OECD Local Economic and Employment Development (LEED) Papers 2013/09

Green Growth in the Benelux: Indicators of Local Transition to a Low-Carbon Economy in Cross-Border Regions

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https://dx.doi.org/10.1787/5k453xgh72ls-en

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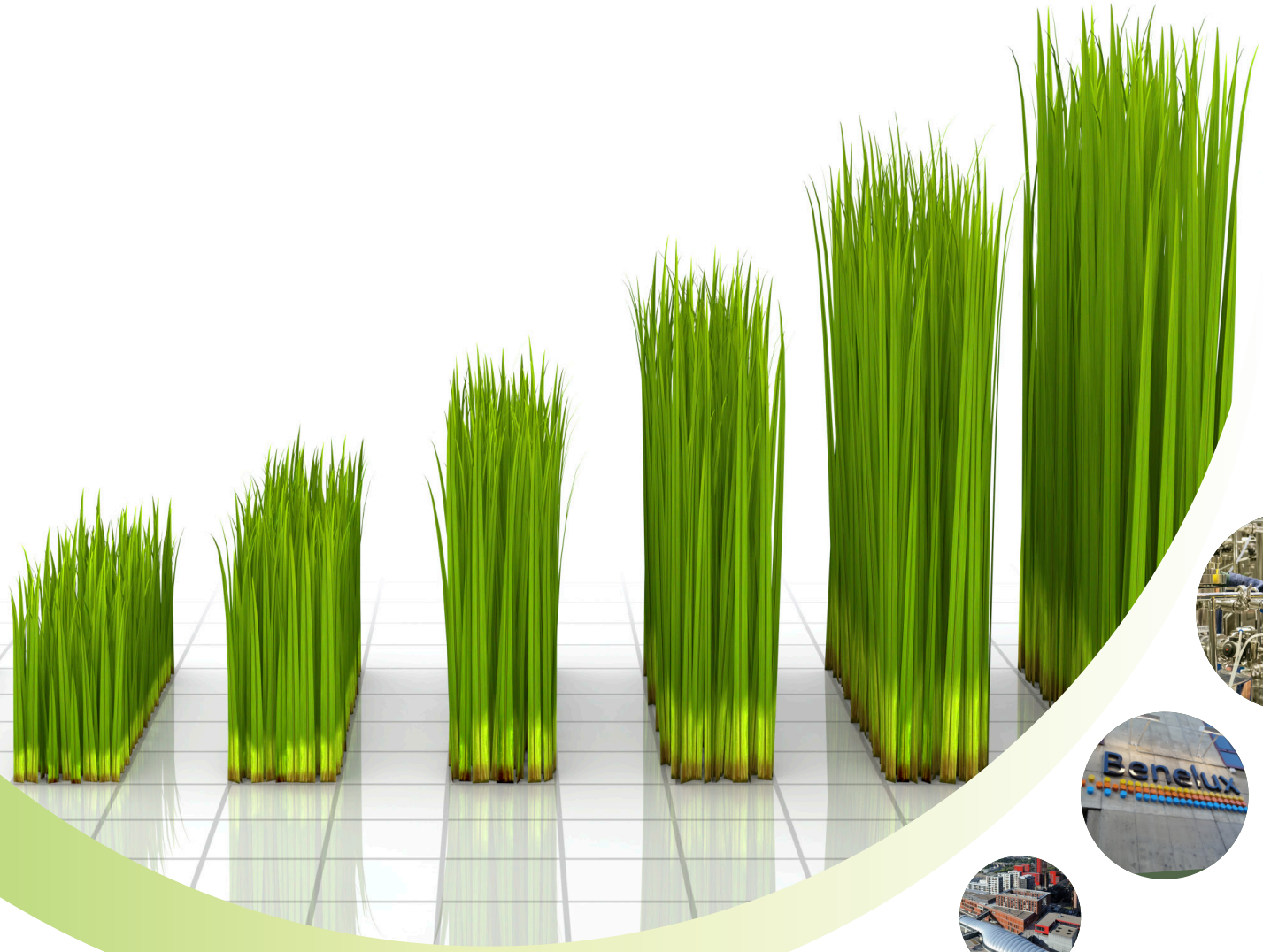

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Indicators of local transition to a low-carbon economy in cross-border regions

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FOREWORD

Since the start of the Benelux co-operative in 1944, the three member countries (Belgium, the Netherlands and Luxembourg) have always been keen to explore the next possible step in international co-operation. In the 1960s, as an experimental arena for international co-operation, the Benelux countries were the first to abandon custom barriers, and became the first union of countries where citizens were able to cross borders freely without the delay of long waiting lines at the frontier. Some years later, before the turn of the 21st century, the three countries made it possible for police officers to pursue criminals across the border into a fellow Benelux country without formal impediments.

Thus, when the OECD Ministers adopted the Declaration on Green Growth in 2009, asking the OECD to develop a Green Growth Strategy and inviting international organisations (amongst others) to closely co-operate with the OECD, in line with the Declaration, the Benelux Union was ready for the challenge. The Board of Secretaries-General of the Benelux Union immediately expressed the wish to arrive at a closer partnership with the OECD. Supported by the ambassadors to the OECD of the three Benelux countries, it became clear that green growth and the transition to a low carbon economy are high-priority topics on the agendas of both organisations and their member countries.

In 2008, the three Benelux countries and their federal entities renewed the 50 year-old Benelux Treaty and formally agreed that improving cross-border relations should be one of the main future topics of the Union. Strong cross-border co-operation is necessary not only to complete the process of the internal economic market in both the Benelux countries and the European Union, but is also indispensable when battling global challenges such as climate change, and the transition to a low-carbon economy.

As the OECD has emphasised, a set of clear indicators is absolutely necessary in order to monitor how a region is performing in the transition towards a low-carbon economy. However, this is not particularly easy in densely-populated metropolitan regions in small countries with a complex structure of economic clusters of companies, SMEs and authorities that stretch across national boundaries. In border regions like the Ghent-Terneuzen and Alzette-Belval areas, developing useful indicators proves to be a special challenge.

For the Benelux Union, the publication of this OECD report does not signify the end of a project. On the contrary; for us, the report marks the starting-point for a more detailed and elaborate piece of work on the refining of local indicators in a cross-border setting. Needless to say, this is a job not only for the OECD, the Benelux Union and national public authorities. Particularly in a cross-border setting, this complex task can only be done together with all stakeholders: research and educational institutes; multinational companies; SMEs; intermediate organisations; regional, local and cross-border public authorities; and many others. This multilevel approach towards developing indicators of the local transition to a low-carbon economy in the Benelux is our challenge for the coming years. With this report, the OECD has provided the Benelux countries with the perfect wind to sail in the right direction.

Jan van Laarhoven	Luc Willems	Alain de Muyser
Secretary General	*Vice Secretary General*	*Vice Secretary General*
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ACKNOWLEDGEMENTS

This report is the result of an international project of the OECD LEED Committee on "Measuring the potential of green growth: Towards a local transition to a low-carbon economy", in collaboration with partners and experts from Denmark, the Benelux countries (Benelux), Germany and Chile. This report presents the results and policy recommendations from the analysis of two cross-border areas in Benelux. The report is the result of combined efforts and strong co-operation between the Benelux Union, national and local authorities and local and international experts. In particular, we acknowledge the contribution of Luc Willems, Deputy Secretary General of the Benelux Union and partner in the study, and Hans Mooren of the Secretariat-General of the Benelux Union, Jan Van Laarhoven, Secretary General of the Benelux Union, and Alain de Muyser, Deputy Secretary General of the Benelux Union for their support and contributions to this study.

The experts who participated in the OECD's study mission to Benelux in June 2012 have provided most valuable input to this report, and we are grateful for the contributions and revisions received for different parts of the document from: Maj Munch Andersen (Technical University, Denmark); Helen Mulligan (Cambridge Architectural Research, UK); Bertil Haack (Technische Hochschule Wildau, Germany); Alwine Woischnik (Ministry of Environment, Chile); Alex Stimpson (European Centre for the Development of Vocational Training, CEDEFOP); Eiko Kauffmann (German Ministry for Economic Co-operation and Development); Carmen Avellaner (Green energy policy consultant); Robert Strauss (Head of Employment Analysis, Directorate-General for Employment, Social Affairs and Inclusion European Commission); Eric De Brabanter, Département de l'Environnement, Ministère du Développement Durable et des Infrastructures, Luxembourg; Sabine Stölb, Ministère du Développement Durable et des Infrastructures, Département de l'aménagement du territoire, Luxembourg; and Myriam Linster of Environment Directorate, OECD.

The report has been prepared by Cristina Martinez-Fernandez, OECD LEED Programme, supervised by Sylvain Giguère, Head of the LEED Division, and Sergio Arzeni, Director of the Centre for Entrepreneurship, SMEs and Local Development. Samantha Sharpe of the University of Technology, Sydney, provided research and editorial assistance. Hans Bruyninckx, Director HIVA, KUL, University of Leuven, provided input to Chapter 2 and prepared Chapter 3. Ariane König, Head of Sustainability and Senior Researcher at the University of Luxembourg, provided detailed inputs on the Alzette-Belval case for the preparation of Chapters 2 and 4. Isabelle Renoir from PROSUD provided data and graphics for the case study. Tom Becker, Collaborateur Scientifique, Cellule Nationale d'information pour la Politique Urbaine (CIPU), Unité de Recherche IPSE (Identités. Politiques, Sociétés, Espaces), Laboratoire de Géographie et Aménagement du Territoire, Université du Luxembourg provided most valuable inputs, advice and assistance with several steps of the study. Melissa Telford proofread and copy-edited the report. Francois Iglesias (LEED) and Elisa Campestrin (LEED Trento Centre) provided administrative and technical support for the publication.

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EXECUTIVE SUMMARY

The transition to a low-carbon economy (LCE) is an aspiration of most local areas, regions and countries. The key to a low-carbon future is the fostering of green growth: economic growth and development that ensures that natural assets will continue to provide the resources and environmental services on which our well-being relies, today and into the future. To do this, green growth must act as a catalyst for investment and innovation, which will underpin sustained growth and give, rise to new economic opportunities (OECD, 2011a).

The path to a low-carbon future is different for each local area, because they each have different starting positions and unique combinations of assets and opportunities. There are activities on measuring progress on green growth at the national and international levels, however at the local level measuring progress is at best patchy and uneven. There are two main reasons why monitoring and understanding progress to green growth needs to be tracked at both the national and international levels, but also at the local level:

1. The impacts of climate change will vary at the local level.

2. The impacts of responding to climate change, including carbon pricing and switching to less carbon intensive energy supply and production will be distributed differently across regions.

Decarbonising the economic and production systems of the world will have positive impacts in combination, but at a disaggregated level there will be winners and losers. It is essential to understand these differential impacts on local areas so as to ensure they can be best equipped to effectively make the transition and to minimise negative impacts, particularly on the local labour markets.

Cross-border regions, such as the two investigated in this report, have additional levels of complexity when it comes to measuring and monitoring their low-carbon transition. Understanding the dimensions of this complexity and the structure and institutions that are available to help find a path to progress through this complexity is essential for transition in cross-border regions.

The cross-border character of the Benelux region also provides a challenge in data collection. Cross-border regions hardly ever coincide with any single data gathering ‘institution’. Moreover, Belgium (Flanders, Brussels, Wallonia), the Netherlands, and Luxembourg have different indicator systems at the national level, and even more so at the more decentralised level. This creates problems of data availability, data (in)consistency, and hence comparability, making it difficult to compose reliable and useful indicator sets at the cross-border region level, and even more problematic to compare various regional dynamics.

There are also the challenges of developing and monitoring low-carbon transitions that exist for all regions, such as building recognition of the importance of indicators into the work and practice of local authorities, and identifying and resourcing appropriate institutions to carry out the collection and reporting of data. Even before one reaches this stage, there is the preliminary challenge of developing appropriate and consistent methodologies for defining and measuring new concepts like green skills and green jobs. It is in addressing this first

challenge that the OECD green growth indicator set offers some solutions. Through this research, and that of similar case studies (or scenarios for strategic planning of green growth) in Copenhagen, Denmark; Berlin-Brandenburg, Germany; and Santiago, Chile, the OECD is contributing further to the introduction of metrics that will assist in the measurement of green growth. In addressing the second challenge, this report of two specific cross-border regions in the Benelux offers guidance and highlights policy implications relevant to other Benelux and cross-border regions.

The longitudinal nature of LCE transition means achieving green growth will take decades, and as statistical collections take a long time to develop, the early commencement of the vital work of setting boundaries and initiating actions will help to accelerate the process of developing these metrics.

This report, particularly the comparative analysis presented in Chapter 5, shows the mismatched speeds at which the industrial reorganisation accompanying the decarbonisation of the economy can occur. In some areas, much progress is being made, and there is evidence of this progress in variables within the green growth indicators and dashboard (shown below). For example, in the Ghent-Terneuzen scenario, the bio-base economy is contributing to the value of turnover and growth in employment in the environmental goods and services (EGS) sectors.

Similar results are also likely to be evident for the construction industry in Alzette-Belval, through the pursuit of resource-efficient building design and certification. In other areas there is evidence of progress, but this evidence is anecdotal, or patchy in its collection, and not able to be included in the dashboard metrics. For example, the emergence of the eco-technologies cluster in the Alzette-Belval scenario is not reflected in the calculations of employment or turnover. The available evidence speaks more to the aspirations of the policies of the institutions in the area.

Figure 1. Ghent-Terneuzen Green Dashboard

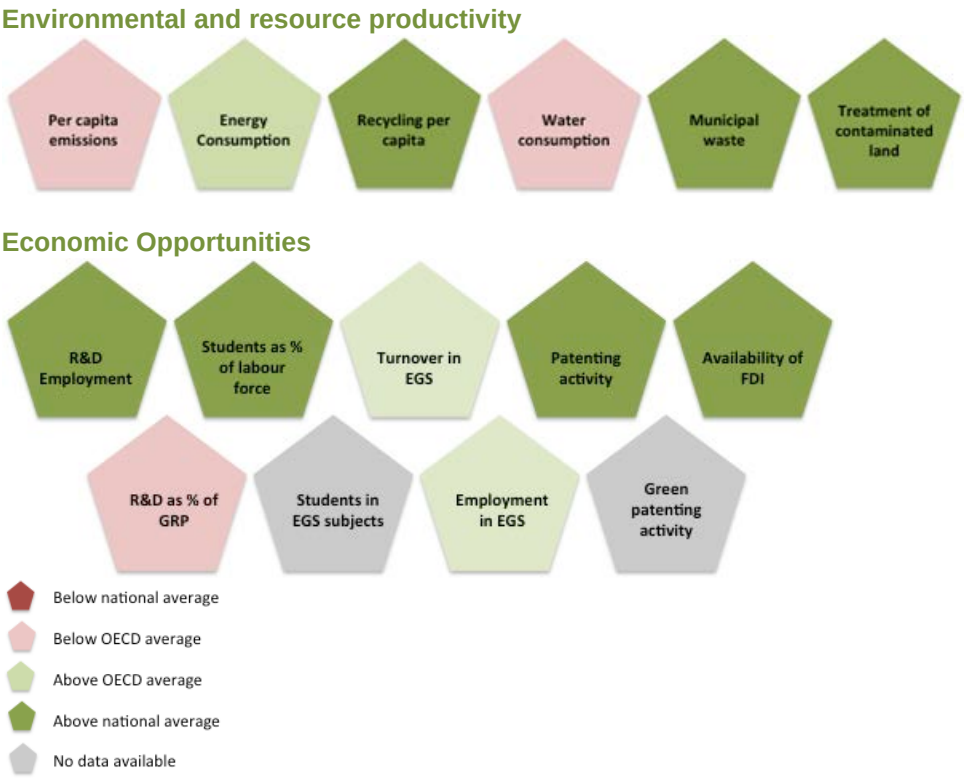
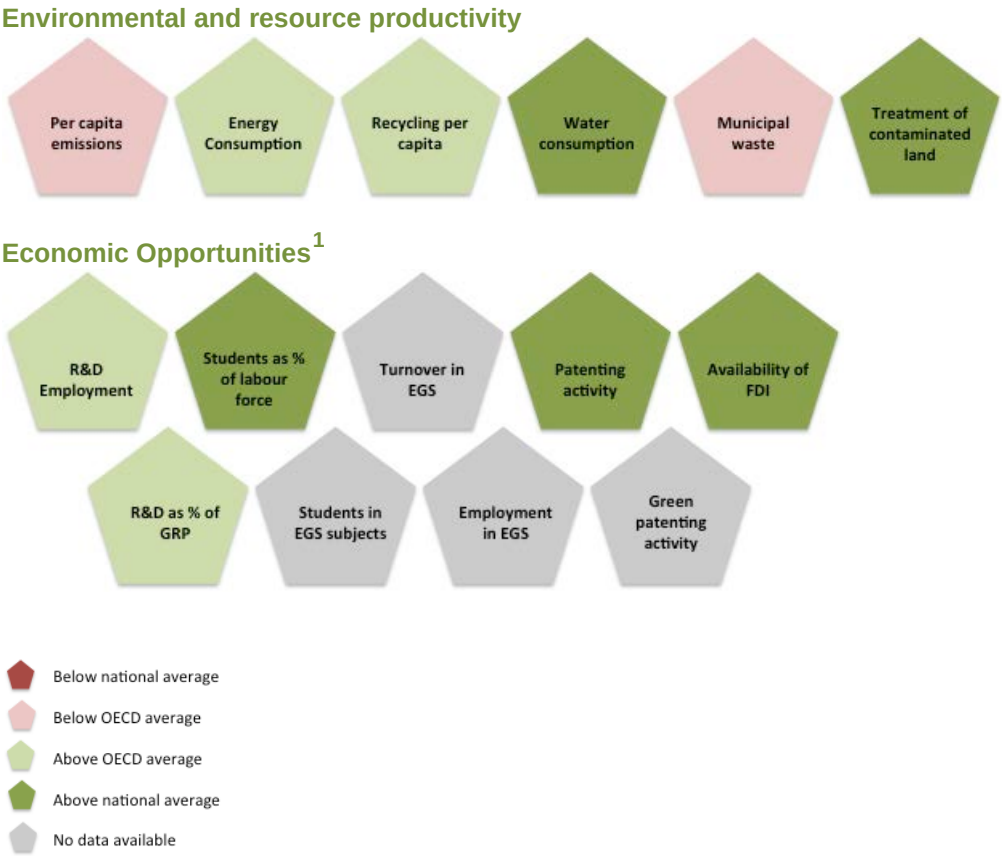


Figure 2. Alzette-Belval Green Dashboard



Policy Challenges and Recommendations

The key policy challenge to emerge from this research is the need for local data sets to inform local decision making. In both the scenarios investigated in this report, it is evident that green growth is seen as being central to future economic and employment development. It is also very apparent that in measuring activity and progress to green growth there is a significant gap between aspiration and opportunities on the one hand, and the ability and resources of the institutions in these regions to systematically assess options and evaluate performance. This is due to a lack of appropriate metrics and the lack of available local data to populate these metrics.

The policy implications indicate that there are six key policy challenges and nine core policy recommendations.

1. Providing consensus on cross-border indicators; what is measured, why and how often, and how they are communicated.

Agreement on a set of common indicators and the mechanisms for measuring and populating these indicators firstly requires stakeholder engagement and agreement to inform and validate the indicator selection process. Through the process of deciding 'what' to measure, monitor and use as indicators for performance, stakeholders can develop a shared understanding and responsibility for developing and populating indicators. This in turn flows into the activities and responsibilities of the institutions from whence these stakeholders come (public, private, public) and develop a platform for co-operation. The guiding suggestion is to

[1] Dashboard content in Economic Opportunities for Alzette- Belval developed from Luxembourg national data as no local data sources were available.

develop indicators in this participatory way early in the process, as they can generate support for the essential goals of the local policy process or project.

Recommendation 1 – Establish a method by which cross-border stakeholders can identify the main variables associated with transition and how these will be measured, and build indicator development and measurement verification into large public investment activities.

2. Defining suitable methodologies and metrics to assess green growth

The indicators collected and analysed through the dashboard highlight areas in which progress is slow, or where the local context in terms of historical industrial legacies or current activity concentrations make local transitions difficult. Both the cross-border case studies presented in this report operate as transport and logistical hubs; Ghent-Terneuzen is the site of a major port and associated road infrastructure, and the Alzette-Belval (as with much of Luxembourg) is a major road transit thoroughfare between the Benelux and other countries. Therefore, much of this current industrial activity is carbon intensive. This will not necessarily change quickly, but if the progress of (greener) change can be monitored and reported at the local level, then the population and businesses of these areas can see first-hand the potential of the low-carbon economy in their area.

Measuring carbon emissions is going to be the most vital performance metric for assessing the low-carbon transition. Indicator development needs to provide a method by which to do this at the local levels, and in such a way that it takes into consideration the local context. For example, if a large percentage of the carbon emissions of the two areas is from transport and logistics infrastructure, which is clearly not an economic activity that is contained to the local region, but which sits at the regional or national level, then the data must allow this distinction to be made.

Recommendation 2 - Ensure data collection provides flexibility to isolate local sources of emissions.

3. Identifying and resourcing local institutions to collect and report on indicators

The Ghent-Terneuzen area benefits from the extended capabilities of the City of Ghent, which has a longer history of collecting indicators at the local level and undertaking national efforts on behalf of the Netherlands to establish baseline reports in new data sets centred around environmental goods and services turnover and employment.

The Alzette-Belval area does not have this same history of local indicator development. The area is facing major industrial transition from a declining steel industry base to what is anticipated to be a clean and knowledge intensive one, centred around the new University of Luxembourg campus and an emerging eco-technologies cluster.

There is an important role for policy in prioritising the development of indicators to track progress, particularly given the amount of investment being made in each of these areas to facilitate transition.

Recommendation 3 - Identify and resource appropriate institution/s to collect and report this data in a consistent format, which provides comparative analysis on headline indicators at the local, national and international level.

4. Maximising the transition impact of large projects and infrastructure development

The case study chapters discuss in-depth examples of major initiatives in green growth activities that are taking place in both cross-border regions. In Ghent-Terneuzen this is the

bio-base economy hub and training centre; in Alzette-Belval it is the high standard efficiency and construction of the urban development of a brownfield site. These major projects will provide significant opportunities for decarbonisation of the local economies.

There is an important role for policy to play in prioritising the development of indicators to track progress in these large projects, particularly given the amount of investment being made in each of these areas to facilitate transition. The scale of this investment provides an opportunity to begin new data collections, as local data collection would only be a small percentage of the total expenditure.

The triple helix framework (industry, university, government) offers a method by which to generate this assessment.

Recommendation 4 - Financially and logistically support data collection projects that are devised and implemented by local stakeholders as a way to cement the operation of cross-border governance.

The ability to track and measure progress towards 'green growth' through locally specific data sources on labour and skills variables would allow the transition to become more transparent to the local populations and, in particular, to highlight the opportunities presented by low-carbon activities and job creation. However, local institutions may not have the capacity for measuring or collecting data, and planning and investment in capacity-building activities thus need to be undertaken, to develop this capacity. Capacity needs to be built into the local institutions in order to measure the impacts of the various measures. The Benelux Union has a role to play in assisting local institutions to enure that there is comparability in the way data is collected and the indicators that are used are cross-border 'proof'.

The ability of local communities to make these decisions is dependent on the provision of accurate and appropriate data for decision-making. The difficulty of achieving this is magnified in cross-border areas, unless structures exist to organise this process. This is also true for identifying and bringing together relevant stakeholders in cross-border regions - it is necessary to create a structure and participatory process that can empower stakeholders across national borders to identify, prioritise and lobby for these major impact initiatives.

Recommendation 5 - Develop processes that seek out and engage a full range of local stakeholders, and which equip them to participate in the discussions and projects. Not all stakeholders are equally able to participate in these activities; recognising and providing resources for these participatory processes increases the likelihood of ownership of the projects and outcomes.

Local stakeholders should also have a means by which their ideas and ambitions can influence the creation of these large projects. The identified need for public transport options in the new Alzette-Belval area in order to prevent the high levels of private vehicle commuting in the area is one example of how local ambitions can inform wider plans for major infrastructure. Knowledge institutions can play a key role in the development of green intelligence for urban transport.

Recommendation 6 – Develop and encourage cross-border groupings of public and elected officials to provide input into large transition projects and thus strengthen the capacity of the Benelux Union.

Cross-border regions must also deal with complexities arising from the presence of multiple political and policy jurisdictional boundaries all influencing the activities in the one cross-border region. Each jurisdiction has an inherent culture and set of norms that shape their activities, so that even when broad policy objectives across jurisdictions align, the method of

achieving these objectives may be different. Where policy objectives do not align, the situation is even more difficult.

Policy co-ordination is an essential element to enable cross-border regions to transition into the low-carbon economy. Cross-border co-operation models need to be strengthened and developed further, to stand as laboratories of co-operation for green growth transition.

The Benelux Union itself is a well-established and equipped co-operative structure through which these cross-border regions can develop harmonised policy objectives across borders. The Benelux Union also offers the opportunity for the development of cross-border governance models that start to align both policy objectives and policy implementation. New models of partnership and governance need to be found and this requires different types of policy and analytical skills – e.g. a small intelligence unit could be created within the Benelux Secretariat, to bring together existing knowledge to help develop horizontal projects for the Benelux regions.

The fact that individual local areas are very different does not mean that there can and should be no learning from shared experiences. In fact, there are common themes in policy implications and needs across all regions seeking transition to a low-carbon economy. The next policy challenges relate to: knowledge creation and diffusion in the green economy; and green industries and emerging markets.

5. Fostering knowledge creation and diffusion in the green economy

The challenge of transitioning economic activities from high carbon intensity to lower carbon intensity at a regional geographical level, and in a way that minimises negative impacts and enhances the positive ones for regional development, is a challenge for all local areas. The scenarios presented in this report have specifically focused on cross-border regions, but issues of sector-based transition and support for emerging 'green' markets such as the bio-base economy in Ghent-Terneuzen, and the green construction industry in Alzette-Belval, are being played out in regions across Europe and the rest of the developed world.

As with all regions, cross-border areas need to ensure that skills development and job creation match the expectations and investments that are being made by all levels of government. Indicator development and data collections focused on related skills, jobs and education, and linked with environmental goods and services, are essential and should be prioritised.

Recommendation 7 - Strengthen innovation capacity in the Benelux Union through international co-operation in order to re-position new industrial ecologies and clusters while addressing the challenges of green growth transition.

In this sense, the policy implications are similar for all regions – the focus should be on skills development across the whole of the labour market (not just students and those entering the labour market), and build on local industrial concentrations and strengths for endogenous economic development through clusters. For regions that have previously had concentrations of carbon intensive industrial activities, such as Alzette-Belval and the steel industry, the transition must also be accompanied by some other significant changes that allow a re-positioning of the area away from the former industrial profile.

The development of the Cité des Sciences and the resource efficient building design offers such an opportunity for a reset. Policy support to enhance and embed these industrial changes is vital, and much can be learned by connecting with other areas in Europe and beyond, which are experiencing similar industrial shifts.

However, in cross-border regions, targeted institutional structures are required to generate and strengthen additional international co-operation for skills development. This is necessary both for the Benelux countries, but also for neighbouring countries. Actions as simple as aligning training and qualification systems for cross-border regions mean that knowledge and innovation systems can operate effectively. Also, mechanisms that structure large project development on both sides of the national borders, linking education systems with promotion of entrepreneurship-based education, will support job creation and job quality in new start-ups and in existing SMEs

Recommendation 8 - Align qualification systems, accreditation and content across borders. Green education and green entrepreneurship can provide a focus for skills recognition and skills activities by the educational institutions in the Benelux. This focus can be developed by provision of specific courses in TVET organisations and by offering Masters and Certificate level courses in Universities and other educational institutions. As areas move from old industry cultures into new LCE activities, new companies and new services are needed. Local entrepreneurs, young and old, male and female should be encouraged to set-up businesses through active and innovative financial mechanisms.

6. Supporting green industries and emerging markets

The transition to a low-carbon economy will see the emergence of new industries and new markets for green products and services. These represent opportunities for firms to grow and develop. However, the process of innovating and commercialising new products in an emerging market is a perilous journey – when customers are not familiar with the unique features of the product, or if the product requires setting a premium price compared to other similar products (even if it performs to a higher standard of efficiency), it can be hard for market penetration to occur.

The risks in this process are higher for small and medium sized firms (SMEs), because they lack the same level of internal resources that large firms have available to support the innovation process. However, as established through the analysis of innovative firms over many years, it is exactly these SMEs who are most likely to be the highly innovative firms, and who seek to introduce new products and processes.

Public policy can play, and indeed does play, a role in the support of these new markets. The most prevalent and effective forms of support to date have been shown to be through government's using their regulatory powers to increase the efficiency standards and emissions reduction requirements of energy, buildings, cars, household appliances, etc. as well as promoting the attractiveness of renewable energy. Public policy can also play a role in supporting new green markets through public procurement. This is where governments act as first, large and/or non-narrow price sensitive customers for new green services and products.

Recommendation 9 - Public procurement should be used to support and encourage new 'green' markets and should be encouraged by all levels of government and the Benelux Union.

Summary of the Main Recommendations for Benelux

Key Policy Challenges	Policy Recommendations
1: Providing consensus on cross border indicators; what is measured, why and how often, and how they are communicated.	• Establish a method by which cross-border stakeholders can identify the main variables associated with transition and how these will be measured, and build indicator development and measurement verification into large public investment activities.
2: Defining suitable methodologies and metrics to assess green growth	• Ensure data collection provides flexibility to isolate local sources of emissions.
3: Identifying and resourcing local institutions to collect and report on indicators	• Identify and resource appropriate institution/s to collect and report this data in a consistent format, which provides comparative analysis on headline indicators at the local, national and international level.
4: Maximising the transition impact of large projects and infrastructure development	• Financially and logistically support data collection projects that are devised and implemented by local stakeholders as a way to cement the operation of cross-border governance. • Develop processes that seek out and engage a full range of local stakeholders, and which equip them to participate in the discussions and projects. Not all stakeholders are equally able to participate in these activities; recognising and providing resources for these participatory processes increases the likelihood of ownership of the projects and outcomes. • Develop and encourage cross-border groupings of public and elected officials to provide input into large transition projects and thus strengthen the capacity of the Benelux Union.
5: Fostering knowledge creation and diffusion in the green economy	• Strengthen innovation capacity in the Benelux Union through international co-operation in order to re-position new industrial ecologies and clusters while addressing the challenges of green growth transition. • Align qualification systems, accreditation and content across borders. Green education and green entrepreneurship can provide a focus for skills recognition and skills activities by the educational institutions in the Benelux. This focus can be developed by provision of specific courses in TVET organisations and by offering Masters and Certificate level courses in Universities and other educational institutions. As areas move from old industry cultures into new LCE activities, new companies and new services are needed. Local entrepreneurs, young and old, male and female should be encouraged to set-up businesses through active and innovative financial mechanisms.
6: Supporting green industries and emerging markets	• Public procurement should be used to support and encourage new 'green' markets and should be encouraged by all levels of government and the Benelux Union.

CHAPTER 1. TOWARDS A LOCAL TRANSITION TO LOW-CARBON GROWTH IN CROSS-BORDER REGIONS

Encouraging green growth and the need for indicators of transition

Green growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. To do this, green growth must act as a catalyst for investment and innovation, which will underpin sustained growth and give rise to new economic opportunities (OECD, 2011a).

The *OECD Green Growth Strategy*, adopted by the OECD Ministerial Council at its meeting in 2011, positioned green growth as being the pursuit of economic growth and development, while preventing costly environmental degradation, climate change, biodiversity loss, and unsustainable natural resource use (*OECD Green Growth Strategy*, 2011[2]).

Achieving greener growth will involve capitalising on opportunities to develop new green industries, jobs and technologies, as well as managing the transition for greening the more traditional sectors and the associated employment and distributional effects. This will require adopting new technologies, developing new products, and supporting new patterns of demand from households, companies and governments.

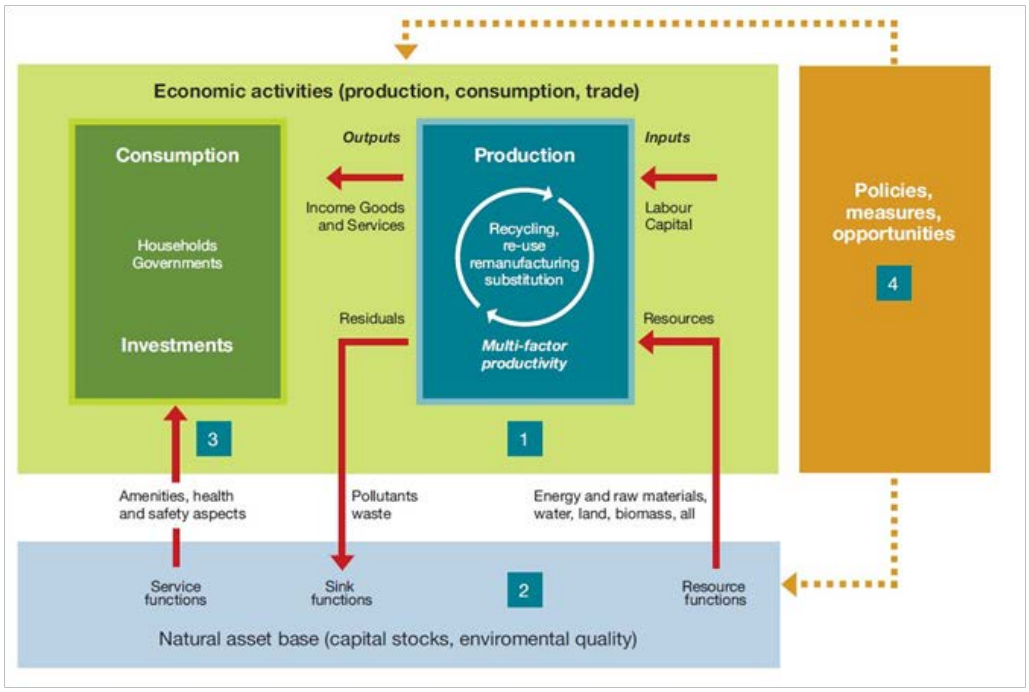
However, there is very limited information regarding how progress can be made when standards and measures are uncertain and based on traditional measures of economic activity. While efforts at the national level are progressing, and many initiatives can be found at the local level, there are a significant number of inconsistencies, and a lack of agreement concerning the indicators needed to analyse, amongst other questions: How do local economies, firms, clusters and regional ecosystems adjust to low-carbon activities? How are local labour markets making the transition? How do firms re-structure their organisation and production processes? How do skills, education and training systems adapt to the development of new areas of growth?

The need for measurable indicators has been well established within the framework of the strategy, targeting four areas of analysis (see Figure 1.1 below):

- Changes in productivity in the use of environmental assets and natural resources.
- Natural asset base.
- Environmental dimensions of quality of life.
- Policy responses and economic opportunities.

[2] www.oecd.org/greengrowth.

Figure 1.1. OECD Framework for Green Growth Indicators



Source: OECD Green Growth Strategy (2011a).

This monitoring of indicators will be essential in order for policymakers at the national level to create and implement green growth strategies. Progress towards green growth will not be equally distributed within countries, therefore, it is also important that progress be monitored at the **local and regional levels**.

The central tenet of the green growth framework is the recognition of natural capital as a production factor and its role in enhancing general well-being (OECD, 2011b). This provides a new dimension for understanding growth and is a counterpoint to how economic activity has been measured and understood throughout much of the modern era, with gross domestic product (GDP) being the central metric for understanding economic performance. The GDP, however, fails to account for depletion of stocks of natural assets in the current production and consumption regimes, and an understanding of how these natural stocks are just as important and relevant to current and future growth as capital and labour stocks.

Natural capital stocks include natural resource stocks (both renewable and non-renewable), land, and ecosystems (as shown in Figure 1.1). Alongside recognition of the natural asset base within the economic model, the indicator framework also includes an understanding of policies and measures that can provide a balance between the economic activity factors. Public policies focused on providing incentives and market structures are needed, which will in turn allow trade-offs between production, consumption and the natural asset base to be made over longer periods of time. Policies are also required that encourage and provide for incubation of innovations that provide for a more efficient, less burdensome use of natural capital in the future.

The green growth framework understands growth not only through the single lens of economic activities based on production consumption and trade, but also through the inter-relationships of these activities with the natural asset base and the public policy measures and mechanisms available to governments.

Varied labour market impacts from green transition

A number of prominent recent reports have sought to define and isolate these green growth impacts in further detail. The first of these reports was the *Green jobs: Towards decent work in a sustainable, low-carbon world* (UNEP et al, 2008). This report highlighted that the impacts of greening would be far-reaching within the labour force, and felt at the individual, organisational and associated labour-organisation level. This finding was further reinforced by research which showed that the boundaries between what is and what is not considered a low-carbon job were becoming increasingly blurred (Cedefop, 2010).

A recent OECD report, *The jobs potential of a shift towards a low-carbon economy* (OECD, 2012d), links the forthcoming changes to similar industrial transformations such as the Information and Communications Technology (ICT) revolution. Impacts of the ICT revolution were extensive, but unevenly distributed; some occupations were significantly affected, with direct impacts being felt on both the positive (job creation) and the negative sides (job destruction). This also applied at the sector level – some sectors grew rapidly in response to ICT, while others were reduced.

For the vast majority of sectors and occupations however, the ICT revolution brought moderate changes to the tasks of individual workers, and the processes and products of businesses. A similar impact is forecast for the low-carbon economy. Recent analysis (Economist, 2013) has highlighted that the productivity gains flowing from the ICT transformation took more than twenty years to materialise. This is a useful reminder that such large and extensive industrial transitions will not happen quickly.

Other reports have identified the economic sectors that are likeliest to experience the most profound changes in the type and volume of employment. These sectors include: agricultural and fisheries; beach and skiing tourism; infrastructure; finance; and insurance (Council of the European Union, 2010). Cedefop further identified sectors such as: renewable energy; energy efficiency (particularly in buildings, new and old); transport; primary manufacturing; and recycling (Cedefop 2010, 2012).

Box 1.1. OECD's framework for thinking about green growth

Economic growth is conventionally thought of as being the process through which workers, machinery and equipment, materials and new ideas and technologies contribute to producing goods and services that are increasingly valuable for individuals and society.

A framework for thinking about green growth builds on this with four additional elements:

- Capturing the importance of changes in the comprehensive wealth of an economy. This means attention to all types of capital: natural (e.g. ecosystems); human (e.g. education and skills); physical (e.g. machinery and equipment); and the intangible assets, which are so crucial to human progress, such as ideas and innovation. Captured within this are some important aspects of growth, including the nature of trade-offs, which arise at the frontier of production possibilities. For example, substituting environmental assets in production or consumption is not necessarily a smooth process; critical thresholds can be crossed after which assets that are renewable cease to be so (e.g. fisheries or soil); or assets that are non-renewable are depleted to a point where substitution with other inputs or goods and services becomes impossible (e.g. climate or biodiversity), potentially short-circuiting growth in well-being. This introduces uncertainties regarding thresholds, irreversible outcomes and discontinuities, all of which complicate policy design.

- Incorporating the dual role played by natural capital in this process. Natural capital contributes to production by providing crucial inputs, some of which are renewable, but others of which are not. It also influences individual and social welfare in various ways, via the effects the environment has on health, through its amenity value and through provision of ecosystem services.

- Acknowledging that investment in natural capital is an area in which public policy intervention is vital, due to market incentives being either weak or non-existent. This is largely because the contribution of natural capital to production is often not priced and the contribution of natural capital to individual welfare is not appropriately valued. The lack of proper valuation and market incentives or signals can affect behaviour and truncate the foresight of households and firms in ways that set the economy on trajectories that are unsustainable (or conversely, which miss growth opportunities), or that are not necessarily maximising well-being. This means that in many cases, better management of natural capital (e.g. via proper valuation of pollution) will be consistent with higher GDP and a lower environmental impact of economic activities. A clear example is when an inefficient energy mix (involving excessive use of fossil fuels) is improved upon by eliminating harmful fossil fuel subsidies.

Recognition that innovation is needed to attenuate trade-offs that arise between investing in (depleting) natural capital and raising consumption or investing in other forms of capital. Indeed, once resource productivity is raised and inefficiency eliminated, a “frontier” is reached along which these trade-offs become more pronounced. Through innovation, the frontier at which trade-offs start to bind can be pushed outwards; essentially greening growth

Source : OECD Towards Green Growth 2011a.

The debate around the need for action on climate change initially highlighted the job creation potential of the low-carbon economy. This continues, with the reality of economic recession and its attendant austerity in many countries making the idea of green employment growth a welcome antidote to the high unemployment rates in many countries. In countries and areas where there are large concentrations of sectors involved in carbon intensive employment, climate change action is usually framed in a ‘job killer’ context.

On the whole, there now seems to be agreement that a low-carbon economy will have a neutral, or slightly positive, overall impact on the labour force in terms of total employment (Cedefop, 2013; OECD, 2012d; UNEP, 2011), but impacts will be spread unevenly across countries, regions and types of work.

The OECD has identified seven main sources of green growth (OECD, 2011b):

- Productivity enhancements through greater efficiencies of resource use.
- Innovation in addressing environmental problems, spurred by policies and frameworks encouraging conditions for innovation.
- New markets from the demand for 'green' technologies, goods and services, and the job growth opportunities these new markets will bring.
- Confidence from investors with greater predictability and policy stability.
- Stability of macro-economic conditions and reduction of the price volatility around resource costs.
- Resolution of resource bottlenecks (including human capital resources), which can make new investments more costly.
- Resolving imbalances in natural systems, which will reduce the risks of more profound and abrupt changes occurring to the natural environment through climate change.

The transformation of industries will have a large impact on regional and local ecosystems for employment creation, development of skills and green entrepreneurship. However, although there are significant positive impacts for some local areas and regions, for others the positive effects of the low-carbon transition will be outweighed by negative job losses. A solid empirical foundation by which to understand how the low-carbon transition will unfold at the regional and local level is still lacking. The *Indicators of local transition to a low-carbon economy* project is part of an effort to provide more empirical evidence at the local level.

