



UNITED NATIONS  
UNIVERSITY

**UNU-FLORES**

Institute for Integrated Management  
of Material Fluxes and of Resources



TECHNISCHE  
UNIVERSITÄT  
DRESDEN

ADVANCING A **NEXUS APPROACH**  
TO THE SUSTAINABLE MANAGEMENT  
OF **WATER, SOIL AND WASTE**



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INTERNATIONAL  
KICK-OFF WORKSHOP

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11-12 NOVEMBER 2013  
DRESDEN, GERMANY



ADVANCING A **NEXUS APPROACH**  
TO THE SUSTAINABLE MANAGEMENT  
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**NEXUS APPROACH TO ADAPTATION OF URBAN  
AREAS TO CLIMATE CHANGES  
Blue Green Dream's paradigm  
for the future spatial planning**

**Prof Čedo Maksimović, Imperial College London**



## The presenter

- ❖ **Professor of Urban Water Systems. Imperial College**
- ❖ **Head of the Urban Water Research Group**
- ❖ **Editor-in-Chief, URBAN WATER JOURNAL**
- ❖ **Editor-in-Chief, URBAN WATER Book Series**
- ❖ **Special Advisor to UNESCO on Urban Water**
- ❖ **Coordinator of the EU projects: Blue Green Dream and RainGain**

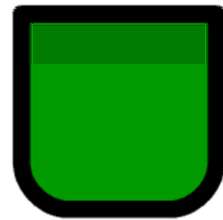


## **KEY QUESTIONS answered in this lecture**

- 2. Do current management approaches adequately address implications of climate change, e.g. frequency, intensity and duration of floods and droughts?**
- 3. Do we have the tools (e.g. models) to integrate sectors and disciplines for integrated management approaches?**
- 4. Will new or improved technologies (and which) be required or at least be helpful to foster integrated management approaches? Do we need new (e.g. specific modelling tools)?**
- 6. Overall: is there a need for more research on the nexus?**
- 8. What are and where are best practice examples of monitoring programmes (quantity and quality of water, soil characteristics, land use, waste sites) at local/national/regional level?**



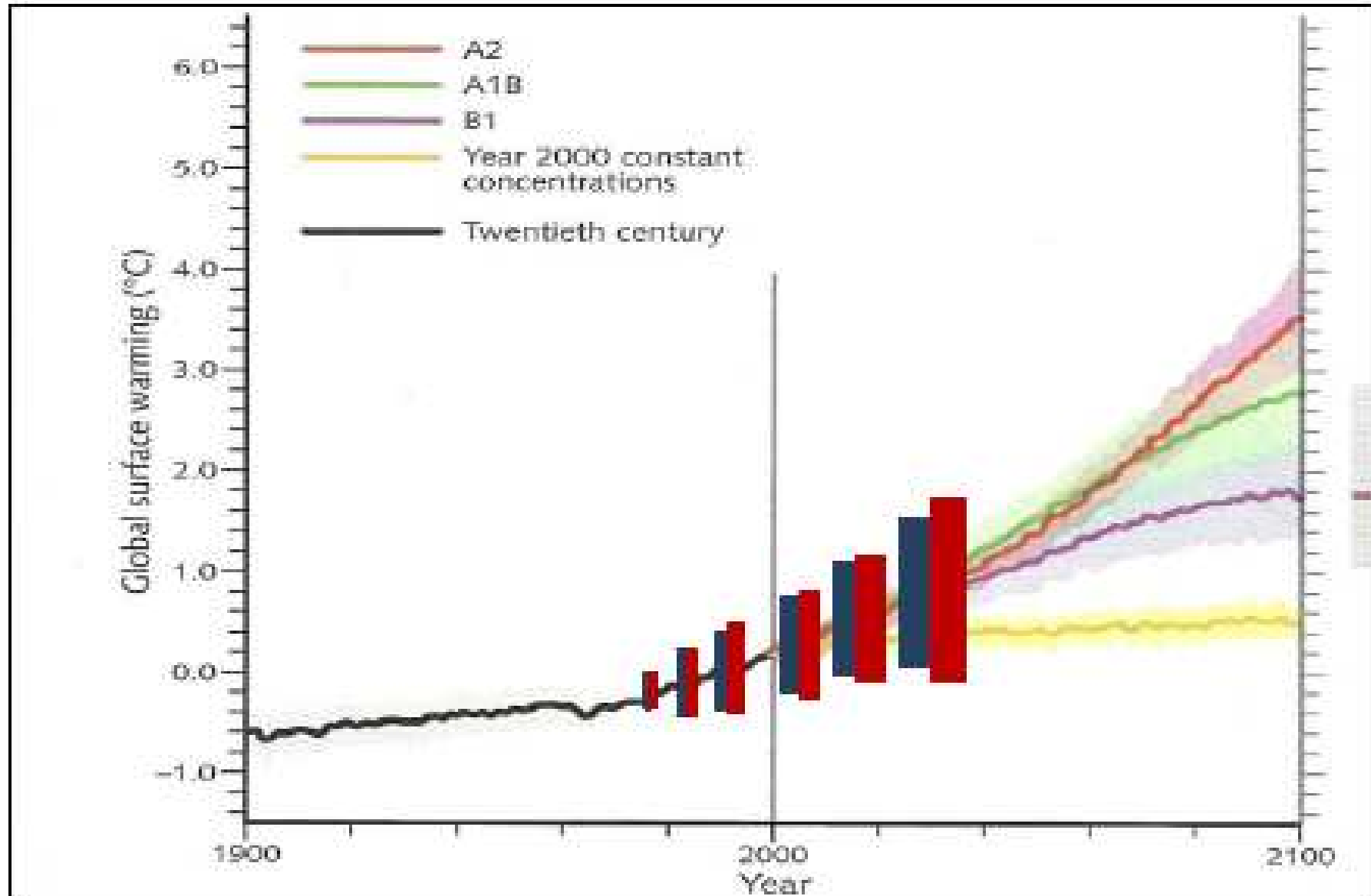
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To BGD or not to BGD, that is not the question now  
BGD deliverables customised to meet your needs



