TECHNICAL UNIVERSITY OF CRETE (TUC)
SCHOOL OF ENVIRONMENTAL ENGINEERING
RENEWABLE AND SUSTAINABLE ENERGY
SYSTEMS LABORATORY

Interreg Mediterranean COMPOSE

Project co-financed by the European Regional Development Fund

WP3: Testing, Activity 3.2

Integrating existing methods, techniques and approaches towards common methodology for demonstration projects

Definition of COMPOSE Common Indicators

Working Document, Feb 2017

European Union
European Regional Development Fund

WP3 (TESTING) LEADER
Technical University of Crete, School of Environmental Engineering, Renewable and Sustainable Energy Systems Lab (TUC ReSEL)

ANNEX TO DELIVERABLE 3.3.1 – SUPPORTING DOCUMENT: DEFINITION OF COMPOSE COMMON INDICATORS
FINAL VERSION, JUNE 2017

AUTHORS: Nikolaos Savvakis, Theocharis Tsoutsos, Afroditi Fotiou (TUC ReSEL)
CONTRIBUTORS: KGZS MB, ISKRIVA

Interreg Mediterranean COMPOSE
Project co-financed by the European Regional Development Fund

Table of Contents

1. INTRODUCTION

COMPOSE builds on existing experience and know-how of MED/EU funded projects, existing initiatives and best practices, aiming to provide a holistic approach for RES planning models that will enhance the increase of RES in the regional/local energy mix through the development of sustainable energy supply chains and the empowerment of local businesses.

COMPOSE will thus contribute to an increased capacity for sustainable RES projects development at the decision-making and planning levels and will promote new business models and technology developments aspiring to compose green economy by exploiting the local potential. At principle, the project addresses the knowledge, sectorial policies and financial instruments required to encourage sustainable use of local natural resources and green investments.

Work Package 3 focuses on the development, monitoring and evaluation of 15 pilot demonstration actions that will be implemented in 11 Mediterranean countries (Slovenia, Cyprus, France, Greece, Italy, Portugal, Spain, Croatia, Albania, Bosnia & Herzegovina, Montenegro). It seeks to assess existing methods, techniques and tools dealing with the integration of RES and energy efficiency projects in the local development strategies, towards a common methodology for planning that will take into account not only technical but also socioeconomic aspects. The methodology, adapted to the identified pilot projects and local specifications, will serve as a basis for the preparation of individual implementation plans and will be tested on the field. The development of the 15 pilot demonstration actions will help to fine-tune the COMPOSE methodology and will enable the transfer of know-how to planning experts and decision makers.

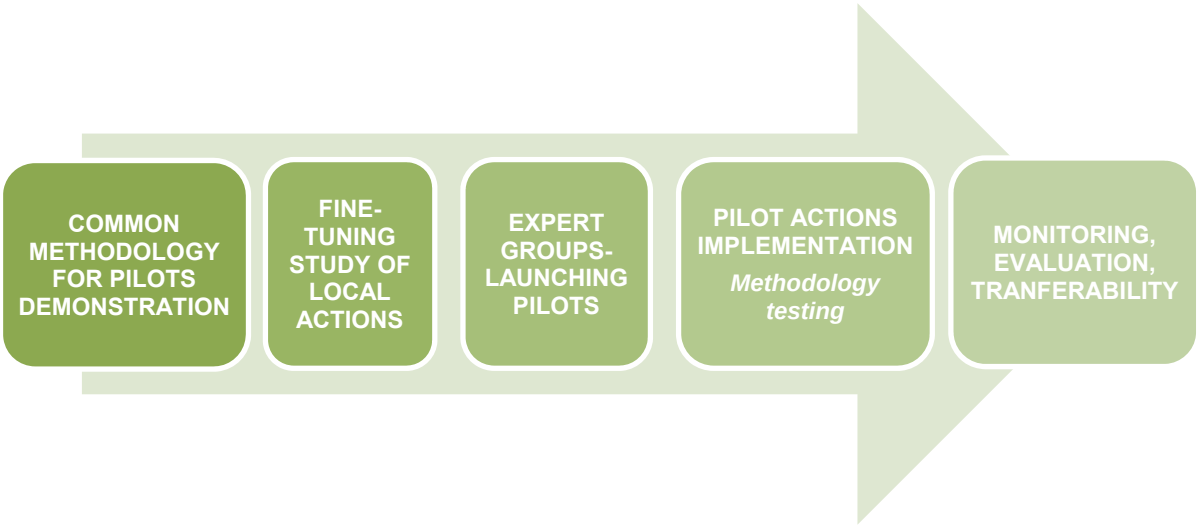

FIG.1: WP3 development steps

This document aims to define the COMPOSE common indicators that may be utilized to measure the pilot actions' progress and impact on communities, to ensure data uniformity and to assist the data collection providing a common understanding of the indicators definition and monitoring aspects.

The COMPOSE common Indicators set supports shaping the proposed pilot actions demonstration and evaluation by identifying a starting point for the Testing processes and by establishing COMPOSE pilot actions' monitoring and evaluation framework.

Thus the purpose of this document is three fold;

- To provide guidance on how to measure the pilot actions' progress and impact on communities.
- To provide a concise, birds-eye view of the COMPOSE project's methodology functionality.
- To elaborate on specific value-adding aspects of COMPOSE that are highlighted in the project and have received some strong attention in the COMPOSE approach; such the development of local value added chains, the communities behaviour change and its relevance to energy management, etc.

