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ESPON “No net land take – policies and practices in European regions"

Main administrative, economic, political or social challenges to implement No Net Land Take (NNLT)

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Coordination
Xavier Desjardins - Coopérative Acadie
Tim Devos – Ghent University
Alexandre Leclercq – CREAT UCLouvain

Advisory group
Michaela Gensheimer, Nicolas Rosignol, Marjan van Herwijnen – ESPON EGTC
Aline Dewaele, Pascale Fouchs, Renée Peters – Service Public de Wallonie

Authors
Romina D'Ascanio - Università degli Studi Roma Tre
Xavier Desjardins - Coopérative Acadie
Tim Devos – Ghent University
Valérie Dupont – Université de Lausanne
Philippe Estèbe – Coopérative Acadie
Alexandre Leclercq – CREAT UCLouvain
Anna Laura Palazzo- Università degli Studi Roma Tre
Antti Roose – University of Tartu
Katarzyna Sadowy – Warsaw School of Economics
Stefan Siedentop - Dortmund University of Technology
Luděk Sýkora – Charles University, Prague
Bob Wealer - Ministère du Logement et de l'Aménagement du territoire, Grand-Duché du Luxembourg
Karsten Zimmermann - Dortmund University of Technology

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Contact: info@espon.eu

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Definitions

Land cover

Land cover corresponds to a bio-physical description of the earth's surface. It is that which overlays or currently covers the ground. This description enables various biophysical categories to be distinguished - basically, areas of vegetation (trees, bushes, fields, lawns), bare soil, hard surfaces (rocks, buildings) and wet areas and bodies of water (watercourses, wetlands). (EEA, https://www.eea.europa.eu/help/glossary/eea-glossary/land-cover)

Land use

Land use corresponds to the socio-economic description (functional dimension) of areas: areas used for residential, industrial or commercial purposes, for farming or forestry, for recreational or conservation purposes, etc. Links with land cover are possible; it may be possible to infer land use from land cover and conversely. But situations are often complicated and the link is not so evident. Contrary to land cover, land use is difficult to 'observe'. For example, it is often difficult to decide if grasslands are used or not for agricultural purposes. Distinctions between land use and land cover and their definition have impacts on the development of classification systems, data collection and information systems in general. (EEA, 2004, https://www.eea.europa.eu/help/glossary/eea-glossary/land-use)

Land take

Land take is a process often driven by socio-economic development needs, that transforms natural and semi-natural areas (including agricultural and forestry land, gardens and parks) into artificial land development, using soil as a platform for constructions and infrastructure, as a direct source of raw material or as archive for historic patrimony (European Commission, 2023, Proposal for a directive of the European parliament and of the Council on Soil Monitoring and Resilience, Soil Monitoring Law, COM/2023/416 final).

Renaturation

A process of returning natural ecosystems or habitats to their original structure and species composition. Restoration requires a detailed knowledge of the original species, ecosystem functions and interacting processes involved. (Source: DUNSTE, EEA, https://www.eea.europa.eu/help/glossary/gemet-environmental-thesaurus/renaturation)

Soil sealing

Soil sealing refers to changing the nature of the soil such that it behaves as an impermeable medium (for example, compaction by agricultural machinery). Soil sealing is also used to describe the covering or sealing of the soil surface by impervious materials by, for example, concrete, metal, glass, tarmac and plastic. (EEA, 2001, https://www.eea.europa.eu/help/glossary/eea-glossary/soil-sealing).

Introduction

Land take and its resulting soil sealing cause significant impacts on the environment (loss of biodiversity, fragmentation of habitats, etc.), on primary productive capacities (agriculture, forestry, etc.), and they also exacerbate the vulnerabilities of territories (heat island effects, floods, etc.). Land take leads to the consumption of a non-renewable resource, namely soil. When it spreads (urban sprawl), land take also results in increased demand for transport (of persons and goods), and thus, for energy. It can moreover lead to higher operating costs for network utilities, territorial disparities (particularly in terms of access to services, etc.), and can pose challenges to territorial cohesion and sustainable land use. There are two concerns about land use: that of planning and developing land, and that of the environmental impact of using a non-renewable resource, soil.

The issue of land take is being debated worldwide[1]. Nor is it new[2]. Since the 1950s and 1960s, when cars became commonplace in Europe and North America, urban sprawl has often been criticised for its impact on land use, especially the threat it poses to agriculture, its effects on perpetuating car dependency and its impact on the environment[3]. More recently, the impact of land take has been analysed in more detail, particularly in relation to biodiversity and climate change. The International Panel on Climate Change[4] has produced a special report on climate change, desertification, land degradation, sustainable land management, food security and greenhouse gas fluxes in terrestrial ecosystems in 2019. The report states that "*actions can be taken in the near-term, based on existing knowledge, to address desertification, land degradation and food security, while supporting longer-term responses that enable adaptation and mitigation to climate change*". Many recommendations from the scientific community and international organizations (like the OECD, the UN[5] and the FAO[6], etc.), targeting policymakers, have been made to avoid or limit land take. In its 2011 *Roadmap to a Resource Efficient Europe*, the European Commission suggested as a milestone that "*by 2020, EU policies take into account their direct and indirect impact on land use in the EU and globally, and the rate of land take is on track with an aim to achieve no net land take by 2050*"[7]. This issue is likely to gain further importance in the upcoming Soil Health Law.

In different European countries, the objective of reducing the artificial use of land is already reflected in land use regulations in very different ways. In some countries, national policies to limit land take have given rise to debates rarely encountered by those involved in urban planning[8], involving charges and counter-charges like favouring "attacks on the countryside", the "race to unbearable densities" or the "inability to meet the needs of industry". This report aims to explain the debates that could arise from this policy in its various stages of implementation (the definition of the objective of no land take, the administrative and technical tools designed to implement it, and land take's impact on the actors of the urbanization process) and the solutions that have been found - or not - to alleviate these difficulties. The report is not designed to say everything about the no net land take policy in Europe, but to give a clear view of the different political options that are available to achieve this objective in terms of implementation, operationalization, and finally, appropriation. As a result, the report is not a set of "best practices". Instead, it seeks to give a clear understanding of the main administrative, economic, political or social constraints and drivers influencing the implementation of No Net Land Take (NNLT).

[1] OECD, *Rethinking Urban Sprawl: Moving Towards Sustainable Cities*, Paris, Organisation for Economic Cooperation and Development, 2018

[2] R. BRUEGMANN, *Sprawl: a compact history*, Chicago, Ill., USA, 2005

[3] D. EVERS, *Sustainable Urbanization and land-use Practices in European Regions*, ESPON GETC, 2020

[4] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Climate Change and Land. Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*, Geneva, Suisse, IPCC, 2019

[5] UNITED NATIONS, W*orld Urbanization Prospects*, 2014

[6] S. DURY *et al.*, *Food systems at risk*, FAO/CIRAD/EU, 2019

[7] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS, *Roadmap to a Resource Efficient Europe*, 2011

[8] M. VANIER, « Zéro artificialisation nette : premières leçons », *La grande conversation. Terra Nova*, 7 septembre 2023 (online at: https://www.lagrandeconversation.com/ecologie/zero-artificialisation-nette-premieres-lecons/)

All EU Member States are experiencing problems with soil degradation and increasing pressure on soil and land. Analysis done by the ESPON SUPER project showed that from 2000 to 2018, about 1.26 million ha of land across the ESPON territory was converted to urban use (*Map 1*). Only in Romania (-0.8%) and Bulgaria (-0.1%) did the share of urban land decrease as a whole, mostly in non-built areas such as construction sites or dump sites. In total, 8.6 times more land was converted to urban/artificial use than vice versa.

Figure 1 shows the origin and destination of this land-use conversion. Of the total amount of land that was converted to some form of urban use, 35% became urban fabric (predominantly residential), 37% went to industrial use (including business parks and offices), 17% to infrastructure (including airports) and 11% was converted into urban green areas. Regarding the origin, most of this urbanisation came at the expense of agricultural land (78%): i.e. arable land, grassland or land with some other agricultural function. A few regions in Austria and Scotland saw most new urban land coming from natural areas.

Map 1: *Development of urban use in ‰ of land area (2000-2018)*

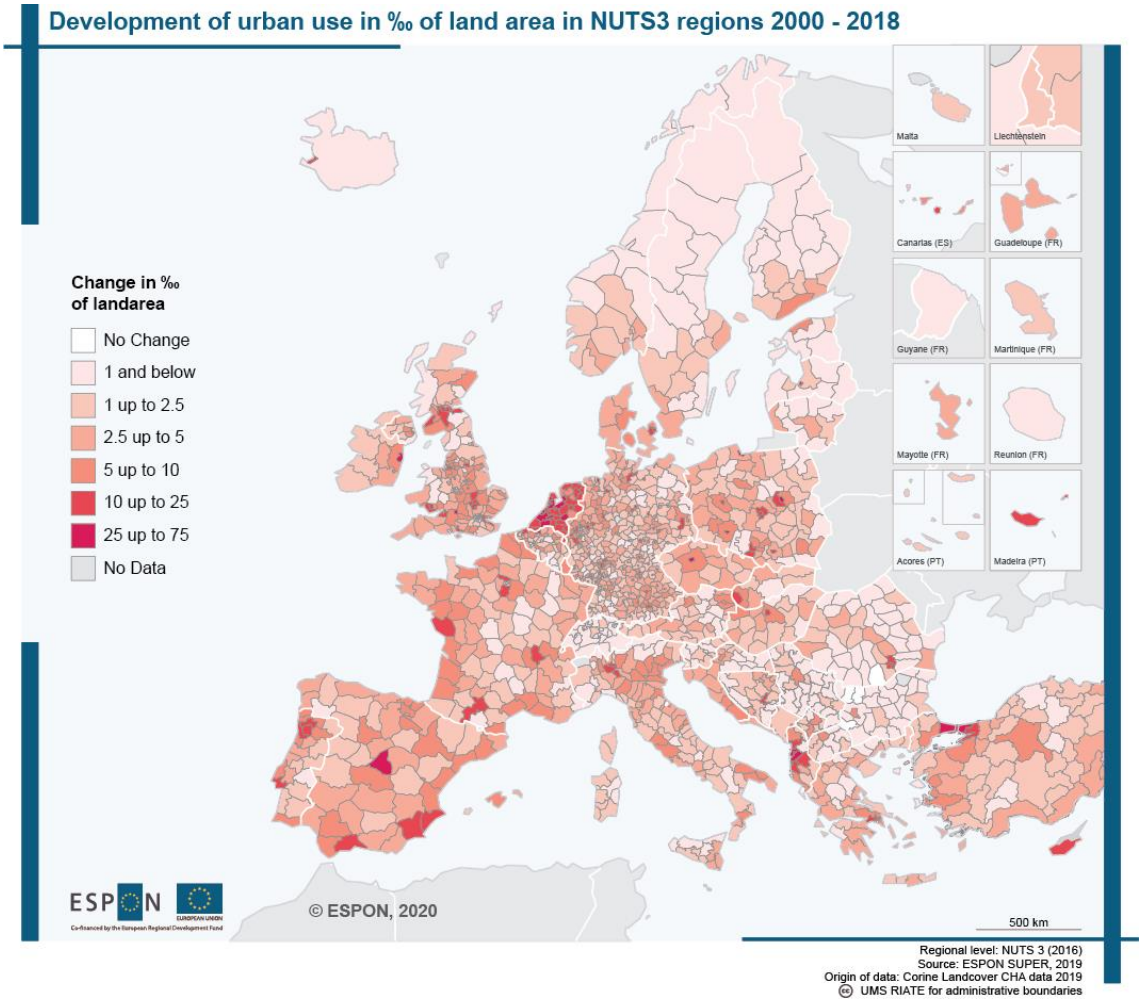
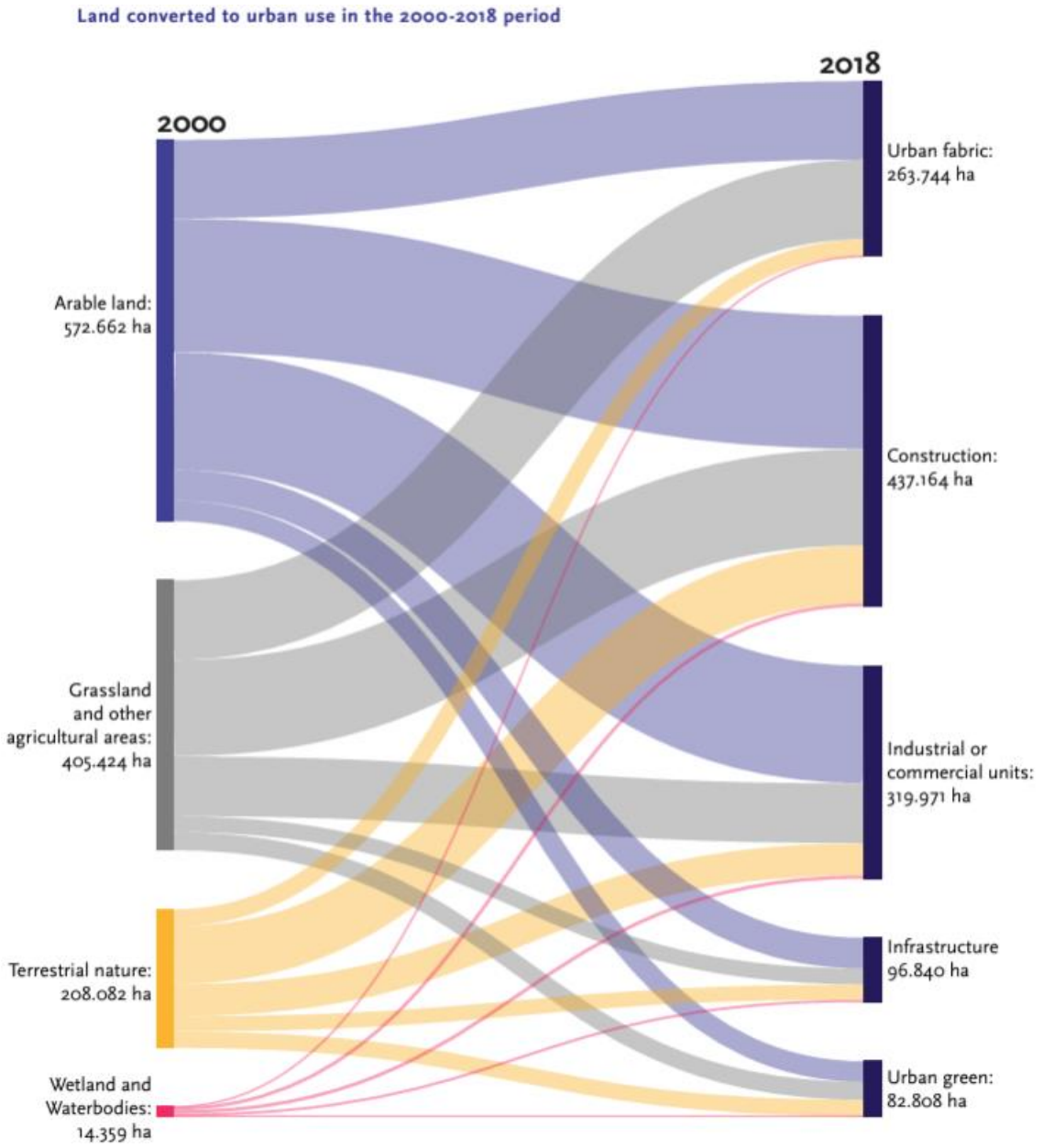


Figure 1: *Land converted to urban use in the 2000-2018 period*



This report is based on case studies of the following nine countries: Belgium, Czech Republic, Estonia, France, Germany, Italy, Luxembourg, Poland and Switzerland. These countries were chosen by the ESPON team because they represent a good sample of the diversity of urbanization processes and urban planning systems in Europe. A common template was developed to obtain specific information about the situation of NNLT implementation in each country. The template was discussed during an online seminar in December 2023 and was designed to provide an understanding of the regulations, the main actors involved in the development of relevant regulations and the main debates taking place. For each country a national expert was invited to illustrate their respective case with a territorial example. During a seminar held in Brussels on 28 February 2024, the comparative chapter and the conclusions of the draft report were discussed together with the experts from the nine countries, the ESPON team and the technicians in charge of preparing the Belgian Presidency of the Council of the EU on this topic.

1 Belgium

Since the 1970s, the Belgian institutional system has evolved from a unitary state to a federal state. Currently, Belgium is composed of six federated entities, with three regions (Wallonia, Flanders and Brussels Capital Region) and three communities (the French, Flemish and German communities). Between the constitutional reform of 1980 and 2020, spatial planning was exclusively the responsibility of the three regions. Since 2020, resulting from its desire to broaden its sphere of autonomy, the German-speaking Community, composed of 9 municipalities, has received spatial planning competence from Wallonia. At the time of writing, the German-speaking Community has not yet taken any measures in relation to NNLT (No Net Land Take). Consequently, our developments relate to the part of Wallonia which is French-speaking (253 municipalities out of 262).

1.1 Walloon Region

In Wallonia, ***a main challenge*** to implement the NNLT strategy relates to the configuration of the ***sub-regional land use plans*** (called *plans de secteur* in French). Those plans were prepared in the 1960s, 1970s and 1980s. A major characteristic of the sub-regional plans is that they have protected agricultural areas, forest and natural areas, covering 83% of Wallonia. However, the *ædificandi* areas where residential development (called *zones d'habitat* in French, which can include housing and all functions compatible with housing, such as facilities and services including shops and offices) is possible have often been planned on agricultural or even forested land and are oversized. In fact, the sizing of residential areas were planned to meet the needs of the demographic and economic booms of the time - the objective of stemming the rural exodus by providing a large number of housing areas in rural municipalities - the existence of numerous roads and plots of land equipped with running water and electricity - the growing use of the car and the development of the single-family home, as well as a logical vision of spatial organisation based on single-function areas.

Suburbanization since the adoption of the sub-regional land use plans means that many municipalities no longer have housing areas occupied by agricultural, forestry or natural land, while some more rural communes still have large areas of undeveloped land in housing zones[9].

Since the sub-regional land use plans were adopted, a number of regulatory measures have been adopted to promote parsimonious land use, reduce urban sprawl and demand for mobility and provide greater protection for agricultural, natural and forestry land. In particular, any modification of an agricultural or forestry zone into a zone for urban development must be compensated for planologically and be the subject of an environmental impact report. As part of this drive for greater regulation of urban development, the Spatial Development Code (CoDT) has been revised and the concept of spatial optimization has recently been introduced. It explicitly includes the reduction of land artificialisation. The 1999 regional land development plan or scheme (*Schéma de développement du territoire* in French - SDT) is currently being updated. After two attempts, a new text was provisionally adopted in March 2023 and should be definitively adopted in April 2024.

1.1.1 Definition and monitoring

- **Is there a (legally binding or commonplace) definition of NNLT in the respective country? Is there a definition of artificialisation? In which document (law, strategy, plan) are these definitions presented?**

The NNLT objective is included in the ***Code du développement territorial (CoDT),*** which is the planning legislation in Wallonia (Territorial Development Act) and comes into force on 1 April 2024, through the concept of

[9] J.-M. HALLEUX, L. BRÜCK et N. MAIRY, « La périurbanisation résidentielle en Belgique à la lumière des contextes suisse et danois: enracinement, dynamiques centrifuges et régulations collectives », *Belgeo. Revue belge de géographie*, nº 4, National Committee of Geography of Belgium / Société Royale Belge de Géographie, 30 décembre 2002, p. 333-354

spatial optimization, which incorporates the objective of reducing the artificialisation of agricultural, forestry and natural land, as well as the objective of reducing urban sprawl.

The CoDT integrates a strategic plan at the regional level called ***Schéma de développement du territoire (SDT)*** (Territorial Development Plan) which draft was adopted by the Walloon Government on March 30, 2023 and submitted for consultation.

The currently adopted SDT operationalizes these objectives as follows:

- defining of a trajectory to reduce the artificialisation of land in order to reach the NNLT in 2050;
- defining of a trajectory to increase the creation of housing and measures to guide commercial and office development in the urban centralities of poles, urban or village centralities;
- setting out measures to reduce soil sealing during residential development.

These measures are based on the European guidelines of the NNLT and the application of the principle: avoid, reduce and compensate. While offering a more operational framework, they take up the guidelines already included in previous attempts to update the SDT.

This concern for operationality means that the SDT defines artificialisation as the process by which agricultural, forestry or natural land is urbanized through construction or the placement of one or more fixed installations following the issue of planning permission.

Desartificilization is the process of converting artificial land into non-artificialised land regardless of its allocation in the sector plan or in the scheme.

Finally, net artificialisation is the balance between artificialisation and desartificilization over a given period. The data relating to net artificialisation is used to monitor its development.

In addition, the SDT identifies on maps for each municipality at least one centrality, defined as a part of a town or village that combines a concentration of housing, proximity to services and facilities and good public transport accessibility. These include village centers, urban centers and urban pole centers. The last-mentioned correspond to the central areas of the municipalities recognized as structuring centers at regional level in the SDT.

The CoDT stipulates that the centrality perimeters and other measures guiding urban development in the SDT will come into force 6 years after its entry into force. The CoDT also provides that the municipal authorities may reformulate these centrality perimeters and these measures guiding urban development as part of their municipal development plan (*Schéma de développement communal* in French - SDC). The legislator is therefore encouraging local authorities to adopt a SDC within the next six years, in order to adapt the regional guidelines to their own policies and specific local circumstances.

As part of the application of this subsidiarity, the SDCs will have to respect the objectives and apply the principles, trajectories and guidelines set out in the SDT, i.e.:

- that urbanization must aim for zero net artificialisation by 2050 according to a linear trajectory defined by basin, avoiding urbanization on agricultural, forestry or natural land by increasing the density of artificialised land while maintaining a minimum amount of open land, and failing that, urbanization on agricultural, forestry or natural land may be carried out by means of controlled densification and soil sealing, but compensating for the surface area thus artificialised by the desartificilization of an area ;
- that the creation of 3 out of 4 new homes should be located in centralities;
- that local and central retail outlets should be located in central areas or in the heart of towns and villages; failing this, retail outlets should be located within the perimeter of existing commercial complexes;
- that the aim should be to optimize the occupation of spaces intended for economic activities by giving priority to the redevelopment of brownfield sites, the remobilization of unoccupied spaces in existing parks and the demolition/reconstruction of existing buildings by applying a land use coefficient of between 50 and 70%.

By ensuring that these objectives are put into practice, the Walloon authorities are seeking to review the logic of land consumption and the dispersal of urban development. They are defining a regional framework that can be implemented by local authorities in line with the principle of subsidiarity.

- **How, to which extent and how coherently is NNLT being monitored, is this diversified in different regions, cities, etc?**

The regional trajectories are set out in the SDT and may be implemented by the municipalities when they adopt a SDC. If the targets are not met, the regional authorities can act, such as revising the land use plan.

The definition of artificialisation through the issuing of permits enables monitoring as part of a well-tried administrative procedure. It guarantees the applicant's right of appeal, environmental assessment and publication for the general public. It also provides the regional authority with supervisory powers.

Regional trajectories are defined by management basin based on one or more administrative districts. They therefore take account of sub-regional development dynamics.

This artificialisation monitoring is confirmed by the change in the nature of the plot of land concerned in the land registry after the permit has been granted. It gives the regional authority access to statistics and enables it to establish a monitoring system, leading to the publication of the development of the territory and its communication to the Walloon parliament every three years. It also enables the authorities to communicate the results demonstrating the measurable contribution to the EU's 2050 objective and report on the progress made as required by the EU Soil Strategy (EU SWD 2021 - 323 final).

- **Which types of (statistical) tools are being used to do so and based on which types of data/databases?**

Until now, the artificialisation of land has been measured on the basis of cadastral data. The cadastral data covers the whole Wallonia but does not include the public domain (including roads, waterways, railways, etc. without distinction).

Parcels registered as arable land, grassland, woodland and lands recognized as natural are defined as undeveloped on the basis of the SDT. If planning permission is granted for these plots and the permit is granted, the land registry records the change in the nature of the land. So, if a plot of arable land and/or grassland and/or woodland and/or land recognized as natural has been the subject of a building permit, it is considered as having been artificialised. These changes can therefore be tracked via the land register and the associated chronological and geographical statistics.

In a second phase, regional authorities plan to establish monitoring based on the execution of permits, but at this stage the processing of these permit data is not optimal and is not generalized.

To conclude this first section

1. The NNLT objective is included in a general strategy labelled "spatial optimization". Spatial optimization refers to the NNLT objective as well as to the "limited dispersion" objective.

2. The aim of the monitoring approach is to mobilize cadastral data by recording the granting of planning permit on a plot previously registered as a natural or forested agricultural plot.

1.1.2 Roles and governance

- **What are the main institutions involved in the design and implementation of NNLT measures and their respective roles?**

In Wallonia, the design and implementation of NNLT measures are directly related to the public institutions in charge of the spatial planning competence.

Responsibility for town planning in Wallonia is shared between the regional and municipal levels. In accordance with the principle of subsidiarity, municipalities will be able to specify measures to achieve NNLT in their communal and local development plans.

- **What are other influential societal or civil society actors involved in NNLT and what is their relation to institutional stakeholders?**

Since the two previous attempts to update the SDT, the Walloon Government has set up two groups of experts bringing together representatives of the various authorities and sectors of activity in 2021-2022. In 2023, all potentially affected stakeholders have been invited to express their views, through consultation bodies and parliamentary debates, as part of the public consultation on the SDT.

In order to help them in their decisions, including those related to NNLT, regional and local authorities benefit from advice provided by universities (CPDT), experts including environmental impact assessors and advisory bodies. Consultative bodies exist at both, regional level (with the "*Pôle Aménagement du territoire*") and municipal level (with the CCATMs ("*Commission consultative communale d'aménagement du territoire et de mobilité*"). These bodies are composed of civic figures representing various types of stakeholders involved in spatial planning.

The Walloon authorities have decided to divide the regional territory into seven "spatial optimization basins" in order to meet the above-mentioned quantitative targets. These geographical "basins" do not correspond to functional regions but to a district or a group of districts in which decentralised services of the Walloon planning administration are located. The Walloon authorities have decided to divide the regional territory in seven "**basins of spatial optimization**" to monitor the above-mentioned quantitative objectives.

In Wallonia, governance is based on the principle of subsidiarity. Guidelines are established at regional level and refined according to specific local conditions. Municipal development plans are called ***Schémas de développement communal (SDC)***. They must reflect regional principles. At the local level, it is expected that the municipalities develop SDC that should focus on the spatial optimization strategy. with the following tasks:

- set out a municipal trajectory for reducing land take in order to move towards NNLT by 2050;
- redefine the perimeters of the centralities according to the SDT delimitation criteria;
- specify measures to guide urban development inside and outside the centralities.

To guide municipalities in defining their urban and village centralities, the SDT project proposes a draft version of the related perimeters and describes the methodology used for their delimitation.

In parallel to the adoption of the SDC, other measures are planned to help with the implementation of the spatial optimization strategy (see the pages 228 and 229 of the 2023 SDT). This includes a regular assessment of the efficiency of the spatial planning instruments, the production of a monitoring of land artificialisation, and the development of a reference guide to improve urban planning and urban design inside the centralities. Moreover, the planning legislation (CoDT) specifies that the Walloon Government will have to produce a report every three years on changes related to urban sprawl, artificialisation and land availability.

Compared to traditional spatial planning approach in Wallonia, the expressed will to follow quantitative trajectories and to develop monitoring procedures can be considered as innovative practices.

To conclude this second section

1. At the regional scale, the NNLT objective and the "limited dispersion" objective will be monitored in seven "basins of spatial optimization".

2. At the municipal scale, the development of the spatial optimization strategy will be based on SDC that municipalities will have to achieve.=

1.1.3 Policies and stakeholder management

- **What are the main tools and policies in place to align various actors in optimizing land use for NNLT?**

At regional level, following on from what has been detailed above, three objectives have been set in terms of spatial optimization: reducing the artificialisation of land, reducing urban sprawl and limiting soil sealing.

The CoDT has been adapted to incorporate spatial optimization and to revise various provisions in order to facilitate the mobilization of land resources in central areas and to curb exemptions from the land use plan outside these areas. It also plans to facilitate the management of land in central areas. Responsibility for commercial development will henceforth lie entirely with the town and country planning authorities, based in particular on the guidelines set out in the SDT. The CoDT also stipulates that the SDT now applies to planning permit for projects over 2 ha, whereas previously it only applied to projects over 15 ha.

The SDT includes various objectives, principles and measures to guide urban development, which can be adapted and reformulated within the framework of the SDCs.

Local authorities are to receive technical and financial support from the regional level to prepare their SDCs.

The Walloon government also plans to accelerate the redevelopment of urban and industrial brownfield sites, depending on whether or not they are located in centralities.

On the basis of monitoring, if deviations from the trajectories are observed the Region will be able to take measures to achieve its objectives.

In Wallonia, the financial resources of local authorities depend largely on the number of inhabitants. They are therefore keen to boost their residential appeal. Local authorities with little natural, agricultural or forest land and, conversely, a lot of built-up land, including potentially valuable brownfield sites, will be able to implement their residential attractiveness strategy while meeting their spatial optimization objectives. Conversely, rural communities will only be able to achieve their residential attractiveness objectives by mobilizing their already built-up land and reaffirming the logic of more compact urbanization.

Densification methods will need to be supported to meet the requirements of residential attractiveness. In urban areas, we need to make the city quieter and more attractive, in particular by developing green infrastructure. In village centers, it will be desirable to encourage gentle densification of already built-up land to achieve densities that guarantee the presence of a minimum number of services.

- **Do you see an evolution in terms of land use regulations?**

A number of changes have been made in the area of spatial planning, in particular through a revision of the CoDT, which introduces the objective of spatial optimization, covering reductions in the artificialisation of land, urban sprawl and soil sealing.

The 2023 SDT project refers to "measures to guide urban development" that could create new land use regulations. These relate to the centrality perimeters and to a definition within and outside these areas of density. These must be at least 20 dwellings per hectare in village centralities, 30 dwellings per hectare in urban centralities and 40 dwellings per hectare in urban pole centralities.

The *ERC* principle must be applied to new urban development projects, whether on built or unbuilt land.

