Landtake in Luxembourg

Tom Fourmann & Marco Tholl

LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Énergie et de
l'Aménagement du territoire

Land take in Luxembourg

Datasets, Statistics, Indicators and Mapping

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l'Aménagement du territoire
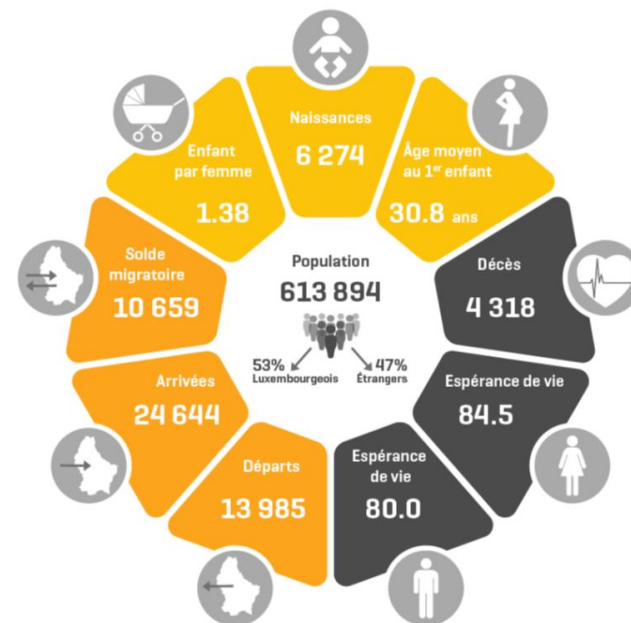
Territorial context

Area: 2'586 km^2

Population: 614'000

approximately 170 nationalities;
percentage of foreigners: 47,5 %

Capital Luxembourg-City: 119'000
inhabitants
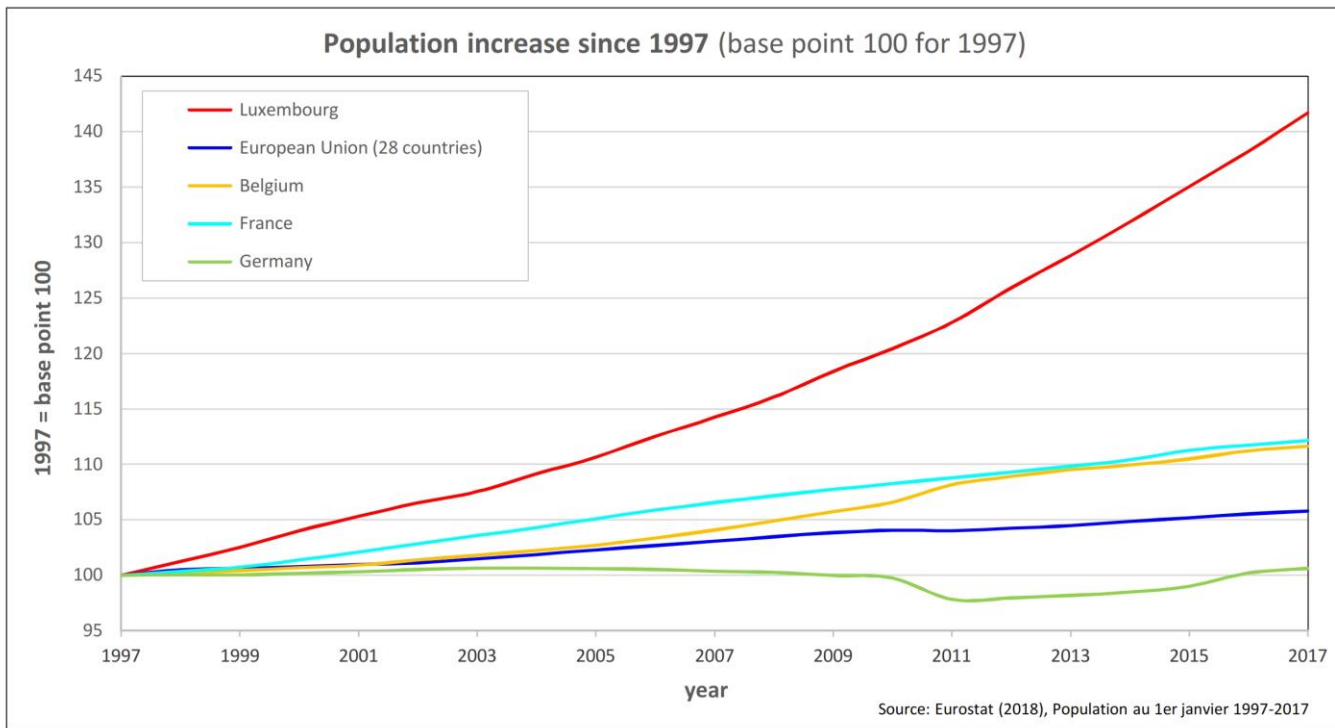
Jobs: 428'000
Cross-border workers: 195'000

Source: STATEC 2019

Part 1: Growth in Luxembourg

➤ Population development at a very strong rate, unequalled in Europe

  • In relative terms, Luxembourg is the country in Europe with the highest growth rates in terms of population and immigration

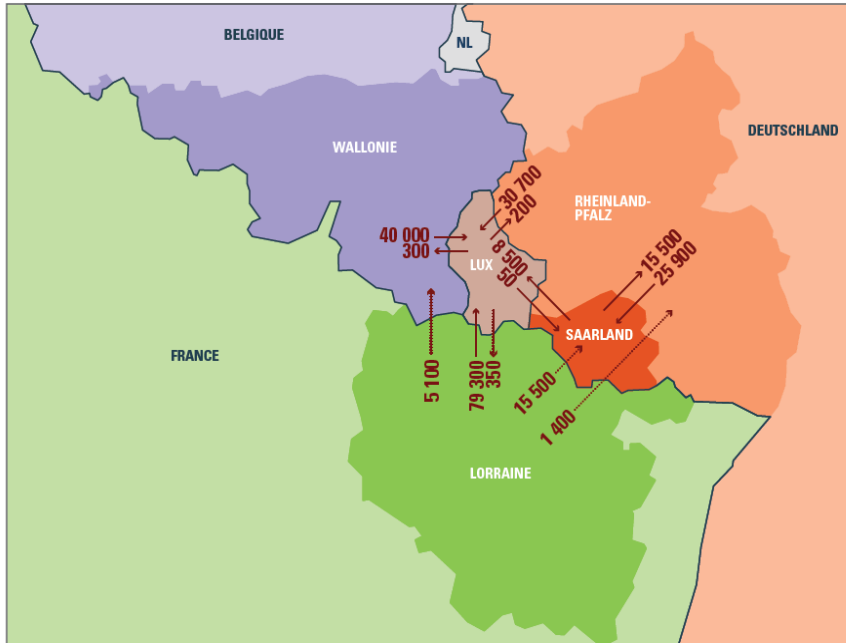**Population increase since 1997** (base point 100 for 1997)

Legend:
- Luxembourg
- European Union (28 countries)
- Belgium
- France
- Germany

y-axis: 1997 = base point 100 (95 to 145)
x-axis: year (1997 to 2017)

