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# The integrated perspective of energy efficiency

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insar PartG



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Energy saving, energy efficiency and the use of renewable energies in the urban context are challenges that affect many different areas.

There is also no standard solution to this challenge.

In each place, the best possible bundle of measures must be created according to the resources, urban structures, competences and possibilities.

This is not only the task of the city government, but of all sectors of society, which should be addressed and involved.





French Quarter, conversion of former military baracks, Tübbingen, Germany

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Global Urbanisation < 50 % of world population lives in towns





#### **Urbanisation and Energy Consumption**

Cities consume approximately 70 % of global energy





Source: Data from IEA (2008)

#### Energy demand in cities will increase



#### **Urban Energy Consumption**



Energy Consumption per capita is very different World Wide





## Energy Consumption per capita is very different World Wide

## depending on

- location (climate)
- built floor per capita
- urban structures
- mobility system
- wealth and gross domestic product (GDP) per inhabitant





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To carry 50.000 people per hour per direction, you need: a 175m wide road used only per car Terrane a a 35m wide road used only per buses a 9m wide railway track bed for metro

Mobility system – individual traffic needs 20 times more space than metro transport systems



How far can I travel on 1 ton of CO<sub>2</sub>?

All values in passenger-kilometers (Pkm), reflecting a 100% occupation rate.

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All data given in this diagram should be considered as guideline values, as real values may differ considerably, depending on e.g. actual load factors, smoothness of traffic flow and technical standards of vehicles and infrastructure.

#### How far can I travel on one ton of CO<sub>2</sub>?



Transport-related energy consumption Gigajoules per capita per year

















#### THE KEY ELEMENTS OF THE PARIS AGREEMENT

A text with universal scope, adopted by 195 countries



**The aim:** to keep the increase in global average temperature to well below 2°C and to 1.5°C if possible.



The objective: to level off greenhouse gas emissions as soon as possible.



The principal: to differentiate between developed and developing countries. Developed countries must lead the way for reduction of emissions and support developing countries in implementing this. Other countries with the ability to do so may also contribute their support on a voluntary basis to achieve this target. The means: Countries must submit Intended Nationally Determined Contributions (INDCs) which are revised upwards every 5 years. The 1st report is due in 2023. North-South technology transfer.

The financing: from 2020, rich countries must contribute at least \$100 billion per year. This amount will be reviewed in 2025.

The new mechanism: loss and damage. Measures must be taken to avert, minimize and address the concrete effects of climate change, in order to help the most vulnerable countries.

Entry into force: 2020 if the Agreement is ratified by 55 countries accounting for 55% of global greenhouse gas emissions.









Redrawn by DNV GL from: Lemmen, D. (2016) UNFCCC Adaptation Committee: 3rd Adaptation Forum. Adaptation Futures 2016.

## The State of the Paris Agreement

Countries by their participation in the Paris Agreement (as of January 21, 2021)



\* On January 20, 2021, President Biden informed the UN Secretary-General of the United States' return to the agreement effective February 19, 2021. Source: UNFCC

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#### **Timeline for the Paris Agreement Ambition Mechanism**





# New Urban Agenda







### New Urban Agenda (2015)

## Classification:

The New Urban Agenda takes the goals of the Paris agreement and the 2030 Agenda for Sustainable Development into account. (6.)



# New Urban Agenda







## The shared vision

... includes cities, that "(g) Adopt and implement disaster risk reduction and management, reduce vulnerability, build resilience and responsiveness to natural and human-made hazards and foster mitigation of and adaptation to climate change;" (13.)



Signing countries commit to

"Ensure environmental sustainability by **promoting clean energy and sustainable use of land and resources in urban development,** by protecting ecosystems and biodiversity, including adopting healthy lifestyles in harmony with nature, **by promoting sustainable consumption and production patterns, by building urban resilience,** by reducing disaster risks and by mitigating and adapting to climate change." (14.c)

#### **Evaluation on National / Subnational / Local level**

Signing countries want to develop mechanisms and common frameworks to evaluate the wider benefits of [...] action on climate change [...]" (115.)

#### Introduction – New Urban Agenda (2015)



<u>Commitments about "Environmentally sustainable and resilient urban development" (65.-80.)</u>

## Cities play a mayor role, but are especially vulnerable to impact of climate change (63., 64.)

Commitment to "facilitate the sustainable management of natural resources in cities and human settlements in a manner that:

- protects and improves the urban ecosystem and environmental services,
- reduces greenhouse gas emissions and air pollution, and
- promotes disaster risk reduction and management,
- through supporting the development of disaster risk reduction strategies and periodical assessments of disaster risk caused by natural and man-made hazards, including standards for risk levels,
- while fostering sustainable economic development and all persons' well- being and quality of life, through environmentally sound urban and territorial planning, infrastructure, and basic services." (65.)

#### Introduction – New Urban Agenda (2015)



Commitments about "Environmentally sustainable and resilient urban development" (65.-80.):

Adopt the smart city approach, **"make use of opportunities from digitalization, clean energy and technologies, as well as innovative transport technologies"** (66.)

Care for **"well-connected and well-distributed networks of open, multi-purpose, safe, inclusive, accessible, green, and quality public spaces**" esp. For disaster management (67.)

support local provision of goods and basic services and thereby safe energy and be less vulnerable (70.)

strengthening the sustainable management of resources (including energy) (71.)

