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RP 1ST RESULTS 2021 N°09

A GROWING POLARIZATION OF HOME-WORK TRAVEL IN LUXEMBOURG

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Document summary

The central conurbation, made up of Luxembourg City and its outskirts, is the country's main employment centre. It concentrates the majority of jobs and therefore receives the majority of daily traffic. Together with the southern conurbation, almost 70% of jobs are located in the central and southern parts of the country. The main commuter flows are therefore to these two centres. In terms of structure, following a centre-periphery logic and due to the cost of distance, the centres attract more residents living in nearby municipalities. The catchment areas of the centres overlap, with each centre having its own catchment area. Since the last census, the central conurbation has been attracting more and more employed residents. The spatial distribution of employed residents and home-work flows reveals structures specific to each centre: highly centralised for the Agglomération-centre and the northern centres, polycentric for the Agglomération-sud. Over the intercensal period, the shape of these areas remained stable, but the number and intensity of flows increased.

Publications based on census data have so far focused on certain aspects specific to Luxembourg, such as its demographic dynamism and multiculturalism. Such dynamism, linked in particular to the labour market, is not without consequences in terms of the supply and location of housing and jobs, and consequently access to employment. Depending on the needs of the labour market, the availability of housing and the transport supply, individuals will adopt specific residential or mobility choices. The interdependence between spatial planning policies, residential strategies and job supply and demand can be analysed in particular through "home-work" journeys. In this context, "commuting" means travelling to and from one's place of residence and one's place of work¹.

For the purposes of this publication, we are interested in employed residents making a home-to-work journey, also known as a 'commuter', regardless of the mode of transport, and excluding home-to-school journeys, which will be the subject of a forthcoming publication. Cross-border journeys are also excluded, as cross-border workers are not included in the population census. The number of jobs in the employment centres, as defined below, and the daily flows arriving there are therefore underestimated.

Generally speaking, jobs are mainly concentrated in cities. They even help to define them. Job centres form a functional system with places of residence. This system can be represented spatially: a given population commutes to a given centre, thus defining an area known as a "commuting area"². These areas are sometimes

referred to as functional urban areas, as opposed to morphological urban areas, which are concerned not with flows but with the degree of urbanisation (see publication n.07).

So, in order to complete the analysis of the distribution of the resident population³, we go further here by asking the following questions: Where do the country's residents work? Where are residents' jobs mainly concentrated? What distinguishes one employment centre from another? How is their commuting area structured? What is the intensity of the flows they receive? Each of these questions is important, because they stem directly from the separation of places of work and places of residence, and therefore raise questions about general spatial planning and the supply and use of transport systems.

We will therefore focus mainly on the definition and analysis of employment centres, commuting areas and commuting flows for the population living in Luxembourg. Data from the 2021 census provides us with the opportunity to analyse the commuting patterns of the population of Luxembourg, while measuring changes with the 2011 census at the municipal level. In addition, the availability of residential information at the level of 1km² cells means that, for the first time, the origin of journeys can be identified in great detail⁴.

Firstly, we will define precisely how the employed population is distributed in relation to the general population and describe the geographical distribution of the employment rate (section 1), since this is the basis for the analysis of commuting flows. We will then describe the profiles of the municipalities in order to distinguish between those that are employment centres and those that are more residential (section 2). This step will enable us to define five main employment centres on the basis of jobs in 2021 (section 3), and then to study the commuting areas of these centres and their evolution between 2011 and 2021 (section 4). Finally, we will represent the various home-work flows between all the municipalities and according to the employment centres in order to distinguish their intensity and any structural changes between the two censuses (section 5).

1 See glossary at the end of this document for definitions.

2 See glossary.

3 See the publication "Distribution spatiale de la population au Luxembourg" (RP 1ers résultats 2021, no. 7).

4 See the publications RP 1ers Résultats n°3 and n°7 for more details on grids and degrees of urbanisation.



I.

Activity structure of the population and geography of the employment rate

To fully understand commuting, we first need to understand the working population (1.1.) and its geographical structure at home (1.2.).

1.1. Definitions of the various population categories

The country's resident population can be divided into several categories. The first distinguishes the working-age population (aged 15 to 64) from those generally considered too young or old to be already or still active (Figure 1).

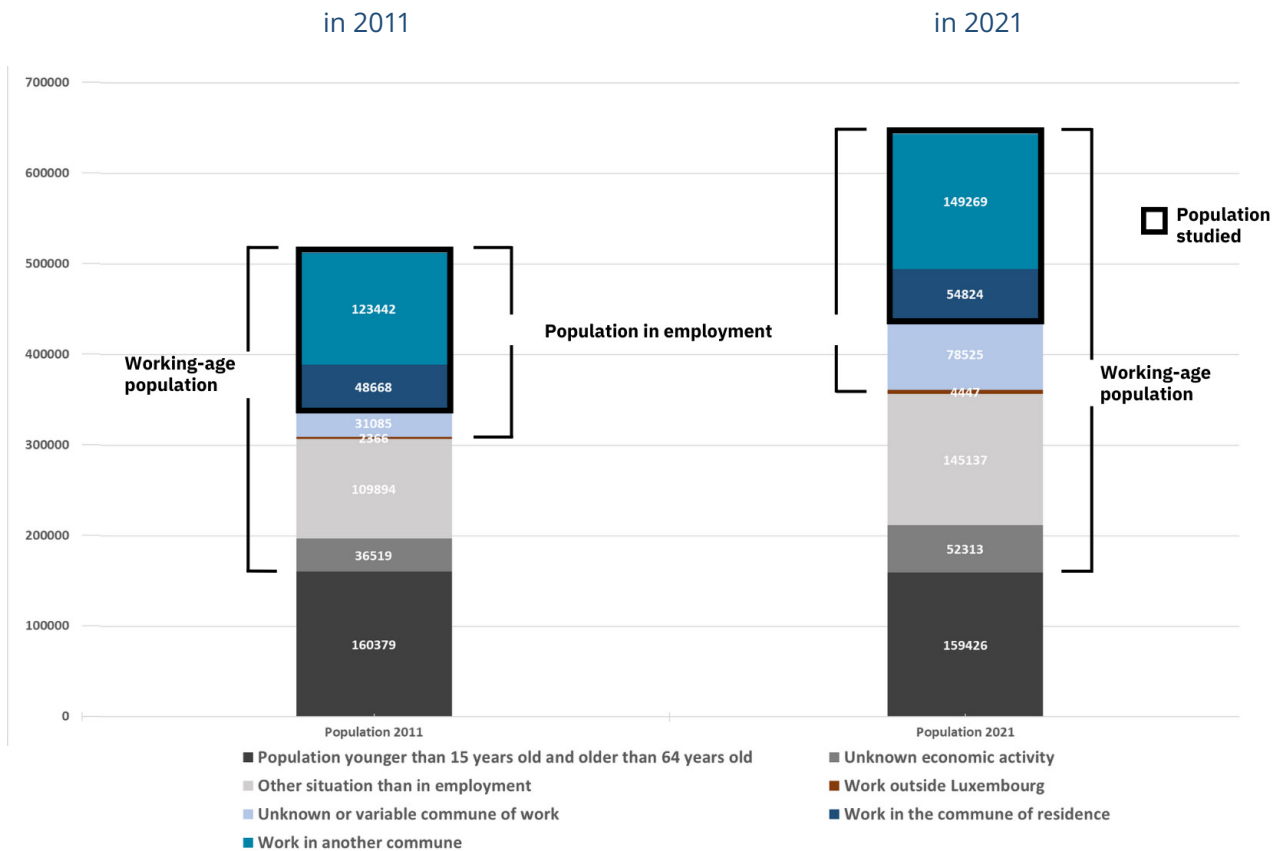
Then, among people of working age, a further division distinguishes those in employment from those in other situations (studying, retired, looking for work, etc.). The latter will be the subject of future publications⁵.

The category of employed persons is then subdivided into residents working in Luxembourg or working outside Luxembourg. In our case, due to the data required to analyse flows (municipality of residence and municipality of work known), the study focuses essentially on residents working in a Luxembourg municipality. Residents working outside Luxembourg (outgoing cross-border commuters) and incoming cross-border commuters will therefore not be considered, as stated in the introduction, since they are not part of the resident population surveyed.

Finally, the category of residents with a job in Luxembourg is subdivided into residents working in their commune of residence, or leaving their commune of residence and entering another Luxembourg commune to work there (= commuters).

⁵ The next publication will deal with respondents who indicated that they were unemployed (2% of respondents) and in employment (48.5%). Pupils/students (21%) and retired people (19.5% of respondents) will then be the subject of specific analyses.

Figure 1: Distribution and definitions of residents according to their activity status



Sources: STATEC RP 2011, RP 2021. Note: the number of people in employment only includes respondents to the question on economic activity.

Since the February 2011 census, Luxembourg’s total population has risen by 131,588 to reach 643,941 in November 2021. Beyond this increase, the changes in the population in employment are particularly significant when we look at the proportions. Between 2011 and 2021, the proportion of residents in employment among the total population rose from 43.2% (205,561) to 48.5% in 2021 (287,067).

In 2021, of these employed residents, 78,525 unfortunately did not provide the municipality of work, or did so incorrectly, or declared a variable place of work⁶. Thus, in this publication, the analysis concerns the 204,093 employed residents making home-to-work journeys to a known Luxembourg municipality in 2021 (there were 172,110 in 2011).

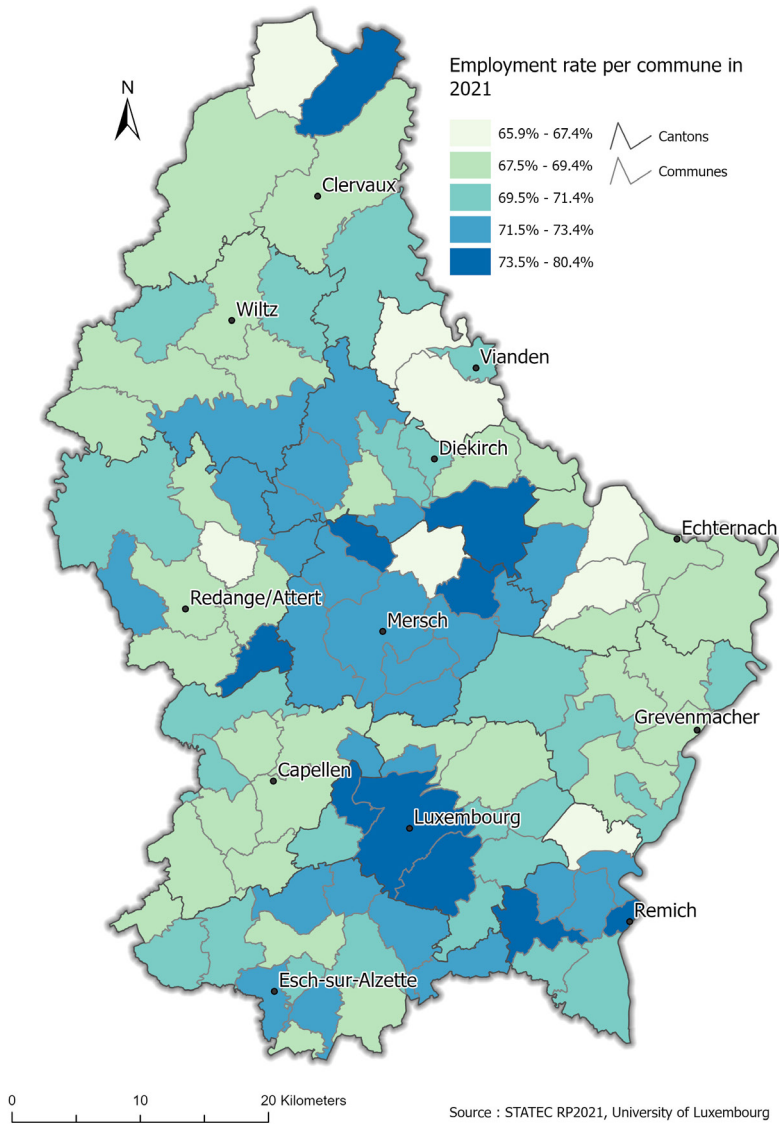
1.2. An employment rate that varies from one municipality to another

The employment rate takes into account all residents in employment, including those whose municipality of work is not known. It corresponds to the number of working-age residents living in the municipality. In 2021, the average employment rate for the country is 72.3% according to the census, meaning that 72.3% of people of working age⁷ actually have a job.

⁶ These people who have not indicated a commune of work will not be taken into account in this analysis, except for the employment rate. This is a large number, but we have no reason to believe this these lack of information has any particular structure that would bias the definition of commuting areas or the intensity of inter-municipal flows.

⁷ People aged 15 to 64 whose economic activity status is unknown have been removed from the total number of people of working age.

