KONFERENCE

počítáme s vodou

POČÍTÁME S VODOU 2015

MEZINÁRODNÍ KONFERENCE O HOSPODAŘENÍ SE SRÁŽKOVÝMI VODAMI V ZASTAVĚNÝCH OBLASTECH

PRAHA·26·3·2015

Hospodaření s dešťovou vodou v kontextu adaptace a zmírnění změny klimatu

Marco Schmidt (Německo)

Technische Universität Berlin

www.enob.info

EnOB
Research for
Energy Optimized Building

Gefördert durch:
Bundesministerium für Wirtschaft und Energie
aufgrund eines Beschlusses des Deutschen Bundestages

EnOB: Research for energy-optimised construction

"Buildings of the future" is the guiding concept behind EnOB – research for energy-optimised construction (the name EnOB is an abbreviation of the equivalent German term Energieoptimiertes Bauen). The research projects sponsored by the German Federal Ministry of Economics and Technology involve buildings that have minimal primary energy requirements and high occupant comfort, with moderate investment costs and significantly reduced operating costs.

This requires sophisticated building concepts and innovative technologies. For this reason, EnOB places an emphasis on research and development in construction engineering and technical building equipment, such as low-exergy systems, building elements with vacuum insulation, or innovative glazing and facade systems. A second focus is on scientifically evaluating energy-optimised buildings. Therefore factors determining success and performance-related criteria are identified for designers, manufacturers and operators of buildings. Learn more about the various areas on which EnOB research is focussing, and about the testing of new concepts, technologies and materials in model projects.

read more

Net zero-energy buildings & co

Net zero-energy buildings and energy-plus buildings demonstrate just what is possible. With these buildings, a neutral annual energy balance can be achieved by integrating architecture, energy efficiency and renewable energy sources in a systematic manner. Projects, concepts, methods and an international survey are shown here ...

in detail

Energy plus child day care centre

The "Noah's Ark" is a child day care centre and energy-plus building, designed to generate more energy than its users will consume. The building concept includes not only a large photovoltaic system for generating energy but also several innovative systems and components for handling heat and electricity in an energy-efficient manner.

in detail

News

13. Nov 2013 - German Federal Ministry of Economics and Technology launches "School 2030" ideas competition

14. Oct 2013 - European energy-plus building prototypes dominate US competition

26. Sep 2013 - How do you get potting soil onto the roof?

all news

Events

20-21 March 2014 | Essen, Zeche Zollverein
EnOB Symposium 2014 "Innovations in the new-build and refurbishment sectors"

27-28 November 2013 | Würzburg
Workshop on high performance thermal insulation 2013

12-13 November 2013 | Stuttgart
3rd "Zukunftsraum Schule" Congress

all events

www.kuras-projekt.de

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

Berlin

Current requirements by city administration and water supplyer:

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

Background: 20-30 times per year overload of combined sewer in Berlin

Stormwater management by swale infiltration

Increase of infiltration from 100 l/m² to 4000 l/m²

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 %

??

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5 %

50 %

15 %

80 %

??

watergy

Water ⟷ Energy

www.watergy.de

www.watergy.eu

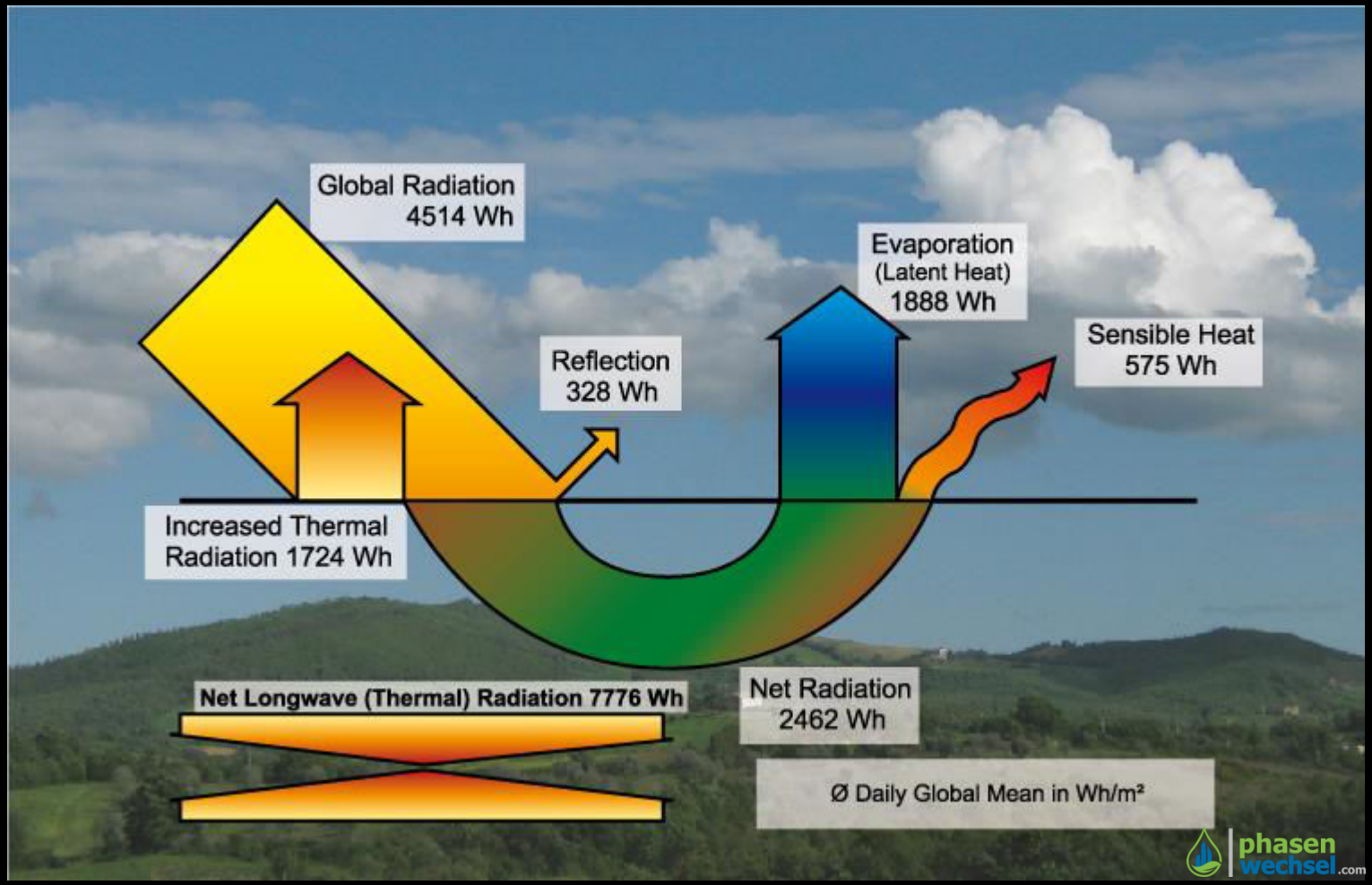
700 kWh/ m^3 at 45 °C

Water heated from 30 to 90°C = 70 kWh/m^3

Water ⟷ **Energy**

Phase Change Material (PCM) = 61 kWh/m^3

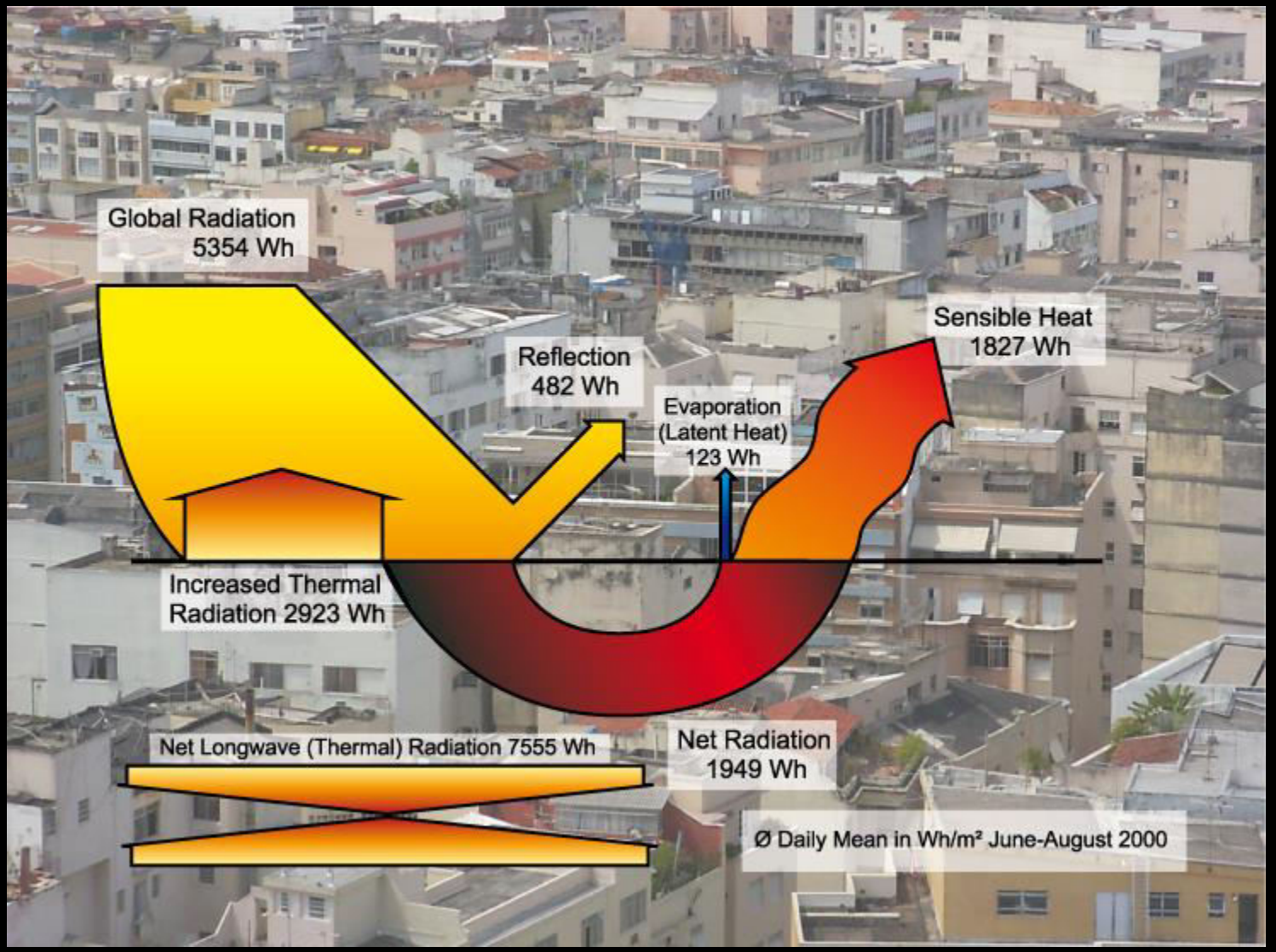
Global Radiation Balance



Data after physicalgeorgaphy.net

Urban Radiation Balance

Example: Asphalt roof

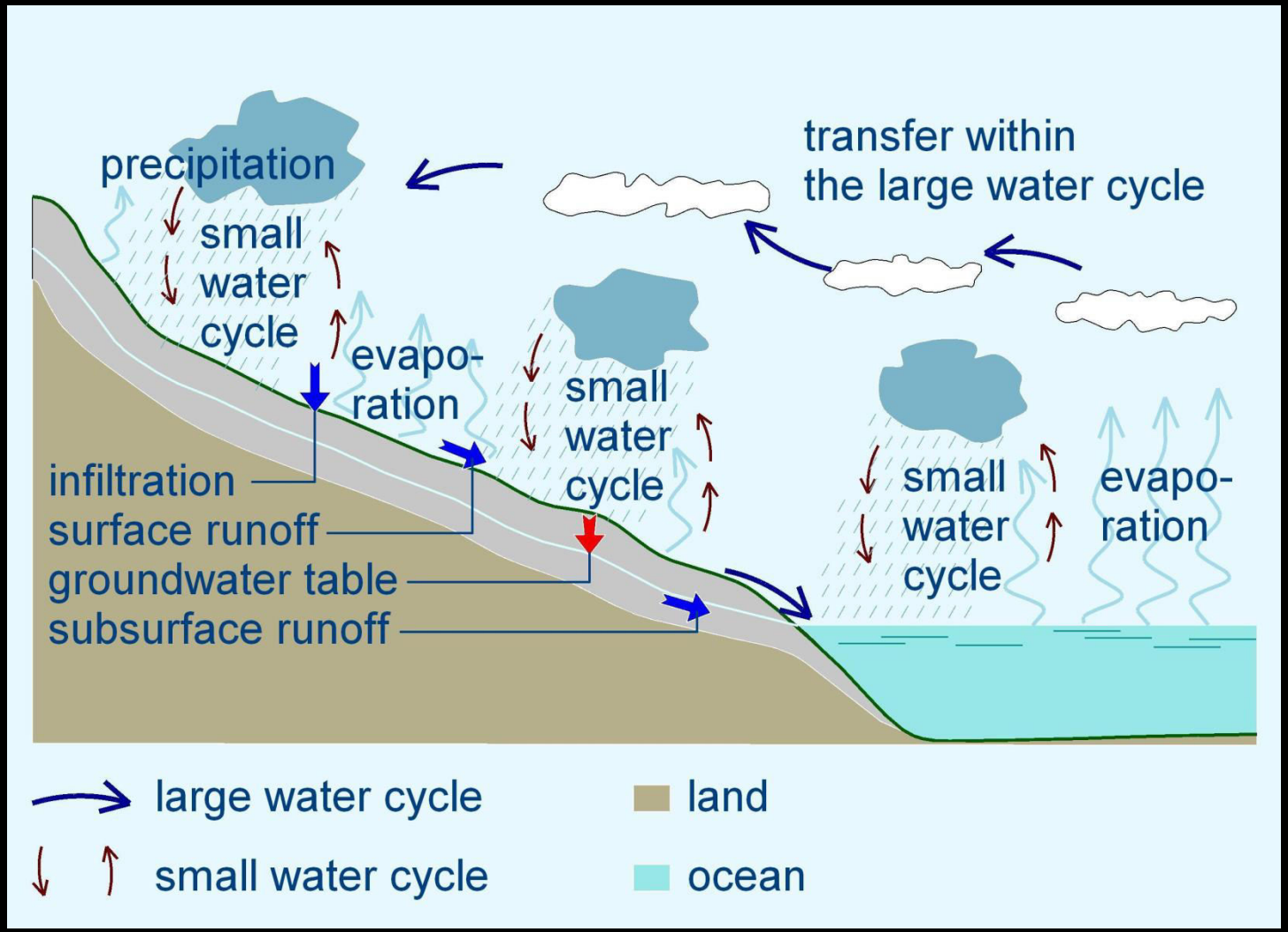


Dramatic reduction in evapo-transpiration on land
Daily loss of *800 km²* of vegetation worldwide

Daily deforestation rate:	*450 km²*
Daily reforestation:	*100 km²*
Net loss of forests daily:	*350 km²*
Daily ongoing global urbanization:	*150 km²*
Daily global desertification:	*300 km²*