"develop sustainable, renewable, and affordable energy, energy-efficient buildings and construction modes, and to promote energy conservation and efficiency, which are essential to enable the reduction of greenhouse gas and black carbon emissions, ensure sustainable consumption and production patterns, and help to create new decent jobs, improve public health, and reduce the costs of energy supply." (75.)

"strengthen the resilience of cities and human settlements" (77.)

"support shifting from reactive to more proactive risk-based, all-hazards and all-of-society approaches" (78.)

#### Introduction – New Urban Agenda (2015)



"promote international, national, sub-national, and **local climate action**, including climate change adaptation and mitigation, and to support cities and human settlements, their **inhabitants and all local stakeholders to be important implementers**." (79.)

Commitments about planning:

"Commit to long-term urban and territorial planning processes and spatial development practices"(72.)

"support the medium- to long-term adaptation planning process, as well as city-level climate vulnerability and impact assessments to inform adaptation plans, policies, programmes, and actions that build resilience of urban inhabitants, including through the use of ecosystem-based adaptation." (80.)









Sustainable urban development:

Density

Mixture of Functions

Polycentrism







## Leipzig Charta for sustainable urban development 2007

## Action strategies to strengthen competitiveness

#### Compact city

- Strive for a compact settlement structure and prevent urban sprawl
- Aspiring to the concept of blending residential work, education, supply and leisure in the neighbourhoods
- Control of the supply of space and speculation





#### Leipzig Charta for sustainable urban development 2007

#### **Recommendations for an Integrated Urban Development Program**

 Description of the strengths and weaknesses of the city (parts) based on an analysis of the existing city structure

- Formulation of consistent development objectives for the urban area
- Development of a vision for the city
- Coordinate different spatial, sectorial and technical plans
- Ensure that the planned investments promote a balanced urban development

The New Leipzig Charta 2020

The transformative power of cities for the common good

-THE TRANSFORMATIVE POWER OF EUROPEAN CITIES -KEY PRINCIPLES OF GOOD URBAN GOVERNANCE -EMPOWERING CITIES TO TRANSFORM













#### Planning theory - The most important phases of urban development planning

Sources: Wandel im Planungsverständnis (aus: Selle, Klaus; Phasen oder Stufen? Fortgesetzte Anmerkungen zum Wandel des Planungsverständnisses. In: RaumPlanung 71 (1995), S. 240)



### Masterplanung versus Incrementalism = Integrated Urban Development Planning



Masterplanning = top down planning



Incrementalism, planning of small, singular steps

= bottom up planning



### Challenge for urban development planning





#### **Why: Integrated Urban Development Planning for the challenges of today**

- Cities and settlement exist. The main tasks of urban development take place inside existing settlements.
- Planning needs to be process orientated.
- Planning methods and concepts must be flexible for changing needs and unexpected occasions and incidents.
- Planning concepts must be comprehensive and resilient.
- Planning must lead to resource-saving and efficient action.
- Different interests, potentials and resources must be integrated.
- Planning must lead to a qualified development.
- Individual projects and measures must follow overarching goals and be integrated into a comprehensive planning process so that funding can be applied for.



#### Main tasks of urban development planning

- Conversion of old industrial sites and buildings
- New use of brownfield sites and gaps between buildings in the city
- Upgrading of existing neighbourhoods
- Revitalisation of old city districts
- Rounding off and expansion of neighbourhoods





## The Town is a complex system

Several shifts of urban structures are working together, to keep a town vital and attractive

Topography and natural resources

Periods of the historic development

The social structure

The economic structure

The structures of the social and technical infrastructure

The structure of public spaces: streets, places and parks

The structures of the plots

The building structure

The different types of buildings



Urban Design Competition Berlin-Altglienicke / Ortolfstraße, Germany 2014 1. prize, Zanderroth Architekten, Herrburg Landschaftsarchitektur, insar PartG , Berlin



## Energy Efficiency

- Saving
- Efficient use
- Use of renewable energies

Energy efficiency on the different urban levels



Region





production of renewable energy,

specific energy resources,

organisation of settlement development with as little land consumption and mobility requirements as possible. ... Energy supply, sustainable urban development (density, mixture of functions,

polycentric structure,

priority for public transport, pedestrians and bicycle riders), ... complex energy network and linkages of energy production and consumption,

all needs for daily life offered in each quarter (quarter of short distances), qualified

public spaces for recreation and communication, ...

## Neighbour hood

Resilient development and building structures, shared mobility offers,

multi generation mixture,

parking management and supply for electric vehicles,

surface water infiltration, ...



Energy efficiency on the different urban levels



## Building

use of renewable energies,

energy-efficient upgrading of the building fabric,

economical regulation of heating consumption;

intensive and flexible use of public buildings, ...





## The urban quarter as a main level of action

Levels of integration

The urban quarter as a main level of action



## What is an urban quarter?

Not specifically defined so far.

Term used in urban sociology since the 1960s:

- "place of primary social relations" (Brepohl, 1952).
- "social space" / "sociotope" (Strohmeier, 1983)





## **Integrated Urban Development Planning**

Sustainable urban development needs comprehensive and sophisticated actions within the layers of Buildings, Quarters as well as district- and citywide concepts.

**Quarters** are regarded as central layer of action as herein technological, social and economic processes become visible and are – at least partially – controllable.









# Conclusion

Energy change is possible, but it needs consistent action and good cooperation between many actors. Everyone is responsible.





# Thank you!





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