Overall this guide will serve as a basis for the following activities of WP3 (Testing):

- 3.2 Integrating existing methods, techniques, tools and approaches towards a common methodology for demonstration.
- 3.3 Preparing individual pilot implementation plans, by setting the pilot actions baseline.
- 3.6 Evaluation of pilot action implementation, by formulated common indicators, to evaluate the impact and transferability potential of actions.

COMPOSE Pilot Actions Overview			
Pilot actions theme	**Country**	**Priority area of intervention**	**RES involved**
3.7 Renewables connecting municipalities through their joint local potential	Slovenia	• **Local business models** • Awareness/ Behavioural change/ Social acceptance on RES	Biomass
3.8 Energy savings and renewable invest potential in public buildings of Lakatamia Municipality	Cyprus	• **IT/ Web tools/ Monitoring management systems** • Awareness/ Behavioural change/ Social acceptance	PV
3.9 From energy savings to RES investments	France	• **Local business models** • Awareness/ Behavioural change/ Social acceptance on RES	PV
3.10 Awareness campaign to foster social acceptance and local investments of small-scale RES	Greece	• **Awareness/ Behavioural change/ Social acceptance** • IT/ Web tools/ Monitoring management systems	PV/WIND Biomass
3.11Biomass potential in rural island communities (Case of Anogia – Crete)	Greece	• **Awareness/ Behavioural change/ Social acceptance** • Small scale RES demonstration	Biomass
3.12 From UCO to biodiesel	Greece	• **Local business models** • Small scale RES demonstration	Biofuels
3.13 Greening Capalbio energy	Italy	• **Small scale RES demonstration** • IT/ Web tools/ Monitoring management systems	PV
3.14 Energy upgrading in historical rural municipalities	Italy	• **IT/ Web tools/ Monitoring management systems** • Awareness/ Behavioural change/ Social acceptance	PV
3.15 RES in rural environments - Sesimba	Portugal	• **Empowering local authorities/ communities for innovative development of local potentials** • Small scale RES demonstration	Biomass
3.16 RES in rural environments - Biovilla	Portugal	• **Empowering local authorities/ communities for innovative development of local potentials** • Small scale RES demonstration	Solar Biomass
3.17 From EE measures to RES investments	Spain	• **Small scale RES demonstration** • Awareness/ Behavioural change/ Social acceptance	Biomass Solar Wind
3.18 Koprivnica Krizevci County RES investment potential – Development of Energy Investment Plan	Croatia	• **Local business models (financial models development)** • Empowering local authorities/ communities for innovative development of local potentials	
3.19 Fostering RES awareness through School Programmes – The promotion of systems using biomass as a fuel in School Programmes	Albania	• **Awareness/ Behavioural change/ Social acceptance** • Empowering local authorities/ communities for innovative development of local potentials	Biomass
3.20 RES for Municipality development - Preparation of heating plant reconstruction project in order to exploit the potential of biomass in our area	Bosnia & Herzegovina	• **Local business models** • Empowering local authorities/ communities for innovative development of local potentials	Biomass
3.21 RES in small urban-rural communities – KRNOVO WIND FARM IMPACT (KWFI)	Montenegro	• **Awareness/ Behavioural change/ Social acceptance** • Empowering local authorities/ communities for innovative development of local potentials	Wind

2. PILOT ACTIONS IMPACT EVALUATION

2.1. GLOSSARY AND DEFINITION

2.1.1. What is a strategic objective and what is a quantified target?

A strategic objective is an objective at higher, more long-term level, while a quantified target is a more specific objective that you want to address at measure level. As far as possible, each measure should have its own quantified targets.

Example:
Strategic objective (region/city/WP level): Ensuring a cleaner and healthier environment
Quantified target (measure level): reduction of 5% of GHG emissions each year

Strategic objective (region/city /WP level): Energy Efficiency in public buildings
Quantified target (measure level): reduction of 10% of total energy consumption

2.1.2. What is the difference between output and impact?

The output is the direct product of the project's activities while the impact can be understood as a contribution to problem-solving or goal attainment resulting from a pilot actions' implementation.

Example:
Output: Construction of a small-scale biodiesel production unit.
Impact: 5% decrease of improper disposal of Used Cooking Oil (UCO), 3.000 L/y of locally produced biodiesel and 7% reduction of the energy consumption of wastewater treatment.

Output: 40 educational events in schools
Impact: 8% UCO recycling increase

2.1.3. What is an indicator?

Then, it is of crucial importance to decide how to measure the expected impacts of pilot actions implementation. The indicator is our most important tool to achieve this objective.

The issue of whether, where and when the indicators should be measured is a critical one as it strongly affects the uniformity and the understanding of the evaluation results. These may vary with the measurement scale, sampling, unit, time of day, etc.

2.1.4. Why do we use indicators?

Indicators are quantitative or qualitative factors or variables providing means to measure achievement, to reflect changes, or to help assess performance or compliance, and - when observed periodically - demonstrate trends. Indicators should convey a single meaningful message (information). Indicators have to be judged on the scale of acceptable standards of performance. Closely related indicators are verifiers which provide specific details that would indicate or reflect the desired condition of an indicator. They are the data that enhances the specificity or the ease of assessment of an indicator, adding meaning, precision and usually also ***site-specificity.***

2.1.5. What is monitoring?

Monitoring refers to the continuous or frequent measurement and observation on specified indicators, often used for warning and control.

