Sino-German Urbanisation Partnership

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

TRANSFORMATIVE CITY

KEYSTONE PAPER 3

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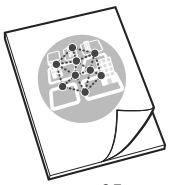
This document is part of five keystone papers looking at current emerging topics in the building and city sector, focusing on energy efficiency and resilience. The keystone papers were developed within the framework of the Sino-German Urbanisation Partnership as a basis for the forthcoming working period and cover following topics:

01
Plus Energy Buildings and Districts

02
Energy Efficiency of Buildings and Districts in Urban Renewal

03
Transformative City

04
Climate Risk Management in Cities



05
Urban Renewal in Districts

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ABBREVIATIONS

BauGB	German Building Code (Baugesetzbuch)
BauNVO	German Land Use Ordinance (Baunutzungsverordnung)
BMU	Federal Ministry of the Environment, Nature Conservation and Nuclear Safety
BMWi	Federal Ministry for Economic Affairs and Energy
DGNB	German Sustainable Building Council
EU	European Union
GHG	Greenhouse gas
IBA	International Architecture Exhibition
IKI	International Climate Initiative
ISEK	Integrated Urban Development Concept
KfW	Kreditanstalt für Wiederaufbau (Germany's government-owned development bank)
NKI	National Climate Initiative
PPP	Public-private-partnership
SEKo	Integrated City Development Concept

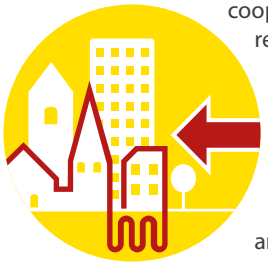
EXECUTIVE SUMMARY

Cities are shaped by continuous urbanisation, increasing or shrinking population numbers, as well as other demographic changes. Cities are important economic drivers, and also responsible for a large proportion of ecological impacts and emissions. Physical transformation in urban environments mainly occurs in form of renewal, rehabilitation and upgrading. Germany's Federal government offers a number of subsidy programmes, with many of them targeting inner city neighbourhoods, the improvement of existing structures, renovation of existing buildings and blocks, as well as the enhancement of green infrastructure and public spaces.

Many large and medium sized cities in Germany experience a shift in growing or shrinking population numbers. Metropolitan areas are particularly attractive for newcomers due to their high quality of life, availability of jobs, and a variety of educational, and leisure facilities. Besides having potentially positive impacts on urban economy, rising population numbers are often accompanied by stress on the housing market and infrastructure, requiring action by municipalities regarding new housing construction, and enhancement of public transportation. In contrast, a number of cities located in Eastern Germany and areas characterised by a declining heavy industry in the West, undergo a transformation in their economic significance and number of residents. This can result in vacant housing units, derelict industrial sites, and oversized infrastructures that no longer meet their intended demand. Sustainable urban development for such transforming cities thus depends on forward-thinking action and targeted investments to improve attractiveness and liveability.

Urban planning legislation in Germany was heavily influenced by so-called functionalist planning paradigms dating back to the first half of the 20th century. The approach followed the principle of separation of functions, such as housing, working, leisure and individual, motorised transportation. Functionalist planning influenced in particular urban development of the 1950s and 1960s, resulting in prefabricated large-scale mass housing, and dependency on motorised transportation, and neglect of urban centres. From the 1970s onwards, subsidy programmes were introduced by the Federal government to enhance the urban design flaws of the past. The recent Leipzig Charter on Sustainable European Cities of 2007, highlights the European Union's (EU) ambitions to follow a more inclusive, and participatory approach in urban development and rehabilitation and is the guiding principle of recent developments regarding urban planning legislation.

In the national urban planning legislation, the German Building Code (BauGB) is the most important regulatory document. It defines legally binding land use management, and regulates area-related requirements for urban development and construction projects. Another instrument outlined in BauGB are so called Integrated Urban Development Concepts (ISEKs), utilised by municipalities for the creation of concrete, long-term strategies addressing challenges in urban development. Urban Development Contracts, municipalities are able to establish public-private-partnerships and deduct certain municipal duties to private developers as a precondition for project realisation. For smaller towns and municipalities, the formation of inter-municipal cooperation is an option, to enhance their potential to realise projects through combined investments.



Germany's Federal government offers a number of programmes providing financial assistance for municipalities to tackle challenges of demographic and structural change. Every year, Administrative Agreements on Urban Development are negotiated and agreed upon between the Federal and state governments, which define the exact amount of financial assistance as well as thematic focal points and target sectors. In recent years, budgets increased significantly, with the Federal government dedicating 740 million Euro for the schemes in the 2017 period.

Despite the current shift from an industrial- towards a service-oriented economy, new technological innovations allow for other forms of re-industrialisation of urban cores. Manufacturing processes emitting minimal amounts of particle matter, with low noise levels, can be established close to residential areas, and allow for synergies with its surroundings. The most recent land use category of "Urban Areas" supports this trend by providing a statutory framework. Transition of urban centres also allows for integration of new green infrastructure, by that addressing ecological, economic and social challenges at once.

1. SETTING THE SCENE

In global and local transformation processes, cities have a key role as dynamic centres of growth. Many contemporary cities in Germany and around the world are shaped by **continuous urbanisation, increasing population numbers and demographic changes**. Furthermore, cities are important economic drivers, while being responsible for large amounts of resource use and emissions.[1] *Urban transformation* describes such diverse facets of change in dense, urban environments. It regards transitions of the urban fabric and the built environment, as well as interlinked socio-economic processes and shifts in urban lifestyles.[2] Other forms of transformation include technological innovations, new modes of industrial production (e.g. *Industry 4.0*), digital and *smart* planning tools, and climate change related adaptation and mitigation developments in cities.[3]

Transformation of the urban fabric is shaped by renewal, rehabilitation and upgrading of existing structures of inner centres. Many renewal programmes in Germany especially target dense inner city neighbourhoods, and the enhancement of current structures. Measures include major renovation of existing buildings and blocks, enhancing their quality and liveability for its residents, as well as their energy performance. Other actions target improvement of public spaces and green infrastructure. By that, urban design of the past, often following outdated planning principles, is restructured and amended towards today's requirements.

1.1 TRANSFORMATION OF GERMAN CITIES AND TOWNS

Besides redevelopment of inner city neighbourhoods, today's German cities and towns are confronted with other phenomena of transformation. A number of German cities experienced a **swift population increase** in the past decade. Large cities **transforming from an industrial- towards a service-oriented economy** are particularly attractive, due to availability of a broad range of jobs, leisure facilities and accessibility of various forms of transportation. In contrast, many cities formerly characterised by traditional forms of heavy industry, experienced a decline of economic relevance in the past decades. This is often accompanied by a **reduction of population numbers**, vacant factories in urban fringes, oversupply of residential units, and underutilised infrastructures. Both forms of transformation encounter different challenges, requiring targeted actions in physical planning as well as measures targeting socio-economic processes.

