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FP7-ENERGY-SMARTCITIES-2012

INSMART

Integrative Smart City Planning

Key Performance Indicators for Cities

Deliverable D.6.1

Author(s): Sofia Simoes, George Giannikidis, Sofia Burioli, Elena Giovannini, Silvia Morigi, Rocco De Miglio, Alessandro Chiodi, Nuno Bilo, António Valentim, Gavin Long, Andy Whitley

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Editors		
	Name (organization)	**e-mail**
Leading participant	Sofia Simoes (FCT) Julia Seixas (FCT)	sgcs@fct.unl.pt mjs@fct.unl.pt
Contributing participants	George Giannikidis (CRES) Leonidas G. Anthopoulos (DEYAT) Rocco De Miglio (E4SMA) Alessandro Chiodi (E4SMA) Silvia Morigi (Energie per la Citta') Gavin Long (UoN) Darren Robinson (UoN) Andrew Whitley (NCC) Nuno Bilo (Evora) António Valentim (Evora)	ggian@cres.gr lanthopo@teilar.gr rocco.demiglio@e4sma.com alessandro.chiodi@e4sma.com mercatoenergia@energieperlacitta.it gavin.long@nottingham.ac.uk darren.robinson@nottingham.ac.uk andy.whitley@nottinghamcity.gov.uk nuno.choraobilo@cm-evora.pt avalentim@cm-evora.pt
WP Leader (WPL)	Darren Robinson (UoN)	darren.robinson@nottingham.ac.uk
Project Coordinator (PC)	George Giannakidis (CRES)	ggian@cres.gr

Executive Summary

This report refers to WP6 (Task 6.1) and it focuses the identification of applicable and measurable Key Performance Indicators (KPI) for the cities of Cesena, Évora, Nottingham and Trikala to enable the delivery of an applicable and realistic city plan towards the sustainability targets. Based on a generic list of KPI and the analysis in WP1-WP5, the KPI for each city are identified considering the specific city targets, its energy characteristics and priorities. The KPI focus on energy, climate, economic and "other" dimensions.

Keywords	KPI, indicators, SEAP, implementation plan, energy planning, monitoring

Table of Contents

List of Tables

Acronyms and Definitions

FEC- Final Energy Consumption

GHG – Greenhouse gases

KPI – Key Performance Indicators

PEC – Primary Energy Consumption

SEAP – Sustainable Energy Action Plan

1. Introduction

1.1. Overview of InSmart

The InSmart concept brings together cities, scientific and industrial organizations in order to establish and implement a comprehensive methodology for enhancing sustainable planning addressing the current and future city energy needs through an integrative and multidisciplinary planning approach.

InSmart project intends to identify the optimum mix of short, medium and long term measures for a sustainable energy future, addressing the efficiency of energy flows across various city districts, namely buildings, transport and mobility. Urban spaces, water/sewage system, waste chain and decentralized energy supply. Each city's energy system is analysed, covering all relevant sectors and a comprehensive GIS platform including energy database was developed. Apart from being a valuable planning tool, the GIS database informs and is linked to the TIMES energy planning model. This model was used to analyse the cost-optimal mix of measures required to meet sustainable energy targets taking into account exogenous parameters (*e.g.*, environmental targets, city expansion). These measures were further assessed with respect to non-technical criteria using a multi-criteria decision making method (PROMETHEE) that addressed economic, environmental, as well as social issues. Within WP6 a detailed economic analysis of the mid-term measures identified through the previous two stage optimisation procedure in WP5 will be undertaken, identifying all relevant investment indicators. Finally, a detailed, realistic and applicable mid-term implementation plan will be developed to describe the necessary steps, required resources and monitoring procedures for each city. The identification of Key Performance Indicators (KPI) is fundamental to support the future implementation of this plan.

1.2. Objectives of this Report

This report refers to WP6 (Task 6.1) and it focuses the identification of applicable and measurable KPI for the cities of Cesena, Évora, Nottingham and Trikala to enable the delivery of an applicable and realistic city plan towards the sustainability targets. Based on the analysis in WP1-WP5, the KPI for each city are identified considering the specific city targets, its energy characteristics and priorities.

