Urban recycling and optimal use of built stock and artificial land

SWECO Academy, March 6th 2023

Context

- CPDT Research « Intensification and requalification of centralities to reduce urban sprawl and car dependency » (2020-2022)

- DPR 2019-2024 (Walloon Government) : intention to stop urban sprawl
    - Reduce the consumption of undeveloped land by limiting it by 2025
    - Preserve as much agricultural land as possible
    - Preserve, reuse or renovate existing buildings
    - Locate buildings to be constructed as far as possible in existing built-up areas (urban, rural or peri-urban) located near services and public transport

- Demographic forecasts : + 166,000 Walloon households by 2050 (BFP, 2021)

No net land take & urban recycling

Objective: 100% of housing production on built-up land (via urban recycling), except in the case of compensation via desartificialisation

- Modification of existing buildings (divisions, extensions, requalification, etc.)
- New construction on artificial land
- Demolition - reconstruction

In order to enable local and regional authorities to check whether the target of 100% of housing production on built-up land is being achieved, it is necessary to monitor the share of all the various forms of urban recycling in housing production.

Source of inspiration : The Planning Policy Guidance n°3 Housing in England (PPG3, DETR, 2000)

23. The national target is that by 2008, 60 % of additional housing should be provided on previously-developed land and through conversions of existing buildings. Each region will propose its own recycling target to be set in RPG, which should contribute to achieving the national target. (...) local planning authorities should adopt their own land recycling targets in development plans which will contribute to attaining the regional target...

Monitoring of the part of urban recycling in housing production

Available data sources

- Data from the registration after the work of construction / rehabilitation has been completed (Cadastre)

  - Data on the land and building stock situation at a given time

  - Spatialization at the parcel level

  - Possibility of distinguishing between building on greenfield and building on artificial land

Comparison of cadastral data between two years (2010 and 2016) with distinction of 3 cases
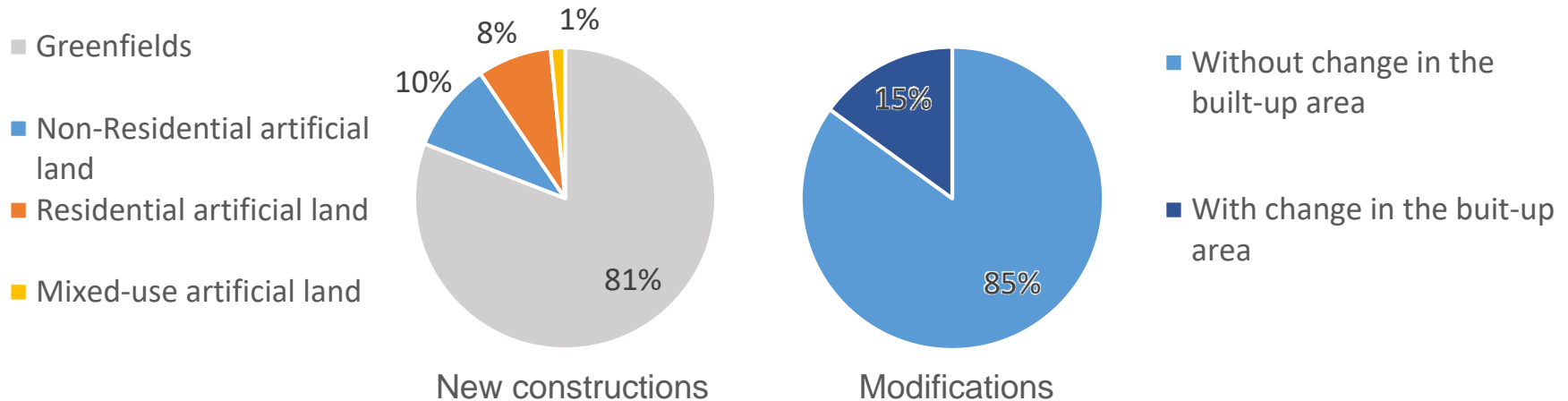
New constructions

Modifications of the number of housing units

Démolitions

Diachronic analysis

- Possibility to distinguish between the construction of buildings on greenfield and those that take place on land that was previously artificialised

- Possibility to associate some housing production
    - with an increase in the built-up area
    - with changes in land use (e.g. from non-residential to residential use)

Legend:
- Greenfields
- Non-Residential artificial land
- Residential artificial land
- Mixed-use artificial land

New constructions: Greenfields 81%, Non-Residential artificial land 10%, Residential artificial land 8%, Mixed-use artificial land 1%

- Without change in the built-up area
- With change in the buit-up area

Modifications: Without change in the built-up area 85%, With change in the built-up area 15%

New constructions

Modifications

Results at the regional level

Housing units increase

- 10 880 housing units / year
  - 8 800 on greenfields
  - 2 080 on artificial land

- 5 400 housing units / year
  - 4 590 without change in the built-up area
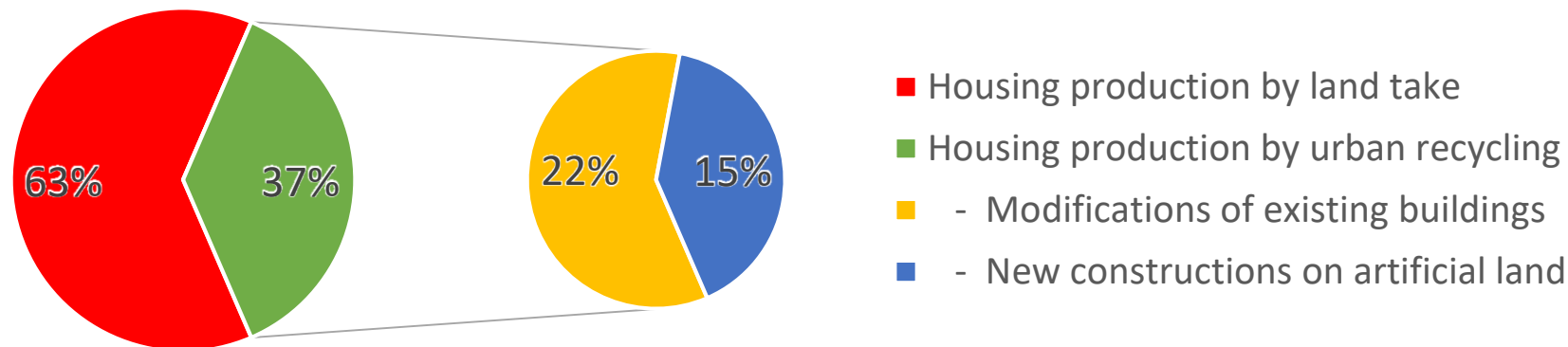 - 810 with change in the built-up area

