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# Greening Growth in Luxembourg

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**By Nicola Brandt**

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## ABSTRACT/RÉSUMÉ

### Greening growth in Luxembourg

With strong economic growth overall and an increasingly important role as a regional economic centre, Luxembourg is experiencing mounting environmental pressures. This is mainly a result of a growing population and a rapid increase in transport, which is dominated by the car, as the number of workers commuting within Luxembourg and from across the border has risen rapidly. Ensuing environmental pressures are sizable, including through CO<sub>2</sub> emissions, air pollution and land use changes. Large-scale commuting, combined with low fuel taxes compared to neighbouring countries, has entailed rapid increases in greenhouse gas emissions, which are higher in Luxembourg in per capita terms than almost anywhere else in the OECD. Sound housing policies, urban and transport planning to limit urban sprawl and to promote public transport, and measures to better internalise environmental externalities will be needed to ensure that Luxembourg's economic growth is compatible with environmental and economic sustainability and the well-being of its population. This working paper relates to the 2012 OECD Economic Survey of Luxembourg ([www.oecd.org/eco/surveys/Luxembourg](http://www.oecd.org/eco/surveys/Luxembourg)).

*JEL classification:* H23, H24, Q25, Q53, Q58.

*Key words:* green growth, urban sprawl, transport policies, fuel taxes, water management

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### Vers une croissance plus verte en Luxembourg

Du fait d'une solide croissance économique globale et du renforcement de son rôle de centre économique régional, le Luxembourg enregistre une intensification des pressions sur l'environnement. C'est là, avant tout, le résultat de l'augmentation de sa population et du développement rapide des transports – dominés par la voiture particulière –, sous l'effet de la hausse rapide du nombre de migrants journaliers à l'intérieur du pays et en provenance des pays voisins. Les pressions sur l'environnement qui en résultent sont importantes, qu'il s'agisse des émissions de CO<sub>2</sub>, de la pollution atmosphérique ou des changements d'affectation des sols. Les migrations journalières à grande échelle, associées au faible niveau des taxes sur les carburants par rapport aux pays voisins, ont provoqué un accroissement rapide des émissions de gaz à effet de serre, lesquelles sont plus élevées au Luxembourg, par habitant, que dans presque tous les autres pays de l'OCDE. Le Luxembourg va devoir adopter une saine politique du logement, des plans d'urbanisme et de transport visant à freiner l'étalement urbain et à encourager les transports en commun, ainsi que des mesures destinées à internaliser davantage les externalités environnementales, pour que sa croissance économique reste viable sur le plan écologique et économique, et compatible avec le bien-être de sa population. Ce document de travail se rapporte à l'Étude économique de l'OCDE de Luxembourg 2012 ([www.oecd.org/eco/etudes/Luxembourg](http://www.oecd.org/eco/etudes/Luxembourg)).

*Classification JEL :* H23 ; H24 ; Q25 ; Q53 ; Q58.

*Mots clés :* croissance verte ; l'étalement urbain ; les politiques de transport ; taxes sur les carburants ; la gestion de l'eau.

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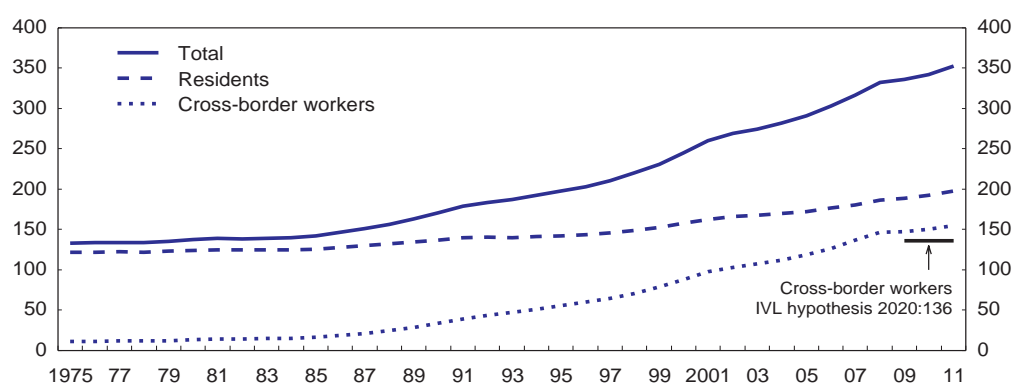
## Greening growth in Luxembourg

By Nicola Brandt<sup>1</sup>

### Luxembourg has rapidly reinforced in its position as an economic centre

Abstracting from the recent recession Luxembourg has experienced strong growth over the past twenty years, averaging close to 4% annually. Luxembourg City has reinforced its position as a regional economic centre. The country's population has grown strongly, from 385 000 in 1990 to 511 000 in 2010, mainly as a result of immigration. Employment growth, which is concentrated in Luxembourg City, has grown even faster, leading to an important increase in commuter traffic, a large share of which comes from across the border (Figure 1).

Figure 1. **Employment developments: residents and cross-border workers**  
In thousands of workers



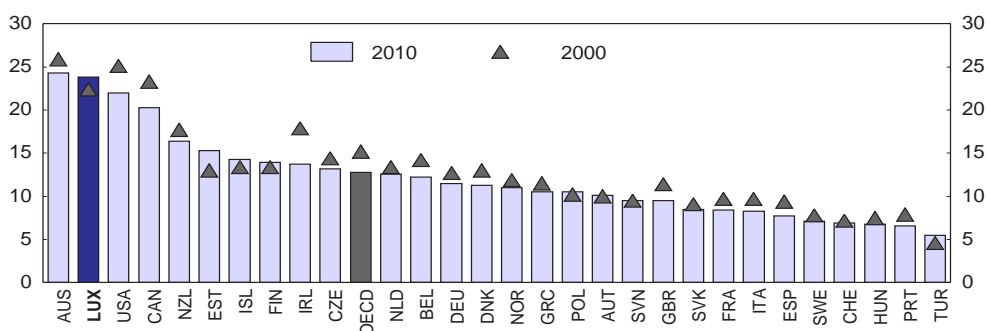
Source: STATEC.

Luxembourg's impressive development into a transborder regional economic centre has not come without environmental pressures. Commuter traffic has increased significantly, the largest share being due to the car. This has led to congestion, local air pollution and considerable CO<sub>2</sub> emissions. Luxembourg's per capita greenhouse gas emissions are high in international comparison (Figure 2) and adjustment requirements to meet EU 2020 targets for emissions outside the EU ETS system are large (Figure 3, B). While Luxembourg's development towards a service economy and technological changes in the steel industry had led to sharp reductions in greenhouse gas emissions from industrial processes and combustion

1. The author is a member of the Economics Department of the OECD. This Working Paper is based on Chapter 2 of the OECD's 2012 Economic Survey of Luxembourg which was prepared under the responsibility of the Economic and Development Review Committee. Compared to the Survey chapter, this paper contains minor updates reflecting recent policy developments. This work has benefitted from discussions with Tom Becker, Mark Hesse, Piritta Sorsa, Jean-Marc Fournier and Bob Ford. Valéry Dugain provided excellent research assistance.

during the 1990s, these have been largely undone by strong emission increases owing to fuel sales to non-residents and – to a lesser extent – the local fleet (Figure 3, A). The building of a single combined heat-power generation plant with a installed electricity capacity of 350 Mega Watt, together with the development of smaller co-generation plants, led to emissions from the energy sector in the 2000s, which had been nil before, as Luxembourg had depended on imported electricity only. Turning around trends in the transport sector will be essential for Luxembourg to reach its Kyoto target in a cost-efficient way. Given the scale of the rise in fuel sales to non-residents, it is hardly conceivable that other sectors could make up for this through sufficient emission reductions at reasonable costs.

Figure 2. **GHG emissions per capita, OECD countries 2000 and 2010**<sup>1,2</sup>  
Tonnes of GHG emitted per capita

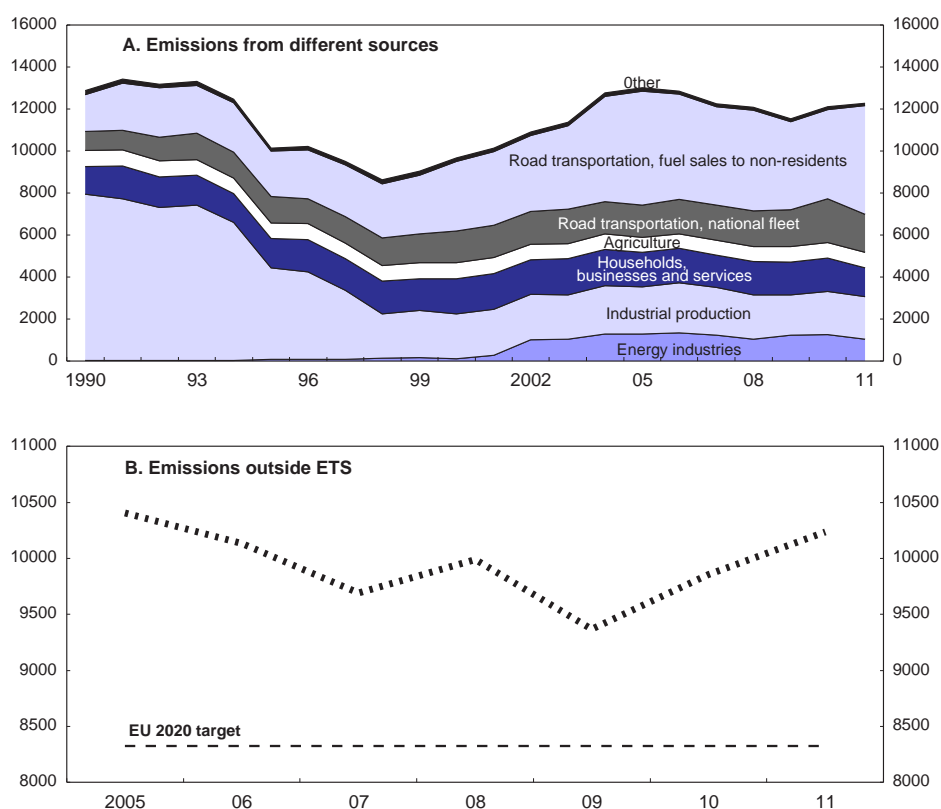


1. OECD area excludes Chile, Israel, Mexico and Korea.

2. Gross direct emissions excluding emissions or removals from land-use change and forestry (LULUCF).

Source: OECD, National Accounts database, Environment (Air and Climate) database and OECD calculations.