The identification of indicators is therefore imperative in order to measure economic progress towards low-carbon activities in such a way that policies, strategies and programmes can be periodically informed by data that is solid and comparable yet relevant to the local area, industry clusters and regional ecosystems under analysis.

Local dynamics of green growth

There are two main reasons why monitoring and understanding progress towards green growth needs to be tracked at both the national/ international level and the local level:

1. The impacts of climate change will be vary at a local level;
2. The impacts of responding to climate change, such as carbon pricing, switching to less carbon intensive energy supply and production will be distributed differently across regions. This will be especially evident in labour markets.

Therefore, whilst national and international responses are required for carbon emissions mitigation, it is at the local and regional levels that strategies for dealing with the impacts of mitigation action will be required. Of the sources of growth, four have local dynamics that are directly relevant to this project:

- Productivity enhancements through efficient resource use;
- Innovation in addressing environmental problems;

- New markets and employment opportunities from green technologies, products and services; and

- Resolution of resource bottlenecks, including human capital development (e.g. skills and training).

Despite their limited capacities to respond to climate change, especially the mitigation component, with the majority of the effective policy levers existing at the national level in most countries, local authorities do have policy levers available in procurement and energy efficiency activities within their own buildings and urban environments. Local governments can encourage the adoption of green skills through promotion of sustainability and triple bottom line reporting, and sustainable practices in the building and construction industry.

What is the Benelux?

The Benelux Union is an inter-governmental union of three states: Belgium, the Netherlands and Luxembourg (see map below). The Union was set up by the governments of Belgium, the Netherlands and Luxembourg after the Second World War.[3] The organisation is a pioneer in the construction of co-operative instruments. After the initial common venture in 1944, which was that of a customs agreement, in 1960, the three countries abolished their border controls. With the establishment of the Benelux Convention on Transfrontier Co-operation in 1986, the Benelux countries were amongst the first to implement the Framework Convention of Madrid (1980), which was designed by the Council of Europe to stimulate territorial cross border co-operation.

The population of the Benelux region is over 28 million people. Since its inception in 1944, it has developed into an economic, political and cultural union over the succeeding years. The Benelux Union provides an excellent example of a cross-border region that has developed a sophisticated cross-border institutional make-up.

The Benelux as an organisation does not have a stated comprehensive policy towards green growth or low-carbon economy policies. The three member countries, Belgium, the Netherlands and Luxembourg, are developing their own pathways, strategies, and policies independently of each other.

[3] This paragraph courtesy of Hans Mooren from the Benelux Union.

Figure 1.2. Map of Benelux Union in European context

Source: Secretariat General of the Benelux Union.

The overarching framework is mostly instigated by the European Union (EU). Over the last decade, the EU has developed an ambitious and fairly comprehensive set of policies, instruments, pathways, and integrated visions of the future, which when taken together, constitute the core understanding of what green growth and the transition to a low-carbon

economy (LCE) mean. The OECD's work on the environment, energy (also through the International Energy Agency), and more recently on green growth and sub-regional socio-economic development, also has significance for the region, and carries political weight in the Benelux countries as being a systematic, reliable comparison of policy performance.

However, this does not mean that the Benelux has no policy and targeted ambitions, or no role to play. The Benelux, within its working programme, devotes specific attention to the theme of sustainable development and green growth, and has existing activities underway in three different areas. Firstly, the Benelux stimulates cross-border policy coherence and sees itself as a facilitator of processes. The themes of sustainability and green growth are playing an increasingly important role in these policy ambitions. Secondly, the Benelux has set up numerous programmes aimed at increasing sustainability of its cities. Exchange of local policy experiences regarding such topics as energy efficiency programmes at the local level are central to the Benelux. Thirdly, there are activities aimed at stimulating cross-border dynamics on concrete trajectories spanning at least two countries. In addition to these, forming linkages with the neighbouring countries of France and Germany, especially in the border regions, is a central working point for the Benelux.

Local and regional dynamics are essential for green growth and LCE strategies in the Benelux countries. There are several reasons for this:

- The local level is often the level at which broader national LCE policies are concretised, implemented and also (partially) financed.

- Cluster-approaches to industrial (eco-)innovations are often strongly embedded in local approaches towards economic development or conversion. They built on local assets, make use of local resources and have an immediate impact on, or links with local knowledge institutions, local labour markets, etc.

- National or international green growth strategies are often linked to local dynamics such as carbon neutral urban or regional development strategies, or the development and support of local economic growth clusters

Typically, densely populated regions and also regions of relatively 'small' countries have cross-border characteristics existing in their local or regional dynamics. This is certainly the case for the Benelux countries. Important cross-boundary dynamics exist in the Benelux. Logistical networks, which are crucial for economic performance and competitiveness, also link vital regions in cross-border areas in the Benelux countries. Railroad systems, inland waterways, coastal transport systems, and highways are essential for the continued linkages between the Benelux countries, for example, the port region of Antwerp-Zeebrugge-Ghent-Rotterdam. In addition, the cross-boundary character includes metropolitan networks linking Belgium and the Netherlands to the German Ruhrgebiet.

Another example, is the axis that connects Kortrijk (Belgium) to the French metropolitan area of Lille, Roubaix in Nord-Pas-de-Calais. The industrial performance of Luxembourg cannot be fully understood without knowledge of its cross-border connections to the Belgian, German and especially French industrial heartland that surrounds Luxembourg. In fact, it is realistic to say that cross-border dynamics are, and have been, an essential element of the socio-economic functioning of the Benelux countries for centuries.

It would be atypical and unconvincing to conceptualise or approach the transition towards a LCE and the dynamics of green growth in a way that does not recognise the essential dynamics of cross-border interactions. Policy instruments and strategies in the region in fact often support the cross-border considerations, e.g. EU funding for cross-border development such as INTERREG (an initiative designed to stimulate co-operation between

EU regions) projects; or initiatives by the Benelux organisation designed to facilitate cross-border exchanges and economic co-operation. Cross-border processes of economic activity and strategic development are therefore an essential part of green growth for the Benelux countries.

The cases discussed in this report illustrate the practices developed in the Benelux region. These cases are good examples of planning scenarios for green growth and the necessity for co-operation, the promising nature of local green growth strategies, the rich assets available in the Benelux region (and adjacent countries), and the need for strategic willingness to shift towards a low-carbon future. However, they also illustrate the complications that can arise or which exist in cross-border processes, and the difficulties inherent in measuring and translating cross-border processes at the local level into relevant broader indicators.

Measuring cross-border green growth: additional challenges

As will be further illustrated in the two chapters that investigate the case studies which were undertaken in the Benelux, and within the dashboard indicator exercise, measuring and monitoring local cross-border projects and dynamics can be a complex and difficult process.

An important reason for this complexity is that, more often than not, very little attention has been paid in the early planning and conceptualisation stages of projects to the need for indicators to monitor the co-operative projects. As learned from the Benelux case studies, indicators are usually not considered essential at this point in the project's development. If performance indicators have been part of the project's design at all, they are most often limited to the more traditional indicators of economic performance, and not to the 'green' or low-carbon characteristics of cross-border projects and processes.

A second, more pragmatic reason for the lack of indicators, is that skills in measuring, monitoring and establishing indicators at the local level are often very poorly developed; even in a highly developed and affluent region such as the Benelux. Indicator use presupposes data gathering capacity, longitudinal efforts, and much instutionalisation; meaning that indicators need to become part and parcel of policy processes and the regular practices of bureaucracies, public agencies and private actors alike. Since this is not yet the case, few reliable and robust indicators exist at the local level.

The cross-border character of the region adds another level of complexity to indicator development. Cross-border regions or geographic circumscriptions hardly ever coincide with any single data gathering 'institution'. Moreover, Belgium (Flanders, Brussels, Wallonia), the Netherlands, and Luxembourg have different indicator systems at the national level, and even more so at the more decentralised level. This creates problems of data availability, data (in)consistency, and hence comparability, making it difficult to compose reliable and useful indicator sets at the cross-border region level, and even more problematic to compare various regional dynamics.

In light of the longitudinal nature of LCE transition, monitoring and indicator development are even more challenging, yet at the same time, necessary. Green growth and LCE transitions will take decades, and in order to know if and which policies, projects or instruments are driving the process in the right direction, valid indicators are indispensable. This is, ipso facto, the case at the cross-border level.

It is important to understand that in the case of the Benelux countries, numerous local entities engaging in LCE transition or green growth processes do in fact measure and monitor what they are doing to some degree. Dozens of cities, provinces, and regions in the Benelux are working on 'low-carbon' futures. Their ambitions by definition include greenhouse gas

emission reductions, energy productivity, and carbon intensity etc. Other omnipresent ambitions include the economic benefits connected to eco-innovation and green investments, such as competitiveness and job creation. However, measurements, indicator development, and reporting are neither coherent nor compatible. This also means that at present little meaningful knowledge is exchanged, few lessons based on solid comparison can be learned, and the basis for structured learning is often not present.

One of the essential challenges and difficulties in working with green growth or LCE indicators at the local level is that local realities and local processes of green growth differ widely (this is supported by the results of the case studies/scenarios undertaken in Denmark, Germany and Chile and the Benelux areas in particular). As a consequence, the development of indicators needs a two-tiered approach:

- *Tier 1*: Developing core indicators to measure transition towards the LCE. Suggestions: measure greenhouse gas emissions in the region; carbon intensity of the economy of the region; carbon intensity of employment in the region.

  Without these measures, the LCE discourse is meaningless, because they make the link between the 'low-carbon' and the 'economy' parts of the LCE and green growth ambitions explicit. Without cutting the carbon intensity in both relative and absolute ways, the term low-carbon has little policy meaning. Stuying the carbon intensity of employment acknowledges the link between the creation of jobs and future considerations.

- *Tier 2*: The Tier 1 indicators can be supplemented by additional regional and/or local indicators. This caters for the need to adapt indicators to meet local circumstances, objectives, priorities, and capacity. Given the enormous variety in local projects, this can only strengthen the relevance of indicator sets

The fact that local realities are very different, however, does not mean that learning from shared experiences cannot or should not be possible. In addition, more attention on the process of local indicator development is needed. The 'how' is probably just as important as the 'what' in local indicator development and use. Through the process of deciding 'what' to measure, monitor and use as indicators for goal attainment or performance measures, stakeholders can create networks, a joint purpose and motivation. In other words, policy processes should include indicators that have been developed, validated and measured by stakeholders, both public and private, in a process of co-creation. Additionally, indicators should be developed in this participatory way early in the process, as they can then generate support for the essential goals of the local policy process or project.

One of the advantages of a 2-tier approach, with additional emphasis on the participatory aspects of the process, is that exchange and learning within and between networks/communities of practice on indicators for a green economy and LCE can be formed, regardless of differences in the precise set of locally used indicators.

Report overview

This report is divided into five chapters. Chapters 2-4 discuss the local experience of transitioning to a low-carbon economy. Chapter Two examines the two case study cross-border scenarios[4] in the context of the wider Benelux region. It provides a picture of the current baseline in terms of demographics and knowledge assets for these regions and an understanding of how they fit within the broader Benelux region. In Chapters Three and Four,

[4] Scenario' is used in this report to qualify the 2 case study areas as two possible cross-border scenarios for green growth strategic planning.

specific green growth initiatives in the case study cross-border scenarios are detailed, with particular reference given to the assets and opportunities for green growth that exist in each region and how the current policy regime supports these activities.

The second aim of this study is to test the suitability and adaptability of the OECD green growth framework in understanding this transition, and to provide a mechanism that will enable monitoring and reporting on progress to a low-carbon future. Chapter Five discusses the Green Growth Dashboard for the two cross-border scenarios and also presents conclusions and recommendations for future policy and monitoring activities.

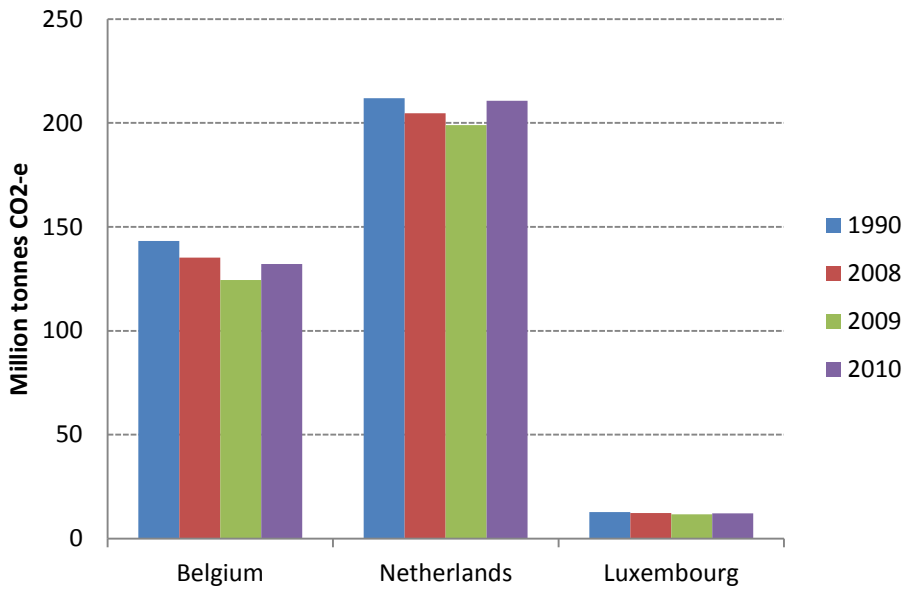
CHAPTER 2. BENELUX'S PATHWAY TO GREEN GROWTH AND TWO CROSS-BORDER SCENARIOS

The Benelux and its Transition to Green Growth

The countries within the Benelux Union; Belgium, Luxembourg and the Netherlands; highlight the challenges that individual countries face in working to decarbonise their economies. Each have high emissions profiles that have only declined slightly from 1990 levels. This signifies that one of the most essential future challenges for the Benelux countries will be the need to shift from their current high emissions-based development model, to a low emissions-based model. This will necessitate significant changes within key systems that characterise the model of consumption and production in all three countries. Decoupling of economic outputs from carbon-based energy and other greenhouse gas (GHG) emitting energy forms (which are often industry-related) is therefore the path of the future.

As data from the European Environment Agency (EEA, 2012) shows, of the total emissions profiles of each of the countries (see Figure 2.1) the Netherlands has the highest total emissions, at 210 million tonnes per annum in 2010. This figure is only slightly below the 1990 levels of 211 million tonnes of carbon emissions. Next is Belgium, where emissions have declined from 1990 levels of 143 million tonnes to 132.2 million tonnes in 2010. Luxembourg's emissions are only a fraction of its fellow Benelux Union neighbours, at 12.2 million tonnes in 2010, however, this is only slightly below its 1990 levels of 12.8 million tonnes.

Figure 2.1. Total carbon equivalent emissions in the Benelux Countries 1990-2010

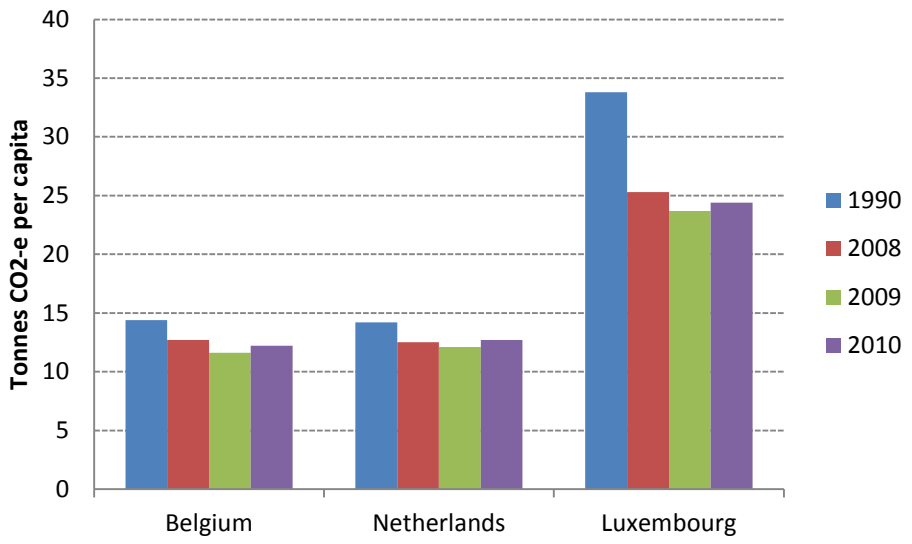


Source: European Environment Agency, 2012.

However, the emissions profiles look completely different when compared on a per capita basis. As Figure 2.1 also shows, Luxembourg is ranked 24th out of 27 European Union

countries for its carbon emissions, whereas the Netherlands is ranked 7th, and Belgium 10th. Figure 2.2 shows the per capita emissions over the same time period (1990-2010). Luxembourg's per capita emissions are well above those of the Netherlands and Belgium, but there were significant reductions in the period between 1990 and 2008 (it should be noted, however, that the high level of per capita emissions is partly due to the fact that road fuel sales to non-residents accounted for more than 40% of the total GHG emissions for Luxembourg).

Figure 2.2. Per capita carbon emissions in the Benelux Union 1990-2010



Source: European Environment Agency, 2012.

The Benelux countries share more than the carbon intensity of their economies. All three countries are densely populated, highly urbanised, have very dense logistical networks, have witnessed an economic shift from a mainly industrial society to a post-industrial, service oriented society (however, still with significant heavy industries and industrial production capacity).

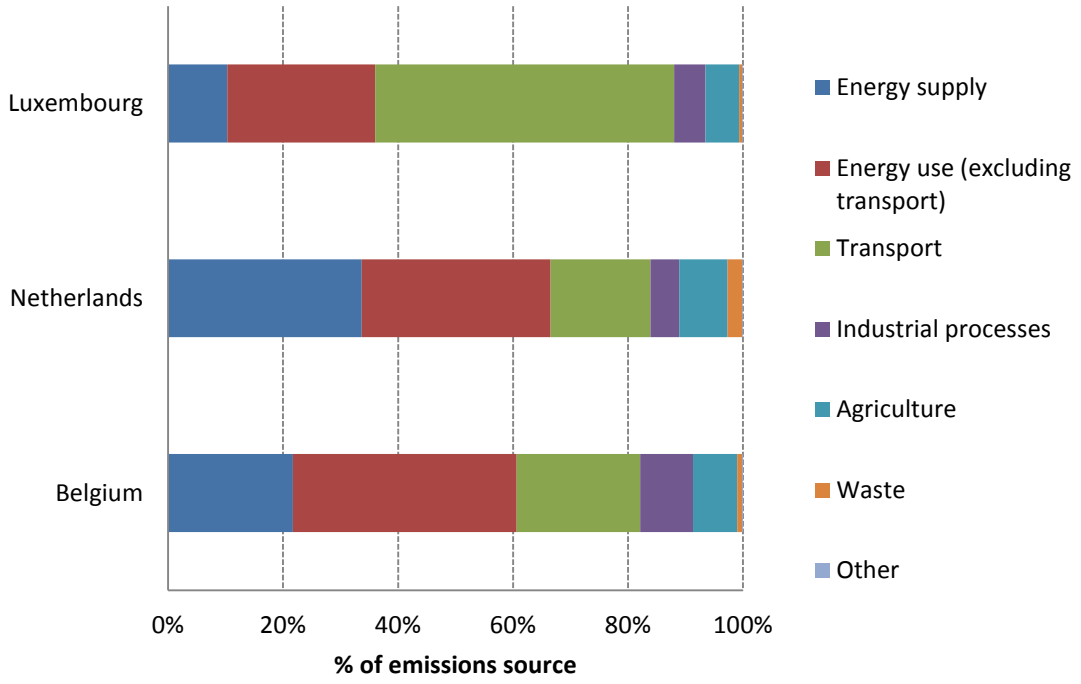
Belgium, the Netherlands and Luxembourg also have a very important logistical transit function. The importance of the transport links to Luxembourg can be seen in Figure 2.3, which presents a breakdown of 2010 emissions by source. In Luxembourg in 2010, transport sourced emissions make up more than half (52%) of the total emissions. The high levels of transport emissions are closely associated with a phenomenon known as 'tank tourism'; cars travelling into Luxembourg for fuel.

The Dutch and Belgian seaports (Antwerp, Zeebrugge, Oostend, Ghent, Brussels, Terneuzen, Vlissingen, Rotterdam and Amsterdam) are hubs of European and global significance. They are connected to the European hinterland through an elaborate system of railroads, highways and inland waterways (the densest network of inland navigation in the world). The main international airports of Amsterdam's Schiphol, Brussels' Zaventem, and Luxembourg also serve as hubs for passengers and goods.

It is important to understand the strong cross-border nature of the Benelux member countries' economies. They are strongly intertwined not only with each other, but also with other neighbouring countries. These interconnections find strong expression in regional connections with, for example, the German Ruhrgebiet and the northern French region of Nord-Pas-de-Calais, or the northern French industrial area of Lorraine. In essence, this means

that the transition towards a low-carbon economy (LCE) or green growth is intimately connected to the position of Belgium, the Netherlands and Luxembourg within essential networks of economic value creation.

Figure 2.3. Emissions by source in the Benelux Union 2010



Source: European Environment Agency, 2012.

The shift towards the green economy in the Benelux countries is also strongly linked to other regional elements, of which just a few are named here. The relatively highly educated workforce opens up opportunities for high end, technological and innovation driven green breakthroughs. The high labour cost per unit, compared to many other OECD or EU countries (and certainly the emerging economies) underlines the necessity of focusing on technological innovation. The specific regional dimensions of climate impact can also be seen as a driving force for specialisation and competitiveness. Belgium and the Netherlands in particular, which are jointly labelled 'The Low Countries', are vulnerable to climate change and can benefit from specific innovation agendas, driven by 'adaptation technology and knowledge' (knowledge and technologies that specifically develop from the need to adapt to climate change rather than just engage in mitigation activities).

In terms of public and private investments in research and development, the Benelux member countries are not near the very top compared to other OECD member states, but instead are situated within the next echelon.[5] The three countries have very good university and research institute systems, and also very significant private sector research and development (R&D) capacities. But compared to the absolute frontrunners such as the Scandinavian countries, there has been less of an explicit link between strong R&D policies and green economic transitions. This leaves room for better policy formulation and coherence between research and development programmes and green growth strategies.

[5] OECD (2011) Science and Technology Scoreboard, OECD, Paris.

A cross-border pathway to green growth

This study examines two case study areas of cross-border regions:

- Ghent-Terneuzen, in the cross-border area of the Netherlands and Belgium;
- Alzette-Belval in the cross-border area of Luxembourg and France.

Further background detail on the two case study regions is provided in the rest of this section, and in an appendix to this report.

Cross-border Scenario 1: Ghent-Terneuzen[6]

This case is located in the province of Eastern-Flanders, home to 1 458 872 inhabitants (Provincie Oost-Vlaanderen, 2012a), of which 243 366 live in Ghent (Studiedienst van de Vlaamse Regering, 2012c). The surface of the province of Eastern-Flanders consists of 300 794 hectares, so the population density of the province is 485 people per km². The population density of Ghent is 1558 people per km².

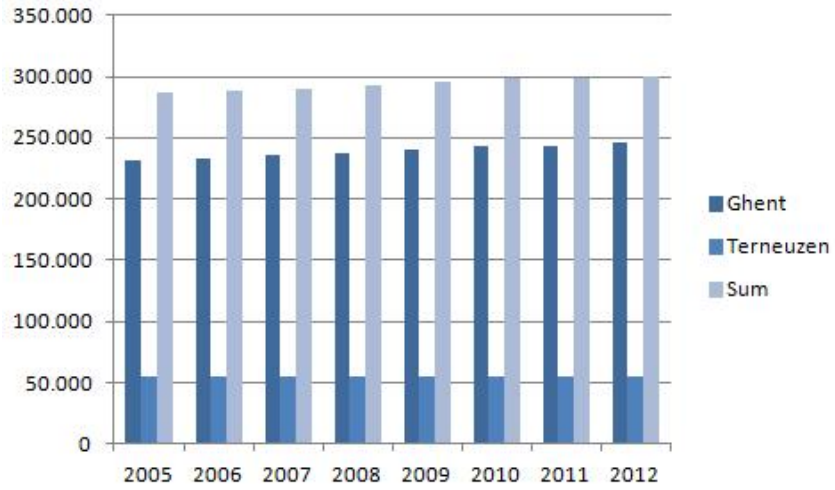
The size of the city of Ghent is 15 618 hectares (Studiedienst van de Vlaamse Regering, 2012c). The number of inhabitants of Ghent has increased by 7% over the last decade and is expected to keep increasing by another 6.2% by 2020 (Studiedienst van de Vlaamse Regering, 2012c). Compared to the average population growth in the Flemish Region (4.3%), the city of Ghent is a growing city, to which young people in particular are attracted to migrate. In 2010, 10.9% of the inhabitants of Ghent were foreigners, and this number is expected to increase (Studiedienst van de Vlaamse Regering, 2012c).

The province of Zeeland has significantly less inhabitants than the province of Eastern-Flanders. In 2010, 381 409 people lived in the province of Zeeland, of which 54 733 lived in Terneuzen (Centraal Bureau voor de Statistiek, 2012). Its land area is approximately 195 333 hectares (Provincie Zeeland, 2012b), of which 25 140 hectares comprises the city of Terneuzen (Centraal Bureau voor de Statistiek, 2012). The population density of the provinces of Zeeland and the City of Terneuzen respectively are 195 people per km² and 218 people per km².

Figure 2.4 shows the population growth in both Ghent and Terneuzen. Whereas the population is decreasing slightly in Terneuzen, the population in Ghent is increasing steadily, resulting in an overall population growth in the region in which Bio Base Europe is located.

[6] In general, there are no specific data for this region of analysis: whether we delineate it as Euroregion Scheldemond or the Ghent-Terneuzen port area. To overcome this gap in data, data are combined for the provinces of Eastern-Flanders (BE) and Zeeland (NL).

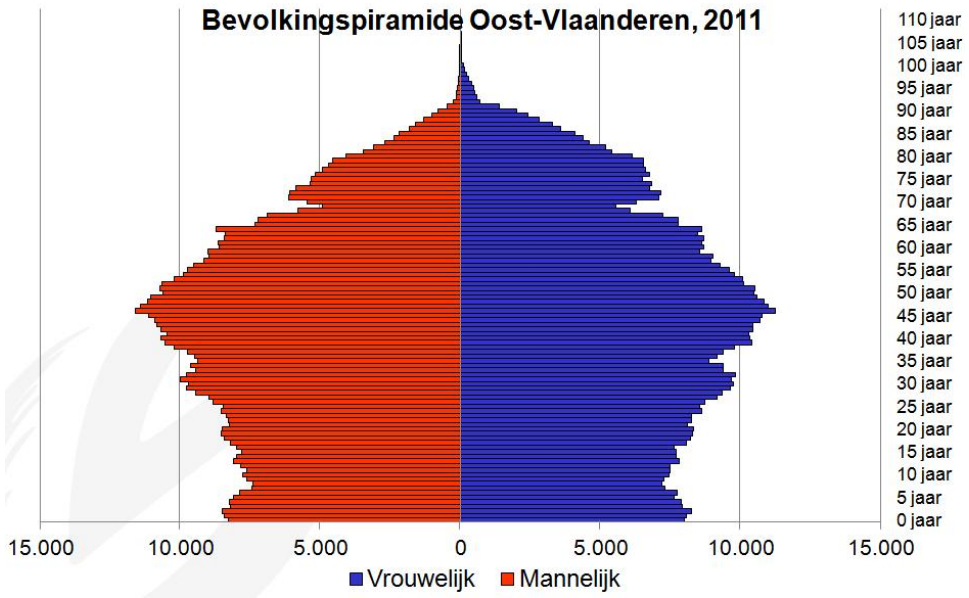
Figure 2.4. Number of inhabitants in the cities of Ghent and Terneuzen from 2005 to 2012



Source: Derived from Studiedienst van de Vlaamse Regering, 2012c and Centraal Bureau voor de Statistiek, 2012.

Figure 2.5 shows the population pyramid of Eastern-Flanders, indicating that the percentage of men (left) and women (right) is almost equal in every age-period. There is a relatively high percentage of people over 50 years of age, and a relatively low percentage of young people, indicating that the province of Eastern-Flanders suffers from an ageing population. The problem of having an ageing population is also well known in Zeeland. This is the Netherlands province with the eldest population. It is expected that by 2025, a quarter of the population of Zeeland will be older than 65 (Provincie Zeeland, 2012c).

Figure 2.5. Population pyramid of Eastern-Flanders in 2011



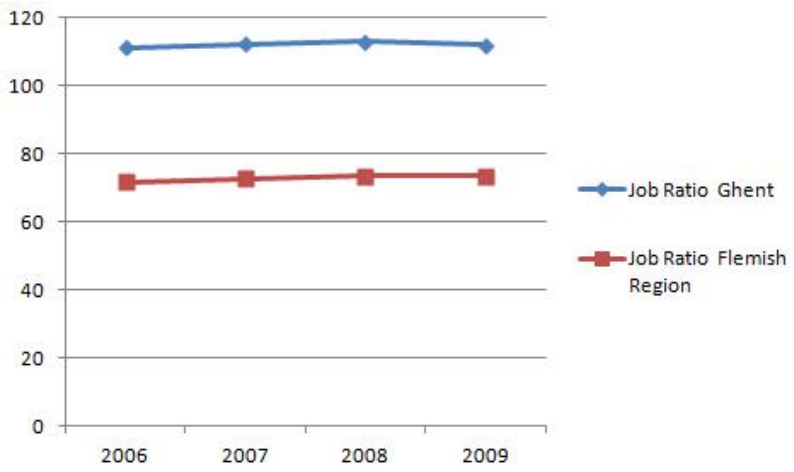
Source: Provincie Oost-Vlaanderen, 2011.

Economic characteristics

The unemployment rate for Ghent over the years 2003 until 2009 has always been higher than 10% (Studiedienst van de Vlaamse Regering, 2012c), meaning that one in ten people who should be professionally active do not have a job.

The **job ratio** measures the availability of jobs in a certain region by dividing the number of jobs by the number of professionally active people (20-64 years old) (Studiedienst van de Vlaamse Regering, 2012c). Figure 2.6 demonstrates the job ratio for Ghent compared to that for the Flemish region. The job ratio for Ghent has been very positive over the last decade. For example, in 2009, the job ratio in Ghent in 2009 was 112, meaning that there were more jobs than professionally active people. In comparison, the average job ratio for the Flemish Region in the same year was 73.4 (Studiedienst van de Vlaamse Regering, 2012c). This is because Ghent has a booming labour market, which attracts people who are looking for work.

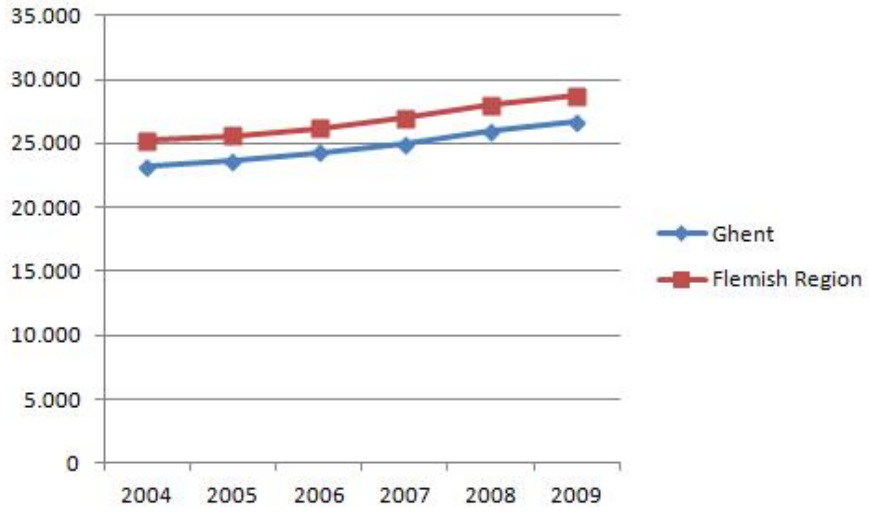
Figure 2.6. Job Ratio for Ghent and the Flemish region



Source: Studiedienst van de Vlaamse Regering, 2012c.

The **primary income** indicates the welfare and purchasing power of a population. The average net income per tax payer is an indicator measured by the City of Ghent. Figure 2.7 shows an increasing level of primary income for the Ghent households. Nevertheless, the primary income level in Ghent is approximately €2000 lower than the average primary income in the Flemish Region.

Figure 2.7. Primary Income in Ghent



Source: Studiedienst van de Vlaamse Regering, 2012c.

Green growth, green jobs and green skills are key words within this debate, but there is little information available regarding green jobs and their potential impact on the economy of the region. The regional authorities have attempted to measure the evolution of green jobs in the City of Ghent.

Ghent focuses mainly on the renewable energy sector as this is the industrial area offering the most employment opportunities. Ghent also focuses on skills development, as the major challenge in Ghent is to make all existing sectors of the economy more sustainable (City of Ghent, 2011). Cedefop states (2010): "Just as information technology skills have become essential to many aspects of working life, there are signs that green skills will become equally important to almost every job". The introduction of green innovations in processes requires more technically qualified staff, who understand the functioning of these new techniques. Technically trained employees are therefore highly in demand (City of Ghent, 2011).

Figure 2.8 shows the skills required for a transition towards a low-carbon society. "Generic skills" are skills required in conventional industries such as oil and gas. Although these skills have a limited impact on the transition process, they are mastered by most employees and are also (partially) applicable in the greener industries (Cedefop, 2010).

According to the City of Ghent, "2200 people were employed in the water, waste recycling and energy sector in 2009" (City of Ghent, 2011). Where generic skills are abundant, Cedefop proposes to "upskill" the employees. This means that specifically lacking knowledge/skills should be remedied by training. The city of Ghent proposes that this specific training be prepared by the company itself, as they understand the specific needs of their organisation best (City of Ghent, 2011). In this regard, as generic skills are expanded throughout the population, the need for specialised green skills can become more important as firms, particularly SMEs, find their niche markets and innovations.

The focus on green skills brings several difficulties with it: (1) upskilling; (2) anticipating the required skills and jobs; and (3) matching the skills to the jobs. In sum: "the transition towards a green economy requires adjusting and amending existing skills, instead of requiring entirely new curricula" (City of Ghent, 2011). Besides upskilling, boosting the image of the technical education programmes is crucial in order to attract young people and

the unemployed. The importance of internships is also mentioned by the City of Ghent (City of Ghent, 2011).

Figure 2.8. Skills for Green Jobs

Source: Cedefop (2010).

Skills ecosystem and innovation

As mentioned, one of the aims of Bio Base Europe is to provide educational opportunities in consideration of bio-based processes. A laboratory for real-life testing of experiments is located in Ghent, and the required training for organisations is provided in Terneuzen. In addition to this initiative, there are academic institutions located in the region that provide programmes designed to educate students for a so-called 'green job'. The possibilities existing within these institutions are briefly discussed here.

Ghent is the main city within the region where green job related education is provided, especially at Ghent University (UGent) and the University College of Ghent (HoGent). The UGent's Bio-Science Engineering Faculty is particularly important. Approximately 1800 students follow a study programme within this department (Ghent University, 2012) and the faculty provides three bachelor programmes related to bio-based processes (Ghent University, 2012), namely:

- Cell-and gene technology;
- Chemistry and food technology, and
- Environmental technology.

In continuation of these bachelor programmes, UGent provides three masters programmes that are particularly relevant to the bio-based economy, namely: (1) cell- and gene technology; (2) chemistry and bioprocess technology; and (3) environmental technology (Ghent University, 2012). Comparable programmes are provided by HoGent, including a bachelor degree in applied bio-science engineering. The masters programme "Industrial

Sciences: Biochemistry" prepares its students in a way that is designed to optimise their finding a job within the bio-based energy sector (University College Ghent, 2012).

A department of the HZ University of Applied Sciences is located in Terneuzen (University of Applied Sciences, 2012). The Academy for Technology and Innovation focuses on developing products in a sustainable way, focusing on chemistry, energy and process technology, engineering, design and innovation (University of Applied Sciences, 2012).

Besides educational opportunities, innovation and R&D are also essential factors for enhancing a transitional process. The City of Ghent supports eco-innovation by mapping the potential for renewable energy. The potential of biomass energy is estimated to be significantly higher than the potential of solar, wind, water and soil energy. This will result in a significantly higher amount of budget being allocated to R&D in the bio-based area. Numbers regarding current expenditure on R&D within the region are not available.

A cluster report of the Ghent Bio-Energy Valley (2010) states that an innovative climate is certainly available and highly stimulated by the University of Ghent, the Port of Ghent and the City of Ghent. Although it is hard to provide exact data, the cluster has tried to make some calculations in co-operation with the University of Ghent. Together they conclude that each company within the cluster has introduced one or two improved biotechnology products on the market (Ghent Bio-Energy Valley, 2010). Considering the amount of patents, companies have filed on average 0.5 patents in the period from 2005 to 2010, and the University of Ghent has filed up to 11 patents in the period from 2007 to 2010. About 75% of these filed patents were granted (Ghent Bio-Energy Valley, 2010).

Cross-border Scenario 2: Alzette-Belval

This case study is located in the southern region of Luxembourg (Esh-Belval) and the cross-border area in France (Alzette), a 'European Grouping of Territorial Co-operation' area (EGTC)[7] The EGTC comprises four municipalities in Luxembourg and eight municipalities in France. The area lies in the centre of a region largely devoted to steel production over the last century. The governance instrument of the *EGTC Alzette-Belval* is of particular strategic significance for Luxembourg, as it presents a platform in which both the state and municipalities can engage to foster targeted cooperation on key local issues amongst Luxembourg and French municipalities. Cross-border cooperation in this case mainly considers the development of urban areas, transport infrastructures, and green industrial development.

One reason for the selection of this particular area is that Luxembourg's largest state-driven development project 'Esch-Belval' lies in the heart of this territory. This development project of industrial wasteland left by the steel industry includes the building of a City of Science and Innovation in order to promote new knowledge-based development dynamics in an area the fate of which was tightly linked to that of the declining steel industry. A central ambition of this case is thus to consider the development of approaches to assessing and evaluating the influence of this large urban development of industrial wasteland including the building of a Science City on regional economic and social development, also with a view to promoting green growth and transition to a low-carbon economy.

The industrialised southern region of Luxembourg, with an area of 200 km^2 and 15 600 inhabitants is the most densely populated in the country, with an average of 761 inhabitants per km^2 in 2011. The population density has been increasing steadily, from 670 inhabitants

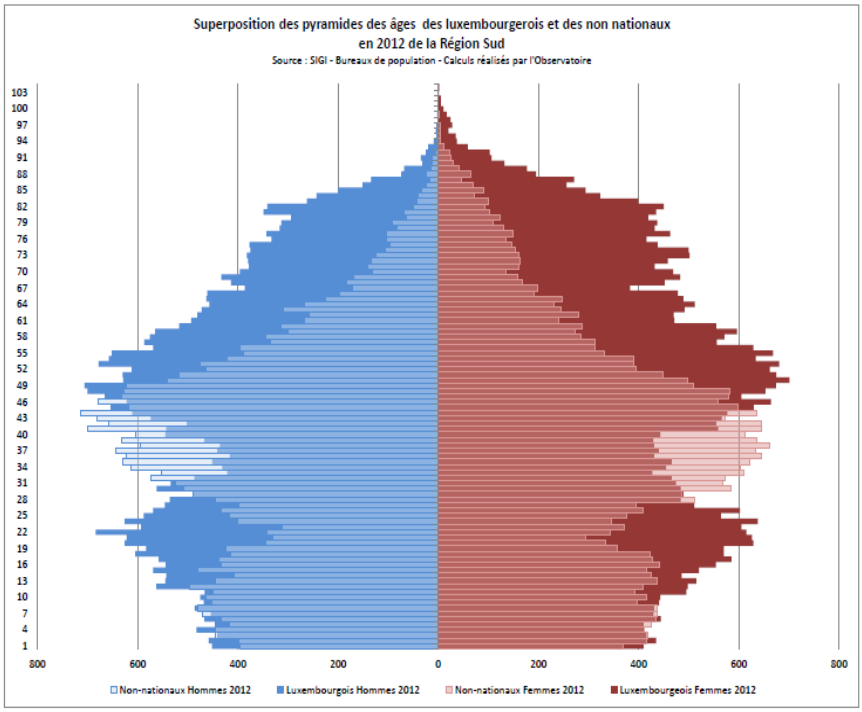
[7] European Grouping of Territorial Cooperation; https://portal.cor.europa.eu/egtc/en-US/discovertheegtc/Pages/welcome.aspx.

per km^2 in 2001 up to 715 in 2007. Between 2001 and 2006 over 80% of the population increase was due to migration. The south is the region in which there is the largest proportion of blue collar workers; in 2007, over 46 % of the population had this status, compared to 37% in the rest of the country.[8]

With 30 975 inhabitants in 2012, the city of Esch-sur-Alzette is the second largest city in the country, and was for long considered the centre of the Luxembourg steel industry. Since 2001, there was close to a 12% increase in the total population and a 22% increase in the active working population. In 2012, the density of the city of Esch-sur-Alzette, with 2 158 inhabitants per km^2, exceeds that of the City of Luxembourg. In 2001, the density was 1 900 and in 2007 it was just over 2 000 inhabitants per km^2. This density facilitates the building of effective public transport infrastructure and can create critical mass for innovative housing projects.

The majority of the residents are of Luxembourg (14 209) or Portuguese nationality (10 363). Of note in all statistics for the region is the discrepancy between the Luxembourg nationals and residents of foreign nationality, the majority of which are Portuguese. Figure 2.9 shows the mean age of foreign residents to be about ten years younger than that of Luxembourg nationals. The mean age increased by over one year between 2001 and 2007, and the life expectancy of the citizens is 80 years.