Source: Eurostat (2018), Population au 1er janvier 1997-2017

Cross-border workers

- ➢ 51,5 % from France
- ➢ 24,3 % from Belgium
- ➢ 24,2 % from Germany

Source:
Statistics Grande Région

Annual population development 2011-2017

Jährliche Bevölkerungsentwicklung 2011 – 2017

Schrumpfende Gemeinden — ab −3% — 0% — ab +3% — Wachsende Gemeinden
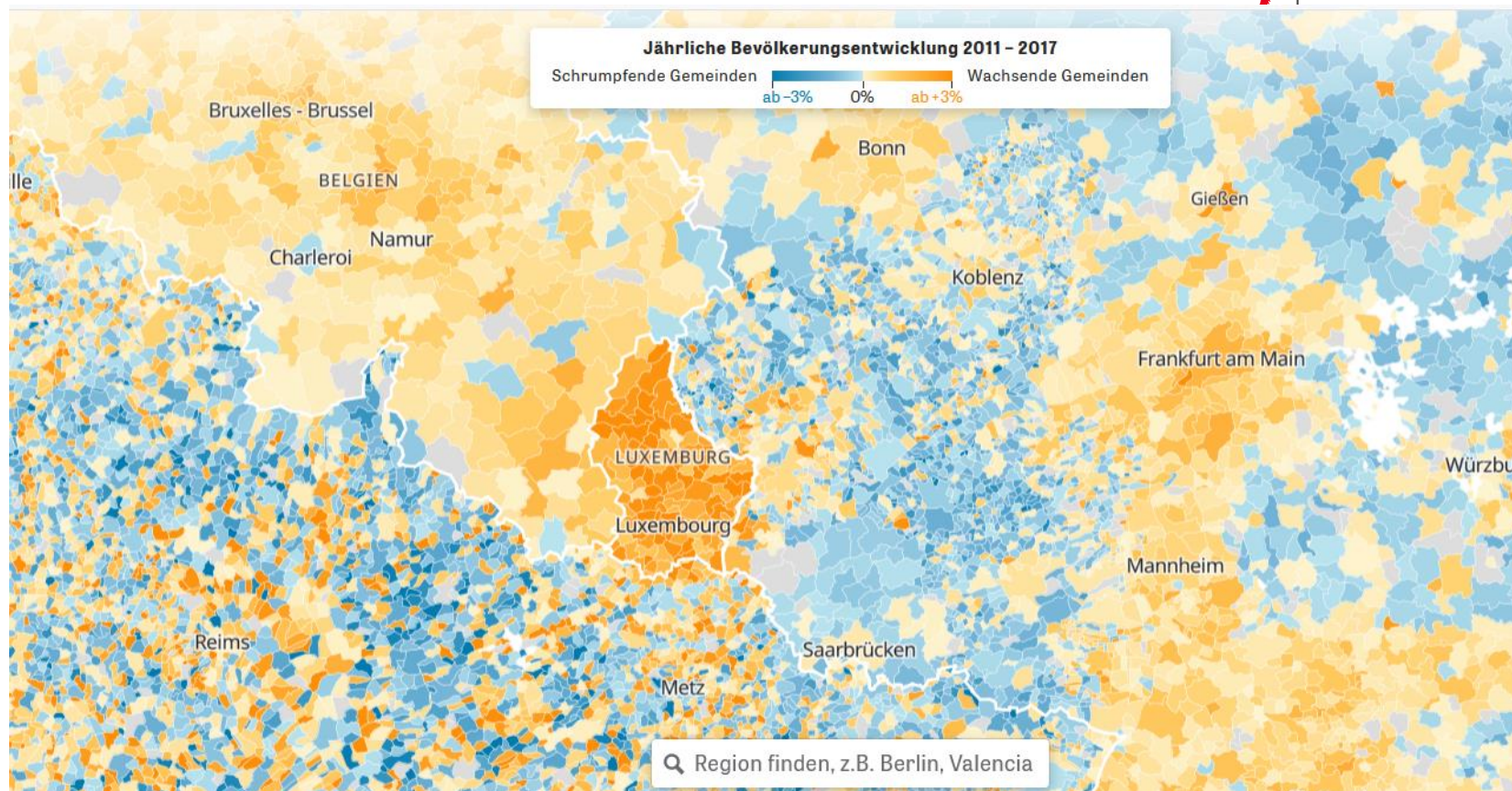
https://www.zeit.de/politik/ausland/2019-07/demografie-europa-bevoelkerung-entwicklung-wandel-karte

Annual population development 2011-2017

Jährliche Bevölkerungsentwicklung 2011 – 2017

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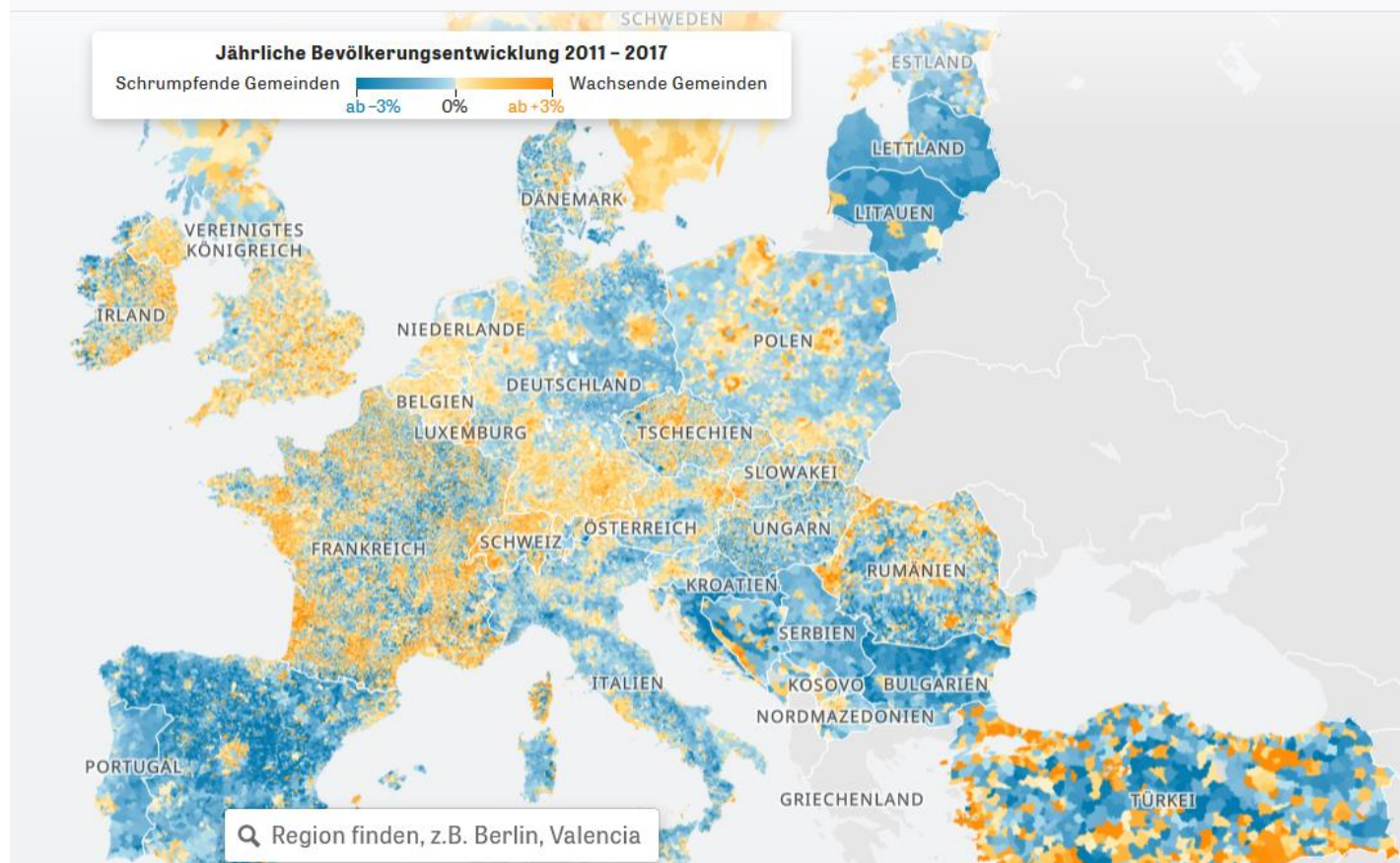
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Fragmentation of the landscape

