

ternatives to the motor vehicle. Besides a well-connected public bus network, this strategy has also focused on providing Park and Ride facilities outside the city limits, and developing an expanding cycling network. City data for 2007 show that approximately 24% of people took public transport to work, and 9% walked or cycled to work. The city has 1.4 km of cycle lanes per square km, and 2.85 km of public transport routes per square km — both well above the averages for the index.

Initiatives underway: The municipality has engaged a German consultancy to provide advice on the cycling network, in the form of a comprehensive cycling concept. The goal is to increase the share of cycling in total transport from 1% to 10%. As part of this plan, existing cycle routes are to be upgraded and made safer, and signage is being improved to the point

Local agenda 21: Supporting flora and fauna

Luxembourg has an unusually large green belt surrounding — and reaching into — the city. Nicknamed “the green lung”, it consists of over 130 ha of parks and green spaces and more than 1,000 ha of forest. Given the easy accessibility for residents of this natural endowment, the city has focused on promoting biodiversity. In particular, it has dedicated substantial resources to the implementation of a local biodiversity component of Agenda 21, a UN-backed framework for environmental action. The main measures chosen by the city of Luxembourg in this regard involve tolerance for wild-growing vegetation in the urban environment, the rejection of herbicides and genetically modified organisms, the sustainable management of wooded areas, the promotion of “green roofs”, the development of wild fauna through ecological mowing patterns, and the planting and maintenance of indigenous trees, bushes and hedges in the city.

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where it rivals the signage for motorists. In line with developments in other European cities, Luxembourg has installed a public network of rentable bicycles. For a short duration of 30 minutes, rental is free, and a variety of short- and long-term tariffs are available too. The city hopes that this will help to reduce the use of cars for short journeys within the city.

Water: With a score of 8.97 in the Green City index’s water category, this is one of Luxembourg’s strongest category rankings, coming in fifth place. Luxembourg is among the best performers in terms of water usage per head per year, with each resident consuming just under 86 cubic metres (based on the lower night-time population of the city). The city also manages to keep water leakages from the system particularly low at only 6.5 percent on average. Luxembourg city is traversed by a number of natural waterways (both open-air and closed), and the city has repeatedly taken measures to keep them clear of pollution. Water quality is constantly measured and published online for transparency. Around 60% of the city’s drinking water comes from ground water to the north and east of the city, and 40% is provided by a national water company SEBES, from a basin further north in the country.

Initiatives underway: The city of Luxembourg is seeking to reduce the impact of the “sealing” of outdoor surfaces from gradual urbanisation, which can reduce the natural rate of water seepage into the groundwater. New urban projects incorporate designs to reuse rainwater, or to channel its flow into the ground rather than into the sewerage system.

The city is running a project with farmers in water-catchment basins to considerably reduce the inflow of nitrates and pesticides.

Waste and Land use: Waste and Land use is Luxembourg’s best category in the Green City index, placing joint second with Zurich, just behind Amsterdam, with a score of 8.82. This strong outcome stems from the city government’s robust commitment to an environmentally sustainable approach to waste, which helped it to keep the amount of waste per capita (382.94 kg) to some of the lowest levels seen across all comparison cities. With a 41% share of waste recycled, the city is the third-most-effective city in the index. The city’s commitment to enjoyable green urban spaces is also solid, albeit helped by its proximity to the countryside. Biodiversity initiatives and the protection of green belts form the core of the city’s strategy. The 1000 ha of communal forests are certified by the Forest Stewardship Council (FSC).

Initiatives underway: The city has partnered

with SuperDrecksKëscht, a waste management foundation to convert all public buildings to a waste management standard. The city is preparing to launch bio-methanisation of organic waste in 2010. The municipality is seeking to provide leadership on waste management and educate children on its value.

Air quality: Luxembourg ranks a respectable 8th place out of 31 in the air quality, with a score of 7.89 out of 10. This reflects a decent performance in terms of air pollution. In conjunction with the national environment administration, the city keeps track of a range of air pollutants. The city is the best performer in the index in terms of (low) ozone emissions and also has a relatively low incidence of sulphur dioxide emissions, but is generally a weaker performer in terms of nitrogen dioxide emissions. In terms of particulate matter in the air, there is also a low occurrence. The city has identified motorised traffic as its main air pollutant, and is therefore targeting its air quality policies mainly in this direction, including through promotion of public transport and “soft-mobility” (non-motorised transport) options, reduction of city bus emissions and dynamic traffic management initiatives.

