

# BETONKERNACTIVERING

WAAROM NIET?  
DE MENS IS FLEXIBEL, GEBOUWEN NIET



**HUYGEN**

Robert Philippi



**RWS Westraven Utrecht**



**DUO Groningen**



# Saxion Deventer



## Ziekenhuizen

- Medisch Spectrum Twente
- Meander Medisch Centrum Amersfoort

## En vele anderen

- Justitie Binnenlandse Zaken Den Haag
- Energy Academy Europe Groningen
- ...

# Waarom wordt BKA zo weinig toegepast?

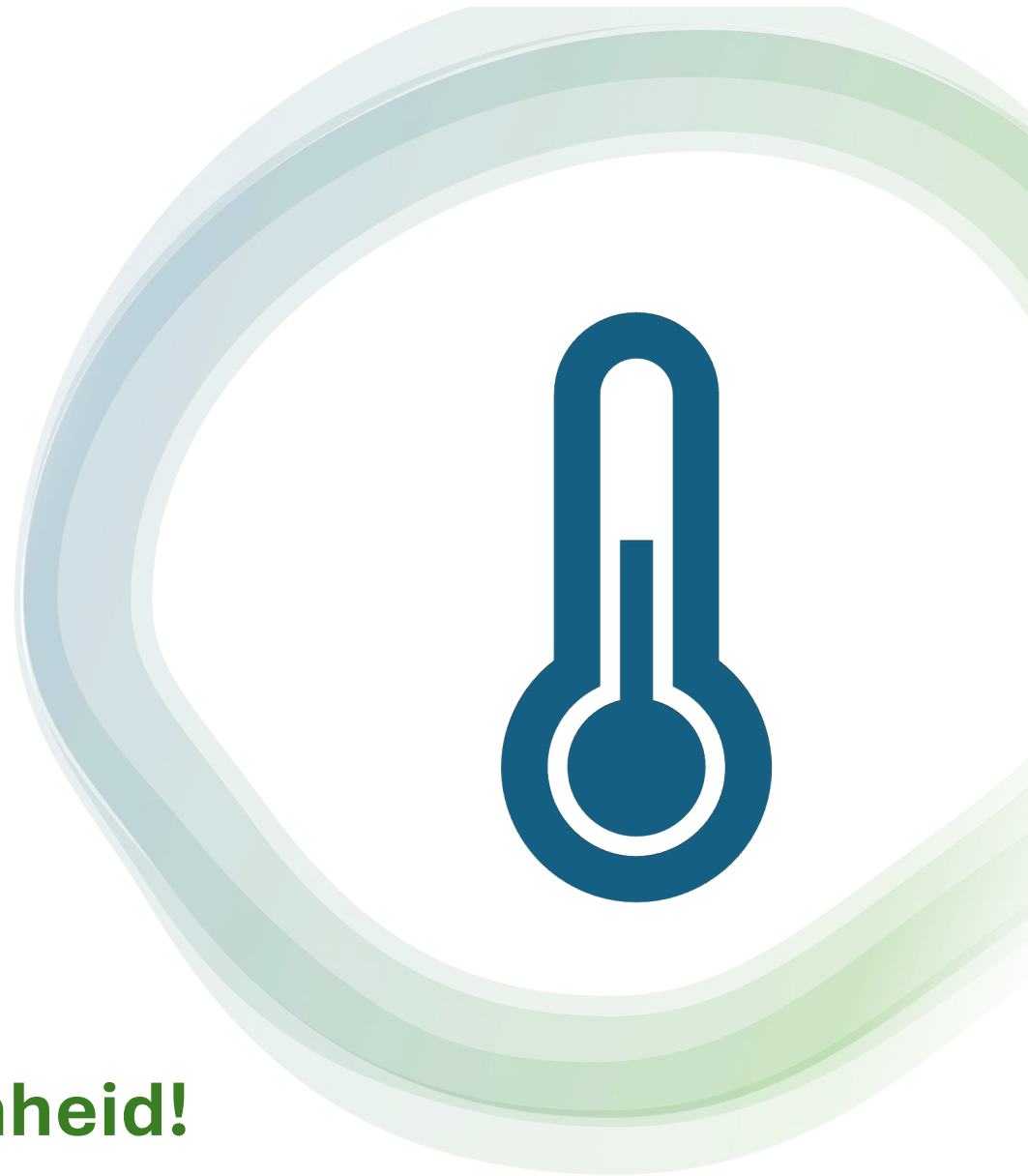
- Weinig materiaal
- Energiezuinig
- Comfortabel
- Lage onderhoudskosten
- Lage piekvermogens
- Stabiel
- Gebruik van vrije koeling
- Lage temperatuur verwarming



## Waarom wordt BKA zo weinig toegepast?

- Weinig materiaal
- Energiezuinig
- Comfortabel
- Lage onderhoudskosten
- Lage piekvermogens
- Stabiel
- Gebruik van vrije koeling
- Lage temperatuur verwarming

**Dit schreeuwt duurzaamheid!**



## “Mijn” 30+ jaar installatietechniek

### “Toen”

- Algemeen comfort
- Beperkte koeling
- Analooq
- Telefoon/fax
- Vast
- Gas
- ...

### Nu

- Individueel comfort
- Volledige koeling
- Digitaal
- Internet
- Mobiel
- Elektrisch
- ...

## “Mijn” 30+ jaar installatietechniek

### “Toen”

- Algemeen comfort
- Beperkte koeling
- Analooq
- Telefoon/fax
- Vast
- Gas
- ...

