



National plan for smart, sustainable and inclusive growth

Luxembourg 2020

National Reform Programme
of the Grand Duchy of Luxembourg under the European semester
2019



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ACRONYMS

AAQE	Annual Allocations of Emissions Quotas
ADEM	Employment Development Agency
AIP	Professional Insertion Activities
ALJ	Local Youth Action
BNL	National Library of Luxembourg
BTS	Vocational Training Certificate
CFE	Financial Contributions by the State
CRP	Public Research Centre
CTIE	Government IT Centre
DESI	Digital Economy & Society Index
DIRD	Domestic Research and Development Expenditure
DSGE	Dynamic Stochastic General Equilibrium
ERA	European Research Area
ERDF	European Regional Development Fund
ESC	Economic and Social Council
ESF	European Social Fund
ETS	Emission Trading Scheme
EU	European Union
FEAD	Fund for European aid to the most deprived
GDP	Gross Domestic Product
GHG	Greenhouse Gases
HPC	High Performance Computing
ICT	Information and Communications Technologies
IGSS	General Inspectorate of Social Security
ILR	Luxembourg Regulatory Institution
KTOE	Kilo-tonne oil equivalent
LCSB	Luxembourg Centre for Systems Biomedicine
LFS	Labour Force Survey
LIH	Luxembourg Institute of Health
LIS	Luxembourg income study
LISER	Luxembourg Institute of Socio-Economic Research
LIST	Luxembourg Institute of Science and Technology
LLL	Lifelong learning
LTIO	Luxembourg Trade and Investment Offices
MIP	Macroeconomic imbalance procedure
MODU	Sustainable Mobility Strategy
MTO	Medium-Term Budgetary Objective
NEET	Not in education, employment or training
NRF	National Research Fund
NRP	National Reform Programme
OAI	Order of Consulting Architects and Engineers
OECD	Organisation of Economic Cooperation and Development
PNEC	Integrated National Energy-Climate Plan
PPP	Public-Private Partnership
PSL	Sectoral Housing Plan
R&D	Research and Development
RDI	Research-Development-Innovation
REVIS	Social Inclusion Revenue
SGP	Stability and Growth Programme
SME	Small and Medium Sized Enterprise
SNJ	National Youth Service
SSM	Minimum wage
STATEC	National Institute of statistics and economic studies
UEL	<i>Union des entreprises luxembourgeoises</i> (Employer's Organisation)

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1. Introduction

The **European economy** is expected to grow for the seventh consecutive year in 2019, but at a more moderate pace. Employment has never been so high and unemployment is at its lowest. Public finances have also improved. Nevertheless, challenges remain. Productivity remains low, the rate of ageing in the population will increase over the long term and technological changes are exerting a strong impact on labour markets. Greater uncertainty is also prevalent, particularly because of the consequences of an expected withdrawal of the United Kingdom from the European Union (EU).

In **Luxembourg**, a good number of cyclical trends remain relatively positive, as do medium-term forecasts, in spite of an increase in risks potentially having negative impacts. Annual real GDP growth was +3.0% for 2018 and is expected to be +3% for 2019 (f), and domestic employment is growing at an average rate above +3.5%. The unemployment rate is falling and has been close to 5% at the beginning of 2019. For Luxembourg, a small open economy integrated into a large cross-border basin, such a development is truly a challenge to overcome because this growth generates a certain number of negative externalities. Luxembourg faces a number of challenges, including mobility, access to housing, the long-term sustainability of public finances, climate and environmental commitments, and the level of economic diversification. In addition, the country is facing a weak productivity growth.

The National Reform Programme (NRP) addresses these factors and challenges in the medium and long term. This 2019 edition of the NRP provides an overview of the implementation of previously announced measures and takes into account the Council's 2018-2019 recommendations, 2020 objectives on the national level, the Annual Growth Survey as well as specific recommendations for the euro area. This NRP also addresses the main conclusions of the Luxembourg¹ Country Report published by the European Commission at the end of February 2019, and for the first time it includes a specific chapter on investment, providing elements of the government's response to the main obstacles to investment that have been identified by the European Commission in the 2019 country report. The challenge for the government is to pursue responsible fiscal policies, increase investment and implement structural reforms. This NRP update includes new government priorities² stemming from the national elections that have taken place in the fall of 2018. The government will pursue a fiscal policy in line with the rules of the Stability and Growth Pact, while preserving a sufficiently broad margin to its medium-term objective (MTO). The government will maintain an attractive economic environment, including a high level of investment in the country's infrastructure. The government will strengthen social cohesion through the active inclusion of the largest number of citizens and will strive to implement an ambitious social policy aimed at reducing the widening income gap and strengthening the fight against poverty and social exclusion. The government will take up the challenges of vigorous economic development, maintaining compliance with ecological limits and social equity.

On the macroeconomic level, Luxembourg is again among the EU Member States not subjected to an in-depth review under the alert mechanism of the Macroeconomic Imbalances Procedure (MIP), despite a number of indicators that remain above indicative thresholds³.

On the microeconomic and employment side, education and training, R&D and innovation, efficient use of resources, social cohesion and inclusion and gender equality as a cross-functional goal, continue to act as the structural pillars of long-term growth. Since 2016, a series of events related to qualitative growth have been organised in Luxembourg. The government presented the Third

¹ For more details see: https://ec.europa.eu/info/publications/2019-european-semester-country-reports_fr

² For more details see: https://gouvernement.lu/fr/actualites/toutes_actualites/articles/2018/12-decembre/03-signature-accord.html

³ For more details see: https://ec.europa.eu/info/publications/2019-european-semester-alert-mechanism-report_en

Industrial Revolution (TIR) strategic study commissioned to Jeremy Rifkin. Its aim has been to prepare Luxembourg via a long-term perspective. This study was chosen as a general guideline for the future development of the country. Luxembourg has a solid foundation from which to respond to future challenges, as significant efforts have been made in ICT, logistics and energy. It is now a question of accelerating the dynamic forces and preparing their convergence in a digital and intelligent network. The government sees digital innovation as an opportunity that should be exploited more and aims to boost productivity through new technologies. At the end of 2018, the government set up a National Productivity Board⁴ to diagnose and analyse the situation and trends in productivity in the broad sense.

On the fiscal side, this NRP goes hand in hand with sound and sustainable public finances as formulated in the Draft Budgetary Plan (DBP)⁵ and the Stability and Growth Programme (SGP)⁶.

The government is pursuing an ambitious pace of public investment. In the draft state budget law for 2019 investments exceed €2.5 billion (4.4% of GDP) for the first time, and the government provides for direct and indirect investment spending growth in the central government's multiannual programming of almost +20%. With regard to private investment, a recent Eurobarometer survey (2018)⁷ showed that Luxembourg is one of the Member States in which firms perceive that there are generally fewer barriers to investment than in most other EU countries. Over the last few years, the government has embarked on multiple investment projects, and the government programme has slated a whole new set of measures, including increasing the availability of housing and improving infrastructure, stimulating private investment, increasing cooperation between research and businesses, providing a skilled workforce and promoting the digital integration of the economy.

The government has again involved the Parliament and social partners in the 2019 European semester discussions, with a view to enhancing transparency and fostering national ownership:

- the Parliament has been involved with the presentation of the NRP & SGP reports in April ;
- social partners have been involved in the national social dialogue under the auspices of the Economic and Social Council (ESC). This involves a regular cycle of consultation carried out annually that was launched in 2014, which aims to cultivate regular social dialogue throughout the year to allow social partners to submit their views to the government⁸.

In conclusion, the coordinated set of measures in the NRP, accompanied by a responsible fiscal policy set out in the framework of the SGP and combined with strengthened governance practices at the national level, should allow Luxembourg to improve the foundations of smart, sustainable and inclusive growth.

⁴ For more details see: <https://odc.gouvernement.lu/fr/domaines-activite/cnp.html>

⁵ For more details see: <https://budget.public.lu/dam-assets/lb/budget2019/links-dokumenter/dbp-2018-2019-fr.pdf>

⁶ For more details see: <https://mfin.gouvernement.lu/fr/publications.html>

⁷ For more details see: https://data.europa.eu/euodp/data/dataset/S2159_459_ENG

⁸ For more details see: <https://ces.public.lu/fr/actualites/2019/semestre-europeen-2019.html>

2. Macroeconomic scenario for 2019-2023

2.1 Macroeconomic perspectives for the period covered by the programme

It is essential that NRP measures take into account the constraints of the macroeconomic environment and the medium-term budget strategy that stem from them. Implementing the NRP as a whole falls under the same economic hypotheses (macroeconomic projections) as the Stability and Growth Programme (SGP).

Macroeconomic forecasts indicate real GDP growth of +3.0% in 2019 and +3.8% in 2020, as well as medium-term growth of +3.0% on average in the period 2021-2023.

Table 1: Change in economic growth and job creation for 2018-2023

	2018	2019	2020	2021	2022	2023
Growth in GDP (as a %)	+3.0	+3.0	+3.8	+3.5	+3.0	+2.5
Total domestic employment (as a %)	+3.7	+3.4	+2.9	+3.0	+2.6	+2.0

Source: SGP (2019)

For the long term, the government has aligned its main economic assumptions with those in the macroeconomic scenario adopted for Luxembourg by the Working Group on Ageing Populations and Sustainability of the EU Economic Policy Committee and of its most recent report on ageing⁹.

2.2 Macroeconomic impact of structural reforms

Over recent years, major efforts have been made in Luxembourg in the area of evaluating reforms. An econometric DSGE (Dynamic Stochastic General Equilibrium) model, called the Luxembourg structural model (LSM), has been developed in order to better simulate macro and microeconomic impacts of structural reforms. Some characteristics of the model make it particularly well adapted to analysing economic policies implemented by Luxembourg. It integrates the economic specificities of Luxembourg, especially the particular functioning of the labour market that takes into account residents and cross-border workers, the importance of negotiations between unions and companies, and the fact that Luxembourg is a small, very open economy. An initial version of the LSM was widely used in reviewing the consequences of structural policies. However, this initial version was not appropriate for studying the consequences of the high level of Luxembourg's specialization in financial services. The development of a new version, known as LSM2, addresses this concern. The LSM2 model including the financial sector for Luxembourg was introduced in June 2012. Still, one must not lose sight of the fact that there is no ideal structure for an institutional macroeconomic model¹⁰.

⁹ For more details see: https://europa.eu/epc/working-group-ageing-populations-and-sustainability_en

¹⁰ For more details see: http://odc.gouvernement.lu/fr/domaines-activite/Outils-evaluation_competitivite/modele-structurel-luxembourgeois-lsm.html

3. Political responses to the major economic challenges

3.1 Implementation of country specific recommendations for 2018-2019

In July 2018 the Council adopted two recommendations on Luxembourg's SGP and NRP for 2018-2019. This chapter describes the measures implemented in Luxembourg to address these recommendations.

3.1.1 Employment rate of older people and long-term sustainability of the pension system

“Increase the employment rate of older people by enhancing their employment opportunities and employability while further limiting early retirement, with a view to also improving the long-term sustainability of the pension system.”

3.1.1.1 Employment rate of older people

The new mechanism to combat long-term unemployment, which has been in effect since July 2017, aims to support the creation of new jobs in the municipality, para-public or social services sector that correspond to real needs. These jobs must be new, not targeting replacement of staff and, above all, not creating situations of unfair competition compared to the private sector. Specific measures are aimed at job seekers aged 50 and over. Since the programme was launched, 80% of the beneficiaries of this mechanism are 50 years or older.

The reform of the professional reclassification system, in effect since 1 January 2016, aims at accelerating procedures, achieving a more thorough preservation of individual rights in external reclassification and creating conditions conducive to internal reclassification. The concept was based on supporting companies in their efforts to improve working conditions by making experts available, by emphasizing internal reclassification, i.e. within a worker's same company, in external reclassification efforts, and above all, improving reinsertion of reclassified persons into a job. On the basis of the initial conclusions related to the implementation of the law, the idea to adjust a certain number of issues in close cooperation with social partners is under review.

The professionalisation placement programme¹¹ and the professional reinsertion contract¹² are two measures that have become applicable since 2016. They are intended for job seekers at least 45 years old, those in outplacement or those with the status of disabled worker. The first measure is a work placement with a maximum period of six weeks giving job seekers the opportunity to highlight their professional capabilities within a company. The second measure offers job seekers the possibility of improving their knowledge and professional capacities within a company for a maximum period of 12 months. These measures are intended for companies that can provide a real opportunity for hiring people on permanent contracts.

The reform of the early retirement schemes¹³, including the solidarity, progressive and early retirement systems of shift and night workers, excluding adjustments, in effect since December 11th, 2017, aims to target more employees with difficult jobs, consequently placing greater emphasis on the working conditions of employees, while favouring the retention of older workers in companies. More precisely, the law abolishes the early retirement-solidarity system and has modified other early retirement systems.

¹¹ For more details see:

<http://adem.public.lu/fr/demandeurs-demploi/aides-financieres-mesures/mesures-emploi/stage-professionnalisation/index.html>

¹² For more details see:

<http://adem.public.lu/fr/demandeurs-demploi/aides-financieres-mesures/mesures-emploi/Contrat-reinsertion-emploi/index.html>

¹³ Law dated 30 November 2017 <http://legilux.public.lu/eli/etat/leg/loi/2017/11/30/a1032/jo>

In order to support and improve lifelong learning (LLL), a key factor in maintaining employees on the job, especially older ones, the government will progressively implement the measures of the white paper on the national strategy for lifelong learning¹⁴. There are eight of these measures, including the adaptation of the LLL mechanism to the life cycle of the learner and diversity in Luxembourg society, and the development of quality in the area of adult training. The Luxembourg Digital Skills Bridge pilot project also helps secure jobs for older people.

3.1.1.2 Long-term sustainability of the pension system

The various foundations of social security are regularly monitored in order to ensure that the services provided are in line with the needs of the insured and that their financial sustainability is assured over a given period, which varies depending on the pillars. In recent reforms, this monitoring has even been reinforced by specific legislation. This applies in particular to the pension insurance and long-term care insurance schemes, which require foresight in the medium and long term by the very nature of their services. These analyses - the reports are discussed with social partners as well as with the stakeholders - aim at ensuring the sound strategic management and long-term sustainability of each of the foundations.

Accordingly, with regard to the general pension insurance scheme, whose legislative reform entered into effect on 1 January 2013, the legislation provides that the General Inspectorate of Social Security (IGSS) analyse the financial situation of the scheme every five years. One of the aims of the reform was to adjust the replacement rate of pensions to life expectancy and to plan for regulating mechanisms if financial resources are inadequate, as well as to reduce the gap between legal and effective retirement ages, by means of an active policy to facilitate the conditions for maintaining older employees in employment.

The general regime analysis done in 2016 (the government decided in its programme that the first evaluation of the impact of the reform and the establishment of a Pensions Group would be put forward one year)¹⁵, carried out based on the actuarial report of the IGSS on the financial situation of the general retirement pension scheme submitted on 2 December 2016¹⁶, concluded¹⁷ that the general pension insurance scheme is currently in a relatively comfortable financial position. Indeed, consecutive surpluses have resulted in the accumulation of a compensation reserve which, at 31 December 2018, corresponded to 4.5 times the amount of annual pay out, well above the minimum required level of 1.5 times the amount of annual pension benefits. The medium-term forecasts and the long-term actuarial projections confirm that the current overall contribution rate of 24% makes it possible to comply with the stipulations of Article 238 of the Social Security Code until the end of the current coverage period extending from 2013 to 2022. The report also highlights the fact that while the impacts of the 2012 pension insurance reform on the financial situation of the scheme are still not fully apparent, actuarial projections confirm that the mechanisms introduced by the pension insurance reform will have a positive effect on the financial situation of the general retirement system over the long term.

However, it is important not to rely on the current high level of the compensation reserve. On the contrary, the analysis of demographic and financial projections implies that it is a question of using the accumulated reserve as a basis for determining effective mechanisms allowing the next generations to benefit from a general and efficient pension system. One of the measures aims to

¹⁴ For more details see:

<http://www.men.public.lu/catalogue-publications/adultes/informations-generales-offre-cours/livre-blanc-lifelong-learning/131025-s31-livreblanc.pdf>

¹⁵ The Pensions Group consisted of experts from different ministries and professional chambers. Its task was to check the concordance of newly introduced provisions in the middle of the legislative period on the basis of an actuarial opinion drawn up by the IGSS, including the readjustment mechanism.

