



Executive Summary

City2020



**“Support to the development of an
ICT driven transition strategy
to the Low Carbon City”**

*Green Digital Cities
Replicating Inventiveness and Exuberance*



Date:	15th October 2010
Authors:	Vin Sumner Cheryl Miller Michael King Olli Aro
Client Organisation:	John Doyle EUROPEAN COMMISSION Directorate-General Information Society and Media Directorate C: Lisbon Strategy and Policies for the Information Society Unit C1: Lisbon strategy and i2010
Version No:	Final Version 1



Cities: driving change



1. SPREaD – Search for Private Rented Energy Data. Improve EPC visibility within the search for private rented homes 
3. Open Public Transport Data: Encourage modal shift through improved data 
4. Classroom energy data: awareness raising with children and their families
5. Neighbourhood energy trading: build on smart meter roll-out schemes

Cities : getting the data right


1. The Consistency of GHG data across Cities needs addressing if Cities are to gain insights and learn from each other 
2. Current data is Production-based. A roadmap is needed for Consumption-based data to support Cities 

City2020

Cities: enabling change

1. Open City Data: City data is scattered. City should take on the enabling role to open this for wider access. Public & private entities can repackage data as valuable information. 
2. EcoCity: Open Repository. Create central repository for information & data on Cities' top-down & bottom-up low-carbon and digital initiatives
3. EcoPoints: Citizen-focused Eco Reward Scheme. Stimulate good eco-behaviour by individuals, families, communities 

Cities: institutionalising change

1. Green Digital Planning: A dedicated function removed from the operational needs of the ICT department. Focused on the digital roadmap and opportunities to drive carbon reductions 
2. Urban EcoFunds: City-focused Eco Reward Scheme. EU opt-in Funding approach to encourage good eco-behaviour by Cities: 



1 Executive Summary

Europe Today

The Digital Agenda for Europe, one of the seven flagship initiatives of the Europe 2020 Strategy, sets out to define the key enabling role that the use of Information and Communication Technologies (ICT) will have to play if Europe wants to succeed in its ambitions for 2020. The Digital Agenda recognises the pivotal role that ICT can play in societal change especially in respect of the environment.

“The digital society must be envisioned as a society with better outcomes for all. The deployment of ICT is becoming a critical element for delivering policy objectives like supporting an ageing society, climate change, reducing energy consumption, improving transportation efficiency and mobility, empowering patients and ensuring the inclusion of persons with disabilities.”

City2020

City2020 is the second of an innovative series of studies commissioned by the Information Society Directorate of the European Commission; the others are Consumer2020 and Information2020. All of these studies examine how **existing** ICTs and networks can be used to make significant and replicable reductions in our use of carbon. The overarching theme across the studies is the role that information can play as a catalyst for **subversively changing bad business practice or inefficient behaviour** when put in the hands of “users”, whether consumers, citizens or organisations.

The ready availability of information in accessible and transparent forms can both empower and enable change. If Europe is to achieve its 2020 targets for the environment and show the necessary leadership, it needs to embrace the possibilities offered by **today’s ICTs** to effect environmental change rather than wait for the next technological revolution. Such change does not simply happen by osmosis and there is a need to facilitate and enable the process.

The Role of Cities

Cities have shown over time that they can be catalysts for change and this report addresses how they can, using current ICTs, enable significant environmental change by putting information in the hands of their “**citizens**”.

In order to harness the power of the City to help move towards a low carbon society and economy, it is important to put the “City” in context. Historically and demographically, cities have had a unique ability to influence the unfolding of major events by engaging their citizenry. In the 21st Century context of looming energy and climate crises, the City2020 study has sought to draw on and exploit the opportunities for the creative interplay of citizens, technology and inventiveness to achieve meaningful results through aggregated and replicable action.

Cities have the local management structures and public investment resources required for more ambitious investments. The public sector at the city level can provide leadership and, through local legislation/rules/licenses, can set the example



for households and businesses in promoting greener, smarter, more cost-efficient ways of doing things.

Arguably, the city is the first and essential scale for considering meaningful change that can be replicated on a global scale. The city is the level at which all the smart green infrastructures and applications need to work together. Cities therefore need to be the pioneers of integrated green investments, including new business models and paradigms. They naturally provide the scale and opportunity for synergies to be realised between initiatives such as smart ICT infrastructures, smart grids, carbon accounting, measurement and visualization. Cities can be seen as the platforms for wider transformation.