Figure 2.9. Demographic distribution in the southern region by nationality

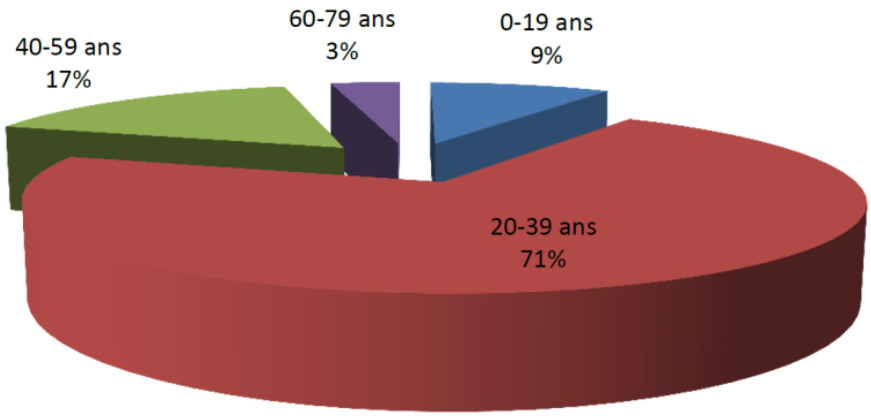


Source: PRO-SUD d'après les Bureaux de populations des Communes du Sud.

[8] PROSUD: Emploi Resident Sud 2007.

Interestingly, the population in the newly developed quarter of Esch-Belval is significantly younger, with a different segment of the population being attracted to this new quarter (see Figure 2.10).

Figure 2.10. Age of population in Esch-Belval[9]



Source: PRO-SUD.

In France, the territory of the Communauté de Communes Pays Haut Val d'Alzette (CCPHVA) was characterised by a decrease in the number of inhabitants since the second half of the 1960s, but this tendency seems to be reversing during the last decade. Although the rate of natural increase is still negative, a high immigration rate is resulting in an increase in the overall population. The history of this territory, similar to that of Esch-Belval, is closely related to the mining and steel industry. This industrialisation ceased during the 1970s, leaving vast zones available for conversion. A population of 26 000 inhabitants lives in these municipalities, which has a high population density of 360 per/km² (the average in France is 113 per/km²). Situated in proximity to the border, the influence of the Grand-Duchy of Luxembourg on the CCPHVA is very significant – 60% of the active residents work in Luxembourg and close to 70%[10] of all wage income inflows from Luxembourg.

The distribution of men and women in the CCPHVA and in the Lorraine region, is 48% and 52% respectively. Compared to the Lorraine region, in the CCPHVA, the young generation of 0-24 year olds is under-represented, and the generation of those aged 65-95 years is over-represented; indicating the area has an ageing population.

Economic characteristics

Luxembourg features a hierarchy of national, regional and municipal 'Zones d'activitées économiques' (ZAE) (Schulz, 2009, 2011).[11]

9 Source: Bureau de population – SIGI - Janvier 2012 / Calculs Observatoire Pro-Sud La population de Belval habitant dans les rues suivantes a été sélectionnée: avenue du Rock´n Roll et Porte de France et avenue de l´Université.

10 Opération d´Intérêt National Alzette-Belval: Mission de préfiguration – Rapport de septembre 2010

11 Schulz, C. & T. Chilla. 2011. Raumordnung in Luxemburg. Luxembourg: Editions Guy Binsfeld. Schulz, C. 2009. Wirtschaft und Mobilität : Luxemburgs Wirtschaft. In Der Atlas du Luxembourg, eds. P. Bousch, T. Chilla, P. Gerber, O. Klein, C. Schulz, C. Sohn et D. Wiktorin, In Der Atlas du Luxembourg, Luxembourg : Emons Verlag.

A total of 4 217 Headquarters in the south of Luxembourg in 2006 represented 16% of all companies within the country, compared to the over 37% that are located in Luxembourg city. In 2005, 14.5% of employees were working in the construction sector (compared to 11% national average), and 26% in industry (compared to the 13% national average), based on STATEC[12] data.

In Luxembourg, the entrepreneurship rate was 667 in 2010 and the company survival rate stood at 55%. In the city of Esch-sur-Alzette, between 2000 and 2010 the number of companies with their headquarters in Esch-sur-Alzette increased by over 22%, to a total of 1 221 in 2010. There is a saturation of space in the city, and companies that were first attracted by the larger city have been known to move to Schifflange, Mondercange or Sanem instead (Poos, 2012).

There is a significant **eco-technology cluster** in the south, and in particular in the area of Esch-sur-Alzette. In 2010, development of the Esch-Belval site led to 3 286 new jobs, and the development company, AGORA, estimates the number of new jobs will increase to over 4 000 in 2012 and to over 7 000 jobs in 2015. AGORA provides guidance on best practice for sustainable development to all private actors renting or purchasing space.[13]

Regarding the French area of Alzette-Belval*:* almost 60% of the residents of the CCPHVA work in the Grand-Duchy of Luxembourg (see Figure 2.11). Moreover, 27 % of the active population works in France, but outside of the territory of the CCPHVA. This has led to the development of a residential economy in the area.[14] The dominance of employment in the tertiary sector can be observed, with 80% of employees occupying positions in the service sector (see Figure 2.12). The two most important employment centres in the area are Audun-le-Tiche and Villerupt; these two cities recorded 55% of all newly created companies in 2008.

[12] Statistics Luxembourg http://www.statistiques.public.lu/en/actors/statec/index.html.

[13] http://www.agora.lu/fr/Services/Les-services-d-agora.

[14] Opération d´Intérêt National Alzette-Belval: Mission de préfiguration – Rapport de septembre 2010

Figure 2.11. Luxembourgish and French Municipalities of the EGTC – population estimates

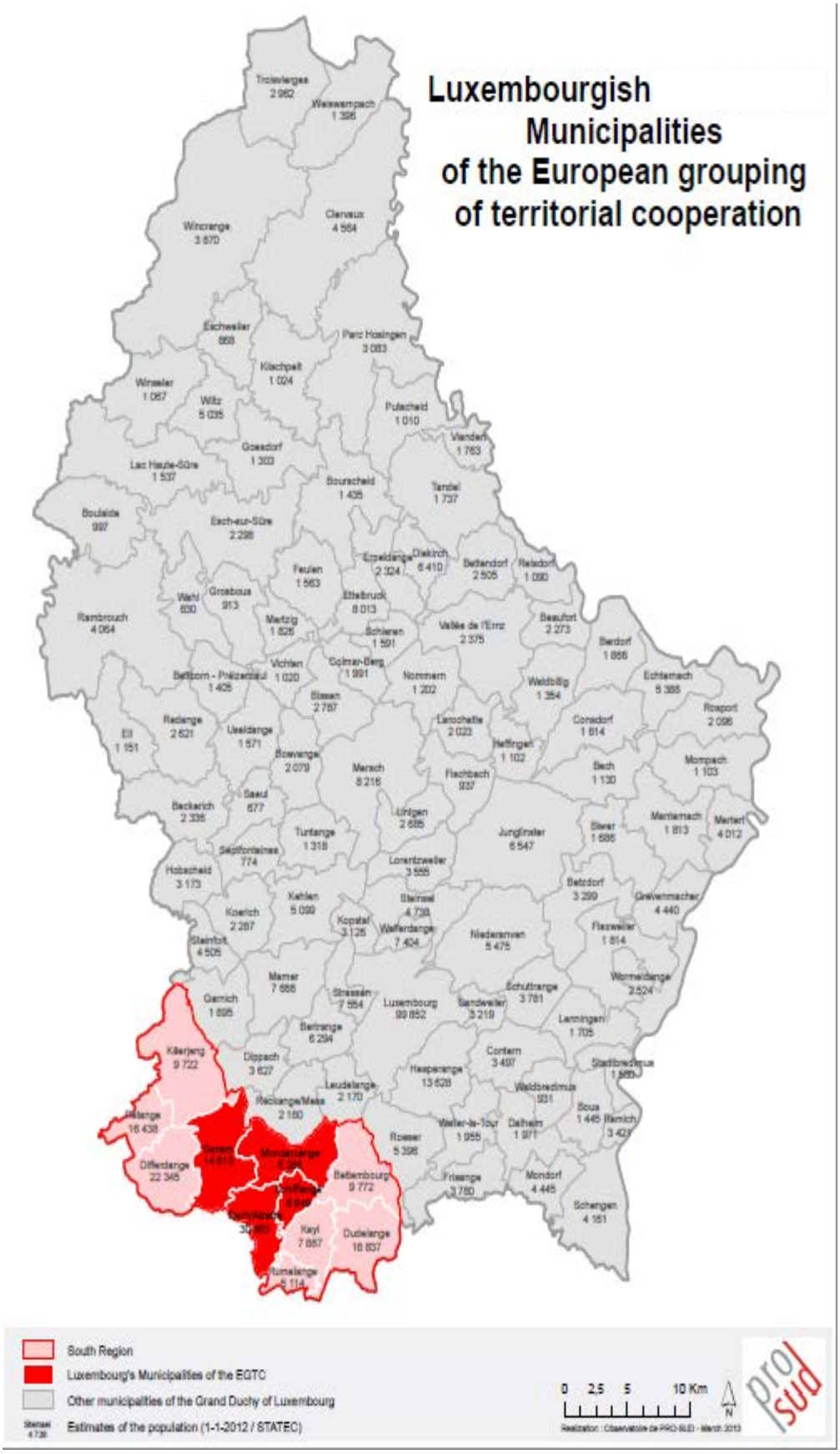
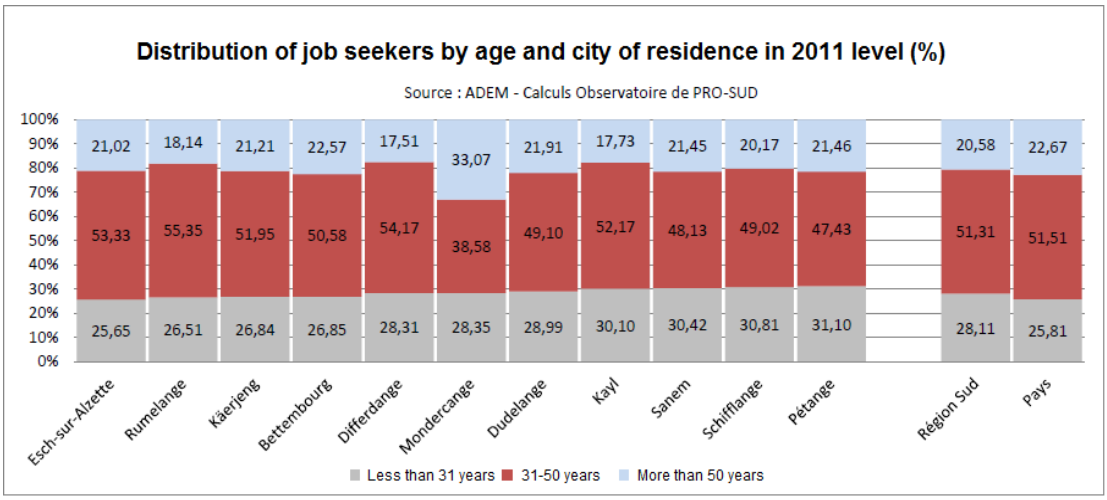


Figure 2.12. Share of private enterprises by sector of activity in 2008



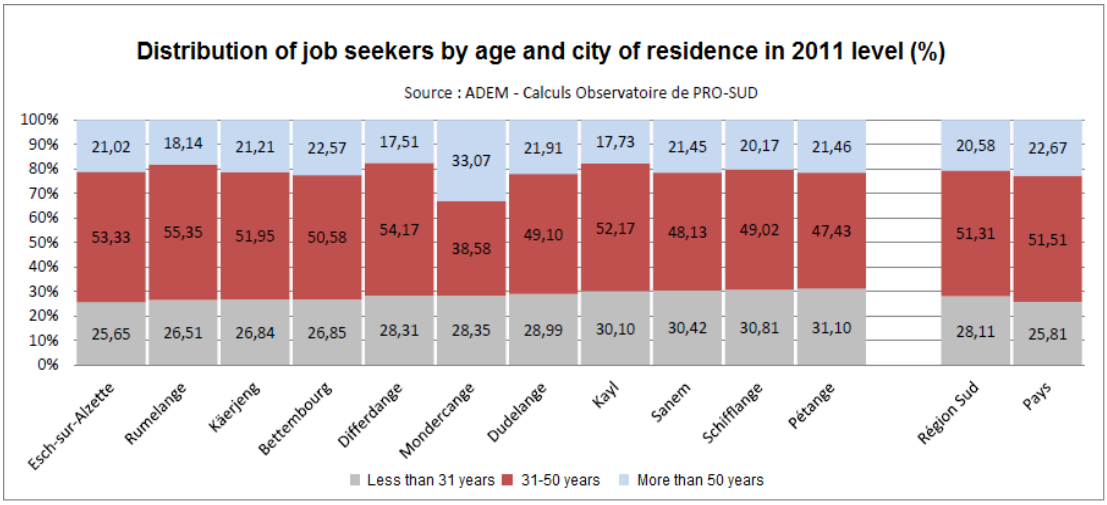
Source: Figure prepared by the authors based on data of AGAPE: Mission de Préfiguration Alzette-Belval – Etat des lieux 2010.

Employment

Luxembourg set targets for achieving an employment rate of 73%; keeping the school drop-out rate below 10%; and achieving the national objective of 40% for the proportion of individuals aged 30-34 that have obtained a tertiary or equivalent education by 2020. In order to attain these objectives, numerous measures have been elaborated, such as the reform of the public employment service (ADEM), the creation of a labour market observatory, the reinforcement of guidance activities dedicated to youth and the creation of programmes that allow those who have left school to return to school or training courses.

Unemployment rates have risen continuously over the last decade. Most job seekers in the south have only a basic level of education. Between 2002 and 2006, the proportion of both young job seekers and those over 50 years old have increased. However, the proportion of job seekers between 30 and 40 years old has decreased (Figure 2.13).

Figure 2.13. Distribution of job seekers by age and city of residence in 2011



Source: PRO-SUD d'après les données de l'ADEM.

In Esch-sur-Alzette, 13.6% of the 13 220 active inhabitants in 2012 are unemployed. This is the highest unemployment rate in Luxembourg. Unemployment has risen by over 70% since 2001, although the shape of the unemployment curve between 2001 and 2010 reflects the national curve.[15] The total employed population has risen by 14.4%. In 2004, 6.8 % of all employees were from across the border.[16] The advent of a University in the area is expected to alleviate the high unemployment rate, however, it is not clear how much effect this will have on employment of less well qualified young people.

The global financial crisis had notable effects on employment in the area. According to the World Health Organisation (WHO), depression and burn-out are increasing and by 2020 could be the second highest causes of disability. The International Labour Organisation has advised that psychological and physical violence in the workplace is costing between 1% and 3.5% of the national gross domestic product (GDP). It should be noted when looking at this connection that there has been a rise in unemployment up from 8 613 people in May 2008, at the start of the financial crisis, to 14 496 in April 2012, and that the unemployment rate in the south is twice that of the whole of Luxembourg. It will thus be important to set up mechanisms to track employment rates and healthcare costs, and organisations such as ADEM, and the CCSS (Chambers of Commerce) will be valuable instruments in this process.

The *Luxembourg 2020* strategy has set the objective of achieving 73% employment by 2020. The strategy describes specific measures aimed at improving the situation of two important target groups: young people; and older workers. A Youth Guidance Centre has been set up in order to facilitate young people's career decisions and it hosts various services for youth, including those available through the public employment service. Moreover, many opportunities have been opened up by establishing measures such as the Work Support Contract, the Initial Employment Contract and the Initial Employment Contract Practice. Significant financial resources have been committed in order to realise these measures. Training and guidance have also been developed within the framework of life-long-learning, with the aim being to improve the situation of older workers.

In the south, there is a specific focus on job creation in the eco-technology sector. CRP Henri Tudor, in collaboration with the Eco-dev cluster, helped establish dedicated business incubators through Technoport, housed in Esch-Belval, which can assist with administrative matters and the elaboration of business plans. Since the set-up of this system, a total of three Ecostart centres have been built in the south, including in Foetz and in Mondercange, with the incubator in Belval being more focused on ICT intensive projects.

Several of these newly emergent enterprises, which are targeted at the eco-technology field, tackle challenges that are highlighted in this report. For example, the young enterprise 'CityMov' builds up car sharing systems based on innovative combinations of technologies for co-ordination and localisation; and the fleet includes normal combustion engine vehicles but also electric and hybrid cars[17] and is now looking to diversify into bicycle and scooter or electro-bike sharing systems. The company claims that its market analyses suggest that in certain areas, car-sharing schemes progressively replace individual ownership, and thus one shared car has the potential to replace 4 to 8 individually owned cars, a scheme that also encourages multi-modal transport instead of predominant reliance on the private car. The need for administration as well as servicing of the fleets promises diversified job creation,

[15] Poos, X., 2012. *Esch: Une Ville en Mouvement : L'intégration de l'Université du Luxembourg dans la ville d'Esch-sur-Alzette.* p.30. Working Paper 15/01/12, 2ème mémoire de recherche présenté dans le cadre du programme de formation spéciale des carrières supérieures administratives cycle CO_CS-TS11A.

[16] Pigeron-Piroth, I. 2009. In *Der Atlas du Luxembourg*, Luxembourg : Emons Verlag.

[17] http://www.citymov.lu/.

offering new jobs across a wide range of qualification levels. An adjacent enterprise is developing mobile ICT applications facilitating modal chaining with real-time information on nearby transport options, including plans to advise on car availability and positioning within car and bicycle sharing schemes.

Skills ecosystem and innovation

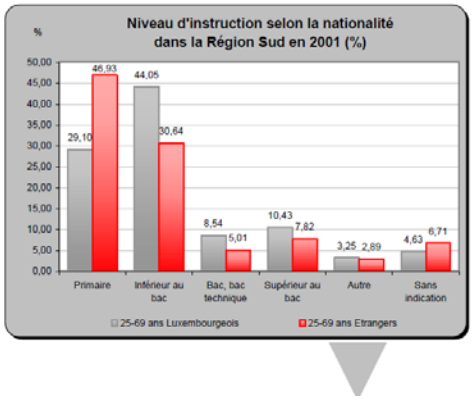
In planning for strategies to promote the creation of green jobs and development of related skills and competences, the demographic, education and employment patterns in the Alzette-Belval area, particularly on the Luxembourg side, have to be considered. The south of Luxembourg comprises eleven communities, which represent 30% of the population of Luxembourg. At the same time, due to much its heavy reliance on the steel industry, which has since declined, it is also Luxembourg's poorest area, with the highest level of unemployment.

In Luxembourg overall, 77% of the population has reached at least the second tier of secondary education. In the south of Luxembourg, the level of education is significantly different between Luxembourgish and foreign nationals. Less than 5% of the 25-69 year old foreign residents in the municipalities of the south have a bachelor's degree, compared to over 10% of Luxembourg nationals (Figure 2.14). The distribution of employment and incomes also differs markedly, with this segment of the population being largely employed in blue collar jobs and as manual labourers. These statistics also point to considerations relating to language barriers in any strategy designed to build green skills in diverse occupations that require different levels of education. For example, in the construction sector, there could be a need to target training at builders who may find French challenging, as well as targeting building material, including eco-material, salespeople, or highly qualified engineers who may come from Germany.

Of the European grouping for territorial co-operation (EGTC) Alzette-Belval municipalities in Luxembourg; Mondercange and Esch-sur-Alzette are on opposite ends of the spectrum regarding the education level for job qualifications among their residents. In Mondercange in 2006, over 68% of the active population had jobs in higher management or administration, compared to a national average of 52%; whereas in Esch-sur-Alzette, over 17% of residents were unqualified workers, compared to a national average of just over 10%.

Figure 2.14. Education level in population between 25 and 69 years by municipality and nationality in 2001

RP2001	Primaire	Inférieur au bac	Bac, bac technique	Supérieur au bac	Autre	Sans indication	Total
Bascharage	22,99	38,81	10,57	12,56	3,58	11,49	100
Bettembourg	26,53	41,76	9,06	10,85	4,04	7,76	100
Clemency	26,31	44,67	10,41	13,67	2,62	2,31	100
Differdange	44,20	36,30	4,78	5,89	3,56	5,26	100
Dudelange	32,99	38,28	7,57	10,34	3,54	7,28	100
Esch-Alzette	42,98	35,00	6,26	10,29	2,64	2,83	100
Kayl	37,76	42,76	5,63	7,81	2,79	3,25	100
Mondercange	18,41	45,39	11,81	16,80	3,49	4,10	100
Pétange	34,36	38,42	6,97	7,67	2,92	9,65	100
Rumelange	43,80	36,21	5,64	6,61	2,51	5,23	100
Sanem	30,84	46,22	8,43	9,75	3,04	1,72	100
Schifflange	34,23	43,27	7,65	7,78	2,37	4,70	100
Région Sud	**35,37**	**39,33**	**7,30**	**9,51**	**3,12**	**5,36**	100
GDL	**25,08**	**37,06**	**8,93**	**16,84**	**3,79**	**8,26**	100



Source: PRO-SUD based on STATEC data from 2001.

In Alzette-Belval, education and innovation will play a key role in transforming this area over the next decade, as four public research organisations, including the University of

Luxembourg are moving here. This is a major shift for a region that has historically been associated with steel production, low skilled jobs, and industrial decline. Greater access to education and the fruitful exchange and integration of the local population with the research community will be driving forces for change. Catering for all education levels for employees involved in the green industry, particularly the construction industry, will be key to success. As the predominant language among the blue collar working communities is French, significant synergies can be expected from cross border co-operation in further developing and expanding such training schemes. Planning should rely on participatory processes, closely co-ordinated with social partners.

The "Institut de Formation Sectoriel pour le Bâtiment" (IFSB) in Bettembourg provides training courses relating to sustainable construction, which target builders and blue collar workers, as well as managers and highly qualified architects and engineers. The "Centre national de formation professionnelle continue" (CNFPC) in Esch-sur-Alzette provides more specific job and sector related training, e.g. for specific crafts, with cleaner production content.

In the construction sector, a number of initiatives that target different levels of qualification have been successfully set up during recent years. CRP Henri Tudor, through its Knowledge Transfer and Training Centre (SITEC), is organising a professional training cycle called "Energie et Constructions", in collaboration with the Order of Architects and Consulting Engineers (OAI). The cycle covers a broad range of topics related to sustainable construction such as energy-efficient buildings, heating and cooling, and environmentally friendly construction materials. The target audience are architects, engineers and managers. CRP Tudor and Lippmann also deliver training in environmental technologies pertaining to areas such as green logistics, innovative wastewater treatment, and environmental monitoring. Special attention is given during the conception of the training to developing a strong and close collaboration with stakeholders, such as the "Association du Personnel des Stations d'Epuration Luxembourgeoises" (APSEL). In addition, the University of Luxembourg offers various Bachelors and Masters degrees that specialise in environmentally sustainable and cross-border governance issues, and the University Cell for sustainable Development offers an interdisciplinary course on social learning processes.

The importance of developing indicators for education, research, and innovation are thus highlighted. When considering how to develop green skills, green training and education, it can be assumed that there will be less distinction made over time between university courses and professional training as university degrees in the area of sustainable development become closer to practice, and professional training seeks to build public awareness around the complexity of the issue and the need for capacity building across disciplines in social learning processes. This is not to say that these training programmes will not still be related to specific subjects or focus on specific challenges such as housing, energy-saving in the built environment, and improved transport systems and practices.

One way to measure green education is to simply count the number of courses offered in sustainable development, eco-technologies and green jobs training, including details of the course providers, number of participants, and number of teaching hours in the course. The complex landscape of organisations in Luxembourg providing ground-level and further skills training, and the new cluster of public research organisations, most of which are engaged in teaching activities, necessitates the building of a platform to establish training needs, target diverse groups, and co-ordinate planning of new courses or adaptation and differentiation of existing courses (OECD, 2010[18]). Targeting courses at workers of all levels of education will

[18] Martinez-Fernandez, Hinojosa & Miranda (2010) *Greening jobs and skills: labour market implications of addressing climate change*. OECD LEED Working Paper.

be also crucial. Additionally, in order to fully understand the cross-border implications, it is necessary to track the number of course participants residing abroad.

Green Policies & Initiatives in the Benelux

This section presents national policies and local initiatives in the Benelux Union and related to the two scenarios under analysis.

National/Regional initiatives relevant for the Ghent-Terneuzen cross-border area

The transition towards a low-carbon economy in Belgium and the Netherlands is structured mainly around climate mitigation policies on the one hand, and industrial and innovation policies on the other. The framework for climate mitigation is mostly developed at the EU level. The EU's *Europe 2020* objectives refer to the targets for 20% reduction in greenhouse gas (GHG) emissions, 20% energy efficiency gains and 20% increase in renewable energy from 1990 levels.[19] In order to reach these objectives, Belgium and the Netherlands have developed policies at the national, regional and local levels. The Belgian case is rather specific, given the distribution of competences over the different regional entities, with Flanders, Wallonia and Brussels having exclusive responsibility for many of the relevant policy initiatives that will contribute to GHG reductions. A truly national climate plan does not exist in the Belgian context, but is rather the combination of different regional plans and the Belgian government's initiatives, which together constitute the country's climate policy.

In the case of Ghent-Terneuzen, the important policy level is mostly at the Flemish level. The basis for the Flemish climate mitigation policy is the *Flemish Climate Policy Plan 2006-2012*, which covers the complete Kyoto period (2008-2012). According to the national distribution plan for GHG reductions, Flanders has to limit its emissions by an average of 5.2% compared to 1990 levels. The policy is centred around five priority areas: agriculture and food; energy; buildings; industry; and transport and mobility.

The Flemish climate change mitigation budget (both domestic and external policy measures combined) amounts to about 1.5 billion euro for the 2006-12 period. In addition to these expenditures by the Flemish Government, there are also climate related expenditures by local, provincial and federal governments, private companies and households. The climate change budgets across all topic and policy areas have increased considerably compared to the original estimate in 2006. An important share of the additional expenditure has been allocated to the ecology subsidy for investments in combined heat and power generation (CHP), renewable energy, and energy savings at the level of individual houses and living units.

There was also a considerable increase in the budgets of the building sector. As part of its 2009 budget planning, the Flemish Government decided to invest an additional 50 million euro/year in rational use of energy (RUE) policy for housing.

The Flemish Climate Policy Plan is explicitly linked to broader strategic processes. In particular, the linkages with the Flanders in Action 2020 Strategy, the Flemish Strategy for Sustainable Development, and the Fourth Environment and Nature Policy Plan are of relevance. Important elements of the policy include a clear emphasis on cost efficiency, by prioritising reduced marginal costs and emphasising internal measures, with the option of additional use of flexible financial mechanisms.

Of importance for Ghent is that local authorities are included in the Flemish strategy, which states that 'the reduction of GHG emissions at the municipal and provincial level is an

[19] See http://ec.europa.eu/clima/policies/brief/eu/index_en.htm.

important objective for local authorities.' As a follow up action from the 2008 climate package of the EU, the European Commission launched the Covenant of Mayors, to stimulate and support local objectives and policies and processes towards a low-carbon society. The city of Ghent has joined this initiative, and committed itself to be an active participant. In addition to the more traditional local spatial planning, mobility and energy policies, the Flemish plan also sees possibilities for 'demonstration projects and knowledge growth'. . In Flanders, the more ambitious cities of Leuven, Antwerp and Ghent, and the province of Limburg have stated an aim of 'carbon neutrality by 2030 or 2050' as their official policy line.

In terms of industrial and innovation policies, the following elements form the core of the Flemish policy framework:

> The driving force in the field of research and innovation is the *Environmental and Energy Technology Innovation Platform*. During the past two years, diverse measures have focused on the improvement of existing systems, and the development of new systems for energy efficiency, the rational use of energy, renewable energy technologies, and classic energy production.
>
> In a broader context, the connection between the ambitions regarding the 'green economy', a low-carbon society, and innovation have been embedded in Flanders' *New Industrial Policy*, and in a number of initiatives in the *Flemish Research and Development Policy*, including I-Clean Tech, and an important new strategic document by the Flemish Council for Science and Innovation about the link between green and low-carbon research and development on the one hand, and industrial innovation and competitiveness on the other.

Both provinces of Zeeland and East Flanders have adopted certain indicators, which are linked to the OECD Green Growth indicators, in order to monitor low-carbon development at a local level. Within the Belgian province of Eastern-Flanders, the departments of economy, the environment, mobility and spatial planning hold relevant, but incomplete, information (Verdonck, 2012b). Of particular importance here is the so-called "milieubarometer" (English: environment barometer). The goal of this barometer is to measure and quantify the effectiveness of the provincial environmental policy (Provincie Oost-Vlaanderen, 2012b). Although the number of indicators is rather limited and the last available measurement dates from 2010, this barometer yet provides valuable insights into the province's efforts.

With regard to the Dutch province of Zeeland, there appears to be a lack of local scale indicators (Woets, 2012). There is also no data collected on cross-border initiatives within the Euregio Scheldemond, although there is a record of organisations and industries which make use of bio-based processes (Verdonck, 2012a and De Kort, 2012).

National initiatives relevant to the Alzette-Belval area

Several EU, national and local policies relate to sustainable development and transition to a low-carbon society in Luxembourg generally and in the south specifically. The overarching policy framework that sets umbrella targets, also provides direction for development of more sector-based policies, and stems from the EU 2020 policy and its national and local manifestations. Land use changes, and relieving the strain on environmental assets and infrastructures are considered within the spatial planning objectives,

titled the *Programme Directeur d'Aménagement du Territoire*.[20] Green industrial development is targeted in the *National Action Plan on Eco-Technologies*.

In the 1990s national policy-making directed increasing attention at land-use and land cover change. The resulting two strategic documents are still very influential in giving direction to the country's spatial development: the national spatial planning programme (Programme Directeur d'Aménagement du Territoire) and the 'Integrated Transport and Spatial Development Concept for Luxembourg' (IVL).[21] The programme defines three key priority areas that can easily be related to the OECD areas for developing Green Growth indicators: urban and rural development, transport and telecommunications, and environment and natural resources.

Developing a key state-driven implementation measure of these national spatial planning objectives, in 2000 the Minister Michel Wolter deemed that the reconversion of the industrial waste land presented a unique chance for redirecting and reviving and diversifying economic development in the South that was structurally deeply affected by industrial decline. This was the origin of the Esch-Belval urban development project that lies at the centre of this case study. A second objective is to promote the cooperation of public authorities at the local, regional and cross-border level, in particular where it concerns the development of cross-border agglomerations like in the case of the Alzette-Belval area.

A long-term objective of the Integrated Transport and Spatial Development Concept is to reduce the traffic and journey distances and its current impact on quality of life on the environment. Innovative urban development will have a key role in reducing the need for traffic within urban agglomerations. New information and communication technologies must be developed to reduce the need for journeys and as a contribution to better organized transport flows. An ambitious modal spilt target that 25% of trips should be done with public transport and 15% by low impact mobility has been set. A public agency, the Verkéiersverbond was created to develop implementation measures, and to proactively invite local private actors to develop company mobility plans, and through other measures. As in housing, in transport the social dimension of accessibility to affordable means is considered key and a prime policy objective.

EU 2020 and related national and local policies and programmes

The overarching policy influencing national and regional development in Luxembourg, France and across the rest of Europe, is the *Europe 2020* strategy for smart, sustainable and

[20] Programme Directeur d'Aménagement du Territoire: http://www.dat.public.lu/strategies_territoriales/programme_directeur/index.html

[21] Since the introduction of the Law of 21 May 1999, the *Programme Directeur d'Aménagement du Territoire* has become the key instrument of national spatial planning. This Law states that the programme "determines the Government's general guidelines and priority objectives for the sustainable development of the living environment, the use of human and natural resources and the development of activities, and the principal measures to be taken with a view to achieving them" (Article 4(2)). The programme is therefore a policy framework specifically aimed at coordinating sectoral plans in order to achieve specific spatial planning objectives. It presents a long-term planning vision that strives towards a coherent use of specific planning policies in order to avoid unbalanced territorial development, ensuring equal access to housing, employment, education, supplies, facilities, transport, natural areas in both urban and rural environments.

inclusive growth and jobs, launched in 2010.[22] [23] [24] The associated key targets, which are also the basis for developing progress indicators, address five main areas of development:

i. Employment: 75% of 20-64 year olds to be employed.

ii. Research & Development: 3% of the EU's GDP to be invested in R&D.

iii. Climate change / energy: greenhouse gas emissions (GHG) to be 20% lower than 1990, 20% of energy to come from renewables; 20% increase in energy efficiency.

iv. Education: Reducing school drop-out rates below 10%; at least 40% of 30-34 year olds completing third level education.

v. Poverty / social exclusion: at least 20 million fewer people in or at risk of poverty and social exclusion.

An associated flagship initiative is aimed at: decoupling economic growth from the use of resources; increasing the use of renewable energy sources; modernising the EU transport sector; and promoting energy efficiency. For its effective implementation, the *Europe 2020* strategy emphasises the need to mobilise actors at all levels, including EU committees, national parliaments, and national, local and regional authorities, social partners and civilian society across Europe[25].

The national adaptation of Europe 2020 (EU2020), the LU2020 policy, adopts the overarching goals of EU2020, and includes a range of multi-sector specialisation policies to foster innovation for growth and promote quality of life, including the implementation of a 'knowledge triangle' within the Cité des Sciences, consisting of the Luxembourg national library's projects in the area of digital information, the master plan for implementing information technologies within the state, and the third SME action plan.

The national plan is complemented by EU policies and instruments that are designed to translate EU2020 into relevant local and municipal actions. 'EU2020 going local'[26] was an Interreg IV C project, which aimed to contribute to a more effective implementation of the Europe 2020 strategy both at the local and regional levels, with the active participation of representatives of municipalities in Alzette-Belval. The project ran from November 2010 to

[22] European Commission, EUROPE 2020, A strategy for smart, sustainable and inclusive growth, COM(2010) 2020 final.

[23] According to Eurocities, 'Green growth means shifting to a development model where environmental protection and economic growth complement each other, rather than being contradictory'. (Eurocities homepage, http://www.eurocities.eu/eurocities/issues/green-growth-issue, 21.05.2012).

[24] The two flagship initiatives: an *Industrial policy for green growth* and *Resource-efficient Europe*, under the Europe 2020 strategy are designed to promote just such a shift to a resource-efficient and low-carbon economy and help the EU reach the 2020 goals for energy production, efficiency and consumption. (Europe 2020 strategy – Flagship initiatives, http://ec.europa.eu/europe2020/reaching-the-goals/flagship-initiatives/index_en.htm, 21.05.2012).

[25] In the European Council Conclusions (24/25 March 2011) the EU Member States have formally recognised the role of all partners: 'In implementing these policies, and in order to ensure wide ownership, close cooperation will be maintained with the European Parliament and other EU institutions and advisory bodies (ESC, CoR), with the full involvement of national parliaments, social partners, regions and other stakeholders (point I.6)'.

[26] www.eu2020goinglocal.eu.

November 2012. The "EU2020 going local" project provided a platform for exchange between municipalities and regional authorities on topics such as indicators for local change with respect to energy-production and use and transport, in order to support political decision processes, expedite public communication, and raise awareness both internally and externally.

The *EU Cohesion Policy* offers financial instruments to support far-reaching structural reforms towards a more resource efficient and low-carbon society and to assist in achieving the Europe 2020 strategy, particularly the resource efficient Europe flagship initiative. It is a large-scale public funding programme aimed at overcoming disparities in European regional development, with a current focus on sustainable energy and green transport choices.[27] The next iteration of the Cohesion Policy after 2013 is expected to place even greater emphasis on low-carbon economic development. The *Territorial Agenda 2020* (TA2020) is an action-oriented policy framework designed to support territorial cohesion in Europe. As such, it tries to mobilise the existing potential within European regions and cities, and to use territorial diversity to provide sustainable economic growth and jobs through integrated spatial development. The TA2020 draws attention to energy, water management, agriculture, housing, tourism and transportation, pointing out that energy challenges could come to the fore and threaten regional competitiveness.

The *Climate Pact Initiative* and the *European Energy Award* (EEA) provide municipalities with tools for developing, implementing and monitoring climate adaptation and mitigation measures. Participation is voluntary. To meet EU2020 emissions and energy efficiency targets, the Luxembourg government is currently preparing a legal framework for the climate pacts, which are conventions between the state and municipalities, giving the latter a more prominent role in climate change mitigation and adaptation policies. The climate pact concept has been developed by MyEnergy, the national organisation providing information and advice on energy efficiency and renewable energies through the Ministry of Sustainable Development and Infrastructure. By signing the climate pact, each participating municipality will commit itself to implementing the EEA process within its territory, including impact monitoring through a set of recommended indicators. The climate pact initiative was approved in September 2012 and was launched in January 2013.

The national plan for eco-technologies

At the national level, Luxembourg has identified environmental technologies as being one of four sectors around which economic development and diversification of the Luxembourg economy shall be centred. Accordingly, the *Action Plan on Eco-technologies*, was launched in 2009 in support of further diversifying the Luxembourg economy in a targeted manner.[28] The definition of environmental technologies as defined by EUROSTAT and OECD was adopted, namely: eco-technologies help to 'measure, prevent, limit or correct environmental damage (pollution of water, air, soil,) as well as problems relate to waste, noise, landscape degradation, biodiversity loss and depletion of resources'. Luxembourg is devoting significant resources to developing, supporting and promoting eco-technologies.

A study commissioned by the Ministry for Economy and Foreign Trade, carried out by the agency LuxInnovation, in which the Centre de Recherche Public Henri Tudor was also involved, has mapped economic and research activities relating to this sector in Luxembourg in 2008 (Magi, 2009).[29] The 235 actors consist of 187 private firms, 7 public research centres

[27] Council of the European Union, Community Strategic Guidelines for Cohesion policy, 2006/702/EC

[28] http://www.gouvernement.lu/salle_presse/actualite/2009/01-janvier/22-krecke-ecotech/index.html.

[29] Magi, L. 2009. Développement économique et Mobilité : Les éco-technologies. In *Der Atlas du Luxembourg*, eds. P. Bousch, T. Chilla, P. Gerber, O. Klein, C. Schulz, C. Sohn et D. Wiktorin, P.118. Luxembourg : Emons Verlag.

including the University, and 41 other public bodies (at the national and municipal level). Main activities fall into the sectors of renewable energies (largely distribution and installation), waste, water and eco-construction and materials, energy management consulting and eco-design. Geographically, several of these activities are clustered in the south, and in particular, the community of Esch-sur-Alzette concentrates many activities around eco-construction and energy.

LuxInnovation launched the cluster EcoDev in 2009. This is a virtual cluster, providing support services to research and economic actors in this sector, and is a platform for information exchange, networking, and communication. The overall objective of the Luxembourg EcoDev Cluster is to reinforce the competitive advantage of the Luxembourg companies that are active in the field of eco-technology and sustainable construction, within a five year timeframe. Specifically, the cluster serves to diversify the activities of the Luxembourg companies, thus allowing them to gain and to contribute to the development of new environmental solutions in the field of eco-technologies and sustainable construction; to raise public awareness and thus improve the uptake of green technologies; to build public-private partnerships in order to develop new collaborative R&D and innovation projects of common interest; to encourage networking and knowledge exchange between public and private actors at the national and the international level; to advise on national and European funding opportunities for eco-innovation technologies, and to source and provide information on emerging technologies and markets.

Another area of focus for Luxembourg is on construction, housing and a proposed economic development focus on reducing energy-use in the built-environment. In Europe, energy-use in and for buildings has been estimated to account for 40% of all energy use (European Union, 2010). The EU directive on energy performance of buildings[30] led to legislative instruments for evaluating and improving energy performance in new buildings, however, the 90% of existing buildings that are older than ten years will also have to be improved if the EU2020 aim of achieving 20% energy efficiency is to be achieved (EU, 2006). The planned new directive to indicate energy-efficiency in public buildings, with associated requirements for a minimum yearly energy renovation rate, presents a first small step in this direction. The Intergovernmental Panel on Climate Change (IPCC) has also highlighted the existing combined challenges of changing user behaviour and retrofitting existing building stock (IPCC, 2007). This has implications for green skills and training – not only architects and engineers, but also builders in terms of use of new materials, and passive house technologies.

There is a significant cross-national nature in all of these endeavours. The small size and multi-lingual and multi-cultural nature of Luxembourg means that several eco-technology firms such as Rotarex, which produces car exhaust catalysts, or Epuramat's waste-water treatment process, already provide products and services to neighbouring countries (Germany, France and Belgium) or export their products to further away markets such as China.

Local initiatives in the Benelux

There are several positive and inspiring examples of local low-carbon or green growth initiatives in the Benelux countries. These range across the full spectrum from fully fledged integrated action plans (e.g. Louvain climate neutral in Belgium, or Nijmegen climate neutral in the Netherlands) to a focus on one aspect of the low-carbon transition, such as innovative climate neighbourhood projects, energy towns and sustainable industrial zones. There are so many in fact, that it is impossible here to provide a comprehensive overview, but noted some illustrative examples are noted below.

[30] 2002/91/EC and 2010/31/EU.

The European Covenant of Mayors

This is one of the most visible low-carbon processes at the local level, and has almost 4 400 signatories, who have pledged that they will contribute at the local or regional level to reach the GHG emission reduction and renewable energy targets of the EU. The 4 400 signatories represent more than 160 million inhabitants. The Covenant in and of itself has created a focal point for local ambitions around low-carbon development and green growth.

Most of the municipalities or other local actors have stated political goals that go much further than the official 20-20-20 goals of the EU. The participants pledge that they will formulate and execute a Sustainable Energy Action Plan (SEAP). The signatories represent cities ranging in size from small villages to major metropolitan areas such as London or Paris, who have signed the Covenant of Mayors on a voluntary basis, and who are committed to implementing sustainable energy policies designed to meet or exceed the EU 20% carbon dioxide reduction objective through increased energy efficiency and development of renewable energy sources. The cities are free to choose the format of their SEAP, as long as it is in line with the general principles set out in the Covenant SEAP guidelines.