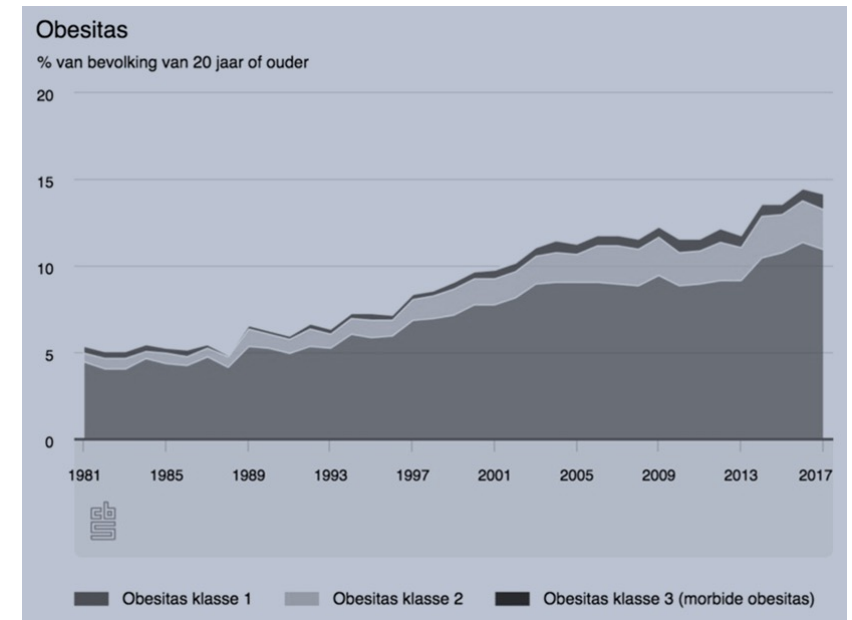
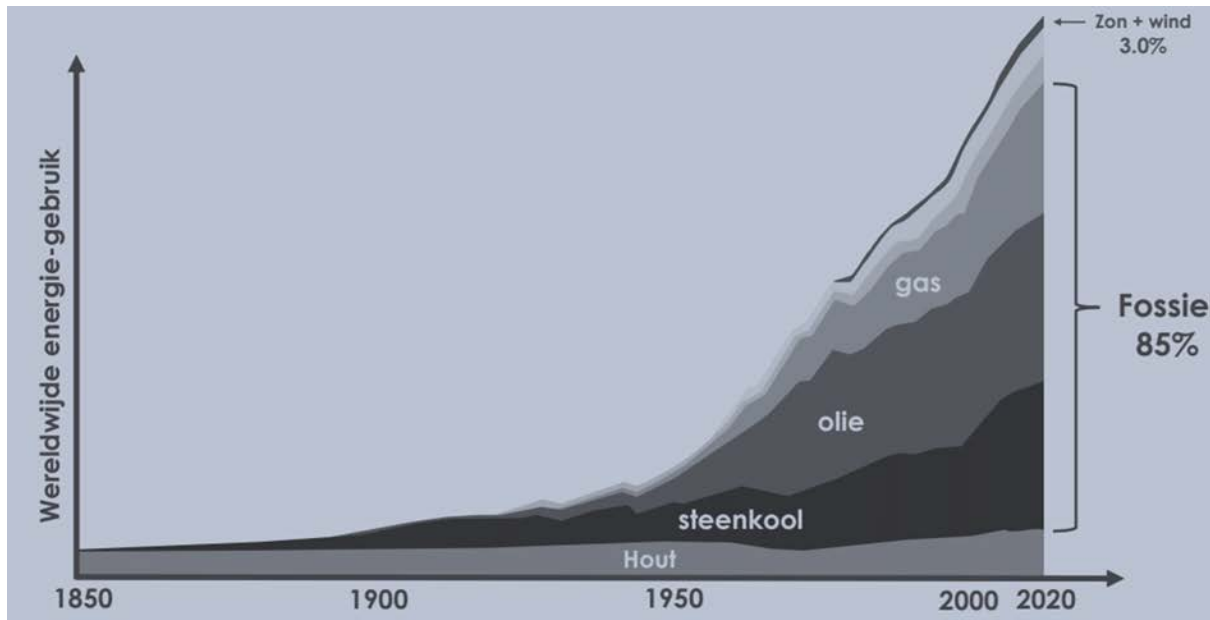
15% van de bouwkosten

### Nu

- Individueel comfort
- Volledige koeling
- Digitaal
- Internet
- Mobiel
- Elektrisch
- ...

