

integrating  
climate  
adaptation  
with green  
roofs and  
solar energy  
production  
on buildings



# SMARTRoofs?

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# Green Roofs and Solar Energy

- Background and facts
- Previous combinations of Green roofs and Solar energy
- What problems are we facing right now?
- Solutions?

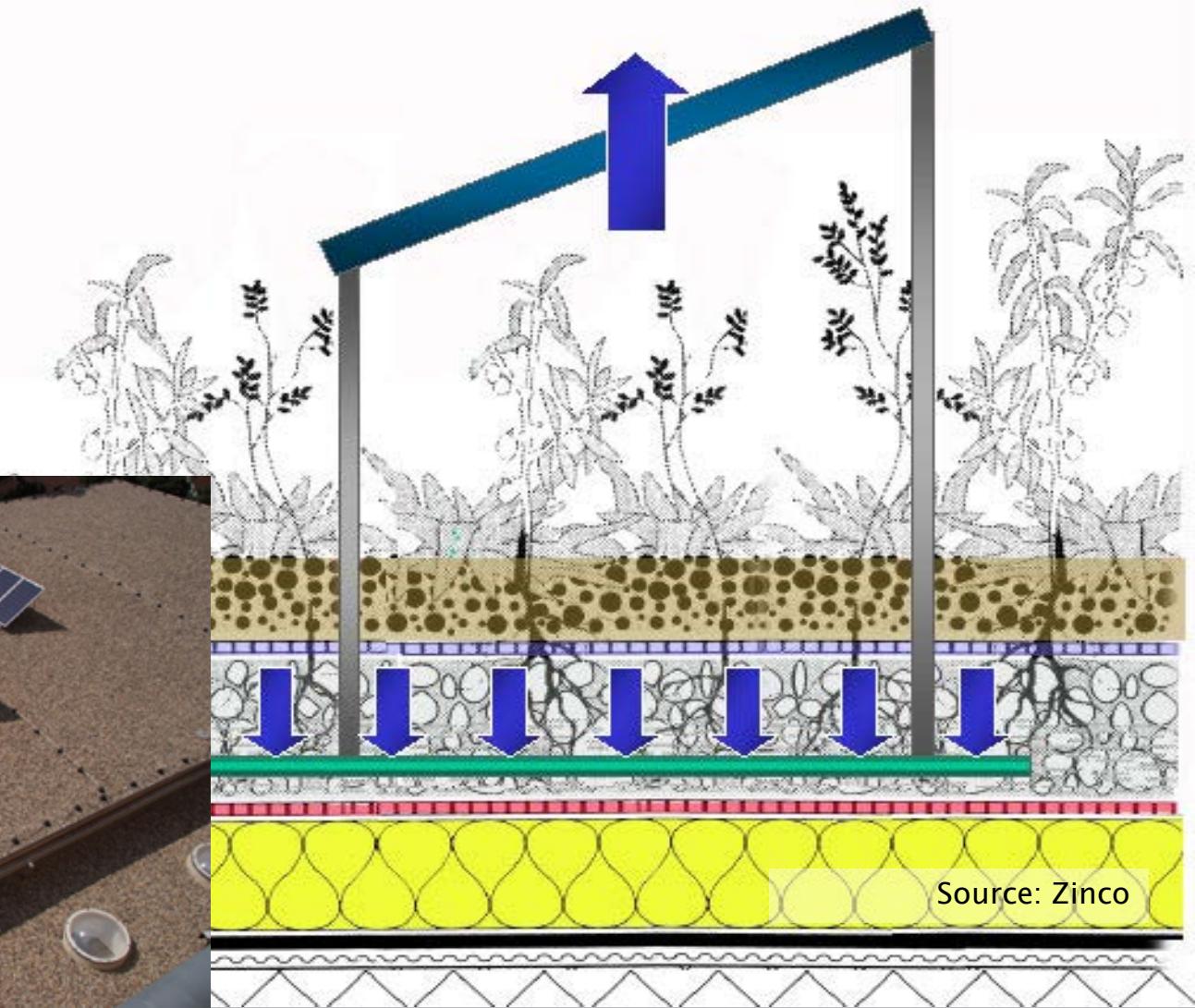


## Background & facts

Stephan Brenneisen Zurich University of Applied Sciences

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During the hot season  
the efficiency of solar  
panels can be 2-5%  
higher if a green roof is  
cooling the roof surface