Belgium has 62 signatories, the Netherlands 17, and Luxemburg 2. Many of the larger cities (Antwerp, Ghent, Luxemburg, Amsterdam, and Rotterdam) are members, and are developing or already implementing local strategies. There is much detail available on the Covenant's website (http://www.burgemeestersconvenant.eu) about individual cities or provinces, the plans they have submitted, aggregate scores at the country level, however, there are no indicators that allow for meaningful comparison or evaluation of these 4 400 different local processes and policy ambitions, thus illustrating the very real need for more structured information gathering and indicator development.

In addition to the Covenant of Mayors, there are other local examples of green growth processes in the Benelux. The seaports of Antwerp, Rotterdam and Amsterdam, for example, have also engaged in low-carbon plans, in recognition that the recent attention on GHG emissions in the maritime sector (the so-called bunkers), pose serious challenges to their core business. Additionally, public housing corporations are building low-carbon neighbourhoods, and universities are stimulating networks of eco-innovation. Boxes 2.1 and 2.2 below illustrate just two examples of low-carbon initiatives in the cities of Ghent and Leuven.

The city of Ghent, in particular, collects an enormous amount of data. As a signatory of the Covenant of Mayors, Ghent aims to become a sustainable city and to be seen to be such. Currently, the city is focusing on winning the European Green Capital Award 2014, and its application necessitated monitoring of many environmental statistics (Mercy, 2012). Relevant statistic information is given at a city-level on its website http://www.gent.be/gentincijfers/ (Verhassels, 2012). Ghent also has a "milieubarometer" to annually measure several indicators such as carbon dioxide emissions, energy use, domestic waste collection, and air, soil and water quality (City of Ghent, 2012). Despite these records, however, the Ghent environmental agency stated that there are insufficient indicators for green economy and innovation. The reason for this is that these are relatively new domains to measure at the city level. Ghent, because of its knowledge intensive urban reconversion, and its link to the industrial potential for eco-innovation, is very keen to develop indicators that will enable it to measure innovations in the future (Mercy, 2012).

Box 2.1. Leuven Climate Neutral

In May 2012, the City of Leuven stated its ambition to become climate neutral by 2030. This high ambition was embedded in a long-term action program called 'Leuven Climate Neutral'.

The political initiative draws on the rich resources of the city of Leuven:

- A major research University and Engineering School, with competences in nearly all major areas of eco-technology and innovation, business modelling, participatory methods, scenario building, etc. In fact, the University of Leuven plays an essential role in Flanders and Belgium in providing the knowledge base for the transition to the LCE and Green Growth strategies. It also connects the city to a European and even global network of knowledge institutions.

- The presence of a number of very ambitious, significant economic players. The INBEV brewery group, which is the largest brewery group in the world, is headquartered in Leuven. IMEC, which is the largest independent computer chip developer in Europe and which co-operates with all the major ICT companies in the world is also based here. In addition to these major players, Leuven is host to dozens of important high technology, eco-innovation and clean technology spin-off companies.

- The city of Leuven has a very strong and well developed network of civil society organisations. The program also explicitly involves local non-government organisations, social-economy networks, etc.

The program is translated into working groups consisting of a mix of the above mentioned groups. Besides the network and process dimensions, Leuven Climate Neutral is also strongly evidence based. A base-measurement of the city's actual GHG emissions, which was undertaken by a specialised consulting firm in co-operation with the university and the Flemish Institute for Technology Development (VITO), provided sounds scientific knowledge and indicators. These are deemed important not only for following up and measuring success (or failure), but also as tools by which to communicate problems, ambitions and success to the local stakeholders.

Linked to this lofty ambition is the very broad scope and encompassing nature of the program. In order to reach climate neutrality, all aspects of the production and consumption habits of the inhabitants and the economic actors will need to be part of the essential transition towards climate neutrality.

Source : http://www.leuven.be/leven/klimaatneutraal/.

Box 2.2. Ghent's urban innovation path

The city of Ghent (about 250 000 in habitants) is an older medieval city with very high population density, a major urban industrial past (textiles and other 19th and early 20th century industries), and significant urban conversion challenges, as many of the neighbourhoods are not adapted to sustainable urban patterns of development.

The city of Ghent therefore embarked on a path of urban conversion and sustainability about 10 years ago. Some of the major initiatives taken include restructuring the old inner city into a zone with very low car mobility. The shift towards a model based on pedestrians, bicyclists and public transportation has fundamentally changed the outlook, feeling and quality of life of the city.

The city has co-operated closely with the University of Ghent on several key aspects of this process. The university has an excellent tradition in the areas of urban planning, eco-technology, and sustainable development. The Centre for Sustainable Development has been a frontrunner in Belgium in the development of indicators for urban sustainability, with a strong emphasis on robust quantification and the processes behind indicator development. This has resulted in the 'Stadsmonitor' or 'Urban Monitor' of sustainability, which has been used by the city to monitor its processes since 2007.

The Monitor consists of 200 indicators, measuring:

- the quality of life in the city; and
- the sustainability of the city's development.

Besides Ghent, other Flemish cities use the monitor, including Antwerp, Brugge, Brussels, Gent, Hasselt, Kortrijk, Leuven, Mechelen, and Ostend.

Ghent has also chosen to follow a path of low-carbon conversion for old neighborhoods. A striking example is the 'Gasmeterlaan site' which is an old brown-field site in the middle of the town. It was originally used for natural gas storage and other industrial facilities, which caused major soil pollution. The site will be redeveloped over the next decade, and turned into a low-carbon neighborhood, with more than 500 houses and apartments, a park, facilities such as 'car sharing', cultural and educational facilities, etc. During the project conceptualisation, sustainability and low-carbon potential were essential elements in the formulation of the master plan and the requirements for developers.

When this neighborhood is completed it will be the largest of its kind in Belgium and undoubtedly an example for urban conversion.

Sources : http://www.gent.be/eCache/THE/4/165.html; http://www.gent.be/eCache/WRA/91/009.html.

Policy Implications

This chapter has been concerned with providing context from the Benelux Union and the two regions that are case study scenarios within this report. The immediate policy implications in each of the two cases, which are likely to also be relevant to other cross-border areas within the Benelux Union, are the additional pressures and complexity that cross-border regions face in the low-carbon transition. These include language barriers, lower education levels among foreign workers, and the need for training to develop new skills required for green growth development.

This cross-border challenge is especially evident when seeking to gather and interpret data on green growth for policy development at the various jurisdictional levels, in order to deliver green growth outcomes to the people and businesses in these cross-border regions.

Another implication is related to the use of green growth as a revitalisation strategy in peripheral areas of decline, and monitoring the results in terms of policy effectiveness. One such mechanism could be to stimulate the private sector much more with policy instruments

that support small-medium enterprises (SMEs) in order for the area to be sustainable to meet the needs of the population density across borders.

However, consideration should also be given to the significant synergies that can be gained from cross-border co-operation in developing and expanding training schemes. To this end, policy planning related to training and skills development should rely on participatory processes, closely co-ordinated with existing public and private social partners.

CHAPTER 3. EUROREGION SCHELDEMOND'S BIO BASE CLUSTER AS A PATHWAY TOWARDS GREEN GROWTH

Abstract

This Chapter analyses the Ghent-Terneuzen case area, with particular emphasis on the recently established Bio Base cluster. The Ghent-Terneuzen area is within the Euroregion Scheldemond and is a cross-border region between the Netherlands and Belgium. The area is the site of two major ports, with implications for related transport and logistics infrastructure. The Bio Base cluster is an economic development strategy for green growth to promote low-carbon economic and skills development activities in the production of energy and industrial products from biomass. The chapter also provides details of the regional policies, initiatives and assets for green growth and the specific challenges facing the region.

Introduction

This chapter examines a piece of the puzzle necessary to develop a pathway towards a low-carbon economy and green growth in the border region between Belgium and the Netherlands, more specifically, the region in the Scheldt river estuary. The study of the biocluster at the seaports of Ghent and Terneuzen is somewhat complicated, because it is very hard to clearly delineate, as neither the geographic boundaries, nor the political nor network boundaries are easy to define.

The biocluster is therefore approached from two different levels – on the one hand, it is investigated as a stand-alone initiative, with high aims towards eco-innovation and potential contribution to the decarbonisation of industrial production and energy systems and, at the other level, it is examined as part of a broader and more integrated approach to low-carbon development and green economic transformation within the Ghent region.

The case thus illustrates that local or regional approaches often do not coincide with traditional policy making boundaries or traditional economic networks. The fact that the biocluster is embedded in cross-border co-operation within a seaport area adds to its complexity. With the harbours of Ghent and Terneuzen being key components, both co-operation and competition play a role. In the process of converting older industrial production sites in the port areas, they support each other through joint research and development facilities, an experimental bio-plant, and a bio-industrial training centre for the labour force. However, each port has its own commercial interests and as such is a competitor with the other.

The case also illustrates the difficulty of working with indicators. The city of Ghent probably has the most advanced systematic follow-up of processes of sustainable development in Belgium. Through its city monitor system, it measures numerous indicators and links them actively to city policies and projects of ecological urban conversion. Yet, at the same time, those indicators are little, if at all, connected to the biocluster project. The biocluster project, which aims to contribute to the low-carbon industrial transition, also monitors its activities in an equally disconnected way. Making solid, evidence-based claims on its achievements is thus very difficult at present. The cross-border nature of the area

further complicates the matter, as an integrated cross-jurisdictional means of measuring, monitoring and reporting is currently not in place.

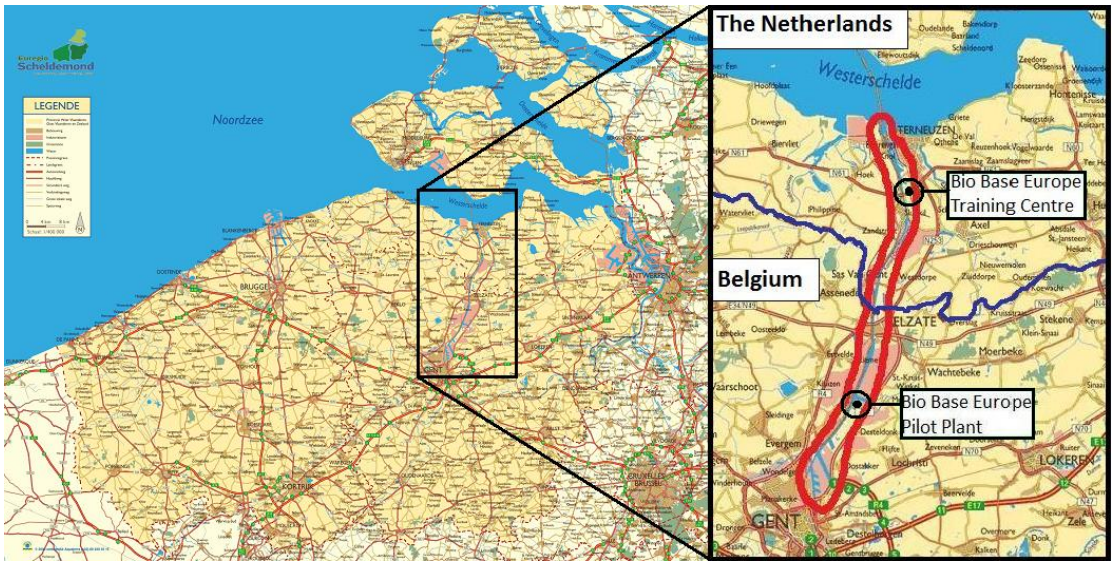
The biocluster therefore has to be evaluated as a single ambitious and creative project. It is also important for it linkages between strong eco-innovation and explicit labour market dynamics and so-called 'green skills', an aspect often forgotten or marginalised in other projects.

Background on the biocluster in the Euroregion Scheldemond

This section provides background information on the biocluster within the Euroregion Scheldemond. The left part of Figure 3.1 shows a map of the Euroregion Scheldemond, consisting of two Belgian provinces (Eastern-Flanders and Western-Flanders) and one Dutch province (Zeeland). The Euroregion Scheldemond is in a slightly darker colour, showing the exact borders of this cross-border region.

The right part of this figure is a close-up of the specific Bio Base Europe area within the Euroregion Scheldemond (outlined in red). The two initiatives of the Bio Base Europe project lie within this field: the Training Centre is located at Terneuzen, an industrial city in the Dutch province of Zeeland, and the Pilot Plant is located in the Ghent harbour, within the Belgian province of Eastern-Flanders. The canal of Ghent-Terneuzen connects both locations, "creating the world's first cross-border harbour" (International Association Bio Base Europe, 2009).

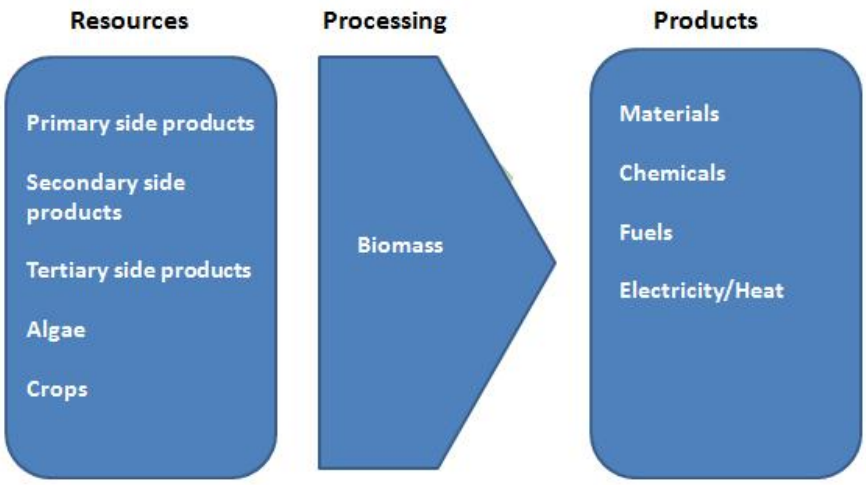
Figure 3.1. Map of the Euroregion Scheldemond with the Bio Base Europe Cluster highlighted



Source: derived from Euregio Scheldemond, 2012a.

The bio-based economy, also known as the bio-economy, is defined by the European Commission as "the sustainable production and conversion of biomass for food, health, fibre and industrial products, and for energy" (Ghent Bio-Energy Valley, 2010). Figure 3.2 illustrates the principles of a bio-based economy.

Figure 3.2. Principles of a bio-based economy



Source: Ministry of Agriculture, 2007, p. 8

The EC developed an additional concept, which connects with the conceptualisation of green growth, namely the "Knowledge-Based Bio-Economy" (KBBE). The KBBE emphasises sustainable economic development within the bio-based economy in order to cope with resource scarcity and climate change (Ghent Bio-Energy Valley, 2010). Since the bio-based economy is being investigated here within a green growth and low-carbon framework, combining both concepts into one defined concept of bio-based economy is feasible. The definition for bio-based economy used throughout this report is the following:

> *Bio-based economy is the sustainable production and conversion of biomass for food, health, fibre and industrial products, and energy. The aim of the bio-based economy is to increase economic development, to create jobs and to lower greenhouse gas emission levels.*

This report uses the EC's definition of a 'Cluster', namely:

> *"A Cluster is a geographical concentration of actors in vertical and horizontal relationships, showing a clear tendency of co-operating and sharing their competencies, all involved in a localised infrastructure of support."* (Ghent Bio-Energy Valley, 2010)

According to the EC, it is beneficial for actors to co-operate in a cluster since it boosts three important variables for green growth. Firstly, employment increases because of new and complementary business formations. Secondly, innovation is stimulated due to ameliorated knowledge exchange between the different actors. Finally, productivity is improved because of lower transaction costs (Ghent Bio-Energy Valley, 2010).

A cluster consisting of a combination of actors operating within the bio-based economy is called a "Biocluster". Within the Euroregion Scheldemond, the biocluster Bio Base Europe exists, which was used here as the main research subject.

Industrial Profile of the Bio-Based Cluster

As mentioned earlier, Bio Base Europe consists of two important facilities: the Bio Based Pilot Plant in Ghent (Belgium); and the Training Centre in Terneuzen (the Netherlands). These initiatives are detailed below, with the organisational structure of Bio

Base Europe being presented first since it is perceived to be an essential factor in the success of cross-border co-operation.

Bio Base Europe is a joint initiative by the EU, Belgium and the Netherlands, which was established in order to meet the need for more research and training facilities for bio-based products and processes in Europe. The move towards bio-based products is designed to enable a transition from a fossil fuel based economy to a bio-based economy (International Association Bio Base Europe, 2009). The overall goal of Bio Base Europe is to speed up the development of a sustainable bio-based economy in Europe to cope with increasing fossil fuel prices and to lower the emission levels of greenhouse gases.

To attain this goal, the knowledge gap needs to be filled through a number of strategies and actions:

- Improving technologies for bioprocesses;
- Promoting innovation; and
- Creating skills and jobs within the bio-based economy (green growth) (Bio Base Europe, 2012a).

"The need to fill the existing gap in the innovation chain of bio-based production, and the need to create growth and jobs in sustainable green sectors are all European, if not global, challenges. Bio Base Europe is an important (cross-border) part of the answer to these challenges. A regional answer, with the support of the national and European levels" (International Association Bio Base Europe, 2009, p.3).

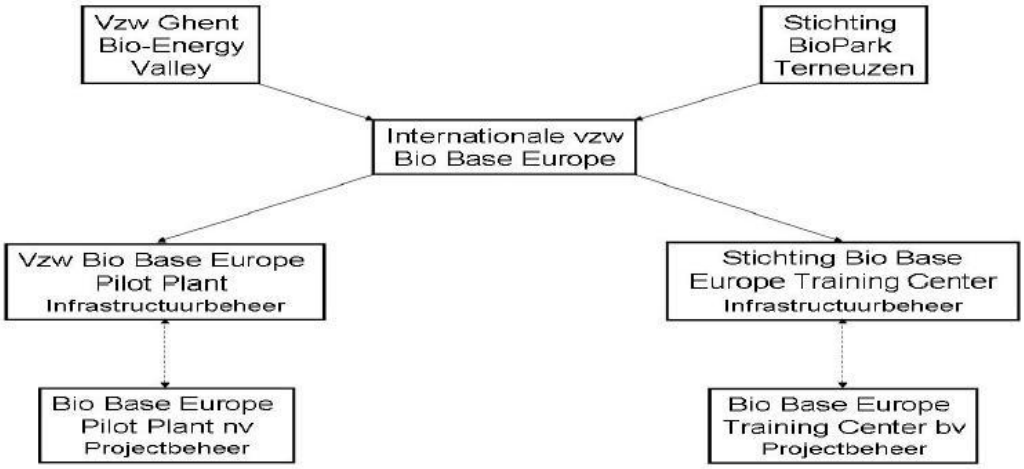
The founding fathers of Bio Base Europe are: VZW Ghent Bio-Energy Valley; and Stichting Biopark Terneuzen (Bio Base Europe, 2012b). Both of these were known bio-based frontrunners in the Dutch-Flemish border region (International Association Bio Base Europe, 2009), making use of collaborative partnerships between private and public partners in order to promote the development of the bio-based economy (Bio Base Europe, 2012b). The founding members established five structures for the management of the Bio Base Europe project, namely:

- Internationale VZW Bio Base Europe (BE+NL): to develop a common strategic policy, to manage the Interreg-project, to co-ordinate common communication, education and promotional activities;
- VZW Bio Base Europe Pilot Plant (BE): in charge of the construction and maintenance of the Bio Base Europe Pilot Plant in Belgium;
- Stichting Bio Base Europe Training Center (NL): in charge of the construction and maintenance of the Bio Base Training Center in the Netherlands;
- The company Bio Base Europe Pilot Plant nv (BE): more detail available below;
- The company Bio Base Europe Training Centre bv (NL): more detail available below.[31]

[31] International Association Bio Base Europe, 2009.

Figure 3.3 represents the organisational structure of Bio Base Europe, positioning the Belgian structures on the left, the Dutch structures on the right and the shared Internationale VZW in the middle.

Figure 3.3. Bio Base Europe's Organisational Structure



Source: International Association Bio Base Europe, 2009.

In the following sections, Bio Base Europe's two companies, namely the Bio Base Europe Pilot Plant nv and the Bio Base Europe Training Centre bv, and their partners are described.

Bio Base Europe Pilot Plant

The Bio Base Europe Pilot Plant is located in the Port of Ghent (Belgium). The aim of the Pilot Plant is "to close the critical gap between scientific feasibility and industrial application of new bio-based products and processes" (Bio Base Europe, 2012a). Therefore, the total bioprocess production chain, from raw biomass to diverse bio-products, can be undertaken at this Pilot Plant in Ghent to an industrial multi-ton scale. A laboratory on an industrial scale has been established, to test certain processes in a real industrial setting. The technologies available at the Pilot Plant consist of "biorefining, biomass pretreatment, biocatalysis, fermentation, downstream processing and green chemistry" (Bio Base Europe, 2012a).

All the required equipment is available in the red, the white and the green process halls. In the red hall, the biodegradables are refined before treatment. Industrial biotechnology processes and water-based downstream processing occurs in the white hall. The green hall is used for green chemistry applications and solvent-based downstream processing (Bio Base Europe, 2012c). Figure 3.4 provides pictures of the Bio Base Europe Pilot Plant's exterior and interior.

Figure 3.4. The Bio-Base Europe Pilot Plant

Source: Bio Base Europe, 2012d.

The Pilot Plant co-operates with companies, research institutes and other partners internationally in order to develop knowledge and practice regarding optimising bioprocesses, generating bio-based products at a larger scale, and on second generation bio-based product and process development (Bio Base Europe, 2012a). Its staff are provided start-up assistance on a technological level, but also through project and funding support.

Although the official opening ceremony took place on 11 June 2012, the Bio Base Europe Pilot Plant was already partially operational (Bio Base Europe, 2012c). From December 2010 many parts were already functioning, resulting in approximately 15 first bio-based projects with innovative companies, often with a European dimension (Dewilde, 2012a). Most of these pilot projects consisted of enzymatic conversion of biomass, but also fermentation processes were carried out. Each project processed tens of tons of biomass (Dewilde, 2012a). In May 2012, the construction of the processing equipment was in its final stage. More than 120 companies and research institutes have expressed interest in the activities of the Bio Base Europe Pilot Plant and have visited its facilities, made use of the available equipment, or requested a tender for future co-operative projects (Dewilde, 2012a).

Since the beginning of 2011, approximately 20 staff undertake the daily operations, but this number should increase to 35 or more in the upcoming years (Bio Base Europe, 2012c).

The Bio Base Europe Training Centre

The Bio Base Europe Training Centre is located in Terneuzen (the Netherlands). Tthe sustainable bio-based economy is promoted here through education, networking, technological innovation and exhibitions (Bio Base Europe, 2012e). It is open for anyone who wishes to learn more about this topic, but more specifically it is available as a training facility for companies to undertake staff training in order to overcome the current shortage of employees with the required technical skills to work in a bio-based economy (Bio Base Europe, 2012e). Staff are able to learn bio-based processes on the job in the safe environment of the Training Centre. In addition to training staff, the Centre also supports companies in hiring qualified employees for functions within the bio-based sector.

The Centre consists of an exhibition room where information on sustainable technologies and bio-based products and processes are presented, an auditorium and conference rooms (Figure 3.5) (Bio Base Europe, 2012e).

Figure 3.5. The Bio-Base Europe Training Centre

Source: Bio Base Europe, 2012d.

The Bio Base Europe Training Centree was officially opened on 11 June 2012. Education at the Training Centre is provided in conjunction with the VDAB (Dewilde, M., 2012b), an initiative by the Flemish government which aims to prepare graduates and the unemployed for the job market (VDAB, 2012). The exhibition room, with information on bio-based products and processes, is open for visits (Dewilde, M., 2012b).

Partnerships

The different entities of Bio Base Europe's organisational structure have partners in both the Netherlands and Belgium. This network consists of public and private actors, which are not only regional, but also national and even international. The 10 most prominent partners of Bio Base Europe are detailed in Box 3.1 (Bio Base Europe, 2012b). The list illustrates the importance of different networks, in this case:national and international government actors, private partners, and knowledge institutions form the backbone of the Bio Base Network.

Financial support for the Bio Base Europe project was offered within the European Union Regional Development Fund (ERDF), via the INTERREG IV programme (Bio Base Europe, 2012b) on 12 December 2008 (International Association Bio Base Europe, 2009). With six million euros of funding being provided by the ERDF, Bio Base Europe was the largest INTERREG project in the region (International Association Bio Base Europe, 2009).

Box 3.1. Partners in the Bio Base Europe Cluster

The Belgian Ministry of Economic Affairs: two of the Ministry of Economic Affairs' main topics are the energy and environment domains (FOD Economie, K.M.O, Middenstand en Energie, 2012).

The Flemish Government: through its framework Vlaanderen in Actie (VIA) Pact 2020, the Flemish government aims to stimulate "economic innovation and a sustainable and socially warm society" (Vlaanderen in Actie, 2012). Through Bio Base Europe, VIA connects with the Flanders Cleantech Association (FCA), which promotes clean technologies, including bio-based processes (Flanders Cleantech Association, 2012).

Agentschap Ondernemen is the agency responsible for implementing the policy developed by the Flemish government within the economy, science and innovation domains (Agentschap Ondernemen, 2012).

Province of Eastern-Flanders: is the most (inter)active province of the three provinces within the Euroregion Scheldemond. Its intent is to support and follow-up the Bio Base Europe projects (Verdonck, 2012a).

Province of Zeeland: one of the three provinces within the Euroregion Scheldemond. According to its website, co-operation with Eastern- and Western-Flanders has plenty of opportunities for Zeeland in terms of agricultural co-operation (where the bio-based economy is understood as being agricultural co-operation) (Provincie Zeeland, 2012a).

Port of Ghent: the location of the Bio Base Europe Power Plant is the Port of Ghent. This project fits within the port's sustainability goals (Port of Ghent, 2012).

Seaports of Zeeland: Terneuzen, the location of the Bio Base Europe Training Centre, is one of the seaports in Dutch Zeeland covered by this organisation (Zeeland Seaports, 2012).

DELTA is a multi-utility company that is, amongst others, responsible for waste collection from companies and governments (Delta, 2012). Its subsidiary, named INDAVER, is in charge of the waste-to-energy process through bioprocesses (INDAVER, 2012).

University of Ghent: internationally known for its specific bachelor and master programmes where the focus is put on bio-engineering. Many of its programmes are very (bio)technical, including the biotechnological processes to convert organic waste into bio-products or bio-energy (Ghent University, 2012).

ROC Westerschelde is a secondary school in Terneuzen where children can obtain a very technical education. After finishing this training, they are ready for jobs within areas such as the bio-based economy sector (ROC Westerschelde, 2012).

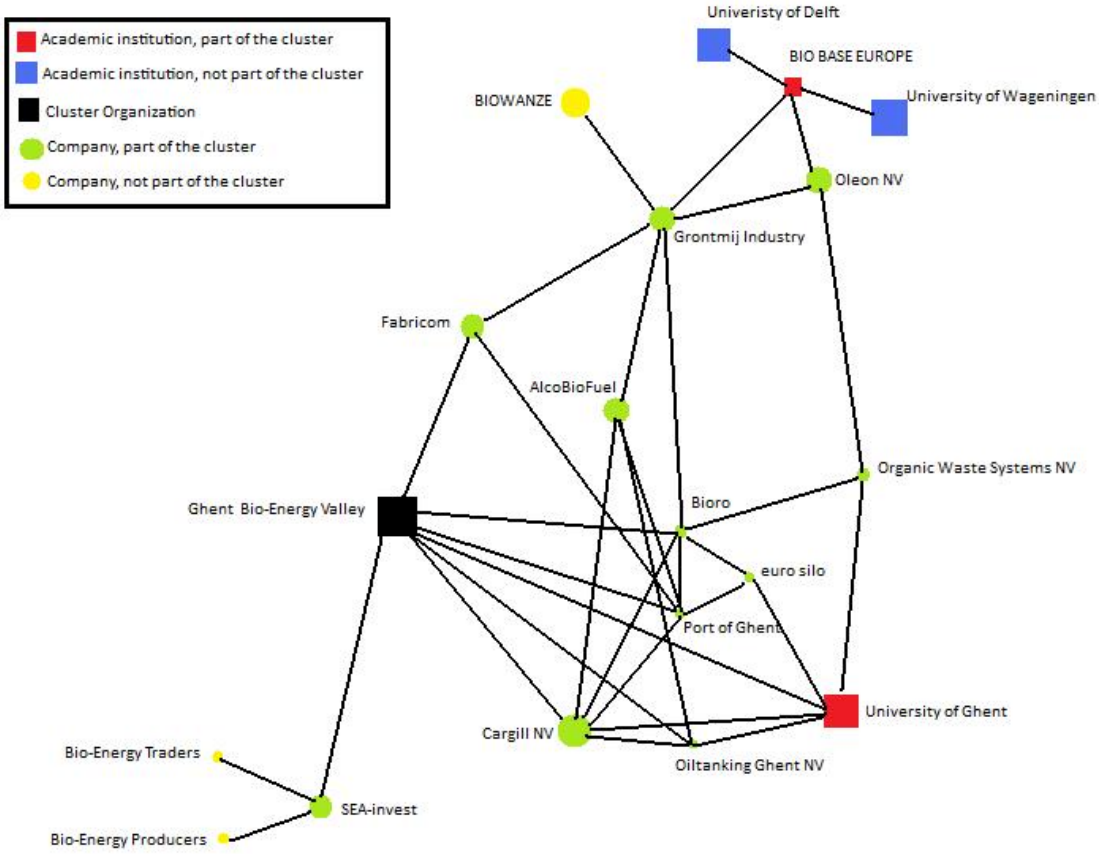
Ghent Bio-Energy Valley and Biopark Terneuzen

It is important to discuss the bioclusters of the Ghent Bio-Energy Valley and Biopark Terneuzen here as well. Both bioclusters are the founding fathers of the Bio Base Europe initiative and consist of a network of biobase-oriented companies and industries that co-operate within the structure of a cluster.

The Ghent Bio-Energy Valley is a joint initiative of the University of Ghent, the City of Ghent, the Port of Ghent, the Development Agency East-Flanders and 17 industrial companies located close to the Port of Ghent (Ghent Bio-Energy Valley, 2012). These companies are active in the fields of bio-energy and bio-based products and can be divided among five categories: (1) biodiesel production; (2) bio-ethanol production; (3) green electricity generation; (4) biogas technology; and (5) industrial enzyme production (Ghent Bio-Energy Valley, 2010). Figure 3.6 shows a social network analysis of the cluster. The size of nodes refers to the size of the organisation. The lines reflect the interaction and collaboration patterns within the bio-cluster, both between formal cluster actors and

organisations outside the cluster, but linked to some of the internal actors. It also shows the richness of connections with the University of Ghent.

Figure 3.6. Biocluster Ghent Bio-Energy Valley



Source: Ghent Bio-Energy Valley, 2010.

Biopark Terneuzen aims to find "smart links" between companies, meaning that side-products of the production processes of one company are shared with other companies that need them for their production processes (Biopark Terneuzen, 2012). The goal of these smart links is to diminish the environmental impact of the participating industries and to boost the economy in the province of Zeeland. Biopark Terneuzen works closely together with Ghent Bio-Energy Valley. This co-operation is testimony to the cross-border practices and ambitions of the Biocluster.

Specific recommendations for the Euroregion Scheldemond

The following challenges are discussed in greater detail below:

1. Cross-border co-operation;
2. The multitude of policy levels in Belgium and the effect this has on the establishment of indicators;
3. Bringing stakeholders together;
4. Insufficient green job creation and green skills; and

5. Making bio-based products and services attractive to consumers.

Cross-border co-operation

Although the Netherlands and Belgium are neighbouring countries and people speak the same language, there are many cultural differences between them. One of these differences, which was mentioned at the workshop, is that Belgians are in general less aware of the danger of water than the Dutch, although its coastline has become very vulnerable to flooding over the past 50 years. This form of knowledge transfer is one of the advantages of cross-border co-operation. A further advantage is that both countries can exchange students and employees that have specific skills the other might need.

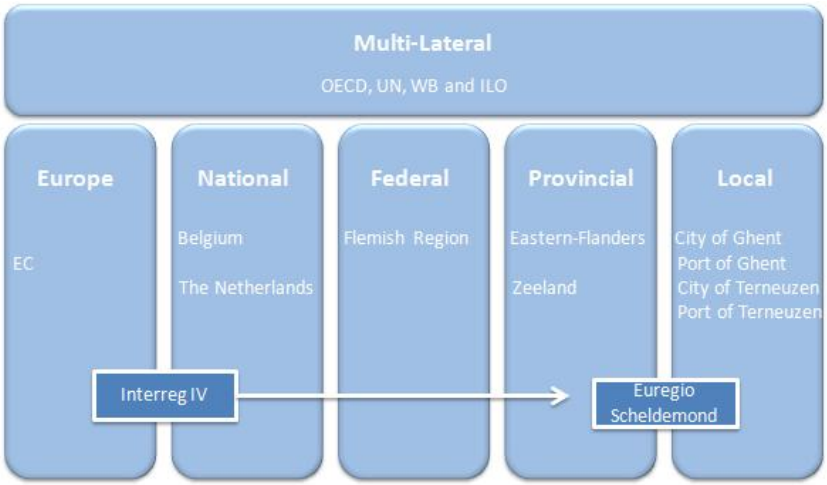
Unfortunately, cross-border co-operation is not only about advantages. One major disadvantage of cross-border co-operation is that the presence of cultural differences creates difficulties in setting priorities, which in turn can make it more difficult in small geographic spaces to work together in a supportive coalition. Good communication and transport facilities are considered to be fundamental for good cross-border co-operation.

The multitude of policy levels in Belgium

As mentioned earlier, Belgium has a much more complicated government system than most of the other OECD countries, and this has impacts on the effectiveness of indicators and the distribution of permits. Figure 3.7 provides an overview of the multi-governance actors involved in the Bio Base Europe case in the Euroregion Scheldemond, showing that the relevant policy levels in Belgium are Flanders, the provinces of Eastern-Flanders, the city of Ghent and the port of Ghent. The Netherlands does not have a federal policy level.

The Flemish government promotes clustering, but this clustering is currently industry driven and merely facilitated by government. The bio-cluster in the Euroregion Scheldemond is thus established from the bottom-up. The only financial support for this cluster is through the joint INTERREG donations from the EU, the Netherlands and Belgium. Consequently, there are no local government actors who are involved financially. The Port of Ghent is known to be a strong proponent of bio-industry. This is due to the fact that the port wants to expand, and so are attempting to get attention and government funding through branding and labelling themselves a 'green port', but success needs to be registered through indicators.

Figure 3.7. Relevant policy actors involved in indicator development



One of the main findings from the workshop was that when considering indicator development and data collection, a core set of indicators that are applicable to all local

regions should be developed. This core set of indicators should be combined with a more flexible set of indicators from which regions can choose additional indicators that best suit their situation. The core set of indicators should consist of a maximum of ten variables. This means the selection of indicators needs to be made carefully. The indicators also have to be compatible with indicators at higher policy levels. A strong link between the local, regional and national levels facilitates the aggregation of indicators. When considering the cross-border issue, it is important to have a comparable set of measurements in both countries. Output indicators focusing on institutional aspects are more commonly used, although outcome indicators measuring impact would be more feasible here. In both cases, there should be a balance and the indicators should be clear and easily measurable.

Before the indicators are developed, it is important to construct a statement of the specific nature of the region. With this statement, comparison across regions will be facilitated and the reasons for measurement are legitimised. Methodology, realistic goals and visions have to be developed early in this process and in close partnership with local stakeholders. The indicators should be linked to these goals. They require a vision and focus on how organisations can contribute to transitions. Throughout the process, reporting should occur at least on a yearly basis, and communication to all participants and stakeholders is essential. Defining communication about the indicators at an early stage is also vital, and industries or companies need to be considered as stakeholders in any communication processes. A comment from one of the small-medium sized (SMEs) businesses participating in the workshop centred around the burden of reporting requirements for small businesses. This should also be considered in the process of indicator development and monitoring.

Some focus groups discussed whether or not it is important to have indicators at the policy level. In general, it is considered to be very important to provide knowledge, bench-marking, comparisons and evaluations of indicators. It was also mentioned that due to the EU Directive on Green Growth, regional governments will shortly have to monitor and collect indicators.

Bringing stakeholders together

The relevant stakeholders in a transition to a low-carbon society consist of public and private actors. The public actors are the local governments. The private actors are the companies, universities, NGOs and citizens. As mentioned above, it is vital to involve as large a group of stakeholders as possible at an early stage in the process. Inclusive growth is not easy and requires a lot of special attention, especially with regard to communication processes. The way to communicate about the indicators should be defined at an early stage.

Insufficient green job creation and green skills

Within the region, very innovative bio-based companies are developed, and logically one would think that this would go hand in hand with green job creation. Unfortunately, this is not the case, since there is a severe lack of graduates with the requisite skills. Many people with higher educational profiles are recruited from abroad. However, not all green jobs require high skills. Education for both high and low profile positions should be broadened within the region. The Training Centre in Terneuzen can play a major role here, training graduates and the unemployed to provide them with skills necessary to find work in a bio-based economy. Co-operation with the colleges and universities in the region is important since they (could) arrange internships within the biocluster. It is also important to ascertain the teaching gaps.

Green jobs and skills should be created across governance levels, cross-borders (both national and regional) and cross-sectors. Considering the latter, organisations like VDAB (see Box 3.1) and PES could play a crucial role in managing demand and supply. Challenges related to green jobs and skills creation include creating proper definitions, addressing

poverty and unemployment, and investigating the relationship between greening and jobs, and greening and gross domestic product (GDP). A learning platform between business, R&D institutions and government should be provided, and together with existing networks such as the Chamber of Commerce and VOKA, a pool of potential employees could be established. VOKA already has a programme at the provincial level that aims to reduce energy use and exchange best practices. The programme is on a voluntary basis, and information and feedback are offered and a benchmarking system is established among the current 58 participants.

There are still many gains to be made through the diffusion of technologies and skills in relation to green jobs. Many job opportunities for instance will lie within the research and development domain. Companies, research institutions and universities are key players, triggering innovation. Nevertheless, the question arises whether or not it is possible to 'steer' universities towards priorities. This is a very sensitive topic for funding and research institutions alike. The role of government is also highlighted, particularly in regard to setting agendas and research priorities, and establishing quality metrics for research outcomes.

The skills requirements of the bio-based economy are mostly technical, management, academic and craft skills. These skills are not novel or especially 'green' as such. Skill needs, and therefore the identification of skills gaps, should be a market driven process - very much steered by what consumers and therefore employers want. The importance of marketing here is undeniable. The need for green products and services should be created, and there is a role for governments here. By buying green products, they in turn create a demand, which is an incentive for companies to develop more green products, which will result in hiring more people. Corporate responsibility and green procurement are essential motivators.

Making bio-based products and services attractive to consumers

Stimulating the demand for bio-based products will be critical to the success of the cluster; commercially viable production is very much dependent on what consumers want. The same applies to green skills. However, the supply-demand mechanism does not always work, particularly in emerging markets, where an excellent bio-product can fail due to insufficient market development. Market development is essential here, because with new products, consumers obviously do not have knowledge or experience of the potential of the new product. This in turn can make the product commercially unviable. The role of public procurement in emerging green markets is therefore seen as vital. Governments can act as first customers, large customers and often as non-price sensitive customers as well. This creates a demand for 'green' products and allows these 'green' businesses to increase their operations.

The exhibition within the Training Centre in Terneuzen helps raise awareness at a consumer level by informing them and by making piquing their curiosity. Other novel ways to raise consumer awareness mentioned at the workshop were through television shows and games.

Policy implications

There are currently no data gathering or indicator development processes in place in the Euroregion Scheldemond or the Bio Base processes in the harbour areas of Ghent and Terneuzen. The case study highlighted potential reasons for this, including:

- Varied understanding within the region of the importance of indicators;
- Lack of identified and resourced organisations to carry out the data collection, monitoring and reporting;

- Existing data sets are not a close enough fit to adequately inform policy and industrial activity in low-carbon transition;

- Added layers of complexity in cross-border regions due to multiple stakeholders and layers of jurisdictional process.

This is not a phenomenon specific to the Euroregion Scheldemond; the cross-border issues are also challenges for other regions, as the following chapter on the Alzette-Belval region will attest. It does, however, highlight a paradox with green growth indicators, in that cities and regions want to transition to low-carbon economies and have stated objectives to this effect, but the information and data needed to track the progress of this transition is not readily available. Knowledge is required around new concepts and definitions of jobs and skills, new data sources and collections, and new institutional norms for the collection and communication of this data. This is where indicator frameworks attempt to bridge the divide, by highlighting what is currently available, other data sources that can be proxies for transition in the short term, and data gaps and methods for filling these gaps over the longer term.

The city of Ghent is proactive in terms of sustainability, low-carbon thinking, and measuring and indicator use, and the cross-border initiatives on bio-based eco-development, with their clearly stated goals in the spheres of LCE and green growth (including green jobs and skills, which is rarely the case) are obviously both closely linked. In fact, many of the actors involved in urban conversion in Ghent are also involved in the bio-based development strategy. *However, neither these linkages and networks, nor the expertise of Ghent in indicator development, match the attention placed on indicator development frameworks at the different levels of government. Much more focus is therefore needed from policy makers in developing this framework for monitoring the transition to a low-carbon economy.*

CHAPTER 4. TRANSITION TO A LOW-CARBON ECONOMY IN THE ALZETTE-BELVAL AREA

Abstract

This Chapter provides an analysis of the Alzette-Belval case scenario, with particular emphasis on the large-scale brownfield regeneration project occurring in Belval. Alzette-Belval is a cross-border area between Luxembourg and France. The area has a long tradition of steel manufacturing. With the changing global dynamics in these sectors, these industries have been in decline in Belval for much of the last decade. In order to ease the impacts of this industrial reorganisation, particularly the labour market impacts, the area is supporting the largest industrial 'brownfield' regeneration and urban development site in Europe. The new urban forms have a specific 'green' and resource efficient focus in their production. This, combined with the move of the University of Luxembourg to the new regeneration site and support for an emerging eco-technologies cluster, has the potential to significantly and rapidly transform the knowledge and industrial base of Belval. The chapter also provides analysis of the regional policies and initiatives that are supporting this transition, but also highlights the challenges of such large scale and rapid change.