¹⁶ For more details see: https://gouvernement.lu/fr/actualites/toutes_actualites/communiqués/2016/12-decembre/02-bilan-assurance-pension.html

¹⁷ The Pensions Group report is available by going to the following link: <https://gouvernement.lu/fr/publications/rapport-etude-analyse/igss/rapport-du-groupe-de-travail-pensions/2018/rapport-du-groupe-de-travail-pensions.html>

promote keeping people on the job by combining a pension with income from work (salary or self-employment) that does not exceed a certain threshold in monetary terms. While this mechanism already existed before the 2012 reform (effective 1 January 2013), it was amended to further encourage its use. Accordingly, between 2010 and 2018, the proportion of retired persons who continued to work increased from 5% to 8%. Of these, the percentage of those for whom the activity is significant even rose from 5% before the reform to 44% in 2018.

Long-term care insurance is one of the fundamental pillars of the Luxembourg social security system. Nursing care insurance was instituted by the law dated June 19th, 1998 as the 5th pillar of Social Security and its purpose is "*to bear the cost of services in kind of assistance and care for dependent persons provided (...) within the home or in a nursing care establishment as well as technical support and alterations in the home*". Currently, the nursing care insurance scheme supports over 14,000 persons and must now be modernised to meet the challenges of a constantly changing population and to continue to guarantee fair access to high quality services¹⁸. The main objectives of the reform¹⁹, which took effect on 1 January 2018, consist in better individualisation of the offer of quality services that meet the daily needs of each person, an improvement in quality by standards and clear criteria with adequate controls, simplification of procedures and consolidation of the system in the light of societal developments and in compliance with the fundamental principles of the basic 1998 law. In addition, the law provides for tools to better monitor the entire system of long-term nursing care insurance, thus allowing better anticipation of future changes. To support the rollout of the reform and to ensure the best possible follow-up, the government has set up a high-level monitoring group where the main actors as well as employee and beneficiary representatives can work together. This step is part of the government's efforts to involve social partners and more broadly all stakeholders to the extent possible, in developing and implementing the various reforms through concerted action by all parties. The various measures of the reform and the concerted action ensure that the system is better prepared to continue providing access to quality care in the future, while ensuring the financial stability of the scheme.

3.1.2 Regulatory restrictions in the business services sector

"Further reduce regulatory restrictions in the business services sector."

In the Luxembourg SBA Fact Sheet (November 2017)²⁰, the European Commission noted that the Luxembourg business services sector has recently experienced exceptional growth, with management & consulting, legal and accounting services acting as the main drivers. Business services in Luxembourg enjoy a favourable business environment for value creation and employment.

In addition, as part of its NRP, the government has recently taken and planned a series of additional measures to improve the business environment.

The new government is continuing to adapt regulations governing access to commercial, craft and professional occupations:

¹⁸ To review the key elements of the reform, please go to: http://www.mss.public.lu/actualites/2016/07/art_ass_dep/index.html

¹⁹ Law dated 12 July 2017

²⁰ EUROPEAN COMMISSION, *2017 SBA Fact Sheet Luxembourg*, November 2017, p.3: "*Professional activities is another sector which has experienced outstanding growth recently. In 2012-2016, SME employment in professional activities rose by 19.2% and SME value added increased by 42.9%. The main growth drivers were the sub-sectors management and consulting (for SME value added), and legal and accounting (for SME employment).*" For more details see: <https://ec.europa.eu/docsroom/documents/26562/attachments/19/translations/en/renditions/native>

- On 30 July 2018, an initial adaptation to the right of company establishment²¹ entered into force, substantially simplifying access to commercial activities and services in Luxembourg. The elimination of the requirement of professional qualification for simple commercial activities and services means that special authorisations for "consulting", "economic consulting" and "fairs and markets" are no longer required. At the same time, the special authorisation procedure for "large" retail areas with more than 400 sq. m. has been repealed. A comprehensive overhaul of the law on the right of company establishment is being considered during the tenure of the new government. This work will re-evaluate national requirements on the basis of the criteria laid down in the Directive (EU) 2018/958 on a proportionality test.
- The regulatory reform concerning architects and engineers will be finalised (submitted in March 2015).
- The rules on accountants and auditors will be reviewed as a result of the changes being considered to the right of professional establishment.

Through the transposition of Directive 2018/958 of the European Parliament and of the Council of 28 June 2018 on a proportionality test before adoption of new regulation of professions, the government is setting up an analytical framework to assess the proportionality of new provisions regulating access to and the exercise of regulated professions. The transposition work has proceeded well and the government will shortly introduce a bill to transpose the directive.

More generally, other measures are in progress or being planned:

- The recent SBA Factsheet 2018 shows that in Luxembourg the environment is unfavourable for entrepreneurs who need a second chance²². As a result, the fifth SME plan will devote a chapter to this subject and the right of company establishment will be modernised accordingly.
- With regard to store opening hours, three studies were conducted by LISER to put the Luxembourg situation in an international context and to identify the implications of changed schedules to concerned staff. Results of this work will be discussed during 2019 with social partners, and changes to the legislation is planned for no earlier than 2020.

A joint investigation by the Benelux General Secretariat to complete a clear analysis of the issue of territorial supply constraints (TSC) present in the Benelux retail market supply chain²³ was published in the first half of 2018. The purpose of this investigation is to analyse territorial supply constraints and to formulate any necessary solutions for improving the conditions of supply (price, offer, etc.) of companies in the Benelux. A national report by the Observatory of price formation²⁴, based on data from the Benelux survey, then presented the nature and extent of the phenomenon in Luxembourg in more detail. It turns out that TSC concern companies of all sizes, in the retail trade as well as outside this sector, especially in craft industries. After this initial analytical phase, the work is currently focusing on various possible courses of action.

²¹ Law dated 18 July 2018 with amendment to 1) the amended law dated 29 June 1989 on the reform of the cabaret system; 2) the amended law dated 2 September 2011 regulating access to craft, retailing, industrialist and certain professional occupations; 3) the law dated 23 December 2016 on sales and sidewalk vending and misleading and comparative advertising. Amended law dated 2 September 2011 regulating access to craft, retailing, industrialist and certain professional occupations

²² For more details see: https://ec.europa.eu/growth/smes/business-friendly-environment/performance-review_en#sba-fact-sheets

²³ For more details see: <http://www.benelux.int/fr/nouvelles/le-benelux-met-son-rapport-sur-les-restrictions-territoriales-de-loffre-dans-le-commerce-de-detail-la-disposition-de-la-commissi>

²⁴ For more details see: https://gouvernement.lu/fr/actualites/toutes_actualites/communiques/2018/06-juin/19-restrictions-territoriales.html

3.2 Investments in Luxembourg: general terms and measures

Since the global economic and financial crisis began a decade ago, the EU has suffered from a low level of investment. Collective and coordinated efforts were needed to reverse this downward trend. The Investment Plan for Europe²⁵ aims to remove barriers to investment through complementary actions at national and EU levels. EU Member States can make greater efforts to improve the general terms for investment at national level, in particular by accelerating structural reforms and removing obstacles to investment.

3.2.1 General terms of investment

While public investment in Luxembourg exceeds the EU average, private investment as a percentage of GDP is among the lowest in the EU. In its 2019 report²⁶, the European Commission identified various obstacles to investment in Luxembourg from a macroeconomic perspective, including: housing availability and transportation infrastructure; private investment and innovation in the business sector; university, research and business cooperation; shortage of skilled labour; digital integration that involves a concentration of investments in digital delivery and digital human capital.

The government is pursuing an ambitious pace of public investment. The government will maintain the necessary investments for qualitative development in line with the political priorities outlined in the 2018-2023 government programme. In the draft law on the state revenue and expenditure budget for 2019, public investment exceeds €2.5 billion euros (4.4% of GDP) for the first time²⁷. The government anticipates a change in its multiannual programming with regard to direct and indirect investment spending by the central government from around €2.5 billion (2019) to €3 billion (2022), an increase of almost +20%. It is important to assess the main factors influencing private investment so as to identify potential barriers. A recent Eurobarometer survey (2018)²⁸ describes companies' perceptions in this regard. A composite index has been calculated to provide an overview of what firms perceive as barriers to investment, ranging from 0 for the lowest level of perceived barriers to 10 for the highest level. Luxembourg scores 3.3 and is among those member states where barriers are generally perceived as less significant.

Box1: Rate of private investment in Luxembourg

STATEC analysed²⁹ the rate of private investment in Luxembourg and compared it to the performance of its neighbouring countries. A "shift share" analysis distinguishes between the allocation or sector effect and the intrinsic effect.

The intrinsic effect shows that private investment, with an unchanged sector structure, decreased significantly in Luxembourg over the period 2012-2016 compared to the reference period used (1995-2000), particularly in financial and insurance businesses, as well as ICT. The manufacturing, transportation and warehousing industries are also behind the decline in the investment rate, but these impacts come largely from a negative reallocation effect, i.e. a change in the structure of the economy.

According to this analysis, increasing the rate of total private investment would mean boosting investment in the financial and insurance activities as well as in ICT. In addition, production should be stimulated in transportation, warehousing and in industry.

²⁵ For more details see: https://ec.europa.eu/commission/priorities/jobs-growth-and-investment/investment-plan-europe-juncker-plan_fr

²⁶ For more details see: https://ec.europa.eu/info/sites/info/files/file_import/2019-european-semester-country-report-luxembourg_fr.pdf

²⁷ For more details see: https://gouvernement.lu/fr/actualites/toutes_actualites/communiqués/2019/03-mars/05-gramegna-budget.html

²⁸ EUROPEAN COMMISSION, Flash Eurobarometer 459 - Investment in EU Member States, November 2018

²⁹ STATEC, Memo on the economy 2/2018, December 2018.

For more details see: <https://statistiques.public.lu/catalogue-publications/note-conjoncture/2018/PDF-NDC-02-18.pdf>

3.2.2 Investment measures

As an illustration, a non-exhaustive list of measures is described below, which furnishes elements of the government's response to the barriers to investment identified by the European Commission in Luxembourg.

3.2.2.1 Availability of housing & Infrastructure

- Availability of housing

The new government notes that house prices continue to rise steadily, despite a multitude of positive actions by previous governments. To remedy this, it will have to invigorate low-cost public housing programmes, particularly rental housing. To achieve this goal, the 2018-2023 government programme plans to launch a concerted public action and private initiative as an adequate response. The priorities of public action will focus on the following points:

- A complete overhaul of the amended law of 25 February 1979 on housing assistance and the system of subsidies for creating housing, with an increase of resources for augmenting the supply of low-cost rental housing;
- Boosting the creation of social housing and low-cost housing;
- Providing more building plots;
- Bolstering current resources to increase the supply side, to include land use plans, municipal development and protection of the environment;
- Development of a new 2.0 “State-Municipalities” Housing Pact aiming to better support municipalities wishing to implement a housing development strategy;
- Better quality of urban areas, quality of life and social cohesion in neighbourhoods, as well as improving quality in construction and energy projects, to include the habitat biology in general;
- Preventing land speculation and improving price transparency in the rental market.

Municipalities will be more involved in reducing the shortage of housing alongside the two existing public players, the Housing Fund and the National Low-Cost Housing Company (SNHBM). To support the municipalities, special units will be established within the Ministry of Housing to advise municipalities in managing their own subdivision projects. This support will be used to support municipal action on the acquisition and development of land, creating housing, the sale or rental of land / housing and management of rental assets. The *Klimapakt* model will serve as a guide, by providing the municipalities with professional housing advisers, while combining this approach with the know-how of private initiatives.

With regard to making land available, the pre-emption right of the State, municipalities and public developers will be analysed and, if needed, simplified and modified as required. The point is to generalize the right of pre-emption at a price fixed at the moment when a subsidized project is realised (public or private), in case the respective property is sold. Overall, available land potential for residential development in the near future is sufficient for the creation of a significant number of dwellings. Therefore, the requirement is to better identify factors in the way of project development and improve the incentives to sell for owners. Only in the medium and long term it will be necessary to make additional land available provided that it is developed in the short term.

Municipalities' ongoing commitment to the creation of social and low-cost housing will be acknowledged by additional financial incentives for these municipalities, possibly by linking the number of state subsidies to a system of graduated subsidies of up to at 100% of costs.

A committee to acquire land slated for housing will be established. This committee will be made up of representatives of the Ministry of Housing and the Ministry of Finance and will work under its own organisation, under the direct responsibility of the Minister of Housing. Its acquisitions will be financed through the special fund, to be funded by the state budget. Capital gains and profits on sales of land will be exempt from income tax.

The property tax reform, which will act to counter land speculation, will be linked to the overhaul of the "new generation" General Development Plans (PAG). An exemption of a portion of real estate tax on property inhabited by their owners will be introduced. The reform of the property tax system will prove to be an opportunity to replace and simplify the system of the municipal tax on unoccupied property or property not allocated for the construction of certain buildings.

- Infrastructure

In February 2019, Parliament agreed in principle to finance about thirty new projects related to major infrastructure project financing carried out by the State (Administrative Public Investment Fund projects, Public School Investment Fund projects, Public Health and Social Investment Fund projects, Road Fund projects, Rail Fund projects, etc.)³⁰.

3.2.2.2 Private investment in the business sector

In recent years, the government has taken multiple measures to increase private investment in the areas of business creation, administrative simplification, Research, Development and Innovation (RDI), economic diversification and investment support:

- The Law dated 23 July 2016 introduces the Simplified Limited Liability Company (S.à.r.l-S). On the basis that raising the compulsory minimum capital is often considered a difficult obstacle to overcome, this measure aims to stimulate entrepreneurship by facilitating access to business creation by reducing start-up costs, a simpler, faster and more efficient company establishment process, and most importantly, a significant reduction in the current underwriting and release requirements.
- In line with the administrative simplification efforts rolled out in recent years, the "*Omnibus*" law dated 3 March 2017 was a decisive initial step towards systematic screening of all administrative procedures and toward a new cross-functional approach, institutionalized through the implementation of a political and administrative inter-ministerial platform.
- The coming into force of the new RDI Promotion Act³¹ in June 2017 gives the government access to a series of tools to effectively support businesses in their RDI approach. This law allows action on companies of all sizes as well as at different levels of the innovation chain. It also makes it possible to reinforce SME innovation via a specific regime. In addition, it offers a strong incentive for the establishment of collaborative research between companies and with public players³².
- The implementation of the space policy reflects the government's desire to diversify the economy by actively supporting the development of a "new space" industry. This relies on the experience gained in Luxembourg by one of the world leaders in the satellite communications

³⁰ Parliamentary Document No 7397. In order to optimize the financial monitoring of major infrastructure projects carried out by the State and to strengthen the rights of participation and control of Parliament, in 2006 the Committee for controlling budget implementation approved a new procedure to be followed in preparing and submitting new infrastructure projects exceeding the €7.5 million threshold. Then, in 2009, this threshold was raised to €10 million. The list of new infrastructure projects is to be submitted to Parliament for approval, thereby allowing the allocation of project review expenses to the various investment funds. The Budget Control Commission must guarantee the financial monitoring of each project whose cost exceeds €10 million. A special financing law will be drawn up for any project in excess of €40 million euros. For more details see: <https://www.chd.lu/wps/portal/public/Accueil/Actualite/ALaUne/?current=true&urile=wcm%3Apath%3Aactualite.public.chd.lu/ST-www.chd.lu/sa-actualites/60d1a45a-676d-44e8-85e9-f9c3046ded5c>

³¹ The purpose of the law is: 1. the renewal of aid schemes for research, development and innovation; 2. the tasks of the National Agency for the Promotion of Innovation and Research; and modifying the amended law dated 5 June 2009 on the promotion of research, development and innovation.

³² See chapter 4.2 The R&D objective and the key measures for achieving it

sector. Through the [spaceresources.lu](http://www.spaceresources.lu) initiative³³, Luxembourg is projecting itself into the future space economy, the development of which will be facilitated thanks to the use of available resources in space. By adopting a law in July 2017, which aims to clarify the question of the appropriation of the resources that can be collected in space and to set up a system of authorization and supervision of these activities³⁴, Luxembourg has positioned itself as a European hub for the exploration and use of space resources. By founding the Luxembourg Space Agency³⁵ in 2018, Luxembourg has endowed itself with a dynamic structure of support for its space policy. This five-pillar program addresses the specific needs of the sector: intensified support for sustainable development of companies, including the facilitation of access to space; implementation of the required policy and financing instruments; development of national talent in space systems and their commercialisation; the implementation of measures to facilitate recruitment and implementation of a promotion and communications strategy for LSA and the Luxembourg spatial ecosystem. This pioneering approach has already made it possible to reap the economic benefits in the short term following the establishment of new space companies in Luxembourg.