The purpose of KPIs within a city in the context of InSmart can be detailed as follows: (i) the assessment of the plan's implementation in each city to decide on contingency measures, when necessary, (ii) public authority communication with (public and private) stakeholders and citizens, and (iii) contribution to the monitoring of the Sustainable Energy Action Plans (SEAP) within the Covenant of Mayors initiative.

1.3. Outline of the Report

The report is organized in four chapters besides the introduction. Chapter 2 presents a brief description on the approach used to select the KPI, followed by Chapter 3 presenting the general indicators which are then adapted to each city's needs in Chapter 4. Some final remarks are then included in the last Chapter.

2. Selecting InSmart Key Performance Indicators

2.1. Context of KPI selection

According to the Energy Indicators for Sustainable Development: Guidelines and Methodologies of the IAEA, IEA, EUROSTAT, EEA and United Nations (IAEA et al. 2005), sustainable energy KPI should allow taking into account economic, social and environmental consequences and will support policymakers to measure and assess the current and future effects of energy use on the several dimensions of sustainable development: economic, social and environmental.

Therefore, KPI should not be seen as only data, and instead they should allow providing "a deeper understanding of the main issues and to highlight important relations that are not evident using basic statistics" (IAEA et al. 2005). The same authors indicate that while some indicators provide a measure of progress towards a desired target and allow distinguishing between desirable and undesirable trends (which is the case of most social and environmental indicators), some other indicators are "not designed to distinguish between 'good' and 'bad' but instead to describe and give an indication of an aspect of energy use". This is the case of most of the economic indicators.

Besides this work of IAEA EUROSTAT, EEA and United Nations, there are several initiatives using KPI for urban energy systems, namely: the POCACITO EU project (Silva et al. 2014), the one of the Asia-Pacific Economic Collaboration for Low Carbon cities (APEC 2013), the widely known indicators and reporting used within the Covenant of Mayors Action Plans initiative (Covenant of Mayors Office and Joint Research Centre of the European Commission 2014) and the *Carbonn* Climate Registry initiative (www.carbonn.org).

Specifically for urban energy systems, KPIs should consider the different economic sectors in the city since each sector has its own dynamics and energy cost-effectiveness, as well as its specific future perspectives, and may have its own energy and climate targets. Moreover, each economic sector is included as a component within the city energy network, thus being necessary to keep track on each city's economic sector performance and also on the city integrated performance.

2.2. Approach to select the KPI

The InSmart KPI were selected aiming to evaluate the performance of cities during the implementation of the sustainable energy plan. The selection of generic KPI presented in chapter 3 was based in a literature review, including the references above mentioned, along with the knowledge and experience of the InSmart team.

The InSmart KPI includes both indicators that make use of absolute metrics (e.g. GJ, tCO2e) and of relative metrics (e.g. %), which are detailed as follows.

A) Absolute metrics indicators:

Step 1. Develop indicators for target years (2020 and 2030), following the Plan's full implementation

Step 2. Interpolate indicators yearly or biennially, following the Plan's full implementation

Step 3. Monitor real implementation yearly or biennially

In this case, KPIs are the difference between real and targeted implementation, i.e. KPIs = Step 3- Step 2.

B) Relative Metrics indicators:

Step 1. Develop indicators for target years (2020 and 2030), following the Plan's full implementation

Step 2. Interpolate indicators yearly or biennially, following the Plan's full implementation

Step 3. Monitor real implementation yearly or biennially

For these relative metric KPI, a direct comparison of KPI with targets is used, i.e. KPIs = Step 3.

Underlying the selection of KPI was considered the principle that for ensuring a truly integrated city analysis (energy-environment-economic) it is necessary to consider performance indicators on the following dimensions: energy, climate mitigation, energy-climate related economic indicators, as well as other city's performance indicators (e.g. mobility infrastructure, acceptability, scale of priority within city's overall planning, etc.). For each dimension, the KPI should address the different activity sectors of each city as considered in the InSMART project, namely:

- Transport,
- Services,
- Residential Buildings,
- Public Buildings,
- Public Lighting,
- Agriculture,
- Industry,
- Water services,
- Wastewater services,
- Waste services, and
- District Heating

Complementarily, following the integrative InSmart approach some KPI focus on the **whole of the ci**ty (hereafter named as integrated city).

