



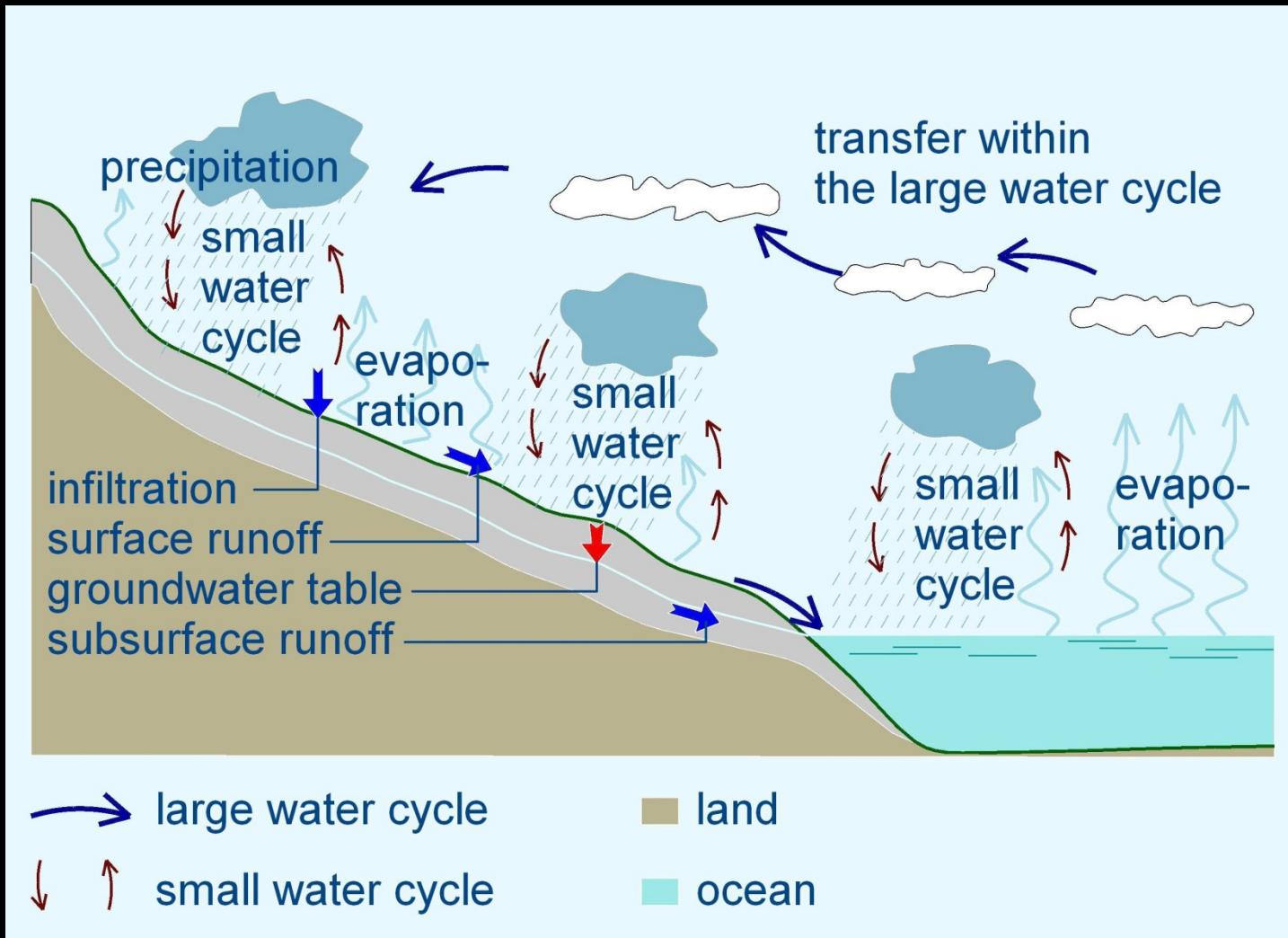
**Sommet Citoyen pour le Climat - Paris 5.12.2015  
Inondations, urbanisation et changement climatique en Europe**

**Marco Schmidt**  
Technische Universität Berlin  
Institute of Architecture  
„Phase Change“ working group

**Clive Ponting:  
The Green History of the World -  
Development and Collapse of Civilizations**



# Large and small water cycle





Sie befinden sich auf: » Kuras Projekt Startseite

## Konzepte für urbane Regenwasserbewirtschaftung und Abwassersysteme

Im Verbundforschungsvorhaben KURAS soll modellhaft untersucht werden, wie durch intelligent gekoppeltes Regenwasser- und Abwassermanagement die zukünftige Abwasserentsorgung, die Gewässerqualität, das Stadtklima und die Lebensqualität einer Stadt verbessert werden kann.

Am Beispiel von ausgewählten Stadtflächen in Berlin soll exemplarisch gezeigt werden, wie durch viele kleine im Stadtgebiet verteilte dezentrale Maßnahmen der Regenwasserbewirtschaftung wie Gründächer, Versickerungsmulden, Teiche und auch klassische Regenspeicher die Kanalisation entlastet und dabei das Stadtklima verbessert werden kann. Weitere Untersuchungen haben die Auswirkungen des Klimawandels auf die Bewirtschaftung des Kanalnetzes im Fokus. Hier sollen Lösungen erarbeitet werden für zunehmend auftretende Probleme durch Unterbelastung der Kanäle durch länger werdende Trockenperioden bei

Suchbegriff

Suchen

NEWS



INIS-Statuskonferenz in  
Hamburg

KURAS-Poster zum Download

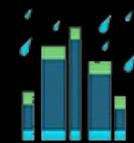
Ausstellung „Ökologische  
Gebäudekonzepte“ in  
Berlin

5. - 27. 11. 2014

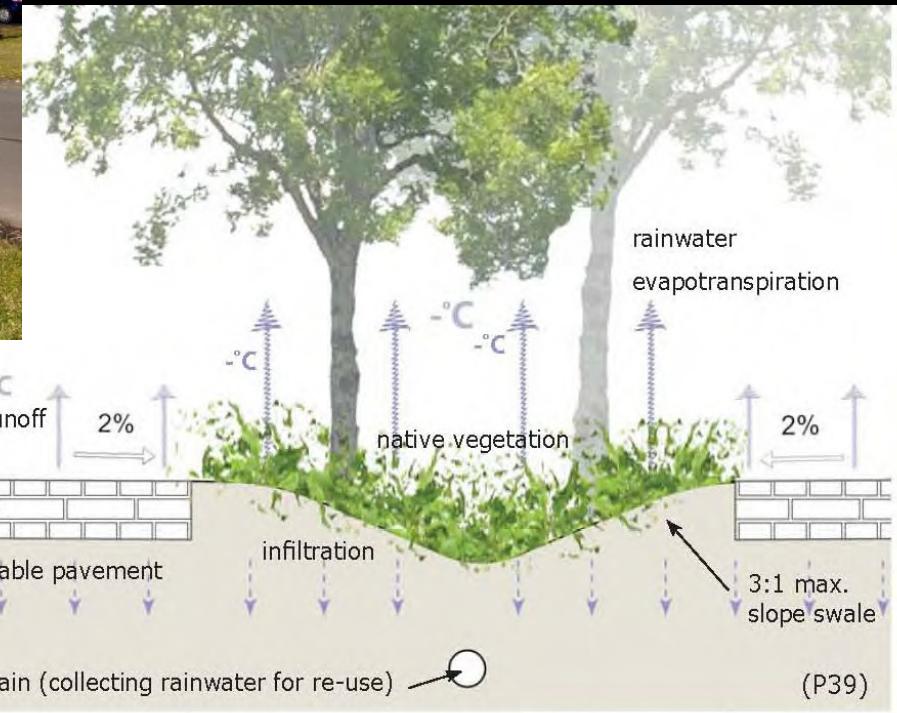
# Combination of measures:

## Infiltration with the goal of increase of evaporation via vegetation



 **kuras**

[www.jm-urbandesign.com](http://www.jm-urbandesign.com)



# Berlin 1983



# First Projects



**Program of careful urban renewal  
Block “108 Berlin-Kreuzberg”,  
Group “Ökotop” TU Berlin 1983**

# Berlin

**Current requirements by city administration and water supplier:**

**Maximum drainage into the combined sewer system of less than 33% of ist intensity**

**Background:**

**20-30 times per year overload of the combined sewer in Berlin**



## *Stormwater management by swale infiltration*

Increase of infiltration from  
100 l/m<sup>2</sup> to 4000 l/m<sup>2</sup>



**Not the first priority !**

**Infiltration needs to be  
combined with vegetation  
to increase evaporation !**

¿How much of the precipitation is converted to evaporation?

5 %

50 %

15 %

80 %

¿How much of the precipitation is converted to evaporation?