Map 1. Employment rate by municipality in 2021



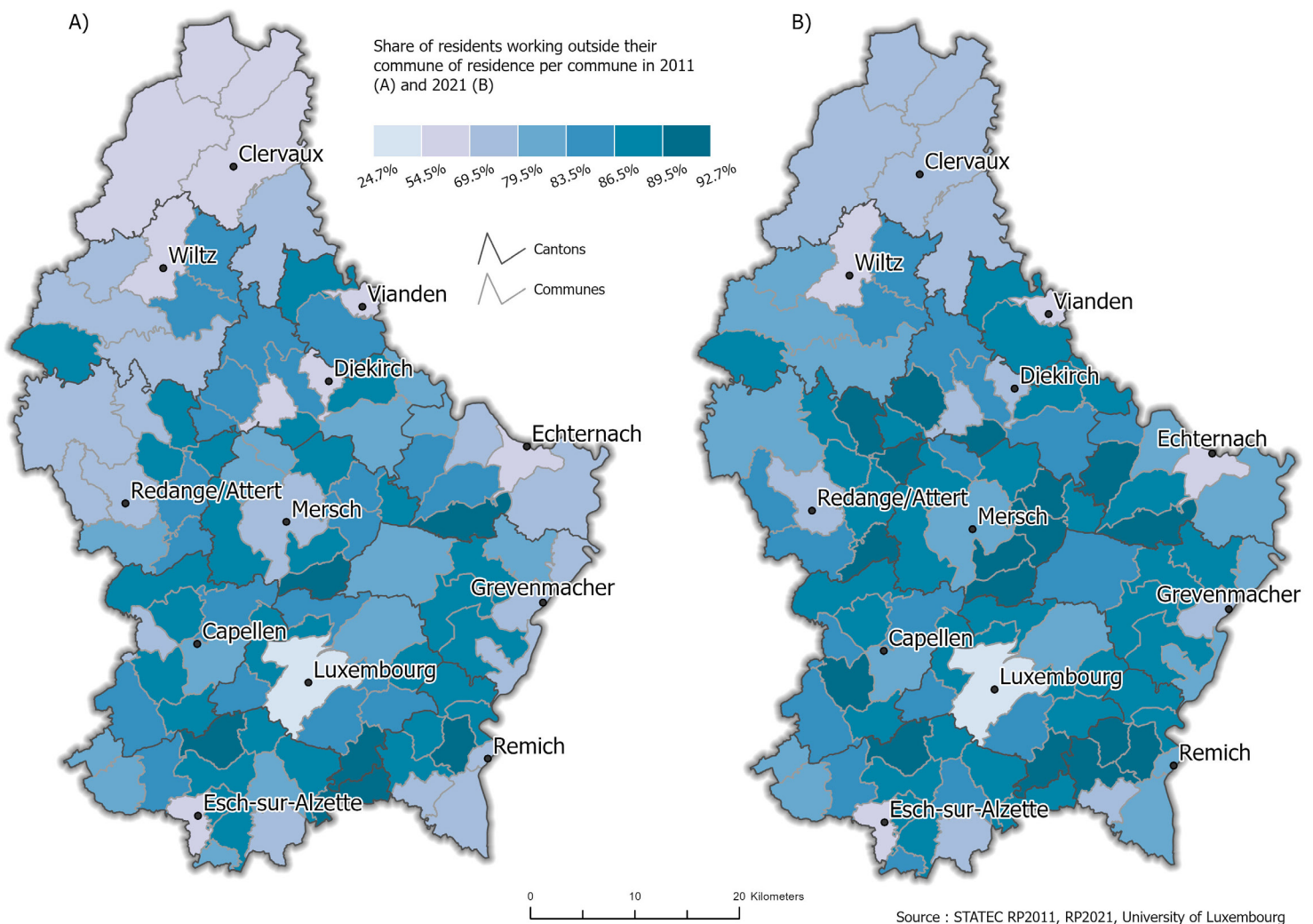
In 2021, Map 1 shows that the municipalities with an employment rate below the average for the country are mainly located on the borders. Overall, we can discern a few clusters of municipalities with an employment rate higher than or equal to the average employment rate, notably around the capital, around Esch-sur-Alzette, and near Mersch and the Nordstad. A high employment rate therefore tends to go hand in hand with suburban areas or the largest towns, but this is not systematic. Smaller urban centres in the north and east tend to have lower than average employment rates.

II. Commuters: from home to work

2.1. Where do commuters live?

If we consider residents whose municipalities of work are given, 149,269 will be travelling to a municipality of work that is different from their municipality of residence in 2021, compared with 123,442 in 2011 (see Figure 1). It is mainly these employed residents who make home-to-work journeys, and who will be included in the analysis of flows below.

Maps 2. Share of residents working outside their municipality of residence by municipality in 2011 (A) and 2021 (B)





In 2021 (Map 2.B), the proportion of commuters is highly variable across the region and varies according to a double effect: inversely with the number of jobs in a municipality (as in the case of Luxembourg City), but directly with the proximity of the major municipalities that provide jobs. The figures range from 24.7% for Luxembourg City (a low proportion of commuters, as many residents living in the capital also work there) to 92.7% for Weiler-la-Tour. Other municipalities with a high percentage of commuters include Grosbous (92.2%), Waldbredimus (92%), Lorentzweiler (91.7%), Bech (91.3%) and Reckange-sur-Mess (91.2%).

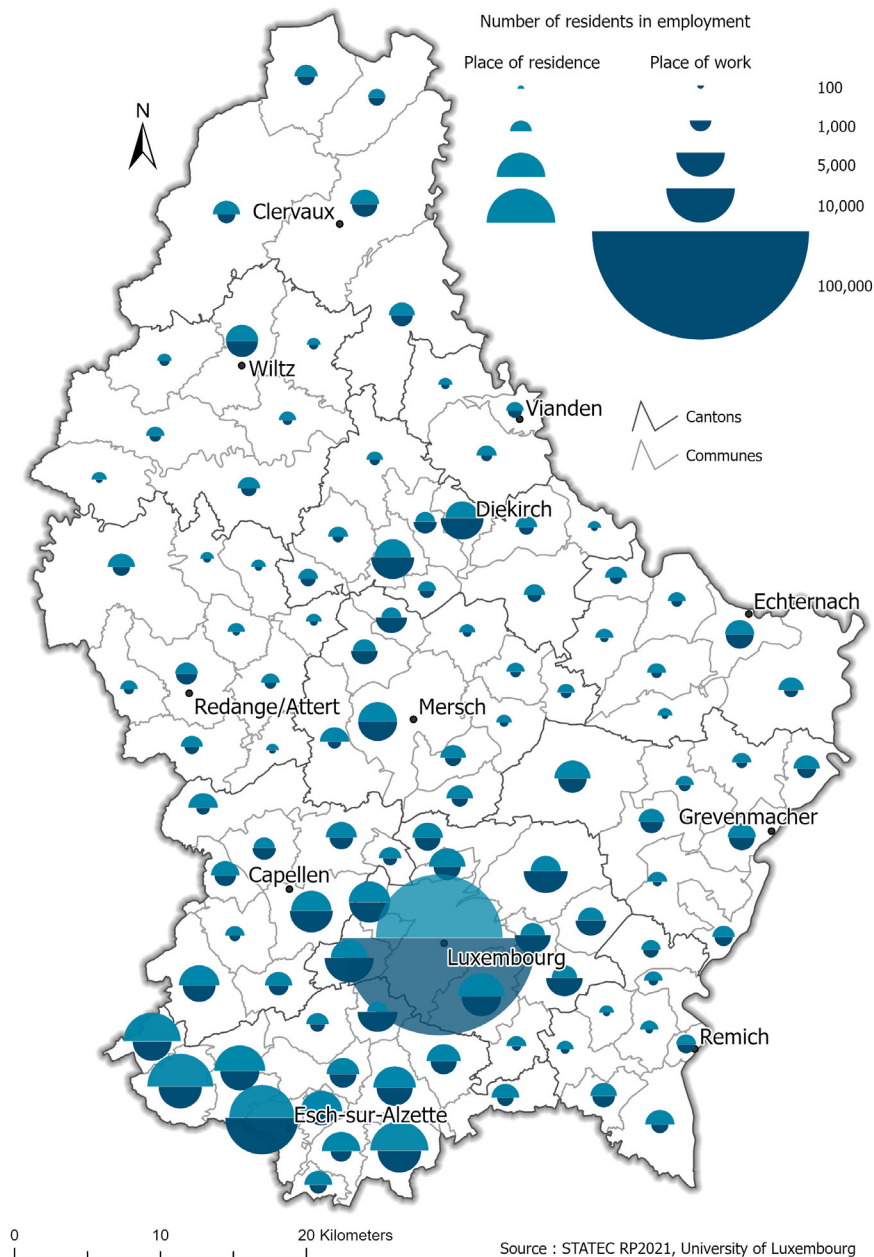
The changes in the intercensal period are visible. For example, in 2011 (Map 2.A), only 6 municipalities had an extreme proportion of commuters (more than 89.5% of residents working in another municipality), compared with 17 in 2021. The map is darker in 2021, as the vast majority of municipalities jump by at least one class, thus increasing the proportion of residents working in another municipality by 5 to 10 percentage points. Only 14 municipalities have a lower proportion of commuters today, and these are mainly employment centres (including Luxembourg City (-3.9)).

Overall, a structure emerges, with peripheral municipalities having a high proportion of residents working outside their municipality of residence, and centres having a higher proportion of residents working in their municipality of residence. This observation has become more pronounced over the years, with values increasing in municipalities close to Luxembourg City, Nordstad and Mersch, reflecting a greater spatial concentration of employed residents commuting to municipalities other than their municipality of residence.

2.2. Where are they going to work?

Representing the number of residents in employment according to both their municipality of residence and their municipality of work gives an effective indication of whether a municipality is more likely to be a source or receiver of worker flows (Map 3). This map makes it easier to define the profile of a municipality as a residential centre, in the first case, or as an employment centre, in the second. More specifically, Map 3 shows both the differences between municipalities in terms of numbers of workers (difference in the size of the semicircles), and also in terms of whether they are more residential (light blue semicircle = number of residents living there) or more attracting (dark blue semicircle = number of residents working there).

Map 3. Number of residents in employment by municipality of residence and municipality of work in 2021



The first observation concerns the importance of Luxembourg City both in terms of jobs provided (80,188 residents work in Luxembourg City) and employed residents living in the capital (33,970)⁸. The outskirts of Luxembourg City are not to be outdone, as the municipalities of Bertrange, Hesperange, Mamer, Niederanven and Strassen have a fairly high number of jobs and employed residents. On the other hand, the Conurbation-sud⁹, in particular Esch-sur-Alzette, Differdange, Sanem, Pétange, Bettembourg and Dudelange, is characterised by fairly large semi-circles. However, there is a contrast between the communes in the south, which seem to have a more residential profile (Esch excepted),

and those on the outskirts of Luxembourg City, which offer more jobs than they have residents in employment who live in these communes. It is mainly around Luxembourg City, the town of Esch-sur-Alzette and the Nordstad that we find the most attracting municipalities. The other municipalities in the area tend to have residential profiles, particularly those in the south, due to their large number of residents, and some municipalities with fairly balanced profiles, such as Mersch, Weiswampach, Strassen and Wiltz.

⁸ It should also be noted that 23,854 residents of Luxembourg City did not provide their municipality of work and are therefore not included in these figures.

⁹ A large urban area made up of several towns located close together.



III.

Five contrasting employment centres

Locating jobs and identifying centres of employment is a necessary exercise in defining commuting areas¹⁰. While map 3 provides a summary of the level of “inbound” and “outbound” workers per municipality, it does not make any groupings other than visual ones. A more appropriate method has been used to define employment hubs by classifying municipalities in order of importance in terms of the number of jobs offered, and grouping together related municipalities.

Methodology insert

Defining employment centres is not an easy task, for a number of reasons. The first is linked to the data available: cross-border commuters are not counted in the census, and information on the municipalities where people work is not complete, so the number of jobs available in each municipality is underestimated. In addition, the methods used by the OECD and INSEE¹¹ cannot necessarily be used or adapted to the case of Luxembourg in such an approach. We have therefore chosen to use the INSEE method for defining employment clusters in urban areas¹², adapting the threshold to 2,000 jobs¹³ in 2021 and aggregating the municipalities identified as centre and peripheral municipalities into a single continuous employment cluster based on a rule of contiguity. This method is a compromise between the INSEE urban areas and the agglomerations of the Programme Directeur de l'Aménagement du Territoire (PDAT).

¹⁰ See glossary.

¹¹ See OECD definition of FUA and INSEE definition of urban catchment areas.

¹² See INSEE definition of urban areas.

¹³ The choice of a threshold of 2,000 jobs (instead of 1,500) is justified by a jump in the statistical distribution of jobs in 2021. Kayl, Rumelange and Schiffange are therefore not included as a result of this adjustment.

