European Commission

European Construction Sector Observatory

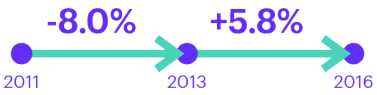
Country profile Luxembourg

June 2018

In a nutshell

The **Luxembourgish construction sector weathered the economic crisis better than most EU countries**, in line with the positive trajectory of the overall economy. Specifically, production in construction peaked in 2011 before dropping by 8.0% between 2011 and 2013. Since 2013, production recovered growing by 5.8% in 2016, yet being still below the pre-crisis level. Furthermore, the number of enterprises in the broad construction sector in Luxembourg totalled 8,019 in 2014 and increased by 10.6% during the period 2010-2014.

Production in construction evolution between 2011 and 2016



The **Luxembourgish property market** fared relatively well after a slowdown in 2012. Housing supply, however, has not kept up with demand in spite of population increases, leading to challenges in housing affordability, urban sprawls and congestion on the roads. Notably, house price index has increased steadily, going up by 32% between 2010 and 2016. To foster construction and improve housing affordability, the government is putting in place a series of measures, as defined on the Housing Pact, including subsidies to invest in social infrastructure for local governments with a predicted population growth of over 1% per year (or 15% over a 10-year period). Furthermore, the government aims to build at least 2,500 new social housing units by 2025.

Investment in construction is picking up after the crisis and increased by 33.9% over 2010-2016.Strategic importance for infrastructure development is placed on sustainable transport. In this respect, LuxTram, a tram going through Luxembourg City, is considered one of the flagship projects, requiring investments of EUR 345.8 million. In addition, Luxembourg has a number of public Special Funds (Fonds spéciaux), each investing in projects under a specific area, such as the Railway Fund (Fonds du Rail).

↑ **33.9%**

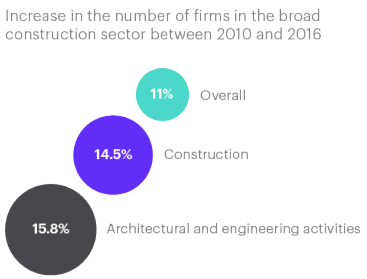
Total investment in construction increase 2010-2016]

Luxembourg has a strong **innovation profile** and boasts a number of construction-related clusters and initiatives, such as the Resource Centre for Technologies and Innovation in Construction, a platform gathering all the main players in the sector, and NEOBUILD dedicated to research and development in sustainable construction. In addition, the Luxembourg Institute of Science and Technology (LIST) is active in the promotion of Building Information Modelling (BIM). The Luxembourgish construction industry is also involved in developing skills in construction, particularly in the fields of energy performance of buildings, renovation, and utilisation of renewables in buildings through initiatives such as LuxBuild 2020.

> Going forward, the Luxembourg's construction sector is expected to benefit from strong demand for residential construction and office buildings, as well as a rebound in public spending.

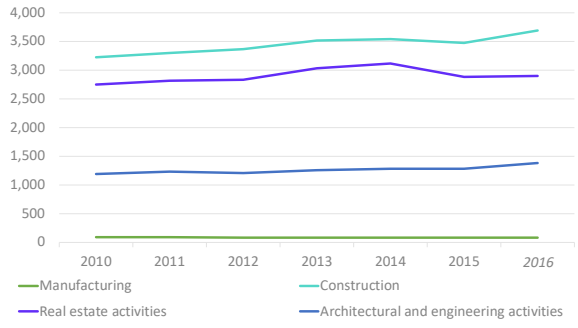
1
Key Figures

The **number of enterprises** in the broad construction sector in Luxembourg totalled 8,044 in 2016[1] (Figure 1), with the construction sub-sector (NACE F) accounting for 45.8% of the total firms, and the real estate activities for 36.0%, which represents 3,686 and 2,896 enterprises, respectively. Overall, the number of enterprises in the broad construction sector increased by 11.0% during the period 2010-2016. This increase was led by the growth of architectural and engineering activities (+15.8%), followed by construction (+14.5%) and real estate companies (+5.4%). On the other hand, the number of companies focused on manufacturing activities decreased by 5.6%, from 90 companies in 2010 to 85 companies in 2016.



Production in construction peaked in 2011 before dropping by 7.8% between 2011 and 2013. Since 2013, production recovered with a year-on-year improvement of 3.6% in 2014, yet being still below the pre-crisis level (Figure 2). Between 2014 and 2016, production continued to increase by 2.1%. The real estate sector was less affected by the crisis, contributing to the development of the construction sector[2].

Figure 1: Number of enterprises in the Luxembourgish construction sector between 2010-2016



Source: Eurostat, 2017.

The **total value added** of the broad construction sector amounted EUR 3.9 billion in 2016[3], with the construction sub-sector contributing to 60.2% of the total[4] (EUR 2.4 billion), followed by real estate activities (23.2% of the total), architectural and engineering activities (12.8%) and manufacturing (3.8%) (Figure 3). The **share of gross value added** of the broad construction sector in the GDP reached 13.3% in 2014, with the real estate sub-sector having the largest contribution, followed by narrow construction, architectural and engineering activities, and last manufacturing, as presented in Figure 4 below. This is below the EU28 average standing at 16.9%.

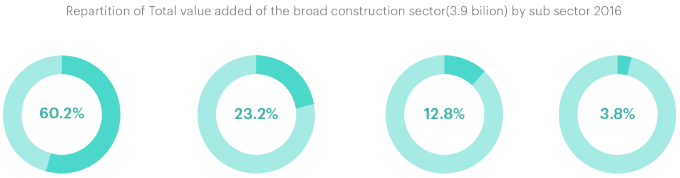
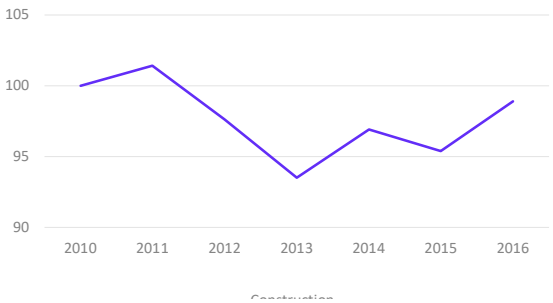
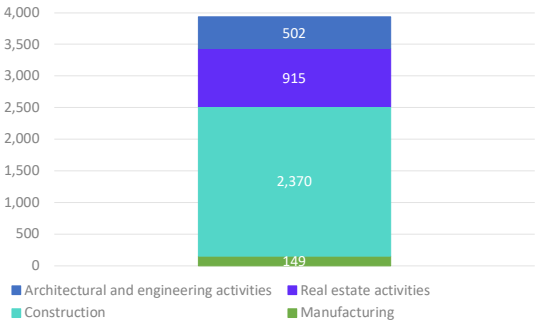


Figure 2: Volume index of production in the Luxembourgish construction sector over 2010-2016 (2010=100)



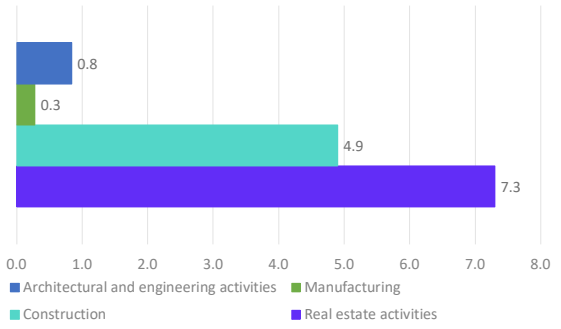
Source: Eurostat, 2017.

Figure 3: Value added in the Luxembourgish construction sector in 2016 (EUR m)



Source: Eurostat, 2017.

Figure 4: Gross value added as a share of GDP in the Luxembourgish construction sector in 2014 (%)

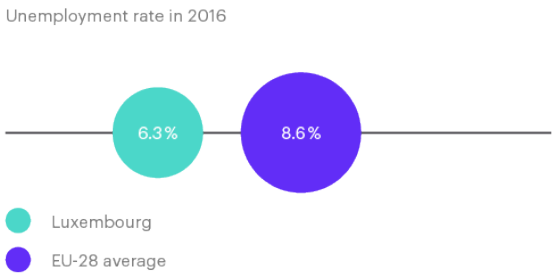


Source: Eurostat, 2017.

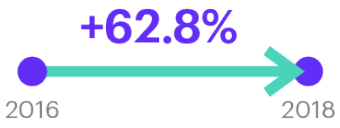
2
Macroeconomic Indicators

Luxembourgish GDP reached 48.9 billion in 2016. This represents an increase of 4.2% compared to the previous year. Since 2010, GDP has grown by 21.6% on average.