For each dimension and activity sector, the KPI selection took into account a set or criteria: relevance, clear message, data availability and data quality and corresponding screening categories. This was based on the POCACITO approach and is summarised in Table 1 (Silva et al. 2014). Basically, a wide set of KPI was proposed to the four partner cities and the final set of KPI was a selection of these based on their performance considering the criteria below.

Table 1 – Summary of selection criteria considered for KPI selection based on the POCACITO project approach

Criterion	Screening categories for each criterion
Relevance (+/-)	Is the city able to influence the indicator on its own? (i.e., is the city level the right level?) (+/-) Is the indicator relevant for small cities as well as for megacities, does it respect the diversity of case study cities? Are there indicators included that enable one to measure development/transition scenarios' impacts (with regard to WP5 objectives)?
Clear message (y/n)	Is the message of the indicator clear? (+/-) Is the meaning of the indicator substantial? (+/-) Are the name and the data of the indicator easily understandable? (+/-) Is the direction of the indicator clear? (y/n)
Data availability (+/-)	Is the data available at the city level? (+/-) Is the data already collected? (y/n) What is the location/source of the data? (location) Is there free access? (y/n) For how long has the data been collected? (years) How often is the data collected? (/year) Are the city officials able to provide us with the data? (+/-) Is the data available for every city? (+/-
Data quality (+/-)	Reliability (+/-) - How consistent is the data? Validity (+/-) - Does it measure what it is intended to measure? Completeness (+/-) - Is the database complete or is data missing? Comparability (+/-) - E.g., is the data standardised? Transparency (+/-) - is it possible for other people to verify the data? Uncertainty (+/-) - How does the indicator deal with uncertainty?

While some criteria have yes or no answers (y/n), others are positively or negatively (+/-) scaled, ranging from “+++”, “++” to “+” and “-“, “--“ to “---“, in an attempt to keep the screening criteria short and manageable.

3. InSmart Generic Proposal of Key Performance Indicators to be adapted for each city

Based on the literature review and work carried on in WP1 to WP5, the following sections summarise the generic proposal of InSmart KPI to be adapted for the needs of each city (in the Chapter 4). The KPI allow tracking the transition towards more sustainable urban energy system following the implementation of each city's sustainable energy plan. The KPI are divided per dimension and activity sectors as previously explained

3.1. Energy Dimension

The generic KPI for the energy dimension are summarized in the following table.

Table 2 – Generic InSmart KPI for the energy dimension

SECTORS	Code	KPI	Unit
Transport	E1	Variation of FEC	GJ
	E2	Share of mobility in public transportation	%
	E3	Share of electricity in FEC	%
	E4	FEC per capita	J/inhab
Services	E5	Variation of FEC	GJ
	E6	Share of green electricity in FEC	%
Residential Buildings	E7	Variation of FEC	GJ
	E8	FEC per capita	J/inhab
	E9	Share of green electricity in FEC	%
Public Buildings	E10	Variation of FEC	GJ
	E11	Energy intensity	J/public employers
	E12	Share of green electricity in FEC	%
Public Lighting	E13	Variation of FEC	GJ
	E14	Share of LED over total lighting	%
	E15	Share of green electricity in FEC	%
Industry	E16	Variation of FEC	GJ
	E17	Share of green electricity in FEC	%
Water services	E18	Variation of FEC in water supply systems	GJ
Wastewater services	E19	Variation of FEC in wastewater systems	GJ
	E20	FEC per capita	J/inhab
Waste services	E21	Variation of FEC in waste systems	GJ
	E22	FEC per capita	J/inhab
District Heating	E23	Primary Energy Consumption	GJ
INTEGRATED CITY	E24	Variation of TPEC	GJ
	E25	Variation of TFEC	GJ

SECTORS	Code	KPI	Unit
	E26	Share of endogenous renewables in TFEC	%
	E27	Share of endogenous energy resources in TPEC	%
	E28	Share of green power in TFEC	%
	E29	New PV Installed Capacity in roof tops	MW
	E30	New Utility scale PV Installed Capacity	MW
	E31	New Installed Capacity Other RES	MW

3.2. Climate Dimension

The generic KPI for the climate dimension are summarized in the following table.