ICTs specifically can help achieve this transformation due to their ability to:

- Measure and make more visible current emission patterns and other environmental data which provides the means to track progress and interventions, but more importantly, which encourages behavioural change towards a low carbon society;
- Improve the energy efficiency of current processes -- i.e. in order to do what we do now but with less energy -- by allowing proliferation of "smart" buildings, grids, manufacturing, lighting, transport, etc.;
- Encourage changes in behaviour which drive new, transformational activities, and underpin a fundamental shift in how we live and work and share energy, thus contributing towards development of a low carbon economy and society;
- Create carbon themselves; as such, green ICT policies need to be in place which ensure that ICT remains a solution to, and not a part of, the climate change problem.

Carbon Footprint of Cities

The objective of City2020 was to identify a number of low carbon initiatives enabled by ICT that could have a significant impact on a City's carbon footprint by 2015. In addition, a common framework or methodology was required that would allow the replication of the approach from City to City.

The Cities of Manchester, Amsterdam, Ghent and Malaga were identified as partners to the study and we have used them to both access information on current work and test our thinking.

The overall objective is to reduce significantly the carbon footprint of a city. This definition goes beyond the direct emissions of the municipality (e.g. libraries, schools, Town Hall, Municipal vehicles, street lighting) to include all emissions within the city boundaries (e.g. individual household energy usage, local business energy usage, private transport). For the purpose of this study the city's carbon footprint is defined in terms of the carbon emissions per capita.



A carbon footprint objective can be disaggregated in various ways. The Intergovernmental Panel on Climate Change schema breaks emissions down by source and sink categories of energy, industrial processes, solvent and other product uses, agriculture, land use, land change and forestry and waste, but was developed for nation states. The GHG Protocol, with the familiar scopes 1, 2 and 3, is well known but is most frequently used for corporations and companies.

Early in the study, a review of potential frameworks concluded that the approach used in the **Covenant of Mayors’ Sustainable Energy Action Plans (SEAP)** should be adopted for the purpose of this study. CoM is specifically focused upon cities and urban areas. The SEAP categories were seen as comprehensive, but had the perceived additional advantage of being relevant to the partner cities of Manchester, Malaga, Ghent and Amsterdam, who are all signatories of the CoM. It should however be noted that the **CoM SEAP is not a Consumption-based accounting approach and so there will be an under-estimation of a city’s total carbon footprint.**

However, **getting data on Production-based emissions can be challenging enough.** Consumption-based emissions at the city level are neither readily available nor realistic at this time given the nature of the very high-level modeling and estimating, and associated assumptions. In particular, any early consumption data that is available would be difficult to compare across cities. Time and practicalities meant that production-based emissions data had to be the focus, however there is an **urgent** requirement for further work on consumption-based emissions for cities. In fact, as seen from the table below, comparison is a challenging exercise even with the more established production-based emissions data, as shown by the partner Cities’ anonymous responses in Table 1.

City	Population	Total Emissions	Per Capita	Comment
City A	444,600	3,211.8 ktCO ₂	7.22	Figures lower than national average of 10.5tCO ₂ as city-level data excludes some categories
City B	568,305	1,354.4 ktCO ₂ e	2.38	Figure seems very low compared to national average of 9.2tCO ₂
City C	243,144	12,661.3 ktCO ₂	52.07	Per capita figure appears too large compared to national average of 12.2tCO ₂
City D	767,849	4,890.2 ktCO ₂	6.37	Figure seems very low compared to the national average of 12.8 tCO ₂

Table 1 - City Basic GHG data



City2020 Framework

An **integrated framework** was developed during the study to help understand how low carbon initiatives drive reductions in a city's carbon footprint specifically through deploying digitally enabled, green initiatives. This framework was developed from themes and concepts that were present at the start of the project, as well as various emergent ideas and lessons that developed during the study.

The three main themes which motivated the study are shown below:

1. A focus on **practical** Low Carbon Initiatives and ideas that recognize the need for **urgent** action:
 - “...identify practical city based strategies and actions that can make a real difference by 2015...”
 - “The study ...will focus on near term practical initiatives that can have a widespread and viral impact across Cities and as such provide a platform for replicating both inventiveness and exuberance.”