Luxembourgish GDP reached 48.9 billion in 2016. This represents an increase of 4.2% compared to the previous year. Since 2010, GDP has grown by 21.6% on average. The highest growth rate was recorded in 2014, when GDP augmented by 5.6%, from EUR 42.7 billion to EUR 45.1 billion. The financial crisis caused two recessions in Luxembourg, the first during the years 2008-2009 (-0.8% and 5.4%, respectively) and the second one in 2012 (-0.9%). Nevertheless, since 2013 growth has been sustained. **The potential GDP** in 2016 was EUR 49.3 billion, resulting in a slightly negative output gap of -1.0%, signalling little room for resource utilisation. This is close to the EU28 average of -0.75%. The **inflation rate** has been continuously decreasing since 2011 reaching a low 0.0% in 2016. In 2016, the average **unemployment rate** in Luxembourg reached 6.3%[5], 3.3% below the EU-28 average (8.6%). However, even if the level of unemployment is very low compared to other EU countries, 6.3% is the second highest unemployment rate recorded in the country since the 2000s, after reaching a record high 6.5% in 2015. Youth unemployment (below 25 years) stood at 18.9% in 2016, higher than the national average, and much higher than the levels of 2014 (14.2%), and 0.2 percentage points over the EU average of 18.7%.



The **total population** of Luxembourg amounted to 576,249 in 2016 and is projected to increase by 30.9% until 2030 and by 62.8% until 2050, reaching 938,416 inhabitants. In parallel, immigration has increased significantly over the past year. For example, 23,803 immigrants arrived in Luxembourg in 2015, compared to 16,962 in 2010 (+40.3%). Further to this, the positive net migration is likely to contribute to the increase of housing demand. In 2016, the working age population made up 69.3% of the total Luxembourgish population, four points over the EU average of 65.3% . By 2050, the share of **working age population** is expected to decrease to 61.5%. In parallel, the proportion of people over 65 years old will increase from 14.3% to 23.5% of the total, highlighting the country's ageing population.



Total population evolution

In 2016, the **general government expenditure** represented 41.2% of GDP. In addition, the **government deficit** reached 1.6% of GDP, below the 3% threshold of the EU's Stability and Growth Pact (SGP), yet a record high since 2010. The general government gross debt has been steadily declining since 2013, when it was standing at 23.4%. In 2016, this number had decreased to 20.0% of GDP.

The Luxembourgish financial system appears in a high-level position according to the 2017-2018 Global Competitiveness Report of the World Economic Forum. It ranks 15th out of 137 economies in terms of **financial market development**, 5th and 6th, respectively, for affordability and availability of financial services, 17th regarding ease of access to loans and 14th in terms of venture capital availability[6]. Despite the overall well-developed financial infrastructure, access to finance in the general economy decreased over the past years, in particular for SMEs. Notably, the number of new loans for SMEs decreased by 7.3% in 2014 and did not pick up in 2015, but continued on a slightly downward trend. In addition, there is a tightening of lending criteria, which affects particularly new-born companies and start-ups with no tangible assets. Moreover, the share of firms receiving a negative answer for their credit demand increased from 22% in 2013 to 27% in 2015[7]. Despite the slight deterioration of financing conditions, access to finance remains a strong point of Luxembourg's economy. Indeed, many policy initiatives have been taken to facilitate the access to capitals, such as loan instruments for companies and SMEs introduced by the *Société nationale de crédit et d'investissement (SNCI)*[8]. Furthermore, in April 2015, the European Investment Fund (EIF) and the SNCI launched the Luxembourg Future Fund[9] (LFF), a EUR 150 million fund aiming to promote and stimulate the diversification and sustainable development of the Luxembourgish economy, particularly in technology SMEs, ICT and Venture Capital funds. A private and public seed fund type of structure named the Digital Tech Fund was created in 2016 targeting venture capital investments in companies who reached the

proof of concept stage. Furthermore, in 2016, a new type of company, a simplified form of the *Société à Responsabilité Limitée* came to light, meaning that less capital is needed to create a start-up and the administrative burden is lighter[10].

Luxembourg ranks 15th out of 137 economies in terms of financial market development, 5th and 6th, respectively, for affordability and availability of financial services, 17th regarding ease of access to loans and 14th in terms of venture capital

3

Key economic drivers of the construction sector

The **labour productivity** in the broad construction sector has grown since 2010, reaching its peak of EUR 71,200 per person employed in 2014. This is well above the EU28 average which amounts to EUR 50,200. As shown in the table below, real estate activities' labour productivity increased by 13.5% between 2010 and 2016[12], from EUR 231,800 to EUR 263,000, whereas labour productivity for manufacturing activities grew up by 14.3% from 59,500 to 68,000. Similarly, productivity rose by 12.1% in the construction sub-sector rising from 47,300 to 53,000 between 2010 and 2016. During the same timeframe, the increase was less pronounced for labour productivity in architectural and engineering activities, growing by 9.6% from EUR 73,800 to EUR 80,900.

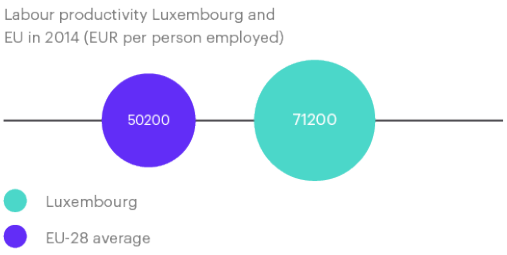
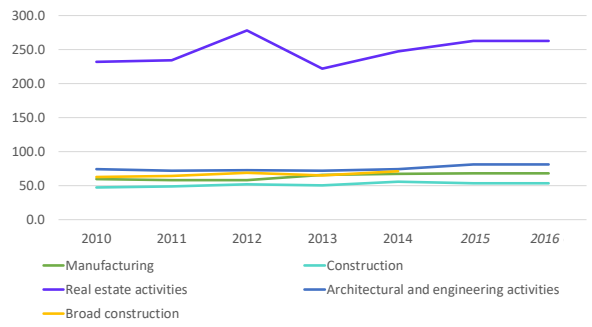


Figure 5:Labour productivity in the construction sector in Luxembourg over 2010-2016 (EUR k)



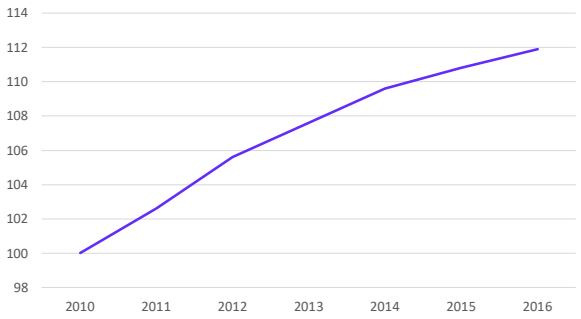
Source: Eurostat, 2017.

Profitability

The **total turnover** of the broad construction sector amounted to EUR 9.3 billion in 2016[13] , a 21.0% increase compared to 2010. Even though there has been an important increase over the past few years, there was an important year-on-year decrease in total turnover from 2014 to 2015 of 6.4%. The construction sub-sector registered the highest share within the sector, accounting for 72.9% of the total turnover, followed by real estate activities (13.4%), architectural and engineering activities (9.2%) and manufacturing (4.5%).

The **gross operating surplus** of the broad construction sector amounted to slightly below EUR 1.4 billion in 2014, 18.6% higher than the level registered in 2010 (EUR 1.2 billion). The **gross operating rate** of the broad construction sector[14], which gives an indication of the sector's profitability, was 14.6%, 0.5 point below the results registered in 2010 (15.1%). This is below the EU28 average, which has reached 17.9% in 2014. In addition, construction costs have been increasing steadily, with the construction cost index rising by 12 points between 2010 and 2016 (Figure 6).

Figure 6: Construction cost index over 2010-2016 (2010=100)



Source: Eurostat, 2017.

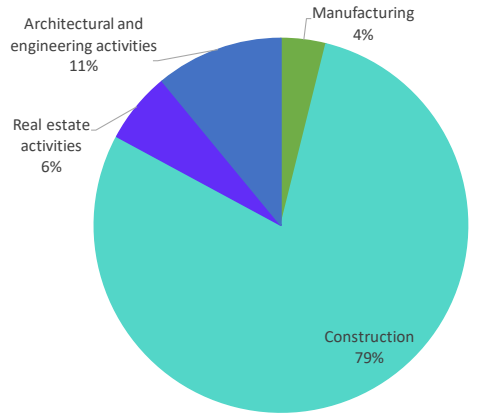
Employment

In 2016[15], the broad construction sector employed 56,590 people, an 11.3% increase compared to 2010 figures.

The narrow construction sector in Luxembourg is dominated by **SMEs**, that represent 99.5% of all companies, with a majority (73.2% of all companies) being micro companies of up to 9 employees in 2014. Overall, the share of number of persons employed by SMEs out of all employment in all companies operating in construction (broad definition) in 2014 is 79.6%. This number has stayed relatively constant since 2010.

In addition, the number of s**elf-employed workers** in the construction sub-sector increased from 500 to 1000 from 2010 to 2016. However, self-employed in the construction sub-sector only represent 4.7% of total employees. This is below the 12.9% EU28 average.

Figure7: Percentage of people employed by construction sub-sectors in Luxembourg in 2016



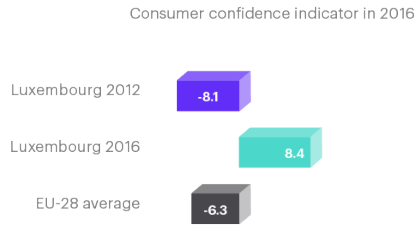
Source: Eurostat, 2017.