The COMPOSE common indicators are classified into the following categories:

1. **Environment**
2. **Energy**
3. **Social Capital**
4. **Economy**

3. LIST OF COMPOSE COMMON INDICATORS

CATEGORY	SUBCATEGORY	INDICATOR	DETERMINATION (MEASUREMENT UNITS)
ENVIRONMENT	Environmental Quality	Greenhouse gas	Tonnes of CO_2-equivalent
		Air pollution	$\mu g/m^3$ (concentration)
		Noise pollution	Number of people in the area exposed to noise levels above L_{den} (55 db)
		Waste to Energy	Mtoe
ENERGY	Natural resources and energy	RES from local resources in the energy mix	%
		Electricity generated from RES	kWh/y or Mtoe/y
		Thermal energy generated from RES	kWh/y or Mtoe/y
		Bioenergy Supply Chain e.g. Biofuels production in L (optional)	L or kWh or Mtoe
		Fossil fuels saved	Mtoe
		Export of energy from local resources	kWh/y or Mtoe/y
	Energy Consumption	Primary energy consumption	kWh/y or Mtoe/y
		Final energy consumption (by sector)	kWh/y or Mtoe/y
		Energy saved through the adoption of EE measures (per segment-optional)	kWh/y or Mtoe/y
ECONOMY	Local Economy and Policies	% of GDP of direct investment in green energy	% of GDP
		RES Investment triggered	Amount in euros
		Contribution to rural economy (optional)	Amount in euros
		Number of new SMEs established	Number of SMEs
		Number of local energy cooperatives	Number of cooperatives
		Number of overnight stays of tourists per capita per year	Number per capita
		Number of European cooperation projects	Number of projects
		Number of new policies at regional level.	Number of regulations improving the local context
		Gross Disposable Local Income (optional)	GDP per capita

CATEGORY	SUBCATEGORY	INDICATOR	DETERMINATION (MEASUREMENT UNITS)
SOCIAL CAPITAL	Health	Life expectancy at birth by sex (Europe 2020 indicator)	years
		Exposure to air pollution (population)	Population exposed to levels exceeding WHO guideline value (% of total)
	Quality of life	Gross disposable household income	Amount in euros
		People at risk of poverty or social exclusion or % in risk of poverty	Population (% of total)
		Households at risk of energy poverty or % in risk of energy poverty	Households affected (% of total)
	Knowledge & Innovation	Population aged 25-64 with tertiary education	% of population aged 25-64
		Research & experimental development expenditure as % of GDP	% of GDP
		Number of people reached by the awareness-raising activities	Number of people (or % of local population)
		Number of people trained e.g. number of participants in CBW /study visits/ trainings	Number of people (or % of local population)
	Employment	Employment rate 20-64 years by sex [%] (regional)	% of population (20-64 y.o.)
		Share of employment by sector	% of total employment
		Youth unemployment rate	% of labour force (15-24 y.o.)
		Number of new jobs	Number of jobs
		Number of employed in Green Economy out of the total labour force e.g. Full direct jobs equivalents along the full value supply chain	employment (% of total)
		Share of tourism related employment in total employment	% of total employment
	Population	Population	Number of residents
		% of population in the age range 20-64 years	% of total population
		Ageing index	% (ratio)

Important Note: Apart from the indicators described above, pilot actions national coordinators may consider using additional indicators for a thorough assessment of each measure. Additional indicators may be thus used to assess an impact or special characteristics of a local problem and/or to express quantitatively the impact. National leaders are invited to add any additional indicator and its definition at the respective table of indicators per pilot action.

4. INDICATORS DEFINITION - Methodology Sheets

The following chapter presents an overview of a set of common indicators that may be utilized to measure the pilot actions' progress and impact on communities.

The Indicator Definition and Methodology Sheet is a practical template that has been developed in COMPOSE to serve as a guideline for each common indicator. The aim of these sheets is to assist partners in the common understanding of indicators, to help ensure data uniformity and to provide assistance with data collection. The structure of the sheets is shown in the table below:

Indicator Name	Name of core indicator
Category	Evaluation category according to the table of common core indicators (Environment, Energy, Social Capital, Economy)
Subcategory	Evaluation sub-category according to the table of common core indicators
Definition	Definition of the indicator through the use of key terms and Area of use
Purpose/Relevance	Description why the indicator is needed, its purpose and objectives
Units	Unit of measurement / Way of calculating the indicator
Data source	Recommended data source for indicator calculation
Monitoring frequency	Frequency with which changes are made to the indicator value; update frequency of the indicator value
Geographic name	Area that is covered by the indicator (Name of the region, country)
Spatial Level	Description of the spatial level of the indicator (transnational, national, regional, local)
Partners involved	In order to monitor COMPOSE project's pilot actions, partners should support a set of indicators that will show whether or not expected changes are occurring as a result of their actions

4.1. ENVIRONMENT IMPACT INDICATORS

Indicator Name	**Greenhouse gas emissions** (Europe 2020 indicator[1])
Category	**Environment**
Subcategory	**Environmental quality**
Definition	This indicator measures the emissions of the six main GHGs which have a direct impact on climate change.
Purpose/Relevance	An increase of greenhouse gas concentration in the atmosphere contributes to global warming, which is a major global challenge to sustainable development. For countries that have committed to reduce or stabilize their GHG emissions under the Kyoto Protocol of the United Nations Framework Convention on Climate Change, the indicator also provides information on the fulfillment of this global commitment.
Units	**Tonnes of CO_2 equivalent**
Data source	United Nations (http://unfccc.int/ghg_data/items/3800.php), European Environment Agency (http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer) , Eurostat, Inspire Geoportal, EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

[1] The Europe 2020 strategy, adopted by the European Council on 17 June 2010, is the EU's agenda for growth and jobs for the current decade. It emphasises smart, sustainable and inclusive growth as a way to overcome the structural weaknesses in Europe's economy, improve its competitiveness and productivity and underpin a sustainable social market economy. Eurostat, the statistical office of the EU, has created eight headline indicators and three sub-indicators to monitor progress towards the Europe 2020 strategy targets.