- At the end of 2017, the government adopted the smart specialisation strategy for Luxembourg³⁶, which recommends specific action plans to be implemented for priority sectors, i.e. manufacturing industry 4.0, clean technologies including sustainable construction, smart mobility and the circular economy, health technologies and ICT. The ICT sector and the circular economy occupy a special position in that they provide the foundation for an innovative economy and a smart society.
- The government has also made a number of changes to the tax law to strengthen investment and innovation: decrease in the corporate income tax rate³⁷, increase in the rates of the investment tax credit³⁸, extending the scope of the tax credit for the acquisition of software and for zero-emission vehicles³⁹ and a new scheme to promote intellectual property⁴⁰.
- With a view to promoting the establishment, acquisition, extension, modernisation and rationalisation of companies offering the required guarantees of viability, which are well managed and form part of the country's economic structure, a support scheme for SMEs which will make investment efforts was established by the Law dated 9 August 2018 relating to an aid scheme for small and medium-sized enterprises⁴¹. In upcoming years, the government has budgeted a +27% increase compared to the 2012-2016 period to support SMEs⁴². The Grand-Ducal Regulation dated 12 October 2018 that sets out the nomenclature of expenditure and companies eligible for the aid scheme⁴³ provided for by law was subsequently adopted. The aid scheme for SMEs is part of Luxembourg's economic diversification strategy. Entrepreneurship in Luxembourg has benefited from a wide range of support instruments over the last few years, but financial support remains a key element in helping new businesses make the initial investments.

In addition to all the measures listed above, the 2018-2023 government programme provides for a whole series of measures to further stimulate private investment, entrepreneurship and the creation of start-ups, some of which are listed below:

³³ For more details see: <http://www.spaceresources.public.lu/en.html>

³⁴ For more details see: <http://legilux.public.lu/eli/etat/leg/loi/2017/07/20/a674/jo>

³⁵ For more details see: <https://space-agency.public.lu/en.html>

³⁶ For more details see: <https://meco.gouvernement.lu/dam-assets/publications/rapport-etude-analyse/minist-economie/ris3/luxembourg-research-and-innovation-smart-specialisation-strategy-2017.pdf>

³⁷ Law dated 23 December 2016 implementing the 2017 tax reform. In addition, the corporate income tax will decrease from 18% to 17% under the draft law on the State budget for 2019.

³⁸ Law dated 23 December 2016 implementing the 2017 tax reform.

³⁹ Law dated 15 December 2017 on the State budget for 2018.

⁴⁰ For more details see: <http://legilux.public.lu/eli/etat/leg/loi/2018/04/17/a254/jo>

⁴¹ For more details see: <http://legilux.public.lu/eli/etat/leg/loi/2018/08/09/a882/jo>

⁴² For more details see: https://gouvernement.lu/fr/actualites/toutes_actualites/communiqués/2017/05-mai/04-closer-cdp.html

⁴³ For more details see: <http://legilux.public.lu/eli/etat/leg/rgd/2018/10/12/a954/jo%20>

- The government will analyse introducing tax measures to encourage investments by private individuals in innovative companies. In addition, the government will explore the possibility of introducing tax incentives for investments that meet the goals of sustainable development and climate transition. The benefits of such investments will be proportionate to the taxable income and risks taken by these taxpayers.
- Regarding industry, R&D efforts and investments, including energy efficiency, will be encouraged to stabilise modern state-of-the-art industrial activity.
- A Luxembourg Space Fund will be launched on the basis of a public-private partnership (PPP). It will take stakes in space companies to promote their emergence in Luxembourg by developing and rounding out the national ecosystem.
- The National Credit and Investment Company (SNCI)⁴⁴ will put in place new indirect collateral instruments, via commercial banks and mutual societies, with a view to create a multiplier effect for SMEs to financing and to support the transfer of businesses. The SNCI also intends to continue modernizing its existing loan and credit instruments for companies. It will therefore recommend revising the general terms and conditions applicable to investment loans, in order to make them more clear and effective. In addition, the SNCI will put a particular emphasis on the support of the investment efforts of companies for digitalisation and Industry 4.0 through its loan instruments. The SNCI will also play a proactive role, particularly in investments in energy efficiency, the circular economy and renewable energies within companies.
- The reform of bankruptcy and controlled management legislation will be completed as soon as possible⁴⁵. This reform will be implemented by focusing on prevention initiatives aimed at companies in difficulty and on collaboration between all the administrations concerned. In this context, fostering business creation must also depend upon diminishing the fear of failure as the main obstacle to entrepreneurship. Here, the legislation on the right of company establishment and its application must be reviewed in order to offer a second chance to entrepreneurs emerging from a period of entrepreneurial failure. This revision of this legislation will have to take into account strict repression of fraudulent bankruptcies.

3.2.2.3 Cooperation between universities, research and businesses⁴⁶

In addition to the measures put in place to strengthen partnerships between researchers and businesses, several funding programs have been established, such as BRIDGES (formerly CORE-PPP), Industrial Fellowships (formerly AFR-PPP), Industrial Partnership Block Grant as well as the JUMP (formerly PoC) and KITS (Knowledge and Innovation Transfer Support) programmes.

The 2018-2023 government programme plans to reinforce the principle of matching funds in order to encourage private investment in research projects, including research on practical applications. This principle, introduced for the first time in the multiannual agreements for 2018-2021 to stimulate the participation of public research organizations in the Horizon 2020 European Framework Program, can thus be broadened and generalised in order to boost collaboration between the public and private sectors.

3.2.2.4 Skilled labour⁴⁷

The government's programme includes a national strategy for higher education, research and innovation that will be developed in order to maximize the impact of investments, both socially and economically.

⁴⁴ For more details see: <https://www.snci.lu>

⁴⁵ For more details see: <https://gouvernement.lu/dam-assets/documents/actualites/2018/12-decembre/Accord-de-coalition-2018-2023.pdf>

⁴⁶ See Chapter 4.2 “The R&D objective and the key measures for achieving it” and Chapter 3.2.2.2 “Private investment in the business sector”.

⁴⁷ See Chapter 4.1 “The Employment objective and the key measures for achieving it” and Chapter 4.4. “The Education objective and the key measures for achieving it”.

The government will implement a genuine skills strategy in order to align training with the skills required in the various economic sectors and to guide people towards the right training throughout their life. An accreditation agency will be created to promote the quality of continuing vocational training and to ensure transparency in the continuing education market.

As part of the European Commission's "Subgroup on Digital Skills of the Digital Single Market Strategic Group", Luxembourg has been asked to update its digital skills strategy as a follow-up to an initial draft (2017). In a fundamentally "whole-of-government" approach, a digital skills working group bringing together digital skills stakeholders such as the Ministry of Labour, the Ministry of the Economy, the Ministry of Education, the Ministry of Research, the professional chambers, the University and ADEM, was set up under the auspices of Digital Luxembourg (2014) to coordinate a digital skills policy to overcome the lack of digital skills and digital specialists in Luxembourg. This working group is currently responsible for updating the national e-skills strategy that takes into account five major areas: assessment of digital skills requirements, youth and students, ICT professionals, lifelong learning for the workforce and citizens.

3.2.2.5 Digital integration

Broader digital integration of the Luxembourg economy has been a major priority for the government for many years. In the Digital Economy & Society Index (DESI)⁴⁸, a European Commission report on the digital economy and society whose most recent edition was published in 2018, Luxembourg ranks 5th in the EU and is one of the countries considered to be among the "high performing countries". Luxembourg is one of the leading countries for connectivity, human capital and use of the Internet, yet in terms of integration of digital technologies by businesses and public digital services, the country ranks somewhat lower. Luxembourg therefore has a solid foundation for responding to future challenges as significant efforts have been continuously implemented over the last decade, although further efforts are still to be made in the area of digital integration of businesses and digital public services.

To this end, a government referral was sent in late 2016 to the Economic and Social Council (ESC) for an opinion on "Luxembourg's economic, social and societal model in technological change". At the end of 2018, the ESC unanimously adopted its opinion⁴⁹. The government sees digitalisation as a big opportunity and aims to make Luxembourg a model country in this area. Progress in the field of digitisation is one of the priorities of the new government and the government programme repeatedly mentions actions related to the field of digitisation. As an illustration, a non-comprehensive list of measures in terms of digital integration can be found below, in such diverse terms as governance and e-government, digital human capital, digital data strategy, digitalisation of SMEs, etc.:

- The government that took office in late 2018 created a Ministry of Digitalisation⁵⁰. The implementation of an electronic administration remains fully in line with the Digital Luxembourg⁵¹ national strategy that was set up in 2014. This strategy will be regularly updated to reflect new strategic priorities and new requirements.
- The one-stop shop "*Guichet.lu*"⁵² was completely redesigned and modernised in 2018. The number of digital administrative procedures submitted is continuously increasing. In 2018, 393,620 procedures were completed and transmitted electronically through this platform and 142,747 private eSpaces and 25,633 business eSpaces were active. The use of the portal in general, and in particular the transactional process offered online, have grown rapidly and

⁴⁸ For more details see: <https://ec.europa.eu/digital-single-market/en/desi>

⁴⁹ For more details see: <https://ces.public.lu/dam-assets/fr/avis/politique-generale/Avis-Letzebuerg-40-221118-.pdf>

⁵⁰ For more details see: <http://legilux.public.lu/eli/etat/adm/agd/2018/12/05/b3633/jo> & <https://digital.gouvernement.lu/fr.html>

⁵¹ For more details see: <https://digital-luxembourg.public.lu>

⁵² For more details see: <https://guichet.public.lu/fr.html>

exponentially in recent years. The use of e-government procedures has increased by more than 500% in four years.

Table 2: Change in the number of electronic procedures submitted (2015-2018)

Year	Number
2015	75,121
2016	109,778
2017	233,543
2018	393,620

Source: Government IT Centre (CTIE)

- Regarding the integration of digital technologies in companies, thanks to significant investments in digital structures, Luxembourg is now one of the most advanced European countries in terms of digitalisation. Starting from a concept of digital data as a valuable resource, in the first half of 2019 Luxembourg developed an innovation strategy for bringing out a sustainable and trusted economy. In keeping with an effort to integrate within the framework of the European digital policy, this strategy specifies clear perspectives, the state of the art and the concrete actions to be implemented for a number of priority economic sectors. The various specific actions recommended are divided into three areas:
 - Strengthen digital infrastructure, in particular by setting up an HPC skills centre to provide high computing power in a secure environment accessible to all public and private stakeholders.
 - Support industry in integrating digital technologies through experimentation and innovation by promoting the development of test facilities and encouraging companies to participate in European Commission tenders for projects. Likewise, a "Digital Innovation Hub" will be set up. It will serve as a one-stop shop to support industrial companies of all sizes in all their digitisation efforts.
 - Create a legal and financial environment conducive to the development of a data-driven economy.

- During the announcement of the development of the 5th edition of the SME Action Plan in Luxembourg (February 2019), it was decided that digitisation of retail and craft businesses is one of the priorities, with the implementation of support measures and additional aids in line with the requirements of small businesses that are often poorly equipped with digital tools⁵³. Increasing digitisation is indeed a major issue, especially for SMEs. Initiatives aimed at raising the awareness of business leaders and supporting them in their strategic approaches to implement digital tools will be supported by the government. Support tools such as Fit4Digital will continue to be used. Fit4Digital aims to help SMEs take the digital transformation step and integrate digital tools with high potential to help these SMEs become more efficient, more profitable and more attractive to their customers. The programme aims to improve the long-term performance of SMEs, increase their turnover and support their digitisation efforts. Fit4Digital offers a quick and efficient analysis of all departments of SMEs to consider the use of ICT, accompanied by specific recommendations on the implementation of IT tools within SMEs. The experts involved are approved by Luxinnovation, which guarantees their professionalism and neutrality. All SME staff will be involved in the digitisation process.

- The *Letzshop* initiative⁵⁴ is the national platform for online sales that all retailers in Luxembourg can use to introduce themselves and sell their products online. This is both a

⁵³ For more details see:

https://meco.gouvernement.lu/fr/actualites.gouvernement%2Bfr%2Bactualites%2Btoutes_actualites%2Bcommuniques%2B2019%2B02-fevrier%2B28-delles-pme.html

⁵⁴ For more details see: <https://letzshop.lu/fr>

benefit to the customer and to retailers because everyone profits from digitalisation, with the added advantage of boosting national retail sales. The project is funded by the Ministry of Economy, 16 towns and municipalities, the Luxembourg Confederation of Commerce (clc) and the Chamber of Commerce. *Letzshop* is managed by the *Luxembourg for Shopping* G.I.E.

4. Progress achieved in national objectives for the Europe 2020 strategy

The European Council decided on the new Europe 2020 strategy at its June, 2010 meeting, confirming the five major EU objectives that will make up the common goals steering EU action in the areas of promoting employment, improving conditions for innovation and R&D, achieving objectives in the area of climate change and energy, improving education levels and promoting social inclusion, essentially by reducing poverty. Each member state had to determine its national objectives reflecting the above-stated European objectives. Luxembourg is determining its national objectives for 2020 and a series of measures to implement them as part of its NRP.

Table 3: National objectives determined by Luxembourg (April 2019)

		European objective 2020	Luxembourg objective 2020
Priority 1 “Smart growth”	<i>Objective 1</i>	“(…) raising combined public and private investment levels in this sector to 3% of GDP”	2.3-2.6%
	<i>Objective 2</i>	“(…) reduce school drop-out rates to less than 10 % ”	sustainably under 10% (a)
		“(…) increasing the share of persons 30-34 years old having completed a university degree or equivalent level of studies to at least 40% ”	66% (b)
Priority 2 “Sustainable growth”	<i>Objective 3</i>	“(…) reduce greenhouse gas emissions by 20% (…)”	reduction of GHG outside of EU ETS by less than 20% compared to 2005, i.e. emissions of around 8,117 Mt CO₂ in 2020) (c)
		“(…) increase the share of renewable in final energy consumption to 20% ”	11% (c) (Average for 2017/2018: 7.47%)
		“(…) move towards a 20% increase in our energy efficiency”	Use of final energy of 49,292 GWh , i.e. 4,239,2 ktoe
Priority 3 “Inclusive growth”	<i>Objective 4</i>	“(…) raise to 75 % the employment rate for women and men aged 20-64”	73%
	<i>Objective 5</i>	“(…) remove at least 20 million people out of the risk of poverty and exclusion” »	reduce the number of persons under the threat of poverty or social exclusion by 6,000 persons by 2020 (d)

Notes:

(a) National data will also be used as measurement tools because the indicator calculated by Eurostat out of the Labour Forces Survey is not totally representative of Luxembourg. Statistics must be provided that better distinguish persons having attended Luxembourg schools in order to be able to assess the quality of the national education system for the national resident population and to provide information about the capacity of the Luxembourg school system to educate young people.

(b) Luxembourg intends that this indicator provide data on the capacity of the national education system to educate young people who can earn post-secondary school diplomas rather than it being a reflection of post-secondary qualifications requirements of the labour market. In Luxembourg there is a strong disparity according to birth country; according to Eurostat, the rate for foreign residents is near 60% and that of native citizens is just under 40%, while in neighbouring countries the difference between the two populations is much less marked. Furthermore, the proportion of university degrees is higher among natives than among foreign-born persons.

(c) With regard to greenhouse gases and renewable energies, strict national objectives were already in place prior to the launching of the Europe 2020 strategy. For the post-Kyoto 2013-2020 period, only the sectors outside of EU ETS are targeted by objectives set amongst Member States. This emissions reduction objective excluding ETS is stated for 2020 as compared to the 2005 level.

(d) With regard to methodology, the indicator used under the Europe 2020 strategy does not take the demographic factor sufficiently into account at the national level. In fact, Luxembourg's demographics are very dynamic, even during difficult times, such that the relative nature of the indicator used as a percentage of population inevitably gives rise to an increase in the absolute number of persons concerned. The government is also supporting this goal through measures that increase the employment rate of women and single-parent families in particular, with a view to achieving a 73% employment rate.

4.1 The Employment objective and the key measures for achieving it

European objective “*aiming to raise to 75% the employment rate for women and men aged 20-64, including through the greater participation of young people, older workers and low-skilled workers and the better integration of legal migrants.*”

4.1.1 National target

Luxembourg's **objective** for 2020 is to achieve an employment rate of **73%**. According to the latest available data, Luxembourg is very close to reaching this objective with an employment rate of 72.5% in 2018.

