

# **Cyber Agora #1 on Underground Urbanism**

## **The Next Level Up is Down**

June 29, 2021 at 3:30 pm CET -to 5 pm CET

**Thematic group 1: Role of subsurface in sustainable future and understanding underground resource potential**  
(3:40 -4 pm CET)

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## Key messages

Pace of global environmental change demands action on a compact urbanisation;

Three dimensional urbanisation is a reality, however it is not properly reflected in planning theory and practice;

Underground space is very relevant to modern trends in urban development agenda: low carbon, energy efficiency, renewable energy, nature-based solutions;

It is necessary to think about and plan cities in three dimensions, and to develop tools to enable this.

**Table 1.3: Growth in urban expansion and urban population**

Geographic Regions	Average of Urban Extent Annual Change 2000-2015	Average of Urban Extent Population Annual Change 2000-2015	Ratio of Urban Extent to Urban Population
Sub-Saharan Africa	5.1%	4.2%	1.20
North Africa and Western Asia	4.0%	2.7%	1.45
North Africa	4.5%	3.1%	1.43
Western Asia	3.5%	2.4%	1.46
Central and Southern Asia	4.3%	3.0%	1.46
Central Asia	5.1%	4.3%	1.18
Southern Asia	4.3%	2.8%	1.50
East and South-East Asia	6.9%	4.2%	1.65
East Asia	7.2%	4.1%	1.77
South-East Asia	5.7%	4.4%	1.31
Latin America and the Caribbean	2.1%	1.9%	1.12
Caribbean*	0.3%	0.8%	0.35
Central America	2.6%	2.3%	1.14
South America	2.0%	1.8%	1.13
Oceania	1.2%	1.4%	0.86
Australia and New Zealand **	1.1%	1.7%	0.67
Oceania [excl. Australia and New Zealand] ***	1.3%	0.8%	1.64
Europe and North America	2.1%	1.0%	2.06
North America	2.0%	1.5%	1.32
Europe	2.1%	0.7%	2.88
Average Global Sample Cities	4.3%	2.8%	1.52

\*One city (Holguin)

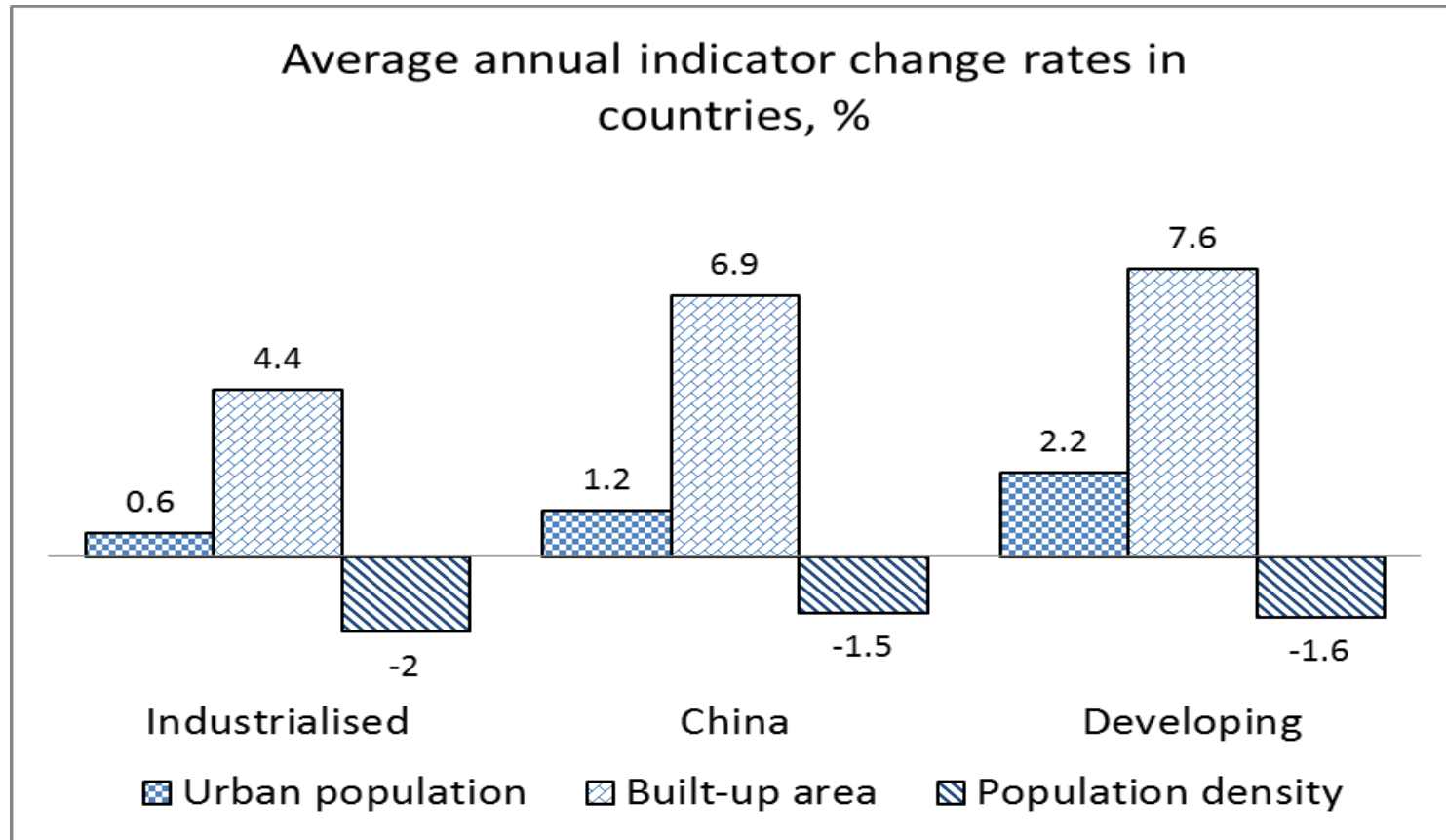
\*\*Two cities (Sidney and Auckland)