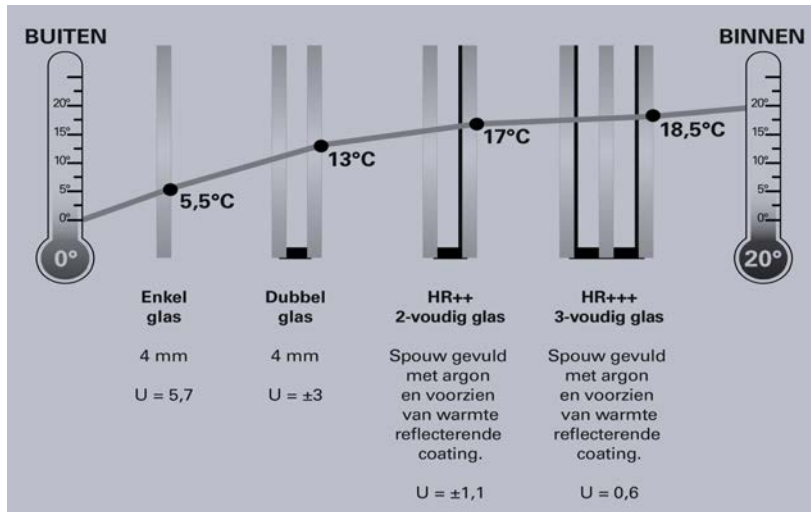
>>40% van de bouwkosten

# Maar we zijn wel energiezuinig en gezond bezig



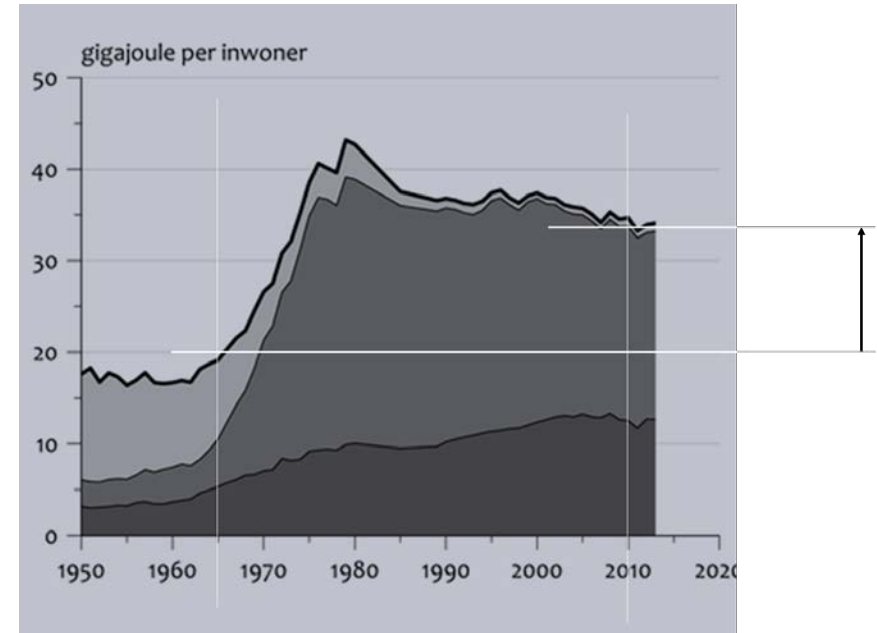


150% efficiënter



60% minder warmteverlies

Van 1965 -> nu +75%





increased efficiency

9x

decreased effectiveness

15x



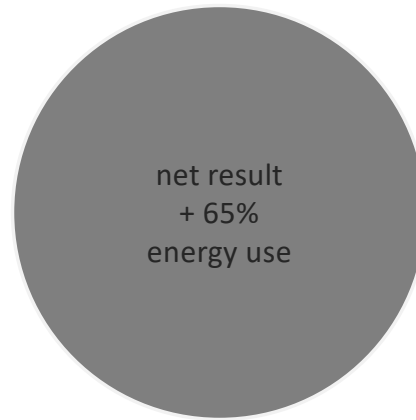
2 -3 hours per day

17 – 19 °C

10 – 15 m<sup>2</sup>

X

180 °C m<sup>2</sup> h



24 hours per day

20 – 24 °C

> 100 m<sup>2</sup>

X

2.640 °C m<sup>2</sup> h

average outside 11 ° C

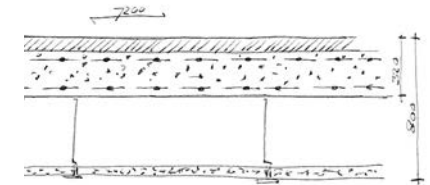


# Maatschappelijke obesitas

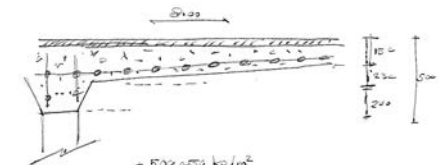
- Van 1650 kg voor een 7-serie
- Naar 1900 kg voor een 3-serie

# Maatschappelijke obesitas

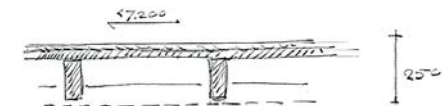
- 1990: 750 kg/m<sup>2</sup> - 475 kg CO<sub>2</sub>/m<sup>2</sup>
- 1930: 500 kg/m<sup>2</sup> - 200 kg CO<sub>2</sub>/m<sup>2</sup>
- 1870: 65 kg/m<sup>2</sup> - 70 kg CO<sub>2</sub>/m<sup>2</sup>



750-900 kg/m<sup>2</sup>  
450-750 kg CO<sub>2</sub>/m<sup>2</sup>



± 500-650 kg/m<sup>2</sup>  
200-225 kg CO<sub>2</sub>/m<sup>2</sup>



65-70 kg/m<sup>2</sup>  
7-80 kg CO<sub>2</sub>/m<sup>2</sup>



Wat we willen is niet  
wat we nodig hebben



Wat we willen is niet  
wat we nodig hebben



# Maatschappelijke obesitas – volgens de norm



Frites - Petite / Moyenne / Grande



231 / 328 / 434 kcal



Chicken Big Tasty™



797 kcal

BURGERS		NUTRI-SCORE	ÉNERGIE À LA PORTION
	McChicken™		439 kcal
	McFish™		285 kcal
	McMuffin™ Egg & Cheese		263 kcal
	McMuffin™ Egg & Bacon		277 kcal



Chicken Big Tasty™



797 kcal



Chicken Big Tasty™  
Bacon



769 kcal



Chicken McNuggets™  
4 / 6 / 9 / 20 Mx



174 / 262  
392 / 872 kcal



Croque McDo™



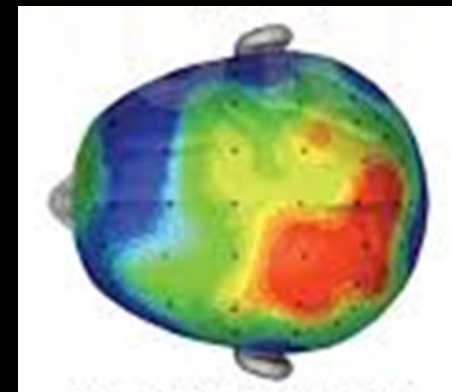
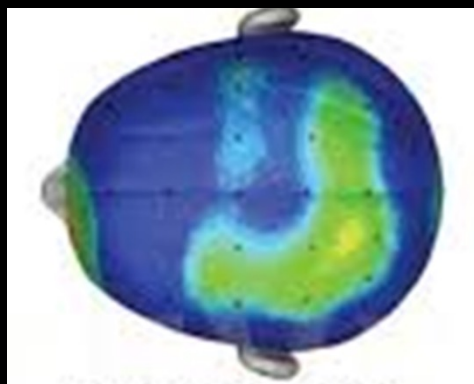
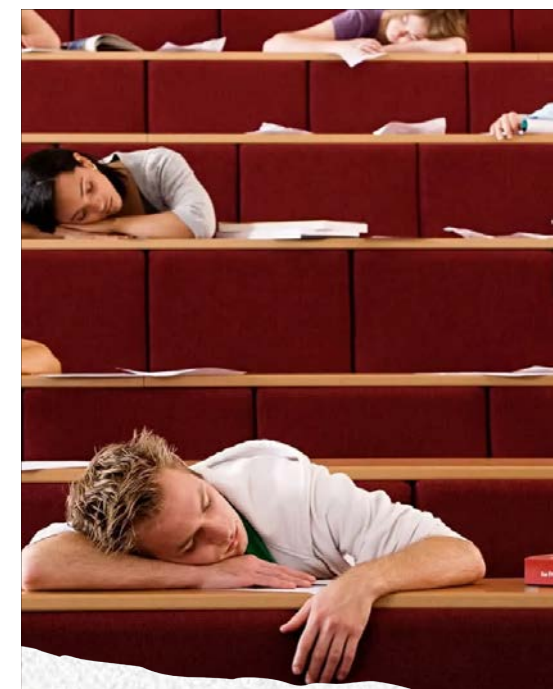
261 kcal



