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D6.1 Baseline assessment & PESTEL Analysis of Palencia's Initial Replication Plan

WP6, Task 6.1

Transition of EU cities towards a new concept of Smart Life and Economy



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Task description	<p>Subtask 6.1.1: Baseline assessment of follower cities. A baseline assessment of the current situation for each follower city will be performed and therefore the feasibility and adaptation of these preliminary plans will be reviewed. To set up the baseline, a PESTEL (Political, Economic, Social, Technology, Environmental and Legal) analysis will be carried out to determine the uniqueness and the context of each follower city for these initial plans NBK will coordinate this task with the cities and supported by CAR and TEC.</p> <p>For this assessment of the context, each follower will be visited, and key stakeholder interviews prepared and performed. The process will continue iteratively with the active participation of local authorities and identified stakeholders.</p>		
Date	Version	Author	Comment
23/05/2017	0.1	A.HENON (NBK)	TOC and questions
9/06/2017	0.2	A.HENON (NBK)	First contribution guideline : one PESTEL analysis on one smart action, preliminary replication plan update and selection of smart action
01/07/2017	0.3	PAL	PESTEL Analysis of Palencia's smart action & Replication Plan update
09/10/2017	0.4	NBK/CAR	Guidelines and place of city level indicators.
20/11/2017	0.5	CAR/PAL	PESTELS of actions
28/11/2017	0.6	PAL	City level indicators
30/11/2017	0.7	CAR	Review of deliverable: summary & conclusions

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Abbreviations and Acronyms

Acronym	Description
mySMARTLife	Transition of EU cities towards a new concept of Smart Life and Economy
EV	Electrical Vehicle
ERDF	European Regional Development Funds

1. Executive Summary

mySMARTLife project aims at the development of an **Urban Transformation Strategy** to support cities in the definition of transition models, as a suitable path to reach high level of excellence in its development process, addressing the main city challenges and progressing to the **smart people** and **smart economy** concepts. To achieve this ambitious strategy, **Advanced Urban Plannings** based on prioritizations of actions are developed for three lighthouse cities and four followers cities. As follower city, Palencia aims to develop a complete replication plan to be deployed at the end of the project.

In order to adopt an integrated approach to evaluate the impacts that interventions have in cities from the point of view of social, economy and environmental field, a methodology is developing for lighthouse cities and replicating for followers cities. One point of this methodology is to allow a comparative analysis of these interventions so that they can be prioritized based on their impacts. For this, an evaluation framework is developing on the WP5. Starting from the definition of a smart city the indicators for smart cities focus on monitoring the evolution of a city towards an even smarter city.

On the first section, an evaluation of the current state and context of the city of Palencia was carried out on the basis of these indicators. The city of Palencia stands out notably by its high political commitment with environmental policies and recently with financing received from ERDF to support a sustainable urban development of the city. As a result, a deployment of sustainable actions has been performed in the city; in special in the transport sector. Furthermore, the air quality of the city is good due to the small size of the city, the absence of important sources of pollution and the large green areas. However, there are still some weakness to overcome such as the lack of employment opportunities in special for youth. Hence, the city presents a demographic problem due to the no sustained generational replacement. A strategic plan has been elaborated from the municipality in order to solve the problems detected in the city and as a result to empower the economic development of the city.

In addition a PESTEL (Political, Economic, Social, Technology, Environmental and Legal) analysis have been carried out for each selected action to determine the uniqueness and the context of its application. Some actions have shown great potential for integration where others seemed limited on certain aspects. For these actions whose PESTEL analysis is not entirely favorable, the context and identified difficulties were analyzed by taking inspiration from partner cities. This highlighted some solutions to apply in order to ensure the implementation of these actions. Such solutions will be reconsidered for its integration in the replication plan as intermediate actions.

The four actions selected by the city of Palencia for being analysed through a PESTEL are:

- In the field of CITY INFRASTRUCTURE:

- Smart Action 1- To implement a district heating network which connect public and private buildings
- In the field of SMART MOBILITY :
 - Smart Action 2 : Deployment of electric vehicles for municipal services
- In the field of URBAN PLATFORM :
 - Smart Action 3 : Deployment of Energy Monitoring in Public Buildings
- In the field of NON-TECHNICAL ACTIONS:
 - Smart Action 4: Smart Citizen Platform

Most of the proposed actions seem very favourable in terms of environmental benefits, receiving the legal aspects an intermediate score in most of the cases. However, the results are different in the other aspects.

The implementation of District Heating in residential areas present the inconvenient of dependence of public and financing entities. However, public funds from the municipality can help to face this initial investment as well as the implementation of ESCO models.

The deployment of EV in municipal fleets has as objective to influence in the citizens and in special in those citizens that use vehicles for small distances (e.g taxis drivers, delivery companies). However, EV are not well accepted due to the technical barriers, the higher costs and the absence of infrastructure for charging. The manufacture plant of vehicles located close to the city could benefit of a change of tend in the use of vehicles, which will benefit to the citizens of Palencia for new contracts. However, current business network around the fuel combustion vehicles could be damaged. To face the lack of interest in this technology, information campaigns focused in the economic benefits of the EV in comparison with conventional cars could be launched by the municipality.

On the other hand, the municipality has a significant interest for the deployment of Energy Monitoring in Public Buildings with the intention to reduce the expenses of the energy bills of the municipality but also to extend these initiatives to private buildings. However, this initiative only can be applied in few public buildings given the lack of financing from other administrations.

Finally, the smart citizen platform presents a strong support of the municipality and will be financed by ERPF, which can influence in the modernization of the economy and the society of the city of Palencia. Nevertheless, this tool could be a source of critics to politicians. Specific measures will be applied in order to avoid the saturation.

The results obtained of the analysis of these four actions will be considered for the development of the replication plan of the city of Palencia.

2. Introduction

2.1 Purpose and Target

The objective of this deliverable is to describe the baseline assessment and the PESTEL analysis of Palencia's Initial Replication Plan and to provide an update of this replication plan. A first part consists to evaluate the current state and context of Palencia through a city level analysis based on specific smart and cities indicator evaluation. A second part consists to define and analyse the strategic plan of Palencia according to the main targets of the SEAPs, other relevant urban planning and lighthouse cities strategic plans. Based on the city level analysis and the strategic plan of the city, the action plan is then updated as well as the lists of selected smart actions. A PESTEL Analysis is then performed for selected actions. For actions whose PESTEL analysis is not entirely favorable, the context and identified difficulties would be analysed by taking inspiration from partner cities. This highlighted some solutions to apply in order to ensure the implementation of these actions. Such solutions would be integrated in the replication plan as intermediate actions required to carry out the concerned smart action.

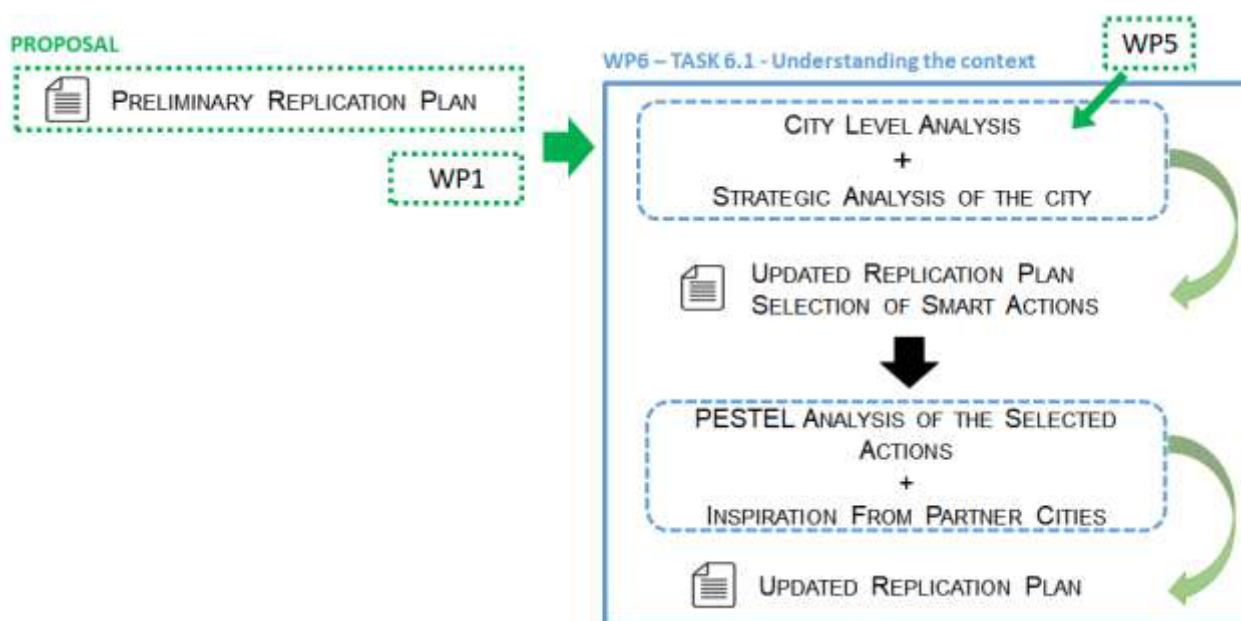


Figure 1: Several successive steps to update the replication plan

2.2 Contributions of partners

The following Table 1 depicts the main contributions from participant partners in the development of this deliverable.

Table 1: Contribution of partners

Participant short name	Contributions
NBK	Overall content production and deliverable leading
CAR	Overall content reviewing and leading contribution
TEC	Overall content support
PAL	City indicators, PESTEL analysis

2.3 Relation to other activities in the project

The following **Figure 2** depicts the main relationship of this deliverable to other activities (or deliverables) developed within the mySMARTLife project and that should be considered along with this document for further understanding of its contents.

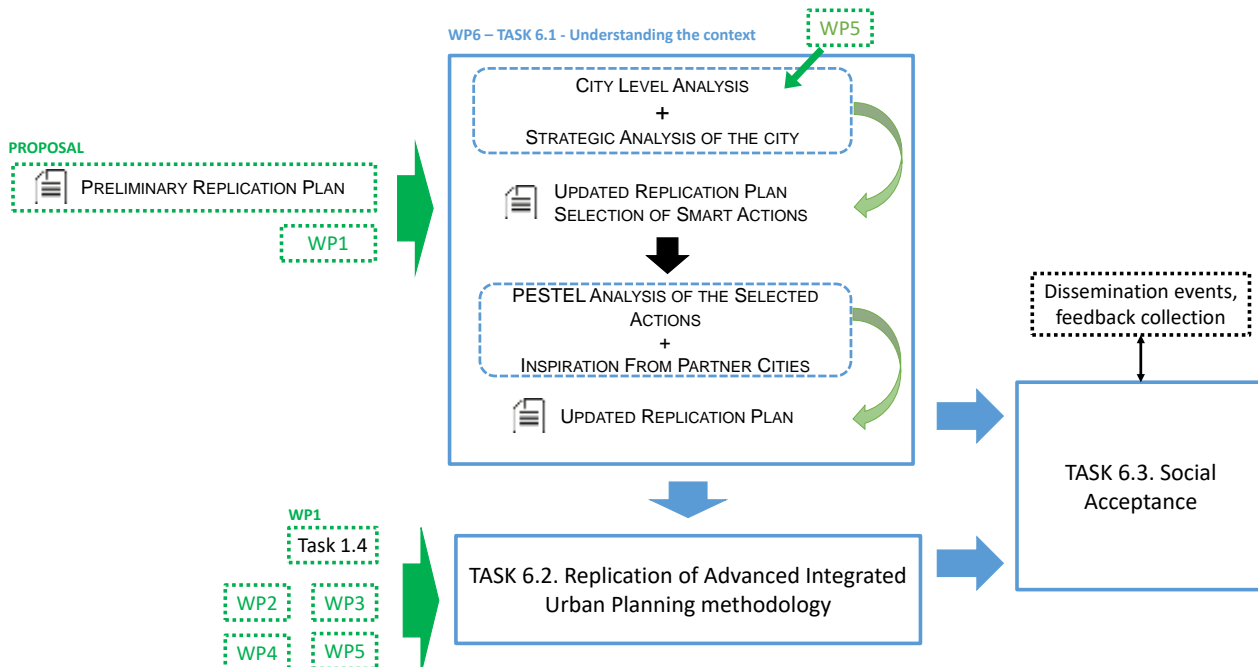


Figure 2: Relation to others activities in the project

3. City level analysis

In order to monitor and evaluate the effectiveness of the project actions and interventions, compared to initial situation, initial objectives and expected results, the WP5 of MySmartLife project aims to define an evaluation framework. It will be used for both Lighthouses and Followers cities evaluation. For the Followers cities it will be particularly useful for assessing and understanding the context of each city so that solutions can be chosen and adapted and for delivering adapted replication strategies and plans.

To elaborate this framework, previous work by CITYkeys and SCIS have been considered. This framework have two fold scope in order to measure and assess the project activities at Smart City Project level and Smart City level considering the five major themes defined by CITYkeys: People, Planet, Prosperity, Governance and Propagation and completed with specific smart city indicators. Starting from the definition of a smart city the indicators for smart cities focus on monitoring the evolution of a city towards an even smarter city.

The characterization of Palencia and its supporting data collection, provides the citywide integrated documentation and analysis of the current conditions required to identify the priority action lines as well as their management needs.

Through a range of city descriptors and indicators, information about the existing conditions including some of the key aspects for the sustainable development are collected and shown in a standardised manner: social, economic and environmental aspects. This information is essential to promote actions and management plans for implementing the sustainable urban regeneration model aiming in mySMARTLife project.

The characterization will follow the approach developed for the evaluation framework developed in WP5. While the overall framework and the full set of indicators will be depicted in WP5 related documents, this report includes a selected list of indicators aiming at covering the city characterisation. These indicators are divided into eight categories:

- General overview, climatic characterisation and geographic positioning
- Socio-economic characterisation
- Environmental characterisation
- Governance characterisation
- Citizen engagement characterisation
- City transportation characterisation
- Energy supply characterisation

- Urban infrastructures characterisation

Indicators from each category are presented separately on the following paragraphs. Inspired from CITYkeys (D1.4 Indicators for smart city projects and smart cities), the tables of selected city indicators are shown, discussing the application field, the title, the unit, a short description and the indicator evaluation for Palencia

- The application field is a common group where various indicators are applicable. Each application field has a dedicated paragraph.
- The title of the city indicator is phrased as evaluating a static situation. A static indicator, assessing the situation at a certain recurrence in time, will allow monitoring over various time periods.
- Important in the choice for the unit of the indicator is the comparability of indicators across a variety of cities differing in size, demography, dominant type of companies/sectors, etc. Here too, absolute values are not suitable. Consequently, most city indicators are defined as '%' or use a Likert scale.
- The description of the indicator are formulated either as a definition or as an interrogative form.

3.1 General overview, climatic characterization and geographic positioning

The city of Palencia is the capital of the province of the same name and it is located in north-norwest of Spain. The municipality takes part of the region of Castile and Leon and specifically from the geographical area "Tierra de Campos", traditionally known for the 'barn of Spain' because of the very large volume of cereal it annually produces.

Located to 749 m of altitude, it lies 235 Km north from Madrid and 200 km from Cantabro sea; the nearest coast. Figure below shows the location of the province of Palencia in the map of Spain.



Figure 3: Geographic positioning of Palencia

Palencia is a middle-size city that has 79,137 inhabitants on an area of 94.71 km². For its part, the alfoz of the city, made up of 10 municipalities, has more than 20,000 inhabitants, which together with those of the capital made a total of 97,482 people. With a low density per area, one third of the population, the most aged, lives in the center of the city and the rest in the other eleven neighborhoods. Urbanistically, it has an elongated shape since the city grows along the Carrion river on its west side and it is divided by a railway line.

The municipality of Palencia enjoys a continental Mediterranean climate with a wide thermal oscillation among seasons and an average annual temperature of 11.6°. The rains are light but frequent during the winter months, however, they are intense but infrequent in summer and it usually snows lightly several days a year.

Palencia, like most cities from Castilla y León, has a great historical-artistic heritage, which testifies to the importance it had in the past. However, despite having important monuments, Palencia is not a favorite city for tourism and although it grows every year the number of tourists does it very slowly.

The city is located between the cities of Spain with a greater landscaped area in relation to the number of inhabitants and has an extensive network of pedestrian streets in the center. Additionally, the city counts with a good quality of air and consequently for all these premises, the citizens have a high quality of life in terms of environment.