Housing units decrease

- 800 housing units / year

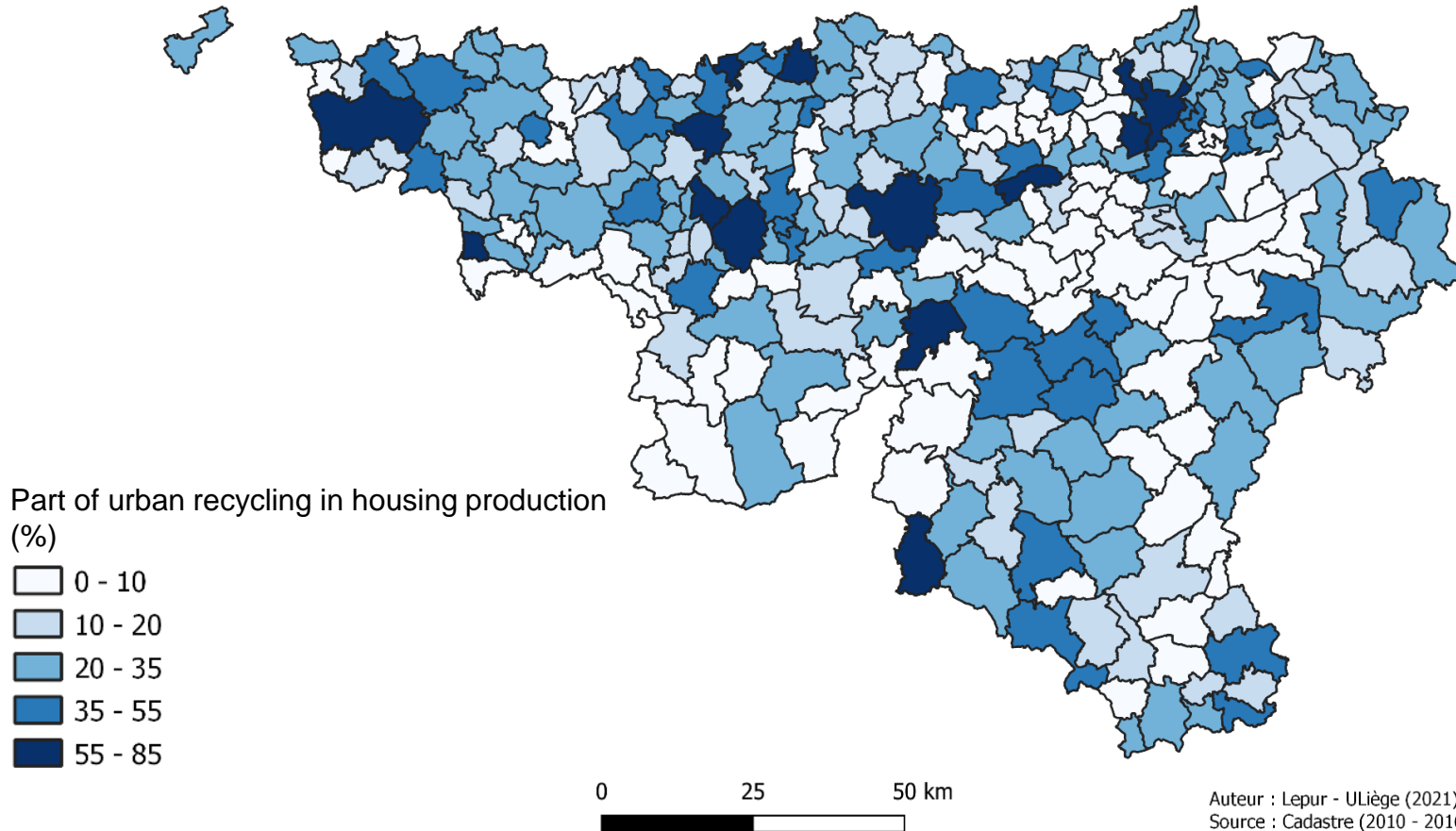- 1 580 housing units / year (Particular period of time)

Results at the regional level

Part of urban recycling in housing production

- ■ Housing production by land take
- ■ Housing production by urban recycling
- ■   - Modifications of existing buildings
- ■   - New constructions on artificial land

	Annual average	Relative part
New constructions on greenfields (land take)	8 819	63%
New constructions on artificial land	2 083	15%
Modifications (include suppressions)	3 046	22%
Net housing production	**13 948**	**100%**

Results at the local level (2010-2016)

CPDT

Part of urban recycling in housing production (%)

- 0 - 10
- 10 - 20
- 20 - 35
- 35 - 55
- 55 - 85

0   25   50 km

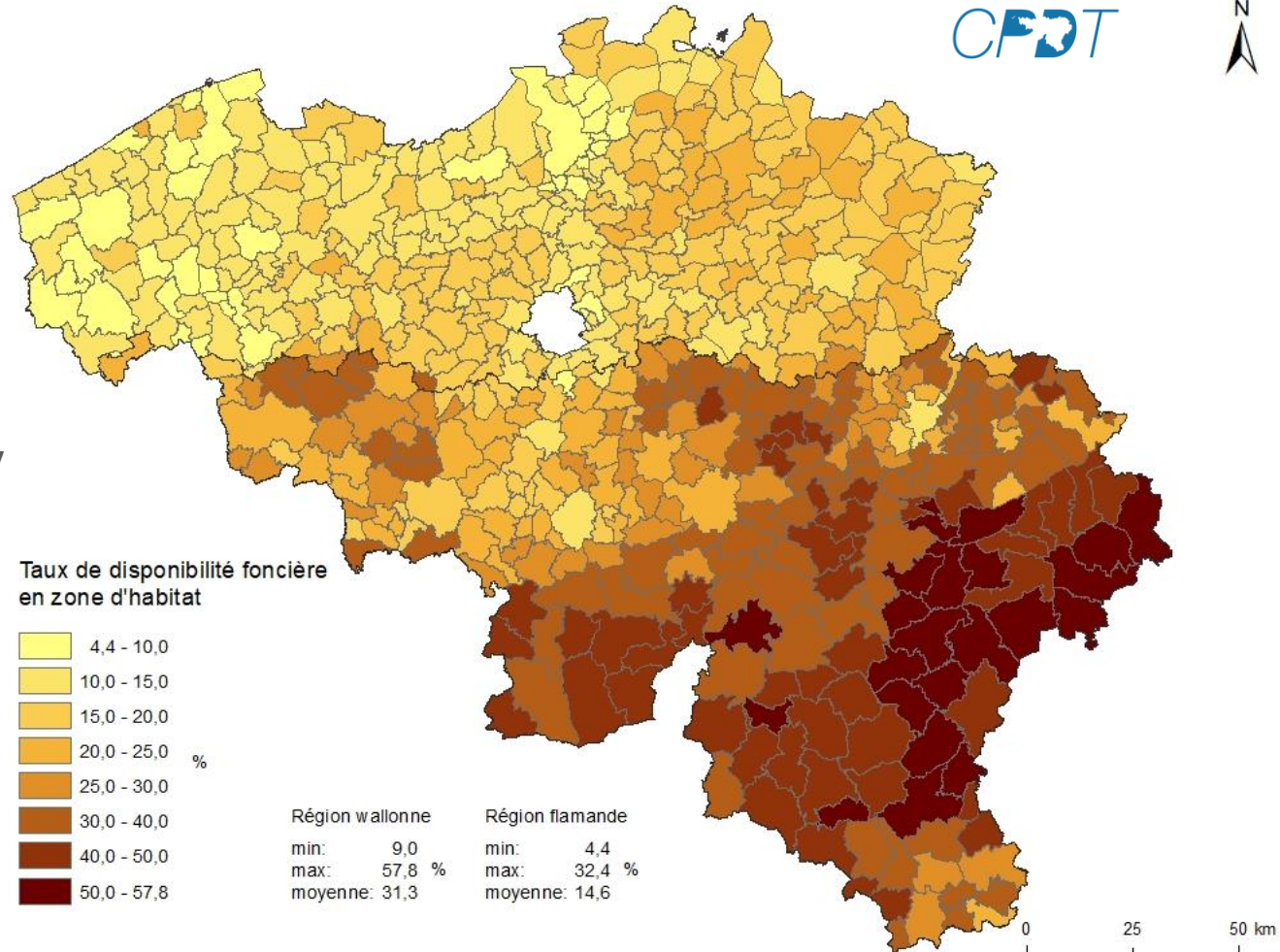Auteur : Lepur - ULiège (2021)
Source : Cadastre (2010 - 2016)