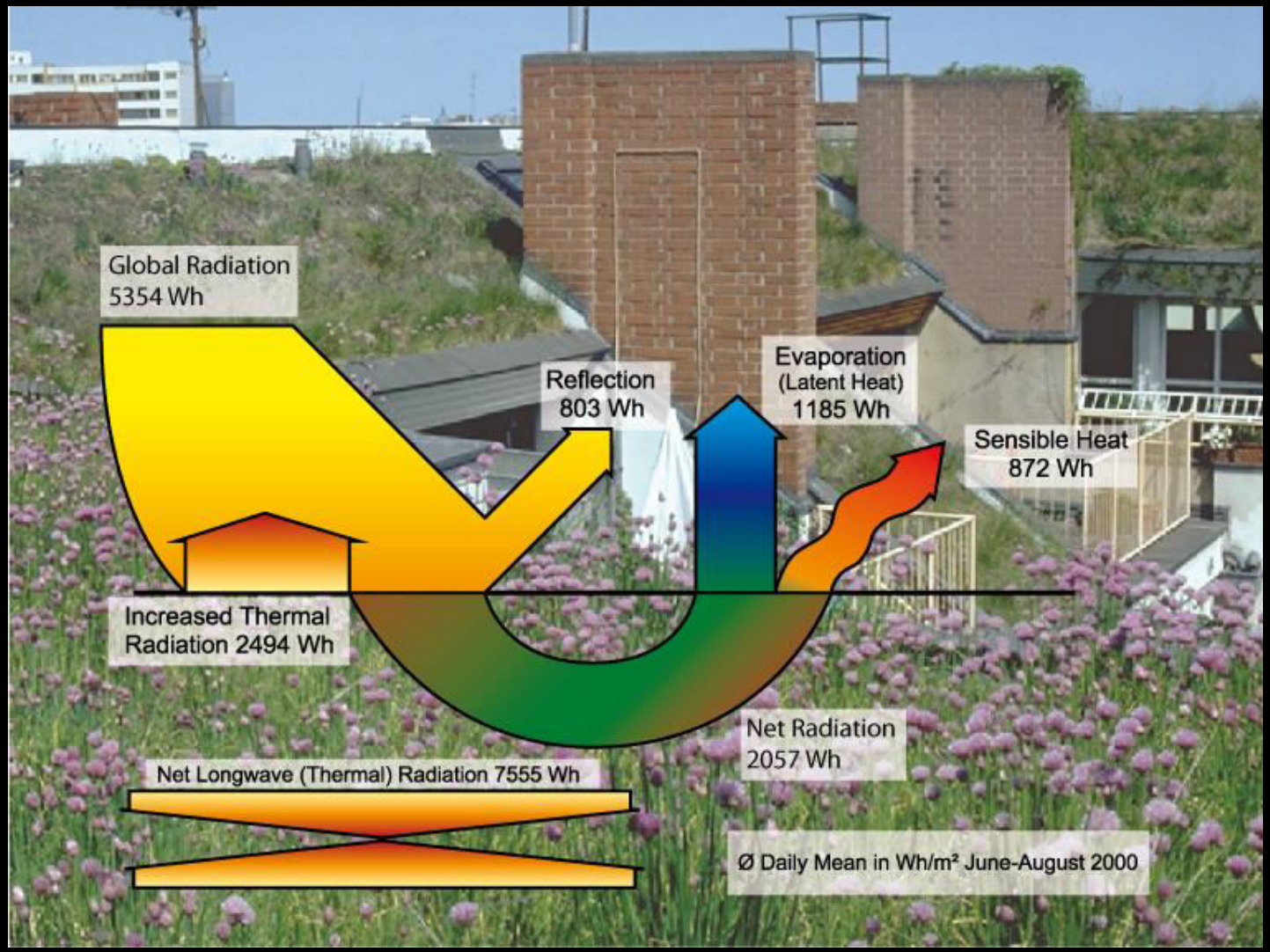
Size of Trebon: 98 km²

Large and small water cycle

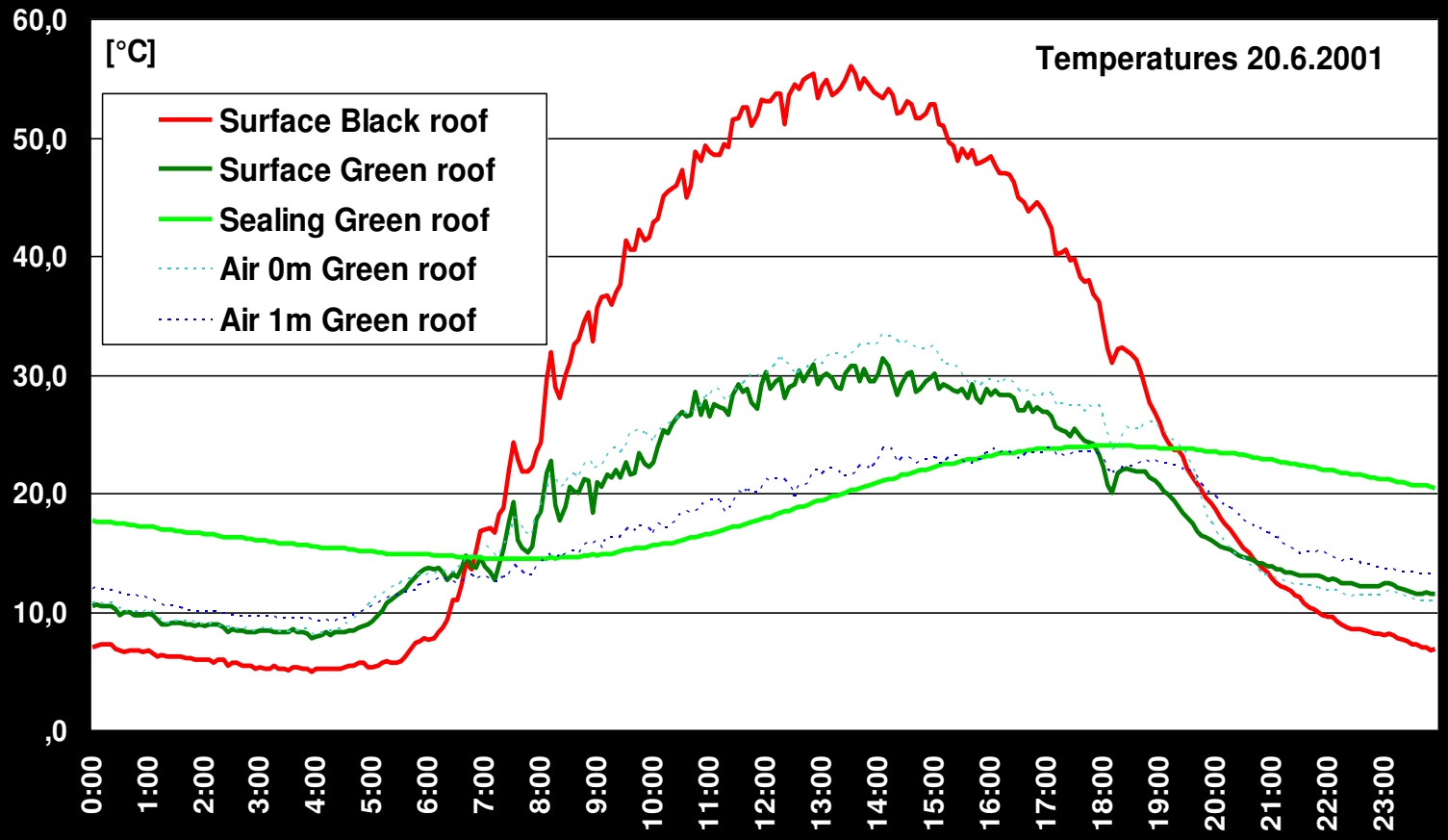


www.waterparadigm.org (Kravcik 2007)

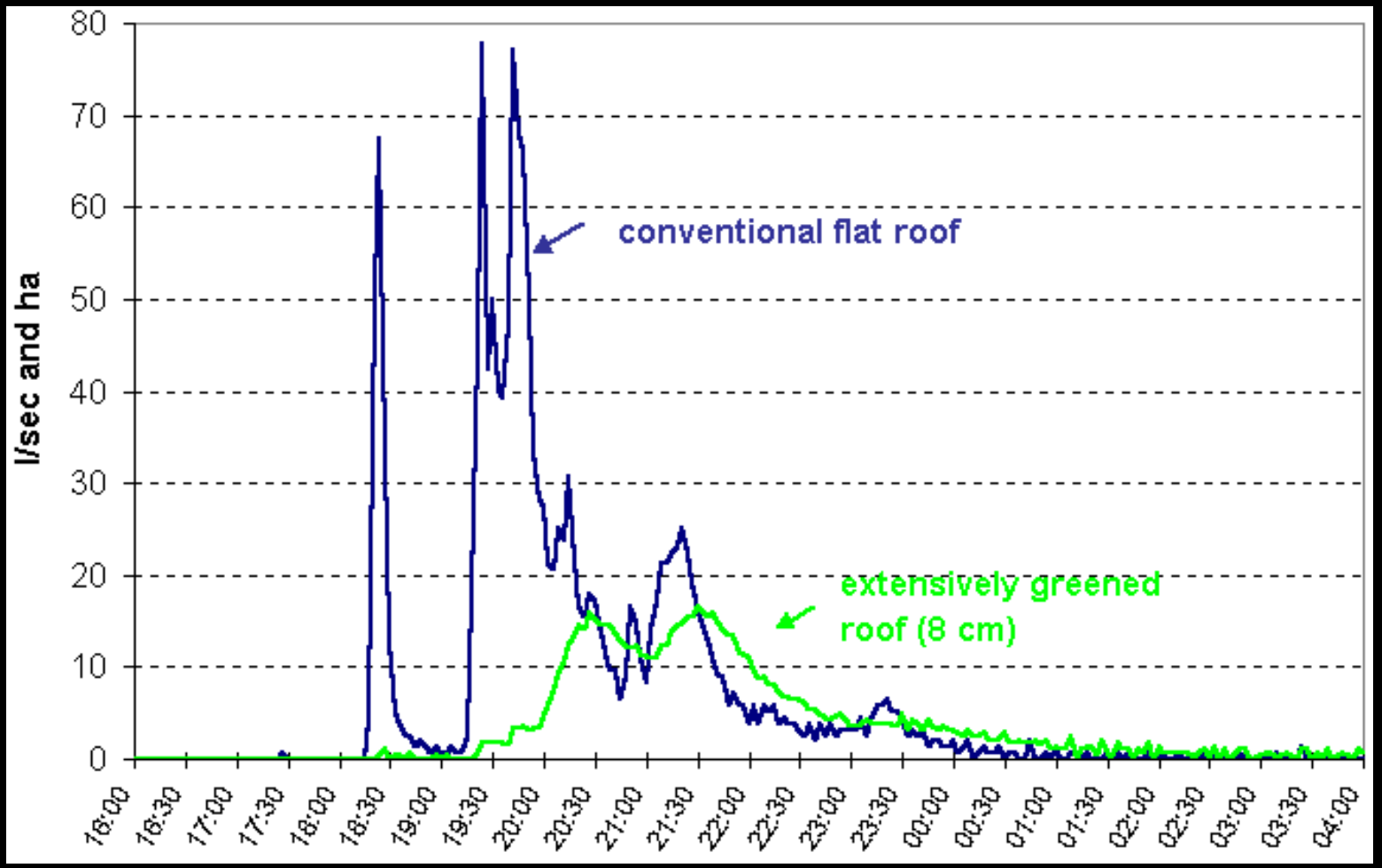
Green Roof Radiation Balance



Surface Temperatures
Asphalt Roof – Green Roof
(Infrared measurements)

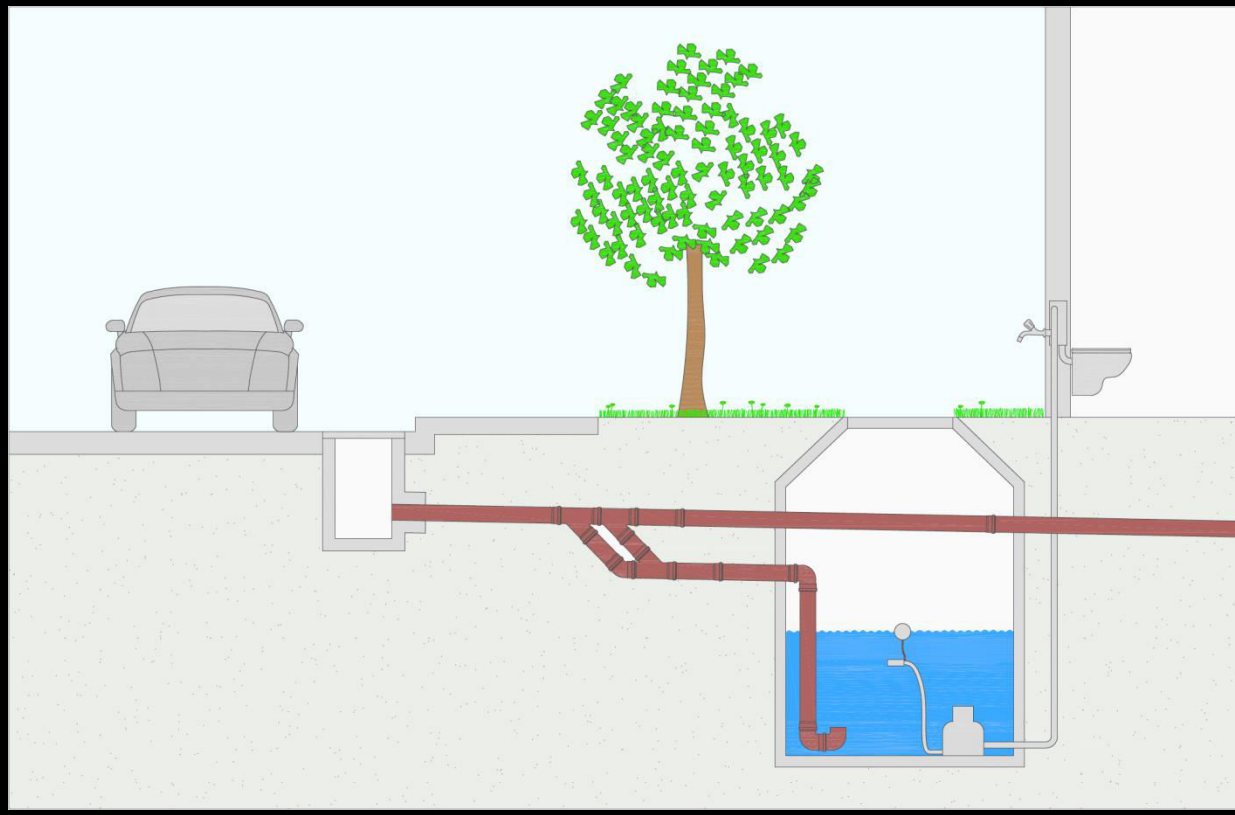


Stormwater Runoff and Drain Delay of Green Roofs compared with Flat Bitumen Roofs

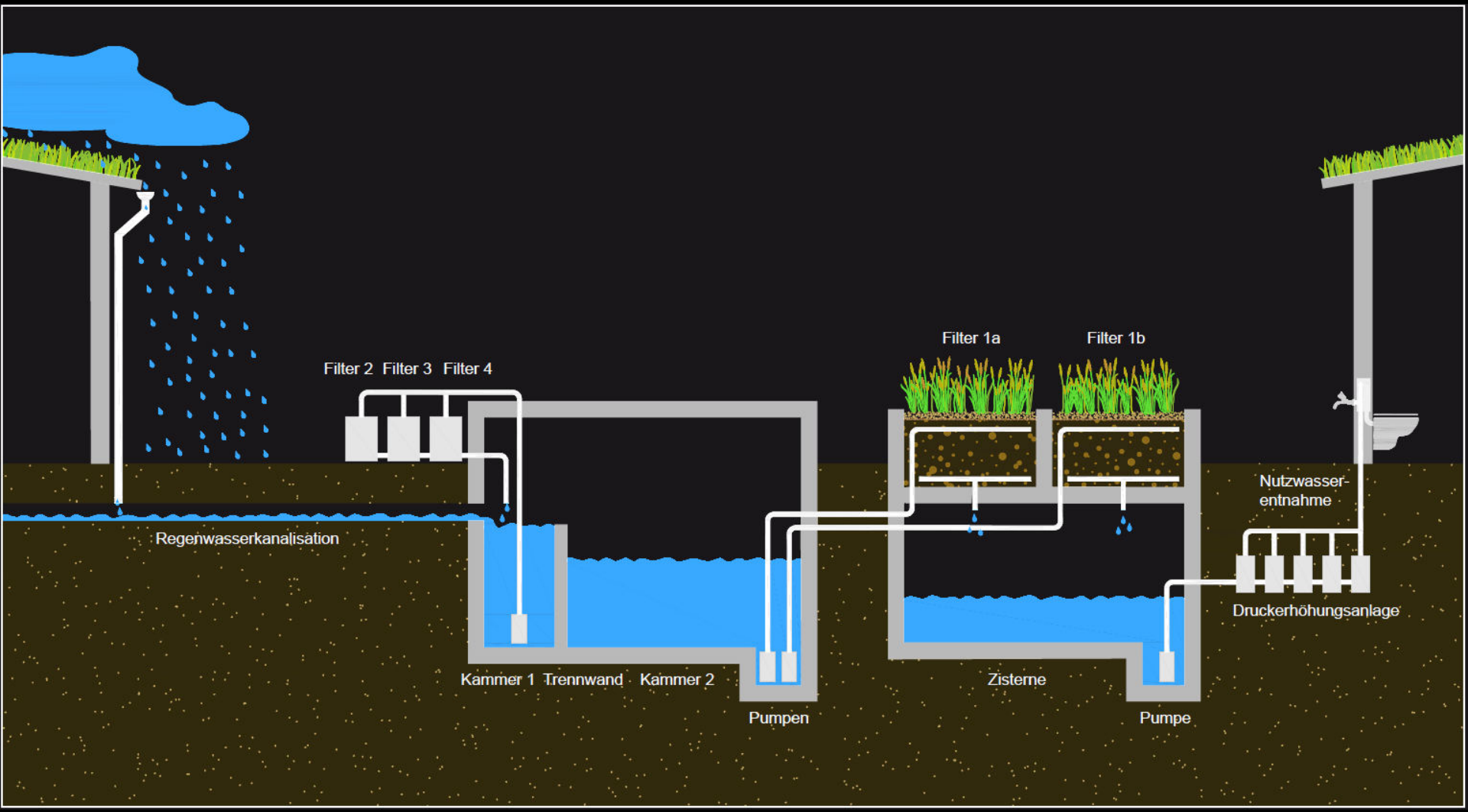


„First Flush“ concentration in tank
Annual retention rates of nutrients, heavy metals …..
External Runoff for seperated sewer systems

