local authorities;

- Innovative cooperation models;
- Innovative smart technologies.

Each thematic pillar corresponds to one of the following strategic objectives:

- Improve policy instruments targeting demand-driven initiatives to increase energy efficiency and the use of renewables in the built environment;
- Find innovative ways for regional and local authorities to support energy consumers' behaviour change, enhancing motivation and awareness;
- Promote more conscious consumers' decisions on energy efficiency in buildings, and more investments on smart technologies.

This Action Plan development process was the result of a set of internal and external interactions under the LOCARBO project.

At an internal level, a set of preceding documents were developed to prepare and frame the production of this Action Plan. These documents refer to the "Regional Analysis & Ambition Info Sheet" and the collected Good Practices, integrated in the project "Good Practices Inventory", and perfectly blended in each LOCARBO Thematic Pillar.

The "Regional Analysis & Ambition Info Sheet" consists in a context analysis, including themes like weaknesses/expectations within the policy-making process, resources exploitation, investments, community involvement, and the establishment of a short political statement expressing region Basilicata preliminary expectations on the Action Plan.

The project networking activities (including training sessions, regional events and thematic conferences) brought excellent opportunities to knowledge transfer, namely best practices exchange to be incorporated into regional/local policies.

At an external level, the interaction that occurred between the local/regional stakeholder group and the municipal technicians and companies within the performed Local Living Lab (LLL) and Institutional Learning Platform (ILP) meetings, was also very useful for the analysis and proposal of achievable action lines and measures that are intended to be developed, implemented and monitored.

A. Strategic approach

A.1 Adopted strategy

[Please define the strategic approach of the AP according to the main contents described before.]

The action plan (AP) of region Basilicata considers the application of Pre-Commercial Procurement (PCP) to improve the Regional Operative Program ERDF Basilicata 2014-2020 (<http://www.pofesr.basilicata.it/fesr201420>) as policy instrument tackled within the region. In particular, the AP enhances the capacity of regional Public Administrations (PAs) to implement PCP procedures to be used within the ERDF Program Basilicata 2014-2020, addressing the implementation of the specific actions and selected topics in order to contribute to the transition to a regional low-carbon economy.

The measures that find a natural match with LOCARBO priorities selected from region Basilicata OP ERDF 2014-2020 are:

- Priority 1B. Strengthen research, technological development and innovation by promoting investments in R&I for the businesses sector by developing links and synergies between companies, research and development centres and the higher education sector;
- Priority 4B. Supporting the transition to a low carbon economy in all sectors promoting EE and renewable energy use in enterprises;
- Priority 4C. Supporting the transition to a low carbon economy in all sectors supporting EE, intelligent energy management, and RES use in public infrastructure, including public buildings, and 'housing'.

In the National Strategy to Adaptation to Climate Change, it is stated that: “Despite the significant differences between mitigation and adaptation strategies, numerous synergies are still possible. In fact, some of the main actions that governments, especially on local scales and at the sectoral level, can take to mitigate climate change also bring benefits in terms of adaptation. In short, these are measures that make it possible to achieve benefits both in the context of adaptation and in other contexts - eg. mitigation of climate change or reduction of environmental pollution (win-win measures), and measures to achieve benefits regardless of the extent of climate change (no-regret measures). The strongest synergistic potential between adaptation and mitigation seems to occur primarily in the sectors of agriculture; secondly in the fields of energy and water management, infrastructure planning and construction.”

Therefore, region Basilicata selected 4 topics in which foster innovation, also by PCP:

- Use of high spatial/temporal meteorological data for promoting RES diffusions;
- Low Enthalpy Geothermal Energy for direct uses;
- Automation Building;
- IoT (Internet of Things) for reducing energy consumptions and losses in water networks.

These topics came from a Regional Strategic Framework (regional smart specialization strategy S3) and the recommendation within the National Strategy to Adaptation to Climate Change (Reduction of emissions of climate-forcing gases, Mitigation, and reduction of territorial vulnerability, Adaptation) and fit the following strategic streamlines (see the table below):

- Reducing the energy needs and CO₂ emissions in the regional public and private buildings;
- Saving water resources, increase efficiency in its production and distribution;

- Fostering and stimulating RES diffusion, the growth of low energy intensity production sectors and low carbon technologies.

Strategic Streamlines	Selected topic				
	PCP	Low Enthalpy Geothermal Energy	Use of high spatial/temporal meteorological	Automation Building	IoT for the optimization of water distribution networks
To Encourage the retrofit of the public and private buildings through concrete and measurable objectives of reducing the energy needs per unit area		+		+	
To Promote policies to save water resources, increase efficiency in its production and distribution					+
To foster and stimulate the growth of low energy intensity production sectors and low carbon technologies	+	+	+	+	+
Supporting and encouraging studies and research for the development of regional mitigation and adaptation strategies	+				

The identified themes and the actions are perfectly in agreement with the regional strategy for the transition of Basilicata towards a competitive economy. They strongly contribute to the general objectives of LOCARBO project and are coherent with its thematic pillars.

LOCARBO good practice “GP TP3 PP2 – Geothermal energy: the Sweden good practice” underlines the market success of geothermal energy heat pumps in Sweden, in the public and private building sector for producing air conditioning environments. Ground source heat pump technology (GSHP) developed rapidly during the 1990’s and is still a strong area of research and development in Sweden.

In LOCARBO good practice “GP TP2 PP2 – Promoting low- and medium-enthalpy geothermal energy exploitation in the northern sector of Basilicata”, region Basilicata intends to stimulate the exploitation and use in Basilicata of the geothermal resource for low-energy buildings, and as support to zootechnical, agricultural and industrial activities, according with the most recent EU political guidelines under energy domain.

LOCARBO good practice “GP TP2 PP3 - The ERMES integrated agricultural monitoring system for greenhouse gas emissions reduction” describes the results achieved by EU-FP7 ERMES project. ERMES ambitious objective was to create an integrated system allowing to exploit information from different sources and different levels of spatial and temporal granularity (Earth Observation data, crop modeling, and user-collected data), in order to provide useful information for various

crop monitoring/management applications. Precision farming has the potential to contribute to the wider goal of meeting the increasing demand for food, whilst ensuring the production sustainability. The system was designed following a modular approach, where core software components are easily extensible with specific functionalities. In fact, even if ERMES was mainly focused on European agriculture, its methods and technologies can also be exploited for other fields of interest (e.g. to support PV plants installation and/or for building energy efficiency).

LOCARBO good practice “GP TP3 PP4 – Energy management in buildings: SystemsLink Energy Management” reports the successful experience of a new energy management software called SystemsLink, which was implemented by Durham County Council. It is an energy monitoring and targeting software system that can handle extremely large amounts of complex data on gas, water, electricity, oil, biomass etc. Since it was installed the software has proved really valuable to the Council and has helped to save as much as 25% of costs in some buildings. The software also has an interactive portal to be created for each site, so that building users can see how much energy they are using and compare consumption for previous weeks, months or years. This raises their awareness and has increased transparency. Energy and water consumption data is collected half hourly for each site meaning that the data can be managed by identifying energy waste (such as boilers being left on overnight), water leaks and billing mistakes. Additionally, the number of staff required to manage energy and water consumption has reduced from 6 people to just 3, who now run carbon and reduction programmes. Both areas of renewed management have led to significant cost, energy and carbon savings.

As evident from the background, the choice to promote the implementation of PCP procedure strongly contribute to the overall LOCARBO objective, by addressing innovation.