3.1.

More than three-quarters of employed residents work in five employment centres

Five employment centres have been identified (Table 1 and Map 4). They are made up of 22 municipalities and account for 156,725 jobs, or 3 out of every 4 jobs held by residents.

Table 1. Breakdown of jobs held by residents by municipality and employment centre

Towns in the cluster	Number of jobs held by residents	
	Workforce	Percentage
Luxembourg City	80 188	39.3%
Bertrange	5 116	2.5%
Niederanven	4 138	2.0%
Mamer	3 929	1.9%
Strassen	3 527	1.7%
Leudelange	3 387	1.7%
Hesperange	3 330	1.6%
Contern	2 862	1.4%
Sandweiler	2 754	1.3%
Total in the conurbation	109 231	53.5%
Esch-sur-Alzette	11 413	5.6%
Dudelange	4 052	2.0%
Differdange	3 983	1.9%
Sanem	3 247	1.6%
Pétange	3 206	1.6%
Bettembourg	2 773	1.4%
Käerjeng	2 303	1.1%
Total in the southern conurbation	30 977	15.2%
Ettelbruck	3 960	1.9%
Diekirch	3 919	1.9%
Colmar-Berg	2 083	1.0%
Erpeldange-sur-Sûre	1 165	0.6%
Total Nordstad	11 127	5.5%
Mersch	3 243	1.6%
Wiltz	2 147	1.1%
Total for the divisions	156 725	76.8%
Outside centres	47 368	23.2%
Total	204 093	100%

Source: STATEC RP 2021. Note: the numbers only include respondents to the question on the municipality of work



To be more precise:

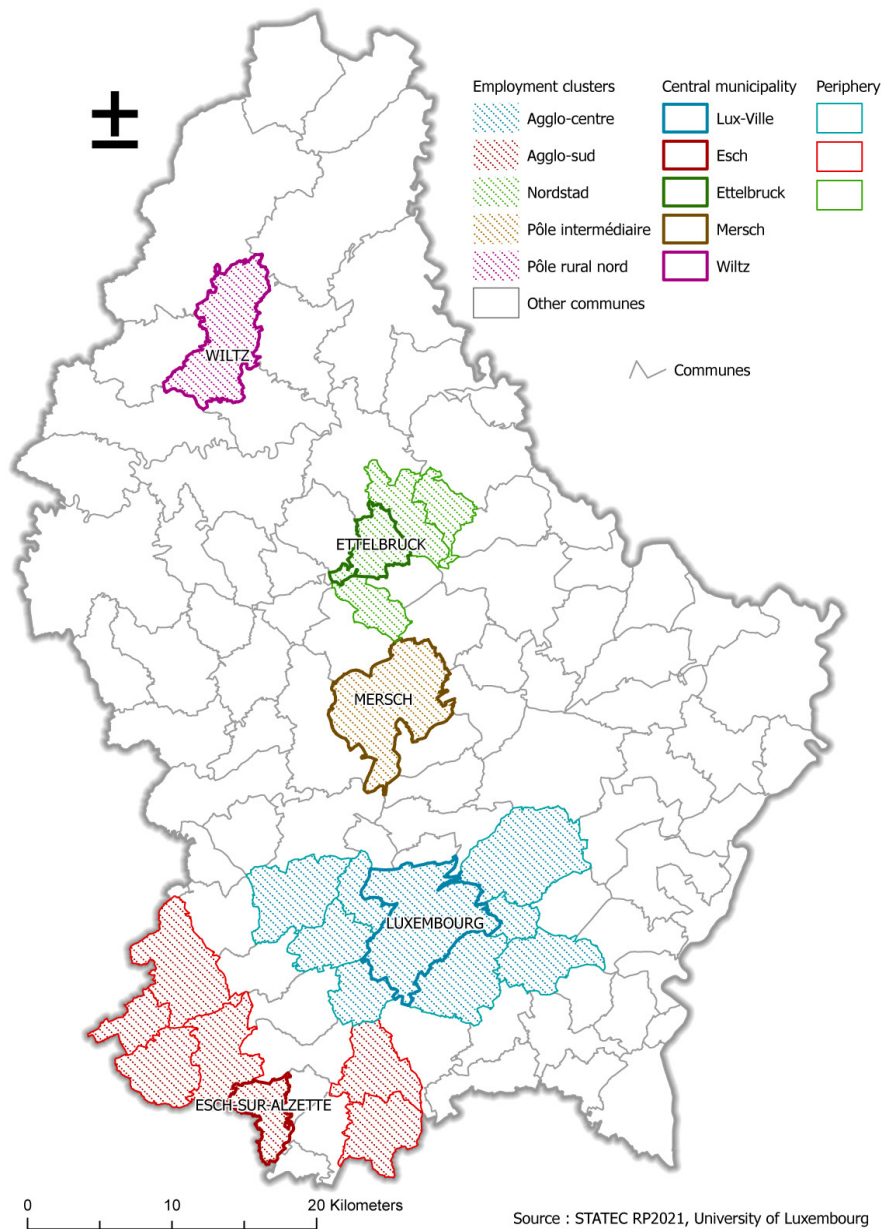
- the Agglomération-centre is made up of 9 municipalities, ranging from 2,754 jobs in Sandweiler to 80,188 jobs in Luxembourg City, with a total of 109,231 jobs, i.e. 53.5% of the total number of jobs held by the country's residents.
- The second centre is the Agglomération-sud, with a total of 30,977 jobs (15.2% of all resident jobs) in 7 municipalities. The municipality with the highest number of jobs occupied by residents is Esch-sur-Alzette (11,413 jobs); the municipality with the lowest number of jobs is Käerjeng (2,303 jobs).
- The country's third main centre is the Nordstad, with 4 municipalities (ranging from 3,960 jobs in Ettelbruck to 1,165 in Erpeldange-sur-Sûre¹⁴) and 11,127 jobs (5.5% of total resident employment).
- Mersch, an intermediate centre between the conurbation and the Nordstad, consists solely of its own municipality (3,243 resident jobs, or 1.6%).
- Wiltz, a rural centre in the north of the country, also has its own municipality (2,147 jobs, or 1.1%).

The remaining 23.2% of jobs are in the 80 other municipalities in the region (outside the employment centres).

¹⁴ The municipality of Erpeldange-sur-Sûre has been added as a municipality in the Nordstad employment centre in order to consider the centre on an ongoing basis.

3.2. A specific territorial configuration

Map 4. Main employment centres in Luxembourg (central municipality and outskirts)



In addition to identifying the centres (three of which are made up of a central municipality and a suburb), their location is interesting. Firstly, there is a contrast between the southern and northern parts of the country, with almost 70% of all jobs held by residents located in the southern part (Agglomération-centre and Agglomération-sud), compared with 8.1% in the north. Secondly, these two centres are not only the largest, but are also relatively close to each other and comprise the country's most densely populated municipalities. They will therefore carry the majority of commuter flows within and between them. Finally, although their respective peripheries are fairly similar in terms of the

number of jobs and the number of municipalities, the weight of the central municipality strongly distinguishes the nature of these two conurbations: 73.4% of jobs in the cluster are in the centre for Luxembourg City and 36.8% for Esch-sur-Alzette, demonstrating the strong monopolisation of the former and the polycentric nature of the latter¹⁵. Comparatively, we also note that the number of jobs in the main centre in the north (the Nordstad) corresponds more or less to that in the town of Esch-sur-Alzette.

¹⁵ See glossary.



IV. Commuter areas to main employment centres

Having identified the main employment centres, we can now study the commuting areas around these centres. These commuting areas correspond to the proportion of residents working in a given employment centre among the employed inhabitants of each municipality. These areas make it possible to visualise the attraction of an employment centre for the country as a whole. Here, we therefore include residents working in their own municipality of residence (in addition to commuters, in other words), as the latter may travel within clusters and municipalities. Although we don't go as far as this, these areas can then be used to delimit the rings

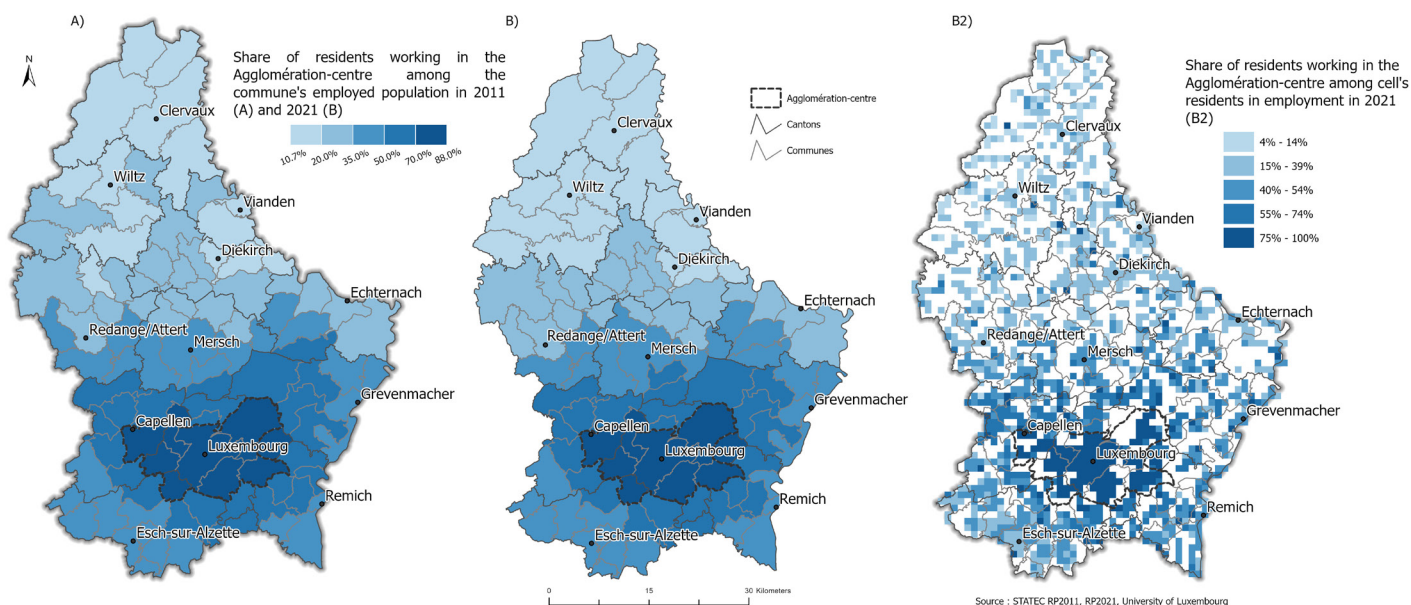
of strict belonging around the centres. In France, for example, INSEE defines the rings around major centres¹⁶ on the basis of 40% of residents working in a centre. It also defines multipolarised areas. More often, in the literature on FUAs (Functional Urban Areas), lower thresholds are used (15% in Europe)¹⁷. Given the size of the country, the importance of cross-border work which is not included in the census, and the majority effect of Luxembourg City (see below), we present the shares of resident workers working in each centre without imposing any limit.

¹⁶ According to the INSEE definition of urban areas.

¹⁷ See glossary.

4.1. The conurbation at the heart of residents' journeys

Maps 5.A, B and B2. Share of residents working within the conurbation-centre by municipality in 2011 (A) and 2021 (B) and by 1km² cell in 2021 (B2)



Maps 5.A, B and B2 above show the influence of the country's main centre, the Agglomération-centre, with almost 110,000 jobs held by residents. First of all, the proportion of residents in employment varies according to a centre-periphery logic as one moves away from the central municipality. In fact, in 2021 (Map 5.B1), for each municipality of residence, at least 10% work in the conurbation-centre, up to 88% for Luxembourg City and more than 70% for the outlying municipalities that make up the cluster, as well as Kopstal and Schuttrange. Of the 102 communes in the country (in 2021), 24 have a proportion of residents working in the conurbation-centre of between 50% and 70%, and 30 communes between 35% and 50%. As a result, for more than a third of the municipalities in the region, half of the residents work in this centre, and for almost two-thirds of the municipalities, more than a third of the residents work there.