Introduction

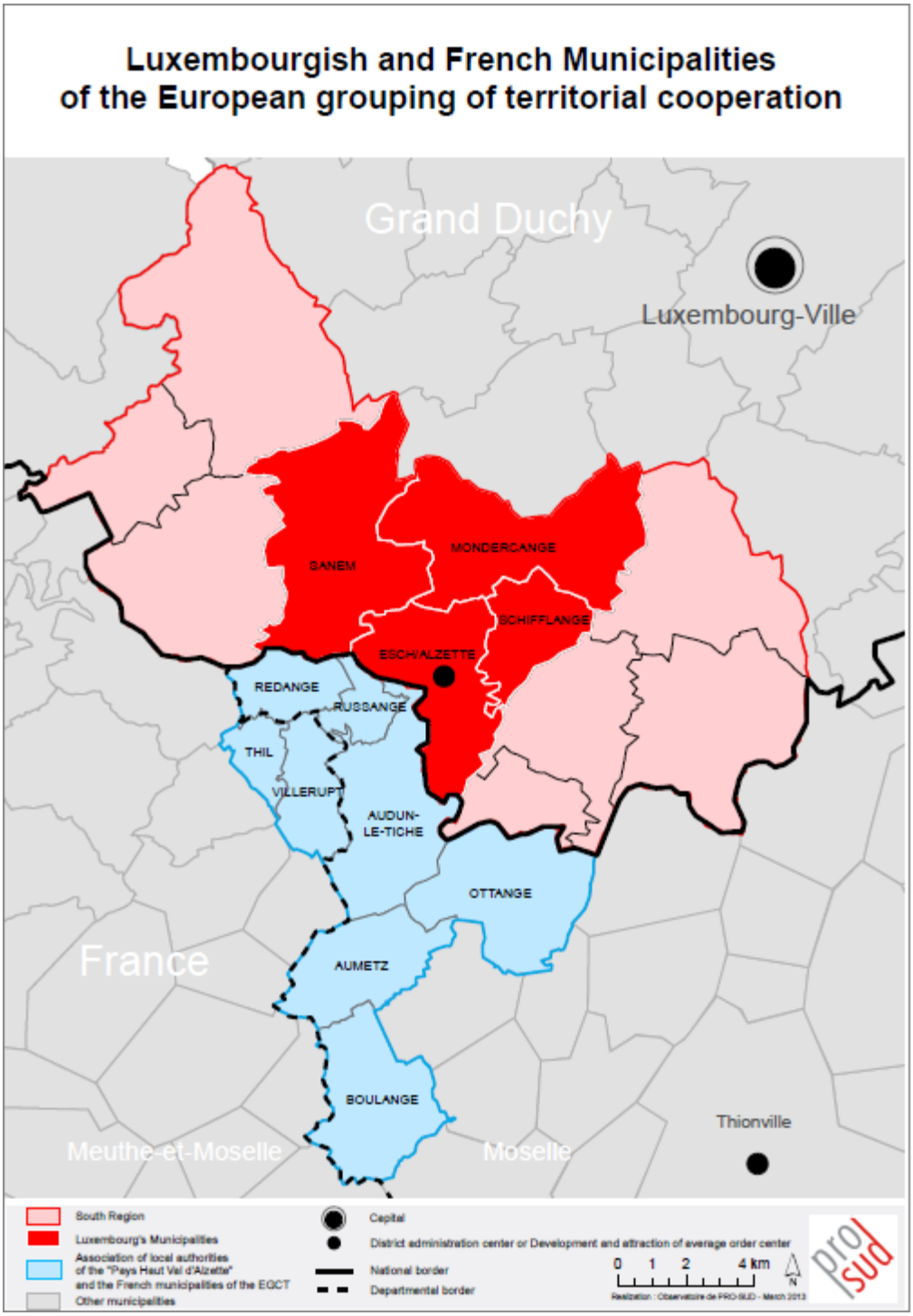
The Alzette-Belval case scenario, which is the subject of this chapter, is a cross-border region consisting of four communities within Luxembourg and eight communities on the French side of the border. The Luxembourg area comprises the cities and communities of Esch-sur-Alzette, Mondercange, Sanem and Schifflange. In France, the eight communities of the European grouping for territorial co-operation (EGTC) area are the communities of the the Communauté de Communes du Pays-Haut de Val d'Alzette (CCPHVA). This is an inter-municipal organisation founded by the municipalities of Audun-le-Tiche, Aumetz, Boulange, Ottange, Rédange, Russange, Thil and Villerupt. The area also corresponds with the EGTC area (Alzette-Belval) as defined in the Arrêté grand-ducal (see Figure 4.1).

The history of this territory is similar to that of the neighbouring communities in Luxembourg, in that it is closely related to the mining and steel industry. Situated at the border, the Grand-Duchy of Luxembourg has significant influence on regional development: 60% of the active residents of the CCPHVA work in Luxembourg and close to 70%[32] of all wage income comes from Luxembourg.

This chapter is structured in four parts: the first describes the environmental assets and land-use issues in this area; the second section then focuses on the development of a cross-border polycentric metropolitan region, and some of the challenges that this proposed. The third section outlines the cross-border territorial governance instruments. The chapter finishes with conclusions and policy findings for the Alzette-Belval region, both in terms of low-carbon transition for regional economies, in this case an economy with carbon intensive industrial legacy; and conclusions for cross-border regions.

[32] Opération d´Intérêt National Alzette-Belval: Mission de préfiguration – Rapport de septembre 2010.

Figure 4.1. Map of the Alzette-Belval case study



Source: Website of the city of Esch-sur-Alzette
http://www.esch.lu/actualites/Documents/GECT_Alzette%20Belval_A4.pdf.

Environmental assets and land use

The hilly landscape of Alzette-Belval provides some evidence of the past open cut mining of iron ore (Minette) in the area, the last mine was actually closed in 1981[33]. The area of Alzette-Belval has seen significant and very targeted regeneration since the 1990s. In Luxembourg, regional development in the south took account of abandoned mines and turned these into natural reserves that also serve as recreational areas close to denser urban settlements. For example, the Ellergronn mine on the territory of Esch-sur-Alzette was converted to woodland that now extends over 100 hectares. The Prenzebierg in the community of Sanem, which closed in 1991, was turned into a natural reserve of more than 250 hectares[31]. The most extensive area is the Haard-Hesselsbierg Staebierg with 600 hectares.

These conservation areas are linked to the cities and towns by bicycle paths. In Esch-sur-Alzette on the French side of the border, there are several conservation areas and protected areas, some of which have been integrated into the EU NATURA 2000 network and receive EU funds.

The quality of the waterways has also improved considerably, and the renaturation of the river Alzette in the area of Esch-sur-Alzette, including the development of flood areas and itinerant pasture to increase biodiversity, presents an exemplary example of environmental protection and regeneration in Luxembourg. Air quality is average compared to other EU countries with the pollutants SO2, NO2, PM2,5 and PM 10 at levels of 63, 58, 15 and 25 μ/m3, respectively.

On the French side of the EGTC, in the CCHPVA territory, similar redevelopment plans exist. One quarter of the almost 470 ha of industrial wasteland will potentially be converted into urban area, leaving the rest of the territory to be reclaimed. The possibility of the development of a recreational activity area is currently under active consideration on the wasteland of Micheville. Eight “Zones Naturelles d´Intérêt Ecologique, Faunistique et Floristique” (Natural area of importance from environmental, fauna and flora aspects) have been listed, hosting several protected species. On the other hand, four underground water reserves are situated on the territory of the CCPHVA, but only one is in a chemically acceptable state according to the criteria of the European Directive 2008/105/CE.[34]

The quality of the watercourses could be described as mediocre to bad.[35] This poor result is a direct consequence of the role the area plays as an important transit traffic zone. The air pollution of certain substances occasionally exceeds the legally determined limits.[36] Five municipalities of the CCPHVA are limited in their urban development by mining risks (subsidence, cave-ins) with almost 45% of their territory accounted for by these risks (61% in Audun-le-Tiche). Any spatial development plans must therefore take these risks into account, and the risk-free zones need to be reserved for future construction projects.

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[33] Renoir, I. 2009. Les minières du Sud, un élément de la trame urbaine. In *Der Atlas du Luxembourg*, eds. P. Bousch, T. Chilla, P. Gerber, O. Klein, C. Schulz, C. Sohn et D. Wiktorin, P.80. Luxembourg : Emons Verlag.

[34] http://www.mam.gov.tr/guncel/2012/ce-haziran-calistay/WFD-Su-cerceve-Direktifi/EQSD.pdf.

[35] Their quality is evaluated by a criteria called ´environmental state´ - it includes 5 categories which determine the human influence on the aquatic ecosystem, ´very good´ being associated with low human impact.

[36] AGAPE: Mission de Préfiguration Alzette-Belval – Etat des lieux 2010.

The "Cite des Sciences" in Esch-Belval – a new force for regional development?

The central focus of the Belval case study centres on the re-use of industrial wasteland in Esch-Belval, which is located in the South of Luxembourg and in the core of the Alzette-Belval area. Today, the site of Esch-Belval presents Luxembourg's most ambitious large urban planning project for regional development in the south. Since the turn of the last century, Esch-Belval has been Luxembourg's largest brownfield site, covering an area of approximately 200 ha. [37]

Esch-Belval was owned by Arbed, the Luxembourg steel group founded in 1911. In 2002, Arbed merged with the groups Aceralia (Spain) and Usinor (France) in order to form the Arcelor group, which in turn merged with Mittal Steel in 2006 to form today's ArcelorMittal, the world's largest steel producer. In 1997, the last blast-furnace for steel production from ore stopped operations, freeing up a 120-hectare surface areawhere the blast-furnaces were previously located. The Luxembourg government dedicated the future use of this site to the construction of a Science Park (the 'Cité des Sciences').

ArcelorMittal continues its operations on the adjacent terrain between Esch-Belval and Esch-sur-Alzette, with a factory for electrical steel production and recycling remaining operational on the site. The ArcelorMittal site is not open for public access, so the connections between Esch-Belval and Esch-sur-Alzette have been developed on the Northern and Southern rings of the site. The state government, together with ArcelorMittal, created the public-private company, AGORA, for the development and sale of the 120 hectare large industrial area on the site of Esch-Belval, which was left by ArcelorMittal.

The year 2002 saw the creation of the Fonds Belval, a public institution in charge of the construction of all public infrastructure and buildings on the site of Esch-Belval. This includes buildings for public administration, a Rockhall, and the "Cité des Sciences" a science, research and innovation park. The main tasks of the Fonds Belval are to draw up detailed construction programmes, conduct feasibility studies, organise architectural competitions, oversee all associated studies and implementation of the building projects, and undertake the financial management and accounting. The development of the "Cité des Sciences" in Esch-Belval was intended to bring research and innovation to this economically deprived area in the South.

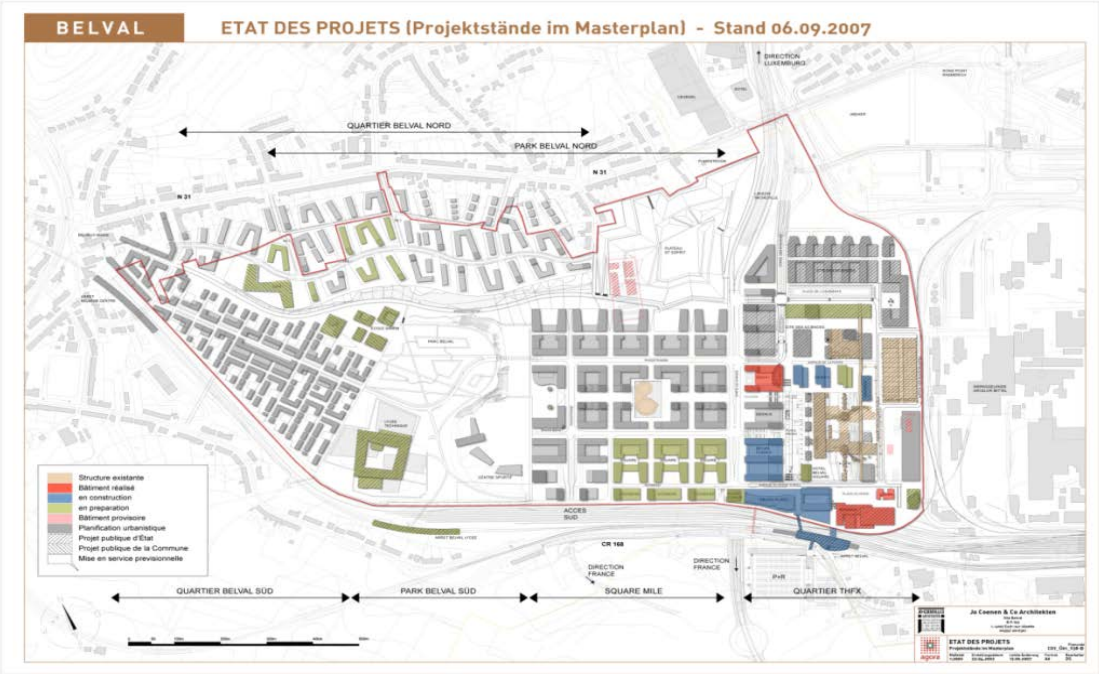
The general Master Plan for the Esch-Belval site, which was prepared by the urban planning office 'Joe Coenen' from Maastricht and commissioned by the developer of the entire site, AGORA, is divided into five areas with distinct characters: the Square Mile, Esch-Belval North, Belval South, the Belval Park, and the terrace of the blast-furnaces that will house the "Cité des Sciences". Offices will predominate on the Square Mile, but 20% of the built space will be reserved for apartments, and some space for commercial use. Esch-Belval North provides for more quiet and extensive residential quarters and the more densely settled and lively Belval South foresees spaces for commerce and artisanal activities (see Figure 4.2 Master Plan Belval). Belval Park, covering 33 hectares, connects the residential quarters with the Square Mile, and features a large network of walking and cycling paths, as well as a regional sports complex, and a new school, the Lycée Technique de Sanem.

The fifth area in the Master Plan, the "Cité des Sciences" on the blast furnace terrace, is a flagship project of the Luxembourg government, and is an example of the potential for restructuring industrial wasteland in the south of Luxembourg to foster social and economic development of a region that has long been dependent on the steel industry. The Fonds

[37] Primm, J. 2009. Belval – Ein ambitioniertes Großprojekt der Regionalentwicklung. In *Der Atlas du Luxembourg*, eds. P. Bousch, T. Chilla, P. Gerber, O. Klein, C. Schulz, C. Sohn et D. Wiktorin, P.82. Luxembourg : Emons Verlag.

Belval oversights the project, which attracts both public and private investment. The programme for the "Cité des Sciences" is comprised of plans for: higher education and research; student life; start-up activities; secondary education; public services and administration; and culture, sports and leisure. The total public investment dedicated to the project in 2003 amounted to one billion Euro for all public buildings and the associated infrastructure. Planned to be constructed over a period of 15 to 20 years, the "Cité des Sciences" will consist of about 25 public buildings on a total surface area of 27 hectares. The Cité will house over 7 000 students as well as 3 000 teachers and researchers. The Terrace will also offer a wide range of opportunities for private enterprises on over 100 000 m^2 of built space.

Figure 4.2. Master plan of Esch-Belval



Source: Courtesy of Jürgen Primm, AGORA

New green standards for infrastructure developments in the area are being set with this project. The development of the Master Plan for the site of Esch-Belval takes into account three key criteria for sustainable urban development: it foresees mixed-use urban quarters, thus ensuring easy access to all commerce to meet basic needs by walking and cycling; and an excellent public transport network connecting Esch-Belval with the rest of the region. Moreover, 30% of the area is dedicated to green space, which also ensures high quality environmental amenities for leisure (in Belval Park). Furthermore, AGORA promotes sustainable construction in terms of building design and materials used. The planners took care to optimise connections to Esch-sur-Alzette, which is the country's second largest city with 27 000 inhabitants, and to the adjacent community of Sanem. Public transport connections to Luxembourg City, twenty kilometers to the north, and Thionville, a major densely populated city area 20 kilometres across the French border, are also provided For this purpose, a new train station (Belval Université) has been built, and improved bus services are planned.

AGORA has recently participated in a pre-certification phase of new urban development projects organised by the German organisation for sustainable construction, DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen). AGORA received the gold pre-certificate, the highest distinction in the category "urban area of mixed use" among the 13 international projects

evaluated.[38] The international label is rapidly gaining acceptance across several countries, and major new development projects are rated according to 45 evaluation criteria. These criteria are divided into five subject areas that also fall within the OECD's green indicators divisions: ecological quality assessing environmental assets and infrastructure; economic quality; socio-cultural and functional quality; technical quality; and the quality of the planning, settlement and usage process.

The Fonds Belval in turn has adopted criteria for sustainable development of the site's public buildings, which are focused on sustainable energy-use that is also a criterion for evaluation in architectural competitions. Emphasis is placed on the principle that it is important to integrate energy management into design: the form of the building, quality of technology, use and comfort, ratio of renewable energy sources, passive solar gains and building orientation, costs of technical installations compared to total building cost, and percentage of translucent surfaces of the facades (optimum at ~30%) are all criteria that are evaluated in the pre-evaluation phase. A second key principle of the Fonds Belval for its building concepts is that building users should bear maximum responsibility for energy-management, and that the technical services of a building should therefore be minimised. The University, together with the Henri Tudor Public Research Centre and the Fonds Belval, developed a competitive set of target values and recommendations relating to measures for efficient energy and water use that were distributed to all planning and construction teams.[39]

Potential for Low-carbon transition from Cite des Sciences

Sustainability challenges of the Cité des Sciences were highlighted during participatory workshops with local and external experts, designed to develop and assess the site development according to locally-adapted sustainability criteria by the firm Basler and Partner. The evaluation process, led by the Swiss consulting firm Ernst Basler + Partner AG included eight workshops, and was also guided by an international expert panel between 2010 and 2011.[40] The main opportunity for regional development was seen to be in the clustering and development of a regionally well-connected site for new knowledge production and innovation. Together with potential challenges, the study identified five interdependent core topics that will need to become central action fields in the near future to ensure the sustainable development of the site. These are: an increased share of housing within the total built surface area; sustainable mobility, including provisions for commuting across the border; an enhanced quality of habitation; an appropriate approach to the use of energy and natural resources; and ensuring the quality of the planning and development process. Specific recommendations under these core themes that are particularly salient to development challenges include:

- Both Fonds Belval and AGORA have to ensure the *quality of further planning and development processes* by establishing a user-platform for the provision of

[38] Founded in 2007 as a registered non-profit association with the main objective of promoting sustainable construction methods, which contain a high level of economic efficiency and are environmentally-friendly, the DGNB (German Sustainable Building Council) has developed a comprehensive overall system for the sustainable evaluation and certification of buildings and urban areas, which holistically accompanies the complete development cycle of the project. http://www.belvalgold.lu/en/belval-gold-district/ DGNB website, http://www.dgnb.de/_de/).

[39] http://wwwfr.uni.lu/content/download/34543/418263/file/Charter%20Report%20on%20Sustainable%20Development%202009-2010.pdf.

[40] Le Fonds Belval (2013) , Evaluierung der Cité des Sciences, Esch-sur-Alzette : Imprimerie OSSA: http://www.fonds-belval.lu/media/publications/86/Dossier_CONCEPT_EVALUATION.pdf (accessed 19.5.2013).

information exchange, and a quality control committee in order to strengthen the political anchoring of the area's development. The cities and municipalities in the region should also develop strategies to leverage development of the site. Opportunities for formalised input through a steering committee, and incentives for communication and co-operation should also be strengthened in order to facilitate progress in this direction.

- AGORA particularly will need to steer development of a *range of different housing opportunities*, with a wide span of price categories, including promoting diverse forms of ownership to ensure affordability for students, researchers and the diversity of the local population. The terrace and the Square Mile should be considered simultaneously in order to avoid the potential for side-by-side disparity of these diverse quarters that is presently a risk.

- All stakeholders should promote the *adotion of the national modal split target*, which aims for a higher use of low impact modes for local mobility such as cycling and walking, and work on implementation measures to reach these targets.

- Leveraging the research activities of future users for improved site development and demonstration projects.

- Improved *regional cross-border co-operation* across the frontiers is a further challenge, especially the need for a mobility strategy and planning body which includes representatives from France, and the development of the Eco-cité..

These will ensure conditions for a future lively and attractive mixed-use of the old blast-furnaces terrace, with a sustainable environmental quality that helps to assure a high quality of life.

The site is being developed to house 5 000 inhabitants and 20 000 daily site workers. The rising demand for office space and habitation in the area support these predictions. Construction of the main residential areas has not yet been finished, but there are already 230 first pioneers living on the site, with a survey in 2012 indicating these are mostly young single men. The majority of these first residents work in the centre of the country and 38% of them work in the suth (PRoSud, AGORA). At the time of writing this report, the target year for moving the first parts of the University of Luxembourg to the Cité des Sciences is 2014.

In neighbouring areas of Luxembourg and France, projects are being developed to ensure the "Cité des Science" is embedded in an area that can absorb and retain new economic activities and a new, skilled labour force in order to benefit the region in the longer term. The first impacts of these large scale, centrally state driven projects are already being felt in the adjacent communities. These include initial plans by Esch-sur-Alzette, the largest city in the region, for two development axes to connect with Esch-Belval and the science city. These are: a new park in the north, with pedestrian and bicycle lanes; and a connection through the 'Terre Rouges' in the south. Another concern is the development of student housing opportunities in conjunction with other neighbouring communities. Four other large building projects are in development, including the quarter Nonnewiesen, a brand new residential quarter for 1 750 housing units on the northern axes connecting to Esch-Belval. All these new developments take into account the most recent insights into building for mixed functions and

minimising the need for transport to run basic errands to commercial and social amenities (Goedert, 2009).[41]

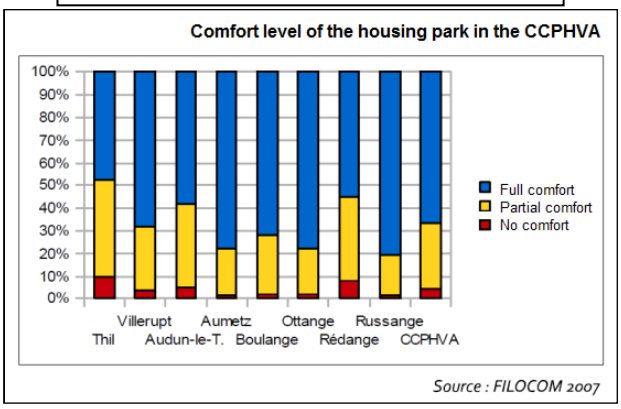
In France, there are plans to develop an Eco-cité organised around the goals of sustainable development designed to reduce household spending in three areas: energy; transport; and rent (Agaménnone, 2012). There is also a French national law that specifies environmental requisites for adoption of the eco-cité lable.

The housing park of the municipalities of the CCPHVA mainly consists of individual dwellings constructed before the 1970s. As a consequence of the past industrial profile of the territory, the presence of working-class districts is significant. An average 48% of the housing was constructed before 1948, and this rate increases to 64% in Thil (see Figure 4.3). One can observe the discomfort level of one third of the housing park as a result of its age (also see Figure 4.3). Additionally, most of the dwellings are mid-sized, which may not correspond to today's and the future's demands.[42] Based upon demographic projections, the CCPHVA is planning to significantly extend its housing park over the next 20 years. Approximately 300 ha have been identified as potential construction areas, ensuring the possible construction of up to 9 700 dwellings. Currently, the planning or building of 2 100 housing units is underway on an area of 84.3 ha.[43]

Figure 4.3. Age and comfort level of the housing park in the CCPHVA in 2007

	Ancienneté du parc			
	Construits avant 1948	Entre 1948 et 1974	Entre 1975 et 1989	Après 1990
Audun-le-Tiche	1639	872	223	430
Aumetz	489	289	126	122
Boulange	375	219	82	197
Ottange	713	271	108	168
Rédange	274	58	55	48
Russange	267	99	34	66
Villerupt	1875	2395	254	277
Thil	485	187	49	35
Total CCPHVA	6117	4390	931	1343

Source : FILOCOM 2007



Source: AGAPE: Mission de Préfiguration Alzette-Belval – Etat des lieux 2010.

[41] Goedert, J. 2009. Esch-sur-Alzette : Métamorphose d'une ville in Der Atlas du Luxembourg, eds. P. Bousch, T. Chilla, P. Gerber, O. Klein, C. Schulz, C. Sohn et D. Wiktorin, P.74. Luxembourg : Emons Verlag.

[42] Source: AGAPE: Mission de Préfiguration Alzette-Belval – Etat des lieux 2010.

[43] Source: AGAPE: Mission de Préfiguration Alzette-Belval – Etude Habitat sur l´Agglomération Tranfrontalière Alzette-Belval - Cahier n°2.

Key cross-border issues: a focus on transport and job creation

A major issue to consider in the creation of a cross-border region includes the co-ordination of transport and job creation. Transport has proven to be one of the biggest challenges for further development in this area as it suffers from road congestion and pollution, which have severe social, economic and environmental impacts.

Luxembourg receives a daily influx of around 120 000 cross-border workers from the greater region (see Figure 4.4). The adjacent regions of the Lorraine in France and the Saarland in Germany, which are also former centres of steel production, have not experienced a similar level of development. Lorraine in particular is somewhat dependent on the cross-border work opportunities offered in Luxembourg.

Additional commuter traffic is caused by the fact that 60% of the country's national jobs are based in the agglomeration of the city of Luxembourg. There has been increased ownership of and travel by car (Luxembourg has over 600 cars per 1 000 inhabitants – one of the highest in the world). Commuting therefore accounts for 50% of the internal journeys in the country. The strong growth in the number of cross-border workers, the lengthening of distances travelled and the constant expansion of source areas have together intensified internal mobility requirements. The resulting saturation of the road network hinders individual mobility, as well as affecting the living environment, particularly in agglomerations. Quality of life and quality of work are affected. Associated trends are road developments encroaching upon the natural environment, a key danger being further fragmentation of woodland.

Figure 4.4. Cross-border commuters 2007-2008

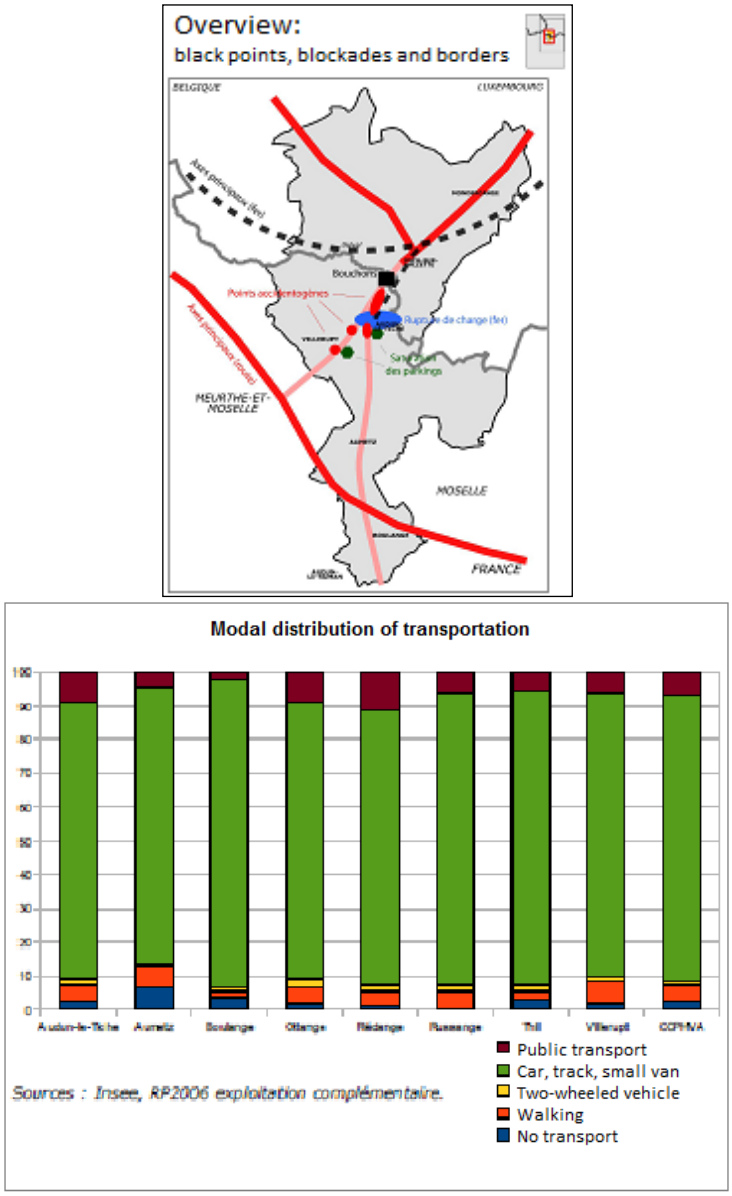
Note: The numbers next to the arrows indicate the number of daily cross-border commuters.

Source: BECKER, T.; HESSE, M. (2010): Internationalisierung und Steuerung metropolitaner Wohnungsmärkte. Das Beispiel Luxembourg. In: Informationen zur Raumentwicklung, no. 5/6, BBSR, 403-415.

A daily flow of 70 000 cross-border workers commutes from the Lorraine region to work in Luxembourg. The mobility of these people requires an adapted transport offering and the development of alternative transport options. The solution lays in the alignment of the French and Luxembourgish projects and decisions.

The Alzette-Belval zone currently experiences difficulties in the domain of mobility. The saturation of the road network towards Esch-sur-Alzette, the inadequacy of the railway network and of the public transport system highlight the limits of an unsuitable mobility system and its effects on the territory´s attractiveness, and on its inhabitants´ quality of life.

Figure 4.5. Transport network and the modal distribution of transportation



Source: AGAPE: Mission de préfiguration Alzette-Belval – Etude sur la mobilité et les besoins en transport sur l´Agglomération Transfrontalière Alzette-Belval – Cahier N°1.

Transport access in the area is further hampered by the co-ordination of the Luxembourgish and the French highway networks and commuting patterns in the area. As shown in the map in Figure 4.5, the areas with the wide red lines are not connected to each other by highways. Instead, linkages are made by a main road (RD16), which is exposed to a flow of up to 17 000 vehicles per day. The development of these linkages is seen as essential if the population of the area is to increase in the ways anticipated.

The municipalities of the CCPHVA are badly serviced by the road-based public transport system, and only one of them, Audun-le-Tiche, is connected to Esch-sur-Alzette by

means of a railway. Considering these conditions, it is not a surprise that the majority of the CCPHVA´s inhabitants o to work (as shown in the chart in Figure 4.5). Moreover, in the sector of the CCPHVA no bicycle path or pedestrian way has been identified, even though the zone has the potential for this. The proximity to each other of certain city centres, such as Audun-le-Tiche and Esch-sur-Alzette (4 km) creates an ideal condition for low impact leisure mobility.

Similarly, in Luxembourg, transport and personal mobility was identified as one of the four major challenges for the development of the City of Esch-sur-Alzette.[44] Due to the social and economic impact of traffic jams, but also due to the pollution of the environment, in the medium term significant improvements in public transport and infrastructure for low impact modes (cycling and walking) are demanded, also in view of the national modal split targets (although experts deem the national model split target not applicable to Belval and instead recommend focusing more on promoting a low impact mode within the site and between Esch and Sanem, and a bit less on public transport).

The first effective measures are being implemented, with the municipalities of Esch-sur-Alzette and Sanem establishing a bicycle sharing system and the development of attractive walkways and cycling paths being a priority in urban development. There are also cross-border cycling paths being developed, not only in leisure areas.

For improved cross-border governance, the University of Luxembourg has brought to life a voluntary co-ordination platform - the Observatoire Belval, to which key actors from France are always invited. Under these auspices, the Verkéiersverbond has organised a sub-group on transport that unites user groups from both sides of the frontier to discuss and implement measures to improve the situation.

Cross-border governance instruments for the Alzette-Belval area

The area of this case study is, however, not only subject to Luxembourg's national policies, but is also shared by France, and also is additionally embedded in several layers of cross-border co-operative frameworks. In a poly-central metropolitan area such as this one, which crosses national boundaries, cross-border co-operation will be essential in order to achieve the developmental synergies required for meaningful progress towards transitioning to a low-carbon economy. Nor is better organisation of transport the only issue, but also of importance is to seek exchanges in relation to urban and industrial developments generally.

The first legal bases for cross-border co-operation initiatives were the bilateral and multilateral agreements of the Framework Convention of Madrid (1980), which was designed by the Council of Europe to stimulate territorial cross-border co-operation. These agreements are mostly designed for territorial public authorities and are often based on national-level regulations for inter-municipal co-operation. Most of these agreements include an option for creating a cross-border legal organisation, largely targeted at fostering co-operation between municipalities and regions. Although Luxembourg has signed both the Karlsruhe Agreement and the Benelux Convention of Transfrontier Co-operation (1986), up until now there have not been any applications of these agreements established with Luxembourg's partners. The main reason for this is that these two governance instruments do not make provision for nation states like Luxembourg that have only two levels of governance (statewide and municipal), but are rather designed for countries that have additional levels of formal governance arrangements.

[44] Poos, X., 2012. Esch: Une Ville en Mouvement : L'intégration de l'Université du Luxembourg dans la ville d'Esch-sur-Alzette. P.30. Working paper, 15/01/12, 2ème mémoire de recherche présenté dans le cadre du programme de formation spéciale des carrières supérieures administratives cycle CO_CS-TS11.

The Benelux Union is a pioneer in the construction of co-operative instruments. The Benelux countries were among the first to implement the Framework Convention of Madrid (1980). Another landmark event was the signing of the Schengen Implementation Agreement, whereby the Benelux countries, France and Germany co-operatively introduced the removal of internal border controls to expedite the free movement of people among these countries. In June of 2008 the three countries, together with the Belgian regional entities, signed a new Benelux Treaty. This Treaty defines the new objectives of the co-operative, focusing even more on cross-border co-operation and its pioneering role within the context of a larger European integration. The Secretariat General is the core structure of the co-operative, under the supervision of the Committee of Ministers and in close connection with a consultative parliamentary assembly. A Benelux Court system ensures there is a uniform interpretation of Benelux regulations. The Secretariat General plays a key expert role in fostering cross-border collaboration and governance. It also recommends projects such as this one, which are designed to develop tools to help identify the cross-border implications of large developments such as in the Alzette-Belval valley, and to measure and promote cross-border collaboration. In the 2014-2016 framework for the Benelux Union, both "cross-border co-operation" and "green growth" are indicated as being priorities for the Benelux co-operative.

The "Greater Region", comprising the Grand-Duchy of Luxembourg, Lorraine, Rheinland-Palatinate, Saarland and Wallonia, is one of the oldest and largest[45] cross-border co-operation areas in Europe (dating from before 1971). Since 1995, the highest-level decision makers of the Greater Region have met every two years at an Executive Summit. Spatial planning, transport, housing, and professional mobility are some of the main topics on the agenda. Of particular salience are the inter-dependencies being created by the more than 200 000 commuters in the region. Luxembourg-city and the south of the country attract the most commuters, followed by Saarland. Altogether, the Greater Region has 25% of the total number of European cross-border commuters.[46]

Transport based research projects are being developed to look at ways to proactively manage these high volumes on of commuters. One such project, the Metroborder research project proposes creating a "cross-border polycentric metropolitan region" in the Greater Region. One central aim is to establish a common "spatial development strategy".[47] Esch-Belval is at the heart of this "metropolisation" process.[48] EU Cohesion funds provide support for such programmes, which can also serve as project-based institutionalised platforms for cross-border collaboration, such as the INTERREG IVA programme, developed in 2007 to cover the Greater Region[49]. At the local level, other cross-border co-operation areas exist, such as the trilateral agreement on the "pôle européen de développement" at the French-Belgian-Luxembourgish border.

The European Commission (EC) in 2006 announced the introduction of an instrument known as an European Grouping for Territorial Co-operation (EGTC). This is an Europe-

[45] ESPON/Metroborder, (2010): Cross-border polycentric metropolitan regions – final report, available in French, English and German : http://www.dat.public.lu/publications/documents/metroborder/ , p. 53.

[46] Idem, p. 39.

[47] Executive Summit, (2011): Déclaration commune – 12ème Sommet de la Grande Région, p. 11 ; http://www.granderegion.net/fr/documents-officiels/declarations-communes-finales/12_SOMMET_GRANDE_REGION_DECLARATION_COMMUNE.pdf.

[48] Decoville, A.; Sohn, C. (2012): Mapping the structuring of a cross-border metropolis – The functional urban region of Luxembourg, p. 125 In: Sohn, C. (ed.): Luxembourg – an emerging cross-border metropolitan region; Peter Lang, Bruxelles.

[49] For more information: http://www.interreg-4agr.eu.

wide instrument for cross-border and inter-territorial co-operation, with a focus on promoting European economic development. Its legal platform allows for partners from all governance levels, including the state, which is thus of more strategic interest for Luxembourg.. The main mission of an EGTC is to promote social and economic cohesion across national borders. [50] This instrument has been created both for the purpose of implementing territorial co-operation programmes, co-financed by the EC under its structural funds, as well as to carry out territorial co-operation actions without financial contributions from the EC.[51] Each EGTC has its own financial autonomy, it can hire staff, sign contracts, and implement tasks assigned to it by its members. Member states, regional authorities and local authorities can all become members.[52,53] Over 30 EGTCs exist, of which several are established in the Greater Region. One innovative example of this instrument is the EGTC IV A, which since April 2010 has acted as the managing authority of the INTERREG IV A programme. The Greater Region is also considering the establishment of an EGTC to host and manage the secretariat of the Executive Summit.[54] At local level, the EGTC "Eurodistrict Saarmoselle" has been established since May 2010,, to implement common cross-border projects, liaise with citizens' cross-border networks and launch territorial marketing strategies.[55]

The EGTC "Alzette-Belval" is the most recent EGTC created in the region, coming into effect in 2011-2012. It is posited as being a "common instrument to promote an innovative cross-border conurbation based on sustainable development principles for the Alzette-Belval territory".[56] The EGTC serves as a platform for institutionalising a cross-border dialogue between different levels of governance, which is considered of particular strategic importance for both countries, as some experts predict that this cross-border area may well grow into one of the first and foremost cross-border mega-cities in Europe.

On the Luxembourg side, members are: the state; and the four municipalities of Esch-sur-Alzette, Mondercange, Sanem and Schifflange.[57] On the French side, four governance levels are involved: the state; the Region Lorraine; the Departments 'Meurthe et Moselle' and 'Moselle'; and the association of eight French communities represented by the inter-municipal organization, 'Communauté des Communes du Pays Haut Val d'Alzette' (CCPHVA) (Audun-le-Tiche, Aumetz, Boulange, Ottange, Rédange, Russange, Thil et Villerupt), founded in 2004. The EGTC can carry out projects with or without European funding. The convention is time unlimited but can be revoked by agreement between the parties. The administrative base is in France and French law applies. Decisions are taken by

[50] Regulation EC No. 1082/2006 of the European Parliament and the Council of 5 July 2006 on a European grouping of territorial co-operation (EGTC). OJ L210/19 31.7.2006.

[51] Regulation EC No. 1082/2006 of the European Parliament and the Council of 5 July 2006 on a European grouping of territorial co-operation (EGTC). OJ L210/19 31.7.2006.

[52] Comité des régions (2007): Le Groupement Européen de Coopération Territoriale (GECT), Etude réalisée par le GEPE sous la direction du Professeur Nicolas Levrat dans le contexte du programme de recherche du CdR, Bruxelles.

[53] Committee of the Regions, (2011): EGTC monitoring report, p.18.

[54] Idem: Executive Summit, 2011 : 4-5.

[55] www.agglo-sarreguemines.fr.

[56] Art. 2, Convention de coopération en vue de la création du GECT « Alzette-Belval », author's translation.

[57] Arrêté grand-ducal autorisant l'Etat du Grand Duché de Luxembourg et les villes et communes d'Esch-sur-Alzette, Mondercange, Sanem et SChifflange à adherer à un groupement européen de cooperation territorial 'Alzette-Belval' et approuvant le projet de convention relative audit groupement ainsi que le projet de status de celui ci Memorial A no. 234 du 21 Novembre 2011 page 3972.

majority voting. There are a total of thirty-two votes, and of the sixteen votes belonging to Luxembourg, the state has eight and each of the four communities have two.

In the mission statement in Article 2 of the Convention of the EGTC Alzette-Belval, the scope is framed by the general remit to contribute towards 'sustainable development of the region', and aims to develop a vision for spatial planning of this cross-border agglomeration.[58] In furtherance of this goal, the instrument works to initiate and facilitate projects to implement this strategy, and ensure that "maitrises d'ouvrages", studies and communication are carried out. Concerns taken into account include: sustainable mobility; employment; services; housing; environmental; training and higher education; research; and health. Initial ideas for more specific projects include development of a joint accelerator for innovation, with a focus on eco- and bio-technologies, and joint data centres.

Of particular relevance to this OECD project was the announcement in October 2009 by the then-French President, Nicolas Sarkozy, that the territory of the Alzette valley, which sits between the two French departments of Meurthe et Moselle, and Moselle, is an 'Opération d'Intérêt National'. This means it is part of a legal instrument that is designed to enable accelerated dedication of funds and project development in selected regional settings. This institutional arrangement aims to create a unified spatial strategy in the form of an "éco-cité", based on specific criteria that include provisions for accountability by the state of natural assets and biodiversity in that area.