Especially large cities like Berlin, Hamburg, Munich, Cologne, Frankfurt, Stuttgart or Düsseldorf, and medium-sized cities, such as Münster or Freiburg, are confronted with an influx of new residents. Population growth in Germany's urban centres is sourced both from in-migration within the country as well as external migration from member states of the *European Union (EU)* and beyond. In addition, influx of refugees from 2014

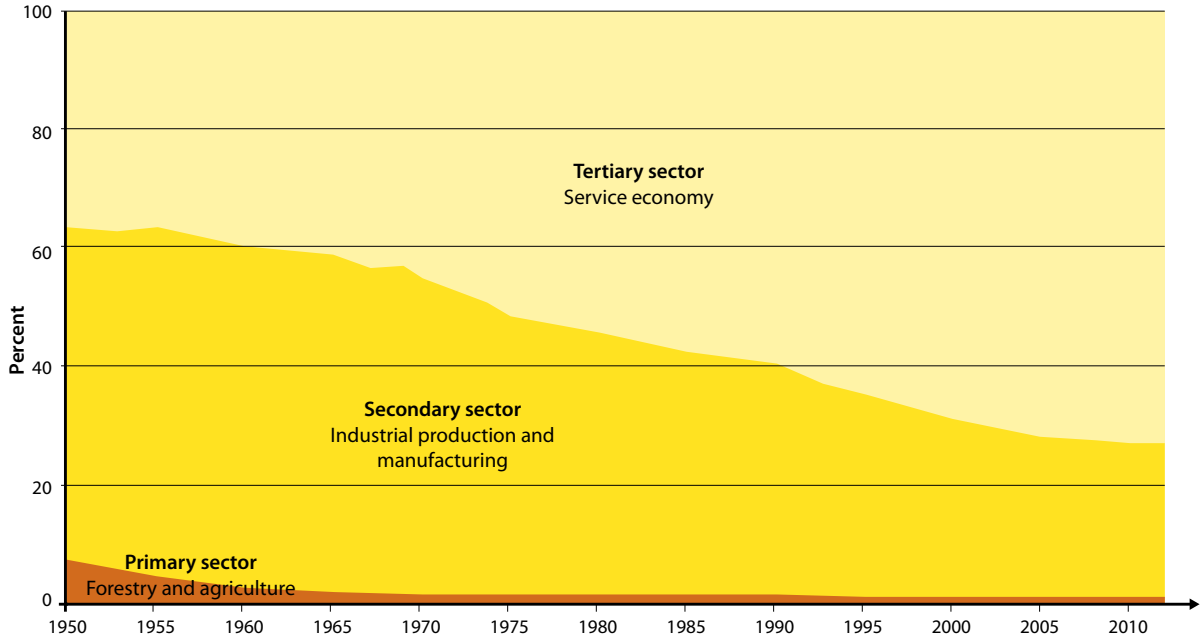


Figure 01: Growing and Shrinking Regions in Germany (BBSR, 2017)

1 WBGU (2016): Humanity on the move: Unlocking the transformative power of cities. Berlin. Source: https://www.wbgu.de/fileadmin/user_upload/wbgu.de/templates/dateien/veroeffentlichungen/hauptgutachten/hg2016/hg2016_en.pdf

2 Difu (2017): Was ist eigentlich? Transformation. Begriffe aus der kommunalen Szene, einfach erklärt. Difu-Berichte, 2. Source: https://difu.de/publikationen/difu-berichte-22017/was-ist-eigentlich-transformation.html

3 Bundesregierung (2016): Stadtentwicklungsbericht der Bundesregierung 2016: Gutes Zusammenleben im Quartier. Source: https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Nationale_Stadtentwicklung/stadtentwicklungsbericht_breg_2016_bf.pdf

onwards contributed to population growth in urban areas.[4] Cities experiencing large population growth within short timeframes, often experience increased demand on the housing market and other public infrastructure.

Despite growing urban centres, population numbers of the majority of German municipalities stagnate or even decline. Especially cities formerly characterised by coal and steel industry a strong industrial sector underwent transformation in their economic performance and decrease of residents. While cities and towns located in Eastern Germany are particularly affected, also former industrial hubs in the West, such as Ruhrgebiet, experience transformative change. Such cities are often referred to as *shrinking cities*. Such cities require targeted instruments to improve their attractiveness and liveability despite decreasing number of inhabitants. Underused existing infrastructure call for sound adaptation, rehabilitation or deconstruction. Other measures include demolition of abandoned facilities, or redevelopment towards other purposes. Overall, adaptation measures need to be integrated into holistic urban planning concepts, to avoid isolated silo thinking and balance different requirements both in terms of physical and socio-economic development.[5]

Shrinking cities often are confronted with limited resources to tackle challenges of demographic change. This accounts in particular for small and medium sized cities and towns in economically underdeveloped regions. Here, inter-municipal cooperation between individual towns can help to introduce new perspectives on comprehensive planning and pooling of financial budgets. By inter-municipal cooperation, smaller cities and towns are able to jointly develop new infrastructure projects, and share initial costs, which would be too expensive for an individual municipality. For instance, cooperation is carried out in projects for renewable energy generation, e.g. biogas plants or wind parks, to establish local energy grids.[6]

1.2 PLANNING PRACTICE AND LEGISLATION – FROM FUNCTIONALISM TOWARDS COMPACT PLANNING PRINCIPLES

Germany's existing urban planning legislation was strongly influenced by modernist planning principles. Dating back to the first half of the 20th century, the *functionalist* planning paradigm followed an approach of separation of functions, strictly segregating areas for housing, working, leisure and transportation. It emerged as a reaction to industrialisation, as well as high population densities, associated with poor living conditions in inner city districts. Particularly urban development of the 1950s and 1960s was affected by functionalist planning, resulting in large-scale mass housing, dependency and increase of motorised individual transportation, neglect of urban centres and growing suburban districts.[7]

From the 1970s onwards, German legislation slowly put urban centres back on its agenda. The first *Urban Development Act (Städtebauförderungsgesetz)* already acknowledged the need for refurbishment and densification of inner city districts, and specified financial responsibilities of the Federal Government, subnational and municipal governments.[8] In the 1980s, also the planning principle of the *Compact city* gained momentum, aiming for a city with short distances between individual functions and a reorientation towards mixed-use developments. The compact city and similar paradigms are increasingly representing contemporary needs of city dwellers, and gaining weight in replacing functionalist models in planning legislation.

This is also reflected in the *Leipzig Charter on Sustainable European Cities*, which was adopted by the EU member states in 2007. Since its introduction, recent trends regarding German urban planning legislation are progressively reflecting aspects of the charter (see Land Use Category *Urban Areas* below).[9] The *Leipzig Charter* aimed to create a guiding vision of the European city and rests on two main pillars. First, the promotion of an **integrated urban development policy**, and second, **dedicated focus on disadvantaged neighbourhoods** in cities and towns of the EU. It includes principles of compact, integrated city development, the model of urban districts with mixed-uses and adequate densities, as well as a focus on refurbishment of disadvantaged neighbourhoods.[10] In Germany, adoption of the Leipzig-Charter initiated the "National Urban Development Policy", promoting the guidelines of the Charter within Germany's urban planning framework.[11]

4 Bundesregierung (2016): Stadtentwicklungsbericht der Bundesregierung 2016.
5 BMI (2018): Städtebauförderung. Source: https://www.bmi.bund.de/DE/themen/bauen-wohnen/stadt-wohnen/staedtebau/staedtebaufoerderung/staedtebaufoerderung-node.html
6 BBSR, BMU (2018): Interkommunale Kooperation in der Städtebauförderung. Bonn. Source: https://www.bbsr.bund.de/BBSR/DE/Veroeffentlichungen/Sonderveroeffentlichungen/2018/interkommunale-kooperation-dl.pdf?__blob=publicationFile&v=3
7 Wienhues, Sigrid, Knickmeier, Sönke (2017): Von der "Charta von Athen" zur "Leipzig-Charta". Die Einführung des „Urbanen Gebiets" als Leitbildwandel in der BauNVO? In: vhw FWS 3 / Mai – Juni 2017.
8 Gesetz über städtebauliche Sanierungs- und Entwicklungsmaßnahmen in den Gemeinden (Städtebauförderungsgesetz), 1971.
9 Wienhues, Sigrid et al. (2017): Von der "Charta von Athen" zur "Leipzig-Charta".
10 European Union (2007): Leipzig Charter on Sustainable European Cities. Source: http://ec.europa.eu/regional_policy/archive/themes/urban/leipzig_charter.pdf
11 BMU (2013): Nationale Stadtentwicklungspolitik. Source: https://www.nationale-stadtentwicklungspolitik.de/

2. REGULATORY FRAMEWORKS

Under consideration of the constant and heterogeneous demographic and structural changes, strong supportive frameworks and strategies, as well as instruments for urban development, are essential for taking action proactively. In Germany, all forms of urban planning and design measures are regulated through the national urban planning legislation. The scope of supportive regulatory frameworks includes statutory guidelines for planning, funding instruments and subsidy programmes, as well as different forms of organisational and financial cooperation, some of which are described below.