The promotion of PCP procedure is perfectly in line with the region Basilicata objective stated in the LOCARBO project, which is focused on:

- 1 – procedural improvement of OP ERDF 2014-2020 governance;
- 2 – looking for effective application of innovative technologies and smart solutions promoting investments in energy chain and benefits for administrations and local communities and build these in the measures of the ERDF OP;
- 3 - contributing to the transition to a regional low carbon economy.

Furthermore, there is a strong link with the LOCARBO 3rd thematic pillar TP3 - Innovative smart technologies. SMART/ICT/IoT play an important role to provide new technologies for data generation, transformation, and management. These innovative systems can allow the achievement of significant advantages in terms of energy savings and in terms of reducing available water resource consumption by increasing efficiency in its production and distribution.

A.2 Objectives

The Action Plan has been developed adopting (as requested) the so-called *Logical Frame Approach* (or *Logframe Approach*). In such approach, normally used in EC-funded projects, a set of Specific Objectives (SOs) are defined; as well known, SOs have to be attained within the Plan’s timeframe. Each activity implemented in order to achieve the SOs, will produce one or more *Outputs*, which are the activities’ results under a *process-oriented* point of view. One or more Outputs, produced by one or more activities, generate the *Outcomes* (also called *Results* in the specialized literature), which can be defined as the Activities’ results under a *goal-oriented* point of view. The Outcomes

can also be defined as the direct *effects* expected to be generated by a combination of one or more Outputs.

Applying the concepts of the Logframe Approach and in the light of the strategic elements illustrated above, the following Specific Objectives have been identified:

- **Specific Objective #1 (SO1):** Enhancing the capacity of regional Public Administrations (PAs) to implement PCP procedures;
- **Specific Objective #2 (SO2):** Promoting, also by PCP, innovation and use of geothermal energy in the regional context;
- **Specific Objective #3 (SO3):** Increasing the actions effectiveness in the field of renewable energy, specifically PV, as well as of building energy efficiency;
- **Specific Objective #4 (SO4):** Promoting, also by PCP, innovative actions in the field of Automation Building;
- **Specific Objective #5 (SO5):** Promoting, by PCP, innovative technologies based on IoT for reducing energy consumptions and losses in water networks.

The achievement, by the end of the Plan’s implementation phase, of the listed Specific Objectives, will give a contribution¹ to the *Overall Objective*, in this case called *Strategic Objective*, defined as in the following:

- **Strategic Objective:** Developing the use of PCP to support the processes of transition to a low-carbon economy.

A.3 Expected Impacts

The mainly expected impacts of the Action Plan have been analysed. As known, impacts are defined as the long (generally)-term *effects* and project’s *contribution* to overarching goals. In the following chart, the results of such analysis are reported, also indicating an estimation of the magnitude of each impact in short, medium and long-term perspectives.

Expected impacts	Estimated magnitude (*)		
	Short-term (**)	Medium-term	Long-term
Activation of initiatives and projects aimed at technological innovation undertaken by public bodies (mainly public utilities and large/medium regional municipalities)	++	+++	+++
Increase in the use of geothermal energy and, consequently, reduction of CO ₂ emission from heating plants	+	++	+++
Increase in installation of PV plants and, consequently,	+	++	+++

¹ Please, note that, according to the Logframe Approach, the Overall Objective has *not* to be achieved by the end of the project/plan. It is only expected that the project/plan will give, to a certain extent, a contribution to its achievement.

Expected impacts	Estimated magnitude (*)		
reduction of CO ₂ emissions due to power consumptions			
Increase in efficiency of new PV plants and, consequently, reduction of CO ₂ emissions due to power consumptions	+	++	++
Increase effectiveness of building's energy efficiency projects and, consequently, increasing of energy savings in buildings as well as reducing CO ₂ emissions due to energy consumption (power and heat)	++	+++	+++
Reduction of the running costs for large public buildings	++	++	+++
Reduction of <i>direct</i> energy consumptions in water networks	+	+++	+++
Reduction of <i>indirect</i> energy consumptions due to losses in water networks	+	+++	+++
Improvement of the safety of water networks	+	+++	+++
Improvement of the quality of the water service provided to end-users	+	++	++
Increase job opportunities in the region Basilicata	+	++	++

(*) + weak; ++ medium; +++ high

(**) Short-term: within 30 months after project completion; medium-term: within 5 years after project completion; long-term >5 years after project completion

It is necessary to remark that the chart shows as the impacts become significant in the medium-term, to increase successively in middle-term then in the long-term (after 5 years from the full implementation of the Action Plan). This is because the Action Plan includes three demonstration projects, whose impacts will be produced after such projects are replicated at large scale.

A.4 Local context background

[Please refer also the local context background (on-going process, policies, experiences, etc.)]

In line with the Kyoto protocol and its subsequent updates, the region Basilicata specifically adopts a development approach based on eco-sustainable lines.

In terms of environmental sustainability, Basilicata presents a scenario of light and shade: on the positive side, it is a region where the modest anthropogenic pressure and production allow to have very low emission values, and significant environmental resources to be exploited, in tourism, in agriculture, in forestry, in the production of renewable energy. On the negative side, region Basilicata is characterized by intensive hydrocarbon extraction and other environmental issues linked to waste and wastewater treatment plants not yet resolved.

The Region's effort to contribute to the global CO₂ sequestration goals impregnates all regional planning. In particular:

- Structural Funds, with the OP ERDF found committed on various fronts (energy efficiency of public and private buildings and energy distribution networks, cogeneration and energy trigeneration, separate collection, smart mobility, biodiversity and protection of Natura 2000

areas) and the PSR found on forestation front, defense of farm (with the CAP adopting the greening method for the provision of premiums) and biomass energy;

- Ordinary regional planning, in particular with the establishment of the Regional Agroforestry Agency, as coordinating subject of forestation projects, clean energy and environmental protection, and the redesign of the ARPAB in order to give it greater operational capacity, as a function of contrast to the emissions of the main polluting plants of the Region (Cova, La Fenice, Siderpotenza, etc.).

Using therefore the data of the regional forecast budget, the model provides that the set of regional policies will save an average of 208 Kt of CO₂ per year.

The main contributions will be:

- 68%, from the energy efficiency measures of buildings and the reconfiguration of the energy distribution network;
- for 30%, from interventions for the protection of natural areas, agricultural production and forestation;
- for the remaining 2%, from other interventions (smart mobility, alternative energies, improvement of rail transport, etc.).

Furthermore, the Region, in the role of driving directions to promote and affirm the culture of sustainable construction, has started the definition of tools and rules to achieve new standards of energy efficiency and environmental quality of the local heritage, providing itself, since 2006, the Basilicata Building Synthetic Protocol (energy-environmental assessment system of buildings for residential use), updated with DGR 695/2010 and equipped with application software. This evaluation tool must be updated and compared to the different needs of intended use (schools, hospitals, offices, urban stairs, etc.).

Last but not list, region Basilicata expresses the interest in knowing the PCP policy instrument and, following, in promoting the use of the PCP to support the processes of transition to a low-carbon economy. In particular, since region Basilicata has never used the PCP, the adoption of this policy instrument could present several critical issues:

- arbitrary choice of intervention sectors;
- errors in the setting of the notice and / or deficiency in the accompanying documents;
- local economic sectors that are not particularly receptive;
- contingencies and errors in the management of the tender and / or of the supply during the proceeding;
- lack of experience and specific precedents in the PCP in the strict sense.