Fragmentation Grand-Duchy of Luxembourg and surrounding regions

Source: European Environment Agency (2011): Landscape fragmentation in Europe, EEA report N° 2/2011

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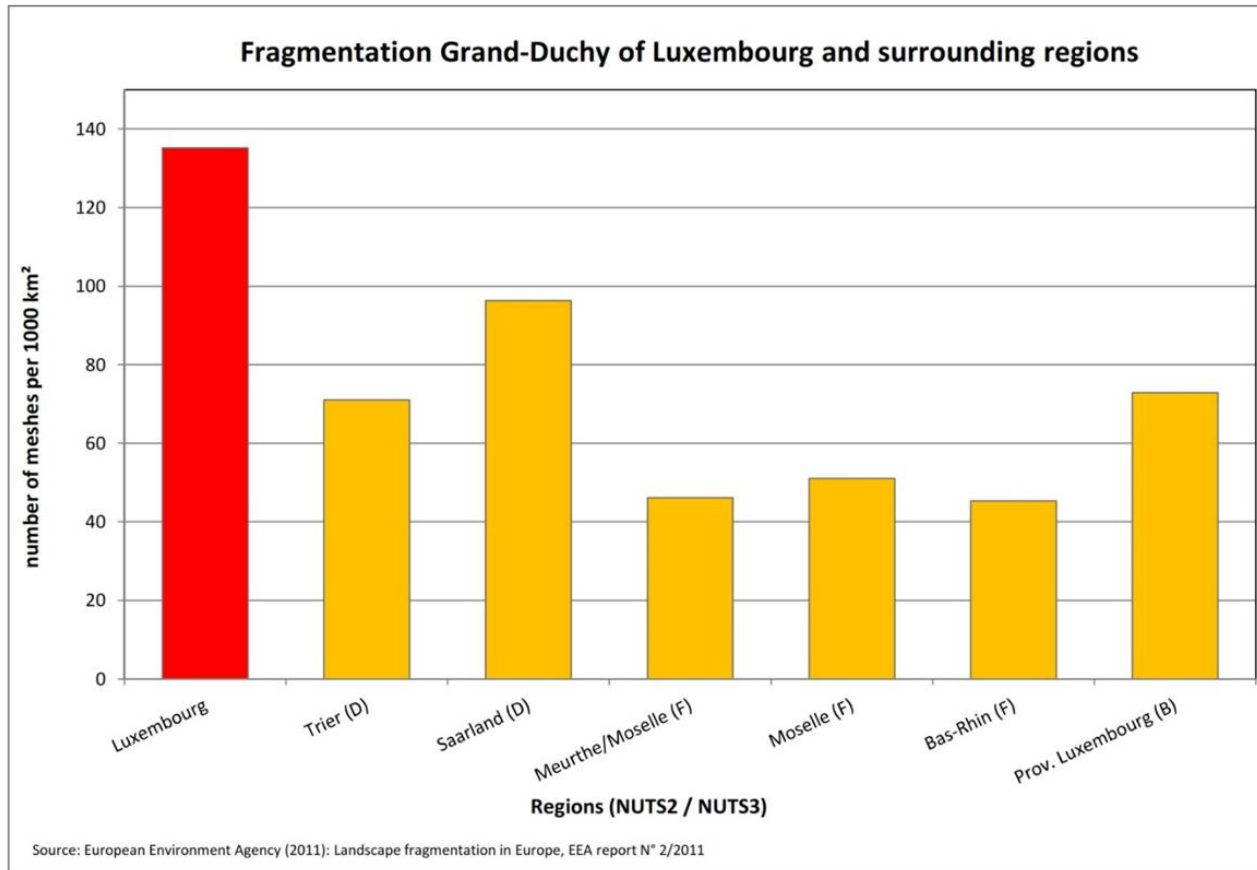
Ministry of Energy and Spatial Planning - Department of Spatial Planning

activities:

- Territorial strategies
- Regulatory plans
- Urban and regional development
- Natural parks
- Cross-border spatial planning
- European territorial cooperation
- International spatial planning policy

Objectives of the spatial planning law

➢ ensure optimal living conditions to the population in all parts of the national territory

➢ concentrate territorial development/land consumption to the most appropriate areas of the national territory

➢ observe the evolution of land use

➢ ensure the coordination of sectoral policies with an impact on land use

➢ ensure rational land use and concentric and coherent urban development

Major instruments

➢ National spatial planning strategy (PDAT - Master Programme for Spatial Planning) → framework

➢ Sectoral Master Plans (Housing, Landscapes, Transport, Economic zones)

➢ Special zoning plans

Dataset production

➢ Landcover 2015 (1*1m)

➢ Landcover 2018 (0,2*0,2m)

➢ Landuse 2015

- Landuse changes 2007-2015

➢ Landuse 2018 (available by end of 2019)

- Landuse changes 2015-2018

Dataset production

➢ in cooperation with the Ministry of the Environment, Climate and Sustainable Development

➢ project for LC & LU 2015 funded by ESA, LC & LU 2018 funded by 2 Ministries

➢ contractor: space4environment (dataset production) & LIST – Luxembourg Institute of Science and Technology (Land Information System)

➢ update: planned for every 3 years

Definitions

➢ **Land cover** corresponds to a **physical description** of space, the observed (bio)physical cover of the earth's surface (DI GREGORIO & JANSEN 1997). It is that which overlays or currently covers the ground

- Can be observed by various "sources of observation" at different distances between the source and the earth's surface

➢ **Land use** in terms of **functional dimension** corresponds to the description of areas in terms of their **socio-economic purpose**

Base data

- Pleiades images (50-cm B&W and 2-meter multispectral)

- SPOT-5/Take-5 images (as multitemporal ancillary information for seasonal and permanent vegetation classes)