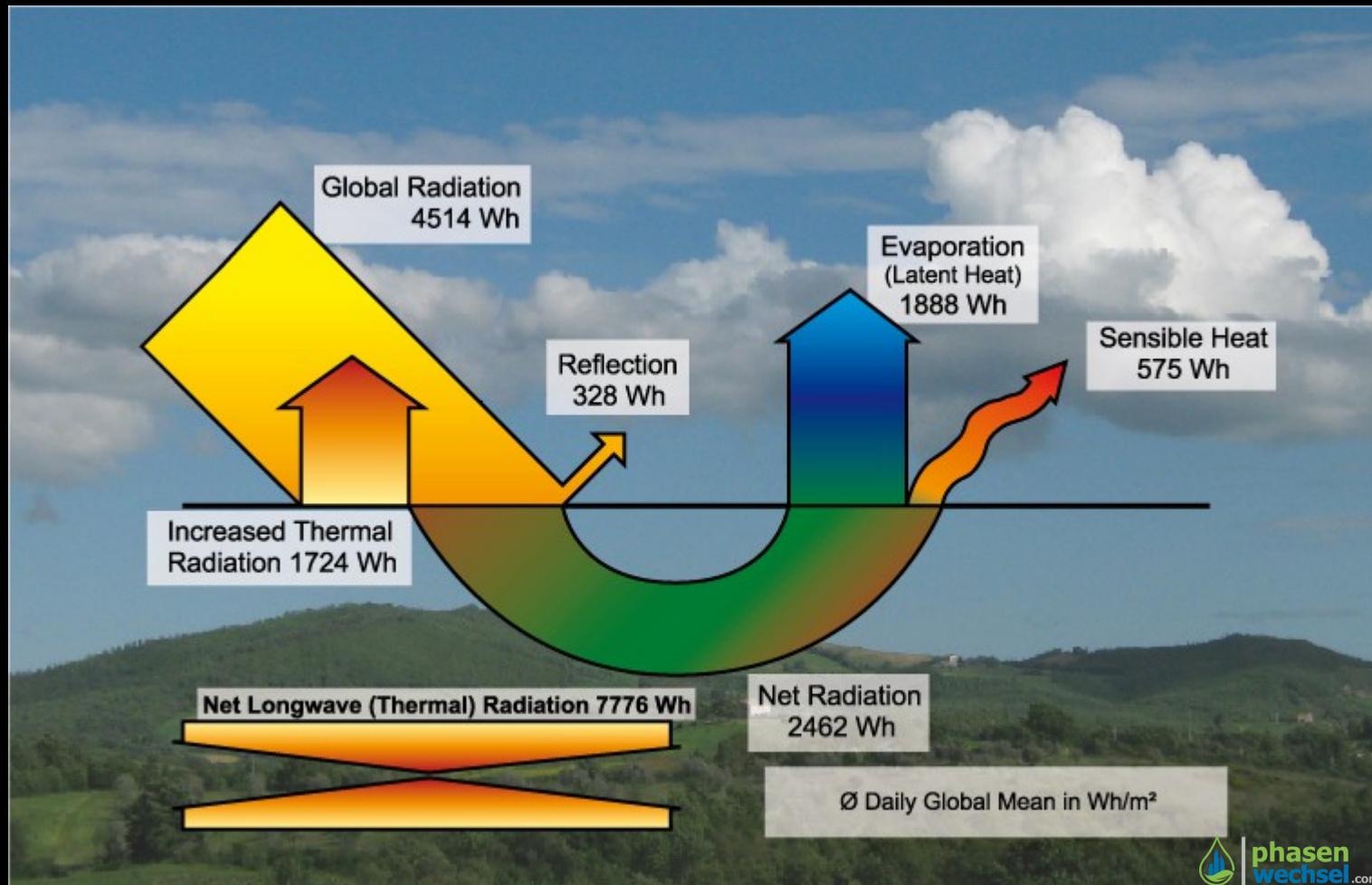
5 %

50 %

15 %

80 %

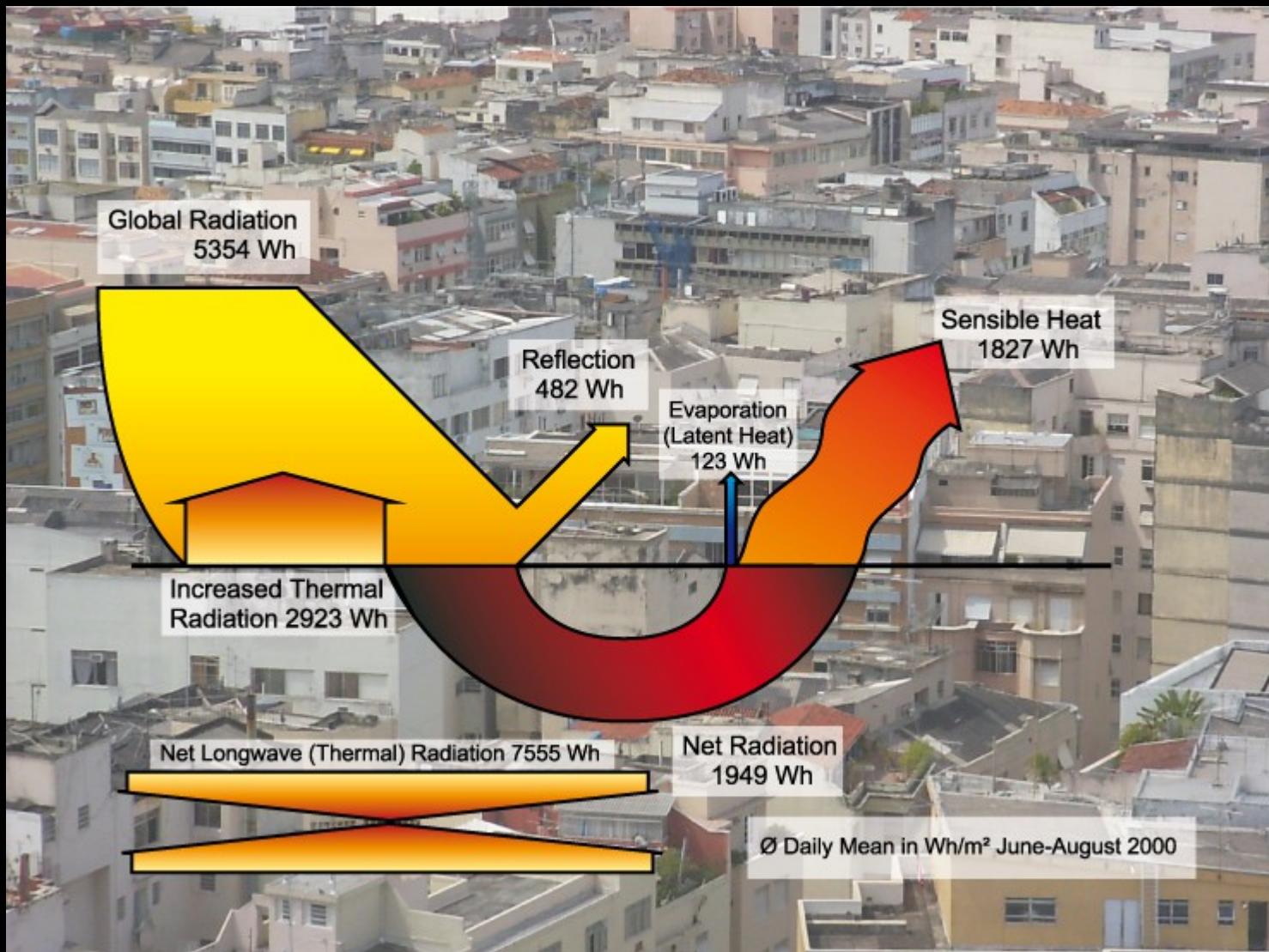
# Global Radiation Balance



Data after [physicalgeography.net](http://physicalgeography.net)

# Urban Radiation Balance

Example: Asphalt roof



Dramatic reduction in evapo-transpiration on land  
**Daily loss of  $800 \text{ km}^2$**  of vegetation worldwide