NH_4	1,1 kg
NO_3	10,07 kg
NO_2	0,91 kg
PO_4	376 g
K	15,98 kg
SO_4	38,67 kg
Cl	23,95 kg
Pb	19,7 g
Cd	6,45 g



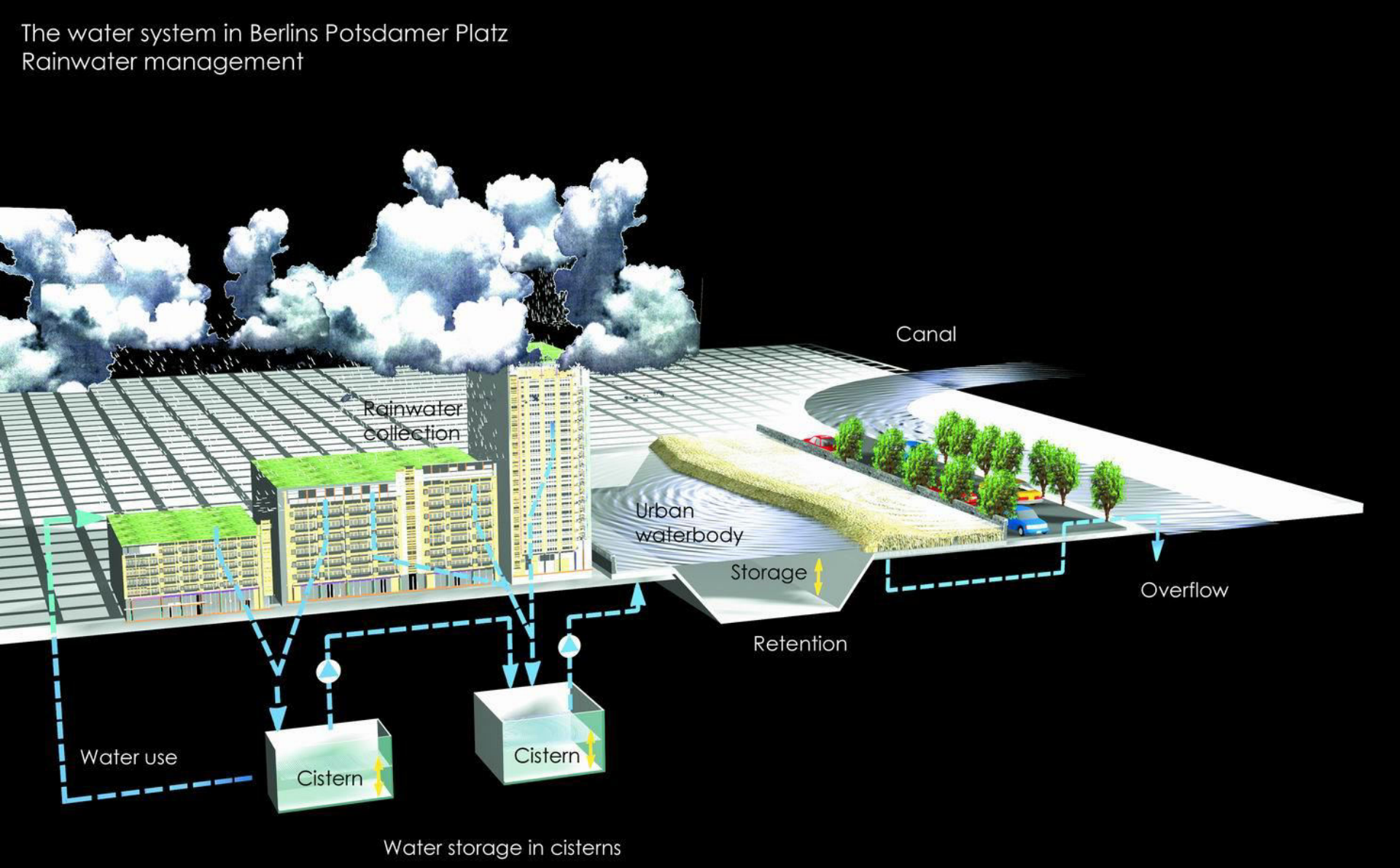
Rainwater Harvesting „UFA Fabrik“




Potsdamer Platz, Berlin City Center

Potsdamer Platz, Berlin

40,000 m^2 of greened roofs
2550 m^3 in 4 tanks for toilet flush and fire fighting
12.000 m^2 urban lake, 1200 m^2 constructed wetland
3500 m^3 stormwater retention in lake (30 cm)
Overall stormwater retention: 125 mm



Architekten: Renzo Piano, Kohlbecker u.a.
Landschaftsarchitektur: Krüger/ Möhrle, Daniel Roehr, Berlin
Urbanes Gewässer: Atelier Dreiseitl, Überlingen

Influential

a) Demand by city water administration

b) Landscape plan/ “Biotope Area Factor” BAF

c) Berlins “Climate Change Adaptation Plan”

d) Split in wastewater fee

(but: not yet used as instrument !)

Prices Berlin 2012:

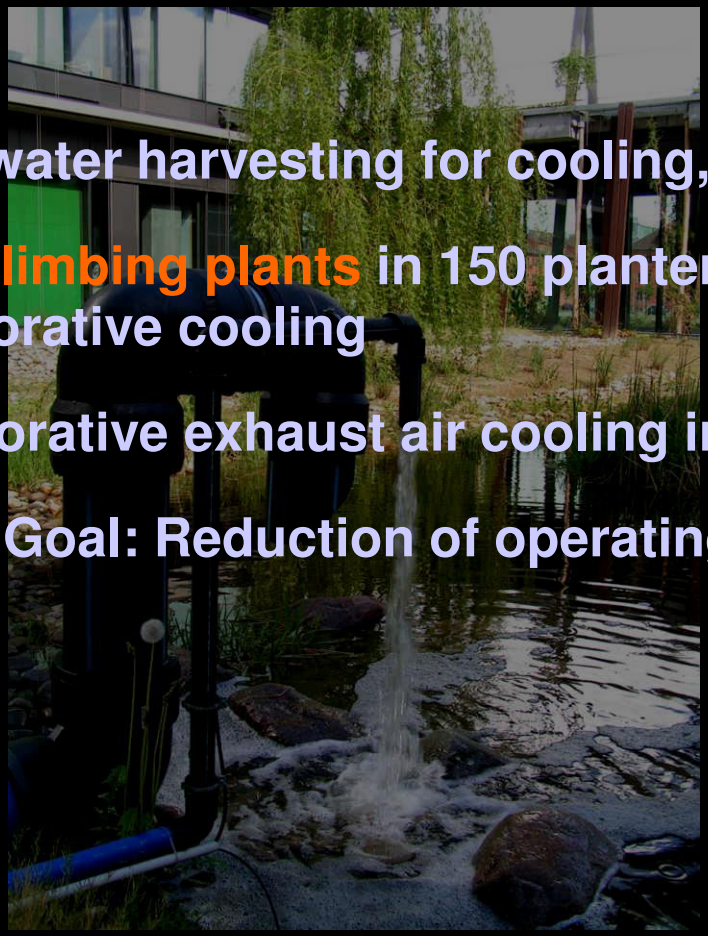
Water	2,17 €/m³
Wastewater	2,46 €/m³
Rainwater	1,90 €/m²a (=3,80 €/m³)

Scientific Monitoring/ Evaluation
2002-2010 Berlin Senate for Urban Development
2011-2013: EnEff Stadt, BMWi via PTJ
2014-2016: INIS, BMBF via PTJ

Institute of Physics,
Humboldt-University Berlin-Adlershof

Institute of Physics, Humboldt- University Berlin

Institute of Physics, Humboldt- University Berlin



Rainwater harvesting for cooling, tank size: 40 m^3

450 climbing plants in 150 planter boxes providing shade and evaporative cooling

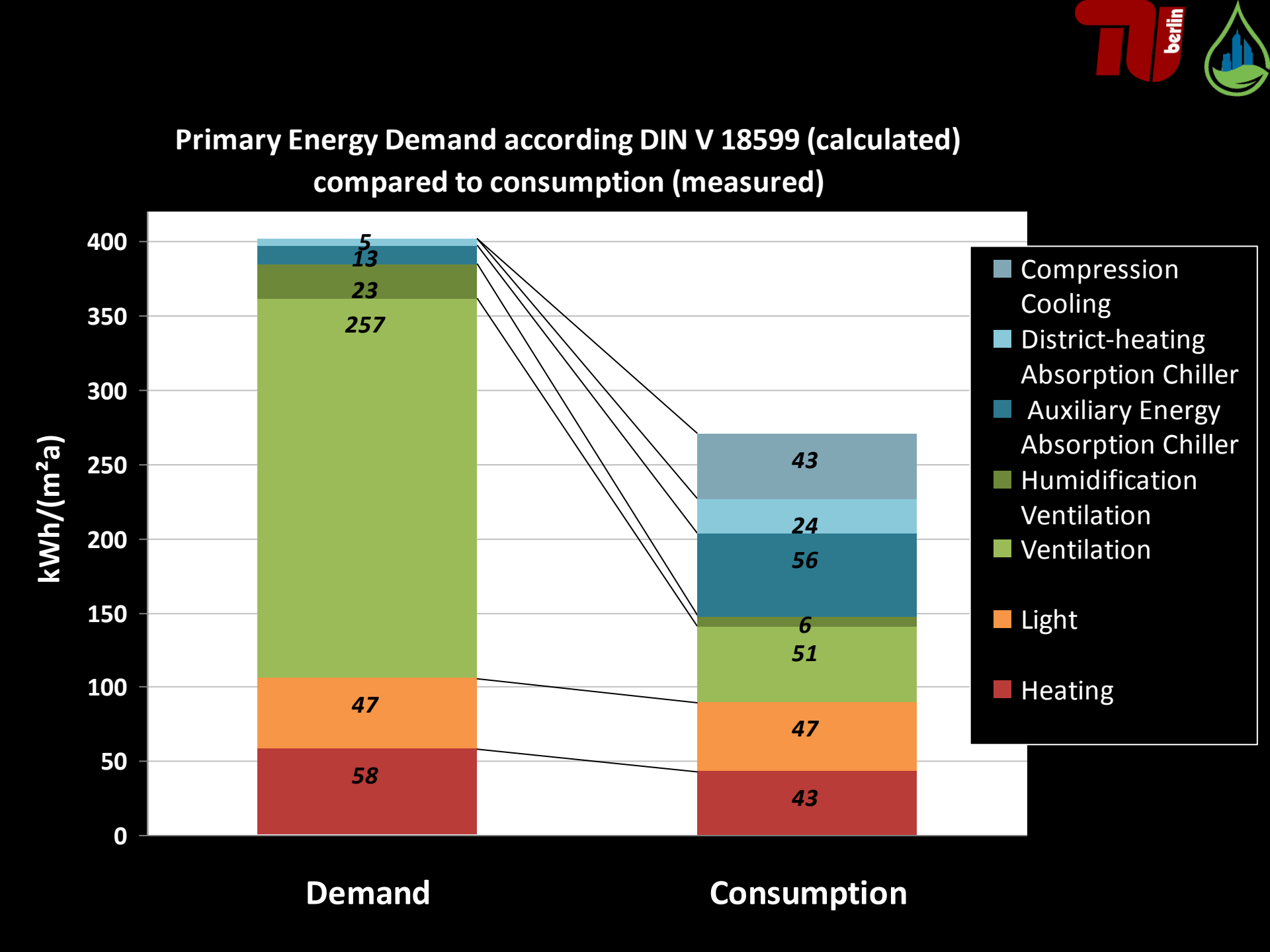
Evaporative exhaust air cooling in 8 air conditioners

Main Goal: Reduction of operating costs

Final Energy

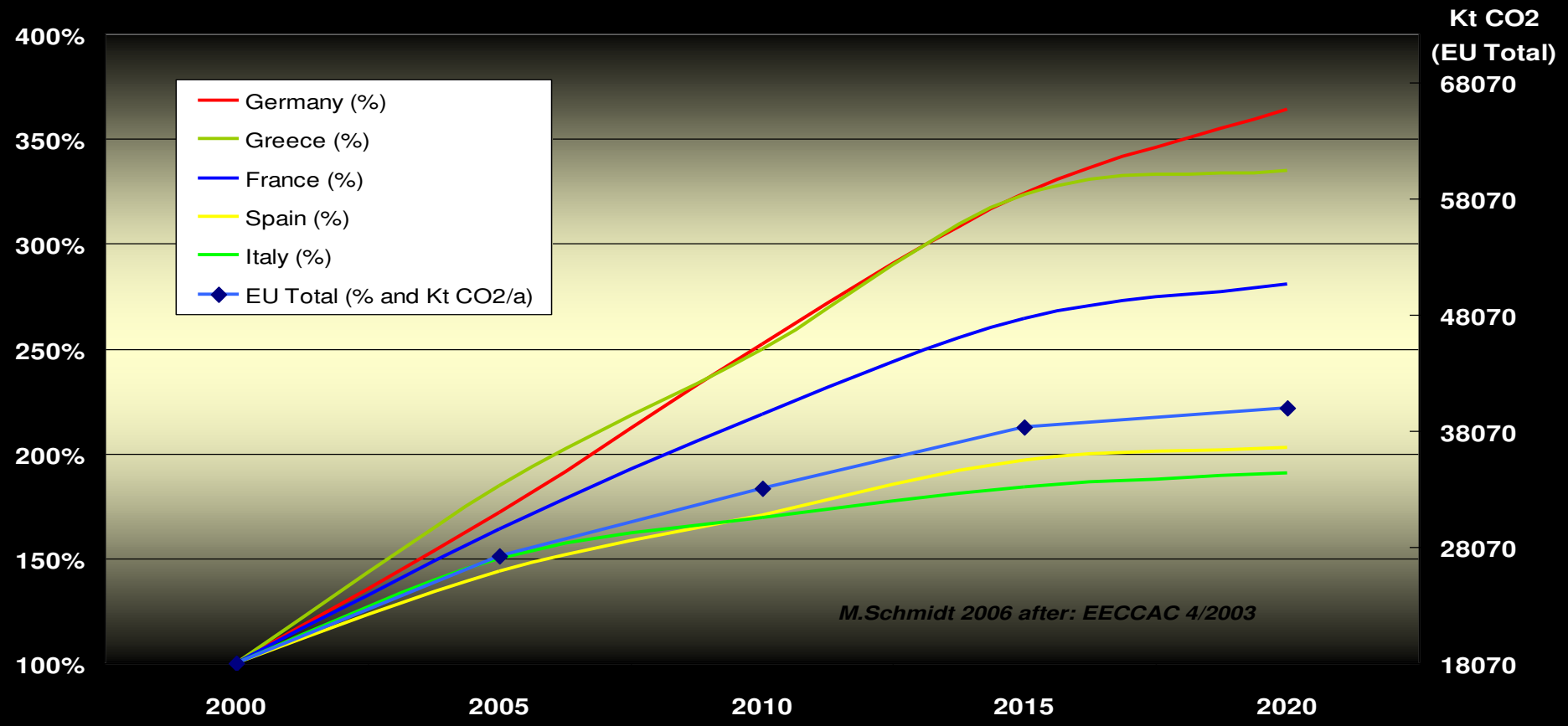
Heating Consumption: 216 kWh/ m²a
Heat for Cold: 132,7 kWh/ m²a
Production of Cold: 62,6 kWh/ m²a

Primary energy factor for district heating: 0.16
Primary energy factor for electricity: 2.3 (2.6)


Primary Energy Demand according DIN V 18599 (calculated)
compared to consumption (measured)
kWh/(m²a)
400
350
300
250
200
150
100
50
0
5
13
23
257
47
58
43
24
56
6
51
47
43
Demand
Consumption
Compression Cooling
District-heating Absorption Chiller
Auxiliary Energy Absorption Chiller
Humidification Ventilation
Ventilation
Light
Heating

Goal: Decrease of energy consumption of buildings by 2020: 40% !!

