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#### GRASPINNO

Transnational model, strategies and decision support for innovative clusters and business networks towards green growth, focusing on green e-procurement in EE/RES for energy refurbishment of public buildings.

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#### Training material for GRASPINNO Living Labs

## MODULE 3 DEVELOPING SMART SEAP

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#### **1. Executive summary**

Aim of this document is the description of a smart application of the **Sustainable Energy Action Plan (SEAP)** based on the Siena Province case. The preparation and its signing of a SEAP is not so rare but very few applications of these plans have given a change in terms of **sustainable development at local level**. This document shows a peculiar application that can give a plus in economic and environmental terms also if applied to other territorial contexts.

A good application of a SEAP gives great benefits to all the community. SEAP is a plan signed by a Municipality but its benefits concern PA, private sector (enterprises, citizens) and also the local environment.

The question is: why is this peculiar SEAP application considered smart? There are at least three reasons:

- 1. Economies of scale. The need to implement a synthesis and a scoring model requires to work with large quantity of data coming out from different sources; once identified the province taking part in the analysis, it will be pursued availability of all data related to the necessary VARIABLES for ALL the municipalities in the same province. It means that the participation of several municipalities in the SEAP drafting does not necessarily imply more work compared to the need to provide data for a single local administration of a province.
- 2. SEAP is a voluntary tool; to have real result in terms of reduction of energy consumption and CO2 emissions, the plan should be made binding. The third chapters deals with this theme with a special attention to the Energy Efficiency of buildings. In the second module of the training materials, we have seen that the Italian public buildings have GPP energy efficiency binding rules in the national procurement code as a result of a transposition of the European Directive 2014/24 but SEAP concerns also private buildings. If no national/regional strong normative constraints exist this typology of buildings, the effectiveness of a voluntary plan is quite low. The chapter 4 introduce a methodology to make binding some aspects of





SEAP. Although the methodology is based on the Italian experience, it is possible to apply it in other territorial contexts with some modifications.

**3. SEAP has been so far a simple tool** at voluntary membership with a little impact on the emissions reduction, make the municipal level a tile of a mosaic and contribute to assign contents of real political action, so is a crucial challenge in which SEAP becomes an effective tool of governance.



#### 2. General and local considerations on SEAP

The **Covenant of Mayors** brings together local and regional authorities across Europe, who gives a voluntary commitment to implement energy, **climate mitigation and sustainability policies** on their territories. The initiative, which currently involves more than 6 000 municipalities, was launched after the adoption of the EU Climate and Energy Package in 2009. The Covenant's aim is to endorse and support the crucial role played by local authorities in mitigating the effects of climate change (80 % of energy consumption and CO2 emissions worldwide are associated with urban activity).

As the Covenant of Mayors is the only initiative of its kind **bringing together local and regional players to achieve EU objectives**, the European institutions see it as an exceptional model enabling different levels of government to work together to develop and implement policy.

Municipalities joining the initiative commit to developing and implementing a sustainable energy action plan (SEAP) containing **measures to reduce their energy-related emissions** compared with the emissions calculated or measured in a baseline year.

The content of this module is based on a sort of local (Siena Province) path to describe how a **sustainable economy can be implemented and preserved** by using a "mosaic" approach where the SEAP is only a tile of a long process.

Environmental sustainability analysis on all territory of Siena by a first calculation of **Green House Gases (GHG)** balance was held since 2001 (SPINECO Project). In the following years, it was thought to adopt an instrument able to annually estimate GHG emissions and re-absorptions to plan a reduction policy of CO2 emissions. Goal: Feasibility Plan was prepared to reset CO2 emissions in 2015.

The Province of Siena has enabled the project "**2015 Siena Carbon Free**" with the goal to be the first wide area with zero emissions by 2015. The project covered the annual calculation and the **ISO 14064/1 certification** of the CO2 release and resorption balance (made by the University of Siena according to the IPCC approach).

The Province of Siena obtained the first certified balance in 2008 - according to the ISO 14064-1 norm – first province in Italy (based on data referred to the year





2006). The standard specifies the principles and requirements for the quantification and reporting of greenhouse gases emissions and their removal. It involves requirements concerning the **design**, **development**, **management**, **reporting communication and verification of greenhouse gases inventory**. The certification is held annually, issued by RINA Services SpA for the 2006 to 2013 Balances.