Green industry development

Central to curbing carbon dioxide (CO^2) emissions from industrial activities are plans in Alzette-Belval to promote and leverage eco-technologies for economic development. The main economic activities in the Alzette-Belval area that will benefit from this relate to the construction and renovation sector, but also to recycling and water management. The construction sector has previously flourished thanks to the proximity of the steel industry. Consequently, this sector presents a suitable basis for further development of eco-technologies. Retrofitting of old building stock and changing social practice to improve energy-use will be essential to meet the EU 2020 targets of a 20% reduction of energy-use (compared to 1990 levels). Transportation, and reducing the environmental impact from individual mobility and freight cargo; where possible replacing goods and services from abroad with local products; and recycling practices (e.g. re-use of building materials and establishment of sites for barter) all link in with this field of activity.

This section of the report firstly provides a more general picture of the economic activities and industrial profile of the area of the EGTC; secondly focuses on energy that is generated for industrial and residential use; and finally, examines the significance of the "Cité des Sciences" as a site for research and innovation.

Energy generation for human use, CO^2 emissions, and savings measures

In view of the EU 2020 targets in the area of climate change and energy use, Luxembourg has set the aim of reducing its greenhouse gas (GHG) emissions by 20% compared to levels in 2005 between now and 2020 in the sectors not covered by the European Emissions Trading System (ETS). In the energy field, Luxembourg has committed itself to the following goals: improving energy efficiency by 14.06% by 2016; and sourcing 11% of energy from renewables. The challenge of reducing GHG emissions is at the heart of the work of the "Environment and Climate Partnership", launched in February 2010, which aims

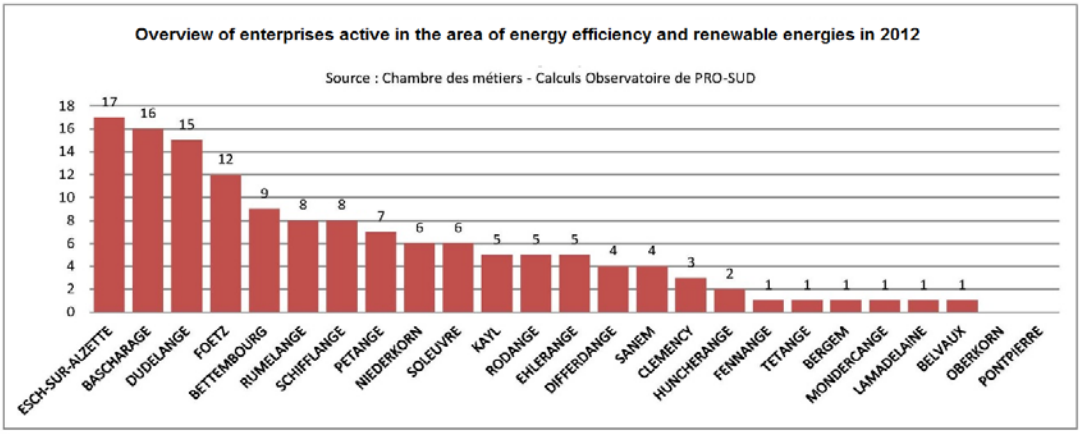
[58] Insights on how this EGTC compares with others was developed in personal communication with Estelle Evrard, doctoral researcher on cross-border territorial governance structures at the University of Luxembourg GEO LAB.

to develop the second national action plan for reducing CO^2 emissions, accompanied by a national plan for adapting to climate change. Currently (2011), it is estimated that Luxembourg was responsible for just over 12 million tonnes of GHG emissions in CO^2 (or 6.2% below their 1990 level).

The following measures were introduced by the government in order to meet the target for increased share of energy consumption from renewable resources: development of renewable energies within the country; addition of biofuels into existing fuels for domestic use; and application of co-operative mechanisms with other member states. In 2011, 2.9% of energy used in Luxembourg was sourced from renewables.[59] The Alzette-Belval area contributes to this target through Twinerg in Esch-Sur-Aleztte, which is a large combined-cycle gas turbine energy plant that is also able to function on wood pellets, and which co-produces district heating for Esch-Belval through steam production. Twinerg is, however, also a major contributor to GHG emissions in Luxembourg (around 7 to 8% of the total emissions) and in particular within the Alzette-Belval territory. In Schifflange, a biogas combustion plant, MinettKompost, was also recently inaugurated.

Of about 800 firms that are active in the area of renewable energies and energy efficiency, 138 are situated in the south (see Figure 4.6), and 30 within the geographic perimeter of this study.

Figure 4.6. Overview of enterprises active in the area of energy efficiency and renewable energy in 2012



Source: Chambre de métiers – Calculs Observatoire de PRO-SUD.

The largest industrial enterprise, consuming the most electricity and resulting in the highest CO^2 emissions of any single organisation in the country, is ArcelorMittal. ArcelorMittal has disposed of two sites in the Esch-sur-Alzette area: the production site in Esch-Belval and the research centre in Esch-sur-Alzette (in Belval and Sanem respectively). Steel products including bar steel through to finished beams and sheets are produced on the Esch-Belval site. Steel is one of the most recycled materials in the world and the input at Esch-Belval is 100% steel scrap. Electro-steel production requires carbon electrodes (the devices that produce the arcs within the electric arc furnace), which both consume and produce CO/CO^2. Each tonne of steel produced currently results in 2.15 tonnes of CO^2 emissions. Approximately 12% more scrap steel needs to be charged in order to produce one tonne of liquid steel i.e. total input is approximately 1.12 tonnes of steel scrap per tonne of liquid steel produced. This is because some iron is lost to slag and dust. Primary liquid iron

[59] Share calculated according to Directive 2009/28/EC.

production (using blast furnaces) is already very close to the physical-chemical limit of the production process (the energy and carbon input required to chemically reduce metal oxides to pure form). This means that large efficiency gains are no longer expected.

However, during the production and finishing processes, when the liquid steel is turned into more advanced products, there are still areas in which energy recovery can be improved, for instance, by using energy by-products to provide district heating instead of simply burning the residual gas from the coking, sintering and blast furnace processes (although it should be noted that there is already significant progress in this area). Recently in Dillingen (Germany), a power plant has been built that should be able to recover much of the energy from these gases and furnaces, which can then be used for power and heat generation. Also, the composition of the emitted gases is much better than is the case when the gas is simply burned off. However, because this plant is a recent development, it is subject to stricter new EU regulations, requiring the purchase of large numbers of emission certificates for the plant. Thus, while strategies to recover heat and energy, improve air quality, and provide district heating are being implemented, some existing laws are discouraging these efforts.

The activities of the ArcelorMittal Esch-sur-Alzette research centre concern both process and product development, and are dedicated to structurally long-term products. Research subjects include the development of:

i. Advanced tools (measurement equipment and models) for intelligent and sustainable production.

ii. New applications for steel, including new products and technical solutions for easily using steel in construction, in an economic and sustainable way.

iii. User-friendly software for pre-design to allow engineering offices and architects to more easily use steel in their designs.

iv. Means to influence international codes and knowledge dissemination through real-life applications, through partnerships with engineering offices and architects.

As an international company with industrial operations in more than 20 countries, the company recognises the impact that climate change has on many regions in which it works. They are fully engaged in global efforts to reduce CO^2 emissions and mitigate their impact. Their target is to reduce CO^2 emissions by 170 kg per tonne of steel by 2020, equivalent to an 8% reduction in normalised emissions from the 2007 baseline.[60] Satellite businesses related to steel-based construction have been formed, which are discussed in the subsequent section.

In order to promote organisational energy-savings schemes, the Chamber of Trades ("Chambre des Métiers") has their own label, 'Energie fir d'Zukunft.[61] The label recognises companies that have acquired the necessary skills as having completed a course of training focused on renewable energies and energy efficiency.[62] The label enables customers to easily identify companies specialising in renewable energy sources. It also implies that the firm provides advice and guidance in the selection and installation of their equipment and provides work according to specifications designed to ensure optimum efficiency in the rational use of

[60] http://www.arcelormittal.com/corp/corporate-responsibility/environment/climate-change.

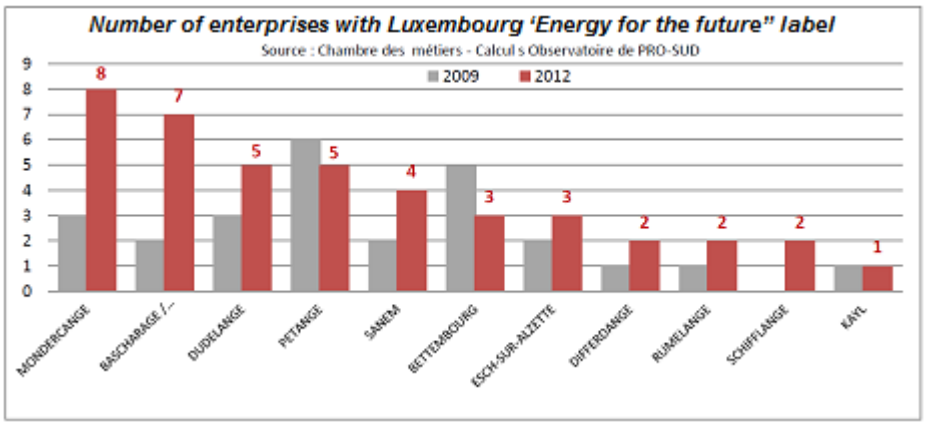
[60] http://www.arcelormittal.com/frydek-mistek/pdf/AM_Enviro_Brochure_en.pdf.

[61] http://www.cdm.lu/entreprise/conseils-aux-entreprises/exploitation-environnement-energie/energie-et-developpement-durable-pour-particuliers.

[62] http://www.cdm.lu/entreprise/conseils-aux-entreprises/exploitation-environnement-energie/energie-et-developpement-durable-pour particuliers.

energy. The Chamber organises specific training modules on development of renewable energy and energy efficiency. This is designed not only to familiarise participants with the support system provided to enable a marketing approach to the individuals concerned, but also to upgrade the participants in the various technological developments of renewable energy sources and energy performance. Of a total of 169 Luxembourg organisations with this label, 15% are situated in the south, and in 2012, seventeen enterprises were certified within the geographic perimeter of this study. Figure 4.7 shows the comparison distribution of labelled enterprises among southern municipalities in 2009 and 2012.

Figure 4.7. Number of enterprises with the Luxembourg 'Energy for the Future' label



Source: PRO-SUD, Indices du Sud 2009 – 2012.

The new role of research and innovation for green industrial development

The "Cité de Sciences" will provide facilities for a large part of the University of Luxembourg, three Public Research Centres - the CRP Gabriel Lippmann, CRP Henri Tudor (who have just committed to a merger in 2016), and the CEPS/INSTEAD (Centre for Studies on Populations, Poverty and Socio-Economic Policies) - as well as a range of other public services such as national archives, a music auditorium, and a national centre for industrial culture. The National Research Fund (Fonds National de la Recherche) authority will also move to Esch-Belval. A predictive exercise informing research priorities, posits research on sustainable resources use in Luxembourg as one of five principal research axes in Luxembourg. Two key priorities within the sustainable resources domain are the sustainable use of energy and also of water. In 2011, the National Research Fund has dedicated 5.4 million Euro in support of research projects in this area.

Table 4.1 provides an overview of all Luxembourg public research institutes and units pursuing research relating to eco-technologies and services, all of which will be clustered on the previous blast-furnace terrace. Most moves are planned to begin in 2014. Some outposts, such as the CRTE, are already in Esch-sur-Alzette, and the CRP Gabriel Lippmann and the Photovoltaic Laboratory (LPV) are already in Esch-Belval. Other research institutes, notably the University and the CEPS/INSTEAD, are also undertake research that is pertinent to urban and regional development, particularly the development of a sustainable transport network and practices. The University IPSE GEO LAB and the City of Esch-sur-Alzette are also developing an 'Observatoire Belval', which sets out to collect data concerning the question of how the "Cité des Sciences" might affect regional development.

Table 4.1. Public research institutes pursuing research relating to eco-technologies in 2009 that are already or will be moved to the Cites des Sciences in Esch-Belval

Research institutes	Principal competencies related to eco-technologies
CRTE – Centre de Ressources des Technologies de l'Environnement (CRP Henri Tudor)	Energy management; renewable energies; sustainable development; eco-conception; eco-construction; sustainable water management; multi-criteria evaluation; clean technologies and process engineering; environmental modelling.
EVA – Environment and Agro-Biotechnologies (CRP Gabriel Lippmann)	Water; air and soil pollution; renewable energies; ecology; agriculture; waste management; sustainable management of aquatic and terrestrial ecosystem; biotechnologies' application to the agricultural and forest sectors; sustainable land management.
CRTIB – Centre de Ressources des Technologies de l'Information pour le Bâtiment (CRP Henri Tudor)	Eco-construction; sustainable development; eco-conception; ICT.
ESRU – Engineering Science Research Unit (University of Luxembourg)	Construction and design; energy; renewable energies; environment; automation and mechatronics; development of technological solutions; sustainable use of resources; centre for expertise.
IPSE – Unité de Recherche Identités, Politiques, Sociétés, Espaces (University of Luxembourg)	Spatial planning; environmental and economic geography; spatial modelling; urban studies; mobility
LPV – Photovoltaic Laboratory (University of Luxembourg)	Renewable energies (photovoltaic systems)

A challenge will be to develop research and education activities that effectively contribute to the transition to a low-carbon society in the Alzette-Belval area. The University of Luxembourg has a strategic action plan for sustainable development, and is a signatory of the Charter of the International Sustainable Campus Network.[63] The Cell for Sustainable Development has proposed a research project developing social learning processes with local organisations to improve energy-use in highly serviced buildings. One of two main research sites could be in the building of the new Luxembourg Centre for Systems Biomedicine in Esch-Belval. This type of project can also serve as a basis for developing education and training tools and services.

A preliminary requisite is for research that takes account of complex situations in which the prime interest is how human actions affect the material world and its environmental flows. Locally adapted knowledge to address complex local challenges is essential in order to develop more socially robust problem framings than just one or two disciplinary lenses. Interdisciplinary research is needed, to engage natural and social scientists and practitioners in order to characterise and develop solutions in an iterative manner over time. It is therefore proposed to organise events by public research organisations that involve developing participatory process scenarios of "Visions for the future". The other key measures are:

i. Keeping track of research projects involving diverse research organisations, other public and private stakeholders and organised civil society;

ii. Establish databases with monitoring data on adoption of eco-technologies or social change relating to transition; or

iii. A web-based platform through which citizens and other stakeholders actively learn and engage in complex problem solving by providing feedback on social practice

[63] http://wwwen.uni.lu/sustainability.

and change as well as suggested solutions. The number of research projects with partners from the Greater Region is an interesting cross-border implication variable.

Having a meaningful number of companies in the eco-technology and service sector is important for the transition to a low-carbon society, and dynamics on the number of companies created and closed down per year provide a picture of the number of viable and applicable innovations. Open source co-creative projects are deemed just as important to count as projects that yield patents, as they reflect new attitudes to property and sharing. Again, the share of revenues in eco-technology companies derived from providing services or selling products in the Greater Region is of interest in assessing cross-border developmental dynamics.

Conclusions and policy implications

The challenges of industrial legacy in carbon intensive industries

The Alzette-Belval region has a long industrial history in steel manufacturing, but is now seeking opportunities for structural renewal and improving quality of life by moving key public research organisations to the area and creating new opportunities for fostering innovation, education and training. Central local priorities include the development of high quality sustainable new infrastructure on former industrial wasteland and in urban areas, and a transport infrastructure favouring public and low impact transport means. For example, the site of Esch-Belval, which will house the new research and innovation cluster, obtained a gold label in a new German site-sustainability-certification scheme.

Development priorities therefore include energy-efficiency and well-being in the built-environment, the production of green energy, and the promotion of public-private partnerships for research and innovation, skill-building and training. There is general agreement that social aspects, such as providing for affordable green housing and combating youth unemployment, also need to be addressed.

'Brownfield' site redevelopments offer opportunities for large-scale land use and building design changes

Land-use and land cover changes from regeneration of industrial wasteland left by the declining steel industry are largely organised in view of sustainable development. Reforestation projects of old mines in the area, which began in the 1990s, are now contributing to increasing air quality and growing local CO^2 sequestration rates through photosynthesis. The river benefits from a re-naturation project that is exemplary for the country. The development of parks and areas of environmental protection also offer healthy recreation, improving environmental health. Large parts of industrial wasteland are turned into urban development projects, notably the Belval project, which received a gold label in a pilot certification project applying the certification of sustainability developed by the Deutsche Gesellschaft für Nachhaltiges Bauen (DGNB). With the completion of the master plan, which AGORA anticipates will be finished around the year 2025, there will be 1 400 000 square metres of sustainable housing, offices and retail development.

The road network is consequently becoming denser, which needs to be managed with care. Strategic investment in transport infrastructure, including public transport, will be crucial to channel the significant number of commuters through this area in a more sustainable manner, and will require targeted effective cross-border co-ordination. A mid- to long-term goal to be considered is to develop zero transport emissions for cross-border commuters.

Restructuring the knowledge base of the region

Four major public research institutes, including the University of Luxembourg, will be clustered on this site. There are several large-scale urban development projects in Esch and adjacent communities to connect with this space. In France, the development of an 'éco-cité' is also in the planning phase.

Policy implications

Monitoring and assessing the development of Alzette-Belval as a new urban metropolitan area that is also transitioning to a low-carbon economy includes the rate and pace of land use changes and particularly monitoring land remediation.

Historical and future carbon flows

Carbon flows in the area are still most affected by the industrial production of steel and electricity. ArcelorMittal is still the area's single largest industrial producer, employer, and emitter of CO^2 (approximately 4 metric tonnes of CO^2 in 2008), followed by the fairly recently established Twinerg Gas combustion plant that can also run on wood pellets, which provides electricity and district heating in the area of Esch-Belval. Measures and communication of soil pollution from steel production, e.g. looking at heavy metal contamination are recommended, as well as monitoring local air quality (e.g. SOX and NOX). Additionally, the construction sector that co-evolved with the steel industry in the area is strong, and there is also an emerging arts and craft sector, and eco-technologies sector.

The environmental technology sector is one of four priority sectors in Luxembourg's policies on economic development and targeted diversification. A national eco-technology innovation cluster was formed in 2009. Green building in Europe accounts for more than one-third of all non-residential design and construction, and will grow to more than one-half of all construction within the next few years. Further development of this sector could bring a strong growth pathway linked to the research and science cluster.

Focus of support on resource efficiency of buildings

Indicators for tracking energy-use and changes in the carbon efficiency of production will be useful; in particular, if complemented by a carbon stock and flow analysis for the area. Assessing water use and waste production, and the percentage of waste recycled in the building sector, for individual organisations and per resident are also important monitors. Organisations and firms should be encouraged to set themselves zero waste targets. The number of employees, and the longevity of local firms in the eco-technology sector, should be monitored, paying attention also to legal indicators of the transition to new forms of ownership of enterprises managing new common arenas such as utilities (including the number of renewable energy co-operatives).

In relation to the construction sector, by 2015, green buildings will support nearly several thousand workers in a range of occupations including construction managers, carpenters, electricians, architects, truck drivers and cost estimators, among many others in Luxembourg. The increased demand for green building construction has created an increased need for a skilled and trained workforce. According to German construction enterprises, training is essential for getting and maintaining green jobs; 30% of green job workers say they needed additional training when they started and most report that formal education and training programmes will continue to be needed. Hiring firms agree; 71% of hiring decision-makers maintain that being credentialed increases competitiveness. Fostering green skills for inclusive growth is vital, and thus requires addressing the gap in education and

unemployment levels between the residents of Luxembourg and foreign nationals in the south.

Policy and programme activities that support the increasing energy and resource efficiency of the built environment (both old and new) are important, and could include the following:

- Energy-efficiency standards of the built environment, old and new, based on regulations and certification schemes.
- Implementation and level of subsidy of retro-fitting programmes for older building stock; mixed-use of new urban development projects (housing and offices).

Knowledge transformation with new infrastructure

The Cité de Sciences in Belval will provide room for a large part of the University of Luxembourg, the Public Research Centres Gabriel Lippmann, and Henri Tudor (who have just committed to a merger in 2016), and the Centre for Studies on Populations, Poverty and Socio-Economic Policies, as well as a range of other public services such as national archives, a music auditorium and a national centre for industrial culture. The Fonds National de la Recherche, the national research funding authority, will also be moved to Belval. A predictive exercise informing research priorities posits research on sustainable resource use in Luxembourg as one of five principal research axes in Luxembourg. Most of these organisations offer education and training relating to sustainable development, with a focus on the construction and energy sector; courses cover needs within diverse jobs in the sector across all levels of education – construction, sales staff, and engineers and architects.

The development of local indicators on green skills and training could be rooted in efforts identifying key skill capacities and skill deficits relating to the transition to a low-carbon economy in the region, in a process engaging all stakeholders, especially social partners. Indicators could include the number of jobs in local eco-technology firms including public services (waste management, water purification, and renewable energy production); the offer of courses in all education and vocational training programmes at all levels; cross-border initiatives on green skills and training, and the number of new professional qualifications obtained; how many employed and unemployed persons have received green training; and the number of training places designed to teach proactive green retrofitting skills. Development of a cross–border eco-innovation training centre was also suggested.

Indicators on research and innovation could include the number of cross-border research projects with private and public partners relating to sustainable energy-use in the built environment; the number of new related patents; and size and longevity, and legal statute of new, relevant enterprises.

Co-ordination of transport and commuting infrastructure

The use of public transport and low impact modes of transport, and research on understanding prevailing modal chains; as well as cross-border co-ordination on policy and investment into the development of transport infrastructure and services are important transitional activities and measures.

Importance of local context to data collection and indicator development

In Luxembourg, governance strategies are very much affected by the interactions across the multiple levels of governance, particularly: legally binding requisites to implement EU policies and targets; national versus local level governance; and a mismatch of these levels

across the borders in the different jurisdictional contexts. *Municipalities should be empowered to contribute to the development of relevant strategies at the national level. There is a need for a local narrative on transitional opportunities and visible, highly salient projects. Participatory governance is needed and requires co-ordinated and (long-term) visions for guidance.*

Of interest are several initiatives for local indicators in the area, such as the local indicators of energy production and use, and transport, which are being developed in the framework of the INTERREG IV C Project "EU 2020 going local". These indicators will likely be developed for the local implementation of the European Energy Awards programme, where the awards present a particular incentive for high levels of municipal engagement to produce such data; as well as indicators for the development of the Eco-cité in France. The European territorial grouping for co-ordination in Alzette-Belval (EGTC) will provide a notable and new tool for cross-border co-ordination, a possible platform for developing visions and indicators, and follow-up on a cross-border area. Special attention should be paid to more marginalised groups of society, inclusive growth, and the avoidance of a spatial segregation of a green elite.

CHAPTER 5. CONCLUSIONS AND POLICY RECOMMENDATIONS: THE BENELUX GREEN GROWTH DASHBOARD

Abstract

This chapter presents further analysis of the transition to green growth in the Benelux region, drawing from the Ghent-Terneuzen and Alzette-Belval case study scenario studies. This chapter presents data collected from the OECD local green growth indicator set, as well as the visualisation of this data into a 'dashboard'. The dashboard provides insights for policy conclusions on the Benelux region's future activities in green growth. It also highlights implications relevant to other cross-border regions. The chapter concludes with overall findings for the report and policy recommendations based on these findings.

The OECD green growth strategy was formally established in June 2009. As a part of this strategy, a monitoring framework was established to track how nations are progressing on their low-carbon transition. This framework was developed based on the understanding that the measurement variables of economic growth and development that have been used in the past would no longer be adequate to describe or understand the transition of green growth. The framework allows progress towards green growth to be measured using internationally comparable data, embedded in a conceptual framework that is able to be communicated to a wide audience of policy makers and the public at large (OECD, 2011b).

These indicators represent a starting point in understanding green growth at the national level, and they will be further elaborated as new data become available and concepts evolve. The Netherlands, one of the Benelux Union countries, pioneered much of the data, including collection methodologies for the creation of the national green growth indicators[64].

It is important to recognise that no single indicator will be effective in capturing progress towards green growth, and not all the indicators presented are measurable today. The OECD framework contains 25 separate indicators, arranged into five themes. An outline of the indicator framework is shown in Table 5.1. The five themes covered include: the environment and resource productivity of the economy; the natural asset base; the environmental dimensions of quality of life; economic opportunities and policy responses; and context indicators covering the socio-economic characteristics of growth.

As with most regions, the Benelux is faced with both challenges and opportunities in decarbonising its economy. How these challenges and opportunities are conceived, measured and addressed in comparison to the activities of other regions and areas is a question many policy makers have. What are the lessons that other local areas can learn from the Benelux region, and what are the critical markers for transition, and how effective have policy responses been in encouraging this transition? To make this assessment required indicators with suitable variables at the local level.

A first step in identifying locally sustainable indicators is to test how useable the framework developed at the 'national' level is to describe activities at the local/cross-border

[64] Statistics Netherlands (2011) *Green Growth in the Netherlands*, accessed at http://www.cbs.nl/NR/rdonlyres/65FA4466-853C-4223-8B69-7C7872E37DC3/0/2011p44pub.pdf.

level. Does the framework increase understanding of the transition at the local level, and if so, in what areas? And if not, what are the important missing elements and how might we start to fill the gaps, whether with proxies or suggestions for further data collection in the future?

Differences between national and local indicator frameworks

Three factors summarise the differences in context between the national and local situations for green growth. These factors need to be considered in designing the local indicators.

First, each area will have a different baseline. Green growth indicators must begin from a baseline. If we are to accurately assess green growth, then this baseline will need to incorporate what is already present in an area. Every area has an array of existing production structures (its production function), including the labour force and capital stock (machinery, built environment etc.) as well as stocks of renewable and non-renewable natural resources. These existing activities and assets will shape the trajectory of the local area's pathway to a low-carbon future.

In the introduction to this report, the OECD definition of green growth was outlined. This definition acknowledges that green growth has several dimensions, and the opportunities for growth will occur through varying sources including:

- New opportunities emerging from new markets and activities.
- Net growth emerging from greening activities across the entire economy.
- Growth that takes into account the environmental impacts and externalities of our current production and consumption activities.

Local indicators of green growth will differ from the national level in three areas:

- Composition of stocks at a defined level of geography.
- Available policy levers and jurisdictions.
- Data availability.

Local trajectories will be unique for each area because of the different compositions of stocks and activities. However, at the national level, the aggregation of these activities masks some of the winners and losers of the transition to greener growth. This makes understanding and communicating local pathways to a low-carbon economy a different, but no less important, task than at the national level.

Second, the policy responses available to local policy makers to direct the transition pathway are more curtailed than at the national level, for example, most local authorities do not have significant taxation revenue raising powers. However, policy makers at the local level have the ability to interact closely with their citizens, and can influence policy that has a direct impact on the daily way of life, for example, through waste, recycling, and active and public transport options. Therefore, the same set of economic opportunities and available policy responses that exist at the national indicator level will not be suitable at the local level.

Finally, data on all the measurement variables are not available at the local level. This is where proxies and other future data collection exercises will need to fill important gaps.

Method for identifying local indicators

The method of designing a local indicator set for local green growth transition was a two-step process. The first step was to make an assessment of the relevance of the national OECD Green Growth Indicator framework and the relevance of the individual variables in describing Benelux's transition to a low-carbon economy. This assessment was completed in collaboration with local research partners, and was informed by the previously mentioned three constraints on local trajectories, namely:

- Different baselines of productive and knowledge activities and stocks of renewable and non-renewable assets;
- The policy reach of the local area and;
- The availability of data.

Table 5.1. shows an assessment of the variables within the OECD Green Growth Indicator framework by relevance to the Benelux's transition to a low-carbon economy. Each variable is rated Low, Medium or High in terms of its ability to contribute to the green growth assessment at the local level.

Table 5.1 OECD Indicator groups and themes

Indicator groups	Topics covered
1. The environmental and resource productivity of the economy	- Carbon and energy productivity - Resource productivity: materials, nutrients, water - Multi-factor productivity
2. The natural asset base	- Renewable stocks: water, forests, fish, resources - Non-renewable stocks: mineral resources - Biodiversity and ecosystems
3. The environmental dimensions of quality of life	- Environmental health and risks - Environmental services and amenities
4. Economic opportunities and policy responses	- Technology and innovation - Environmental goods and services - International financial flows - Prices and transfers - Skills and training - Regulations and management approaches
5. Socio-economic context and characteristics of growth	- Economic growth and structure - Productivity and trade - Labour markets, education and income - Socio-demographic patterns

In creating this indicator framework, the OECD made a conscious effort to be pragmatic, acknowledging that this is an emerging area, and that analysis of green growth will be imperfect until this indicator framework and the data sources upon which it relies mature. However, it is important to attempt to identify and test which areas will work, and to investigate what data is available with which to assess the current situation.

The Benelux region and the Green Growth Indicator framework

The previous chapters have outlined the progress of the two cross-border regions, Ghent-Terneuzen and Alzette-Belval, towards a low-carbon economy. The Benelux region is a critical component of the northern European economy and the area is characterised by its transport and logistics industries, both road and sea. Throughout this report, significant evidence has demonstrated the impact of the green growth ambitions of the countries that make up the Benelux, and the effect that cross-border activities can have on the emissions profile, labour market and innovation dynamics of the region.

Table 5.2. Ghent-Terneuzen's green growth indicators and the local transition

The socio-economic context and characteristics of growth		Relevance to local transition[65]
Economic growth, productivity and competitiveness	GDP growth	M
	Net disposable income	M
	Labour productivity	M
	Trade weighted unit labour costs	M
Labour markets, education and income	Labour force participation	M
	Unemployment rates	M
	Population growth	M
	Life expectancy	M
	Income inequality	M
	Educational attainment	H
Environmental and resource productivity		
	CO^2 production	H
	Energy productivity	H
	Material productivity (non-energy)	L
	Water productivity	M
	Multi-factor productivity	M
Natural asset base		
Renewable stock	Freshwater resources	L
	Forest resources	L
	Fish resources	L
Non-renewable stocks	Mineral resources	L
Biodiversity and ecosystems	Land resources - land use state and changes	M
	Soil resources - agricultural land affected by soil erosion	L
	Wildlife resources - endangered species	L
Environmental quality of life		
Environmental health and risks	Environmentally induced health problems - exposure to air pollution	H
	Exposure to natural or industrial related losses	H

[65] High (H), Medium (M), Low (L).

	Connection to sewage treatment	H
	Connection to safe drinking water	H
Economic opportunities and policy responses		
Innovation	Renewable energy R&D	H
	Environmental technologies R&D	H
	All-purpose R&D	H
Patents important to GG	Environmentally related patents	M
	All patents	M
Environmental goods and services (EGS)	Gross value add of EGS	M
	Employment in EGS	M
International financial flows important to GG	Official development assistance	M
	Carbon market financing	M
	Foreign Direct Investment	M
Prices and transfers	Environmentally related tax revenues	M
	Structure of environmentally related taxes	M
	Energy pricing	M
	Water pricing and cost recovery	M
Regulations and management	TBD	M
Processes		
Training and skills	Students in EGS	M
	Courses in EGS	M

Table 5.3. Alzette-Belval's green growth indicators and the local transition

The socio-economic context and characteristics of growth		**Relevance to local transition**[66]
Economic growth, productivity and competitiveness	GDP growth	M
	Net disposable income	M
	Labour productivity	M
	Trade weighted unit labour costs	M
Labour markets, education and income	Labour force participation	M
	Unemployment rates	M
	Population growth	H
	Life expectancy	L
	Income inequality	H
	Educational attainment	H
Environmental and resource productivity		
	CO^2 productivity	H
	Energy productivity	H
	Material productivity (non-energy)	H
	Water productivity	M
	Multi-factor productivity	L

[66] High (H), Medium (M), Low (L).

Natural asset base		
Renewable stock	Freshwater resources	M
	Forest resources	H
	Fish resources	L
Non-renewable stocks	Mineral resources	L
Biodiversity and ecosystems	Land resources - land use state and changes	H
	Soil resources - agricultural land affected by soil erosion	M
	Wildlife resources - endangered species	L
Environmental quality of life		
Environmental health and risks	Environmentally induced health problems - exposure to air pollution	H
	Exposure to natural or industrial related losses	H
	Connection to sewage treatment	H
	Connection to safe drinking water	H
Economic opportunities and policy responses		
Innovation	Renewable energy R&D	H
	Environmental technologies R&D	H
	All-purpose R&D	M
Patents important to GG	Environmentally related patents	M
	All patents	M
Environmental goods	Gross value add of EGS	M
and services	Employment in EGS	H
International financial flows important to GG	Official development assistance	L
	Carbon market financing	M
	Foreign Direct Investment	M
Prices and transfers	Environmentally related tax revenues	H
	Structure of environmentally related taxes	M
	Energy pricing	H
	Water pricing and cost recovery	M
Regulations and management	TBD	
Processes		
Training and skills	Students in EGS	H
	Courses in EGS	H

The highly rated variables are in: labour market characteristics and dynamics (unemployment rates, educational attainment, labour force training and skills development, and environmental health); resource productivity (energy, water and carbon productivity); and the knowledge intensity of the city, which is linked to its ability to embrace green economy opportunities (innovation and patenting activity, size and growth of the environmental goods and services industry). The effectiveness of policy responses in encouraging these green economy opportunities and ensuring the net economic benefit is captured for the Benelux case study regions is also seen as an important measurement variable.

The lower rated variables are not considered of lower importance in green growth, but of lower relevance to understanding green growth at the local level, due to the three reasons mentioned earlier (composition of stocks, availability of policy levers, and data availability). For example, indicators for natural assets resources such as forests and fisheries are not applicable to most regions, as they do not have these resources (particularly urban ones). Regions either do not have the capacity to effectively measure resources within their jurisdiction, or do not have the ability through their policy remit to influence how these natural stocks are used or depleted.

This assessment was then used to inform the second phase of the development of the local indicator set: selecting suitable local variables. Workshops with Benelux stakeholders determined that there were three specific areas of the green growth indicator framework which were especially meaningful for understanding local components of green transition:

- Resource efficiency, but extended to include waste efficiency and the level of recycling within the local area;
- Knowledge intensity and green economy opportunities; and
- Policy responses to support green growth.

Three of the five headline themes of the OECD national framework were kept in the local indicators set. The headline theme of environmental and resource productivity remains in the local framework, although the variables are modified to per capita rather than productivity based measures in order to align with the availability of local data sources. The natural asset base and environmental quality of life measures, whilst seen as very relevant for the national level, at the local level presented data collection (particularly in being able to collect meaningful local data), and policy jurisdiction issues (limited local policy reach in these areas).

The economic opportunities and policy response themes were considered as being the most relevant for understanding the local situation, and was expanded to include economic opportunity measures, policy responses, but also skills and training measures. The socio-economic context indicators also remain, as important indicators of the local context for interpreting the previous variables. These were modified to take advantage of likely local data sources. The four theme areas of the local indicator framework are each explained in further detail below.

1. *The socio-economic context:* This describes the social and industrial characteristics of the area under investigation. As noted earlier, local trajectories towards a low-carbon economy will be strongly shaped by the existing industrial and human capital, therefore, it is important to show indicators within this context.
2. *Environmental and resource productivity:* This captures the headline resources' productivity figures for the local area.
3. *Economic opportunities:* This examines the capacity of the local areas to act on the low-carbon opportunities. It includes measures of research and knowledge intensity, students and learning, and the value and number of jobs associated with the green economy.
4. *Skills and training ecosystems:* Skills and training systems can be very path dependent and will require significant momentum and time to change. This item captures the progress of green skills development in the local areas and the patterns of change in the skills and training ecosystems that will manage this progress.

5. 5. *Policy responses:* Each local jurisdiction has different policy levers available to it, but additionally, each jurisdiction has a different pattern of policy action and learning. Green policy is a new area of knowledge and policy development for many local and regional governments; they need to build not only political consensus for action, but also internal capability and capacity of policy design, implementation and evaluation. Theme 4 captures the progress of local policy actors in green policy making.

Specific variables and data for the first four themes were identified and developed from existing data sources. Data for the fifth theme – policy responses - were collected through a survey of stakeholders.

Considerations used to shape this framework include data availability, current and proposed policy activity, cross-border implications and an assessment of the literature on green jobs and skills for data collection methods and options.

In many cases, the variables were the same measurement variables used in other forms of regional development (productivity, employment, business start-up and survival), innovation (R&D spend, R&D employees, patents) and resource efficiency (energy, water and waste per capita). Data collection for these variables was easier because the concepts were established and data collection against these variables was already happening, if not at the specific local level then at the regional or national level.

Similar issues also exist when analysing the skills dimensions of the green growth transition. It is clear that such a major change in industrial processes and activities will also have a resulting impact on the knowledge and skills that employees require – but the metrics and data that can characterise the evolution of so-called ‘green’ skills are not yet available.

Indicators and data sources were more difficult to identify and collect in areas in which the indicators were not well-established or already being collected. This included areas such as eco-innovation, green jobs and investment, and green knowledge and skills.

One noticeable gap in the emerging variables for economic opportunities of the low-carbon economy is an indicator of the prevalence of green technology and/or resource efficiency knowledge and skills within the labour force. A measure of students (in both university and vocational training) studying environmental-related subjects are proposed as an initial proxy for measure green skills. Measuring the number of students studying these subjects year on year will allow a picture of the skills capacity in this area within the labour force to be built up over time. Further measurement variables will be required to gain a more sophisticated understanding of the greening of skills and occupation, but the identification of this variable was seen as a first step.

A collaborative process between the five case study areas participating in the OECD LEED Local Indicators for a Low-carbon Economy project ensured agreement on the final variables for the local indicator set, bearing in mind that the variables had to be suitable to a range of local areas across OECD member countries. Table 5.4 shows the data collection for both Ghent-Terneuzen and Alzette-Belval in the Benelux region against the local indicators set. Comparisons are then made with corresponding OECD, EU or national averages depending on data availability.

Table 5.4. Data table for Ghent-Terneuzen and Alzette-Belval

Socio-economic context	Ghent-Terneuzen data	Alzette-Belval* data	Unit	Source
Entrepreneurship rate	42200-27100 (VRIND 2012)	678 in 2010 (an increase of 2,7% in firms cf 2006 (2007))	Firms	Ghent (Flanders region) – VRIND Belval - http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=680&IF_Language=fra&MainTheme=4&FldrName=1&RFPath=43 http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=678&IF_Language=fra&MainTheme=4&FldrName=1&RFPath=43
Firm survival rate	72.1% (alive in 2010 after 5 years)	55% (2010)	%	Ghent (Flanders region) – VRIND Belval - http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=682&IF_Language=fra&MainTheme=4&FldrName=1&RFPath=7516;
Employment creation	na	6857	Persons in capital region	Belval - http://www.adem.public.lu/actualites/2013/01/news_12_12/Bulletin_dec_2012.pdf
Productivity	na	82100 € = 111286.55 $	$US/per capita	Luxembourg - http://www.statistiques.public.lu/catalogue-publications/note-conjoncture-en/2010/Economic-update-2-2010.pdf
Educational attainment	73%	77.3% (2011)	Persons aged 25-34	Ghent (Flanders region) – VRIND Belval - http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tps00065&plugin=1
Income per worker/month	2977	3033*	EU	Ghent (Flanders region) – National Bank Luxembourg - http://www.statistiques.public.lu/catalogue-publications/luxembourg-en-chiffres/luxembourg-figures.pdf

* In most cases Luxembourg data is used for Alzette-Belval case – Luxembourg level data is denoted with *

Environmental and resource productivity	Ghent data	Belval data	Unit	Sources	Comparison	Source
Per capita emissions	11.81	23.1*	t/per capita	Ghent (Flanders region) - VMM Mira data 2010 Luxembourg figure – Département de l'Environnement Ministère du Développement durable et des Infrastructures	Compared to OECD average 10.36137828	1. OECD Factbook 2011: Economic, Environmental and Social Statistics - ISBN 978-92-64-11150-9 - © OECD 2011
Energy consumption	13.9	166.11*	€/PJ	Ghent (Flanders region) - VMM Mira data 2010 Luxembourg (2010) - Département de l'Environnement Ministère du Développement durable et des Infrastructures	Compared with OECD average $6(US)	OECD Factbook 2011: Economic, Environmental and Social Statistics - ISBN 978-92-64-11150-9 - © OECD 2011
Water consumption	1160kL	800kL* (80m3)(2009)	kL/per capita/per annum	Ghent (Flanders region) -VMM Mira data 2010 Luxembourg - http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Water_statistics	Compared with OECD average 870kL/annum,	OECD Factbook 2011: Economic, Environmental and Social Statistics - ISBN 978-92-64-11150-9 - © OECD 2011
Municipal waste collection	525	237	kg/per capita	Ghent (Flanders region) - OVAM, 2010 Esch Canton (2010) - http://www.statistiques.public.lu/stat/TableViewer/tableView.aspx?ReportId=382&IF_Language=eng&MainTheme=1&FldrName=3&RFPath=65	Compared with OECD 540kg/per capital (2009) and	OECD Factbook 2011: Economic, Environmental and Social Statistics - ISBN 978-92-64-11150-9 - © OECD 2011
Recycling per capita	374	180*	kg/per capita	Ghent (Flanders region) - OVAM, 2010 Luxembourg (2010) - Département de l'Environnement Ministère du Développement durable et des Infrastructures	121t/per capita EU countries (Eurostat 2009)	OECD Factbook 2011: Economic, Environmental and Social Statistics - ISBN 978-92-64-11150-9 - © OECD 2011
Treatment of contaminated land	1	1	Binary 1= yes, 0=no	Ghent (Flanders region) - OVAM, Flemish decree on soil sanitation	1	Binary 1= yes, 0=no

Economic opportunities	Ghent data	Belval data	Unit	Source	Comparison	Source
R&D employment	8.5 (2010)	No local data available	Per 1000 employees	Ghent - ECOOM statistics 2011	Compared with 6.3 EU27 average (Source #1), Netherlands - 4,489 miljoen werkenden Luxembourg national data 6.8 (2009)	1. OECD Factbook 2011: Economic, Environmental and Social Statistics - ISBN 978-92-64-11150-9 - ©OECD 2011
Students in the labour force	4.3%	No local data available	% of work force	Ghent - VRIND	Luxembourg national data 2.39% (2011) University students only	
Students in environmental subjects	No local data available	No local data available	% of work force		Na	No available sources
All purpose R&D	2.01% (2009)	No local data available	Regional GDP	Ghent - ECOOM statistics 2011	Compared with 2.33 OECD average (2011) (Source #1), 2.8 ,Luxembourg national data 1.68% of GDP	1. OECD Factbook 2011: Economic, Environmental and Social Statistics - ISBN 978-92-64-11150-9 - © OECD 2011
Triadic patent applications for climate change mitigation technologies	No local data available	No local data available	per million			1. http://pdwb.de/nd05.htm#2010 (accessed: 18 February 2013) Source #3: http://www.statistik-berlin-brandenburg.de/produkte/Faltblatt_Brochure/brandenburg_in_Zahlen_de.pdf (accessed: 18 February 2013)
All patents	120 (2008)	No local data available	per mill population	Ghent - ECOOM statistics 2011	Compared with OECD average 37.3 (2009) (Source #1), Luxembourg national data 61.2 (2010)	1. OECD Factbook 2011: Economic, Environmental and Social Statistics - ISBN 978-92-64-11150-9 - © OECD 2011
Turnover of EGS industries	13.4 billion (2010)	No local data available	$US million	Ghent - LNE		
Employment in EGS	63400 (2012 - source #1), 36902 (2010 – source #2)	No local data available	persons (2009)	Ghent – Source #1 VRIND report 2012, Source #2 LNE report.	Netherlands - 77000 (2005) national planning bureau	
Foreign Direct Investment	1	1	Binary 1= yes, 0=no			

Dashboard for data visualisation

To analyse the data presented in the indicator framework, a 'dashboard' data visualisation tool is developed. The dashboard takes the indicators one step further and helps the information to be summarised and communicated. The dashboard tool has been used in numerous global indicator programmes, including the UN Commission for Sustainable Development, and the Sustainable Development Index (SDI) in the United States of America, as it offers a way to summarise all the indicator variables in one visual output.