A.5 Direct and Indirect Beneficiaries

Regarding the beneficiaries, it is needed to distinguish between *Direct* Beneficiaries, generally called, in the international literature, *Target Groups*, and *Indirect* beneficiaries or *Final Beneficiaries*. The Target Groups are either groups of people or entities who will directly benefit from the action at the action purpose level; the Final Beneficiaries are those who will benefit from the action in the long term at the level of the society or sector at large².

² These definitions of Target Groups and Final Beneficiaries are given on the format adopted by the European Commission for the project proposals

In this Action Plan, the following Target Groups have been identified (see also the chart above):

- Municipalities located in the region Basilicata (directors, officials and technical staff);
- Private companies operating in the geothermal energy exploitation (owners, members of the boards, staff);
- Private companies operating in the fields of renewable energy (PV, with reference to owners, members of the boards, staff);
- Private companies operating in the field of building energy efficiency (owners, members of the boards, staff);
- Private companies operating in the field of smart technologies (owners, members of the boards, staff);
- Private companies operating in the field water management (owners, members of the boards, staff);
- Public research organizations and universities (researchers and professors);
- Other private research organizations (researchers);
- Water utilities (directors, staff).

The Final Beneficiaries (or Indirect Beneficiaries) of the Action Plan are listed the following:

- a) Municipalities that will replicate the technical-operative models defined and validated within the Action Plan implementation;
- b) Families and entities (companies, other organizations, etc.) that will install plants for geothermal exploitation;
- c) Families and entities that will install new PV plants;
- d) Entities (mainly public organizations such as schools, hospitals, etc.) that will replicate the technical model on building automation defined and validated within the Action Plan implementation;
- e) Water network end-users living in those areas where the IoT-based technical-operative model for reducing energy consumption and losses is replicated;
- f) National scientific community in general;
- g) Local communities of the region Basilicata (globally around 574.000 inhabitants) in general.

B. Vision, goals and results

B.1 Structure of the Action Plan

The Basilicata's Action Plan has been articulated on five Specific Objectives (indicated in details at item A.2) in order to contribute to the Strategic Objective. The first OS (OS1) is aimed at Enhancing the capacity of regional Public Administrations (PAs) to implement procedures of Pre-commercial Procurement, so to be the regional Pas, to a certain extent, a driver for innovation in the region in the fields of interests. OS2 (focussed on the exploitation of geothermal energy), OS4 (regarding automation building) and OS5 (concerning the application of the *Internet of Things* to water systems) will be attained by means of the implementation of demonstration projects, aimed at

defining and testing specific technical-operative *models*, suitable to be successively replicated in the regional context at large scale. OS3, focussed on meteorological data, is aimed at supporting operators and users in installing more efficient PV plants.

In order to achieve the OS defined, the following programme of activities has been planned.

B.2 Preparation of tools & support

Activity 1.1.1 - *Predisposition of appropriate tools to facilitate regional PAs in implementing PCP procedures* - is aimed at preparing and providing regional Public Administrations (such as municipalities, public utilities, etc.) with appropriate tools for activating and implementing PCP procedures. To do so, a *Tool Kit* on PCP will be realized. The PCP is still not commonly adopted by PAs (not only in the region Basilicata), so it is believed that the availability of the kit will represent a valid support. The kit will be successively diffused at regional level. **Activity 3.1.1** – *Implementation of demonstration project for meteo data (irradiance, temperature, humidity) to support actions in the PV plants project, and for building energy efficiency* - will be functional to provide operators working in the field of renewable energy with upgraded and exhaustive data to plan and implement PV plants as well to support building energy efficiency in urban areas. **Activity 4.1.1** - *Individuation of the most effective possible innovation in the field of automation building*, is aimed at supporting PAs to activate and implement PCP procedures in the specific field of building automation.

Outputs: a) Tools kit on PCP; 2) Detailed regional meteorological data for planning new PV plants and for building energy efficiency projects; c) Analysis of possible actions using PCP in the field of automation building and related tools for activating the procedures.

B.3 Applied research

Activity 2.1.1 - *Implementation of a technical-economic analysis on the regional potentials of geothermal energy exploitation*. This activity starts from a previous project financed by the Italian Ministry of Economic Development to CNR named VIGOR, which was aimed at promoting the use of geothermal energy in less developed Italian regions (Campania, Puglia, Calabria and Sicily). VIGOR contributed to increase knowledge in exploitation of geothermal resources and use of the geothermal energy sources in the selected regions. The project contributed also to the diffusion of an innovative vision of the geothermal use, highlighting the low- and medium-enthalpy source for direct use, also defining a series of geothermal plant projects. This approach allowed to suggest initiatives aimed at the realization of geothermal use through the activation of different forms of financial support (Interregional Operative Programs POI and Regional Operative Programs POR). During the first part of LOCARBO project, the lesson learnt aims to apply the same methodological approach of VIGOR project to region Basilicata.

Currently, many plants use water at a temperature higher than necessary, because it is easily obtained with gas boilers. The reconversion of the plants to operate at temperatures close to the

actual necessity requires components and products that are still non-existent or niche, therefore very expensive. However, what is not yet economically viable could become so in the long term, thanks to the widespread use of geothermal systems and increasingly efficient plants. Of particular importance is the development of new types of plants able to exploit the medium and low temperature subsoil fluids. In fact, these resources, in the medium to long term, will allow a great boost in technology, since they have a much wider geographical distribution than traditional sites. Research related to geothermal energy in urban environment is currently being carried out at several academic institutions expanding their research program on heat pumps to include thermal energy storage, deep geothermal energy exploitation, and geothermal energy solutions for new markets.

The action, hence, aims to provide analytical information useful to stimulate the use of low- and medium-enthalpy geothermal sources. It will be possible through a precise reconnaissance, analysis and study activities aiming at systematize and expand the knowledge of the regional geothermal potential and the technological prior art analysis in a prospective of future possible exploitation of the geothermal resource on the whole regional territory. The research activity, after expansion and systematization of existing knowledge, will produce the necessary technical and economic feasibility knowledge to stimulate the innovation and diffusion processes into the geothermal energy exploitation field.

Outputs: a) Technical and economic feasibility knowledge on geothermal energy exploitation in the Regional context

B.4 Demonstration projects

Activity 2.3.1 - *Implementation of a demonstration project aimed at geothermal energy exploitation.* CNR

The proposed activity aims at development of a systematic methodology applicable in different regional areas by the final implementation of a demonstration project aimed at geothermal energy exploitation of hot waste water stored in hydrocarbon reservoirs for private or public buildings heating and cooling.

From a strictly energetic point of view, Basilicata plays an important role in the national energy frame and contributes significantly in energy supply from fossil sources (in 2013 the oil and natural gas extracted in the region represented respectively the 72% and 16% of the national production equal to about 5.5% of the Italian requirements). In particular, on the whole regional territory, a total of 487 deep wells are present of which 126 actually operating.

The most important area in the Europe for onshore oil production is the Agri Valley in region Basilicata, where 27 wells in production are connected by 100 km of underground pipelines, that connect them the Agri Valley Oil Centre (COVA) network, in turn the starting point of the pipeline that transports the production directly to the Taranto refinery.

The Agri Valley oil field is characterized by a large amount of co-produced water, which must be reinjected or treated because it could not be directly delivered to the environment. The water

heat recovery could be a quite interesting option while the wells are still producing hydrocarbons. Moreover, when the oil field is depleted the field could be converted into a geothermal reservoir. In conclusion, the project will promote energy efficiency by the requalification of energy production systems on public buildings in region Basilicata and decrease the environmental impact of hydrocarbon extraction. The project will develop a least-cost tool to support both design, operational, and purchase decisions for geothermal exploitation of co-produced hot water stored in hydrocarbon reservoirs, and eventually reconvert an oil field into a geothermal one. Finally, this project will operate, collect data, and market the energy savings and carbon emission decreases thanks to the geothermal energy project to promote the widespread adoption of this new technology.