Figure 3. **Greenhouse gas emissions**<sup>1,2</sup>  
In Gg (1 000 tonnes) of CO<sub>2</sub> equivalent



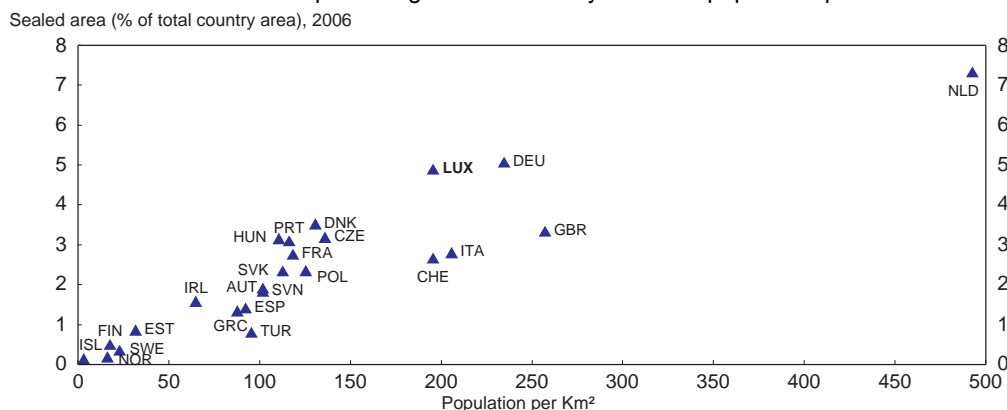
1. EU 2020 targets now concern emissions outside the EU ETS only. Therefore the panel B shows emissions outside the ETS for those years where the ETS scheme was in place.
2. Data referring to 2011 are provisional.

Source: Ministry of Sustainable Development and Infrastructure, Environment Department.

Employment and population growth in Luxembourg have been accompanied by urban sprawl, which has also favoured car traffic and led to considerable land use changes. The share of the built-up area has more than doubled over the last twenty years and the share of Luxembourg's area covered by the transport network has increased by 30%. This has entailed important increases in sealing (impermeable soil due to changes related to construction works). This has already started to cause an increased incidence of floods and it poses threats to biodiversity (Schulz and Chilla, 2011). The share of sealed surface area in Luxembourg is important compared to other countries with similar or higher population density (Figure 4),



Figure 4. **Sealed surface area and population density across different countries**<sup>1</sup>  
 Sealed area in percentage of total country area and population per Km<sup>2</sup>



1. Sealing refers to a change in the nature of soil, mainly through construction works, which renders it impermeable.  
 Source: European Environment Agency and the World Bank.

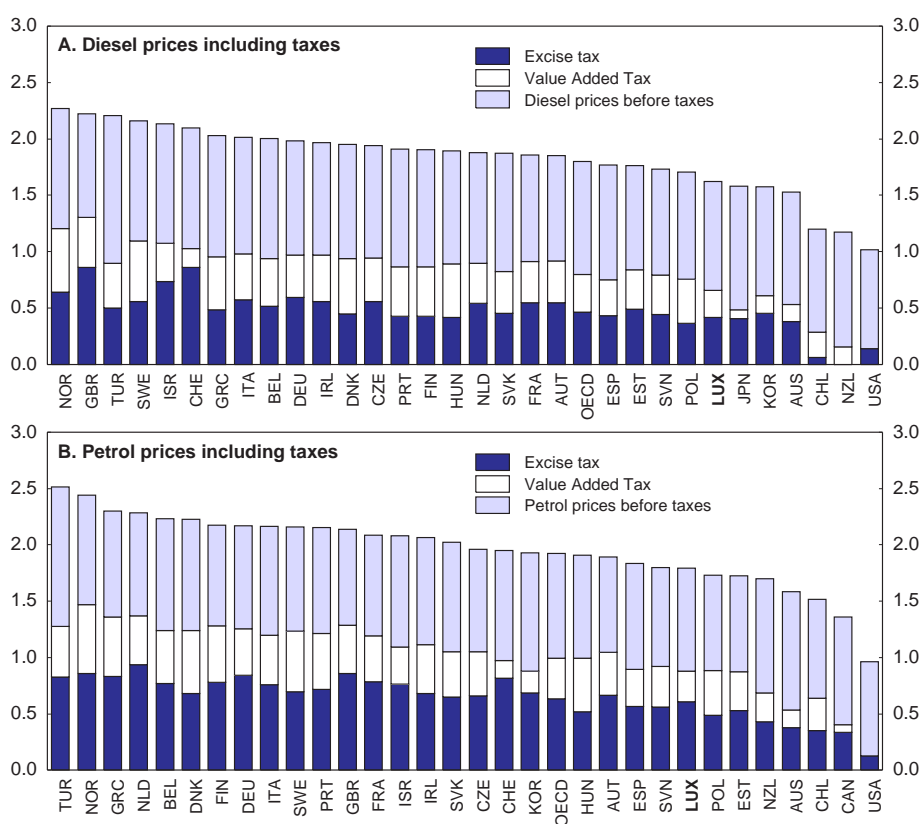
Since urban sprawl and road transport are the main causes of environmental pressures associated with Luxembourg's economic growth, this paper focuses on these two issues. The first part discusses policies to improve pricing systems for road traffic and the ensuing externalities. This is important because the recent growth in greenhouse gas emissions ascribed to Luxembourg in recent years is a result of a strong trend increase in commuting dominated by the car, notwithstanding efforts to promote public transport, walking and bicycling, as well as fuel sales to non-residents related to Luxembourg's comparatively low taxes on petrol and diesel. The second part discusses urban planning and housing policies, given their potential role in promoting denser settlements with shorter commutes, favouring walking and bicycling and better connections to public transport.

## Transport investment and pricing

### *Fuel taxes are among lowest in Europe generating high fuel sales to non-residents*

The largest part of the increase in emissions in recent years is due to automobile traffic. A large share is owing to fuel sales to non-residents, accounting for an extraordinary 70% of all fuel sales within the country (see Figure 3). This is mainly related to Luxembourg's relatively low fuel taxes, which weaken incentives to use public transport, induce commuters to fill their tanks in Luxembourg and create strong incentives for both private car owners in the region and drivers of heavy vehicles in transit to take a detour to also fill up their tanks in Luxembourg (Figure 5). While some of this simply replaces emissions that would have been ascribed to neighbouring countries had drivers bought their fuel there, there are probably additional emissions due to extra trips and detours taken to buy fuel in Luxembourg. Related to sometimes heavy traffic NO<sub>2</sub> concentrations in some areas continue to exceed limit values defined by the EU to limit adverse health effects, as do ground-level ozone concentrations, notwithstanding improvements (Figure 6).

Figure 5. **Diesel and petrol prices and taxes across OECD countries<sup>1 2 3</sup>**  
Total Price (US dollars per litre), 2011