3.1.1 City features

Indicator title	Units	Description of the indicator	PALENCIA
Size	km ²	Land area of city	94.71
Population	Inh	Total number of persons inhabiting a city	79,137
Population density	Inh./km ²	Population per unit area in the city	836
People > 75 years	%	Population elder than 75 years old	11.3
Average population age	y	Average of the age of the population	46
Type of city	Typology	Typology of the city under study	Urban area

3.1.2 Land use

Indicator title	Units	Description of the indicator	PALENCIA
Land consumption	nº build/km ²	Measure of land use intensity and urban areas density	69.64
	km ² /km ²	Measure of land use intensity and urban areas density	0.34
Balance between residential and non-residential building use	%	Measure of land use diversity	96

3.1.3 CO2 target

Indicator title	Units	Description of the indicator	PALENCIA
CO2 target	%	Overall CO2 emission reduction target	20

3.1.4 Climate

Indicator title	Units	Description of the indicator	PALENCIA
Climate koppen geiger classification	Group	The Köppen climate classification scheme divides climates into five main groups (A, B, C, D, E), each having several types and subtypes. Each particular climate type is represented by a two- to four-letter symbol.	Csb (Warm temperature, summer dry, warm summer)

3.2 Socio economic characterisation

Palencia began its development into a city in the 11th century and was an important center for the textile industry by the 15th century. Then, the agriculture and agri-food industry started to take strength in the economic model of the city for being nowadays an important center for automotive and food industries which are placed in the municipalities of alfoz. Concerning the city, services are the main productive sector.

Their population ages rapidly because the birth rate is low and there is no sustained generational replacement. Historically, the city has received population from the province that has made to increase the

population. However, nowadays the city loses population at a rate average of 0.50% due to the emigration of young people in search of new opportunities to close municipalities such as Valladolid and Madrid.

On the other hand, the city counts with an excellent geostrategic position for the transporting of commercial goods, converting it in a link between Portugal and important cities from Spain. Furthermore, the proximity to the city of Valladolid (only 45 km far), which is the capital of Castilla y León, provides many advantages for the business to the city of Palencia, although also implies that population moves to a biggest city looking for leasures activities.

It has to be also mentioned that the first university of Spain was placed in Palencia in the century XIII, maintaining still the city a university centre for the implementation of several degrees as well technological centres associated to the university focused in the agri-food sector.

3.2.1 Education

Indicator title	Units	Description of the indicator	PALENCIA
Number of high edu degrees per 100,000 population	n/100,000 h	It is an indicator of well being and development = It is calculated collecting the number of higher degrees divided by one 100.000th of the total population	Non available

3.2.2 Employment

Indicator title	Units	Description of the indicator	PALENCIA
Unemployment rate	%	Unemployment	10.8
Youth unemployment rate	%	Youth unemployment	21.5

3.2.3 Economic performance

Indicator title	Units	Description of the indicator	PALENCIA
GDP	€/cap	Economic performance	22,689
Median disposable income	€/household	Economic wealth : Median disposable annual household income	27,641
New businesses registered	#/100.000	Economic activity, attractiveness	130

3.2.4 Equity

Indicator title	Units	Description of the indicator	PALENCIA
Fuel poverty	%-points in €	Equity : %-points of gross household income spent on energy bills	17
Population Dependency Ratio	#/100	Economic development = Number of economically dependent persons (net consumers) per 100 economically active persons (net producers)	57.65
Diversity of housing	%	Diversity = % social housing of total housing stock	Not available
Costs of housing	% in €	Equity : % gross household income spent on housing	31.41

3.2.5 Innovation

Indicator title	Units	Description of the indicator	PALENCIA
New startups	#	New business	103
Research intensity	% in euros	Innovation = R&D expenditure as percentage of city's GDP	0,99

3.2.6 Green economy

Indicator title	Units	Description of the indicator	PALENCIA
Green public procurement	%	Stimulating eco-innovation	Non available

3.2.7 Tourism

Indicator title	Units	Description of the indicator	PALENCIA
Tourism intensity	nights/100000	Number of night for 100,000 inhabitants	58,693

3.3 Environmental characterisation

Palencia is a green city, with more than 350.000 m² green area and gardens. In fact, it is one of the cities with largest landscaped area of Spain in relation to the surface area and was rewarded as sustainable city in 2010.

Furthermore, the city has an optimal quality of air due to its middle size and low density of the traffic and counts with a suitable wastewater plant. Concerning the treatment of waste, a new plant was built in 2006

which is supported by a good waste classification systems for paper, glass, plastic, clothes and batteries and clean points to the disposal of dangerous substances and goods of large volumen, being the average production of waste in the city of 0.87 kg per inhabitant (year 2015).

Finally, due to the intention to be a sustainable city, the municipality joined the Covenant of Mayors in 2010 with a commitment of reducing the CO₂ emissions in a 20% until 2020.

3.3.1 City environmental impact

Indicator title	Units	Description of the indicator	PALENCIA
Greenhouse gas emissions per capita	tonnes CO ₂ /capita	- tonnesCO ₂ / inhabitan (2010)	3.00
Greenhouse gas emissions (tertiary)	Mtonnes CO ₂ /year	- Mtonnes CO ₂ /year (2010)	0.05957
Greenhouse gas emissions (transport)	Mtonnes CO ₂ /year	-Mtonnes CO ₂ /year (2010)	0.02209
Greenhouse gas emissions (Residential)	Mtonnes CO ₂ /year	- Mtonnes CO ₂ /year (2010)	0.09328
Greenhouse gas emissions in buildings, equipment/facilities and Industries	Mtonnes CO ₂ /year	- Mtonnes CO ₂ /year (2010)	0.00873
Greenhouse gas emissions (Public lighting)	Mtonnes CO ₂ /year	- Mtonnes CO ₂ /year (2010)	0.002
Greenhouse gas emissions (Municipal)	Mtonnes CO ₂ /year	-Mtonnes CO ₂ /year (2010)	0.0062
Greenhouse gas emissions (Industry)	Mtonnes CO ₂ /year	-Mtonnes CO ₂ /year (2010)	0.06498
Transport greenhouse gas emissions per capita	t /(pers.·a)	Measure of the total greenhouse gas emissions per capita due to public and private transport.(2010)	0.28
Percentage of renewable energy use in public transport	%	Measure of the use of renewable energy in public transport. (2010)	0

3.3.2 Water resources

Indicator title	Units	Description of the indicator	PALENCIA
Water consumption	m ³ /cap/day	Water resources (2015)	0,19
Water re-used (rain/grey water)	% of houses	Water resources	Not available

3.3.3 Air pollution

Indicator title	Units	Description of the indicator	PALENCIA
NOx emissions	g/cap	Air pollution	Not available
PM 2,5 emissions	g/cap	Air pollution	Not available
Air quality index	index	Annual concentration of relevant air pollutants	Not available

3.3.4 Noise pollution

Indicator title	Units	Description of the indicator	PALENCIA
Exposure to noise pollution	% of people	Noise pollution. dB night time measured at receiver	Not available

3.3.5 Waste

Indicator title	Units	Description of the indicator	PALENCIA
Amount of solid waste collected	tonnes/capita/year	Waste	0.33
Recycling rate	% tonnes	Lower amount of waste. Percentage of city's solid waste that is recycled	16.5

3.3.6 Land consumption

Indicator title	Units	Description of the indicator	PALENCIA
Brownfield use	% of km ²	Share of brownfield area that has been redeveloped in the past period as percentage of total brownfield area	Not available
Compactness	inhabitants or workplaces / m ²	Efficient city plan	Not available

3.3.7 Urban heat island effect

Indicator title	Units	Description of the indicator	PALENCIA
Urban Heat Island	°C UHI _{max}	Maximum hourly difference in air temperature within the city compared to the countryside during the summer months	Not available

3.3.8 Food consumption

Indicator title	Units	Description of the indicator	PALENCIA
Local food production	% of tonnes	Share of food consumption produced within a radius of 100 km	Not available

3.4 Governance characterisation

Palencia has a clear commitment of reducing GHG emissions, of increasing the quality of life of its citizen, of decreasing energy demand and associated economic costs. This firm commitment is underpinned in the urban plans which have been developed by Palencia City Council.

The most relevant plans developed for the city of Palencia are described below:

- Local Agenda 21: Palencia City council started to work in the first Local Agenda 21 being the first municipal commitment to fighting climate change. This strategic plan allowed involving all the community for first time in the future strategy of the city.
- Sustainable Energy Action Plan: Palencia joined the Covenant of Mayors in 2010 and submitted the SEAP in 2015 with a commitment of reducing the CO₂ emissions in a 20% until 2020 what involves a reduction of 0,60 tons per habitant and year in basis to the baseline (year 2010).
- The Strategic Plan for the City of Palencia defines the model of development for the municipality for the period 2012-2020 and set the course for future activities in the city. This plan is focused on the principles of creation of employment, improvement of the life quality and positioning of Palencia, considering the sustainability as a key aspect to reach such objectives. Actions addressed in sustainability covers the efficiency energy in buildings, the use of sustainable transport and the extend use of ICT.
- The Strategy for a Sustainable Urban Development of Palencia is the result of a grant of 30 M€ from ERDF Funds and supposes a second phase for the implementation of the Strategic Plan. It consists of 18 programs for being implemented among 2016-2020 with a posible continuation towards 2022

focused in the use of new technologies, low carbon economy, protection of environment and social inclusion.

- The Sustainable Mobility Plan of the city of Palencia intends to implement a series of measures that positively affect the quality of life in the city, favoring the use of public transport, expanding spaces and creating itineraries for cyclists and pedestrians. Currently, it is in a preliminar phase where the mobility of the city is being characterized.
- Cycling mobility plan is a document elaborated in 2017 whose objective is to promote the urban use of bicycles in the city of Palencia. It consists of an extend diagnosis of the current urban use of bikes and the barriers found for concluding with a set of specific actions to be implemented in the municipality.

On the other hand, the municipality takes part of the Smart City of Valladolid-Palencia, named as Smart city VyP. It started with the aim of promoting and favouring the union of these cities, since they are only separated for 45 km, through the deployment of innovative projects applied to both urban scenarios and interurban scenarios. This Smart City initiative addresses the concept to Smart City from a point of highly innovative view: consider not one, but two cities, nearby and different characteristics, thus adding transport from one city to another as a problem more within the Smart City since many citizens move daily from one city to another to work or study, together with the transport of urban and interurban goods. The strategic line is situated within the frame of urban city model for Palencia and is focused on five different axis: Energy, Environment, Logistics & Transport, Citizens and Tourism in order to improve several aspects of the quality of life in Palencia, dealing with the urban environment in general, but also, in particular, urbanism, mobility, energy and natural resources rational use (including savings), among other areas including sustainable development.

Concerning the public procedures, the tenders have/will incorporated energy efficient as award criteria and it is foreseen to include the considerations of bioclimatic architecture and environmental planning in the General Plan of Urban Planning.

3.4.1 Urban planning

Indicator title	Units	Description of the indicator	PALENCIA
Existence of an Agenda 21	YES/NO	Has the city elaborated an Agenda 21?	YES
Existence of local sustainability plans	YES/NO	Is there any specific sustainability plan in the city?	YES
Existence of Smart Cities strategies	YES/NO	Is there any specific Smart Cities strategy in the city?	YES

Signature and compliance of the Covenant of Mayors	YES/NO	Has the city signed the Covenant of Mayors. And Is the city complying with it? (both questions need to be answered)	YES
Existence of plans/programs to promote energy efficient buildings	Number of plans	Is there any specific plan for promoting energy efficient buildings in the city?	4
Existence of plans/programs to promote sustainable mobility	YES/NO	-	YES
	Number of plans	Is there any specific plan for promoting sustainable mobility in the city?	2
Existence of regulations for development of energy efficient districts	Number of regulations	Is there any specific regulation for developing energy efficient districts in the city?	0
Existence of regulations for development of sustainable mobility	Number of regulations	Is there any specific regulation for developing sustainable mobility in the city?	1
Existence of local/national Energy Performance Certificate (EPC)	YES/NO	Is there any specific EPC for buildings in the city?	YES
Share of Green Public Procurement	%	Percentage annual procurement using environmental criteria as share of total annual procurement of the city administration	Not available
Climate resilience strategy	Qualitative Likert scale	The extent to which the city has developed and implemented a climate resilient strategy	6
Smart city policy	Qualitative Likert scale	The extent to which the city has a supportive smart city policy	5
Preservation of cultural heritage	Qualitative Likert scale	Identity of place based on its history = the extent to which preservation of cultural heritage of cultural heritage of the city is considered in urban planning	5

3.4.2 Public procurements and regulations

Indicator title	Units	Description of the indicator	PALENCIA
Level of correspondence between local energy codes	YES/NO	Is there any discrepancy between different local energy codes for buildings?	YES
Level of correspondence with national regulation	YES/NO	Is there any discrepancy between local codes and national regulation?	NO
Level of correspondence with European legislation	YES/NO	Is there any discrepancy between local codes and European legislation?	NO
Level of correspondence with international construction standards	YES/NO	Is there any discrepancy between local codes and international construction standards?	NO

3.4.3 Citizen participation

Indicator title	Units	Description of the indicator	PALENCIA
Voter participation	%	The percentage of people that voted in the last municipal election as share of total population eligible to vote	66.15

3.4.4 Governance collaboration

Indicator title	Units	Description of the indicator	PALENCIA
Cross-departmental integration	Qualitative Likert scale	The extent to which administrative departments contribute to "Smart City" initiatives and management	4

3.4.5 Online government data

Indicator title	Units	Description of the indicator	PALENCIA
Availability of government data	Qualitative Likert scale	The extent to which government information is published	4

3.4.6 Open government dataset

Indicator title	Units	Description of the indicator	PALENCIA
Quantity of open data	#/100.000	Quantity of open data sets provided by city's open data portal	32.5

3.4.7 Collaboration

Indicator title	Units	Description of the indicator	PALENCIA
Multilevel government	Qualitative Likert scale	The extent to which the city cooperates with other authorities from different levels	4

3.5 Citizens engagement characterisation

Palencia has several channels for informing and consulting the citizens as well as for improving the citizen engagement. Firstly, it has to mention the figure of the neighbourhood associations and youth associations as motors of reactivation of the city. Currently, it exists 17 associations that act as citizen representatives and are invited to launch initiatives to be executed by the town council as well as to provide their opinion about municipal decisions. In addition, the website of the municipality is a usual channel of communication and for exchange information with citizens, existing a reserved space for inquiries, opinions and complains of the citizen on the municipal services.

On the other hand, the municipality publishes newsletters for promoting the activities performed in the city and counts with several social media (facebook, twitter) in which citizens can be informed about news of the city as well as to report any feedback.

Additionally, Palencia is subscribed to European Mobility week and another activities in order to increase citizen's engagement.

Finally, the municipality intends to promote a governance model based on citizen participation, public-private collaboration and cooperation between institutions and between territories. Some initiatives have been carried out in this sense, although there is still room for improvement of the citizen engagement process. A good example of this initiative is the opportunity left for the citizens for make proposals for the design of the future renovation of a mytical park of the city. Other destacable initiatives consists of the involvement of different key stakeholders in the redaction of the sustainable mobility plan and the strategic plan for the city as well the participation of citizens in the city diagnosis of those plans by collecting their point of view in questionnaires and interviews.

3.5.1 Channels of communication

Indicator title	Units	Description of the indicator	PALENCIA
Number of local associations per capita	Number of consultations / inhab.	Total number of citizen associations in the city	0.014
Number of information contact points for citizens	Number of information points	Total number of information contact points, related to municipal citizen offices, information about energy efficiency, mobility, environment, etc.	1
Number of municipal websites for citizens	Number of municipal websites	Total number of municipal websites for citizens (citizen participation portal, open data, transparency, etc.)	1
Number of interactive social media initiatives	Number of social media links	Total number of municipality links in social media channel as Facebook, Twitter, YouTube, etc.	2
Number of discussion forums	Number of forums	Total number of discussion forums dedicated to the citizens	3

3.5.2 Accesibility of services

Indicator title	Units	Description of the indicator	PALENCIA
Access to public amenities	%	Basic services available close to home = Share of population with access to at least one type of public amenity within 500m	Not available
Access to commercial amenities	%	Basic services available close to home = Share of population with access to at least six types of commercial amenities providing goods for daily use within 500m.	Not available

3.5.3 Diversity

Indicator title	Units	Description of the indicator	PALENCIA
Diversity of housing	%	Diversity = % social housing of total housing stock	Not available

<p>Preservation of cultural heritage</p>	<p>Qualitative Likert scale</p>	<p>Identity of place based on its history = the extent to which preservation of cultural heritage of the city is considered in urban planning</p>	<p>5</p>
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3.6 City transportation characterisation

Palencia has not problems of traffic except for the light congestion in peak time due to working and children school delivering in working days. In any case the routes in the city are measured in minutes.