The continued increase in the employment rate over recent years is primarily due to wider participation of women in the labour market. The rate of employment of women rose from 58.4% in 2005 to 67.8% in 2018. Accordingly, the percentage of women in domestic employment increased from 37.9% in 2005 to 40.6% in 2018.

Table 4: Statistics of the labour market in Luxembourg

	2005	2010	2013	2014	2015	2016	2017	2018
Domestic employment	287,178	337,406	362,361	371,489	381,316	393,036	406,104	421,992
<i>Percent of cross-border workers</i>	<i>41.2 %</i>	<i>44.3 %</i>	<i>44.2 %</i>	<i>44.2 %</i>	<i>44.5 %</i>	<i>44.9%</i>	<i>45.0%</i>	<i>45.5%</i>
<i>Percent of women</i>	<i>37.9 %</i>	<i>39.3 %</i>	<i>40.4 %</i>	<i>40.5 %</i>	<i>40.6 %</i>	<i>40.5%</i>	<i>40.5%</i>	<i>40.6%</i>
Total employment rate [20-64]	69.0 %	70.7 %	71.1 %	72.1 %	70.9 %*	70.7%	71.5%	72.2%
Employment rate: Men	79.4 %	79.2 %	78.0 %	78.4 %	76.7 %*	76.1%	75.3%	76.5%
Employment rate: Women	58.4 %	62.0 %	63.9 %	65.5 %	65.0 %*	65.0%	67.7%	67.8%
Employment rate: Youths [20-24]	44.0 %	35.5 %	35.4 %	33.3 %	44.1 %*	40.3%	41.9%	46.4%
Employment rate: Youths [25-29]	81.3 %	81.5 %	76.0 %	81.0 %	80.9 %*	81.8%	81.4%	79.3%
Employment rate: Seniors [55-59]	46.8 %	55.7 %	54.7 %	58.1 %	55.9 %*	57.2%	56.3%	55.2%
Employment rate: Seniors [60-64]	12.7 %	20.1 %	22.9 %	23.1 %	16.5 %*	17.8%	19.5%	22.0%
Unemployment rate (LFS)	4.6 %	4.6 %	5.9 %	6.0 %	6.5 %*	6.3%	5.5%	5.2%

Source: STATEC; Eurostat-LFS Note: * break in series

Box2: Employment rate - explanation of methodological discrepancies

The employment rate of persons aged 20 to 64, calculated on the basis of data from the Labour Force Survey (LFS), shows an upward trend over the last years in Luxembourg. Nevertheless, it is important to interpret this trend with caution.

STATEC carried out technical analyses of this indicator in Luxembourg⁵⁵ and its conclusions were published in the fall of 2018. The employment rate, that is the share of the working-age population (aged 20-64 years), can be calculated from two different sources: LFS and administrative data. The employment rate calculated on the basis of administrative data is based on domestic employment taken from national accounts related to the population, an official figure from the population census. Domestic employment from the national accounts is based mainly on IGSS data and is calculated using harmonised rules at European level.

Over the last few years, the employment rate differs sharply depending on the source used, the first indicating an increase in the employment rate and the second a decrease. The analysis shows that the increase in the employment rate in LFS data is mainly due to methodological changes designed to improve the survey by obtaining better response rates, better coverage of working people, etc. The decline in the employment rate derived from administrative sources is explained by longer university studies, the introduction of parental leave and ageing of the population.

4.1.2 Key measures

Apart from the measures that are part of the implementation of EU Council recommendations in the area of employment⁵⁶, the government continued its efforts to achieve the national objective. These efforts focus particularly on supporting job seekers targeting vulnerable groups, especially youth, women, seniors, persons with specific needs and the long-term unemployed. To achieve this, national employment policy promotes high quality, sustainable and inclusive jobs, and supports measures and actions designed to eliminate precariousness and poverty, thus seeking to obtain improved living conditions and a sustainable social model. The various measures and actions are prepared and implemented in close coordination with the concerned ministries and departments to ensure a concerted horizontal approach that promotes the synergies between the various measures.

The government will implement a genuine skills strategy in order to align training with the skills required in the various economic sectors and to guide people towards the right training throughout life. An accreditation agency will be created to promote the quality of continuing vocational training and to ensure transparency in the continuing education market.

The speed of technological transformation poses a challenge in terms of jobs and skills. In the spring of 2018, the government launched a pilot project to support and encourage businesses to develop the skills of employees to enable them to take up a career changing job or a new job. It is a question of adapting approaches to job retention by focusing on skills enhancement⁵⁷. The second phase of the pilot project will be launched in the spring of 2019.

Training for job seekers is a priority area of the employment policy. ADEM continues to work closely with companies to produce multiple specific training programmes that overcome skills deficits on the labour market and give the perspective of a specific job. ADEM has formed partnerships with the major training institutions in Luxembourg to this end⁵⁸.

⁵⁵ For more details see: <https://statistiques.public.lu/catalogue-publications/cahiers-economiques/2018/PDF-Analyses-01-2018.pdf>
<https://statistiques.public.lu/catalogue-publications/note-conjoncture/2018/PDF-NDC-02-18.pdf>

⁵⁶ See Chapter 3.1.1.1 Employment rate of older persons.

⁵⁷ For more details see: <https://www.skillsbridge.lu/>

⁵⁸ House of Training, *Chambre des Métiers*, Luxembourg Lifelong Training Center (*Chambre des Salariés*), Institut national d'administration publique (INAP).

In attempting to facilitate the insertion of women into jobs, it is essential to emphasize promoting reconciliation between professional and family life. Under the 2015-2018 Action plan for gender equality, the law dated 15 December 2016 strengthens the principle of equal salaries by gender⁵⁹. The government continues to promote the principle of equal pay through the positive action programme. This program provides participating companies with a *Logib-Lux* software package that can be used to acquire knowledge of their current salary structure and to identify the causes of any salary inequalities via an expanded report. A brochure developed by the government will serve as a guide for all relevant stakeholders including employers, social partners and employees, providing a series of details on the measures that are already in place to achieve a more equitable labour market. It is also possible to find a list of contact bodies that people can refer to in case of problems.

The reform of parental leave and paternity leave facilitates reconciling work and family life.

The personalised process for job seekers was fully rolled out in December 2015. This new way of working enables ADEM to improve job seeker support quality, to manage a constantly increasing number of files and to customize the follow-up of job seekers in order to integrate them in the most rapid and sustainable manner into the labour market. On 9 March 2016, the ADEM officially launched a new interactive platform - the "Job Board" - which aims to increase the chances of meeting between employers and job seekers and encourages the autonomy of job seekers⁶⁰. In addition, ADEM's Employer Department and the permanent dialogue underway with the private sector as part of the "Business, Partners for Employment" programme make it possible to better adapt ADEM's offers, particularly training, to business needs. With this in mind, UEL and ADEM renewed their partnership for a further three years (2018-2020). In addition, ADEM has continued to invest in vocational training for job seekers.

It should be noted, however, that the ongoing negotiations at European level concerning the coordination of social security systems, and more particularly the unemployment benefits component, could generate major disruptions in the public employment service in Luxembourg by potentially doubling the number of job-seekers registered at ADEM⁶¹.

The Youth guarantee programme⁶², officially launched in June 2014, has been continuously developed and improved, especially regarding the launching mechanism for NEETs, youths who are not in employment, not in education, not in training programmes and not in an academic course. Of the young people who enrolled in the programme, 85% received high quality job offers⁶³. The ADEM youth services have extended their scope to persons up to age 30.

The draft law on the regulation of internships aims to introduce a high quality and transparent environment⁶⁴. Internships play an important role in training and career counselling. The new framework will facilitate the transition between the worlds of education and work while ensuring the quality of internships and the legal certainty of the various stakeholders.

⁵⁹ Law dated 15 December 2016 on the amendment of the Labour Code; amendment of article 2 of the law dated 21 December 2007 on the regulation of the financing of political parties For more details see: <http://legilux.public.lu/eli/etat/leg/loi/2016/12/15/n2/jo>
With the introduction of the new law dated 15 December 2016 on equal pay in the labour code, situations of unequal wages between men and women have been elevated to the rank of a criminal offence. Today the wage gap between men and women is 5.5%.

⁶⁰ Presentation of the new "JobBoard": http://www.adem.public.lu/fr/actualites/adem/2016/03/JobBoard_presentation/index.html

⁶¹ Given the very specific situation of the employment market in Luxembourg, the paradigm shift in unemployment benefits in the context of border work will cause a considerable increase in the administrative and financial burden.

⁶² For more details see: <http://jugendgarantie.lu/>

⁶³ ADEM figures for the period of January to September 2018.

⁶⁴ Draft law no. 7265.

Job seekers from immigrant communities often do not have a good command of at least one of the languages used in Luxembourg. Therefore, ADEM has developed its internal language training offer and developed partnerships externally to offer job seekers more courses. In close coordination with the competent public authorities and the private sector, ADEM is also pursuing skills evaluation programmes for refugee job seekers. These assessments make it possible to identify skills that have already been acquired and guide job seekers towards appropriate training to fill any gaps in their skills profile.

The implementation of the measures and actions developed in favour of sustainable professional integration, job retention and social inclusion are supported by the 2014-2020 Operational Program of the European Social Fund (ESF). The current operational programme puts greater focus on young people under 30, including those from an immigration background, people who are far removed from the labour market who need better social inclusion and job seekers and employees over 45. Moreover, the ESF projects particularly focus on new jobs in the ITC sector by enhancing the acquisition of new skills of workers and job seekers.

4.2 The R&D objective and the key measures for achieving it

European objective "improving the conditions for research and development, in particular with the aim of raising combined public and private investment levels in this sector to 3% of GDP (...)." "

4.2.1 National target

Implementation of an effective RDI policy for both the public and private sectors is a priority for the Luxembourg government. The government has set a range of between **2.3% to 2.6% of GDP** as a national **objective** for R&D intensity for the year 2020. The government programme for 2018-2023 provides that public investment in research and innovation, both public and private, reflected by the budgetary resources of the State, will be increased to 1% of GDP. Research spending in the public sector will be 0.8% of GDP for 2023.

The government's RDI budgets have continued to increase, both in the public and private sectors, with allocations rising from €23.6 million in 2000, representing 0.13% of GDP, to €368.5 million in 2018, 0.65% of GDP.

Table 5: Changes in budget allocations for RDI from 2000 to 2018

	2000	2006	2008	2010	2012	2014	2016	2018
(Mn €)	23.6	102.5	167.9	218.1	267.4	317.5	336.0	368.5
% GDP	0.13	0.34	0.49	0.54	0.60	0.63	0.63	0.65

Source: www.statistiques.public.lu

Private R&D spending in Luxembourg has diminished over the last 15 years, while public sector spending has steadily increased. The share of public research increased from 7.5% of total expenditure in 2000 to almost 50% in 2016. Public R&D intensity is now approaching the national target (0.8% of GDP). This change is one consequence of the political actions of governments since 1999, including the setting of objectives for the development of research intensity expressed through expenditures objectives, the establishment of a National Research Fund (NRF) and the University of Luxembourg, and the introduction of multiannual agreements.

Table 6: Changes in gross domestic expenditures and in intensity of research by sector

Years	Public research (Mn €)	Intensity (% GDP)	Private research (Mn €)	Intensity (% GDP)	Total (Mn €)	Total (% GDP)
2000	27,5	0.12	337.0	1.46	364.5	1.58
2005	64.0	0.21	408.0	1.36	472.0	1.57

2006	78.5	0.24	485.0	1.43	563.5	1.67
2007	96.6	0.26	495.0	1.33	591.6	1.59
2008	136.8	0.36	482.0	1.26	618.8	1.62
2009	149.6	0.40	470.7	1.27	620.3	1.67
2010	203.7	0.51	400.0	1.00	603.7	1.51
2011	215.2	0.50	416.2	0.96	631.4	1.46
2012	251.0	0.56	310.4	0.70	561.4	1.26
2013	287.8	0.62	317.9	0.68	605.7	1.30
2014	291.4	0.59	338.4	0.68	629.8	1.27
2015	320.6	0.62	341.8	0.66	662.3	1.28
2016	319.9	0.60	339.3	0.64	659.2	1.24

Source: www.statistiques.public.lu

The structure of the Luxembourg economy partly explains the relatively low R&D intensity in the private sector. The business sectors that represent the bulk of the Luxembourg economy, namely services and in particular the financial sector, traditionally invest less in R&D⁶⁵. In this context, it must not be forgotten that R&D only constitutes an input indicator and that an equally important indicator is output, which encompasses innovation, marketing of new products, implementation of new procedures, etc. Luxembourg performs generally better in this area.

4.2.2 Key measures

a. Measures for achieving the nation's target in public research

The government recently released its national roadmap based on the priorities of the European research area (ERA) Roadmap:

- Increase the efficiency of research systems

The major objective of Luxembourg is to develop and implement a national strategy for higher education, research and innovation. The 2018-2023 government program confirms that any R&D policy fully subscribes to the principle of autonomy of public bodies in higher education and research in order to enable them to fully achieve their potential. The importance of linking part of the additional funding to the achievement of performance-based funding targets in the multiannual agreements will be reinforced and the principle of matching funds will be introduced to encourage private investment in research projects.

The government programme plans to strengthen governance in the higher education and research system by creating a coordinating committee to group higher education and research bodies together. This body will contribute to better coordinate higher education and research bodies and their activities in priority areas in order to increase transparency in the allocation of financial resources and to improve efficient use of public funds. The purpose of this enhanced coordination is to attract more students and talent to Luxembourg and to form substantial synergies between the various bodies. In addition, the establishment of joint professorships between two bodies, professors affiliated with the University, as well as setting up joint doctoral training and creating inter-institutional research groups or units may be facilitated through this strengthened coordination.

The government is finalising an update of the research priority areas, based on a report by the National Research Fund (NRF).

- Streamline transnational cooperation and concurrent actions

Currently, the NRF has 21 bilateral partners to support projects between researchers based in Luxembourg and abroad (e.g. ANR, BELSPO, BMBF, CNRS, DFG, RIKEN, RCN, etc.). The NRF

⁶⁵ See 2017 NRP. For more details see: <https://gouvernement.lu/dam-assets/fr/publications/rapport-etude-analyse/minist-economie/observatoire-de-la-competitivite/programme-national-de-reforme/2017-pnr-luxembourg-2020/2017-pnr-luxembourg-fr.pdf>

is part of twelve research networks offering multilateral research opportunities (e.g. NORFACE, PRIMA, COST, EDCTP, COST, etc.).

The European High-Performance Computing (EuroHPC) initiative, launched by Luxembourg, will oversee the pooling of resources within the EU to develop and stimulate the use of supercomputers. High performance computing is key to digitising industry and the economics of data. Its many practical applications will bring benefits to a wide range of industrial and commercial sectors, as well as to users from academia, the scientific community and the public sector.

- Opening of the labour market for researchers

The 2018-2023 government programme stipulates that in order to create an attractive environment and to attract a sufficient number of specialists to Luxembourg, actions aimed at increasing international and inter-sector mobility must be strengthened. For researchers and professors, these actions will be based on a process of recruitment and transparent evaluations, carried out openly and based on merit. Against this backdrop, the fight against job instability linked to the status of researcher will be conducted. The professional situations and long-term career prospects of researchers will be analysed to this end.

The human resources policies developed by the University and the public research centers (CRP) support a transparent, open and merit-based recruitment process for researchers / professors. The law requires that scientific positions at the University and CRP be published and that recruitment committees be set up. In addition, the University of Luxembourg is implementing the European Framework for Careers in Research to facilitate the recognition of career stages and mobility in Europe under Horizon 2020.

Candidates for the ATTRACT programme, which was established specifically to attract excellent young researchers to Luxembourg and the senior level PEARL mechanism of the NRF, as well as for senior positions are examined by juries composed of independent international experts. Requests for the AFR programme of the NRF for doctoral / post-doctoral fellowships are also reviewed by international experts. The NRF's INTER Mobility programme is intended to support incoming and outgoing geographic mobility, as well as cross-sectoral mobility between the public and private spheres. The PRIDE programme aims to support the development of a critical mass in a certain field of research and technological development by allocating a block of doctoral scholarships to a consortium of excellent researchers gathered around a like research and training programme.