Why this part of urban recycling in housing production is so low in a great part of Wallonia ?

In Wallonia, the availability of greenfield land to produce housing within the urbanisable areas of the land use plans is still immense in relation to the needs (even beyond 2050)

Flanders vs Wallonia

Taux de disponibilité foncière en zone d'habitat

- 4,4 - 10,0
- 10,0 - 15,0
- 15,0 - 20,0
- 20,0 - 25,0 %
- 25,0 - 30,0
- 30,0 - 40,0
- 40,0 - 50,0
- 50,0 - 57,8

	Région wallonne	Région flamande
min:	9,0	4,4
max:	57,8 %	32,4 %
moyenne:	31,3	14,6

0   25   50 km

Réalisation: Lepur - ULiège (2017)
Sources : Cadastre (2016), Plan de secteur (2016), Gewestplan (2016)

Why this part of urban recycling in housing production is so low in a great part of Wallonia ?

Availability of greenfield land

Flanders vs Wallonia

	Zones d'habitat / Woongebieden		ZACC / Woon-Uitbreidings-gebieden	
	Wallonie	Flandre	Wallonie	Flandre
Disponibilités foncières	**56.460**	**29.357**	**16.665**	**14.640**
Surface totale au P. de S. / Gewestplan	180.582	197.394	21.635	28.319
Taux de disponibilité	**31,3%**	**14,9%**	**77,0%**	**51,7%**

Territoire	Dispo en ZH au 01/01/2016 (en ha)	Ratio dispo ZH/poulation (en ha1.000 hab.)
Brabant Wallon	4.542	11,45
Hainaut	11.317	8,46
Liège	18.698	17,02
Luxembourg	11.755	41,93
Namur	10.148	20,74
Total Région wallonne	**56.460**	**15,67**
Antwerpen	7.928	4,35
Limburg	6.377	7,39
Oost-Vlaanderen	6.141	4,13
Vlaams-Brabant	5.483	4,89
West-Vlaanderen	3.416	2,89
Total Région flamande	**29.344**	**4,53**
G-D Luxembourg	2.840	5,29
Rhénanie-Palatinat	6.000	1,48
Rhénanie-du-Nord-Westphalie	19.043	1,05
Suisse	30.000	3,56

Why this part of urban recycling in housing production is so low in a great part of Wallonia ?

With this great availability of greenfield land in Wallonia, the costs of urban recycling operations that involve demolition-reconstruction are often too high compared to greenfield operations in a large part of the territory
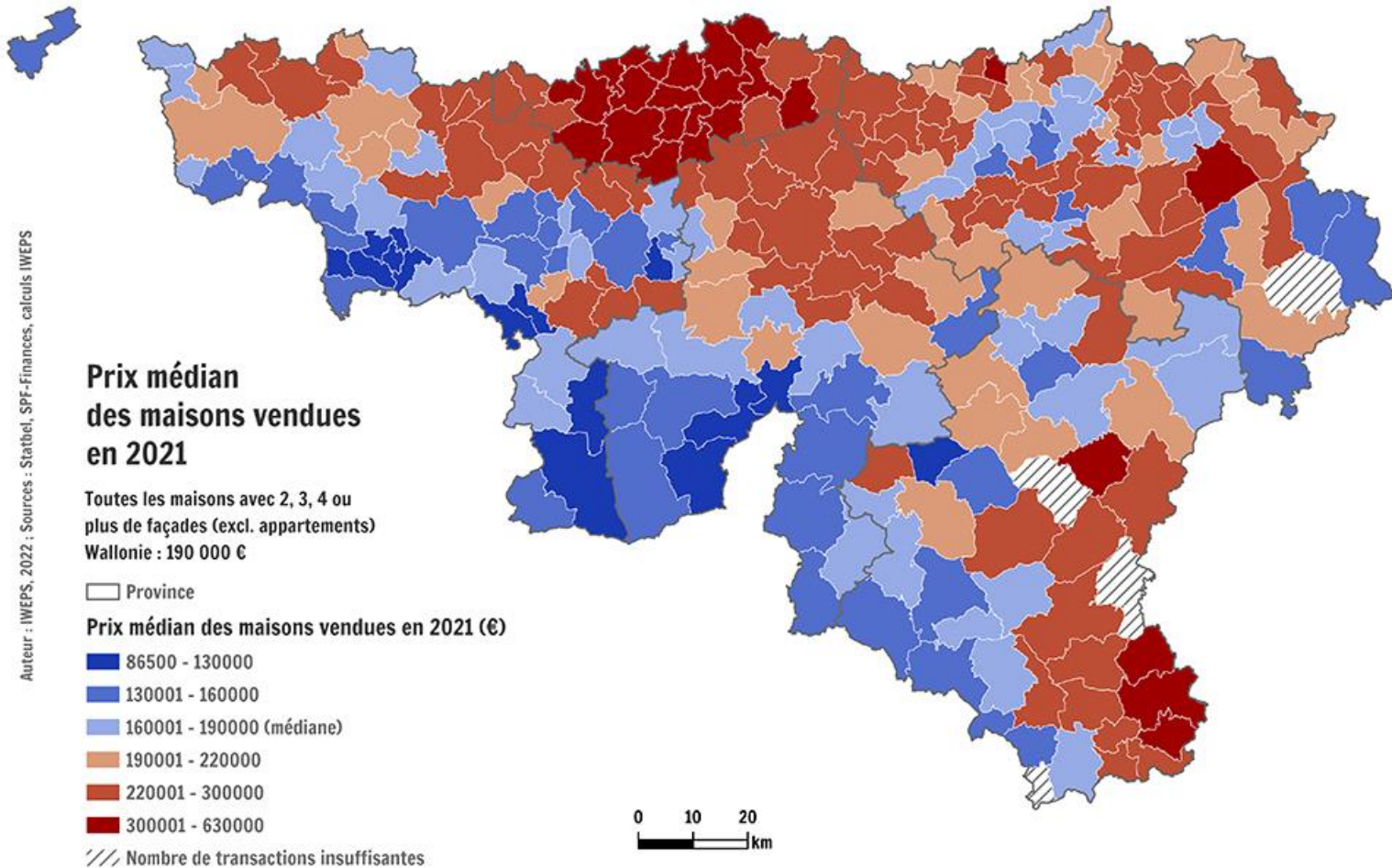
Median house price per m²