Output: n.1 demonstration project on a public building implemented, operated and monitored

Activity 4.2.1 - *Implementation of a demonstration project of automation building.* The “A COGnitive dynamic sysTem to allOw buildings to learn and adapt – COGITO” project is focused on the integration of Internet of Things (IoT) with dynamic cognitive systems (SDC) with the aim of improving the management of public and residential buildings with cognitive and self-developed capabilities. The goal of the project is to combine IoT technology, cognitive computing, big data, machine learning and reasoning to help people live and work better in buildings, as well as maintain and manage the building itself by providing it with the capabilities to learn over time how to improve building management by acting in advance by performing programming, monitoring and control actions.

New custom services will be developed that will take into account building occupants, reduce costs through automation and optimization of facilities, and improve end-user satisfaction. The project will develop a Cognitive IoT (CIoT) architecture that will integrate thousands of sensors in buildings and will be able to learn about building behaviours and intuitively assist users in detecting and mitigating undesired events.

Cognitive buildings will be able to analyse the use of space, monitor the comfort of the occupants and generate intelligent building management systems. To this end, a new generation of smart devices will be designed, namely Cognitive Objects, in order to increase the reliability, flexibility and graininess of the data provided. Cognitive Objects are complex objects that will benefit from innovative hardware technologies and advanced cognitive software algorithms. New embedded devices and/or dedicated processors (for example, IBM TrueNorth, NVIDIA Jetson TK1, FPGAs, Raspberry PI 3) will be evaluated to support the execution of cognitive algorithms. The use of such devices will allow the exploitation of a "local" computational power that will permit the processing of data close to data sources in order to create a low-latency fog / mist computing environment.

The buildings, by incorporating cognitive technologies, will increase the value of the offered services by making them more effective, cheaper, safer, faster and more distinctive. The new 5G communication technology, which will be tested for the realization of a demonstrator in the city of Matera, will bring significant performance improvements to support cognitive services in buildings.

Outputs: a) n.1 Demonstrative public building implemented and monitored.

Activity 5.1.1 - *Implementation, through PCP procedures, of a demonstration project for the application of IoT to water networks.* The project has the objective of developing and prototyping a system of automation and optimization of the water distribution network managed by Acquedotto Lucano based on the new frontier of the Internet of Things (IoT - Internet of Things). This innovative system will allow the achievement of significant advantages in terms of energy savings, in terms of reducing grid losses as well as for the general optimization of the available water resource.

The IoT is universally referred to as the future evolution of the use of the web, based on which objects (ie "things") become recognizable and acquire intelligence thanks to the fact of being able to communicate data about themselves and access information aggregated by others; through chips and sensors inserted inside them, objects in general are able to interact with each other and with the surrounding reality. In this way, the physical world can be almost entirely digitalized, monitored and in many cases virtualized.

In the specific case of a water distribution network, the objects (called smart objects) consist of both devices for detecting network data (ie pressure detectors, flow rate, consumption, possibly water levels), and by actuating devices such as valves , lifting pumps with or without inverter, gate valves / gates, etc. It is a system of interconnected elements that can usefully be governed by algorithms based on the so-called *Intelligence of Swarms*, the concept underlying the IoT, in order to transform the entire plant into a smart system, able to self-learn and self-regulating based on direct surveys of the main process variables carried out in real-time.

B.5 Results dissemination/information campaign

Activity 1.1.2 - Implementation of an on/off-line information campaign on PCP, targeted to regional PAs; **Activity 2.1.2** - Analysis results dissemination targeted to regional stakeholders aimed at inform stakeholders on the technical-economic analysis on the regional potentials of geothermal energy exploitation. The main goal is to inform the largest possible audience on the possibility of using geothermal sources for a more cost-effective rehabilitation of existing buildings, optimizing energy consumption and reducing carbon emissions, and divulge the other possible uses of geothermal energy both in various agricultural and industrial processes; **Activity 2.2.1** - Analysis of social acceptability of geothermal energy through a targeted and detailed study case. A promotion activity of the geothermal resource and its uses will be carried out by the administration of Focus group and questionnaire to relevant stakeholders (citizens, PA, professional associations) in order to develop the conscience of the population and develop awareness on the socio-economic and productive fabric of the regional territory for an open market consultation. In this sense, communication (understood as information, dissemination and promotion) has a fundamental role in shaping public opinion, capturing the attention of politicians and starting a virtuous innovation mechanism that takes into consideration the interests of all the stakeholders involved; **Activity 2.3.2** - Dissemination of project results to relevant stakeholders (demonstration project on geothermal exploitation); **Activity 3.1.2** - Demonstration of a demo of

detailed meteo data (irradiance, humidity, temperature) to relevant economic operators and regional PAs; **Activity 4.2.2** - Dissemination of project results to relevant stakeholders (automation building); **Activity 5.1.2** Dissemination of project results to relevant stakeholders (smart water networks).

Outputs: a) Public events, participated by regional PAs and other relevant stakeholders; b) Articles on specialized magazines and local newspapers; c) Report on results of Focus group and questionnaire administered; d) Technical and economic analysis available on the regional web site; e) Site visits at the demonstration project sites; f) Relevant documents available on the regional web site/dedicated pages; g) Data-base available on the regional web site.

B.6 Training

Activity 1.2.1 - Implementation of training activities on PCP, targeted to directors, officials and technicians of regional PAs

Outputs: a) Training courses on PCP in classroom and/or by e-learning;

The following chart provides the overview of the Action Plan's logic as well as the expected results linked with the respective activity/ies and outputs.

Synthetic view of the of the Action Plan

Strategic objective	Developing the use of PCP to support the processes of transition to a low-carbon economy			
Program structure	Description	Actions	Outputs	Results (Outcomes)
Specific Objective 1	Enhancing the capacity of regional Public Administrations (PAs) to implement PCP procedures	1.1.1 Predisposition of appropriate tools to facilitate regional PAs in implementing PCP procedures	<ul style="list-style-type: none"> • Tools kit on PCP 	1.1 Regional PAs informed and equipped with adequate tools for implementing PCP procedures
		1.1.2 Implementation of an on/off-line information campaign on PCP, targeted to regional PAs	<ul style="list-style-type: none"> • Public events, participated by regional Pas, to present and illustrate the Tools kit on PCP • Tools Kit on PCP available on the Regional web site • Tools kit on PCP sent by e-mail to the regional PAs • Webinars 	
		1.2.1 Implementation of training activities on PCP, targeted to directors, officials and technicians of regional Pas	<ul style="list-style-type: none"> • Training courses on PCP in classroom and/or by e-learning 	1.2 Directors, officials and technicians of regional PAs equipped with the knowledge to implement PCP procedures
Specific Objective 2	Promoting, also by PCP, innovation and use of geothermal energy in the regional context	2.1.1 Implementation of a technical-economic analysis on the regional potentials of geothermal energy exploitation	<ul style="list-style-type: none"> • Technical, technological, and economic feasibility knowledge on geothermal energy exploitation in the Regional context 	2.1 Public & private stakeholders informed on the regional opportunities of geothermal energy exploitation in the regional context
		2.1.2 Dissemination of analysis results targeted to regional stakeholders	<ul style="list-style-type: none"> • Articles on specialized magazines and local newspapers • Technical and economic analysis available on request • Public events participated by 	