- Orthophotos

- Ancillary data: OBS map (former LC/LU map), Topographic map, Digital elevation model, Cadastral map, Agricultural Parcels

Land Cover classes

➢ Buildings

➢ Other constructed area

➢ Bare Land (bare soils, rocks, sand & gravel)

➢ Water

➢ Trees and bushes

➢ Permanent herbaceous vegetation

➢ Seasonal herbaceous vegetation

Land Cover Map 2015

- building
- other construced area
- bare soils
- water
- trees and bushes
- shadows
- permanent herb. vegetation
- temporary herb. vegetation

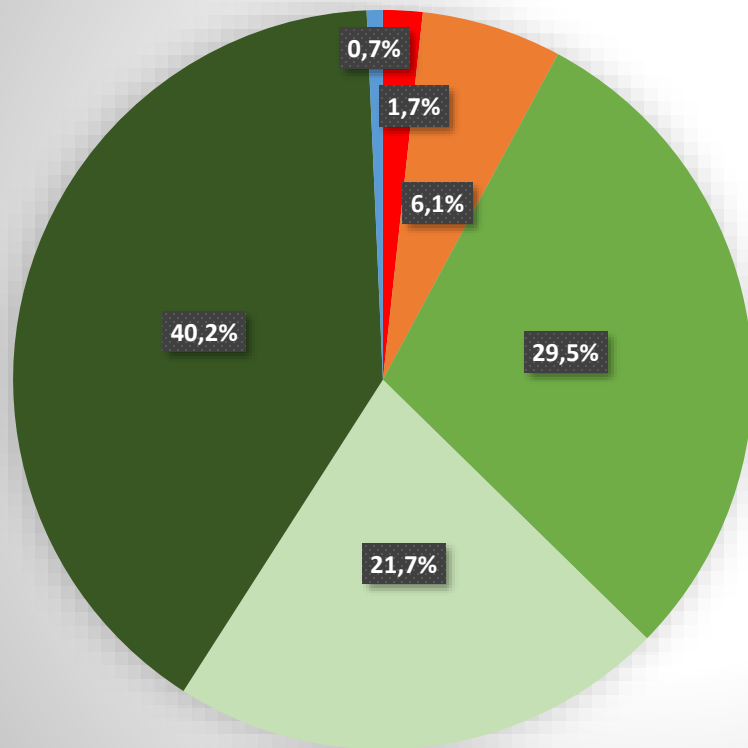0   250   500 m

N

MEA - DATer 2019
LIS-L Landcover 2015

0   250   500 m

N

MEA - DATer 2019
Orthophoto 2016

Land Cover 2015

Pie chart showing Land Cover 2015:
- buildings: 0,7%
- other constructed area: 1,7% / 6,1%
- permanent herbaceous vegetation: 29,5%
- seasonal herbaceous vegetation: 21,7%
- trees and bushes: 40,2%
- water

Imperviousness degree
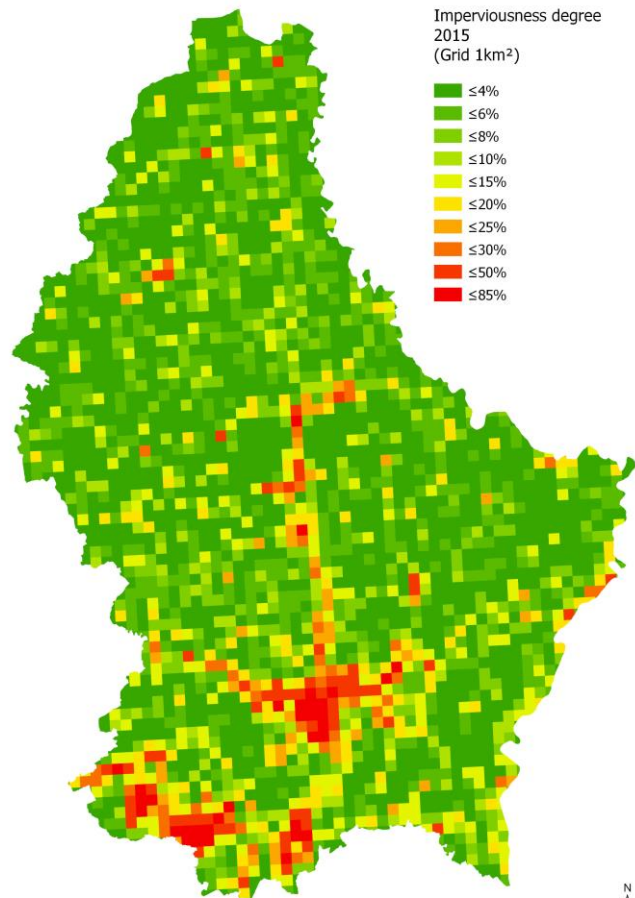
Imperviousness degree
2015
(Grid 1km²)

- ≤4%
- ≤6%
- ≤8%
- ≤10%
- ≤15%
- ≤20%
- ≤25%
- ≤30%
- ≤50%
- ≤85%

MEA - DATer 2019
Values based on LIS-L Landcover 2015

Imperviousness degree

Imperviousness degree of
the luxembourgish
municipalities 2015

- ≤5%
- ≤6%
- ≤7%
- ≤8%
- ≤10%
- ≤15%
- ≤20%
- ≤44%

MEA - DATer 2019
Values based on LIS-L Landuse 2015

Soil sealing per user

Soil sealing 2015 in m² per user (population & labour)
- ≤200
- ≤350
- ≤500
- ≤750
- ≤1500