The city is making efforts in the area of sustainable mobility, implementing pedestrian areas in the town center, promoting environmentally sustainable public transport and extending the use of bicycle.

The city counts with 14 buses that run 6 lines and cover the twelve neighborhoods and the most significant areas and places of the city. Recently, the fleet has incorporated a hybrid bus which can operate with electricity and biodiesel and which travels in the most used line. It has technology adapted for people with visual and hearing disabilities, Wi-Fi connection, geolocation and connection to charge mobile devices. All these buses are monitorized so that the user can know where the bus is and how long it takes to get. Additionally, the city incorporated two e-carsharing service points with a total of four vehicles that were located strategically next to the train station and the city center to be used for travelers and visitors. Furthermore, the city has a network of 14 chargers distributed by the city.

A significant investment has been made for promoting the use of bike. Currently, the lenght of bike route network and an intelligent parking for bicycles, that is actived through a mobile application, has been recently implemented. This sytem has been placed next to the train station and a public garden that will be completely renovated in order to be a reference of the city in terms of smart city concept with the intention that was the first image of visitors and travellers that arrive Palencia from the train and bus stations that are just next to. Finally, it has to mention that the high speed train stops in Palencia since 2015 which can foster the economic growth of the city. Unfourtunately, a system of bicycle loan of 45 bikes located in 5 points of the city was cancelled since it was not well-accepted by the citizens.

3.6.1 Mobility city profile

Indicator title	Units	Description of the indicator	PALENCIA
<p>Total number of public transport vehicles</p>	<p>Number of vehicles</p>	<p>Number of public vehicles that are destined to public transport (bus, taxis...)</p>	<p>66</p>
<p>Number of fossil fuelled four wheels vehicles per capita</p>	<p>n/ cao</p>	<p>Number of fossil fuelled vehicles (four wheels) of the city divided by type: public and private</p>	<p>1.38</p>

Vehicle fuel efficiency	kWh/100km	Total energy consumed for vehicles/total amount of vehicle kilometres completed	Not available
Fuel mix	%	Percentage of the market share of transport fuel for each type of fuel used in given period	99.86
Average occupancy	number of passengers per vehicle	Average of number of passengers per vehicle per trip	Not available
Average vehicle speed	km/h	Average network speed by vehicle (peak/off-peak)	Not available

3.6.2 Sustainable transport

Indicator title	Units	Description of the indicator	PALENCIA
Number of Electric Vehicles (EV) in the city	n/100.000	Number of electric vehicles in the city per 100.000 including private, public and service (taxi and first mile) vehicles including also motorbikes	51 EV
Public transport use	#/cap/year	Annual number of public transport trips per capita	Not available
Access to public transport	%of people	Share of population with access to a public transport stop within 500m	Not available
Access to vehicle sharing solutions	#/100 000 people	Number of vehicles available for sharing per 100.000 inhabitants	4 vehicles
Length of bike route network	km/100000 people	Length of lanes in the city for bikes per 100,000 inhabitants	21 km

3.6.3 Charging points

Indicator title	Units	Description of the indicator	PALENCIA
Total kWh recharged in the EV charging stations.	kWh	Number of kWh recharged during a year in the public charging stations. It will be required to infrastructure operator and vehicle owners in order to compare this indicator with energy consumption and distance travelled.	Not available
Charging points per eVehicle	%	This indicator measures the number of public charging points related to the	0.54

		total amount of electric vehicles in the city.	
Total charging points	#	Total number of public charging points	15
Recharges per year	#/year	Usage of the recharging points	Non-available
infrastructure growth e-car	[number of e-car charging]	Total number of public charging points in the city for e-cars	13
infrastructure growth e-bike	[number of e-bike charging]	Total number of public charging points in the city for e-bikes	13

3.6.4 Transport problems

Indicator title	Units	Description of the indicator	PALENCIA
Congestion	% in hours	Increase in overall travel times when compared to free flow situation (Uncongested situation)	Not available
Traffic accidents	#/100 000 people	Number of transportation fatalities per 100 000 population/year	0.00258

3.7 Energy supply characterisation

The largest consumer of energy in Palencia is the residential sector that uses individual heaters of natural gas mainly, gas-oil and electricity followed by the industrial sector and services. The City of Palencia participates in different projects focused in the reduction of emissions and energy consumption through efficiency measures. Example of these projects are: the change of public luminaires by efficient led luminaires managed to reduce more than 21% CO₂ emissions from the municipality, rehabilitation of more than 510 houses in the center of the city to improve their energy efficiency and sponsoring the construction of a heating network by district, the installation of PV for electrical supply and solar thermal system to produce hot water in public buildings and clean fleets project development optimizing public transport.

3.7.1 City energy profile

Indicator title	Units	Description of the indicator	PALENCIA
Final energy consumption per capita	MWh/capita	-	13.31

Final energy consumption (Transport)	TWh/year	-	0.084
Final energy consumption (Buildings, equipments/facilities and Industries)	TWh/year	-	0,9
Final energy consumption (Municipal)	TWh/year	-	0.028
Final energy consumption (Tertiary)	TWh/year	-	0.25
Final energy consumption (Residential)	TWh/year	-	0.43
Final energy consumption (Public lighting)	TWh/year	-	0.0095
Final energy consumption (Industry)	TWh/year	-	0.31
Final energy consumption (electricity)	TWh/year	-	0.001
Final energy consumption (Heat/Cold)	TWh/year	-	Not available
Final energy consumption (Fossil fuels)	TWh/year	-	1.089
Total buildings energy consumption per year	GWh/inhab.year	Residencial consumption in the city for heating and electricity uses	5.31
Final energy consumption per capita	MWh/capita	-	13.31

Primary energy consumption in the city per year	GWh of PE/year	Gross inland consumption of the city excluding non-energy uses	Not available
Primary energy consumption per capita	MWh/capita	-	Non available
Primary energy consumption (Transport)	TWh/year	-	Not available
Primary energy consumption (Buildings, equipments/facilities and Industries)	TWh/year	-	Not available
Primary energy consumption (Municipal)	TWh/year	-	Not available
Primary energy consumption (Tertiary)	TWh/year	-	Not available
Primary energy consumption (Residential)	TWh/year	-	Not available
Primary energy consumption (Public lighting)	TWh/year	-	Not available
Primary energy consumption (Industry)	TWh/year	-	Not available
Primary energy consumption (electricity)	TWh/year	-	Not available
Reduction of primary energy use	%	Target	Not available

3.7.2 Renewable energy

Indicator title	Units	Description of the indicator	PALENCIA
Final energy consumption (Renewables)	TWh/year	-	0.0042
Share of local energy production to overall final energy consumption	%	-	2.38
Renewable electricity consumed within the city	%	The percentage of electric energy derived from renewable sources, as a share of the city's total energy consumption	2.38
Non-RES Heat/ Cold production	TWh/year	-	Not available
RES Heat/Cold production	TWh/year	-	Not available
Non-RES Electricity production	TWh/year	-	Not available
RES Electricity production	TWh/year	-	4.2
Renewable energy per carrier	GWh/RES_supplier	Energy that each renewable systems provides to the city	4.20
Percentage of renewable energy	%	Amount of energy coming from the renewable sources	2.38
Green electricity purchased	%	The percentage of green electricity purchased, as a share of the city's total electricity consumption	Not available

3.7.3 Energy mismatch

Indicator title	Units	Description of the indicator	PALENCIA
Maximum Hourly Deficit (MHDx)	kWh	Energy mismatch : The maximum yearly value of how much the hourly local electricity demand overrides the local renewable electricity supply during one single hour	Not available

3.7.4 Energy monitoring

Indicator title	Units	Description of the indicator	PALENCIA
Smart energy meters	% of buildings	This indicator is the percentage of smart meters coverage on the energy	Not available

		distribution network; it could be distinguished for electric and methane or heat networks.	
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3.7.5 Energy systems

Indicator title	Units	Description of the indicator	PALENCIA
Number of connections to a district heating network	% of buildings	Number of houses connected to a district heating network of the city	0

3.7.6 Potential of retrofitting

Indicator title	Units	Description of the indicator	PALENCIA
Refurbished buildings improving energy performance	% of refurbished buildings	Number of buildings subject to refurbishment improving their energy profile above the EPBD (Energy Performance of Buildings Directive) requirements	Not available

3.8 Urban infrastructure characterisation

Palencia has a secure web platform that is open to the citizen and that will be transformed and joined to the new service management platform that will monitor the existing intelligent public lighting, the existing intelligent garbage collection and treatment service, monitoring of energy consumptions of the administrative buildings, management of water resources for the irrigation of gardens, monitor the consumption of drinking water through future smart meters, the management of rental bicycles, monitoring of the management of urban fleets, etc ...

3.8.1 Liveability of neighbourhoods

Indicator title	Units	Description of the indicator	PALENCIA
Use of groundfloors	m2	Liveability of neighbourhoods	Not available

3.8.2 Green spaces

Indicator title	Units	Description of the indicator	PALENCIA
Green and blue space	m2	Nature and recreation possibilities	600,230

3.8.3 Traffic management

Indicator title	Units	Description of the indicator	PALENCIA
Traffic management system	YES/NO	Is there an automated traffic management system in the city?	YES
Parking management system	YES/NO	Is there an automated parking management system in the city?	YES
Public bicycles management system	YES/NO	Is there an automated public bicycles management system in the city?	NO
Public transport management system	YES/NO	Is there an automated public transport management system in the city?	YES
Number of public transport stops with real time info	%	Number of public transport stops with real time information. ICT applied to public transport needs accuracy and territorial coverage	Not available

3.8.4 Lighting management

Indicator title	Units	Description of the indicator	PALENCIA
Lighting system connected	YES/NO	Is there an automated lighting management system in the city?	YES

3.8.5 Waste management

Indicator title	Units	Description of the indicator	PALENCIA
Waste management system	YES/NO	Is there an automated waste management system in the city?	YES

3.8.6 Communication infrastructure

Indicator title	Units	Description of the indicator	PALENCIA
Access to public free WiFi	%	Attractiveness, accessibility of online services	0
Access to high speed internet	%	ensure good city connectivity and the provision of efficient digital infrastructures	Not available
Number of phone connections per 100,000 inh	Connections/100.000 hab.	Total number of cell phone connections in the city in relation to the population of the city	Not available
Number of Internet connections per 100,000 inh	Connections/100.000 hab.	Total number of internet connections in the city in relation to the population of the city	Not available

3.8.7 Urban platforms

Indicator title	Units	Description of the indicator	PALENCIA
Cybersecurity	Qualitative Likert scale	Data protection, security of ICT systems	5
Data privacy	Qualitative Likert scale	The level of cybersecurity of the cities' systems	5
Number of data publishers	#	Number of data publishers that publish data into the existing urban platform	Not available
Number of sensors/devices connected**	#	Number of IoT sensors/devices from any field that are connected in the current urban platform	0
Number of services deployed	#	Number of available services in the current urban platform	0
Number of available Open APIs	#	Number of available APIs in the current urban platform	0

Number of available Open Data sources	#	Number of available Open Data sources in the current urban platform	0
Number of accesses to the urban platform APIs	#	Number of accesses that have been made into the APIs of the urban platforms	0

4. Applying strategic analysis

4.1 Replication plan update

(Associated with document Ref. Ares (2016)5909815 - 13/10/2016)

4.1.1 Main targets of the SEAPs or other relevant urban planning

The basis for the replication plan and the selection of solutions in the city of Palencia are the local policies and the work carried out by the municipality in the projects derived from participation in networks of intelligent cities.

Below are reported the main commitments made by the city of Palencia on efficiency and use of renewable energies in the most important plans of the city: SEAP, Palencia Strategic Plan and the Strategy for a Sustainable Urban Development in Palencia.

- SEAP Covenant of Mayors

In this Plan the city council realized that the biggest amount of CO₂ emissions were taken place in the residential area and in the private mobility. However, the action plan is mainly focused in the emissions that can control the council, which correspond with 43% of total emissions and which implies **the energy efficiency in public buildings, public lighting and public transport**. The commitment made is the reduction of CO₂ emissions by a 20% in 2020.

- Palencia Strategic Plan 2012-2020

This plan has as a target to enhance and promote local development with the available resources (economic, social, environmental, cultural, etc.) to strengthen the competitive positioning of Palencia and its suburbs and to define a new model of city management based on sustainability.

Table below summarizes the priority areas for empower sustainability in the future model of Palencia according as it is structured the plan.

Estrategy	Program	Actions
E1: Health and Live	Housing policies	Housing rehabilitation
	Sustainable urbanism	Efficiency in public buildings and vehicles
		Bioclimatic buildings
E2: Environment	Sustainable mobility	Diagnosis of the mobility profile in the city
		Development of a participative action plan for sustainable mobility

E5: Governance	Good government	Simplification of administrative procedure
		Digital administration
		Portal for citizen engagement

- Strategy for a Sustainable Urban Development in Palencia for period 2016-2020/20222

The 18 programs for being implemented among 2016-2020 with a possible continuation towards 2022 are focused in the use of new technologies, low carbon economy, protection of environment and social inclusion.

4.1.2 Which actions and solutions (technical and non-technical) that are going to be implemented in mySMARTLife project are already in the city planning for a near future?

Actions identified in the urban planning of Palencia are aligned with the solutions to be implemented in mySMARTLife project as it can be checked below in the list of planned actions in the city of Palencia.

Those local actions already planned in the city of Palencia that will be analyzed through PESTEL are marked in *italics*.

Palencia Strategic Plan 2012-2020

E1: Health and Live

- Development of programs aimed at the promotion of housing rehabilitation

E2: Environment

Sustainable urbanism

- *Deployment of efficiency in public buildings through the realization of energy audits, reduction of the energy demand and the use of RES*
- Deployment of efficient public lighting by replacement of the old lamps
- Introduction of efficient criteria in the tenders for contracting public transport.
- Development of municipal ordinances on energy sustainability.
- Introduction of bioclimatic buildings as well as environmental planning in the General Plan of Urban Planning.
- Development of municipal ordinances in the field of bioclimatic architecture

Sustainable mobility

- Develop a diagnosis of the mobility profile of the city of Palencia.
- Development of a participative action plan for promoting sustainable mobility based on the extent of the use of bike, pedestrian areas and use of EV and support of public transport.
- *Replacement of public vehicles by sustainable vehicles.*

E5: Governance

- *Simplification of administrative procedures with the purpose of creating a single window and through the use of ICTs*
- *To get better the municipal web portal to allow the total electronic administration, agglutinating all the municipal services of the city under a single portal*
- *Promote the citizen engagement through different ways (website, social media, etc).*

Strategy for a Sustainable Urban Development in Palencia for period 2016-2020/20222

- *Electronic Administration and Transparency Portal*
- *Digitization and georeferencing project of the city*
- *Promotion of the use of the bicycle*
- *Electric mobility: car sharing system and increase of recharging posts*
- *Stops on demand of urban transport and car sharing platforms*
- *Renewal of bus fleets and municipal vehicles by hybrid vehicles*
- *Creation of areas of pedestrian routes*
- *Replacement of public lighting and installation of LED lamps and point-to-point control*
- *Installation of District Heatings in public buildings: educational centers*
- *Systems for minimizing energy demand for heating and cooling*
- *Promotion of the use of renewable energies in public buildings*
- *Plan of rehabilitation and urban regeneration of Palencia*
- *Valorization of the green areas of the city*
- *Valorization of the surroundings of the Carrión River*
- *Economic regeneration of the disadvantaged neighborhoods of the city*
- *Regeneration of the social housing environment located in disadvantaged urban areas*
- *Enabling spaces for groups in disadvantaged urban areas*
- *Social regeneration: social services linked to health; special attention to the elderly*


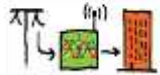









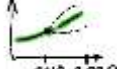

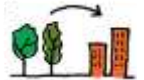


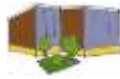





SEAP



- *Project for adaptation and rehabilitation of a traditional market in the city*
- *Conducting energy audits of all public buildings*
- *Change of fossil fuel boilers by biomass boilers in the schools of the municipality*
- *Minimization of the energy demand for the heating and cooling of buildings, as well as the promotion of renewable energies.*
- *Change of fleet of municipal vehicles that run on diesel and gasoline for vehicles that use less polluting fuels*
- *Promotion of public transport that uses non-polluting and sustainable energy sources*

- Provide emission reduction devices to the bus fleet
- Incorporation of energy efficiency criteria in the contracting of public transport
- Replacement of the exterior lighting of Palencia by another of greater efficiency
- Development of programs aimed at the promotion of housing rehabilitation
- Public information campaign for citizens on the importance of being energy efficient
- Public information campaign for entrepreneurs on the importance of being energy efficient
- Expansion of the network of bike lanes
- Creation of pedestrian areas and itineraries that connect different neighborhoods with the center and each other
- Creation of dissuasive parkings in the outskirts of the city
- Electric vehicle impulse plan
- Platforms of shared cars for the Palencians who travel to work
- Campaigns promoting more efficient driving habits and the use of public transport
- Control of the circulation of heavy vehicles in urban areas
- Limitation of circulation, improvement of signaling and construction of elevated pedestrian crossings
- Design of new gardens and green areas



Finally, those solutions from mySMARTLife project that have been already implemented in the city of Palencia have been described in the table below.