Indicator Name	**Air pollution: PM10,PM2,5 ,CO, NOx, SOx**
Category	**Environment**
Subcategory	**Environmental quality**
Definition	Air pollution travels over long distances and over local boundaries, causing damage to human health and ecosystems. This indicator defined as yearly average (e.g. PM10: particulate matter with a diameter of 10 micrometers or less) concentration at surface level in μg/m^3.
Purpose/Relevance	This set of indicators tries to measure the degree of reductions in emissions for healthier natural living environments. Moreover, the indicator also provides information on the integration of the EU's air policy.
Units	**μg/m^3 (average concentration)**
Data source	European Environment Agency (http://www.eea.europa.eu/themes/air/interactive/pm10), Inspire Geoportal, EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Noise pollution**
Category	**Environment**
Subcategory	**Environmental quality**
Definition	This indicator measures the average number of exceedance times (in annual basis) with noise levels greater than 55 decibels (dB) L_{den}. L_{den} is the common EU indicator that corresponds to the average noise level throughout the day, evening and night, to which a citizen is exposed over the period of a year.
Purpose/Relevance	Environmental noise pollution relates to noise caused by road, rail and airport traffic, industry, construction, as well as some other outdoor activities. It is a pervasive pollutant that directly affects the health and well-being of exposed humans and wildlife.
Units	**Number of people in the EU exposed to noise levels above L_{den} (55 db)**
Data source	European Environment Agency (http://www.eea.europa.eu/soer-2015/europe/noise), Noise Observation and Information Service for Europe (NOISE) viewer, EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Waste to Energy** -e.g. UCO collection in L (optional)
Category	**Environment**
Subcategory	**Environmental quality**
Definition	This indicator measures the potential of waste that can be exploited as an energy resource.
Purpose/Relevance	Waste-to-Energy (WtE) is a form of minimising rejection of recoverable waste, in order to maximise the use of waste as an energy resource. Most WtE processes produce electricity and/or heat directly through combustion, or produce a combustible fuel commodity, such as biofuels. This indicator is in line with Energy Union and Circular Economy strategies.
Units	**Mtoe or L or…**
Data source	Eurostat, European Environment Agency, EU projects, EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	TUC, KGZS MB, ISSP, AUT, Srebrenik Municipality

4.2. ENERGY IMPACT INDICATORS

Indicator Name	Electricity generated from Renewable Sources
Category	Energy
Subcategory	Natural Sources and Energy
Definition	This indicator is the ratio between the electricity produced from renewable energy sources and the gross electricity consumption for a given calendar year. It measures the contribution of electricity produced from renewable energy sources to the regional/local electricity consumption. Electricity produced from renewable energy sources comprises the electricity generation from hydro plants (excluding pumping), wind, solar, geothermal and electricity from biomass/wastes. Gross regional/local electricity consumption comprises the total electricity generation from all fuels (including auto production), plus electricity imports, minus exports.
Purpose/Relevance	Renewable energy resources and significant opportunities for energy efficiency exist over wide geographical areas, in contrast to other energy sources, which are concentrated in a limited number of countries. Rapid deployment of renewable energy and energy efficiency and technological diversification of energy sources would result in significant energy security and economic benefits.
Units	% of production
Data source	Eurostat, EU projects, IRENA database, World Bank (http://data.worldbank.org/indicator/EG.ELC.RNWX.ZS), Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

Indicator Name	**Fossil fuels saved**
Category	**Energy**
Subcategory	**Natural Sources and Energy**
Definition	This indicator measures the fossil fuels savings through the development of RES and EE projects.
Purpose/Relevance	Fossil fuel is a generic term for non-renewable carbon-based energy sources such as solid fuels, natural gas and oil. Burning fossil fuels for energy presents a large number of environmental impacts and socioeconomic effects. Rapid fossil fuel substitution by alternatives ''fuels'', such as local renewable resources, would result in sustainable rural development, energy security and environmental protection.
Units	**Mtoe**
Data source	Eurostat, EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

Indicator Name	Thermal Energy generated from Renewable Sources
Category	**Energy**
Subcategory	**Natural Sources and Energy**
Definition	This indicator measures the amount of thermal energy generated by a renewable energy source (biomass, solar, geothermal, etc.) for immediate use or for storage in a thermal ''battery'' for later use.
Purpose/Relevance	Renewable heat is an application of renewable and it refers to the renewable generation of thermal energy, rather than electrical power (e.g. replacing a fossil fuel boiler using concentrating solar thermal to feed radiators). This indicator aims to measure any increase of embedding of thermal energy from renewable resources into the local energy system.
Units	**kWh/y or Mtoe/y**
Data source	EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

Indicator Name	**Created Bioenergy Supply Chain** e.g. Biofuels production in L (optional)
Category	**Energy**
Subcategory	**Natural Sources and Energy**
Definition	Bioenergy supply chain describes the flow of materials derived from biological sources (e.g. wood biomass) to its eventual energy end use. Along the way, these materials pass through a series of processes in what is called the biomass supply chain. Various segments of the bioenergy supply chain require unique sets of knowledge, technology and activity. These may include harvesting, transporting, aggregating, storing and converting biomass. Additionally, and depending on the type of material and the conversion technology used, preprocessing may also be a necessary step along the pathway from source to energy use. This indicator measures the amount of energy produced through the created Bioenergy supply chain.
Purpose/Relevance	One of the main advantages of bioenergy potential is that it includes often a byproduct, residue or waste-product of other processes, such as farming, forestry, tourism etc. From this point of view, the proposed indicator could investigate the development of bioenergy industry.
Units	**L or kWh or Mtoe**
Data source	Eurostat, EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/region/local
Partners involved	TUC, KGZS MB, ISSP, AUT, Srebrenik Municipality