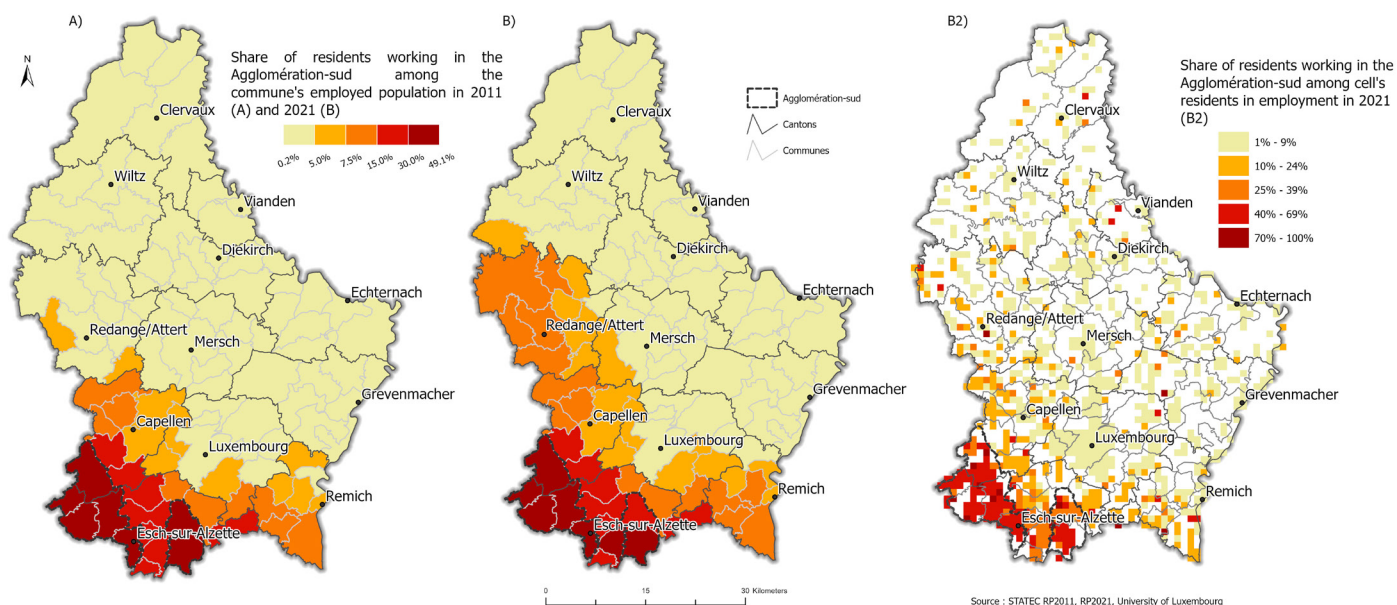
Between the two censuses, the structure of this commuting area changes little. However, the conurbation is attracting an increasing number of residents in employment, as their share is rising in the municipalities of the centre and nearby municipalities. The most noticeable changes are to be found in certain municipalities

to the north: the share of Wahl, Esch-sur-Sûre, Goesdorf, Diekirch and Reisdorf is increasing, while that of Putscheid, Kiischpelt and the municipality of Lac de la Haute-Sûre is decreasing.

The map by 1km² cell (Map 5.B2) gives a better idea of the specific features of the commuting areas by eliminating the uninhabited or non-commuting areas in each municipality, even though the structure of the central conurbation's commuting area remains similar to that by municipality. Within the cluster itself, only Luxembourg City has almost all of its cells containing residents in employment, and almost all the cells in the communes have shares of between 75% and 100%. The maps by municipality show a variation in the proportion of residents with the distance from the central municipality, with some more marked contrasts, particularly in the north, where some cells have a concentration of over 50% around cells with lower proportions. Others that are further away still have very high shares, such as Wintrange, Berdorf and Esch-sur-Alzette.

4.2. The southern conurbation: a stable and expanding centre along the borders

Maps 6.A, B and B2. Share of residents working in the Agglomération-sud by municipality in 2011 (A) and 2021 (B) and by 1km² cell in 2021 (B2)



The southern conurbation is the country's second largest employment centre. As in the case of the Agglomération-centre, the proportion of residents working there decreases with distance, regardless of the census date. In 2021 (Map 6.B), the commuting area of the Agglomération-Sud will extend mainly along the southern and western borders of the country and as far as those of the Agglomération-Centre, Mersch and Nordstad. The municipalities with the highest shares are those in the cluster and Kayl (30 to 49%). Of the municipalities that make up the Agglomération-sud employment cluster, Bettembourg and Käerjeng have a lower proportion of residents working in the cluster than in the Agglomération-centre (56% and 45% respectively). The expansion between 2011 and 2021 of the commuting area of the Agglomération-Sud is striking, particularly along the western border, in the canton of Rédinge (see map 6.A). The changes in the south of the country are less visible.

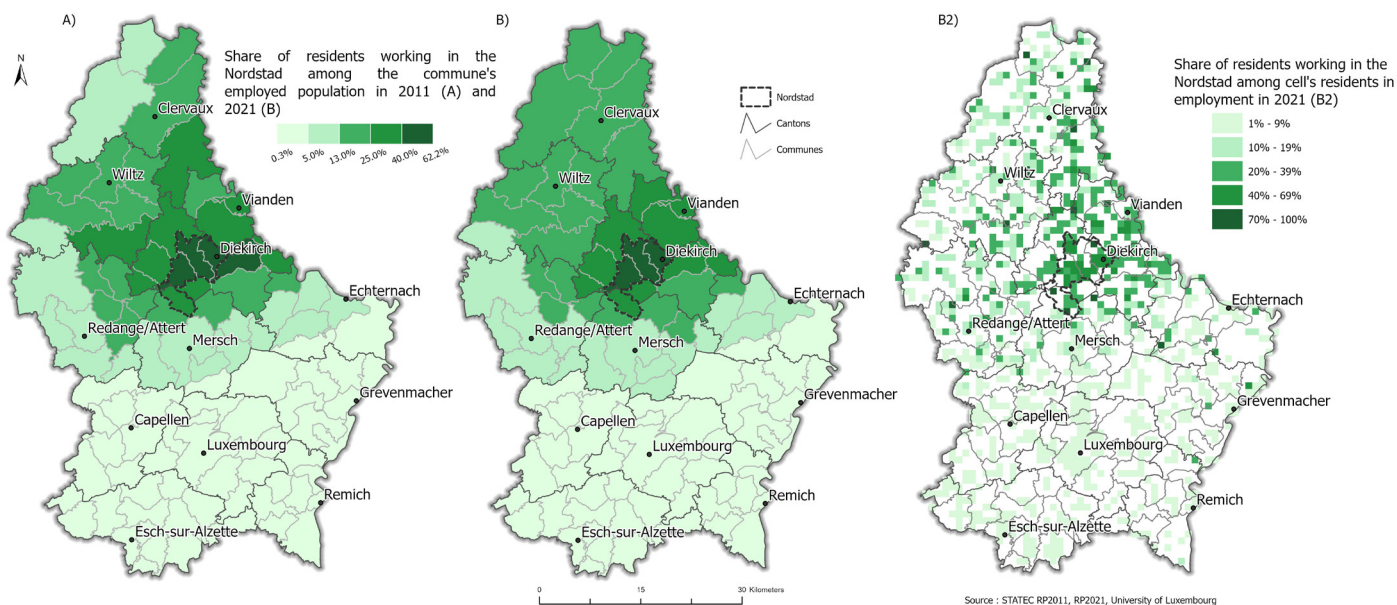
The structure of the commuting area in 2021 is shown on the map by 1km² cells (Map 6.B2), with a large proportion of the cells in the centre containing more than 40% of residents working in the southern conurbation, and some cells with more than 70%. Some of the

municipalities closest to the centre, such as Kayl, Schiffflange and Mondrange, have cells with 25% to 40% of residents working in the conurbation-sud, covering almost the entire surface area of these municipalities. As you move further away from the centre, the number of cells with residents working in the Agglomération-sud decreases. Some of the more distant cells still have a large proportion of residents in employment, such as those in the communes of Rédinge, Junglinster, Clervaux, Tandel and Rambrouch.

As mentioned earlier, the country's two main centres, the Agglomération-centre and the Agglomération-sud, are particularly close and comprise the most populous towns. For some municipalities located between these two centres, such as Pétange, Dudelange, Bettembourg and Schiffflange, a large proportion of the employed population work in one or the other.

4.3. The Nordstad: a perceptible influence to the north

Maps 7.A, B and B2. Share of residents working in Nordstad by municipality in 2011 (A) and 2021 (B) and by 1km² cell in 2021 (B2)

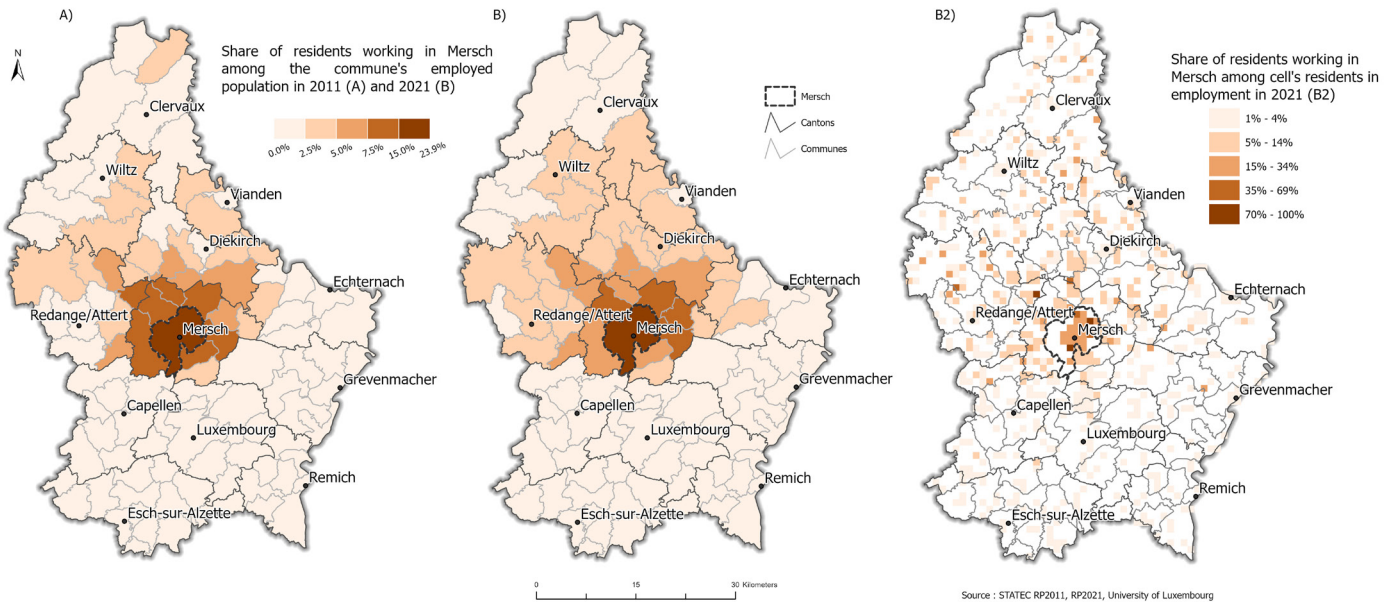


As far as Nordstad is concerned, in 2021 (Map 7.A), the proportion of residents in employment decreases with distance from the centre of the cluster. The municipalities that make up the cluster have the highest proportion of residents working in the Nordstad (between 40% and 62.2% for Ettelbruck). Colmar-Berg, which is also part of the cluster, is an exception (33.5% working in the cluster). Because of its geographical location, it is also very attracted by the Agglomération-centre (32.2%) and the Mersch cluster (6.7%). They are followed by the nearest municipalities, such as Vianden, Tandel and Bettendorf to the east, Feulen and Mertzig to the west, Bourscheid and Putscheid to the north and Schieren to the south. All of the municipalities located further north have shares of between 13 and 25% of residents in employment in the Nordstad, as well as some municipalities to the west as far as Wahl and Prézérdaul and to the south as far as Bissen, La Rochette and Vallée de l'Ernz. In the west, from Boulaide, via Redange-sur-Attert, to Beckerich, the municipalities have shares of residents in employment in the Nordstad of between 5% and 13%.

Since 2011 (Map 7.B), the proportion of residents from the core municipalities working in the Nordstad has fallen in favour of the conurbation-centre, particularly in Ettelbruck and Diekirch. However, there has been a northward shift, particularly in Wincrange and Troisvierges. On the map by 1km² cell (Map 7.B2), the majority of cells where more than 70% of residents work in the Nordstad are in or around the cluster, and the furthest away are mainly to the north in Wiltz, Troisvierges and Parc Hosingen, and to the west in Goesdorf, Boulaide and Redange-sur-Attert.

4.4. Mersch: a limited attraction

Maps 8.A, B and B2. Share of residents working in Mersch by municipality in 2011 (A) and 2021 (B) and by 1km² cell in 2021 (B2)



The situation of Mersch is interesting and special because this centre, consisting of a single municipality, is geographically located between the conurbation and the Nordstad. Overall, the centre's commuting area tends to extend to the north of the country, and to a lesser extent to the west and east. In 2021 (Map 8.B), it can be seen that the municipality with the highest proportion of residents in employment in Mersch is the central municipality, with a relatively low proportion compared to the other centres. While only 18.9% of Mersch residents work in the Mersch centre, 47.3% work in the central conurbation. Only 3 communes have between 7.5 and 15% of residents working in Mersch. There are also a few municipalities with a share of between 5 and 7.5%, such as Ettelbruck and Grosbous in the north, Vallée de l'Ernz in the east and Saeul in the west, but their numbers are also limited. Because of its proximity to the conurbation, Mersch's commuting area is extremely limited to the south. Almost all the communes to the south of the centre have less than 2.5% of their residents working in Mersch (with the exception of Lorentzweiler).