The **investment ratio** followed different trend as confidence indicators. In fact, even though it picked up from 2010 until 2012 (from 17.6% to 20.8%), it then followed a decreasing trend and stood at 17.9% - hence at a similar level as in 2010. This is, however, below the EU28 average, which in 2016 reached 19.8%. On the other hand, investment per worker experienced a significant increase from 2010 to 2014, going up 19.9% to reach 53,900.

According to data from the national statistics agency (STATEC), business confidence in construction in July 2017 has risen to levels not seen since 2000. This confidence indicator is measured as the average of the state of order books and employment outlook. Between January 2010 to July 2017, the indicator has increased from -40 to 12.

Business confidence

The economic crisis affected the **business confidence** in the general Luxembourgish economy in a significant manner, although to a lower extend than in the neighbouring countries. From 2010 to 2012, the consumer confidence index dropped from -0.2 to -8.1. Since 2012, the consumer confidence indicator has been recovering, but is still below the pre-crisis level and has reached 8.4 in 2016, above the EU28 average standing at -6.3. Similarly, the industry confidence indicator dropped from -18.5 in 2010 to -38.8 in 2013 before bouncing back and reaching -14.8 in 2016, lower than the EU28 average which stands at -2.5. On the contrary, the construction confidence indicator followed a slightly different trend, dropping to -25.0 in 2010 and gradually increasing since then to reach 2.1 in 2016, above the EU28 average, which has reached -13.9 in 2016.



Domestic sales

The ranking for the top five **most domestically sold construction products** in Luxembourg remained constant since 2010, with the exception of "Other structures and parts of structures", that increased its sales value by 612.1% over 2011-2015 to take over "Other worked ornamental" and enter the top five. The value of domestic sales has experienced different trends depending on the type of product during the period 2010 to 2015. Comparatively, the products that have increased the most their sales from 2010 to 2015 are "Towers and lattice masts of iron of steel" (+1340%), followed by "Boards, blocks and similar articles of vegetable fibre" (+339%), even if these two products are far from being among the most sold Conversely, "Articles of asbestos-cement" experienced a 45.8 decreasing in its domestic sales value. The top 5 most domestically sold construction products are presented in Table 3, including a comparison with the most sold in the EU-28. These represented 54.0% of total domestic construction product sales in 2015.

Export of construction-related products and services

The ranking of the **most exported products** remained relatively stable since 2010, with the exception of "Other structures and parts of structures," which dropped from the first to the fifth position in the ranking. The top 5 most exported construction products from Luxembourg and the EU-28 are summarised in Table 4. Together, these made up 77.7% of all construction products exports in 2015.

Table 3: 5 most domestically sold construction products in Luxembourg and in the EU in 2016

Luxembourg			EU-28
Product	Value (EUR m)	Share in construction product domestic sales (%)	Product
Other structures (group 251123)	36.5	13.0	Other structures (group 251123)
Windows, French windows, etc. (group 162311)	36.2	12.9	Doors, windows, etc. (group 251210)
Ceramic titles and flags (group 233110	245.2	9.0	Ready-mixed concrete (group 236310)
Tiles, flagstones, bricks etc. (group 236111)	234.6	8.7	Prefabricated buildings of metal (group 251110)
Doors, windows and their frames (group 251210)	23.9	8.5	Prefabricated structural components for building, etc. (group 236112)

Table 4: the 5 most exported construction products in Luxembourg and in the EU in 2015

Luxembourg			EU-28
Product	Value (EUR m)	Share in construction product domestic sales (%)	Product
Fibreboard of wood or other ligneous materials (group 162114)	53.2	19.8	Ceramic tiles and flags (group 233110)
Particle boards and similar (group 162113)	49.9	18.5	Other structures (group 251123)
Portland cement, aluminous cement etc (group 235112)	49.0	18.2	Fibreboard of wood or other ligneous materials (group 162114)
Prefabricated buildings of metal (group 251110)	41.7	15.5	Doors, windows, etc. (group 251210)
Other structures and parts of structures (group 251123	15.2	5.6	Marble, travertine, etc. (group 237011)

In terms of cross-border provision of construction services, Luxembourg exported EUR 332 million worldwide in 2016, a decline compared to 2010 (9.3%).

In terms of **cross-border provision of construction services**, Luxembourg exported EUR 332 million worldwide in 2016, a decline compared to 2010 (9.3%). This level is still significantly lower than in 2008, when the provision of cross-border construction services reached its peak of EUR 417 million. On the other hand, export to EU28 countries has increased from EUR 190 million to EUR 234 million, increasing by 23.2%. Exports outside of the EU followed the opposite trend, decreasing by 44.3% from EUR 176 million to EUR 98 million). Luxembourg imported a total of EUR 268 million in construction services in 2016, 81.7% of which came from the EU-28, thus achieving a trade deficit of EUR 64 million in 2016.

As for the **cross-border provision of architectural services**, Luxembourg exported EUR 9 million worldwide in 2015. At the same time, it imported a total of EUR 7 million in architectural services in 2015, all of them from the EU-28, and achieved a trade surplus of EUR 2 million.

Access to finance in the construction sector

The construction sector in Luxembourg benefits from the **strong development of the financial infrastructure** in the country. However, access to finance for SMEs, which represent the lions' share of enterprises in the Luxembourg construction industry, remains a challenge. Indeed, due to their size and lower level of specialisation in financial matters, SMEs tend to have less access to capital markets and are more reliant on funding from banks.

Nevertheless, SMEs in Luxembourg are comparatively better off than EU peers, as for instance loans of less than EUR 1 million are on average cheaper than in the EU. Yet, SMEs typically struggle with requirements for loan guarantees and collateral, as well as the cost incurred for of bank loans[18].

Furthermore, other financial instruments are available to support the construction industry. Namely, syndicated loans *(Crédit syndiqué pour projets d'une certaine envergure)* provide finance to companies for large-scale projects, such as acquisition of land and buildings, mergers and acquisitions, as well as business modernisation[19].

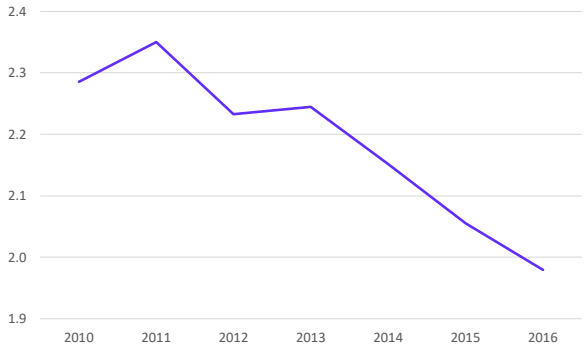
In order to aid the construction of research infrastructures, the Luxembourgish government, through a law enacted in May 2017, can cover up to 50% of eligible costs. Given the difficulties encountered by SMEs in accessing capital, particular attention is given to them, specifically by increasing the financing aid that can be given[20].

Access to housing

In Luxembourg, the number of households increased by 14.0% from 2010 to 2016, rising from 205,000 to 234,000. In parallel, house prices have also increased steadily, going up by 32.2% between 2010 and 2016. At the same time, the mean equivalised net income has gone up by 9.1% from 2010 to 2015, reaching EUR 39,707.

This is well above the EU28 average. Higher households' incomes, together with the increasing number of net migration and the improvements in consumer confidence is expected to boost housing demand in the years to come. In addition, the continuously decreasing interest rates on mortgages for loans over 5 years of original maturity, which has reached a bottom low of 1.98% in 2016 (Figure 10), is likely to constitute a further boost to housing demand.

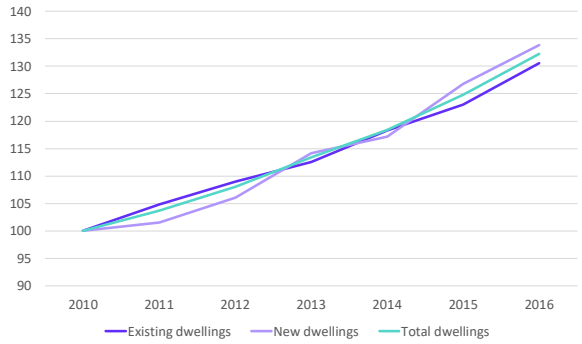
Figure 8: House price index in Luxembourg over 2010-2016 (2010=100)



Source: Eurostat, 2017.

Despite the rise in housing demand due to the ongoing trend of increasing population, housing supply has not kept up with demand, leading to challenges in housing affordability, urban sprawls and congestion on the roads. Indeed, Luxembourg City and its surroundings are by far the most expensive areas to live in Luxembourg. **Rental prices** are significantly lower (22% on average) 30 minutes by car away from the capital. Thus, considerable amounts of people are settling down in a bordering region due to the lower house prices leading to increased traffic[21]. Regarding rental prices, the average rent decreased by 3.2% between 2010 and 2015, but prices have started to grow again since then, with a year-on-year increase of 2% from 2014 to 2015.

Figure 9: Mortgage rates for loans for over 5 years original maturity (%) (2010-2016)



Source: Eurostat, 2017.

Land availability is one of the factors linked to the shortage of housing supply, as 91.8% of constructible land is privately held, while only 5.9% and 1.9% is the hands of municipalities and the state, respectively[22]. To foster construction and improve housing affordability, the government is putting in place a series of measures, as defined on the Housing Pact (see Policy schemes).