But: Increase of energy consumption for cooling: 260%



Source: Energy Efficiency and Certification of Central Air Conditioners (EECCAC) Study for the D.G. Transportation-Energy (DGTREN) of the Commission of the E.U.

Reasons for Global Increase in Cooling Demand

1: Increase in use of glass

2: Decrease in Heat Capacity, use of light materials

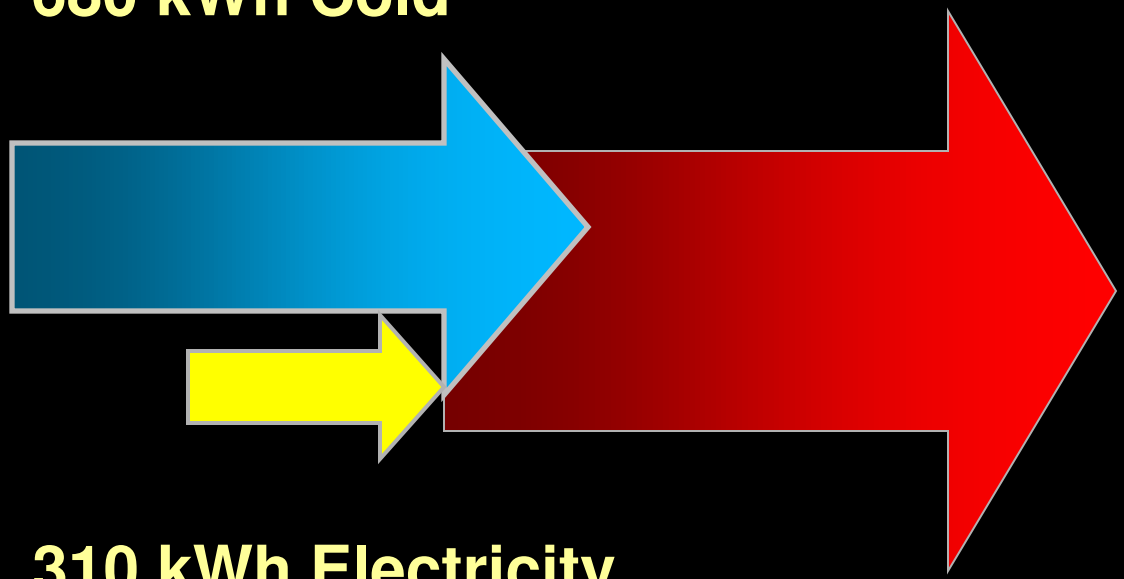
3: Increase in electricity consumption

4: Increase in Urban Heat Island Effect

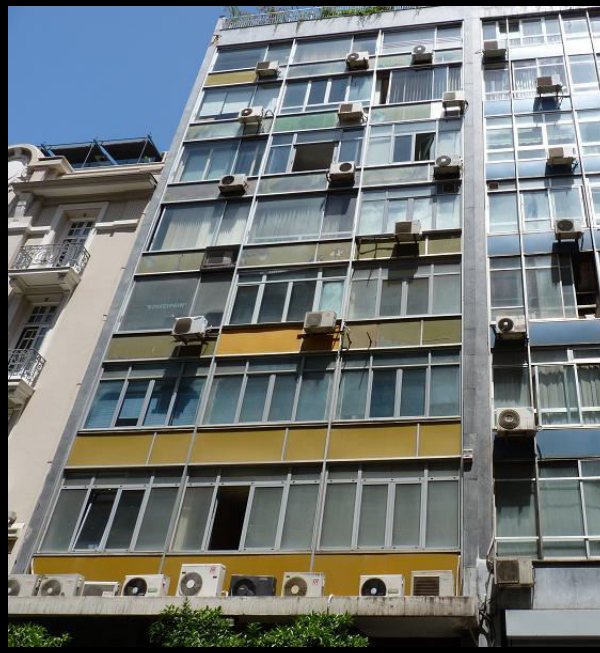
5: Global Warming

Never use electricity to cool a building !

680 kWh Cold

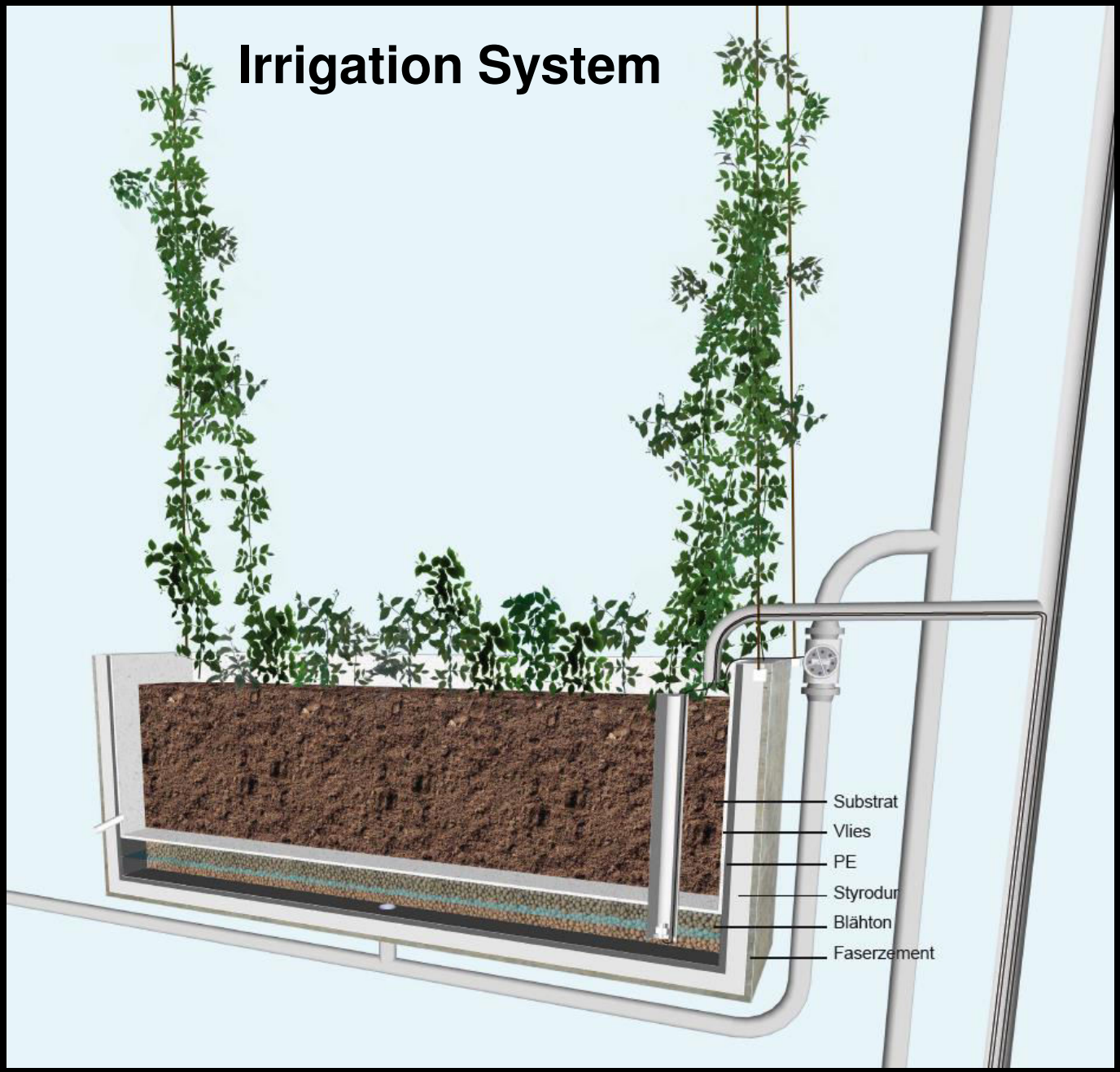


310 kWh Electricity
(annual COP 2,2)