2.1 GERMANY'S URBAN PLANNING LEGISLATION – THE PREREQUISITE FOR URBAN TRANSFORMATION

Urban planning and design measures are regulated through Germany's urban planning legislation *(Städtebaurecht or Bauplanungsrecht)*. **The German Building Code (BauGB) is the most important plank of the planning law.** It defines legally binding land use management, and regulates area-related requirements for urban development and construction projects. *BauGB* covers the main instruments for municipal governments to shape their urban development. It includes the definition of German town planning and zoning laws, development plans, and regulations concerning environmental impact assessment. Furthermore, it takes modes of participation of public and private stakeholders in a planning process into account. In addition, it includes specifications focusing on urban renewal, and the scope of Federal urban development subsidy schemes (see below).[1]

Furthermore, BauGB integrates requirements of directives issued by the EU.[2] It aims to steer urban transformation that is conducted well balanced, and proactively planned. BauGB is structured in four sections:

- *General Urban Planning Law (Allgemeines Städtebaurecht),* covering topics regarding urban land-use planning, building permissions, land reallocation, expropriation and compensation, infrastructure provision and servicing, as well as nature conservation
- *Special Urban Planning Law (Besonderes Städtebaurecht)*, including urban rehabilitation, urban development and renewal programmes, the preservation of physical structures, and character of neighbourhoods, and urban-development enforcement orders
- *Other Provisions (Sonstige Vorschriften),* regulating vaulaution, compentencies, administrative procedures and planning safeguards, amongst others
- *Transitional and Concluding Provisions (Überleitungs- und Schlussvorschriften)*

Another regulation, the *German Land Use Ordinance (BauNVO)* builds upon BauGB, and further determines land use and zoning categories. It outlines the possibilities in zoning for municipal authorities, and includes definitions and various uses of land. Furthermore, *BauNVO* regulates maximum densities, building heights, and site occupancy indexes.[3]

Figure 02: Potential development and implementation process of an ISEK (Source: BMU from Schulten Stadt- und Raumentwicklung, 2016, adapted by BuroHappold)

1 Baugesetzbuch (BauGB). Source: https://www.gesetze-im-internet.de/bbaug/inhalts_bersicht.html
2 BMI (2018): Städtebaurecht (Bauplanungsrecht). Source: https://www.bmi.bund.de/DE/themen/bauen-wohnen/stadt-wohnen/staedtebaurecht/staedtebaurecht-artikel.html
3 Verordnung über die bauliche Nutzung der Grundstücke (Baunutzungsverordnung – BauNVO).

2.2 INTEGRATED URBAN DEVELOPMENT CONCEPTS (ISEK)

Implementation of urban development planning, notably urban renewal projects, can quickly strain limited budgetary frameworks of municipal authorities. Thus, the German Federal Government introduced several subsidy schemes, to support urban development processes, which are described in the subsequent chapter. As a prerequisite to secure funding from the subsidy programmes targeting urban development, *Integrated Urban Development Concepts (ISEKs)* are to be developed by municipalities.

ISEKs are a planning instrument for the creation of concrete, long-term strategies addressing challenges in urban development, as well as functional, cultural, socio-economic and spatial deficits. ISEKs define specific development targets and timeframes, connect stakeholders and include public participation in the planning process. An ISEK focuses on a well-defined area, neighbourhood or district, and corresponds to superordinate planning levels. Moreover, ISEKs aim for participation of all relevant stakeholders and the public. Subsequently, ISEKs are implemented by municipalities, and subsequently gradually updated throughout the process.[4]

As municipalities are confronted with a broad variety of challenges, design and implementation process of ISEKs differ from case to case. Nonetheless, a typical planning process of an ISEK starts with analysis of the existing urban fabric, considering different uses (e.g. lack of housing, commercial spaces, etc.) socio-economic aspects, or urban mobility. Findings are then assessed in a SWOT-analysis. Subsequently, strategic goals and the specific planning area are outlined, and current concepts and other projects considered. Furthermore, additional finance for measures envisaged is secured, and budgetary plans are developed. Eventually, detailed project proposals, as well as implementation and controlling concepts are drawn up. For successful implementation, participation of relevant stakeholders and the public should be envisaged throughout the whole process.

ISEKs are usually executed over a timeframe of several years. Realisation of a strategy is often carried out throughout a decade, after which it is again redefined. During implementation, high commitment of all involved stakeholders is required. Realisation of specific projects in many cases needs additional detailed planning. Furthermore, progress of the projects is monitored and continuously reassessed. Collected quantitative data is analysed, and findings interpreted. If necessary, the ISEK is subsequently adapted, and further steps planned.[5]

2.3 PUBLIC-PRIVATE-PARTNERSHIPS THROUGH URBAN DEVELOPMENT CONTRACTS

Another important regulatory instrument in transformative cities are *Urban Development Contracts (Städtebauliche Verträge),* regulated by § 11 BauGB. With this form of *public-private-partnership (PPP),* municipalities are able to cooperate with private developers and to include binding (financial) commitments as a precondition for project realisation.

Urban Development Contracts are a tool to integrate private developers in the process of urban land use planning and assign them several tasks, which usually would be carried out by municipalities. This includes establishment of basic infrastructure (e.g. water and sewer systems), soil decontamination and other measures preceding a construction process. Other potential commitments regulated through an Urban Development Contract are specifications for land use, e.g. setting of time limits for temporary uses, or compensatory measures. This includes, for example, the integration of affordable housing units in residential developments. In addition, specifications on the energy performance of the respective construction project can be outlined, or measures regarding renewable energy generation incorporated.[6]

Subnational governments and municipalities further develop legislation and preconditions for PPPs. For example, in 2014, the City of Berlin introduced a guideline called "*Berlin Model for cooperative development of construction land*". For Urban Development Contracts in Berlin, consideration of the *Berlin Model* is mandatory for large-scale housing developments. The Berlin Model requires that project developers cover costs for technical, social and green infrastructure. It includes a standardised process framework, to assess if obligations for developers are adequate, aiming to ensure transparency and predictability of costs. Furthermore, considering tight conditions on the (affordable) housing market, the Berlin Model integrates a quota for low-cost housing. Of the total established residential floor area, a share of 30 % needs to be dedicated for affordable housing units. The guideline is gradually updated to react towards arising issues in the city's development. [7]

4 BMU (2016): Integrierte städtebauliche Entwicklungskonzepte in der Städtebauförderung. Berlin. Source: https://www.staedtebaufoerderung.info/StBauF/SharedDocs/Publikationen/StBauF/Arbeitshilfe_ISEK.pdf?__blob=publicationFile&v=5

5 BMU (2016): Integrierte städtebauliche Entwicklungskonzepte in der Städtebauförderung.

6 BauGB § 11 (1)f.

7 Senatsverwaltung für Stadtentwicklung und Wohnen, Berlin (2018): Berliner Modell der kooperativen Baulandentwicklung. Source: https://www.stadtentwicklung.berlin.de/wohnen/wohnungsbau/download/vertraege/modell_baulandentwicklung.pdf

2.4 INTER-MUNICIPAL COOPERATION OF SMALL AND MEDIUM SIZED CITIES AND TOWNS

Small and medium sized cities and towns in transitioning regions are often confronted with tight municipal budgets, when implementing development plans, innovative strategies, or new infrastructure. Here, the formation networks to cooperate between individual towns within regions holds potential to realise projects and stem investments together, which would be too cost-intensive for a single municipal authority.