2. **Twin perspectives** are critical in the movement towards a Low Carbon City:
 - a) The vital role of Individuals and Groups/Organizations/Communities – the ‘bottom-up’ perspective:
 - “At the end of the day, a city is its people...its communities ... its happenings”
 - Need to recognise the diversity of a Citizen’s roles as parent, student, consumer, citizen, householder, employee, churchgoer, etc. and the breadth of communities/groups/organisations as a source of action and ideas.

 - b) The role and opportunity for “City Hall” and City Authorities – the ‘top-down’ perspective:
 - “Cities as engines of change...”
 - “Turn your city upside down” – the ‘Head Office’ as a facilitator rather than a director of change
 - How can the city authority empower and enable communities?

3. The enabling, transformative and potentially subversive role of ICT:
 - “...ICT now provides ...the enabling tool to restructure how Cities and their citizens can interact and provide a viable transition route to a low carbon society.”
 - “...opportunity for Cities to exploit ICT for transformational change toward the Low Carbon Economy and Society”

Recognising the above, the diagram below summarises the framework we developed to show the relationship between local carbon initiatives, the participants, and the enablers at City level including its Digital Form, i.e. the ICT approach adopted by the City.

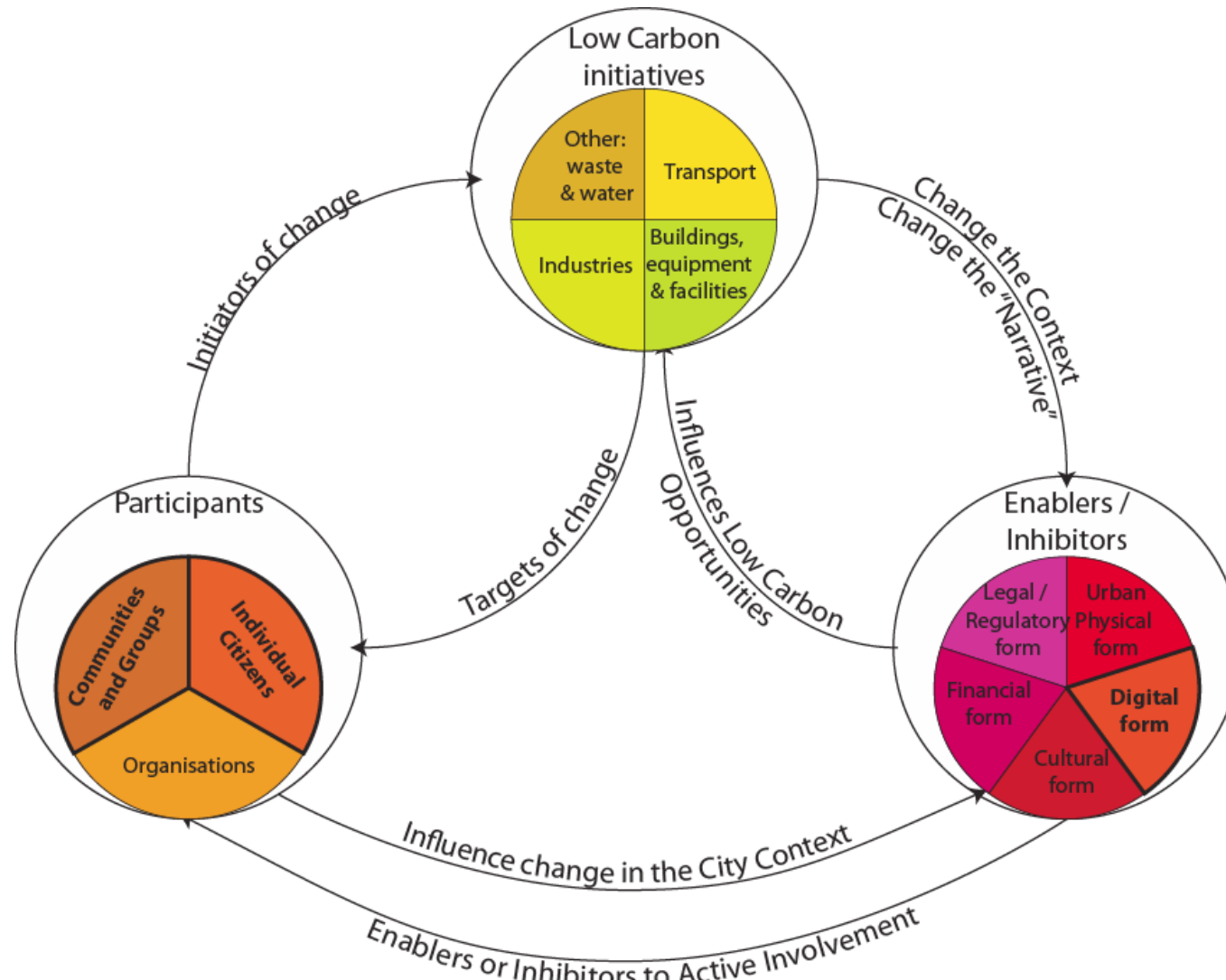


Figure 1 - City2020 Integrated framework



Initiatives

Our City2020 framework highlights two distinct types of low carbon initiatives:

- those that are *enabling* or context-changing on the level of a City's ability to identify and deliver low-carbon initiatives; and
- those which focus on *behaviour* change, targeted at specific groups and/or individuals within a City.

The former kinds of initiatives are decidedly fewer in number, broader in reach, and typically require greater political buy-in for implementation, as they aim to impact a City in its totality, by addressing the *context* which influences how the City identifies, delivers and manages low-carbon initiatives. Behaviour-focused initiatives may be said to be an output, or by-product, of the context of the city. As such, behaviour-focused initiatives plentiful in number across a City, and in all cases, dependent on the enabling environment in the City in which they are created, deployed and managed.

The below table highlights specific initiatives identified within the City2020 study. Four *behaviour-focused*, or action-oriented initiatives and five *enabling* initiatives are noted, divided by their respective categories, although the inter-relationship between the two groups of initiatives is implicit.

A further distinction is made between enabling initiatives. There are those which can be decided and acted upon at City-level, whereas some enabling initiatives must be agreed on a European policy level.



Action/Behaviour Initiatives

Search for Private Rented Energy Data