Over the last 10 years, the proportion of Mersch residents employed in their local authority has fallen significantly, from 23.9% in 2011 (Map 8.A), as has that of neighbouring municipalities. On the other hand, for some communes to the north, west and east, their

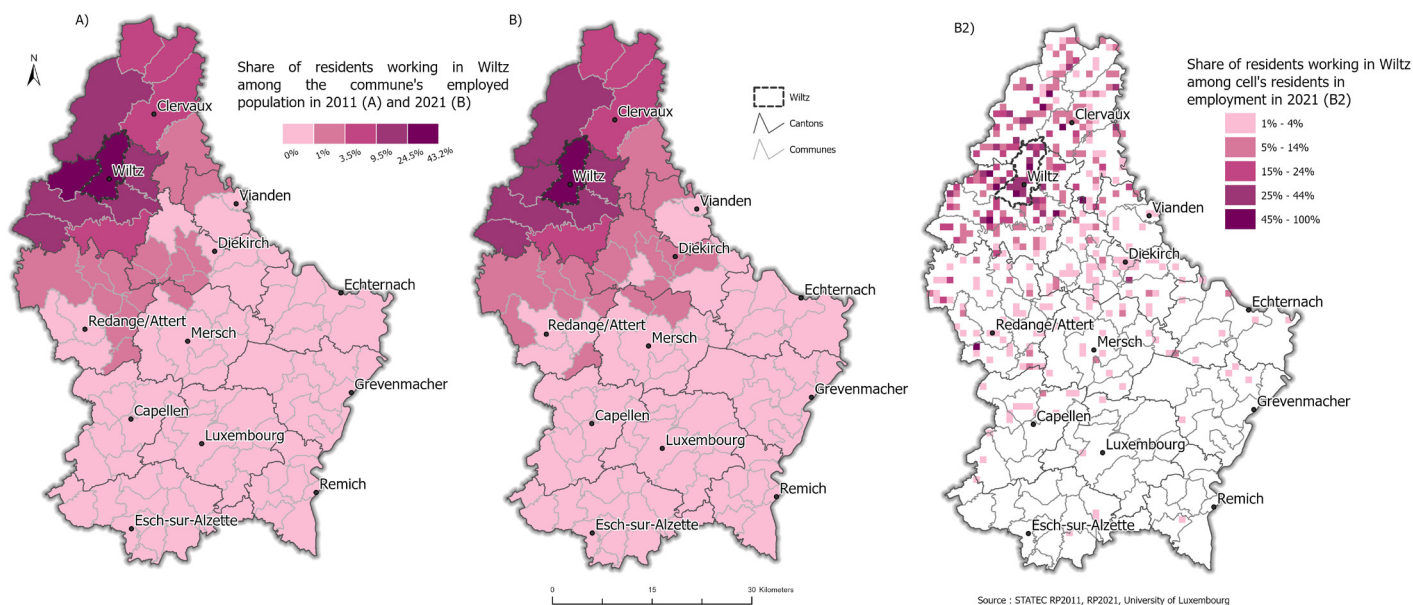
share has increased slightly, from less than 2.5% to values between 2.5 and 5%.

On map 8.B2, the cells with the highest percentages of residents working in Mersch are mainly located in Mersch, with a few in Schieren, Vichten and Rambrouch, but very few in the rest of the area. The centre is mainly made up of cells, with shares of 15 to 35%, of which, very few are found outside, except in Rambrouch and Parc Hosingen, but to a lesser extent. In the immediate suburbs, there are mainly cells with shares of between 5% and 14%, the number of which decreases significantly as you move northwards away from the centre, leaving only cells with shares of less than 5%.

The attraction of Mersch remains largely limited by the two centres (Agglomération-centre and Nordstad) that surround it. The nearby municipalities are gradually losing their share of residents in employment, mainly to the detriment of the conurbation-centre and Nordstad. Overall, the Mersch employment centre finds its workers mainly to the west and north, with the proportion of residents in employment increasing in the municipalities to the south of Wiltz and Clervaux.

4.5. Wiltz: mainly attractive to the west

Maps 9.A, B and B2. Share of residents working in Wiltz by municipality in 2011 (A) and 2021 (B) and by 1km² cell in 2021 (B2)



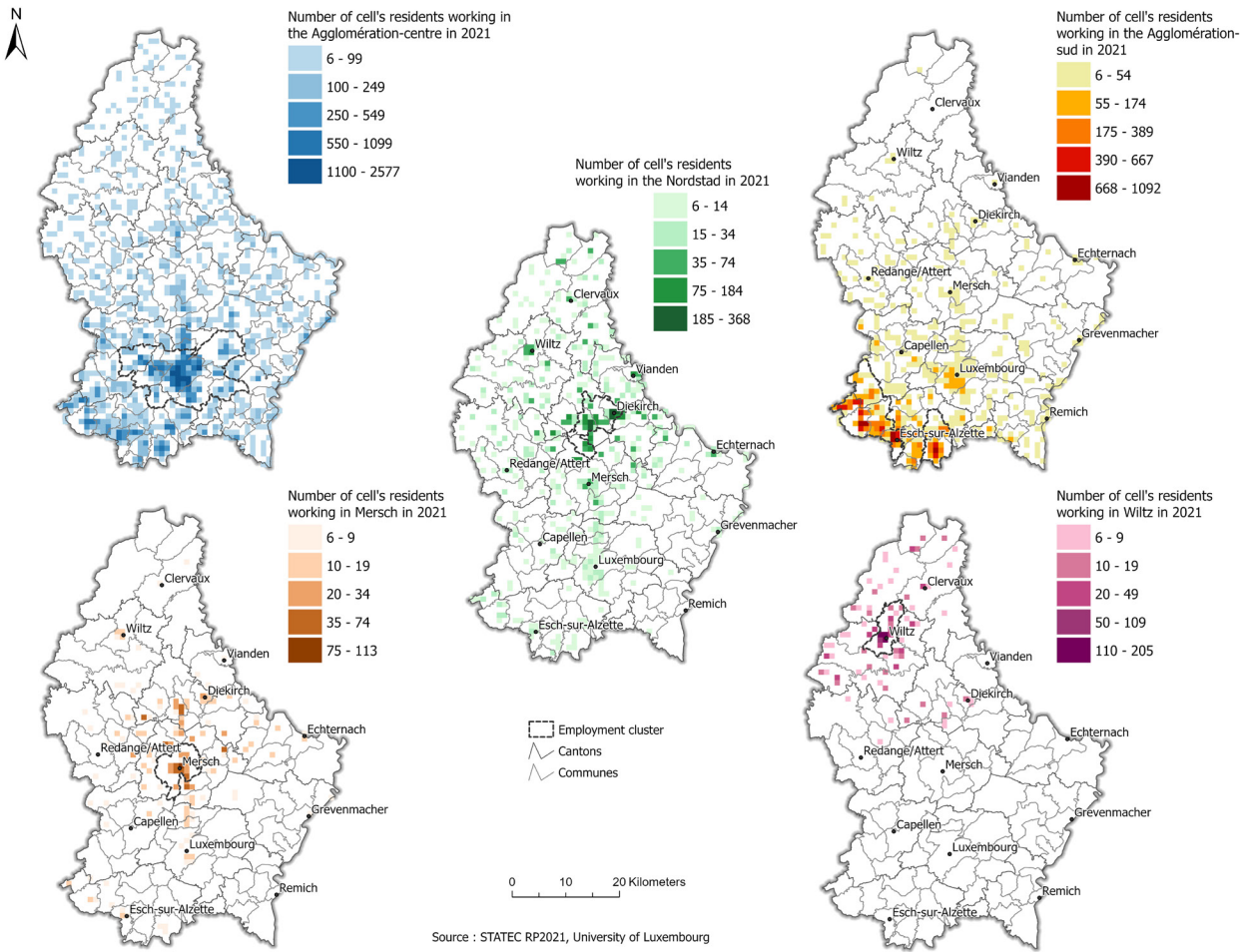
Also consisting of a single municipality, the Wiltz centre is the most northerly in the country, with its commuting area extending mainly along the western and northern borders, and to a lesser extent southwards to the commuting areas of the other centres. In 2021 (Map 9.B), the municipality with the highest proportion of residents working in Wiltz is Wiltz, with 34.3%. The majority of municipalities in the canton of Wiltz have shares between 9.5 and 24.5%, with the exception of Esch-sur-Sûre with 5.4%. In Clervaux, only Winrange has a high proportion of residents working in Wiltz, at 10%. Clervaux, Troisvierges, Weiswampach and Parc Hosingen are lower, with shares of 7, 6.5, 3.5 and 2.9% respectively.

Over the last 10 years, the proportion of residents working in Wiltz has fallen from 41.2% to 34.3%. This is also the case for the nearest municipalities, Winseler and Goesdorf. Only 4 municipalities in the two cantons have seen their shares increase: Clervaux, from 5% to 7%, Troisvierges, Parc Hosingen and Boulaide, to a lesser extent. For the other municipalities in the area, the situation changes very little.

Overall, the municipalities are mainly polarised towards one or even two employment centres, essentially the conurbation-centre, and generally the nearest or most attractive. In the more distant communes, although a large proportion of residents work in the conurbation-centre, there is a form of multi-polarisation, particularly in the west of the country, where residents also work in the southern conurbation, in Nordstad, Mersch and Wiltz. As for the municipalities in the north of the country, residents work in the central conurbation, Nordstad, Wiltz and Mersch to a lesser extent, or outside these centres. In the east, the majority of residents work in the conurbation, Nordstad and outside the centres. In the south and centre of the country, residents work mainly in the Agglomeration-Centre and the Agglomeration-Sud.

In addition to mapping the areas by municipality, the use of cells allows us to better understand the spatial distribution of workers destined for the employment centres and to quantify the extent of the areas. The five maps below show the number of a cell's residents (with a minimum of 5 employed residents) working in each of the centres.

Map 10. Number of residents working in an employment centre per 1km² cell in 2021



V.

Structure and trends in commuter flows from 2011 to 2021 by employment centre

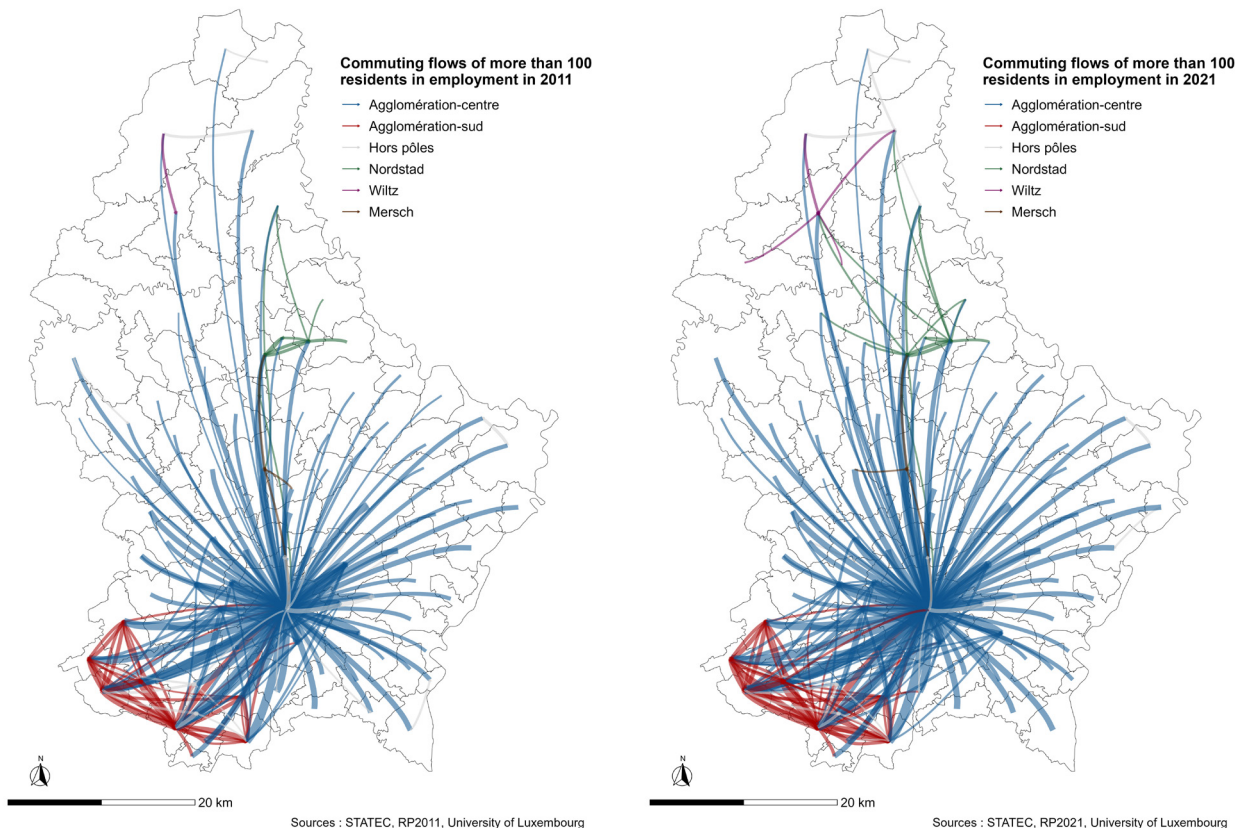
5.1. Concentration of flows between the centre and south of the country

Based on the identification of employment centres carried out above, it is possible to characterise the various worker commuting flows by employment centre. The flows observed range from 1 person to 25,578 in the case of Luxembourg City.