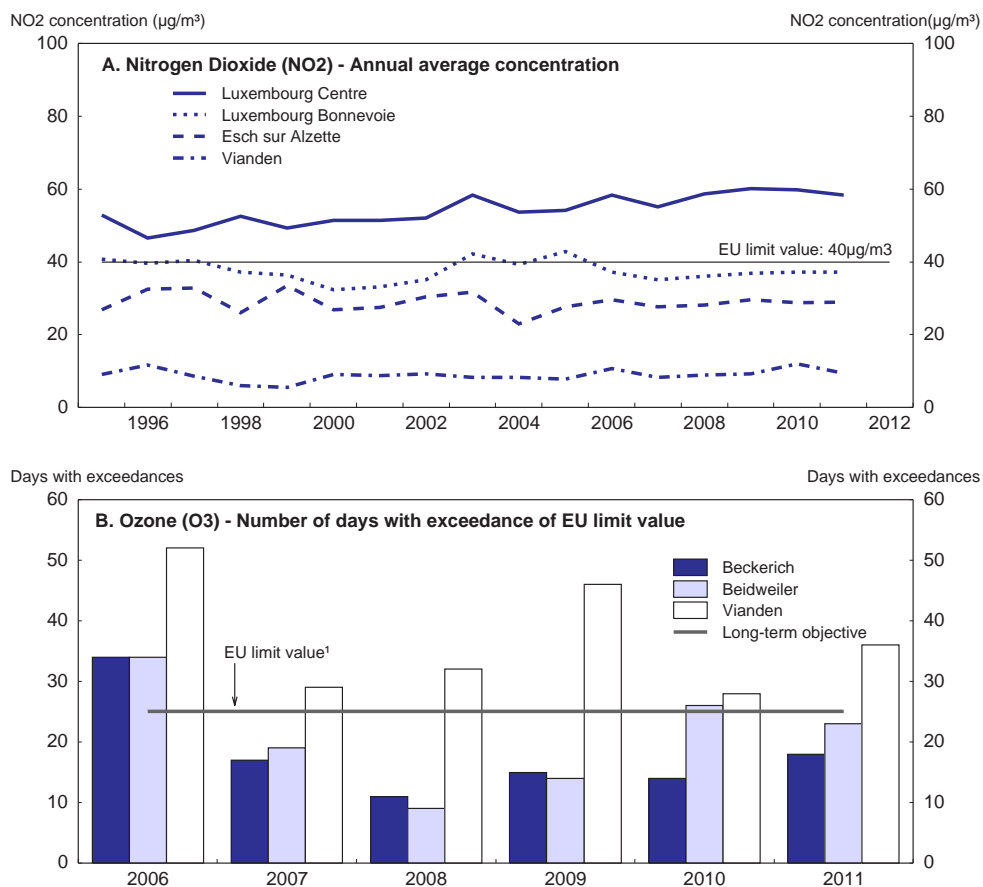
1. Diesel prices: for Estonia, data refer to 2005-2011. For Israel, data refer to 2001-2010. For Slovenia, data refer to 2005-2011. Petrol prices: for Australia, data refer to 2006-2011. For Canada, data refer to 2002-2010. For Estonia, data refer to 2005-2011. For Israel, data refer to 2000-2010. For Slovenia, data refer to 2005-2011.

2. Automotive diesel and premium unleaded 95 prices.

3. OECD refers to OECD Average.

Source: OECD, Energy database (IEA data).

Figure 6. **NO<sub>2</sub> and ground-level ozone concentrations in Luxembourg**



1. The EU limit value requires that the daily maximum of eight-hour moving average should not exceed 120µg/m<sup>3</sup> more than 25 days a year. This is intended to limit negative health effects.

Source: Ministry of Sustainable Development and Infrastructure, Environment Administration.

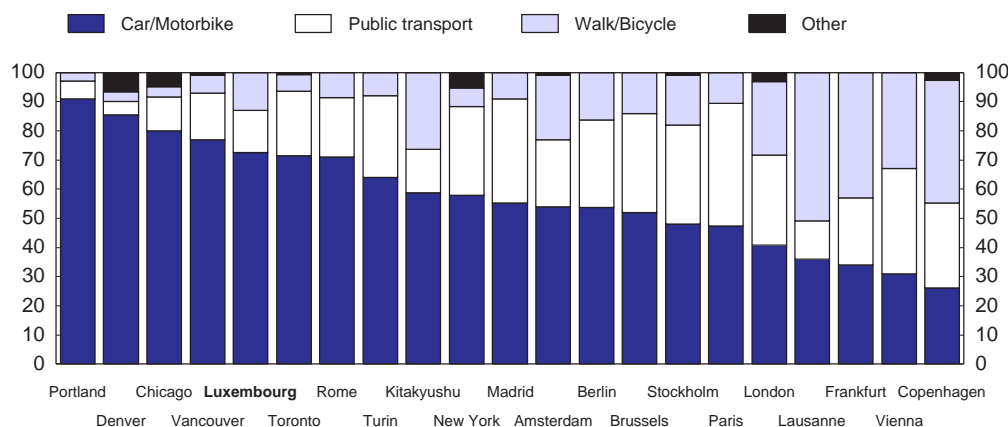
In part owing to cheap fuels, the share of cars in trips to work is significant in Luxembourg. 86% of commuters from neighbouring countries use mainly the car to get to their workplace, down from 91% in 2007 (Schmitz and Gerber, 2011). The number of cars per inhabitant is high in Luxembourg compared to other European countries (Figure 7). The share of the car in trips to work is also high compared to other regional centres in Europe, more akin to urban centres in North America, and the share of walking and bicycling is low (Figure 8).

Figure 7. **Cars per person across OECD countries<sup>1</sup>**  
Number of passenger cars per 1000 inhabitants



1. Passenger car stock at end of year n has been divided by the population on 1 January of year n+1.  
Source: European Commission/Eurostat, Transport in Figures 2012.

Figure 8. **Modal split of trips to work – different economic centres**  
In percentage



Source: For Brussels, Federale Diagnostiek Woon-Werkverkeer (2008); for Frankfurt, Sonderauswertung zur Verkehrserhebung, Mobilität in Städten – SrV 2008: Städtevergleich Dresden (2009); for Lausanne, City of Lausanne (2001); for Turin, Commune of Turin (2011); for Vienna, Yearly questionnaire of households by Wiener Linien, ([www.nachhaltigkeit.wienerstadtwerke.at/de/daseinsvorsorge/oePNV/modal-split.html](http://www.nachhaltigkeit.wienerstadtwerke.at/de/daseinsvorsorge/oePNV/modal-split.html)) from 8.7.2011); for Luxembourg, Ministère du Développement durable et des Infrastructures (2009); for Melbourne, Victoria State Government (2007); Toronto and Vancouver, Statistics Canada (2006); for Copenhagen, Berlin, Rome, Amsterdam, Madrid and Stockholm, Eurostat (2003-2006); for Paris, Insee - Enquête Nationale Transport (2008); for Kitakyushu, Person Trip Survey (2005); for Chicago, Denver, Los Angeles, New York and San Francisco, American Community Survey (2005-2009); for Portland, American Community Survey (2009) and for London, Department for Transport (2008-2009).

### **Fuel taxes do not cover environmental costs**

It is Luxembourg's declared goal, formulated in its national sustainability strategy, to gradually raise taxes on fuels, while taking into account the effects on its budget. Some studies suggest that around 10% of government revenues may be due to fuel sales to non-residents, as people who fill their tanks in Luxembourg also tend to buy tobacco and other goods that are more lightly taxed than in neighbouring countries (Thoene, 2008). Transport fuel sales to non-residents concerns cross-border commuters who choose to fill their tanks on their way to work rather than at home, residents of neighbouring countries who make extra trips to Luxembourg to buy fuel and drivers of trucks in transit who often fill their tanks exclusively in Luxembourg. A share of these groups might move to buy fuel elsewhere when Luxembourg increases fuel taxation. However, reliable studies that assess the elasticities of fuel demand in Luxembourg are rare. There is one study, which tries to assess possible effects on fuel demand and government revenues of higher fuel taxes based on a simulation model with alternative assumptions concerning the demand

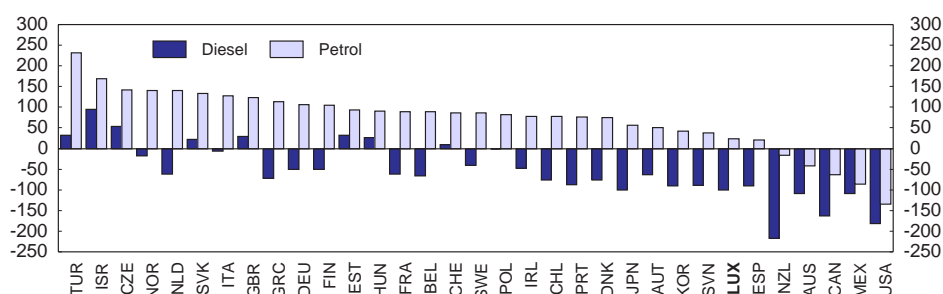
elasticity with respect to fuel price differences with neighbouring countries (Thoene, 2008). The model suggests that even when assuming relatively high elasticities, there is a range of price increases that would not reduce government revenues, while leading to lower fuel demand. Yet, a price increase of 10 cents for diesel, which would be needed to roughly match excise taxes in neighbouring countries, is estimated to reduce associated government revenues by almost 50%. However, the study is based on relatively weak data on truck transit transport and trips to Luxembourg by drivers from neighbouring countries. Luxembourg should work to gather better data on these issues and build on this study to obtain reliable information about possible revenue effects of higher fuel taxes. This would be important information to understand to which extent revenue losses would need to be replaced through spending cuts or tax increases elsewhere, when fuel tax rates are gradually increased to those prevailing in neighbouring countries.

It would also be good to develop a better understanding of the extra emissions caused in the region through detours and extra trips taken by non-residents, including drivers of heavy vehicles, to fill their tanks in Luxembourg. These extra trips as a result of tax competition run counter to joint efforts with European partners to limit GHG emissions and air pollution and they contribute to congestion and pollution in Luxembourg. The government should consider commissioning a study of the benefits of higher fuel prices in terms of reduced congestion and pollution and lower greenhouse gas emissions, perhaps jointly with the European Union and neighbouring countries.

The European Fuel Tax Directive seeks to set minimum taxes for petrol and diesel, ensuring that different fuels would be taxed in line with their carbon content. This would imply that minimum tax rates for diesel would increase to €0.393 per litre by 2018, well above Luxembourg's current rate of €0.32 per litre. Luxembourg should collaborate in this process to help avoid harmful tax competition in Europe and ensure that tax minima are sufficiently high to allow every member country to adequately price externalities related to fuel use. A thorough study assessing the costs and benefits of higher road prices would help shed light on this issue. More generally, this should also go for other issues, such as health hazards associated with tobacco.