Indicator Name	**Export of Energy from local resources**
Category	**Energy**
Subcategory	**Natural Resources and Energy**
Definition	The indicator captures the amount of exported energy, which is produced from local resources. The sub-sectors that make up the energy exports potential are solar thermal, geothermal, photovoltaic, wind power, biomass, hydropower etc.
Purpose/Relevance	A local energy economy approach linking local energy generation to local energy use is considered as a crucial step in creating sustainable communities. In that sense, the purpose of this indicator is to identify a number of energy resources that should be firstly exploited to cover the energy needs at a local level.
Units	**kWh/y or Mtoe/y**
Data source	EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

Indicator Name	**Primary energy consumption**
Category	**Energy**
Subcategory	**Energy consumption**
Definition	This indicator measures the total energy demand of a region or building. It covers consumption of the energy sector itself, losses during transformation (for example, from oil or gas into electricity) and distribution of energy, and the final consumption by end users. It excludes energy carriers used for non-energy purposes (such as petroleum not used for combustion but for producing plastics).
Purpose/Relevance	Identification of energy needs
Units	**kWh/y or Mtoe/y**
Data source	Eurostat, European Environment Agency (http://www.eea.europa.eu/data-and-maps/indicators/primary-energy-consumption-by-fuel-6/assessment-1), INSPIRE Geoportal, EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/region/local
Partners involved	All Partners

Indicator Name	Final energy consumption by sector
Category	**Energy**
Subcategory	**Energy consumption**
Definition	Final energy consumption is the total energy consumed by end users. It is the energy which reaches the final consumer's door and excludes that which is used by the energy sector itself. This indicator describes quantities consumed by private households, commerce, public administration, services, agriculture and fisheries.
Purpose/Relevance	This indicator expresses the energy consumption for the major energy end-use sectors (residential, commercial, tourism, industrial and transportation).
Units	**kWh/y or Mtoe/y**
Data source	Eurostat, European Environment Agency (http://www.eea.europa.eu/data-and-maps/indicators/final-energy-consumption-by-sector-9/assessment), INSPIRE Geoportal, EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

Indicator Name	**Energy saved through the adoption of EE measures** ***(per segment-optional)*** e.g. - energy saved by installing building energy management systems (optional) - energy saved through the adoption of EE measures in public lighting (optional)
Category	**Energy**
Subcategory	**Energy consumption**
Definition	This indicator measures the reduction of the amount of energy required to provide products and services, as result of the adoption of energy efficiency measures.
Purpose/Relevance	This indicator is selected to monitor and evaluate the overall impact of all energy efficiency measures implemented.
Units	**kWh/y or Mtoe/y**
Data source	EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

4.3. ECONOMY IMPACT INDICATORS

Indicator Name	**Contribution to rural economy (optional)**
Category	**Economy**
Subcategory	**Local Economy and Policies**
Definition	This indicator refers to the contribution (amount in euros) to the rural economy, as result of RES and EE projects development.
Purpose/Relevance	This indicator aims to analyse different aspects of local value chains, that may induce more regional job creation, stimulating the rural economy, etc.
Units	**Amount in euros**
Data source	Region, municipality
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Number of local energy cooperatives**
Category	**Economy**
Subcategory	**Local Economy and Policies**
Definition	This indicator measures the number of created renewable energy cooperatives, which are business models where citizens jointly own and participate in renewable energy or energy efficiency projects.
Purpose/Relevance	This indicator aims to identify innovative approaches and business models, such as energy cooperatives with citizens' participation.
Units	**Number of cooperatives**
Data source	National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Number of European cooperation projects**
Category	**Economy**
Subcategory	**Local Economy and Policies**
Definition	The indicator is the number of European cooperation projects (transnational, interregional, regional development Co-operation). Cross-border projects are not included.
Purpose/Relevance	- The **transnational programmes** add an important extra-European dimension to regional development, developed from analysis at a European level, leading to agreed priorities and a coordinated strategic response - Interregional cooperation works at the pan-European level, covering all EU-27 Member States, and more. It builds networks to develop good practice and facilitate the exchange and transfer of experience by successful regions. It showcases what regions do well, to the benefit of those still investing. - There are also a number of new instruments available to support regional development along the EU's external borders with countries which are either candidates for EU membership or potential candidates and also with so-called third countries (i.e. non-EU members).
Units	**Number of projects**
Data source	European Commission: European Territorial Co-operation, state, region
Monitoring frequency	**-**
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Number of new policies at regional level**
Category	**Economy**
Subcategory	**Local Economy and Policies**
Definition	This indicator measures the number of new energy policies that would be implemented at regional level.
Purpose/Relevance	This indicator would contribute to capitalize pilot actions implementation
Units	**Number of policies**
Data source	National/regional surveys
Monitoring frequency	**Annual**
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Investment to RES triggered**
Category	**Economy**
Subcategory	**Local Economy and Policies**
Definition	The cost of RES is not determined solely by the availability of renewable energy sources such as wind, solar, biomass or water resources; project costs are also driven by administrative costs and capital costs. This indicator refers to this cost, as an investment to RES triggered.
Purpose/Relevance	This will address barriers such as complicated authorisation procedures, the lack of one-stop-shops, the creation of registration procedures, planning processes that may take months or years and fear of retroactive changes to support schemes increase project risk. Such high risks, particularly, in countries with stressed capital markets, result in a very high cost of capital, raising the cost of RES projects and undermining their competitiveness.
Units	**Amount in euros**
Data source	Eurostat, National Statistical Services, National/regional surveys,
Monitoring frequency	-
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**% of GDP of direct investment in green energy**
Category	**Economy**
Subcategory	**Local Economy and Policies**
Definition	This indicator measures the proportion of gross domestic product (GDP) that would be invested for green energy production.
Purpose/Relevance	This indicator is used to highlight a possible transition to a green economy.
Units	**% of GDP**
Data source	Eurostat, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	Number of overnight stays of tourists per capita per year (optional)
Category	**Economy**
Subcategory	**Local Economy and Policies**
Definition	This indicator is a ratio of nights spent in tourist accommodation establishments annually by total resident population.
Purpose/Relevance	The rapid growth of tourism is directly linked to energy consumption, especially in the summer period. Hence the number of overnight stays of tourists per capita per year would justify an upward trend in energy demand.
Units	**Number per capita**
Data source	Eurostat, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Gross Disposable Local Income (optional)**
Category	**Economy**
Subcategory	**Local Economy and Policies**
Definition	The indicator (GDLI) is the amount of money that residents of the pilot areas (i.e. the household) have available for spending or saving, indicating the economic environment in which the pilot action is developed. This is money left after energy expenditure associated with income.
Purpose/Relevance	Mainly to depict the economic environment that COMPOSE concept will be developed. *It is not foreseen that a noticeable change will be monitored/measured in that indicator due to the microscale of COMPOSE pilot actions*
Units	**GDP per capita**
Data source	National/regional surveys
Monitoring frequency	Annual
Geographic name	Region/Municipality
Spatial Level	regional/local
Partners involved	All partners