Various measures are likely to support the intensification of urbanization in centralities, including tax on undeveloped land, the right of pre-emption, the activation of land reserves, urban planning charges aimed at creating affordable and social housing, and so on.

Those regulations firstly relate to the proportion of unsealed soil surfaces that must be reserved for urban projects on sites larger than 0.5 ha (p. 43). This must be at least 30% of the surface area of the plot in the centralities (or, at the very least, it must be equivalent to the situation before the development). Outside the centralities, the proportion of unsealed soil surfaces has been fixed to 70% (or a proportion equivalent to the situation before the development).

As far as economic activity, the SDT project stipulates that "by 2030, 30% of new economic land will be developed on land that has already been built on. This rate will rise to 100% by 2050, except in the case of compensation". The project proposes to "make available 150 ha net of economic land per year, giving priority to the rehabilitation of brownfield sites, the remobilization of unoccupied space in existing economic parks and the demolition/reconstruction of existing buildings".

Various measures have also been taken to reduce the diversity of activities permitted in agricultural and forestry zones, including a ban on the installation of photovoltaic panels on large areas of land. In addition, it has been confirmed that authorized activities must be convertible. No construction is permitted in natural areas or green

spaces. Lastly, measures restricting construction and changes to the ground surface in flood-prone areas have been strengthened.

It should also be noted that the Walloon parliament has adopted the subsoil code under the aegis of environmental policy, as well as other measures for nature conservation and the development of biodiversity.

- **What kind of compensation is envisaged?**

The reform of the CoDT has reaffirmed the importance of planological compensation in the event of changes to the land use plan.

On page 41, the 2023 SDT project specifies that, by 2050, any new artificialisation will be compensated at regional level by converting artificialised land into non-artificialised land.

Art. D.II.45 of the CoDT provides for two possible types of compensation in the event of the creation of a new developable area to the detriment of an area not intended for development within the land use plans. The two types are as follows:

  - planological compensation;
  - alternative planning, which may be environmental, energy or mobility-related.

Following the most recent reform of the CoDT in 2024, the possibility of using alternative offsets, rather than planological, has been fairly well limited. From now on, "the inclusion of any new area intended for urban development (...) instead of an area not intended for urban development shall be compensated, for at least eighty-five per cent of its surface area, by the modification of an existing area intended for urban development".

- **Do you see any form of active (institutional) capacity building to ensure more pro-active NNLT approaches?**

Through the possibility of municipalities creating and adopting their new thematic SDC, the commitment of local authorities for spatial optimization should improve. Hopefully, this evolution will gradually limit both, land take and the spatial dispersion of new developments, particularly through urban regeneration. However, this remains a huge challenge in Wallonia because of the overabundance of available greenfield land in a number of municipalities where new urban developments are easier and cheaper compared to urban regeneration operations.

- **Do you see any dominant transformation in terms of developing multi-actor coalitions in relation to NNLT? In response to particular (local or supralocal) urbanization processes or issues?**

In relation to NNLT or, more generally, to the spatial optimization strategy, the most visible coalition seems to be the one of the rural and periurban municipalities that want to continue their development through new residential urbanization.

To conclude this third section

1. The effectiveness of the political alignment between the regional and municipal levels will need to be confirmed over the coming years...

2. The political alignment is particularly challenging for periurban and rural municipalities that want to continue their development through new residential urbanization on greenfield land.

1.1.4 Obstacles and levers

- **Is NNLT a hot topic politically, and which different arguments and discourses are dominant in the ongoing national debate?**

The reform of the SDT is focusing on the spatial optimization strategy. During the last ten years, the different political parties agreed with this general strategy, including the NNLT objective. However, the way in which it should be implemented was and still is a matter of discussion.

At the regional level, one of the main concerns is about housing affordability, with the fear that a supply limitation will exacerbate the affordability crisis for low but also for middle-income households. At the regional level, another concern relates to the possibility to combine the NNLT strategy with the objective to reindustrialize the region.

At the municipal level, the positions with regards to spatial optimization and NNLT seems to be influenced by various factors and are difficult to classify. It seems that the major urban municipalities are mainly in favor of those strategies, due to a perspective of reinforcement of their own housing market. On the opposite, periurban and rural municipalities that want to continue their developments appear less favorable. On another hand, some municipalities want to maintain their distinctive low-density level and appears more favorable to artificialisation regulation. In the same way, some rural municipalities are eager to rely on a more binding framework that could help them in rejecting some permit with low density.

The issue of the planning discrepancy between urban versus periurban-rural municipalities is not new in Wallonia. It can be considered that this discrepancy explains why the 1999 version of the regional master plan is still the official version and why the Wallon authorities have not been able to revise the SDT during the last ten to fifteen years.

The situation of the periurban and rural municipalities nonetheless varied as, after several decades of urbanization and enrichment, some municipalities of the affluent outskirts aim to limit new property developments in order to maintain the quality of life of their current inhabitants.

Finally, it must be said that, in Wallonia, the population is not much concerned with spatial planning issues. The press is not particularly interested and very few people are able to link spatial planning to general issues as the socio-environmental transition. At the local level, densification and infill developments are often rejected by neighboring communities and, moreover, most of the population continues to consider the periurban model (with its large garden) as the ideal housing model.

- **What are the main levers or obstacles that can be identified in this ongoing debate?**

Following former developments, five main obstacles to the NNLT objective can be mentioned:

- the configuration of the sub-regional land use plans and the quasi-impossibility to limit greenfield residential zones potentially available for housing development due to the landowners' right to financial compensation for downzoning;
- the limited technicity in the domain of land use management and the limited availability of specialized labor forces able to initiate innovative and active land policies;
- the desire of periurban and rural municipalities to continue their development through new urban developments on greenfield land;
- the reject of densification and infill developments by neighboring communities and the general preference of the population for the periurban housing model of the isolated house;
- the fear that the implementation of NNLT will increase land costs for both, the population and the economic activities.

- **Would you say these obstacles and levers are influenced by specific challenges of your geographical, planning and urbanization context?**

Urban developments in Wallonia are strongly impacted by the proximity of several metropolitan centers, notably Brussels, Luxembourg, Lille and Aachen. As the land availability in the neighboring regions is more limited than in Wallonia, we see the development of structural immigrations towards the region. This situation has strong

impacts on property prices, and it therefore amplifies urban sprawl. Walloon families are constraints to live further away from their working and living environment with, consequently, longer distances to commute and stronger car dependency. If the NNLT is made operational in the neighboring regions, it will exacerbate those already existing processes.

- **What are found solutions for effectively achieving NNLT? For example, solutions in the form of policies for promoting the development of brownfields, temporary using brownfields or compensating land value reduction?**

As mentioned above, the NNLT objective has been put forward by the Walloon authorities since 2019. Indeed, Wallonia has a tradition of "perimeters and area-based policy" based on the definition of spatial perimeters where developments are encouraged in one way or another, usually with the aim of stimulating urban regeneration and limiting urban sprawl.

In Wallonia, the policy of urban regeneration dates back to the mid-1970s, with specific perimeters for renovation ("*périmètre de rénovation urbaine*" in French). Within the perimeters for renovation, municipalities define urban regeneration options in consultation with residents and with the regional level. The planned measures usually involve the redesign of public space, social housing, public facilities, green areas, the reuse of monuments, private subsidies for renovation, etc.

In Wallonia, since the beginning of the 1990s, the "*revitalisation urbaine*" instrument has complemented the "*rénovation urbaine*" instrument. This PPP instrument aims to increase the financial profitability of urban property developments carried out by private developers in urban neighborhoods. Through this instrument, the municipality can obtain a regional subsidy to finance the development of public space within an urban perimeter around the private project.

Besides perimeters aiming to sustain urban regeneration at the neighborhood scale, Belgium also has a tradition of perimeters to support the regeneration of former industrial sites. In Wallonia, the specific instrument aiming to support the regeneration of former industrial sites is called "*sites à réaménager*" (SAR), or "site to redevelop" in English. Once a SAR perimeter is delimited, financial support through public subsidies is available. The delimitation of a SAR perimeter also helps the development process through simplified procedures for zoning revisions as well as for granting planning permission.

To conclude this fourth section

Five main obstacles to the NNLT objective can be mentioned:

1. the configuration of the sub-regional land use plans and the quasi-impossibility to limit greenfield residential zones potentially available for housing development due to the landowners' right to financial compensation for downzoning;

2. the limited technicity in the domain of land use management and the limited availability of specialized labour forces able to initiate innovative and active land policies;

3. the desire of most periurban and rural municipalities to continue their development through new urban developments on greenfield land

4. the reject of densification and infill developments by neighboring communities and the general preference of the population for the periurban housing model of the isolated house;

5. the fear that the implementation of NNLT will increase land and building costs for both, the population and the economic activities.

1.2 Brussels

1.2.1 Definition and monitoring

- **Is there a (legally binding or commonplace) definition of NNLT in the respective country? Is there a definition of artificialisation? In which document (law, strategy, plan) are these definitions presented?**

Today, there is no legally binding definition of NNLT available in the Brussels Capital region. As there is a lack of legal definition, the definition of artificialisation of soils is informally understood in different levels and organisations of government, though they are not specifically coordinated in between actors. It is generally accepted that asphalt, pavement and fixed constructions such as buildings and infrastructure are considered to be artificialisation. However, this arbitrary definition reaches its limits around topics such as underground infrastructure, parking spaces, cobblestones, gravel in parks and private driveways.

Besides the building code that regulates constructed volumes on one parcel, there are guidelines available that help to reduce soil artificialisation, they make the topic more known in the public administrations and citizen's lives[10].

- **How, to which extent and how coherently is NNLT being monitored, is this diversified in different regions, cities, etc?**

Since the Brussels Capital Region is one city region, there is no diversification on its territory. On the municipal level, differences could be seen in the planning permit granting and monitoring of soil artificialisation of private properties. Since no law around NNLT exists, these practices are not harmonised but can be monitored through statistical tools.

- **Which types of (statistical) tools are being used to do so and based on which types of data/databases?**

There is an interactive map that is publicly accessible that gives an indication the amount of soil artificialisation for each neighbourhood. This data was provided by Brussels environment (Regional administration in charge of environment policy) based on aerial scans and photographs[11].

The PRAS or GBP (Plan Régional d'Affectation du Sol or Gewestelijk Bestemmingsplan), can give an indication on the available 'constructable' space in Brussels and what has already been constructed since 1997 (note that this data is non-exhaustive). On a smaller scale, there are of course redevelopment tools where it is common to not cause more soil artificialisation. It is not uncommon to free up more open space from elsewhere in that neighbourhood in exchange of a new building or infrastructure. On top of that, there is the tool Good Living - project pending - (formerly RRU (Reglement Régional d'urbanisme) or GSV (*Gewestelijke Stenbouwkundige Verordeningen*) which enforces certain rules about safeguarding open soil in projects[12].

1.2.2 Roles and governance

- **What are the main institutions involved in the design and implementation of NNLT measures and their respective roles?**

Perspective. Brussels is responsible for spatial planning and statistics, while Brussels. Environment is responsible for environmental matters, including soil health and water management.

[10] https://www.gidsduurzamegebouwen.brussels/ https://perspective.brussels/sites/default/files/poles/bkp_nl_hd.pdf ; http://www.publicspace.brussels/wp-content/uploads/2017/03/20170321-guide-espaces-publics-bruxellois.pdf

[11] https://wijkmonitoring.brussels/Indicator/IndicatorPage/2481?tab=Sheet&SubTheme=12

[12] https://stedenbouw.irisnet.be/pdf/RRU_Titre_1_NL.pdf

Urban. Brussels handles the issuance of planning permits, building volumes, and building heights. Finally, the municipalities within Brussels are responsible for the management of smaller-scale public spaces and the issuance of construction permits.

- **What are other influential societal or civil society actors involved in NNLT and what is their relation to institutional stakeholders?**

Citizens' action groups such as BRAL, inter-environment Brussels, ARAU, government programs aimed at reaching citizens and/or public institutes. Of course, the other 2 regions of Belgium, Flanders and Wallonia have their own processes and evolutions regarding NNLT. Most notably in Flanders (where it still remains in the stage of a legal draft), this provides the most influence.

- **How does the main governance framework function in relation to NNLT?**

It follows the mindset that open space should be preserved over many government levels, such as is adopted from the EU and national level. Though no legal framework currently is in place in the Brussels-Capital Region (in Belgium there is only a formal draft legislations in the Flemish Region).

- **Do you witness any ongoing innovations or transitions of the governance frameworks or stakeholders alliances?**

Mostly sensibilisation and adopting a design mindset to reduce soil artificialisation as much as possible in public spaces and buildings. In private households, transitions are noticeable when it comes to forbidding private driveways in front gardens and a stricter monitoring of planning permits related to the building of terraces and annexes.

1.2.3 Policies and stakeholder management

- **What are the main tools and policies in place to align various actors in optimising land use for NNLT?**

Mostly monitoring of the amount of remaining unbuilt parcels that are buildable by zoning. Parks, squares, roads, etc are omitted in this calculation.

- **Do you see an evolution in terms of land use regulations?**

Certain legal documents and guidelines have been updated or are being updated to be more in line with the current challenges, opportunities and mindset adopted in cities and urban areas. These policies concur indirectly to limit urban sprawl and soil artificialisation. For example, the tools such as Green and Blue network (maillage vert et Plan Gestion de l'Eau) and the earlier mentioned Good Living. The regional land use plan (PRAS-GBP) is being updated and aim to include NNLT trend. Periods of heavy rain and drought raises the awareness of better water management and its relation to territorial development. This has caused a stricter interpretation of the existing building code (for example to limit artificialisation of garden). Reopening rivers, renaturalising river banks and bodies of water are now also done regularly in the Brussels territory to create more open space. EU initiatives such as the PLEDGE for biodiversity or the future Nature Restoration Law leads Brussels towards a better understanding of the NNLT.

- **What kind of compensation is envisaged ?**

In the administrative scope of Brussels as a consistent dense city-region, it might not be feasible and helpful to adopt such measures. That said, concepts such as stillstand and nature restoration laws, on top of local pressure, can help in the adaptation of local zoning laws or the design of projects.

- **Do you see any dominant transformation in terms of developing multi-actor coalitions in relation to NNLT? In response to particular (local or supralocal) urbanization processes or issues?**

In larger areas that are being redeveloped, the project lead is often not one authority, but a conglomerate of multiple actors. Mostly these are different government agencies (for example urban planning with environment and

social actors). On the other hand, in response to large developments, citizens and citizens' action groups might also work together to better represent their views.

1.2.4 Obstacles and levers

- **Is NNLT a hot topic politically, and which different arguments and discourses are dominant in the ongoing regional debate?**

The topic of soil artificialisation is very relevant politically, not so much NNLT specifically. In Brussels, as a city-region, the built surfaces are already very high historically and the debate mostly involves preservation of open space instead of achieving NNLT. The borders of the Brussels Capital Region do not extend outward and most of Its constructable surface area is already built up or has future development plans. The main debate following soil artificialisation have to do about preservation and cleansing soils.

Politically the arguments for open space preservation mostly come from the perspective of citizen health, preserving biodiversity, protecting natural spaces, mitigate climate change and access to green space for citizens (and its many functions such as sports, nature, rest, quiet…).

A qualitative density is often put on the table as the main tool to achieve NNLT or preservation of open space. Combatting building vacancy, monofunctional office buildings and renovating the existing housing stock is the best agreed way of relieving stress of the available open space. Mutualisation of spaces is another way but still to be defined.

- **What are the main levers or obstacles that can be identified in this ongoing debate?**

There is an (affordable) housing shortage in Brussels, this makes it so that available open space that is not defined as a protected or classified (green) space, quickly becomes of interest for real estate actors. Many brownfields have the potential to become either new green spaces or new neighbourhoods. This causes friction between stakeholders since one seems to be irreconcilable with the other. As there is no clear strategy for these spaces , monitoring of soil artificialisation or NNLT, the outcome of many of these spaces are never fully predictable.

- **Would you say these obstacles and levers are influenced by specific challenges of your geographical, planning and urbanization context?**

There is a clear link to be made between the context of urbanization and the need for investment plans vs the need to preserve open (green) spaces that are not under protection

Furthermore, being an urban Region and a capital city, Brussels keeps on growing and attracting inhabitants without the possibility of enlarging it's administrative border, the population demographics also change which might require different types of facilities. This plays an important role for the fact that there is no adequate metropolitan cooperation in place. Balancing the demand of housing vs the need to preserve green and open space within its own already dense region is specific for Brussels compared to the other Belgian regions and other larger cities in the EU.

- **What are found solutions for effectively achieving NNLT? For example, solutions in the form of policies for promoting the development of brownfields, temporary using brownfields or compensating land value reduction?**

In Brussels, brownfield are often biodiversity hotspots, the redevelopment of those locations into housing often causes a lot of debate (for example the 'Moeras van Wiels' and the Josaphat site). Another way to contribute to NNLT in Brussels is into combatting vacancy of buildings, reconversion of office spaces, renovating heritage buildings and the housing stock, mutualisation of spaces, taking note that this alone might not overcome the challenges. Finally, a better cooperation at the metropolitan level between the three regions where the Brussels functional urban area is spread, could prove helpful as well.

1.3 Flanders

1.3.1 Definition and monitoring

- **Is there a (legally binding or commonplace) definition of NNLT in the respective country? Is there a definition of artificialisation? In which document (law, strategy, plan) are these definitions presented?**

The relevant definitions and goals are presented in the *Strategic Vision of the Spatial Policy Plan of Flanders*, approved by the Flemish Government on July 20 2018. NNLT is defined by means of a strategic goal in the Strategic Vision: *'The additional average daily land take is reduced to 0 hectares by 2040.'*

NNLT is described in the Strategic Vision as transition from a daily land take of 6 hectares in 2016 to 0 hectares in 2040, bringing it intermediately down to 3 hectares in 2025.

Land take is defined as increase in settlement area (the eventual decrease of settlement area on certain sport is called 'reverse land take') . Settlement area is defined according to the (2011) Roadmap to a Resource Efficient Europe: *The space that is taken up by human activity. i.e., the space we use for housing, trade and industry, transport infrastructure, recreation and sport, greenhouses as well as parks and gardens.*

Settlement area consists of the space occupied by our settlements, i.e. through housing, industrial and commercial purposes, transport infrastructure, recreational purposes, stables, greenhouses etc. Parks and gardens are also part of it.

Settlement area is translated as *'ruimtebeslag'* In Dutch. Land take can be translated as bijkomend ruimtebeslag'.

The NNLT goal is complemented in the Strategic Vision with a set of spatial principles regarding avoiding land take (= the increase of settlement area) and making efficient use of the existing settlement area.

The Strategic Vision holds a definition for soil sealing (Dutch: *'verharding'* or more specifically 'bodemafdekking'): *Soil sealing is the surface area of which the nature and/or condition of the soil surface has changed by applying artificial, (semi-) impermeable materials, resulting in the loss of essential soil ecosystem functions (houses, roads, other constructions, ...).*

The term 'artificialisation' is not used in Flanders. However, confusion about the terminology has been recently generated in the drafting process of the new Soil Monitoring Law where the concept of 'land take' has been connected with a new definition. In the draft texts 'land take' means "the conversion of natural and semi-natural land into artificial land" being unclear what is exactly meant by 'artificial land'. Moreover, it seems to be put closer to soil sealing than to the original meaning of settlement area. Therefore, in the reaction to this drafting process, the Belgian regions will propose a clarification of the terminology, whereby land take and soil sealing retain their original meaning as described above.

- **How, to which extent and how coherently is NNLT being monitored, is this diversified in different regions, cities, etc?**

In the region of Flanders the indicator "ruimtebeslag" is published as an (official) Flemish statistic (https://indicatoren.omgeving.vlaanderen.be/indicatoren/ruimtebeslag) and since 2013 its evolution has been monitored in a structural way.

At this moment land take is measured with a refined method on an 3 year frequency, which as such is sufficient to monitor the Flemish objective of no net land take by 2040. However, in the future it might be possible to increase the frequency with this method. The triennial measurements make it possible to derive difference maps and thus visualize and analyse the evolution in a spatial explicit way. Due to the absence of adequate input datasets historical time series beyond 2013 are not possible. Provinces and municipalities have adopted the regional databases to calculate their specific land take.

In Flanders, land take is measured on a very fine-grained scale and resolution. This is desirable because of the high degree of spatial fragmentation that characterizes this region. Therefore it is quite a challenge to link the Flemish figures to the European ones coming from EU-databases (such as Corine Land Cover). The European institutes are fishing with larger meshes, and therefore miss a lot of relevant detail in highly fragmentated regions like Flanders.

- **Which types of (statistical) tools are being used to do so and based on which types of data/databases?**

Alternative databases are available to map and analyse land use and land take (as the increase of settlement area) in Flanders but all have different sources and purposes of development and thus different outcomes of what the total amount of land take in Flanders is and how it evolves. Therefore, the Flemish administration commissioned the Flemish research organisation VITO to develop a base reference to analyse and monitor land use and land take in Flanders. This resulted in a geodatabase that captures the evolution of land use on a 10m resolution starting from a baseline measurement for the year 2013. This land use database is based on the combination of the best available spatial (GIS) databases in Flanders, resulting in a 4 level raster dataset at 10m resolution. No specific fieldwork was carried out for the layout of this land use file. An aggregated version called 'land use map' was composed, resulting in a 1 level raster dataset at 10m resolution.

The indicator for (the evolution of) 'ruimtebeslag' is calculated based on this Flemish 'land use map. Therefore, a selection is made of the land use classes that are considered as 'settlement area' in compliance with the applied definition provided by the Roadmap to a Resource Efficient Europe. The result is a binary map with an indication for each 10x10m grid cell in Flanders whether it is part of settlement area or not, and this for every measurement year (at the moment 2013, 2016, 2019 and 2022). From this binary maps figures and graphs about the state and evolution (land take) of settlement area can be as shown in the published indicator. The geodata of the land use maps and of the settlement area maps are published as open data.

1.3.2 Roles and governance

- **What are the main institutions involved in the design and implementation of NNLT measures and their respective roles?**
    - Flemish Government and Flemish administration (Departement Omgeving: spatial development, environment, green economy, animal welfare). Role is to design the relevant goals and spatial principles regarding NNLT. The Flemish government also prepares relevant instruments and regulations. It implements NNLT on a Flemish scale.
    - Provincial government and administration (5 Flemish provinces). Role is to implement the relevant goals on a provincial scale.
    - Local governments (300 cities and municipalities). Role is to implement the relevant goals on a local scale.

- **What are other influential societal or civil society actors involved in NNLT and what is their relation to institutional stakeholders?**

All actors in the quintuple helix (Environment, Civil Society, Academia, Industry and Government) play their role. Their relation to Institutional stakeholders is formally organised (in advisory councils etc.), as well in (informal) networking.

- **How does the main governance framework function in relation to NNLT?**

The institutional governance framework functions according to the relevant laws in relation to spatial planning. Goals on the Flemish institutional level are expected to be implemented on the provincial and local level, by means of the spatial planning instruments provided by the law, such as spatial policy plans or zoning plans. Of course other 'instruments' such as awareness, communication, research etc. can also be of support.

- **Do you witness any ongoing innovations or transitions of the governance frameworks or stakeholders alliances?**

Recently local governments can voluntarily join a municipal merger (several municipalities formally forming one new larger municipality), in order to increase local capacity.

Recently the governance framework has been set out for so-called 'reference-regions' (15 in Flanders) in which local governments work together on regional (supra-local) topics.

1.3.3 Policies and stakeholder management

- **What are the main tools and policies in place to align various actors in optimising land use for NNLT?**

Overall, the Flemish policy (Strategic Vision of the Spatial Policy Plan of Flanders) is twofold and complementary:

1. Reducing the daily land take to zero in 2040 by two main principles:
    a) Considering spatial expansion as an exception only if there is a societal need for it and if alternatives by means of more efficient use of the settlement area are insufficient. Spatial expansion can only be realised as a 'state of the art'.
    b) No net increase of settlement area in open space and a decreasing soil sealing in open space
2. Increasing the spatial efficiency of the existing settlement area by means of intensification, re-use, mixed use and temporary use.
    a) During last 10 years, the daily land take had be reduced from 5 to 3,8 hectares per day. Spatial efficiency projects have contributed considerable to this reduction. A great number of initiatives support the amount and quality of spatial efficiency projects: pilots, promotion, inspiration, cooperation, spatial implementation plans, subsidies, etc.
    b) More efficient use of space does not mean cities and villages will be stuffed absolutely full with buildings. That's why the policy of spatial efficiency goes along other principles and goals such as:
        - Implementing 10 core qualities in spatial projects, like shared and multiple use of space, spatial adaptability, recognizability, heritage value, biodiversity and soil quality, energy transition, climateproof, health Improvement, social inclusivity, economic vitality.
        - Bundling new dwellings and workspaces on urban nodes with sufficient public transport and amenities in the vicinity.
        - Developing a fine-meshed network of green spaces and water features.

- **Do you see an evolution in terms of land use regulations?**
    - Flanders is covered entirely with approved zoning plans. Off course, a number of these existing zoning regulations have today very good restrictions on new land take.
    - But we have to bear in mind that these existing zonings also have a number of exception rules that allow different forms of land take. That is particular the case with existing buildings or activities that are alien to the zoning, like existing residential dwellings in agricultural zoning. The administration is investigating the possibility of amending the legally framework so that allowing activities that are alien to the zoning, are accompanied by an obligation to remove certain constructions.
    - The Flemish existing zoning plans that cover the majority of the area are remarkably old, dating largely from the 1970's. The foreseen spatial expansion in these plans is in many cases no longer necessary. So, the planning administration tries to actualise zonings, with different initiatives of re-zoning:
        - We are currently changing the zoning in about 100 water-sensitive areas
        - We have a new regulatory framework that counters development of so-called residential reserve areas (on the current zoning plans)
    - A new regulation allows to simultaneously adapt the urban development regulations in force in spatial planning, and adapt the ownership situation of those involved, with the aim of achieving better use of space.

- **What kind of compensation is envisaged?**

This answer depends on the interpretation of compensation.

a) Compensation can be interpreted as spatial planning compensation. There is a compensation regulation when deciding on new zones for housing, companies, recreation or amenities. The government that decides on this new zoning, is required to re-zone old badly situated zonings (for housing, companies, recreation or amenities) to open space.
b) Compensation can be interpreted as financial compensation of re-zoning. With the recent approval of the so-called instrument decree, a number of adaptions have been made to the financial mechanisms in place when a government decides to re-zone an area. (details can be provided if necessary)

c) Compensation can be interpreted as 'reverse land take', which is a relatively new policy. But there are many initiatives:
   - About 16% of Flanders is considered as sealed. Flanders subsidizes 'depaving' projects. These projects do not cover very large areas yet, but have their importance as good practices to learn from.
   - Local governments can apply charges and conditions when issuing a permit. They can demand the demolition of a building or a pavement, if it's proportional to the project.
   - Occasionally, buildings are demolished within projects for the development of nature reserves.
   - The Flemish government has taken initiatives to purchase homes or agricultural holdings located in sensitive areas in terms of flooding or as a result of the nitrogen problem. The Flemish government demolishes the building and restores the soil. In both cases the buildings are sold voluntary.

d) Compensation can be interpreted as balance between new and reverse land take.
   During the downward trajectory towards No Net Land Take, there is still additional land take possible till the final year (2040 in the case of Flanders), although this additional land take should gradually diminish. Only when the allowed amount of land take becomes very small (or net zero) towards 2040, measures are really necessary to steer towards an overall balance of net zero. This would mean that spatial policy at the end of the trajectory only stimulates the spatial efficiency of the existing settlement area. And new demands on land take should be compensated. This certainly implies that monitoring is a first and very important tool for steering towards a balance.

- **Do you see any form of active (institutional) capacity building to ensure more pro-active NNLT approaches?**

The Departement Omgeving (spatial development, environment, green economy, animal welfare) has several initiatives of capacity building with partners. These initiatives are needed within the broader approach of NNLT:
- Supporting the 21 provincial cities in qualitative densification;
- pilot projects such as strategic public transport nodes, 'bouwshift' (building shift: new name for NNLT and spatial efficiency), spatial efficiency and 10 core qualities, parking policy;
- cooperation with the broad field of building (the representative association of contractors, architects, surveyors…);
- webtools such as inspirational projects for spatial efficiency, sustainability of urban sprawl;
- guidance books (sustainability of urban sprawl, Building shift in practice, preliminary consultation …);
- research projects such as 'Cost price and obstacles for densification in Flanders';
- subsidy-policy for various supportive and facilitating aspects of NNLT, such as: pilots for spatial policy plans, renewal of abandoned industrial buildings, de-sealing projects …

- **Do you see any dominant transformation in terms of developing multi-actor coalitions in relation to NNLT? In response to particular (local or supralocal) urbanization processes or issues?**

Past legislature a specific taskforce was installed for the 'Building Shift' (bouwshift). This taskforce Is no longer working, but could have been the beginning of a multi-actor coalition.

The 'Reference Regions' (see above) have the potential to be a platform for supralocal discussion on implementing NNLT.

1.3.4 Obstacles and levers

- **Is NNLT a hot topic politically, and which different arguments and discourses are dominant in the ongoing national debate?**

There certainly is an ongoing debate in Flanders about NNLT, with a very variable use of terminology through the past decade. In the previous legislature, the NNLT goal in the Spatial Policy Plan of Flanders was commonly described as 'concrete stop' (betonstop). This term gave rise to a lot of communicative confusion. In the last years, the NNLT policy is named 'building shift' (bouwshift).

At the very base of the debate is the scarce land. Every societal partner wants space to develop its own sector. But there's never going to be enough space In Flanders to fill in each of the sectoral needs. As we speak, this fight for land can be seen in the conflict between agriculture and nature. Each side demands a guarantee for a number of hectares in Flanders.

Other discourses have a financial side. There are the financial consequences of the price to be paid when rezoning an area. There's also the debate about the price difference between greenfield development and densification projects.

Recent disastrous floodings have started the debate about the future of existing houses in areas prone to flooding. Flooding risks have given rise to greater acceptability about de-paving and water policy (infiltration…). A number of policy initiatives have started like the 'Blue Deal' and 'Resilient Wetland' (Weerbaar Waterland).