Table 3 – Generic InSmart KPI for the climate dimension

SECTORS	Code	KPI	Unit
Transport	CLIM1	Variation of GHG emissions in transport	tCO2e
	CLIM2	Average vehicles carbon intensity	kgCO2/vehicle
Services	CLIM3	Variation of GHG emissions in services	tCO2e
Residential Buildings	CLIM4	Variation of GHG emissions in residential buildings	tCO2e
	CLIM5	Average household carbon intensity	kgCO2/household
Public Buildings	CLIM6	Variation of GHG emissions in public buildings	tCO2e
	CLIM7	Average buildings carbon intensity	kgCO2/m2
Public Lighting	CLIM8	Average carbon intensity	
Industry	CLIM9	Variation of GHG emissions in industry	tCO2e
	CLIM10	Average carbon intensity	
Water services	CLIM11	Variation of GHG emissions in water systems	tCO2e
Wastewater services	CLIM12	Average carbon intensity	kgCO2/inhab
Waste services	CLIM13	Variation of GHG emissions in waste systems	tCO2e
	CLIM14	Average carbon intensity	kgCO2/inhab
District Heating	CLIM15	Average carbon intensity	kgCO2/inhab
INTEGRATED CITY	CLIM16	Variation of GHG emissions	% change from base-yeart
	CLIM17	Emissions per capita	tCO2e/inhab
	CLIM18	Total GHG emissions	tCO2e

3.3. Economic Dimension

The generic KPI for the economic dimension are summarized in the following table.

Table 4 – Generic InSmart KPI for the economic dimension

SECTORS	Codes	KPI	Unit
Transport	ECON1	Investment in Transport measures	M€
Services	ECON2	Investment in Services measures	M€
Residential Buildings	ECON3	Investment in Residential buildings measures	M€
Public Buildings	ECON4	Investment in public buildings measures	M€
Public Lighting	ECON5	Investment in public lighting measures	M€
Water services	ECON6	Investment in sectoral measures	M€
Waste services	ECON7	Investment in sectoral measures	M€
District Heating	ECON8	Investment	M€
INTEGRATED CITY	ECON9	Total Investment	M€
	ECON10	Total investment public funds	M€

3.4. "Other" Dimension

The generic KPI for the "other" dimension are summarized in the following table.

Table 5 – Generic InSmart KPI for the "other" dimension

SECTORS	Code	KPI	Unit
Transport	O1	Extension of bike lanes	km
	O2	Public bikes	No.
	O3	EV charging points	No.
	O4	New parking lots	No.
Public Buildings	O5	Zero Energy Buildings	No
Public Lighting	O6	New automated management	No.
Waste services	O7	Variation of waste production	t
	O8	Variation of recycling rate	% from base year
District Heating	O9	Expansion of network	km
	O10	Inhabitants supplied	No. inhabitants
INTEGRATED CITY	O11	New businesses related with energy services	No.
	O12	New jobs created	No.

4. Final selection of KPIs for each city

Based on the criteria listed in section 2.2 and the generic proposal of KPI in section 3, each InSmart partner city has selected the most adequate ones for the specific needs of each city as listed in this section.

4.1. Trikala

The indicators selected for monitoring the implementation of the sustainable energy implementation plan in Trikala are a subset of the Generic InSmart indicators and are presented in the following tables.

