POCACITO

european post-carbon cities of tomorrow

REPORT ON LEADING CITIES INVENTORY

D2.1

LEIBNIZ-INSTITUTE FOR REGIONAL DEVELOPMENT AND STRUCTURAL PLANNING (IRS)

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LIST OF ABBREVIATIONS

COM	Covenant of Mayors
EEA	European Energy Award
EUROSTAT	Statistical Office of the European Union
GDP	Gross Domestic Product
GHG	Green House Gas
ICLEI	Local Governments for Sustainability
PCC	Post-Carbon Cities
PPS	Purchasing Power Standards
SEAP	Sustainable Energy Action Plan

EXECUTIVE SUMMARY

POCACITO facilitates the transition of EU cities to a forecasted sustainable or "post-carbon" economic model. The project focuses on towns, cities, megacities, metropolitan areas and urban clusters larger than 1 million people as well as small and medium-sized cities. This document details the completion of Leading Cities Inventory (D2.1)[1]. Although a stand-alone deliverable, it can be viewed primarily as an interim result and internal knowledge base for the project.

The project seeks to advance a post-carbon vision for cities of various sizes, regions, degrees of wealth, in different political and socio-cultural contexts across Europe (and ultimately beyond). The Pocacito project understands the Post Carbon City (PCC) to mean: “the establishment of new types of cities that are low-carbon as well as environmentally, socially and economically sustainable” (WP1 Common Approach). To facilitate transitions to PCC we need a more differentiated understanding of what is possible for cities in varying contexts of action and in differing stages of post carbon transition. Thus the leading cities inventory and, later on, the good city practice inventory need to capture as many facets of post-carbon city transition in Europe as possible.

Our research consisted of a review of the literature on cities, carbon-related and, more generally, urban environmental initiatives (e.g. transnational city networks such as Covenant of Mayors) and practices. This was supplemented by original research in the form of an expert survey, which provided fresh insights and addressed (geographical) gaps in the state of the art. A methodology to select leading cities according to a combination of performance and action indicators was developed. This drew on both the existing material and the expert survey city nominations. 94 leading cities have been identified and basic information and data has been gathered to show their progress with respect to their development towards post-carbon futures. The leading cities have been contextualised according to available data on the following variables: total urban population size, regional GDP in PPS per capita and average heating degree-days. A great diversity of cities has emerged. The leading cities vary markedly in location, size, wealth and heating days. Finally, a short list of high performing cities (including Bottrop, Zurich and Munster) was produced.

Not every city selected can be seen as a European leader. Rather the inclusive approach adopted also identified cities of national or regional significance, even if their performance is not comparable to European leaders. Their inclusion should assist with developing a more contextualized understanding of good practices. The ultimate aim of the inventory has been to reflect on the broader spectrum of urban post-carbon transitions activities found in cities. The broader meaning of the leading cities list will be the subject of further research in WP2.

[1] This report is accompanied by an extensive database on leading cities (see Excel document). The lists presented are drawn from the material gathered in this database.

I INTRODUCTION

POCACITO facilitates the transition of EU cities to a forecasted sustainable or "post-carbon" economic model. The project focuses on towns, cities, megacities, metropolitan areas and urban clusters larger than 1 million people as well as small and medium-sized cities. This document reports on the Leading Cities inventory (D2.1) and should be read in conjunction with the accompanying excel document. Although a stand-alone deliverable, it can be viewed primarily as an interim result and internal knowledge base for the project. It also serves as a basis for best practice identification (D2.2 Good Practices Inventory, D2.3 Good National and EU Practices Inventory).[2] The aim of the project is advance a post-carbon vision for cities of various sizes, regions, degrees of wealth, in different political and socio-cultural contexts across Europe (and ultimately beyond). WP2 identifies and collects basic information and data on c.100 leading cities in Europe in the transition to the post-carbon city. Crucially, the aim is to include national and regional leaders, as well as European. In some member states the nationally leading cities are also well-known internationally (e.g. Stockholm). In contrast, in other member states most leading cities are not recognized as European leaders, even if they remain the most important reference points for nearby or similar cities, especially those cities that do not have the capacity to search for and implement international best practice.

To facilitate transitions to PCC we need a more differentiated understanding of what is possible for cities in varying contexts of action and in differing stages of post carbon transition. Thus the leading cities inventory and, later on, the good city practice inventory, need to capture as many facets of post-carbon city transition in Europe as possible. It was therefore necessary to go beyond a simple ranking of cities. There are recognised problems with rankings and award schemes, notably their lack of a sound methodology, coverage only of cities who volunteer to be included and, most damagingly, perhaps, their lack of usefulness to policymakers.[3] Rankings and awards have tended to create a sense of a high performing, wealthy elite of more sustainable cities, generally (but not only) from Western and Northern Europe. They may be “leading cities”, but the questions arise what they are leading in, and for which other cities they are leading. Not all cities in Europe can learn from good practices in these commonly mentioned cities, because of the differing contexts they are in. As well as geographical bias, there is little sense of how cities have advanced and how other cities might also advance and why action and performance take these forms that they do.

The aim of this report is to better contextualize the notion of “leading” in relation to cities (as well as practices), to identify similarities among cities with respect to what is conducive to a transition to a “post-carbon” state. To gain such a rounded view, we looked beyond the usual cities that appear in sustainable city rankings i.e. the group of “first in class” cities and that of large, dominant cities in Europe. Hence our understanding of leading cities was not only related to measured performance (the basis for most rankings/ environmental awards), but rather the inter-relationships between

[2] Analytical results of the Leading Cities Inventory (and selected good practices) will be made available publicly through learning events, publications and the project’s website.
[3] City Climate Leadership Awards. Online: http://cityclimateleadershipawards.com/expert-voices-stefan-denig-infrastructure-cities-sector-siemens/

context, actions and performance. The aim was to assess a wide range of cities in relation to their own potential to act and perform rather than that of other cities. Hence we aim, in a very preliminary fashion, to illuminate some of the contextual factors which shape opportunities and constraints in post carbon transitions, considering different and changing contexts. To make the analysis more inclusive "actions" were included in the analysis on the grounds that they were, at the least, indicative of willingness to change. As such they were a necessary supplement to performance, which ultimately rests on recorded or recordable data. A further aim of this report is to document first steps towards a typology of leading post carbon-cities in Europe. This typology would be useful for matching cities based on their contextual similarities for potential learning and knowledge transfer.

Our research consisted of a review of the literature on cities, post-carbon and, more generally, urban environmental initiatives (e.g. transnational city networks such as Covenant of Mayors) and practices. This was supplemented by original research in the form of an expert survey, which provided fresh insights and addressed (geographical) gaps in the state of the art, particularly with regards to cities in Central and Southern Europe. After this a methodology to select leading cities/ good practices according to a combination of performance and action indicators was developed. This drew on both the existing material and the expert survey city nominations. Our leading cities were chosen according to the following selection criteria:

Those cities with

Minimum 3 memberships in initiatives (e.g. Energy Cities) *or nomination in city rankings* (e.g. Green City Index).

OR

Minimum 1 expert survey nomination

AND

Approved Covenant of Mayors (COM) Sustainable Energy Action Plan (SEAP)

OR

European Energy Award (EEA)

OR

Minimum two expert survey nominations

Following this the findings were contextualised according to available data on the following variables: total urban population size, regional GDP in PPS per capita and average heating degree-days.