Source: Zinco





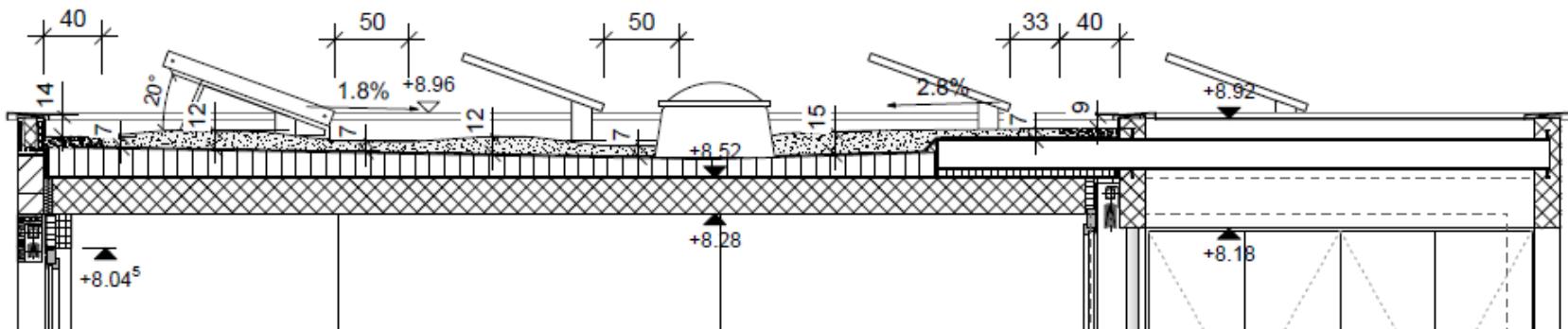
# First problems: panels came down



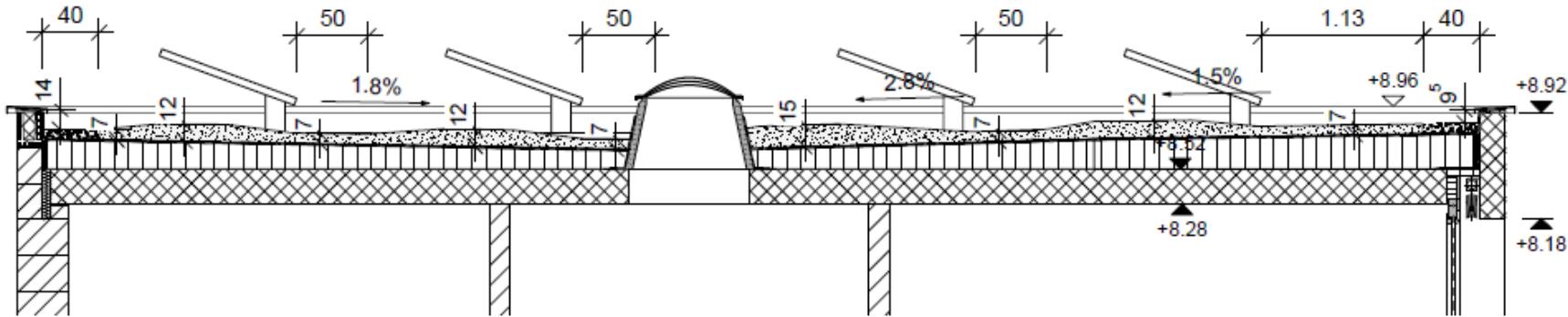
# Solution



# Solution



Schnitt A



Schnitt C