DISTRICT/BUILDING	CITY INFRASTRUCTURES	MOBILITY	NON-TECHNICAL ACTIONS
 Domotics & Smart Controls	 Smart Grids	 Electric Vehicles	 Policy Improvements
		4 public EV: 3 cars and 1 van 1 hybrid bus	SEAP, Strategic for the Sustainable Urban Plan of the city
 Building Integrated RES	 District Heating	 Charging Stations	 Innovative Businesses
PV in public buildings (5-10 kw)		14 charging points	
 Storage	 Public Lighting	 Demand mgt: eV ↔ Grid	 Urban Planning
	One third of public lamps reemplaced by efficient LED technology		Strategy for a Sustainable Urban Development of Palencia in the period 2016-2020
 Retrofitting	 Urban RES	 Urban Freight (Logistics)	 Citizens' Engagement
 New Buildings	 Thermal Storage	 Multi Modality	 Staff Exchange
		Car-sharing: 3 hybrid vehicles and 1 electric vehicle	
	 Electrical Storage	 I.T.S	

URBAN PLATFORM AND ICT DEVELOPMENTS	
 Urban Platform	 IoT
Intelligent Transport System (ITS) in traffic management not totally implemented.	

4.1.3 Which actions from the set of actions that are going to be implemented in mySMARTLife project are closer to the city interests, so could be replicated in the future?

The actions that are closer to the city interests will be the ones that the city council thinks have more chances to be replicated by the private capital in the city. Specifically the interest of each type of intervention is described below:

- **Building & District:**

- Heating is the main responsible of energy consumption and GHG emissions in the residential sector so that a high emphasis will be placed in encourage the investment of private capital in RES and in special in **biomass boilers**. For reaching this objective, the city council intends to reemplace the fossil fuel boilers of public buildings.
- In addition, **smart controls** seem interesting in order to promote the benefits of energy measures and consequently influence on the citizens behaviour in the daily routines and make easier the introduction of energy measures at dwelling scale.

- **City infrastructure:**

- Given the potential for energy savings detected in the **municipal lighting installations**, the objective of the Municipality of Palencia, owner of the facilities, is to perform an energy management by the reemplacement of old lamps by LED technology.
- In addition, the installation of **DH systems** is interested in order to do actions at larger scale in order to reach a big impact in the city but also extend the benefits of the use of RES to a bigger number of citizens.

- **Mobility:**

- **EV** is one of the priorities of the city in order to make people familiar with this technology and consequently encourage to the investment of private companies in charging infrastructure. The city will continue investing in electric vehicles in all the variables: e-carsharing, multimodality, public transportation and urban freight.
- **Charging Stations** will be another opportunity to create a charging infrastructure management, also finding new ways of integration of EV charging point, energy storage and solar plant.
- **Smart urban mobility:** The city is defining the technical requirements to build a network of smart bicycle loans, based on the management of an application so that the user has the possibility of knowing the nearest parking points of bikes, optimal routes, information of the municipal space in base to geolocation and open data of the city.

- **Optimization of urban transport in low-use lines:** The city is defining the technical requirements to implement an interactive system between the user and the urban transport management.
- **Urban platform:** These are measures that directly affect the perception of the city by citizens and visitors.
 - **Smart metering:** To invest in energy monitoring systems in emblematic public buildings is a strategy to extend these measures to private buildings..
 - **Smart water metering:** The city is working in the requirements to implement smart water metering in the residencial areas of Palencia.
 - **Intelligent automatic irrigation:** The city is working to define the requirements to transform the existing automatic irrigation into an irrigation conditioned by climatological factors, supporting sustainable water management of municipal irrigation.
 - **Intelligent Transportation System.** The municipality would like to manage the traffic with visual monitoring, dynamic information, parking information which allow to direct vehicles for alternative roads.
 - **Open Data GIS platform.** The city is working to define the requirements to create a portal of free data that contain geolocation platforms and data of interest to citizens.
- **Non Technical Actions**
 - **Citizen engagement:** The city is interesting in deploy web/App platform for promoting the communication among citizen and local government. This channel will be addressed to the collection of information, suggestions, complaints and incidents about the city.

4.1.4 How will the financing be of these selected actions? Other programmes are envisaged like ESIF or ERDF funds?

The city of Palencia has received recently a large financiación from ERDF funds to deploy the Strategy of Sustainable Urban of the City among 2016-2020 with a possible continuation towards 2022. The grant gained is 30 M€. This strategy is based in the use of new technologies, low carbon economy, protection of environment and social inclusion. Therefore, selected actions could be financed by these public funds. On the other hand, since these actions are cost-effectiveness due to the long-term savings, the municipality could face the upfront costs. In addition, the city is very active in the preparation of proposals for funding their initiatives so that this could be other source of financiación. Finally, private sector could be interested to invest in certain measures, so that this option could be included in the financiación plan of the actions.

4.1.5 Which stakeholders (local, regional or national) are close/engaged to the city to support the city transformation?

These actions, which involve the city transformations, are also included in the Strategic Plan of Palencia where all the main city stakeholders had the opportunity to participate, existing a list of stakeholders attending from the very beginning of the Plan. These stakeholders correspond with public bodies from different administrations, neighbourhood associations, university, relevant large companies and SME of the city, Official College of Engineers and Architects of Palencia, NGOs, etc.

Furthermore, the participants of the platform "Smart city Valladolid and Palencia" have regular meetings to exchange impressions about how to continue the transformation of the city of Palencia into a smart city. This initiative is formed by 24 private companies and supported by local and regional government, being the secretary held by CARTIF.


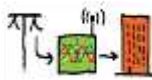









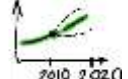




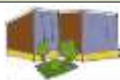





4.2 Selection of smart actions



After reviewing the wide number of actions to be implemented in mySMARTLife project and after taking into account the priorities identified in the urban planning of the city of Palencia, the smart actions selected to be considered in the replication plan are the following :

- In the field of CITY INFRASTRUCTURE:
 - Smart Action 1- To implement a district heating network which connect public and private buildings
- In the field of SMART MOBILITY :
 - Smart Action 2 : Deployment of electric vehicles for municipal services
- In the field of URBAN PLATFORM :
 - Smart Action 3 : Deployment of Energy Monitoring in Public Buildings
- In the field of NON-TECHNICAL ACTIONS:
 - Smart Action 4: Smart Citizen Platform

These actions are detailed in the following PESTEL analysis sub-sections:

Table 2: Selection of smart actions

DISTRICT/BUILDING	CITY INFRASTRUCTURES	MOBILITY	NON-TECHNICAL ACTIONS
 Domotics & Smart Controls	Smart Grids 	Electric Vehicles 	Policy Improvements 
		Deployment of EV in the municipal fleet	
Building Integrated RES 	District Heating 	Charging Stations 	Inovative Businesses 
	District heating network		
Storage 	Public Lighting 	Demand mgt: eV ↔ Grid 	Urban Planning 
Retrofitting 	Urban RES 	Urban Freight (Logistics) 	Citizens' Engagement 
			Smart Citizen Platform
New Buildings 	Thermal Storage 	Multi Modality 	Staff Exchange 
	Electrical Storage 	I.T.S 	

URBAN PLATFORM AND ICT DEVELOPMENTS	
 Urban Platform	 IoT
Deployment of Energy Monitoring in Public Buildings	

5. PESTEL analysis

5.1 Methodology

The purpose of this document is to update the replication plan. It is therefore necessary to analyse the selected actions in an urban context. Thus, one objective is to identify the opportunities and the barriers to the implementation of these actions. This will make it possible to study the feasibility of their implementation, but also to give priority to actions with a favorable context and to raise the barriers for other actions. The actions with a difficult context can then be compared with similar actions set up in partner cities and solutions can be sought to overcome the identified barriers. Use of PESTEL tool in the earliest stage, can be done to meet these objectives.

The objective of the PESTEL analysis is to evaluate the feasibility of each smart action considering the different Political, Economic, Social, Technological, Legal and Environmental implications for each. It consists to assess the strategic viability of the different actions based on a series of questions. The methodology, and specifically these questions come from the STEEP deliverable "D2.3 Guidelines for prioritising interventions" which aims to provide a set of guidelines and principles that can be applied in any city for prioritising interventions regarding energy efficiency.



Figure 4: PESTEL Analysis

In order to evaluate actions regarding each field it is required to provide evidence regarding the success of this particular intervention to give this a 'score'. On this Project, as on the STEEP Project, 5 level score is used represented with a specific colour. Performance of a given action is rated from 'exemplary' to 'best

practice', 'good practice', 'minimum standard' and finally the 'sub-standard'. The higher the environment (incentives or lack of barrier) is favorable to the development of the solution the higher will be the score. In some cases it may be difficult to understand the question this way, then answer considering that: if the solution and the environment go both towards the same positive direction, then the score is high. The objective of this score is not to assess the performance of the city in overcoming the barriers, but a score to help the decisions about implementing or not a new action and also to prioritise these actions.



Figure 5: Scoring method inspired from STEEP D2.3

When all selected actions would have been evaluated with PESTEL analysis it would be then possible to prioritise some specific actions. To overcome identified barriers, solutions will be sought from partner's cities. Such inspired solutions will be then added to the replication plan.

5.2 PESTEL analysis for Smart action 1: District Heating

5.2.1 Short description

In order to reduce greenhouse emissions and the energy bill costs derived of the use of fossil fuels in buildings, we found that replacing the existing gasoil boiler of three municipaly buildings by a District Heating feeded with biomass as an ideal solution. Such buildings correspond with a Public Library, the Local Police Building and a Public Service Center. Apart of these buildings, we expect that two private buildings (Art School and a Kindergarten) and private residential buildings (around 160 dwellings) can also be connected once the District Heating is in service with proper promotion.

5.2.2 Political Factors

In an urban DH network project, the Local Government may play a very important role in terms of planning the territory for allow the authorizations for its installation as well as granting aids for the energy solution. In addition, the council city can participate actively in the project, with the degree of implication and financing that decides: from total ownership and control by the local entity of all network elements, the support to private entities through subsidies and loans as well as without participation in ownership or exploitation.

Existing political support for the implementation of the smart-action

The use of biomass in buildings complies with the existing urban planning of Palencia since this is one of the measures to meet objectives of reduction of emissions by 2020. Exactly, the Strategic Plan of the

municipality and the SEAP encourage the promotion of renewable energies for heating in buildings as well as the minimization of energy demand of these facilities. Consequently, future governments and current opposition will support initiatives of this type, although some objections can rise for this specific project with the intention to prioritize other buildings and zones of the city.

Finally, the municipality has not estimated the future demand for heating and the possibilities to supply such heating at large scale as in other European cities. This leads to the implementation of district heating at small scale as well as leaving to the private initiative and its interests the implementation of this type of solution in Palencia.

⇒ Such political support will benefit the future implementation of DH in the city of Palencia. However the uncertain if it will possible to install this system in the location and buildings selected by the current local government lead to evaluate the action with 4 instead with 5.

Stakeholders involved for the operational implementation of the smart-action

This type of project requires from professionals with large experience in order to develop successfully this type of project. Unfortunately, there are not companies with experience in DH projects in Palencia. On the other hand, a study of feasibility for this action has been developed as first step, being aware of the project some companies of engineering and energetic services, although they have not collaborated in the elaboration of the study of feasibility.

⇒ The lack of awareness but the openness of companies to innovative solutions is the reason to score this item with 3.

5.2.3 Economic Factors

Financial scheme

The installation of a District Heating requires to face the initial investment and the periodic cost for its maintenance during the exploitation phase. This type of project is usually funded in Spain with energy companies through ESCO business models and can be supported by public funds from specific programs at regional and national scale. Additionally, the municipality can invest part of its budget in these systems. Concerning loans from banks, these financing entities are not willing to provide loans to a community of owners from private dwelling due to possible defaulters.

In the case of the action evaluated, since the implementation of RES in public and private buildings is a priority of the municipality of Palencia and takes part of the SEAP and Strategic Plan of the city, specific public funds can be used from the municipality which can be complemented with other available public funds.

⇒ This item could be evaluated with 3 due to the possibility to obtain a proper financing scheme to face the upfront costs by the combination of different financial resources: public funds from the municipality, the region of Castilla y León and national funds as well as to apply ESCO models. However, because it can be needed the own economic resources of residents, the action is scored with 4 since they could reject the connection of the private buildings in the DH.

Local impact

Since this initiative would be the first district heating fed with biomass in the province of Palencia, it is expected a propagation of this type of project because of an increase of the social acceptance of this solution. In addition, given the north of the province is covered with a large forest area, this action could promote the creation of a network of suppliers and producers of biomass. But also the energy companies and suppliers of biomass could benefit during the execution of the civil works, the installation and maintenance of the DH network.

⇒ This item should be evaluated with 5 since the biomass is the type of energy renewable which generates more number of jobs and given the demographic problem of rural areas and the city of Palencia which are losing population due to the lack of business opportunities. However, the item was evaluated with 4 since the implementation of this solution does not guarantee to use local biomass or to hire local companies for the installation of DH.

Price of energy

One of the main reasons of the replacement of old fossil fuel boilers by biomass boilers should be the profitability due to the less cost of the biomass. Nevertheless, this factor is not the most important in the decision making process since biomass boilers are more expensive than those which operate with fossil fuel. Hence, this item has been reported with 3.

5.2.4 Social Factors

Equality promotion

This solution promotes equality since the old buildings from residential areas are the main target building where to implement DH because they require improving the thermal comfort and decreasing the energy costs due to the bad insulation and their inefficient energy systems. In addition, elder people and with low incomes are usually the type of people who live in this type of dwelling and therefore they will be the main potential beneficiaries of this solution. However, this system can be applied in any buildings, which require replacing boiler after concluding life span.

On the other hand, this action promotes healthy lifestyles since promote sustainable habits among residents and a better awareness on environmental.

⇒ This item has been evaluated with 4 and not with 5 since not always the residents living in the potential buildings to connect to the DH are residents with economic needs.

Community

Despite biomass is most profitable than fossil fuels, there is a large opposition to the society to this type of fuel. Specifically the society initially refuses the business models aligned with district heating, known as ESCO, and prefer continue payment to the traditional energy companies although they are unhappy with the high payment of energy bills. Therefore, residents from residential buildings can opposite to connect to the DH, but also the rejection could extend towards the neighborhood associations that can be against the DH networks due to the works in the streets to install the pipes that cause interruption in the access of traffic and pedestrians. This can be moved to more groups, specifically nowadays with the media as transmitters and creators of opinion and knowledge, which are sometimes not aware of the benefits of sustainable, energy efficient and green solutions. Nowadays, citizens from Palencia express their opinion in several existing platforms in social media, but also the associations of the neigbourg could join to this opposition.

The disagreement of residents about the acceptance of the connection of residential buildings to DH execution is a possibility in a city where these systems do not exist. Thus, the resistance to change the heating system could block the execution of DH or to delay the beginning of the works.

⇒ This item has been evaluated with 4 since private buildings are only a part of the project and they can connect in a further stage to the DH.

Safety

Concerning the security of this solution, it counts with totally safety systems to avoid any fire of biomass, which can be one of the uncertain of this technology.

5.2.5 Technological Factors

Deployed technologies

Biomass boilers is a technology very well deployed and implemented in worldwide and they take part of district heating networks in many locations. Spain does not count with DH systems to supply energy to large areas but the connection of several buildings to a DH system is growing. However, despite the region of Castilla y León, where Palencia is located, has several DH systems installed and also counts with the first DH implemented in the county, the city of Palencia has few buildings with biomass boilers and any building is connected to DH systems.

⇒ Since the technology is not the barrier for the deployment of this action, the mark must be high. We decided to evaluate with 4 instead 5 because although biomass boilers have similar efficiency than an oil or gas-fired boiler, which is the other option to be implemented to replace the current boiler systems, in some

occasions a loss of efficiency is produced in biomass boilers due to the moisture of fuel and complications in the operation of boilers (excess of air, incomplete combustion).