Strategic objective	Developing the use of PCP to support the processes of transition to a low-carbon economy			
Program structure	Description	Actions	Outputs	Results (Outcomes)
			relevant stakeholders <ul style="list-style-type: none"> • Webinars/face-to-face meeting targeted to technical officials of regional PAs 	
		2.2.1 Analysis of social acceptability of geothermal energy	<ul style="list-style-type: none"> • Report on results of Focus group and questionnaire administered 	2.2 Relevant stakeholder involved with geothermal energy exploitation decisions
		2.3.1 Implementation of a demonstration project aimed at geothermal energy exploitation	<ul style="list-style-type: none"> • n.1 demonstration project on a public building implemented, operated and monitored 	2.3 Replicable, technical-operative model for implementing projects aimed at geothermal energy exploitation, defined, validated and disseminated to relevant stakeholders at regional level
		2.3.2 Dissemination of project results to relevant stakeholders	<ul style="list-style-type: none"> • Public events participated by relevant stakeholders • Articles on specialized magazines and local newspapers • Site visits at the demonstration building • Relevant documents available on the regional web site/dedicated pages 	
Specific Objective 3	Increasing the actions effectiveness in the field of renewable energy, specifically PV as well as of building energy efficiency	3.1.1 Implementation of demonstration project for meteo data (irradiance, temperature, humidity) to support actions in the PV projects, and for building energy efficiency	<ul style="list-style-type: none"> • Detailed regional meteo data (irradiance, humidity, temperature) for planning new PV and for building energy efficiency projects 	3.1 Private citizens, relevant economic operators and regional PAs enabled to planning and implementing more effective projects in the fields of renewable energy (PV) as well as of building energy efficiency
		3.1.2 Demonstration of a demo of the detailed meteo data (irradiance, temperature, humidity)	<ul style="list-style-type: none"> • Demo on web site • Articles on local newspapers 	

Strategic objective	Developing the use of PCP to support the processes of transition to a low-carbon economy			
Program structure	Description	Actions	Outputs	Results (Outcomes)
		to relevant economic operators and regional PAs		
Specific Objective 4	Promoting, also by PCP, innovative actions in the field of <i>Automation Building</i>	4.1.1 Individuation of the most effective possible innovation in the field of automation building	<ul style="list-style-type: none"> • Analysis of possible actions using PCP in the field of automation building and related tools for activating the procedures 	4.1 Officials and technicians of regional PAs supported in implementing PCP in the field of automation buildings
		4.2.1 Implementation of a demonstration project of automation building	<ul style="list-style-type: none"> • n.1 Demonstration public building implemented and monitored 	4.2 Replicable technical-operative model for implementing automation building projects defined, validated and disseminated to relevant stakeholders at regional level
		4.2.2 Dissemination of project results to relevant stakeholders	<ul style="list-style-type: none"> • Public events participated by relevant stakeholders • Articles on specialized magazines and local newspapers • Site visits at the demonstration building • Relevant documents available on the regional web site/dedicated pages 	
Specific Objective 5	Promoting, by PCP, innovative technologies based on IoT for reducing energy consumptions and losses in water networks	5.1.1 Implementation, through PCP procedures, of a demonstration project for the application of IoT to water networks	<ul style="list-style-type: none"> • n.1 Demonstration project on a representative water network implemented and monitored 	5.1 Replicable technical-operative model for reducing energy consumptions and losses in water networks, validated and disseminated to relevant stakeholders at regional level
		5.1.2 Dissemination of project results to relevant stakeholders	<ul style="list-style-type: none"> • Public events participated by relevant stakeholders • Articles on specialized magazines and local newspapers • Site visits at the demonstration project's site 	

Strategic objective	Developing the use of PCP to support the processes of transition to a low-carbon economy			
Program structure	Description	Actions	Outputs	Results (Outcomes)
			<ul style="list-style-type: none"> • Relevant documents available on the regional web site/dedicated pages 	

C. Implementation procedure

[Describe in detail the implementation procedure defining in an operative way activities, and responsibilities]

The region Basilicata AP focus starts from the need of sustainable development, rational use of energy, renewable energies diffusions and reduction of greenhouse gases emissions. Therefore, developing the use of PCP to support the processes of transition to a low-carbon economy is the main direction of the following SOs:

- SO1 – Enhancing the capacity of regional Public Administrations (PAs) to implement PCP procedures;
- SO2 – Promoting, also by PCP, innovation and use of geothermal energy in the regional context;
- SO3 – Increasing the actions effectiveness in the field of renewable energy, specifically PV and small wind-energy, as well as of building energy efficiency;
- SO4 – Promoting, also by PCP, innovative actions in the field of Automation Building;
- SO5 – Promoting, by PCP, innovative technologies based on IoT for reducing energy consumptions and losses in water networks.

As widely described in the previous paragraph, each Specific Objective has been divided into activities which timing is shown in the Gantt chart in the table below. Moreover, the nature of the actions to be implemented, their timeframe, and the players involved are indicated.

Activity type	n. activities	Players involved	Timeframe
Preparation of tools & support	3	Region Basilicata, CNR, Research Organizations, private sector, Water utilities	12 months (first year)
Applied research	1	CNR, Research Organizations	12 months (first year)
Demonstration project	3	Region Basilicata, Municipalities, CNR, Research Organizations, private sector	24 months
Results dissemination/information campaign	7	Region Basilicata, Municipalities, CNR, Research Organizations, private sector	12 months (second year)
Training	1	Region Basilicata, Municipalities, CNR, Research Organizations, private sector	12 months (second year)

C.1 Stakeholder identification and responsibilities

The implementation of the Action Plan will involve the following main stakeholders, with the respective responsibilities, also indicated below.

Stakeholder	Brief description	Main responsibility/role in the AP implementation
Region Basilicata	Government of the region and management of the European Funds	<ul style="list-style-type: none"> • General coordination & monitoring of the Action Plan within the LOCARBO Project • Allocation of the most of the funds for implementing projects and training activities • Preparation of Tools on PCP procedures • Funding the implementation of PCP procedures for some demonstration projects included in the Action Plan • Implementation of results dissemination activities within LOCARBO
CNR – National Council of Research	Region Basilicata’s consultant. CNR is the governmental organization for carrying out research in Italy	<ul style="list-style-type: none"> • Technical support for the implementation of the Action Plan • Partner of the demonstration project on automation building (see below – the project has been already funded by another national programme) included in the Action Plan
Municipalities located in the region Basilicata	Local territorial governments. N. 131 municipalities are located in the region that will be potentially involved in the Action Plan	<ul style="list-style-type: none"> • Targets of PCP tools and training activities related to PCP procedures • Targets of PCP knowledge and tools for building automation • Targets of results dissemination • Application of the knowledge produced in the activities related to Specific Objective 2 • Replication of the technical-operative models produced within LOCARBO
Private sector, specifically professional association and companies operating in the geothermal energy exploitation	Private companies, mainly SMEs, either located or operating in region Basilicata, that offer consultancy, maintenance services and/or construction of geothermal energy plants	<ul style="list-style-type: none"> • Targets of training activities • Targets of results dissemination • Application of the know-how and knowledge produced in the demonstration project on geothermal energy exploitation
Research organizations	Other departments of CNR (different from those directly involved in LOCARBO), ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development), universities and other private research centres operating in	<ul style="list-style-type: none"> • Possible scientific support for PCP procedures • Possible participation to PCP procedures in partnership with the private sector • Possible scientific support for demonstration project implementation