MEA - DATer 2019
Values based on LIS-L Landcover 2015

Land Use Classes
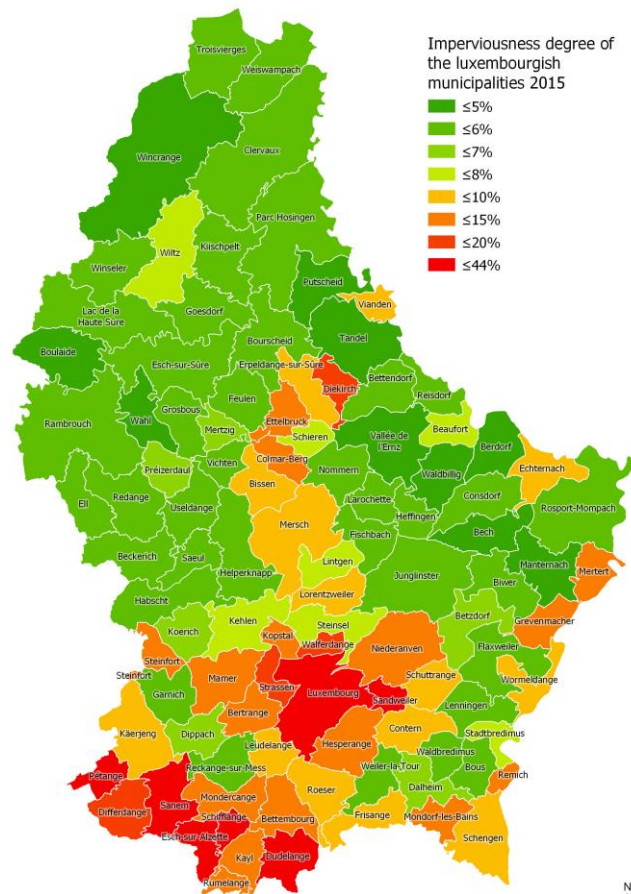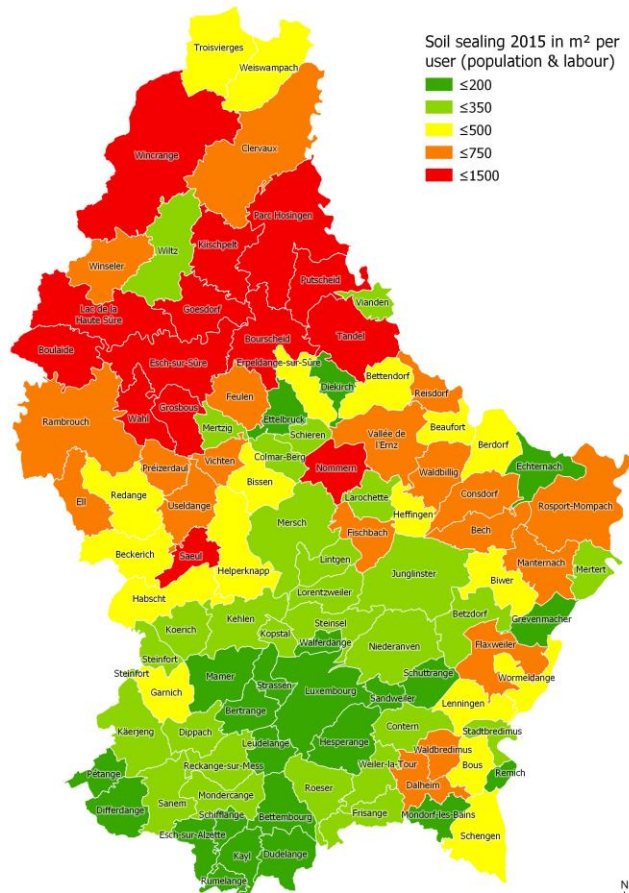
➢ Hierarchical classification system

➢ 6 thematic blocks (51 subclasses):

- Settlements,
  - Residential, Agricultural, Industry & commerce, Square, Parks, …
- Transport,
  - Road, Railways, …
- Agriculture,
  - Arable Land, Grassland, Orchard, …

Land Use Classes

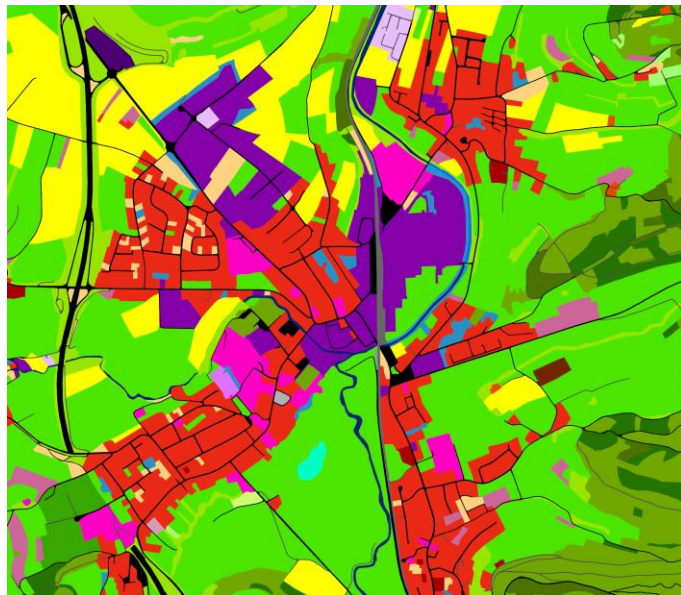- Forestry
  - Coniferous, Mixed, Deciduous, …
- Natural areas (vegetated and non-vegetated) and
  - Gravel, Rocks, Bushes, …
- Water systems
  - Running Water, Still Water …

Land Use Map

Legend:
- Residential
- Agriculture facilities
- Industry & Commerce
- Unused urban areas and brownfields
- Social, Military, Cultural and Other
- Residential (Estate)
- Agriculture facilities (Estate)
- Industry & Commerce (Estate)
- Cemetery
- Square
- Park
- Public facilities: Other
- Camp ground
- Other sports facilities
- Other recreation facilities
- Utility (production, disposal facilities)
- Construction
- Arable land
- Grassland
- Orchard
- Special cultures: Other
- Forest: Coniferous
- Forest: Mixed
- Forest: Deciduous
- Forest: Young forest
- Forest: Clear cuts
- Grassland
- Bushes
- Running water: Natural
- Running water: Artificial
- Standing water: Artificial
- Rural roads
- Main roads
- Railways
- Parking