Independently of the European directive, there is a strong case for Luxembourg to review its fuel taxation. Diesel is taxed much more lightly than petrol, although it has higher carbon content and it generates more pronounced local externalities, in particular health-threatening pollution. In fact, the carbon price implicit in diesel taxation is negative after deducting estimated costs of local externalities from the tax to take into account that fuel prices approximate other externalities in addition to CO<sub>2</sub> emissions (Figure 9). More generally, implicit carbon prices generated by taxation differ widely across different fuels and electricity (Table 1). This means that carbon emission mitigation is not being pursued at least cost. Luxembourg should bring carbon prices more in line across different sources to price externalities more efficiently. This will require a higher tax on diesel.

Figure 9. CO<sub>2</sub> prices implicit in diesel and petrol taxes after adjusting for externalities<sup>1,2</sup>  
EUR/tonne of CO<sub>2</sub>, 2012Q1



1. The implicit carbon price for diesel and gasoline is obtained by subtracting the external costs of negative externalities from the carbon price implied by the excise tax. The implied carbon price is computed by converting the excise tax per litre to a tax per ton of CO<sub>2</sub> after deducting the estimated cost of a range of externalities associated with burning fuel. The conversion is done based on a CO<sub>2</sub> content of 2.7kg of CO<sub>2</sub> per litre of diesel (light fuel oil for households and industry), and of 2.24kg of CO<sub>2</sub> for petrol (premium unleaded for households). Other external costs considered include air pollution, noise, accidents and congestion. The estimates are taken from Persson and Song (2010, "The Land Transport Sector: Policy and Performance", *OECD Economics Department Working Paper*, No. 817, Table 5.9) for noise pollution, accidents and congestion. The cost estimate for air pollution for Germany published in CE DELFT (2008, Handbook on Estimation of External Costs in the Transport Sector) is used for all countries.
2. Data refers to 2010 Q4 on diesel for Canada and diesel and petrol for the USA.

Source: OECD calculations.

Luxembourg has a reduced VAT rate for solid mineral fuel (12% as opposed to the standard 15%) and for natural and liquefied petroleum gas and electricity (6%). Moreover, the sale of coal is subject to a zero excise tax rate, as is the sale of diesel used in agriculture. Luxembourg plans to achieve large-scale emission reductions through higher energy efficiency standards for new buildings and financial help for retrofitting the existing housing stock. Pricing externalities associated with domestic energy use will be essential to create incentives for households to take up financial help for retro-fitting and it would also contribute to the cost efficiency of these measures. These tax rebates should therefore be reconsidered to price fuel use more in line with its externalities. The extra revenues could contribute to compensating potentially lower fuel tax revenues that Luxembourg may have to accept to end fuel tax competition with neighbouring countries and price externalities related to transport fuel use.

Table 1. **Implicit carbon prices across different fuels**  
Euros/tonne, 2012:q1

	Petrol	Diesel	D/Petrol	LPG	Natural gas		Electricity		Light fuel oil		Coal
					HH	IND	HH	IND	HH	IND	
Norway	318	202	0.64	--	--	--	858	0	76	76	--
Netherlands	318	156	0.49	53	85	9	11	17	93	93	--
Italy	304	213	0.70	84	--	--	92	126	144	144	0
United Kingdom	300	249	0.83	--	0	3	0	6	48	48	2
Greece	289	147	0.51	--	28	28	12	16	21	147	--
Germany	283	168	0.60	52	--	--	140	--	22	22	0
Finland	281	168	0.60	--	41	41	71	29	57	57	17
Turkey	275	143	0.52	127	0	5	14	-22	116	--	0
Belgium	265	153	0.58	0	9	3	71	52	7	7	0
France	265	158	0.60	34	6	7	250	156	20	20	0
Switzerland	263	230	0.87	--	29	29	588	588	30	30	9
Sweden	262	179	0.69	--	149	45	1946	36	159	48	--
Israel	258	205	0.80	--	--	--	0	0	205	--	1
Ireland	254	171	0.68	--	14	14	0	0	32	17	0
Portugal	252	131	0.52	37	0	0	0	0	105	--	0
Denmark	251	143	0.57	--	0	--	171	11	124	21	18
Japan	232	118	0.51	54	--	0	8	8	7	7	2
Austria	227	156	0.69	--	30	--	110	105	39	39	16
Slovak Republic	222	132	0.59	52	0	7	0	0	--	0	--
Czech Republic	221	156	0.71	49	0	6	2	2	9	9	2
Korea	217	128	0.59	85	22	22	--	--	25	25	--
Slovenia	214	130	0.61	47	23	23	26	22	49	49	--
<b>Luxembourg</b>	199	118	0.59	31	--	--	--	--	4	8	0
Spain	196	128	0.65	18	0	0	0	0	31	31	--
Estonia	183	141	0.77	40	11	5	11	10	40	40	--
Hungary	179	137	0.76	50	0	5	0	2	--	--	0
Poland	170	109	0.64	62	0	0	5	5	20	20	0
Chile	165	33	0.20	0	0	--	0	0	-7	--	--
New Zealand	159	1	0.01	--	6	6	0	0	--	0	--
Australia	132	110	0.83	11	--	--	--	--	--	--	--
Canada	111	55	0.49	--	0	0	--	--	16	10	--
United States	40	37	0.92	--	--	--	--	--	--	--	0
Mexico	0	0	--	--	0	0	0	0	0	0	0

1. The implied carbon price is computed as the amount of the tax levied per litre times the amount (litres) of fuel that needs to be burnt to reach a CO<sub>2</sub> emission of one tonne of CO<sub>2</sub>eq. One litre of diesel (light fuel oil for households and industry), petrol and LPG (liquefied petroleum gas) is assumed to produce respectively 2.7, 2.24 and 1.7 kg of CO<sub>2</sub>. It is assumed that 4 535 269 kcal of natural gas generates 1 tonne of CO<sub>2</sub> and that burning 1 kg of coal generates 2.93 kg of CO<sub>2</sub>. HH and IND refer to households and industry, respectively.
2. Data refers to 2010 Q4 on diesel for Canada and diesel and petrol for the USA.

Source: OECD calculations based on data obtained from International Energy Agency (2011), *Energy Prices and Taxes*, Paris.

### ***The share of public transport remains modest***

Luxembourg plans a number of new infrastructure projects to promote public transport and limit congestion. A new railway is planned between Luxembourg and Bettembourg and the Luxembourg-Pétange line will be extended to double the rail track. In Luxembourg City, new hubs will be built at the periphery and outside the centre to relieve the central station and Hamilius, the central exchange hub for buses. The new hubs will be linked by a tram and tangential buses so that people can go directly to workplaces in the periphery without going through the centre. This would be a welcome shift from star-like transport system to a network, with the potential to shorten travel times and reduce congestion. The tram will replace buses in central areas, nearly tripling capacity, to reduce traffic jams and pollution. The transport plan also includes new road infrastructure projects. Given that the intention is to favour public transport, there may be a case for focusing on extending the public transport infrastructure instead.

Luxembourg has ambitious plans to increase the share of public transport and walking and cycling in total trips. Higher prices for individual road transport along with extensive investments in public

transport will be needed to reach these goals. The government plans to increase the share of public transport in motorised transport from 12% in 2002 to 25% by 2020. Improvements in the quantity and quality of public transport offered have led to a substantial increase in its use in recent years. However, given the dynamic development of population and employment in Luxembourg car traffic has risen at the same time. This is why the share of public transport has increased only little. The use of public transport at the national level has experienced a rather moderate shift from 16% towards 17.8% in 2009 whereas the use of public transport of cross-border workers has risen more strongly from 9% in 2007 to 14 % in 2010. However, these data are based on a rather small sample of surveyed households. The last comprehensive household survey dates back to 1995. To obtain more reliable up-to-date mobility data it would be good to conduct another household survey. Luxembourg is a leader in short trips of below 5 km made by car (more than 70% compared to 5% in the Netherlands and 30% in Denmark) rather than walking or bicycling, suggesting that the full costs of taking the car are not sufficiently internalised. Only 13% of trips in Luxembourg are made by bike or by foot, although 40% of trips are shorter than 3 kilometres. Luxembourg wants to double the share of walking and biking to 25% by 2020.

Luxembourg should also continue to improve co-ordination with adjacent regions to promote public transport. This process has been complicated by the large number of actors in the region and difficulties in deciding on cross-border burden-sharing. Nevertheless, Luxembourg has provided financial support to extend public transport beyond its borders. There are some unified ticketing systems and a few rail and bus lines operate into neighbouring regions with full or partial financial support from Luxembourg. Making technical and commercial co-operation with neighbouring regions more effective remains a priority, including the exchange of traffic data, coordination of timetables, harmonisation of fares and the wider introduction of mixed travel passes. Luxembourg has elaborated a cross-border mobility scheme called SMOT with the region Lorraine in France and is currently preparing similar schemes with the neighbouring German Länder of Saarland Rhineland-Palatinate and with Wallonia in Belgium.

### ***Congestion pricing is not used***

Higher road prices, including congestion pricing and charges for parking, would help Luxembourg achieve the desired modal split – the share of different transport modes in total trips – and internalise road traffic externalities. A study by the European Forum of Transport Ministers on road pricing in a number of European cities concluded that taking into account all costs, including those related to the use of infrastructure, congestion and pollution, would require much higher prices for road traffic in urban areas. Road prices for small petrol cars would have to increase by 100% and more, depending on the city, in peak periods compared to 2000 prices. Addressing externalities effectively would require congestion pricing in addition to taxing fuels and charging for parking (ECMT, 2003).