The **building stock distribution** of residential dwellings between owners and tenants has steadily increased from 2010 to 2015, from 68.1% of owners in 2010 up to 73.2% in 2015. The population earning above 60% of median equivalised income is more likely to own its own dwelling – 79.1% in 2015, from 73.0% in 2010. On the other hand, the population earning below 60% of median equivalised income shows a more modest increase in ownership rates, going from 39.1% in 2010 to 40.8% in 2015, with a sharp decrease from 2014, when it stood at 44.3%.

Regarding **building permits** in residential dwellings, there is no clear trend since 2010. In fact, after a 19% year-on-year increase in 2011, the number of permits decreased to reach its 2010 level in 2013, before rising again by 60% in 2014. From 2014 to 2016, the number of permits decreased dramatically, by 71.0%. On the other hand, at the EU28 level, the amount of permits has remained stable and increased only by 1% between 2010 and 2016.

In parallel, **renovation spending** is increasing constantly in Luxembourg. Fostered by the booming property prices, the expenditure of households on maintenance and repair of dwellings was largely not affected by the crisis. The actual renovation spending of households has increased by 49.4% between 2010 and 2015 from EUR 219 million to EUR 326 million. This has been supported on the government level by introducing a number of policies and measures to reconstruct existing houses, adapt to special needs, improve energy efficiency and noise insulation (see Policy Schemes).

Infrastructure

Luxembourg ranks 17th out of 137 in terms of its infrastructure, according to the 2017-2018 Global Competitiveness Report[23] published by the World Economic Forum. In particular, Luxembourg ranks 8th regarding the quality of the electricity supply, and respectively 15th and 16th regarding the quality of roads and for the quality of overall infrastructure.

Despite its small size, Luxembourg counts with a rail density of 106 km2 and a road density (motorway) of 62 km2 in 2015. In 2012, the government published its global strategy for a sustainable mobility in Luxembourg[24], which contains its plans for enhancing transport infrastructure and solve mobility issues affecting the country (see TO 1 - Investment conditions and volumes).

Luxembourg ranks 17th out of 137 in terms of its infrastructure, according to the 2017-2018 Global Competitiveness Report[25] published by the World Economic Forum

4

Key issues and barriers in the construction sector

Company failure

Overall, the **business demography** in the broad construction sector is showing diverging trends with the number of **company birth** increasing over 2010-2014 for the construction and real estate sub-sectors, but decreasing for architecture and engineering services. On the other hand, **company deaths** have increased for the construction and architectural sub-sectors, whereas they have decreased for the real estate sub-sector.

Company births in the construction sub-sector went up by 13.5%, from 288 in 2010 to 327 in 2014. The number of deaths increased by 30.4% from 204 to reach 266 in 2014. The real estate sector shows a similar trend in terms of births, with a 29.0% increase from 259 to 334. In terms of deaths, there has been a small decline from 221 to 206 over the 2010-2014 period, representing a 6.8% decline. Finally, births in the architecture and engineering sub-sector dropped by 9.4% and deaths increased by 4.1% over the same time period.

The number of **bankruptcies** in construction has been on the rise in recent years, with 91 bankruptcies registered in 2015 compared to 70 in 2014, representing a 30% increase from the previous year[26].

Trade credit

According to the 2015 Survey on the Access to Finance of Enterprises (SAFE), **trade credit** is a relevant source of finance for 31% of SMEs in Luxembourg. This is below the EU average, where 35% of survey respondents consider trade credit relevant for their business[27]. Compared to 2014, the relevance of trade credit for SME financing has increased both in Luxembourg (26%) and in the EU (33%)[28].

Late payment

In contrast to many EU MS, companies in Luxembourg are among those most likely to exercise their rights regarding compensation in case of late payments. In addition, companies can offer clients incentives for early payment, such as a 2% discount when they pay within 15 days. This system is considered to function according to business stakeholders[29].

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The law of 29 March 2013, which transposes the Late Payment Directive, defines that the payment period cannot exceed 60 days, unless the two parties agree otherwise. Payments by the public administration, however, are to be settled within 30 days. Longer payment periods by the public administration must be justified and cannot exceed 60 days[31].

While the Late Payment Directive appears to have been implemented to a satisfactory degree, data on the average payment duration collected by the European Payment Index is not available for Luxembourg and thus does not allow for an in-depth analysis of late payments as a constraint for businesses[32].

Time and cost of obtaining building permits and licenses

> Luxembourg ranked 7th in 2017 with respect to "Dealing with construction permits", according to the World Bank Doing Business 2017[33].

Luxembourg ranked 7th in 2017 with respect to "Dealing with construction permits", according to the World Bank Doing Business 2017. Indeed, 11 procedures are required to build a warehouse, lower than the OECD high-income average (12.1), taking 157 days, slightly above the OECD high-income average (152.1) (Table 5). In terms of the cost of building a warehouse, this is considerably cheaper in Luxembourg, as it represents 0.7% of the value of the warehouse, instead of the OECD high-income average of 1.6%.

Table 5: Construction procedures timing and costs in Luxembourg

Procedure	Time to complete	Associated costs
Obtain a recent copy of the cadastre plans from the Cadastre Administration	1 day	EUR 10
Obtain approval in principle (accord de principe)	60 days	EUR 60
Obtain feasibility study for the sewage (canalization) connection	30 days	EUR 1,950
Obtain commodo/incommodo classe 3 approval from the Ministry of Environment	120 days	no charge
Obtain construction permit from the Urban Department (service de l'urbanisme) of the Commune	90 days	EUR 960
Obtain excavation permit from the Ministry of Public Works	60 days	EUR 10
Hire independent surveillance company to carry out inspections of construction works	1 day	EUR 15,874
Request and receive inspection of completed works from the Urban Department	1 day	no charge
Request and receive sewage (canalization) inspection	1 day	no charge
Obtain water connection	32 days	no charge
Obtain sewage (canalization) connection	5 days	EUR 3,000

Source: Doing Business overview for the Luxembourg, Word Bank, 2017.

Skills shortage

The **number of job vacancies** in the construction sub-sector experienced an increase by 107.5% from 2010-2015, namely from 120 to 249. The number of job vacancies in real estate activities has been increasing, yet to a lesser extent. From 26 vacancies in 2010, they have increased by 34.6% to reach 35 in 2015. The increasing vacancies give an indication of employers' difficulties in finding the right skills on the market.

↑ **107.5%**

Increase in number of job vacancies in the construction sub-sector 2010-2015

In parallel, **adult participation in education and training** in the construction sub-sector increased from 8.2% in 2010 to 10.0% in 2016 with a peak of 11.3% in 2014, above the EU28 average standing at 9.2%. Even though the numbers of tertiary students in engineering, manufacturing and construction, specifically in architecture and building, have been increasing, they remain very low with 81 graduates in 2011 and 112 in 2015, a 38.3% increase.

The European Centre for the Development of Vocational Training has compiled a list of shortage occupations in Luxembourg which includes engineers (specifically, logistic, civil and mechanical engineers)[34].

According to the FEDIL, the Business Federation in Luxembourg, the construction sector will be in need of qualified personnel given that 6,000 people will reach retirement age until 2020[35]. In terms of most needed qualifications in the construction sector, it appears that mason, brick layers and façade specialists are among the professions highest in demand.

Sector & sub-sector specific issues

Material efficiency and waste management

In 2014, Luxembourg reported 543,775 tonnes of mineral waste from **construction and demolition (C&D) waste**. Mineral C&D waste amounted to 558,051 tonnes in 2012, which represents a slight (-2.6%) decrease compared to 2014. Furthermore, in 2012, Luxembourg achieved an 88.4% recovery rate of C&D waste, which is above the 70% target defined in the Waste Framework directive[36].

> In terms of legal framework for the management of C&D waste, two main pieces of legislation are applicable in Luxembourg, namely the Law of 21 March 2012 on management of waste and the Grand-Ducal Regulation of 24 February 2003 on landfilling of waste, as amended. In addition, Luxembourg introduced a General Waste Management Plan in 2010, which also covers C&D waste[37].

Climate and energy

Emissions of greenhouse gases (carbon monoxide and dioxide, methane and nitrous oxides) from activities related to construction and real estate in Luxembourg amounted to a total of 141,829 and 64,685 tonnes in 2014, respectively. Emissions in the construction sub-sector have decreased by 15.5% during the period 2010-2014, whereas the real estate sub-sector experienced an increase of 25.7%.

5

Innovation in the construction sector

Innovation performance

> Luxembourg is classified as a Strong Innovator, according to the European Innovation Scoreboard 2017, with an overall performance in 2016 in terms of innovation and R&D of 19% above that of the EU.

Luxembourg is classified as a Strong Innovator, according to the European Innovation Scoreboard 2017, with an overall performance in 2016 in terms of innovation and R&D of 19% above that of the EU. From 2010 to 2016, the innovation index has increased by 1.4% relative to that of the EU. The country's strengths lie in Attractive research systems, Innovatin-friendly environment, and Intellectual assets. Conversely, Luxembourg scores below the average in terms of Linkages, Finance and Support as well as in Sales impact[38] [39].