Table 6 – Trikala KPIs for the energy dimension

SECTORS	Code	KPI	Unit
Transport	E1	Variation of FEC	GJ
Services	E5	Variation of FEC	GJ
Residential Buildings	E7	Variation of FEC	GJ
Public Buildings	E10	Variation of FEC	GJ
Public Lighting	E13	Variation of FEC	GJ
	E14	Share of LED over total lighting	%
Water services	E18	Variation of FEC in water supply systems	GJ
Wastewater services	E19	Variation of FEC in wastewater systems	GJ
INTEGRATED CITY	E25	Variation of TFEC	GJ
	E26	Share of endogenous renewables in TFEC	%
	E29	New PV Installed Capacity in roof tops	MW
	E30	New Utility scale PV Installed Capacity	MW
	E31	New Installed Capacity Other RES	MW

Table 7 – Trikala KPIs for the climate dimension

SECTORS	Code	KPI	Unit
Transport	CLIM1	Variation of GHG emissions in transport	tCO2e
Services	CLIM3	Variation of GHG emissions in services	tCO2e
Residential Buildings	CLIM4	Variation of GHG emissions in residential buildings	tCO2e
Public Buildings	CLIM6	Variation of GHG emissions in public buildings	tCO2e
Water services	CLIM11	Variation of GHG emissions in water systems	tCO2e
Wastewater services	CLIM12	Variation of GHG emissions in water systems	tCO2e
INTEGRATED CITY	CLIM16	Variation of GHG emissions	% change from base-yeart

Table 8 – Trikala KPIs for the economic dimension

SECTORS	Codes	KPI	Unit
Transport	ECON1	Investment in Transport measures	M€
Residential Buildings	ECON3	Investment in Residential buildings measures	M€
Public Buildings	ECON4	Investment in public buildings measures	M€
Public Lighting	ECON5	Investment in public lighting measures	M€
Water services	ECON6	Investment in sectoral measures	M€
INTEGRATED CITY	ECON9	Total Investment	M€

Table 9 – Trikala KPIs for the "other" dimension

SECTORS	Code	KPI	Unit
Transport	O1	Extension of bike lanes	km
Public Buildings	O5	Zero Energy Buildings	No

4.2. Nottingham

The indicators selected for monitoring the implementation of the sustainable energy implementation plan in Nottingham are a subset of the Generic InSmart indicators and are presented in the following tables.

Table 10 – Nottingham KPI for the energy dimension

SECTORS	Code	KPI	Unit
Transport	E1	Variation of FEC	GWh
	E2	Share of mobility in public transportation	%
	E3	Share of electricity in FEC	%
	E4	FEC per capita	kWh/person
Residential Buildings	E5	Variation of FEC	GWh
	E6	FEC per capita	kWh/person
	E7	FEC per household	kWh/dwelling
	E8	Share of low carbon energy in FEC	%
Public Buildings	E9	Variation of FEC	GWh
	E10	Energy intensity	kWh/public employees
	E11	Share of green electricity in FEC	%
District Heating	E12	Primary Energy Consumption	GWh
INTEGRATED CITY	E13	Variation of TPEC	GWh
	E14	Variation of TFEC	GWh
	E15	Share of endogenous renewables in TFEC	%
	E16	Share of low carbon energy in TFEC	%
	E17	New PV Installed Capacity in roof tops	MW
	E18	New Utility scale PV Installed Capacity	MW
	E19	New Installed Capacity Other RES	MW

Table 11 – Nottingham KPI for the climate dimension

SECTORS	Code	KPI	Unit
Transport	C1	Variation of GHG emissions in transport	tCO2e
	C2	GHG emissions per capita	kgCO2/person
Residential Buildings	C3	Variation of GHG emissions in residential buildings	tCO2e
	C4	Average household carbon intensity	kgCO2/household
Public Buildings	C5	Variation of GHG emissions in public buildings	tCO2e
	C6	Average buildings carbon intensity	kgCO2/m2
District Heating	C7	Average carbon intensity	kgCO2/person
INTEGRATED CITY	C8	Variation of GHG emissions	% change from base-year
	C9	Emissions per capita	tCO2e/person
	C10	CO2 emissions per household	tCO2e/dwelling
	C11	Total GHG emissions	tCO2e

Table 12 – Nottingham KPI for the economic dimension

SECTORS	Codes	KPI	Unit
Transport	EC1	Investment in Transport measures	£M
Residential Buildings	EC2	Investment in Residential building measures	£M
Public Buildings	EC3	Investment in public buildings measures	£M
District Heating	EC4	Investment	£M
INTEGRATED CITY	EC5	Total Investment	£M
	EC6	Total investment public funds	£M

Table 13 – Nottingham KPI for the "other" dimension

SECTORS	Code	KPI	Unit
Transport	OT1	Extension of bike lanes	km
	OT2	Public bikes	No.
	OT3	EV charging points	No.
Residential Buildings	OT4	Reduction in fuel poverty	Households
	OT5	Low carbon Buildings[1]	Dwellings
District Heating	OT6	Expansion of network	km
	OT7	households supplied	Households
INTEGRATED CITY	OT8	New businesses related with energy services	No.
	OT9	New jobs created	No.