Stakeholder	Brief description	Main responsibility/role in the AP implementation
	the fields of geothermal energy, smart technologies, renewable energy (PV), automation building and water sector	<ul style="list-style-type: none"> • Targets for results dissemination • Possible support for training activities
Private sector, specifically professional association and companies operating in the fields of renewable energy (PV) and Energy efficiency	Private companies, mainly SMEs, either located or operating in region Basilicata, that offer consultancy, maintenance services and/or construction of PV plants. Companies operating in building energy efficiency	<ul style="list-style-type: none"> • Targets of results dissemination • Application of the knowledge produced in the activities related to Specific Objective
Private sector, specifically professional association and companies operating in the field of smart technologies	Private companies, mainly SMEs, either located or operating in region Basilicata, that offer consultancy, maintenance services and/or construction of automation building systems	<ul style="list-style-type: none"> • Targets of results dissemination • Application of the know-how and knowledge produced in the demonstration project on automation building
Water utilities	Water utilities operating in the region that provide O&M services of water networks	<ul style="list-style-type: none"> • Targets of results dissemination • Replication of the technical-operative model for reducing energy consumptions and losses in water networks
Private sector, specifically professional association and companies operating in the field water management	Private companies, including SMEs, either located or operating in region Basilicata, that offer consultancy, O&M services and/or construction of water networks/systems	<ul style="list-style-type: none"> • Target of result dissemination • Participation to possible public tenders for replicating the technical-operative model for reducing energy consumptions and losses in water networks

GANTT of the implementation phase

Activity	First year				Second year			
	I	II	III	IV	I	II	III	IV
1.1.1 Predisposition of appropriate tools to facilitate regional PAs in implementing PCP procedures	■	■	■	■				
1.1.2 Implementation of an on/off-line information campaign on PCP, targeted to regional PAs					■	■		
1.2.1 Implementation of training activities on PCP, targeted to directors, officials and technicians of regional PAs					■	■	■	■
2.1.1 Implementation of a technical-economic analysis on the regional potentials of geothermal energy exploitation	■	■	■	■				
2.1.2 Analysis results dissemination targeted to regional stakeholders					■	■		
2.2.1 Analysis of social acceptability of geothermal energy			■	■				
2.3.1 Implementation of a demonstration project aimed at geothermal energy exploitation	■	■	■	■	■	■	■	■
2.3.2 Dissemination of project results to relevant stakeholders							■	■
3.1.1 Implementation of demonstration project for meteo data (irradiance, temperature, humidity) to support actions in the PV projects, and for building energy efficiency	■	■	■	■	■			
3.1.2 Demonstration of a demo of the detailed meteo data (irradiance, temperature, humidity) to relevant economic operators and regional PAs						■	■	■
4.1.1 Individuation of the most effective possible innovation in the field of automation building	■	■						

Activity	First year				Second year			
	I	II	III	IV	I	II	III	IV
4.2.1 Implementation of a demonstration project of automation building								
4.2.2 Dissemination of project results to relevant stakeholders								
5.1.1 Implementation, through PCP procedures, of a demonstration project for the application of IoT to water networks								
5.1.2 Dissemination of project results to relevant stakeholders								

D. INPUTS analysis

[For each activity, please identify the INPUTS resources and define whether you consider internal or external resources.]

All the activities rely on the collaboration with local stakeholders that is evident from the following table:

Program structure	Description	Actions	Internal Resources	External Resources/Stakeholders	Estimated costs (Euro)	Funding sources
Specific Objective 1	Enhancing the capacity of regional Public Administrations (PAs) to implement PCP procedures	1.1.1 Predisposition of appropriate tools to facilitate regional PAs in implementing PCP procedures	Basilicata Region's internal staff and means	CURSA and Other Research Organization	€ 200,000	ERDF – Specific funds already budgeted for PCP initiatives
		1.1.2 Implementation of an on/off-line information campaign on PCP, targeted to regional PAs				
		1.2.1 Implementation of training activities on PCP, targeted to directors, officials and technicians of regional Pas				
Specific Objective 2	Promoting, also by PCP, innovation and use of geothermal energy in the regional context	2.1.1 Implementation of a technical-economic analysis on the regional potentials of geothermal energy exploitation	Basilicata Region's internal staff and means	CNR and Other Research Organization	200,000	ERDF and/or other regional funds, EU project funds, national funds
		2.1.2 Dissemination of			20,000	Region Basilicata

Program structure	Description	Actions	Internal Resources	External Resources/Stakeholders	Estimated costs (Euro)	Funding sources
		analysis results targeted to regional stakeholders				and stakeholders internal resources
		2.2.1 Analysis of social acceptability of geothermal energy			50,000	ERDF and/or other regional funds, EU project funds, national funds
		2.3.1 Implementation of a demonstration project aimed at geothermal energy exploitation			300,000	ERDF and/or other regional funds, EU project funds, national funds, stakeholders resources
		2.3.2 Dissemination of project results to relevant stakeholders			20,000	Region Basilicata and stakeholders internal resources
Specific Objective 3	Increasing the actions effectiveness in the field of renewable energy, specifically PV, as well as of building energy efficiency	3.1.1 Implementation of demonstration project for meteo data (irradiance, temperature, humidity) to support actions in the PV projects, and for building energy efficiency	Basilicata Region's internal staff and means	CNR and Other Research Organization	20,000	ERDF and/or other regional funds, EU project funds, national funds
		3.1.2 Demonstration of a demo of the detailed meteo data (irradiance, temperature, humidity) to relevant economic operators and regional PAs			30,000	

Program structure	Description	Actions	Internal Resources	External Resources/Stakeholders	Estimated costs (Euro)	Funding sources
Specific Objective 4	Promoting, also by PCP, innovative actions in the field of <i>Automation Building</i>	4.1.1 Individuation of the most effective possible innovation in the field of automation building	Basilicata Region's internal staff and means	CURSA and Other Research Organization	35,000	ERDF and/or other regional funds, Cogito project national funds
		4.2.1 Implementation of a demonstration project of automation building			1,400,000	ERDF and/or other regional funds, Cogito project national funds
		4.2.2 Dissemination of project results to relevant stakeholders			40,000	Region Basilicata and stakeholders internal resources
Specific Objective 5	Promoting, by PCP, innovative technologies based on IoT for reducing energy consumptions and losses in water networks	5.1.1 Implementation, through PCP procedures, of a demonstration project for the application of IoT to water networks	Basilicata Region's internal staff and means	CURSA and Other Research Organization	2,600,000	ERDF – Specific funds already budgeted for PCP initiatives
		5.1.2 Dissemination of project results to relevant stakeholders			40,000	Region Basilicata and stakeholders internal resources

E. Indicators and sources of verification

As requested, in the following charts the expected shares of indicators, set by the LOCARBO Project, are reported.

RESULT INDICATORS		
Indicator	Set in LOCARBO	Expected share produced by the AP
No. of Growth & Jobs or ETC programs addressed by the project where measures inspired by the project will be implemented 100% of policy instruments addressed with structural funds link	5	---
No. of other policy instruments addressed by the project where measures inspired by the project will be implemented 100% of policy instruments addressed without structural funds link	2	---
Estimated amount of Structural Funds (from Growth & Jobs and/ or ETC) influenced by the project (in EUR)	92,957,776	8,000,000
Estimated amount of other funds influenced (in EUR)	8,500,000	1,000,000

POLICIES (SELF-DEFINED PERFORMANCE INDICATOR)		
Indicator	Set in LOCARBO	Expected share produced by the AP
Number of Stakeholders (SMEs, research institutions, etc.) directly involved in LOCARBO informed on the Pre-Commercial Procurements instrument for realizing innovative energy efficiency solutions ³	20	20

OUTPUT INDICATORS		
Indicator	Set in LOCARBO	Expected share produced by the AP
No. of policy learning events organized	71	10
No. of good practices identified	21	3
No. of people with increased professional capacity due to their participation in interregional cooperation activities	518	80
No. of action plans developed	7	1
No. of appearances in media (e.g. press)	60	8
No. of new visitors to project website since last reporting period	60	20

³ This indicator has been changed. The previous one was: *Electricity consumption of private enterprises in the tertiary sector (excluding public administration) in GWh: target value 7*

As recommended by the EC Project Cycle Management Guidelines⁴, once the project description and assumptions have been drafted (see below, at item F), it is necessary to identify indicators that might be used to measure and report on the achievement of objectives, as well as their respective sources information.