4.4. SOCIAL IMPACT INDICATORS

Indicator Name	Life expectancy at birth by sex (Europe 2020 indicator[2])
Category	**Social Capital**
Subcategory	**Health**
Definition	Simple indicator expressing the average life expectancy at birth for both women and men in years.
Purpose/Relevance	This indicator represents a proxy for the overall quality of the health-care system in a region. It tells us about the healthiness of living environment and together with the aging index, it allows to assess social policies projections and risk of exclusion.
Units	**years**
Data source	Eurostat, EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	regional/local
Partners involved	All Partners

[2] The Europe 2020 strategy, adopted by the European Council on 17 June 2010, is the EU's agenda for growth and jobs for the current decade. It emphasises smart, sustainable and inclusive growth as a way to overcome the structural weaknesses in Europe's economy, improve its competitiveness and productivity and underpin a sustainable social market economy. Eurostat, the statistical office of the EU, has created eight headline indicators and three sub-indicators to monitor progress towards the Europe 2020 strategy targets.

Indicator Name	Exposure to air pollution (population)
Category	**Social Capital**
Subcategory	**Health**
Definition	E.g. Percent of population exposed to ambient concentrations of air pollutants (e.g. PM2.5) that exceed the WHO guideline value is defined as the portion of a country's population living in places where mean annual concentrations of PM2.5 are greater than 10 μg/m^3, the guideline value recommended by the World Health Organization as the lower end of the range of concentrations over which adverse health effects due to PM2.5 exposure have been observed.
Purpose/Relevance	The indication of air quality is intended to inform comparisons of the health risks due to air pollution before and after the implementation of RES and EE measures.
Units	**Population exposed to levels exceeding WHO guideline value (% of total)**
Data source	Eurostat, EU projects, World Bank (http://data.worldbank.org/indicator/EN.ATM.PM25.MC.ZS) Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

Indicator Name	Gross disposable household income
Category	Social capital
Subcategory	Quality of life
Definition	The indicator (GDHI) is the amount of money that individuals (i.e. the household) have available for spending or saving. This is money left after expenditure associated with income, e.g. taxes and social contributions, property ownership and provision for future pension income. It is calculated gross of any deductions for capital consumption.
Purpose/Relevance	This indicator measures the welfare of resident population in a region and reflects the level of poverty.
Units	Amount in euros
Data source	Eurostat, OECD (https://data.oecd.org/hha/household-disposable-income.htm), EU projects, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

Indicator Name	**People at risk of poverty or social exclusion (Europe 2020 indicator[3]) or % in risk of poverty**
Category	**Social capital**
Subcategory	**Quality of life**
Definition	This indicator is the share of people with an equivalised disposable income (after social transfer) below the at-risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income after social transfers. It's a union of the three sub-indicators below: - People living in households with very low work intensity: People living in households with very low work intensity are people aged 0-59 living in households where the adults work less than 20% of their total work potential during the past year - Severe material deprivation rate - At-risk-of-poverty rate: The number of people with an equivalised disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income.
Purpose/Relevance	This indicator does not measure wealth or poverty, but low income in comparison to other residents in that country, which does not necessarily imply a low standard of living.
Units	**Population (% of total)**
Data source	Eurostat, EU projects, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

[3] The Europe 2020 strategy, adopted by the European Council on 17 June 2010, is the EU's agenda for growth and jobs for the current decade. It emphasises smart, sustainable and inclusive growth as a way to overcome the structural weaknesses in Europe's economy, improve its competitiveness and productivity and underpin a sustainable social market economy. Eurostat, the statistical office of the EU, has created eight headline indicators and three sub-indicators to monitor progress towards the Europe 2020 strategy targets.