0   250   500 m   N

Auteur: MEA - DATer 2019
Fond de carte : Land Cover 2015

0   250   500 m   N

MEA - DATer 2019
Orthophoto 2016
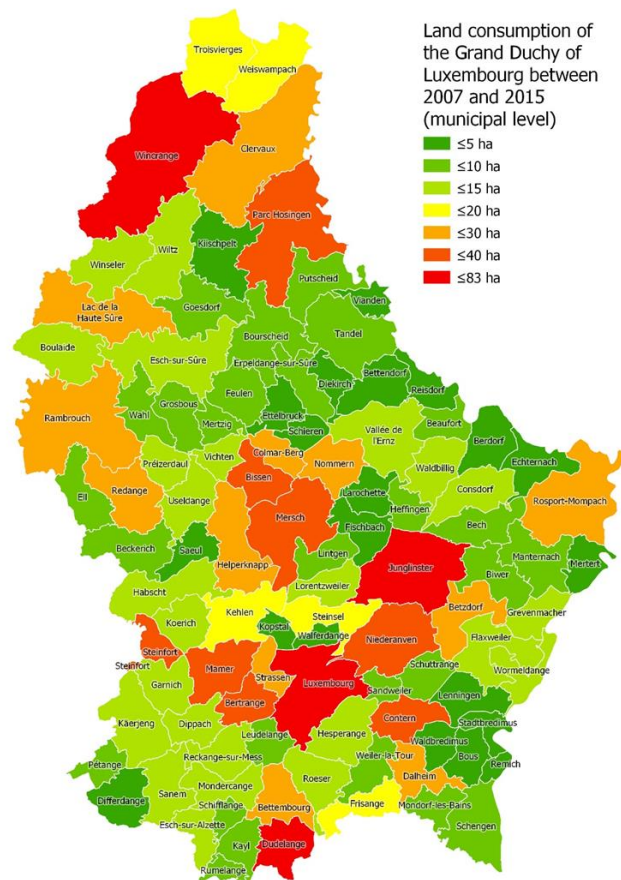
24

Land Use 2015

Pie chart "Land Use 2015":
- 8,6%
- 3,7%
- 0,4%
- 2,1%
- 35,3%
- 49,9%
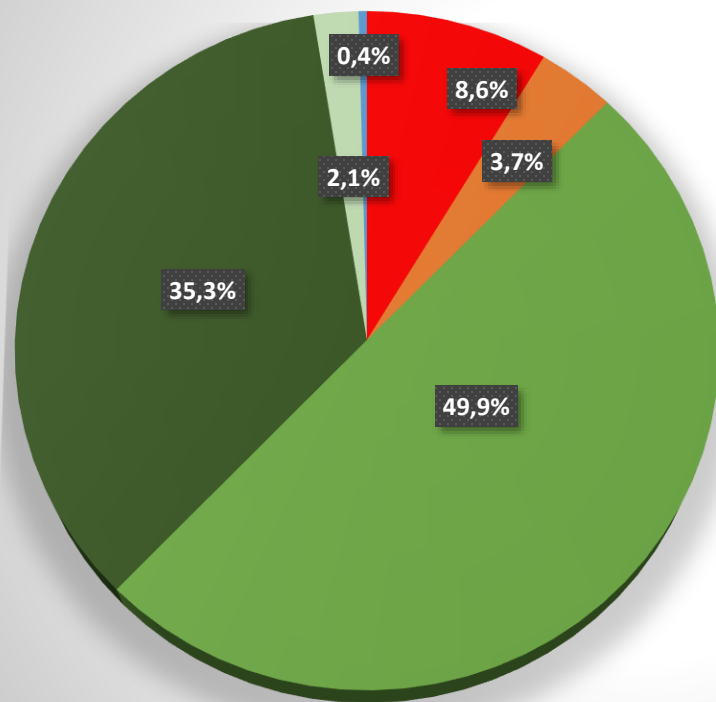
Legend:
- Settlement
- Transport
- Agriculture
- Forest
- Natural surfaces
- Water

Land take between 2007 and 2015

Land consumption of the Grand Duchy of Luxembourg between 2007 and 2015 (municipal level)

- ≤5 ha
- ≤10 ha
- ≤15 ha
- ≤20 ha
- ≤30 ha
- ≤40 ha
- ≤83 ha

MEA - DATer 2019
Values based on LIS-L Landuse 2015

Land take for residential purposes

Land consumption for residential purposes between 2007 and 2015 (municipal level)

- ≤1 ha
- ≤2 ha
- ≤5 ha
- ≤10 ha
- ≤15 ha
- ≤30 ha
- ≤60 ha

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MEA - DATer 2019
Values based on LIS-L Landuse 2015

Land Use Changes 2007-2015
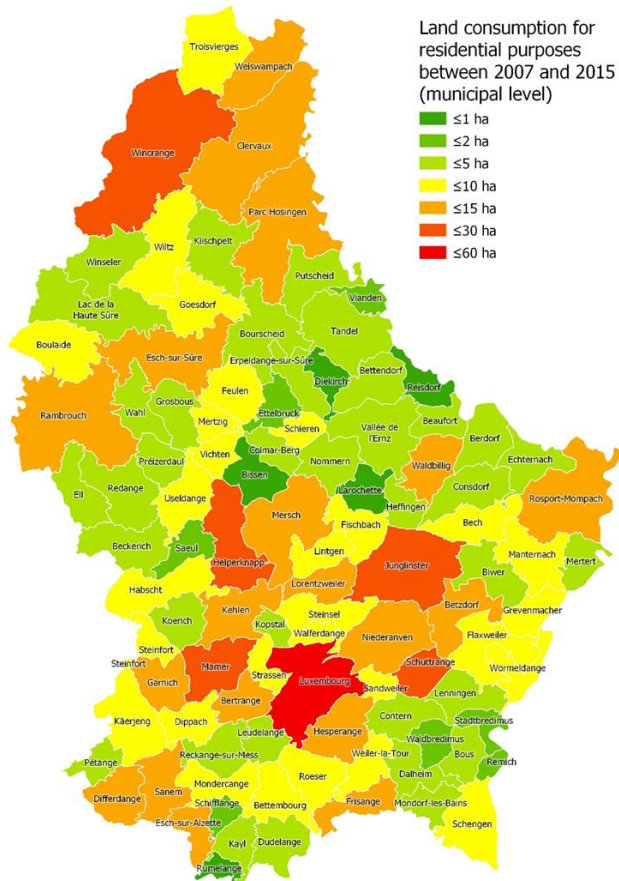
➢ Settlement and transport: + 1400 ha (14 km2)
  - Land consumption/take = 0,5 ha per day

➢ Agriculture: **- 1200 ha**

➢ Forest: **- 200 ha**

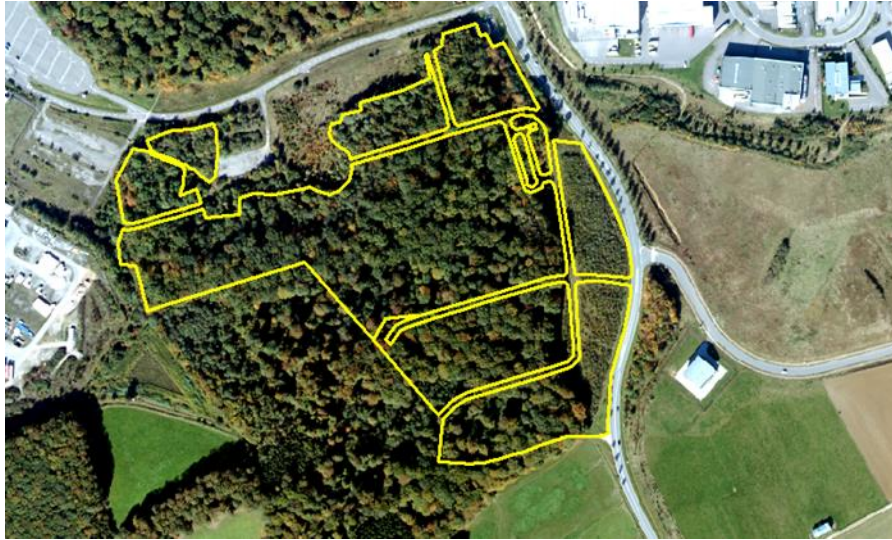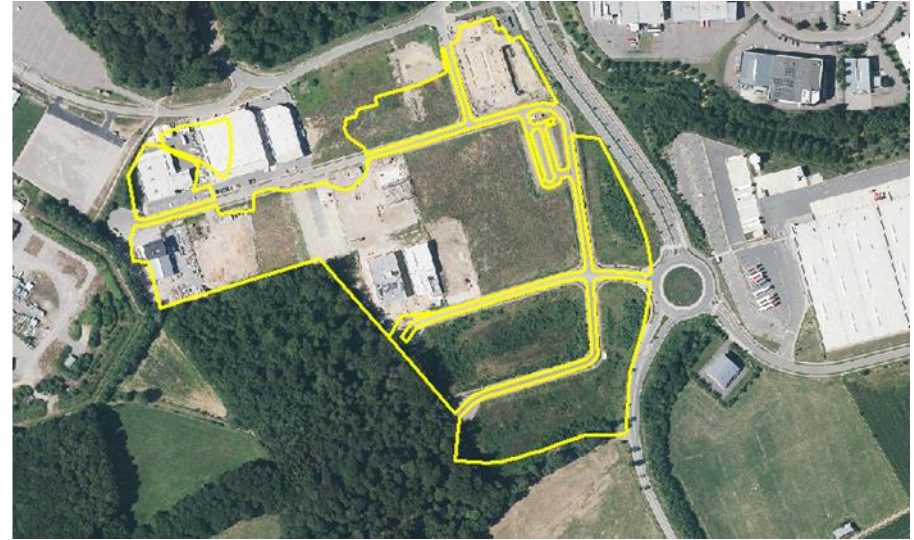# Examples – residential area