The results, our leading cities list, may ultimately contain some surprises, such as Koprivnica and Litoměřice, alongside more familiar names, like Stockholm and Nantes. The main point to make is that this was not a ranking exercise and was instead an explicitly inclusive, exploratory research process. Hence, our inclusion of expert survey nominations. Results are only indicative of the inter-relationships between performance, action and context. There were the usual restrictions of time and resources, as well as data availability. The hope is that the leading cities lists will throw light on cities not usually included in such exercises, while providing the basis for a more contextualised approach to assessing cities performance in the post-carbon transition.

Finally, it should be noted that this report is more than simply a list of leading cities. The accompanying excel document is an *inventory of leading cities* focused on performance, actions and

context indicators. There is much potential to build on this material by adding more contextual variables or initiative data. It is thus possible to contextualise further and provide more specific insights for urban policymakers and practitioners. These opportunities for learning will be developed in WP6 Marketplace of Ideas.

II LEADING CITIES INVENTORY

II.I CONCEPTUAL APPROACH AND METHODOLOGY

To catalyze transitions to PCC, we need a more differentiated understanding of what is possible for cities in varying contexts and stages of transition. Existing rankings and indices typically present high performers and do not sufficiently consider contextual factors. To go beyond a straightforward inventory, our more conceptual approach is based on the dimensions shaping a city's transition to a "post-carbon" city.

II.I.1 CONCEPTUAL MODEL

Understanding transitions to post-carbon cities requires an analysis of the relationships between urban contextual characteristics, the actions undertaken and the overall performance of cities in moving to a post-carbon system. Although it seems obvious to state that contextual factors such as economic strength shape the potential of a city to act and move towards sustainability, this often seems to be overlooked in existing city rankings and awards. Such contextual factors can range from local – e.g. urban form – to national and global - e.g. internationally agreed emission reduction goals. Within given settings, however, cities are able to carry out focused actions and move towards locally defined goals. As the figure below illustrates, with successful action and high performance over time, positive feedback loops become possible and may accelerate post-carbon transitions and ultimately even positively change the urban context itself. **Context** was understood as those local, national and global factors which constrain and enable actions and ultimately performance. Examples include urban form and population size. **Actions** are the concrete steps taken by cities in pursuit of the post carbon transition. Examples include those steps indicative of willingness to change, like joining relevant networks such as Energy Cities to implementation of policies and practices such as Sustainable Energy Action Plans (SEAPs). **Performance** is quite simply the measured (emissions reduction) or observed (awards, achievements) outcomes of such actions. The following questions do, then, guide research:

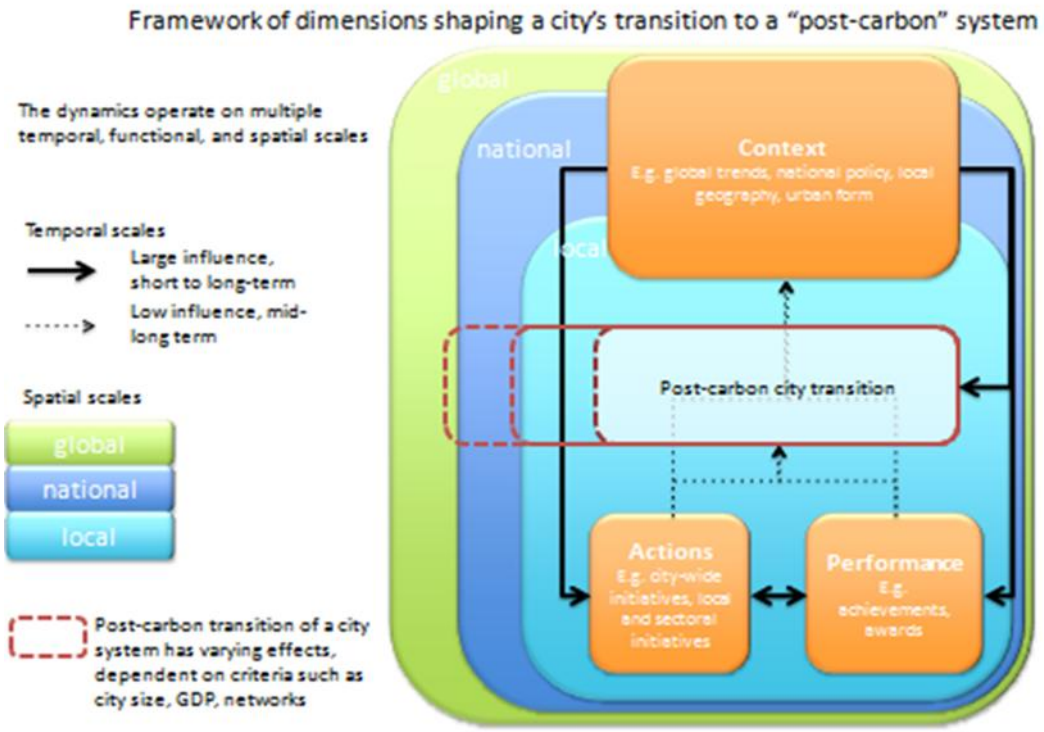
What types of urban context exist?

What do cities do to achieve the post-carbon transition? What kind of strategies in what types of cities?

What context variables promote or constrain actions and performance?

Which actions in which contexts are the most effective?

Figure 1: Conceptual model



II.I.2 METHODOLOGY

Research was conducted according to the following steps:

1. State of the art: what material exists on cities, practices and post-carbon initiatives

In the first step, we compiled long lists of cities involved in transnational initiatives related to cities and environment/ climate. By transnational initiatives we refer to the general range of networks, associations, awards and ranking systems, which involve a process of gaining membership or a process of gaining recognition for activities in the field of climate and environment. This was an initial gathering of data on the level and quality of action in cities according to the websites of the following organisations:

- Carbonn Cities Climate Registry
- Climate Alliance
- Climate Alliance Climate Star Award
- Covenant of Mayors (COM)
- C40 Cities Climate Leadership Group
- Energy Cities
- European Energy Award (EEA)
- European Smart Cities

- Local Governments for Sustainability (ICLEI)
- Mercer City Infrastructure Ranking
- Soot Free Cities
- Siemens Green City Index
- Urban-LEDS (Urban Low Emission Development Strategies)

Other datasets and indices, such as Eurostat's Sustainable Development Indicators and the World Governance Indicators, were selected as information sources at the country level. Some 20 variables are pre-identified as viable indicators for context-, action- and performance-related sub-dimensions (see WP2 Leading Cities excel database.

2. Expert survey: original research for new insights, to filter material

Running parallel to this project partners conducted an expert survey. 25 experts in urban climate and energy policy and planning from academic, policy and practice backgrounds were asked to nominate cities they considered "leading" in the post-carbon transition, giving brief explanations as to why. Experts were explicitly asked to consider the constraints contextual factors (e.g. low GDP) impose and think about cities which could be considered leading under different constraints. High performers were not excluded from consideration, but experts were encouraged to be inclusive and think of leading cities in their countries and regions and not just Europe-wide. This was particularly the case for Central and Eastern Europe and Southern Europe and the Balkans.

3. Contextualise findings according to available data

The next step was feeding the data into multi-dimensional matrices and applying filter criteria to produce leading cities lists according to performance criteria and level of activity. These are then grouped according to context variables: urban population, economic development and climate and energy. Discussed further in following section (111.11.3 Indicator Selection).

4. Develop criteria to select leading cities according to performance and action

Based on the data we gathered on cities, practices and post-carbon initiatives in Step 1 we decided on the following selection criteria[4]:

Those cities with:

Minimum 3 memberships in initiatives (e.g. Energy Cities) *or nomination in city rankings* (e.g. Green City Index).