Indicator Name	Households at risk of energy poverty or % at risk of energy poverty
Category	**Social capital**
Subcategory	**Quality of life**
Definition	Energy poverty, often defined as a situation where individuals or households are not able to adequately heat or provide other required energy services in their homes at affordable cost. This is due to rising energy prices, recessionary impacts on national and regional economies, and poor energy efficient homes. This indicator is the percentage of people whose share of energy expenses relative to its disposable income (income minus taxes) is higher than 10% (threshold is fixed and independent of country specific patterns).
Purpose/Relevance	This is a simple indicator, easy to communicate and measures an absolute value for energy poverty. It aims to support stakeholders in their task to protect vulnerable consumers and to address energy poverty by identifying best practices.
Units	**Households Affected (% of total)**
Data source	EU projects, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

Indicator Name	Population aged 25-64 with tertiary education (optional)
Category	**Social capital**
Subcategory	**Knowledge & Innovation**
Definition	The indicator is defined as population aged 25-64 with tertiary education as a percentage of all population aged 25-64.
Purpose/Relevance	This indicator measures the highly-qualified labor force as a basis for future R&D activities. Human capital is an essential factor for innovation potential.
Units	**% of population aged 25-64**
Data source	Eurostat, EU projects, National Statistical Services, National/regional surveys
Monitoring frequency	**Annual**
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

Indicator Name	**Research & Experimental Development expenditure as % of GDP (Europe 2020 indicator[4])**
Category	**Social capital**
Subcategory	**Knowledge & Innovation**
Definition	This indicator is total gross domestic expenditure on research and experimental development (GERD) as a percentage of gross domestic product (GDP).
Purpose/Relevance	R&D expenditure represents one of the major drivers of economic growth in a knowledge-based economy. As such, trends in the R&D expenditure indicator provide key indications of the future competitiveness and wealth of the EU. GERD includes expenditure from business enterprise, higher education, government and private non-profit expenditure on R&D. The indicator measures the key R&D investments that support future competitiveness and result in higher GDP.
Units	**% of GDP**
Data source	Eurostat, EU projects, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All Partners

[4] The Europe 2020 strategy, adopted by the European Council on 17 June 2010, is the EU's agenda for growth and jobs for the current decade. It emphasises smart, sustainable and inclusive growth as a way to overcome the structural weaknesses in Europe's economy, improve its competitiveness and productivity and underpin a sustainable social market economy. Eurostat, the statistical office of the EU, has created eight headline indicators and three sub-indicators to monitor progress towards the Europe 2020 strategy targets.

Indicator Name	**Number of people reached by the awareness-raising activities.**
Category	**Social capital**
Subcategory	**Knowledge & Innovation**
Definition	This indicator refers to the number of participants in public awareness-raising events and it is related to measuring performance and impacts of the project.
Purpose/Relevance	This indicator is used to provide an indication of the efforts made by project partners to promote renewable energy and energy efficiency at the beginning, during, and at the end of the project**.**
Units	**Number of people (or % of local population)**
Data source	Region, Municipality,
Monitoring frequency	During the Project
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Number of eventually trained/educated** e.g. number of participants in pedagogical visits to the pilot installations (optional)
Category	**Social capital**
Subcategory	**Knowledge & Innovation**
Definition	This indicator measures the number of participants (e.g. stakeholders, habitats, students etc.) who have completed training courses during this project.
Purpose/Relevance	This indicator goes one step further than the strictly recording number of people trained; it helps project implementers evaluate the effectiveness of training actions by monitoring the behavioral change of training participants.
Units	**Number of people (or % of local population)**
Data source	State,Region,Municipality,..
Monitoring frequency	During the Project
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Employment rate 20-64 years by sex [%] (regional) (Europe 2020 indicator[5])**
Category	**Social capital**
Subcategory	**Employment**
Definition	The employment rate is calculated by dividing the number of people aged 20 to 64 (by sex) in employment by the total population of the same age group.
Purpose/Relevance	The employment rate, in other words, the proportion of the working age population in employment, is considered as a key social indicator for analytical purposes when studying developments within labor markets.
Units	**% of the population (20-64 y.o.)**
Data source	Eurostat, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

[5] The Europe 2020 strategy, adopted by the European Council on 17 June 2010, is the EU's agenda for growth and jobs for the current decade. It emphasises smart, sustainable and inclusive growth as a way to overcome the structural weaknesses in Europe's economy, improve its competitiveness and productivity and underpin a sustainable social market economy. Eurostat, the statistical office of the EU, has created eight headline indicators and three sub-indicators to monitor progress towards the Europe 2020 strategy targets.