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# ISSUES TACKLED BY BGD

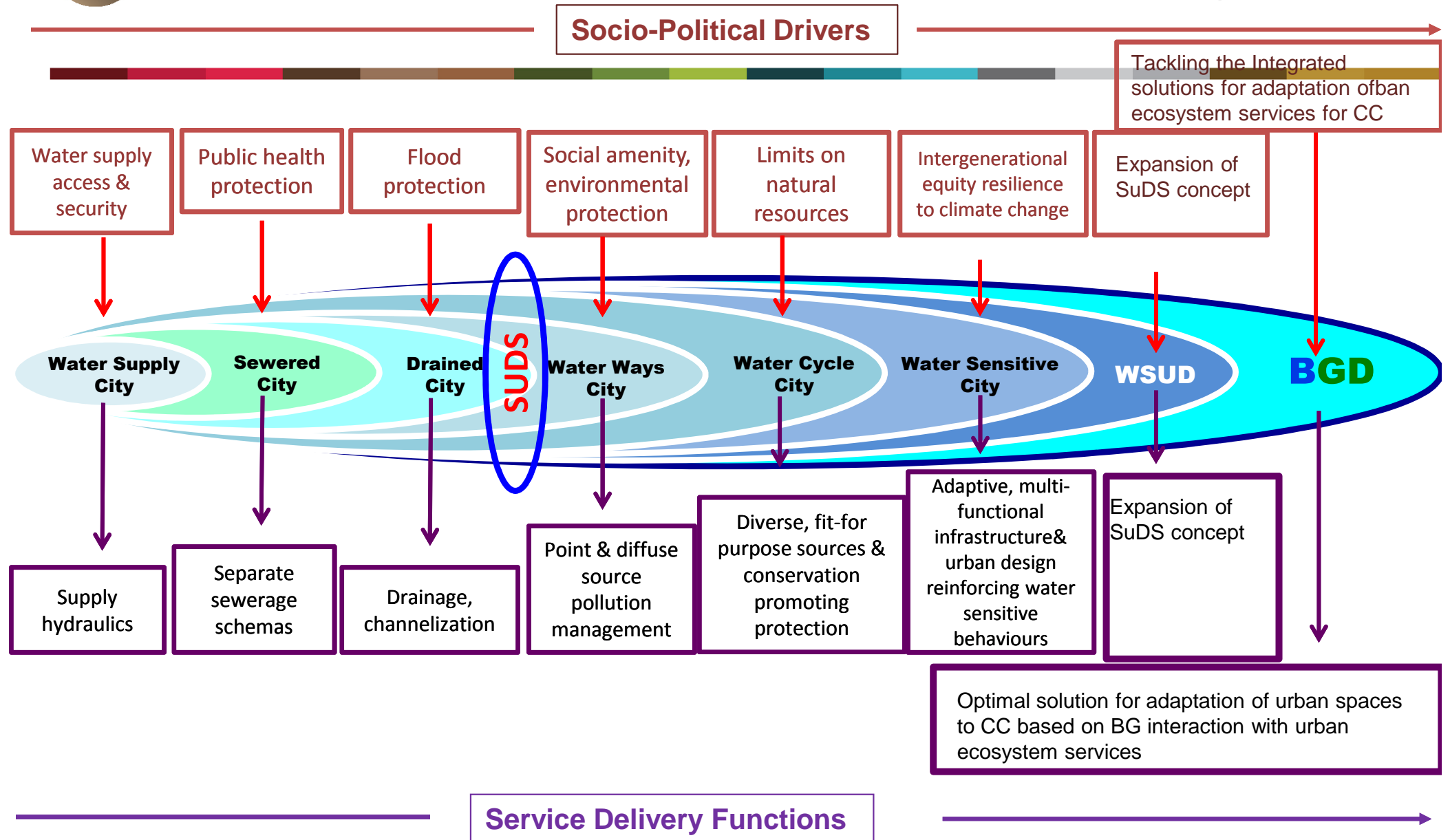
## Urban creep





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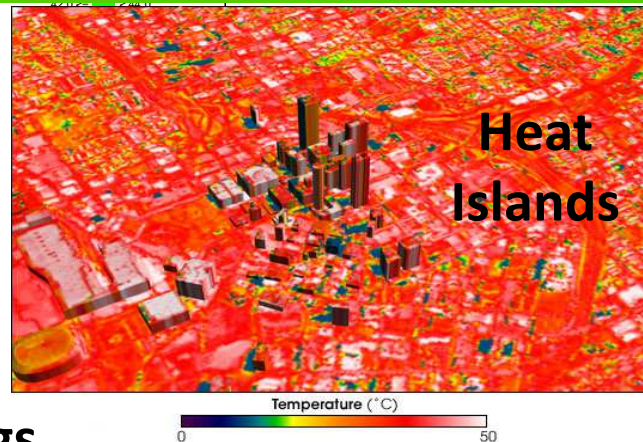
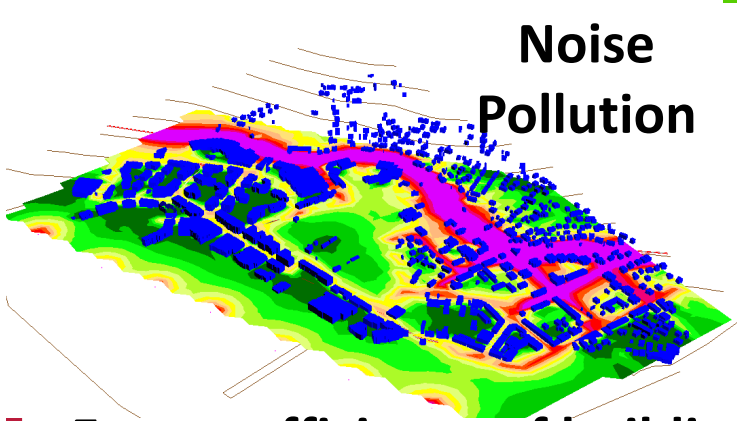
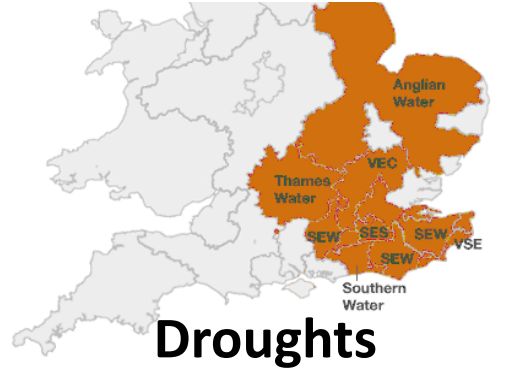
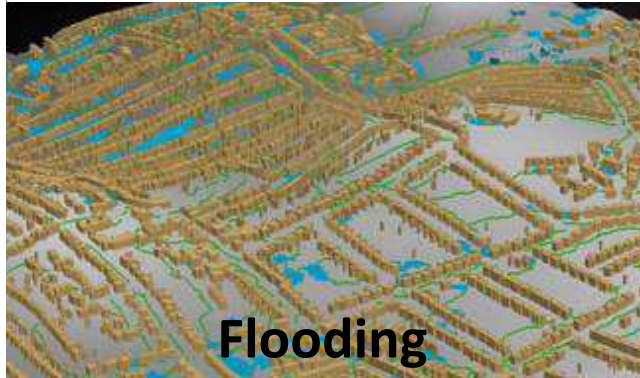
# The Broadening of Urban Water Systems Design



WSUD: Water Sensitive Urban Design Adapted from R. Brown, Monash Uni.



# Some issues tackled by Blue Greening

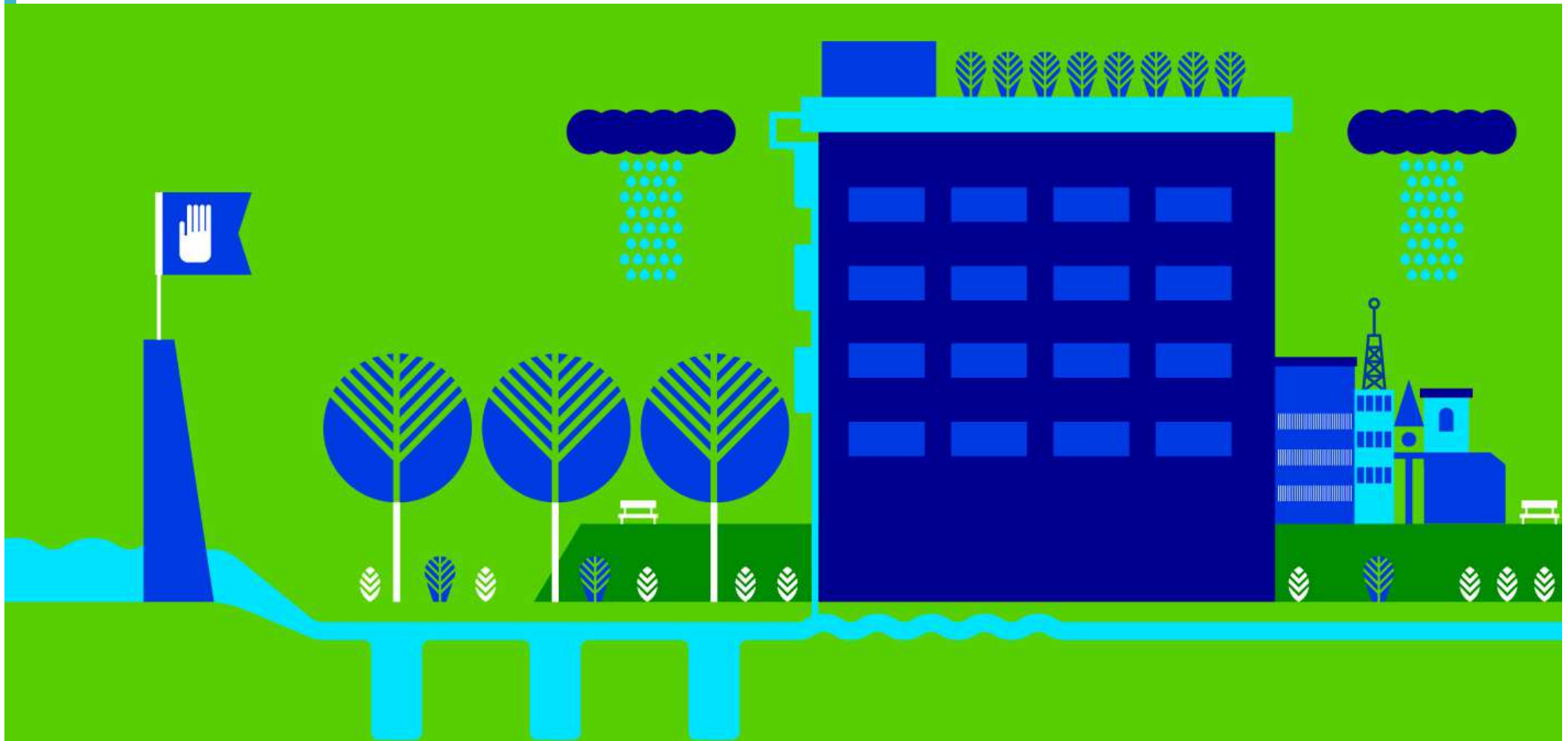


+ Energy efficiency of buildings



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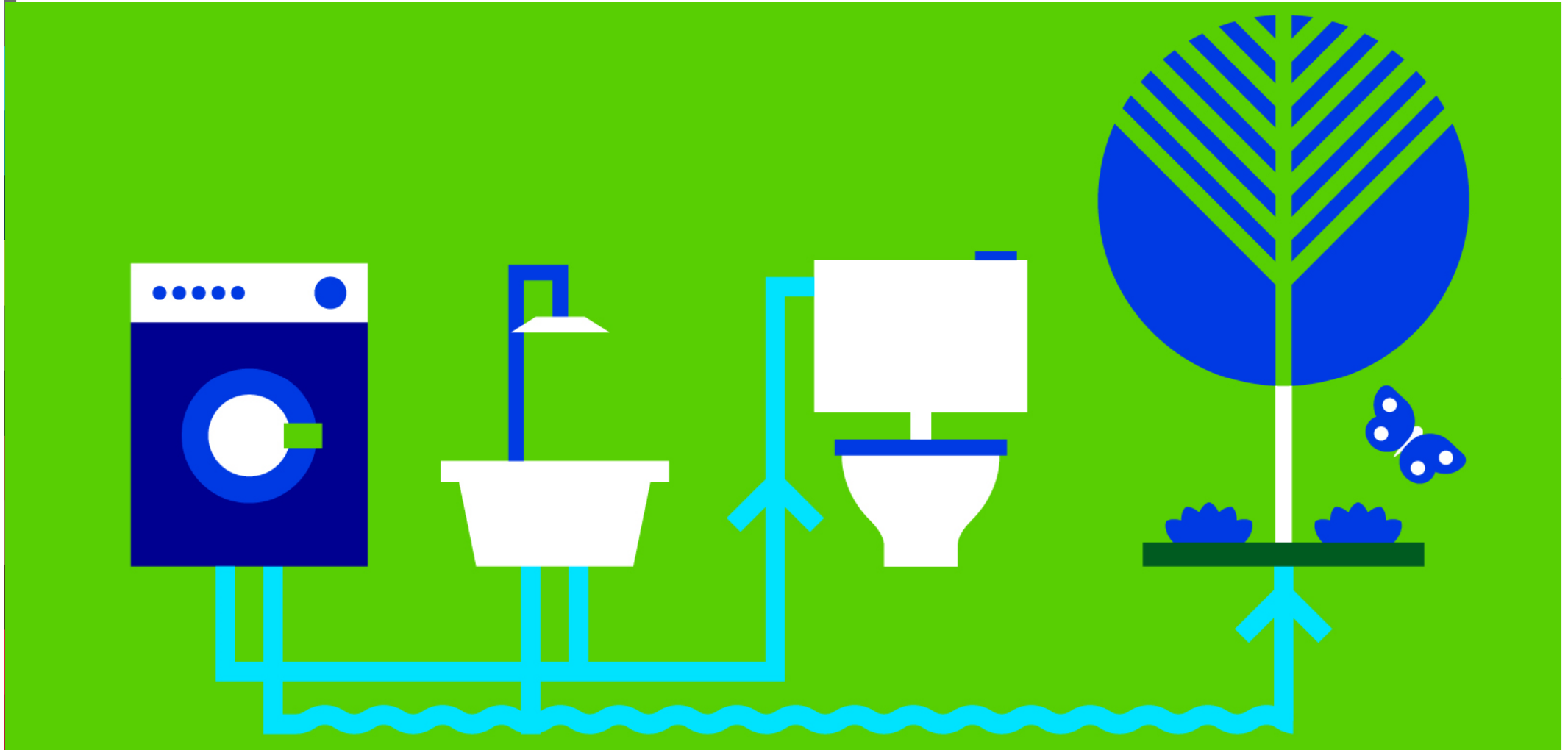
# REDUCED PLUVIAL FLOOD RISK