Residential emissions contribute to a City's footprint. The private rented sector often lags behind other sectors in terms of energy performance.

All homes bought, sold or rented require an Energy Performance Certificate, which must be visible across all media. There is currently a market distortion in the private rented sector with EPCs not effectively part of the decision making process when tenants search for properties.

This initiative will connect the existing EPC legislation (Energy Performance of Buildings Directive) with the Search capabilities of the Internet to make energy usage more visible in the rental decision making process. EPCs are now embedded in the search for domestic appliances – this initiative seeks to embed energy awareness into the search for domestic private rentals in the same manner as domestic appliances.

Classroom Energy Data

Schools and in particular children offer the opportunity not only to reduce the school **footprint** through classroom competition, but to also embed a low carbon attitude from an early age.

Through smart submetering in schools, make available information about an individual classroom's energy use to the school children online and on their mobiles and encourage competition between classes to see who can make the greatest reduction. In addition, to the peer to peer challenge eco positive rewards such as train/bus tickets or low energy discounts on goods could be made available. Raising awareness at school will raise awareness at home and as with IT use can be transferred from child to parents, as well as increasing self-awareness for their future lives.

Open City Transport Information

Make available public transport data to the public that can then be repurposed to support low carbon activities. For example to provide better information on bus arrival.

Cities would ensure that all data relating to public transport is available online and accessible by members of the public. This would include at a minimum timetables, fares ,vehicle locations and levels of occupancy. In cases where the public transport is outsourced then such data publication would be part of the license agreement.

An example of this has already taken place in the UK (<http://timefinder.org/>), where a graduate student has developed a web-based application showing when buses will be arriving at Manchester and London bus stops and thereby encouraging more people to take public transport.

**Neighborhood Energy Trading**

Individuals can be motivated as part of communities to joint action to improve their environment, but need some kind of reward structure other than money.

The idea is to promote a competition between neighbourhoods , in a similar way to sports competitions to see which neighbourhood can reduce its footprint by the greatest relative amount. In addition, there would be a non-monetary reward for the winning communities. This approach is currently being piloted in the UK and Bulgaria by the DEHEMS FP7 project (www.dehems.eu) .