Source : Zimmo.be

Prix médiane d'une maison au m² — €/m²

1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400
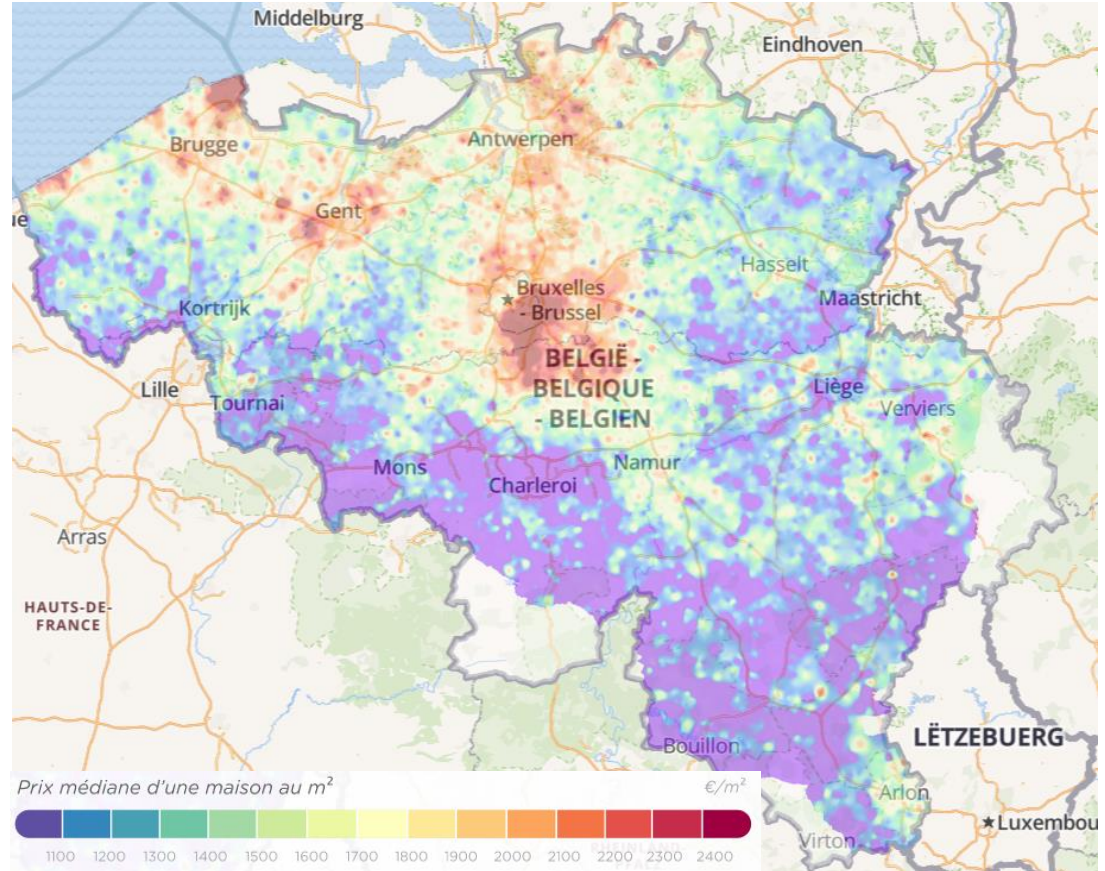
Median house price in 2021 in Wallonia

Source : walstat.be

Auteur : IWEPS, 2022 ; Sources : Statbel, SPF-Finances, calculs IWEPS

**Prix médian
des maisons vendues
en 2021**

Toutes les maisons avec 2, 3, 4 ou
plus de façades (excl. appartements)
Wallonie : 190 000 €

☐ Province

Prix médian des maisons vendues en 2021 (€)

■ 86500 - 130000
■ 130001 - 160000
■ 160001 - 190000 (médiane)
■ 190001 - 220000
■ 220001 - 300000
■ 300001 - 630000

/// Nombre de transactions insuffisantes

0   10   20
km

Potential for urban recycling

*Between end of 2013 and beginning of 2015, Lepur participated in **the update of the SAR Inventory (Sites to be redeveloped - Brownfied)** on behalf of SPW – TLPE - DAOV in the framework of the Lepur-Converto-WALPHOT consortium*