In the construction sector, the **number of construction related patent applications** has lied between 1 and 4 from 2010 to 2016. During the latter year, the number of patents has reached 4. Given the low number of patents and the large fluctuations, no clear trend can be depicted from the data. In 2015, ne Luxembourgish construction firm active in the manufacturing of construction products ranks within the top 1,000 EU companies by R&D (industrial sector ICB-3D), according to the 2015 EU R&D Scoreboard[40], whereas according to the 2016 Scoreboard, no Luxembourgish construction firm was part of the ranking[41].

Eco-innovation and digitalisation

Eco-innovation and circular economy are priority areas, with the country boasting a thriving eco-innovation ecosystem of cleantech companies active in the fields of eco-construction, renewable energy, waste and water management. These are actively supported by numerous public agencies and research organisations, as well as the government.

The **Luxembourg EcoInnovation Cluster** plays a key role in this respect. It is a network that supports the various actors of the cleantech sector, with the goal of creating and developing new and sustainable business opportunities, mainly through collaborative R&D and innovation projects. Its main objectives are to diversify the activities of Luxembourgish businesses; build public-private partnerships to develop new collaborative projects; promote networking between public and private actors at national and international level; and contribute to the development of new environmental solutions in the field of eco-technologies and sustainable construction[43].

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In November 2016, a new **"Wood Cluster"** was established in order to support the 1,500 companies working directly or indirectly with wood, half of which work in the construction sector. Such initiative underlines the importance of promoting sustainable development and the circular economy in Luxembourg[45].

A key actor in the field of construction innovation and digitalisation is the **Luxembourg Institute of Science and Technology (LIST)**, which is active in the promotion of Building Information Modelling (BIM) in Luxembourg. Namely, LIST carries out research and experimentation work related to the uses of BIM and virtual design/construction. It is involved in several research projects, such as the **BIMetric**, a project in partnership with two French research institutions aiming to define a methodology for the analysis of BIM operations, specifically the evaluation of the maturity of BIM and of the measure of return on investment for BIM operations[46]. An additional research project in this field includes the BIM_RIDE, which focuses on the coordination of interdisciplinary 3D digital mock-ups[47], namely, the digital design of a project throughout its life cycle. In partnership with LIST, another project aims at using BIM together with 4D in order to help decision making in the pre-construction phase as well as the monitoring of construction[48].

Progress in the definition and implementation of a national **BIM strategy** in Luxembourg is also being achieved by the Resource Centre for Technologies and Innovation in Construction *(Centre de Ressources des Technologies et de l'Innovation pour le Bâtiment – CRTI-B)*, a platform gathering all the main players in the sector (developers, contractors, etc.)[49]. Several working groups have been created within the CRTI-B, with the aim of developing a BIM guide. The working groups will be in charge of creating a BIM Execution Plan (BEP), defining the criteria for exchange of information between part-

ners, the terminology, collaboration method, roles of actors involved, as well as norms and other reference documents[50].

> In order to promote research, development and innovation in the field of eco-technologies for sustainable construction, the Council for Economic Development and Construction (CDEC) created NEOBUILD in 2011, a private sector initiative supported by the Ministry of Economy and Foreign Trade.

As a technological innovation pole, NEOBUILD aims to foster the emergence of innovative sustainable construction technologies for SMEs, to contribute and manage their development, and support their implementation in Luxembourg[51]. Its competence areas include technology transfer, support with expertise, its network and dissemination of innovative projects. Furthermore, it introduced the NEOBUILD Innovation Living Lab, which integrates over 100 different materials in a zero energy building and functions as laboratory to test innovative solutions[52]. In 2014, **Imsim** was created in order to foster immersive simulation during the construction process. For the coming years, the CDEC is expecting to further make progress in fostering urban farming, urban agriculture and connected objects in its strategy for greater innovation in the construction sector as a means to integrate new technological changes[53].

6

National & Regional Policy & Regulatory Framework

Policy schemes

> In 2008, the Housing Pact (Pacte Logement) was adopted, aiming to encourage municipalities to promote housing development through financial incentives.

Indeed, as part of the Pact, local governments with a predicted population growth of over 1% per year (or 15% over a 10-year period) can claim subsidies to invest in social infrastructure, such as schools, and commit to support the construction of new dwellings to respond to the population increase[54]. Between 2011 and 2016, 56 municipalities benefited from state aid coming from the Housing Pact. 243 million euros have been invested by the State, thus enabling the creation of 1,704 housing units at accessible prices over the period[55]. Since 2015, a new Housing Pact 2.0 is under discussion in order to tackle growing territorial, urban and socio-economic issues in Luxembourg[56].

Under the Pact, municipalities can benefit from state support for the construction of dwellings. For instance, for the construction of new **dwellings, which are meant for sales**, the government can cover up to 50% of the infrastructural costs incurred (e.g. related to the installation of technical infrastructure such as sewage, water, gas, electricity, etc.), 50% of the study costs (e.g. fees of architects and engineers) as well as 50% of the price of the land, with the view of creating a land stock to be used for the construction of rent-controlled housing[57]. Moreover, the Pact includes measures to further support affordable rental housing, such as the requirement for developers to include a minimum of 10% of social housing into their new developments[58].

As for the construction of **new rental dwellings**, the Pact stipulates that the government can cover up to 75% of the construction or acquisition costs incurred by the municipalities, up to 70% for the construction of student dwellings and up to 100% of costs incurred for the construction of dwellings for foreign workers or asylum seekers[59].

The Pact also introduced some measures to compensate for the limited **land ownership by municipalities**. For instance, a local tax can be enforced on dwellings that have been vacant for over 18 months and on building land which has not been developed for at least three years, so as to prevent speculation[60].

Subsidies, guarantees and fiscal incentives have been in place for many decades in order to support homeownership, which explains the high rate of homeownership in Luxembourg (see Access to housing). For instance, for the construction and acquisition of a dwelling, **subsidies** of up to EUR 9,700 are offered to eligible beneficiaries, according to the type and surface of the dwelling. These can be increased by up to 30% in specific cases[61]. Moreover, the state offers **guarantees** on mortgages for beneficiaries who cannot provide sufficient guarantees to financial institutions to secure a loan. The maximum amount of the guarantee cannot exceed EUR 131,630[62].

> To increase supply of both housing and land for construction purposes, the government introduced additional fiscal measures, including a tax credit of up to EUR 20,000 to lower registration tax costs related to the purchase of a dwelling (Bëllegen Akt)[63]; a 'super-reduced' VAT rate of 3% rather than the standard rate of 17% on construction and renovation of dwellings, allowing to save up to EUR 50,000 per dwelling[64].

The reduction of capital gain taxes on sales of secondary residences, with first residences being already exempted from the capital gains taxesn Luxembourg and an increase of the accelerated amortisation rate on rented buildings amounted from 4% to 6%. These housing-related tax advantages have the effect of lowering the marginal cost[65] of owner-occupied housing, thus favouring ownership[66]. A fiscal reform introduced in 2017 by the government, further aims to encourage homeownership by increasing tax deductible interest rates paid related to a home loan and lowers taxes both on capital gains (until the end of 2017) as well as on rental incomes[67].

In January 2017, a new set of policies upgrades the previous **PRIMe HOUSE** programme aiming to support renovation of existing dwellings with measures including grants when improving energy efficiency as well as subsidies for energy efficiency consulting. Concurrently, the "Klimabank" policy has been introduced in order to foster investment in the renovation of housing which are older than 10 years. In partnerships with banks, this will allow homeowners to receive interest free loans, for a borrowed capital of up to EUR 100,000 over up to 15 years, depending on socio-economic conditions of the household. Alongside the Klimabank, the government has introduced a system of financial aid for the establishment of a durability certification for new housing (LENOZ)[68].

The government has also recently started to direct its support towards

> To meet the growing demand for social housing, the Housing Authority will be pursuing a EUR 50 million investment plan over 2016-2020 for the construction of 640 new social housing units and associated infrastructures on 16 sites owned by the Housing Authority.

tenancy. In January 2016, a **rent subsidy** was introduced by the Ministry of Housing, designed to support low-income households paying a monthly rent of over 33% of their disposable income. The monthly subsidy can reach up to EUR 300[69]. Aimed initially to target 18,600 households, only 11% applied and were granted the subsidy. Therefore, in 2018, the threshold is planned to be decreased from 33% to 25%. Moreover, only three months of salary slips will be necessary, compared to six before the reform. Finally, the income ceilings are revised upward, meaning that more people will be eligible for the subsidy. Overall, the budget planned for 2018 amounts to EUR 10 million[70].

Given the wide-ranging nature of all state aid for housing in Luxembourg, a **one-stop shop** has been put in place since January 2017, in order to answer citizens' concerns and questions. This will combine information on aids given by both the Ministry of the Environment and the Ministry of Housing[71].

> Finally, social housing is provided through public developers, such as the Fonds du Logement (Housing Fund) and the Société Nationale des Habitations à Bon Marché (SNHBM), which owns dwellings that are rented at a reduced price to low-income households[72]. The SNHBM has built, since its establishment in 1919, 9000 housing in different cities across the country. The government aims to build at least 2,500 new social housing units by 2025[73].