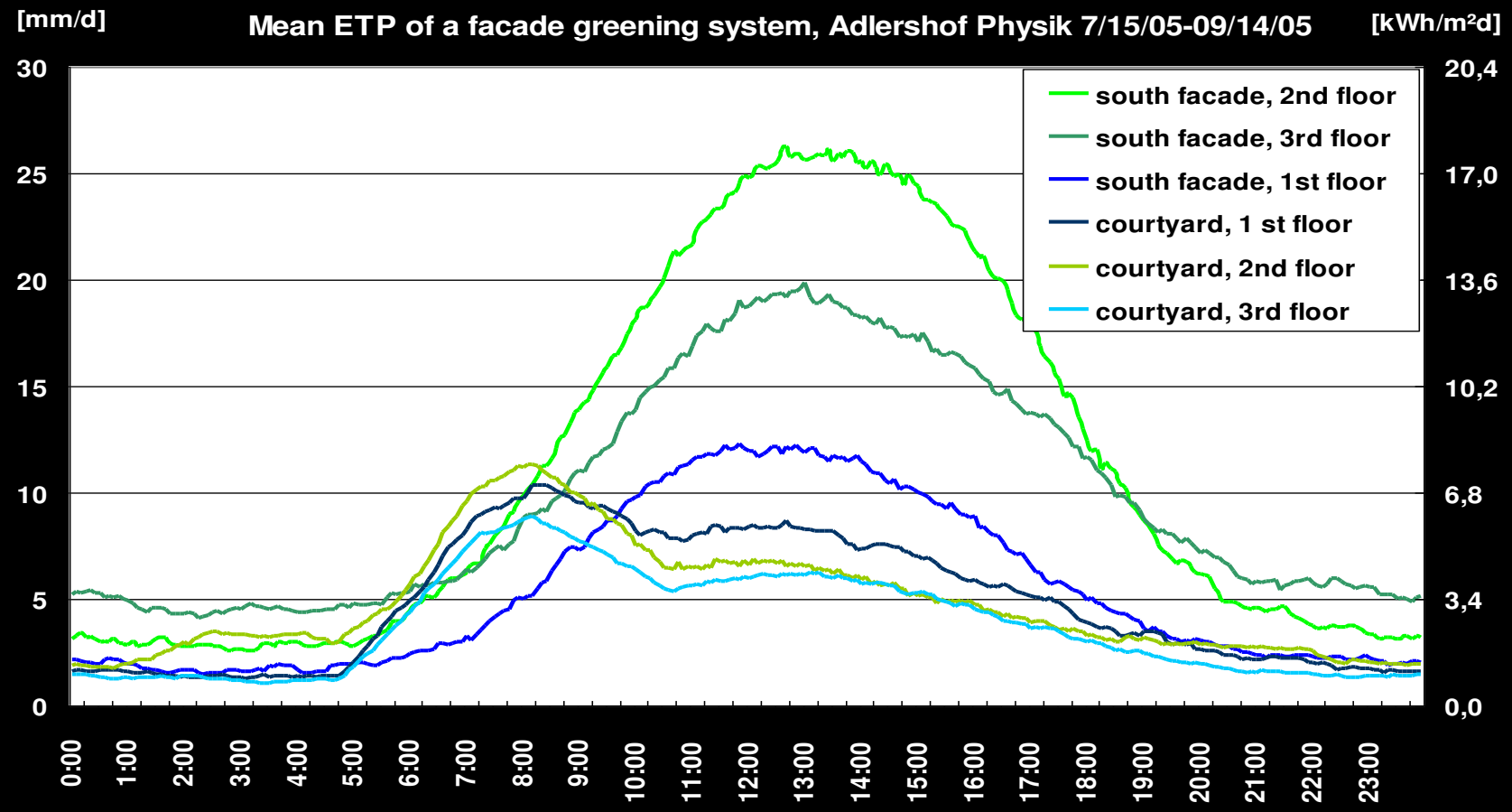


990 kWh
Sensible Heat
Released Outside

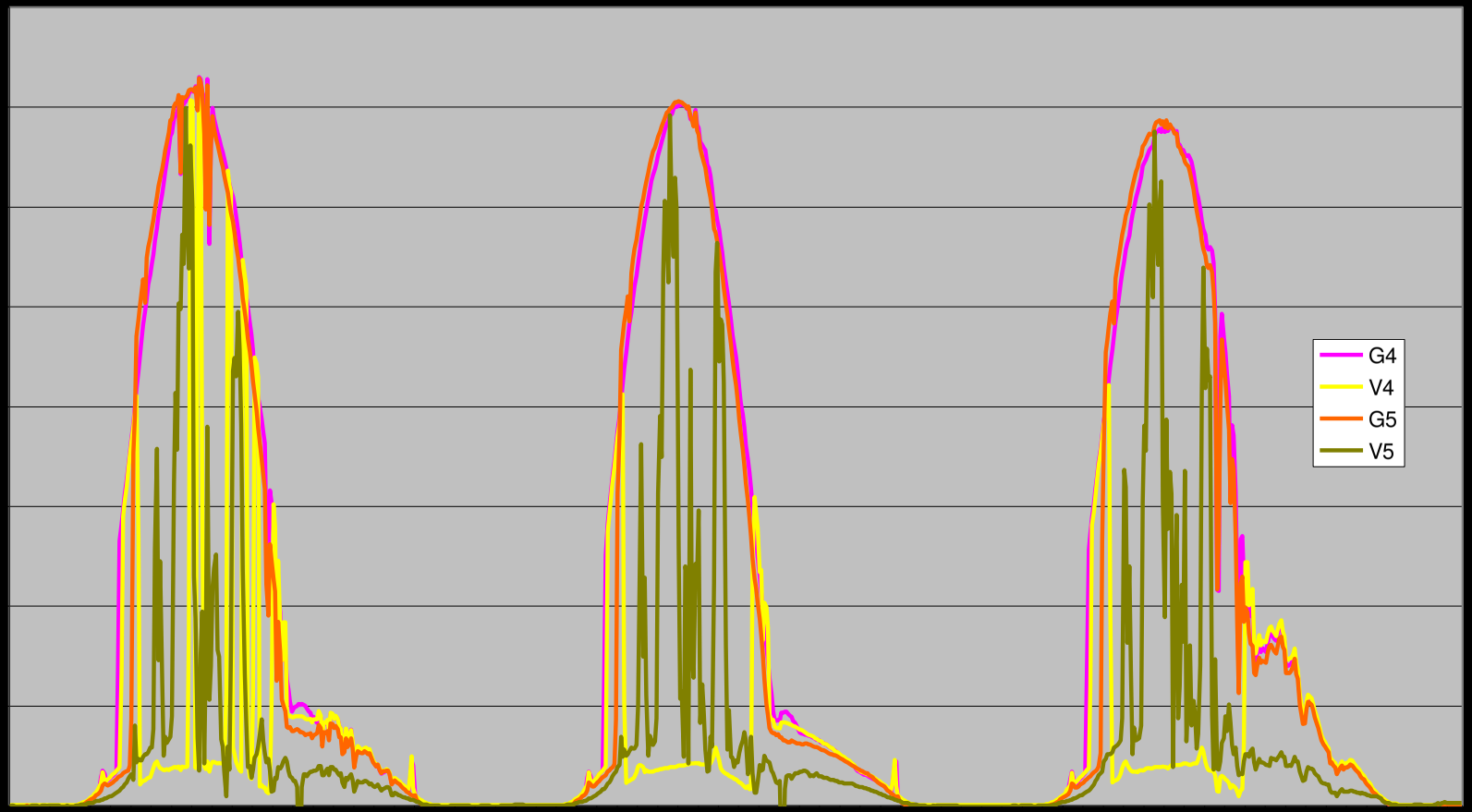
Irrigation System

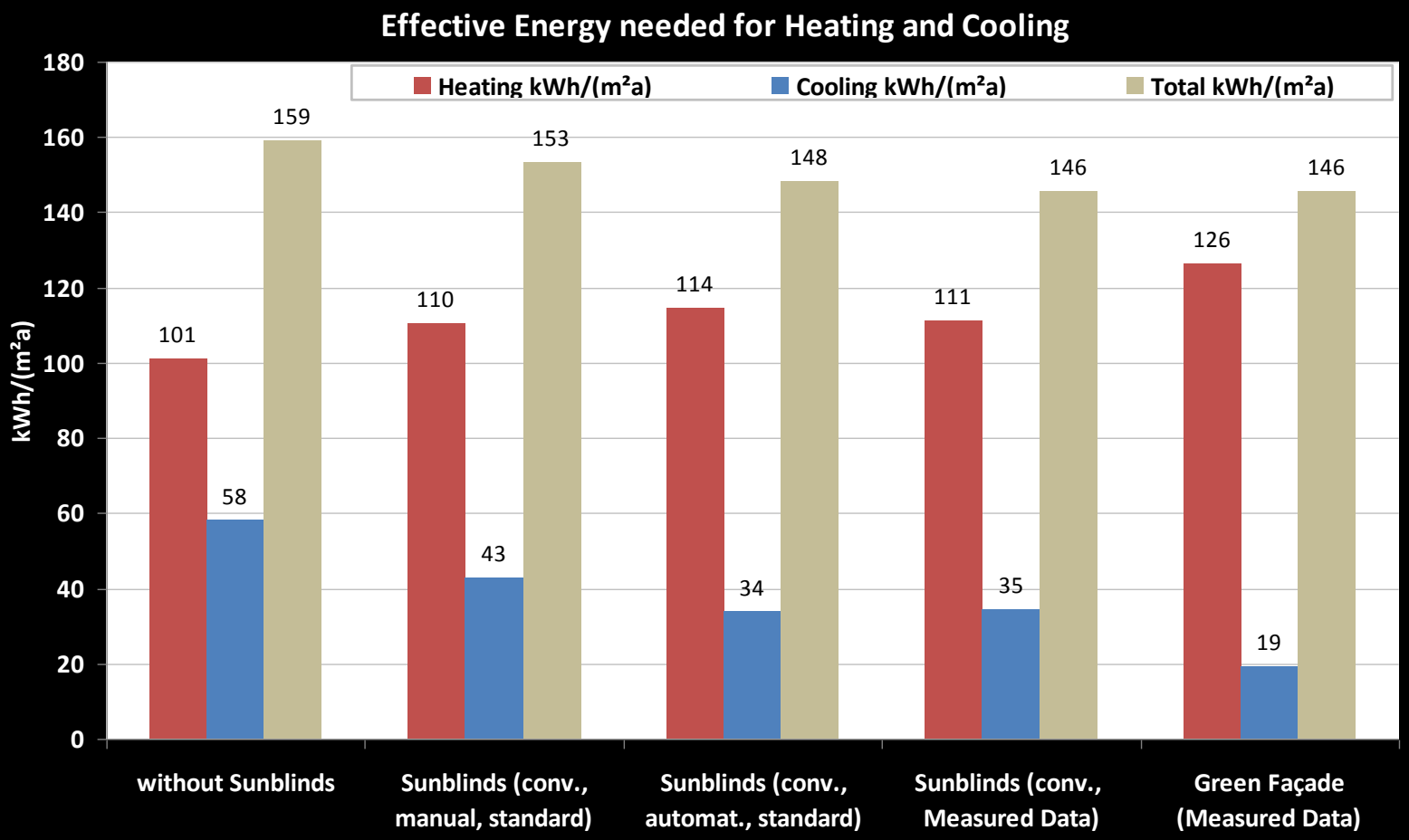


Mean daily evapotranspiration 15.7.05 - 14.09.05 corresponding cooling rate: 280 kWh per day

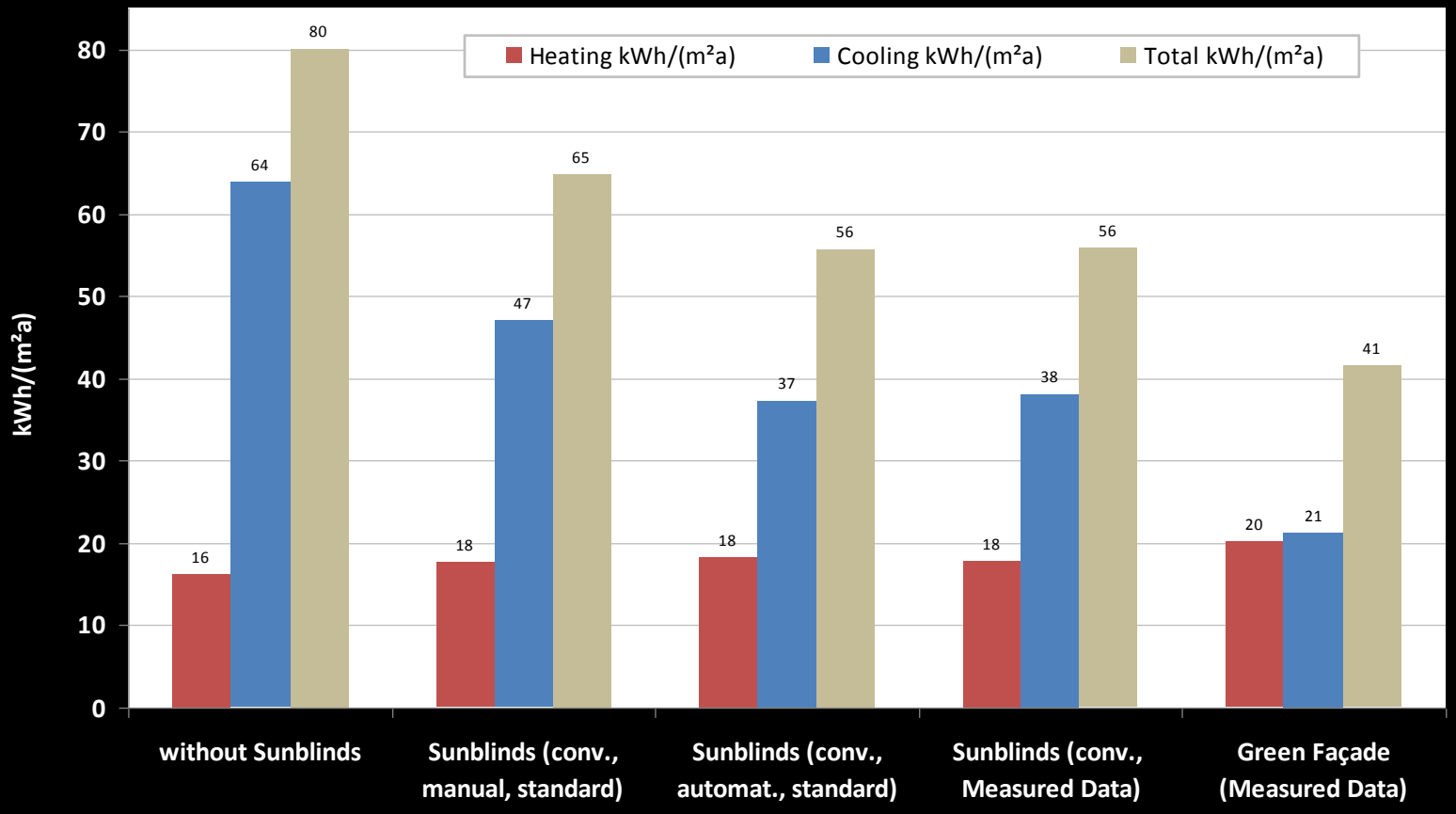


Comparison conv.blinds with green facade on energy demand and solar yield

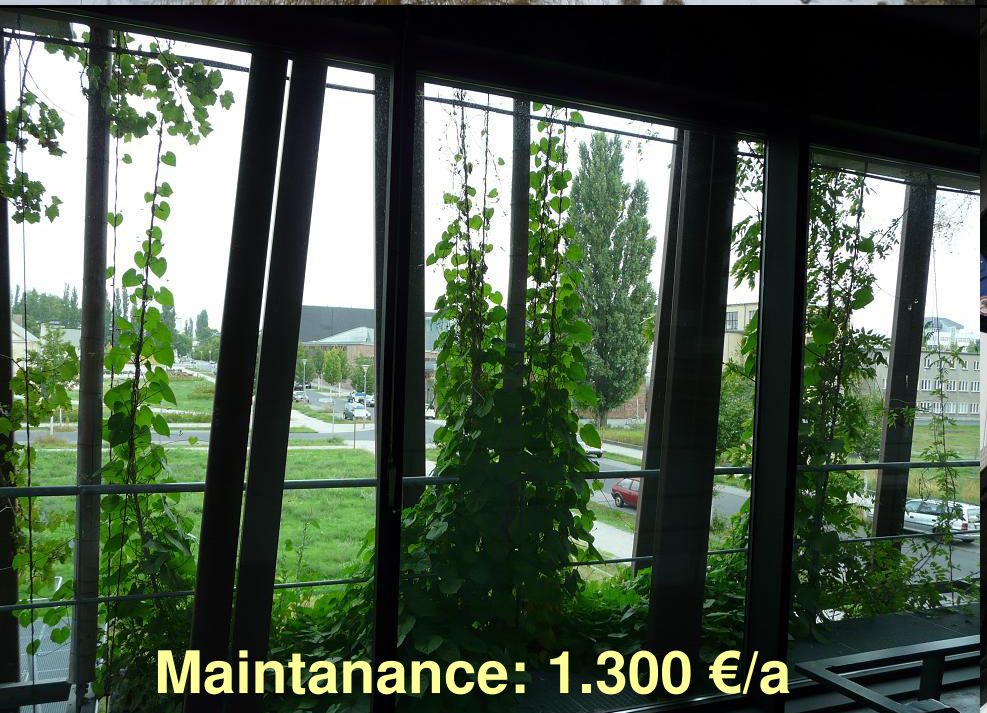



Effective Energy needed for Heating and Cooling
Heating kWh/(m²a)
Cooling kWh/(m²a)
Total kWh/(m²a)
kWh/(m²a)
180
160
140
120
100
80
60
40
20
0
101
58
159
110
43
153
114
34
148
111
35
146
126
19
146
without Sunblinds
Sunblinds (conv., manual, standard)
Sunblinds (conv., automat., standard)
Sunblinds (conv., Measured Data)
Green Façade (Measured Data)

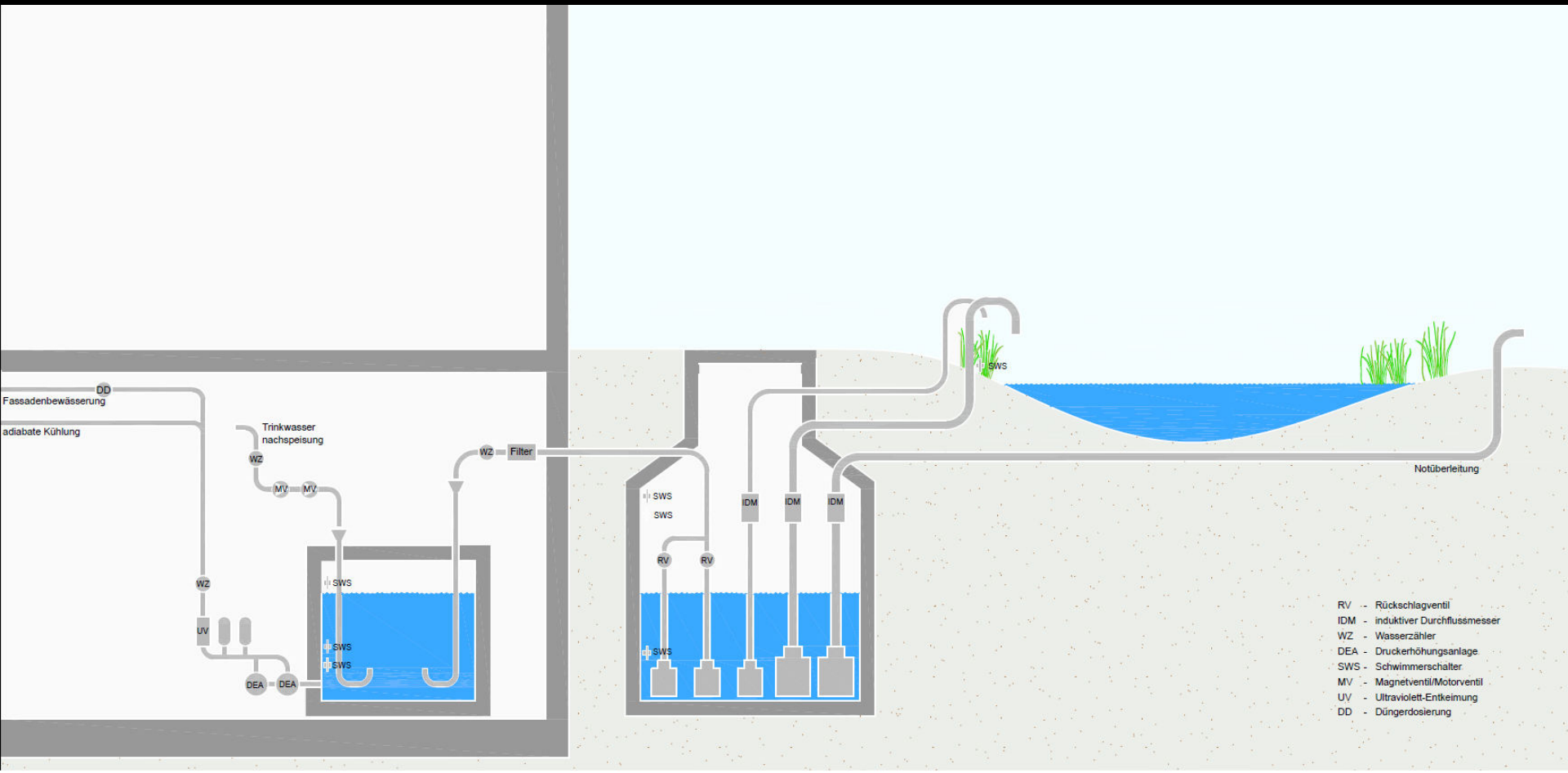
Primary Energy needed for Heating and Cooling