The results of the update of the SAR inventory

Premiers résultats SAR 2015
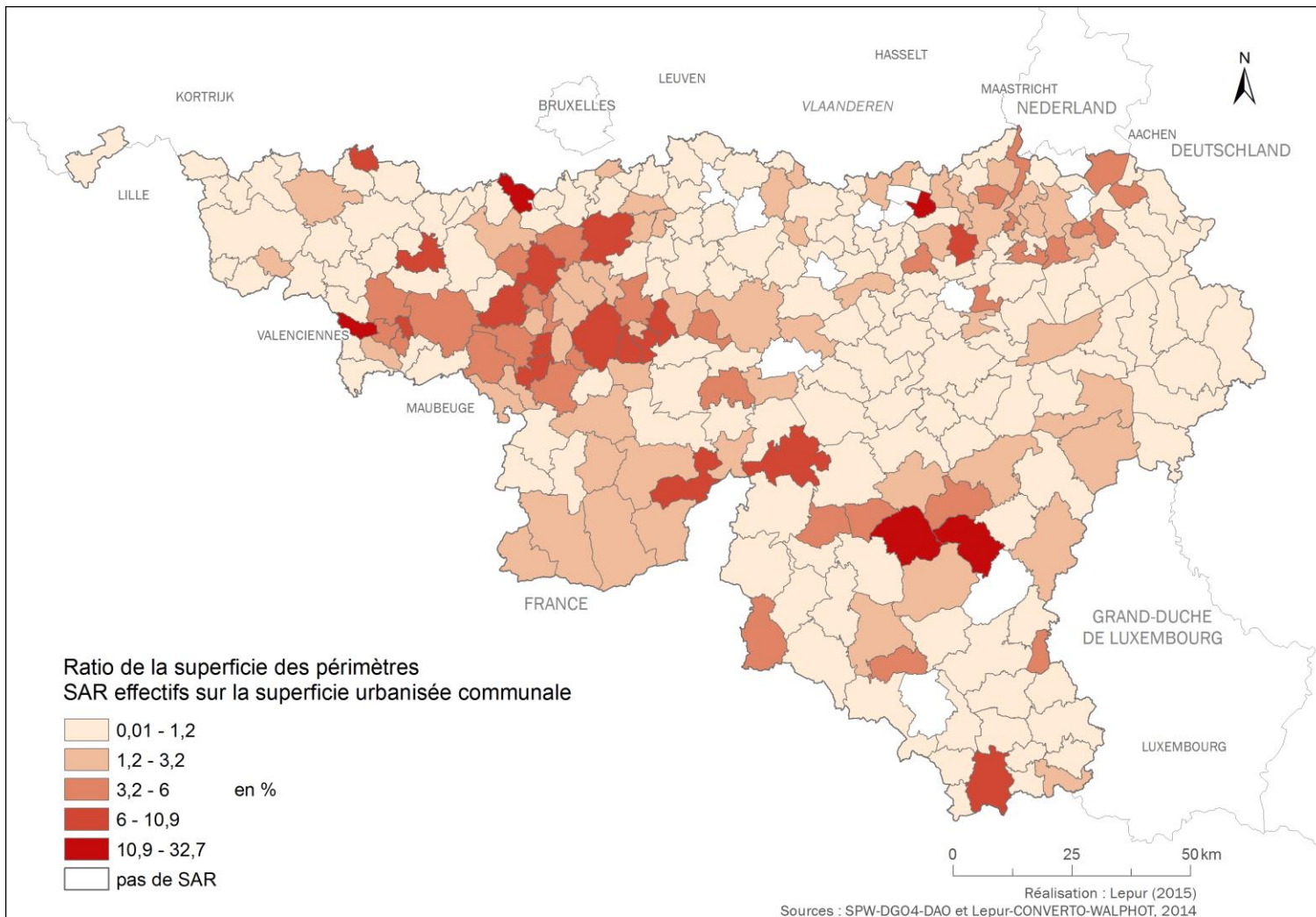**Nombre de sites nouveaux/non nouveaux**

	2015			
	Nbre de SAR	Nbre de sites "Non SAR"	Total	%
Sites non connus de la DAO (en début d'inventaire)	1 147	0	1 147	24.11
Sites déjà connus de la DAO	1 066	2 544	3 610	75.89
TOTAL :	2 213	2 544	4 757	100.00
% :	46.52	53.48	100.00	

Entre 2015 et 2021:
- **361 nouveaux SAR** (c'est-à-dire non identifiés en 2015), ont été ajoutés à l'inventaire.
- **315 anciens SAR**, présents dans l'inventaire 2015, semblent avoir été depuis lors réoccupés ou reconvertis totalement (ancien SAR r**éaménagés**) ;
- **55 autres SAR**, déjà connus de la DAOV en 2015, mais non inclus à l'inventaire de l'époque, car en cours de travaux, sont également **réaménagés** aujourd'hui.

The results of the update of the SAR inventory :

High concentration of SARs on the Mons-Charleroi-Liège-Verviers axis and near the French border, where the housing prices are low

Ratio de la superficie des périmètres SAR effectifs sur la superficie urbanisée communale

- 0,01 - 1,2
- 1,2 - 3,2
- 3,2 - 6   en %
- 6 - 10,9
- 10,9 - 32,7
- pas de SAR

0   25   50 km

Réalisation : Lepur (2015)
Sources : SPW-DGO4-DAO et Lepur-CONVERTO-WALPHOT, 2014

Distribution of the total net consumption of land in Wallonia by artificialisation between the main land uses (in ha/year)

Source: Lepur-CPDT, 2021, NdR CPDT n°79)

68% of the total net artificialisation is due to housing (813 / 1,200 ha / year between 2013 and 2017)
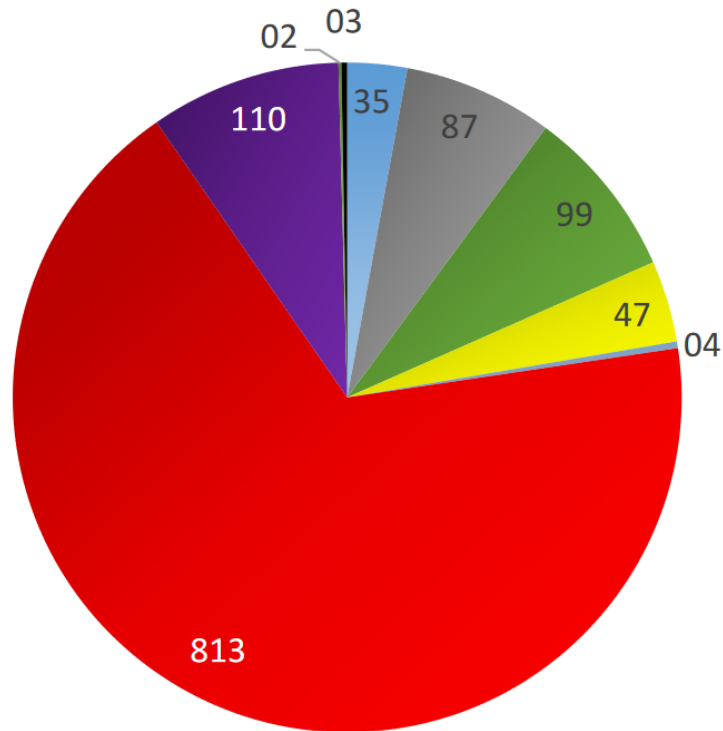
Legend:
- Carrières, décharges et espaces abandonnés
- Infrastructures de transport
- Terrains occ. batiments agricoles
- Terrains occ. commerces, bureaux et services
- Terrains occ. services publics et équipements
- Terrains résidentiels
- Terrains usage industriel et artisanal
- Terrains usage loisirs et espaces verts urbains
- Autres espaces artificialisés

Pie chart values: 03, 02, 35, 87, 99, 47, 04, 110, 813

Total : 1200 ha/an

Share of residential land in the total of artificial land in Wallonia :
1,156.2 / 1,836.4 = 60.8%