OR

Minimum 1 expert survey nomination

[4] The formalized selection statement in excel (see table "Total"):
=IF(AND(OR('Total '!A4>2,NOT(ISBLANK('Total '!P4))),(OR('Total '!AW4="x",'Total '!BD4="Certified",'Total '!BD4="gold",'Total '!P4>1))),'Total '!B4,"")

AND

Approved Covenant of Mayors (COM) Sustainable Energy Action Plan (SEAP)

OR

European Energy Award (EEA)

OR

Minimum two expert survey nominations

Memberships in initiatives or nominations in rankings were seen as a good indicator of action as well as performance. Memberships are at the least indicative of a willing to change and, in the case of the Covenant of Mayors, it entails a political commitment to reduce Carbon Dioxide emissions to meet the EU 20% reduction targets and a series of formal steps to facilitate concrete measures and projects. Perhaps the most important is the Sustainable Energy Action Plan (SEAP), which outlines the main actions cities intend to take, hence the inclusion of Covenant of Mayors' approved SEAPS in the selection criteria. The European Energy Award (EEA) covers six areas of activity (mobility, internal organisation, communication & cooperation, supply and disposal, municipal buildings and facilities and development and spatial planning strategy) which determine the city's potential to act. The city's actions are measured by an internal audit team annually and an external audit completed every four years. The EEA has three steps. The first is comprehensive process of energy and climate protection policy and administrative reform in the municipality, externally monitored by the EEA. Once the EEA auditor and the national EEA committee have approved the municipality's policy and implementation, the results of the external audits (every four years) are used in an awards system. Cities with an implementation of 50 % of the scope of action are certified with the European Energy Award. An implementation of 75 % of the scope of action results in the European Energy Award Gold certification.[5]

Despite their problems, rankings can provide a good indication of performance, as they are sometimes based on quantifiable data (e.g. Siemens Green City Index) or on particular projects undertaken within a recent time period (e.g. European Green City).

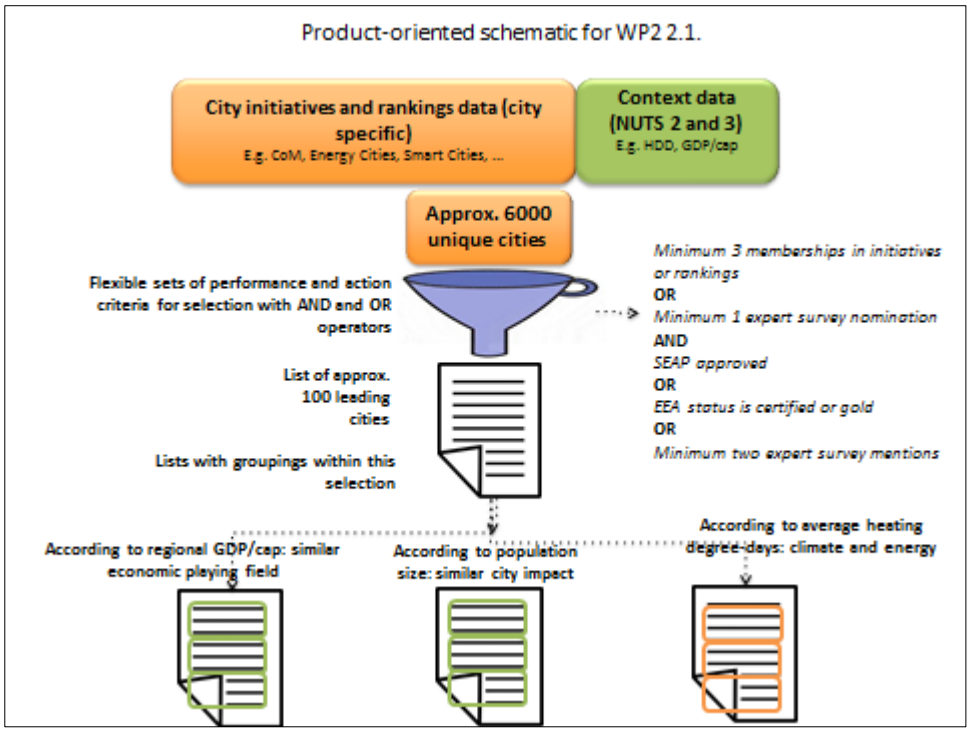
To complement these selection criteria expert survey nominations were seen as another possible entry point (minimum of two required or one nomination plus SEAP). This provides a balance to the existing data and allowed lesser known cities or cities active (but perhaps still relatively low performing) in more difficult contexts of action to be considered.

5. Produce report and range of lists of cities (leading cities, leading cities grouped according to contextual variables)

The findings were contextualised according to available data on the following variables: total urban population size, regional GDP in PPS per capita and average heating degree-days. More discussion in following section on Indicator Selection (III.1.3).

[5] For more information on EEA: http://www.european-energy-award.org/eea/process/

Figure 2 Methodology overview



II.I.3 INDICATOR SELECTION

The contextual dimension comprises external factors shaping a city's chances to transform into a post carbon system. Such contextual factors can range from the local (e.g. urban population density) through national (e.g. the share of renewable energy in gross final energy consumption) to the trans-national (e.g. emission reduction targets). It can be assumed that the transitions of individual cities are shaped by the initial conditions and assets of the cities that change in the long-term (location and boundaries; population density and urban form; infrastructure; size; vulnerability) and features that change in the medium-term (economic situation; social capital and social cohesion; local and national governance structures, including participation). The city itself has a limited influence over these factors such as a governance structures, and only on mid-to long term time scales. This is particularly true of national governance structures and politics, where the level of decentralisation in a country can have a large influence on the level of formal political autonomy enjoyed by the city in relation to climate and energy issues. For example, German's federal system ensures a high degree of autonomy for municipalities and larger city-state regions, such as Berlin and Hamburg. Lack of formal autonomy does not necessarily imply lack of activity, however, as the proactive approach to environmental issues of many cities in the centralised UK system shows.

We had the following "filters" for selecting context indicators:

- Indicators must be explicitly (e.g. GHG emissions reduction) or implicitly (e.g. government effectiveness) relevant for post-carbon development
- Indicators must reveal relevant and useful information for the city itself (as far as data allows) and other cities.

- We are looking for indicators with broad coverage of key areas that shape a city's progress in and chances for post-carbon transition. Broad, simple indicators are an asset. Intricate indicators dependent on hard-to find or patchy data and are more difficult to reproduce and compare.

We selected the following context indicators: urban population, economic development and climate and energy. All have: EU coverage, are subnational and minimum NUTS-2.

Table 1 Context indicators and data specifications

Indicator	Dataset	Source	Year/ period	Spatial resolution	Comparability over time and space	Data quality
Urban population	Total urban population	City initiatives, Eurostat, online sources	Approx. 2010	City-level	Medium	High
Economic development	Regional GDP in PPS per capita	EUROSTAT	2011	Subnational, NUTS 2 Level	High	High
Climate and Energy	Average heating degree-days	EUROSTAT	2000-2010	Subnational, NUTS 3 Level	High	High

Total population of city: the population size information was drawn from different city initiatives. If figures from more than one initiative were available, then the figures were compared. A comparison a subset of cities hosting multiple figures showed a high agreement of population figures. The population size data from the initiatives "SIEMENS Green City Index" and "European Energy Awards" were preferred over the Expert survey figures due to more harmonized collection of population data.