Methodology insert

For the sake of clarity, movements within the municipality of residence have been masked to make it easier to visualise the spatial structure of the various flows. The maps below therefore show the flows of residents in employment by municipality of residence towards their respective employment centres, in 2011 and 2021, according to the colour of the employment centre used on Map 4. For a more legible representation, the choice made, after several tests, is to retain the flows of more than 100 residents in employment and to normalise them by means of a logarithmic transformation. Maps 12 and 13 below show all resident flows according to different thresholds (10, 50, 100, 250, 500 and 2000).

Maps 11. Commuting flows of more than 100 residents in employment in 2011 (A) and 2021 (B)





In 2021, 235 different flows of more than 100 residents in employment will stretch across the entire region between different municipalities, for a total of 83,805 residents in employment (Map 11.B). Of the 235 flows mapped, 138 are destined for the conurbation-centre, representing more than 75% of residents in employment, i.e. 64,157.

Some major flows are also destined for the Agglomération-sud and come mainly from the other municipalities in the Conurbation-sud or from Luxembourg-City. In total, there are 52 flows accounting for 13,747 residents in employment, the majority of which are destined for Esch-sur-Alzette.

As far as flows into the Nordstad are concerned, the most significant are between Diekirch (213) and Ettelbruck (200), both as sending and receiving municipalities. The centre accounts for around 17 different flows for a total of 2,210 residents in employment. As for the flows to Mersch and Wiltz, there are 3 and 4 respectively, accounting for 369 and 499 residents in employment.

The main flows towards Wiltz come from Wintrange, Clervaux, Goesdorf and Lac de la Haute-Sûre. Despite having a larger number of jobs than Wiltz, Mersch has fewer significant flows, especially from Luxembourg-City, Helperknapp and Ettelbruck, which can be explained in particular by their location.

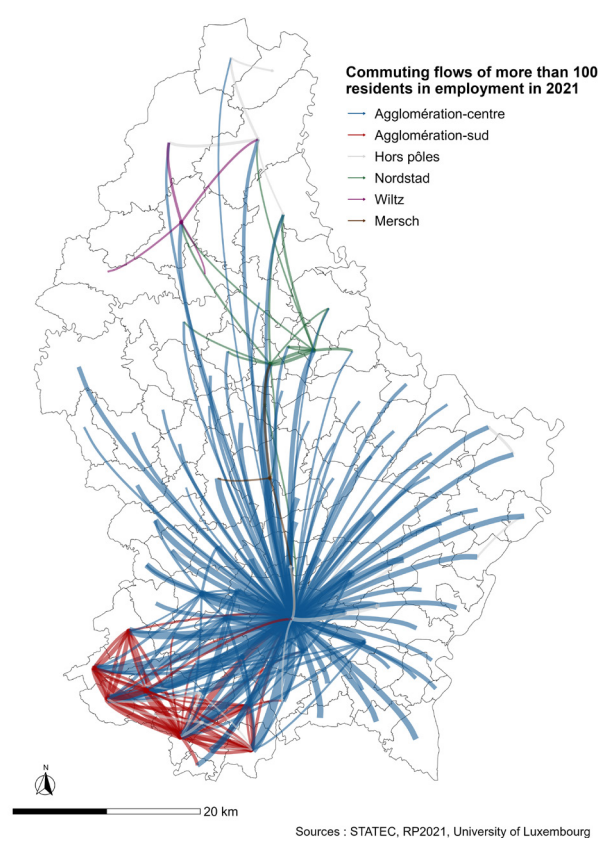
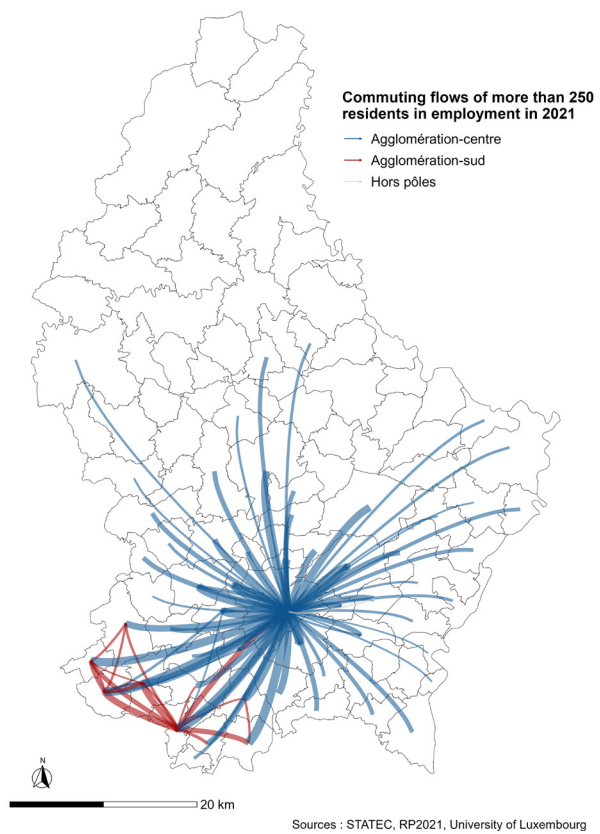
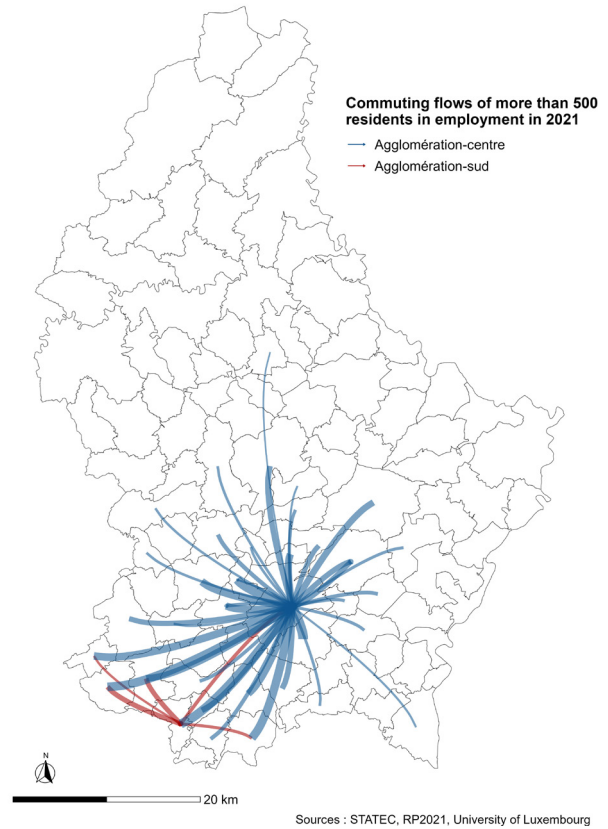
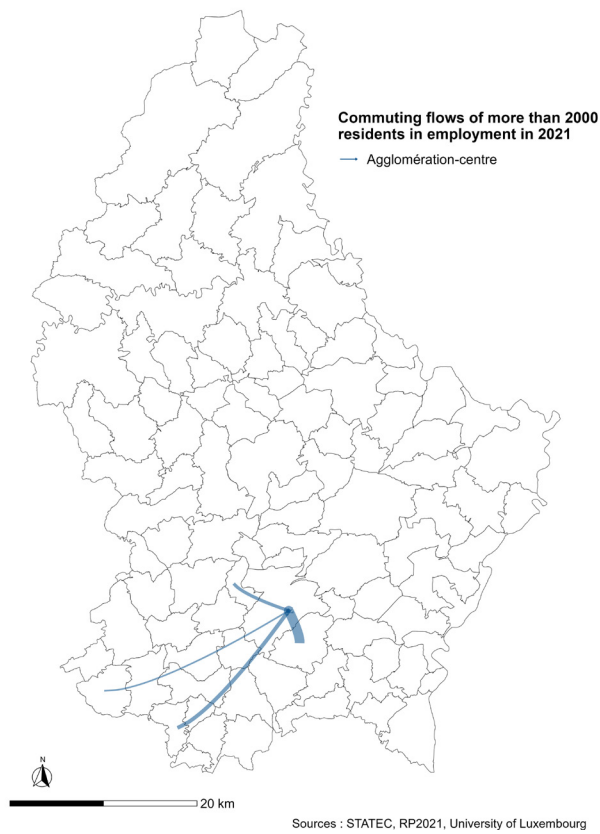
Population growth has generated more and more flows and intensified existing ones. In 2011, instead of 235 flows of 100 residents in employment, there were 197 for a total of 69,217 residents. Nevertheless, the structure has not particularly changed, as the majority of flows continue to be towards Luxembourg-City, with a fairly similar proportion of residents in employment (77% in 2011). Similarly, there has been little change in the structure of the Agglomération-sud, apart from the appearance of flows from Dippach and Reckange-sur-Mess to Esch-sur-Alzette. For these two centres, apart from a few additional flows, it is mainly the intensification of existing flows that is visible.

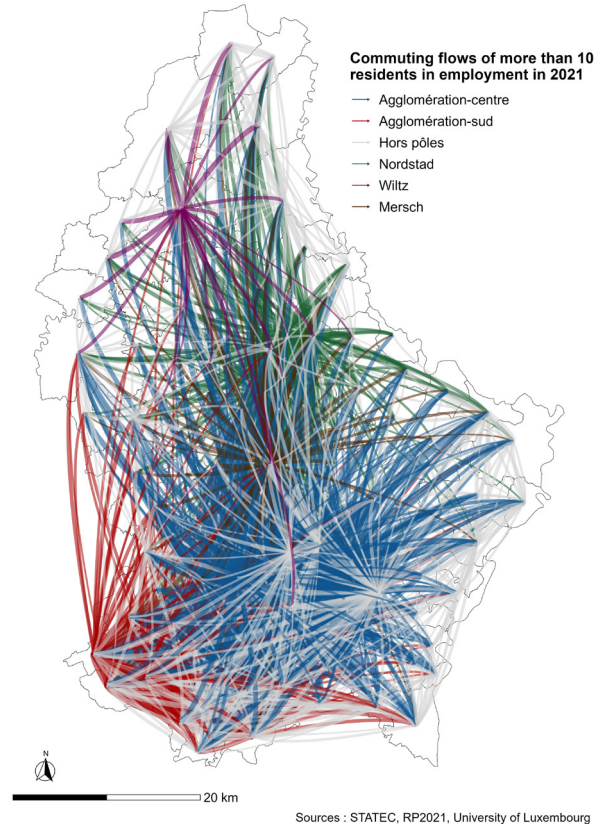
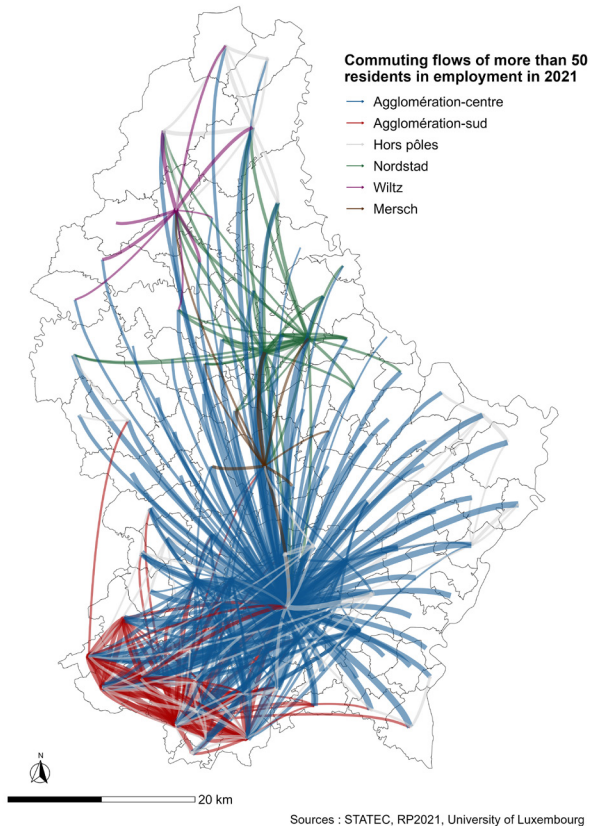
The most noticeable changes have been in the north, where there are generally fewer flows. There has been an increase in flows to the three centres, particularly Nordstad, where the number has risen from 12 to 17, representing an increase of around 500 residents in employment. For Wiltz, in 2011, there was only one flow of more than 100 people from Wintrange. As far as Mersch is concerned, the number of flows has not decreased, but there has been a change in the municipalities of origin of residents in employment between Lintgen and Helperknapp. As for the number of residents in employment coming from Ettelbruck, they have increased, while those coming from Luxembourg-City have decreased.