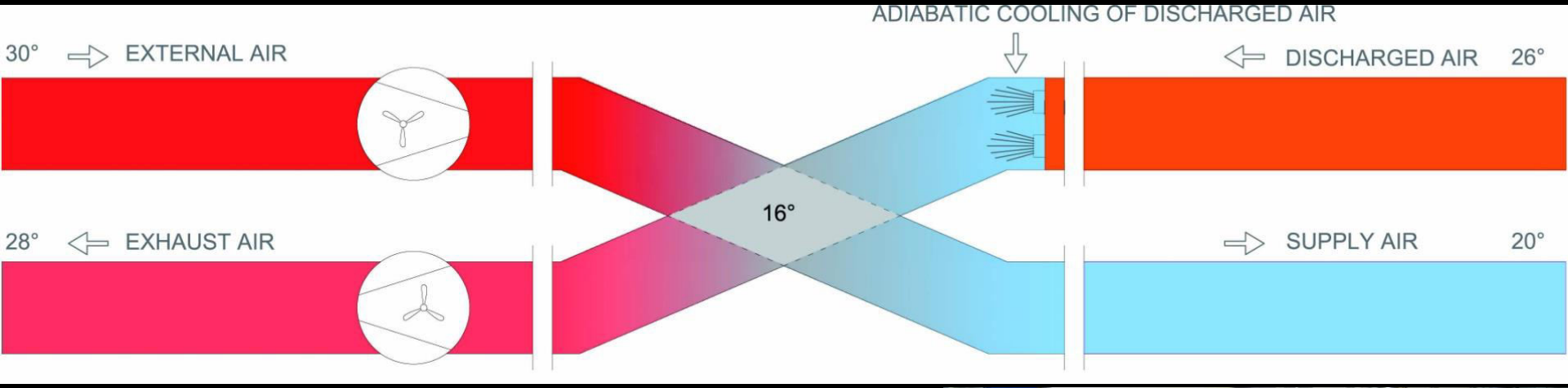

Maintenance: 16.525 €/a


Maintanance: 1.300 €/a

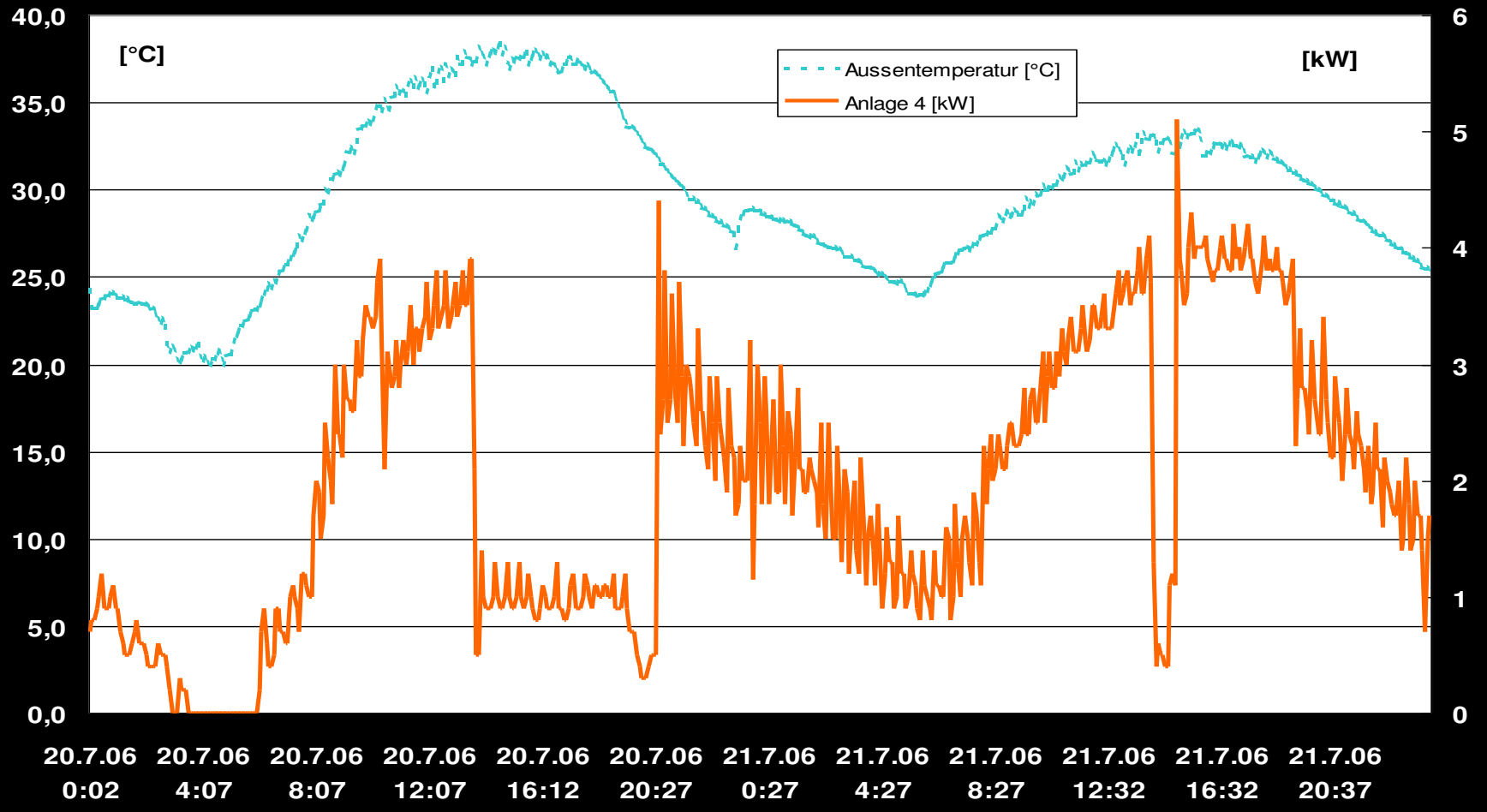

Investment 3M membrane: 38.000 €


DD
Fassadenbewässerung
adiabate Kühlung
Trinkwasser
nachspeisung
WZ
MV
MV
WZ
Filter
WZ
UV
DEA
DEA
SWS
SWS
SWS
SWS
SWS
SWS
IDM
IDM
IDM
RV
RV
SWS
Notüberleitung
RV - Rückschlagventil
IDM - induktiver Durchflussmesser
WZ - Wasserzähler
DEA - Druckerhöhungsanlage
SWS - Schwimmerschalter
MV - Magnetventil/Motorventil
UV - Ultraviolett-Entkeimung
DD - Düngerdosierung

Evaporative Exhaust Air Cooling



Difference in konv. Energy Consumption with and without Evaporative Cooling



Costs for Cooling

1 g H_2O: 2450 J = 2450 Ws a 100 °C
1 m^3 = 2720 MJ = 700 kWh a 45 °C

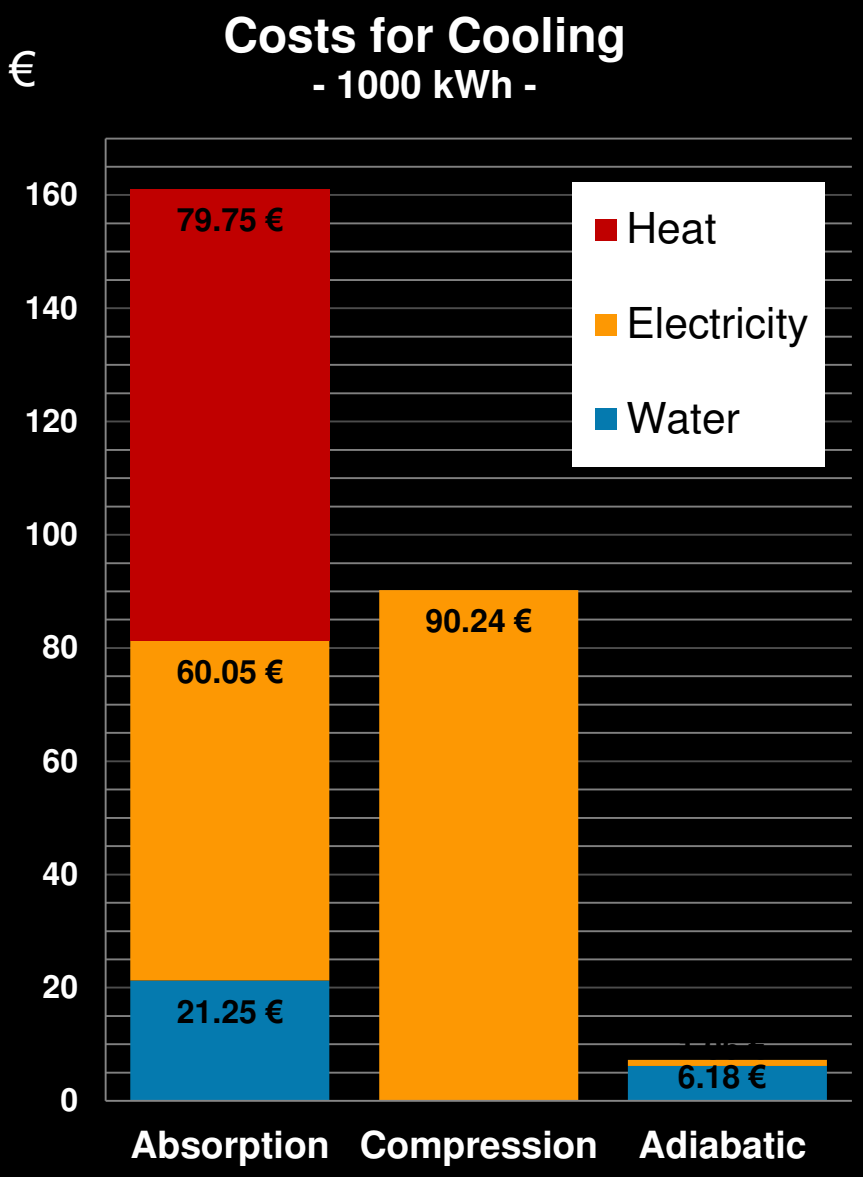
Adiabatic: 0,51 € (0,128 €/kWh)

Compression: 43,71 €
(0,128 €/kWh COP 2,05)

Absorption: 111,38 €
(0,0329 €/kWh WZ 0,47)

Use rainwater instead of tap water!

	Conductivity	max
Rainwater	30 µS	1600 µS
Tap water	700 µS	1600 µS




Böll Foundation, Berlin

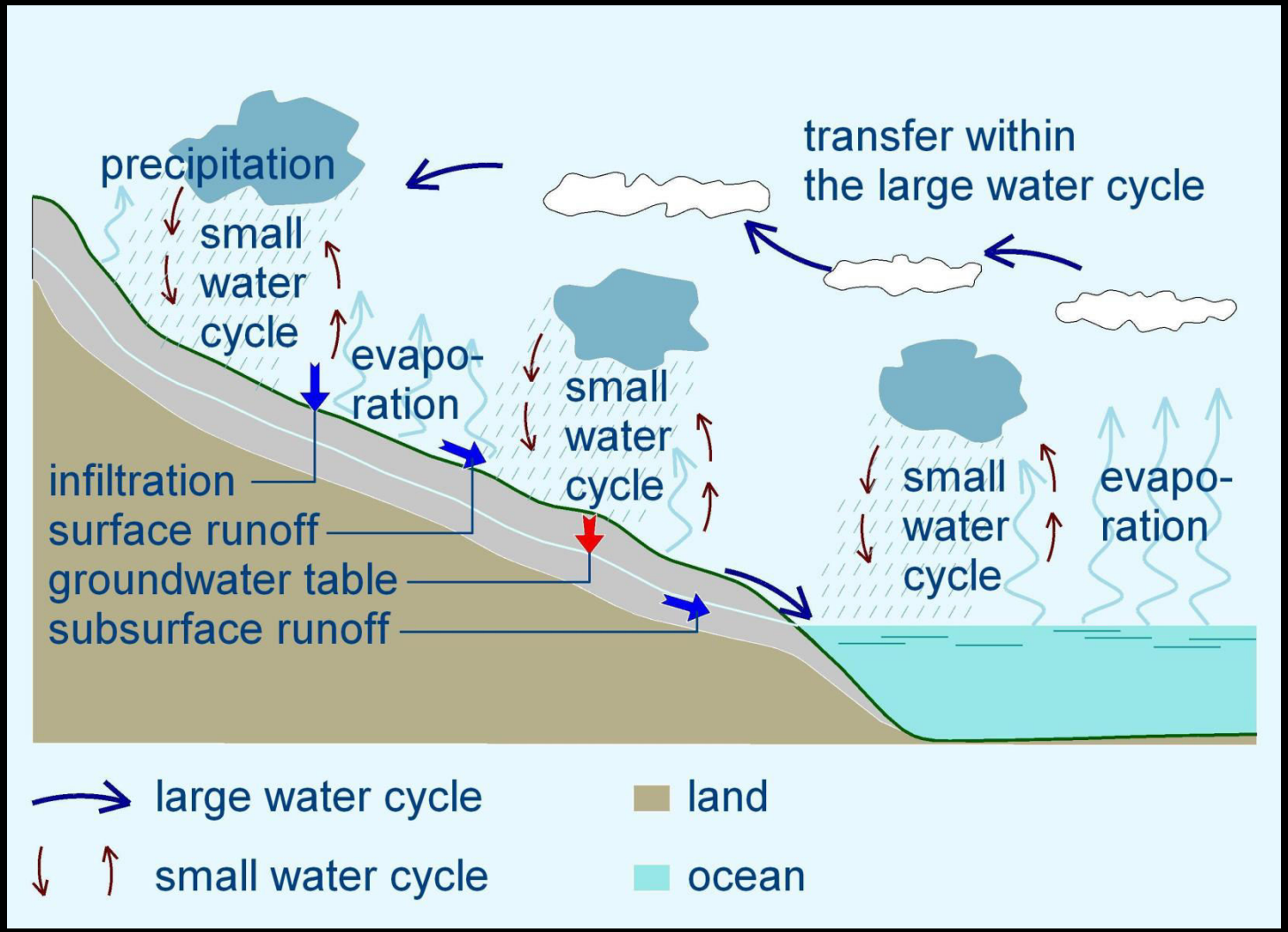

RITTAL
Art.-Nr. 7240.200
CE
RoHS

Dramatic reduction in evapo-transpiration on land
Daily loss of *800 km²* of vegetation worldwide

Daily deforestation rate:	*450 km²*
Daily reforestation:	*100 km²*
Net loss of forests daily:	*350 km²*
Daily ongoing global urbanization:	*150 km²*
Daily global desertification:	*300 km²*