- Promoting gender equality and integration of gender in research content

The 2018-2023 government action will aim in particular to increase the proportion of women in regular teaching positions at the University and in the key positions of higher education and research. Several measures have been taken to improve the situation. The various laws provide that the Governance Board of the University of Luxembourg and the boards of directors of public research institutes and the NRF (for which the rule also applies to its scientific council) must have a minimum of 40% of members of the under-represented sex. The performance contracts of research institutes call for working toward gender equality at all stages of researchers' careers, and particularly for appointments to internal boards (directors / scientists). The NRF performance contract includes the goal of having 40% and 30% representations of the under-represented sex at the submitted project level for the ATTRACT and PEARL programmes, respectively. The multiannual contract of the University of Luxembourg explicitly provides for establishing and implementing a Gender Action Plan. In the future, these initiatives will be further strengthened by focusing on two strategic objectives: increasing the percentage of the under-represented gender in leadership and decision-making positions and applying gender mainstreaming in public research programmes. The new multiannual development contract of the University of Luxembourg for the years 2018-2021 provides for a targeted 30% increase over the situation at 31 December 2017 in the proportion of female regular professors.

- Streamline the dissemination, accessibility and transfer of scientific knowledge

The NRF JUMP Programme (formerly PoC) is a competitive funding program, open to all areas of research, designed to bridge the technical and financial gap between research-based discoveries and their commercialization / use. The NRF's Knowledge & Innovation Transfer Support (KITS) programme provides competitive funding to research institutions to attract knowledge transfer specialists.

An open science policy for scientific data and publications is to be determined. By increasing the flow of scientific knowledge through open access to scientific data and publications resulting from publicly funded research the exploitation of scientific results will be maximised. The NRF and ten other national research funding bodies, with the support of the European Commission and the European Research Council (ERC), have launched *cOAlition S*, a joint initiative to achieve open and full access to research publications in 2020 (Open Access). The initiative is promoted by Science Europe, the association of national research funding organisations in Europe of which the NRF is an active member.

Finally, more solid support will be provided to promoting scientific and entrepreneurial mentalities among young people and exchanges between researchers and civil society.

- Bolster the international dimension of ERA

Increased participation of scientific actors in the bi- and multi-national collaboration established by the NRF and the European ERASMUS+ programmes, Horizon 2020 and the next Horizon Europe Framework Program will be promoted. To this end, the government has brought public research centres into the multiannual agreements, as well as the founding contract of the University covering the years 2018-2021, a bonus in addition to the State's endowment. This bonus will be distributed annually starting in 2019 on the basis of the revenues of the public research organisations of the Horizon 2020 framework program for the last three years.

b. Measures for achieving the nation's target in private research

Private R&D expenditure intensity was 0.68% in 2017. In an effort to overcome this situation, the government is continuing to promote RDI in the private sector, reinforcing technological skills, access to public research and the digitisation of businesses via specific measures. However, it should also be noted that, in absolute terms, private R&D expenditure increased significantly during 2012-2017 (+ 20.78%).

The coming into force of the new RDI Promotion Act⁶⁶ in June 2017 gives the government access to a series of tools to effectively support businesses in their RDI approach. This law allows action on companies of all sizes as well as at different levels of the innovation chain. It also makes it possible to reinforce SME innovation via a specific regime. In addition, it offers a strong incentive for the establishment of collaborative research between companies and with public players. Finally, companies can pool their efforts to create research synergies based on the scientific community via the research infrastructure scheme. Support for innovative start-ups is again available, which is an essential lever in the policy of support for the start-up ecosystem.

In addition to these tools, the development of a digital economy strategy, which is currently being validated, aims at coordinating innovation and infrastructure implementation policies in order to ensure a trust-based secure data economy. This data-driven innovation strategy is fully in line with the framework set up by the Third Industrial Revolution (TIR) in Luxembourg. It will be important

⁶⁶ The purpose of the law is: 1. the renewal of aid schemes for research, development and innovation; 2. the tasks of the National Agency for the Promotion of Innovation and Research; and modifying the amended law dated 5 June 2009 on the promotion of research, development and innovation.

to identify areas of development and innovation in the priority sectors that are underpinned by data processing. Certain flagship projects and measures already in place have been incorporated into this strategy, which should boost spending in private sector RDI:

- High Performance Computing (HPC) and big data enabled applications: Luxembourg's access to HPC capabilities falls within the framework set by the TIR. The signature of the Euro-HPC declaration and the implementation of the European strategy will combine to provide companies with the computing power they need to process their data, in an environment of trust, both in Luxembourg and more extensively within the EU. The proposed infrastructure should be an effective lever for the research activities of the companies. The themes selected by Euro-HPC mostly correspond to the government's priority sectors. The work conducted in 2018 clarified key issues related to the use, architecture, technology and computing power of this new machine. At the same time, the national strategy for implementing the HPC and Big-data enabled applications infrastructure was developed with the aim of providing a national structure for data management and processing data for users in the form of a skills centre in a secure environment.
- Industry 4.0: This project was initiated in 2016 with the support of the Materials & Manufacturing Cluster. A business awareness campaign was conducted to guide them towards data exploitation and enhancement. In 2018, 26% of RDI funding was allocated to Industry 4.0 projects.
- The Fit4Digital program, whose objective is to ensure the digital transformation of companies (programme reserved for VSEs), and an SME support programme carried out with the support of Luxinnovation.

At the same time, flagship projects have been implemented in the strategic sectors:

- National Composites Centre Luxembourg: This is a centre whose operational concept is based on close cooperation between public and private players. Following the opening of this centre in 2016, a non-profit organization was created in February 2018 made up of industrial operators and Luxinnovation, which was intended to guide and promote its activities. Furthermore, a mixed group of researchers and entrepreneurs was tasked with setting research orientations and analysing market requirements for composite materials. Its activities should provide significant leverage in this sector. A number of multi-lateral research projects should be completed in 2019.
- Additive Manufacturing: This initiative was started by the Materials & Manufacturing Cluster group. A survey within manufacturers on available and desired equipment was conducted in 2017, as well as the mapping of potential RED projects. The necessary level of critical mass proved insufficient to further develop this initiative.
- Joint Research Programme: In cooperation with the NRF, the objective of this programme currently being developed is to promote solid public-private partnerships on a long-term basis between Research and Technology Organisations and industries in areas deemed priority by the government. The first calls for projects should be launched in 2019.

In addition to these flagship projects, new measures were taken and actions pursued to relaunch RDI activities over the long term and to stimulate investment in knowledge capital:

- The tasks of the Luxembourg Intellectual Property Institute (IPIL)⁶⁷ were determined upon its establishment under the form of an Economic Interest Group in 2014⁶⁸. In addition to its crucial role of coordinating the implementing public policy with regard to intellectual property, IPIL

⁶⁷ Federate the actors involved, develop and offer support and support services for companies, players in the research field, public institutions and any other interested public, develop and provide training as well as promotional and awareness-raising activities and conduct projects and studies to advise the government.

⁶⁸ For more details see: <http://www.gouvernement.lu/3891246/01-conseil-gouvernement>

has been operational since 2015 and is able to support the proper management of research and innovation projects. Accordingly, in addition to support for the proper management of intellectual property in research projects, the patent information search and technological or competitive monitoring services keep it constantly updated with technical information in a particular area and provide strategic and operational support for all purveyors of innovative projects. The use of these specific and highly specialised services makes it possible to avoid duplicating research already carried out elsewhere, determine prior art and identify trends and technical developments in a particular field, to monitor new developments in a technology and to monitor competitors' innovation activities. In addition, the 2018-2023 government program stresses that intellectual property rights must be taken into account in a cross-functional manner, particularly as part of the digital innovation strategy for the development of a sustainable, data-driven and trust-based economy. The government insists on the need to encourage companies and stakeholders to integrate intellectual property aspects into their R&D strategies and to enable them to value their products, so that these efforts result in competitive advantages that ultimately benefit the entire Luxembourg economy.

- The Luxembourg Cluster initiative, whose activity should stimulate synergies and emulation amongst members by promoting networking between the public and private sectors, open innovation and exchange of technologies. A reform aimed at setting up a cross-sectoral management of clusters should improve their visibility and impact on Luxembourg companies. The Luxembourg Cluster initiative is active in the following themes: Biohealth, Eco-Innovation, ICT, Materials & Manufacturing, Automobility, Wood and Creative Industries.
- Supporting start-ups continued through the Fit4Start coaching and start-up financing programme, which has been stepped up, with 25 participating start-ups compared to 10 in 2017. The mechanism has, since, diversified beyond the ICT sector, five start-ups in the Biotech sector were also able to benefit of it as from their start-up phase. At the same time, Luxembourg is continuing to support the implementation of hosting infrastructures dedicated to start-ups in strategic sectors such as Biotech and Ecotech. The ICT Digital Tech Fund dedicated to innovative companies, with public and private commitments amounting to €20.3 million, made its first investments.
- Support to SMEs and encouraging innovation are reinforced through the implementation of a series of SME support programmes focusing on the innovation spirit: the *Fit4Innovation programme*, whose objective is helping SMEs improve their level of competitiveness to free up resources for innovation, took on two new sections; the *Inno4growth* programme, an innovation support programme conceived to help SME transition from the ideas to marketing phase and to grow through innovation via value creation projects; the *Inno4Circularity* component to raise business awareness about the transition to a circular economy, support for companies in participating in the SME instrument of the Horizon 2020 programme; the innovation Club as a forum for exchange of perspectives with regard to key factors for innovation success, as well as the emergence of new ideas. In 2017, RDI projects were implemented by companies that had never had such projects before participating in the *Fit4Innovation* programme.
- With regard to activities promoting and supporting innovation, the following measures were put in place: an innovation portal centralising all information on RDI⁶⁹; a site developed which includes all innovative solutions originating in Luxembourg intended to promote the use of innovative solutions in public contracting; the magazine HAPPEN promotes research and innovation in Luxembourg internationally; domestically, www.Horizon2020.lu⁷⁰ offers a full

⁶⁹ For more details see: www.innovation.public.lu

⁷⁰ For more details see: www.Horizon2020.lu

panorama of European programmes and provides guidance for players who want to participate in this arena. As a national contact point, Luxinnovation advises and supports researchers and companies, it stimulates them to participate in several training and information workshops such as Horizon 2020 Day as well as the Fit4Horizon2020 measure intended to promote Luxembourg participation in European programmes by covering a part of the costs of preparing a project proposal.

4.3 The Climate change and energy objective and the key measures for achieving it European objective “reducing greenhouse gas emissions by 20% compared to 1990 levels; increasing the share of renewables in final energy consumption to 20%; and moving towards a 20% increase in energy efficiency.”

4.3.1 Greenhouse gas emissions objective

4.3.1.1 National target

This objective is based on European Council decisions within the context of the “Climate and Energy Package” of March, 2007. Greenhouse gas (GHG) reductions for Luxembourg are at 20% by 2020 with relation to the year 2005 in the sectors not covered by the EU Emissions Trading System (ETS)⁷¹.

In accordance with Regulation (EU) No 525/2013, the latest inventory of GHG emissions in Luxembourg covers the period 1990-2017. For 2017, GHG emissions amounted to 10.2 million tonnes of CO₂ equivalent (Mt CO₂e) (excluding international air transport and forest and land-based emissions and removals - LULUCF), or 184,000 tons of CO₂e more than in 2016. Compared to 2005, a record year since the onset of the 2000s, emissions even decreased by 2.98 Mt CO₂e (-22.9%) which may be explained essentially by an increase in emissions from road transportation and buildings. Compared with 2005, a record year since the beginning of the 2000s, emissions have even decreased by 2.79 Mt CO₂e (-21.4%).

Table 7: Changes in GHG emissions, excluding LULUCF for select years (in million tons of CO₂e)

Source	1990	1995	1998	2000	2005	2010	2014	2015	2016	2017	2017/2005	2017/2016
production et distribution d'électricité et de chaleur	0,04	0,09	0,16	0,12	1,24	1,21	0,67	0,46	0,25	0,24	-80,4%	-3,4%
production industrielle	7,91	4,36	2,08	2,18	2,13	1,94	1,78	1,73	1,79	1,80	-15,5%	0,6%
transports routiers: flotte nationale	0,85	1,03	1,15	1,22	1,44	1,61	1,70	1,72	1,74	1,76	22,3%	1,0%
transports routiers: exportations de carburants routiers	1,73	2,29	2,72	3,63	5,74	4,89	4,43	3,98	3,78	3,87	-32,6%	2,2%
ménages, commerces et services	1,32	1,40	1,57	1,63	1,63	1,66	1,37	1,57	1,63	1,70	3,9%	4,2%
agriculture	0,75	0,75	0,74	0,73	0,67	0,70	0,70	0,71	0,73	0,74	10,0%	1,0%
autres sources	0,16	0,16	0,20	0,17	0,17	0,16	0,14	0,13	0,12	0,13	-25,5%	2,5%
émissions totales de GES, hors LULUCF	12,76	10,09	8,63	9,68	13,02	12,18	10,79	10,29	10,05	10,24	-21,4%	1,8%

Source: Environment Agency of the Ministry of the Environment, Climate and Sustainable Development, submission dated 15 March 2019

For the second post-Kyoto 2013-2020 period, only the sectors outside of EU ETS are targeted by objectives set amongst Member States. For Luxembourg, this emissions reduction objective excluding ETS amounts to **-20% for 2020, compared to 2005 levels**. This objective is to be met along a linear trajectory for which the starting point, in 2013, is comprised of average emissions excluding ETS for 2008 to 2010. These yearly budgets are represented by annual allocations of emissions allowances (AAQE). Thus, for 2020, emissions outside ETS should be limited⁷² to **8,117 million tons of CO₂**.

⁷¹ Appendix II of Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020. Also see Chapters 4.3.2 and 4.3.3.

⁷² Given the adjustment stipulated in Article 10 of Decision No 406/2009 / EC as published in the Commission Implementing Decision dated 31 October 2013 (2013/634 / EU) and the adjustment recorded by Commission Decision 2017/1471 dated 10 August 2017 amending Decision 2013/162

The latest official Luxembourg GHG emissions projections were transmitted to the European Commission in April 2017. Taking into account the latest trends in emissions as reported in the inventories, as well as the work done for the drafting of the "National Integrated Energy-Climate Plan 2021-2030" (PNEC)⁷³, Luxembourg estimates that, for the period 2013-2020, it could generate an "emissions reserve" of about 0.44 Mt CO₂e in the central scenario under existing measures. In this case, the use of external credit should no longer be necessary. However, calculations of "reserve" or "deficit" are accompanied by a great deal of uncertainty because they are very sensitive to the expected changes for a particular source of emissions, namely road transport, which alone accounts for almost two thirds of total emissions excluding ETS.

Table 8: Indicative trajectory for GHG emissions, excluding LULUCF & ETS under EC decision 406/2009/EC (in million tons of CO₂e)

	2005	2008	2009	2010	2013	2014	2015	2016	2017	2018	2019	2020
émissions totales de GES, hors LULUCF	13,02	12,16	11,62	12,18	11,25	10,79	10,29	10,05	10,24	10,18	10,14	10,09
émissions de l'aviation civile (vols nationaux)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
émissions ETS vérifiées dans le CITL	2,60	2,10	2,18	2,25	1,85	1,93	1,66	1,50	1,49	1,46	1,43	1,41
émissions totales de GES, hors LULUCF et hors ETS - version ESD	10,42	10,06	9,43	9,93	<u>9,37</u>	<u>8,86</u>	<u>8,61</u>	8,55	8,74	8,73	8,70	8,68
allocations annuelles de quotas d'émission - Décisions 2013/162/UE et (UE) 2017/1471					9,81	9,61	9,41	9,20	8,99	8,78	8,57	8,36
contribution à l'adaptation des ETS (Art. 10 ESD)					0,28	0,27	0,27	0,26	0,25	0,25	0,24	0,24
allocations annuelles de quotas d'émission ajustées (Art. 10) - Décisions 2013/634/UE et (UE) 2017/1471					9,54	9,34	9,14	8,94	8,74	8,53	8,32	8,12
déficit (+) ou réserve (-) d'émissions par rapport aux allocations annuelles de quotas d'émission					-0,17	-0,48	-0,53	-0,39	0,01	0,19	0,38	0,56
déficit (+) ou réserve (-) d'émissions par rapport aux allocations annuelles de quotas d'émission - cumul 2013-2020												-0,44

Source: Environment Agency and Ministry of the Environment, Climate and Sustainable Development, based on the 2019v1 submission - 2005 to 2017 - and projections of 29 April 2017, revised in the light of projections of the PNEC project for non-ETS emissions - 2018 to 2020

Notes: The ETS emissions found in the CITL come from the EU Emissions Trading System data viewer of the European Environmental Agency: <http://www.eea.europa.eu/data-and-maps/data/data-viewers/emissions-trading-viewer>. The total GHG emissions, excluding LULUCF and excluding ETS from 2013 to 2015 (underlined) are those used after the European Commission's verification of compliance over the 2013-2020 period.