- **What are the main levers or obstacles that can be identified in this ongoing debate?**

An obstacle in the debate is the confusion about definitions and figures, used in various ways by different stakeholders. Past decade gave rise to confusion about quantitative information about NNLT: the precise amount of settlement area in Flanders, the difference with soil sealing, the increase numbers etc. There's also confusion on definitions for NNLT, settlement area, soil sealing, the difference between settlement area and zoning categories etc. The main lever in the debate is spatial planning and the question how to develop our settlements in a sustainable way, holding different challenges in account: energy transition, climate change (mitigation and adaptation), mobility, environment …. Spatial planning gives solutions in integrated and combining spatial concepts.

Flanders is strongly characterised by urban sprawl. Urban sprawl in Flanders comes with an important societal, environmental and financial impact. But the urban sprawl in Flanders is also historically and culturally embedded. Therefore this obstacle is very hard to tackle. The current outdated but valid zoning plans that still cover most of the region (*gewestplannen*) are an inheritance of the past and can be regarded as obstacle. Changing or deleting this zoning plan is a very hard issue to tackle. It is related to property rights and price issues.

- **Would you say these obstacles and levers are influenced by specific challenges of your geographical, planning and urbanization context?**

Flanders has a number of geographical characteristics that influence the NNLT debate:

- Flanders is relatively flat and is dominated by the delta of a number of important rivers.
- Flanders has a lot of urban sprawl with the very recognizable ribbon development between a network of town and villages. The infrastructural networks are very dense.
- Flanders has 32% settlement area and 15% soil sealing.

In regard to this characteristics, spatial planning and adaptation to climate change are big challenges.

The current zoning plan (gewestplan) is an inheritance of the past and can be regarded as obstacle. Changing or deleting this zoning plan is a very hard issue to tackle. It is related to property rights and price issues.

2 Czechia

2.1 Definition and monitoring

- **Is there a (legally binding or commonplace) definition of NNLT in the respective country? Is there a definition of artificialisation? In which document (law, strategy, plan) are these definitions presented?**

There is **no explicit No (Zero) Net Land Take (NNLT) policy** implemented by the Government of the Czech Republic. Similarly, there is **no explicit definition of artificialisation**, i.e. the conversion of land to artificial surfaces.

The vocabulary of territorial development (update as of 7.12.2023, https://www.uur.cz/uzemni-planovani/slovnik-uzemniho-rozvoje/) provides definitions of and refers to 2903 concepts in the field of spatial and territorial planning and development. However, it **does not include the concept of NNLT**. It mostly focuses on **taxonomy of land use and definitions of different land uses for the purposes of territorial, spatial and land use planning**. Land is considered as an important part of the (natural, human, living) environment, which is a source of production value (agriculture, forestry, extraction of raw materials) as well as a source of natural qualities and ecosystem services (including cultural values and recreational purposes).

However, **various policies** at national, regional, urban and local levels use and **apply principles and practices associated with NNLT** and address the issue of sustainable use of land. The examples on the national government level include: Strategic Framework Czech Republic 2030 (sustainable development), State Environmental Policy of the Czech Republic 2030 with a view to 2050 (sustainable development), Regional Development Strategy of the Czech Republic 2021+ (regional policy and development), Principles of Urban Policy of the Czech Republic (urban and regional development), Smart City Concept (urban development), Spatial Development Policy of the Czech Republic (spatial planning), Architecture and Building Culture Policy of the Czech Republic, Urban and Active Mobility Concept 2021-2030, etc. On the urban, regional and local level, various strategies, plans and practices reflect the principles, such as integrated strategies for ITI of metropolitan areas and agglomerations, strategies of climate change adaptations, sustainable mobility plans (OECD 2017).

Czechia is a country with a **relatively large proportion of new land take among European countries** while at the same time showing positive signals towards the **re-naturalization of former urbanized areas** (European Environment Agency, 2023, Net land take in cities and commuting zones in Europe, https://www.eea.europa.eu/en/analysis/indicators/net-land-take-in-cities). In 2018, the artificial areas covered 6,7 % of the country territory (5 254 km^2) with an increase of 445 km^2 between 1990–2018 (Grešlová et al. 2021).

In Czechia, there is a **strong policy priority and several policy mechanisms in place for the protection of un-built land** with specific priority for arable land protection and protection and enhancement of the ecological functions (ecosystem services) of the landscape (see section 2.2 below).

The issues related to NNLT are also discussed in **the State Environmental Policy of the Czech Republic** (SEP CR) 2030, which describes the following main challenge: the high proportion of impermeable paved areas in settlements and the expansion of settlements into the open landscape (urban sprawl) instead of using brownfield sites. According to the SEP CR the proportion of built-up areas in the Czech Republic increased by 5054 ha between 1993 and 2018. The monitoring of net land take has been discussed on the platform of the state environmental policy as a **possible indicator for the fulfillment of the UN SDGs** and specifically in relation to the biodiversity.

- **How, to which extent and how coherently is NNLT being monitored, is this diversified in different regions, cities, etc?**

While there is **no explicit No (Zero) Net Land Take (NNLT) policy** and **no explicit definition of artificialisation**, the Czech Republic has detailed monitoring of land use structure that allows to monitor land use change, including the conversion of land to artificial surfaces. Therefore, **there are instruments that can be used for monitoring and evaluation of targets related to the concept of NNLT**, provided it becomes a target in national policies.

The **monitoring and evaluation of changing land use structures** is based on data from the State Administration of Land Surveying and Cadastre. The system provides a very detailed database, specifically including a **comprehensive classification of agricultural soils**. The monitoring and use of data in policies, regulations and assessment is dominantly in two major areas.

Firstly, changes in the overall size and structure of individual categories of land use, focusing on the share of built-up and other areas in the total territory, provides insights into issues into land take or land occupation. This serves as one of the **indicators for monitoring sustainable development** within the country and is embedded within the system of spatial/territorial planning. The focus is on **land with sealed surfaces**, which includes categories of (a) built-up areas and (b) other areas, mainly artificial land including transport infrastructure, landfills, or mining. It is important to note that, land with green surface such as gardens and parks (including those within the built-up areas of a city) are not considered as land taken by development (Act on the Protection of Agricultural Land).

Secondly, the system provides very **detailed categories for agricultural land**, assessed and classified by a **system of Ecological Land Quality Evaluation Codes** (BPEJ). BPEJ codes were determined based on a complex surveying and probing of agricultural areas and they provide information about the main soil and climatic conditions of units of agricultural land and assess the soil **production ability**. The BPEJ codes **determine the basic monetary value of agricultural land**, determine the selling price of land owned by the state and form the basis to **protect** different categories of agricultural land. The BPEJ system is used as an **economic instrument** for soil protection. Moreover, the systems postulates a fine when **using high-quality land for non-agricultural purposes** (Act on the Protection of Agricultural Land).

- **Which types of (statistical) tools are being used to do so and based on which types of data/databases?**

The basic data on land use structure, which also allows to monitor and assess land use changes, are publicly available on a **detailed spatial scale on the level of local governments**, which are in the Czech Republic **municipalities**. The country is characterized by a very **fragmented structure of local governments** with 6254 municipalities and 4 military areas. The public availability of the data on land use is provided by the national system of physical planning due to its focus on sustainable development. The system includes non-statutory "spatial analytical documents (územně analytické podklady - ÚAP)" (see Box 1.1).

The territorial levels of public administration are obliged to provide and update the analytical document to the details and extent necessary for the procurement of the plans and regulatory plans. On the national level, the **Spatial analytical document of the Czech Republic** (ÚAP ČR) are elaborated by the Institute for Spatial Development which is an organizational unit of the state, established by the Ministry of Regional Development of the Czech Republic.

Box 1.1: *Monitoring of land use structure and land use change in spatial analytical documents*

The spatial analytical documents of the Czech Republic (ÚAP ČR 2022) "contain the ascertainment and assessment of the state and development of the area, its values, limitation of the changes in the area due to protection of public priorities, arising from the regulations or stipulated under the special regulations or arising from the properties of the area (hereinafter referred to as "limits of the territory use"), programs for executing the changes in the area, ascertaining and assessing the area sustainable development, and determination of problems for solution in the planning documentation (hereinafter referred to as "analysis of spatial sustainable development")" (Town and Country Planning and Building Code (Building Act)).

The main issues related to the NNLT discussed in ÚAP ČR 2022 are the **protection of the agricultural land and the related fund and the preservation of land intended to fulfil the forest function from excessive loss due to land development** (urban sprawl, construction of industrial zones, construction of transport infrastructure, mining, suburbanization). The key national issues in spatial planning are seen as **suburbanization** associated with **land artificialisation** (in Czech language it is land development / or building up, i.e. the covering of land with impermeable materials). Development is particularly associated with **uncontrolled urban sprawl** (suburbanization) and, together with erosion, is considered the main threat for agricultural soils.

The most urgent issue is the ongoing development of greenfields for commercial centers, logistics and industrial complexes, as well as for housing, which is carried out in open countryside or on the outskirts of settlements. Spatial analytical document of the Czech Republic (ÚAP ČR 2022) states that over the last 20 years, the built-up area in the country has increased by more than 33 km².

Based on the Town and Country Planning and Building Code (Building Act) the **set of national data that provide analytical material relevant to planning are annually provided by the Czech Statistical Office** (ČSÚ), on the scale of municipalities (https://www.czso.cz/csu/czso/csu_a_uzemne_analyticke_podklady). Individual cities often provide their own open data on ÚAP with much broader and detailed data coverage (example for the Capital City of Prague: https://uap.iprpraha.cz/#/).

2.2 Roles and governance

- **What are the main institutions involved in the design and implementation of NNLT measures and their respective roles?**

Currently, there is **no national commitment to achieve zero net land take or delineate certain thresholds to new net land take** nationally, regionally or locally. Similarly, there is **no active public policy discussion about the issue of no net land take**. However, in Czechia, **there are policies and practices related to the objectives and mechanisms of NNLT**, but an explicit link is currently missing. These policies, regulations and practices can be identified along the following **three mutually interrelated areas**.

First, in the Czech Republic (as well as in Slovakia and Poland) there is a long-term established and practiced political goal of the protection of quality of agricultural land, forest and water, with specific priority for arable land protection (Marquard et al. 2020). This specifically concerns **arable land that is seen as a valuable and scarce resource for agricultural production** (Act on the Protection of Agricultural Land). Economic instruments (a fee according to the quality of the soil) counter the conversion of high-quality agricultural soils for non-agricultural purposes. Despite the fact that laws are in place to prevent the conversion of high-quality agricultural land, in practice, there are exceptions being made in favor of economic or other societal interests. However, the regulations were tightened in the past one to two decades. Similarly, there is a strong emphasis on **nature and landscape protection** that includes the protection of species, biodiversity, conservation and considerate use of natural resources and protection and conservation of natural values and aesthetic values of nature and landscape (Nature and Landscape Protection Act). This is closely related to the **protection and development of land, which provides ecological and ecosystem functions and services** related to **global environmental changes and its effects** in terms of floods or heatwaves as well as protection and **development of land and natural areas that provide spaces for outdoor recreation and relaxation** (Town and Country Planning and Building Code (Building Act)). The above functions are often mutually related and overlapping in the territorial development of cities, settlements and regions.

Second, Czechia has a well-established **system of land use (spatial/territorial) planning and development**. The key objectives of spatial and land use planning concern **sustainable development** understood as the **balanced conditions for economically efficient, environmentally sustainable and socially inclusive development** that favors the **utilization of the already developed land in already urbanized areas** and **protect the non-developed land and areas**. It includes the **regulation on the use of high-quality arable land for non-agricultural purposes**, **nature and landscape protection and conservation**, ensuring the **provision of ecosystem services** through the fortification of **systems of ecological stability**, and **spatial arrangements of settlement and built-up environment** that can ensure **long-term sustainable development**.

Third, there are policies and strategies that on a general level emphasize sustainable development, indicate trends that threaten sustainable development and provide objectives in tackling the negative trends and support sustainability. The negative trends also include processes that lead to the **loss of land outside already build-up areas**, which namely concerns arable land. The **largest land losses are related to suburbanization and suburban sprawl around major cities**. These strategic documents also point to the extent of **brownfields and need for their regeneration and reuse**. Last but not least, policies prioritize keeping cities **compact and dense** with an imperative to provide within urban built-up areas ("intravilan") alternative development sites to greenfield development on the edges of existing built-up areas and sprawling greenfield construction outside cities and towns to wider commuting regions. The national policies that address these trends and priorities in relation to territorial development and planning of land use are: the "Strategic Framework Czech Republic 2030" (key national document with priorities for sustainable development), "Spatial Development Policy of the Czech Republic" (national spatial planning), and the Regional Development Strategy of the Czech Republic 2021+ (national regional policy). There are thematically specific national policies and strategies, which address these issues in more detail, namely Principles of Urban Policy of the Czech Republic (urban and regional development), Smart City Concept (urban development), Architecture and Building Culture Policy of the Czech Republic, Urban and Active Mobility Concept 2021-2030. These policy documents **explicitly identify processes that lead to the less efficient, sustainable and inclusive development of settlements and settlement systems, such as suburban sprawl and not sufficient brownfield redevelopment**, and that are often related to greenfield developments and extensive consumption of new unbuilt land as well as suggest objectives, and instruments to tackle these processes.

- **What are other influential societal or civil society actors involved in NNLT and what is their relation to institutional stakeholders?**

Non-governmental organizations use the term and concept of NNLT only exceptionally. The explicit reference to NNLT is present only in a few academic and research publications authored by scholars from universities (Kirschner et. al. 2023). The term and the reference to EU goal of NNLT for 2050 was also used in a work of the Czech Environmental Information Agency (CENIA) in mapping changes in CORINE Land Cover 1990–2018 (CENIA is an organization established and funded by the Ministry of the Environment of the Czech Republic to provide information, data and research support for the state administration (Grešlová et al. 2021, p. 34).

However, civic society actors and NGOs involved in urban, spatial and territorial development often emphasize issues of sustainable development related to the agenda of NNLT including combating sprawl, keeping compactly developed cities and reuse of brownfields (among the most active NGOs in this field is Arnika https://arnika.org/).

- **How does the main governance framework function in relation to NNLT?**

As there is **no explicit commitment to achieve zero net land take or delineate certain thresholds to new net land take** at the level of national government, regions and municipalities, we can only discuss the possibilities, capacities and competences within the existing governance framework in relation to potential use of NNLT concept in public policies.

First, at present, there are **national policies and strategies** that define general priorities that are **closely related to the philosophy of NNLT**. They emphasize sustainable development, indicate trends that threaten sustainable development, such as loss of land outside already build-up areas namely due to greenfield construction related to suburbanization and sprawl, and provide objectives in tackling the negative trends and for the support to sustainable development, such as priority for brownfield regeneration and compact city development. The **narratives and articulations in these policies and strategies** point to the general need for conservation of valuable natural areas, certain level of protection for arable land, reuse of already build up land, decreasing pressure of new development on the use of greenfield areas and enhancement of landscape ecological functions and ecosystem services. However, they do **not opened yet the discussion about targets that would limit the land development by an explicit objective of NNLT**.

Second, the system of the protection of quality of agricultural land is driven by a **long term goal of balancing land development between two main objectives**. First is related to the priorities for the protection of **arable land as a valuable asset for agricultural production**. Second to economic development **priorities related to the needs of the industrial production, distribution, retail and transportation** as well as objectives in the area of **new housing development** and **residential urbanization**. The instruments used for the protection of arable land losses are thus not primarily related to the idea of NNLT. Recent discussions of more restrictive approach to the use of the most valuable land for large industrial and warehousing halls and shopping big-boxes is driven primarily by defending sectoral interests of primary and secondary economic sectors, rather than objectives related to green transition. However, the available tools and instruments can be also used to enhance the objectives of NNLT, provided the government approves such targets.

Third, the **national system of spatial planning** addresses the negative trends related to the undermining NNLT as well as defines priorities in relation to territorial development and land use that are closely affiliated with the objectives of the concept of NNLT. The Czech national system of spatial planning (see Box 1.2 and 1.3) provides **a complex governance framework that could be used for both the definition as well as the fulfilling NNLT targets**.

Box 1.2: *Czech national system of spatial planning*

The "Town and Country Planning and Building Code (Building Act)" and national system of planning documentation provision on national, regional and local (municipal) levels and regulation of construction through permits issued by a dense network of building offices includes, implements and enforces essential principles that contribute to the reduction of net land take.

"The objective of town and country planning is to create the preconditions for construction and ***for sustainable development*** *of the area, consisting in the balanced relationship of conditions for the favourable environment, for economic development, and for cohesion of community of inhabitants of the area, and which* ***satisfies the needs of present generation without endangering the conditions of life of the future generations****. … With respect to that it determines the conditions for economical utilization of the developed area and* ***ensures the protection of the non-developed area and grounds without development potential****. …"*

On the national level the principles of land protection are explicitly expressed and narrated in the **national "Spatial Development Policy of the Czech Republic"**, which is the anchoring national strategic document in spatial planning.

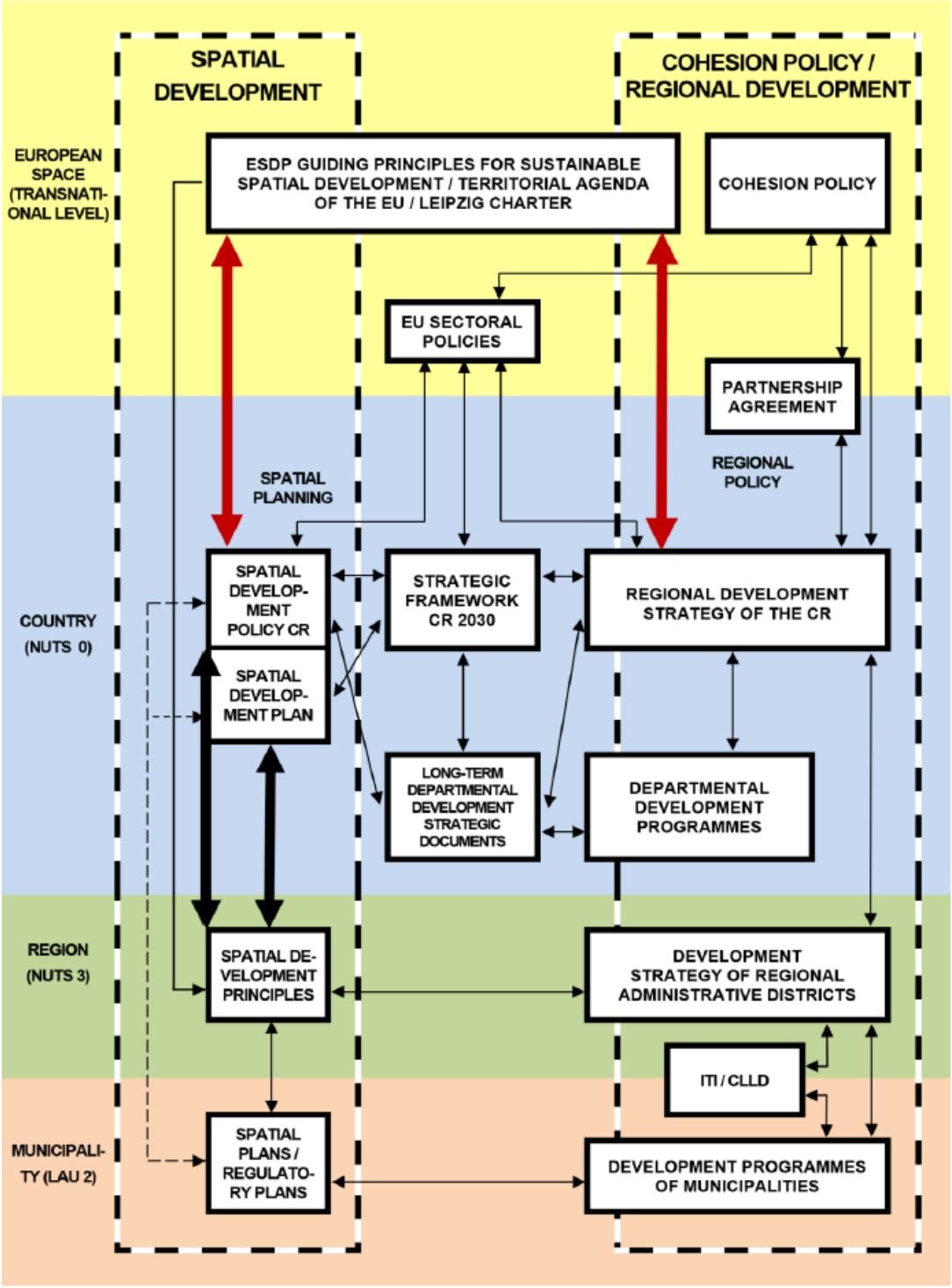
"Create ***conditions for the development, potential and multifunctional use of abandoned areas and sites (so-called brownfields*** *of industrial, agricultural, military and another origin, including the territory of former military training areas).* ***Use efficiently built-up areas*** *(support reconstruction, revitalization and rehabilitation of areas) and* ***provide protection of undeveloped areas*** *(especially agricultural and forest land) and* ***preservation of public green areas, including the minimization of their fragmentation****. The aim shall be the efficient use and arrangement of the territory which is economic in the demands on public budgets for transport and energy, and which by coordinating public and private interests in the development of the territory,* ***reduce negative consequences of suburbanization for the sustainable spatial development****." (Spatial Development Policy of the Czech Republic, 2023, p. 16).*

*"****Define and protect, in co-operation with the municipalities concerned, the plots necessary for the creation of continuous areas of publicly accessible greenery from being built up*** *in the development areas, development axes and specific areas* ***where the landscape is adversely affected by human activity, using its natural regeneration****. The aim is* ***to preserve continuous areas of undeveloped land in the immediate vicinity of large cities suitable for undemanding forms of short-term free-time activities, as well as for the creation and development of forest stands and preservation of the permeability of the landscape****. (Spatial Development Policy of the Czech Republic, 2023, p. 16).*

On the regional level the spatial planning document is called **Spatial Development Principles**. *"The spatial development principles determine especially the basic requirements for purposeful and economic arrangement of the region´s territory, delimit the areas or corridors of the supra local importance and determines the requirements for their utilization, especially the areas or corridors for the public works, public benefit measures, they determine the criteria for decision making on possible variants or alternatives of the changes within their utilization. The spatial development principles may delimit the areas and corridors, aiming at examining the possibilities of future utilization, their existing utilization must not be altered in a method, which would make impossible or materially deteriorate the examined future utilization (hereinafter referred to as "territorial reserve"). As a component of the development principles it is also* ***the assessment of the impact on the area spatial sustainable development****. Within the environmental impacts assessment there are* ***described and assessed the ascertained and expected material impacts of the development principles on the environment*** *and the acceptable alternatives fulfilling the tasks of the development principles." (Town and Country Planning and Building Code (Building Act)).*

2.3 Policies and stakeholder management

Box 1.3: *Policy and regulatory framework for spatial development in the Czech Republic: Spatial/territorial planning and regional (and urban) policies*



Source: Spatial Development Policy of the Czech Republic, 2023, p. 11.

- **What are the main tools and policies in place to align various actors in optimizing land use for NNLT?**

NNLT is not currently on any political and policy agenda in the Czech Republic. There is **no explicit commitment to reduce net land take and no active public policy discussion about the issue of no net land take**. Any discussion on the governance mechanisms in relation to NNLT would be speculative.

No tools and policies are currently explicitly related to NNLT. However, there is wide array of policies, regulations, instruments, tools and practices that impact land take. These instruments and their **evolution** are discussed above in sections 2.1 and 2.2. As there is no commitment to NNLT, there are **no efforts** to align various actors, their policy objectives and instruments **to systemically address NNLT**.

- **Do you see an evolution in terms of land use regulations?**

After the two decades of dynamic suburban growth in 1990s and 2000s, the **general goals of combating sprawl and support for brownfield development, compact cities and higher densities of new construction** are now widely shared between politicians and experts. However, the concrete **practices often differ from general goals**. This is mostly related to **decentralization of land use planning and control of development** to the very local level of thousands of independent municipalities. Consequently, the control of sprawl is hard to achieve.

One of the opportunities for pursuing the planning and development aligned to NNLT is the use of **Cohesion Policy instrument of Integrated Territorial Investments (ITI)**, which thanks to the Integrated Strategies for the ITI uses metropolitan cooperation to addresses (among others) also issues related to suburbanization and brownfield reuse (see Box 1.4).

- **What kind of compensation is envisaged?**

At present time, **compensations are related to the protection of agricultural (arable) land** with a system of fees paid according to the quality of the soil taken for new construction. While the system to a certain extent limits the conversion of high-quality agricultural soils for non-agricultural purposes there are exceptions and strong **pressures for using agricultural land namely in the support of industrial production** (including distribution, warehousing and transportation) and thus the **national economy competitiveness**.

Box 1.4: *Integrated Strategy for the Development of Brno Metropolitan Area 2021+*

Brno Metropolitan Area is composed of 184 municipalities, with population of 720 thousands in a territorry of 1 978 km². Its establishment in 2014 was anchored in Czech national Strategy for Regional Development for the purposes of **integrated metropolitan planning and strategy implementation** under the EU Cohesion Policy instrument **Integrated Territorial Investments (ITI)** (for relations between metropolitan governance and EU Cohesion Policy in Brno Metropolitan Area see outputs of ESPON METRO).

The current **Integrated Strategy for the Development of Brno Metropolitan Area 2021+** addresses four development areas: **mobility, environment, public services, and coordination of development**. The integrated policies and development projects balance efficient, sustainable and inclusive development, with a focus on **circular economy, green and inclusive solutions**. In particular, one of the strategic measures aims at **metropolitan coordination towards efficient use of the built-up area, limiting the development of the open countryside** caused by the growth of metropolitan areas, expanding and connecting areas of greenery and improving the efficiency of water and energy management. While the integrated strategy does not explicitly uses the NNLT concept its objectives and measures are in line with it.

- **Do you see any form of active (institutional) capacity building to ensure more pro-active NNLT approaches?**

As the issue of NNLT is not currently on political and policy agenda there is **no active (institutional) capacity building to ensure more pro-active approach to NNLT**. However, many issues related to NNLT, such as suburban sprawl or brownfield redevelopment are actively addressed in national policies, regional priorities, metropolitan cooperation anchored by the Cohesion Policy instrument of ITI as well as pursued by some local (municipal) authorities.

- **Do you see any dominant transformation in terms of developing multi-actor coalitions in relation to NNLT? In response to particular (local or supralocal) urbanization processes or issues?**

Any **multi-actor coalitions** that would pursue changes in policies towards substantial reduction in the land-take for new development and land artificialisation and thus launching a pathway towards NNLT agenda **currently**

does not exist. However, it can be expected, that **once there is a strong requirement postulated by the EU, the Czech government and the whole intricate web of public, private and non-governmental organizations on all levels will express and define their interests** (for details see below).

2.4 Obstacles and levers

- **Is NNLT a hot topic politically, and which different arguments and discourses are dominant in the ongoing national debate?**

NNLT is **not currently on any political and policy agenda in the Czech Republic**. There is **no explicit commitment to reduce net land take and no active public policy discussion on the issue**. It can be expected, that once there is strong requirement from the EU, the Czech government and the whole intricate web of public, private and non-governmental organizations on all levels will express and define their interests.

- **What are the main levers or obstacles that can be identified in this ongoing debate?**

At present time, there is **major difference and discrepancy between the explicit use of the concept NNLT** (it is not used in legal regulations, policies, etc.) **and wide spectrum of diverse policies and practices that are in some aspects related to the NNLT**. The political and public discourse is dominantly **driven by traditional approach to the land use change** that **balances the priorities for efficient use of soil for agricultural production** and **priorities for urbanization** in terms of provision of land for new housing, industrial production, services (namely retail) and transportation. The **sustainability narrative** related to the protection of environment and green transition is still rather **lagging behind** as secondary. Consequently, the values expressed in policy and public narratives are **not yet ready for narrow articulation of NNLT** in terms of avoiding sealing agricultural land and open spaces and when land is taken, then compensation is ensured elsewhere for example by renaturalization of unused land.

NNLT is a **complex issue**. It covers several thematic domains divided between individual ministries and their interests. The NNLT as a tool to fulfill environmental objectives is most closely in the spheres of interest of the Ministry for Regional Development of the Czech Republic - MMR (spatial planning, regional and urban policies, housing policy) and Ministry of Environment of the Czech Republic – MZP (landscape protection, nature protection, ecosystem functions). The issue is **coordination and division of roles, labor and competences between the two ministries**. As the decision-making on land use is strongly embedded within the national spatial planning, it can be expected that **the key policy and executive issues will be driven by the MMR**, which MZP will mostly focus on protection of green areas and monitoring of land take. In relation to the production function of land, there are interests of Ministry of Agriculture of the Czech Republic (agricultural soil protection), Ministry of Industry and Trade of the Czech Republic (will defend availability of land for production and trade facilities) and Ministry of Transport of the Czech Republic (land for key national transportation corridors).

As NNLT is an issue of territorial development, another limitation is related to the **coordination between regional and urban policies and spatial/territorial planning**, both embedded at the Ministry for Regional Development of the Czech Republic – MMR. While the spatial planning mostly sets the regulatory framework (and can act in favor of land protection, however, in practice and specifically on municipal level, there are cases favoring development on new land), the regional, urban and housing policies are mainly based on the development incentives and are pro development (however, they more and more focus on circular economy principles including the use of land, i.e. priority for brownfield to greenfield development).

The EU Cohesion Policy programs seem to pay in the current period more **attention to the EU Green Transition**. While the regeneration of brownfields is a long standing priority, measures have not efficiently addressed sprawl. There are indications that the Integrated Regional Operational Program (IROP) will more closely define objectives **to promote regionally differentiated and locally sensitive approach to the green transition including the issues of new land take**.

- **Would you say these obstacles and levers are influenced by specific challenges of your geographical, planning and urbanization context?**

Provided the national government formulates the country objectives related to NNLT, they will need to **reflect specific local, urban, metropolitan, regional conditions** to gain support from partners in regional and local

governments, which are power-full in terms of spatial and land use planning and development. For instance recent research study documented that in regions with lover GDP per capita more undeveloped land is consumed in comparison with rates in regions with higher GDP per capita (and thus higher pressures for development), in these wealthier regions that can reduce the total new land consumption, they, however, more high-quality land is used. Both the national NNLT targets as well as the use of land preservation regulations and incentives for land recycling shall carefully **evaluate, incorporate monitor local and regional needs and potentials to fulfill NNLT.**

- **What are found solutions for effectively achieving NNLT? For example, solutions in the form of policies for promoting the development of brownfields, temporary using brownfields or compensating land value reduction?**

The introduction of the NNLT and its wider acceptance in Czechia **first requires the formulation and dissemination of narratives and representations to establish a discourse that will introduce the concept of NNLT** to wider government (governance) and professional community. Such an approach need to aim at the **understanding and acceptance of the concept, its relevance and positive effects**. Only then in can have **performative effects** in terms of the materialization of the concept in planning instruments, regulations and incentives with effects on urban development and land use change.