Daily deforestation rate:  **$450 \text{ km}^2$**

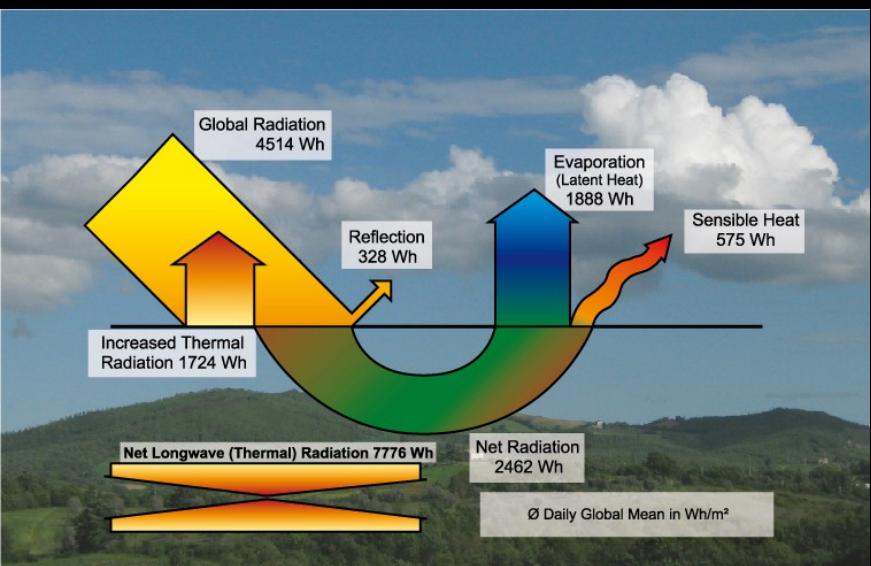
Daily reforestation:  **$100 \text{ km}^2$**

Net loss of forests daily:  **$350 \text{ km}^2$**

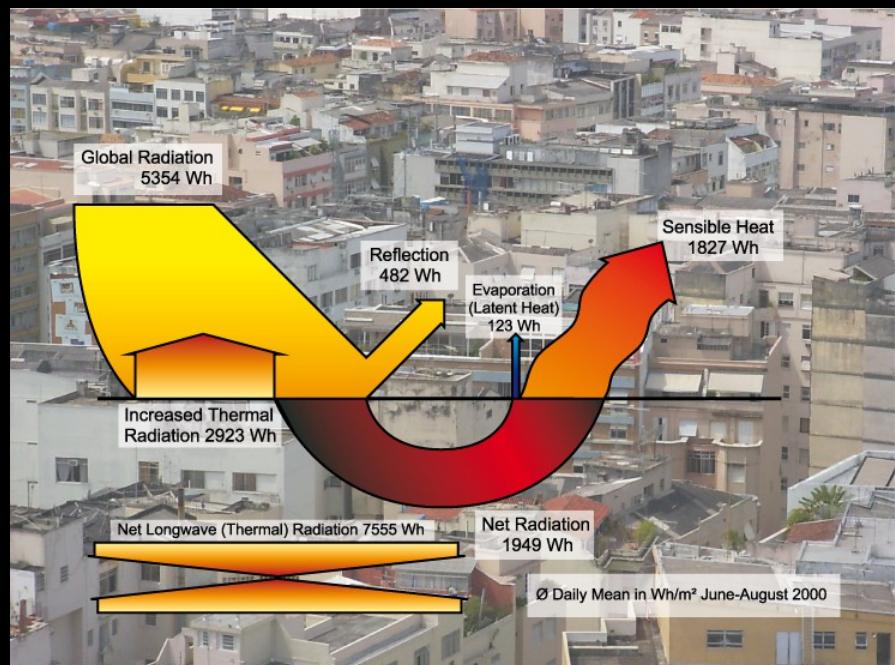
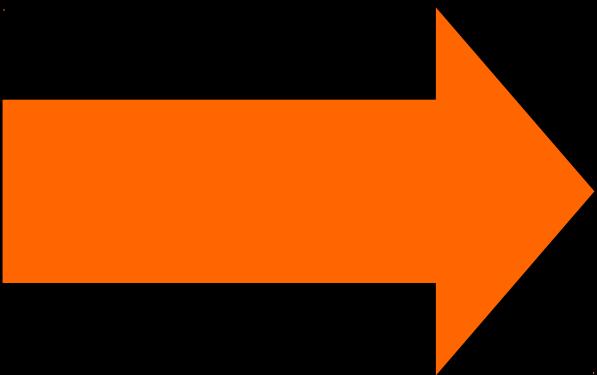
Daily ongoing global urbanization:  **$150 \text{ km}^2$**

Daily global desertification:  **$300 \text{ km}^2$**

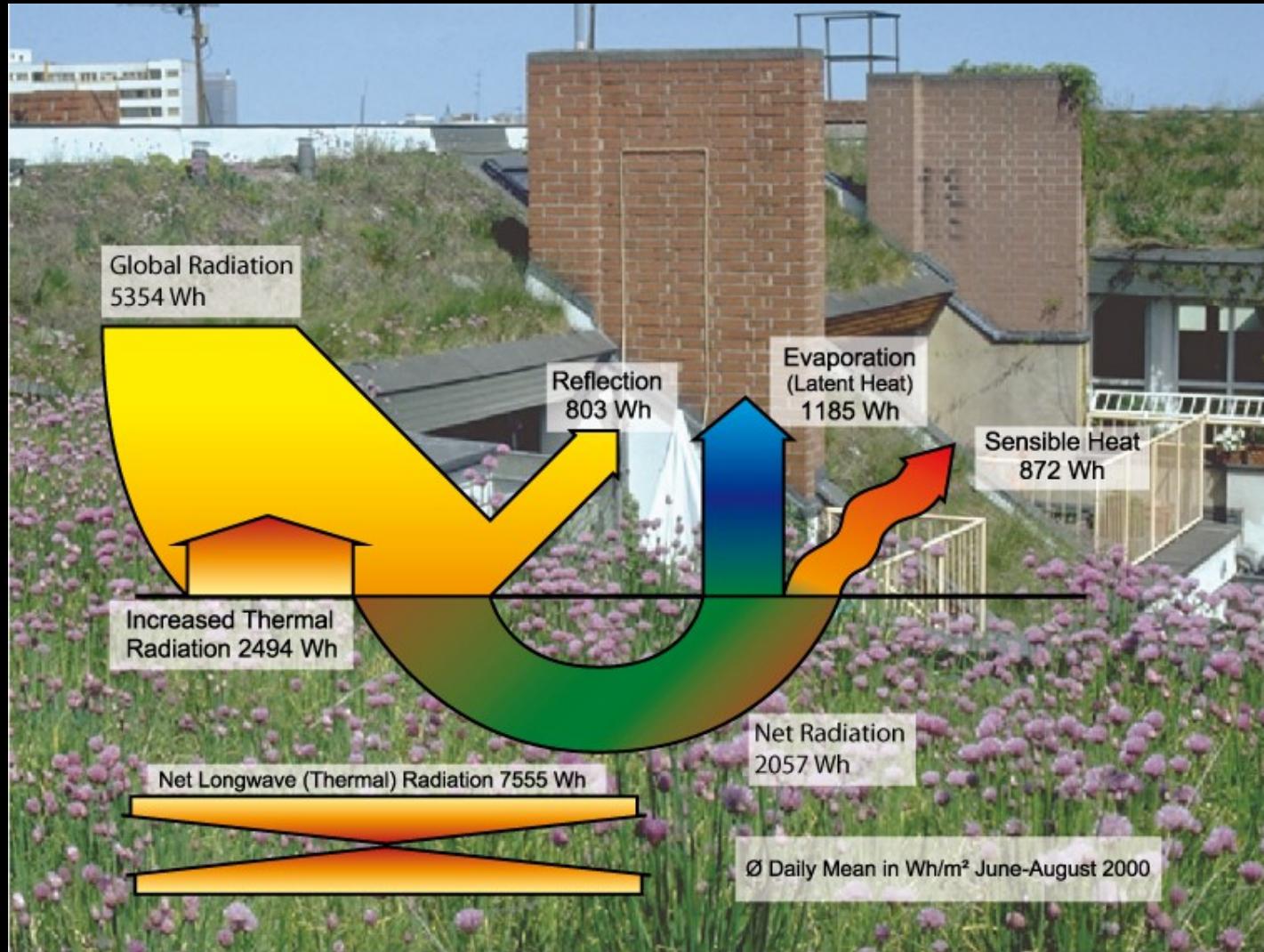
***Size of Berlin:  $890 \text{ km}^2$***