In January 2017, the Government adopted a program for the construction of subsidised housing projects as well as increased State participation. The programme covers 533 projects for a total of 10,981 housing units. For 61 new projects the state participation is estimated to be of EUR 42.1 million[74].

Insurance and liability related regulations

In Luxembourg, according to the **Law of 13 December 1989**, architects and engineers are required to take out compulsory third party liability and professional indemnity insurance, which cover all professional liabilities. In addition, the Order of Architects and consulting Engineers *(Ordre des Architectes et des Ingénieurs-Conseils - OAI)* developed non-compulsory guidelines for third party liability insurance and professional indemnity insurance. Other types of insurance are also common, such as the Contractor's All Risk (CAR) and Decennial Liability insurance. The latter covers all parties involved in the construction project who are likely to be subject to decennial liability under the acts 1792 and 2270 of the Civil Code. This type of insurance lasts for 10 years starting from the acceptance of works. As for public procurement projects or private projects, the contract may require the parties involved to take out one or several of these insurances[75].

Principles of liability in construction are mainly governed by the **Civil Code**, where articles 1147 and 1382 define general liability rules and articles 1792 and 2270 refer specifically to construction parties (contractors, architects etc.). The Civil Code lays out the regime of contractual liability, which has a different duration depending on whether a damage occurs before or after handover. The liability limitation period for damages occurred before completion of the project is 30 years from the handover of the works. For damages occurring after completion, decennial liability applies when there has been damage affecting the solidity of the building shell (10 year limitation period). In case of defects to minor works (decoration and maintenance works), bi-annual liability applies, whereby the construction parties are liable for 5 years[76].

Building regulations

In Luxembourg, building regulations *(Règlement sur les bâtisses)* are specific to each municipality, and may therefore vary. In general, they divide the area into different types of zones (high density, low density, residential, industrial, etc.), and define the general rules applicable to each zone (e.g. safety requirements, characteristics of the building land, etc.), as well as the requirements of constructions (stability, safety, rules applicable to the building site, etc.)[77]. Moreover, the regulations also specify the procedure to be carried out to request the building permit, necessary for any new construction work, as well as enlargements, transformations, external modifications and demolitions of existing buildings[78].

> In parallel, a general development plan (Plan d'aménagement general - PAG) and a specific development plan (Plan d'aménagement particulier – PAP) also exist for each municipality

The PAG consists of a set of graphical and written provisions which aim at the rational utilisation of land; harmonious development of urban and rural structures; protection of the cultural heritage and natural environment; smart energy usage; and improving the quality of life of the population[79]. The PAP implements and specifies each zoning area of the PAG of a municipality (with the exception of green areas, lands subject to a land use plan, etc.)[80]. Thus, the building regulations, the PAG and the PAP constitute the framework for the sustainable development of the territory of the municipalities.

> In order to reduce the administrative burden linked to the issuance of building permits and therefore improve the supply of housing, the 'Omnibus' law has been voted and is aiming to simplify the current process.

The law shortens the length of the procedure to obtain a building permit, since it contains measures that reduce the time available to the administration to react. Moreover, it introduces the concept of 'tacit consent', meaning that no reaction from the administration can be considered as a positive answer[81].

7

Current Status & National Strategy to meet Construction 2020 Objectives

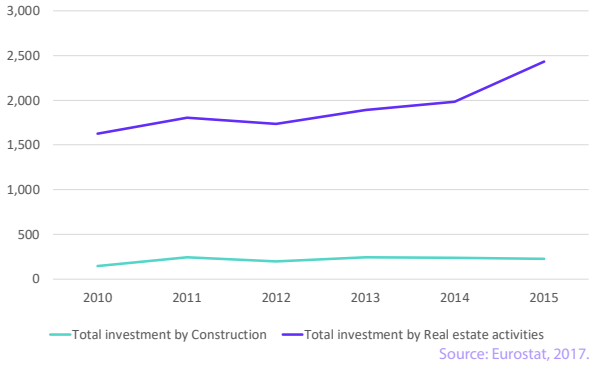
TO 1 - Investment conditions and volumes

Total **investment by the broad construction sector**[82] has shown similar trends since 2010 (Figure 12). Indeed, investment by the real estate sub-sector increased by 49.7% between 2010 and 2015 from EUR 1.6 billion to EUR 2.4 billion. Investment by the narrow construction sector increased by 54.0%, from EUR 146 million in 2010 to EUR

↑ 49.7%

Total investment by the broad construction 2010-2015

Figure 10: Investment by the Luxembourgish broad construction industry between 2010-2015 (EUR m)



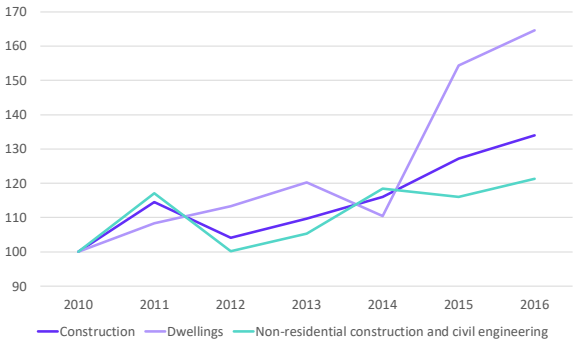
Source: Eurostat, 2017.

Total **investment in construction**[83] has risen from 33.9% between 2010 and 2016 (Figure 13). Investment in dwellings increased by a greater extent in the same period, by 64.6%. There is also a positive trend in the investment in non-residential construction and civil engineering, yet that is less pronounced. In fact, it increased by only 21.2% over the same period. In absolute terms, investment in construction amounted to EUR 5.6 billion in 2015, out of which EUR 2.0 billion were invested in dwellings and EUR 3.6 billion in non-residential and civil

↑ 33.9%

Increase of investment in construction in 2010-2016

Figure 12: Investment in the Luxembourgish construction sector between 2010-2016 (2010=100)



Source: AMECO, 2017.

Total **inland infrastructure investment as a share of GDP** has remained relatively constant, amounting to 0.8% both in 2008 and 2013, although it reached 0.9% in 2009-2011. Specifically, investment in rail infrastructure experienced a slight decline over 2008-2013, from EUR 149.7 million to EUR 145.9 million (-2.6%). Conversely, investment in road increased by 59.8% over the same period, from EUR 137.8 million to EUR 220.1 million. Indeed, Luxembourg boasts the third highest rail density (106.3 km/1,000 km2) and the second highest motorway network density in the EU (58.8 km/1,000 km2)[85].

Similarly, **investment in rail and road infrastructure maintenance** showed an increasing trend over 2010-2014. Namely, rail maintenance grew by 18.9% over the same period, from EUR 120.0 million to EUR 142.8 million, whereas road maintenance increased by 20.6%, although from a lower base, from EUR 34.0 million in 2010 to EUR 41.0 million in 2014

The main highlights for road infrastructure development in Luxembourg in recent years was the construction of the A7 motorway tunnel, connecting Luxembourg City with northern city of Mersch, known as "Route du Nord" or "Nordstrooss".

he major 31-km long infrastructure project with a budget of EUR 715 million took 18 years to be finalised and is hope to create more linkages and revive the economic potential of the North of Luxembourg.

The Luxembourgish government has placed strategic importance on sustainable transport, both nationally and at the cross-border level. Indeed, the government is implementing its **Global Strategy for Sustainable Mobility** *(Stratégie Globale pour une Mobilité Durable – MoDu)*, published in 2012. The strategy is centred on the development of public transportation and therefore relies on the extension of domestic and cross-border infrastructure. It has four main objectives, including achieving 25% of daily transfers through soft mobility (e.g. non-motorised transport) by 2020 and 25% of motorised transfers through public transportation by 2020[86].

An instance of the projects to be carried out under the MoDU strategy includes the new tramway system in Luxembourg City, known as **LuxTram**, which is expected to cost around EUR 345.8 million. Of the total project cost, the central government will contribute EUR 230.5 million, with the remaining EUR 115.26 million being provided by the city council. The funds will be used to perform studies, construct infrastructure and a depot in Kirchberg, and procure rolling stock. The initial section will extend 6.4 km from the city's main railway station. The implementation of the first phase is expected to be completed at the end of 2017, for an investment of about EUR 230.5 million[87], whereas completion of the Findel - Cloche d'Or line is scheduled for 2020-2021. Moreover, through its Transportation Sector Plan (PST), the strategy foresees a series of other measures, such as the installation of a high capacity and high frequency transportation system in the capital and the promotion of electric based mobility[88]. Furthermore, Luxembourg has a number of public **Special Funds** *(Fonds spéciaux)*, each investing in projects under a specific area. For instance, projects to be supported by the Railway Fund *(Fonds du Rail)* include the railway station Pfaffenthal-Kirchberg *(Pont Rouge)*, with a total planned investment of EUR 96.3 million, which will also be a key part of the MoDu strategy. Other projects include the construction of the new Luxembourg-Bettembourg railway line, with a total investment of EUR 212.8 million, and the expansion of the Hamm-Sandweiler railway tracks (EUR 215 million)[89].