Road prices that take into account the costs of infrastructure use and externalities could lead to a decrease of passenger kilometres travelled by car by 15-30%, according to this study, while passenger kilometres travelled by bus or metro would increase substantially. Air pollution and CO<sub>2</sub> emissions would be reduced by up to 50% and the traffic speed during rush hours would increase by 10%. It should be noted that while fuel taxes can be a good approximation to CO<sub>2</sub> emissions and pollution, they cannot be differentiated to provide incentives to reduce congestion, noise and accident costs. Therefore, an ideal road pricing system would combine fuel taxes with other charges, such as congestion prices and tariffs for parking.

Levels of congestion on the main road transport corridors in Luxembourg are high and there are severe bottlenecks at the entrance to urban areas, notably in Luxembourg City. This results in unsafe driving conditions and noise in addition to high levels of emissions and local air pollution. Introducing a system of congestion charging around Luxembourg City and congested road bottlenecks would induce a shift towards public transport or sharing of car journeys. By charging for each trip, this policy solution would help to align the private costs of undertaking a journey with the congestion externality exerted on



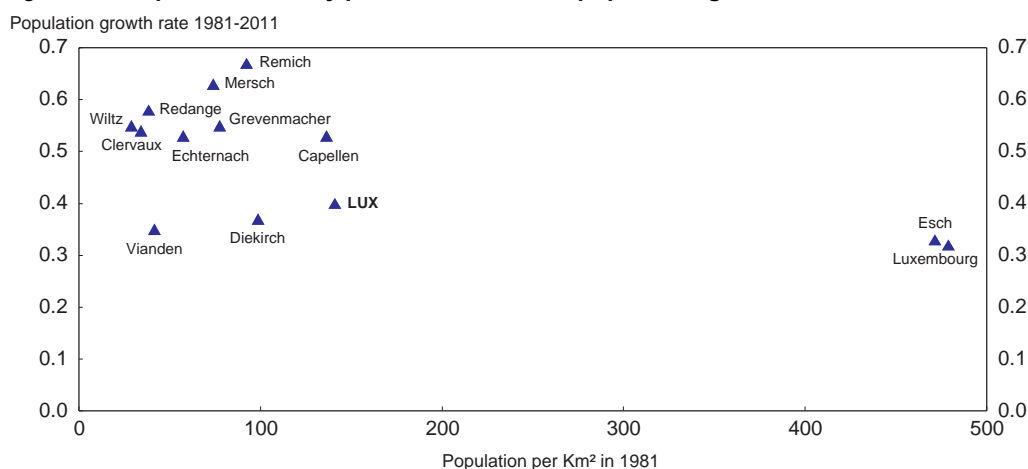
other road users. The government should consider the experience of similar schemes in London and Singapore. Such a scheme should be introduced in a non-discriminatory way for both residents and those living in other countries, which may require bilateral agreements with neighbouring countries to enforce the system on drivers with a foreign licence plate.

Increasing parking prices or differentiating them in line with scarcities is likely to be more efficient than Luxembourg's current system of restricting the number of parking places in Luxembourg City. To encourage the use of public transport for trips to work and an engagement of employers to facilitate this, Luxembourg has currently opted to limit the number of parking spaces that can be provided in new office developments. However, this is likely to bring about only very gradual changes. While reducing the number of parking places increases the private costs of car trips through longer search times for a parking place, it can also result in increased cruising for a spot. The associated external costs in terms of CO<sub>2</sub> emissions, pollution and congestion can be substantial (Shoup, 2011a). Another option would be to increase parking fees for all parking places or to differentiate them over time, thus helping to manage demand, so that cruising for parking places along with the associated externalities is reduced. Such a system has recently been introduced in San Francisco and other cities in the US for curbside parking. Parking prices are adjusted to maintain one or two parking places free on each block, thus ensuring that drivers find a parking place relatively rapidly (Shoup, 2011b). The government should consider whether such a system could contribute to a more efficient management of parking slots in Luxembourg City and other urban centres.

### Urban planning and housing policies to control urban sprawl

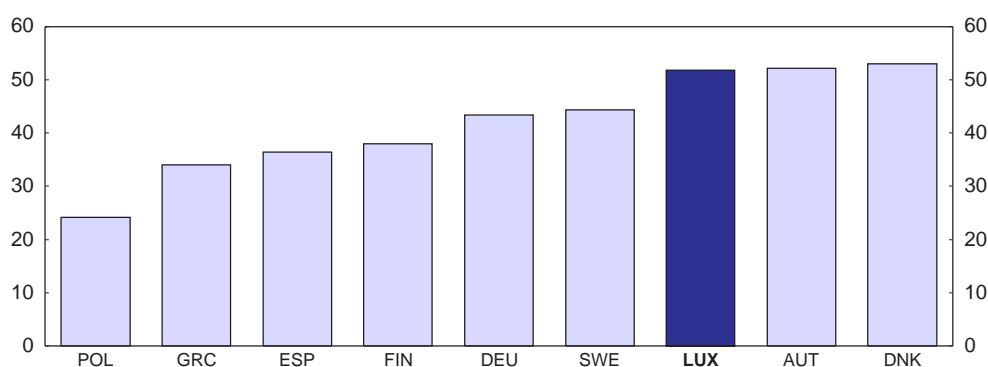
Urban sprawl is significant in Luxembourg. Low population density areas have experienced much faster population growth rates than urban areas over the past 30 years, as many families have used their high and rising incomes to live in a detached house (Figure 10). The housing stock offers a large amount of square metres per person compared to other European countries (Figure 11) and the share of homeownership is relatively high (Figure 12). At the same time, employment growth is concentrated in the centre-south around Luxembourg City. The ratio of jobs to residents who are in the labour force in Luxembourg City is 3.8:1. This compares to 1.4:1 in Frankfurt, another city that is well-known for its high share of commuters. This has led to a considerable increase in commuting within the country, with the share of commuters increasing substantially in all regions, apart from Luxembourg City (Figure 13). Low-density territorial development leads to more important soil sealing than necessary and it encourages the use of the car.

Figure 10. **Population density per km<sup>2</sup> in 1981 and population growth between 1981 and 2011**



Source: STATEC.

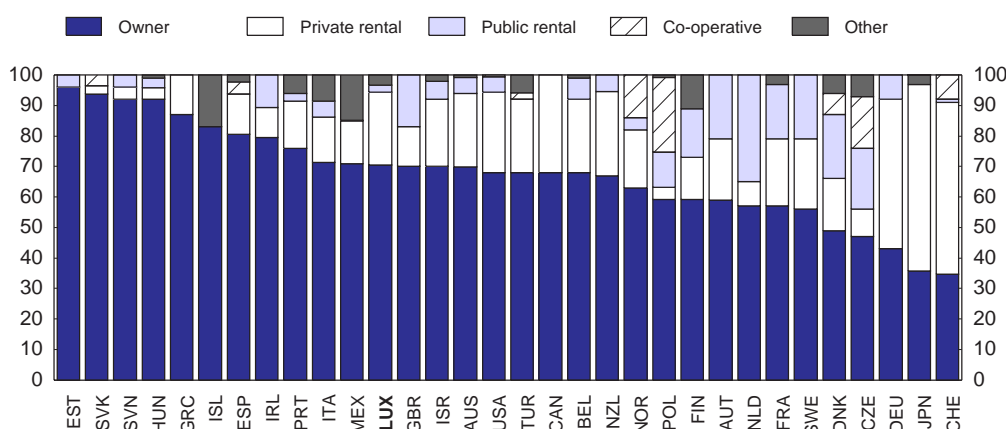
Figure 11. **Housing area available per person across different countries<sup>1</sup>**  
M<sub>2</sub> per person



1. Data refer to the period 2007-2009 for Poland, Greece, Finland, Germany, Sweden, Luxembourg (Grand Duchy) and Austria. Data refer to the period 2003-2006 for Spain and Denmark.

Source: Eurostat.

Figure 12. **Share of home ownership across different countries (2009)**  
Percent of dwelling stock



Source: Calculations based on OECD Housing Market questionnaire.

