



Work Package 2

Executive Summary:

D2.5 'Inventory and assessment of energy actions'

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Executive Summary

Deliverable aims and objectives

Deliverable D2.5 is an analysis of the current and planned energy actions in each partner city. Its key aim is to find the most viable stand-alone actions and cross-sector opportunities for the cities to include in their enhanced Sustainable Energy Action Plans (SEAPs). It includes an inventory and assessment of the most promising actions, in terms of their feasibility and impact from the perspectives of ‘energy and technology’, ‘economics and finance’ and ‘organisation and stakeholders’.

Energy actions may be seen as overall programmes, projects or specific interventions taken by organisations within the city. In this deliverable the actions have been assessed on key elements within the three dimensions listed above, such as: integration potential in terms of technical compatibility, willingness for collaboration, contribution to objectives for various organisations, cost, impact, timing, risk, as well as legal and contractual issues.

The analysis of stand-alone actions has led to the identification of promising cross-sector opportunities, bringing together actions that cross more than one smart cities’ sector (energy, transport and ICT), or those that cross multiple Covenant of Mayors’ sectors (buildings, transport, public lighting, industry, local electricity production and local heat/cold production), into integrated opportunities that deliver greater benefits to the city and its inhabitants.¹ This is helping the cities to develop enhanced SEAPs that will deliver their emissions reductions targets by 2020, and that could also serve as best practice examples for other cities.

City approaches

Each city has gathered information for their inventory and assessment of energy actions from various departments in their local authorities, as well as external stakeholders such as sector experts where necessary. The full details of each city’s actions can be found in Annexes B-E. Each city’s work follows the template provided in Annex A, which covers:

- Brief technical assessment;
- Contribution to EU 2020 climate and energy goals;

¹ European Innovation Partnership on smart cities and communities: <http://ec.europa.eu/eip/smartcities/>;
Covenant of Mayors new SEAP guidelines:
www.covenantofmayors.eu/IMG/pdf/Reporting_Guidelines_SEAP_and_Monitoring.pdf

- Financial assessment;
- Stakeholder assessment;
- Risk assessment (timing, finance, political, legal).

The areas included have been designed to meet multiple needs, including the requirements of this and other STEP UP deliverables, and the requirements of the Covenant of Mayors for the new SEAP template.² As a result, cities were required to provide detailed information on their actions, where possible, to enable their feasibility and potential impacts to be more accurately assessed. The acquired data and conclusions will be used to develop later deliverables, including the scenario analysis (D2.6), development of enhanced SEAPs (D2.7) and creation of an implementation plan dealing with prioritising actions, monitoring and review (D2.8). There are also close links with Work Package 3, in which the most promising opportunities identified in each city are developed to the edge of implementation, and Work Package 4, where some of the key learnings and experiences from the STEP UP project are being shared with companion cities and those of the wider learning network through workshops, webinars and other learning opportunities.

Key findings

The table below shows a consolidation of the tools and approaches used in all cities for both stand-alone actions and cross-sector opportunities, which highlights some interesting commonalities and differences between the cities. The tools and approaches have been split into 'direct' (which directly reduce carbon emissions) and 'enabling' (which enable and support a reduction in emissions, but do not directly reduce them). Although arguably some of the cities' actions use multiple tools and approaches, the table below shows the principal tool or approach used for each action. For example, an action which focuses on encouraging people to invest in small scale renewable energy schemes or use energy more efficiently in the home would be classified as an enabling approach such as 'new business model' or 'communication to encourage behaviour change' rather than 'renewables' or 'energy efficiency – retrofit', as it is not directly resulting in the emissions reductions associated with these direct measures.

It is interesting to note that whilst there is a fairly even split between direct and enabling actions, over half of the enabling actions come from Ghent. This may be unsurprising as Ghent analysed a much larger number of actions than the other cities (41 in total), whilst Riga and Glasgow did not

² Covenant of Mayors (2014), www.covenantofmayors.eu/IMG/pdf/Revised_SEAP_Template.pdf

analyse all of their cities' actions, but it could give an indication that these types of actions are more in focus in Ghent than the other cities.