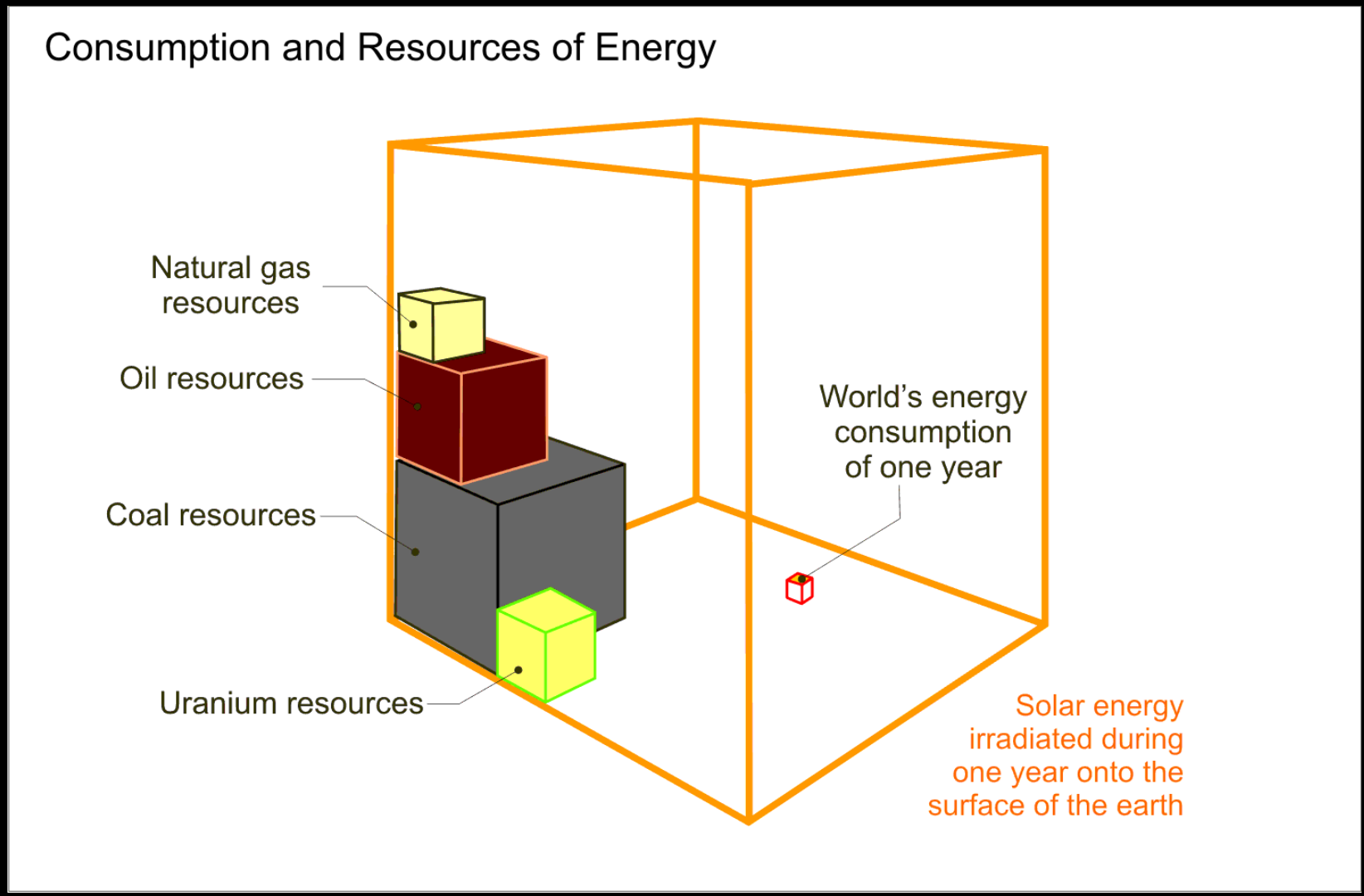
Size of Trebon: 98 km²

Large and small water cycle



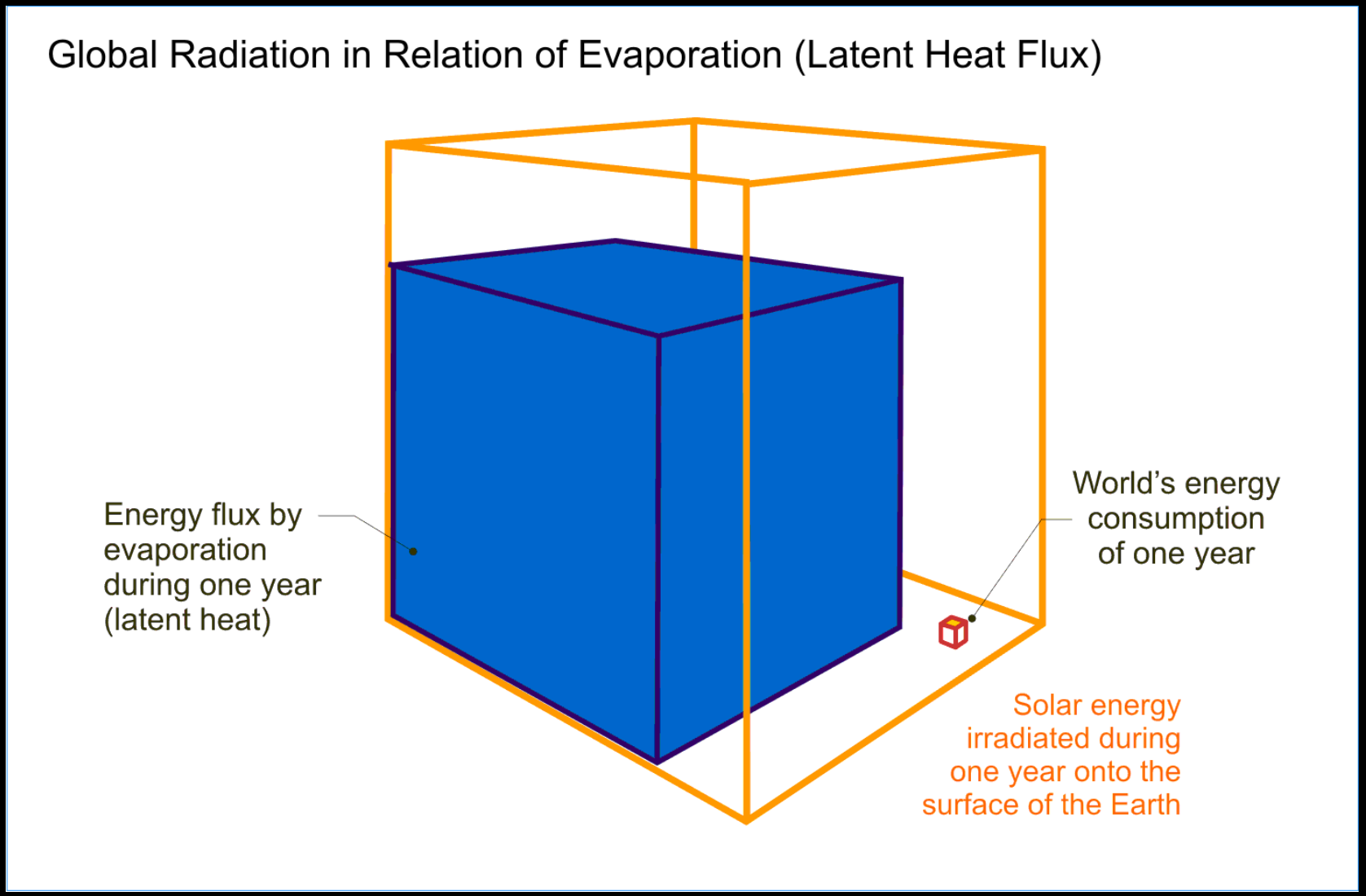
www.waterparadigm.org (Kravcik 2007)

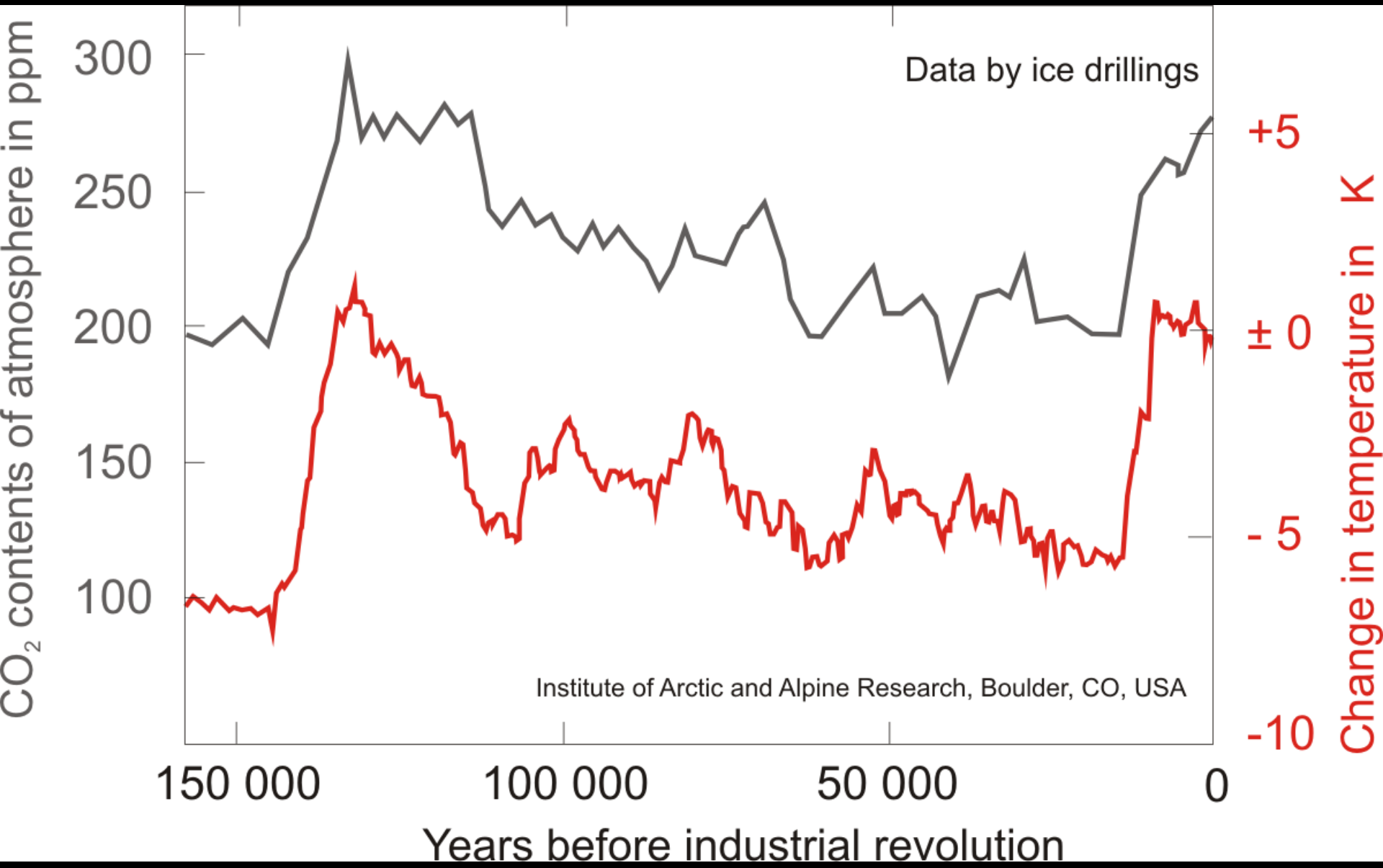
Global Energy Consumption in Relation to annual Radiation



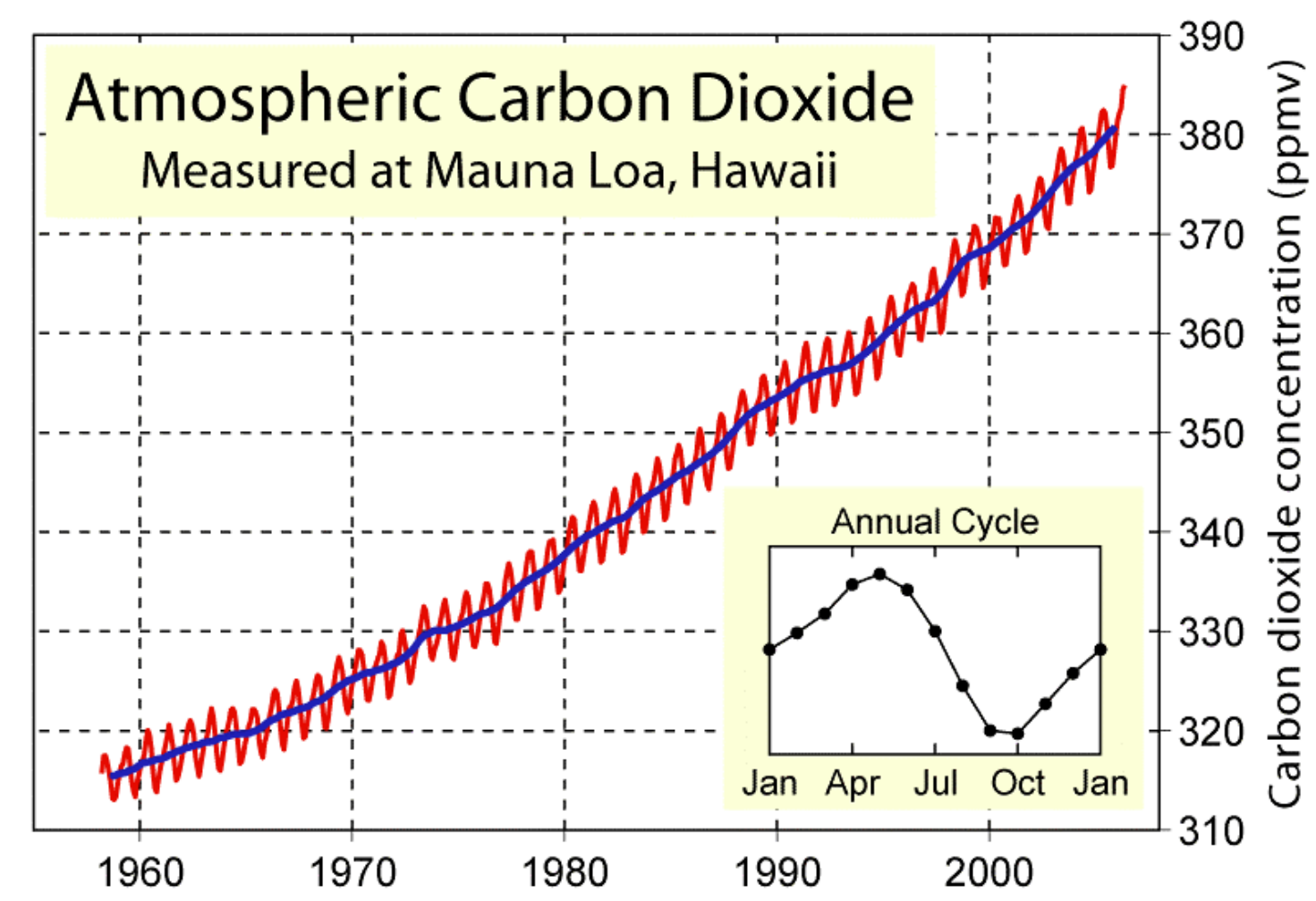
after Greenpeace / S. Krauter 2006

Annual Evaporation in Relation to Radiation



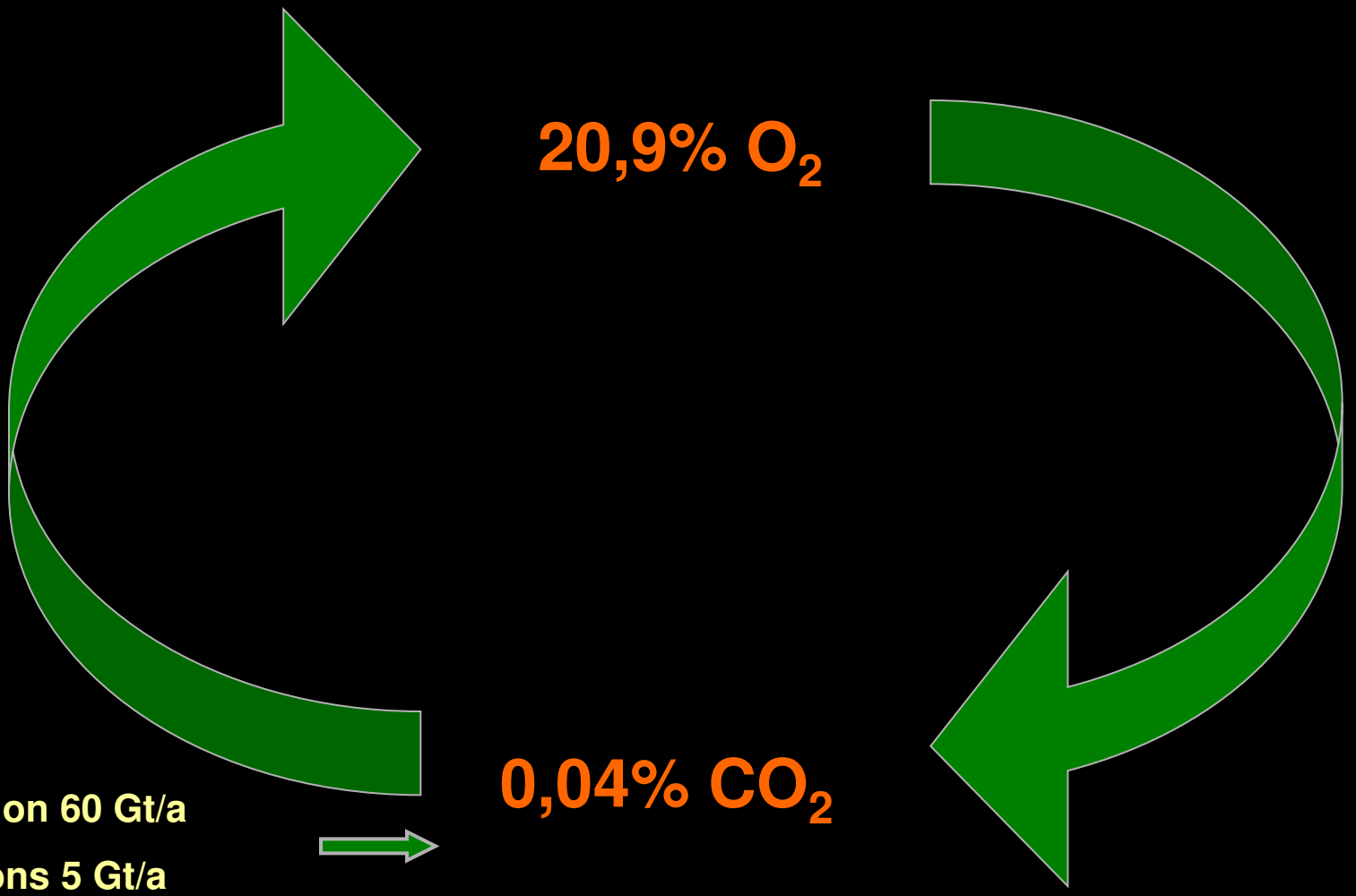

Data by ice drillings
Institute of Arctic and Alpine Research, Boulder, CO, USA
CO_2 contents of atmosphere in ppm
300
250
200
150
100
Change in temperature in K
+5
± 0
- 5
-10
150 000
100 000
50 000
0
Years before industrial revolution

Why does CO_2 correlate with the global temperature ?