The "annual emissions allocations" are published in Appendix I of Commission Decision 2013/162/EU dated 26 March 2013 on determining Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/EC of the European Parliament and the Council (ESD). Data adjusted for Article 10 of Decision 406/2009/EC were published in an Implementing Decision 2013/634/EU dated 31 October 2013 and those modified to take account of the methodological changes induced by the use of revised guidelines for calculating inventories were published in Commission Decision 2017/1471 of 10 August 2017.

4.3.1.2 Key measures⁷⁴

The government has access to a broad range of instruments to achieve the reduction of GHG emissions not pertaining to ETS in accordance with existing rules. In particular, the second action plan to reduce CO₂ emissions contains numerous measures relating to transport, building, energetic efficiency and renewable energies, to industries, to information and awareness campaigns and to consultancy and energy training. However, this second Action Plan, which is aimed primarily at the period 2013-2020, will be replaced by the end of 2019 by the policies and measures of the Luxembourg National Integrated Energy-Climate Plan 2021-2030 (PNEC), as required by the European Parliament and Council regulation on the governance of the Energy and Climate Action Union published at the end of 2018⁷⁵. This plan will also incorporate a longer-term perspective of objectives up until 2050 with a view to full de-carbonisation of the Luxembourg economy.

/ EU to revise the annual allocation of emission allowances for Member States for the period 2017-2020. Amount stated as GWP in the Fourth IPCC Report in effect as from the 2015 inventory submissions.

⁷³ See Chapter 4.3.1.2.

⁷⁴ Also see Chapters 4.3.2 and 4.3.3.

⁷⁵ Regulation (EU) 2018/1999 of the European Parliament and of the Council dated 11 December 2018 on the governance of the Energy and Climate Action Union, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22 / EC, 98/70 / EC, 2009/31 / EC, 2009/73 / EC, 2010/31 / EU, 2012/27 / EU and 2013/30 / EU of the European Parliament and of the Council, Council Directives 2009/119 / EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council.

In the area of transport, the government seeks a genuine change of paradigm through the implementation of actions and projects proposed through its overall sustainable mobility (MoDu2.0) strategy. The ongoing works for the commissioning of a tramway in Luxembourg City are emblematic of this change. MoDu 2.0 aspires to the development of public transportation, to more intense use of the soft mobility concept and to the establishment of a near real time Public Transport Telematics System. This strategy, with the Transportation Sector Plan (PST) that covers it, also recommends a series of other measures such as the installation of a high capacity and high frequency transport system in the capital, the promotion of electric-based mobility or the introduction of an ecological mobility label for companies.

The government programme provides free national trains, trams and buses from now to the first quarter of 2020. Rates for cross-border transport will be reduced after consultation with the neighbouring SNCB, DB and SNCF networks. Rates will also be reduced on the RGTR transportation network "RegioZone". This will benefit not only residents but also cross-border residents.

The tax deductions for electric vehicles were replaced on 1 January 2019 by direct and higher financial assistance. Thus, for example, a subsidy of up to €5,000 will be available for the purchase of a new 100% electric car⁷⁶.

The government intends to increase excise duties on gasoline (1ct) and on diesel (2ct) in the interest of reducing greenhouse gas emissions and protecting the climate.

With regard to residential buildings, apart from the implementation of the sectoral housing plan (PSL), an ambitious schedule has been prepared for progressively strengthening requirements in terms of energy performance in new buildings and residences. Accordingly, since 1 January 2017 all new residential construction are now generally required to meet the AA energy class standard, which is the nearly-zero energy use building standard, making Luxembourg one of the precursors in the EU to require this type of criterion. As energy retrofitting is often quite expensive, the government set up a "climate bank" in 2017. This initiative is part of a "climate bank and sustainable housing bonus" published at the end of 2016, through which the government has implemented new mechanisms to simultaneously promote sustainable construction, sustainable energy-efficient renovation of existing residential buildings and enhancement of renewable energies in the housing sector. In particular, this involves the following measures:

- "climate bank": a climate loan at a reduced interest rate and a zero-interest climate loan for the most disadvantaged households that seeks to promote sustainable energy-efficient renovation even more and prepare for energy insecurity.
- reform of the *PRIME House* financial aid scheme: new, more attractive bonuses to promote the construction of sustainable housing and sustainable energy renovation.
- a certification system for sustainability of new housing (LENOZ): this certificate reflects the level of sustainability ultimately achieved by housing units.

These instruments are being revised with the aim of making them more specific and with less of an administrative burden. For the post-2020 period, the goal is to increase the rate of renovation through stronger incentives and reduced barriers, and, as in the current programme, to seek a high level of recovery. At the same time, efforts are being made to achieve the best possible approach for the development of a one-stop system.

⁷⁶ More details on all these new premiums can be found at www.clever-fueren.lu.

With regard to administrative buildings, the government intends to progressively reinforce energy performance requirements for new administrative buildings. More specifically, as of January 1st, 2019, an effort to improve primary energy efficiency has been introduced, which can be achieved through the integration of renewable energies and energy efficiency measures. For 2020, energy efficiency calculations will be modified in the light of new technical developments. Additionnally there is one final tightening from the norms perspective of a building whose energy consumption is almost zero. The government intends to establish new financing methods to achieve the gradual renovation of all existing buildings and has already conducted an inventory of central government buildings covered by the European directive on energy efficiency.

Numerous measures seeking to promote energy efficiency, as well as the use and production of renewable energies, are being implemented actively. A study on the potential of renewable energies in Luxembourg was finalised at the end of 2016 and as part of the future governance system of the European Energy Union, Luxembourg will have its final "National Integrated Energy-Climate Plan 2021-2030" which will cover these two aspects.

Industrial entities that are susceptible to emitting substantial GHG quantities are involved in the Community Emissions Trading Scheme. Furthermore, the government has set up a system of energy audits in large corporations and is encouraging ecotechnologies.

Through the Climate Pact, the government is offering technical and financial support to municipalities in an effort to reinforce their role as models in climate policy, to reduce greenhouse gas emissions and their energy bills and to stimulate investment on a local and regional level and, since 2016, to ensure improved air quality. The Climate Pact has been highly successful, as illustrated by the participation of nearly all municipalities. The circular economy concept has been incorporated into this since 1 January 2018.

In the field of land use, the redrafting of the territorial planning program which sets out an integrated strategy of sector programs having repercussions on territorial development and which determines the guidelines, the political objectives as well as the measures of the government and municipalities to be taken within the framework of the objectives of Article 1 of the new planning law for national territory dated 17 April 2018 are pursued in order to: provide the entire population optimal living conditions by enhancement and sustainable development of all parts of national territory; guide and focus development in the most appropriate places in the country; observe and monitor territorial developments and to ensure the coordination of municipal, inter-municipal, national, cross-border and international sector policies that have an impact on territorial development; ensure a rational use of land as well as a concentric and coherent urban development and encourage the municipalities to develop common strategies. In addition, the new Land Use Act provides for territorial state-municipality cooperation agreements designed to encourage municipalities to develop and implement inter-municipal or cross-border strategies and to contribute to implementing land use plans and programmes. One of the priority objectives of the work of these state-municipality cooperation agreements is the promotion of the use of sustainable means of transport. Analyses of cycling routes have now been launched in the three development centres of Nordstad, the agglomeration of the City of Luxembourg and the South region. Specific measures to improve the cycling routes identified there will be implemented in upcoming months and years.

4.3.2 Renewable energies objective

4.3.2.1 National target

Directive 2009/28/EC dated 23 April 2009 for promoting the use of energy produced from renewable resources calls for Luxembourg achieving an **11% share** of energy from renewable

sources in its gross final consumption for 2020 as well as an objective of 10% share of fuel energy from renewable resources in the transport sector for 2020. Luxembourg is on track to reach its 2020 targets. In 2017, the share of renewable energy in final consumption reached 6.38%, compared to 5.44% in 2016 and 5.04% in 2015. In recent years, Luxembourg has steadily increased its share of renewable energies and in 2017 was on its indicative trajectory. The contributions to this objective by the various sectors were 8.05% for electrical energy and 8.11% for heat and cooling production. The portion of renewable energy used in transportation came to 6.44%. Thus, the overall increase in final consumption of renewable energies in Luxembourg is slightly lower than the expectations of the national action plan for renewable energies (excluding statistical transfers). With regard to keeping to the trajectory, Luxembourg must achieve an average rate of 7.47% for 2017 and 2018.

4.3.2.2 Key measures

The national action plan in the area of renewable energies sets out three areas for achieving the national objective in this domain:

- Developing renewable energy within the country by means of producing electricity and heat/cooling from renewable sources.
- Adding biofuels into fuels for use domestically as well as developing public and private electric mobility.
- Use of the cooperation mechanisms, primarily through statistical transfers and joint projects with other Member States and third countries.

The measures, as well as the planned schedule, are described in this action plan. The principal recent actions taken as part of these measures that have an impact on the development of renewable energies are outlined below:

- Spread in the use of renewable energies on national territory

In the domain of energy performance of residential buildings⁷⁷, as of 1 January 2017, new residential buildings are generally required to meet the highest energy performance class of AA, which corresponds to the nearly zero energy use building standard. The new requirement levels also contain an implicit incentive to implement renewable energies. With regard to new administrative buildings, an incentive to increase the use of renewable energies beginning 1 January 2018 stated the requirement for a building standard of buildings whose energy consumption is almost zero.

New financial instruments have been put in place as part of the development of renewable energies in the country. A new regulation took effect in 2017⁷⁸. The regulation provides for the possibility of domestic and European competitive bidding procedures (call for tenders) for the development of new installations for the production of electricity from photovoltaic solar energy. The call for tenders was launched in 2018 and ten projects were chosen. Of the 20 MW of power to be awarded, 15 MW were awarded. A recurring competitive bidding system is being considered for upcoming years.

The draft Grand-Ducal Regulation to amend the current regulations, in this case the amended Grand-Ducal Regulation of 1 August 2014 relating to the production of electricity based on renewable energy sources, was introduced mid-2018 in the regulatory procedure to give a new impetus to the production of electricity from renewable sources. Its main purpose is to improve the existing framework to enable a faster roll-out of facilities based on renewable energy sources in the

⁷⁷ See chapter 4.3.3 Energy efficiency objective.

⁷⁸ Grand-Ducal Regulation of 24 April 2017 modifying amended Grand-Ducal Regulation dated 1 August 2014 relating to the production of electricity based on renewable energy sources.

country. In particular, adaptations are made to the pricing structure of photovoltaic power plants and to an enlargement of the group of photovoltaic power plant operators to cooperatives or companies with peak electric power production of more than 200 kW and less than 500 kW. The group of potential beneficiaries in the field of biomass and waste wood has been extended to include large power plants (power production of > 10 MW).

- Mix of biofuels in fuel available for consumption nationally

Through a modification to existing legislation⁷⁹, the rate of biofuels mixed with gasoline and diesel has been set at 5.85% for 2017. Directive 2009/28/EC stipulates that in 2020, it will be mandatory to include a minimum share of 10% of biofuels in the total consumption of gasoline and diesel for transportation, so that the share of biofuel will have to be continuously increased. The contribution of biofuels produced from waste, residue, non-food cellulosic material or from lignocellulosic material is considered equivalent to double that of other biofuels. In 2018, the minimum rate of these "double counted" biofuels to be added in gasoline and diesel was 15%.

- Electric mobility

In Luxembourg, the government and network managers monitored the installation of 800 public charging stations for electric cars as well as for chargeable hybrid electric cars (plug-in hybrid cars). The first of these 800 public charging stations, called "Chargy"⁸⁰, were installed by the distribution system operators at the beginning of 2017. At the end of 2018, 277 of these terminals were operational. In addition to these 800 terminals, the government is evaluating possible strategies for implementing fast charging infrastructure, and super-fast charging in motorway service areas, and for developing a clear and consistent framework for charging stations not accessible to the public, for example in private homes or at the workplace.

- Use of cooperation mechanisms in the field of renewable energies

Directive 2009/28/EC provides for cooperation mechanisms to enable Member States to achieve their objectives through cooperation mechanisms. Apart from its national efforts and in order to reach its 11% renewable energy target, Luxembourg concluded in 2017, as the first EU member state, two statistical transfers with Lithuania and Estonia. Both agreements provide for the mandatory transfer of minimum quantities and the possibility of transferring maximum quantities for the period 2018 to 2020. For 2018, Luxembourg will have acquired a total of 1,100 GWh amount of energy produced from renewable sources from the two countries (550 GWh from each of them). It should be stressed that Luxembourg is the first country to use the cooperation mechanisms to ensure the achievement of its national objectives, which is a clear signal for increased European cooperation in the field of renewable energies.

4.3.2 Energy efficiency objective

4.3.2.1 National target (final energy use)

Luxembourg has set the **objective** for energy efficiency of annual final energy use not to exceed **49,292 GWh** by 2020, i.e. **4,239.2 ktoe**, or 52,111 GWh and 4,481.6 ktoe of primary energy⁸¹. In addition to the energy efficiency objective, Luxembourg has also set an energy savings target of 5,993 GWh to be achieved by 31 December 2020 through a mechanism of energy efficiency obligations set up in 2015. During 2018, Luxembourg held discussions with the obligated parties with a view to adapting the regulation to requirements actually encountered, and to recent technological developments in the field of energy efficiency. An amendment was introduced in the

⁷⁹ Amended law dated 17 December 2010 setting the excise and other taxes on energy products, electricity, manufactured tobacco products, alcohol and alcoholic beverages.

⁸⁰ For more details see: <https://chargy.lu/>

⁸¹ In application of Article 3 of EU directive 2012/27/EU relating to energy efficiency. The energy efficiency objective for 2020 is therefore no longer expressed in percentages but rather in absolute values of final energy used.

regulatory procedure in April, 2019. The intent is to adapt certain technical stipulations to the actual needs encountered, and to recent technological developments in the field of energy.

In early 2019, Luxembourg completed an initial outline for its Integrated National Energy-Climate Plan (PNEC).

Through Directive 2012/27/EU, the EU has put in place a common framework of measures to promote energy efficiency in order to achieve the EU's 2020 target. Measures in the areas of energy efficiency in the sectors of households, services, industry and transportation appear in the directive. The EEAP focuses on the administration and implementation of Directive 2012/27/EU and covers significant measures to improve energy efficiency and forecasted/achieved energy savings in supply, transportation, distribution and final use of energy up to 2020. The two main elements of the EEAP are a forecast of overall consumption by the final and primary energy sectors in 2020 and quantified measures whose objective is to improve energy efficiency and generate energy savings in upcoming years, for the purpose of achieving the national energy efficiency goal. At the end of 2018, Directive 2018/2002/EU amended Directive 2012/27/EU and put in place a common framework of measures to promote energy efficiency in order to achieve the EU's 2030 target. Transposition of this directive began in 2019.

In short, the baseline forecasts, i.e. estimates of final and primary energy consumption up to 2020, show a change in energy consumption in line with the mandatory objectives for Luxembourg in 2020.

4.3.2.2 Key measures

- Energy performance in buildings

Directive 2010/31/EU of the European Parliament and of the Council dated 19 May 2010 on the energy performance of buildings reformulates the existing Directive (2002/91/EC) and provides a new "nearly zero energy use" standard for all new buildings for 2021 (2019 for public buildings). The "Nearly Zero Energy Building" (NZEB) legislation came into force on 1 January 2017 through the Grand-Ducal Regulation dated 23 July 2016 amending the amended Grand-Ducal Regulation dated 30 November 2007 concerning energy performance in residential buildings, which is the energy performance standard required for new residential buildings. NZEB energy efficiency standards generally correspond to buildings of the AA energy classes (thermal insulation and energy performance classes).

With regard to administrative buildings, the transposition of this aspect of the directive continued in 2018 and has made considerable progress. An amendment to the Grand-Ducal Regulation comes into force in April 2019 and a draft Grand-Ducal Regulation concerning the energy performance of administrative buildings is underway to modify the methodology for calculating energy efficiency that incorporate new technical developments, and to reinforce the requirements of the NZEB, the new energy performance standard required for new administrative buildings.

At the same time a new software package for calculating the energy performance of administrative buildings is being developed with an external consultant and has made substantial progress. This new software should be more advanced and technically better calibrated on actual energy situations within buildings.