2007

2015

Cessange

5,2 ha

Examples – industrial site

ZI Contern   5,4 ha

Examples – agricultural facilities
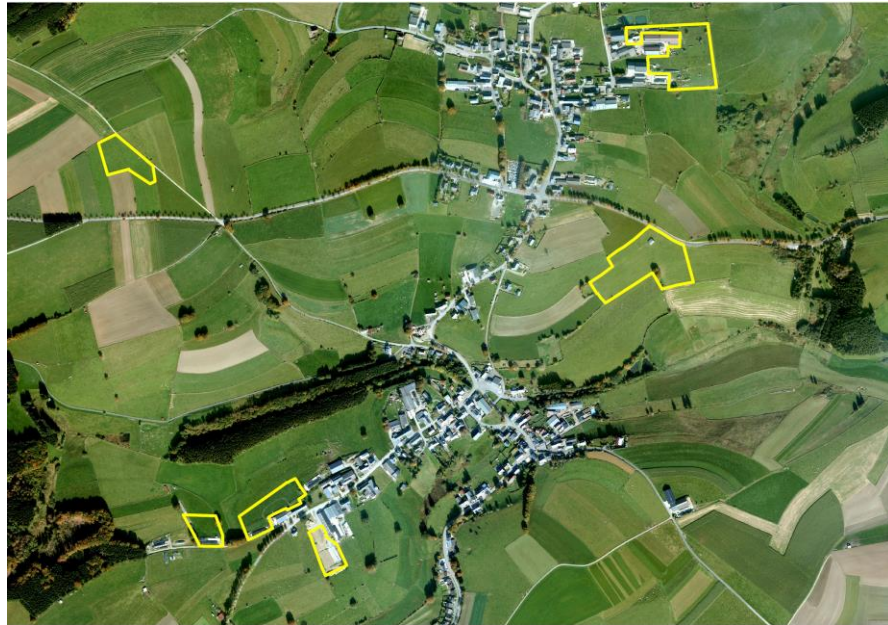
Hachiville, Hoffelt   8,6 ha
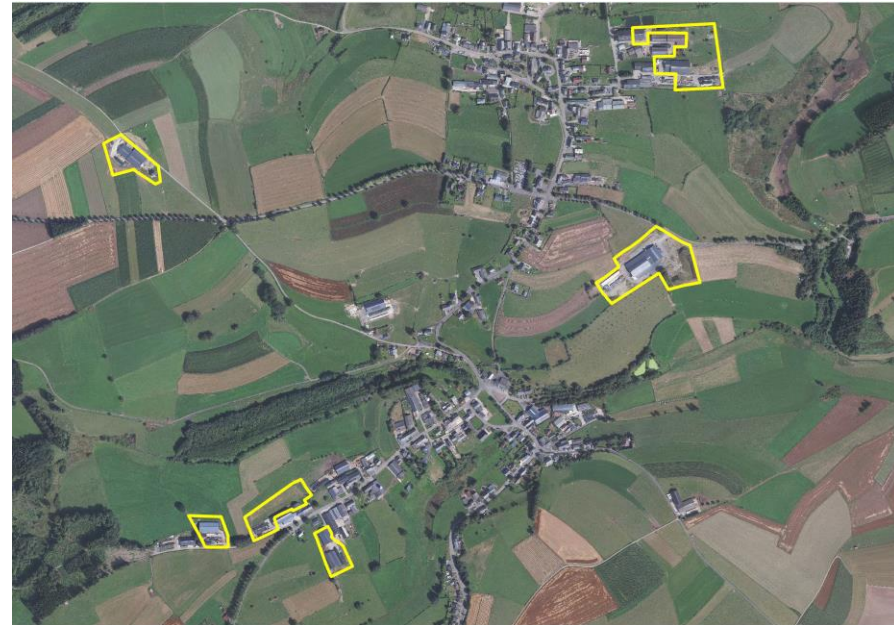
Examples – transport
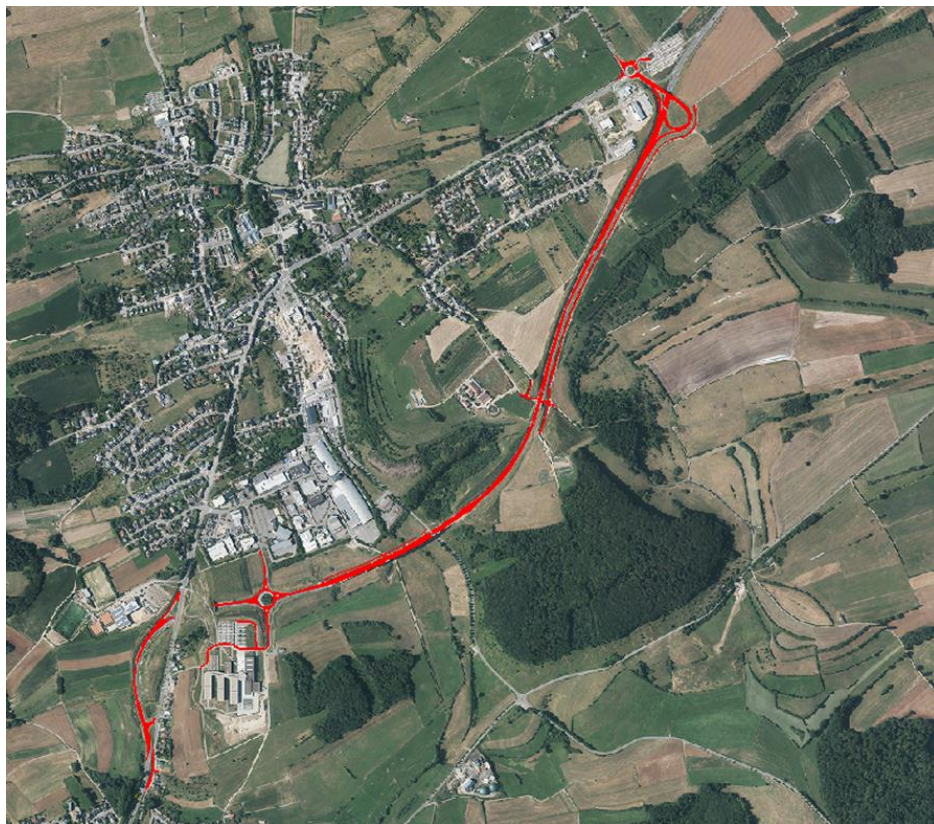
6,2 ha – length 3,5 km (bypass road)   2,32 ha