Objectively, Verifiable Indicators (OVI) describe the project’s objectives in operationally measurable terms (quantity, quality, time, etc.). Specifying OVIs helps to check the feasibility of objectives and helps form the basis of the project’s monitoring and evaluation system. They are formulated in response to the question “How would we know whether or not what has been planned is actually happening or happened? How do we verify success?” OVIs should be measurable in a consistent way and at an acceptable cost. A good OVI should also be SMART, which means:

- **Specific** to the objective it is supposed to measure
- **Measurable** (either quantitatively or qualitatively)
- **Available** at an acceptable cost
- **Relevant** to the information needs of managers
- **Time-bound** – so we know when we can expect the objective/target to be achieved

In addition, Indicators should be independent of each other, each one relating to only one objective in the Intervention Logic, i.e. to either the Overall Objective, the Project Purpose or to one Result. For example, indicators at the level of a Result should not be a summary of what has been stated at the Activity level, but should describe the measurable consequence of activity implementation. It is often necessary to establish more than one indicator for each objective statement. For example one indicator may provide good quantitative information, which needs to be complemented by another indicator focused on qualitative matters (such as the opinions of target groups). At the same time, the trap of including too many indicators should be avoided. The guiding principle should be to collect the minimum amount of information required to help project managers and evaluators determine whether objectives are being/have been achieved. The meaning of an Objectively Verifiable indicator is that the information collected should be the same if collected by different people (i.e it is not open to the subjective opinion/bias of one person). This is more easily done for quantitative measures than for those that aim at measuring qualitative change.

Adopting the general principles reminded above, the Indicators reported in the following chart have been defined for the Basilicata’s Action Plan.

Program structure	Indicators	Source of verification
Specific Objective 1	IO1 – Number of regional PAs enabled to implement PCP procedures (at the end of the project)	Cross analysis of data from: <ul style="list-style-type: none"> • registers of training courses on PCP • register of public events to present the tool kit on PCP • Download of the tool kit from the

⁴ See *Project Cycle Management Guidelines* at the EC web site for further information.

Program structure	Indicators	Source of verification
		regional web site
Specific Objective 2	IO2 – Number of professional association operating in the Region Basilicata offering the service of design & installation of geothermal plants (at the end of the project)	Market research on the web
Specific Objective 3	IO3 – Number of professional association enabled to use the demo on meteo data for PV plants installation in the Basilicata territory	GSE (National Authority for the Management of Electric Services) data on grid connections
Specific Objective 4	IO4 – Number of initiatives activated by regional PAs in the field of automation buildings by the end of the project	Official Registers of formal decisions adopted by regional PAs
Specific Objective 5	IO5 - Number of initiatives activated by regional water utilities and municipalities for the application of IoT to water networks by the end of the project	Official Registers of formal decisions adopted by regional water utilities and municipalities
Result 1.1	IR1.1 – Number of regional PAs globally participating to the planned public events for presenting the PCP tool kit	Registers of public events
Result 1.2	IR1.2 – Number of Directors, officials and technicians of regional PAs participating to the planned training courses on PCP	Registers of training courses
Result 2.1	IR2.1 – Number of stakeholders participating to the planned public events on geothermal energy exploitation	Registers of public events
Result 2.2	IR2.2 – Number of relevant stakeholder involved with geothermal energy exploitation decisions	Registers of Focus Groups and questionnaires
Result 2.3	IR2.3 – Number of stakeholders participating to the relevant planned events	Registers of public events
Result 3.1	IR3.1 – Number of accesses to the web demo on regional meteo data	Web site of the Region Basilicata
Result 4.1	IR4.1 – Release of the final draft of the analysis implemented in activity 4.1.1	Web site of the Region Basilicata
Result 4.2	IR4.2 - Number of stakeholders participating to the relevant planned events	Registers of public events
Result 5.1	IR5.1 - Number of stakeholders participating to the relevant planned events	Registers of public events

F. External conditions assessment

Assumptions are external factors (or conditions) that have the potential to influence (or even determine) the success of a project/action, but lie outside the direct control of project managers. They are the answer to the question: “What external factors may impact on project implementation and the long-term sustainability of benefits, but are outside project management’s control?” The assumptions are part of the vertical logic in the Logframe matrix. This works as follows:

- once the Activities have been carried out, and if the Assumptions at this level hold true, results will be achieved;
- once these Results and the Assumptions at this level are fulfilled, the Specific Objectives will be achieved;
- once the Specific Objectives have been achieved and the Assumptions at this level are fulfilled, contribution to the achievement of the Overall Objectives will have been made by the project.

In the case of the Action Plan of region Basilicata, the following external factors - that have to be verified - have been identified:

A) At Strategic Objective level (assumptions that have to be verified in order to allow Strategic Objective to give their contribution to the AP):

- EE Regional PAs are inclined to introduce a new policy instrument that has never been used before

B) At Specific Objectives level (assumptions that have to be verified in order to allow Specific Objectives to give their contribution to the General Objective):

- EE 1 Regional PAs have resources to undertake projects by means of PCP procedures
- EE 2 Regional PAs have availability of suitable sites to develop projects for exploiting geothermal energy
- EE 3 Regional PAs and other operators have availability of suitable sites to develop projects for exploiting PV
- EE 4 Regional PAs have resources to develop and implement automation building projects
- EE 5 Regional PAs have resources to develop and implement IoT for optimizing water networks

C) At Results level (assumptions that have to be verified in order to allow the plan’s results (or Plan’s Outcomes) to achieve the Specific Objectives:

- EE 1.1 Regional PAs are willing to use the tools made available
- EE 1.2 Directors, officials and technicians of regional PAs are able to work in team and their organizations are quite well structured

- EE 2.1 The stakeholders are interested in the specific field
- EE 2.2 Relevant economic operators have will/believe profitable moving to such field of activity
- EE 2.3 Relevant stakeholder adopt the new technical-operative model for planning and implementing their actions in the field of geothermal energy exploitation
- EE 3.1 Actions are planned & designed by well-skilled, specialized personnel
- EE 4.1 PAs have the necessary resources to implement the actions
- EE 4.2 Relevant stakeholder adopt the new technical-operative model for planning and implementing their actions in the field of automation building
- EE 5.1 Relevant stakeholder (water utilities and municipalities) adopt the new technical-operative model for reducing energy consumptions and losses in water networks

D) At Activities level (assumptions that have to be verified in order to allow activities - and their respective outputs - to produce the results):