4.3. Cesena

The proposed approach (POCACITO) has enabled the Municipality of Cesena to focus its efforts only on relevant, clear and available KPIs.

The InSmart analysis of the Municipality of Cesena does not contain the analysis of the sectors "Industry" and "Agriculture". The KPIs that relate to these sectors have been excluded. Other KPIs have been excluded because they are not supported by data availability, or they are not relevant in Cesena area.

The following are the KPIs selected from the Municipality of Cesena:

Table 14 – Cesena KPI for the energy dimension

SECTORS	Code	KPI	Unit
Transport	E1	Variation of FEC	GJ
	E2	Share of mobility in public transportation	%
	E3	Share of electricity in FEC	%
	E4	FEC per capita	J/inhab
Residential Buildings	E7	Variation of FEC	GJ
	E8	FEC per capita	J/inhab
	E9	Share of green electricity in FEC	%
Public Buildings	E10	Variation of FEC	GJ
	E12	Share of green electricity in FEC	%

[1] *Low carbon building* would be based on the UK definition for the lower carbon compliance level. This is represented by a 25% reduction in carbon emissions for around an additional £5000 premium in construction cost. This would be in line with existing *green* homes recently built in the city and planned for the near future.

SECTORS	Code	KPI	Unit
Public Lighting	E13	Variation of FEC	GJ
	E14	Share of LED over total lighting	%
	E15	Share of green electricity in FEC	%
Wastewater services	E19	Variation of FEC in wastewater systems	GJ
	E20	FEC per capita	J/inhab
Waste services	E21	Variation of FEC in waste systems	GJ
District Heating	E23	Primary Energy Consumption	GJ
INTEGRATED CITY	E25	Variation of TFEC	GJ
	E26	Share of endogenous renewables in TFEC	%
	E29	New PV Installed Capacity in roof tops	MW
	E31	New Installed Capacity Other RES	MW

Table 15 – Cesena KPI for the climate dimension

SECTORS	Code	KPI	Unit
Transport	CLIM1	Variation of GHG emissions in transport	tCO2e
	CLIM2	Average vehicles carbon intensity	kgCO2/vehicle
Residential Buildings	CLIM4	Variation of GHG emissions in residential buildings	tCO2e
	CLIM5	Average household carbon intensity	kgCO2/household
Public Buildings	CLIM6	Variation of GHG emissions in public buildings	tCO2e
	CLIM7	Average buildings carbon intensity	kgCO2/m2
Wastewater services	CLIM12	Average carbon intensity	kgCO2/inhab
Waste services	CLIM13	Variation of GHG emissions in waste systems	tCO2e
	CLIM14	Average carbon intensity	kgCO2/inhab
INTEGRATED CITY	CLIM16	Variation of GHG emissions	% change from base-yeart
	CLIM17	Emissions per capita	tCO2e/inhab
	CLIM18	Total GHG emissions	tCO2e

Table 16 – Cesena KPI for the economic dimension

SECTORS	Codes	KPI	Unit
Transport	ECON1	Investment in Transport measures	M€
Residential Buildings	ECON3	Investment in Residential buildings measures	M€
Public Buildings	ECON4	Investment in public buildings measures	M€
Public Lighting	ECON5	Investment in public lighting measures	M€
District Heating	ECON8	Investment	M€
	ECON10	Total investment public funds	M€

Table 17 – Cesena KPI for the "other" dimension

SECTORS	Code	KPI	Unit
Transport	O1	Extension of bike lanes	km
	O2	Public bikes	No.
	O3	EV charging points	No.
Public Buildings	O5	Zero Energy Buildings	No
Public Lighting	O6	New automated management	No.
Waste services	O7	Variation of waste production	t
	O8	Variation of recycling rate	% from base year
District Heating	O9	Expansion of network	km
	O10	Inhabitants supplied	No. inhabitants
INTEGRATED CITY	O11	New businesses related with energy services	No.
	O12	New jobs created	No.