The **incentives provided within the EU agendas**, ranging from narratives in policies to their embedding into instruments can help to rise attention to NNLT and incorporate the term, concept and agendas into national cultural and institutional setup. The EU Cohesion Policy and specifically the Integrated Regional Operational Program (IROP) can in association with the Regional Development Strategy of the Czech Republic, the Spatial Development Policy of the Czech Republic and other national instruments address the new land take.

The national regional and urban policies use **integrated instruments of the implementation of the EU Cohesion Policy**, namely Integrated Territorial Investments (ITI) and Community Led Local Development (CLLD), which main priority is territorial coordination and integrated planning among a large number of stakeholders. The Integrated Strategies for the ITIs pay major attention to urban-rural, core-suburban **cooperation** (bridging the individual interests of municipalities) with an aim to manage sprawl, limit new land take, support brownfield regeneration and land reuse, and enhance sustainable mobility. This way they can **substantially contribute to the reduction of net land take**.

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3 Estonia

3.1 Definition and monitoring

- **Is there a (legally binding or commonplace) definition of NNLT in the respective country?**
- **Is there a definition of artificialisation? In which document (law, strategy, plan) are these definitions presented?**

In Estonia, there are currently no legally binding regulations, restrictions, or specific definitions pertaining to land take. Consequently, the concept of No Net Land Take does not find applicability within the normative framework. Discussions on land take are infrequent and sporadic in environmental and soil debates, primarily initiated by individual researchers and research projects. The predominant legal and instrumental term in this context is the neutral and predominantly functional 'land use.' This terminology mirrors the substantial rise in artificial surfaces in Estonia, corresponding to national transitions and convergences, as well as the considerable influence of what we might typify as neoliberal land use planning, the aggressive expansion of the property market, and development.

The principal laws governing land take in Estonia include the Planning Act, which specifies planning principles, functions and procedures, including land take cases. In 2015, the Estonian Planning Act includes the principle of promoting previously used land (rather than greenfield areas). No judicial review of land use plans based on this principle is known to have taken place. Tools are being developed by the Estonian Ministry of Regional Affairs and Agriculture to further support the implementation of this principle

Open cast mines (such as oil shale, building materials, and peat) fall under the regulation of the Earth's Crust Act and other mining regulations, providing a framework for land reclamation.

In 2020, the Estonian Ministry of Finance, then responsible for land use planning policy analysed the systematic problem of land take in Estonia in the overview of the implementation of Estonia's national spatial plan. Land use statistics by Statistics Estonia was used, as well as CORINE data. Based on the overview, the drafting of the new national spatial plan was initiated in 2023, aiming among other policy aims at tackling the land take issue in the land use planning policy. area.

The objective of No Net Land Take is addressed in the draft environmental strategy of 2023 which establishes additional goals and actions related to No Net Land Take. In a similar conservation approach, land take is strictly governed by the Nature Protection Act, which restricts and limits development and construction in nature protection zones and areas. The proportion of protected areas in Estonian terrestrial territory is set to increase from 20% to 30% by 2030.

According to the OECD's report (2022), an increase in built-up area per capita indicates a decline in the efficiency of land use patterns attributed to urban sprawl . Developed land reaches 1000 km², 2.2% of Estonian territory.

- **How, to which extent and how coherently is NNLT being monitored, is this diversified in different regions, cities, etc?**

No designated land take monitoring with statistical accounts or filters occurs in Estonia. Land take reporting is covered by the land balance account in the land registry, as well as by environmental, agricultural, and forestry surveys. Environmental surveys and time-series data claim the natural and semi-natural land. Regionally, the focus on land take has emerged in the suburban agenda of the Tallinn metropolitan region.

With a mean annual land take rate of 0.84% of the initial artificial land, Estonia ranks at the top among European countries (EEA). Still, no quantitative land take target are set in Estonia.

- **Which types of (statistical) tools are being used to do so and based on which types of data/databases?**

Multiple land use accounting in Estonia creates ambiguity and allows for factual manipulation. The Estonian Topographic Database and the Cadastral Information System, managed by the Estonian Land Board, provide basic land use data. These databases, available as public open data portals since the late 1990s, offer various digital platforms and interfaces for public and professional end-users in the fields of environment, agriculture, and planning. In

2023, the environmental board launched the land use tool ; however, land take is neither presented nor set as an indicator. Environmentally driven land take indicators focus on natural and semi-natural land uses.

Furthermore, several land use databases rely on different data sources, land use categories, models, and sectoral scopes. Examples include the environmental registry focusing on landscape and ecosystems, the LULUCF approach in the environmental agency serving climate reporting, the planning approach operated by local authorities, and the agricultural registry supporting agricultural land use and the Common Agricultural Policy (CAP). Statistics may vary due to alternative sectoral definitions.

Additionally, cross-country databases like CORINE Land Cover, the Copernicus Land Monitoring Service, LUCAS, Land use/cover area frame statistical survey, and other frameworks and specialized surveys (soil, biodiversity, etc. in Eurostat, European Environment Agency, JRC, etc.) provide comprehensive data. European land use databases maintain a high-quality standard and assurance at the national level. Under Eurostat coordination, Estonian statistics are developing ecosystem land use accounting.

The academic community and research projects diversify data sources, leading to critiques of normative definitions and traditional in-situ land use data. Varying spatial resolutions of satellite images and in-land data may result in different statistics across sources and contribute to pro-environment academic discourses. For instance, in 2023, an alternative forestry inventory challenged the official data deployed in forest land and forestry monitoring and reporting.

In the context of spatial planning and urban sprawl, digitalization, as a unified database and a possible procedure information system, alongside retrospective digitization of previously established plans, simplifies data availability and increases transparency. The ecosystem land use accounting has been developed by the Estonian Environment Agency and Statistics Estonia (as mentioned in the previous paragraph). LULUCF sector's land categories, including 'settlements' (remaining and converted), are accounted for according to UNFCCC and LULUCF methodology by the Estonian Environment Agency. The Estonian Land Registry is set to standardize, harmonize, and facilitate various national reporting on land use and land-use change, including land take.

3.2 Roles and governance

- **What are the main institutions involved in the design and implementation of NNLT measures and their respective roles?**

On the national and strategic level, the ministry responsible for land use and spatial planning is the Ministry of Regional Affairs and Agriculture. In 2023, land use planning policy and agriculture were combined under one ministry, but links between agricultural policy and land use planning policy remain to be developed.

The Ministry of Climate, established in 2023, facilitates coordinated climate policy, with strong multisectoral implications for land use, urban planning, transport, and energy planning in the decarbonization of the economy. As a subsidiary of the climate ministry, the Environmental Board is responsible for land conservation and protection.

At the local level, local authorities (79) have broad discretionary powers in adopting comprehensive and local plans. They define functional zoning and assign 'artificial' uses to specific land plots.

Since re-gaining independence and going through a rapid restitution and privatisation process in the early nineties, private land owners have played a focal role in the development of Estonia's land use.

- **What are other influential societal or civil society actors involved in NNLT and what is their relation to institutional stakeholders?**

Property development and agricultural lobbying have had a direct impact on land take policy-making, though it is not directly institutionalized and transparent. In contrast, environmentalists—most notably the Estonian Fund for Nature, the Center for Environmental Justice, and the Chamber of Environmental Societies—campaign for land and soil conservation, opposing urban sprawl, open-cast mining, and other forms of land take.

Urban, rural, and neighbourhood NGOs function as NIMBYs (Not In My Backyard) in the case of larger and environmentally sensitive new developments, such as wind parks, large farms, transport corridors, open-cast quarries etc. The most dominant debate has been the forestry debate between the forest industry and environmentalists,

with certain NNLT elements and references. Also, the Estonian research community played a pioneering role in introducing the new wave ecological and climate paradigm for the land use thinking and accounting.

- **How does the main governance framework function in relation to NNLT?**

The main land-use planning instrument in Estonia is the Comprehensive Plan of the local authorities (79). Small-scale Detail Plans are adopted separately by the local council. Detail plans, covering a single land parcel or in some cases, larger territories, are to fulfil the overall spatial visions set in the comprehensive plans. In practice, the land use foreseen by detail planning is strongly dependent on private landowner aspirations, and changes to comprehensive plans are not rare.

Assigning uses to specific land plots is a decision of detailed planning that is mostly made by local governments. The County Plans and municipal Comprehensive Plans fail to organize and optimize land take in suburban areas. The regulatory power of County Plans is soft and vague, while Comprehensive Plans, following the local welfare and growth agenda, aim for unrealistic residential and commercial zoning. Over two decades, County Plans have included conditions to limit sprawl and settlement growth outside densely populated areas. The implementation powers of county planning has nevertheless proven insufficient to limit the growth of settlements as local municipalities have up until recently mainly considered all growth patterns as desired developments, potentially increasing tax incomes. The allocation of residential lands in some recently adopted Comprehensive Plans continues to be very generous in the suburban zones, resembling someone playing SimCity.

Another dimension of land take is already adopted plans allocated for development, with non-expiring terms. There are no taxes or other national-scale tools to manage land oversupply and overplanning. Municipalities compete in terms of development offers, which drives the suburban growth machine.

Vertical land use governance is straightforward two-tier between central government/ministries and local authorities, leaving the regional approach aside and underrepresented in confronting land use cases. Coordination occurs generally on an ad-hoc basis.

The processing of plans and the granting of building permits is an area with extensive scope for consideration and the autonomy of the local government, where it is not always possible to objectively determine what the intended purpose of the land should be. Therefore, in such ultraliberal planning framework, the processing of plans and the issuing of permits are different decisions regarding purposes, volumes, favourable ground for corruption cases in terms of accesses, and related infrastructure. A large margin of discretion specific to planning cases remains, posing a certain risk of corruption.

- **Do you witness any ongoing innovations or transitions of the governance frameworks or stakeholders alliances?**

The new Estonian national spatial plan currently being developed will set goals and objectives on land take.

The drafting of the environmental strategy (2023) opened new sections on land policy and management and soil, marking the first time in strategy-making on the national level. Previous attempts to address land take issues were relegated to a narrow cadastral and database focus. Although the strategy does not enforce related sectors such as spatial planning, energy, and transport, commitments made at the EU or Estonian levels apply directly to these areas.

EU policy-making and related domestic processes play a dominant role in the land take theme, even though land use can be an in-between theme in the Common Agricultural Policy, as well as in the EU Green Deal and climate policy.

The environmental arena, including land use, evolves with pan-European mutual cooperation, although national stakeholders often act in so-called silos, with fragmented, loosely specified assignments and diffused responsibility. The role of local governments is crucial, though financial autonomy is poor, as are professional capacities. The integrity of projects by research institutions and private stakeholders depends heavily on EU-funded grants, achieving a systemic and comprehensive approach to implementing land policy. This can result in contradictory decisions and actions at the national and local levels.

A long history with extensive facilitation concerns the protection of fertile agricultural lands, though it remains without outcomes. As an example of a reversal, in 2019, due to significant opposition from landowners, the Estonian Parliament decided to abandon an initiative to protect valuable farmland against land take, mainly addressing suburban development, despite it being an issue for which legislative regulation has been sought for years. The

draft law had been in the legislative process for an extended period but failed to reach the final parliamentary debates.

Case study on development embargo in suburban municipalities around Tallinn as a best practice case

As a pioneering local act on no land take, the Viimsi municipal council near Tallinn approved a planning and construction ban from December 2023 until September 2025, coinciding with the adoption of the municipality's comprehensive plan. Building rights could be granted for purposes of public interest, public premises, water, and waste management. The debates on the development embargo were triggered by water shortages during the summer, though general public and political sentiment has been turning against development. The population of Viimsi has tripled to 23,000 since 2000, affecting the qualities in the built environment and provisioning public services.

More widely, suburban municipalities around Tallinn intend to introduce minor planning restrictions, such as Rae, which has restricted the initiation of detailed plans that change the comprehensive plan. This signals changes toward a more regulated path in planning and development in Estonian suburbs, which can be labelled as a rudimentary opening of the no-net-land-take policy. The growing participation of suburban residents in local planning and territorial governance demonstrates their willingness and ability to mitigate risks to their quality of (suburban) life as early as possible.

Another shadow measure to freeze land take in suburbs is to form a landscape protection area with national or local designation. The Viimsi municipality established Kelvingi and Viimsi protected areas, and Saue Kõpu protected area near Tallinn.

These no-land-take policy-making trends and regulatory measures apply only around Tallinn; suburbs near Tartu and Pärnu have not reached such a critical status due to a smaller range of interest and investments.

3.3 Policies and stakeholder management

- **What are the main tools and policies in place to align various actors in optimising land use for NNLT?**

The Estonia 2030+ national spatial plan, issued in 2012, introduced the concept of a scattered city, low-density urbanised space, combining all settlements types from compact cities, suburbs to rural villages. In contrary to the land use efficiency, this concept has promoted land take in sparse forms and wasteful allocations, establishing a fragmented chaotic urban and built land use patterns. The new national plan currently being developed has set as a goal to address this.

The land exchange corruption case (2006-2014), profiteering of land transactions with high nature value, has left a deep mark on the land policy making in Estonia as the land exchange and compensation proposals are cautiously phased out as a rule, despite strong environmental arguments and extensive work and consensus at the expert level.

The EU top-down policy initiatives have a strongest impact in relation to land policies in Estonia, mainly climate and environmental domain.

Estonian suburban municipalities around Tallinn and Tartu are looking for a more sober approach and orderly solutions in land use. The suburban pattern is being supplemented by densification, not expansion and remote urbanization. There are no regional agreements and coordination between municipalities to reduce land take.

This is framed by the economic circumstances, the land tax is low, there is no real estate taxation in Estonia. Regional gap between metropolitan and rural areas is manifested by the biggest regional real estate price difference among EU countries.

- **Do you see an evolution in terms of land use regulations?**

The law-making process in Estonia largely follows the harmonization of EU directives, which serves as the primary driver for legislation upgrades and the revolutionary transformation of land-use policies. A tour de force in this evolution is the climate law making that will set ambitious targets for 2030 and beyond. Estonia's climate law being drafted since 2023 is interpreted with high expectations as a saviour for multiple sustainability challenges.

The drafting of climate law underscores the importance of land use in mitigating climate change and will determine how the land use sector contributes to the climate goals. As Estonia faces challenges in meeting its 2030 targets for land, land use change, and forestry (LULUCF), the 'settlement' category, contributing to carbon emissions, is a top priority. Additionally, other environmental, biodiversity, and planning regulations have an indirect impact on developing the land take discourse.

Amendments in planning law, currently in the early drafting stages in the ministry, aim to strengthen the role and mandate of plans at all planning levels, introducing and enabling land take measures and quotas, among other new themes.

In the legal framework of land operations, codification is applied to enforce current rules, establishing clear institutional support for land operations. The implementation of sustainable land policy principles and the upgrading of digital land management operations are technical part of this effort.

The environmental strategy draft signals that net land take should be quantified to protect soils. To achieve this, regulations on soils are anticipated to be consolidated, harmonized, and upgraded to secure soil protection, with increased attention to unsustainable and inefficient land use.

- **What kind of compensation is envisaged?**

In the current political debate and expert community, only nature protection compensation is modestly discussed, primarily in the context of forest land and its conservation values. In the compensatory scheme, the land resources of state forest have been considered in a 'land-to-land' exchange.

In 2023, as a leading case in land justice, the toleration fee was introduced in case of wind energy installations (2 km buffer zone).

- **Do you see any form of active (institutional) capacity building to ensure more pro-active NNLT approaches?**

Subordination could be activated by stakeholder groupings in drafting climate law and implementing LULUCF. Additionally, several multi-stakeholder LIFE, etc., European projects on biodiversity and climate support capacity building, extending beyond the scope of scientific cooperation. Programmed actions and strong funding in research and innovation pull along the governmental bodies.

- **Do you see any dominant transformation in terms of developing multi-actor coalitions in relation to NNLT? In response to particular (local or supralocal) urbanization processes or issues?**

So far, this has not happened, and municipalities are forced to continue the liberal land use policy. In the meantime, there are discussions in the Tallinn metropolitan region on public services and mobility, which cannot be directly related to land take and development. See above.

On the national level, no visible political coalitions are revealed promoting land policy. In the coming years, public debate on sustainability will focus on urgent climate and energy issues.

3.4 Obstacles and levers

- **Is NNLT a hot topic politically, and which different arguments and discourses are dominant in the ongoing national debate?**

The following discourses and domains of land take can be contextualised within NNLT vision in Estonia:

Elaborating the National Spatial Plan Estonia 2050. The National Spatial Plan Estonia 2050 , in its inception phase, sets the starting points and scope, following sustainability principles and aiming to create a high-quality living environment for all. These overarching goals serve as the basis for addressing various topics, including land use and land take scoping. Land use is expected to align with the goals of sustainability and the Green Deal, particularly in terms of climate, biodiversity, and land and soil protection. The emphasis is on increasing land use efficacy.

New spatial instruments, detailed regulations, and measures beyond traditional land use plans are to be developed to avoid excessive land take and minimize the use of natural land. This may involve supporting spatial planning through tax policies and other regulatory measures. Also, key indicators and quantified trends related to land use are not reflected in the strategic national indicators (Tree of Truth), which are designed to monitor the progress of the national strategy Estonia 2035.

Balancing in public and private interests. In the core of spatial and land use planning, the balance between private and public interests shifts towards the public. This is reflected in the emerging place-making ethos, enhanced urban space qualities, and increased allocation of land for public spaces. Setting rules of considering competing interests and agreement on uniform land use and take principles.

Integrity. The second aspect of balance-seeking concerns how precise conditions or general rules are set by a particular plan, which could revise and precondition the principles of land take.

Urban sprawl. Fighting urban sprawl remains a wicked challenge, trending agenda in territorial governance, aiming to simplify, slow down, and halt the suburban growth machine. The land policy and planning framework should acquire, transfer, re-plot, harmonize, and establish conditions for usage restrictions within a broader territorial approach with contemporary sustainability qualities. The call for setting a coherent metropolitan planning code across administrative boundaries needs further policy initiatives at the national level.

Protecting valuable farmland is never-ending story in Estonia. Environmental measures of CAP provide some new prospects.

Land take for energy facilities. Land take for solar and wind parks and other energy facilities has emerged as a new theme needing special balanced attention. Simplistic ban or controversial siting decisions point to internal conflicts and mismanagement in the operationalisation of sustainability.

- **What are the main levers or obstacles that can be identified in this ongoing debate?**

The legal mandate of National Spatial Plan and County Spatial Plan is generic, optional and discretionary undermining the upper tier policy developments and innovativeness in land use policy. The regional county-level territorial governance is missing in Estonia leaving land use policy-making and decision making fragmented and selfish at local authorities.

Public policy is oversaturated with sustainability and environmental reforms and upgrades, which can lead to additional confusion and bureaucracy. Instrumentally, policy initiatives on NNLT can be brought up by climate, biodiversity and other environmental policies in making. The passive land use for carbon sinks in climate mitigation is becoming more and more important, an easy catch.

In general public understanding, spatial planning seems to be responsible for everything that happens in land use for, without always having the means and legal mandate to actually direct the changes, as stated in the green paper of spatial planning (2020) . This could blur the processes and affect public awareness in this field.

- **Would you say these obstacles and levers are influenced by specific challenges of your geographical, planning and urbanization context?**

Suburbanization in Estonia persists due to path dependence on plans and development rights, a phenomenon known as overplanning, along with the availability of undeveloped Detailed Plans. Land prices and planning costs are generally low or very low in more remote areas, fueling a speculative market. Abundant land resources serve as reserves. The property market also propels suburbanization.

New Estonian suburbs are small, green, and located not too far from urban centers. They lack uniformity, differing from dull mass developments seen in Western Europe or the USA (Wu and Keil 2022). Massive potential exists for infill development and densification. In the governance and planning reality, sustainability rhetoric may align with the growth agenda, echoing the prevalent phenomenon of greenwashing.

- **What are found solutions for effectively achieving NNLT? For example, solutions in the form of policies for promoting the development of brownfields, temporary using brownfields or compensating land value reduction?**

As a new policy signal, the draft environmental strategy of 2023 launched the soil protection action lines, which aim to set frameworks and criteria for promoting brownfield uses instead of expanding land take in greenfields.

Planning restrictions and expending nature protection areas in suburban Tallinn can be seen as an initial step towards implementing a no-net-land-take policy. To bolster this effort, suburban municipalities are also exploring shadow measures like establishing landscape protection areas with national or local designation. Also, these measures highlight a proactive approach by suburban residents and local governments to safeguard the quality of suburban life and mitigate risks associated with rapid development.

The majority of land take for open-cast mining (such as oil shale, peat, and construction sand) is scrutinized by providing alternatives. Additionally, the reclamation of mining land has been directed towards multifunctional uses and contemporary landscaping and ecosystem services approaches. Still, no land tax incentives on brownfield development in Estonia.

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CASE STUDY

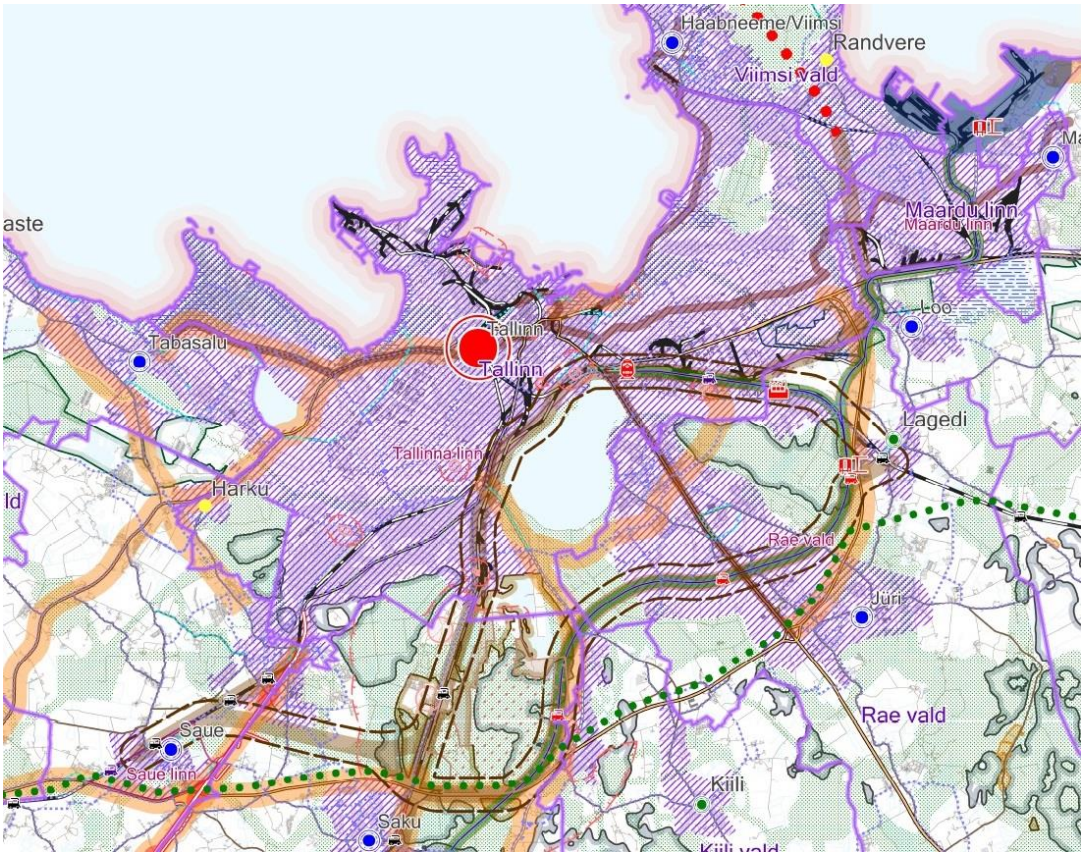
Urban sprawl in the Tallinn Metropolitan Area

The Tallinn metropolitan area | NUTS3 EE001 North-Estonia

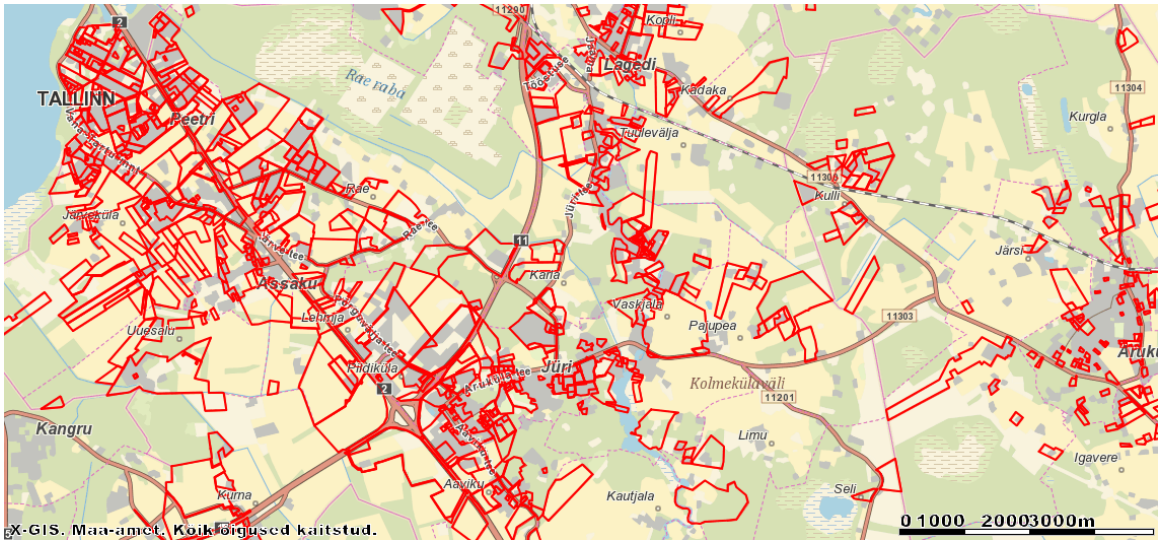
The evolution of urban sprawl around Tallinn is a textbook case, the plot-by-plot developments on the outskirts of Tallinn resulting in diffuse, sparse, fragmented settlements without focal points, mainly mono-functional residential areas and commercial logistics parks, along with some large shopping centers. The Greater Tallinn has reached densification, and shallow polycentric urban regionalisation just in 2020s. Suburbanization has expanded Greater Tallinn to 800 km2 (incl Tallinn city 160 km2) in the ultraliberal planning system and nearly unlimited land supply.

The suburbs are created on the basis of individual detailed plans that largely disrupt the strategy of developing an integrated and cohesive new towns through comprehensive plans. Developing suburban lands remains legally, procedurally and operationally simple, cost-efficient and fast (compared to the core city). Local governments, as the bodies adopting comprehensive and detailed plans, have undivided authority and wide discretionary powers

in the final decisions regarding suburban development as there is no regional tier in Estonian territorial governance and land use planning.



Map 2: *Sprawling Greater Tallinn featured by the 2030+ Harjumaa county spatial plan. High-density neighbourhoods and development zones shown using purple diagonal stripes in the Harjumaa spatial planning map.*



Map 3: *Fragmented new suburban settlement: the detailed planning areas of the rural municipalities of Rae and Raasiku in the southern suburb of Tallinn, adopted 1999-2018.*

4 France

4.1 Definition and monitoring

- **About land consumption in France**

France's demography is one of the most dynamic in Europe; but overall, it is a low-density country (around 110 inhabitants per square meter). Planning and building policies are fragmented: 37 000 municipalities keep the quasi-exclusive power to decide the use of their land and grant urban planning permits. Both features explain why in France, the land consumption is more intense than in other European countries: 60% of land take occurs in small municipalities (around 20% of the total population), where the housing market is relaxed, mainly in small urbanization operations (8 houses per Ha). As a result, each year, 24 000 ha of farming land, forests and natural land are taken, resulting in scattered urbanization patterns, and increasing global costs for roads, public facilities and use of private cars. At the same time biodiversity is under threat, as natural space is more and more fragmented. This situation is also based on an economic building model, supported by public policies: cheap land, cheap houses, generous public funding for first-time home buyer, and thousands of small local businesses specialized in the production of individual houses.

- **Legal definition of NNLT**

The 2022 Climate and Resilience Act clarifies the two terms: land consumption and soil artificialisation. Land take is a legal concept that refers to the change in use of agricultural, natural and forestry land for urban development. Soil artificialisation is based on qualitative observations, to measure whether the ecological functions of the soil are being sustainably affected or preserved.

- **Monitoring of NNLT**

The Climate and Resilience Act sets a two-stage target: from 2021 to 2031, the aim is to reduce land take in favour of urbanization by 50% compared to the last ten years; from 2030 to 2050, the aim is to achieve zero net artificialisation, meaning that every urbanized area must be offset by an equivalent 'deurbanized' area. Deurbanization (or renaturation) means turning previously urbanized or artificialised soil into open ground, by restoring all ecological functions: hydrological, biological, climatic. Renaturation should not be confused with dewaterproofing or greening of the cities. A space is considered by the law as restored if its surface area is greater than 2500 m2 and if it relates to biological corridors. Renaturation, though, should only happen as a compensation in last resort: the NNLT target is mainly to be reached by avoiding or reducing land consumption.

The 50% reduction in land consumption applies to the whole of France and uniformly to each region. Regions may modulate the land consumption reduction targets between sub-regional areas (cities, towns, villages) according to their past consumption, demographic and economic dynamics, or for reasons of regional balance (between town and country, for example). These differentiated objectives, set out in regional development plans, are then applied to lower-level urban planning documents, such as SCoTs[13] (medium-scale documents) and PLU[14]s (large-scale documents). Certain exceptions are provided for: major projects of national or European scope are not included in the objective of reducing land consumption. A national reserve of 12,500 ha has been planned for these projects[15]. Areas where photovoltaic panels are installed are not considered urbanized either if they can be used for agricultural purposes. Each municipality has been granted at least one hectare for urban development during the period 2021-2031.