Synergies

According to the Census of 2011, Palencia counts with 44.610 buildings, of which more than 7,046 are over 50 years and more than 19,928 are between 30 and 50 years old. These buildings have central heating and in some occasions individual boilers. Consequently, the potential to retrofit buildings and reemplace old heating systems by DH system in Palencia is high.

Concerning the action analysed, the area selected to install DH is perfect to connect public and private buildings given the variety of building typologies (residential, education, administrative, etc).

⇒ This item was scored with 4 since we found difficulties to connect the kinder garden to the DH because of the recent change of boiler so the whole action (public buildings + private buildings) could not be implemented in their totality at the same period.

5.2.6 Environment Factors

Impact of the smart-action on air quality and GHG emission standard

The replacement of fossil fuel by biomass contributes to achieve the European objectives for the year 2020: to reduce the energy consumption and CO₂ emissions in a 20% and to increase the use of RES in a 20%. Palencia has also as environmental commitment to reduce the emissions of CO₂ emissions in a 20%.

The replacement of fossil fuel by biomass in this action contributes to reduce the GHG to the atmosphere for being considered the biomass as a carbon neutral fuel and to the increase in the use of RES. But in addition, this sustainable fuel generates lower emissions of NO_x, SO_x and CO₂ than conventional fossil fuels which can influence in the air quality of the city.

⇒ This item was scored with 5 since although the air quality in Palencia is not currently a problem, the heating systems are responsible of 39% of these emissions. Therefore, if this action was replicated in other locations in the city, a big impact can be obtained.

Impact of the smart-action on energy

Biomass boilers are a eco-friendly way of energy supply since it is a renewable energy source. Thus, this item has been scored with 5.

Waste

Biomass used in boilers usually come from the harvest of forest or from byproducts of wood manufactures so that the combustion of this raw material is an opportunity to make a sustainable use of a residue.

On the other hand, the combustion of biomass produces ashes that are considered as residues. For top quality wood pellets ash content should be less than 0.7% by weight and can even be as low as 0.3-0.5 depending on the combustion conditions, whereas wood chip will produce around 1-1.5%. This is not a big problem since modern biomass boilers has automatic ash extraction and are disposal in dumping site without any previous treatment because they are not dangerous.

⇒ This item was evaluated with 4 since despite the previous boiler did not generated any residue, the amount of ashes produced with biomass boiler is not high, they are not dangerous and have a potential use as fertilizer and can be transformed in cement.

5.2.7 Legal Factors

Current policy framework

The Horizontal Property Act can be a barrier to the execution of energy efficient projects in private buildings since the community of neighbour can not request a loan since it has not a legal personality. As a result, loans must be applied for all the residents being each one responsible of the non-payments. Consequently, financing entities are not willing to fund to the communities of neighbours and the financing of the project is conditioned to the public support as well as to new financing schemes with companies.

⇒ This item was evaluated with 3 since current normative restrains the borrow of loans from banks to the community of neighbours.

Need for new legal frameworks

Since the municipality is involved in the execution of the DH, it will be required to reach an agreement about the ownerships and exploitation of this system.

⇒ This item was evaluated with 3 due to the difficulty to make an agreement among private and public organisms.

5.2.8 Synthesis of the PESTEL analysis

Table 3: PESTEL summary and score for action 1: District Heating

PESTEL Analysis		Main barriers and opportunities	Score
Political	Political support	Existing political support for solution adopted Vision of the municipality is at small scale (few number of buildings)	4
	Stakeholders	Lack of knowledge on DH but openness to innovative solutions	3
Economic	Financing	Requirement of public funds and private funds (from banks, private companies and/or citizens)	3
	Local impact	Big opportunity for new business (biomass suppliers, installers of boilers, etc) but the lack of expertise or the competence with other markets can difficult these initiatives and the associated creation of job	4
	Prices of energy	Profitability of the biomass respect other fuels but this is not the determined factor which is the higher cost of the boiler biomass with respect to the traditional ones	3
Social	Equality	Target buildings where to implement this action are those with old heating systems in which usually live elder people and/or residents with low income. In addition, this action contributes to healthy lifestyles	4
	Community	Resistance of residents, which can be extended to the neighborhood, consumer associations and in the media, to change the current heating system because of the natural rejection to the change but also for the lack of awareness on DH with biomass	4
Technological	Deployed technologies	Any DH already implemented in the city Lower efficiency of biomass boiler in comparison with current system in case of bad operation of DH	4
	Synergies	It is not time for replacement of boilers in some of the buildings selected	4
Environmental	Air quality	The solution contributes to reduce CO2 and NOx	5
	Energy consumption	Biomass boilers are a eco-friendly way of energy supply since it is a renewable energy source.	5
	Waste	Biomass used in boilers usually come from the harvest of forest or from byproducts of wood manufactures so that the combustion of this raw material is an opportunity to make a sustainable use of a residue Ashes generated in the combustion process are considered as waste	4
Legal	Current policy	Current normative restrain the borrow of loans from banks to the community of neighbours	3
	Needs for new legal framework	Requirement of an agreement among public and private organism for the exploitation of the DH	3

Figure 6: Synthesis of PESTEL analysis for District Heating

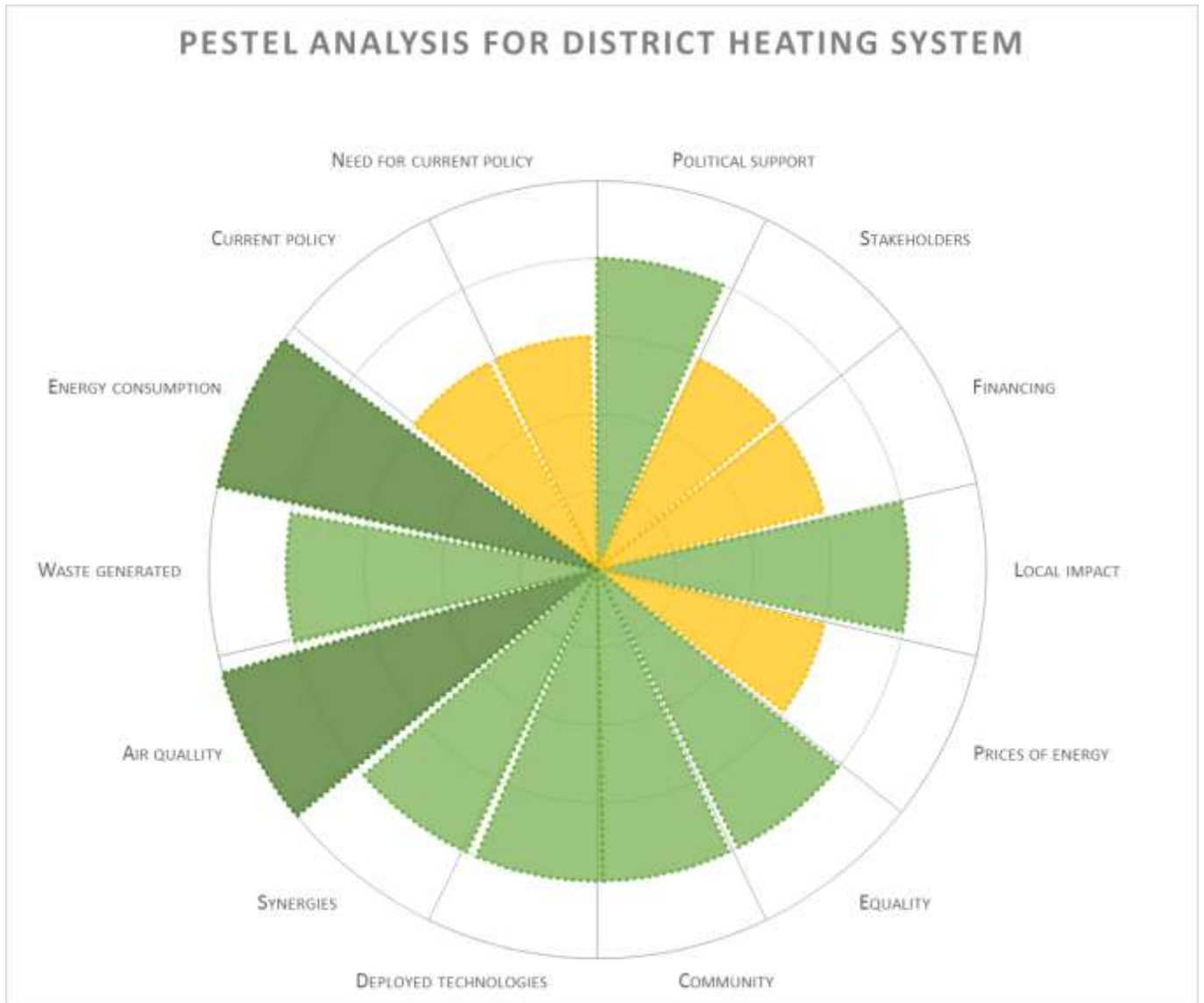


Table 4: Solutions to overcome barriers in Action 1

PESTEL Analysis		Main barriers	Solutions to overcome barriers
Political	Political support	Existing political support for solution adopted Vision of the municipality is at small scale (few number of buildings)	
	Stakeholders	Lack of knowledge on DH but openness to innovative solutions	A solution could be to create a joint adventure with senior companies in DH from close provinces and acquire knowledge for the future
Economic	Financing	Requirement of public funds and private funds (from banks, private companies and/or citizens)	The municipality of Palencia will provide funds to implement the model of DH in the city
	Local impact	Big opportunity for new business (biomass suppliers, installers of boilers, etc) but the lack of expertise or the competence with other markets can difficult these initiatives and the associated creation of job	Local suppliers of biomass will be the priority for the purchase of the raw material
	Prices of energy	Profitability of the biomass respect other fuels but this is not the determined factor which is the higher cost of the boiler biomass with respect to the traditional ones	Specific forums to inform about the economic benefits of this solution in the long term
Social	Equality	Target buildings where to implement this action are those with old heating systems in which usually live elder people and/or residents with low income	
	Community	Resistance of residents, which can be extended to the neighborhood, consumer associations and in the media, to change the current heating system because of the natural rejection to the change but also for the lack of awareness on DH with biomass	Raise awareness campaigns to promote the DH as an alternative heating option with economic and environmental benefits Specific forums to provide detailed information about the project
Technological	Deployed technologies	Any DH already implemented in the city Lower efficiency of biomass boiler in comparison with current system in case of bad operation of DH	It will ensure the use of biomass of quality
	Synergies	It is not time for replacement of boilers in some of the buildings selected	Those buildings that have not amortized the current heating system will be able to connect to the DH in the future
Environmental	Air quality	The solution contributes to reduce CO2 and NOx	
	Energy consumption	Biomass boilers are a eco-friendly way of energy supply since it is a renewable energy source.	
	Waste	Biomass used in boilers usually come from the harvest of forest or from byproducts of wood manufactures so that the combustion of this raw material is an opportunity to make a sustainable use of a residue Ashes generated in the combustion process are considered as waste	Ashes will be collected by the energy company as part of the maintenance works
Legal	Current policy	Current normative restrain the borrow of loans from banks to the community of neighbours	Public funds from the municipality will help to face the initial investment. An ESCO could be other option to reduce the upfront costs
	Needs for new legal framework	Requirement of an agreement among public and private organism for the exploitation of the DH	

5.3 PESTEL analysis for Smart action 2: Electric Vehicles for fleet municipality services

5.3.1 Short description

With the purpose to reduce the emissions of GHG to the atmosphere and impulse the use of sustainable vehicles in the city of Palencia, the municipality has as objective to reemplace the current fleet of municipal vehicles by EV vehicles. With this action, the municipality assumes an exemplary role in the adoption and purchase of electric vehicles.

The municipality owns a total of 118 vehicles among cars, motorcycles, vans and trucks. Currently, a replacement of 14 vehicles of the municipal fleet is considered, with the objective of replacing more vehicles in the future. The new vehicles correspond with 9 electric vehicles, 1 PHEV (plug-in hybrid electric vehicle) and 4 electric motorcycles.

5.3.2 Political Factors

Existing political support for the implementation of the smart-action

Palencia City Council has a strong commitment with the clean and efficient transport and in fact, specific actions for the progressive replacement of current diesel and gasoline vehicles by hybrid or electric vehicles or with low polluting fuels have been introduced in the urban actions plans (e.g. SEAP, Palencia Strategic Plan and the Strategy for a Sustainable Urban Development).

On the other hand, the municipality has already purchased four EV for municipal services (3 cars for police department and 1 electric van) and has installed two free charging infrastructure in the city: in the public parking of the hospital and in a parking place in the centre of the city. Additionally, the municipality has supported the installation of charging points from private initiatives.

Finally, it has to mention the lack of a national figure that leads the promotion of electric mobility at all levels of the administration.

⇒ The implementation of this measure should not have any opposition from the political groups, hence a score of 5 should be chosen. However, the objective of this measure is to encourage the purchase of private vehicles by citizens and consequently the final score is 3 since citizens do not see the need of replace the vehicles to improve the quality of the air in the city since this does not suffer of a significant pollution and however the new product has technical limitations and a high costs than conventional fuel vehicles.

Stakeholders involved for the operational implementation of the smart-action

This section describes how different stakeholders are involving in the electrical movility in Palencia.

In one way, energy suppliers only supported this type of initiatives under funded projects, however other private companies decided to invest in Palencia. Below it is shown the available charging infrastructure in Palencia.

- Only one gas station counts with this infrastructure in the city (fast charging infrastructure).
- There are 10 public electric chargers in commercial centers of the city located in the parking area. These were installed by an energy company through a funded project (Recargavyp) and provided free electricity for two years. They are currently in operation and are slow charging infrastructure.
- A private foreign company has installed 3 shared EV with associated charging infrastructure.

On other hand, the associations of electric vehicles and the manufacturing companies have not organized informative campaigns to empower the purchase of this type of vehicles. The neighborhood associations, although very committed to environmental quality, do not demand more electric chargers in their areas because they do not need them and are not aware that the expansion of the chargers network could encourage purchase and use of electric vehicles from their neighbours.

⇒ The lack of big support of EV by stakeholders in Palencia reflects the score 3 in this item.

5.3.3 Economic Factors

Financial scheme

Electrical Vehicles have a price higher than conventional vehicles. However, due to the low costs of operation which includes the cheaper cost of fuel (electricity versus oil) and the non-requirement of maintenance, the investment is recovered in a non-long lifespan. Currently, there are discounts for the purchase of EV which consists of 1,100-15,000 €, being usually 5,500 € the grant received with additional 1,000 € in case to install a charging point at home. However, these annual packages aids usually exhaust quickly.

Concerning the maximum grant to be received, there are limitations in order to avoid the total funding of the grant was consumed by the same beneficiary (e.g. large companies or administration), which affects to the action analysed since the municipality must adapt the replacement of vehicles.

On the other hand, the growth of this sector is conditioned to the availability of charging infrastructures. There are also aids for the acquisition of private points of recharge (1,000 € for conventional and 15,000 € for fast infrastructure).

⇒ The dependence of public or private financing restrain the deployment of this sector in the city of Palencia, hence, the score received to this item is 2.

Local impact

Palencia is the fifth Spanish city where more vehicles are manufactured and the plant located next to the city employs directly 4,300 people. Thus, more than 20% of the population of Palencia depends directly on the automobile sector.

If the promotion and use of electric cars is successful, this can contribute to the transformation of this industry and therefore Palencia could be a producer of EV and be therefore a reference of innovation. Public investment could help to transform the car industry in Palencia.

⇒ This item has been scored with 2 since the transformation of the manufacture plant could increase the economic activity of this plant but also could affect other jobs linked with the traditional vehicle of combustion as services of maintenance and repair since the EV does not require of the current services provided. Nevertheless, new business could rise for the recycling of batteries.

Energy price

The price of energy for each 100 Km traveled in EV is similar to the price of gas oil each 100 Km when vehicles use charging infrastructures from petrol station. Nevertheless, if these vehicles are recharged at home, the price is six times lower to conventional fossil fuels. However, the energy price is not currently a determined aspect because of the higher costs of the EV, restriction of the travelled distances and requirement of charging infrastructures.

⇒ Previous aspects lead to score this item with 1.

5.3.4 Social Factors

Equality promotion

The poorest communities cannot afford the purchase of EV due to their higher price with respect to conventional vehicles.

⇒ Previous item was scored with 1 since low-income families of Palencia cannot allow buying EV.