So-called *inter-municipal cooperation* allows for utilisation of a broad range of organisational forms within diverse regulatory frameworks. Guiding principles are required to define a common organisational basis and delegate responsibilities and competencies between individual stakeholders. Organisational forms are regulated either through formal or informal modes of cooperation. Formal cooperation is regulated by existing legislative frameworks and binding contracts between the cooperating municipalities. This includes a high level of liability for the participating parties. On the other hand, informal cooperation emerges without legally binding contracts. Such cooperation is easier adapted with changing thematic focus and interest of the individual entities. In many cases, inter-municipal cooperation is carried out in a mixed form of both approaches. Initially, they often start informally, benefiting of increased flexibility. Over time, the mode of formalisation gradually increases between the participating parties, with sharpening of responsibilities on individual duties.[8]

Legal basis for cooperation between two or several cities or towns builds Germany's *Act for Municipal Self-Administration*, as outlined in Germany's Constitution. The law outlines self-governance and responsibilities of municipalities. It includes a framework and boundaries for modes cooperation with other municipal authorities. The act requires that inter-municipal cooperation is an exception, rather than standard practice to fulfil individual municipal duties (e.g. provision of infrastructure). Other regulations for cooperation are defined on subnational level. Frameworks differ between individual states. Here, most important regulations are outlined in communal bylaws, other legislation regarding financial compensation and policy, and additional acts on collaboration of municipalities. While legislation on the Federal level offers a broad range of possibilities, in many cases, subnational legal frameworks define the possible extent of cooperation, and appropriate modes of organisation. [9] Inter-municipal cooperation is supported by one of the Federal urban renewal schemes, the *Smaller Towns and Municipalities Programme*, described in detail in the subsequent chapter.

For example, a cooperation called *"Mittelbereich Seelow - Oderlandregion"* between six small municipalities in the state of Brandenburg, was established in 2006 and has since been implementing comprehensive development strategies and projects for the region. It started as an informal exchange of experience on administrative level, which resulted in a cooperation agreement between the municipalities in 2011. Comprehensive strategies for the region were developed, and supported by funds of the Federal Smaller Towns and Municipalities Programme. Concrete projects include the redevelopment of a school's courtyard with combined funds, an intercommunal hazard planning concept regarding fire safety, modernisation of a child day care centre, and new buildings for a local fire brigade. [10]

8 BBSR, BMU (2018): Interkommunale Kooperation in der Städtebauförderung.
9 BBSR, BMU (2018): Interkommunale Kooperation in der Städtebauförderung.
10 BBSR, BMU (2018): Interkommunale Kooperation in der Städtebauförderung.

3. FINANCIAL INCENTIVES AND SUBSIDIES

In Germany, a number of Federal programmes provide financial assistance regarding the challenges of demographic and structural change, enhancement of socio-economically disadvantaged regions, improvement of green infrastructure and open spaces, as well as energy performance in the building sector. In addition, renewal schemes provide a basis for improvement of citizen's quality of life, strengthening of communities, while including measures regarding climate mitigation and adaptation.

3.1 URBAN DEVELOPMENT SCHEMES OF THE FEDERAL GOVERNMENT OF GERMANY

For urban rehabilitation, the Federal government provides a number of programmes with different thematic focus financially supporting municipalities with grants. Federal law regulates possible scope and the process guidelines for urban development schemes through BauGB. For implementation, budgetary responsibility is shared between Germany's Federal Government and the 16 subnational governments (state governments). To receive financial assistance by a scheme, as a precondition, municipalities are required to develop ISEKs (see above).

Every year, *Administrative Agreements on Urban Development (Verwaltungsvereinbarung Städtebau)* are negotiated and agreed upon between the Federal Government and state governments. Those annual Administrative Agreements define the exact amount of financial assistance as well as thematic focal points and target sectors. In recent years, funds for urban reconstruction have been gradually increased. For the funding period of 2017, the Federal Government dedicated 740 million Euro for urban development schemes, several of which are described below.[1]

3.1.1 Urban Reconstruction Programme

The *Urban Reconstruction Programme (Stadtumbauprogramm)* targets the physical renovation of urban cores and is a reaction to challenges concerning demographic as well as structural changes. When first implemented in 2002, two individual programmes specifically targeting urban reconstruction projects in Eastern and Western parts of Germany were established, considering regional characteristics, for example, supporting demolition of vacant housing units. The importance of urban renewal was emphasised through integration of urban rehabilitation into BauGB. The schemes were evaluated in 2016 and proved highly successful. As a result, they were merged and continued as a single Urban Reconstruction Programme in 2017.[2]

The Urban Reconstruction Programme integrates several approaches for refurbishment. It targets upgrading of inner city districts, brownfield revitalisations, refurbishment of infrastructure and residential areas, and enhancement of energy performance and reduction of carbon emissions. Furthermore, it supports integration of green spaces and parks into the existing urban fabric. Moreover, the scheme aims to strengthen inner developments of cities, prior to expanding towards the urban boundaries or greenfield developments.

While population numbers of some cities, predominately of cities in Eastern Germany, are projected to continue to shrink, a number of cities in Western parts of Germany are experiencing progressive

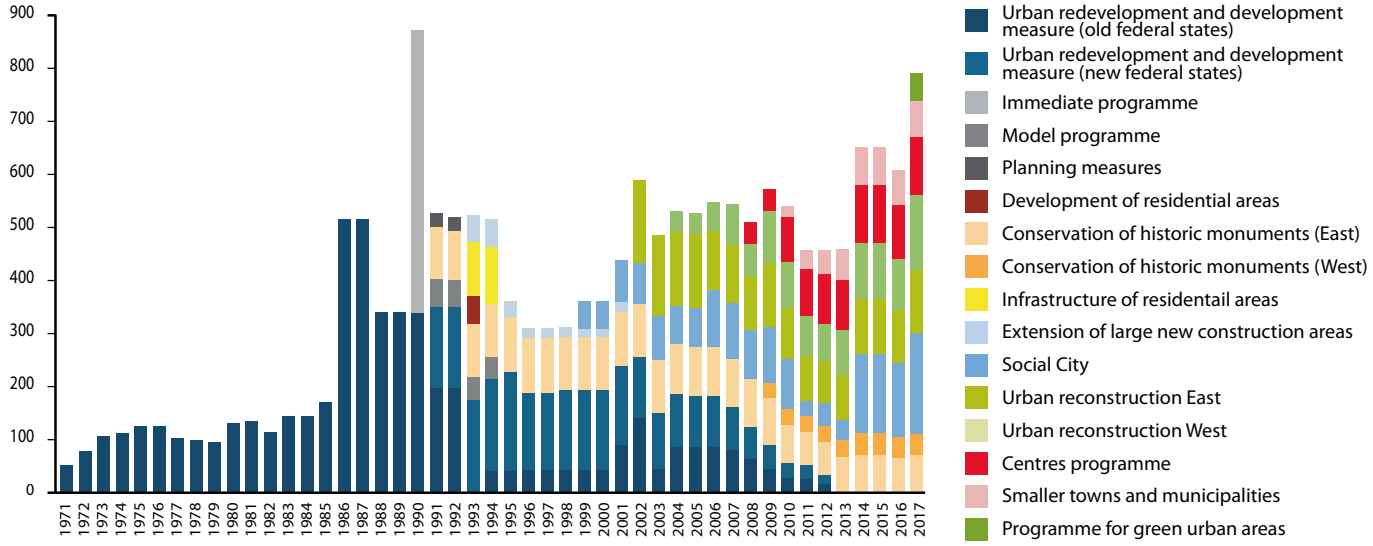


Figure 03: **Financial assistance as concluded in Administrative Agreements on urban renewal programmes from 1971 to 2017 in million Euro (BBSR, 2017, adapted by BuroHappold)**