Initiatives underway: Luxembourg city has partnered with the national environment ministry to create a comprehensive air quality plan (“plan qualité air”), following repeated readings of excessive nitrogen dioxide emissions, which triggered an improvement plan under European environmental directives. Having already made some progress towards improving transport alternatives to motor vehicles by implementing an ambitious cycling concept, in 2010-15 the city plans to move towards the reintroduction of trams on some city thoroughfares, improve the availability of mobility infrastructure, limit the number of heavy-lorry deliveries in the city centre and introduce new norms for newly constructed central heating systems. One item that could make a considerable difference is the mooted increased use of district heating and co-generation of electricity and heating.

Environmental governance: Luxembourg ranks 7th out of 31 cities in environmental governance, not far behind the top performers, reflecting its strong commitment to environmental sustainability. Luxembourg municipality’s approach to environmental governance is marked by openness and accountability. Each year, the city publishes an environmental assessment of the current situation and an action plan for the coming year, demonstrating the progress of initiatives in each category. Data for various environmental categories are easily retrievable.

Luxembourg (city)_Luxembourg



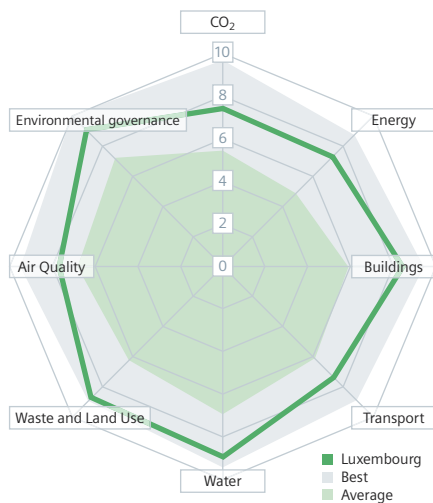
Luxembourg is the largest urban area in the state of Luxembourg, but with an estimated population of just 92,000, it is smaller than most European capitals. The city population, however, swells during the day to around 2.5 times its usual size, as commuters from Luxembourg, France, Belgium and Germany commute in to work. As a result, negative environmental externalities, such as carbon emissions and air pollution, are considerably higher than would be expected for a city of this size, especially on a per-head basis. Our assessments use the day-time population as a reference for the Green City Index, since this population accounts for most of the environmental impacts. On the whole, however, Luxembourg has a favourable environmental situation. Luxembourg state has one of the highest GDP levels per head in the EU, and given Luxembourg city’s specialisation in financial and business services, the city has a high per-capita income too. Population density is

fairly low, and a higher-than-usual share of the city’s territory is reserved for parks and forests. The share of heavy industry and manufacturing in the city is fairly low.

Luxembourg was not one of the original 30 cities comprising the “European Green City Index”. For purposes of this city portrait, a theoretical 31-city index was created, to evaluate where Luxembourg would fit in with the cities in the original index. Based on this theoretical index, Luxembourg places a respectable 6th out of 31. The city scores respectably across all categories, and particularly well in waste and land use, energy and water. Its lowest rank of ninth, in the category of buildings, still represents a reasonable outcome. Luxembourg’s strong environmental performance reflects the city’s green credentials and aspirations. There is also a case to be made that the city’s small size (with a day-time population of 220,000, it has the smallest population of the 31 cities) represents a con-

siderable advantage in tackling environmental issues, making those issues easier to manage than they would be in a metropolitan area of 100 times Luxembourg’s size (such as London or Paris).