Grouping: the thresholds for grouping the leading cities according to population size were taken from Dijkstra and Poelman (2012). An additional class was added (5,000-50,000) in order to accommodate cities below the threshold for the smallest class (50,000 – 100, 000). These thresholds for small and medium-sized towns were taken from the ESPON TOWN Report on small and medium sized towns in their functional territorial context (2014).

Population size classes:

5,000-50,000: Small- and medium-sized town

50,000-100,000: Small urban centre

100,000-250,000: Medium urban centre

250,000-500,000: Large urban centre

500,000-1,000,000: XL urban centre

1,000,000-5,000,000: XXL urban centre

5,000,000 and above: Global city

Regional gross domestic product (GDP) (Purchasing Power Standards (PPS)[6] per inhabitant) by NUTS 2 regions (EUROSTAT: base year: 2011): according to EUROSTAT (2014)[7] GDP is an indicator of the output of a country or a region. It details the total value of all goods and services produced less the value of goods and services used for intermediate consumption in their production. Linking GDP to PPS (purchasing power standards) removes differences in price levels between countries, and increases accuracy. Calculations on a per inhabitant basis allow for the comparison of economies and regions significantly different in absolute size. GDP per inhabitant in PPS is the key variable for determining the eligibility of NUTS 2 regions in the framework of the European Union's structural policy.

Grouping: the thresholds for grouping the leading cities according to average regional GDP in PPS per inhabitant were chosen to allow for a relatively even spread of the leading cities in each class. Categories comprise *steps of RegGPD/cap. The average minimum across all NUTS-2 units between 2000 and 2009 is €6,400, the average maximum is €80,400. The highest RegGPD/cap in 2011 is €80,4000 (Inner London), the lowest RegGPD/cap in 2011 is €7200(Severozapaden, Bulgaria).

GDP/CAP in € PPS classes:

10-20, 000

20-30, 000

30-40, 000

40-50, 000

50-60, 000

60-70, 000

70, 000 or above

Heating degree-days by NUTS 2 regions (EUROSTAT: annual data. Average heating days, 2000-2009): according to Eurostat (2014)[8] the number of actual heating degree-days indicates expresses the extent of the cold in a specific time period taking into consideration outdoor temperature and room temperature. According to the European Environment Agency 'Heating Degree Day' is a proxy for the energy demand needed to heat a home or a business and is derived from measurements of external air temperature[9]. Consumption of energy is strongly related to climatic conditions. If the temperature decreases below a certain value, "heating threshold", more energy is consumed due to increased need for space heating. Space heating is responsible for a large part of European energy

[6] Purchasing Power Standards (PPS): is an artificial currency unit devised to reflect the difference in prices for goods and services in countries.

[7] Eurostat (online): http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=0&language=en&pcode=tgs00005 (03 Jul 2014 10:39:11 MEST). (General Disclaimer of the EC website: http://ec.europa.eu/geninfo/legal_notices_en.htm).

[8] Eurostat, "Heating degree-days by NUTS 2 regions - annual data [nrg_esdgr_a]". Avaiable online: http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/data/database?_piref599_1905587_599_923575_923575.p=h&_piref599_1905587_599_923575_923575.expandNode=doAction&_piref599_1905587_599_923575_923575.nextActionId=1&_piref599_1905587_599_923575_923575.nodePath=.EU_MAIN_TREE.data.envir.nrg.nrg_esdgr. Accessed: 03.07.14.

[9] European Environment Agency: http://www.eea.europa.eu/data-and-maps/indicators/heating-degree-days-1. Accessed: 16.07.2014

consumption. Hence a decrease in the use of space heating has the potential to lead to a significant decrease in overall energy use.

Ideally, the grouping would take both heating-degree days and cooling degree days into account, e.g. by following the joint classification scheme for Europe suggested by Tsikaloudaki et al (2011). However, comparable cooling degree days data were not available on NUT-2 level. The future work of WP2 towards a typology of European cities with respect to post-carbon development will include a calculation the cooling-degree days required for this joint classification scheme.

To establish a common and comparable basis, Eurostat defined the following method for the calculation of heating degree days: (18 °C - Tm) x d if Tm is lower than or equal to 15 °C (heating threshold) and are nil if Tm is greater than 15 °C. The methodology was harmonised for all EU countries.

Grouping: the thresholds for grouping the leading cities according to average heating-degree days per year were chosen to allow for a relatively even spread of the leading cities in each class. Categories comprise 1000 – steps of heating-degree days per year. The average minimum across all NUTS-2 units between 2000 and 2009 is 253, the average maximum is 6,689. As with the other grouping seven classes were chosen.

Heating degree days per year (EEA) classes:

0-1000

1000-2000

2000-3000

3000-4000

4000-5000

5000- 6000

6000 or above

II.I.4 DATA AVAILABILITY

There will always be a trade-off between comparability, spatial scale and specificity of datasets in the selection of indicators. We aimed to make use of existing, authoritative datasets that allow for the best possible degree of comparability over space in the EU and over time. At the same time, this also entails use of national datasets for multiple sub-dimensions. Multiple contextual factors can be adequately reflected on this level of aggregation, or even benefit from it for comparability and coverage reasons. For example, the EU Sustainable Development Indicators (SDIs) are used to monitor the EU Sustainable Development Strategy (EU SDS) in a report published by Eurostat every two years. They are presented in ten themes, of which multiple themes are instrumental indicators of post-carbon development, and explicitly carbon-related. This approach has the advantages of a) facilitating further use of the leading cities outputs beyond the POCACITO project itself, and b) applying data with an EU focus both geographically and contextually.

Our objective was to produce lists by systematizing city initiatives from a post-carbon development perspective. It should be stressed that there is a pronounced lack of comparability between sub national (city-based, initiative, high-resolution data) and national data, as well as a lack of uniform spatial and temporal coverage of data. These constraints influence how the leading city lists are devised. We have used existing datasets with the greatest possible spatial EU coverage. This allows for a degree of city comparability across regions. At the same time, this also entails use of national datasets for multiple sub-dimensions.

A clear weakness in our study is the non-inclusion of Green House Gas (GHG) emissions data, which would have been a highly relevant indicator of performance. It was not possible to find comparable GHG emission inventories for all of our leading cities. While some of the city inventories provide comparable data by using comparable methods and the same baseline years, others do not, or are lacking accessible data on GHG emission inventories, to our knowledge. Our study was, ultimately, dependent on the data available at city-level. It was not possible to conduct original research on this.

An option for future research could be to group our leading cities according to energy or emissions related data (e.g. EU Sustainable Development Indicators (SDI)). This will be considered in the work towards Typologies of leading cities and practices (D2.4). We are aware of the need to contextualize further by using energy and emissions related data on progress and actions.

Other datasets which we intend to engage with later in the WP include Eurostat's Urban audit and those provided by ICLEI programmes. On time grounds we decided against their inclusion in this Deliverable.

As will be seen, there is a bias towards German cities in our leading cities list. This is the result of choosing European Energy Awards as a selection criterion. EEA is heavily populated by Austria and Germany. The justification for this is that EEA is a strong indicator of action and measured performance and an easily accessible data set which covers thousands of European cities. Further, this bias was addressed by the range of selection criterion (memberships, rankings, expert survey nomination, SEAP approval). Also, we should remember that Germany has the largest population in Europe, has embarked on a national energy transition (*Die Energiewende*) and is, ultimately, home to many cities which are highly active in climate and energy policy. This is, perhaps, reflected in the most recent Siemens Green City Index, which has a separate index for Germany, alongside that for Europe[10].