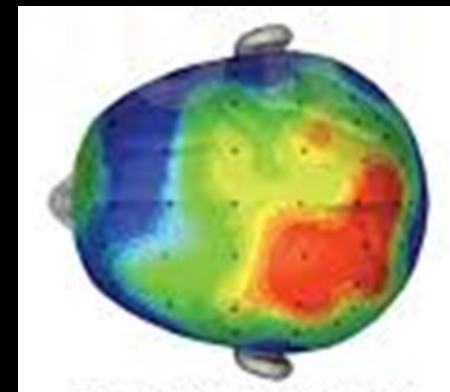
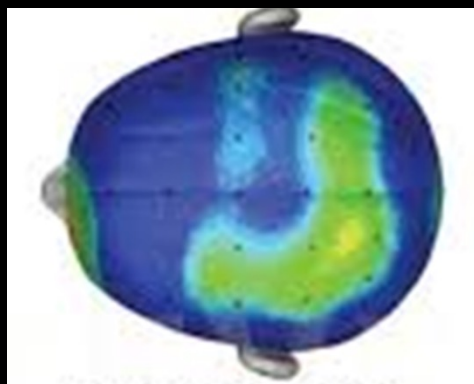
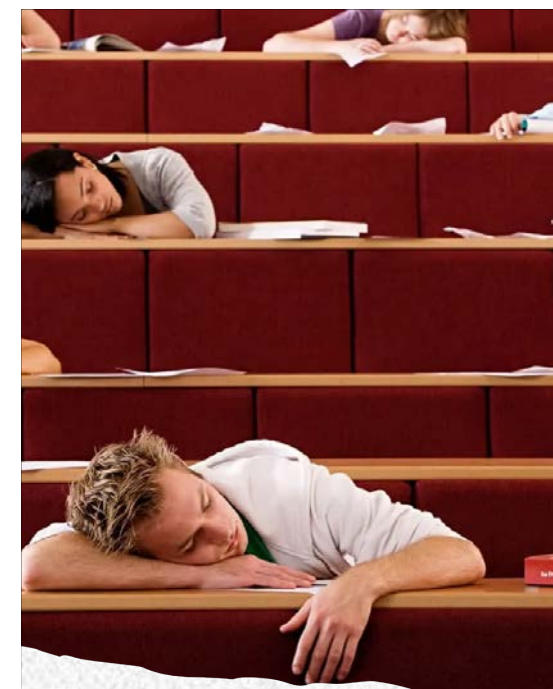
Vinaigrette à l'huile de noisette



170 kcal



Wat we willen is niet  
wat we nodig hebben



Wat we willen is niet  
wat we nodig hebben

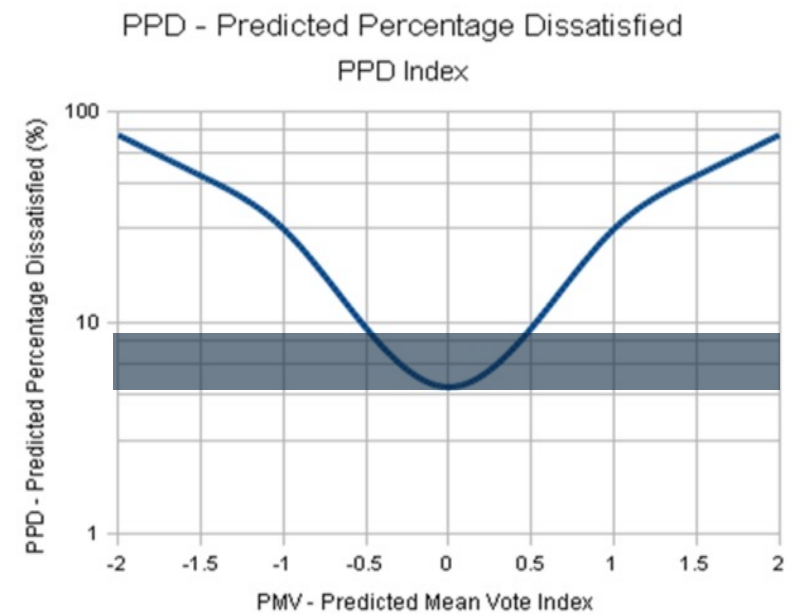
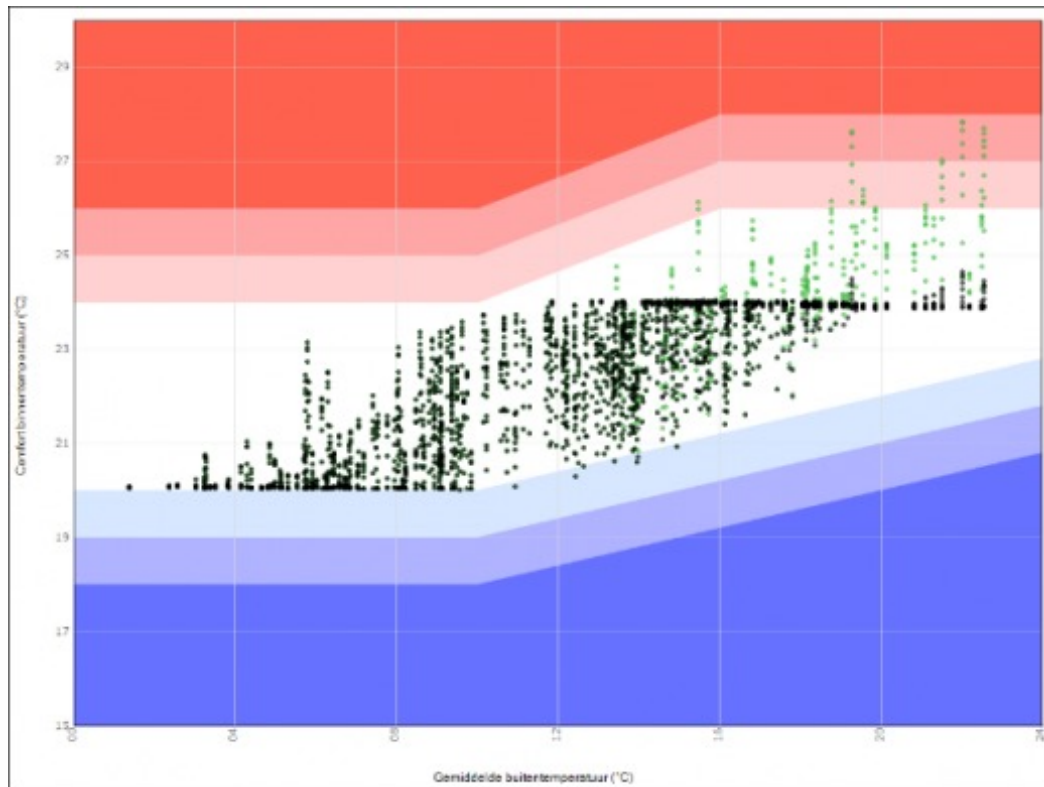
Mensen zijn niet productiever en  
gezonder in een statische  
gecontroleerde omgeving