*Share of artificial land dedicated to residence in Wallonia in 2022 (6.6% - or 1,836.4 km²)*
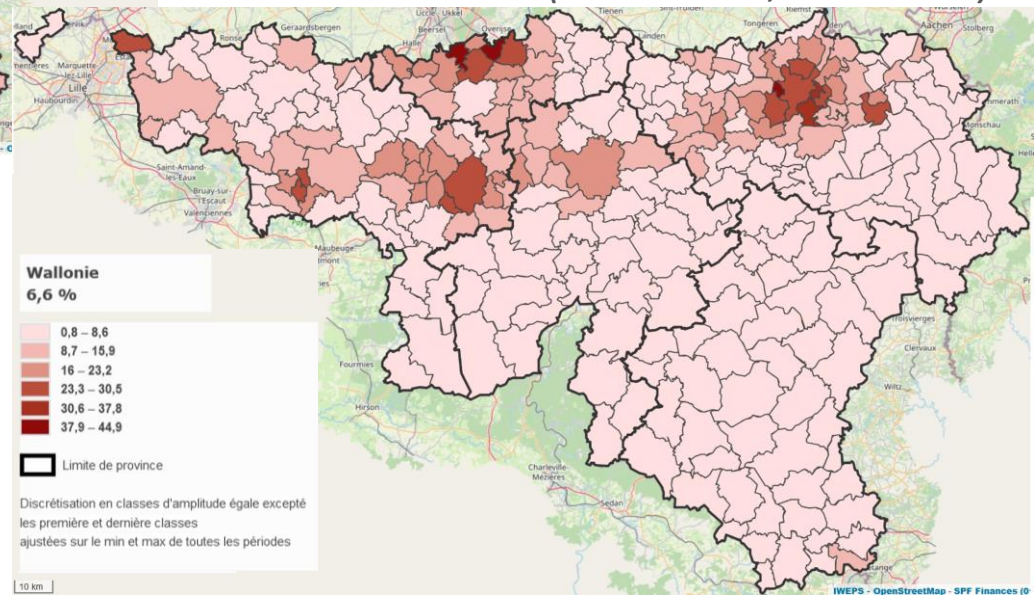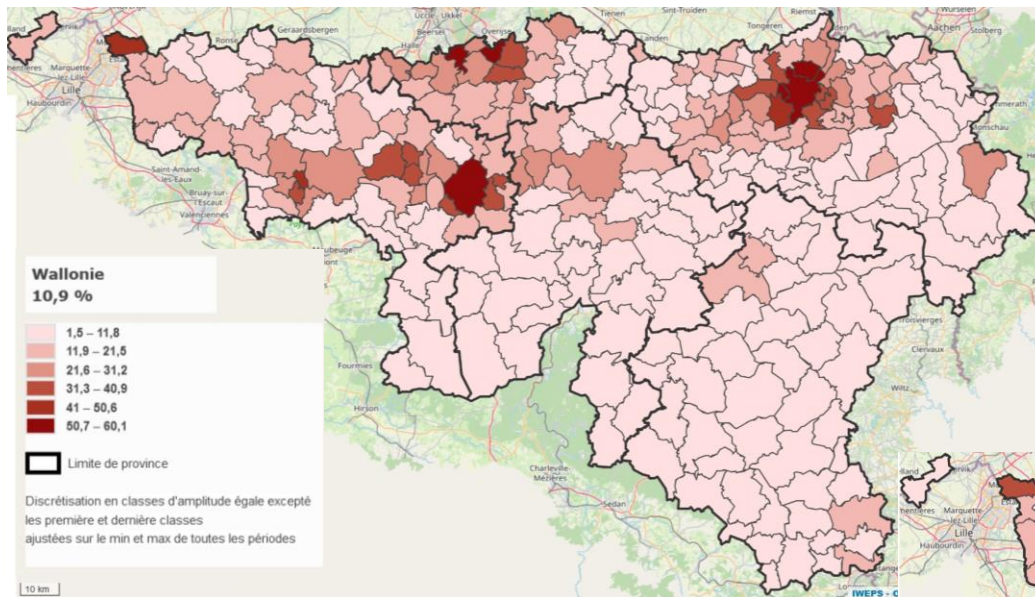
Total share of artificial land in Wallonia in 2022 (10.9% - or 1,156.2 km²)

Source: Walstat

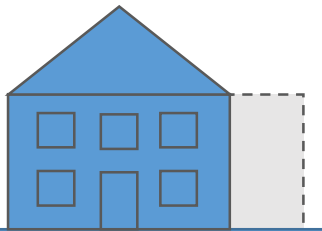# *Estimation of the potential for soft densification of residential land already built up : Method*

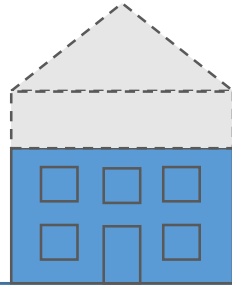**Estimating the potential for housing production on developed land for residential use through five different mode.**

Mode 1	Mode 2	Mode 3	Mode 4	Mode 5
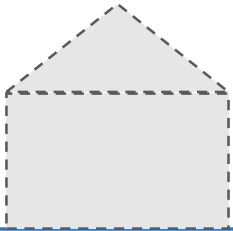
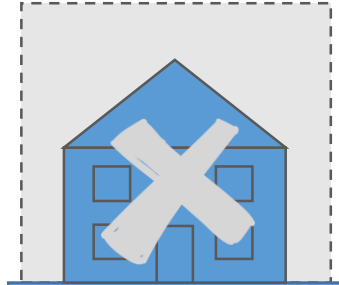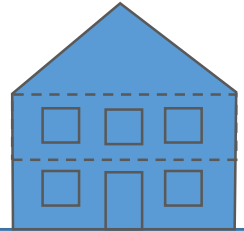| New constructions on already developed land (bimby) | Horizontal extension of an existing building | Vertical extension of an existing building | Demolition-reconstruction | Division of existing housing units |

Method

1. Identify applicability criteria for each mode:

- Minimum area required

- Accessibility to roadway

- Distance to roadway

- Distance to existing building

- Size of existing building

- Average density within a specified radius

- Part of single-family housing units (non-subdivided buildings) within a specified radius
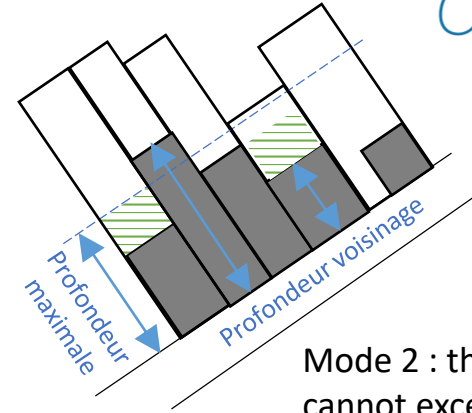
Mode 2 : the extension cannot exceed the depth of the existing building
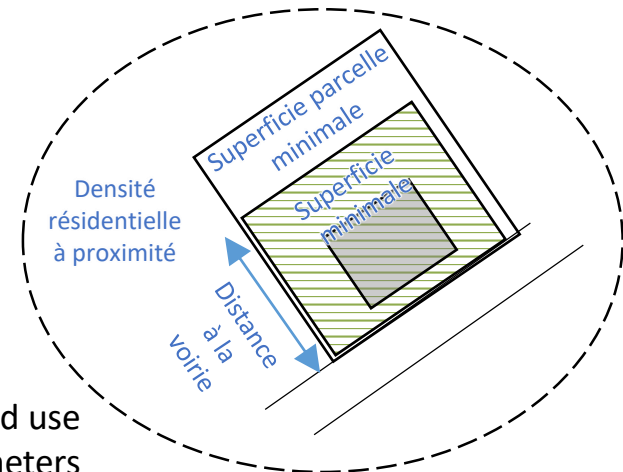
Mode 4: reconstruction is done according to the average land use coefficient (LUC) of housing units located within 500 meters