Since 2007 it is active the calculation of greenhouse gases Balance in collaboration with the University of Siena - Department of Chemistry - and the Italian Naval Register s.p.a- (now RINA Services s.p.a.).The calculation is performed in accordance with the Guidelines for National Greenhouse Gas Inventories established by the IPCC (Intergovernmental Panel on Climate Change). The following figure describes the examined areas



Figure 1: Emissions specifications

Yearly calculations of the GHG emissions and re-absorptions balance reducing CO2 emissions, according to Kyoto Agreement, are related to:

- CO2 Carbon dioxide
- CH4 Methane
- N2O Nitrogen oxide

The analyzed greenhouse gases emissions are converted into equivalent CO2 in accordance with the conversion factors or global warming potential. Thanks to this





system it is possible to measure the CO2 emitted annually in the province of Siena and how much of it is absorbed back. The data examined are referred to the previous two years, this for physiological reasons due to the collecting and processing data by the sources. **In 2011 the Net Emission CO2 Balance was negative for the first time ever: forest areas reabsorption exceeded GHG emissions in the whole territory and Siena became the first vast area in Europe with a certified negative carbon balance.** The goal has been reached four years in advance of the planned 2015.

The Figure 2 was taken on **Terre di Siena Green** website (<u>http://green.terresiena.it</u>) and, despite it's in Italian language, it clearly shows this trend. Specifically:

- the first column includes the gross emissions;
- the second column includes the forestry absorptions;



- the third column includes the net emissions.

Figure 2: CO2 Re-absorption share 2006-2011.

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Many projects, ISO Certification, transparency and credibility to the GHG inventories, the Administrative guide through actions (renewable energy source production, heating and lighting, transport, forest development and fire prevention) and, last but not the least, involving people (information and sensitization, environmental education in schools and training for workers, recognition) are the causes that leads to reach the goal.

The change in tasks and **roles of the Province** (recent institutional reform) has constrained to leave a monitoring and control system of GHG emissions and energy consumption focused on a vast area towards a municipal system based on SEAP. **The transfer from the provincial system to the municipal one allowed to transform a big problem** (a different territorial level) **in a great opportunity** by building a smart collection method able to create relevant economies of scale and reduce the costs for the analysis. In addition, SEAP gives a further advantage in comparison with a **certification system** of vast area because it is perfectly integrated in a European sustainable policy where financial tools, possible actions and measures are well defined even if the average size of rural municipalities doesn't fit with the available tools effectively. For this reason, a "rural" solution is needed to tackle the problem of greenhouse gas emissions and energy consumption. **One of the goals of GRASPINNO is to develop this solution**.



## 3. Relationship between GPP and SEAP in a general context of Sustainability

A series of **SEAP recommendations** have to be introduced as suggest by the activities carried out in the previous GRASP project. The introduction of GPP in the planned activity couldn't be enough to transform the plan in real actions and activities. **Every SEAP has to be transformed from a voluntary plan to a cogent road map** even if the recent legislation on the procurement in some countries can help this change, making GPP compulsory for EE/RES in buildings. Anyway, this support remains marginal because public sector contributes about 4-6% of the total energy consumption and GHG emissions in a municipality. For instance, in GRASP, Tuscan local governance tools have been proposed to increase the role of PA in reducing environmental effects.



Figure 3: SEAP – Share of the Public Sector

In the following table this approach has been showed: in the left column there are actions and interventions foreseen in a specific SEAP, in the right one there are governance tools, according to the Tuscan Regional Law 65/2014, to be used to go beyond the voluntary provisions of the SEAP. In order to clearly draw the outlines of the process the governance tools are described briefly:





- "Piano Strutturale Comunale" (PSC Municipal Structural Plan) and "Piano strutturale intercomunale" (PSI – Intermunicipal Structural Plan), have no a cogent function but they show critical aspects and address the strategies to solve them;
- "Piano operativo comunale" (POC Municipal Operational Plan),
  "Regolamento edilizio comunale" (REC Municipal Building Regulation) and "Piani Attuativi Comunali" (PAC Municipal implementation Plans) have a cogent function, putting in practice the address described in the preordained governance tool, PSC or PSI, introducing rules, measures and regulations.

Hereinafter a table with some possible recommendations concerning the building sector. It should be stressed that the application of recommendations in SEAPs could be extended to several sectors.