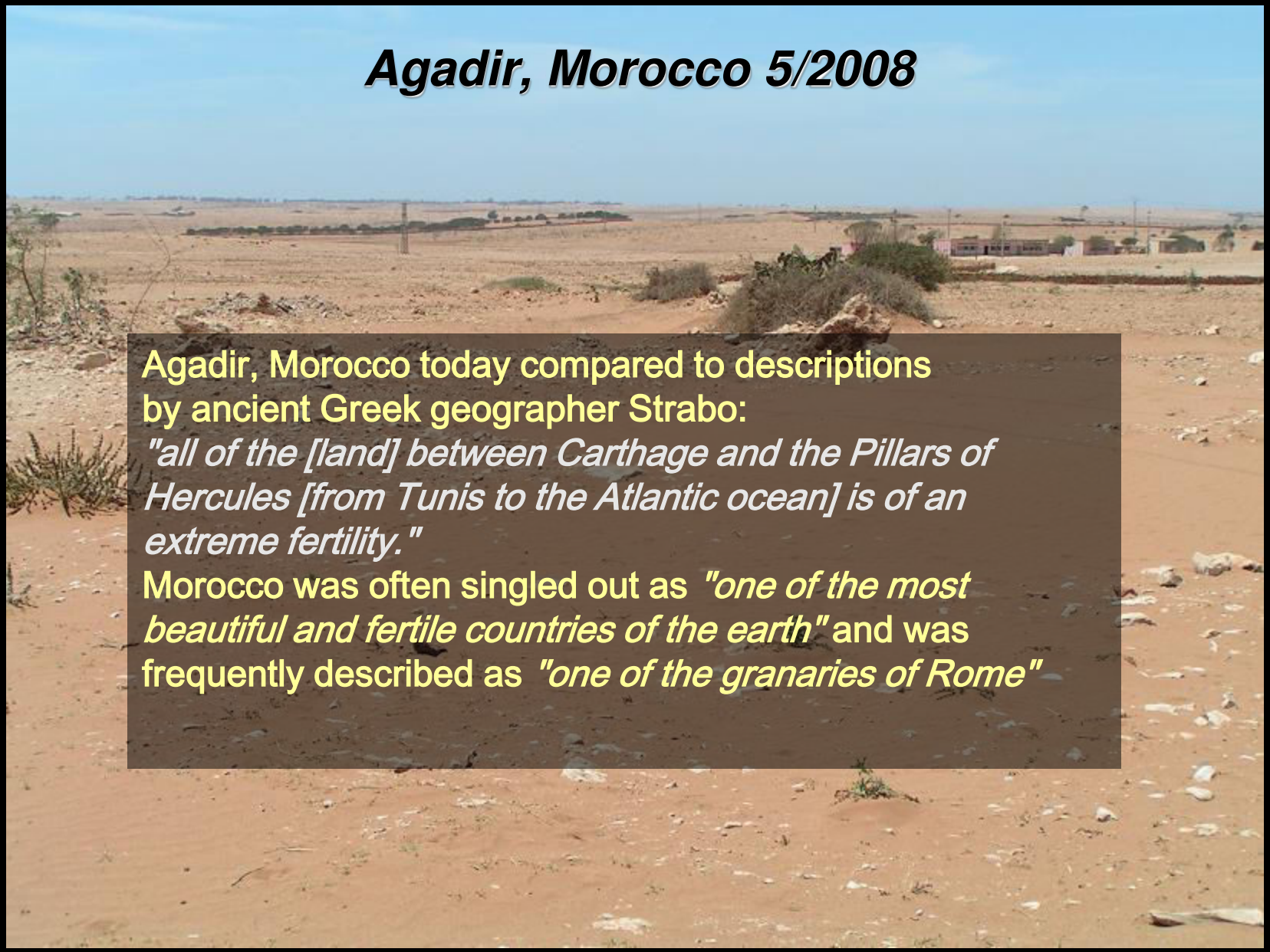
Wrong Paradigm !

Photosynthesis is the driving process for the relation between O_2 and CO_2 in the atmosphere



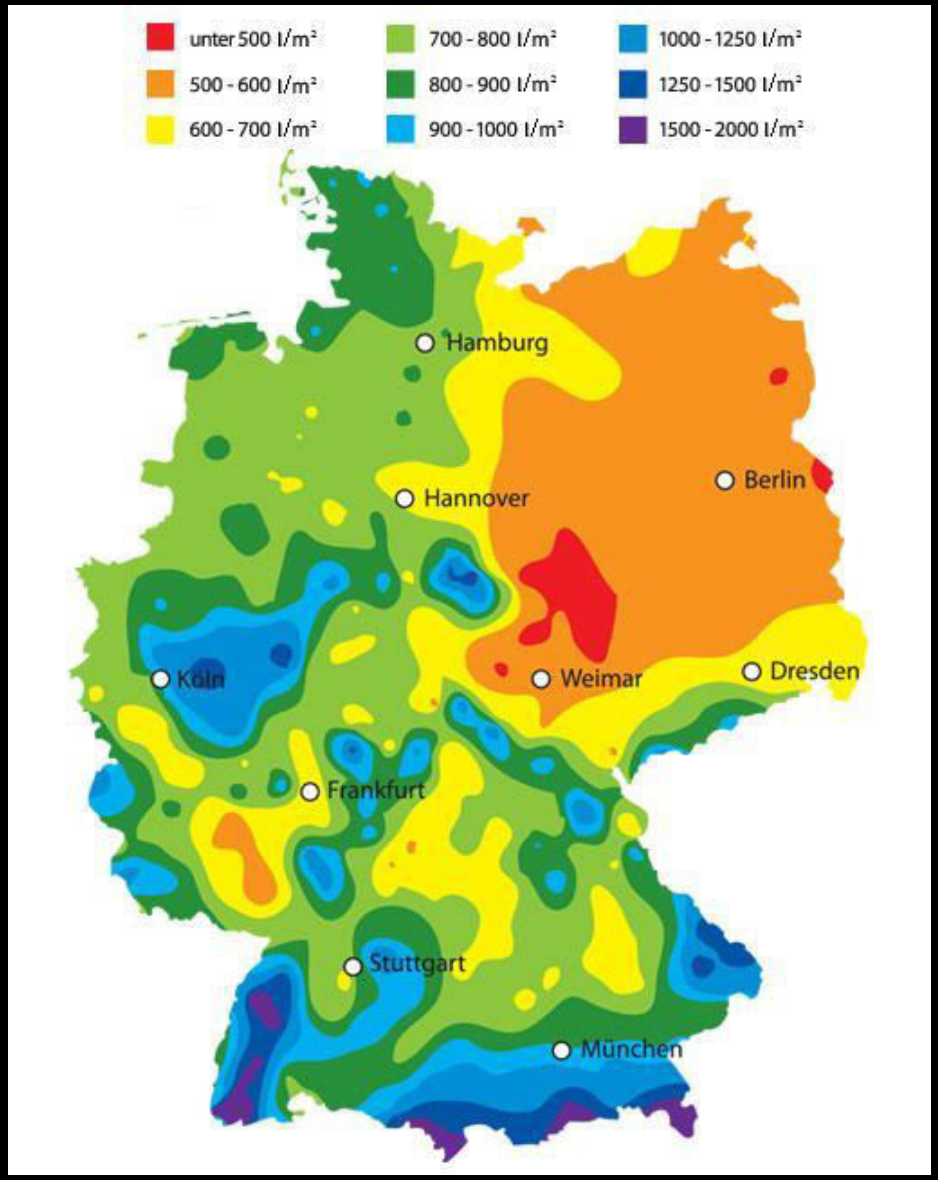

Agadir, Morocco 5/2008

Agadir, Morocco 5/2008

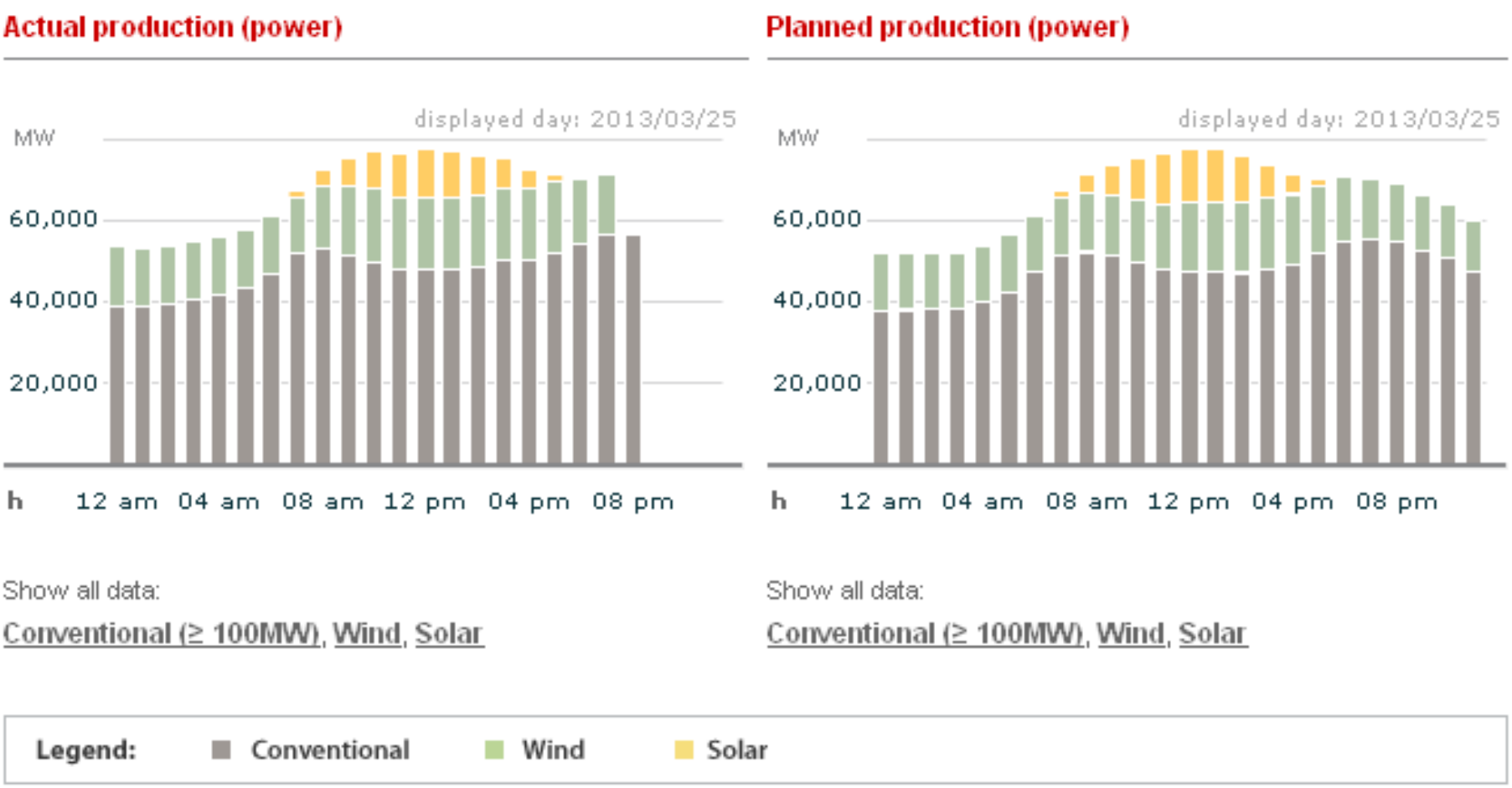


Agadir, Morocco today compared to descriptions by ancient Greek geographer Strabo:
"all of the [land] between Carthage and the Pillars of Hercules [from Tunis to the Atlantic ocean] is of an extreme fertility."
Morocco was often singled out as *"one of the most beautiful and fertile countries of the earth"* and was frequently described as *"one of the granaries of Rome"*


Brandenburg, Germany, 2011 after Harvesting


unter 500 l/m²
500 - 600 l/m²
600 - 700 l/m²
700 - 800 l/m²
800 - 900 l/m²
900 - 1000 l/m²
1000 - 1250 l/m²
1250 - 1500 l/m²
1500 - 2000 l/m²
Hamburg
Berlin
Hannover
Köln
Weimar
Dresden
Frankfurt
Stuttgart
München

Renewables in German Electric Power Production

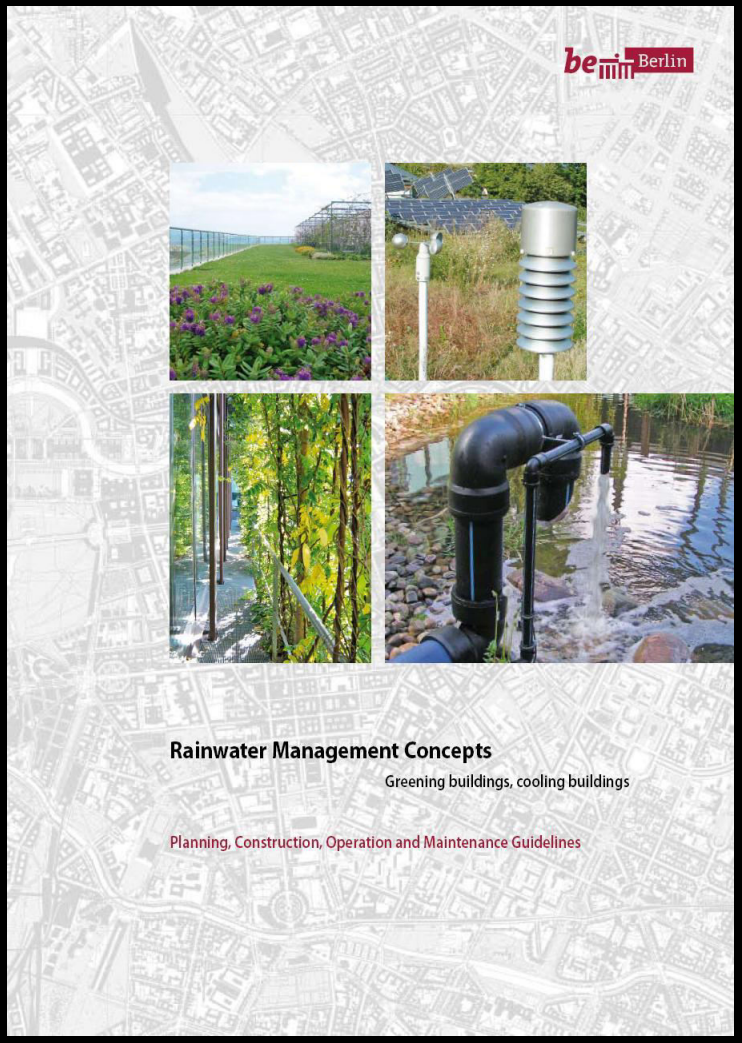


http://www.transparency.eex.com/en/

Renewable Biomass ?

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

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



Děkuji za pozornost !
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

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