# De mens is geëvolueerd in een dynamische omgeving

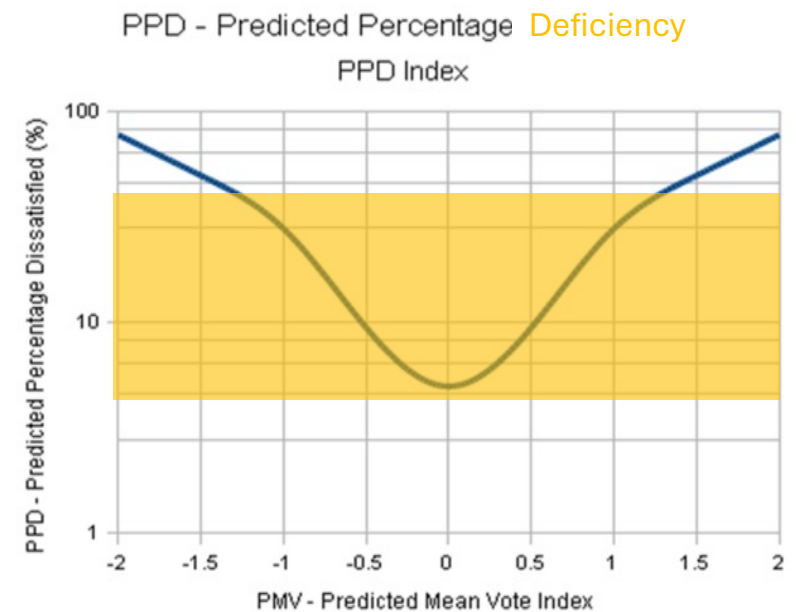
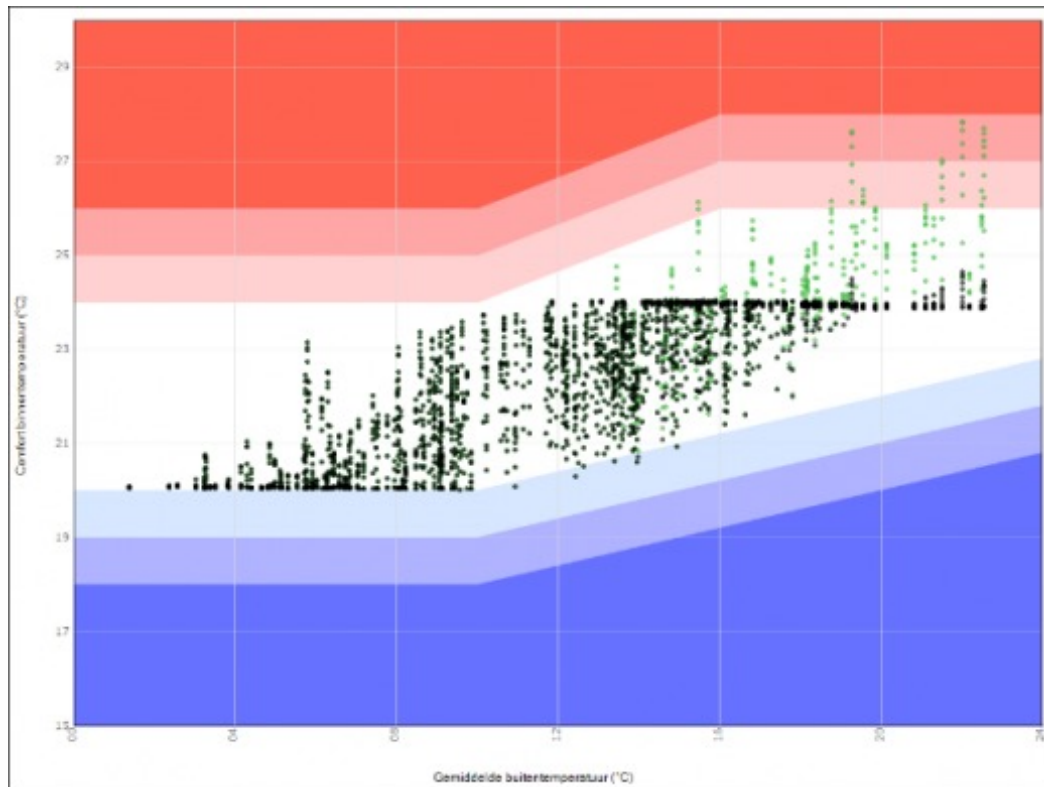
- Volg buiten
- Volg bioritme
- Volg lichamelijke cycli