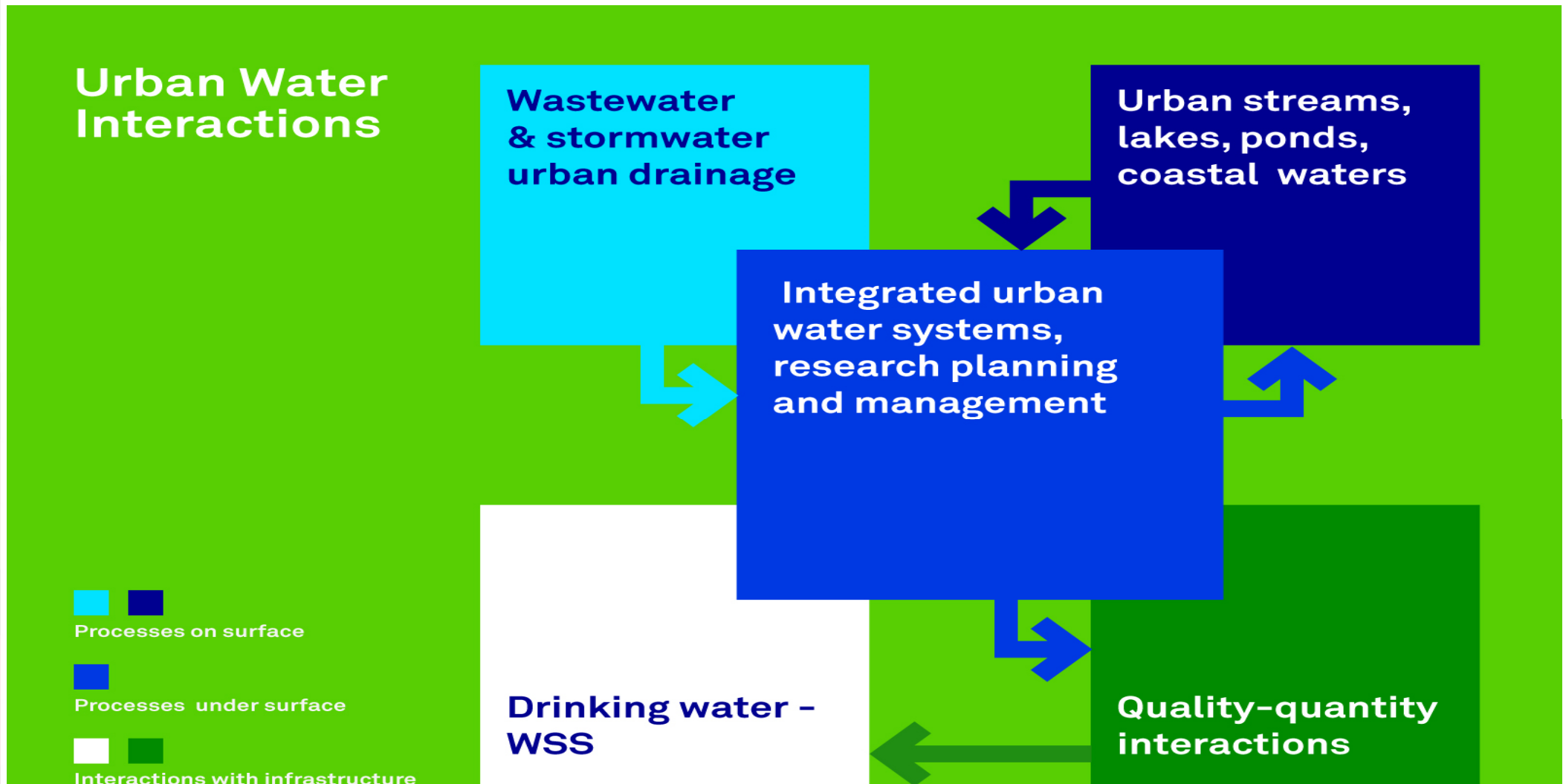
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# GREY WATER RECYCLING





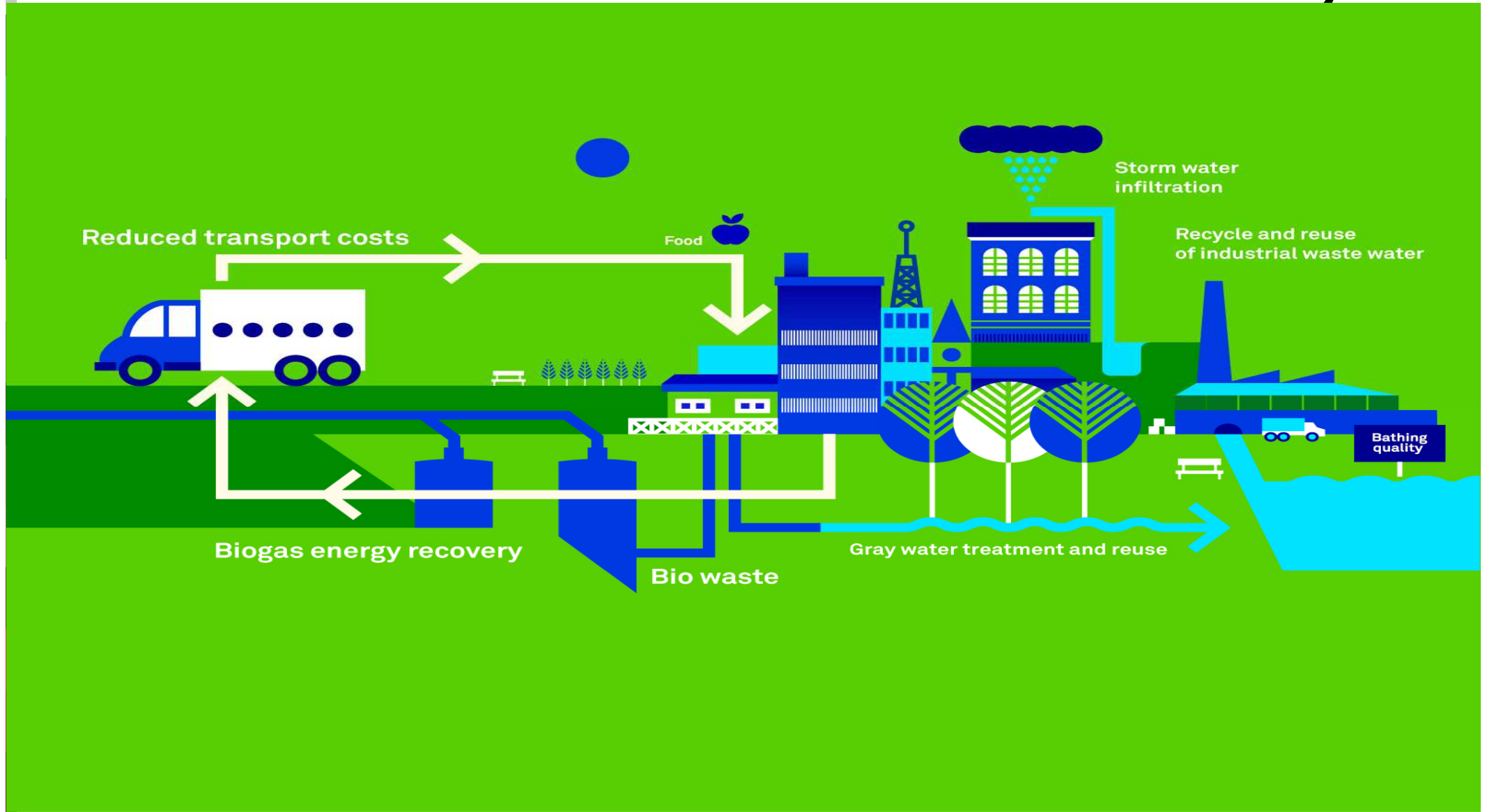
# Integrated water footprint reduction





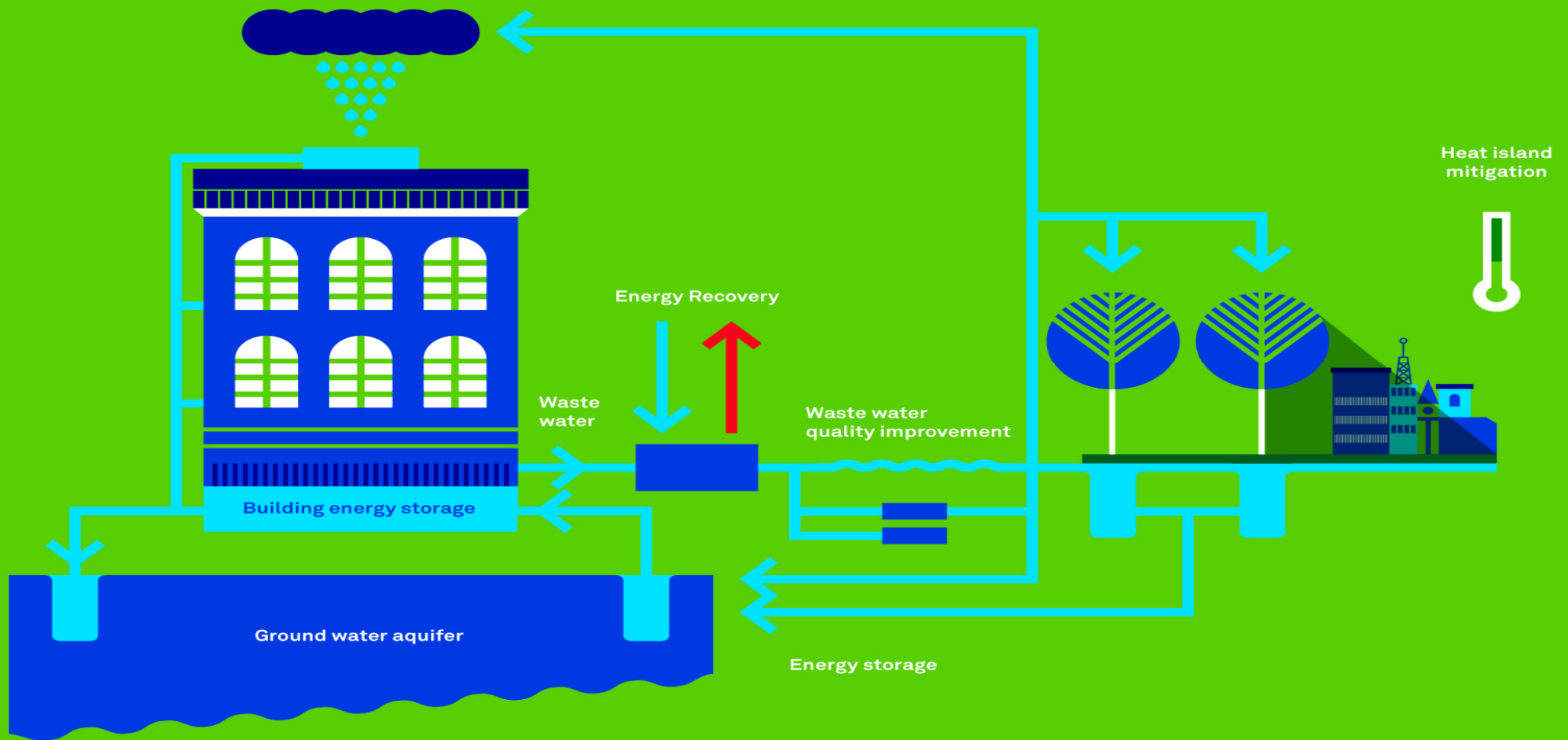
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# Stormwater / wastewater / solid waste recovery