\*\*\*One city (Suva)

Source: Based on UN-Habitat, 2016b

# Pace of global environmental change demands action on a compact urbanization

## Policy = Urban sprawl? A Compact city?



source: Bobylev & Jefferson, Sustainable Infrastructure for Resilient Urban Environments (SIRUE) 2012 – 2015

Calculated using data from: China Urban Development Report, 2010; He et al, 2012; UN-Habitat, 2011; Angel et al, 2005; UN-Habitat, 2013. \*tolerances: built-up area equals urban area, excluding major green areas and water bodies; OECD countries equals to (1) developed (2) industrialised countries; data for China is for the years 2000 - 2009, data for the urban population is for the years 2010 - 2020, data for urban population density is for the years 1990 – 2000, the rest data is for 2000-2030.

# Urban underground space sustainable use contributes to achieving United Nations 2030 Agenda and Sustainable Development Goals

Goal 11: Make cities inclusive, safe, **resilient and sustainable**

Goal 9: Build **resilient infrastructure**, promote sustainable industrialization and foster innovation

Goal 7: Ensure access to affordable, reliable, **sustainable and modern energy** for all

Goal 13: Take urgent action to combat **climate change and its impacts**

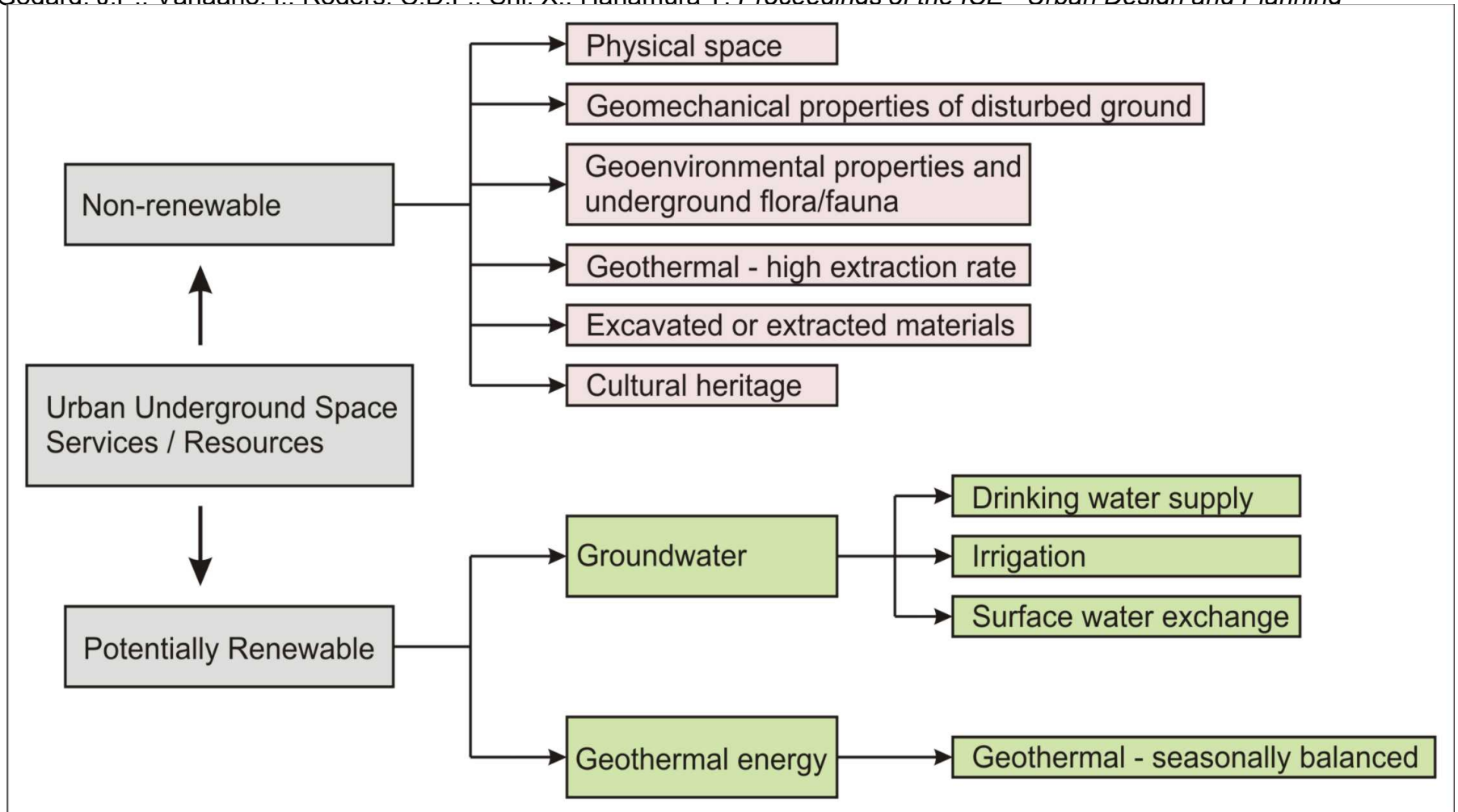


# Urban Underground Space resource potential

## Subsurface resources

(after Parriaux, Bobylev, Sterling)

Sustainability Issues for Underground Space in Urban Areas (2012) Sterling, R., Admiraal, H., Bobylev, N., Parker, H., Godard, J.P., Vähäaho, I., Rogers, C.D.F., Shi, X., Hanamura T. *Proceedings of the ICE - Urban Design and Planning*