# Maatschappelijke obesitas – volgens de norm



# Maatschappelijke obesitas – volgens de norm

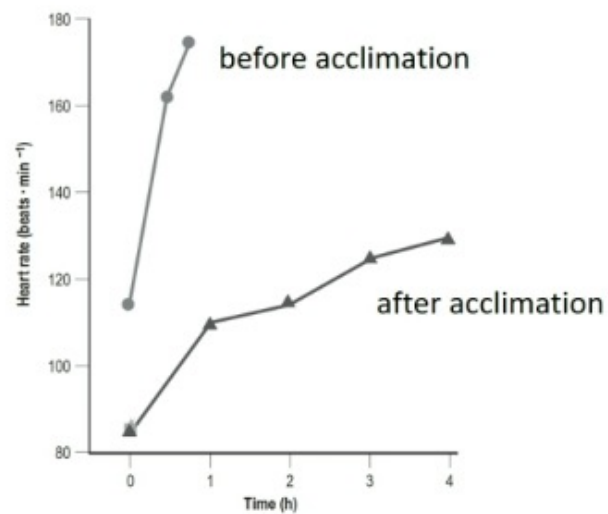


Onzin?

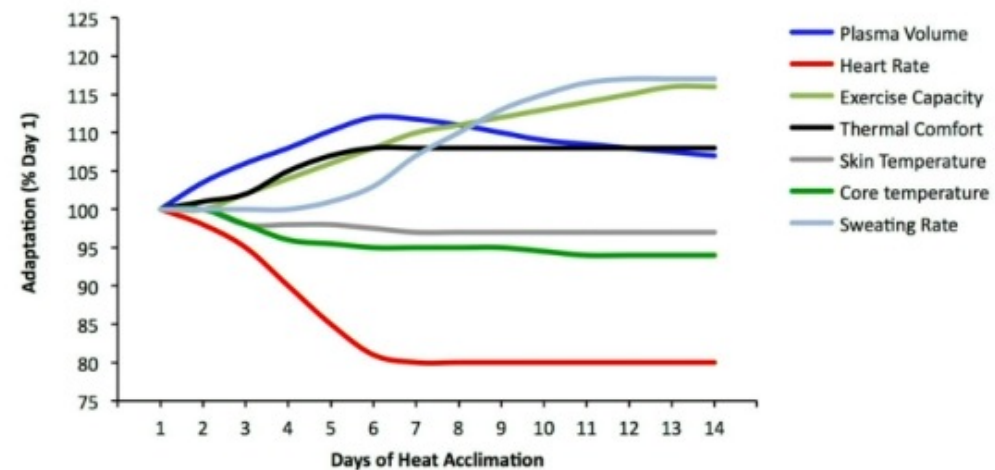
# Onzin?

**Active** heat acclimation (regular exposure to heat plus exercise)

- Reduction in core temperature
- Reduction in heart rate



Cohen & Gisolfi MSSE, 1982

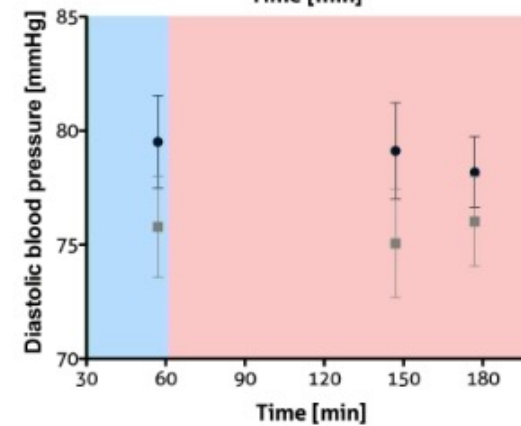
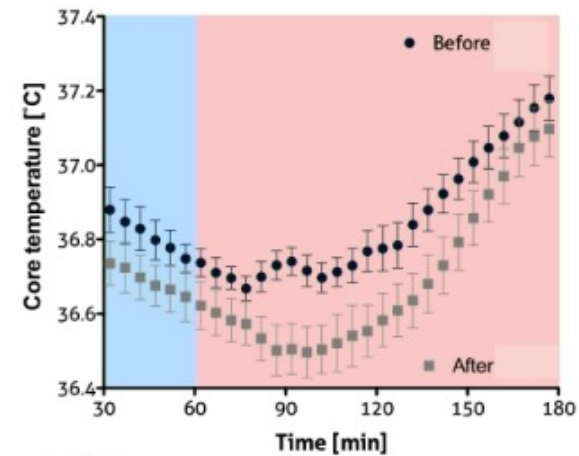
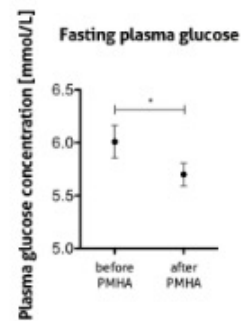