The dashboard has been created for environmental and resource productivity, and green economic opportunities, as these will be the main points of comparison across the OECD project. These variables have proved of most interest to policy makers for comparative analysis across local areas.

The socio-economic variables reported in Table 5.4 provide a localised context for the dashboard. This is important because local performance in terms of environmental and resource productivity and green economic opportunities is highly influenced by the local situation.

The dashboard shows the challenge of decarbonisation in a region that has a lot of carbon intensive industry. This is a challenge shared by many other regions where major industry and infrastructure such as ports and major transport logistical routes are located. This highlights the need to keep regional indicators within the context of national efforts and the importance of time series analysis in a region over time as well as making comparisons between regions.

Dashboard data was collected for most variables at the Benelux regional level. In some important areas relating to green growth employment and value of turnover there are still not consistent data sources available at either the local or national level. The problem is partly one of definition (i.e. how are green industries defined) and secondly one of determination - how is the 'green' element isolated from the wider impact of greening and increased focus on resource efficiency that is happening across the entire economy? It is in these areas that we are really at the frontier of defining and measuring green industrial activity.

The results of the exercise for Benelux can thus be summarised as follows.

Environmental and resource productivity: Ghent-Terneuzen performs well on most measures of environmental and resource productivity, with indicators above OECD country averages (energy consumption per capita and treatment of contaminated land) and in some cases the Netherlands averages (recycling per capita and municipal waste per capita). The two variables in this section where performance is below the Netherlands national level are in per capita emissions. As noted earlier in this report, both the Ghent-Terneuzen and Alzette-Belval cases are characterised by their role as transportation and logistics hubs, which means that emissions from transport vehicles, including the port in Ghent-Terneuzen, affect the emissions profiles of the area. The performance against water consumption per capita in the region was 1160kL per capita per annum, a third higher than the OECD countries' average of 870kL per capita per annum.

Alzette-Belval also performed above OECD averages (water consumption) and Luxembourg averages (energy consumption, recycling per capita and treatment of contaminated land). Two areas were below national levels, the first were per capita emissions and the second municipal waste. In the case of the per capita emissions, this is for similar reasons as in the Ghent-Terneuzen case - a concentration of emission intensive industries. In Alzette-Belval's case, this includes transportation and logistics (this occurs for Luxembourg

as a whole, as it is at the intersection of a number of countries), but also the remnants of heavy industry in the region that are associated with steel manufacturing.

Economic opportunities: The performance of Ghent-Terneuzen in terms of economic opportunities is more mixed. On a number of measures, Ghent-Terneuzen performs well (R&D employment, students as a proportion of the labour force, and the availability of foreign direct investment into the region). Ghent-Terneuzen also performs at a similar level to the wider Netherlands in employment and turnover in environmental goods and services. In two variables, performance is below the national or OECD average (R&D expenditure as a percentage of gross regional product, and per capita patent counts). Further, in two variables there was no data available at a local level that could be comparable for Ghent-Terneuzen (students studying environmental subjects as a percentage of the labour force, and per capita patenting in 'green[67]' technologies).

On the one hand, the strong performance of Ghent-Terneuzen in R&D employment and students as a percentage of the labour force suggests knowledge intensity within the region that is perhaps not also being reflected in the R&D expenditure and patenting activities originating in the region. This is not atypical as many knowledge intensive activities do not result in patenting such as the R&D expenditure needs of other sectors (such as biotechnology and materials sciences). The case study of Ghent-Terneuzen shows the focus on training and bio-based economy research and development that is taking place in the region, and the very applied and industry-focused nature of this work.

The performance of the Alzette-Belval case study region in terms of economic opportunities is harder to determine, due to the lack of data at any regional levels appropriate for this analysis. The main data sources available are at the Luxembourg national level, and due to the specific context of the Alzette-Belval region in terms of its emissions profile, industrial and labour force structure, it is difficult to draw conclusions about the region from national data sets.

A recommendation from this research for the Alzette-Belval region would be to improve the availability of local data sources to allow this regional contextualisation of economic opportunities associated with the transition to a low-carbon economy.

[67] Green technologies as defined by the European Union Patent and Trademark Office.

Figure 5.1. Ghent-Terneuzen Green Dashboard

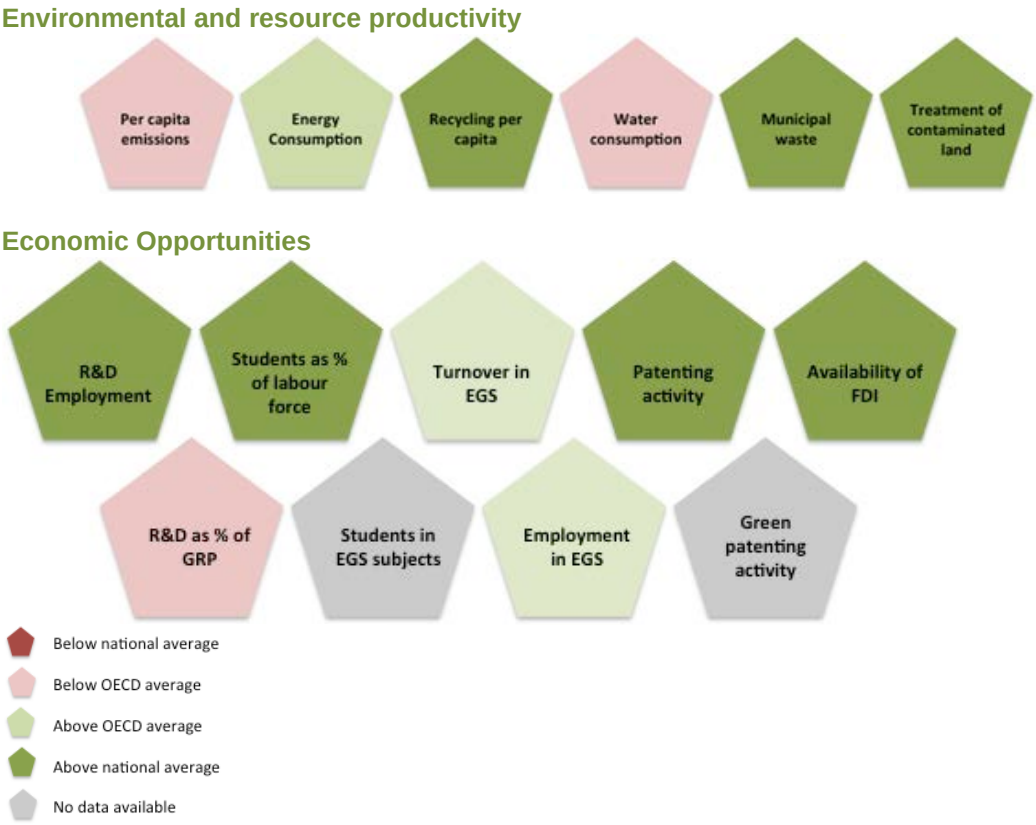
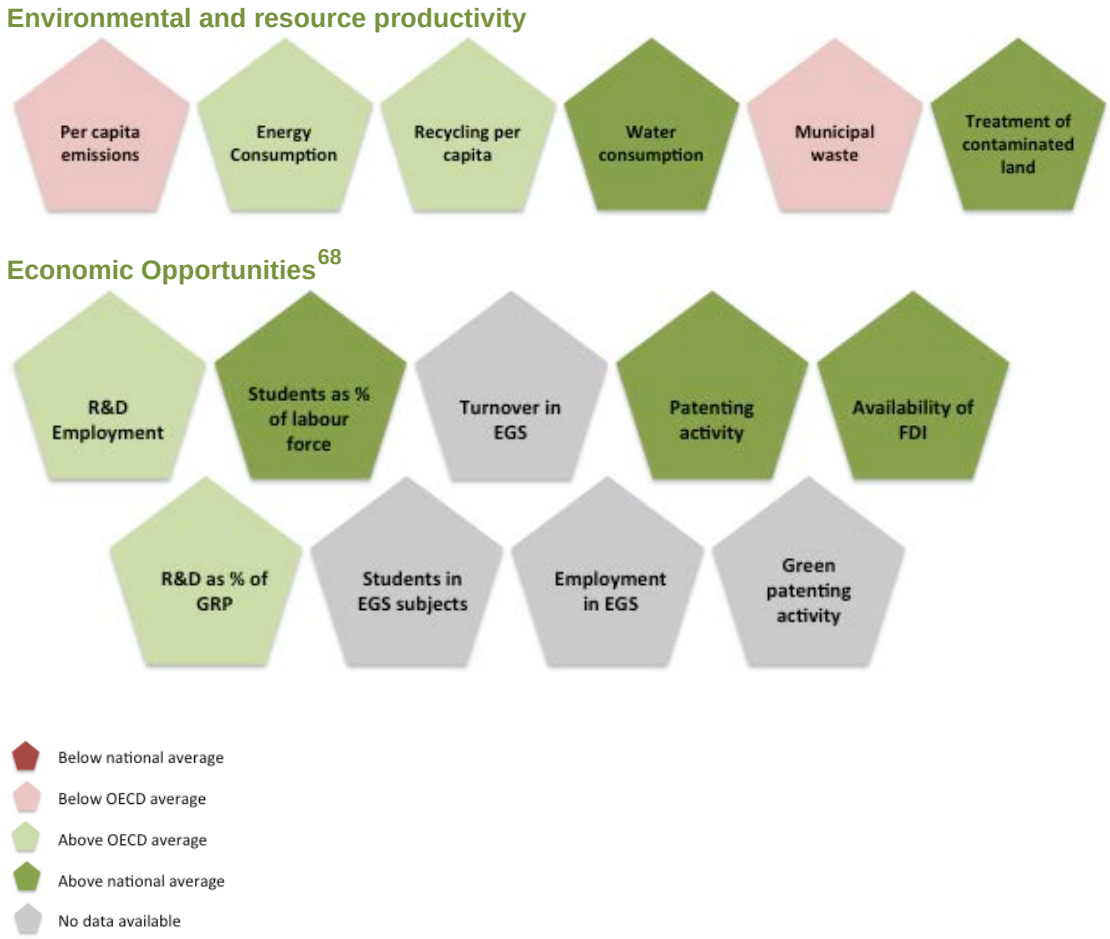


Figure 5.2. Alzette- Belval Green Dashboard



Policy and skills indexes for Benelux

To further assess the progress of policy responses for low-carbon economy support, and green skills and training, a small survey of local stakeholders (representing government, business, trade unions, higher education institutions etc.) was completed.

As noted, the local policy assessment and skills ecosystem were derived from a short questionnaire submitted to local policy and training stakeholders. These stakeholders were asked to assess the progress of various policy and skills development mechanisms in encouraging local transitions to a low-carbon economy.

The results for each of these two variables are shown in spider charts (Figures 5.3 and 5.4). The spider chart for each of the indexes represents the average answers on a five-point scale. These results are subjective, but together with the other elements of the indicator framework can offer a richer picture of the current status of local transitions. If these questionnaires are conducted at frequent intervals, progress in transition will also be evident.

Policy responses: in both the Ghent-Terneuzen and the Alzette-Belval cases, stakeholders note areas for improvement in the focused policy responses. In Alzette-Belval, stakeholders felt that policies around Universities were the most developed in terms of green transition, closely followed by industry associations and support for social activities. This

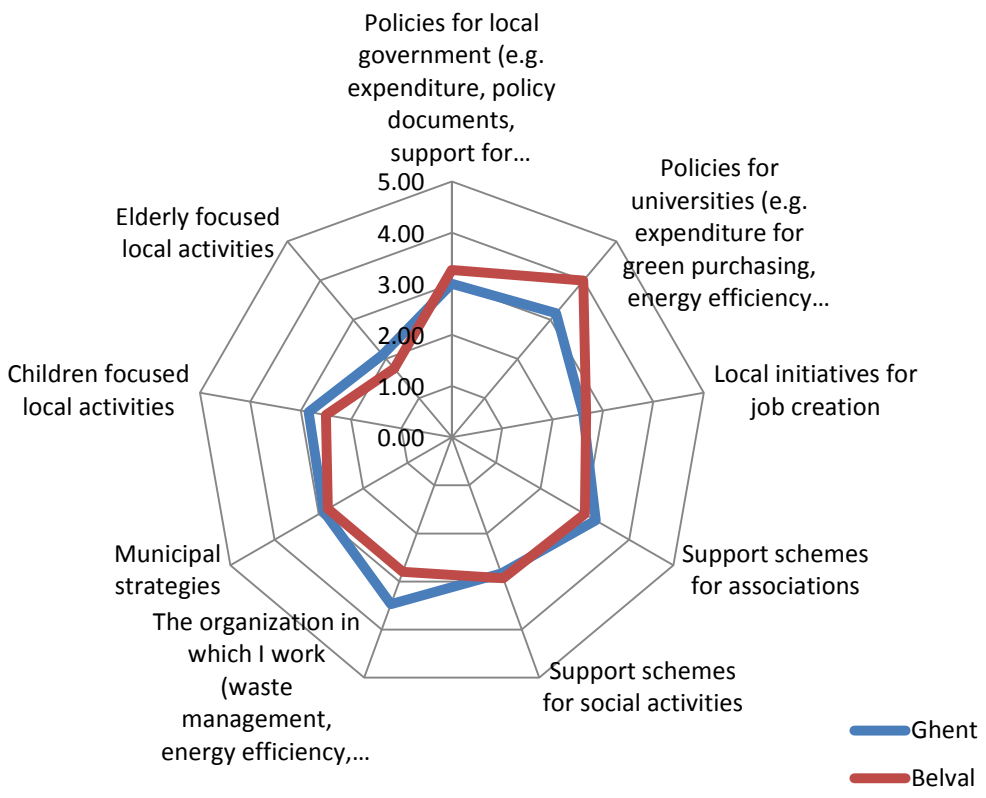
[68] Dashboard content in Economic Opportunities for Alzette- Belval developed from Luxembourg national data as no local data sources were available.

result is not surprising given the levels of investment in the region being directed at the establishment of the new University of Luxembourg campus in the area.

In Ghent-Terneuzen, policy areas that stakeholders felt were the most supportive of green transition were in actual workplaces and then at the municipal level. The strong focus on local industry as shown in the Bio-Base economy cluster, and the active involvement of the City of Ghent in a number of low-carbon initiatives reinforce these results.

In both cases, the lowest scores were received for policies focused on the elderly and children. This is likely to be a result of the audience that attended the workshops and also the industry and labour force focus of this case study. This makes it difficult to determine whether these low scores for elderly and children-based policies are a result of minimal policies in these areas, or minimal recognition of the existence of these activities by the stakeholders completing the questionnaire.

Figure 5.3. Policy index for Benelux cases



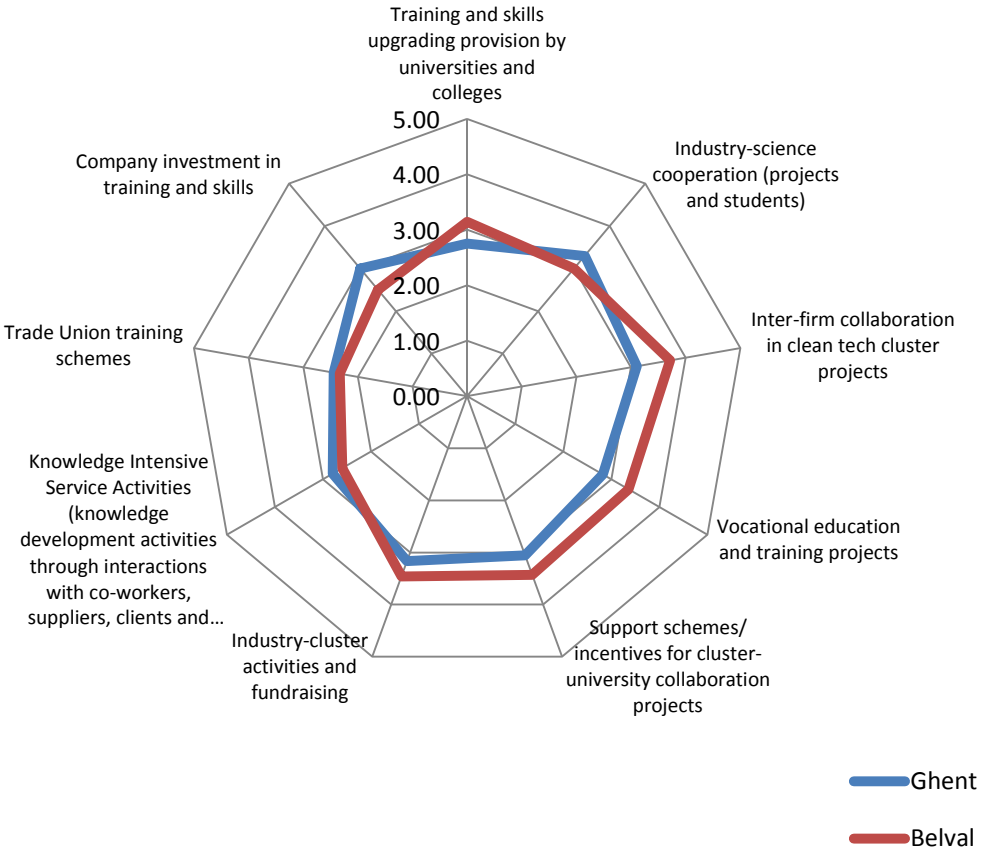
Ghent-Terneuzen n= 17, Alzette-Belval, n=15.

Note: 1 = low green focus, 5= high green focus.

The results from the skills ecosystem components of the questionnaire also reflect the regional focuses of each of the case studies. In Ghent-Terneuzen, stakeholders scored highly in the areas of industry-science co-operation, company based training and skills investment, and knowledge intensive service activities. This is consistent with the industry focus of much of the activity around the bio-based cluster. In the Alzette-Belval case, stakeholders provided higher scores for university and vocational learning skills development within the region,

again consistent with the emerging role of the university and the nascent stages of an eco-technologies cluster in the region.

Figure 5.4. Skills ecosystem analysis for Benelux cases



Ghent-Terneuzen n= 17, Alzette-Belval, n=15.

Note : 1 = low green focus, 5= high green focus.

Policy Challenges and Recommendations

The key policy challenge to emerge from this research is the need for local data sets to inform local decision making. In both the scenarios investigated in this report, it is evident that green growth is seen as being central to future economic and employment development. It is also very apparent that in measuring activity and progress to green growth there is a significant gap between aspiration and opportunities on the one hand, and the ability and resources of the institutions in these regions to systematically assess options and evaluate performance. This is due to a lack of appropriate metrics and the lack of available local data to populate these metrics.

The policy implications indicate that there are six key policy challenges and nine core policy recommendations.

1. Providing consensus on cross-border indicators; what is measured, why and how often, and how they are communicated.

Agreement on a set of common indicators and the mechanisms for measuring and populating these indicators firstly requires stakeholder engagement and agreement to inform and validate the indicator selection process. Through the process of deciding 'what' to measure, monitor and use as indicators for performance, stakeholders can develop a shared understanding and responsibility for developing and populating indicators. This in turn flows into the activities and responsibilities of the institutions from whence these stakeholders come (public, private, public) and develop a platform for co-operation. The guiding suggestion is to develop indicators in this participatory way early in the process, as they can generate support for the essential goals of the local policy process or project.

Recommendation 1 – Establish a method by which cross-border stakeholders can identify the main variables associated with transition and how these will be measured, and build indicator development and measurement verification into large public investment activities.

2. Defining suitable methodologies and metrics to assess green growth

The indicators collected and analysed through the dashboard highlight areas in which progress is slow, or where the local context in terms of historical industrial legacies or current activity concentrations make local transitions difficult. Both the cross-border case studies presented in this report operate as transport and logistical hubs; Ghent-Terneuzen is the site of a major port and associated road infrastructure, and the Alzette-Belval (as with much of Luxembourg) is a major road transit thoroughfare between the Benelux and other countries. Therefore, much of this current industrial activity is carbon intensive. This will not necessarily change quickly, but if the progress of (greener) change can be monitored and reported at the local level, then the population and businesses of these areas can see first-hand the potential of the low-carbon economy in their area.

Measuring carbon emissions is going to be the most vital performance metric for assessing the low-carbon transition. Indicator development needs to provide a method by which to do this at the local levels, and in such a way that it takes into consideration the local context. For example, if a large percentage of the carbon emissions of the two areas is from transport and logistics infrastructure, which is clearly not an economic activity that is contained to the local region, but which sits at the regional or national level, then the data must allow this distinction to be made.

Recommendation 2 - Ensure data collection provides flexibility to isolate local sources of emissions.

3. Identifying and resourcing local institutions to collect and report on indicators

The Ghent-Terneuzen area benefits from the extended capabilities of the City of Ghent, which has a longer history of collecting indicators at the local level and undertaking national efforts on behalf of the Netherlands to establish baseline reports in new data sets centred around environmental goods and services turnover and employment.

The Alzette-Belval region does not have this same history of local indicator development. The area is facing major industrial transition from a declining steel industry base to what is anticipated to be a clean and knowledge intensive one, centred around the new University of Luxembourg campus and an emerging eco-technologies cluster.

There is an important role for policy in prioritising the development of indicators to track progress, particularly given the amount of investment being made in each of these areas to facilitate transition.

Recommendation 3 - Identify and resource appropriate institution/s to collect and report this data in a consistent format, which provides comparative analysis on headline indicators at the local, national and international level.

4. Maximising the transition impact of large projects and infrastructure development

The case study chapters discuss in-depth examples of major initiatives in green growth activities that are taking place in both cross-border regions. In Ghent-Terneuzen this is the bio-base economy hub and training centre; in Alzette-Belval it is the high standard efficiency and construction of the urban development of a brownfield site. These major projects will provide significant opportunities for decarbonisation of the local economies.

There is an important role for policy to play in prioritising the development of indicators to track progress in these large projects, particularly given the amount of investment being made in each of these areas to facilitate transition. The scale of this investment provides an opportunity to begin new data collections, as local data collection would only be a small percentage of the total expenditure.

The triple helix framework (industry, university, government) offers a method by which to generate this assessment.

Recommendation 4 - Financially and logistically support data collection projects that are devised and implemented by local stakeholders as a way to cement the operation of cross-border governance.

The ability to track and measure progress towards 'green growth' through locally specific data sources on labour and skills variables would allow the transition to become more transparent to the local populations and, in particular, to highlight the opportunities presented by low-carbon activities and job creation. However, local institutions may not have the capacity for measuring or collecting data, and planning and investment in capacity-building activities thus need to be undertaken, to develop this capacity. Capacity needs to be built into the local institutions in order to measure the impacts of the various measures. The Benelux Union has a role to play in assisting local institutions to enure that there is comparability in the way data is collected and the indicators that are used are cross-border 'proof'.

The ability of local communities to make these decisions is dependent on the provision of accurate and appropriate data for decision-making. The difficulty of achieving this is magnified in cross-border areas, unless structures exist to organise this process. This is also true for identifying and bringing together relevant stakeholders in cross-border regions - it is necessary to create a structure and participatory process that can empower stakeholders across national borders to identify, prioritise and lobby for these major impact initiatives.

Recommendation 5 - Develop processes that seek out and engage a full range of local stakeholders, and which equip them to participate in the discussions and projects. Not all stakeholders are equally able to participate in these activities; recognising and providing resources for these participatory processes increases the likelihood of ownership of the projects and outcomes.

Local stakeholders should also have a means by which their ideas and ambitions can influence the creation of these large projects. The identified need for public transport options in the new Alzette-Belval area in order to prevent the high levels of private vehicle

commuting in the area is one example of how local ambitions can inform wider plans for major infrastructure. Knowledge instiutions can play a key role in the development of green intelligence for urban transport.

Recommendation 6 – Develop and encourage cross-border groupings of public and elected officials to provide input into large transition projects and thus strengthen the capacity of the Benelux Union.

Cross-border regions must also deal with complexities arising from the presence of multiple political and policy jurisdictional boundaries all influencing the activities in the one cross-border region. Each jurisdiction has an inherent culture and set of norms that shape their activities, so that even when broad policy objectives across jurisdictions align, the method of achieving these objectives may be different. Where policy objectives do not align, the situation is even more difficult.

Policy co-ordination is an essential element to enable cross-border regions to transition into the low-carbon economy. Cross-border co-operation models need to be strengthened and developed further, to stand as laboratories of co-operation for green growth transition.

The Benelux Union itself is a well-established and equipped co-operative structure through which these cross-border regions can develop harmonised policy objectives across borders. The Benelux Union also offers the opportunity for the development of cross-border governance models that start to align both policy objectives and policy implementation. New models of partnership and governance need to be found and this requires different types of policy and analytical skills – e.g. a small intelligence unit could be created within the Benelux Secretariat, to bring together existing knowledge to help develop horizontal projects for the Benelux regions.

The fact that individual local areas are very different does not mean that there can and should be no learning from shared experiences. In fact, there are common themes in policy implications and needs across all regions seeking transition to a low-carbon economy. The next policy challenges relate to: knowledge creation and diffusion in the green economy; and green industries and emerging markets.

5. Fostering knowledge creation and diffusion in the green economy

The challenge of transitioning economic activities from high carbon intensity to lower carbon intensity at a regional geographical level, and in a way that minimises negative impacts and enhances the positive ones for regional development, is a challenge for all local areas. The scenarios presented in this report have specifically focused on cross-border regions, but issues of sector-based transition and support for emerging ‘green’ markets such as the bio-base economy in Ghent-Terneuzen, and the green construction industry in Alzette-Belval, are being played out in regions across Europe and the rest of the developed world.

As with all regions, cross-border areas need to ensure that skills development and job creation match the expectations and investments that are being made by all levels of government. Indicator development and data collections focused on related skills, jobs and education, and linked with environmental goods and services, are essential and should be prioritised.

Recommendation 7 - Strengthen innovation capacity in the Benelux Union through international co-operation in order to re-position new industrial ecologies and clusters while addressing the challenges of green growth transition.

In this sense, the policy implications are similar for all regions – the focus should be on skills development across the whole of the labour market (not just students and those entering the labour market), and build on local industrial concentrations and strengths for endogenous economic development through clusters. For regions that have previously had concentrations of carbon intensive industrial activities, such as Alzette-Belval and the steel industry, the transition must also be accompanied by some other significant changes that allow a re-positioning of the area away from the former industrial profile.

The development of the Cité des Sciences and the resource efficient building design offers such an opportunity for a reset. Policy support to enhance and embed these industrial changes is vital, and much can be learned by connecting with other areas in Europe and beyond, which are experiencing similar industrial shifts.

However, in cross-border regions, targeted institutional structures are required to generate and strengthen additional international co-operation for skills development. This is necessary both for the Benelux countries, but also for neighbouring countries. Actions as simple as aligning training and qualification systems for cross-border regions mean that knowledge and innovation systems can operate effectively. Also, mechanisms that structure large project development on both sides of the national borders, linking education systems with promotion of entrepreneurship-based education, will support job creation and job quality in new start-ups and in existing SMEs

Recommendation 8 - Align qualification systems, accreditation and content across borders. Green education and green entrepreneurship can provide a focus for skills recognition and skills activities by the educational institutions in the Benelux. This focus can be developed by provision of specific courses in TVET organisations and by offering Masters and Certificate level courses in Universities and other educational institutions. As areas move from old industry cultures into new LCE activities, new companies and new services are needed. Local entrepreneurs, young and old, male and female should be encouraged to set-up businesses through active and innovative financial mechanisms.

6. Supporting green industries and emerging markets

The transition to a low-carbon economy will see the emergence of new industries and new markets for green products and services. These represent opportunities for firms to grow and develop. However, the process of innovating and commercialising new products in an emerging market is a perilous journey – when customers are not familiar with the unique features of the product, or if the product requires setting a premium price compared to other similar products (even if it performs to a higher standard of efficiency), it can be hard for market penetration to occur.

The risks in this process are higher for small and medium sized firms (SMEs), because they lack the same level of internal resources that large firms have available to support the innovation process. However, as established through the analysis of innovative firms over many years, it is exactly these SMEs who are most likely to be the highly innovative firms, and who seek to introduce new products and processes.

Public policy can play, and indeed does play, a role in the support of these new markets. The most prevalent and effective forms of support to date have been shown to be through government's using their regulatory powers to increase the efficiency standards and emissions reduction requirements of energy, buildings, cars, household appliances, etc. as well as promoting the attractiveness of renewable energy. Public policy can also play a role in supporting new green markets through public procurement. This is where governments act as first, large and/or non-narrow price sensitive customers for new green services and products.

Recommendation 9 - Public procurement should be used to support and encourage new 'green' markets and should be encouraged by all levels of government and the Benelux Union.

Summary of the Main Recommendations for Benelux

Key Policy Challenges	Policy Recommendations
1: Providing consensus on cross border indicators; what is measured, why and how often, and how they are communicated.	• Establish a method by which cross-border stakeholders can identify the main variables associated with transition and how these will be measured, and build indicator development and measurement verification into large public investment activities.
2: Defining suitable methodologies and metrics to assess green growth	• Ensure data collection provides flexibility to isolate local sources of emissions.
3: Identifying and resourcing local institutions to collect and report on indicators	• Identify and resource appropriate institution/s to collect and report this data in a consistent format, which provides comparative analysis on headline indicators at the local, national and international level.
4: Maximising the transition impact of large projects and infrastructure development	• Financially and logistically support data collection projects that are devised and implemented by local stakeholders as a way to cement the operation of cross-border governance. • Develop processes that seek out and engage a full range of local stakeholders, and which equip them to participate in the discussions and projects. Not all stakeholders are equally able to participate in these activities; recognising and providing resources for these participatory processes increases the likelihood of ownership of the projects and outcomes. • Develop and encourage cross-border groupings of public and elected officials to provide input into large transition projects and thus strengthen the capacity of the Benelux Union.
5: Fostering knowledge creation and diffusion in the green economy	• Strengthen innovation capacity in the Benelux Union through international co-operation in order to re-position new industrial ecologies and clusters while addressing the challenges of green growth transition. • Align qualification systems, accreditation and content across borders. Green education and green entrepreneurship can provide a focus for skills recognition and skills activities by the educational institutions in the Benelux. This focus can be developed by provision of specific courses in TVET organisations and by offering Masters and Certificate level courses in Universities and other educational institutions. As areas move from old industry cultures into new LCE activities, new companies and new services are needed. Local entrepreneurs, young and old, male and female should be encouraged to set-up businesses through active and innovative financial mechanisms.
6: Supporting green industries and emerging markets	• Public procurement should be used to support and encourage new 'green' markets and should be encouraged by all levels of government and the Benelux Union.

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ANNEXES

OECD Workshop,
Indicators of local transition to a low-carbon economy in Benelux
12th June 2012 Esch/Belval – Luxembourg

SUMMARY NOTE

By Dr. Ariane König

This summary note presents key insights of the OECD workshop on 'Measuring transition towards a low-carbon economy in the Alzette-Belval area' organised by the Secretariat of the Benelux Union, the OECD LEED programme and the University of Luxembourg under the auspices of the OECD LEED project on Indicators of Local Transition to a Low-Carbon Economy. The Luxembourg Ministry of Economy and Foreign Trade and the City of Esch-Alzette hosted the workshop.

The objective of the project is to develop indicators that can measure change and inform strategies for local transitions to low-carbon economic activities by local actions of local private and public actors. The OECD project focuses on measuring decoupling of environmental impacts from economic growth and improving job prospects, with a focus on better understanding needs for more targeted building of green skills and training for more inclusive green growth. This workshop, focusing on the Alzette-Belval area, was proposed and supported by the Secretariat of the Benelux Union, and co-organised by the University of Luxembourg.

The opening remarks by Alain de Muyser, Deputy Secretary General of the Benelux Union, Elisabeth Mannes-Kieffer, First Government Advisor at the Ministry for Economy and Foreign Trade, and by Jean Huss, First Alderman from the City of Esch-Alzette, highlighted the strategic value of the choice of this case study for measuring local transition to a low-carbon economy.

The geographic perimeter to be considered for the development of the indicators corresponds to the geographic perimeter of the recently established European grouping for territorial co-ordination, 'Alzette-Belval' as defined in the Arrêté Grand-Ducal approving the project of this convention of 21 November 2011, and comprises four communes in the south of Luxembourg and eight communes in the Lorraine region in France. This perimeter provides the opportunity to better understand the need for and potential of cross-border partnerships for green growth.

The Alzette-Belval region has a long industrial history in steel manufacturing, but is now seeking opportunities for structural renewal and improving quality of life by moving key public research organisations to the area and creating new opportunities for fostering innovation, education and training. Key local priorities are the development of high quality sustainable new infrastructure on former industrial wasteland and in urban areas and a transport infrastructure favouring public and low impact transport means. For example, the site of Belval, which will house the new research and innovation cluster, obtained a gold label in a new German site-sustainability-certification scheme. Development priorities thus include

energy-efficiency and well-being in the built-environment, the production of green energy, and the promotion of public-private partnerships for research and innovation, skill-building and training. Social aspects, such as providing for affordable green housing and combatting youth unemployment are also addressed. Overviews on specific local circumstances were provided by Ariane König for the Luxembourg area and by Sébastien Agamennone for the French area. Cristina Martinez-Fernandez, representing the OECD LEED Programme, introduced the international project and objectives.

The remainder of the workshop was structured in four thematic sessions, organised as round table discussions to allow a maximum of interaction between local and OECD experts, and a concluding panel discussion by the OECD experts. Key insights highlighted in these sessions will be summarised in turn.

Roundtable session 1: Environmental assets and infrastructures

Land-use and land cover changes from regeneration of industrial wasteland left by the declining steel industry are largely organised in view of sustainable development. Reforestation projects of old mines in the area, which began in the 1990s, are now contributing to increasing air quality and growing local CO^2 sequestration rates through photosynthesis. The river benefits from a re-naturation project that is exemplary for the country. The development of parks and areas of environmental protection also offer healthy recreation improving environmental health. Large parts of industrial wasteland are turned into urban development projects, notably the Belval project which received a gold label in a pilot certification project applying the certification of sustainability developed by the Deutsche Gesellschaft für Nachhaltiges Bauen (DGNB). With the completion of the master plan which AGORA expects around the year 2025 there will be 1.400.000 square metres of housing, offices and retail sustainable quality development. Four major public research institutes including the University of Luxembourg will be clustered on this site. There are several large scale urban development projects in Esch and adjacent communities to connect with this space. In France also, the development of an 'éco-cité' is in the planning phase. The road network is becoming denser this needs to be managed with care. Strategic investment in the transport infrastructures, including public transport, will be crucial to channel the significant number of commuters through this area in a more sustainable manner, and will require targeted effective cross-border co-ordination.

Accordingly, indicators should measure: land-cover change over time according to well-defined and detailed categories that, for instance, specify the need for green spaces in urban settlements and proportion of certified forests; energy-efficiency standards of the built environment old and new based on regulations and certification schemes; implementation and level of subsidy of retro-fitting programmes for older building stock; mixed-use of new urban development projects (housing and offices); use of public transport and low impact modes, and research on understanding prevailing modal chains; and cross-border co-ordination of policy and investment into the development of transport infrastructure and services. Measures and communication of soil pollution from steel production, e.g. looking at heavy metal contamination are recommended, as well as monitoring air quality (e.g. SOX and NOX). One mid- to long-term goal to be considered might be to develop zero emissions transport for cross-border commuters.

Roundtable session 2: Greening of production and the role of eco-technologies

Carbon flows in the area are still most affected by the industrial production of steel and electricity. ArcelorMittal is still the area's single largest industrial producer, employer, and emitter of CO2 (approximately 4 metric tonnes of CO^2 in 2008), followed by the fairly recently established TwinErg Gas combustion plant that can also run on wood pellets, which provides electricity and district heating in the area of Esch-Belval. The construction sector

that co-evolved with the steel industry in the area is strong, there is also an emerging art and craft sector, and eco-technologies sector. The environmental technology sector is one of four priority sectors in Luxembourg policies on economic development and targeted diversification. A national eco-technology innovation cluster was formed in 2009. Green building in Europe accounts for more than one-third of all non-residential design and construction and will grow to more than one-half of all construction within the next years.

Indicators for tracking of energy-use and changes in carbon efficiency of production will be useful; in particular if complemented by a carbon stock and flow analysis for the area. Assessing water use and waste production, and percentage of waste recycled, in the building sector, for individual organisations and per resident are also key. It is important to differentiate between enterprises dedicated to environmental goals and the greening of traditional enterprises. Organisations should be encouraged to set themselves zero waste targets in a time frame they determine. The number of employees, and longevity of local firms in the eco-technology sector should be monitored, paying also attention to the legal form indicating transition to new forms of ownership of enterprises managing new commons such as utilities (such as the number of renewable energy cooperatives).

Roundtable session 3: Green skills for transition to a low-carbon economy

By 2015, green buildings will support nearly several thousand workers in a range of occupations including construction managers, carpenters, electricians, architects, truck drivers and cost estimators, among many others in Luxembourg. The increased demand for green building construction has created an increased need for a skilled and trained workforce. According to interviews on the green building industry by German construction enterprises, training is essential for getting and maintaining green jobs; thirty percent of green job workers say they needed additional training when they started and most report that formal education and training programs will continue to be needed. Hiring firms agree; seventy-one percent of hiring decision-makers maintain that being credentialed increases competitiveness. Fostering green skills for inclusive growth is key, and requires also addressing the gap in education and unemployment levels between the residents of Luxembourg and foreign nationality in the South.

The Cité de Sciences in Belval will provide room for a large part of the University of Luxembourg, the Public Research Centres Gabriel Lippmann and Henri Tudor (who have just committed to a merger in 2016), and the Centre for Studies on Populations, Poverty and Socio-Economic Policies, as well as a range of other public services such as national archives, a music auditorium and a national centre for industrial culture. The Fonds National de la Recherche, the national research funding authority will also be moved to Belval. A foresight exercise informing research priorities posits research on sustainable resource use in Luxembourg as one of five principal research axes in Luxembourg. Most of these organisations offer education and training relating to sustainable development with a focus the construction and energy sector; courses cover needs in diverse jobs in the sector across all levels of education – constructors, sales staff, and engineers and architects.

The development of indicators on green skills and training could be rooted in efforts identifying key skill capacities and skill deficits relating to transition to a low-carbon economy in the region in a process engaging all stakeholders especially social partners. Indicators could include the number of jobs in local eco-technology firms including public services (waste management, water purification; renewable energy production); the offer of courses in all education and vocational training programmes at all levels; cross-border initiatives on green skills and training, and the number of professional reconversion and new qualification obtained; how many employed and unemployed persons have received green training; and the number of training places for building proactive green retrofitting skills. It was suggested to develop a cross –border eco-innovation training centre.

Indicators on research and innovation could include the number of cross-border research projects with private and public partners and organized civil society relating to sustainable energy-use in the built environment; the number of new related patents and open source tools from research of organisations with the main seat registered in the area; and the number, size and longevity, and legal statute of new related enterprises.

Roundtable session 4: Green strategies for local public and private actors

In Luxembourg governance strategies a very much affected by the interaction across the multiple levels of governance: in particular legally binding requisites to implement EU policies and targets, national and local, and a mismatch of these levels across the border in the different jurisdictional contexts. Municipalities should be empowered to contribute to development of strategies at the national level of concern to them (such as plans for eco-technologies in this case). There is a need for local narrative on transition opportunities and visible highly salient projects. Participatory governance is needed and requires coordinated and (long-term) visions for guidance. Of particular relevance to this project are local indicators of energy production and use and transport being developed in the framework of the INTERREG IV C project *EU 2020 going local*. These indicators will likely be developed for the local implementation of the European Energy Awards programme, where the awards present a particular incentive for high levels of municipal engagement to produce such data; as well as indicators in development for the development of the Eco-cité in France. The European territorial grouping for coordination Alzette-Belval (EGTC) will provide a notable and new tool for cross-border coordination, a possible platform for developing visions and indicators and follow up on a cross border area. Special attention should be paid to more marginalised groups on society, inclusive growth and the avoidance of a spatial segregation of a green elite.

Indicators could be developed to assess public-private implementation projects, development of green housing (retrofitting of old stock or newly built) across a range of rent levels including affordable housing projects; surveys of average household spending on energy and transport; the number of cross-border projects and participatory processes for visioning to frame issues and social learning to initiate projects. Assessing investment flows and new investment structures is also crucial.