5.2. Two forms of flow polarisation: centralised and polycentric structures

By gradually varying the threshold of residents and flows represented on the maps below and those animated on the STATEC website, the distribution and intensity of flows in the area becomes more visible.

Maps 12. Commuting flows of more than 10 residents in employment in 2021

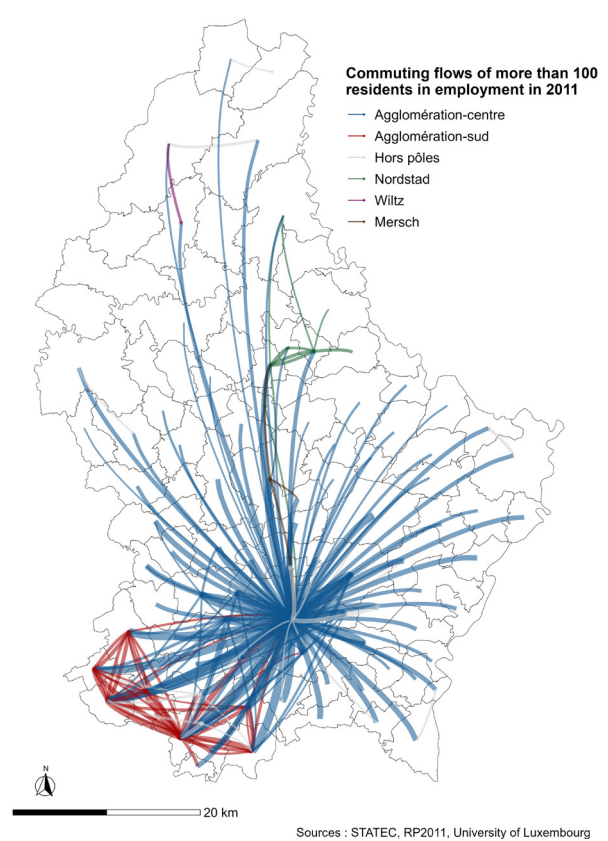
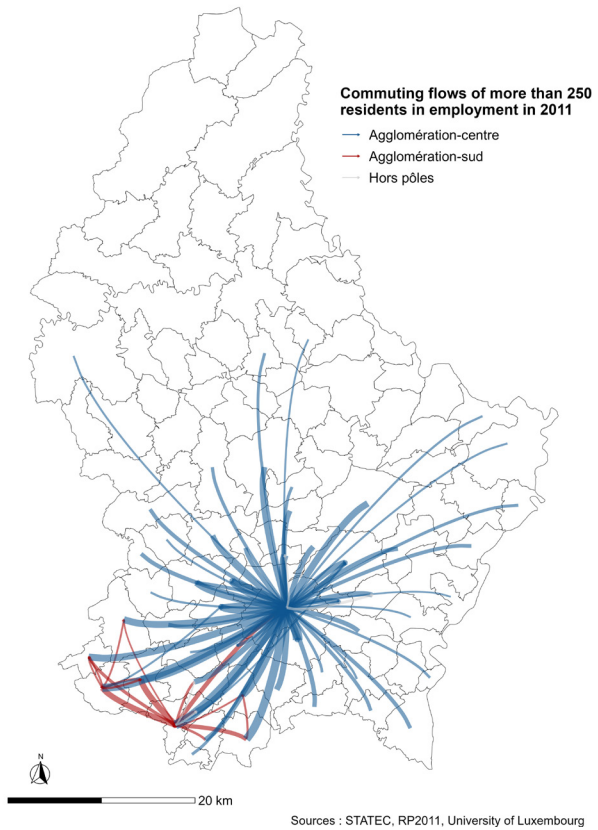
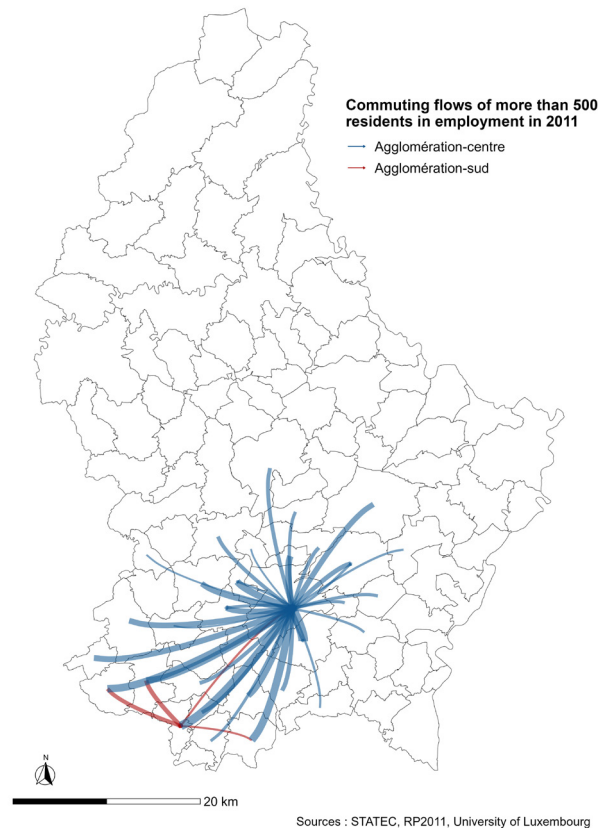
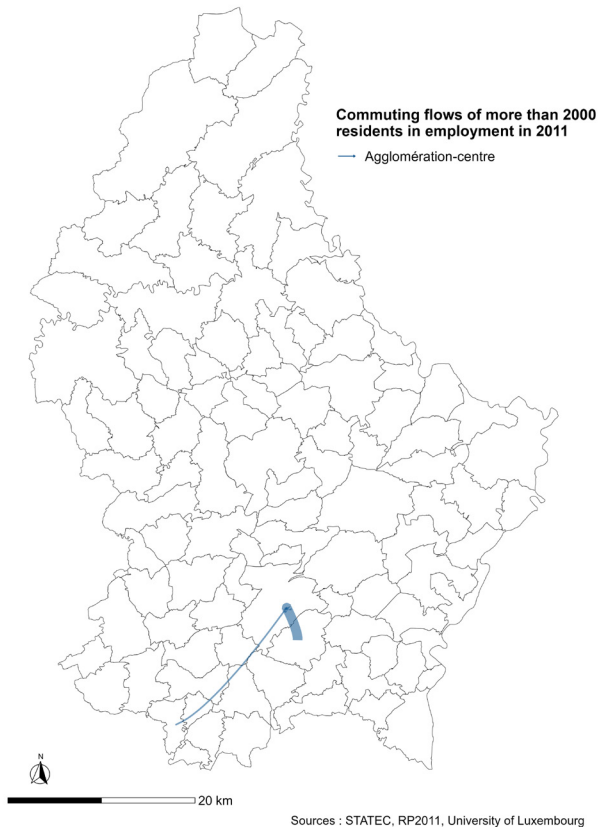


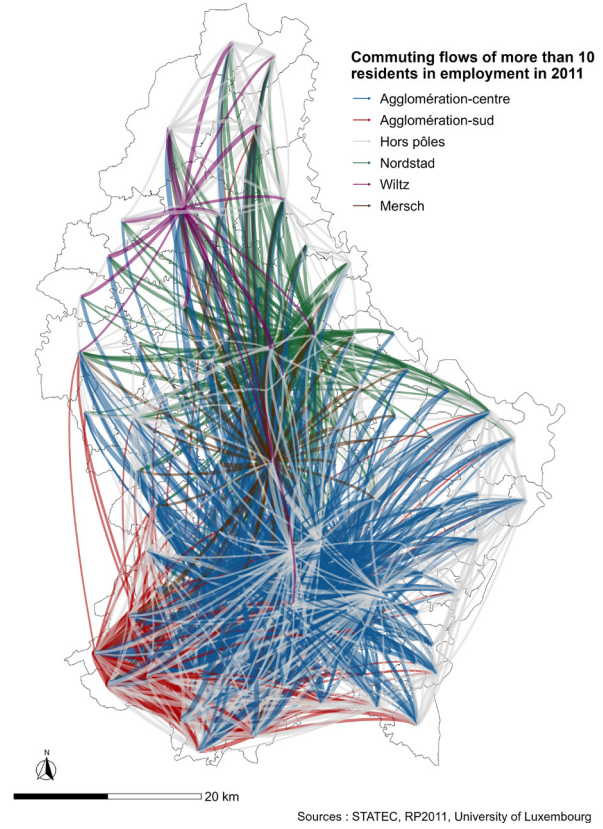
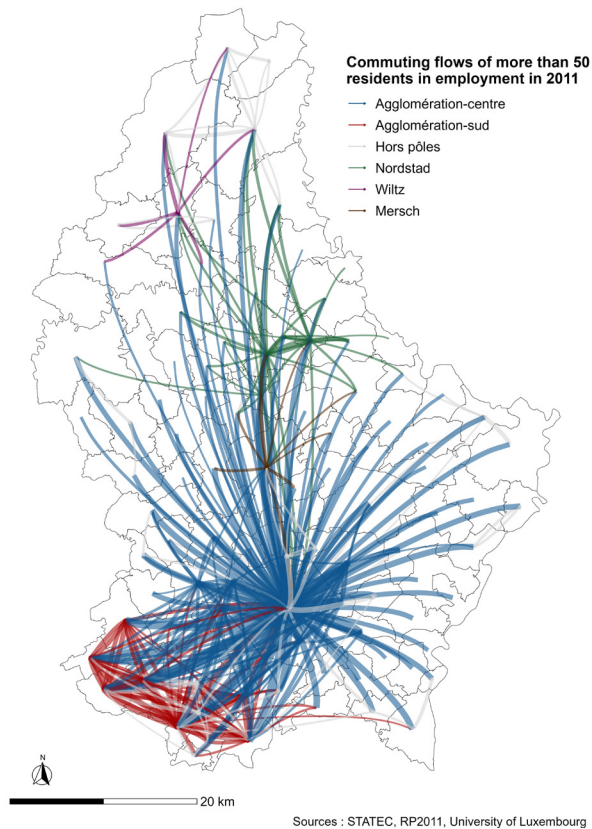


The main flows are to and between the two main centres. Flows to the Agglomération-sud come mainly from the south of the country, and more particularly from the Conurbation-sud and Luxembourg-City, further demonstrating the polycentrism of the centre.

Flows towards the Nordstad are similar to those towards Ettelbruck, although slightly different due to flows towards Diekirch. Flows to the smaller centres of Wiltz and Mersch also show highly centralised patterns.

Maps 13. commuting flows of more than 10 residents in employment in 2011





More than a study of the main flows, the resulting structure shows a very marked centrality around the conurbation-centre, in particular Luxembourg City. This phenomenon is also found in the centres to the north of the country. The most obvious form is that of the highly polycentric Agglomération-sud, which particularly reflects the idea of conurbation insofar as, although Esch-sur-Alzette appears as the central municipality, significant flows are also directed towards other municipalities in the cluster. Over the last 10 years, the structure has been almost identical, and the flows have intensified, with more residents in employment and some additional flows.

Conclusion and outlook

Luxembourg is a very dynamic and attractive country whose catchment area extends beyond its borders. As a result, the number of residents is on the increase, creating a greater demand for housing and jobs throughout the country, and generally leading to more journeys from home to work.

It should be noted that the employment of many cross-border workers is also an effect of this strong cross-border attraction. It has not been considered here, since cross-border commuters, like the 220,600 jobs they held in November 2021¹⁸, are not taken into account in the population census.

In recent years, the proportion of employed residents in the total population has risen to almost 50%. Such an increase in the number of people in employment inevitably influences the definition and delimitation of employment centres, as well as the resulting commuting patterns. Some municipalities have many residents in employment, but not necessarily jobs occupied by residents, and vice versa.