- Voluntary agreement with Luxembourg industrial companies

As part of its policy of rational use of energy, in early 2017 the government signed a new voluntary agreement with the industrial sector which covers the period 2017-2020 (inclusive). The aim of this agreement is to increase the commitment of member companies to improve energy efficiency and to

get them to implement new or renewable energy sources. Companies signing the agreement further commit to implementing an energy management system that identifies potential improvements in energy efficiency and establishes an action program to produce a package of measures to achieve this potential. The economic interest grouping *myenergy* is taking over the coordination and follow up roles of data provided by companies, as well as information dissemination, consulting and awareness responsibilities.

- Smart electric and gas meters

Luxembourg has continued monitoring the widespread installation of smart joint metering by gas and electricity network operators. Since 1 July 2016, grid operators have been installing a smart meter for each new connection to their grids, and progressively replacing existing meters of each of their customers. As of end 2018, approximately 140,000 smart electricity meters and 30,000 smart natural gas meters have been installed nationwide. The replacement of at least 95% of the old electricity meters will continue through until 31 December 2019. With regard to natural gas, the replacement of at least 90% of the old meters will extend through 31 December 2020.

- Strategy to mobilize investment in the renovation of the national supply of buildings

The government has also pursued its long-term strategy to mobilize investment in the renovation of the national supply of public and private residential and commercial buildings under Directive 2012/27/EC. This strategy emphasizes the following points: priority for complete, highly energy-efficient renovations; affordability of energy renovation measures; improved coordination between energy policy and protection of heritage; promoting sustainable construction and the circular economy.

- Strategic Study entitled "The Third Industrial Revolution"(TIR)

In September 2015, the government, the Chamber of Commerce and IMS Luxembourg jointly launched the strategic study "The Third Industrial Revolution Strategy", in close collaboration with economist Jeremy Rifkin and his team of experts. This process, in line with the so-called "open societal innovation" approaches and aimed at making the existing economic model more sustainable and interconnected for future generations, produced a study that was presented in November 2016. The government took the view that the executive summary of this strategic study provides a general direction for the future development of the country and decided to transpose a number of specific projects using existing or new platforms. Consequently, with regard more specifically to the energy component, it was decided to create the thematic platform "*Energiezukunft Lëtzebuerg*" aiming to thematise all the strategic aspects of energy transition in the medium and long term, as well as the implementation of the "Internet of Energy" in Luxembourg. The ambition sought for this platform is not simply a transition to a fully sustainable energy system but the use of this transition to achieve energy savings whilst combining technical and commercial innovations in an intelligent manner. The platform will also take into consideration the results of the "Building", "Mobility" and "Smart Economy" pillars of the strategic study. The main tasks of the platform are split into two parallel working processes, one of which consists in developing and finalising a proposal for a national energy strategy and the other in achieving the implementation of measures identified by the strategic study, particularly in the field of smart energy infrastructure and the implementation of the national energy Internet, which is leading Luxembourg towards a digital and intelligent energy network. In 2017, Luxembourg started a process of evaluation and preparation with a view to incorporating market concepts that are compatible with the results of the strategic study into Luxembourg law, and that take into account the results obtained from the work of the "*Energiezukunft Lëtzebuerg*" thematic platform. Preparatory work has begun to amend the amended Law of August 1st, 2007 on the organisation of the electricity market with a view to incorporating new concepts such as individual and collective self-consumption within an energy community or a

national computer platform for energy data. This work led to a draft law introduced in the legislative procedure in early 2018.

4.4 The Education objective and the key measures for achieving it

European objective *"improving education levels, in particular by aiming to reduce school drop-out rates to less than 10% and by increasing the share of 30-34 years old having completed tertiary or equivalent education to at least 40%."*

4.4.1 Early school leavers objective

4.4.1.1 National target

The government continues to pursue its **objective** of sustainably keeping the school dropout rate **below 10%**. LFS figures show a positive trend⁸², the rate having decreased from 9.3% in 2015 to 5.5% in 2016 and stood at 7.3% in 2017. For ten years the government has been conducting a national study as a complement to the LFS. This data does not allow comparison at European level, but enables to identify dropouts at the level of the national system. Two studies have made it possible to better identify the phenomenon and to identify the most vulnerable groups and thus set up more specific intervention projects: according to this analysis, it is at the lower cycle of secondary education (general and preparatory) as well as at the beginning of vocational training that students run the greatest risk of dropping out.

4.4.1.2 Key measures

The main measures are based on the three action cores: prevention, intervention and compensation, plus specific projects carried out in different national high schools / vocational training centres in the country. When all the remedies offered by the school community are exhausted, compensatory measures are required that are described in greater detail below, namely the intervention of the National Youth Service, the National School for Adults or the Adult Training Service. Finally, a drop-out can request help from the School Mediation Service.

- Prevention

In 2018, the government continued its efforts to promote the academic success of an increasingly heterogeneous population, where the linguistic and socio-economic background is critical to student success⁸³. Reform projects in early childhood education and care, care for children with special needs and at the secondary education level have been under way since the 2017-2018 school year, continuing into the 2018-2019 school year.

At the level of early childhood education and care, the objective of introducing pluri-lingual education programmes⁸⁴ is to support language development in children from a very young age and thus to better prepare them for society and for school attendance in Luxembourg. This programme targets children from age 1 in early childhood education and care, who also have a free 20-hour programme per week.

In secondary education, a series of laws was approved in 2017 to set the contours of a modern high school⁸⁵. The key points of these reforms take into account that students do not perform at the same level in all the languages taught at secondary level (German, English, and French). General secondary education accommodates two-thirds of pupils, and its school population is much more

⁸² For more details see: http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_40&plugin=1

⁸³ See the OECD PISA results.

⁸⁴ For more details see: <http://www.men.public.lu/fr/actualites/publications/enfance/infos-generales/170320-plurilingue-petite-enfance/index.html>

⁸⁵ For more details see: <http://www.men.public.lu/catalogue-publications/secondaire/informations-generales-offre-scolaire/modernisation-lycee/lycee.pdf>

heterogeneous than that of classic secondary education. The lower grades have been rendered more flexible to respond to the widely different profiles of these students, support them in disciplines where they have weaknesses and encourage them to develop those in which they have talents. In grades 6 and 5, languages and mathematics are offered in basic and advanced classes. The new system allows students to follow the level most suited to their individual profiles in each of these disciplines. To help young people make the proper choices in moving towards training that will offer them the greatest chances of success, remedial and guidance measures are reinforced in these classes.

In order to take into account the needs of students from migrant backgrounds and families who settle in Luxembourg for a set period, the European and international school⁸⁶ offer in public education has been expanded and now includes international, European, French-speaking and English-speaking classes, or a German-Luxembourgish school, as well as classes with a specific language scheme.

The vocational induction classes / vocational orientation and initiation courses aim to reintegrate minors or adult pupils into the school system or in vocational training. The educational approach of vocational induction classes / vocational orientation and initiation courses is to promote a specific, active and sustainable learning process. The training is complemented by one or more internships.

In its fight against the school dropout phenomenon, the government has been running a service since September 4th, 2018 called the School Mediation Service for keeping, including and integrating youth in schools. This service is dealing with individual cases of pupils whose schooling is at risk by the inadequate implementation of existing resources or because of flaws in the education system or in its legislation.

- Intervention

In this action area the goal is to intervene as soon as a situation occurs that could potentially lead to a student abandoning studies. Two courses of action are recommended: the projects set up by services of the Ministry of Education, Children and Youth are involved in these: intervention and individualized monitoring of a student in difficulty and / or intervention at the level of an entire class, or even of a school.

Fifteen high schools offer vocational induction classes (CIP) at the beginning of the school year to young pupils who do not meet the criteria for access to higher classes of general secondary education or vocational training. Similar classes also accept minors who have already left the school system to enable them to undertake or get back into training courses.

The Psycho-Social and School Support Centre (CePAS) and the Psycho-social and School Support Service (SePAS)⁸⁷ working in most of the country's high schools, together recommend a very diversified range of measures to fight against leaving school, including areas for students at risk of dismissal or dropping out in the form of support programmes adapted to the abilities and needs of the person or the class, such as individual interviews, professional role-playing and developing academic careers in one's original class. Professionals supervising young people can also benefit from CePAS's know-how and support programmes. Accordingly, CePAS and SePAS have the possibility to collaborate with all participants in the schooling process, as well as with the partners of the Guidance Centre, psycho-medico-social networks and companies to jointly develop a global concept for keeping kids in school and to develop different screening mechanisms.

⁸⁶ For more details see: <http://www.men.public.lu/fr/actualites/grands-dossiers/systeme-educatif/offre-internationale/fr/index.html>

⁸⁷ For more details see: <https://cepas.public.lu/fr/accompagnement-scolaire/prevention.html>

The intervention of local Youth Units (ALJ) in high school preparation programmes is done using a "before-during-after" logic, which is to say that ALJ guidance counsellors seek to establish contact with at-risk students prior to supposed instance of dropping out, and then be available to support them during a possible period of inactivity until they return to school or take up some other activity. ALJ employees act as external experts who support the efforts of the school. ALJ actions are normally dedicated to students in the 5P (preparation class), 5AD (adaptation class), CIP (professional initiation class) and COP (professional guidance class) programmes. Students in other classes with a provisional guidance notice to a CCP (certificate of professional competence) or DAP (vocational qualifications) at the end of the 2nd term, are also considered at-risk students and therefore targeted by this offer. However, since systematic intervention by class is not possible, schools will ensure that ALJ guidance counsellors make contact by other means, for example during information and awareness activities organised by the school.

Relay or "mosaic" classes are designed for students at risk of leaving school because of their behaviour. Mosaic classes aim to reintegrate and re-socialise students into their initial class or into a class suited to their development via a temporary individualised programme lasting 6 to 12 weeks.

Cultural projects are primarily for students in the general secondary school preparation courses who are experiencing academic difficulties. It is necessary to use creativity to overcome the resistance developed by students in their relationship with school and learning and to bolster the self-confidence of those students who have already experienced many failures.

- Remediation courses

The National School for Adults (ENAD), formerly known as the Second Chance School, is aimed at 16-30 year olds who have dropped out of school without obtaining recognised certification or who do not find an apprenticeship and offer them a new chance of success in the mainstream school system. It offers a wide range of training programmes to reintegrate students' initial educational coursework, to obtain a secondary school diploma, to acquire the level of training required to get into other training courses or to access professional careers. ENAD offers individual tutoring and educational support for learners as part of their personal, academic and professional project.

The upskilling pathway programmes for adult education and training have three aims:

- acquire a qualification for professional insertion or promotion;
- acquire the certificates or diplomas that provide access to other studies (5th year classes that provide access to vocational training and upper secondary education and courses leading to high school diplomas that are the gateway to higher education);
- develop basic and language skills of first-time immigrants and applicants / beneficiaries of adult international protection (DPI / BPI) in order to gain access to a qualification for future studies and to the labour market. The development and accessibility of these courses will be reinforced by making their content modular, the permeability of education pathways, recognition of prior training and by digitalisation of the offer.

The two National Centres for Continuing Vocational Training (CNFPC), in Esch-sur-Alzette and Ettelbruck, offer vocational guidance and induction courses (COIP) to young adults who do not have the necessary skills to access the market and / or who left school prematurely. These courses are intended for students over 17 years old. The "*Sprong an d' Léier*" project offered by the CNFPC (Esch-sur-Alzette) supports young people without apprenticeship contracts when the school year has already begun. The programme helps them find an apprenticeship position for the next school year. The project presents an alternative to COIP classes. Young people can discover a potential future job and thus ensure that they obtain the necessary qualifications. Every young person may try

out four different sectors for a three-week period, during which they will get an overview of the practical and theoretical aspects of a job in that area. The project provides a means of accommodating young people who find themselves without an apprenticeship position after 1 November.

4.4.2 Tertiary education objective

4.4.2.1 National target

The national **objective** consists of ensuring that **66%** of the working population between the ages of 30 and 34 receive higher education and earn higher education degrees between now and 2020. This objective was set at the time when two out of three jobs in Luxembourg require higher education training.

4.4.2.2 Key measures

The government is continuing its efforts to create a fertile ground for expanding the supply of public and private higher education programmes, as well as for developing quality in the sector, particularly through a revision of the law on the organisation of higher education provided for by the government 2018-2023 programme. This revision of the law will aim at optimising the governance of the programmes leading to professionally oriented “*Brevet de technicien supérieur*” (BTS) higher education programmes and the review of accreditation and monitoring procedures for BTS programs as well as institutions and programmes of higher education in Luxembourg. At the same time, it will be necessary to consolidate the programs in place, paying particular attention to quality assurance and monitoring their development in terms of the number of students and the adequacy of training for the labour market, as well as to promote coordinated new offers of training programmes leading to the BTS.

This revision of the Law on the Organisation of Higher Education will align with the 2016 amendment to the same law, which focused particularly on quality assurance in accreditation procedures for foreign higher education institutions and programmes in Luxembourg. Accordingly, the evaluation for the accreditation of these institutions and programmes is now carried out by foreign and independent quality assurance agencies that are members of the European Association for Quality Assurance in Higher Education (ENQA) and registered in the EQAR European Register (European Quality Assurance Register for Higher Education), which ensures that these agencies comply with the ESG (Standards and Guidelines for Quality Assurance in the European Higher Education Area).

In addition, Luxembourg will participate in the OECD project “Enhancing higher education systems performance”, which involves carrying out a study of the Luxembourg higher education system. This OECD assessment will feed into considerations about developing a national strategy for higher education, with particular concentration on achieving better coherence between higher education and the labour market.

Since 2012, several higher education institutions have been established on the national territory. At the beginning of the 2018-2019 academic year, nine courses offered by private higher education institutions were accredited. The number of accredited professionally oriented short-cycle higher education programmes “*Brevet de technicien supérieur*” (BTS) was 29 for the 2018-2019 academic year with a total of 819 students.

There has also been debate for several years about the need and opportunity to develop a medical training programme at the University of Luxembourg. Since its inception in 2003, the university has been offering a degree programme that is limited to the first year of undergraduate medical

education. In recent years, Luxembourg has concluded bilateral agreements with Belgium and France in order to reserve a fixed quota of slots for students having successfully completed the first year at the University of Luxembourg with a view to continuing medical studies in partner universities. The University of Luxembourg is currently developing a first cycle of university medical studies leading to a Bachelor’s Degree, planned to begin in 2020, and thus contribute to the sustainability of the supply of doctors in Luxembourg. In addition, in 2018 the government signed an additional protocol on scientific and academic cooperation with the government of the French Republic which provides for inter-university cooperation in Master's programs in medicine and university medical centres as part of basic and specialisations in medical training.

The government continues to bolster its policy for higher education and research on the financial resources level. Accordingly, financial contributions to the functioning of the University of Luxembourg have grown considerably. The State's allocation for the functioning of the University increased from €72 million (2009) to €101.6 million (2012), reaching €184.9 million in 2019. Investments for completing construction and equipping of these new infrastructures for higher education and research on the Belval site are continuing with a total investment of some €800 million between 2010 and 2019.

The relations between the University of Luxembourg and the government are governed by a multiannual establishment contract set at four years, which covers the institution's objectives in the areas of education, research, and administration, in addition to the resources and manpower required for carrying out these activities. In the new 2018-2021 agreement, the University commits to obtaining accreditation of several Bachelor and Master degree programmes in order to provide and support a high-quality education experience that corresponds to the trends in innovation.

The number of students enrolled at the University of Luxembourg has been stable for several years.

Table 9: Total number of students at the University of Luxembourg by academic year

Year	Number of students
2012-2013	6,308
2013-2014	6,231
2014-2015	6,309
2015-2016	6,189
2016-2017	6,153
2017-2018	6,366
2018-2019	6,423

Source: Ministry of Higher Education and Research

4.5 The social inclusion objective and key measures for achieving it

European objective “promoting social inclusion, in particular through the reduction of poverty, by aiming to lift at least 20 million people out of the risk of poverty and exclusion. The population is defined as the number of persons who are at risk-of-poverty and exclusion according to three indicators (at-risk-of-poverty; material deprivation; jobless household), leaving Member States free to set their national targets on the basis of the most appropriate indicators, taking into account their national circumstances and priorities.”

4.5.1 National target

The government supports the conclusions of the European Council in this **objective**⁸⁸ through measures that contribute to increasing women's and single-parent families' rate of employment in order to arrive at a **73% employment rate** in 2020. Access to employment creates the type of conditions that promote social inclusion and constitute a rampart from which to react against poverty and social exclusion, both for individuals and society in general. In the area of horizontal and transversal approaches, all the efforts detailed under the national employment and education objective headings are, together with the measures outlined below, also measures for contributing to promoting social inclusion, particularly by reducing poverty.