1 Verwaltungsvereinbarung Städtebauförderung 2017 (VV Städtebauförderung 2017).
2 BBSR, BMU (2017): Gemeinsame Evaluierung der Programme Stadtumbau Ost und Stadtumbau West. Bonn / Berlin. Source: https://www.bbsr.bund.de/BBSR/DE/Veroeffentlichungen/Sonderveroeffentlichungen/2017/evaluierung-stadtumbau-ost-west-dl.pdf?__blob=publicationFile&v=3

growth. Hence, the programme takes into account the specific circumstances of cities and towns located in both geographical regions. Especially in Eastern parts of Germany, the Urban Reconstruction Programme continues financial support schemes established in the previous programme period. In 2017, 260 million Euro were dedicated for the programme, supporting 1081 municipalities. Every year, its budget is increased by 50 million Euro. Municipalities are required to be implemented the funds in a five-year timeframe, after initial approval. [3]

3.1.2 Socially Integrative City Programme

The *Social City Programme (Soziale Stadt)* aims to rehabilitate and improve socio-economically disadvantaged neighbourhoods in cities and towns. It combines investments on physical infrastructure with measures targeting social cohesion and community life. Since recent years, the programme also targets facilities supporting refugees. For project implementation, the Federal Government finances a third of the total cost. The remaining amount is to be allocated by subnational and municipal governments.[4]

In practice, the programme financially assists the construction and refurbishment of community centres, public spaces and dedicated social infrastructure. Furthermore, it encourages formation of stakeholder networks and pooling of instruments to strengthen communities. Here, an important pillar of the scheme forms participation of residents and all involved parties, such as NGOs, associations, or local enterprises.

As a precondition, municipalities are required to develop an ISEK, including and potentials of the respective neighbourhood. Here, it is essential to consider participation of local public stakeholders in the process. Moreover, projects need to be located in a distinctly outlined area. The implementation process is then coordinated by a local neighbourhood management facility. In addition, the facility forms the contact point for public and other involved stakeholders. After realisation, projects are evaluated and monitored. Findings are analysed and considered in development of other projects.[5] Since introduction of the programme in 1999, around 1.7 billion Euro were subsidised by the Federal Government. Roughly 900 neighbourhoods in more than 500 municipalities have profited through the scheme.[6]

3.1.3 Programme for Green Urban Areas

In 2017, the *Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU)* introduced the *Programme for Green Urban Areas (Zukunft Stadtgrün)*. The programme is a new component of the Federal Government's urban development schemes, to foster an increase of green spaces in cities and towns. It dedicates funds towards establishment of new, as well as improvement of existing green infrastructure and parks in urban areas. By that, it aims to increase quality of life for residents, enhance urban microclimate and ecological aspects, and integrate biodiversity and natural environments within cities.[7] In the Administrative Agreement of 2017, 50 million Euro were dedicated for the scheme.[8]

The programme aims to implement measures for green spaces into urban development plans. Projects target enhancement of public places, infrastructure of residential areas, extension and modernisation of buildings, by urban greenery. Furthermore, the scheme aims to link individual park areas and form networks of green and public spaces throughout cities, improving urban resilience and microclimate. Another component of the programme includes restructuring of brownfields through temporary or permanent establishment of park infrastructure.[9]

The Federal government intends to further strengthen the role of green urban structures within the framework of the existing renewal programmes and recently published the *Master Plan for Urban Nature (Draft) (Masterplan Stadtnatur)*. It includes a number of measures to raise awareness of the importance of biodiversity and nature within cities. For instance, to implement measures regarding conservation of biological diversity and green and open spaces intensively, the importance of green infrastructure is planned to be anchored in the BauGB. In addition, the Federal government aims to establish the lack of green and open spaces as an additional criterion to access funds of other urban renewal programmes, such as Urban reconstruction or Social City. By that, the role of green areas in cities is strengthened as an important part of public infrastructure. Shortage of green recreational areas in the vicinity of neighbourhoods, would thus be also defined as a so-called "urban development deficiency", increasing accessibility of funds for municipalities regarding such matters.[10]

3.1.4 Smaller Towns and Municipalities Programme

The *Smaller Towns and Municipalities Programme (Kleinere Städte und Gemeinden)* focuses on small and medium sized towns and cities. The programme supports municipal governments to react proactively towards structural, demographic and economic changes. Especially municipalities experiencing shrinking population numbers in economically underdeveloped regions are

3 BMI (2018): Städtebauförderung - Programm Stadtumbau. Source: https://www.staedtebaufoerderung.info/StBauF/DE/Programm/Stadtumbau/stadtumbau_node.html.
4 BMI (2018): Programm Soziale Stadt. Source: https://www.staedtebaufoerderung.info/StBauF/DE/Programm/SozialeStadt/Programm/programm_node.html
5 BauGB.
6 BMI (2018): Programm Soziale Stadt.
7 Ergänzende Verwaltungsvereinbarung Städtebauförderung 2017 (ErgVV Städtebauförderung 2017).
8 BMU (2017): Bundesbauministerium fördert „Zukunft Stadtgrün". Pressemitteilung Nr. 127/17. Source: https://www.bmu.de/pressemitteilung/bundesbauministerium-foerdert-zukunft-stadtgruen/
9 ErgVV Städtebauförderung 2017.
10 BMU (2018): Entwurf – Masterplan Stadtnatur. Maßnahmenprogramm der Bundesregierung für eine lebendige Stadt. Source: https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Naturschutz/masterplan_stadtnatur_entwurf_bf.pdf

targeted. In addition, it aims to reinforce the role of specific cities as regional centres, supporting their supply function in terms of administration and liveability. Furthermore, inter-municipal cooperation between individual towns is encouraged by the scheme. By that, networks are established and financial resources pooled, to develop infrastructure, public transportation projects or concepts for tourism and marketing together.[11] For the funding period of 2017, the Federal Government provided 70 million Euro for the programme.[12]

The scheme supports establishment of integrated, inter-municipal development concepts. Here, demand and supply for infrastructure is assessed, under consideration of local citizens and relevant public entities. Furthermore, potential rehabilitation of specific infrastructure is assessed upon long-term perspective and capacity. Based on the integrated development concept, project realisation is financially supported by means of the programme. For example, public and social facilities are refurbished, vacant buildings modified and reused for other purposes, or (re) development of town centres encouraged. In addition, the programme supports establishment of green areas and public spaces.[13]

3.2 ADDITIONAL PROGRAMMES SUPPORTING TRANSFORMATIVE PROCESSES IN CITIES

Effectivity of programmes supporting urban transformation is reinforced by harnessing synergies between individual financial schemes. Programmes issued by Federal, subnational, municipal institutions, as well as funds from the EU (e.g. *European Regional Development Fund (ERDF), European Social Fund (ESF)*) can get bundled together. Furthermore, private investments can get integrated in project finance. Especially for inter-municipal cooperation, combination of funds can result in an increased scope for transformative measures, reducing funds of individual municipal budgets.[14], [15]

Besides the urban development schemes presented above, the Federal Government offers additional programmes targeting urban transformation. Those supporting urban renewal under consideration of energy performance of buildings and districts, are routed through *Kreditanstalt für Wiederaufbau (KfW),* Germany's government-owned development bank. For instance, KfW's own *Energy-efficient Urban Refurbishment Programme (Energetische Stadtsanierung)* issues grants to municipal governments for measures improving overall energy performance of districts. Municipalities are supported in development of integrated refurbishment concepts for neighbourhoods, targeting enhancement of energy performance of buildings, creating synergies with other infrastructure (e.g. biogas plants, water and wastewater management, etc.). Through holistic approaches in urban neighbourhoods, economies of scale are generated and energy efficiency implemented exhaustively. In addition, KfW offers a wide range of grant and loan schemes to be combined with each other. For example, KfW provides individual programmes targeting new construction and refurbishment of residential and commercial buildings, or enhancement of district energy supply systems, complementing funds of the Energy-efficient Urban Refurbishment Programme.