[13] SCoT : schéma de cohérence territoriale (territorial coherence scheme) ; PLU : plan local d'urbanisme (local urban plan).

[15] The law draws up a list of major projects: fast train railways, industrial or ecological of national interest, expansion of major ports, equipment for defense or national security, new prisons, nuclear reactors, main electrical substations.

- **Tools, data and databases**

The legal measure of land consumption is based on compulsory declarations for any construction registered in the municipal land register. Based on these declarations, the body responsible for monitoring land use assesses, parcel by parcel, the surface area that has been developed and classifies development by type (housing, business, mixed use). These data cover the whole territory but has two limits: it doesn't take roads into account and includes unbuilt plots if they have been declared buildable by the local planning authority.

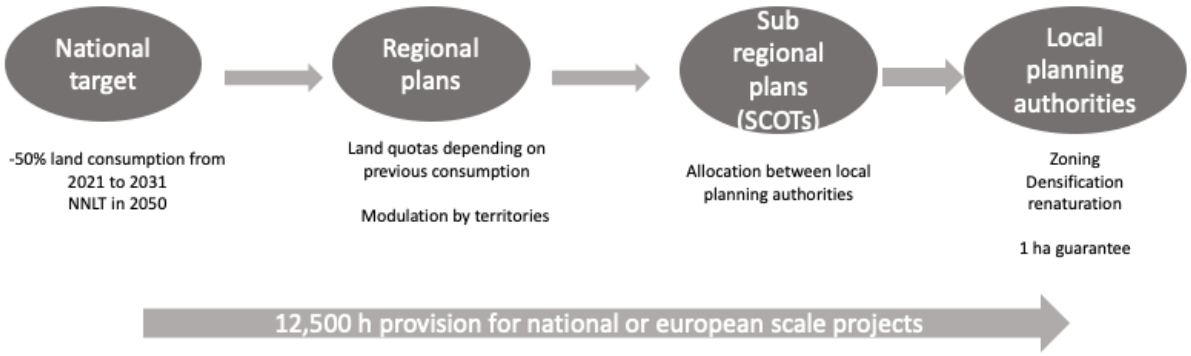
As for soil artificialisation, a geographical information system is currently being implemented in France, enabling to assess the degree of land artificialisation at a detailed level[16]. This is one of the main reasons why the law first requires a reduction in land consumption and postpones the NNLT objective to after 2030, when the whole country will be covered by a consensual database. Some Regions, such as Île-de-France have implemented a more comprehensive monitoring based on a mix of legal data (such as planning permissions), satellite monitoring (such as Corin Land Cover) and other sources (such as agricultural census). Region Île-de-France has also identified renaturation deposits.

4.2 Roles and governance

- **What are the main institutions involved in the design and implementation of NNLT measures and their respective roles?**

Due to the French model of territorial governance, mainly four institutional levels are involved in the design and implementation of NNLT. On the national level, the 2022 Act has been designed by the Ministry for Ecology, which is also in charge of monitoring, observation, and implementation. The law project is mainly based on the outputs of the "civil climate convention", a non-institutional assembly drawn by lot from electoral lists. This assembly was given a wide margin to maneuver by the government, but the implementation of its conclusions was seen as both disappointing and deceptive, with the government accused of watering down the convention's conclusions. However, as we shall see later, 'zero net artificialisation' is perceived as arbitrary and dictatorial by some local elected officials. Regions may modulate the 50% reduction target between different areas. Those targets must be included in the regional plan. At the local level, two kinds of institutions are involved: planning authorities (a group of several local authorities) and *in fine*, local authorities in charge of local planning schemes (such as commune or intercommunalities). They must plan in accordance with the quotas defined in the regional plan. Local government officials (*Préfets*) have the legal power to check if local authorities abide by the objectives of the law modulated by the regional plan. They can prohibit urbanization if the local plan does not include the objectives of land consumption reduction. Local planning authorities should deliver a report on land consumption every three years.

Figure 2: *Institutions involved in NNLT implementation*



[16] OCSGE, occupation du sol à grande échelle (large scale land-use)

- **What are other influential societal or civil society actors involved in NNLT and what is their relation to institutional stakeholders?**

Besides institutional actors, the main actors involved are those who deal with the building process, i.e., landowners, final consumers (first-time home buyers for instance), real estate agents, developers, architects, etc. Interests are not always convergent: small construction companies may not have the skill and the financial capacity for urban renewal[17]; customers may be disappointed, if they are looking for large, cheap land. Some experts say that this could even put an end to the "middle class dream" of a single house ownership in the middle of a large garden (where, possibly, you can build a swimming pool). Farmers on the national level have no claim about NNLT; locally the position may be different: often, when a farmer retires and has no successor, selling his land for urbanization (providing the local authority agrees) is a valuable source of income, which will vanish when farmlands will be protected.

The relation between civil society actors and governmental organizations depends on what local authorities can control. A major part of housing production occurs without any institutional control, mostly in small towns and rural areas. In those places, local authorities don't have the means to control what is happening once the parcel has been designated for urbanization purposes by the local planning scheme. Cities, however, may have a better control over the urban production process, because they enjoy skilled civil servants, financial ability to buy land, and strong capacities to discuss with professionals. Local elected officials in cities may also be less involved in "face-to-face" relationships with landowners than their rural counterparts. They also benefit, in contrast to small towns, from local agencies: social housing organizations, land public companies, public developers. Hence, they can play with different tools and take the leadership on urban development. The transfer of planning to inter-municipal organizations (intercommunalités) should improve the capacity of local authorities.

- **How does the main governance framework function in relation to NNLT?**

The process is top-down:

a) The Climate and Resilience Act sets the national objectives.
b) Regions modulate the global target according to local dynamics and needs.
c) Local planning authorities design their planning documents according to regional prescriptions.

But the governance process uncovers the weakness of the regional level, whose normative capacities are tight and the room for political maneuver is tenuous. Most regions have granted a 'bonus' to rural areas, to maintain a so-called 'balance' between rural and urban areas. This could lead to an unwanted output: less capacity of housing and business development in cities, and a fierce competition with low density areas, offering more space, and less capacity of control.

- **Do you witness any ongoing innovations or transitions of the governance frameworks or stakeholders' alliances?**

The main issue lies in low density areas, with poorly equipped local authorities, and at the outskirts of cities. Some regions and large urban areas are building cooperation programs to attract qualified urban planners and architects and help small local authorities cope with the new situation. In some places (Clermont-Ferrand), local development companies seek to intervene both in high- and low-density areas, to achieve an economic balance between profitable and loss-making operations. In the Toulouse region, a coalition involves the metropolis, its suburbs, and many peri-urban and rural municipality. They benefit from the skills of Toulouse's urban planning agency. This is the case in most metropolitan areas. The problem lies with remote, rural, and isolated municipalities.

[17] As urban renewal is a recommended solution, building new single houses is cheaper in short run.

4.3 Policies and stakeholder management

- **What are the main tools and policies in place to align various actors in optimizing land use for NNLT?**

The main and most efficient tool should be the SCoT. SCoTs are middle scale planning documents, elaborated by a coalition of local authorities (a group of 'communautés de communes' or 'communautés d'agglomération'). Although these planning documents are managed by weak political structures, they have strong normative power over local planning strategies which must abide by the SCoT guidelines. Hence the SCoT management institutions are the real forum for negotiations between local authorities. Till now, such negotiations haven't begun, but whether they succeed or not will shape the future of land use in France.

- **Do you see an evolution in terms of land use regulations?**

We may witness a radical change in local authorities' strategies. As a maire near Toulouse puts it 'formerly, a good mayor was a builder for housing and business projects; now, a good mayor is sober in land consumption and has to do more with less'. That's why bargaining between local authorities is so important: mayors and actors can design ways together to reduce land consumption while sparing space for development. In order to do so, they must agree on places for urbanization, which places to protect and those that can be "deurbanized", while opening discussions with first-time home buyers on the reduction of the space allocated to each new home. During the last twenty years, the town-planning code has evolved a great deal. It includes new tools planners can use: for example they can design renaturation reserves, where they can use their right of pre-emption; they can decide for an open-land ratio or a biotope ratio for every plot or to prevent price land increase, they can buy the land and rent it.

- **What kind of compensation is envisaged?**

It depends on the meaning given to the term compensation. If compensation deals with compensating newly urbanized areas, they are already some legal provisions; trees are to be replaced, when cut for building; special protected areas must be restored, when artificialised. But these operations are rare and expansive, they cannot apply to small building operations which are the main cause of land consumption. As said before, many places could be deurbanized. But most of the time, the cost of restoration is heavy, from 95€ to 390€ per m2 (according to a survey by France Stratégie, a government think tank). Most of the time, a real compensation is not the best course of action, but rather a better ecological management of green spaces in cities, industrial or commercial areas is what is needed. Local regulation could impose new forms of subdivision, building semi-detached houses as it often occurs in Northern Europe, with, as said before open land or biotope ratio per plot.

So far, there is no question of compensation, at least at the national or regional level. Some Regions have implemented a sort of "negative compensation" giving rural communities more room to maneuver. Compensation can take place within SCoT zones and, more likely, within "intercommunalités", i.e., institutions where local communities share taxes and services. The one Ha guarantee granted to each municipality can be shared with others, to protect larger farming, natural or forest areas and concentrate the buildings in few places, such as local centers (i.e., market towns). But for now, mayors of small towns are reluctant to share land.

Somme new ideas may occur, such as exchange of building rights —which exist in some countries and US States: towns needing expansion could buy building rights from small municipalities which accept not to build. This could solve one major issue (that will be discussed below), which is that local taxes are based upon land consumption

- **Do you see any form of active (institutional) capacity building to ensure more pro-active NNLT approaches?**

Cities are already adapting their urban policy. Their main concern, for Toulouse policy makers, is how to conciliate the need for increasing density in housing and businesses, with the citizens' demand for more green areas. That drives to new approaches of town planning such as what was implemented in Montpellier, where the local planning authority decided to base its strategy on protected green spaces, while trying to optimize density in already urbanized areas. This involves having strong and in-depth debates with both urban stakeholders and citizens to determine an acceptable density threshold, for economic balance as well as for the comfort of residents.

Other solutions can be found in low density areas, with less than 20 housing per ha. New design —such as 'semi-detached houses'— could increase the density up to 40 houses per ha, without reducing the comfort of residents.

Another concern is the increase in land prices. In recent years, few municipalities have set up land reserves, most of them have no leverage on the local land market. New solutions may occur from experimentation in collective land ownership: the house owner pays a rent to a landowner (possibly a local authority); this would be an efficient way to regulate land speculation which may occur as available land becomes rare. That situation may be commonplace in several European countries, but it is a new idea in France, where private property is a 'sacred right' since the "Déclaration des Droits de l'Homme et du Citoyen" (1789)!

- **Do you see any dominant transformation in terms of developing multi-actor coalitions in relation to NNLT? In response to (local or supralocal) urbanization processes or issues?**

In Toulouse metropolitan area, which is one of the faster growing places in France, a horizontal coalition, between planning authorities (SCoT), was set up several years ago. It organizes debates about demographic and economic change, balanced development between Toulouse and its peripheries, land consumption, etc.…

In many places, such informal organizations exist. These organizations have no real legal powers, but they can (not always of course) help to reach agreements between divergent interests. In that way, they are necessary.

4.4 Obstacles and levers

- **Is NNLT a hot topic politically, and which different arguments and discourses are dominant in the on-going national debate?**

Since the Climate and Resilience Act, NNLT has raised strong political opposition. In the beginning, climate activists claimed that the law itself was far below the minimum requisites to slow climate change, and thus was a betrayal of the citizens' convention conclusions. Then, after the promulgation of the law, the protests came from 'rural' municipalities. Reducing land consumption is considered to prevent any development in small places, that depend on demography for their subsidies and public services. The law itself was dubbed as "ruralicide" (i.e., a way to kill rural municipalities); the President of the Region Auvergne-Rhône-Alpes (one of the biggest in France), threatened to disobey. Then the Senate (the chamber of local authorities) voted a bill of law that authorizes each municipality to consume one ha of land for the next ten years. This was to satisfy small rural municipalities, some of them having not consumed as much during the last ten years.

Some academics say that, increasing the cost of land, this law creates more injustice, because it will make it more difficult, for lower- or middle-class household to buy a house. The criticisms follow Hirschman's pattern in his book *Rethoric of Reaction*: perversity, futility, jeopardy[18].

- Perversity: protecting the land leads to killing rurality and prevents modest households to buy their home.
- Futility: NNLT is useless in a country like France, which has a lot of space.
- Jeopardy: it will raise the cost of urban development and make heavier the financial load on local authorities, already in poor condition.

Moreover, monitoring is accused of imprecision or even errors: there is no large consensus on how to measure land consumption.

[18] A. O. HIRSCHMAN, *The rhetoric of reaction: perversity, futility, jeopardy*, Cambridge Mass, USA, 1991

- **What are the main levers or obstacles that can be identified in this ongoing debate?**

Off the record, local elected official (mayors…) admit that it is not so difficult to reduce the land consumption by 50% within 10 years. Some big cities such as Toulouse may protest, arguing they welcome nearly 1000 new people each month, but most of these people choose to live in outskirts, where density is low. So, this law deals mostly with low density outskirts. The main issue is how to increase density in peri urban municipalities. As for rural communities, the next ten years should not be unbearable: most of them welcomed few people, on large pieces of land. A decrease by 50% should not hamper their attractiveness.

- **Would you say these obstacles and levers are influenced by specific challenges of your geographical, planning and urbanization context?**

Now land makers are facing three main issues:

- The issue of political fragmentation, meaning that decision-making power should be transferred to a larger scale.
- The issue of the building economic model, that should be able to face urban renewal at controlled costs.
- The issue of fiscal compensation, which is not yet settled: local taxes are mainly based upon population and building; therefore, it should evolve to help municipalities that agree not to build.

5 Germany

5.1 Definition and monitoring

- **Is there a (legally binding or commonplace) definition of NNLT in the respective country?**

  Is there a definition of artificialisation? In which document (law, strategy, plan) are these definitions presented?

In Germany, data on land use (Bodenfläche nach Art der tatsächlichen Nutzung) is being derived from the Real Estate Cadastre Information System (Liegenschaftskataster-Informationssystem, ALKIS). With regard to NNLT, the most relevant indicator is "settlement and transportation area" (Siedlungs- und Verkehrsfläche, SuV), which mainly consists of built-up area, transportation area, and urban recreational area. The Federal Statistical Office publishes the degree of and increase in SuV on an annual basis. The degree of sealing of SuV is currently around 50%. The indicator "Increase in SuV" (shown in hectares per day) is part of the indicator set for the German Sustainability Strategy.

The 2021 updated version of the German Sustainability Strategy includes the goal of reducing the increase in SuV to less than 30 hectares per day by 2030. It also states the aim of achieving a circular land economy by 2050, so that no more (net) land is to be used for settlement and transport purposes (Federal Government 2021, p. 271). In the prevailing expert discourses in Germany, it becomes apparent that the move towards a circular economy of land is considered a prerequisite for NNLT. However, the German Sustainability Strategy does not have any binding effect on decision making at the level of federal states and local authorities as holders of planning sovereignty. In their spatial development plans, the federal states have referred to the "30-ha target" to varying degrees. While some federal states have specified the target for their own territory, others have largely ignored it (LABO 2020). So far, no tools or mechanisms for implementing the circular economy of land exist (despite pilot projects and simulations).

- **How, to which extent and how coherently is NNLT being monitored, is this diversified in different regions, cities, etc?**

The SuV is surveyed annually and reported by the Federal Statistical Office and the statistical offices of the federal states at the level of counties and municipalities. The transition of the real estate cadastre to the ALKIS system between 2013-2016 resulted in changes in the sub-types of land use included in the SuV that cannot be attributed to real changes in land use. This limits the validity of the indicator in a longitudinal sense. For this reason, the change in SuV is presented as a four-year average in the indicator report on the German Sustainabilty Strategy (Federal Government 2021).

- **Which types of (statistical) tools are being used to do so and based on which types of data/databases?**

The data can be accessed digitally at the level of municipalities, counties, federal states and the federal territory in the databases of the Federal Statistical Office and the state offices in various output formats (GENESIS-ONLINE). https://www-genesis.destatis.de/genesis/online

5.2 Roles and governance

- **What are the main institutions involved in the design and implementation of NNLT measures and their respective roles?**

In the federal system of Germany, responsibilities are shared between institutional levels but the federal government and the 16 States share legislative powers. The design of policies would be the task of federal government and the 16 States have legislative powers. On the national level, the ministry in charge of legislative proposals is the Ministry of Housing, Urban Development and Building Affairs (spatial planning); the Ministry for the

environment would be involved as well (soil protection). The ministries of the states and the federal ministry collaborate on a regular basis in the standing conference for spatial development (RMK). This standing conference is of utmost importance in what we call cooperative federalism. The ministers in charge of environmental policies use a similar mechanism. This guarantees a minimum of policy coherence in a federal state.

In the process of policy design for NNLT-measures two federal advisory bodies would certainly be involved: the Federal Agency for the Environment (*Umweltbundesamt* / UBA) and the Federal Agency for Buildings Affairs and Spatial Planning (BBSR). UBA financed several studies on land take and publishes policy briefs on a regular basis. BBSR is currently less active in this field. However, in the past (between 2005 – 2009) BBSR financed several pilot projects such as trading land certificates (*REFINA, Fläche im Kreis*).

A third actor with advisory functions is the Academy for Spatial Planning and Regional Development (ARL), a hybrid organization engaging in both research and policy advice, financed by the states and federal government. ARL is, however, less influential compared to UBA and BBSR.

Implementation of spatial planning and environmental planning policies is the task of the states and municipalities. Hence, these levels would be the main actors. States, planning regions within the states and municipalities elaborate statutory binding land use plans on different scales. Any other mechanism facilitating the circular economy of land would be in the hands of these planning levels.

Coordination and coupling of levels is essential for a successful implementation of policies targeting the reduction of land take. Federal government defined the national goal for the land take of 30 ha/day in 2030 (see above). This goal is not binding for states and municipalities. Hence implementation depends on the political willingness of local and state governments. In fact, some state governments (but by far not all) did so and defined benchmarks (North Rhine Westfalia, Hesse (2,5ha goal), Rhineland-Palatinate). This non-binding character is certainly a weakness of the NNLT approach in Germany.

The commitment to achieve a zero net land take by 2050 (circular economy of land) was expressed in the national climate protection plan in 2016 (p. 68). Again, this does not imply the obligation to take action on behalf of the states and municipalities as this document guides policies of federal government. The federal ministry for the environment published an integrated environmental program in 2016 and defined a reduction goal for land take of 20ha/day until 2030 – but this is merely the position of this particular ministry. The state of Baden-Württemberg announced to achieve the goal of net land take by 2035 but measures taken so far are very soft (an incentive-based funding program *Flächen gewinnen durch Innenentwicklung* for cities that supports infill development).

- **What are other influential societal or civil society actors involved in NNLT and what is their relation to institutional stakeholders?**

Several environmental associations are active in the discourse on NNLT. The German Association for Housing, Urban and Spatial Development (*Deutscher Verband für Wohnungswesen, Städtebau und Raumentwicklung*), being a sort of think tank and acting on behalf of cities and regions was however not involved so far. The German building industry successfully lobbied for a more relaxed approach in the recently adopted EU Nature Restoration Law[19] (see also Build Europe).

- **How does the main governance framework function in relation to NNLT?**

See above. So far there is no clear governance mechanism for the implementation of NNLT. The legislative process would require a national initiative in combination with consultations in the second chamber (*Bundesrat*). Note that the federal spatial planning law is subject to competing legislations, meaning that the states can derogate.

- **Do you witness any ongoing innovations or transitions of the governance frameworks or stakeholders alliances?**

In addition to what has been said above: no. So far it's not clear which actor will take the lead in the process of designing policies for NNLT. Germany has no clear road map for meeting the goal of zero net land take by 2050. It is, however, observable that many suburban municipalities in major agglomerations no longer accept growth –

[19] https://www.bauindustrie.de/themen/artikel/parlament-stimmt-fuer-das-gesetz-zur-wiederherstellung-der-natur

for several reasons (mostly overstrained infrastructure but also rejecting densification of suburbs). Cases can be found in the Frankfurt/Rhine-Main area (so called "Josefstadt", a new urban district for 30.000 inhabitants in Frankfurt rejected by suburban municipalities), Stuttgart and Munich. In addition, climate related risks are increasingly taken into consideration. The German association of assurance companies published a study on 134 German cities ranked by the degree of sealed surface (2021).[20] Insurance companies point to the role of "good urban planning" in order to prevent damages resulting from floods and heavy rain events.

5.3 Policies and stakeholder management

- **What are the main tools and policies in place to align various actors in optimizing land use for NNLT?**

A spatial planning policy based on quantitative targets has only been established in a few federal states. In the state development and regional planning of Hesse, North Rhine-Westphalia and Rhineland-Palatinate, for example, there are attempts to set contingents for land designation options at the municipality level, although these are binding to varying degrees. As far as the authors are aware, there is no top-down distribution of a state-wide contingent based on an overarching volume target (like the 30 ha target at the national level).

In other federal states, qualitative guidelines for land-saving urban development are formulated. These are at least partially linked to instruments such as density targets and demand assessments (like in Bavaria or Baden-Württemberg). In such cases, a local authority must provide the higher authority with a calculation of the need for additional settlement areas if it intends to update its land use plan. However, this practice is rather non-transparent and presumably not very effective in terms of achieving the NNLT.

***Box 2**: Tradable Planning Permits – a Model Experiment in Germany*

From 2015 to 2017, the German Environment Agency (*Umweltbundesamt*) carried out a pilot project to test the instrument of tradable planning permits (TPP) with 87 participating municipalities from all over Germany. The core idea behind the TPP instrument is to cap the amount of land that can be designated for artificialisation, based on the federal government's land-saving targets ("30-ha-minus-x" by 2030, "net zero" by 2050). The planning permits are distributed to the municipalities in proportion to population size and free of charge ("*grandfathering*"). A municipality is only entitled to designate previously unbuilt areas for development purposes if it is in possession of a corresponding quantity of planning permits. However, municipalities can purchase permits from other municipalities or sell them. Inter-municipal trading results in an equilibrium price that indicates the relative scarcity of permits.

In the pilot project, a realistic simulation of trading was carried out with case studies and field experiments. The practicability of the instrument could be demonstrated in this way. There was a strong municipal preference for inner-urban development and fiscally profitable projects on greenfield land. The average permit price was about EUR 90 per m² of developable land which can be passed on to developers and thus makes new construction correspondingly more expensive. The sellers were predominantly shrinking municipalities, while growing municipalities were predominantly buyers. Smaller, growing municipalities in suburban areas were the most heavily burdened in fiscal terms. Overall, it was shown that TPP can not only contribute to a targeted reduction of land take, but would also have a structural policy effect by generating financial flows from growth regions to shrinking regions.

Reference: Henger, R., et al. (2019). Modellversuch Flächenzertifikatehandel. Realitätsnahes Planspiel zur Erprobung eines überregionalen Handelssystems mit Flächenausweisungszertifikaten für eine begrenzte Anzahl ausgewählter Kommunen. Abschlussbericht. UBA Texte 116/2019. Umweltbundesamt. Berlin.

- **Do you see an evolution in terms of land use regulations?**

In Germany, the reduction of land take has been discussed since the 1980s. The issue shows pronounced cycles with phases of stronger and weaker political attention, so that a clear trend towards greater politicization cannot

[20] https://www.gdv.de/gdv/medien/medieninformationen/versiegelungsstudie-ludwigshafen-ist-die-am-staerksten-versiegelte-stadt-in-deutschland--133126

be identified so far. The failure to meet the "30 ha target" originally envisaged for 2020 remained more or less unnoticed in the urban policy debate. Apart from lip service, more restrictive land-saving urban development policies do not enjoy a higher priority among relevant political players and stakeholders at the moment.

However, it can be said that the priority of inward over outward (greenfield) development has gained in importance at federal, state and local policy levels in recent years. This postulate is codified as a principle of urban development in relevant federal laws and state development programs. Although there are no national statistics on the proportion of building activity aimed at inward development, it can be taken for granted that this proportion has increased significantly over the years. Thus, the priority statement on infill and brownfield development has undoubtedly contributed to the reduction in land consumption in Germany since 2000.

- **What kind of compensation is envisaged?**

The Federal Nature Conservation Act (*Bundesnaturschutzgesetz*) requires that impacts on ecosystems (as an outcome of land take) should be avoided or - if unavoidable - compensated for. However, the compensatory measures to be taken in such cases are largely limited to the restoration of agricultural land. The desealing and renaturation of former built-up areas only takes place in the rarest of cases. One obstacle is the need for financial compensation from affected private owners. To date, there is no further compensation regulation in Germany that would be suitable for offsetting greenfield development through deconstruction and unsealing.

- **Do you see any form of active (institutional) capacity building to ensure more pro-active NNLT approaches?**

Due to Germany's federal political system, a uniform picture is hardly recognizable. The spatial planning policies of the federal states vary considerably. This results in a rather diverse pattern of strategies, use of instruments and planning cultures. NNLT currently only plays a subordinate role in the spatial development policies of most of the federal states. However, there are some promising initiatives at state level: The state governments of Bavaria and North Rhine-Westphalia intend to integrate a "five-hectare principle" into the state development plan as a guideline for state and regional planning. The state of Baden-Württemberg announced to reach the goal of NNLT by 2035 and launched some funding programs. The city government of Berlin published an Atlas with potential sites for desealing and restoration. The Hessian state government has raised the minimum density values for new residential construction, which could curb land consumption in the medium term. Paragraph 19 of the climate law of Lower Saxony from January 2024 requires each municipality to record potential sites for unsealing until the end of 2026.

- **Do you see any dominant transformation in terms of developing multi-actor coalitions in relation to NNLT? In response to particular (local or supralocal) urbanization processes or issues?**

Effective vertical integration of the goals of land-saving urban development as multi-level governance can only be observed to a limited extent in Germany. As mentioned before, only a minority of the federal states are committed to the goals of the German Sustainability Strategy and the municipalities are keen to keep their local planning sovereignty. Other stakeholders with a potential interest in reducing urban sprawl, such as chambers of agriculture or public transport companies, tend to be passive. A politically powerful coalition of actors for the concerns of land-saving urban development has not yet emerged.

5.4 Obstacles and levers

- **Is NNLT a hot topic politically, and which different arguments and discourses are dominant in the ongoing national debate?**

NNLT is not really a salient issue in the German political discourse. The main reason is the fact that the current federal government declared in the coalition treaty that the goal is to build 400.000 new housing units per year in order to solve the shortage of affordable housing in many parts of Germany (larger agglomerations in particular). A slogan often used is "*Bauen, Bauen, Bauen – built, built, built*". Federal government has taken some measures but is not successful in this regard. It is, however, very clear that a conflict of goals exists between housing policy and environmental policy. The main argument in favour of NNLT is climate change, as healthy soils provide for so called passive climate mitigation.

- **What are the main levers or obstacles that can be identified in this ongoing debate?**

The main obstacles are federalism, a slow change of mindset, the mentioned goal conflict between provision of affordable housing and reducing land take and the tax system. German federalism makes a nation-wide policy for NNLT unlikely as this would require a coordinated effort by a majority of states and federal government. Three out of four political parties being in government on state and federal level are not inclined to take initiative. The liberals (FDP) and conservatives (CDU/CSU) represent the interests of house owners and the construction and real estate industry. Any restrictions with regard to land take would not find support. The social democrats act on behalf of renters and more building land would help to keep rents stable. The green party is in favor of sustainable land use policy but is in the opposition or part of a coalition government.

This does, however, not prevent some states to take action and this has in fact happened in the past with regard to the implementation of the national objective to reduce land take to 30 ha/day until 2030 (Hesse, Rhineland-Palatinate, North Rhine Westfalia).

The German tax system gives no incentives for reducing land take. Any measures such as value capture by changing the cost-benefit-ratio for using previously built up land in competition to using green fields have not been established. From 2025 onwards a new tax on property (*Grundsteuer C*) will be introduced. This will be a tax on land that is defined as building land but so far unbuilt due to a lack of initiative of the owner. However, due to federalism, states can opt out and use own models and several states have declared to do so (Bavaria, Hesse, Baden-Württemberg, Hamburg and Lower Saxony). In any case, it will be up to the municipalities to use this new type of property tax.

In a more general sense, the German planning culture is not prepared for NNLT as it is still growth oriented. A perception prevails, in particular in suburban, peri-urban and rural regions, that land is still available and can be developed at reasonable costs. In addition, density is accepted only to a limited degree. Density levels (and verticalization of housing) in German agglomerations are moderate compared to at least some Italian, French, Spanish and English agglomerations.

The main levers are EU Legislation and an increasing awareness of the risks of artificialisation (sealed surfaces and flood risks).

- **Would you say these obstacles and levers are influenced by specific challenges of your geographical, planning and urbanization context?**

With regard to the specific German context, the fact that at least a perceived availability of land still prevails in many regions is influenced by the geography and polycentric pattern of urbanization. The moderate density levels contribute to this perception. There is no strong incentive to use land more effectively – an insight also confirmed by a recent study of the federal Ministry for Housing, Urban Development and Building Affairs. The availability of area for infill development in German cities is still significant. However, there is currently no official survey of inner-urban development potential at a national level. The federal government's so-called building land reports (*Baulandberichte*) are produced irregularly and the content can differ. Some federal states and planning regions have introduced permanent land use monitoring tools. Examples include North Rhine-Westphalia, the Ruhr Regional Association and the FrankfurtRhineMain Regional Association. In other federal states, digital tools are provided for monitoring purposes, but their use in the municipalities is voluntary. Overall, there is no uniform practice at federal state level.

