

# Bioprincipled Cities in the Bioeconomy

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## 1. Bioeconomy, what and why?

- The bioeconomy seeks to address the great societal challenges, specifically mitigating climate change, regenerating vital ecosystems and achieving food security and wellbeing of a growing world population.
- Bioeconomy is “the knowledge-based production and utilization of biological resources, processes and principles to provide products and services across all economic sectors within the framework of a sustainable economy”<sup>1</sup>.
- Bioeconomy aims for new harmony between people and nature. As the majority of world population will live in urban areas, bio-principled towns and cities is essential.

## 2. Vision of bioprincipled cities<sup>2</sup>

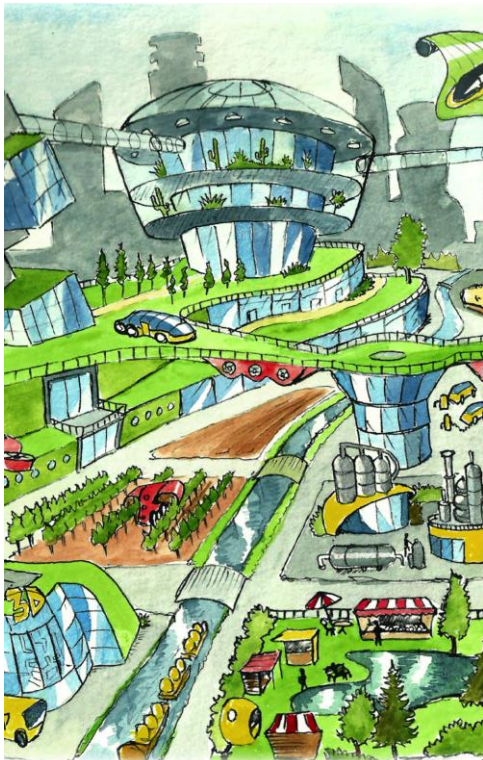
- The integration of biological principles into urban planning and city life is a key element for the achievement of greener cities with high levels of self-sufficiency and quality of life.
- Locally coordinated production, provision, use and recycling systems ensure that cities function on the basis of closed material and energy cycles.
- Attention to labor markets and urban industry 4.0 as well as urban-rural linkages and related mobility and resource flows of bio-principled cities.
- Emissions, waste and losses are minimized. Renewable resources, cropping techniques and biotechnology play a major role in closing the loops.
- Bio-products value-chains are based on the cascading use of natural and renewable resources, e.g. water. Urban (vertical) farms need new technology to become economically and ecologically efficient high-tech production centers.
- Spaces for recreation, production, services, work and living are integrated and decentralized in city districts.

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<sup>1</sup> German Bioeconomy Council (2013): Bioökonomie-Politik-Empfehlungen für die 18. Legislaturperiode. Available on <http://www.bioekonomierat.de/fileadmin/Publikationen/empfehlungen/Politikempfehlungen.pdf> [April 2016]

<sup>2</sup> In 2015, the German Bioeconomy Council initiated a survey among experts from the broad field of bioeconomy, who were invited to provide their visions for the most important and desirable innovation projects for the future of bioeconomy. Bioprincipled Cities was rated as one of the most important flagship projects.

- Cities innovate sustainable building designs and construction techniques by referring to biological principles and renewable resources.
- Green areas, and especially the green belts of big cities are recognized as important retreats and contribute to biodiversity, water regulation and filtration, air cleaning, halting soil erosion and desertification, mitigating temperature extremes (saving energy consumption) and human recreation.



Source: German Bioeconomy Council

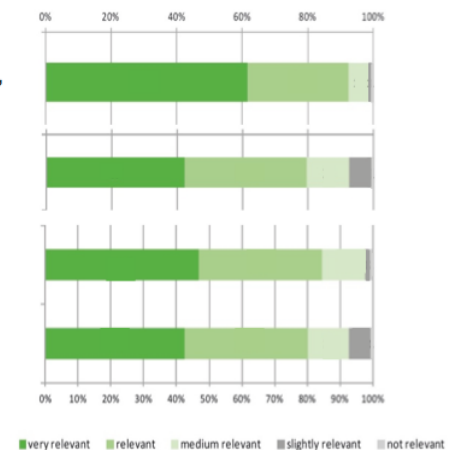
### Vision of a biopricipled city – most relevant aspects (results of international Delphi Panel survey 2015)

Urban planning: efficient metabolism, closing material loops, zero-waste

Green industry production in cities, integrated with residential living

Architecture: using bioprinciples & materials to achieve water & energy autonomy

Biobased building materials



### 3. Innovations for bio-principled cities

Innovations for bio-principled cities must be realized in the following areas:

- Urban planning (metabolism & circular material flows, ecosystem services & greening, mixed-use)
- Architecture & design (e.g. wooden construction, biobased materials, intelligent building systems)
- Biobased production (biobased and circular industry production, urban agriculture)

### 4. Strategy for the way forward

- International research cooperation and partnerships for learning
  - Sharing innovations internationally
  - Incentives and tax credits to internalize positive externalities of bio-principled cities
  - Inclusion of citizens
- Bio-principled cities as key element of strategy for Sustainable Development Goals of UN (Agenda 2030)