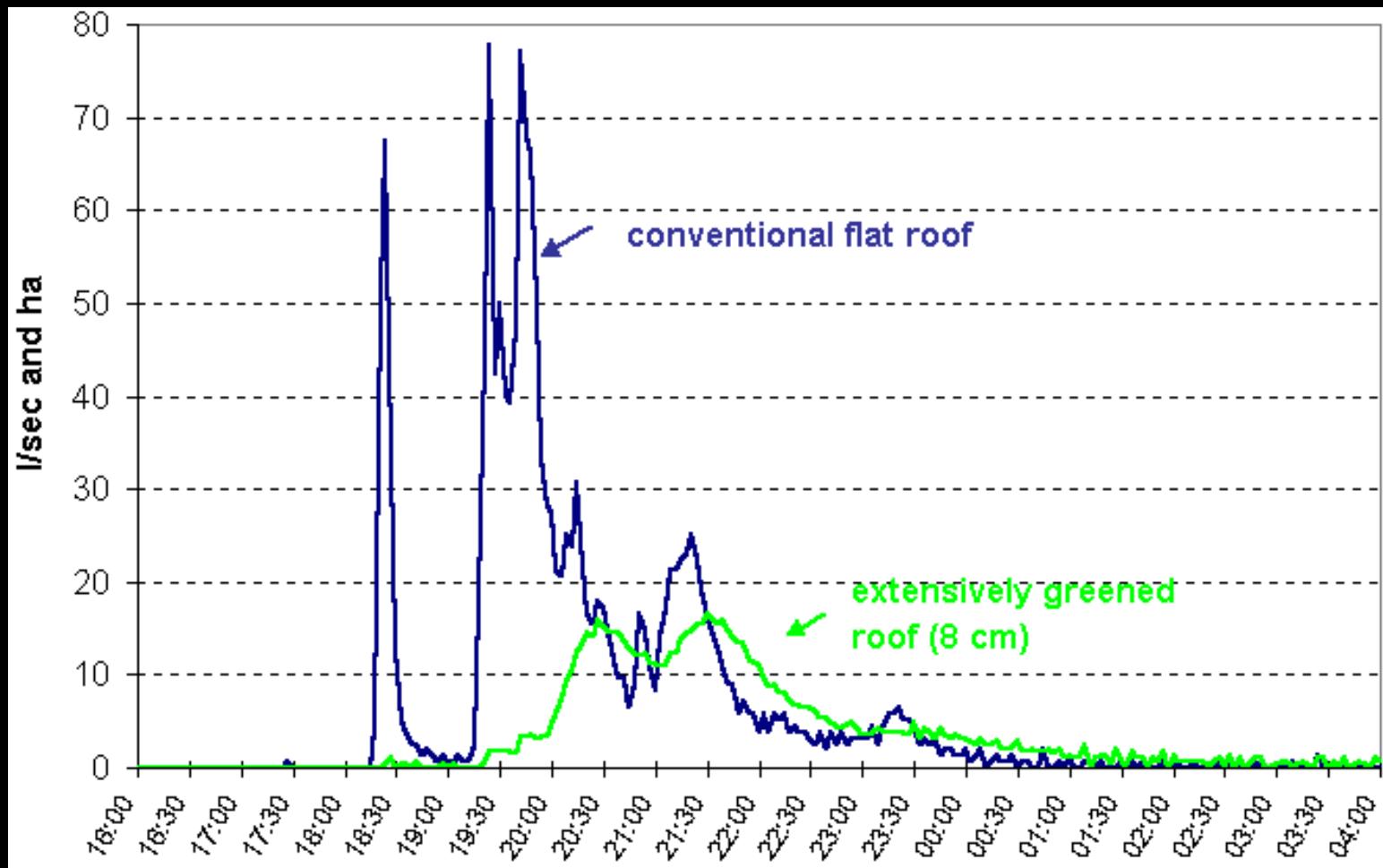
800 km<sup>2</sup>  
daily !