- **What are found solutions for effectively achieving NNLT? For example, solutions in the form of policies for promoting the development of brownfields, temporary using brownfields or compensating land value reduction?**

The priority of inner (infill) development over greenfield development, which has long been undisputed in Germany, and the considerable progress made in the re-development of industrial brownfield sites have led to a considerable reduction in land consumption. However, most stakeholders do not believe that the national "30-ha-target" by 2030 and a NNLT by 2050 will be achievable given the high demand for residential and commercial space. Beyond scientific debates on suitable instrumental approaches for an effective land-saving policy, a certain political restraint in this policy area is currently evident. The federal and state governments face the responsibility of alleviating the precarious situation on the housing markets and achieving the national expansion targets for renewable energy. Both are exerting considerable pressure on open spaces and in this situation the NNLT is not

being given much attention. Steps taken so far by state governments include capacity building for desealing in terms of identifying potential sites (see case of Lower Saxony and Berlin above). Given the decentralized nature of the German planning system municipalities may also take the initiative. The city of Herbolzheim, located in Baden-Württemberg, launched a program supporting desealing financially (40€/m2 of desealed space, maximum sum is 5.000€; see: https://www.stadt-herbolzheim.de/wirtschaft-handel/klimaschutz/foerderprogramm-klimaschutz/foerderung-zur-entsiegelung-von-flaechen).

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6 Italy

6.1 Definition and monitoring

- **Is there a (legally binding or commonplace) definition of NNLT in the respective country? Is there a definition of artificialisation? In which documents (law, strategy, plan) are these definitions presented?**

Italy lacks a singular definition of "land take" due to the decentralization of spatial planning to regions since the 1970s, resulting in varied interpretations. At the national level, the responsibility for knowledge and monitoring of land uses, land cover, and land consumption lies with the National System for Environmental Protection (SNPA), established by Law No. 132 of June 28, 2016, which created the national network system for environmental protection and regulation. SNPA comprises the Italian Institute for Environmental Protection and Research (ISPRA), committed to monitoring land take, along with the Environmental Protection Agencies of the Regions and Autonomous Provinces.

Due to its peculiarity of being a densely inhabited country, ISPRA distinguishes between: i) Land use, defined as a territory characterized according to its current and future planned functional dimension or socio-economic purpose (e.g. residential, industrial, commercial, agricultural, forestry, recreational) (EC, 2013a), that is the description of the land in terms of its socio-economic and ecological purpose, and ii) Land cover, as a description of the surface of the earth by its biophysical characteristics, including the vegetation, bare soil, open bodies of water and artificial surfaces that can be observed by any earth observation platform (EC, 2013b) (Strollo et al., 2020).

Accordingly, land take (or land consumption) is intended as a change from non-artificial land cover to artificial land cover, as a process resulting from anthropic activities that cause the loss of a fundamental environmental resource by replacing land originally intended for agriculture, natural or semi-natural areas, with urbanized areas. Such increase is usually processed on an annual basis; consumed land means the total quantity of artificial land cover existing in the year considered. The definition of artificial land cover is in line with the definition of "Artificial surfaces and constructions" provided by EEA (2023) and defined as all surfaces where the natural landscape has been changed by or is under influence of human construction activities by replacing natural surfaces with artificial 2D/3D constructions or abiotic artificial materials; artificial parts of urban and rural areas, where mankind has built settlement infrastructures. This includes sealed areas (buildings, other constructions, and sealed flat surfaces) and non-sealed areas (artificial but unsealed) and excludes urban greenery and vegetated areas that should be placed under "Biotic Vegetation land cover class".

Net land take is calculated as the difference between land consumption and the increase of agricultural, natural, and semi-natural surfaces due to restoration, demolition, de-sealing, or other restoring actions.

The transformation of agricultural and natural territory into artificial areas has affected almost 77 square kilometres in 2022, mainly flat lands and hilly areas. This is the highest value in the last 11 years, averaging 21 hectares per day.

- **How, to which extent and how coherently is NNLT being monitored, is this diversified in different regions, cities, etc?**

In Italy, ISPRA NNLT monitoring is carried out for the entire national territory and is updated every year, ensuring homogeneous and timely data, also at the local level. The national monitoring is also accompanied by specific monitoring activities in some Regions, foreseen by local laws, with different definitions of land take that follow specific planning and policy choices for the Italian regions. The regions that have legislated the most are Emilia-Romagna, Lombardy, Veneto, and Tuscany.

In the Lombardy Region, land take is defined as the change from agricultural surface to other uses not connected to previous land uses, excluding new parks and including supra-municipal infrastructures. Land take is calculated as the percentage ratio between the surfaces of the new transformation areas which lead to a reduction in the agricultural surfaces of the current urban planning tool and the urbanized and urbanizable surface area.

In the Emilia-Romagna Region, land take is calculated according to the balance between the areas where urban plans envisage new urbanization outside the perimeter of so-called "urbanized territory" and the ones allocated to de-sealing interventions, through the removal of the soil waterproofing.

The most compliant definition with ISPRA and the European recommendations is the one given by the Veneto Region. The Regional Law No. 14 of June 6, 2017, includes in land take all forms of subtraction of "natural and semi-natural soil affected by soil waterproofing interventions, or by artificial covering, excavation, or removal interventions that are likely to compromise its eco-systemic functions and production capabilities" (art. 2). As a matter of fact, soil sealing outside the urban boundaries is part of the overall computation, obtained from the balance between the aforementioned surfaces and those returned to natural and semi-natural surfaces.

- **Which types of (statistical) tools are being used to do so and based on which types of data/databases?**

Monitoring takes place based on a national map of land consumption according to a three-level classification system, splitting between consumed and non-consumed land.

The geometric resolution of the data aligns with the data provided by Copernicus, notably the Sentinel-2 mission, that, since 2015 has been delivering multispectral data with 10 meters spatial resolution.

A further classification level (the second one) differentiates between permanent types of land consumption (buildings, paved roads and areas, railways, landfills, construction sites, yards and other dirt areas, permanent greenhouses, airports and ports, waterproof sports areas and fields, railway locations, other impervious areas, photovoltaic fields, waste dumps and other permanent sealed surfaces), and reversible types (construction and unpaved areas with soil compaction, permanent deposits of material, quarries, other artificial land cover).

Filling, revising, and implementing data deriving from photointerpretation, are carried out under the supervision of ISPRA by all partners who also take care of validation activities in an open-source environment.

6.2 Roles and governance

- **What are the main institutions involved in the design and implementation of NNLT measures and their respective roles?**

Since 2013, a report on Land Consumption, Territorial Dynamics, and Ecosystem Services has been delivered yearly, with maps and indicators assessing land degradation and land consumption impact on landscape and soil ecosystem services. As a reference dataset of the National Environmental Information System (SINA), it is freely available in open format.

The report investigates land consumption processes within broader dynamics affecting urban, agricultural, and natural areas at different levels through indicators dealing with characteristics and consumption trends, urban growth, and landscape transformations, also providing a deep insight into evolution, distribution, and features of vegetation. It assesses the impacts of the increase in artificial land cover, with a main focus on lost or threatened ecosystems.

As mentioned before, if ISPRA is responsible for monitoring land take for the Ministry of the Environment, the Regions have the power to legislate on land use planning, and, internally, some of them have an observatory (e.g. Region Lombardy) to monitor ongoing processes.

- **What are other influential societal or civil society actors involved in NNLT and what is their relation to institutional stakeholders?**

Among others, the Land Take Research Center, founded in 2008 by the Department of Architecture and Urban Studies (DAStU) of the Polytechnic of Milan; the National Institute of Urban Planning (INU); Legambiente ONLUS, to investigate ongoing processes all over Italy.

For some years now, the Italian Alliance for Sustainable Development (ASviS) bringing together almost 300 member organizations among civil society, has been delivering an annual report to raise awareness to the general public and institutions of the importance of the 2030 Agenda for Sustainable Development, focusing on NNLT.

Among the legislative proposals submitted throughout different legislatures, a framework law was discussed by six large national associations (FAI, Legambiente, LIPU, Slow Food Italia, Touring Club Italiano, and WWF Italia), clarifying the main challenges and steps in NNLT, but ended up with nothing.

- **How does the main governance framework function in relation to NNLT?**

The Regional Law of Lombardy No. 31 of 28 November 2014 introduced new provisions concerning regional planning in a broad sense (the Italian term is "Governo del Territorio", to which State and Regions are jointly entrusted), addressing land consumption and regeneration of previously urbanized areas. The law provides for the adaptation of spatial planning tools with new provisions for land consumption reduction and the redevelopment of degraded land.

- **Do you witness any ongoing innovations or transitions of the governance frameworks or stakeholders' alliances?**

In Italy, there are around 8,000 municipalities, few of which have to date started mergers and co-planning processes, despite a 2014 law prescribing compulsory inter-municipalisation for municipalities with less than 5,000 inhabitants.

In Emilia Romagna, Tuscany, Sardinia, and Sicily, a growing number of municipalities has joined as "Unioni di Comuni", resulting in the sharing of supra-local infrastructures that avoid land consumption and allow for better governance of open space.

6.3 Policies and stakeholder management

- **What are the main tools and policies in place to align various actors in optimising land use for NNLT?**

The Regional Law of Emilia Romagna No. 24 of 21 December 2017 (Regional regulations on the land protection and use) sets the objective of zero land take by 2050. Municipalities were due to adapt their urban planning tools by 2020 and conclude the process in the following two years. Land take in agricultural areas is only permitted for public needs and public utility works in case of unavailability of already urbanized areas and ensuring the lowest possible impact and land take. Land take is permitted exclusively for public works of public interest and for strategic settlements aimed at increasing the attractiveness and competitiveness of specific areas, only in cases where there are no reasonable alternatives consisting in the reuse of already urbanized areas and their regeneration. Regional and urban planning can foresee an overall land take within the maximum limit of 3% of the surface area of the urbanized territory. Some types of public works at a supra-municipal level are not included in the calculation of land take.

- **Do you see an evolution in terms of land use regulations?**

Since 2012, the Government has been addressing the reduction of land take as a national priority through various draft laws. However, none of these measures have been formally defined thus far.

Thanks to ISPRA, awareness of the phenomenon has certainly grown, and many regions, although with sometimes conflicting approaches, are addressing the topic within their policies and planning tools. Whereas in northern Italy we are witnessing an update of the regional legislation and the planning system including the objectives of limiting land take, in central and southern Italy there is still a delay.

The amendment to Article 41 of the Constitution dating back to 2022 marks a significant advancement: it empowers legislation to establish necessary programs and oversight mechanisms, ensuring that both public and private economic endeavors are steered and synchronized towards social and environmental objectives.

Accordingly, every act of urban planning and land use transformation must comply with the land take hierarchy included in the European Soil Strategy to achieve no net land take: (1) land take needs to be avoided, (2) more land needs to be reused, (3) land take needs to be minimized and, finally, (4) land take needs to be compensated for.

The Italian Alliance for Sustainable Development (ASviS), established in 2016 upon the initiative of the Unipolis Foundation and the University of Rome "Tor Vergata", releases an annual report monitoring the progress in implementing the UN Sustainable Development Goals. According to ASviS, land take should be part of a set of policy measures that are closely intertwined. Among its recent recommendations (2023), it states the need to resume the draft law prepared by the Senate in the previous legislature regarding urban regeneration, under the responsibility of "an interministerial steering committee to coordinate the various related programs, as part of the new Interministerial Committee for Urban Policies (CIPU), re-established with a new remit in 2021".

Regarding land use, legislation should mandate an agreement between central and local governments to determine the maximum allowable land consumption within each region. This agreement should include specific allocations for municipal or supra-municipal areas based on available data and predefined criteria. Furthermore, there is a need to increase funding for urbanization expenses and grants, calculated based on the costs of greenfield housing projects.

The so-called Essential Levels of Public service (Livelli essenziali delle prestazioni)', currently under debate, address fundamental rights such as access to facilities and services guaranteed throughout the national territory. Housing policies are intertwined with regeneration initiatives, necessitating a consistent provision of funding for housing benefits to renters to mitigate the impact of escalating rents on low-income households. The State should establish a secure, long-term investment plan for the housing sector, regardless of any extraordinary plans or programs, particularly focusing on the enhancement and expansion of public residential housing (ASviS, 2023, Invest in Urban Regeneration and Revitalise Housing Policies, p. 202).

- **What kind of compensation is envisaged?**

The latest national law proposal (in 2016) envisaged the adoption of "environmental compensation" measures aimed at recovering, restoring, or improving, in a manner commensurate to the extent of the intervention itself, the functions of the soil already waterproofed through its de-waterproofing, and to restore soil natural conditions.

In the Piedmont Region, ecological compensation is envisaged as a way to control land take, allocating certain areas for ecological, environmental, and landscape purposes, as compensation for the new land consumed.

6.4 Obstacles and levers

- **Is NNLT a hot topic politically, and which different arguments and discourses are dominant in the ongoing national debate?**

The objective of "No Net Land Take by 2050", so far taken into consideration by several regions as a sectoral issue, is currently a matter of debate and legislative scrutiny under the hallmark of "urban regeneration" in a series of draft laws coupling land consumption with afforestation measures improving soil permeability (e.g. legislative decree 1131/2019, Measures for urban regeneration). In 2022, the National Plan for the Ecological Transition – Pte (MATE, 2022) was approved, including the fight against land consumption in the country's priority areas. The objective of the Plan is to achieve net zero consumption by 2030, through a series of coordinated actions. Furthermore, it stresses the need for a national law on land consumption, foreseen among the reforms of the Recovery and Resilience Plan (PNRR). As previously mentioned work has yet to commence on the bill concerning land consumption. Likewise, a nationwide urban regeneration law is struggling to gain momentum.

- **What are the main levers or obstacles that can be identified in this ongoing debate?**

The Italian urban planning framework operates from the top down and is governed by a law dating back to 1942. Despite revisions over the years, the law remains outdated on the backdrop of manifold, often conflicting, regional approaches to planning and land management. The concept of "Governo del Territorio" reflects a division of responsibilities between the State and Regions, resulting in a vertical subsidiarity.

For several years now, the Italian Institute of Urban Planning (INU) has been proposing a law of principles addressing the Governo del Territorio, which also includes land take, to update the national planning system and provide the regions with sound foundations. This year the final proposal will also be presented to the Ministries and the Government.

Given these circumstances, land take and spatial planning are a major matter of concern for the regional authorities and the municipalities that are understandably concerned about shouldering the greatest burden in terms of consensus-building. Building rights are grounded in private ownership and do expire only upon amendments of the master plans. Only in areas with environmental or landscape constrains are building rights not completely enforceable. In such cases, the floor area ratio (indice di utilizzazione fondiaria) can be reduced and moved elsewhere. Still, private ownership can postpone their building rights whenever they want, and this hampers sustainability goals.

- **Would you say these obstacles and levers are influenced by specific challenges of your geographical, planning and urbanization context?**

The main obstacles at a policy level concern the structure of the Italian planning system and the competences split between the State and the Regions. So far, all national law proposals have been rejected by the Committee of the Italian Regions, and the existing laws on land take bear different definitions and approaches from each other. At present, all regional laws are misaligned with the targets set for 2030 and 2050.

- **What are found solutions for effectively achieving NNLT? For example, solutions in the form of policies for promoting the development of brownfields, temporary using brownfields or compensating land value reduction?**

Pending the national Framework Law on "Governo del Territorio", our legal landscape is primarily shaped by regional laws, resulting in a highly fragmented setting. The diminishing role of provinces has led to regional authorities taking the reins on spatial policies, addressing various aspects of planning, urban development, land conservation, and ecological sustainability either jointly or individually. Experience has shown that overarching initiatives focusing on broad areas of responsibility rather than on specific issues tend to be more effective.

As for Emilia-Romagna, under the umbrella of Law 24 of 2017, alongside the objectives outlined in the Recovery and Resilience Plan (PNRR), spatial planning efforts have been aligned with the sustainable development goals. This involves prioritizing expenditure streams for municipalities in mission 2 "Green revolution and ecological transition" and offering incentives through various mechanisms.

A significant component of the Spatial Reorganization Program of the Region (PRT) spanning from 2021 to 2023 revolves around strategically integrating activities across municipalities. This strategic shift has been made possible by a decade-long initiative. Upholding principles of subsidiarity, differentiation, and adequacy, the Emilia-Romagna has established criteria and procedures to attain 46 optimal territorial areas tasked with delivering essential services to citizens. These entities, known as "Unioni di Comuni" (see above), help reaching economies of scale and service efficiency.

The PRT has provided support to Unioni di Comuni actively pursuing administrative streamlining efforts, increasing technical expertise and management competencies to enable the inception of intermunicipal plans. Recognizing and rewarding urban planning decisions aimed at shared public facilities and establishing stable platforms for institutional governance have been key aspects of such support.

Incentives outlined in Law No. 24/2017 target the revitalization of disused areas and buildings within urbanized zones designated by Master Plans (PUC). These incentives encompass exemptions for reuse and regeneration initiatives, reductions in construction contributions for urban and building restructuring, and, if the case, the provision of additional building rights linked to the quality of project design, as well as faster procedures.

In terms of monitoring, the National Atlas of Land Take has been released since the tenth edition of the "Land Take, Spatial Dynamics, and Ecosystem Services" report, a collaborative effort by ISPRA and the National Environmental Protection System (SNPA). Its primary objective is to offer the public a user-friendly and visually comprehensible tool to depict the spatial distribution of land take across Italy.

The atlas comprises a concise overview of the latest monitoring data along with 41 thematic posters (at a scale of 1:250,000) covering the entirety of the national territory. These posters not only present statistical data but also incorporate visual representations of land elevation, hydrographic networks, protected areas, and areas prone to hydraulic risks. This comprehensive approach aims to provide a holistic understanding of the territorial changes driven by artificialization, particularly impacting ecologically sensitive regions.

As seen, the National Atlas of Land Take supplements existing tools developed by ISPRA and SNPA concerning land take, territorial conditions, settlements, and their impacts on ecosystem services. Its dual purpose is to educate and raise awareness about these issues while serving as a technical and scientific resource to inform policymaking and regulatory frameworks.

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7 Luxembourg

7.1 Definition and monitoring

- **Is there a (legally binding or commonplace) definition of NNLT in the respective country?**

  Is there a definition of artificialisation? In which documents (law, strategy, plan) are these definitions presented?

The definition of NNLT in Luxembourg is directly influenced by the European Environment Agency's of "Land take" and anchored in the master plan for spatial planning (*Programme directeur d'aménagement du territoire*, PDAT). The master plan for spatial planning is a strategic document that defines the political objectives and strategies for the territorial evolution of the Grand Duchy of Luxembourg. The actual PDAT was adopted by the government in June 2023. The modified law of 17 April 2018 concerning spatial planning in Luxembourg provides the instrument of the PDAT and foresees a specific procedure for its elaboration (coordinated by the Department of Spatial Planning with an inter-ministerial working group bringing together all the Government's sector policies with a territorial impact, consultation of the municipalities, etc.). The PDAT orientates the decisions that influence the territorial development of the municipalities and the sectoral policies but does not have binding value.

The PDAT defines "Land take" as follows :

> Land take is the process by which the soil is removed from its natural, agricultural or forested state. It is measured using land use data. In the context of urban development, land "taken" refers to built-up land for residential use (buildings, houses) or commercial use (offices, factories, etc.), paved or stabilised surfaces (roads, railways, car parks, roundabouts, etc.) and land that is not built-up but has been heavily shaped by human activity and can thus be categorised as artificial (building sites, quarries, mines, landfill sites, etc.). This category also includes artificial "green" areas (urban parks and gardens, sports and leisure facilities, etc.).

The objective regarding the reduction of "land take" in order to attain NNLT is the following :

> Between 2007 and 2018, land take in Luxembourg averaged 0.46 hectares per day. Taking into account the projects and plans that have been approved or are in the process of being implemented, the PDAT proposes to gradually reduce land take to reach an average of 0.25 hectares per day by 2035, and then to aim for no net land take from 2050 onwards. This non-binding objective should be taken into account when deciding whether and how they decide to artificialise land. Municipalities were given theoretical maximal thresholds for land take as a guideline for their future development to 2035 and 2050. The monitoring of land take will show if the municipalities took into account - or not - the maximum thresholds.

- **How, to which extent and how coherently is NNLT being monitored, is this diversified in different regions, cities, etc?**

The PDAT aims to concentrate the development in the most appropriate locations articulated through a polycentric territorial development framework known as "urban system" (armature urbaine). This urban system identifies: three urban agglomerations, a list of regional "Central Places" outside of the urban agglomerations and municipalities with endogenous development. Regarding NNLT, the PDAT indicates theoretical maximal thresholds for soil artificialisation for the time horizons of 2035 and 2050. These theoretical maximal thresholds are shared out between the different municipalities in respect of the urban system based on Central Places (CDA) and a typology of territories defined by the PDAT.

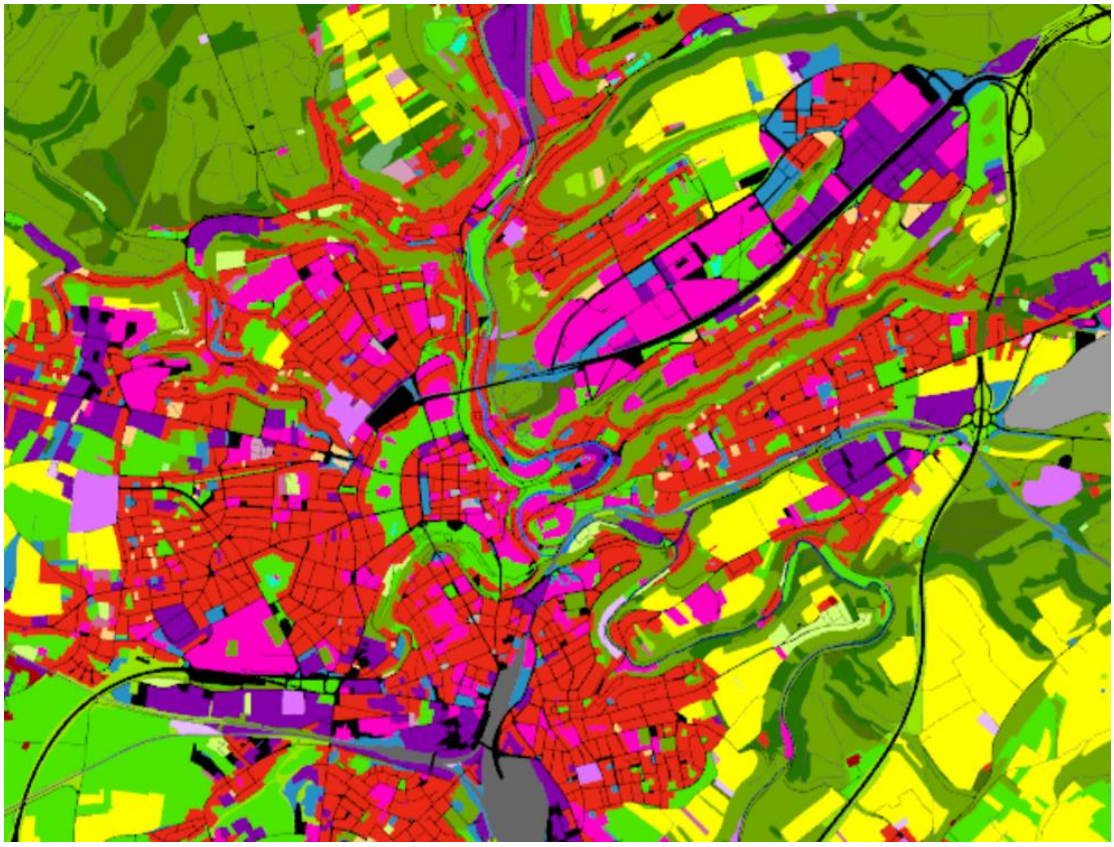
The monitoring of the land take is based on the comparison of 2 datasets on land use at different points in time (generally at an interval of 3 years. The land use dataset is geographic data in a geographic information system (GIS) and it can be evaluated not only nationwide but also for regions, cities or municipalities or any desired kind of spatial aggregation. We currently have datasets for 2007, 2015, 2018, 2021 and an update is planned for 2024.

- **Which types of (statistical) tools are being used to do so and based on which types of data/databases?**

The datasets mentioned in the previous question are part of the LIS-L (Land Information System Luxembourg) and are publicly available on the OpenData site of Luxembourg (https://data.public.lu/en/datasets/lis-l-land-use-2007-2015-2018/)

The data is available as Shapefiles or ESRI File Geodatabase File.

The land use data can be visualized on the national Geoportal (http://g-o.lu/3/9QE4)



Map 4: *Extract of the land use map of 2018 for the city of Luxembourg*

We have built a dashboard (in Qlik) based on this geodata to analyze this data and the changes between 2 periods of time in relation to land take in particular.

This data can be processed with various tools, GIS systems (ArcGIS or QGIS in our case), imported for analysis and charting into Business Intelligence (BI) systems (in our case Qlik) or simply to a spreadsheet.

7.2 Roles and governance

- **What are the main institutions involved in the design and implementation of NNLT measures and their respective roles?**

The main institution involved in the design of NNLT is the Department of Spatial Planning of the Ministry of Housing and Spatial Planning. The definition anchored in the PDAT has been approved by an interministerial working group and has undergone a consultation of the municipalities which had no impact on the definition.

The objective of reducing land take is implemented through any authority's decisions that have an impact on spatial planning, especially the municipalities but also the sectoral policies (housing, economy, public works, etc.).

Decisions that impact the spatial development should be taken in respect to the objective anchored in the PDAT i.e. gradually reduce land take to reach an average of 0.25 hectares per day by 2035, and then to aim for no net land take from 2050 onwards.

- **What are other influential societal or civil society actors involved in NNLT and what is their relation to institutional stakeholders?**

The most influential actors are the landowners, which are mostly private owners, notably promoters that own land in the most strategic areas. On the contrary, the state and the municipalities own relatively little land.

The relation between the state and the private owners is rather tense as the main objective of the government should be to develop the country in the most durable and resilient way in order to provide optimal life conditions for all the inhabitants and their descendants. On the contrary, private owners often seek to maximize profits (speculation) or at least preserve constructible land for their relatives and descendants. A certain clash between private and common interests can be observed. Furthermore, the Luxembourgish Constitution strongly protects property but doesn't foresee any obligations of the owners towards society in general.

- **How does the main governance framework function in relation to NNLT?**

Until now, sectoral policy decisions were taken following the main objectives of the different policies itself, without seeking to reduce land take or even respect spatial planning policies which are mostly unbinding.

Similarly, the municipalities follow overall local interests. It has to be emphasized that the Luxembourgish Constitution protects the "autonomie communale" which preserves for the municipalities the power to manage their territory and municipal interests themselves through their own bodies. The "municipal autonomy" can represent a barrier to the implementation of national spatial planning policies.

- **Do you witness any ongoing innovations or transitions of the governance frameworks or stakeholders alliances?**

The government has approved and adopted the PDAT in June 2023, so it engages itself to follow the orientations anchored in this strategic planning document. But unfortunately, discussions and political initiatives on various topics emerge but do rarely lead to changes.

In the past five years for instance, the revision of property tax was often debated, political initiatives were also taken but often collided with the Constitution. The evolution of the instauration of mobilization taxes for unbuild land was similar. Nevertheless, it has to be emphasized that the new government has declared the revision of the property tax a priority; which means that efforts (and hopefully results) are to be expected.

It has to be emphasized that the size of the country, the sole two levels of decision (government and municipalities) and the proximity of national politicians and local populations can represent an obstacle to unpopular political decisions impacting the electors.

Furthermore, the housing problem faced by all countries of the European Union is often seen as contrary to NNLT policies. Although in comparison, the housing crisis is stronger in Luxembourg due to the economic and demographic growth leading to extremely high prices.

7.3 Policies and stakeholder management

- **What are the main tools and policies in place to align various actors in optimising land use for NNLT?**

The PDAT and the environmental policies, the latter authorizing or not the extension of buildable land.

- **Do you see an evolution in terms of land use regulations?**

Not yet. See Section 7.2, last question.

- **What kind of compensation is envisaged?**

In terms of 'land take', the NNLT principle itself includes compensation for any land taken through the restoration or unsealing of land. No net land take means that if land is taken, other land must be de-artificialised. In theory, therefore, the definition includes compensation.

As for financial compensations, the PDAT calls for several measures and instruments in order to implement NNLT without financially disadvantaging land-owners, such as:

- The instrument of *Transferable Development Rights* (TDR), which, by transferring development rights from an undeveloped plot of land to one that meets sustainability criteria in line with the public interest, makes it possible to direct urban development "inwards" from the built-up area, in a concentric and coherent manner.
- A compensation fund financed by the capital gains resulting from the zoning change of plots of land (as a possible response to a request for financial compensation following the reclassification of certain plots of land).
- The policy concerning subsidies/funding/financial support /financial participation of the State adapted in line with the objectives of the PDAT, including in particular the urban system of Central Places and the reduction of land take.

- **Do you see any form of active (institutional) capacity building to ensure more pro-active NNLT approaches?**

The PDAT proposes the creation of a support for experimentation and pilot projects by means of a Special Fund for Territorial Development (*Raumentwicklungsfonds)*, given that the objectives of the PDAT require decisions and actions that depart from the usual development methods and thus exact testing, monitoring and counteracting.

Furthermore, specific projects have been launched to serve as pilot projects for promoting NNLT and a denser lifestyle. The projects are namely the conversion of the Foetz commercial zone and the green belt for the central agglomeration, called "Agglo-Center".

The aim of the "Foetz" project is to provide an example of how an economic and commercial area such as Foetz can be converted from a single-purpose space to a high-quality multifunctional use with more rational use of the available space (e.g. integration of housing, local shops, recreation areas, green spaces, etc.).

The green belt project is based on a territorial analysis proposing a development strategy to tackle the major challenges; its general aim is to develop the urban structure while limiting the human footprint on nature. At present, urban development is increasing the pressure on the "green zone" and on urban green spaces within the agglomeration, as well as on so-called "quiet areas", which are essential elements in guaranteeing a high quality of life for the population. By preserving and creating multifunctional spaces, the aim is to regulate the urban microclimate, protect and enhance biodiversity, and serve as a place for recreation and leisure, as well as for local agricultural production.

- **Do you see any dominant transformation in terms of developing multi-actor coalitions in relation to NNLT? In response to particular (local or supralocal) urbanization processes or issues?**

To **strengthen horizontal and vertical governance**, the PDAT calls for:

- Promoting and anchoring citizen participation in political decision-making;
- Involving other audiences (e.g. developers);
- Improving communication and support for stakeholders (by providing information and raising awareness among the general public and local stakeholders, or even setting up an advisory and training structure).