Five employment centres have been identified, accounting for 76.8% of jobs. The largest is the Agglomération-centre, the country's main centre, which accounts for more than 50% of the jobs of the country's residents (109,031), mainly in Luxembourg City (80,188), the central municipality of this centre. The second centre, Agglomération-sud, has fewer jobs (30,977), mainly in Esch-sur-Alzette (11,413), but they are more evenly spread across the communes that make up the centre. The third employment centre (Nordstad), the main centre in the north, has almost the same number of jobs as Esch-sur-Alzette (11,127). The last two centres, each consisting of a single municipality, Mersch and Wiltz, have fewer jobs. There is a contrast between the north and south of the country, with a concentration of jobs and population in the country's two main centres, while the centres in the north are made up of few, if any, municipalities.

The commuting areas are therefore very different depending on the employment centre studied, although the same centre-periphery logic can be observed for each of them. The agglomeration-centre's commuting area extends over the whole of the country, and the centre is attracting more and more commuters, with at least 35% of residents in employment in the communes of the southern half of the country, and 70% within the communes of the centre. The commuting area of the southern conurbation is more limited and extends mainly along the western and southern borders of the country. The cluster attracts mainly employed residents from the municipalities in the cluster and the Southern Conurbation. Between 2011 and

2021, the commuting area of the Agglomération-sud has expanded in the western part of the country, in the canton of Redange-sur-Attert.

The Nordstad area is expanding northwards, attracting mainly working residents from the north-east. The situation is rather different for Mersch: the proportion of residents in employment is tending to fall within the centre and nearby municipalities, although the commuting area is expanding further.

The structure of traffic flows differs from one centre to another. The Agglomération-centre is highly centralised, attracting the majority of flows and the largest flows in the area. The main flows are concentrated between the Agglomération-centre and the Agglomération-sud. The structure of the Agglomération-sud is more polycentric, and the centre attracts mainly employed residents from the Conurbation-sud. The centres in the north also have centralised structures, with the main flows coming from nearby municipalities.

Commuting patterns therefore reflect a multitude of criteria that make it possible to understand the dynamics of both settlement and activity, as well as, in a more complex and operational way, to make forecasts and simulations about the future choices and needs of the population and the country. Knowing and forecasting these dynamics is vital in order to establish and guide future policies (transport system planning, location of new residential and business developments, digital offer, awareness campaigns, etc.). The analysis of commuting therefore has several dimensions: economic, environmental and social, which can help in public policy decision-making.

This work represents an initial approach to analysing commuting areas, commuting and mobility. It is through the definition of an appropriate area that comparisons according to criteria such as age, gender or professional status will make it possible to identify inequalities, constraints or opportunities. Other analyses and publications based on daily mobility variables such as the mode of transport used, journey time and distance will complete this first study of the 2021 census commutes.

¹⁸ IGSS/CCSS data at 30 November 2021, salaried and non-salaried employees.

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Glossary:

Commuting area: the commuting area of an employment centre is the area made up of municipalities whose residents commute to and from the centre.

Central municipality: the central municipality is the main municipality of the employment centre containing the most jobs.

Home-work journeys: these are journeys made by workers between their place of residence and their place of work.

FUA: a Functional Urban Area (FUA) consists of a city and its commuter zone. The commuting zone corresponds to all the municipalities where at least 15% of residents work in the city.

Commuting: commuting means travelling from your home to your place of work outside your municipality of residence.

Commuters: commuters are people in employment who travel from their home to their place of work outside their municipality of residence.

Polarisation: the concept of polarisation refers to the attraction exerted by a pole (the centre) over a group of areas under the domination of this centre. Monopolisation is relative to a single centre.

Polycentrism: polycentrism is a form of regional organisation based on several poles, i.e. several attractive and dynamic areas that have an influence on an area.

Employment rate: the employment rate relates the number of people actually in work to the population of working age (15 to 64).

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URL : <https://statistiques.public.lu/fr/recensement.html>



Appendix:

Table 2. Shares and numbers of residents in employment in each employment centre by municipality in 2021

Municipality of residence	Residents having indicated a commune of work in Luxembourg (of which proportion working in the commune of residence)		Share to Agglo-Centre	Share to Agglo-sud	Departure to Nordstad	Part towards Mersch	Departure to Wiltz	Non-pole share
	Number	Proportion						
BEAUFORT	1045	16%	29%	3%	15%	3%	0%	49%
BECH	484	9%	49%	4%	3%	1%	0%	43%
BECKERICH	1036	14%	42%	8%	6%	3%	1%	40%
BERDORF	700	18%	33%	3%	7%	2%	0%	54%
BERTRANGE	2852	15%	85%	6%	1%	0%	0%	7%
BETTEMBOURG	3844	14%	56%	29%	1%	0%	0%	14%
BETTENDORF	1020	12%	18%	2%	36%	4%	1%	39%
BETZDORF	1454	12%	64%	4%	1%	1%	0%	30%
BISSEN	1150	13%	38%	4%	17%	8%	1%	33%
BIWER	722	13%	52%	4%	3%	1%	0%	41%
BOULAIDE	514	12%	23%	5%	9%	1%	12%	49%
BOURSCHEID	600	14%	28%	3%	27%	3%	2%	38%
BOUS	725	9%	51%	8%	1%	1%	0%	39%
CLERVAUX	1793	30%	16%	1%	16%	2%	7%	58%
COLMAR-BERG	854	16%	32%	4%	33%	7%	1%	22%
CONSDORF	773	14%	41%	4%	5%	3%	0%	48%
CONTERN	1368	13%	79%	5%	2%	0%	0%	13%
DALHEIM	623	10%	56%	12%	1%	0%	0%	31%
DIEKIRCH	2379	27%	23%	2%	44%	3%	1%	27%
DIFFERDANGE	9188	19%	39%	46%	1%	0%	0%	13%
DIPPACH	1581	12%	58%	18%	1%	0%	0%	22%
DUDELANGE	7212	24%	40%	43%	1%	0%	0%	15%
ECHTERNACH	1816	34%	29%	3%	5%	1%	0%	62%
ELL	667	16%	32%	8%	7%	2%	1%	49%
ERPELDANGE-SUR-SURE	835	14%	24%	3%	42%	4%	1%	25%
ESCH-SUR-ALZETTE	9016	33%	38%	46%	1%	0%	0%	14%
ESCH-SUR-SURE	1103	18%	20%	4%	21%	4%	5%	45%
ETTELBRUCK	2819	25%	27%	3%	41%	5%	1%	23%
FEULEN	859	10%	27%	3%	30%	4%	2%	34%
FISCHBACH	521	10%	43%	3%	12%	8%	0%	34%
FLAXWEILER	857	11%	52%	4%	2%	0%	0%	42%

Municipality of residence	Residents having indicated a commune of work in Luxembourg (of which proportion working in the commune of residence)		Share to Agglo-Centre	Share to Agglo-sud	Departure to Nordstad	Part towards Mersch	Departure to Wiltz	Non-pole share
FRISANGE	1646	11%	56%	17%	1%	0%	0%	27%
GARNICH	811	9%	57%	16%	2%	0%	0%	24%
GOESDORF	642	15%	20%	2%	17%	2%	16%	43%
GREVENMACHER	1686	24%	43%	3%	2%	1%	0%	50%
GROSBOUS	475	8%	26%	6%	18%	7%	3%	40%
HABSCHT	1860	11%	53%	10%	2%	2%	0%	33%
HEFFINGEN	659	12%	49%	3%	7%	3%	1%	37%
HELPERKNAPP	1813	11%	48%	5%	8%	6%	0%	33%
HESPERANGE	4674	14%	84%	6%	1%	0%	0%	8%
JUNGLINSTER	2791	15%	61%	4%	3%	1%	0%	32%
KAERJENG	3498	15%	45%	41%	1%	1%	0%	12%
KAYL	3155	12%	39%	31%	1%	0%	0%	28%
KEHLEN	2060	14%	62%	7%	3%	2%	0%	26%
KIISCHPELT	410	15%	19%	2%	17%	2%	12%	48%
KOERICH	978	11%	60%	10%	2%	1%	1%	27%
KOPSTAL	1099	11%	71%	7%	2%	1%	0%	20%
LAC DE LA HAUTE-SURE	735	17%	16%	2%	16%	2%	16%	48%
LAROCLETTE	720	10%	35%	2%	13%	8%	0%	42%
LENNINGEN	818	13%	59%	5%	2%	0%	0%	34%
LEUDELANGE	912	13%	79%	12%	1%	0%	0%	8%
LINTGEN	1415	10%	52%	4%	7%	7%	0%	30%
LORENTZWEILER	1498	8%	61%	4%	5%	3%	0%	27%
LUXEMBOURG	33970	75%	88%	5%	1%	0%	0%	6%
MAMER	3466	18%	82%	7%	2%	1%	0%	8%
MANTERNACH	814	13%	45%	3%	3%	1%	0%	49%
MERSCH	3193	19%	47%	5%	9%	19%	1%	20%
MERTERT	1477	20%	44%	3%	2%	1%	0%	50%
MERTZIG	850	12%	28%	3%	25%	6%	2%	36%
MONDERCANGE	2277	12%	48%	26%	1%	0%	0%	25%
MONDORF-LES-BAINS	1495	21%	48%	11%	1%	1%	0%	39%
NIEDERANVEN	1931	19%	84%	3%	1%	1%	0%	11%
NOMMERN	568	12%	34%	3%	18%	8%	1%	35%
PARC HOSINGEN	1434	22%	19%	1%	24%	3%	3%	50%
PETANGE	6945	18%	39%	45%	1%	0%	0%	14%

Municipality of residence	Residents having indicated a commune of work in Luxembourg (of which proportion working in the commune of residence)		Share to Agglo-Centre	Share to Agglo-sud	Departure to Nordstad	Part towards Mersch	Departure to Wiltz	Non-pole share
PREIZERDAUL	655	11%	32%	7%	15%	3%	2%	41%
PUTSCHEID	441	11%	17%	2%	26%	5%	2%	49%
RAMBROUCH	1590	20%	30%	8%	11%	3%	2%	46%
RECKANGE-SUR-MESS	1080	9%	55%	22%	0%	0%	0%	22%
REDANGE-SUR-ATTERT	1109	21%	32%	9%	10%	3%	1%	46%
REISDORF	389	13%	21%	3%	28%	4%	1%	44%
REMICH	854	20%	47%	6%	1%	0%	0%	46%
ROESER	2488	13%	63%	13%	1%	0%	0%	23%
ROSPORT-MOMPACH	1387	18%	36%	3%	3%	1%	0%	57%
RUMELANGE	1663	15%	37%	29%	1%	0%	0%	33%
SAEUL	352	10%	49%	6%	8%	6%	2%	30%
SANDWEILER	1276	11%	81%	5%	1%	1%	0%	12%
SANEM	5509	16%	38%	49%	1%	0%	0%	12%
SCHENGEN	1816	18%	45%	12%	1%	1%	0%	42%
SCHIEREN	728	9%	31%	3%	26%	5%	2%	33%
SCHIFFLANGE	3714	12%	46%	27%	1%	0%	0%	25%
SCHUTTRANGE	1417	12%	72%	4%	1%	1%	0%	22%
STADTBREDIMUS	748	12%	48%	6%	1%	0%	0%	45%
STEINFORT	1733	15%	56%	12%	2%	1%	0%	29%
STEINSEL	1989	13%	63%	4%	4%	2%	0%	26%
STRASSEN	3708	12%	87%	5%	1%	0%	0%	7%
TANDEL	868	12%	18%	2%	33%	4%	1%	43%
TROISVIERGES	1164	25%	14%	2%	13%	1%	7%	63%
USELDANGE	752	12%	39%	6%	9%	5%	1%	40%
VALLEE DE L ERNZ	970	16%	25%	1%	23%	5%	1%	45%
VIANDEN	661	32%	15%	2%	25%	2%	1%	55%
VICHTEN	545	9%	32%	5%	17%	6%	1%	39%
WAHL	405	14%	25%	8%	16%	4%	2%	45%
WALDBILLIG	716	9%	39%	4%	10%	5%	0%	42%
WALDBREDIMUS	473	8%	65%	5%	2%	1%	0%	28%
WALFERDANGE	2841	11%	69%	4%	3%	2%	0%	22%
WEILER-LA-TOUR	864	7%	68%	11%	1%	0%	0%	19%
WEISWAMPACH	651	28%	14%	1%	16%	2%	4%	65%

Municipality of residence	Residents having indicated a commune of work in Luxembourg (of which proportion working in the commune of residence)		Share to Agglo-Centre	Share to Agglo-sud	Departure to Nordstad	Part towards Mersch	Departure to Wiltz	Non-pole share
WILTZ	2259	34%	15%	3%	14%	3%	34%	31%
WINCRANGE	1571	25%	13%	1%	12%	1%	10%	62%
WINSELER	447	20%	13%	3%	13%	1%	22%	48%
WORMELDANGE	1075	19%	48%	5%	1%	1%	0%	46%
Total	204093	27%	54%	15%	5%	2%	1%	23%

Sources: STATEC RP 2021.

Note: the numbers only include respondents to the question on the municipality of work and the economic activity situation.