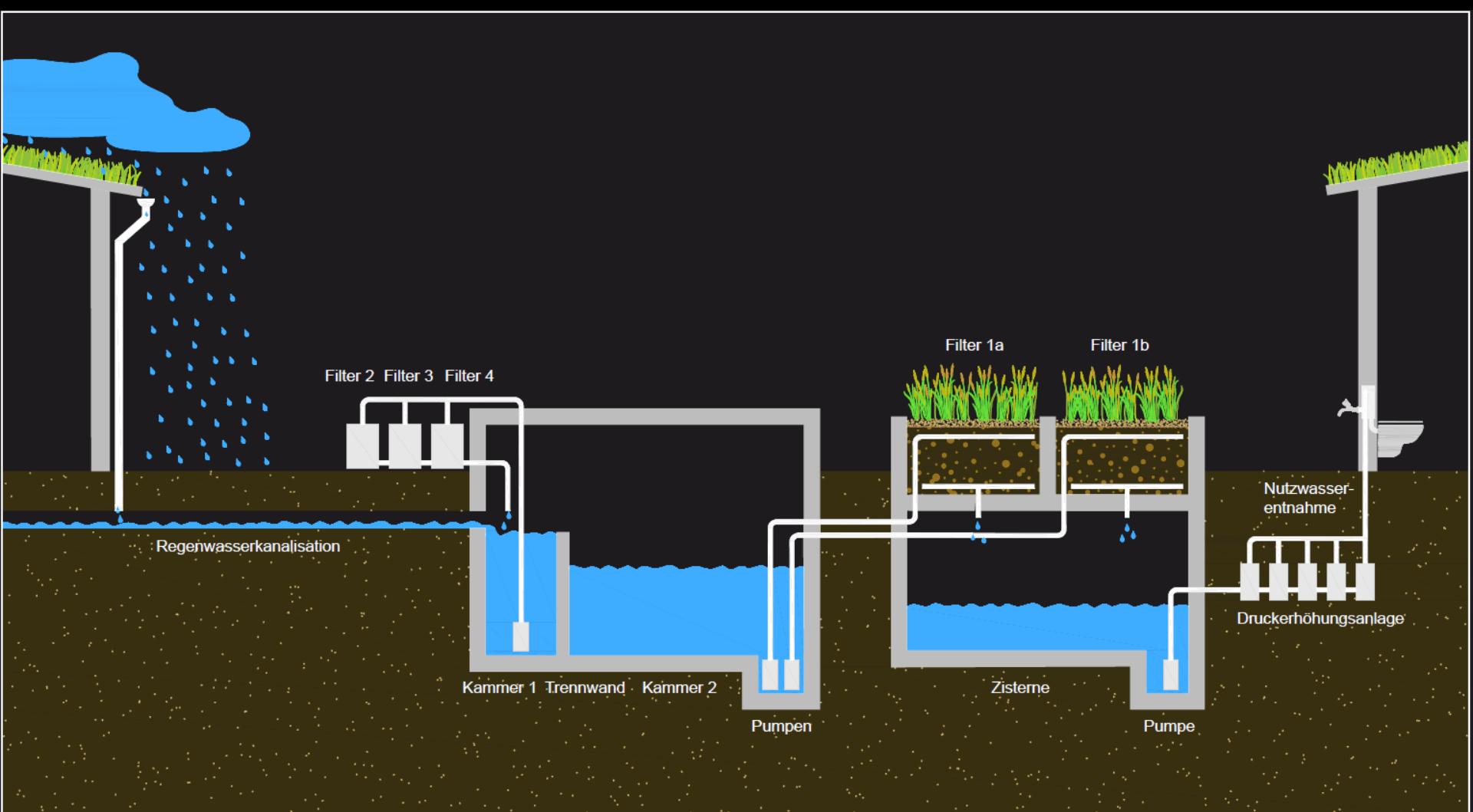
# Green Roof Radiation Balance



# Stormwater Runoff and Drain Delay of Green Roofs compared with Flat Bitumen Roofs



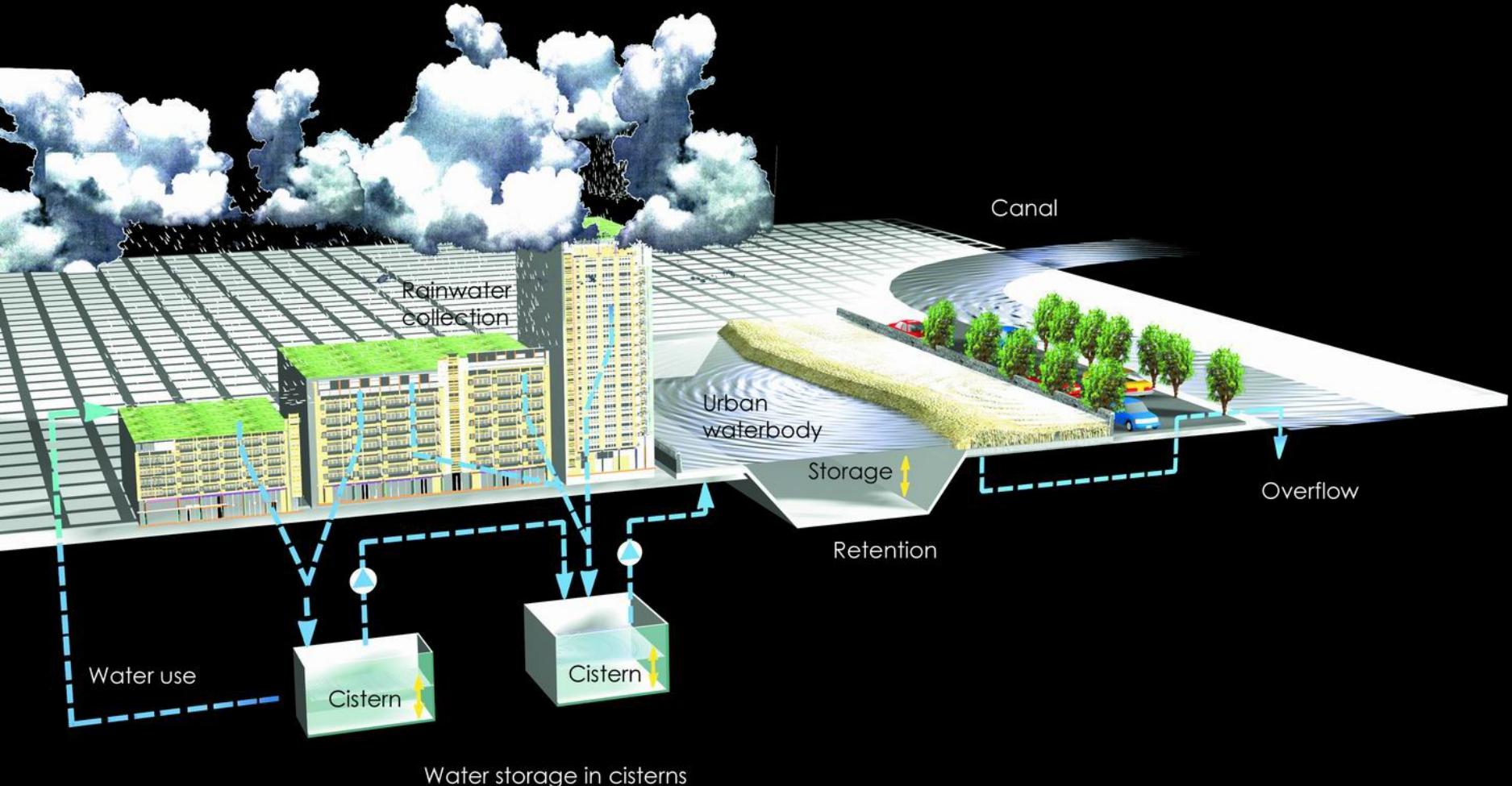
# Rainwater Harvesting „UFA Fabrik“





Potsdamer Platz, Berlin City Center

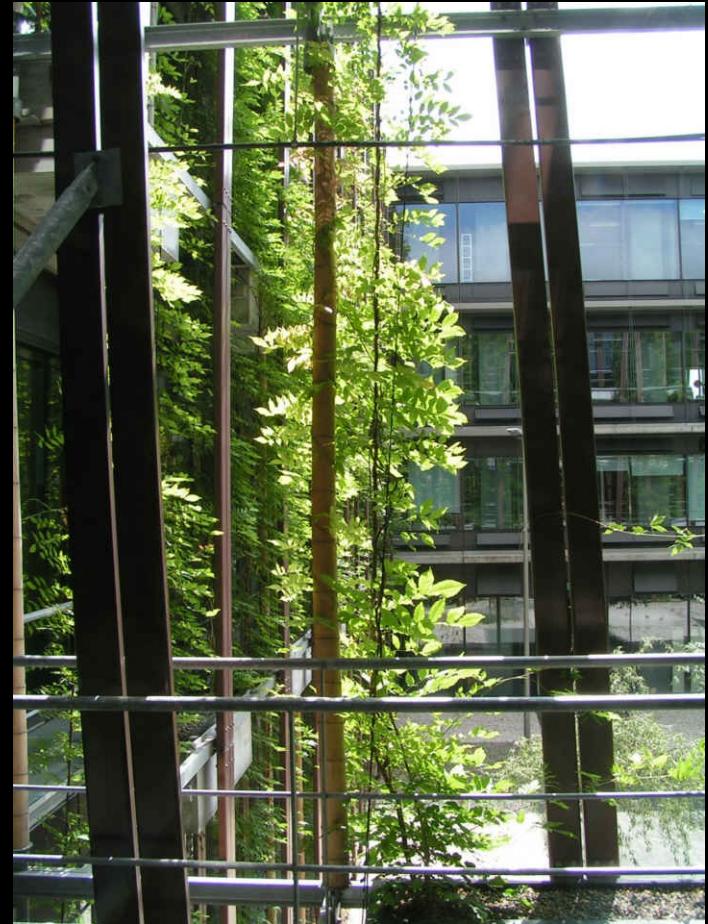
The water system in Berlins Potsdamer Platz  
Rainwater management



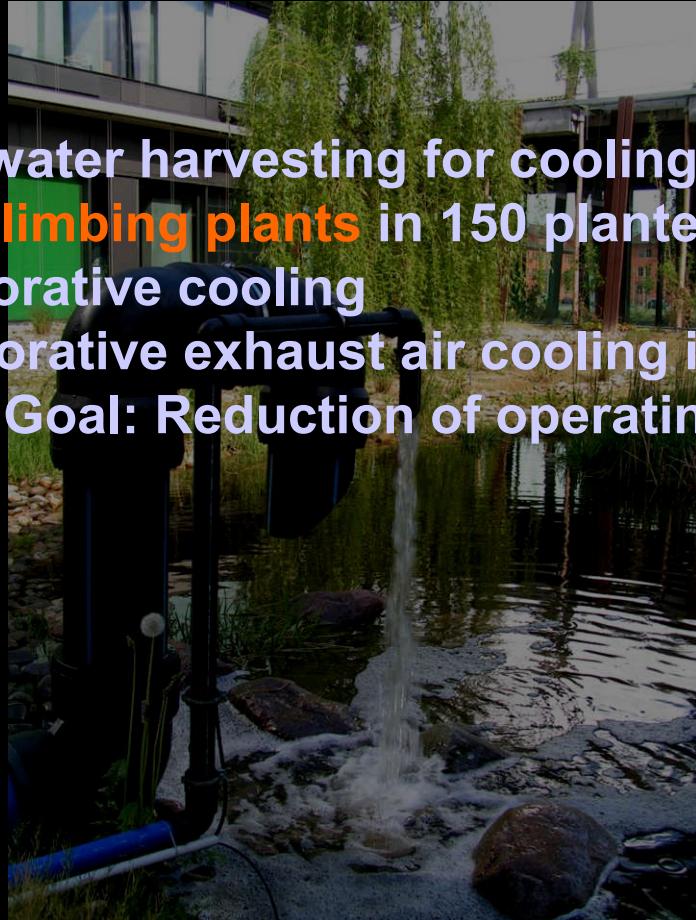
**Architects:** Renzo Piano, Kohlbecker u.a.  
**Landscape Architects:** Krüger/ Möhrle, Daniel Roehr, Berlin  
**Urban Lake:** Atelier Dreiseitl, Überlingen



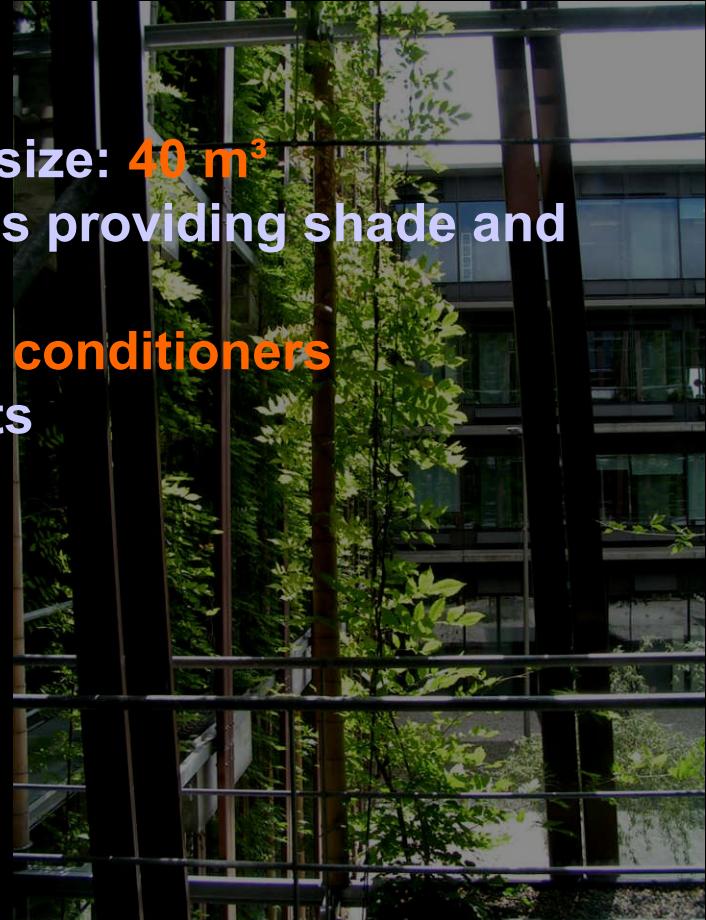
# Institute of Physics, Humboldt- University Berlin