7.4 Obstacles and levers

- **Is NNLT a hot topic politically, and which different arguments and discourses are dominant in the ongoing national debate?**

NNLT was a debate during the elaboration of the PDAT and the consultation of the municipalities :

Between sectoral policies it is claimed that:

- NNLT limits economic development
- NNLT is contrary to housing development

Between the Minister of Spatial Planning and the municipalities:

- The annual dotation (FDGC) out of the financial envelope (limited) which a municipality receives is dependent on economic and especially demographic growth. Less growth means less financial possibilities. For the municipalities, NNLT is equated with less growth.

In general:

In a situation of different crises such as biodiversity, climate, housing, etc., a political choice has to be made. The actual political orientation tends to prioritize the housing crisis - and the social tensions resulting - before environmental issues. Furthermore, the offered solutions consisting in denser neighborhoods are rather unpopular due to a general fear of higher population densities and the resulting proximity. The fact that the new government declared the densification a priority hopefully leads to changes in favor of NNLT.

- **What are the main levers or obstacles that can be identified in this ongoing debate?**
  - price of buildable land in comparison to unbuildable land (greenzone)
  - buying land is considered a secure and worthy real estate investment
  - structure of ownership in Luxembourg (developers own a big part of land strategically well located)
  - solutions linked to higher densities are mostly considered unpopular and politically difficult to represent
  - constitutional protection of the property rights sometimes contrary to common interests
  - constitutional protection of the "autonomie communale" especially regarding municipal spatial planning - if a municipality doesn't accept the objective, it cannot be "forced"
  - fund for the global endowment of the communes („fonds de dotation globale des communes", FDGC), which represent the most part of the main ordinary revenues of communes, is mostly based on demographic growth
  - implementation of the objective NNLT questioned in the framework of exponential national growth

- **Would you say these obstacles and levers are influenced by specific challenges of your geographical, planning and urbanization context?**

Yes, absolutely. For various reasons :

- the small size of the country
- the two levels of decision, communal and national
- the fulminant economic and the demographic growth pointing out the country in its greater region and the EU
- the price of land, linked to the strong demand due to the economic development, and making it a secure and worthy investment
- the structure of ownership : promoters, strategically buying and developing with the main objective of maximising rentability
- constitutional protection of the "autonomie communale"(autonomy of the municipalities) and property rights capable of undermining common interests
- the lack of urban culture making higher (urbanization) densities fundamentally unpopular
- the extremely high ratio of the number of motor vehicles to the number of inhabitants and households. This characteristic, alongside with the lack of urban culture, favors the development of housing in rural areas which, due to lower densities, tends to increase soil artificialisation more than urban development.

- **What are found solutions for effectively achieving NNLT? For example, solutions in the form of policies for promoting the development of brownfields, temporary using brownfields or compensating land value reduction?**

Beyond the means ennumbered in section 7.3 (What kind of compensation is envisaged?) the PDAT recommends to start looking at the territorial impact of every public decision in order to attain the twofold objective of gradually reducing the amount of land being built up and concentrating development in the most appropriate locations.

The aim is not to prohibit building on undeveloped land or to make it impossible to develop new urban areas, but rather to plan differently and to develop a new culture of urban development and territorial planning. In this context, the PDAT proposes a series of measures designed to meet this challenge.

- Urban regeneration: The reconversion and the development of a greater mix of function in underused areas.
- Multifunctionality, combining several functions in the same place, or even within the same building.
- The potential of wasteland: Luxembourg has 611 hectares of brownfield land that could be reused.
- The potential for developing multifunctional areas around stations, particularly rail.
- The potential of spaces freed up by adapted mobility: Reassess the use of spaces dedicated to parking motorised vehicles and to consider a more rational use of these areas. Grouping parking spaces together in scalable, multifunctional buildings would also free up public space.
- Complex operations: The low-carbon city – compact, green and mixed – requires complex operations based on cross-financing and multiple operators whose skills have to be increased.
- An active land policy: Identification of strategic sites and a policy of active public acquisition of specific plots of land.
- The principle of reversibility of the building stock: Central buildings should remain functionally neutral, ground floors should be designed in a multi-programmatic way and car parks should be built as a priority in silos constructed according to the principles of evolutionary architecture.

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Programme directeur d'aménagement du territoire 2023 - Stratégies territoriales - Portail de l'aménagement du territoire - Luxembourg (public.lu)

8 Poland

8.1 Definition and monitoring

- **Is there a (legally binding or commonplace) definition of NNLT in the respective country?**

The definition of NNLT for Poland has not been proposed. A translated version of the term (from Polish translation of the EU Soil Strategy [1]) is mostly present in quotes of EU documents. Google search for the exact Polish phrase for NNLT gave 4 results on January 19th 2024.

- **Is there a definition of artificialisation? In which document (law, strategy, plan) are these definitions presented?**

Types of land use are specified in the regulation of the Minister of Development, Labor and Technology of July 27, 2021 on the register of land and buildings. The work of the National Statistical Office (GUS, Statistics Poland) is based on this classification. Land use is monitored at national level by GUS, according to following land use structure: Agricultural land (with subcategories); Forest land; Built-up and urbanised areas (with subcategories); Land under water; Wasteland [2]. Areas of special environmental value under legal protection encompass: Nature reserves; Landscape parks; Protected landscape areas; Ecological arable lands; Landscape-nature complexes. For the forest and agricultural land the additional soil quality classification is provided. Regional and some local data are published in BDL (Bank of Local Data).

- **How, to which extent and how coherently is NNLT being monitored, is this diversified in different regions, cities, etc?**

The NNLT as such is not being monitored. On the local level in urban planning other potentially relevant categories are used. At the local level in urban planning other potentially relevant categories are used:

- *Biologically Active Area*/PBC (monitored in all new investments and to some extent in the existing land use): an area with natural vegetation and rainwater retention; semi- PBC: area of terraces, flat roofs and similar surfaces with plant vegetation. The definition of PBC does not distinguish between natural and man-made areas. As long as they have the environmental capacity mentioned above, they are considered as PBC.
- *Compact Area*: an area with a fully developed, compact functional and spatial structure. The concept was created as a basis for local algorithms comprising the character of the area (supply) and demographic prognosis (demand). The goal was to concentrate new housing in the already urbanised areas and to protect greenfield sites from market-driven pressures [3]. It should also protect the greenfield sites from being dedicated to housing in local documents and strategies.
- *Ecological or environmental compensation*: obligatory if, according to the environmental assessment of the planned investment, negative impact on the environment is expected. The aim is to restore the natural balance of the area in question by compensating for the environmental damage, for example by means of hydrotechnical works, earthworks, land reclamation, reforestation, tree planting or the development of vegetation concentration areas.

- **Which types of (statistical) tools are being used to do so and based on which types of data/databases?**

At the local level more precise monitoring of the land use was an element of the main planning document, the Local Study (*Studium*), which described the existing and planned land use structure but was binding only on the public administration level and did not constitute the local law. According to the new legislation [4], the studies will lose their validity and instead general master plans covering the whole area of the municipalities are to be prepared until the end of 2025.

There are tools dedicated to the information about the planning documents and about the actual status. Several information are encompassed in Geoportal [4], which could be possibly used for the NNLT monitoring. On the

planning level the Central Digital Register [5] has been recently introduced. It will constitute a data base, comprising all data until now gathered and published on the municipalities` websites regarding local documents (masters plans, building permits and similar). The statistical survey "Local planning and spatial development" is carried out by GUS as a permanent survey conducted once a year since 2005 [6]. It also presents the state of planning (e. g. area covered by the master plans) rather than specific land use. Detailed information is published by GUS regarding the agricultural areas [7]. Data on the "taken" land (built-up and urbanised areas) are published for regional and local levels, e. g. for voivodships (BDL) or even districts of Warsaw (Panorama of Warsaw Districts).

8.2 Roles and governance

New legislation has been introduced during last 2 years [3], several regulations will most probably hold. Local governments are in the process of their implementation, which is to be completed in 2026. They encompass new general master plans and new development strategies. As before, on the national level there are binding legal regulations, while implementations and specific policies remain on the local level.

- **What are the main institutions involved in the design and implementation of NNLT measures and their respective roles?**

It is difficult to point out actors directly involved in the design and implementation of NNLT measures, or even those whose main goals and values are unambiguously aligned with them. In future policies following actions may be pertinent:

- protection of soil and agricultural land (Ministry of Agriculture and Rural Development, The Agency for Restructuring and Modernisation of Agriculture [8], [9]);
- forest protection (most of the forest land is state-owned and managed by the dedicated agency State Forests [10]);
- re-use of post-industrial areas and other areas in need of regeneration (dedicated bodies on the municipal level);
- re-use of the heritage areas (conservation institutions on national, regional and local level);
- several institutions involved in environmental activities, from Ministry of Climate [11] and Environment to National Fund for Environmental Protection and Water Management [12] to professional and civic NGOs.

- **What are other influential societal or civil society actors involved in NNLT and what is their relation to institutional stakeholders?**

As yet, there are no such actors.

- **How does the main governance framework function in relation to NNLT?**

At the national level issues most directly linked to NNLT are: tools against urban sprawl and environmental protection of the land and soil, especially regarding forests and agricultural use. The latter is an object of longstanding and complex legislation, dating from the 1970s and re-written and updated several times, with current Act dating from the early 1990s [13], [14]. Possibility of the artificialisation of the arable land depends on the quality of the soil, the higher the quality the more complex the process. The most fertile and valuable soils can only be excluded from the agricultural use only by the decision of the Ministry of Agriculture and Rural Development. Decisions regarding less valuable soil are made on the local level and are much more strongly impacted by the socio-economic goals of the rural communities. The regulations do not apply to the soil within the city limits, e.g. community gardens (RODs, Family Gardens), relatively large complexes created originally for fruit and vegetable production for family needs. They are listed as agricultural land, but they are not protected by the legislation in a way the agricultural land outside of the city is. The typology of the agricultural land in the Act is not identical to this aforementioned in the regulation of the Minister of Development, Labor and Technology of July 27, 2021, but refers to it.

- **Do you witness any ongoing innovations or transitions of the governance frameworks or stakeholders alliances?**

Ministry of Development Funds and Regional Policies is responsible for overarching policies, including strategic documents impacting regional and local policies. The main document for spatial management was KPZK 2030 (Concept of Spatial Development of the Country [15]), encompassing: the principle of *ecological compensation* - policy which was to maintain natural balance and compensate for environmental damage resulting from spatial development and an increased urbanization; and principal of use of the urbanized areas and regeneration as apriority before new land take. The document has been annulled in 2020, which was a step back from possible NNLT policies, even if the effectiveness of those principles had been considered low [16]. Currently new document (vision, not strategy) is being prepared, the Concept of Development until 2050 [17]. The relevant topics covered in the draft document are: biodiversity, urban sprawl and settlement network. Creation of such document may support new alliances between decision-makers and experts or academia.

8.3 Policies and stakeholder management

- **What are the main tools and policies in place to align various actors in optimising land use for NNLT?**

The form of stakeholder management which might be important for NNLT is the cooperation between a large city and surrounding municipalities. There are few formal possibilities of such cooperation. One is based on the common EU-funded ventures (ZITs), realized in the Functional Area (e. g. in Warsaw). Another form, with more strict regulations is a metropolitan association. In 2023, only one such an alliance existed, in Silesia, since 2018 (Box 1). Metropolitan association has a legal identity and requires an act of the parliament to be constituted as a legal body. Attempt to create another one was proposed but foiled in the parliament. Ministry of Development Funds and Regional Policies is working on a draft law regarding, among others, metropolitan associations. New regulations will facilitate the creation of new metropolitan associations. Local governments may carry out their public tasks by means of co-operation with other local governments through intercommunal (inter-municipal) associations to provide assistance, including financial assistance, to each other. Municipalities may also sign an inter-municipal agreements when one of them is entrusted to carry out one or several of their public tasks. This tool would need further study to its potential for NNLT.

Box 3.1: *Metropolitan region in Silesia GZM*

Established in 2018, encompasses over 20% of the area of Silesian voivodeship (2554 mk2), and approximately 50% of the population (2.2 million); main city – Katowice. Post-industrial area (including coal mining) is currently undergoing energy transformation.

One of the identified problems is urban sprawl, resulting, among other factors, from the perception of the non-artificialised land mostly as the resource of future income. However, there is no direct attempt to ensure the NNLT. Spatial policies focus on improvements of the transportation system, blue and green infrastructure, and limitation of urban sprawl [18].

The proposed actions encompass improvements of the already urbanised and often built-up areas through the revitalization programmes. In the programmes following actions are to be included: construction of social housing on the brownfields; other investments in the post-industrial sites; improvement of the environment (air quality, green areas, access to recreational areas); stronger network of social infrastructure within the city (schools, health centres etc.) to create more desirable living environment compared to the suburbs and sprawl.

Large problem for local governments are so-called *spec-ustawy* (special acts of the parliament), overriding existing land use regulation on the national level, as well as local decisions regarding the land use. Examples encompass "Lex-developer", which allowed construction of housing on the greenfields, transportation systems investments or other large public investments, including sport stadiums. Currently, plans for the international airport hub (CPK) with large plans for accompanying infrastructure (roads and railways) is under investigation. However, local authorities could also use the special act from 2003 promoting the development of road network for the construction of local roads.

- **Do you see an evolution in terms of land use regulations?**

On the other hand, there is an evolution towards more strict regulations regarding environmental impact of new investments. For example, until recently the investor was legally responsible only for the breach of environmental obligations (resulting from the assessment of environmental impact) during the investment process. The phase of use and exploitation of the site has not been included. Under the new law, the investors may be held accounted for such a breach also after the construction process is completed and site is in use. Stricter requirements for the environmental assessment are also in force.

- **Do you see an evolution in terms of land use regulations?**

Under new regulations the share of the PBC in total urbanised area also have to be higher than previously for new investments. New acts on spatial planning require higher level of participation from the stakeholders and provide a catalogue of innovative forms of cooperation, negotiations and education [3]. Together with the planned works on the obligatory new master plans and local strategies it may create a platform for (1) introducing the concept of NNLT to various stakeholders, (2) development and implementation of the tools for NNLT.

- **Do you see any form of active (institutional) capacity building to ensure more pro-active NNLT approaches?**

No such actions can be identified.

- **Do you see any dominant transformation in terms of developing multi-actor coalitions in relation to NNLT? In response to particular (local or supralocal) urbanisation processes or issues?**

Metropolitan areas cooperation might be identified as such, however, it is yet of a limited impact (see above).

Box 3.2: *Metropolis and new strategic documents*

The capital city of Warsaw covers an area of 517 km2 and has a population of 1.86 million. It is surrounded by 33 much smaller municipalities of different character, but all strongly influenced by the economic hub in their centre. There has been cooperation between them, for example within the framework of the Integrated Territorial Investments (ZITs). However, they tend to focus on specific problems, most notably improving the transport system between areas of urban sprawl and workplaces within the city limits. Warsaw's local government is also struggling to reduce the impact of air pollution caused by incoming traffic and the unsafe source of heating in the surrounding area.

There is no direct approach inspired by the NNLT objective in the new overall master plan and strategy. They are at a very early stage and so far include the protection of several environmentally valuable areas within the city. Blue and green infrastructure is to become a backbone of the spatial concept. According to the office responsible for future documents, compensation processes for new investments, which are closest in character to the NNLT, are to take place in specific areas, i.e. a reclaimed or environmentally improved area should be located as close as possible to the newly taken land.

8.4 Obstacles and levers

- **Is NNLT a hot topic politically, and which different arguments and discourses are dominant in the ongoing national debate?**

The main obstacle is the absence of NNLT in a public debate and little awareness of the goal. This results in fragmentation of the complex body of issues constituting possible NNLT policies between agriculture, environmental protection, housing, regeneration of contaminated land, heritage, etc.

- **What are the main levers or obstacles that can be identified in this ongoing debate?**

Several policies limit the actions of the investor to the area of the investment, not including broader compensation. Absence of the term in the debate require development of the vocabulary and linking the idea with the already existing ones [19].

Important stakeholders are present whose goals are contrary to NNLT: developers (and their strong and efficient organisations) and small, often rural municipalities for whom taxes for new land take constitutes an important source of income. Both actors exert strong pressure for increased land use, mainly for housing and logistics investments.. The first is to some extent mitigated by legal regulations, however

the professional organisations of housing investments are well prepared to counterargument for the NNLT. The logistics hubs and sites are a source of substantial taxes for local governments and generally are limited mostly by the regulations protecting valuable arable and forest land. Transport of goods and logistics are important elements of national economy and also may have strong impact on other policies.

Lack of the metropolitan regulations facilitating the cooperation between the main city and surrounding municipalities, without the necessity of the specific Act of the parliament for each municipal area (as explained earlier), is also a barrier. On the other hand, if the legislation is developed at some point, or the number of metropolitan associations increases, it may create a good practice basis also for medium size cities, which do not qualify for the legal solutions as metropolis, but encounter similar problems of urban sprawl (especially former voivodeship capital cities). Tools can be developed and tailored starting from the, perhaps limited, experience of cooperation in the metropolitan areas [Box 2]. Polycentric structure of the country, with several large and strong municipalities (metropolis) is in itself a basis for policies encompassing NNLT. Associations of metropolis, cities and rural municipalities may play the role in the process. Generally, local level is strong and well managed.

Other activities fragmented but possibly favourable for NNLT encompass: growing environmental consciousness, growing market for high quality local food in cities, popularity of the 15` city concept. New governmental programme Regions of Revitalisation 3.0 [20] supporting the local level in re-use of the problematic areas may also enhance chances for the better balance between land take and re-use.

There is also some activity in the private sector, resulting from the obligatory ESG reporting. Some companies use NNLT-driven or NNLT-like actions to improve their non-financial outcomes.

- **Would you say these obstacles and levers are influenced by specific challenges of your geographical, planning and urbanization context?**

Polycentric structure of the country, with several large and strong municipalities (metropolis) is in itself a basis for policies encompassing NNLT. Associations of metropolis, cities and rural municipalities may play the role in the process. Generally, local level is strong and well managed.

Afundamental difficulty is the nature of the socio-economic change, which happened in Poland since 1989. Both on the national and local level strictly economic goals are often still dominant, understandably in the context of huge challenge of catching-up with much more developed countries of EU-15 after 1989. Land take, necessary for new infrastructure (e. g. large investments in the transportation system), housing and new forms of economic activity constituted an important part of the economically and socially successful policies. This created a well-trodden path which would have to be replaced by radically different logic of NNLT.

Along those lines, it must be observed, that recently local governments have faced growing responsibilities and costs of their legal obligations (among them higher level of civic participatory processes in spatial planning) accompanied by decreasing funds. Such trend encourages local authorities to seek funds in higher taxes from the land use.

What are found solutions for effectively achieving NNLT? For example, solutions in the form of policies for promoting the development of brownfields, temporary using brownfields or compensating land value reduction?

The Revitalization Programmes might become an efficient tool for achieving NNLT. They are based on the Revitalization Act from 2015, which was the result of the complex and prolonged debate. It encompasses several specific tools for re-use, improvement and intensification of use of the formerly abandoned sites in cities. Some funds are additionally dedicated for the heritage areas, which in the light of the Faro Convention might impact more areas than in the traditional approach. The Act created an institutional framework for Revitalization Programmes (including participatory processes), facilitates investments for both public and private sector. The example is the Revitalization Programme for Warsaw, focused on the dilapidating and partially post-industrial area of Praga. Among investments completed or under construction on the post-industrial sites are: large private housing complexes (e. g. one on former cosmetics plant site), multi-functional commercial hub (former spirits factory) and new public concert hall (former veterinary university). Important element of this policy is strong connection to two other elements. One is the Local Warsaw policy (supporting concentration of uses and services in local centres serving residential areas); the other is the development of the public transportation system, in this case a metro line.

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9 Switzerland

9.1 Definition and monitoring

- **Is there a (legally binding or commonplace) definition of NNLT in the respective country?**

In Switzerland, the objective of no net land take (no net soil loss) is stated in the 2020 Swiss National Soil Strategy,[21] and repeated in the 2022 Swiss Sustainable Development Strategy.[22] However, these documents are not legally binding. The Swiss Soil Strategy defines NNLT as "the result where soil functions that are lost at one site as a result of construction are restored, i. e. offset, at another site by removed soil being spread. With the focus on soil functions, this indicator takes into account not simply the affected land area, but also the difference in quality between different soils." Otherwise stated, it will still be possible to build on soil, but any loss of functions must be offset by rehabilitating the soil elsewhere. Its definition thus originates in the focus on soil functions rather than affected land surfaces.

- **Is there a definition of artificialisation? In which document (law, strategy, plan) are these definitions presented?**

The Swiss National Soil Strategy defines "soil consumption" as follows: "*Soil consumption in the narrower sense* is understood to mean the destruction of soil by means of sealing or removing soil. With it, soil loses all of its ecological functions. *Soil consumption in the broader sense* describes the loss of soils in order to extend urban areas". With these narrower and broader senses, the Swiss National Soil Strategy provides two alternative scopes for the objective of no net land take, which renders it quite confusing. On the one hand, the term "soil sealing" is further defined in the strategy as "Soil sealing describes the man-made covering of soils by buildings, construction and layers of tarmac, concrete or similar materials, as well as any other coverage of soil using impermeable substances. Water and gas exchange are largely halted by sealing. As a result, these soils lose their function as a habitat for plants, soil animals and organisms, as well as their filter and absorption capacity. Biologically, they all but cease to be active." On the other hand, "Urban area" corresponds to the "settlement and urban areas" classification found in the official land use statistics. It covers industrial and commercial complexes, building complexes, transport infrastructure, special urban areas, and recreation facilities and parks. In the most recent land use statistics survey, they accounted for 8% of the Swiss territory.[23] The degree of soil sealing, consisting of the proportion of buildings and hardened surfaces within urban areas, was 63 %.

- **How, to which extent and how coherently is NNLT being monitored, is this diversified in different regions, cities, etc?**

The objective of no net land take is not monitored *per se* for now. However, the federal Statistical office monitors land use changes in Switzerland, including settlement and urban areas and soil sealing.[24] These statistics are based on a grid (100x100m) where each point is attributed a land use and soil cover information. This is done mainly by human interpretation of aerial images taken at regular intervals, increasingly supported by AI-Methods (automated pre-interpretation).

* We thank Professor Jean Ruegg (University of Lausanne) and Guillaume Raymondon (Region Morges) for their insightful comments and suggestions.

[21] CONSEIL FEDERAL, *Stratégie Sol Suisse: Pour une gestion durable des sols*, Berne 2020.

[22] CONSEIL FEDERAL, *Stratégie pour le développement durable 2030*, Confédération Suisse, Berne, 2022.

[23] OFFICE FEDERAL DE LA STATISTIQUE, *L'utilisation du sol en Suisse : Résultats de la statistique de la superficie 2018*, Berne 2021.

[24] *Id.*

In addition, the Swiss Federal Office for Spatial Development is also providing indicators, monitoring systems and analyses focusing on e.g. land take, sprawl and density within construction zones.[25] These territorial monitoring systems use a variety of available statistical tools, suited to provide information for the main indicators that can be related to land take (loss of soil, densification of built environment etc.).

In a separate, ongoing project, several national Offices are combining forces to establish a monitoring of sealed surfaces. The aim is to provide reliable information on the state and development of the sealed areas that is both more up-to-date and available in a higher resolution than what exists today.

Furthermore, the Swiss Federal Office for Spatial Development also monitors buildable zones. This type of statistic is based on the geodata contained in the municipal land use plans (statistic of legal status of zones rather than on the ground land use).[26]

Finally, the national sectoral plan for crop rotation areas (aiming to protect particularly valuable cropland/soils) established in 2023, shows the extent of these croplands by using geodata.[27] The cantons have to provide their data according to a national (harmonized) data model.

Aside from the national level, most cantons have individual monitoring systems in place.

The functional approach stated above will require the development of methodologies capable of comparing the functions lost through construction with those regained through compensation projects. A monitoring initiative in this regard has been recently initiated (see *infra*).

9.2 Roles and governance

- **What are the main institutions involved in the design and implementation of NNLT measures and their respective roles?**

The Swiss National Soil Strategy was adopted by the federal government and prepared in coordination by the Federal Office for the Environment (FOEN), the Federal Office for Spatial Development (ARE), and the Federal office for Agriculture (FOAG). However, in Switzerland, land use is a cantonal competence, the federal one being limited to principles (article 75 Constitution). Accordingly, the cantons will be responsible for implementing the NNLT measures. Depending on cantonal structures, municipalities will also likely play a key role, given that many land use plans and land use decisions are taken at the municipal level.[28] Several cantons have started to adopt soil strategies aiming at the sustainable use of soil and the protection of soil functions. However, to date, the author is unaware of cantonal strategies stating a similar NNLT objective. For instance, the Canton the Vaud has a soil strategy in its master plan, with the goal of preserving the land most suitable for agriculture, nature and cultural heritage, and stabilizing the proportion of building zones located on this land[29].

- **What are other influential societal or civil society actors involved in NNLT and what is their relation to institutional stakeholders?**

The work of scientists has been decisive in the adoption of the Swiss Soil Strategy, which was influenced by the result of the national thematic research program on the sustainable use of soil, funded by the National Research Fund.[30]

[25] See https://www.are.admin.ch/are/fr/home/developpement-et-amenagement-du-territoire/bases-et-donnees/observation-du-territoire.html.

[26] See https://www.are.admin.ch/are/fr/home/developpement-et-amenagement-du-territoire/bases-et-donnees/statistique-suisse-des-zones-a-batir.html.

[27] See https://www.are.admin.ch/are/fr/home/developpement-et-amenagement-du-territoire/bases-et-donnees/statistique-sda.html.

[28] Only the cantons of Geneva and Bâle-ville have retained these decisions at the cantonal level.

[29] See https://www.vd.ch/fileadmin/user_upload/themes/territoire/amenagement/PDCn/Contenu_detaille/F11_Priorites_du_sol.pdf.

[30] https://www.nfp68.ch/fr.

The NNLT is not operational yet and there is little discussion on the topic. However, as will be described below, two modifications of the land use law have taken places in the past ten years, that contribute in practice to achieving NNLT. These modifications were largely influenced by two popular initiatives, as they were both adopted as a counter-project to these initiatives.[31]

- **How does the main governance framework function in relation to NNLT?**

In land use planning, the federal government sets the overall principles. Each canton has its own land use law. Cantons are further responsible for adopting territorial master plans. Land use plans are then adopted at the municipal level in conformity with the master plans.

9.3 Policies and stakeholder management

- **What are the main tools and policies in place to align various actors in optimizing land use for NNLT?**

Neither the Swiss National Soil Strategy nor the Sustainable Development Strategy provide for concrete reduction and compensation measures to achieve the NNLT. In response to a parliamentary postulate calling on the Federal Council to draw up a report analyzing the concrete economic, social and societal consequences of the NNLT, the Federal Council acknowledges that no measures have been planned at this stage (in 2020).[32] Since then, nothing has been proposed in relation to the NNLT objective.

- **Do you see an evolution in terms of land use regulations?**

In regard to land consumption avoidance, under Article 15 LAT, building zones must in principle meet "foreseeable needs for the next fifteen years". This criterion constitutes an upper limit to building zones, which was intended to contain its expansion.[33] However, it is a relative limit linked to human demographics, which can be increased regularly, with no fixed overall limit.[34] In practice, many municipalities overestimated their foreseeable needs for the next fifteen years and oversized their building zones. To counter this issue, the LAT was amended in 2012 to purposely require municipalities to reduce them (LAT 1),[35] in line with the consistent case law of the Swiss Federal Supreme Court[36]. In addition, the LAT now requires cantons to set out in their master plans how to ensure that building zones comply with the conditions of art. 15. This modification switched the governance structure in relation to urban areas. Whereas municipalities had an important margin of discretion, they now have to follow the cantonal rules on how to calculate the "foreseeable needs for the next fifteen years". For example, in the Canton de Vaud, the new master plan, revised and approved in 2022, now includes a demographic growth potential for each municipality (Measure A11).[37] Municipalities that have building zone reserves higher than their allocated demographic growth potential must reduce their building zone accordingly.[38]

This reform also strenghtened the principle of densification (inward settlement development). Measures should be taken to make better use of unused or insufficiently used areas in building zones and of opportunities to

[31] See INITIATIVE PAYSAGE, *Initiative populaire fédérale "Contre le bétonnage de notre paysage (Initiative paysage)"*, Initiative déposée le 8 septembre 2020 à la Chancellerie fédérale, see online: https://www.initiative-paysage.ch/initiative-2/.

[32] THIERRY BURKART, *Conséquences économiques, sociales et sociétales de la Stratégie Sol Suisse*, Postulat n°20.3477, déposé par Thierry Burkart au Conseil des Etats le 2 juin 2020.

[33] FRANZISKA WASER, *La réduction de la zone à bâtir surdimensionnée selon l'art. 15 al. 2 LAT*, Schulthess, 2018, N 80-81.

[34] RAPHAËL MAHAIM, *Le principe de durabilité et l'aménagement du territoire: le mitage du territoire à l'épreuve du droit: utilisation mesurée du sol, urbanization et dimensionnement des zones à bâtir*, Schulthess, 2014, p. 203.

[35] Art. 15 al. 2 LAT, modification du 15 juin 2012 (RO 2014 899; FF 2010 959).

[36]Voir notamment ATF 140 II 25 cons. 4.3 p. 31; ATF 117 Ia 302 cons. 4b p. 307; ATF 116 Ia 221 cons. 3b p. 231, ATF 116 Ia 328 cons. 4b p. 331.

[37] The new master plan of Vaud can be found online: https://www.vd.ch/themes/territoire-et-construction/amenagement-du-territoire/plan-directeur-cantonal/version-actuelle.

[38] See more extensively, https://www.vd.ch/themes/territoire-et-construction/amenagement-du-territoire/zones-a-batir-dhabitation-et-mixtes/redimensionner-les-zones-a-batir.

consolidate and densify the settlement areas. Lastly, the reform strenghtened the protection of high-quality agricultural land. Each canton must maintain a specific minimal quota of these lands. In practice, further construction on these fertile soils is extremely restricted as the required quota are barely fulfilled.