CO₂ Emissions: The level of carbon dioxide (CO₂) emissions in Luxembourg is comparatively low, but Luxembourg is not among the best-performing cities in the Green City index, placing 8th out of 31 in this category. CO₂ emissions are estimated to be 4.3 tonnes per inhabitant per year. In this respect, Luxembourg ranks in the middle of the cities in the index, but in terms of CO₂ emissions per unit of GDP, the city’s performance is much better, placing third. The city’s top-level CO₂ strategy targets an increase in renewable energy consumption (from a fairly low share currently) and an improvement in the energy efficiency of final energy consumption. As part of this approach, the city has focused on its



Capturing and using waste heat

Given the high energy consumption and CO₂ emissions involved in heating residential and commercial buildings in Luxembourg, the city has focused on co-generation, which allows the combined production of heat and electricity with a high energy efficiency, providing both economic and environmental benefits. The process rests on using the heat generated in the electricity production process and distributing it to connected buildings through a district heating network. The environmental benefits, as stated by the city of Luxembourg, can be in the order of a 35% reduction in primary energy consumption and a 40% cut in CO₂ emissions. In Luxembourg's case, the city provides the co-generation facilities, and residential or commercial buildings can apply to be attached to the co-generation network (generally for heating purposes). The benefits to the heating consumer include the savings associated with having heating provided externally and the environmental benefits of this efficient method.

own energy consumption, in municipal buildings, vehicles and the like.

Initiatives underway: The city of Luxembourg has adopted an ambitious target for CO₂ reduction, looking to achieve a 10% reduction in CO₂ emissions of the city every five years. This commitment was secured under the aegis of Luxembourg city's membership of the Klimabündnis, a member of the International Climate Alliance.

In 2008 the municipality achieved its aim of having 100% of the electricity used by the municipal government produced by renewable fuels, which has allowed the CO₂ emissions attributable to the city's administrative functions almost to halve since 2006.

(in a variety of ways) reduced private consumption of energy.

Initiatives underway: As part of the renewable energy drive, Luxembourg city offers subsidies for the installation of mainly solar energy panels on residences and commercial buildings. There is also a wide range of programs that dispense energy-saving advice and tips.

The city is making a major effort to reduce the energy use of its lighting installations, of which there are three major components: street lighting, festive lights, and the illumination of city monuments. Since 2009 all Christmas light bulbs have been replaced by energy-efficient ones, and electricity consumption by street

lights has been reduced through more energy-efficient regulation of that system. The proportion of energy supplied by cogeneration plants is steadily increasing.

Buildings: The buildings category delivers Luxembourg one of its poorer category rankings (9th), despite a high 8.54 points. The relatively low ranking reflects the tough competition from other west European cities with excellent scores in this category. In particular, there are a number of cities with similar outcomes for energy consumption of residential buildings. Luxembourg uses 686 MJ per square metre of residential buildings. One reason for this good result

may be that Luxembourg residents have access to subsidies for heating and insulation.

Initiatives underway: The city of Luxembourg helps to provide consultation sessions on energy-efficient building construction and renovation. The sessions consist of advice from experts on converting residences and offices to low-energy buildings, installing solar panels or securing more energy-efficient heating systems. The initial assessment is free, and the homeowner pays 10% of the cost of subsequent consultation sessions, with the city taking on the balance.

The city is seeking to apply ecological criteria in its own building projects. As part of a flagship project, which is intended to serve as an exam-

ple to local construction firms, a new building in Pfaffenthal is built to passive house (low energy) standard entirely with ecologically sound building materials, taking the energy footprint of each material into account. Another municipal building in passive house standard and using ecologically sound building materials has already been built in Hamm. All new city buildings are planned using this low-energy standard.

Transport: Luxembourg ranks 8th on transport issues, with 7.31 points out of 10. Given the city's size limits, as well as the large number of commuters entering the city each day, city policymakers have long been seeking transport al-

In a theoretical 31-city index, Luxembourg places a respectable 6th place.

Energy: Luxembourg scores one of its best category rankings for the Energy section, placing fifth out of 31 with 7.5 points. The strong score is underpinned by a low energy intensity — the energy used per unit of GDP is the second-lowest of all cities. Likewise, energy used per inhabitant per year was 46 gigajoules (based on the number of inhabitants during the day). The energy score is held back slightly by a weaker performance than many other European cities in the use of renewable energy as a share of total energy consumption.