Community

Citizens from Palencia are not motivated to acquire an EV because of the economic and technical limitations of this type of vehicle. Furthermore, an opposition reaction to the advance of the electric vehicle can rise because citizens can see as their jobs are at risk if the manufacture plant decides to invest in this type of vehicle, although others can have a positive attitude because they see as an opportunity.

⇒ Previous aspect was scored with 2 because of the low willingness of citizens to acquire this type of vehicle, but also taking into account the future predisposition of citizens that do not require to travel large distances (e.g. taxis drivers and deliver companies). Concerning the possible opposition of the citizens from

Palencia to EV because of the uncertain of the future of manufacture plant located in the proximity of the city has not been reflected in this score because it is unknown how citizens can react with the introduction of EV in the plant.

5.3.5 Technological Factors

Deployed technologies

The city council of Palencia is interested to buy slow charging EV for the municipal services with batteries of 33 kWh and an autonomy of 270 km. They will be loaded at night when they are left in the municipal parking lots of each service.

The reason of the municipal government to invest in this type of EV is to demonstrate the proper working of EV in order to make them attractive to citizens since they refuse for the limitations in the capacity of the batteries and the time used in the recharge. Filling the tank of conventional vehicles to cover 600 km takes about 5 minutes, while obtaining 200 km of batteries requires a recharge time of several hours depending the type of charger, having 200 km as maximum distance travelled).

Finally, it has to mention the high cost of batteries that need to be replaced in case they get damaged (5,000-6,000 €). However, it exists the option to hire them for a fee of 40-50 €/month.

⇒ Previous item was scored with 1 since the exemplar role of the municipality in EV has not as a consequence a rapid trend in the acquisition of sustainable vehicles due to the technical barriers of these vehicles. However, the acceptance of these vehicles by taxi drivers, delivery companies and families which use a vehicle to work daily could increase.

Synergies

Nowadays, since the use of EV is minimum, there is not any problem with the saturation of the electricity grid during the recharge. However, with the expected increase of EV in the city, it will be necessary to invest in smart grids and optimize the use of energy so that the network is not affected.

⇒ Previous item was scored with 1 since a rapid growth of the units of this type of vehicle can arise a problem in the electricity grid which currently does not exist in the city of Palencia.

5.3.6 Environment Factors

Impact of the smart-action on air quality and GHG emission

The EV do not emit GHG, NOx, particles or noise but the electricity needed to move them arise from fossil fuels in 26% (the rest of energy comes from nuclear in a 23% and RES in 41%). Therefore, these vehicles can not be considered as zero emitters of GHG and other pollutants.

⇒ Previous item was scored with 3 since the main benefit of EV is the non-production of pollution at local level avoiding health problems to the citizens of Palencia. In fact, these solutions will improve the quality of air of the city. However, the energy required from their movement come from the current power plants built, so that this action does solve the problem of emissions to the atmosphere.

Impact of the smart-action on energy

EV consumes less energy than conventional vehicles. In general terms, it can states that EV almost a quarter of a gasoline car, and the third part of a diesel car. Hence, this item was scored with 5.

Waste

The rise of electric vehicle can generate big ammounts of batteries once they end their lifespan. It is estimated that a battery has a capacity for 3,000 cycles of complete recharging.

⇒ This item was evaluated with 5 since the batteries are totally recyclable.

5.3.7 Legal Factors

Current policy framework

According to the Horizontal Property Law, the installation of a recharging point in a community does not request for permission, however, problems arise when it is necessary to cross non-common areas. On the other hand, the installation of recharge infrastructure in the service sector force to change the statutes of those entitites interested to offer this service to the customes (e.g. restaurant, hotels, etc) to include the resale of energy between its activities. Consequently, these entities must pay the associated tax.

⇒ This item was evaluated with 3 due to the potential problems found by residents for installing infrastructure of recharge.

Need for new legal frameworks and policies

The installation of the infrastructure for recharging electric vehicles is currently regulated. However, it will be required to adaptr this in a future scenario with a significant number of EV. On the other hand, it is required the change of laws that affect the installation of charging points in areas of services.

⇒ This item was evaluated with 3 since those beneficiaroes of the payment of restaurants and hotels to offer charging infrastructure will opposite to a change in the law.

5.3.8 Synthesis of the PESTEL analysis

Table 5: PESTEL summury and score for action 2: EV for fleet municipality services

PESTEL Analysis		Main barriers and opportunities	Score
Political	Political support	The municipality play as exemplary role in the adoption and purchase of electric vehicles, however this isolated action does not influence in the acquisition of these vehicles by the citizens. Lack of a figure that leads the promotion of electric mobility at all levels of the administration	3
	Stakeholders	Lack of interest of stakeholders in the promotion of EV and installation of charging points. Neighbours association do not claim the expansion of chargers network. However, some interesting initiatives have been implemented in the city by private companies	3
Economic	Financing	Requirement of public funds for afford the purchase of EV and the charging points. Also, existing public packages of aids are usually exhausted quickly.	2
	Local impact	Big opportunity for the future business of the manufacture plant of vehicles located next to the city although it exists a lack of investments to transform the car industry in Palencia However, a big growth of the EV could affect to the business network around the fuel combustion vehicles	2
	Prices of energy	The energy price is not currently an determined aspect for the purchase of EV but the restriction of the travelled distances and requirement of charging infrastructures.	1
Social	Equality	Low-income families of Palencia cannot allow buying EV	1
	Community	Resistance of citizens to invest in EV	2
Technological	Deployed technologies	The exemplar role of the municipality in EV has not as a consequence a rapid tend in the acquisition of sustainable vehicles due to the technical barriers of these vehicles	1
	Synergies (future proofing)	A rapid growth of the units of this type of vehicle can arise a problem in the electricity grid which currently does not exist in the city of Palencia.	1
Environmental	Air quality	The solution contributes to reduce CO2, NOx and particles in the city but not in the locations next to the power plants which use fossil fuels to produce the energy required for these vehicles	3
	Energy consumption	EV consumes less energy than conventional vehicle	5
	Waste	Batteries generated is a new waste to be managed, although they are recyclable	4
Legal	Current policy	Current normative prevents the development of recharge infrastructure in residential and services areas (e.g. hotels, restaurants, etc)	3
	Needs for new legal framework	Opposition to the change of the current normative which forces to payment taxes to those that offer changing infrastructures. In a future scenario with an important number of EV, adaptations to the current normative which deals with charging infrastructure will be needed	3

Figure 7: Synthesis of PESTEL analysis for Electric Vehicles for fleet municipality services

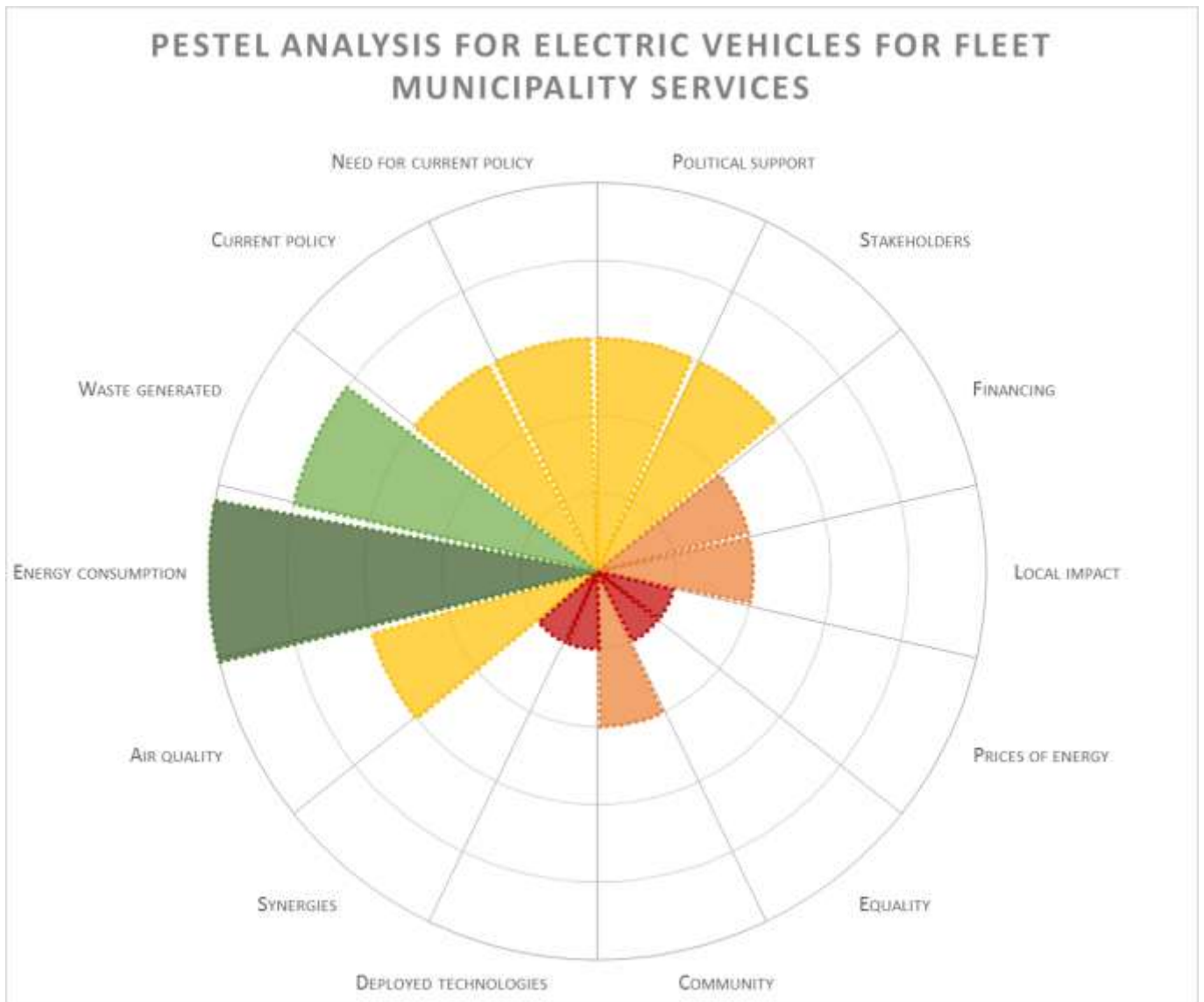


Table 6: Solutions to overcome barriers in action 2: EV for fleet municipality services

PESTEL Analysis		Main barriers	Solutions to overcome barriers
Political	Political support	The municipality plays as exemplary role in the adoption and purchase of electric vehicles, however this isolated action does not influence in the acquisition of these vehicles by the citizens. Lack of a figure that leads the promotion of electric mobility at all levels of the administration	An effective increase in the purchase of EV will be achieved only with more economic incentives for the acquisition of vehicles (aids and tax incentives) and information campaigns to complete the effectiveness of the action analysed
	Stakeholders	Lack of interest of stakeholders in the promotion of EV and installation of charging points. Neighbours association do not claim the expansion of chargers network. However, some interesting initiatives have been implemented in the city by private companies	The municipality should promote the use of the current EV already available in the city to show to the stakeholders that the city demands of new EV and points of recharge. In a further stage, it would be needed to remove the obligation to those hotels, restaurants, services interested to install an electric charger to declare itself as energy manager because they have to pay taxes.
Economic	Financing	Requirement of public funds for afford the purchase of EV and the charging points. Also, existing public packages of aids are usually exhausted quickly.	The municipality should press to other administrations to increase the funds for the acquisition of EV or move own municipality budget for this measure
	Local impact	Big opportunity for the future business of the manufacture plant of vehicles located next to the city although it exists a lack of investments to transform the car industry in Palencia. However, a big growth of the EV could affect to the auxiliary industry around the fuel combustion vehicles	Municipal politicians should prepare a strategic plan for the transformation of the manufacture plant of vehicles on technical training at all levels and financing for non lose competitiveness in a market with an increasing demand for electric cars
	Prices of energy	The energy price is not currently a determined aspect for the purchase of EV but the restriction of the travelled distances and requirement of charging infrastructures.	
Social	Equality	Low-income families of Palencia cannot allow buying EV	The municipality should promote the use of the current sharing EV in the city as option for travelling instead to own vehicles
	Community	Resistance of citizens to invest in EV	Information campaigns focused in the economic benefits of the EV in comparison with conventional cars for specific groups of the population: e.g. taxi drivers, deliver companies, etc which are not affected by the limitation of travelled distance
Technological	Deployed technologies	The exemplar role of the municipality in EV has not as a consequence a rapid tend in the acquisition of sustainable vehicles due to the technical barriers of these vehicles	Information campaigns focused in the economic benefits of the EV in comparison with conventional cars for specific groups of the population: e.g. taxi drivers, deliver companies, etc which are not affected by the limitation of travelled distance

	Synergies	A rapid growth of the units of this type of vehicle can arise a problem in the electricity grid which currently does not exist in the city of Palencia.	
Environmental	Air quality	The solution contributes to reduce CO2, NOx and particles in the city but not in the locations next to the power plants which use fossil fuels to produce the energy required for these vehicles	Information campaigns addressed to communicate the environmental problems derived of the use of conventional cars
	Energy consumption	EV consumes less energy than conventional vehicle	
	Waste	Batteries generated is a new waste to be managed, although they are recyclable	
Legal	Current policy	Current normative prevents the development of recharge infrastructure in residential and services areas (e.g. hotels, restaurants, etc)	Associations and municipalities could press to the government to modify the legislation
	Needs for new legal framework	Opposition to the change of the current normative which forces to payment taxes to those that offer changing infrastructures. In a future scenario with an important number of EV, adaptations to the current normative which deals with charging infrastructure will be needed	Associations and municipalities could press to the government to modify the legislation

5.4 PESTEL analysis for Smart action 3: Energy Monitoring of Public Buildings

5.4.1 Short description

The action consists of the realization of energy audits in three municipal buildings of Palencia through the implementation of a monitoring systems with the objective to obtain valuable information regarding how buildings are performing in order to implement the most suitable energy solutions which allow the reduction of the energy demand and the use of renewable sources which conclude with cost savings. This solution is based on sensors that process the data collected which will be connected to the municipality platform (i.e. website) in order to make available the results of the monitoring and actions to the citizens.

Buildings will be selected both for their level of consumption and their impact on the inhabitants due to their visibility since this measure intends to influence in the citizens and promote the energy efficiency in private buildings. The buildings where this action will be deployed were built between 1984 and 2006 and require of an economic investment to solve failures in insulation and change of heat system. Metering installed will be able to monitorize electrical and thermal energy, but also fuel and water consumption as well as the sensorization of the temperature, humidity and CO₂ in each building.

5.4.2 Political Factors

Existing political support for the implementation of the smart-action

Public buildings are target sector to focus the efforts for reducing CO₂ in the city since they represent the 35% of the total consumption of the city council.

The realization of energy audits complies with the measures established in the existing urban planning. Thus, the SEAP foresees the realization of energy audits in 40 municipal buildings with a further implementation of efficient energy solutions for obtaining a reduction of 394.02 Ton CO₂ and saving 254 MWh in 2020. Nevertheless, the realization of these energy audits do not require of the implementation of energy monitoring.

Concerning the specific action “energy monitoring of public buildings”, this was not considered in any urban plans of the city although it is aligned with the objectives pursued in the Strategic Plan and Estrategy for a Sustainable Urban Development: reducing the energy demand and increase the use of RES in public buildings. Such link is because the information collected in the meters can help to identify the most suitable solutions to be implemented in the future in public buildings analyzed.

Thus, taking into account this premise, any party from the opposition should be against of auditing and implement energy meters in public buildings. However, only the energy audits have an assigned budget in the SEAP whereas the monitoring of buildings not.

⇒ This item was evaluated with 2 since only the energy audit has associated a public funding but currently it does not exist any financing for the installation of monitoring systems. On the other hand, the opposition can disagree the buildings selected.

Stakeholders involved for the operational implementation of the smart-action

The company that will be in charge of the monitoring of the three buildings will be selected through a tender process. But also, it is interesting that this action could be extended with the further implementation of energy solutions in public buildings but also in residential area to achieve a higher impact in the emissions of the city.

However, local companies have not enough expertise to realize the complete pack of improvements in the public and private buildings: energy audit and energy solutions in the building envelope as well as active measures which cover energy systems and BEMS.

On the other hand, to extend the action analysed to private buildings is difficult despite citizens claim to save energy and costs in residential areas. Currently, there are more than 1,800 buildings in the city with more than 50 years and that require of a technical inspection of the building that include the thermal behaviour and consequently could be interested to extend the analysis of the buildings through energy audits.