Périard et al. Scand J Med Sci Sports 2015

# Onzin?

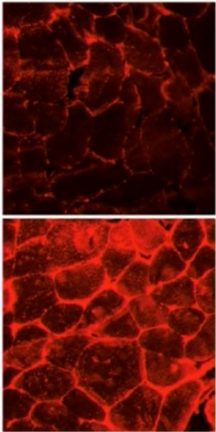
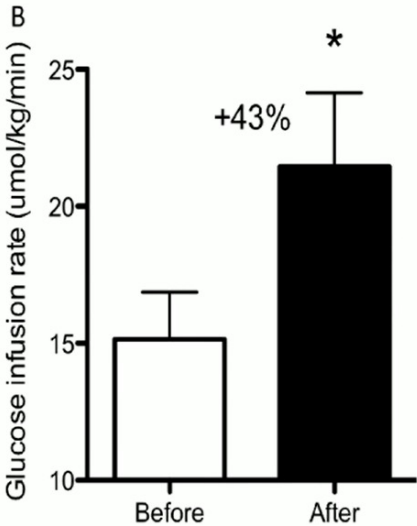
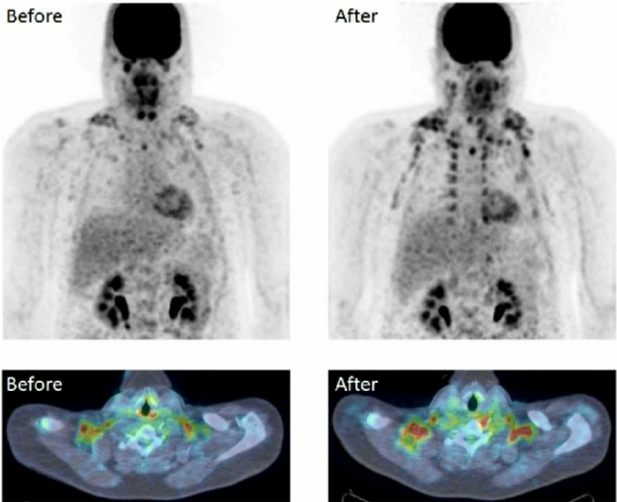
## Results passive heat acclimation

- Core temperature drops
- Blood pressure drops
- Plasma glucose drops
- Plasma insulin drops
- Increased insulin sensitivity



# Onzin?

Cold acclimation in diabetes type 2  
increase insulin sensitivity



Increase in muscle composition



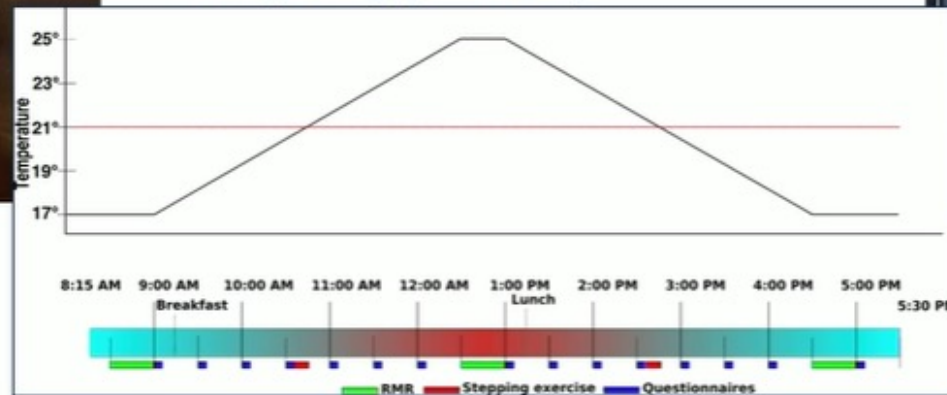
Hanssen et al., Nat Med 2015

# Onzin?



## Drifting indoor temperature in laboratory and real offices

- health parameters
- energy savings (est. 15-20%)

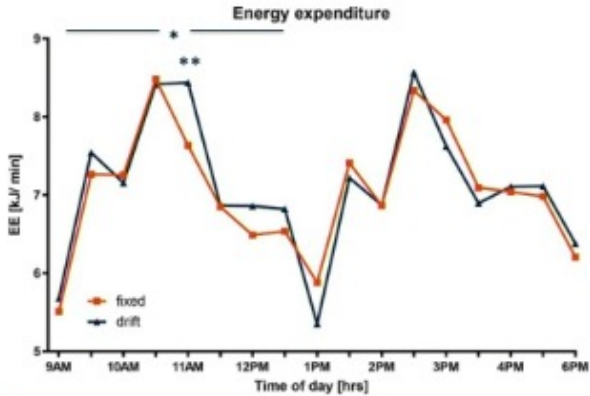


### Lab study

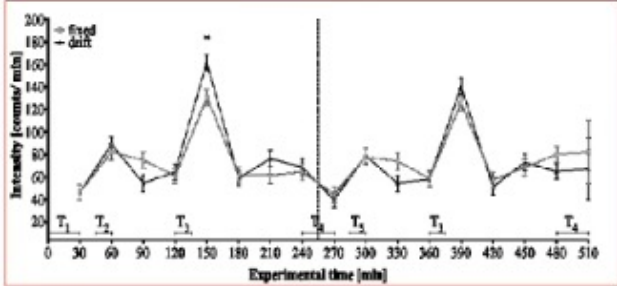
Evaluating the effects of drifting vs a fixed ambient temperature on subjective comfort, sensation and thermo-physiology

# Onzin?

Significant higher energy expenditure and physical activity in the morning between fixed and drift