4.5.2 Key measures

- Measures announced in the 2018-2023 government programme

The reconciliation between professional and family life will remain a priority ambition of the government, which will respond to the need for flexibility of families and businesses through an ambitious policy in the areas of work organisation, social transfers and tax policy. Government action will continue to promote equal opportunities, including measures to combat the risk of poverty, especially for single-parent families, and to support parents in reconciling work and private life. Investments in families and children will continue, with emphasis on benefits in kind. Accordingly, primary school children will be accommodated and supervised free of charge in reception centres during school weeks. In order to combat the "working poor" phenomenon and to appropriately implement social transfers, the amount, range and criteria for allocating the cost of living allowance will be accordingly modified.

- Key measures completed or underway to achieve the national objective

The government continued to take measures to modernise family policy by promoting employment, including employment of women, and job retention, with a view to obtaining financial independence for both parents. In addition, the government has maintained a strong commitment to the most vulnerable people through a combination of measures to support them.

- Reconciliation between professional and private life: Making parental leave periods flexible and improving its modalities, as well as a substantial increase in the parental leave allowance, was introduced by the reform on 1 December 2016, and since have been very successful. The positive effects that were hoped for both in terms of reconciliation of private and professional life, equal opportunities and time that parents and especially fathers have available for raising their children, have been achieved. The table below clearly shows that the reform of parental leave is particularly favourable to men. In the past, the majority of parental leave was taken by women. In 2017, 3,674 men took parental leave, compared to 4,577 women. In 2018, there was almost gender parity with 4,875 women on parental leave, compared to 4,721 men. Moreover, to ensure greater reconciliation between professional and private life and in doing so keeping parents employed, particularly women, beginning 1 January 2018, the government implemented an adaptation of a series extraordinary leave policies. Family leave, intended for parents with a sick child, has been completely modified.

⁸⁸ The government has set a goal of reducing the number of people at risk of poverty or social exclusion in Luxembourg by 6,000 by 2020. However, regarding methodology, the AROPE indicator does not take into account the demographic factor and Luxembourg's demography continues to increase significantly, even in times of crisis, so that the relative nature of the indicator (as a % of the population) inevitably leads to an increase in the absolute number of people concerned. In addition, social benefits in kind (e.g. service vouchers) are not reflected in the at-risk-of-poverty rate, although the impact of these benefits on the standard of living of households is significant.

³The European Foundation of Social Rights is based on 20 key principles that focus on three themes: Equal opportunities and access to the labour market, fair working conditions and social protection and insertion.

Table 10: Comparison between the 1st and 2nd parental leaves- situation at 31 December of each year

	Women 1 st leave	Men 1 st leave	Women 2 nd leave	Men 2 nd leave
1999	1,323	60	20	30
2000	1,707	79	69	156
2001	1,886	75	96	240
2002	1,951	104	122	394
2003	2,143	91	158	521
2004	2,155	107	170	541
2005	2,325	96	186	611
2006	2,389	105	199	644
2007	2,285	111	181	591
2008	2,526	124	248	697
2009	2,681	106	241	788
2010	2,921	110	231	866
2011	2,711	119	242	849
2012	2,879	116	204	826
2013	2,859	141	169	908
2014	3,006	122	200	928
2015	3,268	149	221	957
2016	3,320	187	237	976
2017	4,058	327	519	3,347
2018	4,287	402	588	4,319

Source: Ministry of Family Affairs, Integration and the Greater Region

- Policy of providing socio-educational welcoming structures to children: The number of authorized places in socio-educational welcoming structures for children 0-12 years old was 59,260 at 31 December 2018. Luxembourg therefore widely exceeded its national objective of 35,000 places in 2015. In Luxembourg, all reception centres apply a quality assurance system. The State contributes to the costs of childcare through the service voucher system. This allows parents to get reduced rates or even free hours of childcare in facilities, depending on their income. The service voucher system contributes to providing greater equality opportunities, as it facilitates access for all children to quality care, regardless of their host facility.

Table 11: Change in the number of places in socio-educational welcoming structures for children (31/12/2018)

Situation at 31/12/2018	2009	2013	2014	2015	2016	2017	2018	2017- 2018 difference	2017-2018 increase
Education and hosting services authorised by social security*	20,308	34,053	35,579	37,440	38,287	40,489	42,417	1,928	4.76 %
Commercial education and hosting services**	2,734	9,194	10,371	10,406	11,576	12,874	14,046	1,172	9.10 %
Nanny services	1,606	3,130	3,258	3,278	3,247		2,797	203	-6.77%

						3,000			
TOTAL	24,648	46,377	49,208	51,124	53,110	56,363	59,260	3,303	5.14%

Source: Ministry of Education, Children and Youth / Education and Hosting Service

Remarks: including reception centres, day care centres and nurseries ** including day care centres and nurseries

- Social Inclusion Income (REVIS): In the area of social exclusion, the law dated July, 28th 2018 relating to Social Inclusion Income (REVIS) took effect in January 2019. The four objectives of this reform are to specify a social inclusion approach, to establish a coherent system of stabilization, social activation and professional reinsertion policies, to act against child and single parent family poverty and to simplify administrative procedures. The introduction of REVIS aims at strengthening the activation of all the beneficiaries of a household. Thus, the law has removed the "inactivity traps" and set up a profiling mechanism that allows people to be active in the areas that are most suited to their needs and skills. A budget of around €6.6 million has been slated for financing the administrative staff from the social agencies implementing the activation measures under REVIS. Moreover, in the REVIS scheme, the shares of the inclusion allowance for children and the household expenses are increased, both for children living in a single-parent household and for families with children.
- Adaptation of SSM, REVIS and RPGH schemes: As of 1 January 2019, the minimum social wage (SSM), social inclusion income (REVIS) and income for severely disabled people (RPGH) increased by +1.1%. These adjustments are the result of a rise in wages observed between 2016 and 2017.
- Cost of living allowance: The Grand-Ducal Regulation of 21 September 2018 aims to renew the allocation of a living allowance to low-income households for 2019. Since 2018, family allowances, the back to school allowance and the birth allowance are no longer being used to determine overall annual incomes of households. This is being done in order to increase the number of potential beneficiaries of the cost of living allowance and to reach more low-income families (working poor).
- Social Assistance Act: In 2018, the 30 Social Administration branches provided a total of €3.6 million in non-repayable financial assistance. Funding for this measure included an annual budget of approximately €20 million (50% of which furnished by the State and 50% by the municipalities).
- Housing-related social exclusion and national strategy against homelessness: The government continued to coordinate the implementation of its 2013-2020 national strategy against homelessness and housing-related social exclusion. In 2018, inter-ministerial collaboration continued to combat homelessness among young people and to support for innovative projects for long-term homeless people. The government concluded an agreement with the Luxembourg Red Cross for the "Abricoeur" service. Certification was awarded to two entities working in the field of homelessness and housing-related social exclusion: the "Streetwork" service of *Caritas Accueil et Solidarité a.s.b.l.* and a new supervised housing unit for young adults in Hesperange. The government programme provides for a final external evaluation of the national strategy against homelessness and homelessness by 2020-2021. The government will continue its cooperation with the different types of social housing agencies and will

consider diversification as well augmenting the effort based on an analysis of current operating methods.

- Rent subsidies: The law reforming rent subsidies took effect on 1 January 2018. Its purpose is to increase the number of households that can potentially benefit from grants.
- European Fund for Aid to the Most Deprived (FEAD): In Luxembourg, FEAD is the vehicle for responding to situations involving a lack of food or basic material goods. A total of 12,453 people representing 4,843 households received food aid and basic material assistance.
- National Integration Action Plan (PAN integration): The government adopted the PAN integration scheme in 2018. The action plan provides a general, strategic and sustainable framework that is open ended and revisable and adaptable over the years. It is based on two action areas: the reception and social support of applicants for international protection as well as the integration of all non-Luxembourg persons residing in the country and addresses the three cross-functional areas of access to information and interaction, quality of services and national and international cooperation and coordination. The action plan will be implemented by all institutional and associative stakeholders through calls for projects, pilot projects and through the development and optimisation of existing integration programmes, including the Reception and Integration Contract (CAI) and the Integrated Career Pathway (PIA) schemes.

5. Use of Structural Funds

5.1 Coordination with structural funds

Coordination between the NRP and the Structural Funds is required because the Europe 2020 strategy also has a Community action program. Projects developed and supported by Community financing under structural funds heading are asked to contribute to meeting the objectives of the Europe 2020 strategy.

With regard to the ERDF 2007-2013 Regional Competitiveness and Employment program (RCE), efforts to support European objectives and national objectives determined by Luxembourg have been made, particularly from the Priority 1-Objective 1 and Priority 2-Objective 3 standpoints. The RCE ERDF program represents total public eligible commitments and investments of €85 million, of which €21.8 million in Community funds amassed during the programming period of 2007-2013 concerning Luxembourg NRP priorities and the Europe 2020 Strategy. These investments, in line with NRP objectives, correspond to 83.2% of the ERDF RCE envelope for Luxembourg for the programming period of 2007-2013. In this way, 50 projects were co-financed in the area of research and innovation by ERDF in the amount of €15.3 million and 13 projects in the area of renewable energy in the amount of €6.4 million. The programme was officially closed out by the European Commission's closing recommendation of 27 October 2017 and the acceptance of the recommendation by the Managing Authority on 6 November 2017. Payment of the balance to beneficiaries was finalised on 10 January 2018.

The European Social Fund (ESF) programme aims to combat unemployment, including youth unemployment, by strengthening the skills and competences of young people and job-seekers, especially those with an immigrant background, and by seeking a better match between supply and demand in the labour market. It improves equal access to lifelong learning for all age groups, helping to keep older workers in the labour market longer. The "Investment for growth and jobs" programme has an overall budget of €40 million, including €20 million of ESF funds.

European Territorial Cooperation programmes for 2014-2020 are being implemented. The thematic areas of all INTERREG programmes in Luxembourg contribute to the objectives of the Europe 2020 strategy. This is the INTERREG Greater Region cross-border programme with its four priority areas of "Pursue the development of an integrated labour market by supporting education, training and facilitating physical mobility", "Ensure an environmentally friendly development and life environments", "Improve living conditions" and "Strengthen the competitiveness and attractiveness of the Greater Region" with an ERDF budget of around €140 million. The themes of the INTERREG "North-West Europe" transnational programme, with an ERDF budget of €396 million, are as follows: innovation; low carbon emissions; efficiency for materials and resources. The themes selected for the interregional INTERREG Europe programme with an ERDF budget of €359 million, which are also relevant to the Europe 2020 strategy, are as follows: strengthen research, technological development and innovation; strengthen the competitiveness of SMEs; support the transition to a low-carbon economy in all sectors; protect the environment and promote the rational use of resources.

5.2 Financing priorities for the period 2014-2020

For the Common Strategic Framework 2014-2020, the ERDF Managing Authority has decided to focus its action on two priority areas in accordance with the recommendations of the European Commission, which take up thematic objectives No. 1 "Strengthening research, development and technology and innovation" and No. 4 "Supporting the transition to a low-carbon economy in all sectors". The ERDF Operational Program, whose budget allocation is €19.5 million, with an estimated total cost of €48.2 million, focuses equally on two thematic objectives: strengthening research, technological development and innovation and the transition to a low-carbon economy in all sectors, in line with the objectives set out in Regulation (EU) 1303/2013 and closely linked to the objectives of the Europe 2020 strategy. In addition, in concert with the municipality of Dudelange, it was agreed to use an Integrated Territorial Investment (ITI) feeding on the themes of the two areas in compliance with regulations and sustainable urban development concepts, in the amount of €1.2 million. The areas of intervention recommended by Luxembourg are consistent with those of the European Commission and will ensure continuity with the 2007-2013 programming period, which is already in line with the Europe 2020 strategy. The "Investment for Growth and Jobs" Operational Programme for 2014-2020 was adopted by the European Commission on 15 December 2014. As of December 31st, 2018, 22 projects were chosen and approved.

Table 12: Financial contracts by area

Area	Total cost (in € mn)	ERDF (in € mn)
Area 1 "Improve research, technological development and innovation"	24.2	9.7
Area 2 "Support the transition to a low carbon emissions economy in all sectors"	20.9	8.3
Area 3 "Technical Assistance"	2.3	1.2
Total	47.4	19.2

Source: Ministry of the Economy

The ESF Operational Programme for 2014-2020, which falls under the Europe 2020 strategy and country-specific recommendations, was approved by the European Commission on 12 December 2014 (Decision C (2014) 9912 final). By this decision, the European Commission has validated the choice of thematic objectives, investment priorities and corresponding financial allocations. The thematic objectives selected are the labour market, education and training, social inclusion and the fight against poverty. These themes are incorporated into the following priority areas for investment: Priority area 1: Support sustainable professional integration; Priority area 2: Bolster social inclusion; Priority area 3: Promote the acquisition of new skills. Thirteen projects were selected in 2018:

- Area 1 - Support sustainable professional integration: Eight projects with a contractual budget of €7,600,600 (investment priority P.I. 1.1. - €1,881,700; P.I. 1.2. - €5,718,900);
- Area 2 - Bolster social inclusion: Two projects with a contractual budget of €724,000;
- Area 3- Promote the acquisition of new skills: Three projects with a contractual budget of €665,800.

The themes of the European Territorial Cooperation (ETC) programmes have been determined based on the Europe 2020 strategy. For the cross-border, transnational and interregional projects with Luxembourg participation approved in the INTERREG Greater

Region, "North-West Europe" and "Europe" programmes, the main fields of action are R&D (innovation) with 21 projects for a budget for the activities of the Luxembourg partners (ERDF + domestic) of about €11 million, and the climate change and energy sector (climate, environment, transport) with 31 projects in the amount of about €34 million.

6. Institutional issues and the role of stakeholders

6.1 National ownership

With a view to increasing transparency and encouraging national ownership, the government closely involved Parliament and social partners:

- the government presented the NRP and SGP to Parliament before submission to the European Commission at the end of April.
- social partners have been involved in the national social dialogue under the auspices of the Economic and Social Council (ESC). In early April 2019, a meeting inaugurated the new annual round of consultation and discussions focused on the main messages to be drawn from the 2019 country report for Luxembourg⁸⁹.

6.2 Communication

Diverse studies have shown that the resistance that forms to structural reforms is linked to the fact that uncertainty regarding expected future benefits of reforms is often greater than the uncertainty regarding costs incurred. The government attaches particular interest to this challenge and intends to pursue its efforts.

Progress achieved as part of the implementation of the Luxembourg 2020 strategy should have effective follow-up, reporting and evaluation processes. Diverse structural indicators used prepare a quantitative follow-up of the Lisbon strategy had a tendency of not taking adequate account of the national specificities surrounding Luxembourg. In 2003, the Tripartite Coordination Committee decided that it would be opportune to publish a national "Competitiveness scoreboard" on an annual basis. The Observatory of competitiveness has since updated this national scoreboard up until 2016. After more than ten years of use, a revision proved necessary. A revision was therefore undertaken with social partners in the Economic and Social Council (ESC)⁹⁰, which in July 2016 unanimously adopted its opinion on the national system of indicators that constitute the new modernised and structured dashboard. The results of this new national indicator system were presented for the first time as part of the latest Competitiveness report⁹¹ in the fall of 2017. This new dashboard is based on 67 indicators, including 41 entirely new ones, which are grouped into the three categories of the economy, social action and the environment. In the latest edition published in the autumn of 2018, Luxembourg ranked ninth and belonged to the group of "high performing" EU countries. It ranked 11th in the economy subcategory, 4th in the social subcategory and 14th in the environment subcategory⁹².

⁸⁹ For more details see: <https://ces.public.lu/fr/actualites/2019/semestre-europeen-2019.html>

⁹⁰ CES, *Le système d'indicateurs national*, Avis, 8 July 2016

For more details see: <http://www.ces.public.lu/content/dam/ces/fr/actualites/2016/07/2016-indicateurs.pdf>

⁹¹ MINISTRY OF THE ECONOMY, *Le système d'indicateurs national*, in the 2017 Competitiveness Report, Perspectives de politique économique n°33, Luxembourg, October 2017.

⁹² For more details see: <https://odc.gouvernement.lu/dam-assets/publications/rapport-etude-analyse/perspectives-politique-economique/perspectives-politique-economique-34/Perspectives-N34-Bilan-2018.pdf>



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