Furthermore, in application of the principle of the separation of buildable and non-buildable zones, territories outside the building zone must in principle be kept free of all construction. However, this principle is not absolute. Many exceptions have been established over the years. As a result, 37% of the surface area of housing and infrastructure lies outside the building zone[39]. In response to a popular initiative to counter this situation, the Parliament adopted a revision of the LAT in september 2023 introducing a stabilization principle outside the building zone (LAT 2).[40] Although not referred to in the parliamentary work, this principle echoes the NNLT, both of which reflect an idea of balance. This principle focuses on buildings and sealing, but the legislator introduced many exceptions.[41] In addition, it futher established new exceptions to the prohibition of construction in non-buildable zones. In terms of implementation, the text requires the cantons to define an overall concept for achieving the stabilization objective in their master plans, and to evaluate it periodically. In doing so, LAT 2 defines the stabilization objective at cantonal level. Note that this modification did not take into account the Swiss Soil Strategy. It focuses on surfaces rather than functions.

- **What kind of compensation is envisaged?**

Several types of compensation are envisaged depending on the underlying framework:

- Concerning building areas, under the current system, compensation for the expansion of building zones primarily takes the form of downgrading another building zone. Hence, a quantitative downgrading has to take place for any new building zone in municipalities that have oversized building zones and when a new building zone or densification operation generates an expansion of the building zones above the 15-year need limit. The swiss legal system also includes several sectoral compensation mechanisms linked to impacts on agricultural lands, forests, and biodiversity. Compensation is also imposed when a new building zone unavoidably encroaches on high quality agricultural land, reducing the amount of high quality agricultural land below the cantonal minimum quota. This compensation must allow the rehabilitation of an area equivalent to that impacted, both in terms of quantity and quality.[42] Lastly, the 2012 modification introduced a system of financial compensation on the added value generated by a new building zone.[43]
- Redarding the new stabilization principle of the non-buildable areas, compensation measures should logically take the form of demolishing existing buildings of equivalent size to those erected, and renaturating sealed surfaces. To compensate for new buildings and sealing, the legislator initially favors an incentive-based approach. The new article 5a LAT introduces a demolition subsidy to encourage private owners to demolish buildings and installations located outside the building zone, to be operationalized in the cantonal master plan.[44] Project-based compensation measures will only be compulsory at a later stage, if the canton does not otherwise achieve its stabilization target.[45]
- In the Swiss Soil Strategy, compensation should take the form of a rehabilitation of soil elsewhere, in line with the functional approach of the NNLT objective.

[39] OFFICE FEDERAL DU DEVELOPPEMENT TERRITORIAL (ARE), *Monitoring de la construction hors zone à bâtir: Rapport 2023*, Berne 2023, p. 9 et 17.

[40] LAT, modification du 29 septembre 2023 (FF 2018 7479) (nLAT). This modification is not in forced yet.

[41] For example, the stabilisation principle for sealing only applies to agricultural areas that are farmed all year round. It also excludes sealing for agricultural and tourist purposes, as well as sealing related to energy production and transmission facilities, or to cantonal or national transport facilities. Art. 1 al. 2 let. b*quater* and Art. 8d al. 2 nLAT.

[42] Art. 30 al. 1bis et 2 Ordonnance sur l'aménagement du territoire (OAT, RS 700.1) ; ATF 134 II 217, cons. 3.3. OFFICE FEDERAL DU DEVELOPPEMENT TERRITORIAL ARE, *Plan sectoriel des surfaces d'assolement*, Berne 2020, p. 13.

[43] Art. 5 LAT.

[44] Art 5a et 8d al. 1 nLAT.

[45] Art. 8d al. 4 et 38b, al. nLAT.

- **Do you see any form of active (institutional) capacity building to ensure more pro-active NNLT approaches?**

The most important innovations concern soil functions. A pilot project, financed by Sanu Durabilitas, has been initiated in the region of Morges (Vaud) to develop a replicable and practicable soil quality indicator.[46] According to Guillaume Recordon (Morge Region) and Juan Ruegg (Professor at University Lausanne), the indicator has generated the interest of other cantons.[47]

In addition, the Federal Council has commissioned the new Soil Competence Center to develop the methodological basis needed to map soils throughout the country.[48]

9.4 Obstacles and levers

- **Is NNLT a hot topic politically, and which different arguments and discourses are dominant in the ongoing national debate?**

Surprisingly, the NNLT objective has not raised a lot of political discussion in Switzerland and is not present in the public debate. To our knowledge, only two parliamentary interpellations occurred in 2020 (see *supra*) and 2023[49]. The NNLT objective and the Swiss Soil Strategy were not even raised during the adoption of the land use law in 2023 introducing the stabilization principle. Discussions are rather focused around LAT 1 (long-term effects are still to be seen), the implementation of LAT 2, and the development of renewable energy in the Alpine region.

- **What are the main levers or obstacles that can be identified in this ongoing debate?**

Regarding the NNLT in relation to soils, the main obstacles are as follow:

- Lack of appropriate data and methodologies on soil functions
- Lack of awareness of the importance to protect soil functions among key stakeholders
- Lack of horizontal integration between cantonal services

The above-mentioned initiatives could contribute to reduce these hurdles.

[46] https://qualite-sols.ch/.
[47] Interviews of 23 and 24 of January 2024.
[48] CONSEIL FÉDÉRAL, préc., note.
[49] https://www.parlament.ch/fr/ratsbetrieb/suche-curia-vista/geschaeft?AffairId=20234250.

10 Comparative approaches

The different case studies are compared across five dimensions:

- national legislative frameworks to reduce land take and the methods used to monitor it;
- the main institutional barriers to implementing this policy;
- the main existing or proposed instruments for redirecting the urbanisation market towards less land take;
- the public debate on NLLT policy (or, more broadly, policies aimed at restricting urban sprawl, since many countries do not have an explicit NNLT policy);
- the level of convergence of each planning system with the objective of reducing land artificialisation;

10.1 Legal frameworks and monitoring

Regarding the implementation of the No Net Land Policies, two types of countries can be identified in the sample analysed:

- The countries in which there is no explicit policy aim for limiting land take (Estonia, Poland and Czechia);
- The countries in which a national aim is expressed. This aim has to be legally adopted by regions or States, albeit with a wide diversity of subnational transcriptions (Germany, Italy, Belgium and Switzerland), or it has to be implemented by local authorities (France and Luxembourg).

Figure 3: *Comparison of legal frameworks and monitoring*

	Explicit aim	**Legally binding aims**	**Definition of land take**	**Monitoring of land take**
Belgium				
Brussels Region	No	No	No	Yes An interactive database giving an indication of the amount of soil artificialisation in each neighbourhood.
Flanders	Yes The aim is that *"the additional average daily land take is reduced to zero hectares by 2040"*	Yes Through the Strategic Vision of the Spatial Policy Plan of Flanders, approved on 20 July 2018.	Yes. Land take is the space that is taken by human activity: i.e. the space used for housing, trade and industry, transport infrastructure, recreation and sport, greenhouses as well as parks and gardens.	Yes The Flemish research organisation VITO was commissioned to develop a base reference to analyse and monitor land use and land take in Flanders. This resulted in a geodatabase that captures the evolution of land use at a resolution of 10m, starting from a baseline measurement for the year 2013.

Walloon Region	Yes Reduce the artificialisation of land to reach the NNLT in 2050.	Yes The NNLT objective is included in the *Code du développement territorial* (CoDT), which is the planning legislation in Wallonia (Territorial Development Act) and which came into force on 1 April 2024.	Yes. The Walloon region master plan (*Schéma de développement du territoire - SDT)* defines artificialisation as the process by which agricultural, forestry or natural land is urbanised through construction or the placement of one or more fixed installations, following the issue of planning permission.	Yes The artificialisation of land is measured based on land registry data. This data covers the whole of Wallonia but does not include the public domain (including roads, waterways, railways, etc. without distinction).
Czechia	No	No	No	No
Estonia	No	No	No	No
France	Yes Halving the pace of the land take during the 2021-2031 decade, compared to the 2011-2021 decade: the aim is zero net land take in 2050.	Yes Law on Climate and Resilience of 2021	Yes The definition is evolutionary. By 2031, land take is defined as the transformation of agricultural, natural or foresty plots into urbanised plots. After 2031, land take is defined by the alteration of the ecological functions of the soil.	Yes The legal measure of land consumption is based on land registry data. The surface area that has been developed is classified by type of use (housing, business, mixed use), plot by plot. A geographical information system is currently being implemented in France, enabling the degree of land take to be assessed at a detailed level.
Germany	Yes Maximum of 30 hectares per day during the next decade, with the aim of achieving a circular land economy in 2050.	No The aim is expressed in the 2021 updated version of the German Sustainability Strategy. It has been adopted in some regions.	Yes Land take is defined as the increase of "settlement and transportation areas" (*Siedlungs- und Verkehrsfläche*, SuV), which mainly consist of built-up areas, transportation areas, and urban recreational areas.	Yes The *Siedlungs- und Verkehrsfläche* are surveyed annually and reported by the Federal Statistical Office.

Italy	Yes In 2012, the Government approved a framework bill to limit land take and enhance agricultural areas. In 2013, the subsequent Government proposed a gradual reduction in national land take, to reach net zero land take by 2050	No The national aim has been transcribed in some regions like Lombardy or Veneto.	Yes Changes to agricultural land and other uses (Lombardy). Increase in natural or semi-natural surfaces affected by soil waterproofing interventions, by artificial covering, excavation or removal which compromises the ecosystemic functions of land and production potential (Veneto).	Yes Law of 28 June 2016, for monitoring land take. Creation of the National Environment Information System. Land use is monitored according to current and planned functional dimensions or socio-economic purposes (e.g. residential, industrial, commercial, agricultural, forestry, recreational uses) and land cover, as a description of the surface of the soil by its biophysical characteristics
Luxembourg	Yes The aim is to reduce land take gradually to reach an average of 0.25 hectares per day by 2035, and then to aim for no net land take from 2050 onwards. This aim is expressed in the national master plan adopted by the governement in June 2023.	No The national master plan is a strategic document. Between 2007 and 2018, land take in Luxembourg averaged 0.46 hectares per day. Taking into account the projects and plans that have been approved or are in the process of being implemented, the PDAT proposes to reduce land take gradually to reach an average of 0.25 hectares per day by 2035, and then to aim for no net land take from 2050 onwards.	Yes Land take is defined as the process by which soil is removed from its natural, agricultural or forested state. It is measured using land use data. In the context of urban development, land "taken" refers to built-up land for residential use (buildings and houses) or commercial use (offices, factories, etc.), paved or stabilised surfaces (roads, railways, car parks and roundabouts, etc.) and land that is not built-up but has been heavily shaped by human activity and can thus be categorised as artificial (building sites, quarries, mines, landfill sites, etc.). This category also includes artificial "green" areas (urban parks and gardens, sports and leisure facilities, etc.).	Yes A database has been created to compare land use at different points in time (generally within three years).
Poland	No	No	No	No

Switzerland	Yes The objective of no net land take is stated in the 2020 *Swiss National Soil Strategy*, and repeated in the 2022 *Swiss Sustainable Development Strategy*.	No (Responsibility of the cantons.)	Yes The Swiss Soil Strategy defines NNLT as "the result where the soil functions that are lost at one site as a result of construction are restored: i.e. offset, at another site by removed soil being spread. With the focus on soil functions, this indicator takes into account not simply the land area affected, but also the difference in quality between different soils".	Yes The objective of no net land take is not monitored *per se* for now. However, the Federal Statistical Office monitors land use changes in Switzerland, including settlement and urban areas and soil sealing. These statistics are based on a grid (100x100m) where each point is attributed land use and land cover information.

10.2 Main institutional barriers to the implementation of No Net Land Take Policies (or convergent policies)

In the different country cases studied, the respective planning system and its governance have not been designed historically to achieve zero net land take. One fact clearly illustrates this: local authorities are very often funded by land use taxes and are therefore 'rewarded' for facilitating urbanisation and development. Consequently, when the NNLT objective is expressed, it triggers a debate about the evolution of territorial governance.

In all countries and regions where there is an explicit target to reduce the amount of land take, national and regional authorities leave the task of implementation to local authorities. However, a national and/or regional target cannot be translated at the municipal level like a "Russian doll". Municipalities are therefore invited to negotiate differentiated trajectories (depending on their demographic growth rate, their potential to reduce the amount of brownfield land, etc.) which, taken together, will make it possible to achieve the regional or national objectives. Such a method requires strong horizontal cooperation between municipalities. While such cooperation exists in all the countries studied, it is found to be insufficient.

10.3 Socio-economic mechanisms for the implementation of NNLT

Land take through urbanisation is not only driven by population growth. Very often, the consumption of land by urbanisation is explained by socio-economic mechanisms[50]. On the demand side, many households and businesses contribute to more sprawling urbanisation through property investment and lifestyles that require extensive urban spaces (transport, housing, leisure and consumption needs, etc.). Conversely, on the supply side, it is more economically viable for developers to meet this demand, as building production costs are lower in sparsely populated areas and urban recycling is almost always more expensive than building on natural or undeveloped land. Public authorities are therefore seeking to redirect these socio-economic mechanisms in favour of more compact urban development. To achieve this, they have two levers. On the supply side, they can "subsidise" urban densification and "discourage" building on natural or agricultural land through taxes or, as in Switzerland, they can use demolition subsidies to encourage private owners to demolish buildings outside building zones. On the demand side, they can help to redirect demand towards already urbanised areas, by financing quality public spaces, installing attractive facilities, restoring heritage, etc. In many countries, therefore, incentive-based funding programmes are designed to combine actions on both the demand and supply sides. These programmes are, for example, the

[50] O. BONNET *et al.*, "Land is back, it should be taxed, it can be taxed", *European Economic Review*, vol. 134, 1st May 2021, p. 103696

Aktionsprogramme Fläche in Baden-Württemberg (DE); the *Action Coeur de Ville* in France or pilot projects to facilitate "*bouwshift*" in Flanders. These programmes are very interesting in facilitating the implementation of NNLT. But they seem clearly insufficient to redirect both demand and supply towards a no net land take.

"Transferable development rights" are also under discussion. This instrument could allow development rights to be transferred from an undeveloped plot of land to one that meets the sustainability criteria. It allows urban development to be directed "inwards" from built-up areas. In Luxembourg, the transferable development rights have been called for by the Master plan for spatial planning, but its implementation now depends on the new government elected in October 2023. Until now, the government has not yet taken a clear position.

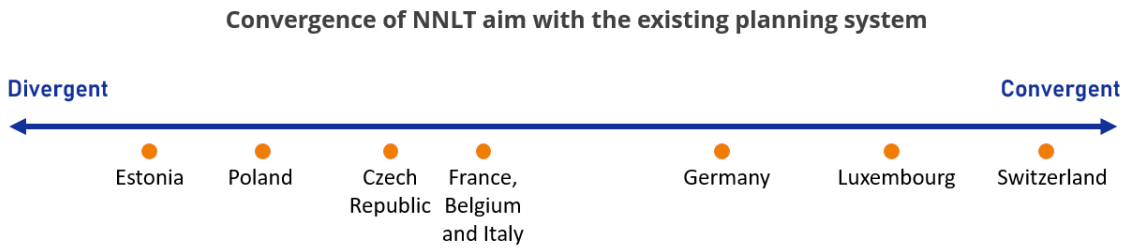
As a result, many discussions have arisen concerning a more profound change of socio-economic patterns of urbanisation through "compensation". This concept proposes to restrict new land take unless it is offset by equivalent desealing or ecological enhancements. In the long term, it could involve prohibiting any new land take unless it is compensated for by the desealing of land equivalent in size and/or ecological quality. Such a mechanism raises many debates. The scale for the compensation could be local, regional or national. At the national scale, it can generate financial flows from growth regions to shrinking regions (see Box 2, in the Chapter on Germany). This issue remains topical with debates in academic and expert circles.

10.4 The degree of convergence of NNLT policies with existing planning systems

Across Europe, countries can be categorised based on the extent to which their existing spatial planning systems converge with the aim of reducing land take. Among the countries analysed in this report:

- Some are characterized by dispersed urban dynamics, supported by prevailing urban planning strategies: this is the case of Estonia and Poland;
- Countries "in the middle of the road", where the NLLT policy complements other measures to fight urban sprawl. However, there are many dispersive tendencies (due in particular to the large number of municipalities, the local tax system and/or the presence of sparsely populated regions): this is the case in Italy[51], France[52], Belgium[53] and the Czech Republic[54];
- Countries where a long-standing planning tradition in favour of compact urban development or focused deconcentration makes the new targets more compatible: this is the case of Germany[55], Luxembourg and Switzerland.

Figure 4: *Convergence of NNLT aims with the existing planning systems*



[51] F. INDOVINA, "La città diffusa. Che cos' è e come si governa", *Daest-IUAV, Venezia*, 1999

[52] E. CHARMES, *La revanche des villages - Essai sur la France périurbaine*, Paris, France, Le Seuil, 2019

[53] J.-M. HALLEUX, "Vers la ville compacte qualitative ? Gestion de la périurbanisation et actions publiques", *Belgeo. Revue belge de géographie*, nº 1-2, National Committee of Geography of Belgium / Société Royale Belge de Géographie, 8 March 2012 (DOI : 10.4000/belgeo.7070 consulté le 6 mai 2024)

[54] K. STANILOV and L. SÝKORA, "Postsocialist Suburbanization Patterns and Dynamics", in *Confronting Suburbanization*, s. l., John Wiley & Sons, Ltd, 2014, p. 256-295

[55] T. SIEVERTS, *Cities Without Cities: An Interpretation of the Zwischenstadt*, London, Routledge, 2003

10.5 Intensity and the issues of socio-political debates on NNLT

Definitions of land take and soil degradation vary between European countries. We can assume that these differences can be explained by the categories of stakeholders most involved in the debate. The three main groups of stakeholders involved are the agricultural sector, the supporters of more "intensive" or compact urban development and the institutions responsible for protecting the environment. Other more specific sectors are presented in the case studies: research and expertise, public transport, large landowners in already urbanised areas and insurance companies. The agricultural sector can be quite ambivalent towards NNLT policy. The supporters of this sector are concerned with ensuring that there is sufficient agricultural land available, but they are often reluctant to give more capacity to local authorities to have powers to tackle soil degradation, and so, discuss agricultural practices. In Belgium and France, the NNLT strategies have emerged when two categories of actors mobilise together: environmentalists and promoters of a more "intense" and “compact” urbanisation.

Not surprisingly, the more precise and rigid the legislation of the country, the more intense the public debate on NNLT. This is why the debate is less intense in Estonia and Poland, for example. In Germany, Italy and Luxembourg, the debates are not very intense. The aim is expressed, but it is not legally binding. In Luxembourg, the debate is not intense because the aim is expressed in a master plan that is non-binding but only provides guidance for national development.

In France, the debate is very lively. The Law of Climate and Resilience of 2021 is criticised by business actors on the grounds of its impact on economic development, with the fear that it will no longer be possible to develop industrial sites, particularly gigafactories. Moreover, the no net land take policy is seen as undermining decentralisation, as local authorities are obliged to take this objective into account when drawing up their town planning documents. In Belgium, and particularly in Flanders, there are also debates, notably on the compatibility of NNLT policy with demographic and economic growth. Surprisingly, the debates in Switzerland are less lively, although they also has very ambitious legislation on the subject of no net land take. We can assume that this Swiss legislation only supplements an already very restrictive planning system that is set to limit urban sprawl.

Many debates concern the compatibility of NNLT policy with economic development and the building of affordable housing. We can assume that the debates are limited because the effects of such long-term orientations on urbanisation are not yet very strongly felt, either by municipalities or by real estate market actors. Moreover, the intensity of the debate could also be linked with demographic trends and therefore be more intense in countries or regions with strong demographic growth, like Flanders.

11 Conclusions and recommendations

"No Net Land Take" (NNLT) is the subject of much debate across Europe. There are two types of discussion:

- A debate on the relevance of this objective. Some are concerned about the vagueness of the concept, which covers many objectives and is difficult to monitor;
- A debate about the usefulness of a quantitative approach to limiting land take.
- In this report, we do not want to close the debate, but to make three types of comments:
- Some recommendations for the development of a common basis for discussion at the European level;
- Some feedback on the main administrative, economic and social obstacles that need to be overcome in order to implement a no net land take strategy;
- Some research that seems necessary to help decision makers.

11.1 The need for a clearer definition of NNLT at the European level

The analysis of the 9 country case studies highlights the need for a clear and shared definition regarding No Net Land Take.

The target of NNLT is ambiguous as it covers both reducing land take and preventing soil degradation through soil sealing[56]. In some countries, the definition of net land take is set at the national level (France, Luxembourg, Germany and Switzerland) and is highly related to the ecological functions of the soil (Switzerland) or goes beyond the ecological functions to include the agricultural functions of the soil (Luxembourg). In some countries such as Luxembourg, the definition is very detailed, whereas in other countries like Germany, the definition is quite broad, focusing on built-up areas with settlements and transportation. In France, the definition is changing, with a new definition that will be legally binding after 2031.

To monitor land take, some countries use land registry data (France or the Czech Republic). In these cases, public infrastructures and roads are excluded from monitoring. Many other countries used data from earth observation satellites (but with different resolutions and methods).

The taxonomy of land take also varies widely between countries. For example, depending on the country, parks and gardens may or may not be considered as 'taken' land.

There are two main consequences of this diversity in the definition of NNLT:

- The implementation of the NNLT strategy may lead to different aims in land use regulation. Depending on the definition, municipalities may or may not be keen to encourage private gardens; they may or may not focus on the issue of unsealing, etc.;
- It is very difficult to compare the efficiency of different countries' strategies in terms of limiting land take.

On the basis of the case studies, it appears that in those countries where monitoring of NNLT has been introduced, it has raised the concern of local authorities and the public about the issue.

In this context, shared definition and harmonized monitoring at the European level are needed to facilitate transnational comparisons, exchanges, and discussions. Indeed, monitoring is essential to raise public concern on this important issue for sustainable development.

[56] E. MARQUARD *et al.*, "Land Consumption and Land Take: Enhancing Conceptual Clarity for Evaluating Spatial Governance in the EU Context", *Sustainability*, vol. 12, nº 19, Multidisciplinary Digital Publishing Institute, 2020, p. 8269

11.2 A quantitative target of land take as a lever for sustainable land use

Concerns about a purely or mainly quantitative approach to urban planning have been raised by the adoption of NNLT strategies. But to deal effectively with NNLT, it appears essential to complement traditional land use planning with approaches that improve soil quality, ecosystem services, etc. NNLT has to be viewed as a tool for promoting sustainable land use and planning, rather than as an isolated and purely quantitative objective in itself, in particular, as its application varies across different countries, serving diverse spatial goals. It is thus crucial to approach the NNLT objective with caution, avoiding a purely quantitative perspective that may oversimplify or divert attention from other essential land use goals and targets like biodiversity or social cohesion.

In many of the countries studied here, NNLT serves as a catalyst for initiating more comprehensive land use monitoring and projects. These projects go beyond traditional dichotomies and challenge purely agriculturally productive or resource-centered definitions of soil and land. For example, integrating ecosystem services approaches in urban planning provides a more holistic and integrated perspective, fostering a nuanced understanding of land use and promoting sustainable practices.

The "zero" net land take target is rejected or viewed with suspicion by many experts or decision-makers. It does not seem appropriate to them because of the need to improve housing and public services and to remain attractive for industrial, tourism and agricultural development. Moreover, some are concerned that the "zero" target is not suitable for spatial planning, which must remain adaptable, especially in the face of demographic, environmental or geopolitical crises. Some insist on the variety of the territorial contexts throughout Europe in terms of demographic development, economic attractiveness, as well as the financial and physical ability to reuse brownfields and densify existing urban areas.

In this context, there is no consensus for a 'no net land take' strategy at the European level. However, the fact of setting a quantitative target for land use seems to be a good way to stimulate the debate on land and soil use and is a useful lever to change urban planning methods and practices. In this sense, it could be recommended at the European level to invite countries and regions to set a quantitative target for land take. Periodic monitoring of land take, based on a common definition and methodology, could be relevant to discuss and challenge the different planning systems in Europe.

11.3 Gambling on NNLT as a lever for transforming broader public policies

As we have seen, the implementation of NNLT faces many barriers or obstacles: the tax system (which very often encourages urban sprawl), the local governance framework (because of the need for more local horizontal cooperation to adapt the differentiated local trajectories to the common goal of reducing land take), the socio-economic mechanisms of urban development, etc. NNLT could be seen as an important initial step, that should be considered in relation to subsequent measures such as transformations in land tax systems, mobility, and infrastructure developments to achieve a "green" transition. If understood in such a way, NNLT has the potential to drive reforms at various levels of government.

By recognising NNLT as a dynamic tool in the context of sustainable land use, it can contribute to comprehensive planning strategies that line up with multiple societal and environmental objectives. NNLT involves comparing and inventorying various means and mechanisms of compensation, both at local and regional levels. By focusing on these underlying mechanisms, we gain insights into the economic implications of NNLT and its impact on sustainable land use practices. This exploration could potentially lead to a radical shift in planning systems, as economic considerations play a pivotal role in shaping land use policies. Understanding NNLT within the broader context of the economics of land use emphasizes the interconnection of environmental, social, and economic factors. This holistic perspective is essential for developing effective policies that balance economic development with ecological sustainability and that contribute to a more comprehensive and resilient planning system.

No Net Land Take could be seen as a major gamble: this policy requires many sectoral policy reforms to be successfully implemented. It might lose its relevance if it is not included as a "piece" in a more general transformation of public policies to promote the green transition. But is NNLT a good starting point to create this "domino effect" on public policies? Is it relevant (socially, politically, etc.) to bet on this "domino effect"?

11.4 Monitoring not only the impact on "land take"

In general, the public discourse on NNLT remains relatively limited, as evidenced by the comparative analysis of the case studies here. Although the topic is actively discussed in academic and governmental circles, it has not gained significant consideration in the general public domain. NNLT is not a prominent subject in public media or popular political discussions, highlighting a gap in awareness and attention. While scholars and policymakers engage in in-depth discussions about NNLT, they seem to be disconnected from the broader public. This discrepancy may stem from the technical nature of the subject, which might not readily capture public interest. Bridging this gap in awareness is crucial to fostering informed public discourse and garnering public support for policies related to NNLT. By linking NNLT to everyday concerns and more central socio-political debates in relation to land use, it is possible to stimulate a broader public dialogue that lines up with academic and governmental efforts to address the challenges and opportunities associated with NNLT.

The public debate has to be based on facts and data. NNLT is often perceived as contradictory to other fundamental spatial needs, notably those related to the need for additional and affordable housing and economic development (mainly reindustrialisation). It is crucial to approach this potential conflict with awareness and address or nuance these apparent paradoxes. One critical consideration involves being mindful of issues such as the dominant narrative of the urban-rural divide and the different dynamics of both growth and shrinkage in various regions. Addressing this issue requires a comprehensive understanding of the implications of NNLT on different spatial contexts, ensuring that policy discussions are inclusive and sensitive to diverse needs and challenges.

To implement NNLT successfully, it is therefore necessary to monitor the impact of the policy on housing affordability, economic development, regional imbalances and the urban-rural divide, because this could highlight the need for other sectoral policy reforms to implement NNLT. Moreover, without an evidence-based discussion of its effects, NNLT could be the receptacle of fears of economic or territorial decline. NNLT risks therefore being rejected by a large proportion of the population and the gamble of its capacity to create a "domino effect" on public policies for green transition would be lost

11.5 New research questions to address

In theory, the objectives of NNLT (conserving biodiversity, preserving agricultural land, promoting more sustainable cities, and regenerating brownfields, etc.) could be achieved without a quantitative approach to land take. For some experts, NNTL then appears to be "not useful". By contrast, some proponents of NNLT argue that the objective of a more sober land take has long been a goal of most urban planning policies, but without a quantitative measure of the implementation of such an objective, the effects are often very deceptive. They also argue that a common target at the national or regional level is a good way to avoid "free riding". Indeed, in the absence of an NNLT strategy, a municipality may fear that the low-density development it rejects will be welcomed by a neighbouring municipality. There is therefore a need to better understand the implications of a quantitative approach to land take.

What is the impact of statistics on spatial planning decision-making? Historians have shown how statistics not only describe reality but also change it. By their very presence, they tend to organise the public debate (see, for example, all the discussions on the centrality of the notion of "gross domestic product (GDP)" in the socio-economic debate). But what are the implications of these figures on land take for spatial planning? Research could be useful to better understand how land use data are used in public, technical or political debates. By whom? And for what purposes?

The two main concerns about sober land take policies are substantive (their impact on housing affordability, and economic development requirements) and procedural (their capacity to generate concomitant transformations to achieve a green transition). Research is needed to measure these two elements. Concerning the impact on housing affordability and economic development needs, previous researchers have shown that under different circumstances it is possible to achieve this apparent paradox through fiscal mechanisms or social housing instruments. But are these circumstances present now? The NNLT strategies put in place in Europe are all very new. To better understand their effects, it seems important to conduct long-term comparative observation (of not less than five years), to look at their effects on land prices, industrial development landscape, public debates, other public policy reforms, biodiversity, etc. If it seems obvious to choose case studies in countries where NNLT strategies are effective, it could be interesting to compare them with local authorities that have promoted a more sober land take without using a quantitative target such as "no net land take". This research must be interdisciplinary, as an

iterative research observation on these issues must mix the methodologies of sociologists, ecologists, architects, geographers, political scientists, and economists, among others.

11.6 Connection to other ongoing (political and societal) debates

The discussions on NNLT are intricately connected to numerous ongoing debates in the field of spatial governance and sustainable land use. Recognizing these intersections unveils the potential of NNLT to contribute meaningfully to broader dialogues and initiatives. By engaging with topics like urbanization, land development, and environmental sustainability, NNLT can become a focal point that encapsulates the complexities of spatial governance. Its relevance extends to discussions on urban sprawl, rural-urban dynamics, housing needs, and the ecological impacts of land use changes. The potential of NNLT thus lies in its ability to serve as a nexus for integrating diverse perspectives and concerns within the broader context of spatial governance. It provides an opportunity to address the intricate relationships between land use, environmental conservation, and societal needs. As such, NNLT can become a catalyst for developing holistic approaches to sustainable land use that encompass economic, social, and environmental considerations.

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ESPON 2030

ESPON EGTC
11 Avenue John F. Kennedy
L-1855 Luxembourg
Grand Duchy of Luxembourg
Phone: +352 20 600 280
Email: info@espon.eu
www.espon.eu

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