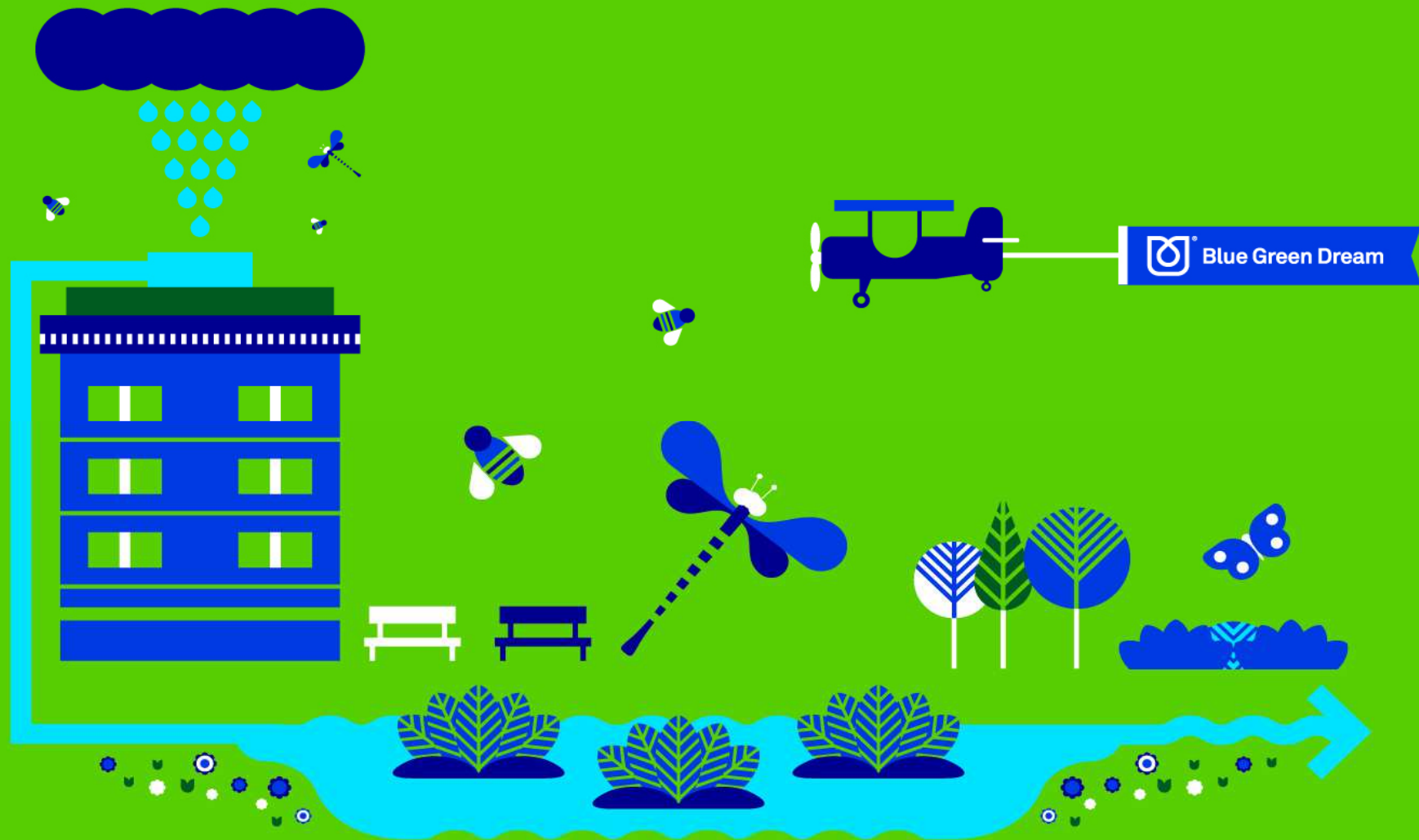
# Water and energy recovery – Interactions with soil





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# BIODIVERSITY ENCHANCEMENT





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# INCREASED AMENITY AND URBAN HEALTH

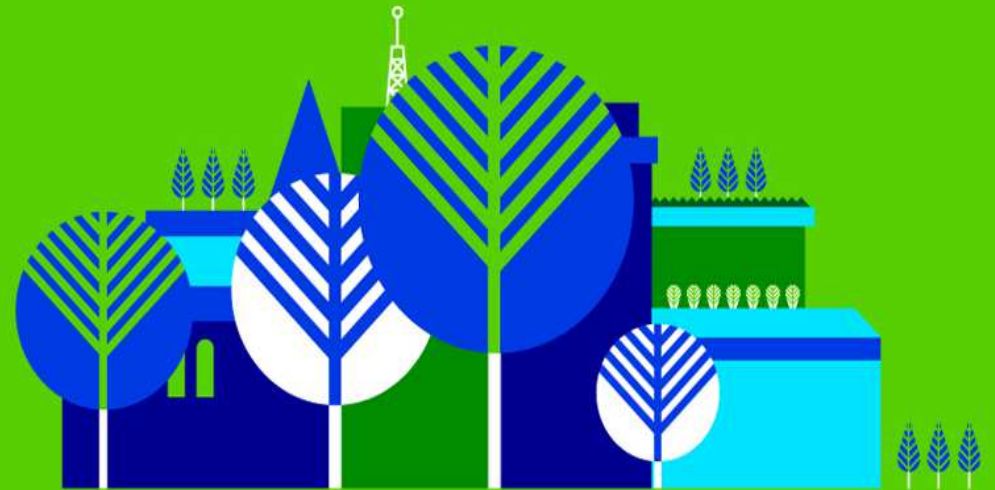






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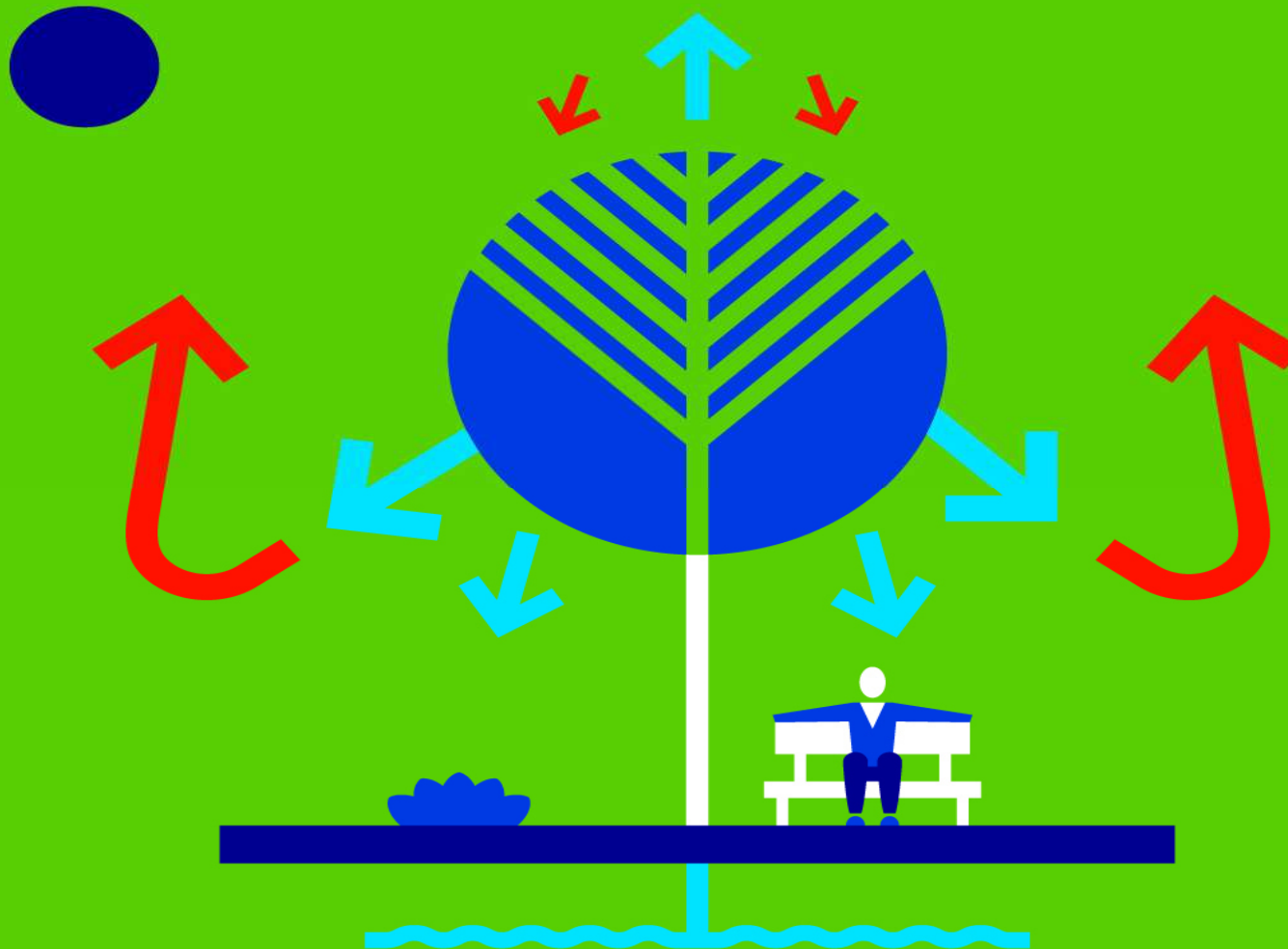
# BGD based URBAN HEAT ISLAND MITIGATION





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# EVAPORATIVE COOLING





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# And the new BGD Regional centres