# Underground space and modern trends in urban development agenda



Nature based solutions

Photo: Nikolai Bobylev – Berlin, Potsdamer Platz & Sony Centre

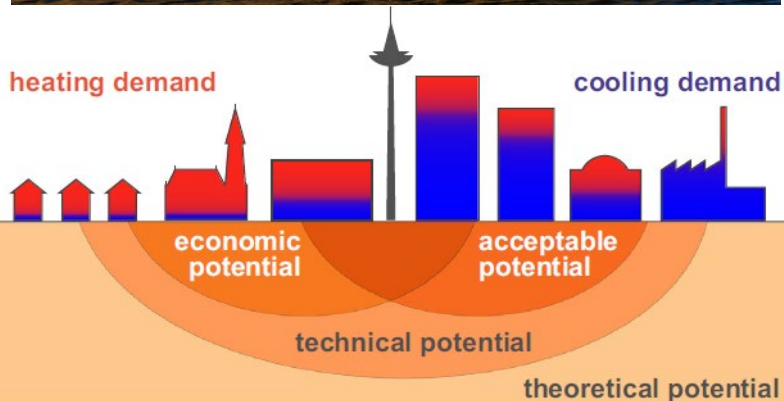


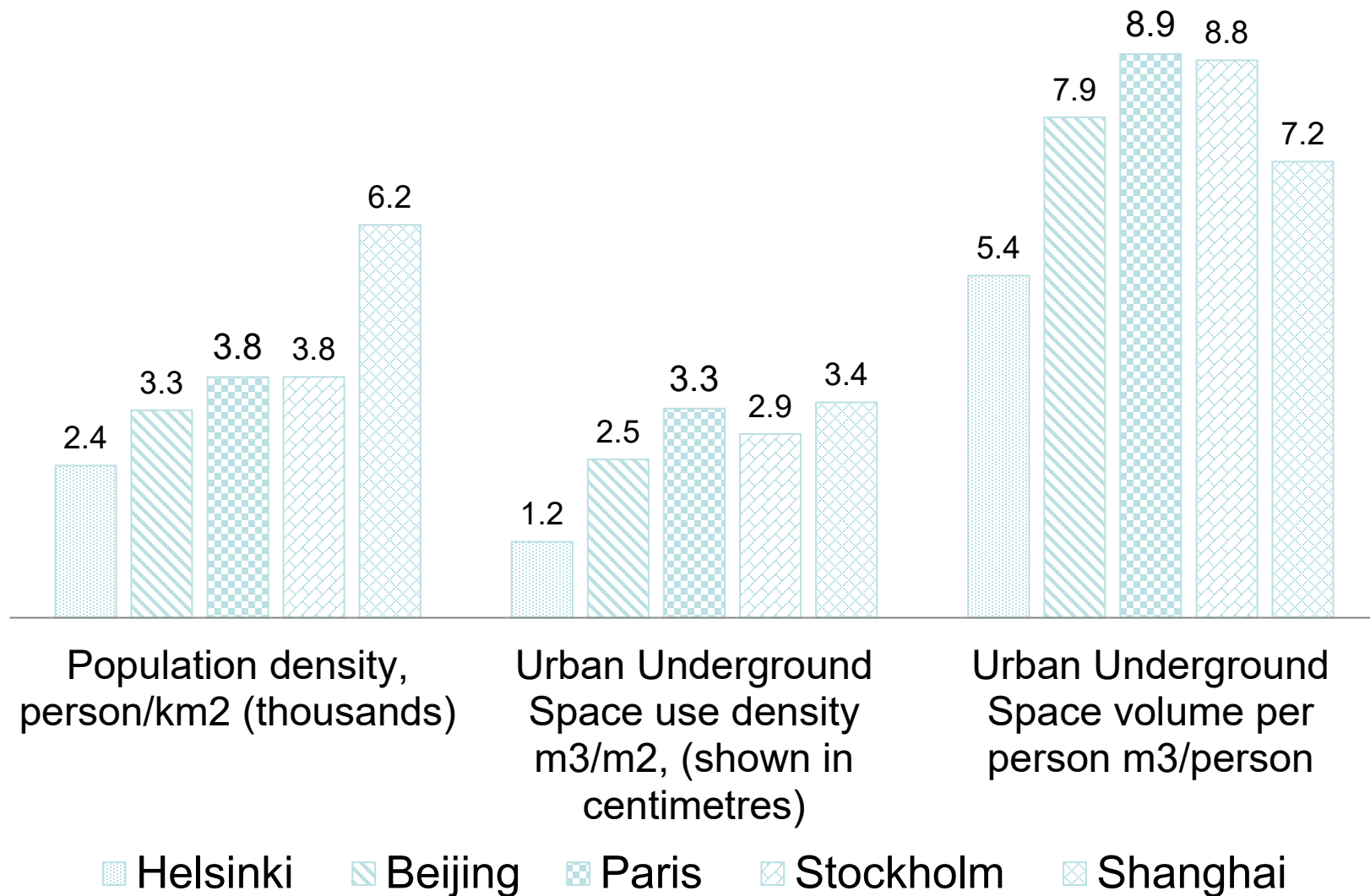
Illustration of the order of categories of geothermal potential beneath cities.