Overall, the budget invested in order to improve mobility and the introduction of multimodal poles of exchange is about EUR 3.8 billion between 2013 and 2023, up from EUR 1.3 billion between 2003 and 2013[90]. The new projects will allow to cut times and create transversal train lines between the north and the south of Luxembourg. Changes will include the creation of new train station, such as Howald station, as well as the modernisation and upgrade of existing stations.

In terms of air travel, a new terminal has been added to the existing airport in Findel, costing an estimated EUR 4.5 million. This will allow to absorb the growing number of passengers going through the airport, which has increased from 12.4% from 2015 to 2016, reaching over 3 million passengers[91].

Financial support for infrastructure investment also comes from the EU. For instance, following the first rounds of calls for projects under the Connecting Europe Facility, Luxembourg has signed agreements for EUR 74 million for transport projects[92]. Moreover, the Luxembourgish government signed a EUR 300 million loan agreement with the European Investment Bank (EIB) for the financing of the construction and renovation of six new and ten existing educational facilities, as well as the new Luxembourg National Library. The projects are expected to be completed by 2020[93].

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TO 2 – Skills

The vocational education and training (VET) system in Luxembourg shows high rates of participation with 60% of secondary level students enrolled in VET in 2014 compared to the EU average of 48%[95].

Despite high enrolment rates, completion rates of VET education are below average with only 29% of students finishing their education in the foreseen time as opposed to 64% in the OECD[96]. Furthermore, the Luxembourgish system offers training paths based on the dual principle, but also ones that are mostly school-based, thus lacking consistency in its VET approach. To improve the VET system, a reform process was initiated in 2015 aimed at increasing the overall matching of skills with labour market needs[97]. A law was adopted in March 2016, applicable for school year 2016/2017 and puts emphasis on quality learning outcomes. Moreover, it is aimed to ensure the quality for work-based learning and encouraging specifically SMEs from offering apprenticeships. This is done in collaboration with the professional chambers. Alongside this reform, a bill was passed in 2015 in order to offer financial support for companies that invest in life-long learning for their employees[98].

With respect to the construction sector, a number of initiatives have been launched aimed at strengthening skills in construction.

The Luxembourg Chamber of Crafts together with the Construction Sector Training Institute (IFSB) and with myenergy, the public agency dedicated to sustainable energy, joined the initiative LuxBuild 2020. This is part of the EU-wide BUILD UP Skills scheme and aims at facilitating training in the fields of energy performance of buildings, renovation and utilisation of renewables in buildings.

Furthermore, the project supports the development of a national roadmap for qualifications in the construction sector. The Ministry of the Economy is one of the supporters of the project, but the initiative also gathers many representatives of the construction industry. The implementation phase of LuxBuild 2020 runs from mid-2014 to mid-2017[99]. A website has been put in place in 2017, in order to centralise all the information on the trainings offered[100].

In addition to LuxBuild 2020, a number of trainings and certifications are available on the market, offered by the public sector or trades association. For instance, **myenergy** offers a voluntary certification for energy advisors. Furthermore, the Professional Association of Architects and Consulting Engineers (OAI) organises advanced trainings in construction and energy. The Luxembourg Chamber of Crafts is also active in delivering trainings on energy renovation, passive house, ventilation systems etc. Finally, specific skills related to energy efficiency in construction are also taught at academic level. For instance, the University of Luxembourg offers and application-oriented engineering degree 'Energy and the Environment' covering energy and environmental technology in construction[101].

Between 2008 and 2014, over 5,000 young people have participated. In addition, the **Building Games**, organised by the IFSB already for the fourth time, are also dedicated to young people. High school students face a series of intellectual and sports competitions linked to sustainable construction. The winner is awarded a study trip dedicated to sustainable construction[102].

In 2014, Luxembourg introduced the so-called **e-Détachement** scheme, which provides posted workers in public and private works with a **Social Badge**. The registration on the e-Détachement platform and receipt of the social badge is mandatory for posted workers, except for self-employed. The rationale for this project comes from the need to combat social dumping and illegal work by identifying posted workers. Furthermore, Social Badges allow to check for social security, health, working conditions, fiscal and tax, and other matters. Not least, information on professional qualifications are stored on the Social Badge. However, given the relatively recent introduction of the scheme, the impact on the labour market of this electronic tool is still difficult to assess[103].

> Another important aspect of skills development in construction is related to engaging young people. To this end, the IFSB launched the campaign Building Generation, which encourages the discovery of professions in the construction sector, thus improving the lack of appeal of the industry.

TO 3 - Resource efficiency / Sustainable construction

> The Third National Energy Efficiency Action Plan (NEEAP III) for Luxembourg, published in 2014, defines the national final energy target for 2020, set at 49,292 GWh, as well as the forecast final energy consumption to be achieved by 2020 (48,789 GWh) by means of a number of measures across all sectors of the economy.

In particular, energy efficiency measures in buildings (both residential and non-residential) are expected to account for over half of the final energy savings by 2020, estimated at 2,698 GWh. Namely, final energy savings in the residential and non-residential sectors are estimated at 474 GWh and 319 GWh in 2020, respectively[104].

With respect to residential buildings, an ambitious timetable has been prepared for the progressive **intensification of energy efficiency requirements** on new residential buildings. Thus, starting January 2017, all new buildings will have to comply with the AAA class, in terms of both thermal insulation and energy performance, corresponding to a passive house. This makes Luxembourg the first EU Member State to require such a strict level of energy performance. This measure is expected to result in final energy savings of 331 GWh[105]. Similarly, the government introduced the intensification of the energy efficiency requirements on new non-residential buildings, making it compulsory for them to meet the energy efficiency class D. Compared to buildings before the introduction of this regulation, final energy savings of around 30% are expected owing to this measure, i.e. 168 GWh[106].

The **Environmental Protection Fund** *(Fonds pour la Protection de l'Environnement)* provides support to municipalities and individuals to implement energy efficiency and renewable energy measure. At building level, the Environmental Protection Fund supports energy renovation measures and energy-efficient new buildings[107]. An instance of support programme is **PRIMe HOUSE**, a scheme of the Ministry of Sustainable Development and Infrastructures, providing financial assistance for investments in the energy efficient renovation of existing residential buildings with an age of 10 years or above[108]. The subsidy can be claimed by physical persons, non-profit associations, as well as public or private developers, and covers interventions such as energy renovation, installation of solar-power heating and installation of photovoltaic panels[109]. The amount of subsidy granted depends on the type of interventions carried out, as well as the surface and type of dwelling. Moreover, if the renovation works result in an improvement of two energy classes, a bonus can be obtained on the subsidy amount granted for the implemented measures. The bonus depends on the achieved energy class, and corresponds to 20%, 30% and 60% of the granted subsidy for energy classes C, B and A, respectively[110]. These measures have all been upgraded in 2017. In total, the maximum state aid given for a single family home is of EUR 24,000[111].

The Ministry of Housing also provides support for energy efficient renovation. The Renovation grant (Prime d'amélioration) is granted for interventions that improve the health and safety of residential dwellings, but also for the enlargement of existing rooms and construction of new ones.

The types of measures covered by the programme include waste-water evacuation and sewage connection, water, gas and electricity piping, installation and replacement of central heating, etc. The grant amounts to 30% of the costs of the works, up to a maximum of EUR 10,000 per beneficiary[112]. Moreover, the Ministry offers **guarantees** to eligible individuals wishing to take out loans for the renovation of their dwelling. The amount of the guarantee cannot exceed EUR 131,630[113].

Furthermore, the government is implementing a 'climate bank' that aims to finance energy refurbishment projects with a reduced or zero interest rate for low-income families. New financing methods for the renovation of commercial buildings are also being considered, and the government has already established an inventory of central government buildings that are heated and/or cooled with total useful surface area in excess of 500 square metres. The inventory is the basis for a strategy for increasing energy performance in government buildings through the annual renovation of 3% of the total surface area of these buildings[114].

Finally, in September 2017, the State Secretary for sustainable development and infrastructure has announced further measures to incentivise companies and households to invest in solar panels by increasing the eligibility of state aid for the investment in such renewable energies to all producers of energy, as well as setting a price for selling the energy produced through solar panels. Moreover, a campaign to increase awareness on the benefits of solar energy has been launched[115].

TO 4 - Single Market

Luxembourg performs well relative to the metrics of the **EU Single Market Scoreboard**, particularly in terms of Transposition of law, Infringements (indeed, Luxembourg has the 6th lowest number of single market-related pending cases in the EU), and Internal Market Information System. Moreover, the country shows an above EU average level of trade integration in the Single Market for goods and services, with services having the highest integration among Member States. Its overall performance in Public Procurement is also above the average, although the scores in terms of aggregation (i.e. the proportion of procurement procedures with more than one public buyer) and reporting quality (i.e. the quality of information provided by public buyers) are less satisfactory[116]. Indeed, Luxembourg has one of the lowest publication rates for public procurement contracts advertised at EU level, with the share of public contracts for works, goods and services published under EU procurement legislation amounting to only 1.5% of GDP in 2015, well below the EU average of 4.2%[117].