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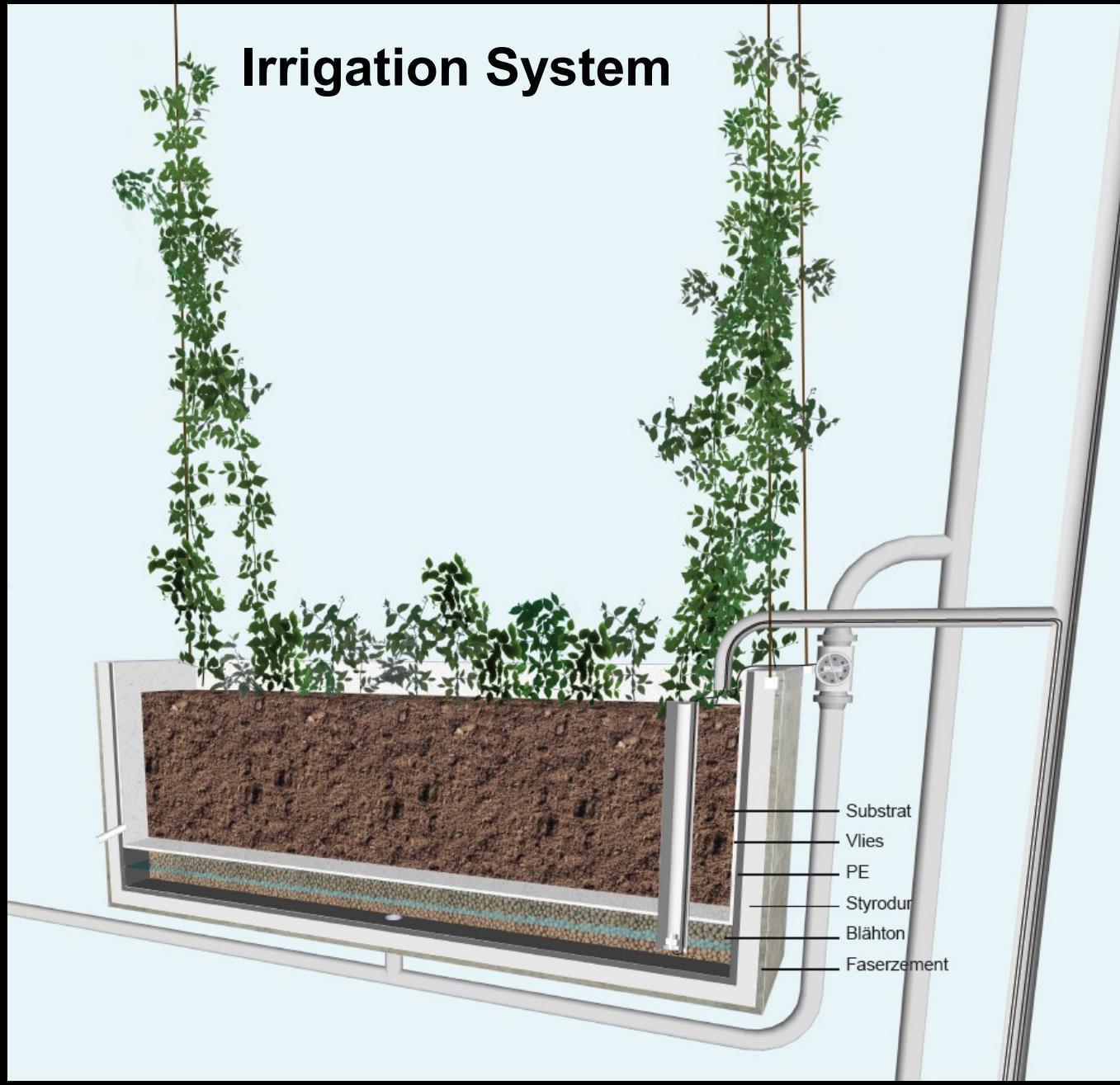


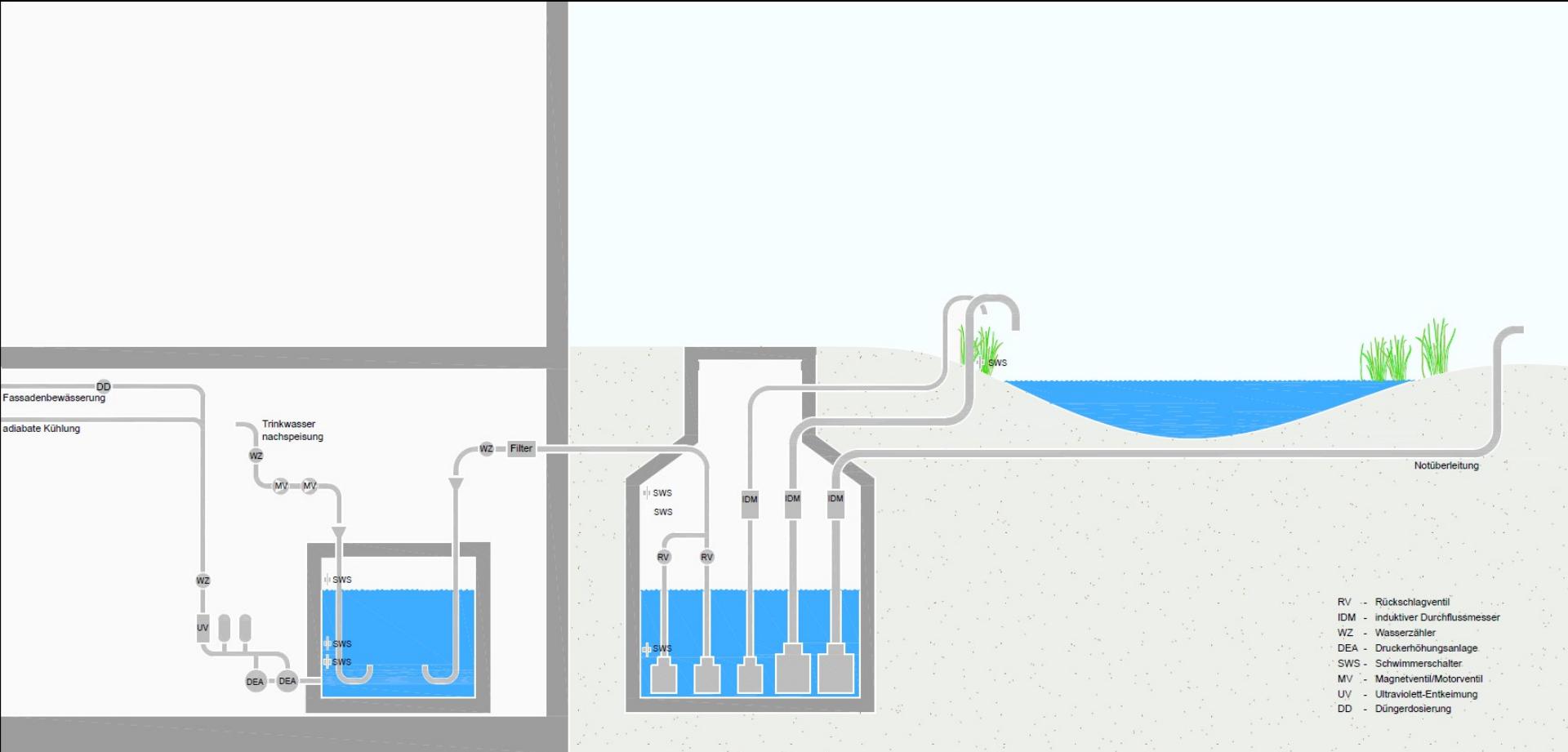
Rainwater harvesting for cooling, tank size: **40 m<sup>3</sup>**  
**450 climbing plants** in 150 planter boxes providing shade and evaporative cooling  
Evaporative exhaust air cooling in **8 air conditioners**  
Main Goal: Reduction of operating costs





# Irrigation System







# Costs for Cooling

$1 \text{ g H}_2\text{O}: 2450 \text{ J} = 2450 \text{ Ws}$  a  $100^\circ\text{C}$