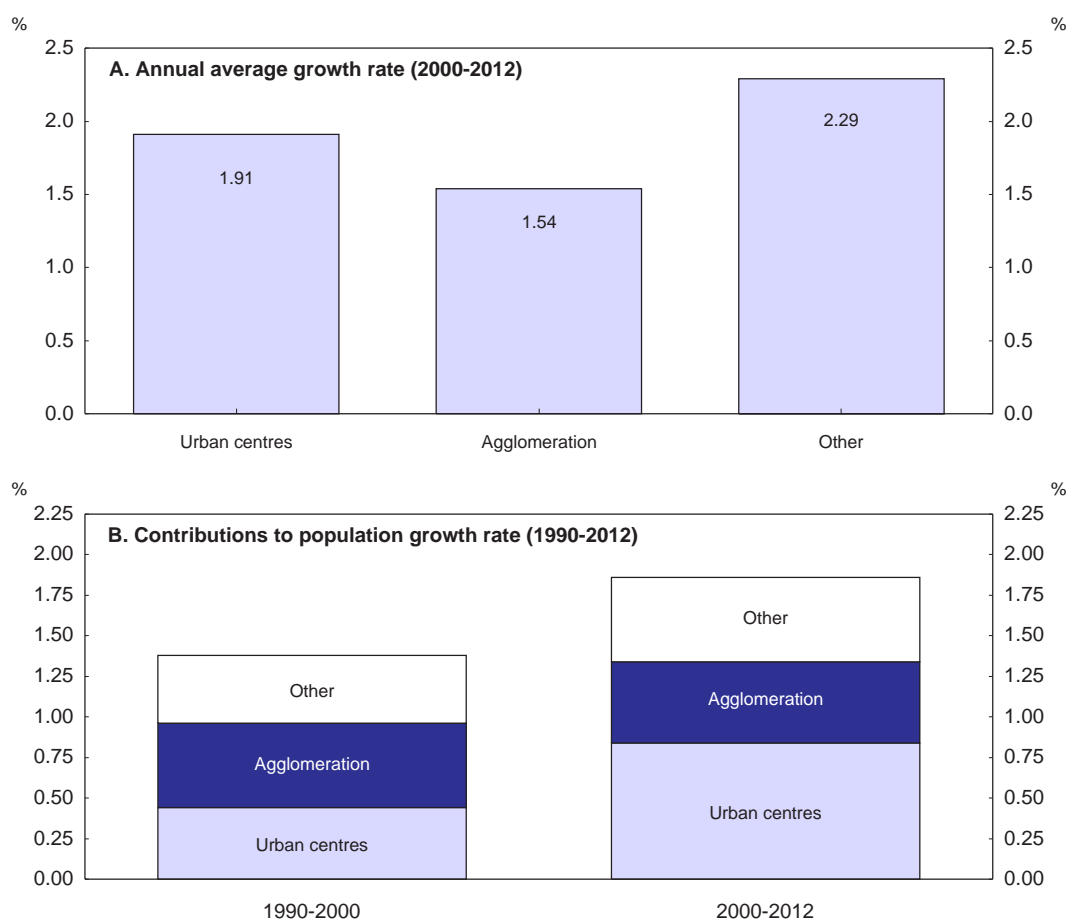
### ***Plans to reduce urban sprawl are behind target***

Luxembourg's national concept for transport and territorial development (IVL) of 2004 seeks to address urban sprawl by proposing a denser territorial development around a few urban centres, some of which are underdeveloped now, such as the South, although they are well-equipped with public services and well-connected with public transport. The outskirts of Luxembourg City are now largely urbanised, but there is scope for further densification. This development would mark a turning point compared with previous trends.

The IVL sets out two scenarios, one where trends of a rapidly increasing share of cross-border commuters would continue, with 75% of new jobs filled by this group: and a second one, where Luxembourg would fill more jobs with workers who settle within the country. Only 40% of new jobs would be filled by cross-border commuters in this scenario. This has become the government's target, as reaching it would be the only realistic chance to realise its ambitious objectives to raise the share of public transport and walking and cycling in total trips.

However, Luxembourg’s plans to increase public transport and to achieve more compact territorial development are behind target. The population has increased more than foreseen, the number of cross-border commuters targeted for 2020 in the IVL was already surpassed in 2010 (see Figure 1), and although the urban areas, that the government hoped to develop, are catching up, the share of citizens settling in areas away from those centres continues to be substantial (Figure 13). Potential development areas are smallest in urban areas that the IVL plans to develop (Ministry of the Interior, 2008), suggesting that significant action is needed to implement the national concept for transport and territorial development.

Figure 13. **Population growth in priority areas for urban development and elsewhere (2000-2012)<sup>1</sup>**



1. There are 16 urban communes classified as a priority for urban development (Urban centres); 27 suburban communes linked to these 16 urban communes (Agglomeration) and finally, 63 rural communes classified as not being a priority for urban development (Other).

Source: CEPS/INSTEAD - Geography and Development Department, and STATEC.

Although the targets formulated in the IVL have been missed, as population growth and the share of workers settling across the border has been stronger than foreseen, the broad conceptual issues outlined in the IVL are still relevant. Policies to ensure better coordination between communal and national planning policies have only recently been introduced or are still being developed, but the government is now close to passing laws that would help put the plans outlined in the IVL into practice. The spatial planning law of 1999 is currently in the final stage of revision and legally binding primary sectoral plans

for housing, landscape, transport and on economic activity zones are now finalised. They will enter the legal procedure which comprises a public consultation process during 2013 (Box 1). This will underpin the IVL with legally binding instruments, making it easier to implement the government's plans. Municipalities, which are effectively the only subcentral government level in Luxembourg, are very small and have traditionally had a lot of autonomy, making it difficult to coordinate territorial planning across the country. They are now required, by a law passed in 2004, to develop new general development plans (PAG), which have to be authorised by the central government, but deadlines for developing these plans have recently been postponed to 2015. The law was reformed in 2011 to simplify authorisation procedures and thus accelerate the process to a maximum of two years. The Housing Pact of 2008 introduced financial incentives for municipalities to mobilise land for building with higher payments for urban areas considered a priority for further development in the IVL. However, the share of these payments in overall transfers to municipalities is small and it thus remains to be seen how effective these payments will be in aligning communal and national territorial planning (Becker and Hesse, 2010). Moreover, the payments are tied to population growth, rather than more concrete criteria connected with the government's desire to build more compact cities. This approach may have to be reviewed.

#### Box 1. Spatial Planning Reforms

**The Spatial Planning Law of 21 May 1999** is currently in the final stage of revision. The objective is to develop legal instruments to better implement spatial planning policies. Consultation procedures related to land zoning will be simplified and sped up, by allowing simultaneous consultation with several bodies. The right of first refusal for the state will be extended and the expropriation law will be modified, so as to limit possibilities for speculation, by fixing the price applicable to any real estate that might be expropriated in the future at a date preceding the finalisation of sectoral plans underpinning the law. Future adjustments will be limited to increases in the general consumer price index. Four primary sectoral plans will enter the legal procedure which comprises a public consultation process during the course of 2013, once the new spatial planning law is passed. These plans will implement the political objectives of the master programme for territorial planning and the IVL with legally binding instruments. They also seek to improve the co-ordination of territorial planning throughout the country.

##### ***Primary sectoral plan for Housing (plan directeur sectoriel Logement PSL)***

The main objective of the PSL is to foster the construction of housing with a focus on development in urban centres that are well connected to public transport and other public services. The PSL defines the scope for growth in the number of housing units, which is higher in urban municipalities than in municipalities with a more rural character. Depending on its category minimum and maximum housing densities are then defined for each municipality. The main implementation instruments are the general development plans (PAG) and the specific development plans (PAP). All municipalities will have to define priority areas for urbanisation, in order to avoid unorganised local development. Moreover, the PSL reserves around 500 hectares of land to be acquired by the government in order to develop large-scale housing projects in line with ecological and social criteria to limit the shortage of affordable housing. Up to 44 000 inhabitants should benefit from new housing that will be developed within these projects.

##### ***Primary sectoral plan for Transport (plan directeur sectoriel Transports PST)***

The primary sectoral plan for transport describes the transport policy projects and measures that require a regulatory framework. It defines legal instruments to introduce a parking management system for all urban areas and to promote cycling and walking. It also reserves land for new transport infrastructures. It sets priorities for key infrastructural transport projects, with a special focus on public transport.

##### ***Primary sectoral plan on economic activity zones (plan directeur sectoriel Zones d'activités économiques PSZAE)***

The main objective of the PSZAE is to shape economic development while taking into account territorial development objectives. The plan reserves around 550 additional hectares, mainly for the development of crafts and industrial activities until 2030. The PSZAE defines regional and national economic activity zones with a focus on extending existing ones; mandates municipalities to reclassify certain areas, which are not suitable for economic development; and imposes strict ecological criteria and requirements in line with the national territorial planning objectives for new economic area zones.