11 BBSR, BMU (2018): Interkommunale Kooperation in der Städtebauförderung. Bonn.
12 VV Städtebauförderung 2017.
13 BMI (2018): Kleinere Städte und Gemeinden – Finanzierung. Source: https://www.staedtebaufoerderung.info/StBauF/DE/Programm/StaedteGemeinden/Programm/Finanzierung/finanzierung_node.html
14 BBSR, BMU (2018): Interkommunale Kooperation in der Städtebauförderung.
15 BBSR, BMU (2016): Gemeinsame Evaluierung der Programme Stadtumbau Ost und Stadtumbau West.

4. BEST PRACTICE CASE STUDY

4.1 TRANSFORMATION OF ZOLLVEREIN COAL MINE COMPLEX, ESSEN

Figure 03: Zollverein Coal Mine Complex, Essen © Avda

The *Zollverein Coal Mine* located in Essen / Ruhrgebiet, was one of the world´s largest and most efficient coal mines between end of the 19th to the begin of the 20th century. The industrial complex was completely renovated after World War I for increased output in order to help with Germany's post-war rebuilding. During renovation and expansion in the 1930s, the architects Fritz Schupp and Martin Kremmer took an innovative approach designing the new shaft ("Shaft 12"), and planned the facilities in the architectural style called *New Objectivity*. The new cube-like buildings with their red brick walls and steel trelliswork set the style for industrial architecture in the Ruhrgebiet, due to their functionality and aesthetics. As a result, the implemented designs are considered as a masterpiece of modernism. . After World War II, however, an energy shift from coal to oil resulted to a gradual decrease on demand for coal, which finally caused the closure of the Zollverein mine in 1986 and of the coking plant in 1993.[1]

Right after the closure of the mine the state of North Rhine-Westphalia bought the site and declared the "Shaft 12" a heritage site, which comes along with the obligation of preserving the site in its original estate. The state also bought the remaining coking plant after its closure in 1993 and set it as a future exhibition site, becoming an official heritage site after some renovations in 2001. In the same year, the Zollverein Coal Mine and the Coking Plant were officially included in the UNESCO World Heritage List as the *Zollverein Coal Mine Industrial Complex*. The Zollverein Facilities embody the aesthetic, social, economic, and industrial history of the Ruhrgebiet.

Since closure, the facilities have been successively renovated and redeveloped for different new uses. The *International Architecture Exhibition (IBA) Emscher Park*, from 1989 to 1999 was the starting point for continuous transformation of the whole region, where Zollverein is located. During IBA, former industrial sites were rehabilitated to landmarks, landscape parks and declared nature reserves, new cultural and educational facilities created, and the "Emscher Park" was established, forming a regional park network of more than 450 km², spreading over 20 cities. A new form of "industrial nature" was created through the strategy. The development of the park network continued after IBA in a subsequent master plan, which has been gradually updated since. For the transition of the region, more than 40 different subsidy programmes were regrouped and combined.[2]

Zollverein Coal Mine is one project of the Emscher Park strategy. The master plan from 2002, developed by Rem Koolhaas / Office for Metropolitan Architecture, set the framework for the subsequent transition process of the mine. Between existing structures and new ideas, the unique industrial architecture was preserved and redeveloped at the same time, to meet today's requirements.[3]

The industrial complex of Zollverein constitutes about 100 hectares. With approximately 1.5 million visitors per year, the Zollverein UNESCO World Heritage Site has become the region's leading tourist attraction. Attractions include visits to the original facilities, which that have been preserved in their original state, permanent and temporary exhibitions in museums, a design museum, as well as cultural events and concerts. The former extraction and compressor hall at the coking plant was transformed into an event space, with a capacity of up to 2,500 people. Some facilities have also being been developed into a

1 ERIH (2018): Zollverein Mine and Coking Plant World Heritage Site. Source: https://www.erih.net/i-want-to-go-there/site/show/Sites/zollverein-mine-and-coking-plant-world-heritage-site/
2 IBA (2018): 1989 – 1999 IBA Emscher Park. A future for an industrial region. Source: https://www.open-iba.de/en/geschichte/1989-1999-iba-emscher-park/
3 Stiftung Zollverein (2018): Der Standort Zollverein. Erhalt durch Umnutzung. Source: https://www.zollverein.de/ueber-zollverein/aktuelle-entwicklung/

business hub, including art studios and companies of the creative industry. Currently, several areas throughout the site are being turned into start-up business incubators. In addition, the design faculty of the *Folkwang University of the Arts* is located on the site, with further educational facilities inaugurated in 2017.[4]
A study conducted by BuroHappold on the Zollverein Complex of 2013 assessed the ecological, economical, socio-cultural / functional, technical, process and site quality according to the sustainability criteria of the *German Sustainable Building Council (DGNB)*. Measures regarding utilisation of excess heat of pumps, innovative cooling systems, establishment of a thermal insulation system, amongst others, reduced the CO_2 emissions of the complex from 0,175 tons per m^2a to 0,011 tons per m^2a.[5]

4 Stiftung Zollverein (2018): The UNESCO World Heritage Site Zollverein. Press Release. Source: https://www.zollverein.de/app/uploads/2018/06/180601_Basic_Press_Release_Summary.pdf
5 Happold Ingenieurbüro GmbH (2013): Gutachten zur energetischen Gebäudesanierung. Beispielsammlung großer Altbauten. Berlin.

4.2 LEIPZIG 2020 AND LEIPZIG 2030 PLAN

Figure 02: City of Leipzig © Leipzig-Hauptbahnhof Webster

The City of Leipzig experienced severe structural and demographic changes subsequent to Reunification of Eastern and Western Germany in 1990. Located in the Eastern part of Germany, Leipzig and its surroundings were a hub for industrial production of chemicals. After Reunification, loss of employment opportunities in industrial production, accompanied by a decline of the city's economic status led to a drastic reduction in population numbers. Many companies leaving the city, and an inadequate housing stock, intensified migration. From around 530,000 residents in 1989, the number of residents dropped to around 440,000 until end of 1998.[1]

Acknowledging the challenges, in the mid-1990s the City of Leipzig started to increase its efforts towards strategic urban development planning. By the 2000s, large-scale strategies were complemented by small-scale projects regarding development potentials during shrinking processes. Sectoral action plans were established, and their progress continuously monitored and adapted. For instance, the existing building stock was refurbished on a large-scale, and the inner city districts structurally enhanced through reestablishment of economic, social and cultural infrastructure. Furthermore, relocation of automotive industry to Leipzig strengthened the city's economy.

In 2009, Leipzig's municipal council passed the Integrated City Development Concept (SEKo), or Leipzig 2020 Plan, including findings from public consultations, adapted to the constantly changing requirements of the city. SEKo builds the foundation of an application for Federal subsidy (see ISEK above). The measures of the development concept derive from socio-demographic analysis, which resulted in a variety of focal areas. These areas of action include housing, economy and employment, green spaces and the environment, education, civil society, culture, city centres, traffic and technical infrastructure, historic preservation, sport, as well as higher education and research institutions.