$1 \text{ m}^3 = 2720 \text{ MJ} = 700 \text{ kWh}$  a  $45^\circ\text{C}$

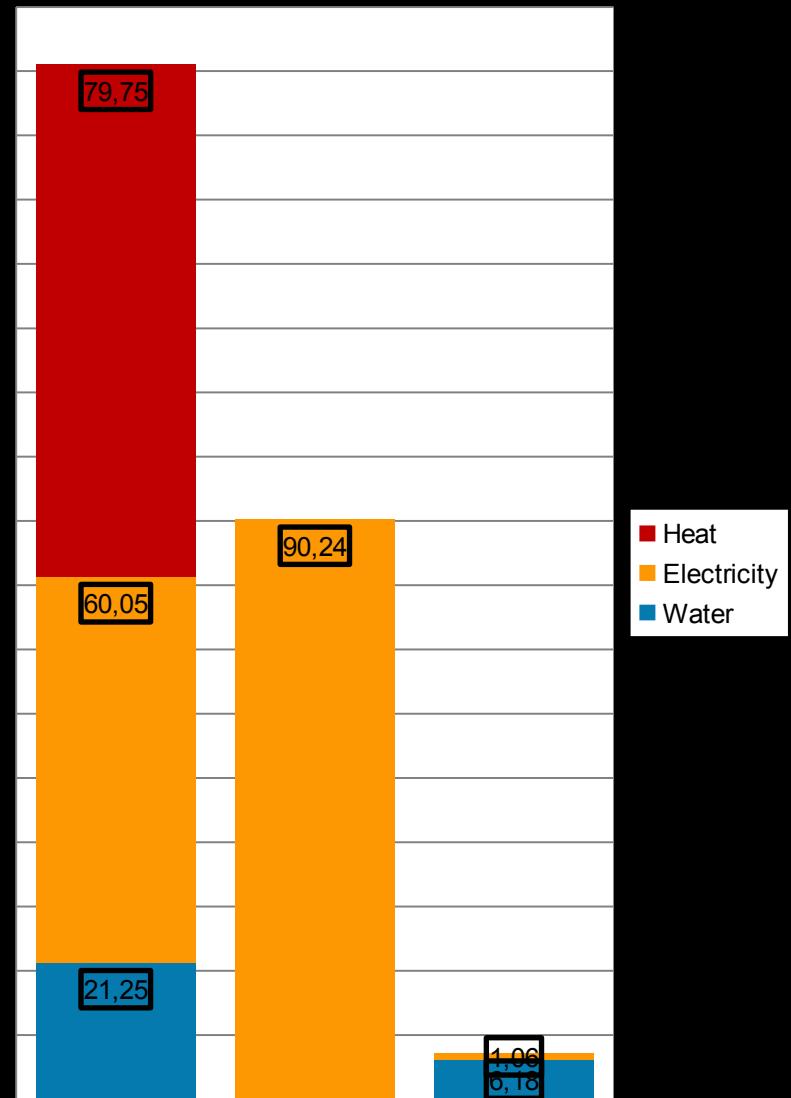
**Adiabatic:** **6,69 € (0,128 €/kWh)**

**Compression:** **90,24 €**  
**(0,128 €/kWh COP 2,05)**

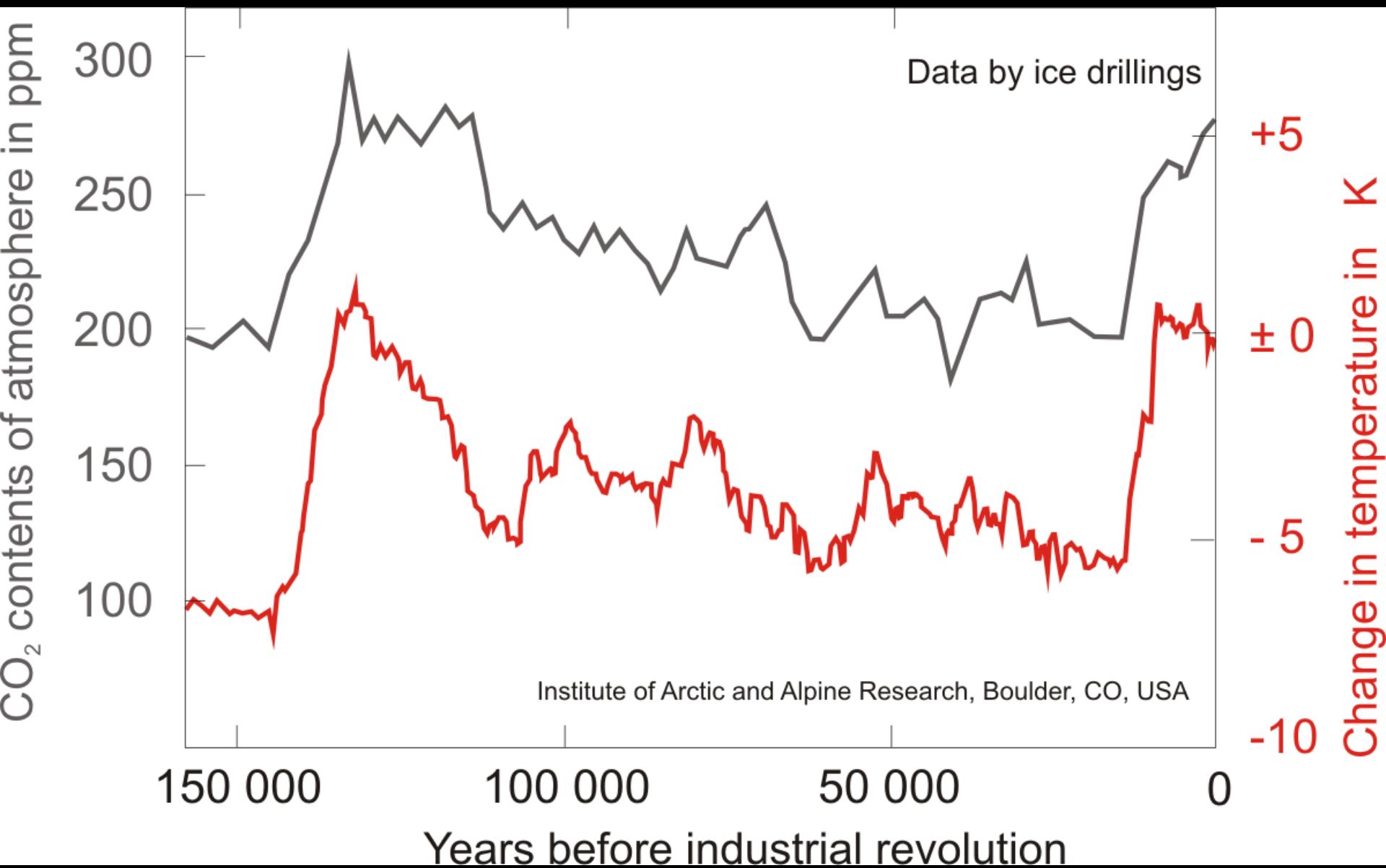
**Absorption:** **162,05 €**  
**(0,0329 €/kWh WZ 0,47)**

Use rainwater instead of tap water!