Table 1. Summary table to show the tools and approaches used by the four STEP UP cities

Tool / approach					
	Ghent	Glasgow	Gothenburg	Riga	Grand Total
Direct	16	8	12	12	48
CHP/DH	2	4	2	4	12
Energy efficiency - industrial processes	1		1		2
Energy efficiency - new build			1		1
Energy efficiency - new build (district)	6		1	1	8
Energy efficiency - retrofit	3	1	2	2	8
Energy efficiency - retrofit (district)	1		1		2
Fleet change to low carbon vehicles	1	1	2	2	6
Public lighting	1	1			2
Renewables	1		2		3
Renewables - biomass				1	1
Renewables - geothermal				1	1
Renewables - solar thermal				1	1
Smart grid		1			1
Enabling	25	5	13	2	45
Change in policy		1	2		3
Coaching to encourage behaviour change	5				5
Communication to encourage behaviour change	5	1	4		10
ICT	3	2		2	7
Improved planning			3		3
Incentives to encourage behaviour change	3		1		4
Infrastructure to encourage behaviour change	2		1		3
New business model	6	1	1		8
Procurement	1		1		2
Grand Total	41	13	25	14	93



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Ghent

Ghent has analysed 38 actions which it classifies as ‘stand-alone’, when considering the Covenant of Mayors sectors (see above). These actions range from retrofit measures, to the implementation of renewables, to the encouragement of behaviour change in businesses, the public sector and residents.

Three cross-sector opportunities have been identified, each combining a number of the city’s stand-alone actions and covering multiple Covenant of Mayors and smart cities sectors. The City of Ghent also defines cross-sector opportunities as measures that link to other policy issues, such as fuel poverty, liveability or health, and uses these opportunities as leverage for energy or climate related actions. For Ghent, sometimes the social or economic win-win is a more decisive factor than the impact on CO₂. The three cross-sector opportunities are:

- **A district heating project for businesses**, which combines stand-alone actions relating to district heating network expansion and working with businesses using guidance and ESCOs to trigger energy efficiency and renewable energy investments. This enables the efficient use of waste energy and the optimal operation of the district heating network, and at the same time can reduce energy costs and increase the security of supply.
- **Energy management for public buildings and transport**, which uses an advanced ICT system and improved monitoring to improve the way that energy is used. This combines stand-alone actions related to energy management in public buildings, ESCOs for municipal buildings, the retrofit of schools and greening the municipal fleet. This more joined up approach should lead to greater efficiencies and better availability of data, and can give insights on appropriate measures to take, including integrated actions in different sectors. In addition, a wider roll out of these systems is likely to bring implementation costs down overall.
- **A 3D solar portal** providing information to the public on the solar potential of roofs, combined with guidance and loans, in order to stimulate investments in solar energy. This combines four stand-alone actions relating to loans, guidance and ESCOs for residential buildings (owners and private-rented), and sensitisation to renewables. This broader focus enables the City to understand the solar potential of many different types of buildings across the city, and also offers the potential to link up different projects and potentially lower costs.



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Glasgow

Glasgow has analysed seven stand-alone actions according to the Covenant of Mayors sectors. These actions cover district heating, demand side management (public and commercial sector buildings), mapping solar energy potential, sustainable transport (electric vehicles and active travel) and sustainable food (food waste and anaerobic digestion). This is not the full suite of actions being considered or implemented in Glasgow, however, but a selection of those that are seen to have high impact or good potential for further integration.