Enabling Initiatives - City**Green Digital Planning**

The establishment of green information and digital planning functions across a city, will provide a focus for joining up a number of key functions in a city , and ensuring that the city fully exploits the opportunity afforded by ICT to facilitate carbon reduction, and lay the groundwork for smart cities.

The proposition is that Cities should identify the Digital and Information services that will support carbon reduction and develop plans from these alongside any wider environmental plans. The key here will be how to make information far more visible and accessible to a wider range of people. The requirement immediately leads to the idea of a “Digital Planner” initially focused on enabling low carbon services, but ultimately with a wider remit to develop a “Digital Vision” and associated plan for the City.

OpenData

Make available city data to the public that can then be repurposed to support low carbon activities.

Cities would establish a policy to ensure that all data that could contribute to low carbon activity is available online and accessible by members of the public.

Green Repository (Eco-City)

This development of a city based - low carbon initiative Bottom (Community) Up Engagement and Repository Tool that can provide details of community led low carbon initiatives and provide a means for individuals and organizations to track their individual footprint and how it contributes to wider community and city footprints.



Carbon Trading (EcoPoints)

A personal carbon trading system for a City, based on Ecopoints ; eco positive behaviours will lead to eco positive rewards.

Building on proven schemes in the private sector, like frequent flyer miles and loyalty cards, a city-level eco-point reward system would stimulate green behavior, including consumption, rewarded by the option to continue carrying out green behavior, which presents significant opportunities on a structural level to improve a City's carbon position. Examples of similar schemes with a specifically "green" angle are the now-defunct NU card in Rotterdam, the e-portemonnaie project in Limburg, Belgium; and the RES and "eco-cheques" systems also in Belgium.

Enabling Initiatives - Europe

EcoFunds for Cities

A City reward/incentive scheme for achieving emission reduction targets linked to carbon credits (energy trading schemes) and/or EU funding for Cities. The rationale behind this idea is that a pool of European funding (including perhaps a fixed percentage as carbon credits) would be targeted specifically for Cities who opt-in to be a member of the City2020/Green Digital City "PLUC" program, agree to implement green digital initiatives, and regularly report, in a structured and auditable manner, on their carbon footprint reduction progress. Carbon accounting and reporting would be performed in the same way as currently carried out within the Covenant of Mayors SEAPs, for example. On the basis of their performance, then, Cities would be rewarded from programme funding for any concrete progress toward achieving their carbon reduction targets in the form of them becoming eligible for additional funding. Such an approach would impact a *City, as a Fiscal/Financial entity*, on the level of where and how it gets funding, and would financially incentivize Cities to engage in the Green Digital City/City2020 "Urban Eco Funds" programme, while providing a mechanism for continuity of the programme at the City level which reinforces "good" behavior.



Recommendations

The recommendations of the City2020 study are that the European Commission should:

1. CITIES: GETTING THE DATA RIGHT

- undertake work to review the Consistency of GHG data across Cities which is essential if Cities are to gain insights and learn from each other;
- recommend to Cities that a roadmap is needed to move from Production-based data to Consumption-based data.

2. CITIES: DRIVING CHANGE

- review the policy implications of the proposed initiatives contained herein and then work with Cities, EUROCITIES and other City organisations to facilitate their implementation.

3. CITIES: ENABLING CHANGE

- recommend that Cities actively facilitate an open data approach, particularly one that has relevance to environmental activities;
- recommend that Cities take action to facilitate a “community up” approach to carbon reduction by implementing the necessary measurement and communication tools to improve visibility of individual and organisational footprints.

4. CITIES: INSTITUTIONALISING CHANGE

- consider the need for Cities to have explicit functions responsible for “Green Information Strategy and Planning”, possibly as part of a City-wide Digital Planning function;
- support results-oriented funding mechanisms from the European Institutions which specifically target and reward Cities for measurably delivering on low-carbon objectives.

The immediate opportunity exists for the European Commission across its DGs to progress these recommendations and initiatives in conjunction with the City2020 partner Cities of Manchester, Amsterdam, Ghent and Malaga, and in parallel develop supportive policy in conjunction with EUROCITIES and other City organisations; our final recommendation to the European Commission is therefore:

5. CITIES: MOVING FORWARD

- convene a cross DG “task force” with the specific objective of facilitating the recommendations and initiatives proposed in this report. The “task force” should at a minimum include the partner Cities and EUROCITIES.