As a result, reducing the consumption of primary energy and increasing that of renewable energies, while continuing to develop urban heating, are among the top priorities of Luxembourg city's environmental plan. Cuts to energy consumption have focussed initially on the city's own buildings, installations and vehicles, but there are also increasingly efforts to incentivise

Overall		CO ₂		Energy		Buildings		Transport		Water		Waste and land use		Air quality		Environmental governance	
City	Score	City	Score	City	Score	City	Score	City	Score	City	Score	City	Score	City	Score	City	Score
1 Copenhagen	87,31	1 Oslo	9,58	1 Oslo	8,71	=1 Berlin	9,44	1 Stockholm	8,81	1 Amsterdam	9,21	1 Amsterdam	8,98	1 Vilnius	9,37	=1 Brussels	10,00
2 Stockholm	86,65	2 Stockholm	8,99	2 Copenhagen	8,69	=1 Stockholm	9,44	2 Amsterdam	8,44	2 Vienna	9,13	=2 Zurich	8,82	2 Stockholm	9,35	=1 Copenhagen	10,00
3 Oslo	83,98	3 Zurich	8,48	3 Vienna	7,76	3 Oslo	9,22	3 Copenhagen	8,29	3 Berlin	9,12	=2 Luxembourg	8,82	3 Helsinki	8,84	=1 Helsinki	10,00
4 Vienna	83,34	4 Copenhagen	8,35	4 Stockholm	7,61	4 Copenhagen	9,17	4 Vienna	8,00	4 Brussels	9,05	4 Helsinki	8,69	4 Dublin	8,62	=1 Stockholm	10,00
5 Amsterdam	83,03	5 Brussels	8,32	5 Luxembourg	7,50	5 Helsinki	9,11	5 Oslo	7,92	5 Luxembourg	8,97	5 Berlin	8,63	5 Copenhagen	8,43	=5 Oslo	9,67
6 Luxembourg	82,56	6 Paris	7,81	6 Amsterdam	7,08	6 Amsterdam	9,01	6 Zurich	7,83	=6 Copenhagen	8,88	6 Vienna	8,60	6 Tallinn	8,30	=5 Warsaw	9,67
7 Zurich	82,31	7 Rome	7,57	7 Zurich	6,92	7 Paris	8,96	7 Brussels	7,49	=6 Zurich	8,88	7 Oslo	8,23	7 Riga	8,28	=7 Paris	9,44
8 Helsinki	79,29	8 Luxembourg	7,56	8 Rome	6,40	8 Vienna	8,62	8 Luxembourg	7,31	8 Madrid	8,59	8 Copenhagen	8,05	8 Luxembourg	7,89	=7 Vienna	9,44
9 Berlin	79,01	9 Vienna	7,53	9 Brussels	6,19	9 Luxembourg	8,54	9 Bratislava	7,16	9 London	8,58	9 Stockholm	7,99	9 Berlin	7,86	=7 Luxembourg	9,44
10 Brussels	78,01	10 Madrid	7,51	10 Lisbon	5,77	10 Zurich	8,43	10 Helsinki	7,08	10 Paris	8,55	10 Vilnius	7,31	10 Zurich	7,70	10 Berlin	9,33
11 Paris	73,21	11 London	7,34	11 London	5,64	11 London	7,96	=11 Budapest	6,64	11 Prague	8,39	11 Brussels	7,26	12 Vienna	7,59	11 Amsterdam	9,11
12 London	71,56	12 Helsinki	7,30	12 Istanbul	5,55	12 Lisbon	7,34	=11 Tallinn	6,64	12 Helsinki	7,92	12 London	7,16	13 Amsterdam	7,48	12 Zurich	8,78
13 Madrid	67,08	13 Amsterdam	7,10	13 Madrid	5,52	13 Brussels	7,14	13 Berlin	6,60	13 Tallinn	7,90	13 Paris	6,72	13 London	7,34	13 Lisbon	8,22
14 Vilnius	62,77	14 Berlin	6,75	14 Berlin	5,48	14 Vilnius	6,91	14 Ljubljana	6,17	14 Vilnius	7,71	14 Dublin	6,38	14 Paris	7,14	=14 Budapest	8,00