Six cross-sector opportunities have been identified, with the majority of them building on some of the city's stand-alone actions and covering a range of sectors and stakeholders. These opportunities are:

- **Housing refurbishment** (energy efficiency and heating), building on the district heating stand-alone actions. This helps residents across the city to make their homes more efficient and reduce fuel bills through insulation and other efficiency measures, district heating and renewable energy opportunities, and has the potential to result in greater impacts at lower costs if entire blocks of flats or streets are retrofitted at the same time.
- **Online building energy modelling tool**, with the potential to link to the district heating stand-alone actions. This enables citizens to assess the energy performance of their buildings and suggests cost-effective measures for improving this. At the same time this provides a repository for intelligence on the condition and energy performance of Glasgow's building stock, which can be combined with other information that is being fed into Glasgow's city observatory. There is scope to expand this to identify district heating opportunities, and to combine data on energy use from transport as well as buildings to create a real-time model of how the city is functioning overall.
- **Intelligent street lighting**, linked to the city centre transport initiatives stand-alone action. This involves developing a dynamic network that can be controlled automatically and manually to reflect road usage and to encourage stakeholders to use cycle paths, parks and open spaces. It is also linked to the roll out of energy efficient street lighting across the city. The intention is to extend the intelligent lighting out beyond pilot sites across the city, and by combining it with existing initiatives to encourage active travel, it will help to reduce emissions from both lighting and transport.
- **Behavioural change project**, building on the demand side management and city centre transport initiatives stand-alone actions. This engages citizens to understand their perceptions and motivations around energy issues and create a legacy tool for future



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engagement with citizens in order to help them change their behaviours and reduce their energy demand. The project has been focused on energy use in buildings to date, but going forward the scope could be expanded to also cover transport, as well as existing initiatives focused on behaviour change in schools.

- **Energy Services Company (ESCO)**, which is being established predominantly to support the roll out of district heating schemes by identifying opportunities and helping schemes get off the ground (therefore building on the district heating stand-alone actions). Linked to this, the Council is also working to encourage developers to look beyond the boundary of their own sites to develop shared energy and heat resources with neighbouring developments.
- **Industrial waste heat recovery and CHP**, which could potentially link to the district heating stand-alone actions. Waste heat recovery is a new concept for the city but one the city intends to explore as it would provide low carbon energy for the city, simultaneously helping to reduce energy costs and CO₂ emissions. In the future it could be used to ensure that district heating schemes have a sustainable, efficient and low cost supply of heat.

Gothenburg

Gothenburg has presented 20 stand-alone actions, according to the Covenant of Mayors sectors. Some of these are ongoing actions (for example as part of other projects) and others will be initiated when the city's Climate Programme (enhanced SEAP) is adopted by the City Council later in 2014. The strategies in the Climate Programme focus on the period to 2030, in which the measures covered here will be implemented. The Programme will require commitment and broad efforts from the city, both in terms of investment in technology and infrastructure, and in the form of investment through information and knowledge-raising actions towards the citizens of Gothenburg. Actions include those relating to city planning, sustainable transport (including personal, public, municipal and cargo), district heating and cooling, energy efficiency of buildings and industry, renewable energy production (large and small scale), and consumption (food, waste, resource demanding goods).

Five cross-sector opportunities have been identified, a number of which have been developed by combining multiple stand-alone actions into four different areas (A, B, C and D in Annex D). The fifth opportunity has been included as an example of an ongoing integrated project. These are as follows:

- **A) Resource efficient planning**, which links to the stand-alone action on planning for an energy and transport efficient society. It focuses on using infrastructure efficiently and reducing the climate impact from traffic through spatial planning approaches.



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- **B) Efficient energy use and conversion to renewables**, which combines stand-alone actions on district heating and cooling, energy efficiency in buildings and industry, and local electricity generation (small and large scale). Through this approach the city intends to develop a resource efficient energy system, from primary resource to end use.
- **C) Reduced climate impact from travel and transport**, which combines stand-alone actions on reducing transport in the city, efficient vehicles owned by the city administration, climate efficient resource handling and energy efficient sea transport, recognising the city's role as a transport hub and its potential influence at the local, national and international level.
- **D) Climate conscious consumption**, which combines stand-alone actions on reduced climate impact from food, reduced procurement of resource demanding goods, and preventing waste and encouraging recycling, recognising that a range of behavioural changes and changes to consumption habits are required to enable a transition to a more sustainable society.
- **RiverCity**, which links to many of Gothenburg's stand-alone actions, namely sustainable planning, district heating/cooling, energy efficiency of buildings, small scale electricity production, reduction of transport, climate efficient cargo handling, and the reduction of waste and encouragement of recycling. This initiative is ongoing, and is an example of district scale regeneration that is taking place in the city.