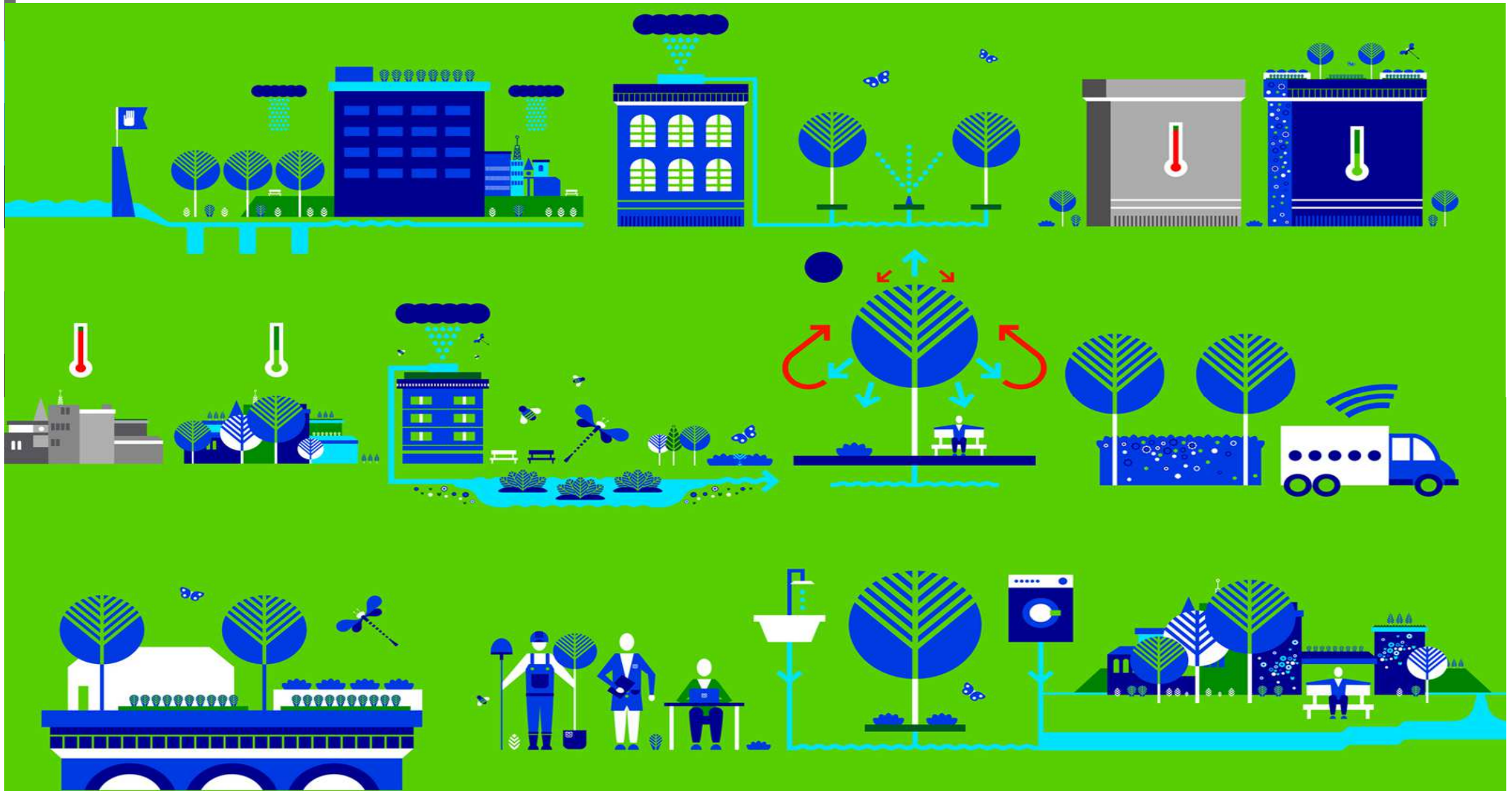
London Berlin Paris Rotterdam

Lodz Belgrade Athens Stockholm Bologna



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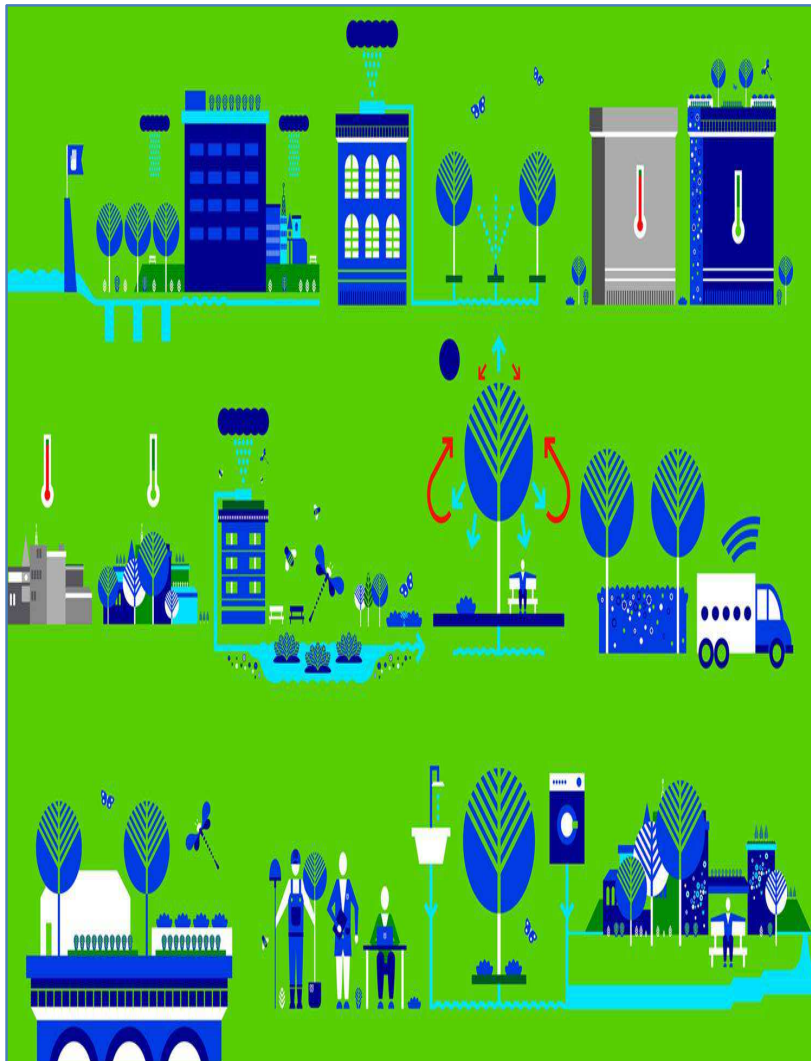
# INTEGRATED MODELLING AND QUANTIFICATION OF IMPACTS ON URBAN ECOSYSTEM SERVICES





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## CLIMATE KIC PhD RESEARCH => BGD INTEGRATED MODELLING SYSTEM



**WATER BALANCE**

**NUTRIENTS & POLLUTION  
MIGRATION**

**MICROCLIMATE &  
HEAT ISLANDS**

**BGD FOR  
ENERGY EFFICIENCY**

**PLANTS  
FOR BG SOLUTIONS**

**BGD & ECOSYSTEM  
SERVICES**

**AIR AND NOISE POLLUTION**

**UK PhDs**

**FRENCH PhDs**

**GERMAN PhDs**

**DUTCH PhDs**

**BGD INTEGRATED  
MODELLING SYSTEMS**



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# BGD Annual meeting TU Berlin

## 7-8<sup>th</sup> October 2013

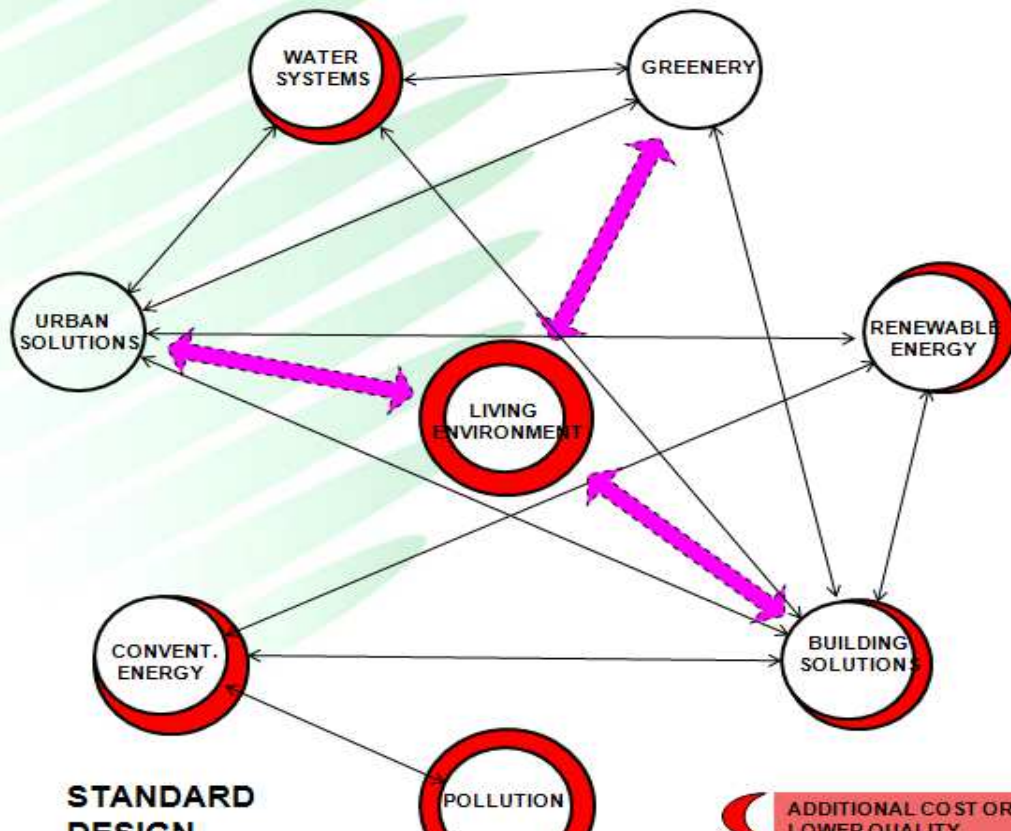




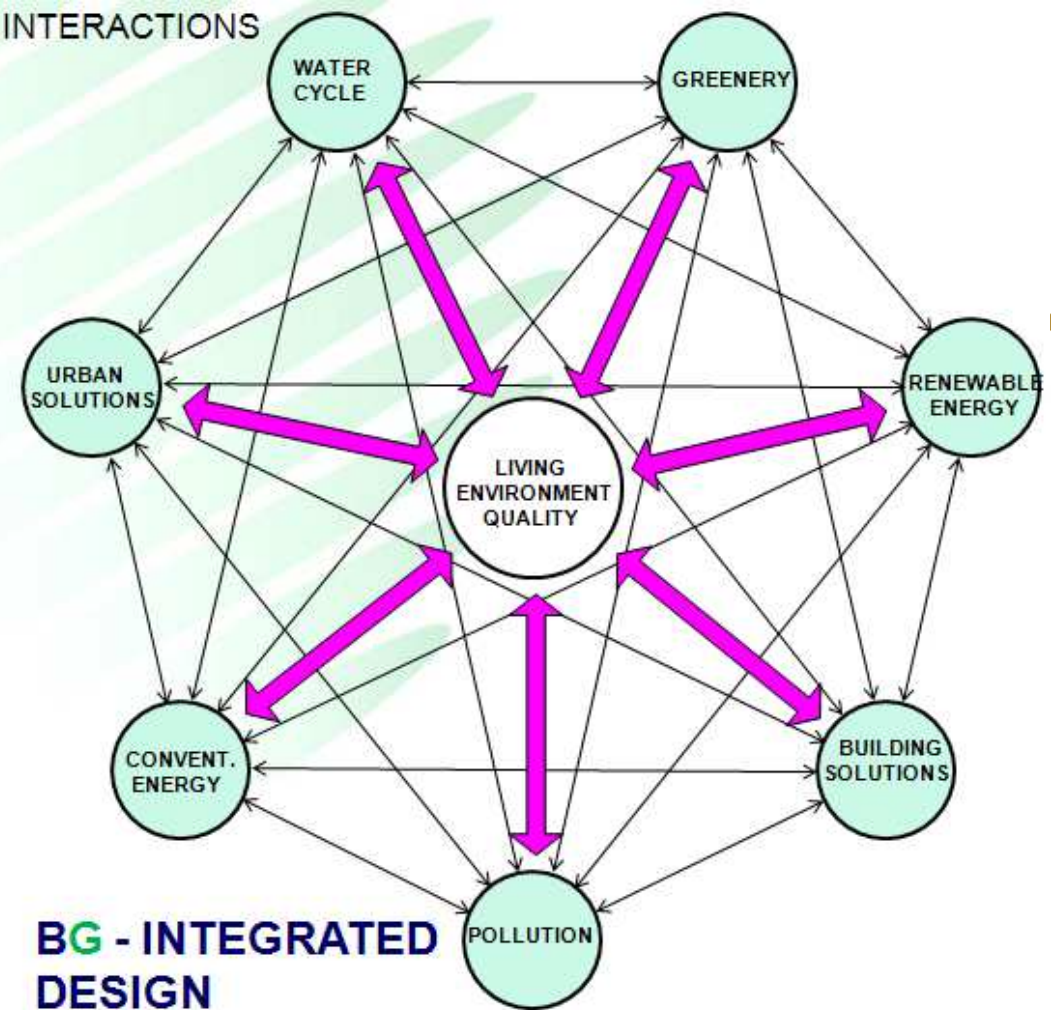
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Capital cost benefits:

- Cheaper water systems
- Cheaper renewable energy plant
- Cheaper artificial energy plant
- ( Often cheaper building)
- Better living environment quality