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Despite having the second lowest level of perceived corruption in public procurement within the EU, a public procurement corruption case was reported in 2011 involving public officials and two bidders on public construction projects[118]. Moreover, in 2010, the Luxembourg Competition Council discovered and sanctioned a cartel between seven tiling companies involved in public works on two construction sites, imposing fines amounting to EUR 145,000 on the grounds of price fixing[119]. Another more recent corruption case, known as the Livange-Wickrange affair, has highlighted Luxembourg's limited capacity to deal with cases of corruption of public officials, according to GRECO, the Group of States against Corruption established by the Council of Europe. In this instance, a contractor bidding for the construction of a football stadium and shopping centre was allegedly favoured by reaching secret agreements with government officials[120].

Luxembourg also reports regulatory barriers in the service sector, particularly business services and retail, and is indeed the country with the most restrictive regulation in the EU in this respect.

This results in low competition and in market entry rates that are significantly below the EU average. Few measures have been put in place to limit restrictions, yet their impact appears limited[121]. Moreover, in terms of mutual evaluation of regulated professions, Luxembourg presents restrictions to the access and conduct of regulated professions in the service sector. For all the profession analysed, except one, the level of restrictiveness is higher in Luxembourg, than the EU average. Since 2011, some measures of been put in place in order to liberalise professional services, which have had a positive impact. In 2015, shareholding and voting right requirements for architects and engineers were removed, while in 2016, fixed tariffs in public contracts for architects and engineers were also lifted[122].

Nevertheless, access to the profession of civil engineers is not regulated in Luxembourg[123]. Therefore, consulting engineers in the construction sector who are established abroad (in the EEA and EU) benefit from the liberalisation of the provision of services based on the principle of the mutual recognition of qualifications, and may provide temporary and occasional services in Luxembourg without needing a business permit and without giving prior notification. Nonetheless, they must notify their presence to the Order of Architects and consulting Engineers (OAI) and register on their list of providers of occasional services. They must also comply with all the rules of the profession in force in Luxembourg and adapt their insurance or take out a specific civil liability

insurance covering their activities and those of their employees, if the insurance they have taken out in their country of origin does not cover all legal and contractual liabilities incurred in Luxembourg[124].

In general, if a profession is regulated in the Member State of origin of the cross-border service provider, the qualifications required for the profession are mutually recognised in Luxembourg. However, there are exceptions for those activities which may have an impact on the safety or health of the population, for which the authorities can require the provider to comply with the conditions of access to the profession in Luxembourg. Thus, the cross-border provider must provide proof of a Master Craftsman's certificate *(brevet de maîtrise)* to be able to temporarily carry out the craft activities of heating-sanitary-refrigeration installer; electrician; lift, goods lift, escalator and handling equipment installer; and carpenter, roofer and tinsmith[125].

Finally, with respect to the implementation of **Eurocodes**, Luxembourg published all EN Parts as National Standards in English, French and German, except for EN 1990-A1. National Annexes are published to all Eurocode parts, except for EN 1990-A1. The use of Eurocodes is not compulsory in Luxembourg, and National Regulations on structural design may be used in parallel with Eurocodes[126].

TO 5 - International competitiveness

Luxembourg ranks 20th out of 138 economies in the 2017-2018 Global Competitiveness Index[127]. It scores below the EU average in terms of the cost and number of documents required to export. Namely, the cost of exporting reached USD 1,425 (EUR 1,286.4) in 2015, above the EU average of USD 1,042.1 (EUR 929.5), whereas the number of documents required to export reached 5 in 2015, higher than the EU average of 4.1. Nevertheless, the time required to export was 8 days in 2015, against the EU average of 11.6)[128]. Overall, Luxembourg's performance in terms of internationalisation of its SMEs is above the EU average[129].

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The **Luxembourg Export Credit Agency** *(Office du Ducroire – ODL)* plays an important role in supporting the internationalisation and export activities of SMEs. It offers a variety of financial instruments, such as **export credit insurance**, which is particularly relevant for construction companies. Indeed, the ODL can cover buyer credits financed by banks, so as to enable foreign buyers to fund export transactions of contracting equipment, services or construction works, as well as supplier credits which the exporter may arrange for its foreign buyer[131].

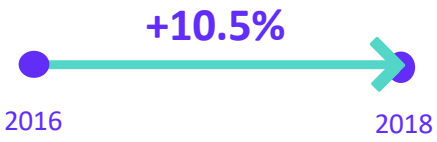
Furthermore, the **Committee for the Promotion of Luxembourg Exports** *(Comité pour la Promotion des Exportations Luxembourgeoises - COPEL)* was founded by a cooperation agreement between the ODL and Luxembourgish government to promote exports of goods and services from Luxembourg-based firms[132]. COPEL contributes to promotional material expenses (e.g. translations for presentations), provides support for participation in trade fairs, seminars and conferences, contributes to advertising costs and provides export training and other consultancy services. The amount of financial aid that COPEL can offer amounts to up to 50% of the expenses incurred, with a ceiling of EUR 200,000 over a period of three years[133].

Further government support is provided through the **Société Nationale de Crédit et d'Investissement (SNCI)**, a bank specialising in medium and long-term financing of investments by Luxembourg-based companies. The SNCI offers financial support for investments in innovation and fixed assets, but also exports. Through its **Financing of foreign investments** loans, SNCI aims to co-finance Luxembourg-based companies wishing to expand abroad as part of their development strategy. Eligible costs covered by this loan include production equipment and buildings used for professional purposes, as well as the acquisition of equity stakes in order to gain control over an existing company. The loan has a maximum value of EUR 2.5 million per project, and SNCI's intervention cannot exceed 50% of the total investment[134].

Finally, the trade promotion agency Luxembourg for Business and Innovation (LfBI) was created in 2008 as a joint initiative of various Ministries, SNCI, ODL and the Chamber of Crafts and FEDIL to foster Luxembourg's internationalisation activities. It acts as a networking platform for exporters, offering advice and information related to the available financial support, export procedures, licenses, trade missions and trade fairs[135].

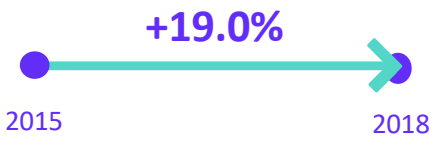
8
Outlook

Economic growth in Luxembourg is predicted to remain sustained with GDP growth rates expected to reach 4.3% in 2017 and 4.4% in 2018. Indeed, compared to other EU economies Luxembourg recovered much better from the 2008 crisis. In this respect, the outlook for the construction sector is showing positive developments with the volume index of production predicted to increase by 5.1% from 2016 to 2017 and by 10.5% from 2016 to 2018.



Increase of the volume index of production

The expansion of the construction sector is also visible from the trends of employment indicators. In fact, the number of workers employed in the broad construction sector is projected to increase by 12.1% in 2017 relative to 2015, reaching 60,087 people, and by 19.0% in 2018 (compared to 2015), to 63,766. Similarly, the number of enterprises operating in the broad construction sector is forecast to grow by 7.4% in 2017 relative to 2014, and to increase by 15.0% in 2018 compared to 2014 levels, reaching 9,219 companies. Value added and turnover in the industry are also on the rise. Notably, the value added of the broad construction sector is expected to grow substantially, with a forecast growth of 10.6% in 2017 compared to 2014, and of 17.9% in 2018 (from 2014 levels), amounting to EUR 4.5 billion. Following a similar trend, turnover is projected to grow at 11.7% in 2017 compared to 2015, and at 18.7% in 2018 (from 2015), reaching EUR 10.5 billion.



The outlook for number of workers in broad construction sector

The housing market has been facing considerable pressure in terms of housing affordability due to fast-growing demand and lagging supply, resulting in a sharp rise of house prices. The Housing Pact and other measures adopted by the government are expected to ease the pressure on the housing market by fostering increased supply of housing as well as affordable housing. Indeed, the government is targeting to create new 2,500 new social housing units by 2025[136]. Furthermore, investment in dwellings is predicted to grow by 6.0% in 2017 and by 11.7% in 2018, compared to 2016 levels respectively.

↑ 11.7%

Investment in dwellings in 2016-2018

The non-residential segment is influenced by the office market, which in turn is linked to Luxembourg's overall economic development and attractiveness as a business location. Similar to the housing market, rising demand for office space is likely to not be met with new construction in the short term, leading to increases in prices. In fact, rental values in prime locations have risen to EUR 47 per sq.m. per month (excluding VAT)[137]. The value of the office market is predicted to rise by an annual compound rate of 5.9% until 2020, reaching a total value of EUR 32 billion[138]. The occupier take-up in 2017 is expected to exceed 200,000 sq.m. The transfer of activities of companies from London to Luxembourg after the Brexit will also impact positively the occupier take-up[139]. The retail market also has potential for growth, despite Luxembourg having already one of the highest shopping centre density per inhabitant in Europe. Indeed, by 2017 the surface area of retail centres is projected to grow by 16% (or 80,000 sqm)[140].

Investments in civil engineering and non-residential construction expected to grow by 4.6% by 2017 and by 7.9% by 2018 compared to 2016, broadly in line with the sector's overall development. Notably, the civil engineering segment will benefit from public investment in transport projects, as outlined in Luxembourg's Global Strategy for Sustainable Mobility.

In conclusion, opportunities for Luxembourg's construction sector arise from strong demand for residential and office buildings, as well as a rebound in public spending, thus creating favourable conditions for the development of the sector[141].

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