Indicator Name	Youth unemployment
Category	**Social capital**
Subcategory	**Employment**
Definition	This indicator refers to the share of the labor force ages 15-24 without work but available for and seeking employment.
Purpose/Relevance	High youth unemployment rates do reflect the difficulties faced by young people in finding jobs. However, this does not necessarily mean that the group of unemployed people aged between 15 and 24 is large because many young people are studying full-time and are therefore neither working nor looking for a job (so they are not part of the labor force which is used as the denominator for calculating the unemployment rate).
Units	**% of labor force (15-24 y.o.)**
Data source	OECD (https://data.oecd.org/unemp/youth-unemployment-rate.htm), Eurostat, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Number of new jobs**
Category	**Social capital**
Subcategory	**Employment**
Definition	This indicator measures the number of new job opportunities that would be created at a local level.
Purpose/Relevance	To express job creation and the contribution to the local (rural) economy.
Units	**Number of jobs**
Data source	Region/Municipality, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Number of employed in Green Economy out of the total labor Force** e.g. Full direct jobs equivalents along the full value supply chain
Category	**Social capital**
Subcategory	**Employment**
Definition	A green economy is an economy that improves human well-being and social equity, while significantly reducing environmental risks and ecological scarcities, and that aims for sustainable development without degrading the environment. This indicator measures the number of green jobs including jobs that help to reduce consumption of energy and raw materials, de-carbonize the economy, protect and restore ecosystems and biodiversity and minimize the production of waste and pollution
Purpose/Relevance	This is one of the core indicators selected to measure how the inclusion of RES and EE measures as horizontal criteria for development planning would influence total job creation. This indicator is also focused on the jobs of the value chain situated in the region/country where the green economy is promoted.
Units	**employment (% of total)**
Data source	EU projects, Research Institutes, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	Share of tourism-related employment in total employment
Category	**Social capital**
Subcategory	**Employment**
Definition	This indicator refers to the share of employees working in tourism related employment to total employment.
Purpose/Relevance	The importance of employment in tourism are: - the continuous growth of tourism in the last decades - the importance of the economic contribution of tourism to national economies (TSA) - general recognition of tourism as a major job generator, especially for youth, women, unqualified workers, etc.
Units	**% of employment**
Data source	Eurostat, EU projects, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	Share of employment by sector
Category	**Social capital**
Subcategory	**Employment**
Definition	This indicator refers to the share of the employment in different sectors. **Agriculture, industry and construction:** Mining and quarrying; Manufacturing, electricity, gas, steam and air conditioning supply; Water supply, sewerage and waste management; Construction **Services:** Market services: Wholesale and retail trade; Accommodation and food service activities; Communication; Financial and insurance activities; Real estate activities; Professional scientific and technical activities; Administrative and support service activities. Mainly non-market services: Public administration; Education; Health; Arts, entertainment and recreation; Other services activities; Activities of households as employers; Activities of extraterritorial organisations.
Purpose/Relevance	Regional sector specialisation is broadly understood to be the extent to which particular economic sectors attract larger shares of employment or output in one region as compared with another.
Units	**% of employment**
Data source	EU projects, National Statistical Services, National/regional surveys, Eurostat
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Population**
Category	**Social capital**
Subcategory	**Population**
Definition	The total number of people inhabiting a country, city, or any district or area.
Purpose/Relevance	This indicator is used to provide clear recognition of population influenced by the RES and EE projects' implementation.
Units	**Number of residents**
Data source	Eurostat, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**% of population in the age range 20-64 years (optional)**
Category	**Social capital**
Subcategory	**Population**
Definition	This indicator refers to the share of people aged 20-64 to the total population.
Purpose/Relevance	This indicator measures working age percentage out of total population. Together with employment rate is the best indicator to measure labor market conditions. Europe 2020 headline target is that 75 % of population aged 20-64 should be employed by 2020.
Units	**% of total population**
Data source	Eurostat, National Statistical Services, National/regional surveys
Monitoring frequency	**Annual**
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

Indicator Name	**Aging index (optional)**
Category	**Social capital**
Subcategory	**Population**
Definition	The indicator is defined as the ratio of the population aged 64 and above divided by population of 15 years and below.
Purpose/Relevance	This indicator measures the balance of the age structure of the society.
Units	**% (ratio)**
Data source	Eurostat, National Statistical Services, National/regional surveys
Monitoring frequency	Annual
Geographic name	Country/Region/Municipality
Spatial Level	National/regional/local
Partners involved	All partners

5. REFERENCES

1) ATTRACT SEE project, List of common set of indicators in SEE(South-East Europe), 2013

2) European Commission, Environment: http://ec.europa.eu/environment/air/pollutants/ceilings.htm

3) European Environment Agency, The European environment — state and outlook 2015 report (SOER 2015)

4) Confederation of European Waste-to-Energy Plants (CEWEP), A holistic approach in the upcoming Circular Economy package, February 2015

5) Eurostat, EU policy indicators

   - http://ec.europa.eu/eurostat/en/web/products-datasets/-/TSDCC330
   - http://ec.europa.eu/eurostat/web/products-datasets/-/t2020_10&lang=en
   - http://ec.europa.eu/eurostat/statistics-explained/index.php/Europe_2020_indicators_-_employment

6) Eurostat, Eurostat's Environmental Data Centre on Natural Resources (EDCNR), http://ec.europa.eu/eurostat/web/environmental-data-centre-on-natural-resources/natural-resources/energy-resources/fossil-fuels

7) GOV.UK, Department of Energy & Climate Change, Renewable Heat Incentive, 2011.

8) Biomass Policies project, Guidelines and indicators for the evaluation of sustainable resource efficient biomass value chains,2014

9) Wisconsin Grasslands Bioenergy Network, http://www.wgbn.wisc.edu/biomass-supply-chain

10) Scottish Government, Community and Renewable Energy Scheme (CARES), Local Energy Challenge Fund, http://www.localenergyscotland.org/funding-resources/funding/local-energy-challenge-fund/

11) Eurostat, Statistics explained,

   - http://ec.europa.eu/eurostat/statistics-explained/index.php/Consumption_of_energy
   - http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Final_energy_consumption
   - http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:At-risk-of-poverty_rate

12) European Environment Agency, Air quality in Europe report, 2016

13) European Commission, Selecting Indicators to Measure Energy Poverty, 2014

14) United Nations Environment Programme, Green Economy Transition, 2011

15) RESCOOP project, https://rescoop.eu/what-rescoop

16) United Nations Environment Programme, Green Economy Transition, 2011