Land use changes by LU classes
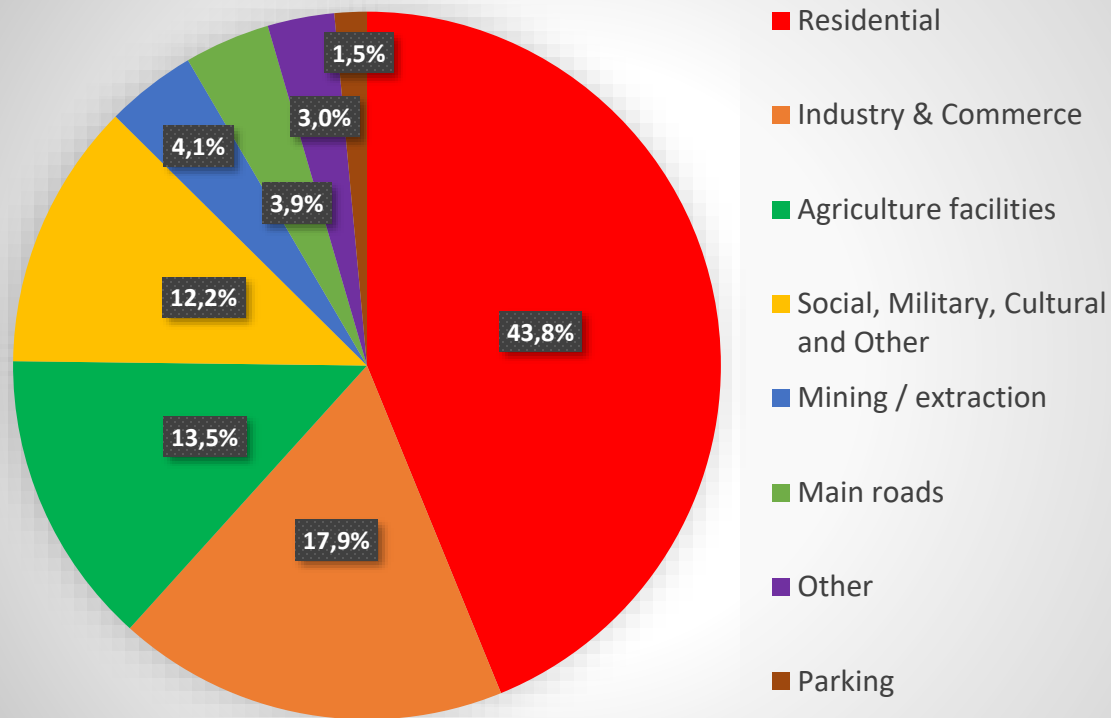
- Residential — 43,8%
- Industry & Commerce — 17,9%
- Agriculture facilities — 13,5%
- Social, Military, Cultural and Other — 12,2%
- Mining / extraction — 4,1%
- Main roads — 3,9%
- Other — 3,0%
- Parking — 1,5%

Imperviousness degree by LU classes

Imperviousness degree of LU classes

	<10%
	10% - 20%
	20% - 30%
	30% - 40%
	40% - 50%
	50% - 60%
	60% - 70%
	70% - 80%
	80% - 90%
	> 90%

Imperviousness degree by LU classes

	Imperviousness degree
Settlement	**44%**
Industry & Commerce	74%
Mining / extraction	67%
Agriculture facilities	62%
Cemetery	51%
Square	47%
Utility (production, disposal facilities)	46%
Residential	38%
Other sports facilities	35%
Social, Military, Cultural and Other	33%
Unused urban areas and brownfields	22%
Camp ground	17%
Other public facilities	8%
Other recreation facilities	7%
Park	7%
Golf course	2%

Indicators

➢ imperviousness degree

➢ artificial area

➢ artificial area per inhabitant

➢ artificial area per inhabitant & worker

➢ annual land take per inhabitant

➢ land take by housing

Indicators

- ➢ land take by industrial and commercial sites
- ➢ land take by agricultural facilities
- ➢ land take by transport and infrastructures (ha/year)

Past Challenges

- ➢ LC & LU 2015: compatibility and comparability with former datasets

- ➢ shorter update intervals

Future Challenges

➢ regular update of LC and LU (every 3 years)

➢ evaluate land take as accurately as possible

➢ reduce land take despite demographic and economic growth
(→ no net land take by 2050)

➢ define land take thresholds at national and municipal level

➢ redevelop land previously used (e.g. as industrial site)

➢ densification of existing quarters

➢ preservation of green areas

The Housing Sectoral Plan:

Projets de PDS 2018
PS Logement
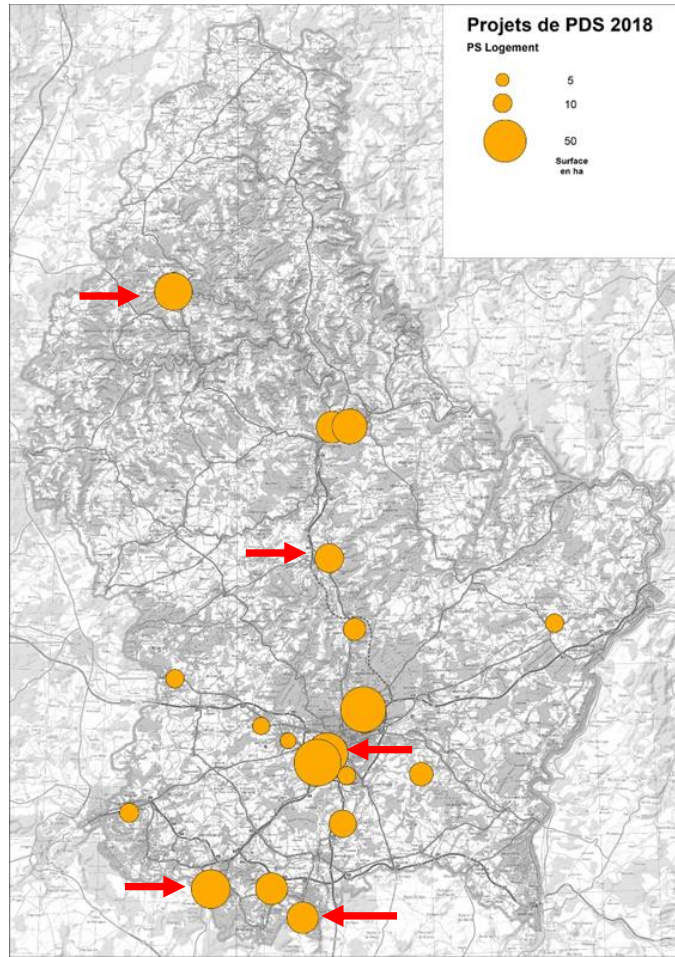
redevelopment of land previously used for industrial or commercial purposes (brownfields) for residential purposes

Current needs

- ➢ better understanding of densification

- ➢ data on construction volume → density

- ➢ more detailed distribution and differentiation of jobs

UNDERSTANDING LAND TAKE.

INDICATORS, DATASETS, MAPPING

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