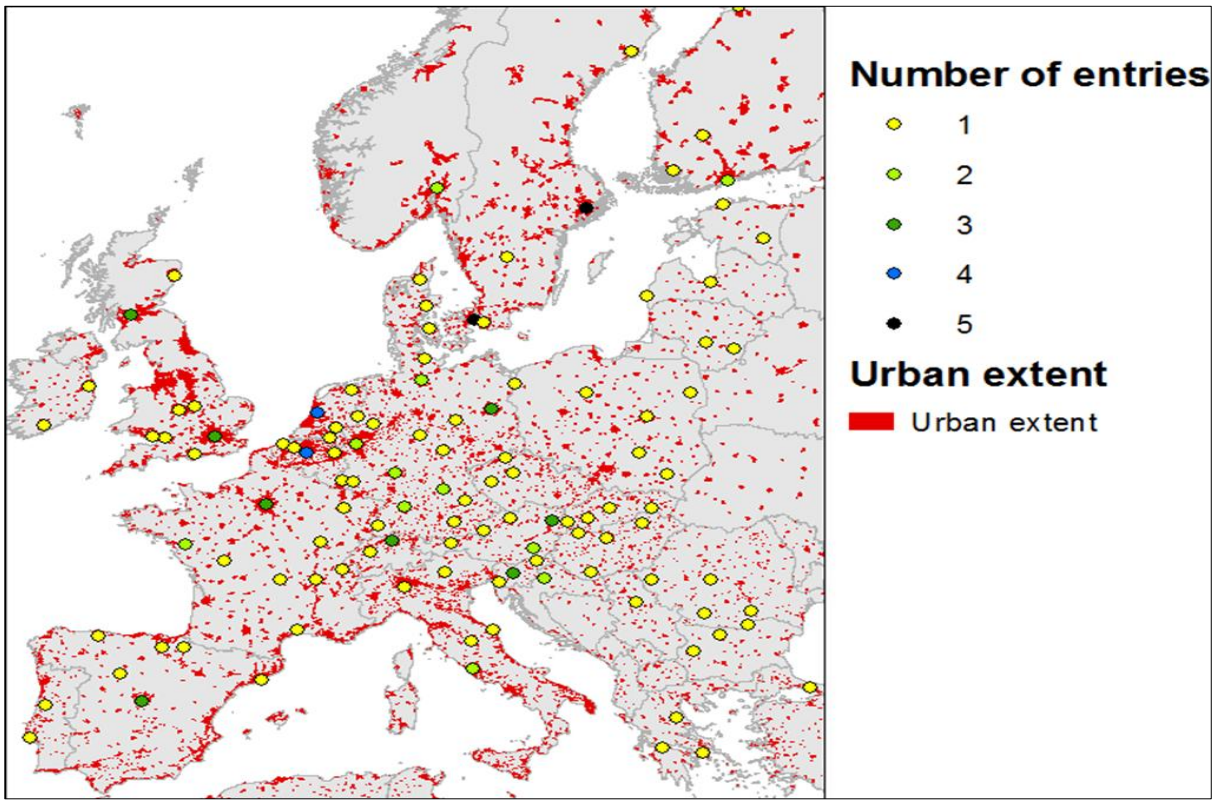
A final minor point to note is that Paris is listed as having only 2 million inhabitants. This is, however, in line with the Siemens Green Index, Energy cities, citypopulation.de and Europe NUTS3 data.

[10] Siemens Green City Index. Online: http://www.siemens.com/entry/cc/features/greencityindex_international/all/en/pdf/gci_report_summary.pdf. Accessed: 16.07.2014.

II.II LEADING CITIES

II.II.1 LEADING CITIES

Figure 3 Five leading cities rankings and urban extent



Leading Cities according to existing rankings

To gain a picture of the existing rankings on climate and energy performance by cities in Europe we combined the results of five rankings: European Smart Cities, Siemens Green City Index, Soot Free Cities, Mercer City Infrastructure Ranking, European Green Capital Award. Overall, there were 161 city entries, 117 individual cities mentioned, with some cities, e.g. Malmo and Stockholm, mentioned in all schemes. What the rankings reveal more generally is strong bias towards large city size groups and iconic cities, like Amsterdam. There is limited coverage, especially with regards to Southern Europe. Given the varying methodologies applied and types of data these rankings are not comparable.

From this a number of questions arise, centred on the meaning and usefulness of the notion "leading". If these ranked cities are leading then how can other cities, the majority of which are smaller, learn from them? Is the notion of "leading" transferable to different contexts (wealth, climate, etc.) transferable?

Ultimately, existing rankings of "leading cities" are not representative enough to be used as the sole basis for selecting our leading cities list. Though they are certainly indicative of performance

and were thus included in our selection criteria, rankings lead to a focus on a few cities leads and thus a limited picture of post carbon city activities would emerge.

For this reason we incorporated a survey of 25 experts on urban climate and environmental issues. This produced a list of 68 cities, with some cities nominate more than once. Despite obvious biases towards particular countries, where interviewees had more expertise (Germany, Czech Republic, Hungary), the experts survey fulfilled its function of providing a fresh look at the overall context of urban post carbon transition. It also helped address certain data "white spots", Central and Southern Europe, small and medium sized cities. On these grounds it was included as a selection criterion for the POCACITO leading cities.

Table 2 Expert Survey Nominated Cities

Country	City
Austria	Güssing
Austria	Vienna
Austria	Linz
Bosnia and Herzegovina	Tuzla
Czech Republic	Jesenik
Czech Republic	Hlinsko
Czech Republic	Litoměřice
Czech Republic	Kopřivnice
Czech Republic	City of Kyjov
Czech Republic	Hostětín
Czech Republic	Chrudim
Czech Republic	Semily
Czech Republic	Prague
Denmark	Kalundborg
Denmark	Copenhagen
Denmark	Albertslund
Estonia	Tallin
Finland	Tampere
France	Lille
France	Nantes
Germany	Hannover
Germany	Leipzig
Germany	Ludwigsburg
Germany	Münster
Germany	Neuruppin
Germany	Tübingen
Germany	Berlin
Germany	Bottrop
Germany	Freiburg im Breisgau
Germany	Heidelberg
Germany	Dortmund
Germany	Pirmasens
Germany	Hamburg
Germany	Munich
Hungary	Pécs
Hungary	Szeged
Hungary	Eger
Hungary	Budapest
Hungary	Budaörs
Italy	Genoa
Italy	Reggio Emilia
Italy	Padova
Latvia	Valmiera
Macedonia	Skopje
Netherlands	Amsterdam
Netherlands	Delft
Norway	Oslo
Norway	Gothenburg
Poland	Czestochowa City
Portugal	Almada
Slovenia	Maribor
Spain	Barcelona
Spain	Merida
Spain	Malaga
Sweden	Växjö
Sweden	Malmo
Sweden	Stockholm
Sweden	Lerum
Switzerland	Zürich
United Kingdom	London
United Kingdom	Sheffield
United Kingdom	Bristol
United Kingdom	Totnes
United Kingdom	Oxford
United Kingdom	Leeds
United Kingdom	York
United Kingdom	Haringey
United Kingdom	Leicester

Table 3 Leading Cities, contextual factors, and number of memberships in initiatives and rankings.

The leading cities are listed in descending order of population size. The cell colours signify the grouping within each of the contextual factors (see legend).