Bayer et al., *The geothermal potential of cities*, 2019  
<https://www.sciencedirect.com/science/article/abs/pii/S1364032119301121?via%3Dihub>



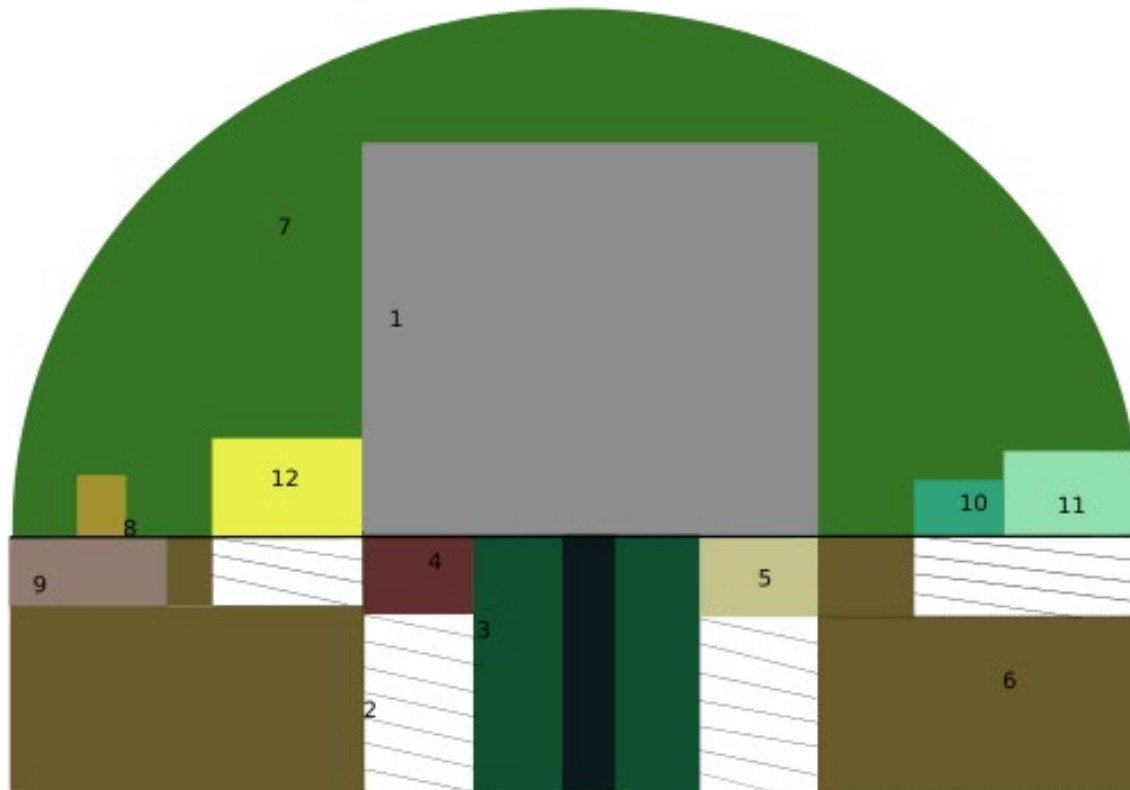
Elon Musk has unveiled a prototype underground tunnel in Los Angeles designed to transport cars, at high speed, around the city.

# How to plan? – Use quantitative data and indicators





# How to plan? – Use functional profiles (ongoing research)



Optimal location of  
city functions from

- Economic
- Environmental
- Climate
- Safety
- ect

points of view

## Back ground – ongoing projects

### Projects:

- (1) Alexander von Humboldt Foundation project on Green Underground: Unlocking the Environmental Potential of Urban Underground Space Use,
- (2) ERA.Net RUS Plus initiative and the Russian Foundation for Basic Research AUCAM project on “Opportunities for and challenges to urban development and social cohesion in Russia’s Arctic under climate change impacts” (ID # 527, 18-55-76003),
- (3) Freie Universität Berlin – Saint Petersburg State University Joint Seed Money Funding Scheme project on Sustainable Urbanization & Comparative Development,
- (4) Swedish Institute project on Urban underground space - Examining current needs, challenges, and gaps for Urban Underground Space Use in a Liveable City

## References

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# Thank you for your attention!

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