Individual plans were created for all focal areas, with each of them aligned to work in parallel to the other plans in an overall comprehensive concept. For example, in some parts of Leipzig, while the regeneration of the housing stock was the focal area of action, the implemented measures did not target only the residential sector but also took economic development strategies and the improvement of recreational facilities into account. The approach to coordinate and integrate the different sectoral plans amongst each other was a shift away from planning in isolated vertical silos and derived from the provisions of the EU's Leipzig Charter on Sustainable Urban Development from 2007.[2]

The SEKo was revised again in 2018 and eventually replaced by the current Leipzig 2030 Plan. With Leipzig being one of the fastest growing cities with more than 10,000 new residents per year, the former development concept required adaptions to react accordingly to those challenges. The new plan prioritises developments in the existing urban fabric, before greenfield developments in the urban fringes. In addition, it aims for mixed-use structures as well as a mix in the socio-economic backgrounds of residents throughout the city.[3]

1 City of Leipzig (2009): Leipzig 2020 – Integriertes Stadtentwicklungskonzept (SEKo). Source: https://www.leipzig.de/fileadmin/mediendatenbank/leipzig-de/Stadt/02.6_Dez6_Stadtentwicklung_Bau/61_Stadtplanungsamt/Stadtentwicklung/Stadtentwicklungskonzept/SEKo_Pdfs/SEKo_BlaueReihe_50_Web.pdf

2 City of Leipzig (2018): Leipzig 2020. Integrated Urban Development Concept. Source: https://english.leipzig.de/construction-and-residence/urban-development/leipzig-2020-integrated-city-development-concept-seko/

3 City of Leipzig (2018): Leipzig 2030. Integriertes Stadtentwicklungskonzept Leipzig 2030. Source: https://www.leipzig.de/bauen-und-wohnen/stadtentwicklung/stadtentwicklungskonzept-insek/

CASE STUDY

4.3 INTEGRATED URBAN RENEWAL IN THE BOTTROP, RUHRGEBIET

Figure 04: Integrated Urban Renewal in the Bottrop, Ruhrgebiet © x1klima

The urban rehabilitation in the industrial city of Bottrop was established as pilot project of the *InnovationCity Ruhr*, a programme looking for ideas and solutions for sustainable urban renewal in industrial metropolitan areas in Germany and worldwide. The purpose of the project was to promote climate-resilient urban transformation under the vision of a *"Blue Sky. Green City."*,, while maintaining the industrial activities in the area. The paradigm of a "blue sky" subsumes the city's ambition for climate mitigation, to reduce 50% of its CO_2 emissions by 2020. "Green city" highlights the objective to equally increase liveability for the city's residents, through dedicated integration of green infrastructure.[1]

Core of the project forms the master plan, setting goals for urban renewal of the city and its 70,000 residents. The plan consists of several strategies and concrete projects that can be gradually implemented in a period of eight years. It includes actions and solutions in the sectors of housing, employment, energy, and transportation. A consortium of four engineering, planning and consulting offices (Albert Speer und Partner GmbH, Frankfurt; Büro Drecker, Bottrop; conlab, Düsseldorf; Gertec, Essen) developed the master plan and specific actions. In addition, Bottrop's citizens were included in the process, and encouraged to propose ideas, participate in workshops and information campaigns.

The development strategy includes solutions for stakeholders at different levels: public administration, politics, businesses, associations and citizens. It gives concrete proposals on how citizens can contribute towards environmental protection. Furthermore, this includes ideas and advice on energy savings, increasing thermal performance through renovation of buildings, how to receive financial support as well as suggestions on behavioural changes to reduce energy consumption. A total of 300 concrete projects and measures were established and integrated in the master plan's implementation programme. It includes projects for energy saving, exchange of outdated heating systems and energy management consultancy services, as well as implementation of new mobility concepts in the city centre. New technologies tested in Bottrop strengthen the local economy and makes the city attractive for the development of environmental technologies.[2]

Throughout Bottrop's development plan, every concrete measures regarding climate mitigation and adaptation aims to generate added value for local residents, enhancing quality of life in the city. In dense inner city districts, for example, the strategy aims to reduce the amount of sealed surfaces and increase the share of green spaces. Simultaneously, they function as accessible, local recreational areas for adjacent neighbourhoods, while regulating temperature, enhancing the natural water cycle, and providing natural habitats for flora and fauna.

A review after the first five years of development and implementation of the master plan showed that a reduction of around 100,000 tons of CO_2 emissions, about 38 % compared to 2010, will be achieved until 2020. The improvement of thermal performance and renovation of residential buildings, combined with the energy consultancy services offered for citizens, and additional information events concerning environmentally friendly behaviour, constituted an important contribution to successful implementation and GHG mitigation.[3]

1 IC Ruhr (2018): Modellstadt Bottrop. Wir machen Klimaschutz. Source: http://www.icruhr.de/index.php?id=277
2 IC Ruhr (2014): Masterplan Klimagerechter Stadtumbau für die InnovationCity Ruhr. Modellstadt Bottrop. Bottrop.
3 IC Ruhr (2015): Halbzeitbilanz der InnovationCity Ruhr. Pressemitteilung. Source: http://www.icruhr.de/index.php?id=181&L=0&tx_ttnews%5Btt_news%5D=228&cHash=a6053c921260161c4637d3d3dd10fb01

5. EMERGING TRENDS

5.1 REINDUSTRIALISATION OF URBAN AREAS - SMART MANUFACTURING IN THE POST-FOSSIL CITY

After Reunification of East and Western Germany in 1990, development of German cities was strongly influenced by a **shift from industrial production towards a service-oriented economy**. Many cities and regions were affected by loss of heavy industry and not able to react accordingly in short timeframes. Post-industrial cities of today, still are affected in their economic performance, loss of population, and structural changes of their urban fabric.

Traditional industrial production and heavy industry of the 19th and 20th century mostly relied on fossil energy sources. This led to industrial areas being located mostly in urban fringes, to avoid pollution in inner city districts. Recent technological innovations regarding manufacturing processes and new forms of industrial production reduce pollution from particle matter as well as noise levels significantly. The concept of "Industry 4.0", integrates flexible, smart modes of fabrication, with smart, interconnected devices. On-demand production, combined with data analysis to enhance efficiency of production cycles, further reshapes traditional forms of mass production.[1]

Re-industrialisation of central urban areas allows for new forms of development, seizing the opportunities of the post-fossil city. New modes of industrial manufacturing develop synergies with its surroundings, enhancing energy performance of districts. For instance, excess heat from manufacturing processes can be used for decentralised district heating networks. With manufacturing processes formerly being primarily arranged horizontally, in dense urban environments, shifts into vertical forms of production should be considered. New forms of industrial architecture, and increased transparency visibility of production processes, can shape the visual appearance of the 21st century city. Furthermore, local production and consumption further decrease emissions, shortening transportation logistics and strengthening modes of circular economy.[2] In Germany, recent legislation targets such new forms of land use in inner city environments, as described below.

5.2 RE-MIXING CITY CENTRES – NEW LAND USE CATEGORY "URBAN AREAS"

In 2017, a new land use category called *Urban Areas (Urbane Gebiete)* was adopted by Germany's Federal Government. The category forms a turning point in Germany's BauNVO and urban land use planning. While the concept of the functionalist planning still dominated Germany's planning legislation, with *Urban Areas*, the approach of a *"compact city, local employment opportunities and a well-balanced socio-economic mix"*[3] comes into focus. This principle is also the guiding paradigm outlined in the Leipzig-Charta of 2007.

The new category was introduced to reduce tension on the housing market of cities with growing populations. With Urban Areas, development of new residential buildings and reuse of existing buildings for housing purposes becomes possible also in or close to industrial and commercial areas. Availability of construction land, which previously was not accessible for residential developments, is increased. Until recently, high requirements of German noise protection laws restricted construction of "incompatible uses" next to each other. This prime example of functionalist planning principles, limited residential developments close to noisy, industrial areas. To implement the Urban Areas category, therefore, requirements of Germany noise protection laws were equally adapted. Furthermore, technical innovations in industrial production continuously decrease noise and pollution levels. This creates the opportunity to integrate such functions closer to other uses within dense urban cores. Urban Areas therefore can be considered as a reaction towards reindustrialisation of cities, while overall enhancing possibilities for mixed-use developments in dense urban environments.