Population classification	
(no fill)	0 – 5.000
	5.000 – 50.000
	50.000 – 100.000
	100.000 – 250.000
	250.000 – 500.000
	500.000 – 1.000.000
	1.000.000 – 5.000.000
	5.000.000 – 20.000.000

GDP/CAP in € PPS classification	
(no fill)	#N/A (No value)
	10.000 – 20.000
	20.000 – 30.000
	30.000 – 40.000
	40.000 – 50.000
	50.000 – 60.000
	60.000 – 70.000
	70.000 – 150.000

Heating degree days per year (EEA) classification	
(no fill)	#N/A (No value)
	1 – 1.000
	1.000 – 2.000
	2.000 – 3.000
	3.000 – 4.000
	4.000 – 5.000
	5.000 – 6.000
	6.000 – 20.000

Leading city	Country	Population	Regional GDP/cap in PPS	Average heating-degree days 2000-2009	Memberships in initiatives and rankings
London	United Kingdom	8.308.369	80.400	2.477	3
Berlin	Germany	3.517.424	28.300	2.933	5
Paris	France	2.249.975	45.600	2.376	4
Hamburg	Germany	1.734.272	50.700	2.991	4
Warsaw	Poland	1.724.404	26.700	3.458	3
Barcelona	Spain	1.611.822	28.400	1.826	4
München	Germany	1.388.308	42.200	3.198	4
Brussels	Belgium	1.140.000	55.600	2.452	4
Stockholm	Sweden	897.700	43.300	3.882	5
Zagreb	Croatia	790.000	15.600	#NV	6
Helsinki	Finland	612.664	38.300	4.545	5
Stuttgart	Germany	597.939	38.000	2.956	3
Düsseldorf	Germany	593.682	34.400	2.581	3
Nantes	France	582.159	24.100	2.117	7
Dortmund	Germany	572.087	28.300	2.977	4
Copenhagen	Denmark	570.000	38.300	3.319	6
Essen	Germany	566.862	34.400	2.581	3
Bremen	Germany	546.451	39.700	2.890	4
Skopje	Macedonia	537.500	9.000	#NV	3
Reggio Emilia	Italy	534.258	31.400	#NV	3
Gothenburg	Sweden	533.271	29.600	3.762	4
Dublin	Ireland	527.612	36.300	2.654	4
Leipzig	Germany	520.838	23.700	#NV	4
Sheffield	United Kingdom	518.090	18.700	2.730	1
Hannover	Germany	514.137	29.900	2.875	5
Bristol	United Kingdom	433.000	27.500	2.612	4
Plaine Commune	France	407.007	45.600	2.376	3
Bologna	Italy	384.202	31.400	2.013	3
Zurich	Switzerland	380.777	75.182	3.010	7
Firenze	Italy	377.207	36.900	1.733	3
Kaunas	Lithuania	361.274	16.900	3.854	3
Bielefeld	Germany	328.314	30.300	2.878	3
Bonn	Germany	309.869	32.400	2.781	4
Malmö	Sweden	303.900	26.800	3.481	5
Münster	Germany	296.599	27.800	2.705	5
Karlsruhe	Germany	296.033	34.000	2.799	3
Newcastle upon Tyne	United Kingdom	268.064	22.500	2.482	3
Gent	Belgium	248.242	27.400	2.414	4
Aachen	Germany	240.086	32.400	2.781	3
Kiel	Germany	239.866	25.900	3.007	3
Bordeaux	France	235.578	23.900	1.847	3
Lille	France	227.533	22.100	2.452	5
Tampere	Finland	220.446	26.300	4.879	5
Freiburg im Breisgau	Germany	218.043	30.200	2.974	6
Padova	Italy	209.678	29.600	#NV	2
Oulu	Finland	193.798	#NV	6.142	3
Pamplona	Spain	193.328	31.100	1.911	3

Genève	Switzerland	189.033	85.223	3.442	3
Hagen	Germany	186.243	28.300	2.977	3
Modena	Italy	184.525	31.400	2.013	3
Oeiras	Portugal	172.063	26.900	833	4
Szeged	Hungary	170.100	11.100	2.663	1
Basel	Switzerland	165.566	127.365	3.019	3
Grenoble	France	157.900	27.300	2.626	3
Pécs	Hungary	156.800	11.200	2.655	1
Dijon	France	153.800	22.700	2.516	4
Cascais	Portugal	153.300	26.900	833	4
Heidelberg	Germany	150.335	34.000	2.799	5
Stavanger	Norway	130.754	36.500	4.297	3
Lausanne	Switzerland	125.885	54.554	3.442	3
Tuzla	Bosnia and Herzegovina	120.400	#NV	#NV	2
Ulm	Germany	117.977	33.300	3.252	3
Bottrop	Germany	116.498	27.800	2.705	3
Besançon	France	116.100	21.600	2.778	3
Maribor	Slovenia	114.500	17.700	#NV	3
Ancona	Italy	101.742	24.600	1.857	4
Ludwigsburg	Germany	88.200	38.000	2.956	5
Växjö	Sweden	85.822	27.600	3.812	5
Rheine	Germany	73.285	27.800	2.705	3
Quimper	France	63.550	22.400	2.128	3
Dormagen	Germany	62.379	34.400	2.581	3
Friedrichshafen	Germany	57.333	33.300	3.252	3
Mouscron	Belgium	57.000	19.900	2.577	3
Eger	Hungary	54.900	10.000	2.898	2
Willich	Germany	50.663	34.400	2.581	3
Neumarkt i.d.OPF.	Germany	38.355	32.500	3.325	3
Echirolles	France	35.700	27.300	2.626	3
Koprivnica	Croatia	31.700	15.600	#NV	4
Rheinberg	Germany	30.684	34.400	2.581	3
Budaörs	Hungary	29.000	27.600	2.743	2
Bregenz	Austria	28.412	34.400	3.496	3
Litoměřice	Czech Republic	24.100	15.700	3.340	3
Kopřivnice	Czech Republic	22.600	17.800	3.354	1
Martigny	Switzerland	16.897	42.907	3.442	3
Kalundborg	Denmark	16.000	22.000	#NV	2
Schwaz	Austria	13.187	33.400	3.728	3
Jeseník	Czech Republic	11.600	16.500	3.356	2
Judenburg	Austria	10.130	28.100	3.428	3
Hlinsko	Czech Republic	9.900	16.700	3.407	2
Wolfurt	Austria	8.221	34.400	3.496	3
Montmélian	France	4.038	27.300	2.626	3
Wieselburg	Austria	3.707	26.600	3.123	3
Kötschach-Mauthen	Austria	3.600	27.600	3.405	3
Großschönau	Austria	1.245	26.600	3.123	3

Following the selection criteria[11], a list of 94 leading cities was generated. Hence the selection criteria employed did not produce exactly 100 Leading Cities. These have not been ranked. As can be seen from Figure 4 there is good coverage across Europe (including non-EU countries, such as Switzerland and Bosnia and Herzegovina. This broader base (in comparison with existing rankings) should provide a better basis for future research considering which practices work best in which urban contexts. D2.2 Good City Practices will look at practices in these leading cities and help further develop possibilities for learning and transfer.