INTERACTIONS



**BG - INTEGRATED DESIGN**

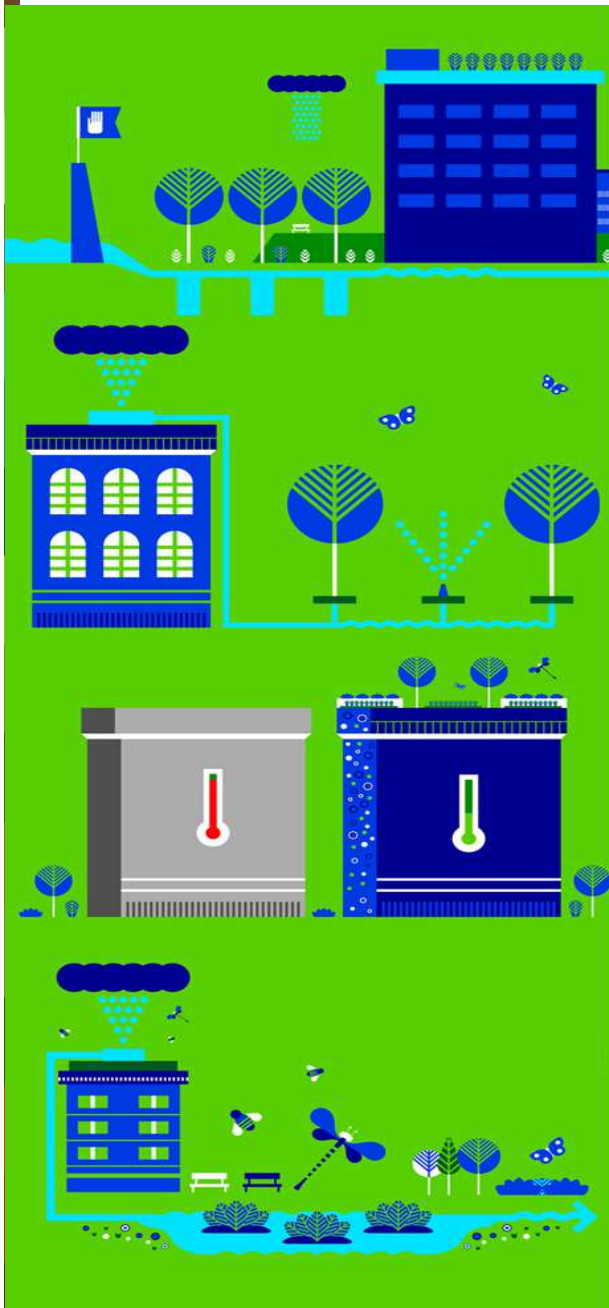
Resulting benefits:

- lower building running cost
- Lower occupants running costs
- Better quality indoor and outdoor
- Environment >>

Marketing stronger / higher profits possible



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## **BGD INTEGRATED MODELLING SYSTEM BGD NEW PARADIGM**

**BGD project will develop  
innovative solutions for:**

**Filling the knowledge gaps  
Water (water footprint)  
Modeling  
Construction  
Monitoring  
BGD Certification**

**Evaluation and certification  
training of professionals  
for implementation of  
innovative solutions**

**Let's  
do it!**







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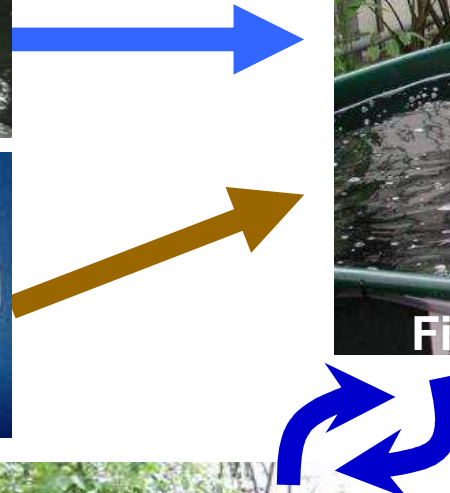
# Urban agriculture products – Aqua culture - hydroponic





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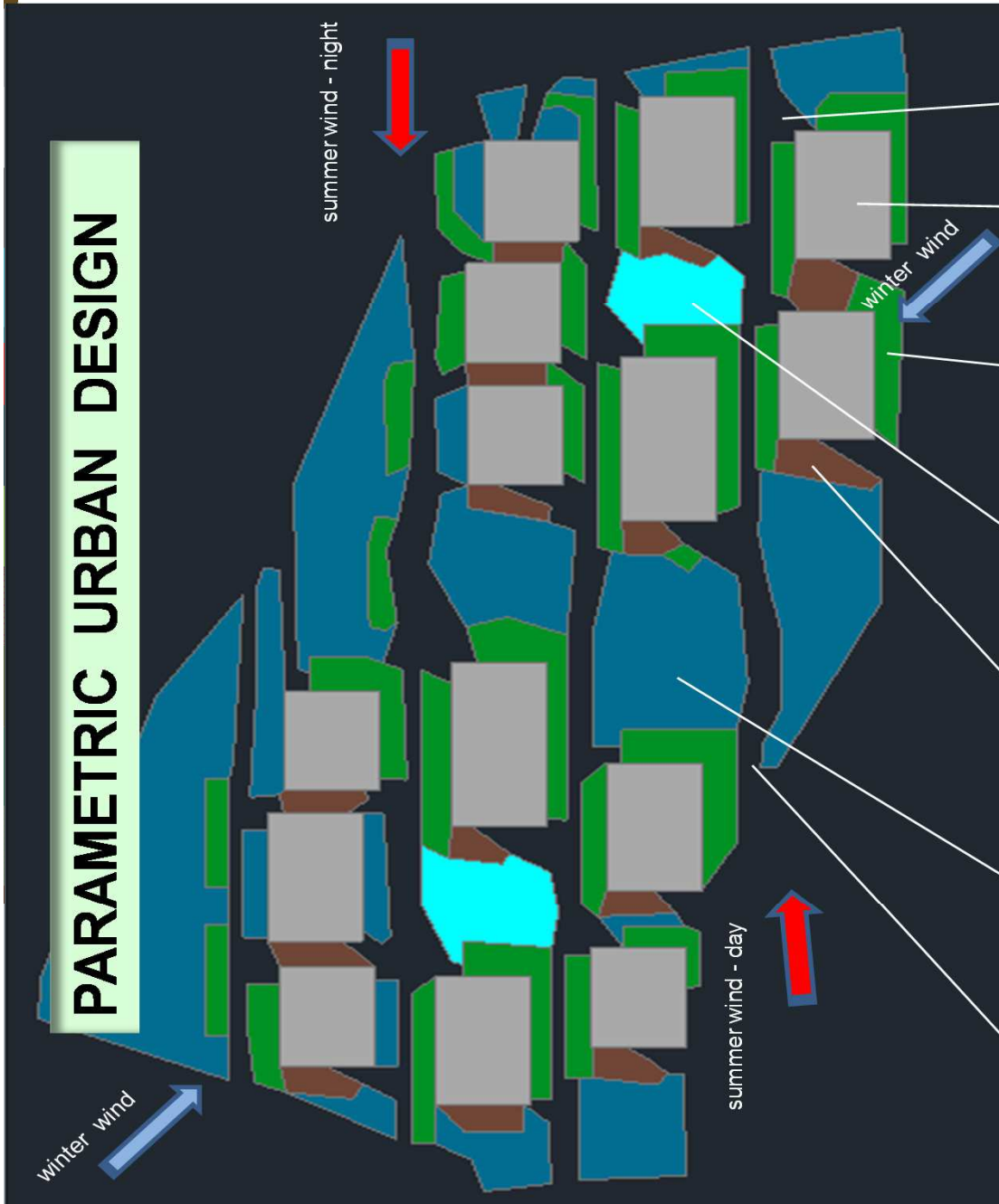
# **Aquaponic = (aquaculture + hydroponic)** **as new source of income for urban farmers**



# Reduce building energy load with adequate design of threes



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**Wind corridor** for the building  
free cooling - summer night

**Clusters orientation** – south /north  
to maximize passive heating and sun  
energy harvesting by PV and Solar  
collectors

**Winter wind barrier** - evergreen threes  
-existing - *Picea abies*, *Taxus baccata*,  
*Pinus sp.*, *Pseudotsuga sp.*  
-new - *Pinus nigra*, *Thuja columnaris*,  
-*Juniperus communis* „Hibernica“



**Semi open space** - for social activities  
central zone threes - high treetop( 3-4m)  
- *Celtis Australis*, *Rhustiphina*, *Betula verrucosa*

**Passive heating** - threes that loose leafs first  
week in October  
- *Acer platanoides*, *Alnus glutinosa*,



**Urban adiabatic cooling** – particular selectio  
of deciduous threes with high leaf surface area  
- existing - *Carpinus Betulus*, *Catalpa bignonioides*, *Acer*  
*sp.*, *Juglans nigra*, *Platanus sp*  
- new - *Liquidambar sp.*