Although Gothenburg has identified these cross-sector opportunities by integrating stand-alone actions, it has not conducted an analysis of these by the three themes of 'energy and technology', 'economics and finance' and 'organisation and stakeholders'. What is therefore missing from this analysis is an understanding and evaluation of how, by grouping stand-alone actions together and developing them as integrated, cross-sector opportunities, greater impacts can be realised, costs can be reduced, and potential risks can be mediated. The city will need to complete this stage of the analysis as it develops its projects further in the remainder of the STEP UP project, so that these benefits of the integrated approach can be fully understood.

Riga

Riga has presented nine stand-alone actions, based on the Covenant of Mayors sectors. These actions focus on heat production and supply, building renovation and district heating, using solar collectors for hot water preparation, and improving the sustainability of public transport. It should be noted that, like Glasgow, this is not the full suite of actions being considered or implemented in the city.



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Five cross-sector opportunities have been identified, one of which has been developed by combining multiple stand-alone actions. These are:

- **Energy saving measures for buildings as end-users of district heating systems**, which combines actions on the renovation of buildings, hot water preparation using solar collectors, and geothermal energy use for a more integrated approach than simply connecting buildings to a district heating system.
- **Tornakalna district**, which is an urban development project on vacant land, providing buildings with multiple functionalities and a multimodal transport junction.
- **Optimisation of the transport system**, through integrated parking spaces, a network of public transport and bike lanes, using ICT to facilitate booking, information and payments.
- **Integrated city services for inhabitants and businesses** driven by cloud platform and mobile technologies, improving the delivery and monitoring of all services.
- **Getlini landfill with biogas** and refuse-derived fuel powered greenhouses, lamb rearing and fisheries, providing the ecological management of waste in the Riga waste management area and producing energy from landfill gas.

Key recommendations

A number of recommendations have been identified, based on the learning points from this deliverable. These recommendations are set out below:

- Recognising the importance of understanding financial aspects in order to evaluate feasibility, and CO₂ emissions in order to evaluate the impact of actions, if this template is used again in the future, by STEP UP cities or other cities, those completing it should be encouraged to make 'best guess' estimates of the impacts of actions where data is not available. This would at least give an indication of what the CO₂ emissions reductions or costs might be, which can then be updated when more accurate information becomes available. Cities should also make use of available carbon accounting tools that have been developed, as well as using examples from elsewhere to get a better understanding of impacts.
- If this template is used again in the future, by STEP UP cities or other cities, guidance on whether a full inventory should be conducted or not would make it easier to make comparisons between cities and to ensure that the exercise helps cities to understand the impact of their actions on their SEAP targets.



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- Cities need to formalise the processes they already have in place to understand the roles of different stakeholders and work with these stakeholders and political decision-makers on the identification of new opportunities, to ensure that integrated and well-supported cross-sector opportunities are at the core of project design going forward.
- Recognising the challenges in identifying the impact of enabling measures, or target based measures, cities should make estimates based on similar measures implemented elsewhere, or using known average savings for these types of measures, to at least get an indication of what the likely impact might be.
- Cities should have the flexibility to interpret cross-sector in the way that is most appropriate for them, but considering all the different frames that are available is worthwhile to ensure that actions are truly integrated in their nature. As the policy themes approach is unique to Ghent, it may be something that other cities can learn from and take on board in the selection of their own actions.
- Where possible, this exercise should be conducted at a relatively early stage in the SEAP development process, where it can help cities to identify both current and new opportunities that could be included in their SEAPs. At the same time, this exercise should be seen as a flexible tool that can continue to be used as the SEAP is developed, with more data added as it becomes available, and potentially new opportunities identified as a result.
- Taking on board the learning points from this deliverable, through STEP UP the Excel template should be revised in order to make it a useful tool for other cities looking to develop their own SEAPs, especially those that are companion cities or part of the learning network. This can then be used in coaching sessions to help other cities understand their actions better and identify new cross-sector opportunities.