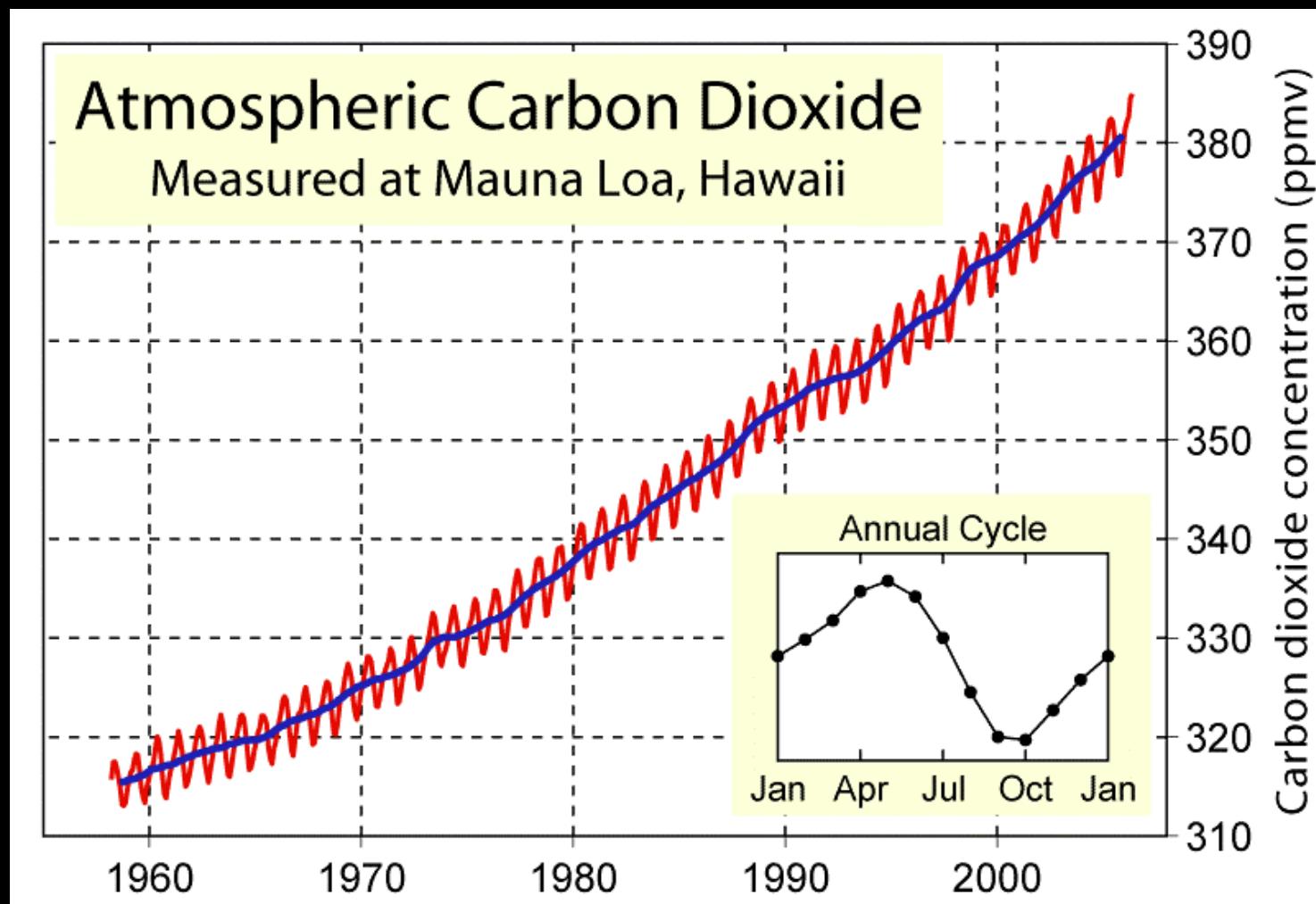
Rainwater  
Tap water





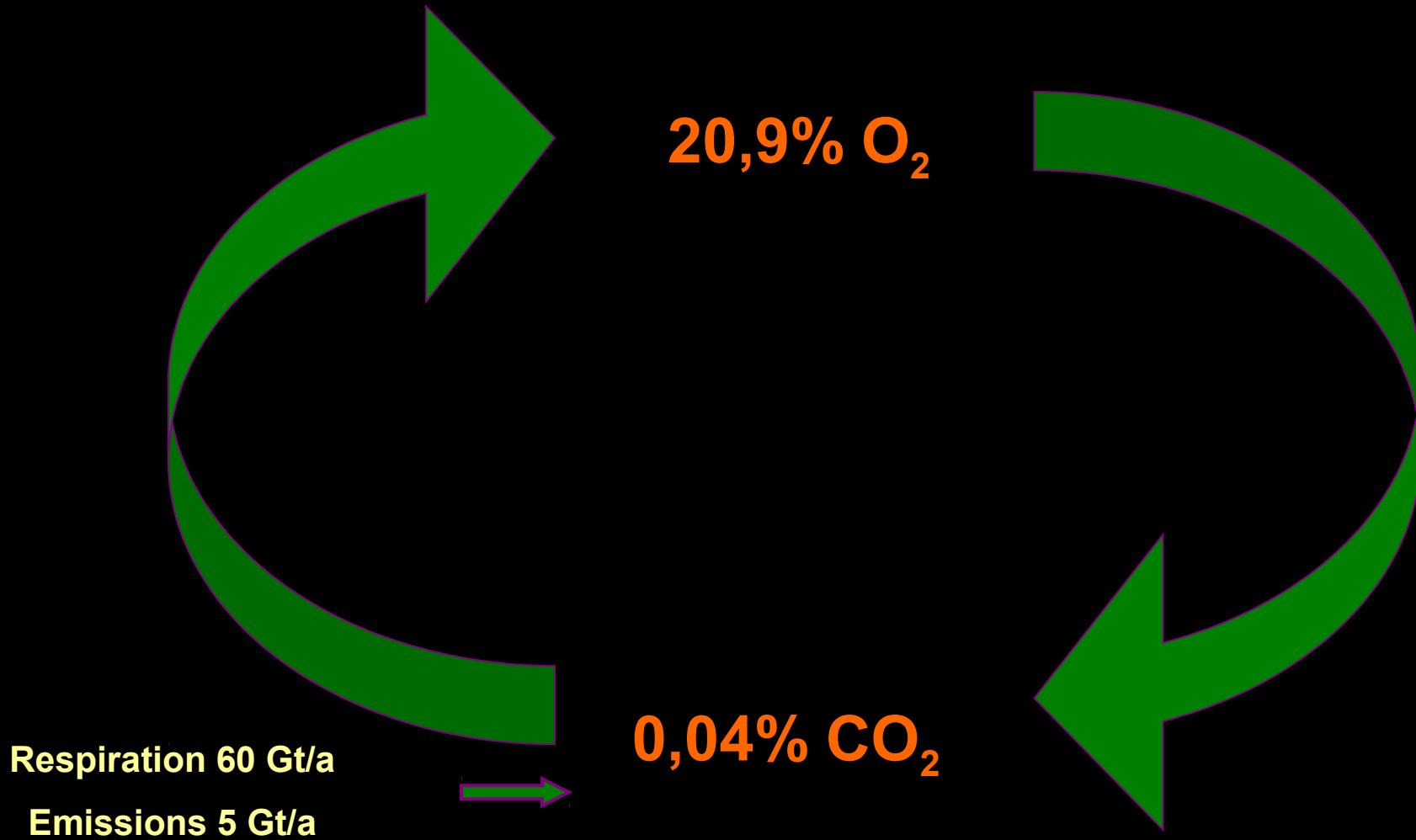


# Why does CO<sub>2</sub> correlate with the global temperature ?



# Wrong Paradigm !

Photosynthesis is the driving process for the relation between O<sub>2</sub> and CO<sub>2</sub> in the atmosphere





# Renewable Biomass ?



## Water for the Recovery of the Climate - A New Water Paradigm



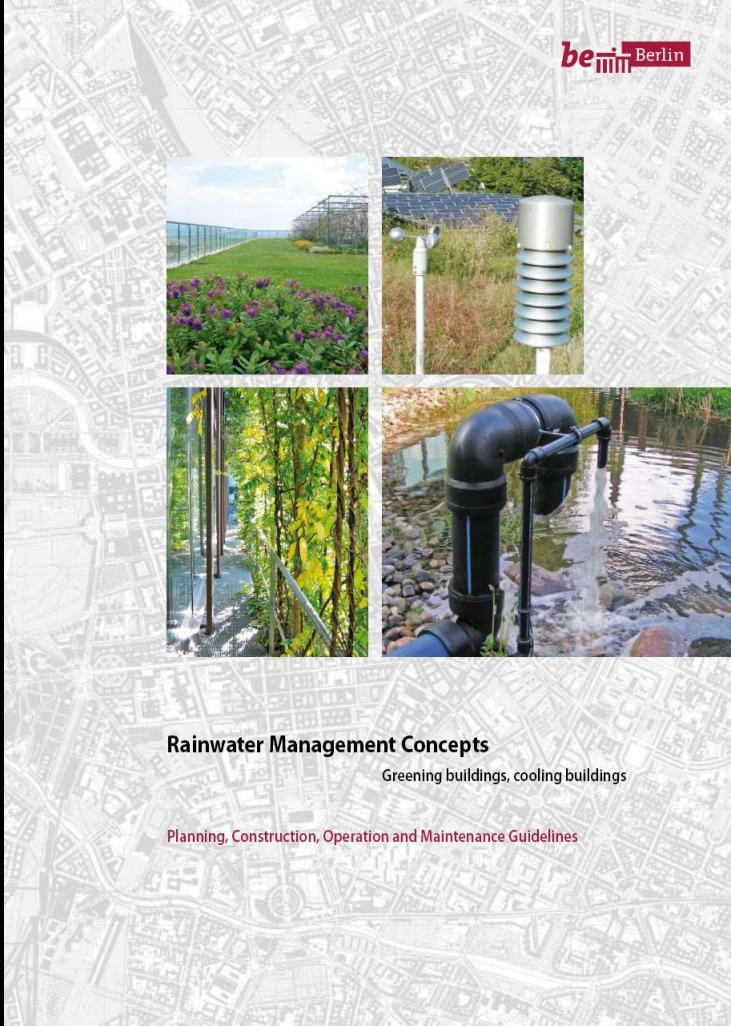
M. Kravčík, J. Pokorný, J. Kohutiar,  
M. Kováč, E. Tóth

1

### Rainwater Management Concepts

Greening buildings, cooling buildings

Planning, Construction, Operation and Maintenance Guidelines





Thank you for your attention !

<http://www.gebaeudekuehlung.de>

<http://www.watergy.de>

<http://www.waterparadigm.org>

<http://www.phasenwechsel.com>

<http://www.enob.info>

<http://www.kuras-projekt.de>



**phasen  
wechsel**.com



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