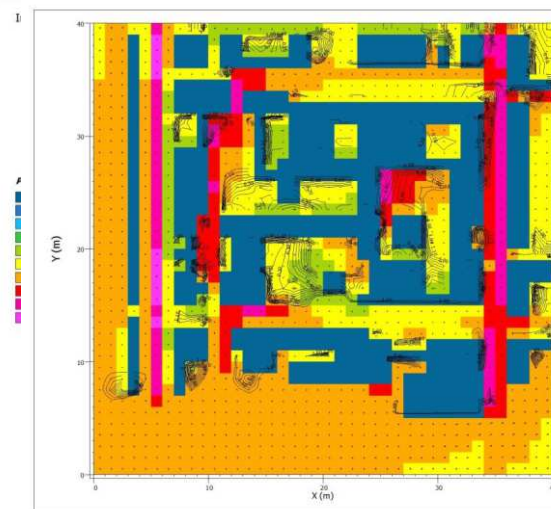
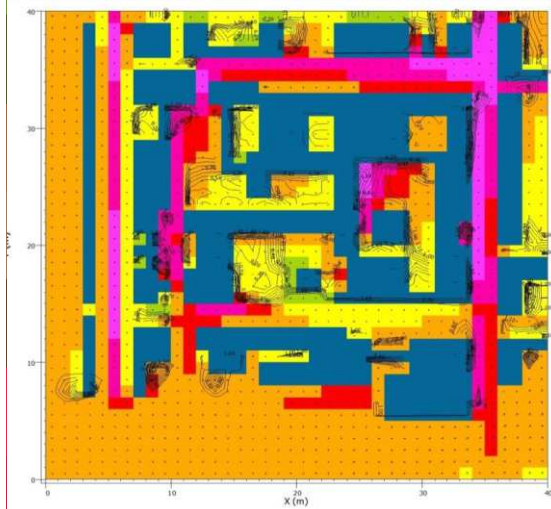
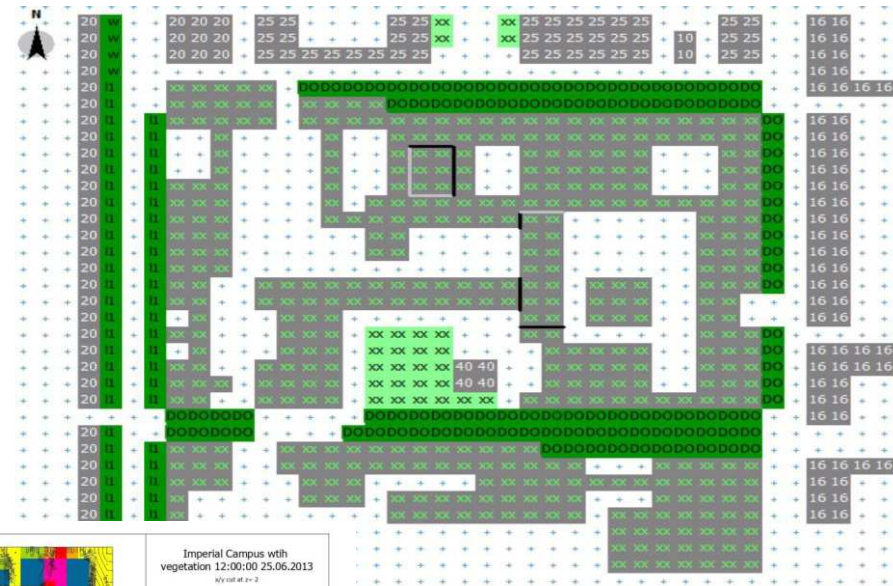
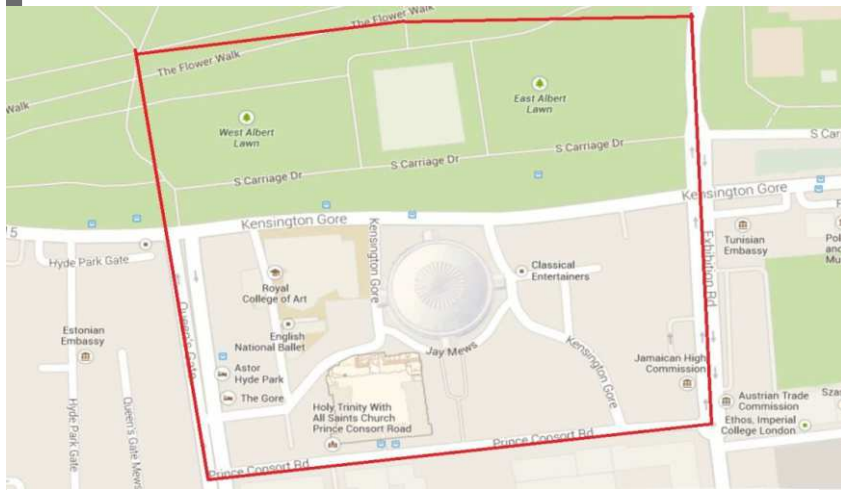


**Wind corridor** for the urban adiabatic  
cooling - summer day

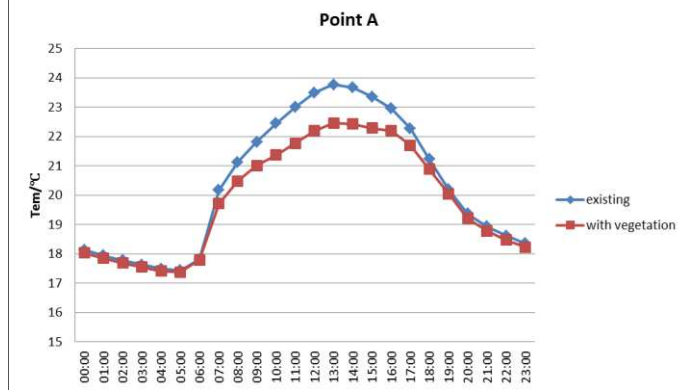
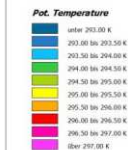


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# Impact of BGS on UHI



Imperial Campus with  
vegetation 12:00:00 25.06.2013  
xy out at z=2





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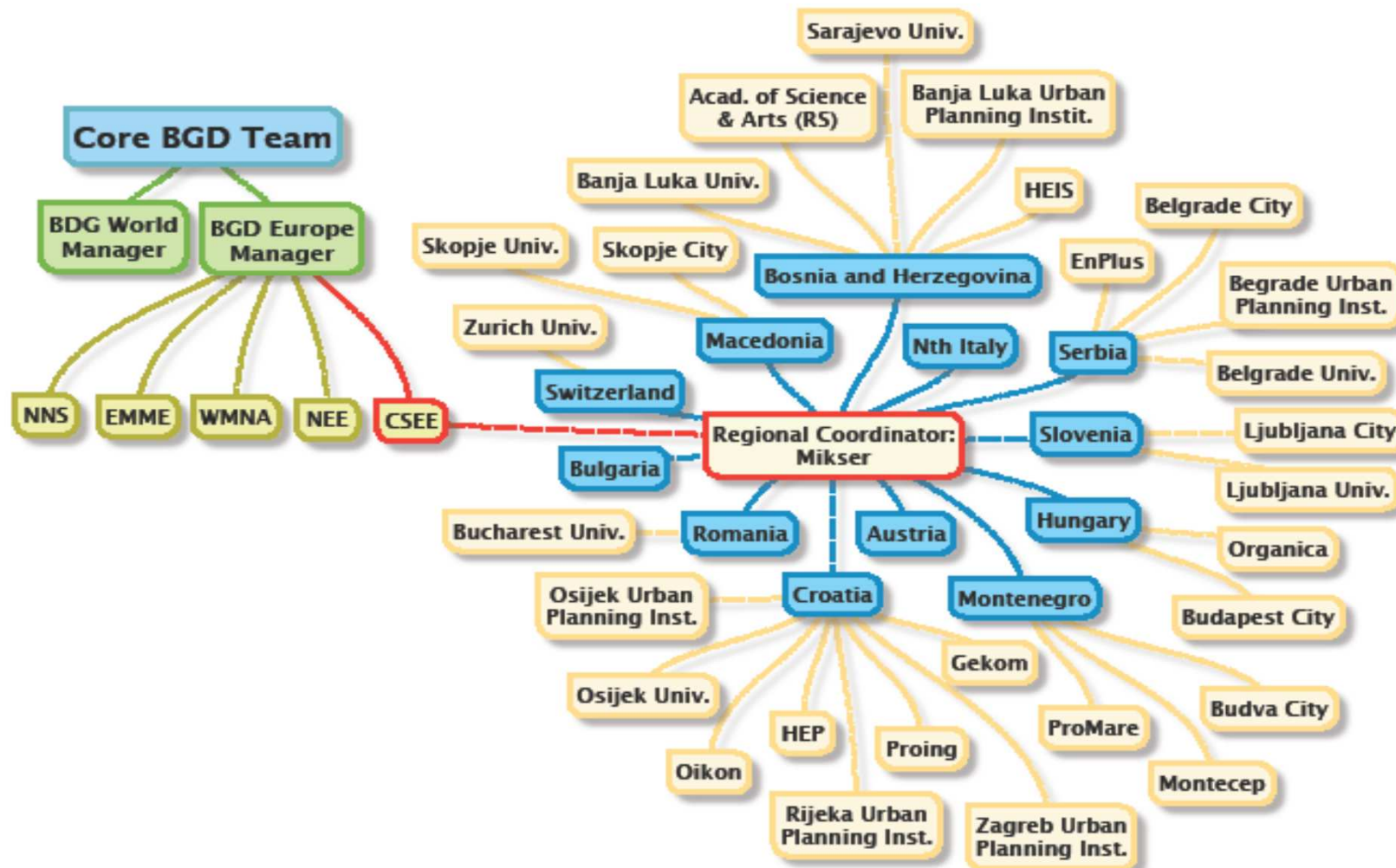
# Blue Green Wave at the ENPC, Paris





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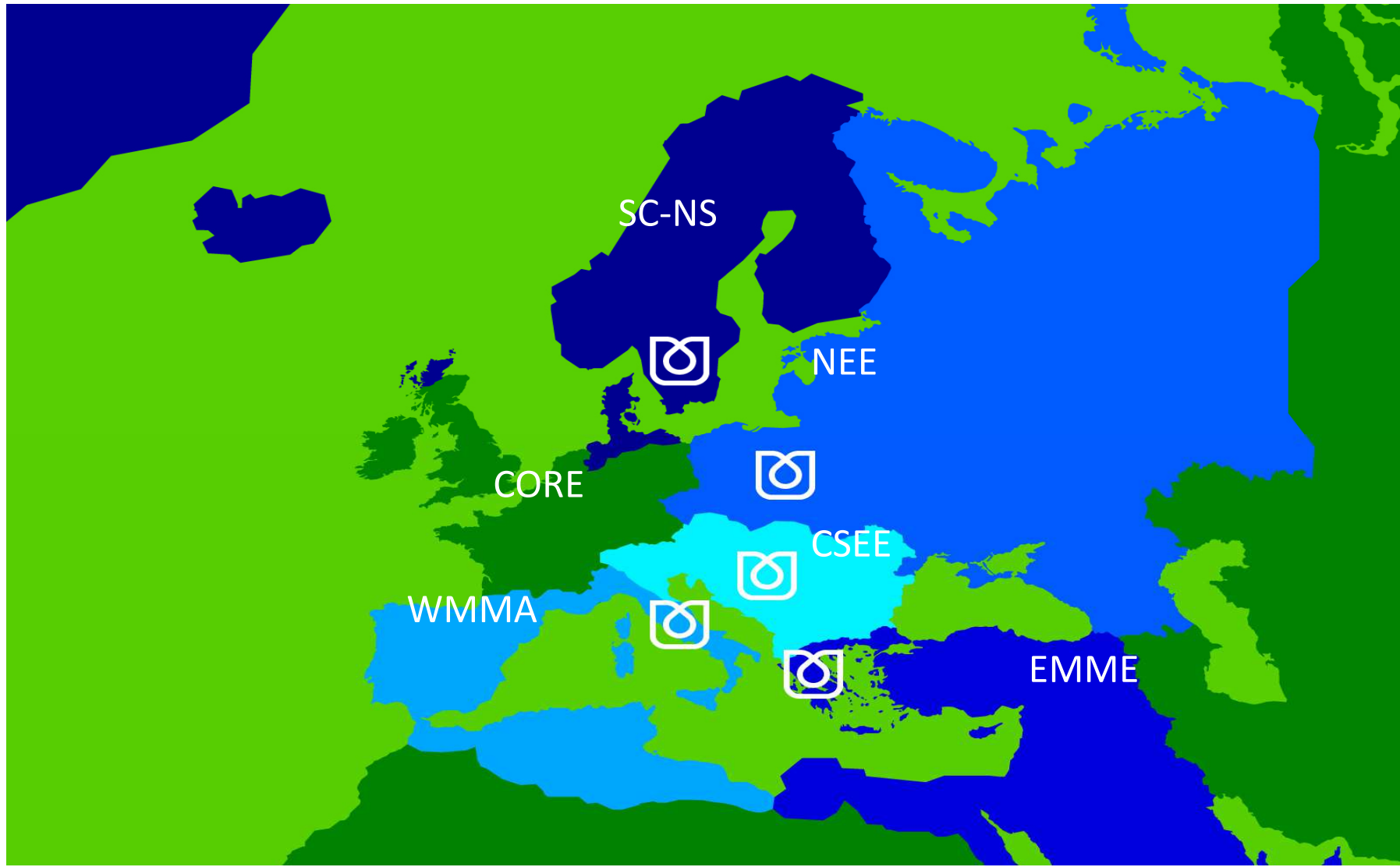
# Schematic of the BG regional networks