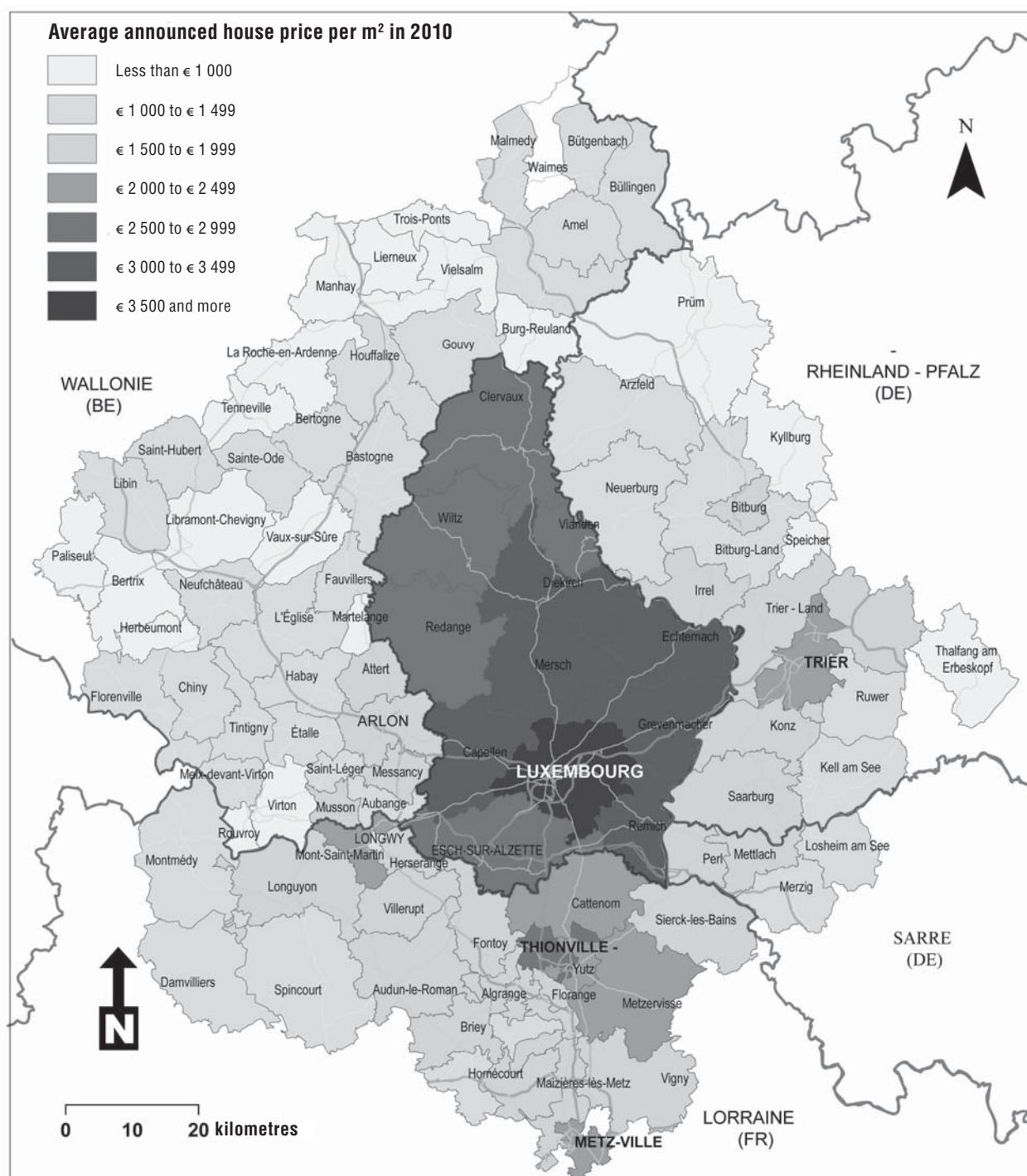
***Primary sectoral plan for Landscape (plan directeur sectoriel Paysages PSP)***

The PSP provides a framework for landscape management and planning to safeguard the quality of life, landscapes and ecosystems. The plan defines conservation areas, guides the development of rural landscapes and defines green belts between major urban areas to limit urban sprawl.

The Housing Pact also provided municipalities with some new housing policy instruments. This includes the right of first refusal that is the right for the municipality to buy any property that is on sale, although it remains more limited than in neighbouring countries. There are also some fiscal and administrative measures, including the possibility to levy surtaxes on empty housing and on land whose owner could have obtained a construction license for several years, but chose not to engage in any development. This could help promote greater flexibility of land and housing supply in urban areas, thus increasing densification. The government should monitor whether the new instruments for communal planning and housing policies help to foster territorial development which is more in line with the IVL. If needed, it should take further measures. Merging Luxembourg's exceptionally small municipalities, which have a high degree of autonomy, could also contribute to better coordination of territorial planning, of water management, which is discussed below, and other policy areas. The number of municipalities has already been reduced from 116 to 106 and the government hopes to reduce it further to 80.

The trends towards urban sprawl and increases in cross-border commuting are related to house prices in Luxembourg, as workers find it too expensive to settle close to their job. Housing in Luxembourg City is among the most expensive of European cities and residential property prices increased rapidly until 2009. They are somewhat lower within Luxembourg further away from the centre and much lower right across the border (Figure 14, Figure 15).

Figure 14. Map of Luxembourg with neighbouring regions indicating average prices



Frontiers

Homogenised spatial units (MAUP: Grasland, 2006)

\* Cantons (Luxembourg and Lorraine)

\* Communes (Wallonie and Sarre)

\* Verbandsgemeinde (Rheinland-Pfalz)

Note: Data sources for Luxembourg : Observatoire de l'habitat – Ministère du logement 2010. For the selected regions of Belgium, France and Germany, data were collected from real estate agencies websites (Athome, Immotop, etc...)

Source: Diop, L. (2011), "Luxembourg: les marchés fonciers et immobiliers transfrontaliers à l'épreuve de la métropolisation", CEPS-INSTED Working Paper, No. 2011-48.

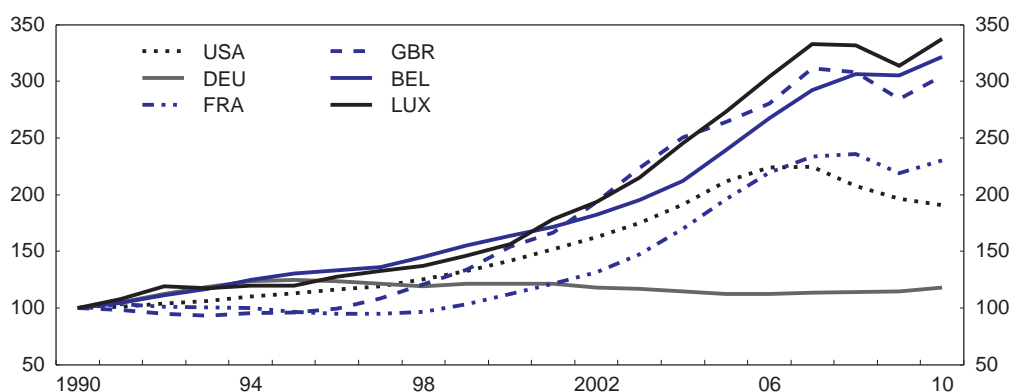
Table 2. **Average price for an apartment per m<sup>2</sup> (2007-2009)**  
in euros

Amsterdam	1921
Barcelona	5268
Berlin	1550
Frankfurt	2150
Geneva	8294
Hamburg	1930
London	4486
Luxembourg City	4412
Milan	2715
Stockholm	3341

Note. Data for Amsterdam, London and Milan refer to 2003-2006.

Source: Eurostat, Urban Audit Indicators database.

Figure 15. **Residential property prices in Luxembourg and other countries**  
Price index (1990=100)



Source: OECD, Analytical database and the European Central Bank - Prices, output, demand and labour markets - Residential property price indicators.

### ***The housing market is affected by inflexible supply***

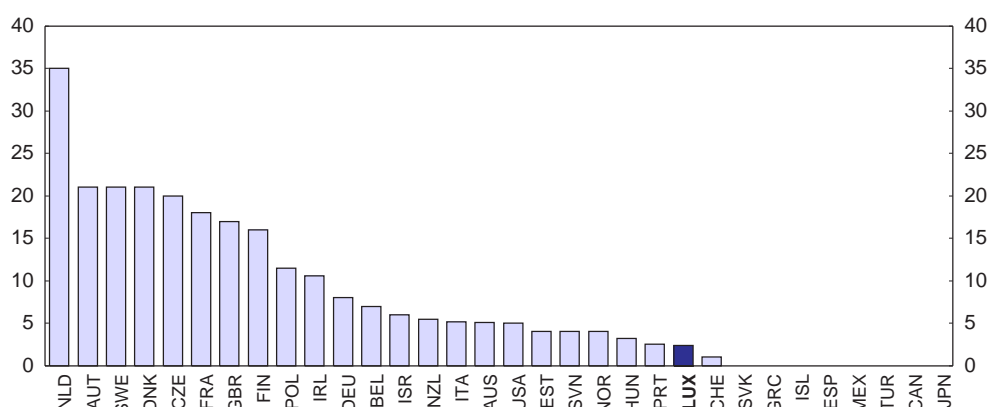
House price developments have been driven by insufficient flexibility in supply. According to official projections around 3 400 of new housing units would need to be built each year to keep up with growing demand (Ministry of Housing, 2009). In reality, supply has fallen short of this target for the last twenty years with an annual average of 2 600 housing units constructed. Only in 2008 and 2009 was the target surpassed. This suggests that measures are needed to promote the flexibility of supply.

The supply of land and housing is constrained by a number of policies. Cumbersome regulations and exceptionally low property taxation encourage land hoarding when further price increases are expected. Administrative procedures related to building authorisation cover multiple administrative fields and require complex coordination among different actors, thus often delaying permissions to build. Housing policy has been further complicated by the fact that the right of expropriation has been blocked since 2003 and the right of first refusal has only been introduced with the Housing Pact law at the end of 2008. However, through the revision of the spatial planning law of 1999 the government hopes to narrow real estate speculation in the planning process significantly and to make expropriation easier.

The government has taken steps to promote more flexible supply. It has recently simplified land planning procedures and set a time limit on finalising PAGs. There is also a five year review of construction permit procedures. The government should consider speeding the review and move swiftly to simplify procedures. It should move to increase property taxes by updating land and building values. Taxes are now based on values of 1941. At a minimum, undeveloped land that is zoned as a building area should be taxed like developed land, rather than – much more lightly – like agricultural and forest areas, as it is today. The government has recently introduced the possibility for municipalities to surtax vacant land and buildings, which is being taken up in one municipality, Esch. Other municipalities are considering it. The government should review results and consider applying such a tax in all those municipalities, which are a priority for urban development in the IVL. The government is also considering deadlines to start development, after buying land that is zoned for construction. If developers fail to meet this deadline the permission to build on this land can be withdrawn. This can be a good alternative to counteract land-hoarding. Given the importance of having competition in the residential construction sector (Barker, 2004) and the small size of the Luxembourg market, a review of the functioning of competition in this sector would be warranted. Concentration rates in the construction sector are very high (Ecorys, 2008), with the four largest firms accounting for at least 75% of turnover in onsite construction and manufacturing of construction materials, and the market share of foreign firms was below 10%, ten years ago, when this issue was last explored (Commission du Bâtiment, 2004). A study that updates this analysis should be conducted by the competition authority.