This item was evaluated with 2 due to the lack of experience of the local companies to implement this type of actions and the few number of them to cover all the target buildings.

5.4.3 Economic Factors

Financial scheme

Energy audits have already an assigned budget from the municipality. However, there is not any municipal aid for the energy monitoring. No more public financing is expected for these actions since they are not included in the regional or national public financing.

On the other hand, regional government offers subsidies for the renovation of residential buildings why the energy solutions could be implemented although without an extended previous analysis which help to select the most suitable solutions for the buildings. The scope will depend on the grant awarded although it is possible to hire energy service companies to realize energy audits and the installation of monitoring systems. Since these companies finance their work with the exchange for a percentage of the savings obtained, municipality will not have to face a big investment for the implementation of energy solutions.

Finally, those citizens interested to replicate the actions in their residential buildings will count with the same financing schemes previously described.

⇒ This item was evaluated with 2 since the municipality has budget assigned for the realization of energy audits but there is not any municipal aid for the energy monitoring. In addition, energy audits and monitoring

meters do not receive any grant from regional or national government. However, these measures can be executed through ESCO models.

Local impact

These technologies for monitoring buildings have not been implemented in municipal buildings of Palencia, so this is a clearly innovative action and, in case of obtaining good results, is likely to be extended in the future to other buildings. As consequence, this action can encourage to new building, commercial and residential buildings to implement this type of solutions and consequently this demand will make to local companies to transform the current activity towards the installation of energy meters as well as Building Energy Management System (BEMS).

⇒ This item was evaluated with 4 due to the big opportunity that this action offers to Palencia in relation to the creation of new business which is characterized for its multidisciplinary integral approach, involving expert personnel in energy efficiency (industrial engineers, civil engineers), experts in the ICT platform for energy efficiency management (telecommunications engineers and computer specialists), etc.

Price of energy

The price of energy has become much more expensive in recent years. However, this has not influenced in a change of habits in the use rational of the energy in the citizens. For the case of the municipality, the costs of the energy consumed in public buildings do not represent a low amount in the total expenses of the city.

For the case of citizens, they assume the low possibilities to reduce the energy bills due to high proportion of fixed costs in the invoice but also to the lack of knowledge on how to reduce costs with energy solutions.

⇒ This item was evaluated with 1 since the energy bills of public buildings is not a significant expense of the municipality and for the difficulty to implement the model of sustainability established in public buildings in other buildings of the city of Palencia due to the lack of aware of citizens to save money in energy bills.

5.4.4 Social Factors

Equality promotion

Old buildings are the target buildings where to implement this action for being the most inefficient buildings since they were built before the technical building code forced to meet energy requirements. Therefore, identify the opportunities to reduce the energy consumption of these buildings and consequently the energy bills will benefit to citizens with lower resources who are the usual users of this type of building.

⇒ This item was evaluated with 3 because unfavorable sectors of society can not assume this type of actuation. However, this type of building has more opportunities than others for being selected by the municipality to be retrofitted as measure of regeneration of the more disfavoured areas of the city.

Community

The selection of representative public buildings to implement energy solutions after the realization of energy audits and implement efficient energy solutions can make possible to boost the installation of RES, BEMS or the retrofitting of other buildings.

⇒ This item was evaluated with 2 since the investment in municipal buildings does not guarantee the extent of energy measures towards the private buildings (residential, services, etc) since citizens are not aware of the economic benefits generated with the energy efficiency.

5.4.5 Technological Factors

Deployed technologies

The technology that supports this solution is based on sensors that process the data collected, but the civil council is interested also in connecting this system with the municipality platform (i.e. website) in order to make available the results of the monitoring and actions to the citizens. Although this solution proposed has been already implemented in administration and private buildings worldwide and there are many initiatives where municipal platform is feed with energy data from buildings, this solution for the case of Palencia is totally new and has some barriers as the requirement of creating an interface.

⇒ This item was evaluated with 3 since it is required to achieve an open platform and this measure implies a significant effort for the municipality due to the low development of the municipal platform.

Synergies

This system will be compatible with the standards of communication protocols most commonly used in sensor communication: Modbus, KNX, LonWorks, M-BUS, analog and digital so that the replication of this solution in other buildings is facilitated.

⇒ This item was evaluated with 4 because once the platform is able to collect data from selected public buildings, the action could extend to other buildings of the city.

5.4.6 Environment Factors

Impact of the smart-action on air quality, energy and GHG emission

The monitoring equipments provide key information for decision making in this area which contribute to the save in the municipal expenses on consumption of electricity, gas and water. But also these equipments allow to improve the comfort conditions of the buildings in temperature and humidity. Exactly, the information obtained includes economic aspect (monthly electricity cost, economic savings compared to the previous month, annual savings associated with energy consumption of the building, etc.) and environmental aspect

(monthly CO₂ emissions of the building, avoided annual emissions of CO₂ with respect to the previous year, equivalent trees planted due to the reduction of CO₂ emitted, etc).

⇒ This item was evaluated with 5 since this action enhance the improvement of environment in all the aspects (energy, air quality and water).

5.4.7 Legal Factors

Current policy framework

The realization of energy audits or the implementation of energy monitoring in buildings is not impuled by any law in Spain. In fact, the New Technical Building Code (2006), that incorporated the requirement in energy efficiency and renewable energies that the interventions in existing buildings must met, does not include any of these measures.

On the other hand, buildings where the action will be implemented are not forced to obtain a certificate of the energy characteristics of the building since they are less of 50 years as it is regulated in the Law 8/2013 for the urban rehabilitation, regeneration and renovation.

Finally this action pretends to support the municipal objective “strengthen the trust of citizens in the municipality through its transparency portal” by providing information and encourage to the citizens to participate in municipal issues. Therefore, the action is affected by the law of transparency and the right to public information (Law 19/2013), complying also with all the requirements

⇒ This item was evaluated with 2 due to the lack of commitment of public body with these actions since they are not considered as mandatory in the current normative.

Need for new legal frameworks and policies

The need to face environmental problem has influenced in the current policy, being this more exigent with the measures to be implemented to reduce the GHG to the atmosphere. Nowadays, the large companies are forced to obtain an energy certificate as well as those dwellings to sale or rented. Therefore, normative could be more exigent with public buildings by forcing for example to have a minimum of efficiency and the realization of energy audits. On the other hand, to force to install monitoring equipment to public buildings as measure to face the energy efficiency could be other solution to be included in the future normative. However, this measure is not cost-effective due to the high costs of this solution.

⇒ This item was evaluated with 3 since it is not easy to change the current policy to make mandatory the realization of energy audits and installation of meters in public buildings.

5.4.8 Synthesis of the PESTEL analysis

Table 7: PESTEL summary and score for action 3: Energy Monitoring of Public Buildings

PESTEL Analysis		Main barriers and opportunities	Score
Political	Political support	This action has the approval of all local political parties since help to met actions included in the urban plans of the city. However, the assignation of municipal funds for the execution of monitoring actions in these buildings could be rejected by the opposition as well as the buildings selected.	2
	Stakeholders	Lack of experience of the local companies to implement this type of actions and few number of them to cover all the target buildings.	2
Economic	Financing	Energy audits have already an assigned budget from the municipality. However, there is not any municipal aid for the energy monitoring. No more public financiation is expected for these actions since they are not included in the regional or national public financiation. However, these measures can be executed through ESCO models.	2
	Local impact	Big opportunity for the city for the establishment of a new business for higher education persons	4
	Prices of energy	Low influence of the energy prices as driver for implement energy measures The costs of the energy consumed in public buildings do not represent a low amount in the total expenses of the city. For the case of citizens, they assume the low possibilities to reduce the energy bills due to high proportion of fixed costs in the invoice but also to the lack of knowledge on how to reduce costs with energy solutions.	1
Social	Equality	Unfavorable sectors of society cannot assume this type of actuation. However, these people live in the potential buildings to be retrofitted by the municipality as measure of regeneration of the city	3
	Community	They are measures requested by citizens however their implementation in municipal buildings does not guarantee the extend of energy measures towards the private buildings	2
Technological	Deployed technologies	Solution already implemented successfully in many municipalities. However, the municipal platform of Palencia has low development for the total implementation of the action	3
	Synergies	The replication of this solution in other buildings is facilitated once the platform is able to collect expected data	4
Environmental	Air quality and energy consumption	This action enhance the improvement of environment in all the aspects (energy, air quality and water).	5
Legal	Current policy	Lack of commitment of public body with these actions since they are not considered as mandatory in the current normative.	2
	Needs for new legal framework	Normative could be more exigent with public buildings by forcing for example to have a minimum of efficiency and the realization of energy audits	3

Figure 8: Synthesis of PESTEL analysis for Energy Monitoring of Public Buildings

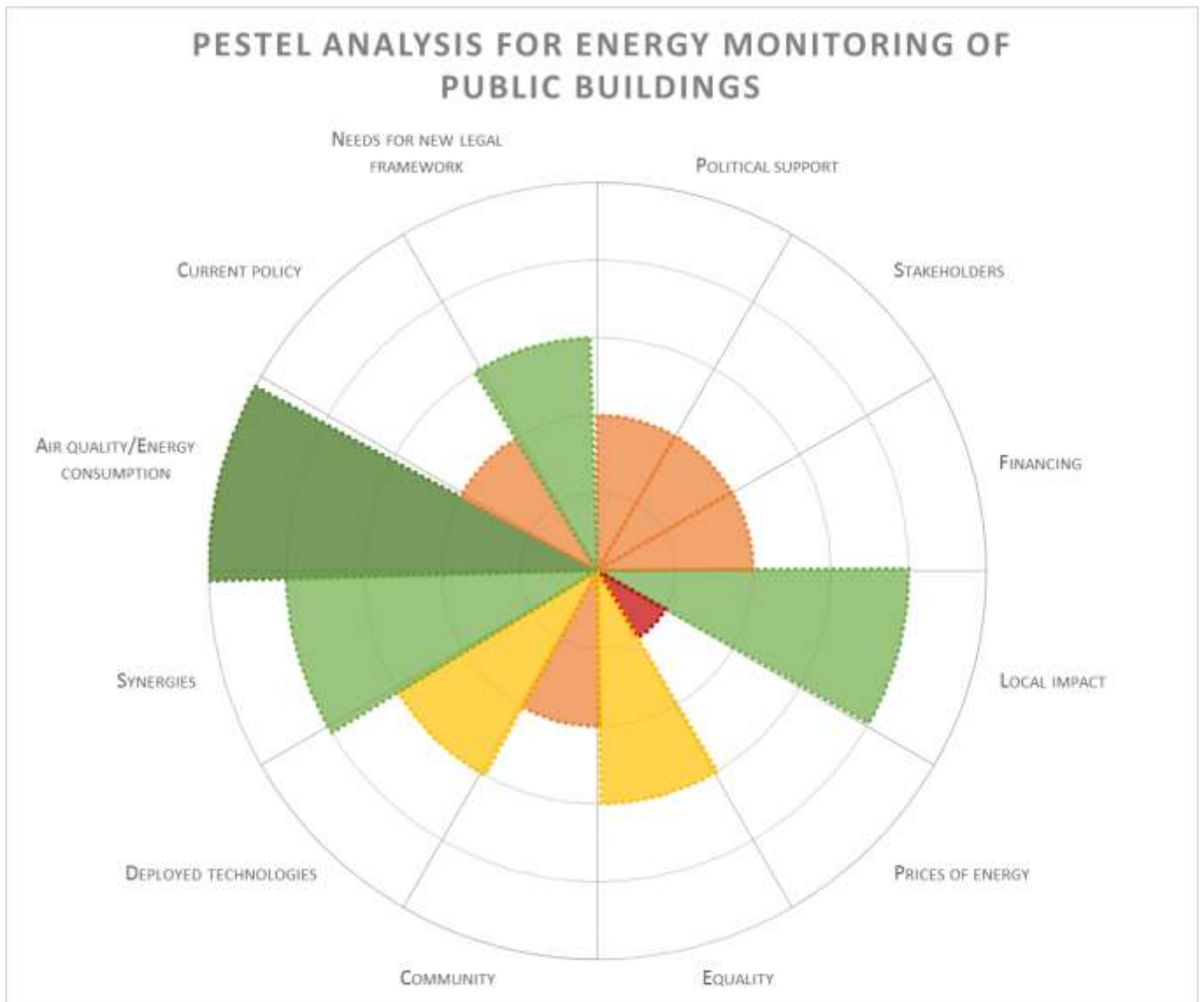


Table 8: Solutions to overcome barriers in Action 3

PESTEL Analysis		Main barriers	Solutions to overcome barriers
Political	Political support	This action has the approval of all local political parties since help to met actions included in the urban plans of the city. However, the assignation of municipal funds for the execution of monitoring actions in these buildings could be rejected by the opposition as well as the buildings selected.	Realization of an extend analysis of the need and benefits of this action to empower the implementation of the action
	Stakeholders	Lack of experience of the local companies to implement this type of actions and few number of them to cover all the target buildings.	Promote the commitment of the council town with energy efficiency to impulse the local companies to address its activity towards these issues
Economic	Financing	Energy audits have already an assigned budget from the municipality. However, there is not any municipal aid for the energy monitoring. No more public financiación is expected for these actions since they are not included in the regional or national public financiación. However, these measures can be executed through ESCO models.	To evaluate the possibility to include this action in an ESCO model
	Local impact	Big opportunity for the city for the establishment of a new business for higher education persons	Facilitate the selection of local companies in the tender to be launched for contracting the future works by including specific criteria
	Prices of energy	Low influence of the energy prices as driver for implement energy measures The costs of the energy consumed in public buildings do not represent a low amount in the total expenses of the city. For the case of citizens, they assume the low possibilities to reduce the energy bills due to high proportion of fixed costs in the invoice but also to the lack of knowledge on how to reduce costs with energy solutions.	Information campaigns focused in the economic benefits derived of the energy efficiency which include also guidelines on how to reduce expenses in the energy bill
Social	Equality	Unfavorable sectors of society cannot assume this type of actuation. However, these people live in the potential buildings to be retrofitted by the municipality as measure of regeneration of the city	
	Community	They are measures requested by citizens however their implementation in municipal buildings does not guarantee the extend of energy measures towards the private buildings	Promote the information obtained to the citizens through social media and local press Information campaigns focused in the economic benefits derived of the energy efficiency Develop a specific app for this issue (or take part of other municipal app already deployed)
Technological	Deployed technologies	Solution already implemented successfully in many municipalities. However, the municipal platform of Palencia has low development for the total implementation of the action	Continue working in this new field by funded projects that help to improve the current platform
	Synergies	The replication of this solution in other buildings is facilitated once the platform is able to collect expected data	

Environmental	Air quality and energy consumption	This action enhance the improvement of environment in all the aspects (energy, air quality and water).	
Legal	Current policy	Lack of commitment of public body with these actions since they are not considered as mandatory in the current normative.	
	Needs for new legal framework	Normative could be more exigent with public buildings by forcing for example to have a minimum of efficiency and the realization of energy audits	

5.5 PESTEL analysis for Smart action 4: Smart Citizen Platform

5.5.1 Short description

The city council of Palencia is developing a new channel for the collection and dissemination of municipal information in order to promote the citizen participation and collaboration with the services of the local administration.

This channel consists of a tool of free software to be deployed in mobile applications and a website and will offer the following options:

- Collect incidents, suggestions and citizen complaints
- Direct survey of citizens
- Consultation of the municipal street
- Consultation of thematic maps
- Management the life cycle of the incidences

The expected outcome are:

- Improvement of communication and transparency of administrations
- Facilitate the process of reporting incidents and suggestions from the citizen
- Increase the flow of information and communication between the parties and encourage direct dialogue with the administration that is currently practically non-existent
- Development of applications that facilitate access to municipal information
- Dissemination of geo-referenced information supported by municipal cartography: street map, municipal GIS, geoportal, etc
- Provide information on the different municipal areas and external services of citizen interest, such as cadastre
- Collect information among municipal areas about incidents, complaints or suggestions reported by citizens
- Improvement of the interoperability of citizen information management across all municipal areas
- Provide details, on the part of the local administration, about incidents that affect the citizenship: works, street cuts ...



5.5.2 Political Factors

Existing political support for the implementation of the smart-action

The city government of Palencia has as commitment the improvement of the e-administration and to adopt digital solutions for efficient provision of public services. This vision is included in the urban plans of the city. Consequently, future governments and current opposition will support initiatives of this type.

However, some politicians can find a barrier because of the political mediation to solve problems for citizens as well as the huge number of critics received and seek to delay or decrease the specific weight of the solution in the deployment of actions in the city.