15 Rome	62,58	15 Ljubljana	6,67	15 Warsaw	5,29	15 Sofia	6,25	15 Riga	6,16	15 Bratislava	7,65	15 Prague	6,30	15 Ljubljana	7,03	=14 Madrid	8,00
16 Riga	59,57	16 Riga	5,55	16 Athens	4,94	16 Rome	6,16	16 Madrid	6,01	16 Athens	7,26	16 Budapest	6,27	16 Oslo	7,00	=16 Ljubljana	7,67
17 Warsaw	59,04	17 Istanbul	4,86	17 Paris	4,66	17 Warsaw	5,99	17 London	5,55	=17 Dublin	7,14	17 Tallinn	6,15	17 Brussels	6,95	=16 London	7,67
18 Budapest	57,55	=18 Athens	4,85	18 Belgrade	4,65	18 Madrid	5,68	18 Athens	5,48	=17 Stockholm	7,14	18 Rome	5,96	18 Rome	6,56	18 Vilnius	7,33
19 Lisbon	57,25	=18 Budapest	4,85	19 Dublin	4,55	19 Riga	5,43	19 Rome	5,31	19 Budapest	6,97	19 Ljubljana	5,95	19 Madrid	6,52	19 Tallinn	7,22
20 Ljubljana	56,39	20 Dublin	4,77	20 Helsinki	4,49	20 Ljubljana	5,20	=20 Kiev	5,29	20 Rome	6,88	20 Madrid	5,85	20 Warsaw	6,45	20 Riga	6,56
21 Bratislava	56,09	21 Warsaw	4,65	21 Zagreb	4,34	21 Budapest	5,01	=20 Paris	5,29	21 Oslo	6,85	21 Riga	5,72	21 Prague	6,37	21 Bratislava	6,22
22 Dublin	53,98	22 Bratislava	4,54	22 Bratislava	4,19	21 Bucharest	4,79	=20 Vilnius	5,29	22 Riga	6,43	22 Bratislava	5,60	22 Bratislava	5,96	=22 Athens	5,44
23 Athens	53,09	23 Lisbon	4,05	23 Riga	3,53	23 Athens	4,36	=20 Zagreb	5,29	23 Kiev	5,96	23 Lisbon	5,34	23 Budapest	5,85	=22 Dublin	5,44
24 Tallinn	52,98	24 Vilnius	3,91	24 Bucharest	3,42	24 Bratislava	3,54	24 Istanbul	5,12	24 Istanbul	5,59	23 Athens	5,33	24 Istanbul	5,56	=24 Kiev	5,22
25 Prague	49,78	25 Bucharest	3,65	25 Prague	3,26	25 Dublin	3,39	25 Warsaw	5,11	25 Lisbon	5,42	25 Warsaw	5,17	25 Lisbon	4,93	=24 Rome	5,22
26 Istanbul	45,20	26 Prague	3,44	26 Budapest	2,43	26 Zagreb	3,29	26 Lisbon	4,73	26 Warsaw	4,90	26 Istanbul	4,86	26 Athens	4,82	26 Belgrade	4,67
27 Zagreb	42,36	27 Tallinn	3,40	27 Vilnius	2,39	27 Prague	3,14	27 Prague	4,71	27 Zagreb	4,43	27 Belgrade	4,30	27 Zagreb	4,74	27 Zagreb	4,56
28 Belgrade	40,03	28 Zagreb	3,20	28 Ljubljana	2,23	28 Belgrade	2,89	28 Sofia	4,62	28 Ljubljana	4,19	28 Zagreb	4,04	28 Zagreb	4,54	28 Prague	4,22
29 Bucharest	39,14	29 Belgrade	3,15	29 Sofia	2,16	29 Istanbul	1,51	29 Bucharest	4,55	29 Bucharest	4,07	29 Bucharest	3,62	29 Belgrade	4,48	29 Sofia	3,89
30 Sofia	36,85	30 Sofia	2,95	30 Tallinn	1,70	30 Tallinn	1,06	30 Belgrade	3,98	30 Belgrade	3,90	30 Sofia	3,32	30 Sofia	4,45	30 Istanbul	3,11
31 Kiev	32,33	31 Kiev	2,49	31 Kiev	1,50	31 Kiev	0,00	31 Dublin	2,89	31 Sofia	1,83	31 Kiev	1,43	31 Kiev	3,97	31 Bucharest	2,67

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