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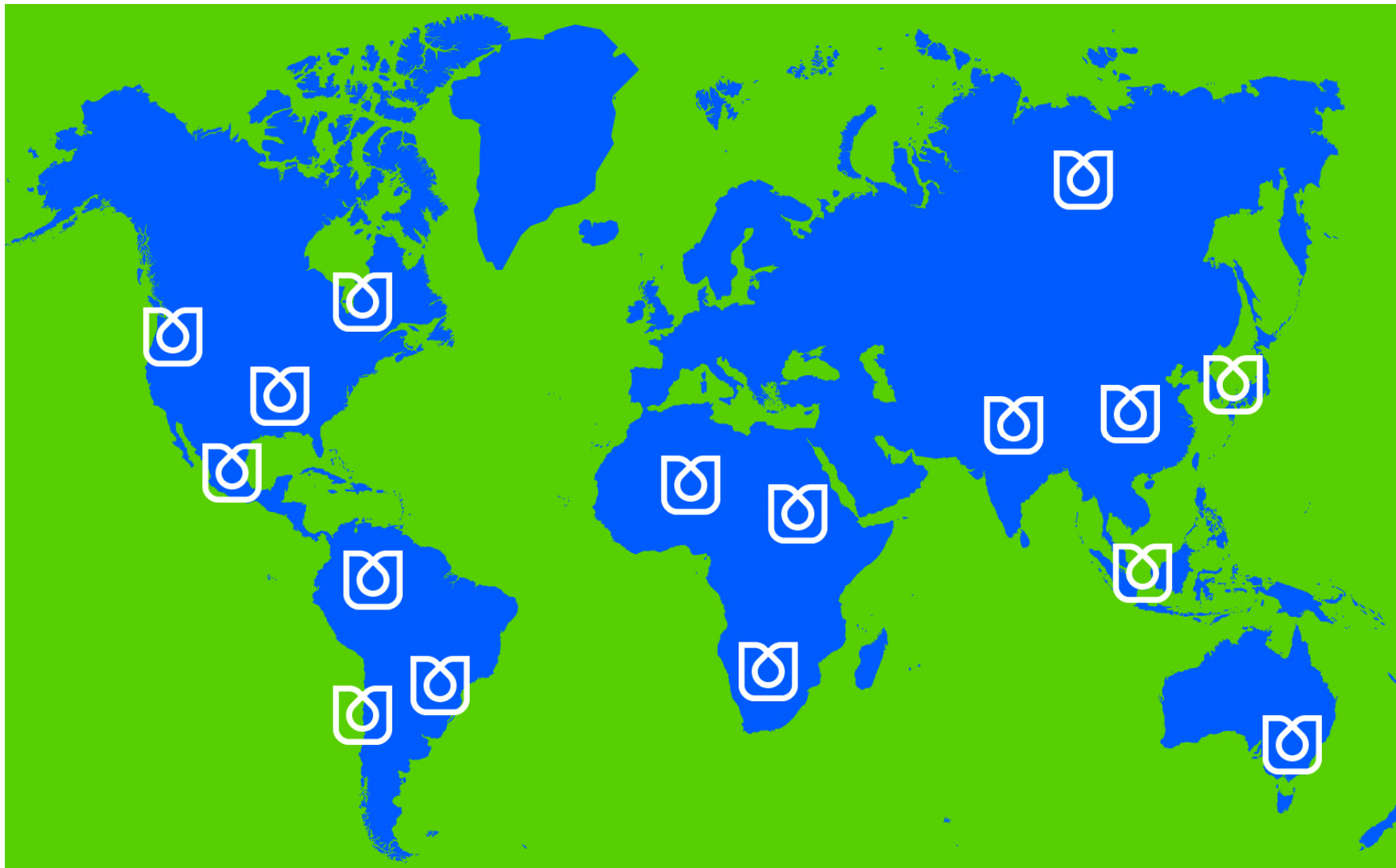
# BGD Regional centres in Europe





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## BGD Regions for Phase 3 – Global coverage

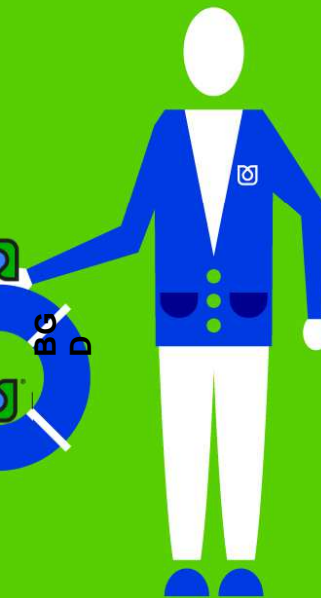
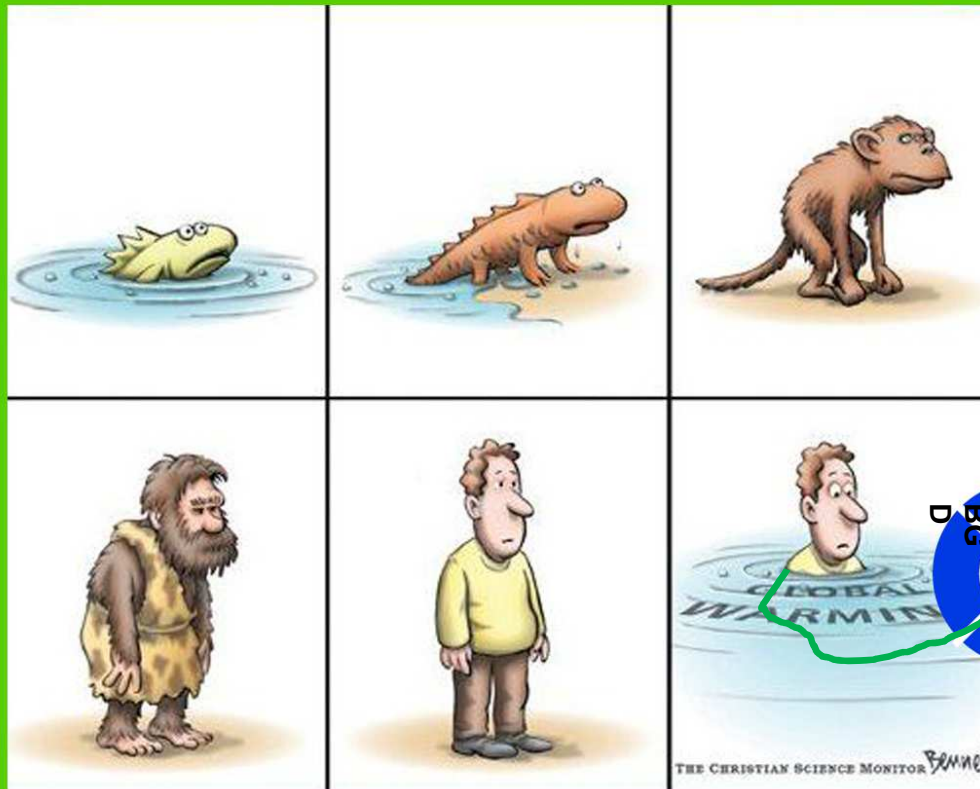






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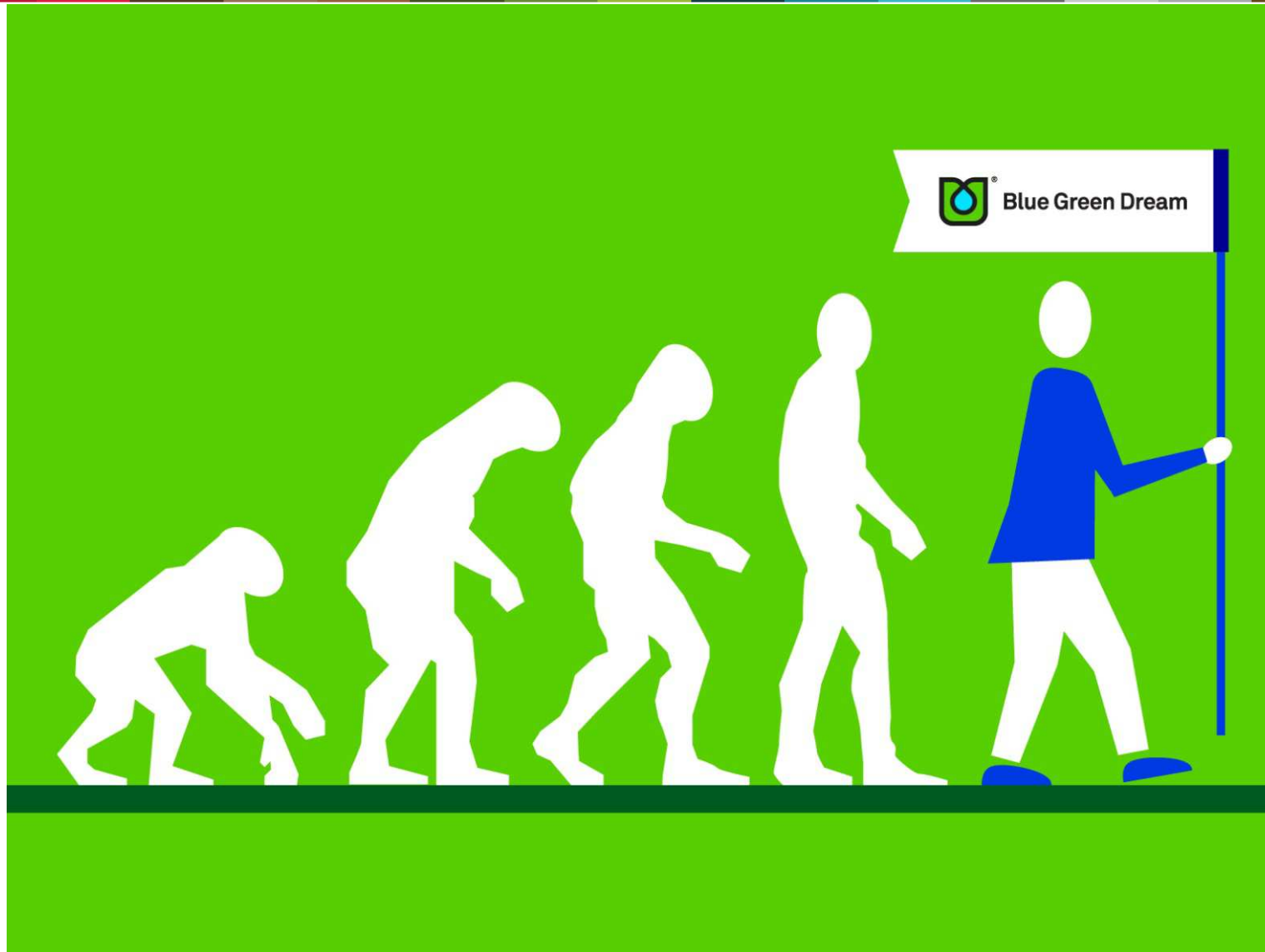
# IMPACTS OF CLIMATE CHANGE ON EVOLUTION ... AND MITIGATION





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## EVOLUTION ... BGD ... NEW ERA IN HUMAN CIVILISATION DEVELOPMENT





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