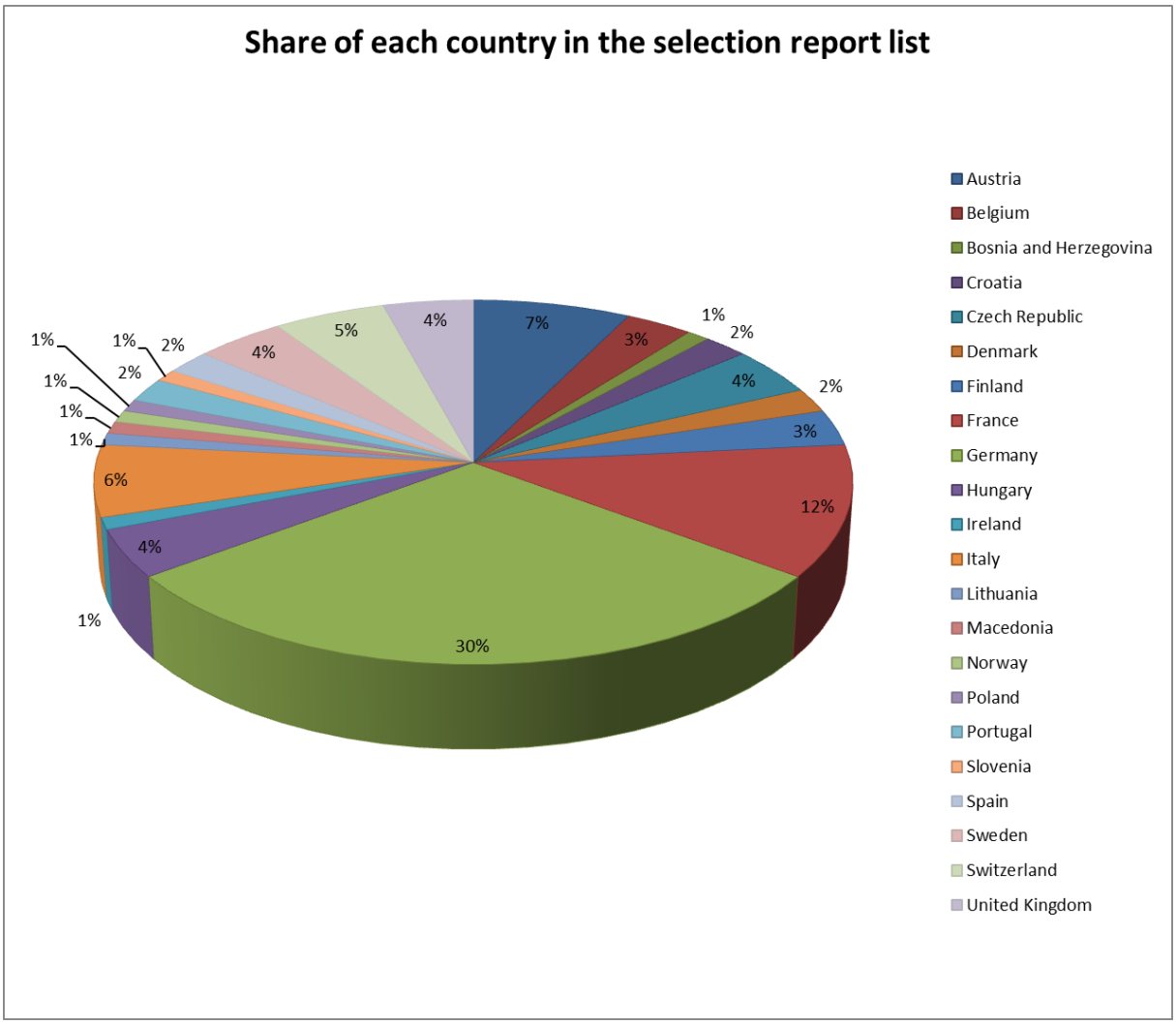


Figure 4 Leading Cities: national distribution of cities (%)

[11] Minimum 3 memberships in initiatives or nomination in city rankings OR Minimum 1 expert survey nomination AND Approved Covenant of Mayors (COM) Sustainable Energy Action Plan (SEAP) OR European Energy Award (EEA) OR Minimum two expert survey nominations.

II.II.2 LEADING CITIES GROUPED ACCORDING TO CONTEXTUAL FACTORS

As stated a key aim was to assess performance of a wide range of cities in terms of a comparison to the city's own potential rather than to other cities, considering different and changing contexts. For this reason we have grouped the 94 cities according to three context variables: total urban population size, regional GDP in PPS per capita and average heating degree-days.

What follows is a preliminary attempt to contextualise notions of leading performance and action, according to these variables. Much more could be done through combining two or more context variables, and increasingly adding variables according to available data. As such this section should be seen in illustrative of the potential of the leading cities inventory. At present, a primary function of the grouping is to begin to reveal the different types (size, GDP, climate and energy) of cities that can be considered leading in Europe. This works towards D2.4 Paper on Typologies. Another purpose of the grouping is to begin showing which types of cities might best learn from other types of cities i.e. matchmaking according to size, GDP and climate and energy. This will be developed in WP6 Marketplace of Ideas.

The groupings detail the following major patterns. Urban population size: there is a large concentration of leading cities with a population between 100, 000- 250, 000. Regional GDP in PPS per capita: the majority of cities are between 20, 000 – 40, 000 GDP (PPS per capita). Heating degree-days: the majority of cites fall into the class 2000 -3000 days for the period 2000 -2009.