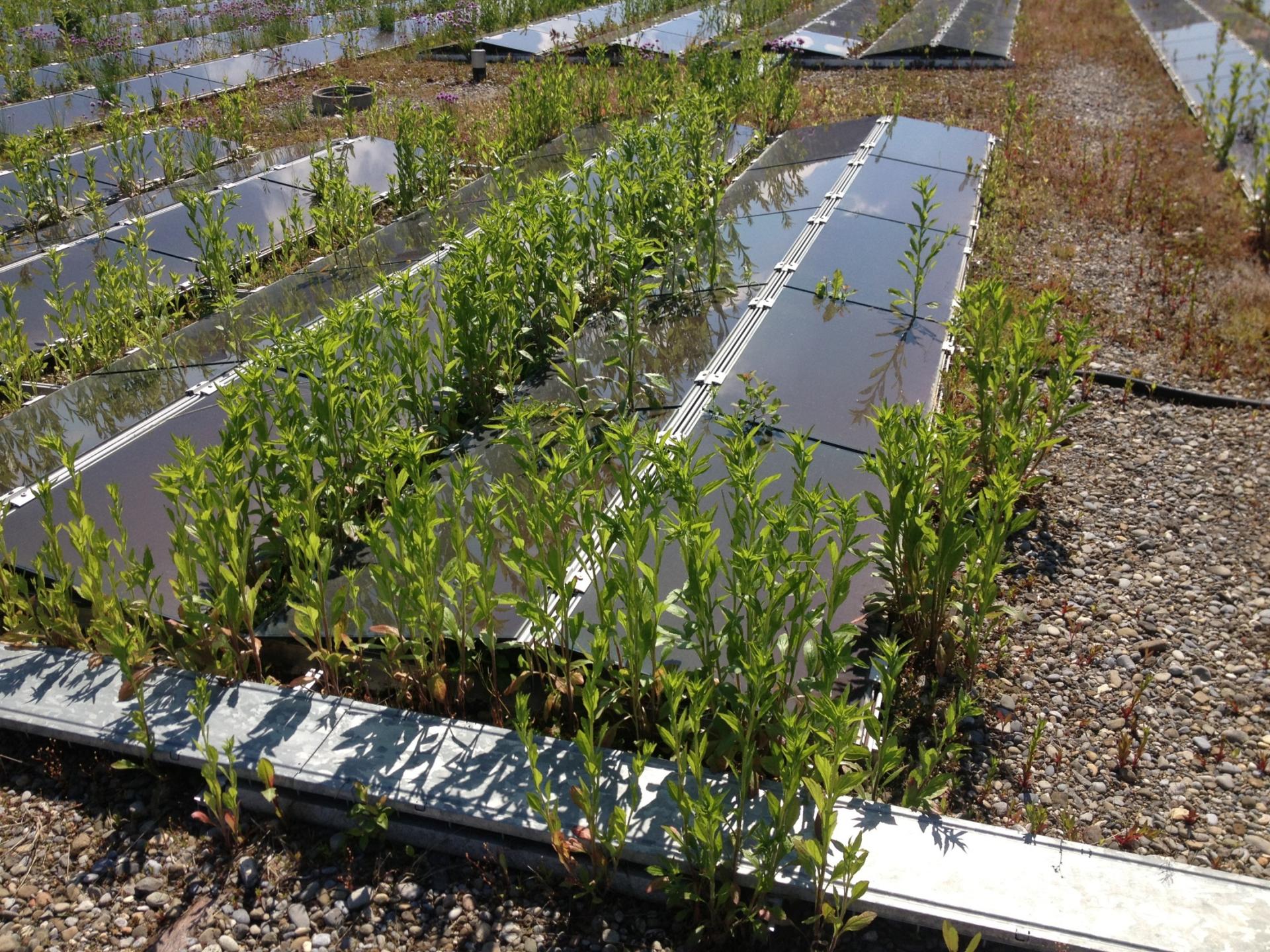
# What problems are we facing right now?







What problems are we facing right now?





# Help!

It's not working!

really?



# The paradise is over...



Optimizing:

- Reducing wind exposition
- material used

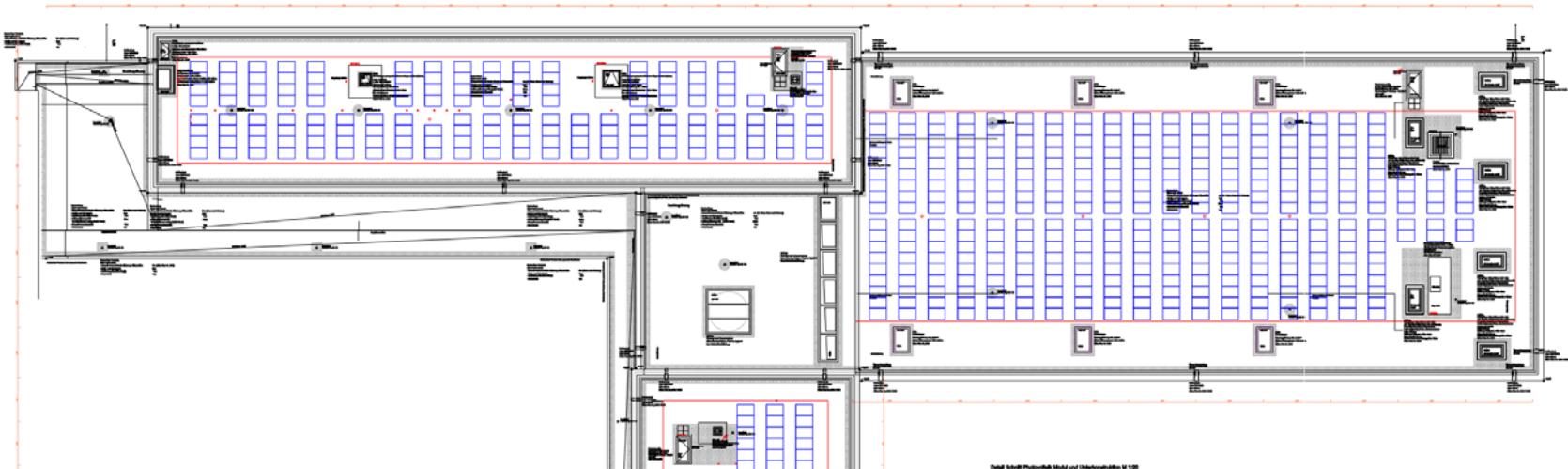




In agricultural areas  
it is clear to have  
elevated panels



# Adapting systems to control the vegetation

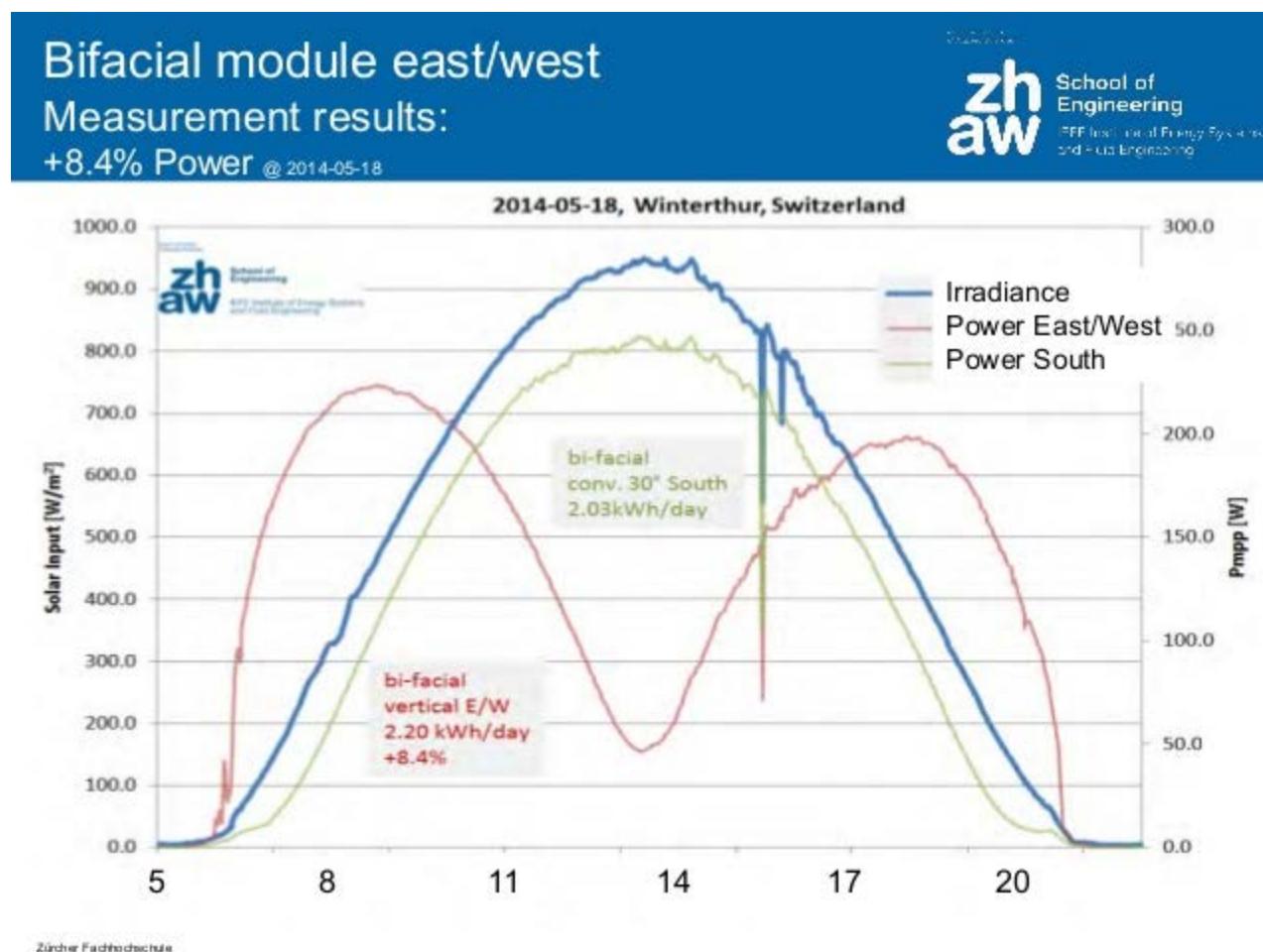




Energiegewinnung am Gebäude - neu gedacht Dr. Stephan Bremer sen & SWF

# Test site in Winterthur

Energy production is better distributed



Quelle: Baumgartner et al. 2017

# Solutions?

- For sure very difficult discussions
- What is more important, climate adaptation or energy production?

## Things to do – for authorities and planners

- Secure the cooling effects of green roofs
  - green roofs should be fixed as mandatory in building codes
- Defining substrate thickness for green roofs according to climate conditions of the area
- If the same roof space should be used as green roof and as area for PV-panels, combined solutions should be taken into account