While a land-use category targeting *Mixed-Use Areas* (Mischgebiete) already existed, it lacked flexibility upon implementation. The proportion of different uses in the respective area requires to be balanced, in both quantity and (visual) quality. This renders planning according to the principle of a Compact city rather difficult, as innovative variants in functional mixes are not possible.[4] In contrast, **Urban Areas aims to create mixed-use neighbourhoods, including commercial and industrial uses, housing, social and cultural uses within short walking distances**. An equal balance between different uses is not mandatory. Hence, the requirements of in integrated, diverse mix of functions are taken into account, and traditional modes of strict functional zoning revised.

1 BMWi (2018): Plattform Industrie 4.0 – Was ist Industrie 4.0? Source: https://www.plattform-i40.de/I40/Navigation/DE/Industrie40/WasIndustrie40/was-ist-industrie-40.html
2 Läpple, Dieter (2016): Produktion zurück in die Stadt. Ein Plädoyer. In: Bauwelt, 35/2016. Berlin.
3 Deutscher Bundesrat (2017): Beschluss zu „Urbane Gebiete". Source: https://www.bundesrat.de/DE/plenum/bundesrat-kompakt/17/956/013a.html?view=main%5BDrucken%5D
4 Wienhues, S., Knickmeier, S. (2017): Von der "Charta von Athen" zur "Leipzig-Charta".

5.3 SUBSIDISED SHRINKING – GOVERNMENT PROGRAMMES SUPPORTING DISADVANTAGED REGIONS

Subsidy programmes of the Federal Government primarily target rehabilitation, or redevelopment of underused structures to increase attractiveness of shrinking cities. In addition, also subnational governments offer approaches to provide subsidies for deconstruction of underused facilities and buildings. By that, structural deficits are brought to a halt and potential environmental damages avoided.

For example, Sachsen's *Brownfield Clearing Programme (Landesbrachenprogramm)* provides subsidies for owners of underused buildings and facilities without need for rehabilitation of the original structures. The programme supports the whole demolition process. It aims to reduce structural shortcomings, potential sources of danger and adverse environmental effects, as well as avoiding devaluation of the whole area through dilapidated structures.[5]

Deconstruction of underused sites formerly used for industrial purposes, transportation hubs or military sites, results in oversupply of brownfields and, in many cases, contaminated areas. In dense urban cores, such areas would usually hold large potentials for redevelopment for construction land, open spaces or local recreational areas. In areas with low demand for construction land, such derelict sites are well-suited for development of innovative green infrastructure, or large, interconnected networks of natural green belts.

5.4 ENHANCING GREEN INFRASTRUCTURE - IMPLICATIONS FOR URBAN TRANSITION

Green infrastructure in urban areas enhances quality of life in cities on several levels, by addressing ecological, economic and social challenges at the same time. They enable a broad spectrum of activities for urban citizens, functioning as meeting places, recreational, playground and sport facilities. They increase liveability in dense environments, enhancing quality of urban neighbourhoods. By that, they are supporting citizens' well-being and health. They also function as natural habitats for flora and fauna, such as birds and insects. Simultaneously, green spaces and vegetation also fulfils an important role increasing resilience of cities, regarding risks of a changing climate, and urban ecology. Urban green areas are therefore crucial regarding regulation of microclimate, provision of fresh air, water conservation and prevention of stormwater.[6] Urban green reduces the risk of heat island effects, and provides natural drainage areas during intense rainfalls. In many cases, establishment of nature-based, multifunctional infrastructure can be more cost-efficient than technical solutions. For instance, establishment of a network of green spaces functioning as natural drainage areas could be considered instead of establishment of artificial retention basins.[7, 8]

Several initiatives of the Federal government, including the *Programme for Green Urban Areas*, BMU's *White Paper on Green Spaces in the City*, as well as the recent *Master Plan for Urban Nature (Draft)* highlighted the role of green infrastructure in the context of urban development in Germany. The Federal Master Plan contains a number of measures to reposition urban green in processes of urban transition. For instance, regarding municipal administrations, greenery and vegetation is considered to become part of the *provision of essential public services (Daseinsvorsorge)*. Furthermore, the plan aims to integrate and highlight the importance of green infrastructure and biodiversity in statutory urban development law (BauGB), enhancing municipal landscape planning within the *Federal Nature Conservation Act*.

5 Sächsische Aufbaubank – Förderbank (2018): Brachenberäumung (Landesbrachenprogramm). Source: https://www.sab.sachsen.de/f%C3%B6rderprogramme/sie-planen-kommunale-investitionen/brachenber%C3%A4umung-%28landesbrachenprogramm%29.jsp?cookieMSG=allowed

6 BMU (2018): White Paper: Green Spaces in the City. Source: https://www.bmi.bund.de/SharedDocs/downloads/DE/publikationen/themen/bauen/wohnen/weissbuch-stadtgruen-en.pdf?__blob=publicationFile&v=4

7 Grunewald, Karsten, Kümper-Schlake, Lennart, et al. (2016): Policy Brief – Towards Green Cities in China and Germany. Source: https://www.ioer.de/fileadmin/internet/IOER_Forschung/FB_L/PDF/PolicyBrief_Grunewald2016_en_final__UA_x1.pdf

8 BMU (2018): Entwurf – Masterplan Stadtnatur. Maßnahmenprogramm der Bundesregierung für eine lebendige Stadt.

6. DISCUSSION

Globally, increased dynamics of change in urban environments are considered as one of the central challenges of the 21st century. Decline of traditional heavy industry in some regions, and transition towards a service-oriented economy, affects areas both in Western and Eastern parts of Germany. This concerns both physical structures, as well as demography. While many German cities experience stagnating population numbers, several large and medium sized cities are confronted with a swift influx of new residents. For shrinking, as well as for growing cities and towns, this poses fundamental challenges regarding housing, future economic perspectives and infrastructure.

Germany's Federal Government is aware of the issues posed by demographic and structural change and provides a strong supportive framework consisting of statutory guidelines for planning, as well as targeted subsidies on urban renewal. Since beginning of the 2000s, financial assistance is issued to assist transforming municipalities. Recently, funds have been gradually increased, to tackle the intensifying dynamics. The outline on subsidy schemes are also included in Germany's planning framework.

For German municipalities, Federal urban renewal schemes are thus a main tool to steer and shape urban transition. While enhancing the built environment through measures in urban design and urban renewal, at the same time, the programmes also include "soft" measures targeting projects enhancing communities and social facilities. With one of the most recent subsidy programmes specifically targeting urban green, the Federal Government supports the redevelopment of existing and new infrastructure, focusing on integration of green infrastructure. Besides providing urban residents with sufficient green and open spaces, by that, one of the central issues in urban transformation is targeted. With dense urban areas being increasingly affected by effects of a changing climate, by that, microclimates are enhanced, and soil-sealing avoided, reducing heat islands and allowing for natural drainage surfaces during rainfalls.

Shrinking and growing cities can make use of green infrastructure in a number of ways, each requiring different, tailored approaches. In urban areas experiencing growth, green infrastructure is often competing with the necessity of new construction land. Under the paradigm of inner city densification, in conversion of central brownfields to new uses, integration of green infrastructure must not be neglected. In contrast, in shrinking cities, underused brownfields and deconstruction of vacant settlements opens up new possibilities for interlinked park networks and natural habitats, as it has been shown with Emscher Park. In both cases, urban green infrastructure offers a toolbox of sustainable solutions, enhancing quality of urban environments on multiple levels.

Transformation processes in urban environments are also reflected in recent innovations of German planning legislation. Former planning principles were aiming for strictly segregated zoning, defining uses that were considered as not suitable to exist next to each other, such as industry, and housing. Paradigms of the compact city, as reflected in the EU's Leipzig Charta, are following a different approach, integrating a broad variety of uses in dense urban environments. Innovations in industrial production, reducing pollution as well as noise emissions, utilising renewable energy, call for reindustrialisation of city centres. This allows formerly "incompatible" uses to exist next to each other, also in case of high densities. The described new zoning category of Urban Areas therefore is a logical and progressive result of German urban development policy reacting to contemporary, technological and demographic shifts.

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