Figure 5 Leading Cities: population span

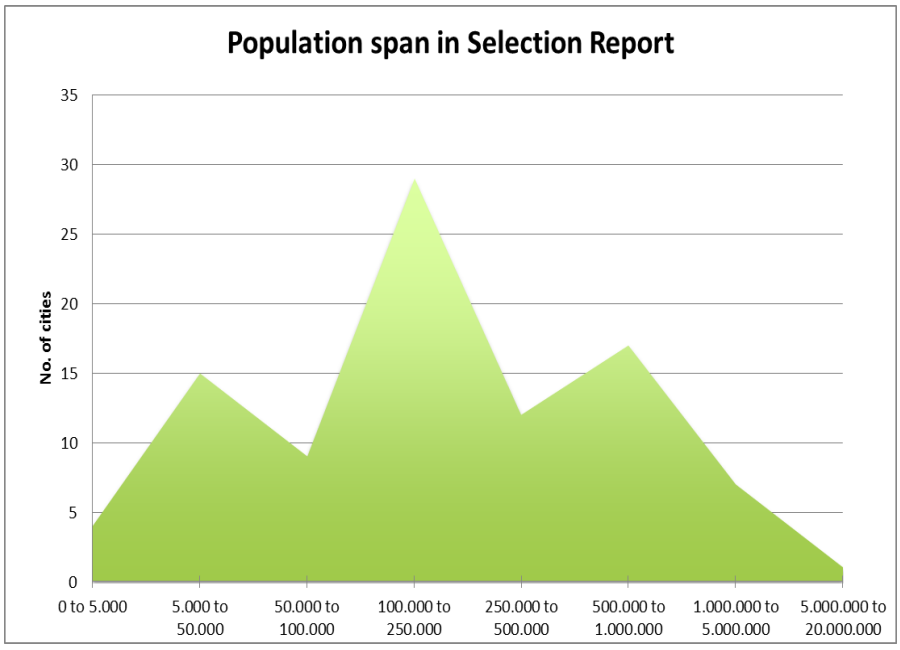


Figure 6 Leading Cities and GDP classifications

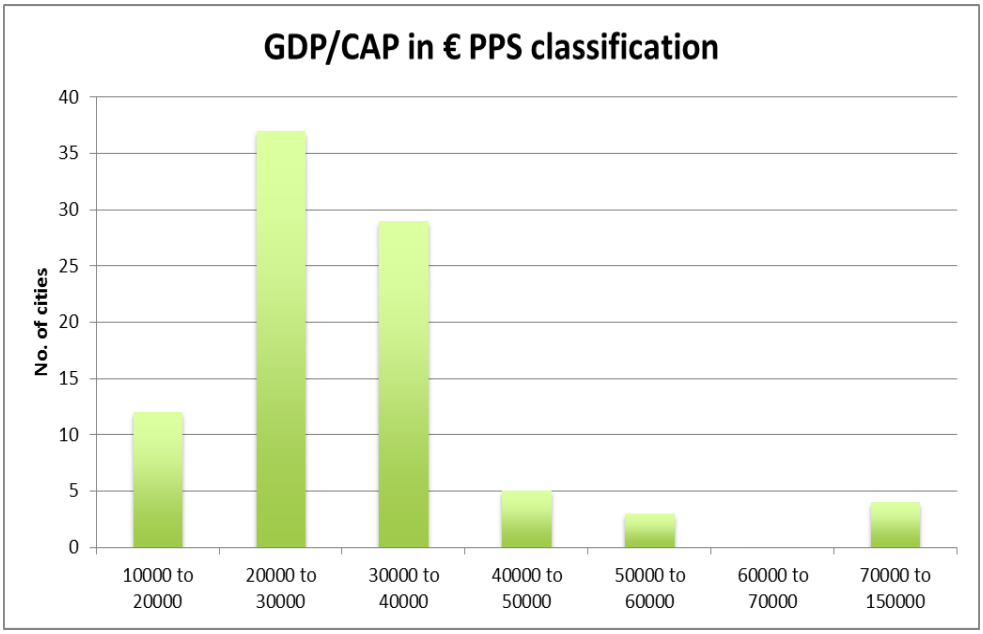
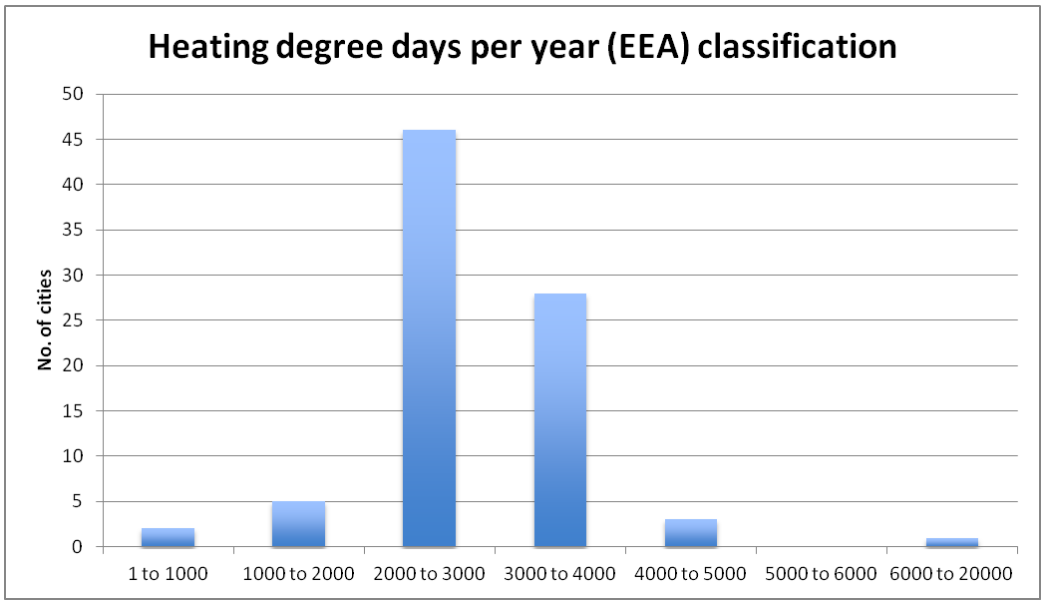


Figure 7 Leading Cities: heating days per year



II.II.3 LEADING CITIES: HIGH PERFOMERS

This final table of high performers was produced by combining our most performance related criteria: Covenant of Mayors SEAP approval with EEA Gold certification. As mentioned EEA has a bias towards German cities, which make up seven of our nine high performers, with the Swiss cities Geneva and Zurich completing the list. Although there are undoubtedly other cities performing to similar levels, according to our data sets these cities have high performance.

Table 4 Leading cities which both are SEAP approved and EEA certified in gold.

Leading city	Country	Population	Expert survey nominations	SEAP approved	EEA Certification
Aachen	Germany	240.086		x	Gold
Bonn	Germany	309.869		x	Gold
Bottrop	Germany	116.498	3	x	Gold
Bremen	Germany	546.451		x	Gold
Friedrichshafen	Germany	57.333		x	Gold
Münster	Germany	296.599	1	x	Gold
Willich	Germany	50.663		x	Gold
Genève	Switzerland	189.033		x	Gold
Zurich	Switzerland	380.777	2	x	Gold

If we were to go a step further and consider expert survey nominations we would have a short list of three cities, which might be seen as our ultimate leading cities: Bottrop, Zurich and Münster.

III CONCLUSION

This report, read alongside the excel database, presents an inventory of Leading Cities in Europe. 94 leading cities have been identified and basic information and data has been gathered to show their progress with respect to their development towards post-carbon futures. A great diversity of cities has emerged. The leading cities vary markedly in size, from London (c. 8.3 million) to Großschönau (c.1200) in Austria. There are extremely wealthy cities, such as Basel (GDP €127, 365) and much poorer cities, such as Skopje (GDP €9 000). There is also a wide variation in climate and energy use in terms of heating days, from Oula in Finland (6 142 days 2000-2009) to Oeiras and Cascais in Portugal (833 days 2000-2009).

While they might not all be considered European leaders, every city has been selected for a reason, or more accurately a combination of reasons (city network membership, rankings, expert opinion, EEA certification, Covenant of Mayors SEAP approval). This means that cities such as Jeseník (Czech Republic) or Tuzla can be seen as leading at least in their national or regional contexts, even if their performance is not comparable to well-known European leaders. Their inclusion should assist with developing a more contextualized understanding of good practices, allowing us to see which practices have been implemented in different types of cities.

Any list of leading cities is likely to provoke plenty of discussion. The aim of this list has been to shift the focus from thinking in terms of the "number 1", the "top ten" and a competition between usual suspects, to a more inclusive reflection on the broader spectrum of urban post-carbon transitions activities found in cities, and a better consideration of the different contexts of action, the constraint and opportunity structures, in which cities find themselves.

The wider meaning of the leading cities list will be the subject of further research in WP2. There is much potential to exploit the data and information contained in the inventory of leading cities. A further step would be to begin validating the results by comparing them more vigorously with particular ranking schemes, especially those with stronger and more transparent methodologies like the Siemens Green City Index. Beyond this the contextual factors present in leading cities and their link to actions, practices and performance will be the focus in the rest of WP2, leading to the various typologies in D2.4: typology of cities; typology of demonstration/pilot projects at neighbourhood level; typology of sectoral policies. Further, the broader, more inclusive empirical base generated here (in comparison to existing rankings) will allow for differentiated insights to the practices which work best in varying urban contexts. D2.3 Good City Practices will examine practices in the 94 leading cities and develop opportunities for learning and transfer.

I would also mention this: This broader base (in comparison with existing rankings) should provide a better basis for future research considering which practices work best in which urban contexts. D2.2 Good City Practices will look at practices in these leading cities and help further develop possibilities for learning and transfer through matching cities based on similarities.

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V ANNEXE

WP2 LEADING CITIES EXCEL DATABASE