INTERVENTIONS	<i>Territorial governance tools that can be used to make cogent a SEAP</i>
BUILDINGS	
Insulation of external walls and roofing, substitution of doors, windows and heat generator	<i>PSC, knowledge framework and sustainable development strategies; POC and REC, sustainable building</i>
Real estate registry containing Energy information	PSC, knowledge framework and sustainable development strategies;
Substitution of old boilers with new ones having higher energy saving performance	POC and REC, sustainable building
Energy audit of public buildings	PSC, knowledge framework and sustainable development strategies;
Re-qualification of indoor lighting plants in municipal building	POC and REC, sustainable building
Energy Certification	POC and REC, sustainable building
Obligation to install RES on refurbished and new buildings	<i>PSC, knowledge framework and sustainable development strategies; POC and REC, sustainable building</i>
Update Building Regulation (improvement of energy performance of buildings)	REC, sustainable building
Photovoltaic plants on roofings	POC and REC, sustainable building
Energy audit and thermographic surveys	POC and REC, sustainable building

Table 1: Intervention and tools





# 4. From a pragmatic implementation of a SEAP to the choice of the measures and the selection of the activities

The application of the **IPCC methodology for Greenhouse** gas emissions Inventory at the province level already foreshadows the enormous potential of the availability of information on municipal level. The "picture" of the whole Italian territory offers the possibility of comparisons and construction of policies that a smaller scale territory makes it impossible.

The Siena Province Carbon Free Certification indicates the political virtuous process that Siena have undertaken; having pursued the goal of equalization between emissions and absorption is still an important achievement but, as we see in the map (Figure 4), Siena is not the province of Italy with the minimum level of per capita CO2 emissions in the atmosphere. That is a clear signal that much more effort has to be done to reduce GHG emissions. That is just a simple marker of the potential that this SEAP could have; in fact, it has important implications in terms of economies of scale: the used methodology provides for the availability of data at municipal level of the Italian provinces. The need to implement a synthesis and a scoring model requires to work with large quantity of data coming out from different sources; once identified the province taking part in the analysis, it will be pursued availability of all data related to the necessary VARIABLES for ALL the municipalities in the same province. It means that the participation of several municipalities in the SEAP drafting does not necessarily imply more work compared to the need to provide data for a single local administration of a province. The tool, expanded to the use of many municipalities, identifies exactly at this stage the possibility of switching from a simple descriptive local condition about energy consumption and greenhouse gas emissions to a concrete process, able to generate government decisions and actions.

The awareness about the opportunity to extend this approach to all the partners (not only Italian ones) and the level of economies of scales that can be created should stimulate the involvement of as many municipalities as possible.







*Figure 4: Per capita CO2 emissions in the Italian Provinces* 

The implementation through adequate models of the *IPCC methodology for Greenhouse Gas Inventories* can became the basis to extend the possibility of building strategies tool for local management, as a sort of "compass" to orient future policy decisions. Participation in **GRASPINNO is strongly influenced by this opening opportunity**: since SEAP has been so far a simple tool at voluntary membership with a little impact on the emissions reduction, **managing the IPCC Guidelines to make them enforceable**, even at the **municipal level** and contribute to assign contents of real political action, **is a crucial challenge**.





The present SEAP monitoring should be integrated with:

- **explanatory analysis of the factors**, making up the energy consumption and the emissions themselves
- **qualifying test** to identify buildings and structures at risk
- **discriminating process** on the potential interventions to realize
- predicting evaluation on the conditions in front of us during the planning phase

It means consolidating a path of research and action towards a genuine tool of governance, an operational guideline through energy conservation, energy efficiency of buildings and companies, real development of renewable without the intervention of incentives, development of sustainable mobility initiatives.

The general idea of the project is to follow the development goals indicated in the inverted pyramid below, in which the policy is the general preliminary work that flows into detailed plans (SEAP) but take on a compulsory commitment, not a simple analysis, till to identify concrete recommendations.