⇒ This item was evaluated with 3 since own politicians can block the continuation of this action due the inconvenients of this solution for the local government.

Stakeholders involved for the operational implementation of the smart-action

A big number of municipal stakeholders from different entities were involved in the elaboration and development of the strategic plan of Palencia, which includes the solution chosen. Therefore, it is expected that these entrepreneurs, syndicates, social entities and public entities will collaborate in the adoption of the solution. Moreover, the deployment of the action will be supported by the Red.es, which is a public figure which offers its technical knowledge to the public administrations.

⇒ This item was evaluated with 3 due the strong support received from stakeholders of the municipality in the development of the Strategic Plan of the city. However, such commitment during its preparation could not continue during the deployment of the solution.

5.5.3 Economic Factors

Financial scheme

This action will be financed by the City Council of Palencia and ERDF Funds in equal parts since it is one of the actions to be executed through the Strategy for a Sustainable Urban Development of Palencia which count with 30 M€.

⇒ Due to the existence of specific budget for the execution of this solution, this item would be evaluated with 5. However, the final score is 4 since the maintenance of the app requires new economic resources.

Local impact

The solution could bring business opportunities since the platform will offer important information about the city but also will help to impulse the tourism of the city since it contains specific modules for tourists. In addition, this solution will encourage the collaboration among different public administration bodies which will help to the companies, citizens and own administration to make progress in their activities.

As a result, it is expected a modernization of the economy and society of the city of Palencia through use of ICTs by citizens, businesses and public Administration bodies.

⇒ This item was evaluated with 3 due to the low use of apps in the city of Palencia given the significant number of elder population.

5.5.4 Social Factors

Equality promotion

The current involvement of the inhabitants from Palencia with the local government is different between the neighborhoods of the city and among the different ages. In one way, youth population do not usually collaborate in neighborhoods activities where claims or suggestions are collected to improve the district and that are reported to the city council. But, however, they use social media to express their opinions. On the other hand, citizens with low resources have less involvement and co-responsibility with local government and a lower participation in the decision making of the neighborhood plans. Hence, it is expected to increase the involvement of the both sectors of the city given the extended use of mobile phones nowadays.

⇒ This item was evaluated with 3 because despite the opportunity which this solution brings to engage citizens in e-government, it is uncertain the level of involvement to be achieved among the most vulnerable citizens of the municipality.

Community

This solution aims to provide to the citizens the opportunity to connect with the municipal services, locate points of interest, request documentation or manage taxes, report faults or incidents in the streets of Palencia through the mobile phones with the objective to increase the quality of life of citizens. In addition, this solution should increase the political awareness of the people involved.

However, this solution can also be a source of constant criticism of municipal management. In addition, citizens could report false incidents which could worsen the current municipal management. Therefore, if all these things happens, the platform no longer makes sense as a meeting point for citizens and social and political groups.

⇒ This item was evaluated with 3 due to the uncertain on the behavior of the citizens of the municipality regarding the use of the platform.



5.5.5 Technological Factors

Deployed technologies

The app is based on the georeferencing of the information and is expected to be used in Android OS and IOs but not in mobile phones with Windows phone and Blackberry given its low use. On the other hand, the main technological problem detected is the congestion of the mailboxes of incidents.

⇒ This item was evaluated with 2 given the efforts to be done by the municipality to achieve the proper design of the app.

Synergies

The tool to be developed will be scalable so that citizens and in particular entrepreneurs and young people should have the opportunity to develop new value added applications for the Palencia urban platform. In addition, this platform can be replicated in the services of another city as well as to contribute to participate in innovative projects in the field of Urban Services.

⇒ This item was evaluated with 2 since the exploitation of this tool in other municipalities requires of an standard product. However, this is not possible since each municipality is interested in a specific structure, which restrain the economic benefit to be achieved with this tool.

5.5.6 Environment Factors

Impact of the smart-action on air quality, energy and GHG emission

Citizens must move to the center of the city to perform administrative tasks because the administrative buildings are in the center of the city. Thanks to this tool, it will avoid the displacement of citizens and therefore the use of vehicles and therefore contribute to decrease the emissions of GHG to the atmosphere and other pollutants.

⇒ This item was evaluated with 3 due the low impact in elder population as well as the small size of the city so that the use of car is not always needed to attend to the administrative offices.

5.5.7 Legal Factors

Current policy framework

Protection of personal data is the most interested issue to be analysed in this framework. Therefore the application must ensure the protection and the privacy of people against third parties.

⇒ This item was evaluated with 5 since the data will be totally protected with the proper mechanisms of the tool.

Need for new legal frameworks and policies

The technical basis of the action is based on free software or open source, which refers to the freedom of users to run, copy, distribute, study, change and improve the software. In consequence, the new versions could be distributed as a new product. There is no legislation that regulates and protects the rights of consumers of the free software programs.

⇒ This item was evaluated with 3 since there is a large way to conclude with this problem through the legislation.

5.5.8 Synthesis of the PESTEL analysis

Table 9: PESTEL summary and score for action 4: Smart Citizen Platform

PESTEL Analysis		Main barriers and opportunities	Score
Political	Political support	Existing political support for solution adopted Modifications of the current scope of the tool because of the numerous critics to politicians	3
	Stakeholders	Strong support of municipal stakeholders to create this tool. Uncertain on the commitment during its operation	3
Economic	Financing	Solution to be financed by ERPF and municipality as part of the deployment of the Strategy for the Urban Development of the city. However new economic resources must be required to the maintenance	4
	Local impact	It is expected a modernization of the economy and society of the city of Palencia and an impulse to the local tourism	3
Social	Equality	Uncertainty in the success of the tool to engage vulnerable citizens in e-government. However, it is expected good results with youth people	3
	Community	Tool used only for criticize the municipal politicians and report false incidents	3
Technological	Deployed technologies	Possible congestion of the mailboxes and tool not compatible with windows phone and blackberries	2
	Synergies	Tool compatible with new added value services designed by own citizens and also with possibilities to be exploited to other municipalities although with limitations to adjust to requirements of other cities	2
Environmental	Air quality	Reduction of GHG and other pollutants due to travel avoided by online services. However this potential of reduction could be less because of the low use of this app	3
Legal	Current policy	Data of users could be used by third parties in case the protection of data is not guaranteed	5
	Needs for new legal framework	There is a large way to protect the rights of consumers of the free software programs through current legislation	3

Figure 9: Synthesis of PESTEL analysis for Smart Citizen Platform

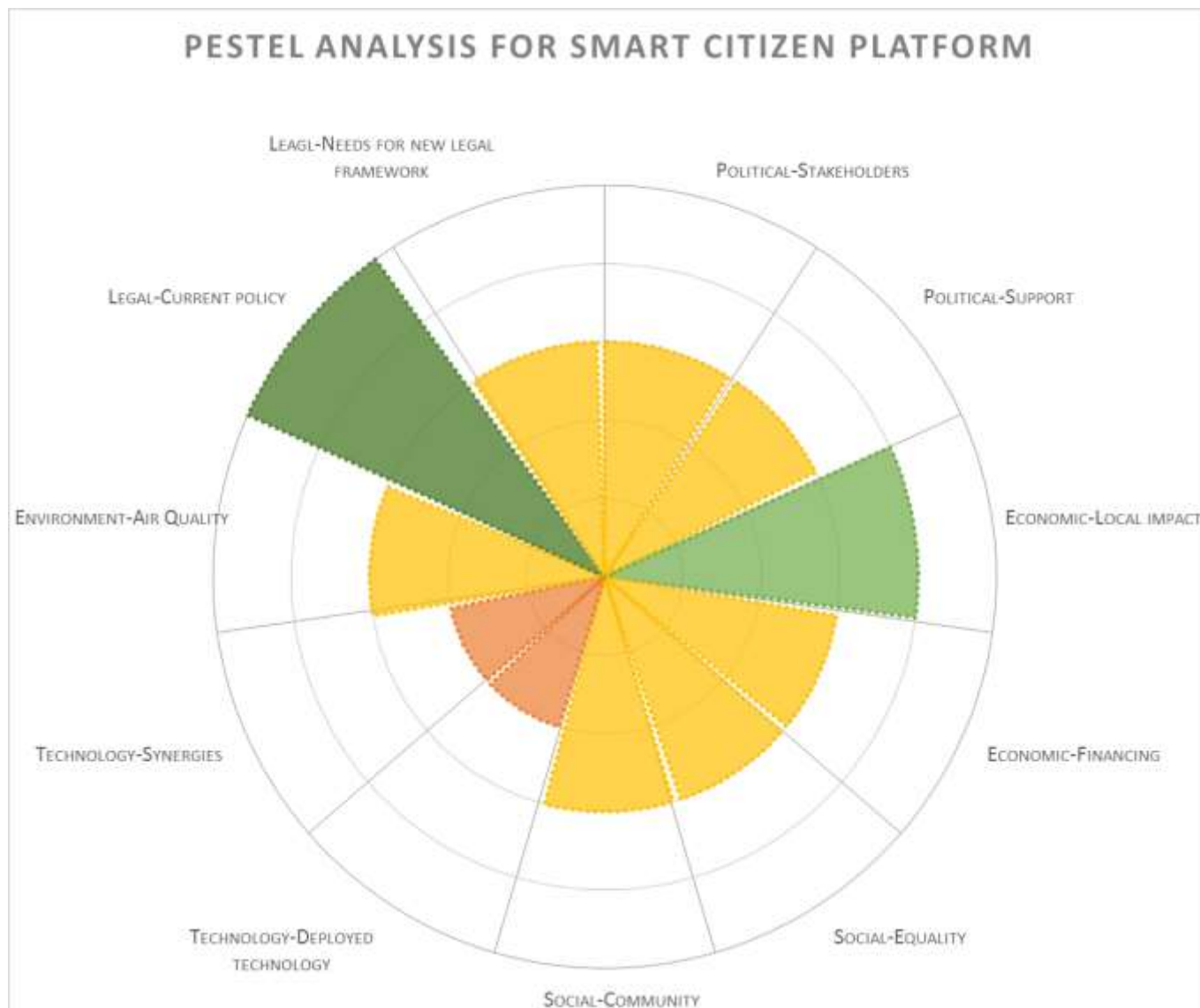


Table 10: Solutions to overcome barriers in Action 4

PESTEL Analysis		Main barriers	Solutions to overcome barriers
Political	Political support	Existing political support for solution adopted Modifications of the current scope of the tool because of the numerous critics to politicians	Implementation of measures that block the access to the tool to specific users who do not use the tool properly
	Stakeholders	Strong support of municipal stakeholders to create this tool. Uncertain on the commitment during its operation	The tool will be very complete in order to engage stakeholders
Economic	Financing	Solution to be financed by ERPF and municipality as part of the deployment of the Strategy for the Urban Development of the city. However new economic resources must be required to the maintenance	It will monitorize the costs savings due to the reduction of administrative work by analysing number of accesses, number of incidents, volume of data downloaded, response time to an incident, resolved incidents, etc).
	Local impact	It is expected a modernization of the economy and society of the city of Palencia and an impulse to the local tourism	An information campaign will be launched for empower the use of the tool in all the age ranges
Social	Equality	Uncertainty in the success of the tool to engage vulnerable citizens in e-government. However, it is expected good results with youth people	Measure of the degree of use of the application as well as the degree of satisfaction of users by proper indicators
	Community	Tool used only for criticize the municipal politicians and report false incidents	Evaluation of the feasibility of this app in comparison with previous scenario where municipal workers had to be on the streets to detect incidents. If this is not feasible, it could reduce the scope of the app
Technological	Deployed technologies	Possible congestion of the mailboxes and tool not compatible with windows phone and blackberries	A menu of subjects, services, and standard cases should be created to rationalize the complaints. In case of detecting a big demand of these phones, the tool will be redesigned.
	Synergies	Tool compatible wiith new added value services designed by own citizens and also with possibilities to be exploited to other municipalities although with limitations to adjust to requirements of oher cities	The national figure which supports municipalities in innovative projects could build a matrix of basic services to standardize the municipal apps
Environmental	Air quality	Reduction of GHG and other pollutants due to travel avoided by online services.However this potential of reduction could be less because of the low use of this app	Creation of indicators to calculate the GHG savings
Legal	Current policy	Data of users could be used by third parties in case the protection of data is not guaranteed	Implementation of measures to protect data from users
	Needs for new legal framework		

6. Conclusions

In this Deliverable, the City of Palencia, a follower city in the mySMARTlife project, provided a solid ground for taking new initiatives which may contribute to the city transformation, a process that already started in Palencia. After the deep analysis carried out during the development of this deliverable, the City of Palencia has summarized in the following table its strengths and weaknesses.

Table 11: Strengths and weaknesses of Palencia

STRENGTHS
<p>Environment: The city is one of the cities in Spain with a greater green area in relation to the number of inhabitants. In addition, the city does not suffer of pollution, being the quality of air good.</p>
<p>Geostrategic position: The proximity to the city of Valladolid (only 45 km far), which is the capital of Castilla y León, provides many advantages for the business to the city of Palencia. In addition, the city counts with an excellent geostrategic position for the transporting of commercial goods, converting it in a link between Portugal and important cities from Spain</p>
<p>Sustainable mobility: The city presents a good connections within the city and with nearby cities though public transport as well as an extensive network of pedestrian streets in the center. In addition, several public and private initiatives have been implemented: Sharing vehicles, EV, intelligent parking for bikes, etc.</p>
<p>Citizen channels: The local government has a close relation with neighbour associations. Periodic meeting allow to launch proposals to be executed by the local goverment</p>
<p>Strong political commitment with sustainable policies: Palencia signed the SEAP with a CO2 target of 20%. The city in addition counts with an Estrategy for Sustainable Urban Development with a budget of 30 M€ to be implemented in the period 2016-2022.</p>
<p>Economy based in agri-food sector: The city counts with several industries of this sector, being a reference in the biscuit industry. In addition, it exists a manufacture plan located in the proximity of the city</p>
WEAKNESSES
<p>Lack of investment and economic opportunities: Despite the big potential for making business because of the good connection with big cities of Spain as well as an importance cultural heritage, there are not many economic activity in the city, being the services sector the main economic activity.</p>

<p>Low population density and unemployment: The population of Palencia ages rapidly because the birth rate is low and there is no sustained generational replacement. This is associated to the lack of employment opportunities, in special for youth.</p>
<p>Education: Even being the city where the first university of Spain was located, nowadays counts with a center with only few degrees. Also there is low number of high level students living in the city</p>
<p>Fossil fuels dependence: Entire heating system in the city is based on fossil fuels usage. Renewable energy producing points are still rare, and mostly related to solar and photovoltaic panels. There are also, some wind parks next to the city.</p>
<p>Lack of monitoring: There is no central monitoring system that could collect, analyze and provide all city data. Some of the indicators are not accessible; some of them can be hardly found in many different sources, or just be provided on national, not on local, level.</p>
<p>Urban Platform: Still to be developed. Nowadays, there is only a website focuses as a channel of communication with the citizens. However, it is not connected to any energy monitoring sytem althouth nowadays the municipality is making progress in this.</p>

PESTEL analysis for the City of Palencia was performed by members of the local agency of the city, being the main results summarized in the following points:

- Polices in Palencia are focused in implemented energy solutions in public facilities but with the intention to act the municipality as reference for the citizens and extend these solutions to the private facilities. Hence, the four actions selected have this objective. In addition, these actions take part of current urban planning of the city.
- In general, strong political support for all selected smart actions exists, but there is no financial background to implement all of them in public facilities. In addition, the implementation in private facilities will depend of the availability of public funds and the implementation of ESCO models.
- Society of Palencia is not aware of the economic benefits of energy solutions. Main barriers are the high costs to face the upfront costs of the actions at private level. However, information campaigns can increase the social acceptance of biomass and EV. In the case of EV, it has identified a potencial group of citizens that could replace the current vehicles (taxis drivers and deliver companies). It is needed to promote the economic benefits of this type of vehicle towards these citizens in order to extend the use of sustainable vehicles.
- Legal environment is created on the national level. The local impact on regulations adoption is low, but could be improved within existing legal frame by use of tools and measures of local policy.

- All the selected actions have (direct or indirect) positive impact on urban ecosystem and environment. Action 1 (DH with biomass) can have a big impact in rural areas since the province counts with large areas of forest. Action 2 (EV) can influence in the close manufacture vehicle, which can create new jobs. However, it is detected a lack of expertise of local companies to execute the actions.

Finally, it has to remark the importance for the city of Palencia of the new funds from ERF (30 M€) for the sustainable development of the city which will make possible to invest in sustainable measures in the city at large scale since until now, the city only has developed solutions that do not have a big impact in the city.



7. References

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