Method

2. Determine the available areas by these criteria on residential land occupied by single-family homes:

- Available land areas
- Available floor areas
- Available heights

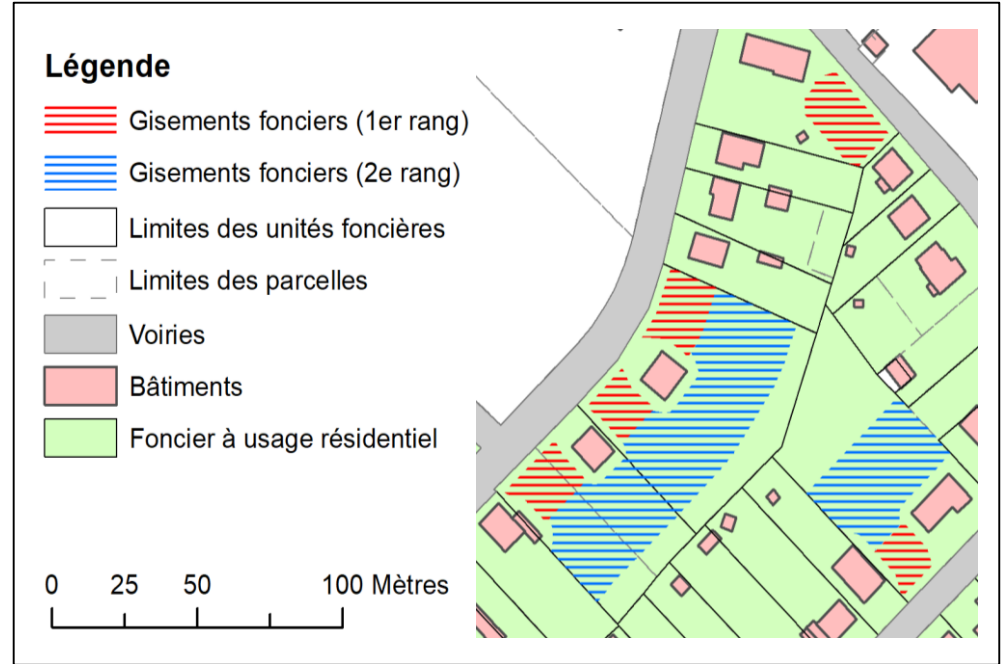Mode 1: Determining the amount of land available for a new building on already developed land

Method

3. Convert available areas into number of housing units:

- Minimum housing unit size (100 m² floor area)
- Density of housing units per available area within a specified radius (500 m)

4. Decline the potential according to the proximity to basic services and structuring public transport stations :

- Proximity to at least two services (shops, pharmacies, primary schools)
- Proximity to a major stop (train stations and bus stops with sufficient service)

< 500 m	**> 500 m et < 1000 m**	**> 1000 m**

Results

Number of potential units for the 5 modes

Proximity to services or structuring stops	Mode 1 Bimby	Mode 2 Horizontal extension	Mode 3 Vertical extension	Mode 4 Demolition-reconstruction	Mode 5 Division	Total
Less than 500m	52 448	56 060	27 161	26 936	33 518	196 123
Between 500m and 1000m	51 813	24 208	6621	2657	27 244	112 543
More than 1000m	100 939	23 365	5226	743	44 760	175 033
Total	**205 200**	**103 633**	**39 008**	**30 336**	**105 522**	**483 699**

Légende

Bâtiment présentant un potentiel d'extension verticale (mode 3)

Parcellaire cadastral

Hauteur du bâti résidentiel

Bâtiment haut

Bâtiment bas

0 30 60   120 Mètres

Légende

Gisements (Mode 4)

Bati résidentiel

Parcelles

Coefficient d'occupation du sol moyen sur un rayon de 500m

COS élevé

COS faible

Légende

Gisements (Mode 5)

Bati résidentiel

Parcelles

Part moyenne de logement unifamilial sur un rayon de 500m

Elevée

Faible

Total employment (sum of salaried and mainly self-employed jobs) in the circular economy (CE) :

Entités	Emploi total dans l'EC en 2013	Part de l'EC en 2013 (%)	Emploi total dans l'EC en 2018	Part de l'EC en 2018 (%)	Part des indépen. dans l'EC en 2018 (%)	Évolution relative de l'emploi total dans l'EC (%)
Ar. de Nivelles	3 066	2,01	3 166	1,92	3,91	3,26
Ar. d'Ath	505	2,08	586	2,31	3,75	16,04
Ar. de Charleroi	3 606	2,48	4 096	2,80	4,85	13,59
Wallonie	26 758	2,24	28 306	**2,26**	4,48	**5,79**
Bruxelles-Capitale	9 258	1,33	8 867	1,24	3,83	-4,22
Flandre	58 710	2,26	60 512	2,17	5,62	3,07
Belgique	94 726	2,11	97 685	2,05	5,11	3,12

(sources : ONSS/RSZ & INASTI/RSVZ, 2013 & 2018)