Policies favour owner occupation of housing over renting and applying more neutral policies might promote supply of affordable housing and promote residential mobility. The share of owner-occupied housing is large in Luxembourg compared to neighbouring countries (see Figure 12). At the same time, it is easier for tenants than for homeowners to move closer to work when they change jobs, and thus a better supply of apartments for rent might be conducive to shorter trips, favouring walking and cycling. While tax relief for owner-occupied housing is not high in international comparison (Andrews *et al.*, 2011), there are a range of subsidies for building or renovating owner-occupied housing, including interest subsidies, a bonus for construction or renovation, a subsidy for registration fees and a generous reimbursement of VAT for constructing or renovating housing property. In contrast, the share of social housing is low in international comparison (Figure 16). Unlike in other OECD countries, very few citizens receive cash allowances to subsidise their rents (Andrews *et al.*, 2011).

Figure 16. **Share of social housing across OECD countries (2009)**  
Percentage of dwelling stock



Source: Calculations based on OECD Housing Market questionnaire.



The government should review the generous subsidies to acquire, build or renovate housing and consider better targeting to promote its objectives. Only few subsidies are targeted to lower-income households and none are tied to Luxembourg's objectives to promote the density of territorial development or other ecological objectives. Subsidies should be reviewed, not least in light of the danger that, in conjunction with relatively inflexible supply of building land, they might simply be capitalized in higher prices. The government should consider targeting subsidies to ecological criteria, such as the compactness of new buildings, whether their position is in line with IVL objectives and the ecological quality of building materials. Subsidies could also be tied to social objectives, such as projects that would offer affordable housing for rent. More targeted support would free resources that the government could use for a more active role in social housing, which would help to enhance the supply of affordable dwellings. In fact, the government envisages using its right of first refusal to buy land to be established through the revision of spatial planning law. This land will be used to develop major housing projects in line with the primary sectoral plan for housing and using new planning law instruments to speed up procedures. More balanced support for owner-occupied housing and housing for rent could also enhance residential mobility, making it easier for citizens to move closer to their jobs and reducing the need to commute by car.

### **Water infrastructure and management**

Overall, the water use in households, industry and agriculture is low compared to other developed countries, reflecting the low use in agriculture. There is little loss through leakage as many of the water supply systems have been upgraded over the last 10 years and the demand for water from industry has decreased with the improvement of industrial processes, notably in the metallurgy sector. However, household consumption has increased by 1.35% per year over the last 15 years, reflecting the country's strong demographic growth and the steady increase in cross-border workers (EAA, 2010).

Water management and infrastructure will have to improve to reflect Luxembourg's high level of development. At least 70% of surface water is likely to fall short of the EU's 2015 targets for chemical and biological quality as determined under the EU Water Framework Directive (EEA, 2015). While the pollution level in watercourses has decreased slightly in recent years, 39% of watercourses are still heavily polluted and 54% are moderately polluted. With regard to drinking water, sources have not yet been protected through regulation of pesticide and nutrient use in their surroundings, although there has been a legal obligation to do so dating back more than 15 years. By the standards of the EU Ground Water Directive, two of five ground water bodies are considered to be in poor qualitative status regarding nitrates and pesticides, and some show clear signs of deterioration. While 95% of the population is connected to a waste water treatment plant, which is high in international comparison, only 36% are connected to a tertiary treatment station, which would improve water quality *e.g.* through nutrient removal, even though the entire country is classified as a sensitive area under the EU Urban Waste Water Treatment Directive. This compares to more than 90% in Germany. Combined sewage and rainwater interceptors can pose problems when heavy rainfalls cause overflows and untreated sewage flows into rivers or lakes. A dual-channel system to separate rainwater, which can re-infiltrate the water table naturally, and sewage requiring purification is still not in place, except in the cities of Luxembourg and Esch-sur-Alzette and in new housing developments.

In October of 2011 the European Commission referred Luxembourg back to the European Court of Justice for poor treatment of urban waste water. The Court had previously ruled in November 2006 that Luxembourg was failing in its obligation to treat and dispose of urban waste water in an adequate manner. Several sewage treatment plants do not yet comply with EU legislation, including in the capital.

The government has taken some steps to tackle these issues. Financial assistance to the municipalities from the Water Management Fund has been doubled to help them cover 90% of investments in sewerage and sewage treatment. The government passed a Water Act in 2008 to transpose the EU Water

Framework Directive and Floods Directive into national law. The law introduces the principle of full cost recovery for drinking water and urban sewage treatment. In addition to water supply and sanitation service charges, which are levied by the service providers, the law introduces an abstraction tax and a pollution tax. The resulting income goes to the Water Management Fund. The abstraction tax is levied on anyone who draws surface water or groundwater and is based on the volume of water drawn. The discharge of waste water into surface or underground water sources is subject to a pollution tax. The tax is proportionate to the units of pollutant load in the water discharged. Delimitations of ground water protection zones are now about to be established. Technical studies have started in 75% of the catchment areas and a by-law has been passed in May 2012, detailing the measures that are needed to protect groundwater. Measures to construct or upgrade sewage systems that do not comply with EU standards have been completed in some cases. They are ongoing or planned in others. Dual-channel systems are mandatory in new building areas. The government plans to upgrade existing single-channel systems with retention basins and other infrastructure to limit pollution due to combined sewage overflows. The government should quickly delimitate ground water protection zones and finalise the necessary upgrades of sewage infrastructure.

#### Box 2. Recommendations to promote greener growth

- Continued substantial investment in public transport to offer an alternative to the automobile. To reduce Luxembourg's carbon emissions, increase taxes on petrol and diesel by gradually eliminating the price differential with neighbouring countries. Consider introducing a system of congestion charges. Further enhance co-operation with adjacent regions to increase the capacity of the public transport system.
- Speed up procedures for granting construction permits. Raise property taxes by updating property values used as a tax base. Widen the application of the surtax on vacant houses and land applied in some municipalities to other areas. Move forward with plans to impose deadlines for starting and finalising development on land that is zoned as a construction area.
- Ensure that the four primary sectoral plans are implemented, including through development of new communal general development plans and the use of the new local housing policy instruments.
- Target subsidies for building a home based on social and ecological criteria.
- Remove environmentally harmful tax subsidies, such as reduced VAT rates on solid mineral fuels, natural and liquefied petroleum and electricity. Introduce congestion charges and parking prices.
- Delimitate water protection zones swiftly and upgrade sewage system infrastructure to improve water quality.

## Bibliography

- Andrews, D., A. Caldera Sánchez and Å. Johansson (2011), "Housing Markets and Structural Policies in OECD Countries", *OECD Economics Department Working Papers*, No. 836, OECD publishing, Paris.
- Barker, K. (2004), "Review of Housing Supply", *Final Report*, London.
- Becker, T. and M. Hesse (2011), "Siedlungsentwicklung und Wohnungswesen", in Chilla, T. and C. Schulz (eds.) *Raumplanung in Luxemburg*, Edition Guy Binsfeld, Luxembourg.

Commission du Bâtiment (2004), *Rapport sur la Situation Conjoncturelle et Structurelle de la Construction* », Luxembourg.

Ecorys (2008), “FWC Sector Competitiveness Studies N° B1/ENTR/06/054 – Sustainable Competitiveness of the Construction Sector”, *Final report*, London.

European Conference of Ministers of Transport (ECMT) (2003), *Reforming Transport Taxes*, OECD publishing, Paris.

European Environment Agency (EEA) (2010), *The European Environment – State and Outlook 2010*.

Ministry of the Interior and of Spatial Planning (2008), *Suivi du développement territorial du Luxembourg à la lumière des objectifs de l'IVL*, Luxembourg.

Ministry of Housing (2009), *Plan Directeur Sectoriel « Logement – Vorentwurf ? »*, Luxembourg.

OECD (2010), *OECD Environmental Performance Reviews – Luxembourg*. OECD publishing, Paris.

Schmitz, F. and P. Gerber (2011), « Voiture ou transports en commun ? Comment les frontaliers se rendent-ils au travail en 2010 ? », *Vivre au Luxembourg*, No. 78, CEPS INSTEAD, Esch-sur-Alzette.

Schulz, C. and T. Chilla (2011) “Räumlicher Kontext und aktuelle Herausforderungen für die Planung”, in Chilla, T. and C. Schulz (eds) *Raumplanung in Luxemburg*, Edition Guy Binsfeld, Luxembourg.

Shoup, D. (2011a), *The High Costs of Free Parking*, Planners Press, Chicago.

Shoup, D. (2011b), “Free Parking or Free Markets”, *Access*, No. 38,

Thöne, M. (2008), Laffer in Luxemburg: Tankverkehr und Steueraufkommen im Großherzogtum“, *Finanzwissenschaftliche Diskussionsbeiträge / Finanzwissenschaftliches Forschungsinstitut an der Universität zu Köln*, No. 08-1, <http://hdl.handle.net/10419/23272>

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