- EE 1.1.1 Regional PAs are open to accept external support and trust in the regional administration
- EE 1.1.2 Regional PAs get involved in the information campaign due to their interest in PCP
- EE 1.2.1 Directors, officials and technicians of regional PAs participate to the training courses
- EE 2.1.1 The analysis results encourage to move on in such field
- EE 2.1.2 Relevant stakeholders get involved in the dissemination campaign due to their interest in the specific matter
- EE 2.2.1 Relevant economic operators participate to geothermal energy exploitation decisions
- EE 2.3.1 All the actors directly involved in the demonstration projects cooperate properly
- EE 2.3.2 Relevant stakeholders get involved in the dissemination campaign due to their interest in the specific matter (read articles, attend site-visits and public events, etc.)
- EE 3.1.1 Owners of the data of interest available to cooperate
- EE 3.1.2 Relevant economic operators and regional PAs get involved in the dissemination activities due to their interest in the specific matter (attend the public events, read the articles, etc.)
- EE 4.1.1 Sources of data & information needed for the analysis available of cooperate
- EE 4.2.1 All the actors directly involved in the demonstration projects cooperate properly
- EE 4.2.2 Relevant stakeholders get involved in the dissemination campaign due to their interest in the specific matter (read articles, attend site-visits and public events, etc.)
- EE 5.1.1 All the actors directly involved in the demonstration projects cooperate properly
- EE 5.1.2 Relevant stakeholders get involved in the dissemination campaign due to their interest in the specific matter (read articles, attend site-visits and public events, etc.)

The following chart provides the synthesis of the analysis.

Synthesis of the external conditions/assumption analysis

Program structure	Description	External conditions/assumptions
Strategic objective	Developing the use of PCP to support the processes of transition to a low-carbon economy	EE Regional Pas are inclined to introduce a new policy instrument that has never been used before
Specific Objective 1	Enhancing the capacity of regional Public Administrations (PAs) to implement PCP procedures	EE 1 Regional PAs have resources to undertake projects by means of PCP procedures
Specific Objective 2	Promoting, also by PCP, innovation and use of geothermal energy in the regional context	EE 2 Regional PAs have availability of suitable sites to develop projects for exploiting geothermal energy
Specific Objective 3	Increasing the actions effectiveness in the field of renewable energy, specifically PV, as well as of building energy efficiency	EE 2 Regional PAs and other operators have availability of suitable sites to develop projects for exploiting PV
Specific Objective 4	Promoting, also by PCP, innovative actions in the field of <i>Automation Building</i>	EE 4 Regional PAs have resources to develop and implement automation building projects
Specific Objective 5	Promoting, by PCP, innovative technologies based on IoT for reducing energy consumptions and losses in water networks	EE 5 Regional PAs have resources to develop and implement IoT for optimizing water networks
Result 1.1	1.1 Regional PAs informed and equipped with adequate tools for implementing PCP procedures	EE 1.1 Regional PAs are willing to use the tools made available
Result 1.2	1.2 Directors, officials and technicians of regional PAs equipped with the knowledge to implement PCP procedures	EE 1.2 Directors, officials and technicians of regional PAs are able to work in team and their organizations are quite well structured
Result 2.1	2.1 Public & private stakeholders informed on the regional opportunities of geothermal energy exploitation in the regional context	EE 2.1 The stakeholders are interested in the specific field
Result 2.2	2.2 Relevant stakeholder involved with geothermal energy exploitation decisions	EE 2.2 Relevant economic operators have will/believe profitable moving to such field of activity
Result 2.3	2.3 Replicable, technical-operative model for implementing projects aimed at geothermal energy exploitation, defined, validated and disseminated to relevant stakeholders at regional level	EE 2.3 Relevant stakeholder adopt the new technical-operative model for planning and implementing their actions in the field of geothermal energy exploitation

Program structure	Description	External conditions/assumptions
Result 3.1	3.1 Private citizens, relevant economic operators and regional PAs enabled to planning and implementing more effective projects in the fields of renewable energy (PV) as well as of building energy efficiency	EE 3.1 Actions are planned & designed by well-skilled, specialized personnel
Result 4.1	4.1 Officials and technicians of regional PAs supported in implementing PCP in the field of automation buildings	EE 4.1 PAs have the necessary resources to implement the actions
Result 4.2	4.2 Replicable technical-operative model for implementing automation building projects defined, validated and disseminated to relevant stakeholders at regional level	EE 4.2 Relevant stakeholder adopt the new technical-operative model for planning and implementing their actions in the field of automation building
Result 5.1	5.1 Replicable technical-operative model for reducing energy consumptions and losses in water networks, validated and disseminated to relevant stakeholders at regional level	EE 5.1 Relevant stakeholder (water utilities and municipalities) adopt the new technical-operative model for reducing energy consumptions and losses in water networks
Activity 1.1.1	1.1.1 Predisposition of appropriate tools to facilitate regional PAs in implementing PCP procedures	EE 1.1.1 Regional PAs are open to accept external support and trust in the regional administration
Activity 1.1.2	1.1.2 Implementation of an on/off-line information campaign on PCP, targeted to regional PAs	EE 1.1.2 Regional PAs get involved in the information campaign due to their interest in PCP
Activity 1.2.1	1.2.1 Implementation of training activities on PCP, targeted to directors, officials and technicians of regional PAs	EE 1.2.1 Directors, officials and technicians of regional PAs participate to the training courses
Activity 2.1.1	2.1.1 Implementation of a technical-economic analysis on the regional potentials of geothermal energy exploitation	EE 2.1.1 The analysis results encourage to move on in such field
Activity 2.1.2	2.1.2 Dissemination of analysis results targeted to regional stakeholders	EE 2.1.2 Relevant stakeholders get involved in the dissemination campaign due to their interest in the specific matter
Activity 2.2.1	2.2.1 Analysis of social acceptability of geothermal energy	EE 2.2.1 All the actors participate to geothermal energy exploitation decisions
Activity 2.3.1	2.3.1 Implementation of a demonstration project aimed at geothermal energy exploitation	EE 2.3.1 All the actors directly involved in the demonstration projects cooperate properly
Activity 2.3.2	2.3.2 Dissemination of project results to relevant stakeholders	EE 2.3.2 Relevant stakeholders get involved in the dissemination

Program structure	Description	External conditions/assumptions
		campaign due to their interest in the specific matter (read articles, attend site-visits and public events, etc.)
Activity 3.1.1	3.1.1 Implementation of demonstration project for meteo data (irradiance, temperature, humidity) to support actions in the PV projects, and for building energy efficiency	EE 3.1.1 Owners of the data of interest available to cooperate
Activity 3.1.2	3.1.2 Diffusion/Demonstration of a demo of the detailed meteo data (irradiance, temperature, humidity) to relevant economic operators and regional PAs	EE 3.1.2 Relevant economic operators and regional PAs get involved in the dissemination activities due to their interest in the specific matter (attend the public events, read the articles, etc.)
Activity 4.1.1	4.1.1 Individuation of the most effective possible innovation in the field of automation building	EE 4.1.1 Sources of data & information needed for the analysis available of cooperate
Activity 4.2.1	4.2.1 Implementation of a demonstration project of automation building	EE 4.2.1 All the actors directly involved in the demonstration projects cooperate properly
Activity 4.2.2	4.2.2 Dissemination of project results to relevant stakeholders	EE 4.2.2 Relevant stakeholders get involved in the dissemination campaign due to their interest in the specific matter (read articles, attend site-visits and public events, etc.)
Activity 5.1.1	5.1.1 Implementation, through PCP procedures, of a demonstration project for the application of IoT to water networks	EE 5.1.1 All the actors directly involved in the demonstration projects cooperate properly
Activity 5.2.2	5.1.2 Dissemination of project results to relevant stakeholders	EE 5.1.2 Relevant stakeholders get involved in the dissemination campaign due to their interest in the specific matter (read articles, attend site-visits and public events, etc.)