Concluding remarks

This case study will provide new insights on the availability of data relating to local transition to a low-carbon economy, and on the significance of cross-border interaction towards this goal. Engagement in the OECD project on developing indicators for local transition to a low-carbon economy presents a great opportunity for the area to develop such indicators in a systematic manner benefitting from the relevant experience gathered in the OECD. Particular to this project are the scarce resources to generate such data at the local and national level also due to the small size of the country (the national statistics office STATEC has one employee who is qualified as an environmental engineer). Such sets of indicators of local transition are of strategic import as they not only reveal, suggest, distort and conceal, but also affect the development path of the object of measurement. It has thus been suggested as feasible to develop a core set of indicators of some five indicators or so that are of salience for cross-national comparisons, such as those relating to carbon efficiency of industrial production of leading enterprises, organisational adherence to the ISO 14001 best practice; waste generation and recycling in municipalities, and education levels (such data are on the OECD list of indicators and already available). Such a core set would be complemented more comprehensive and locally specific set of some fifteen to twenty indicators that assess locally contingent social circumstances relevant to inclusive transition to a low-carbon society, that is developed in a participatory process with local actors giving them ownership, and that also considers EU initiatives that are legally binding. The EGTC Alzette-Belval may provide a

useful platform for developing such a set of indicators in a participatory vision-driven social learning process.

Acknowledgements

This summary report was prepared with input from the facilitators and rapporteurs at the workshop Franklin Bafohn Feyeh; Tom Becker; Kay Friedrichs; Florian Hoffmann; John Park; Simone Polfer; Paul Schosseler; and Christian Schulz. All workshop participants contributed their special expertise and salient insights. The workshop was organized locally by the City of Esch, the Benelux Union (special thanks to Claudine Hermans-Otto and Hans Mooren), and the University of Luxembourg (special thanks to Danielle Schwirtz- Lejeune).

OECD Workshop
Indicators for local transition to a low-carbon economy in Benelux
Case study 2: The ALZETTE-BELVAL area
12th June 2012 Esch-sur-Alzette, Luxembourg

AGENDA

Organised by
OECD LEED Programme, Benelux Union, and the University of Luxembourg

Hosted by
Ministère de l'Economie et du Commerce exterieur and the Ville d'Esch-sur-Alzette

Background

This study is proposed within the framework of the OECD Green Growth Strategy and the OECD LEED project on Indicators of Local Transition to Low-Carbon Economy.

The project aims to define key indicators of area-based transition to a low-carbon economy. The objective is to define *measurable indicators* at regional/local level that can inform over time of transition to low-carbon economic and industrial activities addressing the two aspects of the green growth economy: fostering job creation and economic development in new areas of growth and sustainable development.

The central aim of the Benelux region is to be a region without borders, improving well-being, mobility, safety and sustainable development. The Benelux Union is a cross-border partnership between Belgium, the Netherlands and Luxembourg as well as Flanders, the Walloon government, the French community and the German community of Belgium and Brussels Capital Region.

This project will examine some of the cross-border regions of the Benelux and define indicators of an area-based transition to a low-carbon economy in these regions, with focus on job-creation and economic development in specific cross border areas of growth and sustainable development. Two cross-border assets will be the focus on in-depth analysis:

- *The cross-border cluster "Bio Based Europe" (in the provinces Western-Flanders, Eastern-Flanders and Zeeland) – the focus of the* ***Ghent workshop***
- *The* cross-*border area of Alzette-Belval (the geographic perimeter for consideration corresponds to the area remit of the European Group of Territorial Coordination (EGTC) Alzette/Belval, including the municipalities of Esch/Alzette, Sanem, Mondercange and Schifflange in Luxembourg and the municipalities of Russange, Ottange, Boulange, Redange, Thill, Villerupt, Audan-le-Tiche et Aumetz in France) – the focus of the* ***Belval workshop****.*

For more information on the project visit the OECD LEED website
www.oecd.org/cfe/leed/projects/lowcarbon
or Benelux Union website: www.benelux.int

Venue: Town Hall, Esch-sur-Alzette, Luxembourg

Tuesday, 12th June 2012

Morning session	
08:30 – 09:00	*Arrival and registrations*
09:00 – 09:15	**Welcome to the workshop** Mrs. Elisabeth Mannes-Kieffer, Ministère de l'Economie et du Commerce exterieur Mr. Alain de Muyser, Deputy Secretary- General, Benelux Union Mr. Jean Huss, 1er Echevin, Ville d'Esch-sur-Alzette *Facilitator:* Dr. Ariane König, Head of Sustainable Development, University of Luxembourg
09:15 – 10:15	**The OECD project on 'Measuring the Potential of Green Growth'** Dr. Cristina Martinez, Senior Policy Analyst, OECD LEED Programme Dr . Samantha Sharpe, Principal Research Fellow, University of Technology, Sydney **Development of indicators for local transition to a low-carbon economy** ***Context, framework, and first suggestions*** Dr. Ariane König, University of Luxembourg **Presentation on the Opération d'Intérêt National Alzette-Belval** ***Discussion on cross-border implications*** Mr. Sébastien Agamennone, Etablissement Public d'Aménagement d'Alzette-Belval *Facilitator:* Mr. Alain de Muyser, Deputy Secretary- General, Benelux Union
10:15 – 10:30	**Introduction to the Roundtable sessions** The roundtable sessions are one of the primary forms suggested by OECD for data collection for the local case studies. There are four consecutive one-hour long topical sessions on this programme. Each session will serve to invite participants to respond to the material they have heard in the presentations in the morning, particularly the background note and first suggestions for local indicators of transition for this topic. The local session leader introduces each topical session. Then discussions take place amongst all workshop participants grouped around four tables, in order to identify priorities of what matters for regional transition and what might be measured. Each table has a discussion leader and a rapporteur. All participants will be asked to write two suggested priorities on a sticky note. These will be collected at each table and ordered under headings on a flip chart in a group discussion. A member of the OECD expert delegation will also be on each roundtable to welcome participants, pose questions, and add commentary to the roundtable discussions. The final fifteen minutes of the session serve for all tables to present key conclusions to the whole group. After each session participants (except table facilitators, rapporteurs and OECD experts) are invited to change tables in order to allow for different group dynamics over the day. *Roundtable leader:* Dr. Ariane König, University of Luxembourg
10:30 – 10:45	*Coffee break*

10:45 – 12:00	**Roundtable session 1. Environmental assets and infrastructure.** *Setting the scene: a presentation on the site-certification scheme of the Deutsche Gesellschaft für Nachhaltiges Bauen (DGNB) for Belval and experience in gathering local data responding to the DGNB indicators.* Every region will start the process of transitioning to a low-carbon economy with different endowments of assets, including natural assets, infrastructure, and human capital. This first roundtable session investigates the environmental assets and infrastructure. Apart from infrastructure quality, one focus is also environmental quality such as air and water quality, and availability of green spaces and biodiversity. This session will also consider transport emissions and waste volume and how the region responds to issues of regeneration of industrial and contaminated sites and threats to decreasing biodiversity. After establishing the quality of the key natural assets in the area, main topics will be the conversion of industrial waste land, increasing urban areas and development projects, re-naturalization of a river area, developments of parks for ecotourism and leisure, and how can the environmental impacts of increased transport linked to local development plans may be minimized? Requisites to infrastructures will be listed and suggestions for indicators will be developed accordingly. The Background note in the morning session presented some relevant information and first suggestions for indicators. This session builds on that information. *Key questions to be addressed include*: How can the quality of natural and infrastructural assets be further improved? How will these assists to local area in transitioning to a low-carbon future? *OECD experts:* Dr. Helen Mulligan (Cambridge Architectural Research), Dr. Maj Munch Andersen (Technical University of Denmark), Prof. Bertil Haack (Technische Hochschule Wildau), Dr. Alwine Woischnik (Ministry of Environment, Chile), Mr. Eiko Kauffmann (GIZ), Dr. Samantha Sharpe (University of Technology Sydney, Australia) *Session facilitators:* Dr. Kay Friedrichs, Mr. Paul Wurth SA *Table facilitators*: Mrs. Simone Polfer, Dr. Paul Schosseler, Prof. Christian Schulz
12:00 – 13:00	**Roundtable session 2. Greening production and consumption and the role of eco-technologies.** *Setting the scene: a presentation on the significance of eco-technologies in economic development of the region.* This roundtable examines the local industry base, its links with the wider economic and labour markets of surrounding areas and highlights key competitive advantages in local industry clusters. This session will also look at the prevalence of start-up and spinout businesses. The presentations in the morning session described the industrial profile of the Belval region and emerging eco-technologies. This session builds on this evidence to discuss the potential of the existing industry base for 'greening' economic development, by increasing economic activities in the eco-technology sector that ensure greater carbon efficiency of production and operation, and identifying emerging opportunities for the region for economic development that does not rely on increased material production and consumption. Of special interest in this theme will also be the relationship and linkages of eco-technology clusters across country borders in the Benelux region, and the opportunities to leverage these linkages for cluster development. *Key questions to be addressed include*: How is the emerging 'green' cluster supported? What is the potential of other industrial sectors for greening? How might the currently established industry and the emergent eco-technology cluster interact and what might be implications for the greening of industrial production and the job market? How will this affect competitiveness of the

	South Luxembourg eco-technology cluster? What role might the European Group on Territorial Coordination (EGTC) play in this? *OECD experts:* Dr. Helen Mulligan (Cambridge Architectural Research), Dr. Maj Munch Andersen (Technical University of Denmark), Prof. Bertil Haack (Technische Hochschule Wildau),Dr. Alwine Woischnik (Ministry of Environment, Chile), Mr. Eiko Kauffmann (GIZ), Dr. Samantha Sharpe (University of Technology Sydney, Australia) *Session facilitator:* Mrs. Simone Polfer, Ministère de l'Economie et Commerce exterieur *Table facilitators:* Dr. Kay Friedrichs, Dr. Paul Schosseler, Prof. Christian Schulz
13:00 – 14:00	*Lunch offered by the Ministère de l'Economie et du Commerce Exterieur*
Afternoon session	
14:00 – 15:00	**Roundtable session 3. Green skills for transition to a low-carbon economy.** *Setting the scene: a presentation on skills eco-systems and the OECD Skills Strategy.* A cluster of leading public research organisations, including the University will be moved to Belval. These organisations also offer training relating to sustainable development. The development of new 'green' sectors and the greening of existing industrial sectors are closely related to the ability of the region to improve access to education in this area. Especially in this region, the fate of which was closely connected to that of the steel industry, it will be key to develop local and to attract the right pool of talent and skills. Requisites include creating the right labour market conditions and supporting and retaining 'green know how' in people, creating new knowledge through research and education, and developing more opportunities for life-long learning within the region. This session examines local training and skills development organizations, what we refer to as the skills- and training-ecosystem. This eco-system will change with the public research organisations including the University, progressively being moved to Belval over the next years to come. Specific skills sets are needed for emerging green clusters but also generally throughout the local economy to allow existing industries to become greener; through more efficient production and operation of local businesses. *Key questions to be addressed include*: What are the characteristics of the current skills ecosystem in the area? What are the advantages and challenges currently facing the local labour market for green skills development? What role might research and innovation play in developing a greener job market, skills base, and more general the greening of the economy? What support and mechanisms are required for transition to a low-carbon economy through more locally targeted training and research? *OECD experts:* Dr. Helen Mulligan (Cambridge Architectural Research), Dr. Maj Munch Andersen (Technical University of Denmark), Prof. Bertil Haack (Technische Hochschule Wildau), Dr. Alwine Woischnik (Ministry of Environment, Chile), Dr. Samantha Sharpe (University of Technology Sydney, Australia) *Session facilitator:* Dr. Paul Schosseler, CRP Henri Tudor *Table facilitators:* Dr. Kay Friedrichs, Mrs. Simone Polfer, Prof. Christian Schulz
15:00 – 16:00	**Roundtable session 4. Sustainable strategies for local public and private actors.** *Setting the scene: a presentation on sustainable strategies and agents of change.* Regional policy makers and other local stakeholders are faced with the challenges of finding innovative ways of establishing and growing businesses in a sustainable way. Co-creating a business-friendly and competitive local

	economy that offers employment and skills-development opportunities for local residents is essential. At the same time, firms are called on to protect and enhance the natural and social environments. The background notes in the morning session presented some of the local policy positions on a number of key variables. Key questions *to be addressed include:* What should be the policy priorities for local public authorities and for firms to stimulate a new economy? How do we identify these priorities? What should be the role of government and other stakeholders in understanding and acting on issues such as job creation for young people, access to capital, emissions reduction, environmental protection, and social integration? Where does the local governance have the strongest leverage? The consideration of cross-border implications and opportunities also to coordinate governance of key questions affecting regional development across the frontier to France with existing regional structures such as the EGTC will also be a key topic here. *OECD experts:* Dr. Helen Mulligan (Cambridge Architectural Research), Dr. Maj Munch Andersen (Technical University of Denmark), Prof. Bertil Haack (Technische Hochschule Wildau), Dr. Alwine Woischnik (Ministry of Environment, Chile); Dr. Samantha Sharpe (University of Technology Sydney, Australia) *Session facilitator:* Prof. Christian Schulz *Table facilitators:* Dr. Kay Friedrichs, Mrs. Simone Polfer, Dr. Paul Schosseler
16:00 – 16:15	*Coffee break*
16:15 – 17:15	**Panel Roundtable** Prof. Bertil Haack, Technische Hochschule Wildau, Germany Dr. Helen Mulligan, Director, Cambridge Architectural, UK Dr. Maj Munch Andersen, Technical University of Denmark, Denmark Dr. Alwine Woischnik, Ministry of Environment, Chile Dr. Samantha Sharpe, University of Technology Sydney, Australia *Q&A* *Facilitator:* Dr. Ariane König, University of Luxembourg
17:15 – 17:30	**Closing** Mr. Jan van Laarhoven, Benelux Union Dr. Cristina Martinez-Fernandez, OECD Dr. Ariane König, University of Luxembourg
17:30	*Cocktail reception hosted by the City of Esch-sur-Alzette*

List of Participants

1	AGORA s.à r.l. & cie, secs	Mr. J. Primm
2	Benelux Union	Mr. H. Abts
3	Benelux Union	Mr. A. de Muyser
4	Benelux Union	Mr. H. Mooren
5	Benelux Union	Mrs. Cl. Otto
6	Benelux Union	Dr. J. Van Laarhoven
7	Benelux Union	Mr. L. Willems
8	Cambridge Architectural Research Limited	Dr. H. Mulligan
9	Copenhagen Capacity	Mr. K. Rovsing Kristiansen

10	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Mr. E. Kauffmann
11	EPFL – Etablissement Publix Foncier de Lorraine	Mr. S. Agamennone
12	Esch-sur-Alzette	Mr. E. Cornélius
13	Esch-sur-Alzette	Mr. J. Huss
14	Esch-sur-Alzette	Mr. X. Poos
15	European Investment Fund	Mr. J. Park
16	EU Parliament	Mrs. I. Page
17	HIVA-Research Institute for Work and Society	Prof. H. Bruijnickx
18	HIVA-Research Institute for Work and Society	Mrs. M. Denayer
19	Ministère de l'Economie et du Commerce extérieur	Mr. Cl. Lutty
20	Ministère de l'Ecologie, du Développement durable et de l'Energie	Ms. M. Etchegaray
21	Ministère de l'Economie et du Commerce extérieur	Mrs. E. Mannes-Kieffer
22	Ministère de l'Economie et du Commerce extérieur	Mrs S. Polfer
23	Ministère de l'Economie et du Commerce extérieur - Direction de la politique Régionale	Mr. R. Weisen
24	Ministère du Développement durable et des Infrastructures Département de l'Environnement	Mr. E. Debrabanter
25	Ministry of Environment Chile	Dr. A. Woischnik
26	OECD	Dr. C. Martinez-Fernandez
27	PRO-SUD	Mrs. I. Renoir
28	Provincie Oost-Vlaanderen	Mrs. T. Vandervelden
29	SERV	Mrs. R. Van Peer
30	Service public de Wallonie	Mr. D. Boreux
31	Stadt Königs Wusterhausen	Dr. L. Franzke
32	Technical University of Denmark	Dr. M. Munch Andersen
33	Technische Hochschule Wildau, Germany	Prof. B. Haack
34	TUDOR (CRP)	Mr. P. Schosseler
35	UNI (Luxembourg)	Ms M-A. Georgescu
36	UNI (Luxembourg)	Mr. M. Neagu

37	Université du Luxembourg	Mr. T. Becker
38	Université du Luxembourg	Mr. F. Feyeh
39	Université du Luxembourg	Mr. F. Hoffmann
40	Université du Luxembourg	Mr. A. Irmen
41	Université du Luxembourg	Dr. A. König
42	Université du Luxembourg	Mrs. A. Leick
43	Université du Luxembourg	Prof. Chr. Schulz
44	Université du Luxembourg	Mr. A. Tabakovik
45	University of Technology Sydney	Dr. S. Sharpe
46	WURTH PAUL SA	Dr.-Ing. K. Friedrichs

OECD Workshop
Indicators of local transition to a low-carbon economy in Benelux
11th June 2012 Ghent – Belgium

SUMMARY NOTE

By Prof. Hans Bruyninckx and Muriel Denayer

The Secretariat of the Benelux Union, the OECD LEED Programme and the HIVA - research institute for work and society co-organised an expert meeting in Ghent on June 11th 2012 focusing on indicators of local transition to a low-carbon economy and green growth. Approximately 50 local and international experts participated, including representatives of government ministries, universities, research centers, business organisations, development agencies, and non-for profit organisations. At the institutional level representatives from the provinces of Zeeland (NL) and Eastern-Flanders (BE) and the cities Ghent (BE) and Terneuzen (NL) participated in the meeting. Information on the event and presentations can be found on the OECD website: Indicators of Local Transition to Low-Carbon Economy.

The meeting was organised as a dialogue between experts and was opened by Mr Luc Willems (Deputy Secretary-General, Benelux Union) and Mr Hedwig de Pauw (director of the Department of Economics, Agriculture & Rural, European and International Cooperation, Province Easter-Flanders). Dr Cristina Martinez-Fernandez, representing the OECD LEED Programme introduced the international project and objectives.

There were four topics of discussion, namely: (1) regional environmental assets and infrastructure; (2) green production and consumption; (3) green skills and training ecosystems; and (4) strategies for green growth for regional policy makers. A summary of the each discussion is provided in the following section.

Roundtable session 1: Regional environmental assets and infrastructure

Every region will start the process of transitioning to a low-carbon economy with different endowments of assets – physical, industrial and human capital. We investigated the environmental assets and addressed issues of environmental quality such as air and water quality, and availability of green spaces and biodiversity. The way the local areas contribute to this quality by examining transport emissions and waste volume and how the region responds to issues of regeneration of industrial and contaminated sites and threats to decreasing biodiversity were discussed as well. The environmental assets and the quality of these assets are important in determining the ability of local regions to mitigate and adapt to Ghent region.

The Ghent-Terneuzen region possesses many environmental assets, and they are well managed. Nevertheless the challenge is to find equilibrium between both industrial and economic growth, and environmental development. The region's main advantage is the location of both ports; its main disadvantage is the lack of employees and graduates.

Roundtable session 2: Green production and consumption

We examined the local industry base, its links with the wider economic and labour markets of surrounding areas and highlighted key competitive advantages in local industry clusters. In addition, we looked at the entrepreneurial culture of the local area and the prevalence of start-up and spinout businesses. We discussed the potential of the existing industry base for 'greening' – less carbon intensive production and operation, and the emerging opportunities for the region in green or clean tech specific clusters. Of special

interest in this theme was the relationship and linkages of clusters across country borders in the Benelux region, and the opportunities to leverage these linkages for cluster development.

The ports of Ghent and Terneuzen's main focus is to grow, and the sustainability-aspect of this development process is not the main priority. The role of local governments should amongst others focus on taking away barriers to green options, and facilitating a sustainable transition process.

Consumer awareness is considered to be fundamental as well. The demand for bioproducts should increase in order to stimulate the biocluster. Positive incentives towards consumers are welcome, but it is important that everybody participates in the development process on a voluntary basis. Information about the transition should be made available for everybody.

Roundtable session 3: Green skills and training ecosystems

The development of new 'green' sectors and the greening of existing industrial sectors is closely related to the ability of the region to attract and retain the right pool of talent and skills, create the right labour market conditions and support and retain 'green know how' within the region. We examined the operation of local training and skills development organizations, what we referred to as the skills and training ecosystem in Ghent, and the implications for the labour market of transitioning to a low-carbon economy. Specific skills sets are needed for emerging green clusters but also generally throughout the local Ghent economy to allow existing industries to become greener; through more efficient production and operation of local businesses.

A systematic cross-border analysis of the labour market is required in order to be able to match the supply of employees with green skills and the demand for (green) jobs. Doing so, industry, trade unions, VDAB, universities etc. should be consulted on a regular basis.

Roundtable session 4: Strategies for green growth for regional policy makers

Regional policy makers and other local stakeholders are faced with the challenges of combining a business-friendly and competitive local economy that offers employment and skills development opportunities for local residents but at the same time protects and enhances the natural environment. We discussed existing and possible strategies for green growth that can be implemented by regional policy makers.

Eventually there should be a core set of indicators, which is small and easily measurable. It is important to select the indicators in the early stage of a transition process and to involve all stakeholders doing so. Once selected, these indicators should be communicated clearly to the industries and companies involved.

There is certainly a need for indicators to measure the transition to a low-carbon society at a local level. An important remark here though is that companies are already complaining about having to report about everything they do. A bottleneck for local indicators is thus to implement indicators at a local level and not putting an incredible burden on industries.

It is fundamental that local public authorities ensure a long-term planning, and at the same time link short-term activities to this long-time plan. They should not attempt to manage the transition, but rather develop a framework to enable the transition process, by for instance providing a setting for dialogue. Considering local policy measures, the region's "ability to be green" should be obvious to attract young people in the region and financial investments.

Concluding remarks

The international experts made closing remarks during the panel discussion. This panel consisted of Prof. Bertil Haack (Technische Hochschule Wildau, Germany), Dr. Alwine Woischnik (Ministry of Environment, Chile), Dr. Maj Munch Andersen (Technical University of Denmark, Denmark), Dr. Helen Mulligan (Cambridge Architectural Research, UK), Dr. Alex Stimpson (European Centre for the Development of Vocational Training, CEDEFOP) and Dr. Samantha Sharpe (University of Technology Sydney, Australia), and was facilitated by Prof. Hans Bruyninckx (HIVA, the Research Institute for Work and Society, Belgium). The international experts put the following points forward:

- It might be more difficult to establish indicators at a local level than at a national level. The set of locally measured indicators developed should be coherent with the available set of indicators at the national level. The challenge is to develop a framework for region-specific indicators by synthesising available and relevant knowledge. There is much data, the long-term challenge is finding the relevant data and coordinating it;

- The difference between regions in developed countries and least-developed countries and which implications this might have on the set of indicators, has been mentioned. These regions have different environmental problems to tackle and a different economic situation, resulting in the need for different set of indicators (e.g. focus on innovation, or decreasing greenhouse gas pollution is not considered very urgent in Chile yet);

- The main ideas originate from private actors. Consequently, companies are considered to be drivers for economy. This way, a natural selection of the best idea occurs. The role of public actors should therefore be facilitating the transition process rather than making the selection of choices instead of private actors. Another role of public actors is to make the transition attractive for everybody, also for the sectors that are threatened and might get lost due to the transition;

- The establishment of a standardized set of indicators by the OECD is considered to be necessary, but regional differences have to be taken into account. Responses on this set of OECD indicators will be different in each region. Probably, the final set of local indicators will be standardized to a certain degree, but needs to include a set of more flexible indicators reflecting the region's local dynamics;

- Asking the experts what the standardized core set of indicators should focus on, air and water quality, greenhouse gas emissions, greening of employment, green skills and training, transport, industrial processes and entrepreneurship were mentioned. Participants in the room also mentioned land-use change, income distribution and an index for sustainable economic welfare.

It was commonly agreed upon that policies should focus on the following two concepts: *inclusive growth* and *crossing borders*. The following preliminary conclusions can be noted:

1. The economic growth should be inclusive, meaning that the economic development should not occur at the cost of jobless, youth and older employees. Also, people from all levels and disciplines should be included in the transition process.

2. Crossing borders seems essential in the Ghent case, and this in different perspectives. Firstly, the borders of countries should be crossed in order to establish an effective cooperation between different nations at different policy levels.

3. Borders between disciplines should be crossed. Inter-disciplinary cooperation is important because all stakeholders should be involved from an early stage in the transition process.

4. Crossing borders also refers to “removing barriers” at an administrative level in order to enhance the transition process. Finally, international exchange of knowledge and employees was mentioned during the workshop as a tool to spread knowledge and learn from one another.

Prof. Hans Bruyninckx (HIVA) and Dr. Cristina Martinez-Fernandez (OECD) closed the meeting.

OECD Workshop
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11th June 2012 Ghent – Belgium

AGENDA

Organised by
OECD LEED Programme and Benelux Union

Hosted in Ghent Region by
Euregio Scheldemond & Research Institute for Work and Society, University of Leuven

Background

This study is proposed within the framework of the OECD Green Growth Strategy and the OECD LEED project on Indicators of Local Transition to Low-Carbon Economy.

The project aims to define key indicators of area-based transition to a low-carbon economy. The objective is to define *measurable indicators* at regional/local level that can inform over time of transition to low-carbon economic and industrial activities addressing the two aspects of the green growth economy: fostering job creation and economic development in new areas of growth and sustainable development.

The central aim of the Benelux region is to be a region without borders, improving well being, mobility, safety and sustainable development. The Benelux Union is a cross-border partnership between Belgium, the Netherlands and Luxemburg as well as Flanders, the Walloon government, the French community and the German community of Belgium and Brussels Capital Region.

This project will examine some of the cross border regions of the Benelux and define indicators of an area-based transition to a low-carbon economy in these regions, with focus on job-creation and economic development in specific cross border areas of growth and sustainable development. Two cross-border assets with be the focus on in-depth analysis:

- *The cross border cluster "Bio Based Europe" (in the provinces Western-Flanders, Eastern-Flanders and Zeeland) – the focus of the* ***Ghent workshop***
- *The* cross-*border area of the Belval (the geographic perimeter for consideration corresponds to the area remit of the European Group of Territorial Coordination (EGTC) Alzette/Belval, including the municipalities of Esch/Alzette, Sanem, Mondercange and Schifflange in Luxembourg and the municipalities of Russange, Ottange, Boulange, Redange, Thill, Villerupt, Audan-le-Tiche et Aumetz in France) – the focus of the* ***Belval workshop*** *.*

For more information on the project visit the OECD LEED website
www.oecd.org/cfe/leed/projects/lowcarbon

or Benelux Union website www.benelux.int

Venue: Conference Centre Novotel Gent Centrum, Ghent, Belgium

Monday, 11th June 2012

Morning session	
08:00 – 08:30	*Arrival and registration*
08:40 – 09:00	**Welcome to the workshop** Mr. Luc Willems, Deputy Secretary-General, Benelux Union Mr. Marc De Buck, Co-chairman Euregio Scheldemond *Facilitator:* Prof Hans Bruyninckx
09:00 – 09:50	**The OECD project on 'Measuring the Potential of Green Growth'** Dr. Cristina Martinez, Senior Policy Analyst, OECD LEED Programme Dr. Samantha Sharpe, University of Technology, Sydney & OECD LEED Expert **Presentation of the Ghent Background Note** Prof. Hans Bruyninckx, HIVA - Research Institute for Work and Society *Q&A* *Facilitator:* Mr. Luc Willems
09:50 – 10:00	**Explanation of the parallel roundtable sessions** The roundtable sessions are one of the primary forms of data collection for the local case studies. The session will be used to get participants to respond to the material they have heard in the presentations in the morning – particularly the background note, and respond to this material and discuss their thoughts on four categories of local indicators of transition. The roundtables will need to be facilitated by discussion leaders. These can be local leaders and academics familiar with the project and facilitating data collection from groups. Each table will have a "host" (the facilitator) who will welcome participants in their table and explain what they are expected to do. The hosts need to moderate the debate in their tables, ensuring that questions are addressed. A member of the OECD expert delegation will also be on each roundtable to welcome participants, pose questions, and add commentary to the roundtable discussions. The group will nominate a rapporteur to transmit key conclusions to the final panel session. It would be two sessions with two parallel roundtables each session. Participants in the workshop will be split into two groups for each session and then discuss in different roundtables. Participants cannot seat at the same roundtable when theme changes; everybody except facilitators and OECD experts moves to a different table with different participants so as to generate different type of discussions. *Roundtable leader:* Prof. Hans Bruyninckx
10:00 – 11:00	**Roundtable session 1 - Regional environmental assets and infrastructure** Every region will start the process of transitioning to a low-carbon economy with different endowments of assets – physical, industrial and human capital. This first roundtable session investigates the environmental assets and addresses issues of environmental quality such as air and water quality, and availability of green spaces and biodiversity. Also how the local areas contributes to this quality by examining transport emissions and waste volume and how the region **Roundtable session 2 - Green production and consumption** This roundtable examines the local industry base, its links with the wider economic and labour markets of surrounding areas and highlights key competitive advantages in local industry clusters. This session will also look at the entrepreneurial culture of the local area and the prevalence of start-up and spinout businesses. The presentations in the morning session described the industrial profile of the Ghent region and emerging areas of 'green' sector clusters. This session

	responds to issues of regeneration of industrial and contaminated sites and threats to decreasing biodiversity. The environmental assets and the quality of these assets are important in determining the ability of local regions to mitigate and adapt to Ghent region. The Background note in the morning session presented some analysis of the environmental quality of the Ghent region. This session builds on that information. Key questions of the session – How important are these environmental assets to the region? How will they assist to local area in transitioning to a low-carbon future? *OECD experts:* Dr. Maj Munch Andersen, Prof. Bertil Haack, Dr. Samantha Sharpe, Mr. Robert Strauss *Facilitators:* Mr. David Michiels, Dr. Ariane König, Dr. Marleen Van Steertegem	builds on this evidence to discuss the potential of the existing industry base for 'greening' – less carbon intensive production and operation, and the emerging opportunities for the region in green or clean tech specific clusters. Of special interest in this theme will also be the relationship and linkages of clusters across country borders in the Benelux region, and the opportunities to leverage these linkages for cluster development. Key questions of the session – How does Ghent support and manage these emerging 'green' clusters? What is the potential for these clusters in green jobs? Describe the Ghent entrepreneurial culture, what are the positives and negatives? What is the potential of other industrial sectors for greening? What does the interactions of current industry structure and 'green growth' industry sectors (particularly the cross-border dimensions) mean for industry and employment development in Ghent? *OECD experts:* Dr. Alwine Woischnik, Dr. Alex Stimpson, Dr. Helen Mulligan, Mr. Eiko Kauffmann (GIZ) *Facilitators:* Dr. Kris Bachus, Prof. Hans Bruyninckx, Dr. Sander Happaerts
11:00 – 11:15	*Coffee break*	
11:15 – 12:15	**Roundtable session 3 - Green skills and training ecosystems** The development of new 'green' sectors and the greening of existing industrial sectors is closely related to the ability of the region to attract and retain the right pool of talent and skills, create the right labour market conditions and support and retain 'green know how' within the region. This session examines the operation of local training and skills development organizations, what we refer to as the skills and training ecosystem in Ghent, and the implications for the labour market of transitioning to a low-carbon economy. Specific skills sets are needed for emerging green clusters but also generally throughout the local Ghent economy to allow existing industries to become greener; through more efficient production and operation of local businesses. Key questions to be answered include, what are the characteristics of the current skills ecosystem in Ghent,	**Roundtable session 4 - Strategies for green growth for regional policy makers** Regional policy makers and other local stakeholders are faced with the challenges of combining a business-friendly and competitive local economy that offers employment and skills development opportunities for local residents but at the same time protects and enhances the natural environment. The background notes in the morning session presented some of the local policy positions on a number of key environmental variables. Key questions for this session – What should be the policy priorities? How do we identify these priorities? What should be the role of government and other stakeholders in understanding and acting on these priorities for issues such as emissions reduction, environmental protection? Where does the local governance have the strongest leverage??

	what are the advantages and challenges currently facing the local labour market for green skills development, where and most importantly how this can be improved and customized, and what support and mechanisms are required to effect this industrial transition. *OECD experts:* Mr. Robert Strauss, Dr. Alex Stimpson, Dr. Samantha Sharpe *Facilitators:* Mr. David Michiels, Dr. Ariane König, Dr. Marleen Van Steertegem	*OECD experts*: Prof. Bertil Haack, Dr. Helen Mulligan, Dr. Alwine Woischnik, Dr. Maj Munch Andersen, Mr. Eiko Kauffmann *Facilitators:* Dr. Kris Bachus, Prof. Hans Bruyninckx, Dr. Sander Happaerts
12:15 – 13:15	*Lunch*	
13:15 – 13:40	**Feedback from Roundtables** *Rapporteurs present key points* *Facilitator:* Prof Hans Bruyninckx	
13:40 – 14:20	**Panel Roundtable** Prof. Bertil Haack, Technische Hochschule Wildau, Germany Dr. Alwine Woischnik, Ministry of Environment, Chile Dr. Maj Munch Andersen Technical University of Denmark, Denmark Dr. Helen Mulligan, Cambridge Architectural Research, UK Dr. Alex Simpson, European Centre for the Development of Vocational Training (CEDEFOP) Dr. Samantha Sharpe University of Technology Sydney, Australia *Q&A* *Facilitator:* Prof. Hans Bruyninckx (HIVA)	
14:20 – 14.30	**Closing** Prof. Hans Bruyninckx (HIVA) Dr. Cristina Martinez-Fernandez (OECD) The City of Ghent	
Afternoon session		
14:30 – 15:00	*Transfer by bus to site visit*	
15:00 – 15.30	**Site visit:** Bio Base Europe Pilot Plant, Rodenhuizekaai 1, 9042 Gent-Desteldonk, Belgium	
15:30 – 17:00	**Opening ceremony:** Bio Base Europe Pilot Plant	
17:00 – 17.30	**Site visit:** Bio Base Europe Training Center, Zeelandlaan 2, 4538 CA Terneuzen, Netherlands	
17:30 – 18.00	**Opening ceremony:** Bio Based Europe Training Center	
18:00	*Dinner reception at invitation of Bio Base Europe*	
19:00	*Depart to Belval by bus* *Approx. 4-hours*	

List of Participants

1	Benelux Union	Mr. H. Abts
2	Benelux Union	Mrs. K. Jacobs

3	Benelux Union	Mr. H. Mooren
4	Benelux Union	Mrs. M. Smids
5	Benelux Union	Dr. J. Van Laarhoven
6	Benelux Union	Mr. L. Willems
7	Cambridge Architectural Research Limited	Dr. H. Mulligan
8	CEDEFOP	Mr. A. Stimpson
9	City of Ghent (Environmental department)	Mrs. B. Govaert
10	City of Ghent (Environmental department)	Mr. J. Mercy
11	Copenhagen Capacity	Mr. K. Rovsing Kristiansen
12	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Mr. E. Kauffmann
13	European Commission DG Employment, Social Affairs & Equal Opportunities	Mrs. E. Dapergola
14	European Commission DG Employment, Social Affairs & Equal Opportunities	Mr. R. Strauss
15	FlandersBio	Ir. W. Dhooge
16	HIVA-Research Institute for Work and Society	Mr. K. Bachus
17	HIVA-Research Institute for Work and Society	Prof. H. Bruijnickx
18	HIVA-Research Institute for Work and Society	Mr. M. Bussels
19	HIVA-Research Institute for Work and Society	Mrs. M. Denayer
20	HIVA-Research Institute for Work and Society	Mr. S. Happaerts
21	HIVA-Research Institute for Work and Society	Mrs. S. Van Eynde
22	ISS-PMS	Mr. K. Parmentier
23	Ministère de la Région de Bruxelles-Capitale Administration de l'économie et de l'emploi	Mrs. G. Pungu
24	Ministère de l'Economie et du Commerce extérieur - Direction de la politique Régionale	Mr. R. Weisen
25	Ministry of Environment Chile	Dr. A. Woischnik
26	MIRA, Milieurapportering Vlaanderen	Mrs. M. Van Steertegem
27	OECD	Dr. C. Martinez-Fernandez
28	Organization Flanders Enterprise	Mr. B. De Potter
29	Pom Oost-Vlaanderen	Mrs. L. Verdonck
30	Povincie Oost-Vlaanderen	Mr. M. De Buck
31	Provincie Limburg	Mr. D. Michiels
32	Provincie Oost-Vlaanderen	Mrs. T. Vandervelden
33	Provincie Zeeland	Mr. L. Leynse
34	SERV	Mrs. R. Van Peer

35	Service public de Wallonie	Mrs. S. Jelas
36	Stadt Königs Wusterhausen	Dr. L. Franzke
37	TeamWork	Mr. T. Will
38	Technical University of Denmark	Dr. M. Munch Andersen
39	Technische Hochschule Wildau, Germany	Prof. B. Haack
40	Université du Luxembourg	Mr. T. Becker
41	Université du Luxembourg	Dr. A. König
42	Universiteit Gent - Ghent Bio-Energy Valley	Mrs. S. Dobbelaere
43	University of Technology Sydney	Dr. S. Sharpe
44	UWV Werkbedrijf/Eures Scheldemond	Mrs. S. O'Brien
45	VITO	Mrs. N. D'Haese
46	Vlaamse overheid - Departement Werk en Sociale Economie	Mr. R. Boey
47	VOKA Kamer van Koophandel O-Vl-Dendermonde	Mrs. A. De Proft
48	Wiersma Projecten en Advies	Mr. M.J. Wiersma

Notes on contributors

Prof Hans Bruyninckx, HIVA, University of Leuven

Prof Hans Bruyninckx is a Belgian political scientist and professor of international relations at the Catholic University of Leuven. He is responsible for the research group Global Environmental Governance and Sustainable Development at the Institute for International and European Policy (Faculty of Social Sciences). He teaches courses on theories and research in international relations, international environmental politics and sustainable development, and introductory courses on social science research. He started studying political science (specializing in international relations) at the Catholic University Leuven. Subsequently, he obtained an additional degree developmental sciences at the Université catholique de Louvain. He holds a PhD in the U.S. Colorado State University within the field of international environmental politics. Later he taught at several other universities in the United States and Europe.

His academic expertise lies within the domain of (international) environmental policy. Hans Bruyninckx is also chairman of the permanent education committee for political science within its faculty and is part of the interdisciplinary research institute Leuven Centre for Global Governance Studies. He is also coordinator of the Research Centre for Sustainable Development, a partnership between the Catholic University Leuven, Ghent University and the Vrije Universiteit Brussel. Since September 2010, Bruyninckx is head of HIVA, the Research Institute for Work and Society which is affiliated with the Catholic University of Leuven. Bruyninckx is also chairman of the environmental umbrella-organization Bond Beter Leefmilieu.

Dr Ariane König, University of Luxembourg

Dr Ariane König holds the position of Head of Sustainable Development of the University of Luxembourg (UL). As Head of Sustainable Development König develops projects connecting research, learning opportunities and campus improvement. In her role as advisor to the UL's president she is responsible for fostering interdisciplinarity in education.

Her current research interests include living laboratories for transition to low-carbon societies, the changing role of Universities in the face of challenges of sustainable development, interdisciplinarity, and the co-production of technologies and social norms. König was lead- author of the International Sustainable Campus Network Charter, which was signed by over 30 leading Universities including Harvard, the Universities of Oxford and Cambridge, ETH Zürich and Hong Kong University.

Prior to joining the UL she was employed at Harvard and the University of Oxford, where she conducted research and taught in post-graduate and executive training courses on the governance of new technologies, the co-production of technologies and social norms, with a focus on biotechnology and food safety. She has also worked as independent scientific consultant for the OECD, the European Commission, EU research consortia, and other research organizations. Her experience in the private sector includes over three years in a leading multinational life science corporation, where she acted as regulatory affairs manager and scientific affairs co-ordinator for the region of Europe/Africa, and was enrolled in the global leadership programme. Ariane König took her BA, MA and Ph.D. in Biochemistry from the University of Cambridge.

Dr Cristina Martinez, Senior Policy Analyst, Organisation for Economic Cooperation and Development (OECD),Local Economic and Employment Program (LEED)

Dr Cristina Martinez-Fernandez is a Senior Policy Analyst specialised on Employment and Skills, Green Growth, Demographic Change, and Southeast Asia at the Organisation for Economic Co-operation and Development (OECD), Local Economic and Employment Development (LEED) programme.

Cristina works on issues related to the challenges of skills and training systems for SMEs, entrepreneurial and innovation activities; industrial policy, climate change and the transformation of labour markets into the low-carbon economy; the challenges of demographic changes and an ageing society for skills and employment development. Cristina also manages the OECD/LEED Initiative on Employment and Skills Strategies in Southeast Asia (ESSSA).

Dr Samantha Sharpe, Principal Research Fellow, University of Technology, Sydney

Dr Samantha Sharpe is Principal Research Fellow at the Institute of Sustainable Futures, University of Technology Sydney and a research associate at the Centre for Business Research, Judge Business School at Cambridge University, UK.

Samantha's research focuses on climate change mitigation and support for innovation and economic development, specifically the financing and encouragement of industrial innovative activity. Outcomes of this research are policy development and industry advice around the support of innovative activity in places, the incubation of new technology, and the role public policy can play in establishing emerging markets for environment and 'green' technologies particularly in energy efficiency and renewable energy.

Samantha has held academic posts, including the NESTA Innovation Research and Policy Fellowship at Cambridge University, senior policy positions in economic development and environmental management in government, most recent in Emissions Reduction Strategy for the NSW Government in Australia. Samantha has is an expert for the OECD on several 'green economy' and local development projects.

Green growth in the Benelux:

Indicators of local transition to a low-carbon economy in cross-border regions

OECD
BETTER POLICIES FOR BETTER LIVES

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BUILDING MORE & BETTER JOBS