4.4. Évora

The indicators selected for monitoring the implementation of the sustainable energy implementation plan in Évora are a subset of the Generic InSmart indicators and are presented in the following tables.

Table 18 – Évora KPI for the energy dimension

SECTORS	Code	KPI	Unit
Transport	E1	Variation of FEC	GJ
	E4	FEC per capita	J/inhab
Residential Buildings	E7	Variation of FEC	GJ
	E8	FEC per capita	J/inhab
Public Buildings	E10	Variation of FEC	GJ
	E11	Energy intensity	J/public employers
Public Lighting	E13	Variation of FEC	GJ
	E14	Share of LED over total lighting	%
Waste services	E21	Variation of FEC in waste systems	GJ
	E22	FEC per capita	J/inhab
INTEGRATED CITY	E25	Variation of TFEC	GJ
	E29	New PV Installed Capacity in roof tops	MW
	E30	New Utility scale PV Installed Capacity	MW

Table 19 – Évora KPI for the climate dimension

SECTORS	Code	KPI	Unit
Transport	CLIM1	Variation of GHG emissions in transport	tCO2e
Residential Buildings	CLIM4	Variation of GHG emissions in residential buildings	tCO2e
	CLIM5	Average household carbon intensity	kgCO2/household
Public Buildings	CLIM6	Variation of GHG emissions in public buildings	tCO2e
	CLIM7	Average buildings carbon intensity	kgCO2/m2
Public Lighting	CLIM8	Average carbon intensity	
Waste services	CLIM13	Variation of GHG emissions in waste systems	tCO2e
	CLIM14	Average carbon intensity	kgCO2/inhab
INTEGRATED CITY	CLIM16	Variation of GHG emissions	% change from base-yeart
	CLIM17	Emissions per capita	tCO2e/inhab
	CLIM18	Total GHG emissions	tCO2e

Table 20 – Évora KPI for the economic dimension

SECTORS	Codes	KPI	Unit
Transport	ECON1	Investment in Transport measures	M€
Public Buildings	ECON4	Investment in public buildings measures	M€
Public Lighting	ECON5	Investment in public lighting measures	M€
Waste services	ECON7	Investment in sectoral measures	M€

Table 21 – Évora KPI for the "other" dimension

SECTORS	Code	KPI	Unit
Transport	O1	Extension of bike lanes	km
	O2	Public bikes	No.
	O3	EV charging points	No.
	O4	New parking lots	No.
Public Buildings	O5	Zero Energy Buildings	No
Public Lighting	O6	New automated management	No.
Waste services	O7	Variation of waste production	t
	O8	Variation of recycling rate	% from base year

5. Concluding remarks

This reports identifies Key Performance Indicators (KPI) for the sustainable energy plan implementation for each city and for tracking its route towards sustainable energy. It explains briefly the context and approach for selecting KPI and provides a description for each KPI. Moreover, the variables, reference years and the sources of information for each indicator are highlighted.

During the selection of the city-specific KPI it was found that there may be an issue with the accuracy of some of the statistical data available for the city since in many cases this has to be either extracted from city data provided by the national statistics or energy bureaus of downscaled from nationally available data. The data provided by national institutions has normally a one to two year lag (e.g. data for 2014 is the most recent currently available in the case of United Kingdom and Portugal).

Moreover, in some cases, the city-specific data provided (or downscaled) from the national statistics shows some inconsistencies with the near-term results from the InSmart models for transport and buildings. However, during the development of InSmart it was found that in some cases the city-specific InSmart models were correct and that the city statistics from national sources were not necessarily always correct. This naturally merits a more thorough analysis, but at this stage it should be mentioned that when using the InSmart city KPI one needs to be aware of potential discrepancies and that in some instances the % variation in national statistics might be more useful than the absolute energy difference. This is particularly important if the KPI is being used to assess a specific change as part of the chosen scenario.

6. References

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