Figure 5: Local approach for a smart SEAP (Siena case study: the "mosaic tiles" of the path)

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This sequential vision starting from a local policy (Siena Carbon Free) is seen as an achieved and consolidated goal. Differently, the next figure introduces not a sequential vision but a **new circular pattern** in which:

- the policy represents the start point with its inertial characteristics;
- SEAP is seen as renewable tool for the governance;
- Municipal planning instruments and their application are strictly related to the SEAP; as regards this aspect, the importance of the use of GPP in the SEAP, has to be emphasized; GPP has to become an integrated protocol to achieve the goals of reducing energy consumption and climate-changing emissions
- the planning of the most effective actions and more efficient maintenance and retrofitting activities in the public or private sector is stimulated
- a new monitoring phase is present to measure the effects of the actions and activities in relationship with the environmental and economic targets. It is a sort of calibration of the processes, adapting once again the programming tools in a kind of perpetual change.

Practically, the circle is a sort of overcoming of the reverse pyramid (Figure 5); it can be interpreted as an infinitive process of improvement.



Figure 6: GRASPINNO Virtuous Cycle





The created propelling force and the diversity and quality of the commissioning projects could achieve **unexpected results**, in the presence of innovative financing solutions.

For offices, schools and public lighting is essential to promote the application of adequate Energy Contracts with Warrantied Result in face of investments on efficiency, taking advantages from all possible sources of possible financial funds and moving towards the public-private partnership in order to bypass budget constraints and improve energy efficiency of public buildings.

## 5. Focus on some SEAP activities: energy efficiency of the public buildings.

Part of the local path described in the previous chapter can be presented with the specific activities carried out in the GRASPINNO project.

The approach has been able to collect SEAP data for 11 public bodies (8+3 in progress) equivalent to the energy data consumption for more than 160 public buildings. After data collection, a screening phase was carried out having as a result a Pilot Plan with 30 pilot buildings. It allowed to start the refurbishment of the buildings using available financial resources.

A **systematic work implies specific procedures** to have a greater impact on the territory. The screening phase gives a clear framework in which the local stakeholders have to operate. **With this important phase, buildings with the high energy consumption are individuated immediately and credible objectives in terms of saving can be reached**. The tools created in the GRASPINNO project are an important contribution to the planning phase by giving the opportunity to measure economic and environmental result and introducing additional financial resources through Private Public Partnership.

The smart SEAP approach, as used at local level, allows to apply the first step of the figure 8. **The screening test is a relevant contribution to individuate profitable activities in the energy refurbishment of buildings** because it maximizes the consumption reduction of the. This approach allows to indentify credible Target Energy Class, facilitating also the planning and the research of financing.

The same tools have also a function of **preliminary energy audit** by giving specific indications on the part of the buildings to be refurbished and which products and materials to use (figure 9). When the difference between the initial





energy class and the target energy class is very large the **ex ante LCC tool** presented in the training module 2 is able to indicate which part of the building is more profitable to refurbish. After this step will be possible to choose the most performing products (with a database) and their thickness.



Figure 7: GRASPINNO procedures for EE of buildings



Figure 8: Target Energy Class and Planning: approach and tools

In this context, the screening phase represents the pivot of the project activity. In the following figure is showed a scatter plot with the position of the local public buildings (Province of Siena) classified according to a thermal and electrical index. This representation allows to highlight the critical energy





situation of the buildings by providing indications also on the kind of **energy consumption** and, thus, addressing the possible interventions.

On the abscissa and the ordinate are reported the consumption in kWh per square meter respectively for the thermal and electrical energy. In green color is represented the area with a low thermal and electrical consumption, the opposite where the color is a darker red. The square with a 60 kwh/sm side on the left in the bottom represents the limit fixed by the European Directive.

![](_page_17_Figure_3.jpeg)

*Figure 9: Scatter plot of Public Buildings classified with a Thermal and Electrical Index* 

![](_page_17_Picture_6.jpeg)

![](_page_18_Picture_0.jpeg)

#### 6. Conclusion

The data collection system and the **methodology of use** is part of an overall strategy that aims to create a complete territorial analysis framework, where, both the data collection phase and their use, should lead to effective implementation of the interventions.

In practice, the intent is to **create a framework of analysis** where the various parts intersect like tiles in a mosaic whose overall vision is nothing more than a systematic path towards the implementation of local energy policies. The **methodology is independent of the geographical context** in which it is applied and can be implemented in whole or in part to different territorial areas. Beyond the means and the territorial resources available, **the system is completely modular and can be completed in several stages**. This means that the management of the activities can be organized in different steps, according to the financial instruments available at the time of the implementation.

![](_page_18_Picture_4.jpeg)