Number and share of circular businesses by district

CPDT
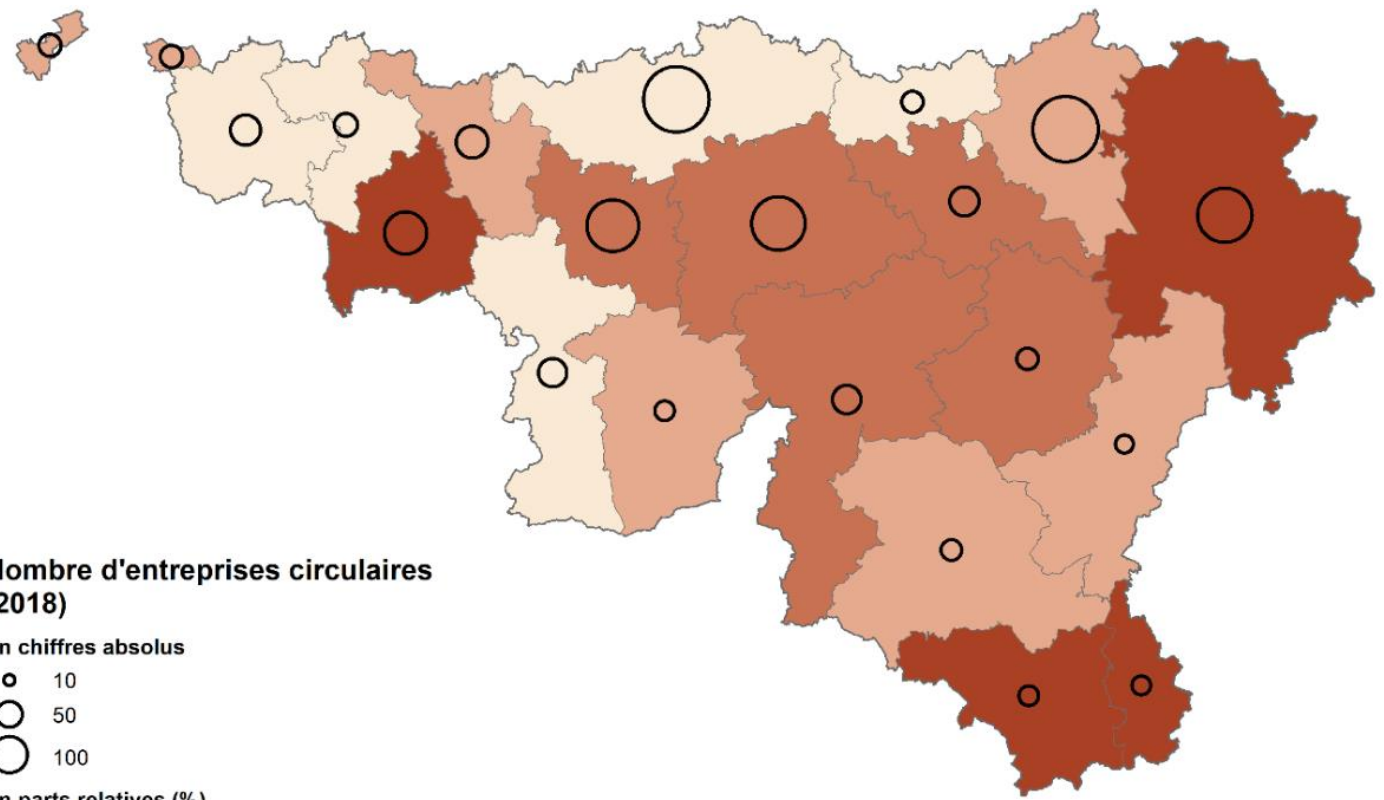
Source : Belfirst, 2018

Nombre d'entreprises circulaires (2018)

En chiffres absolus
- ○ 10
- ○ 50
- ○ 100

En parts relatives (%)
- Moins de 1,7 %
- De 1,7 à 2 %
- De 2 à 2,3 %
- Plus de 2,3 %
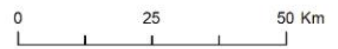
Note : les résultats découlent d'un classement opéré sur base des codes NACE et doivent être considérés avec largesse.

0   25   50 Km

Réalisation : CPDT Lepur-Creat (2020)
Sources : Belfirst (2018)

Analysis of the spatial distribution of companies involved in the circular economy at a fine scale

➢ Use of a **1 km² grid**
  ➢ Grid built according to the specifications of the European INSPIRE directive

➢ Share of companies belonging to the studied economy for each grid cell

➢ Aim : To characterise the spatial behaviour of companies
  ➢ By a cross-referencing of companies with a typology of territorial contexts

Typologies des contextes territoriaux

Sélection de 10 variables

1) Population (IWEPS, 2017)
2) Nombre de trains par jour de semaine (AOT et SNCB, 2018)
3) Nombre de bus par jour de vacances scolaires (AOT, 2018)
4) Longueur du réseau routier structurant (voies express et nationales) (OSM, 2019)
5) Part de l'isochrone 5 min au départ des sorties d'autoroute (OSM et Openrouteservice, 2019 et 2020)
6) Part des terrains résidentiels (CPDT-IWEPS, 2015)
7) Part des terrains industriels et affectés à l'artisanat (CPDT-IWEPS, 2015)
8) Part des terrains affectés aux commerces, bureaux, services (CPDT-IWEPS, 2015)
9) Part des parcs d'activités économiques (PAE) (SPW, 2020)
10) Couverture territoriale 4G (Orange, Proximus, Base) (IBPT, 2020)

Résultats de la classification k-means (10 classes) [17546]

- Rural [6662]
- Rural mais couverture 4G moyenne [5228]
- Bonne accessibilité routière et faible densité [1401]
- Résidentiel [1459]
- Bonne accessibilité autoroutière et faible densité [1897]
- Parc d'activités économiques et industrie [226]
- Urbain [498]
- Urbain avec très bonne accessibilité ferroviaire [65]
- Parc commercial et tertiaire périphérique [84]
- Urbain très dense avec très bonne accessibilité bus [26]

Classification k-means : sélection de la typologie à 10 classes

1) Rural
2) Rural mais couverture 4G moyenne
3) Bonne accessibilité routière et faible densité
4) Résidentiel
5) Bonne accessibilité autoroutière et faible densité
6) Parc d'activités économiques et industrie
7) Urbain
8) Urbain avec très bonne accessibilité ferroviaire
9) Parc commercial et tertiaire périphérique
10) Urbain très dense avec très bonne accessibilité bus

Profil des classes

Valeurs standardisées (moy = 0, écart-type = 1)

17 546 grids covering the Walloon territory

Spatial behaviours of the three economies

	Circulaire	Créative	Numérique	Total Belfirst
Rural avec couverture 4G faible	3,8	3,9	4,6	5,1
Rural avec couverture 4G moyenne	9,8	8,9	8,9	10,3
Bonne accessibilité routière et faible densité	**12,9**	7,4	6,0	7,7
Résidentiel	17,4	21,5	**27,5**	22,7
Bonne accessibilité autoroutière et faible densité	**12,0**	9,7	10,8	10,9
Parc d'activités économiques et industrie	**9,9**	4,8	4,9	5,4
Urbain	22,5	**26,6**	22,3	24,2
Urbain avec très bonne accessibilité ferroviaire	3,6	**5,2**	3,9	4,1
Parc commercial et tertiaire périphérique	**4,6**	**4,2**	**6,1**	4,0
Urbain très dense avec très bonne accessibilité bus	3,5	**7,7**	4,9	5,7
TOTAL	100	100	100	100

Breakdown of the three economies among mesh types (in %)

In **bold**, the values above the value corresponding to the total of the Belfirst companies.

Conclusions related to the spatial distribution of businesses involved in the circular economy at a fine scale

➢ For the most common wastes (household wastes, green wastes - wood and other vegetation - and construction materials), given the constraints linked to the costs of transport, the distance between waste production, sorting and recycling/reuse should as far as possible be less than 40 or 50 km

  ➢ Share of employment in CE in Wallonia as high (at least) as in Flanders
  ➢ Provincial scale = relevant scale for developing the circular economy

➢ Strong propensity of circular economy companies to locate near major traffic routes and outside residential areas

  ➢ Need to reduce the nuisance associated with cartage (+ odours, dust)
  ➢ Less presence of the circular economy in Brussels and Walloon Brabant

For further information : cpdt.wallonie.be
CPDT Research Intensification and requalification of centralities to reduce
urban sprawl and car dependency (2020 – 2021 – 2022)
CPDT Research Emerging economic dynamics (circular, digital and creative economies)
and new territorial challenges : (2020 – 2021 – 2022)

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