energy expenditure



physical activity

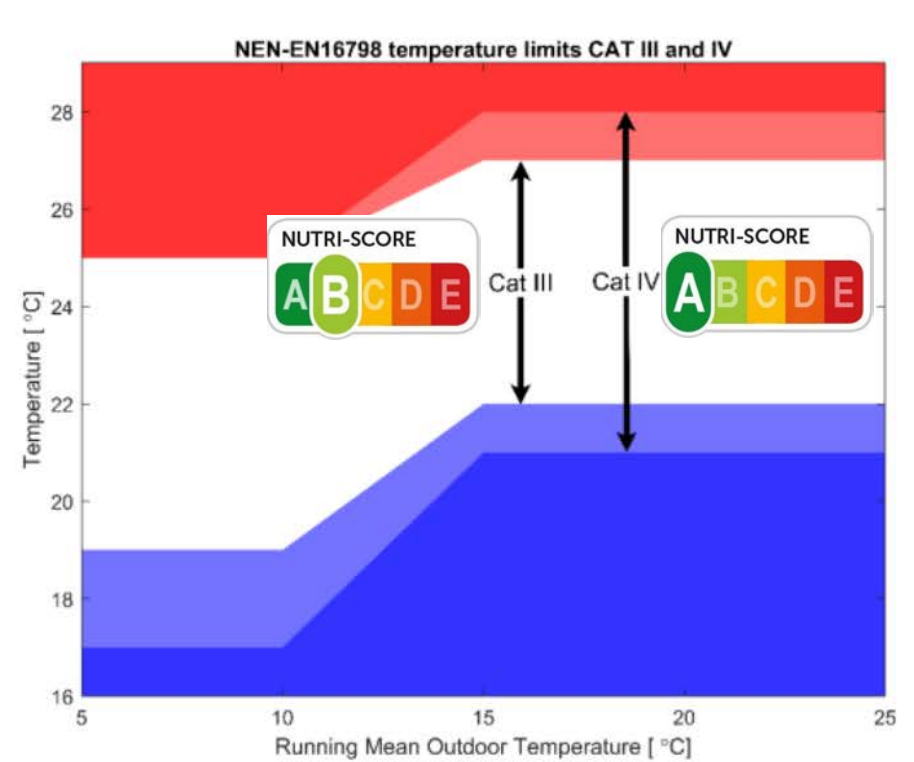
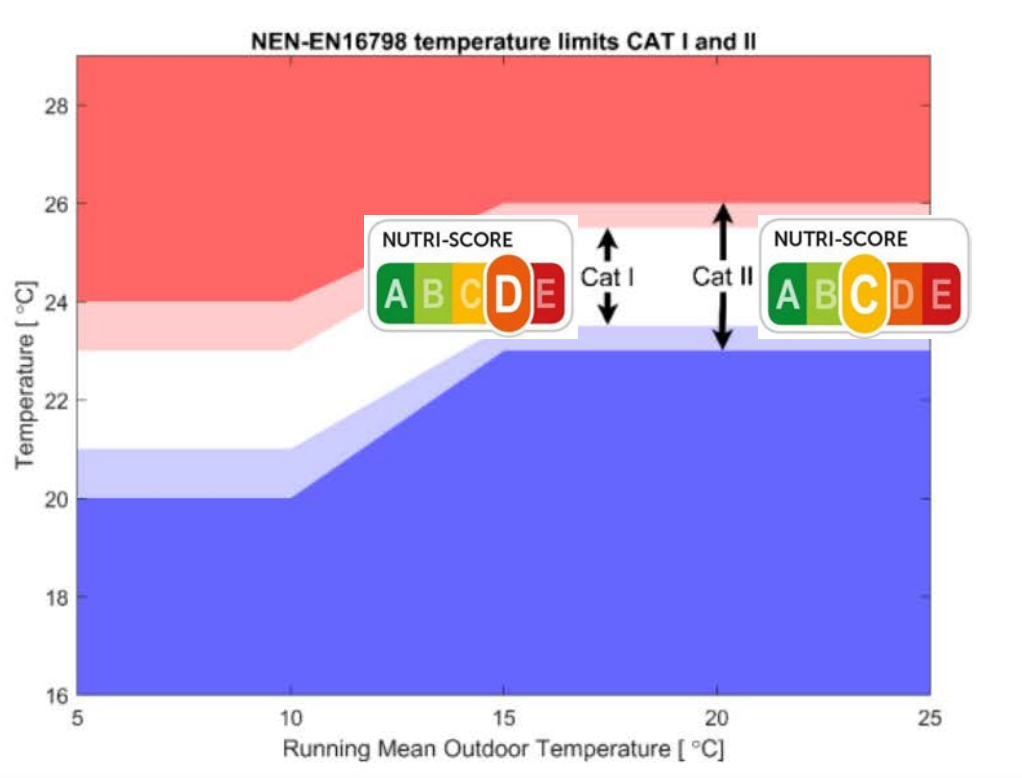
Ivanova et al. 2021, *Physiol & Behav.*

# Onzin?

## Conclusions

- Significant higher energy expenditure in the morning during drift  
This effect goes hand in hand with a small increase in physical activity
- Skin temperatures and skin temperature gradients follow the ambient temperature: indicative of increased vasomotion during drift:  
The cardiovascular system is more challenged
- A temperature ramp in the range of 17-25°C is voted as comfortable
- Potential of a dynamic temperature:  
increased metabolic health on the long term without compromising comfort

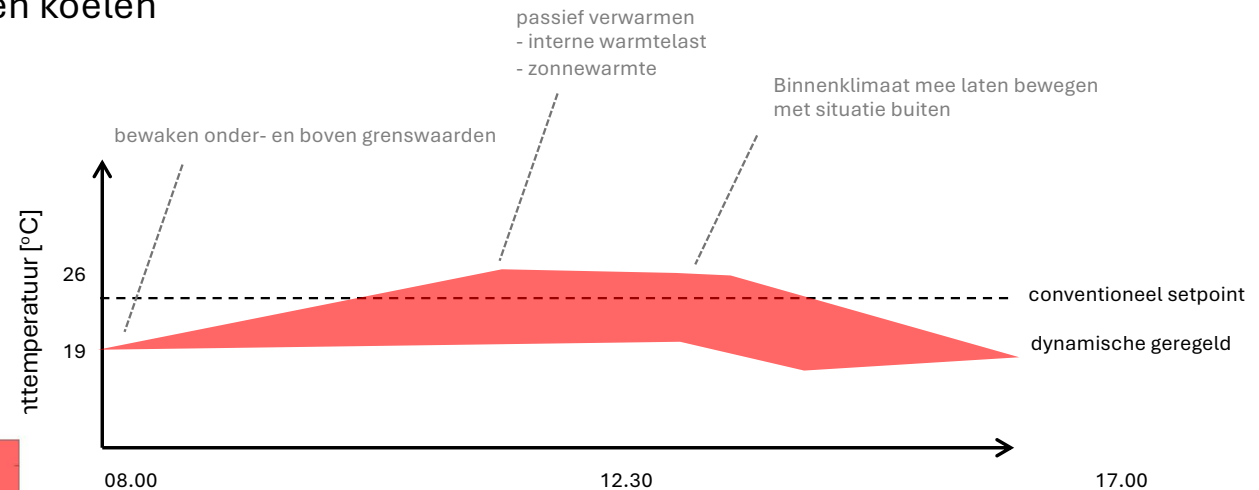
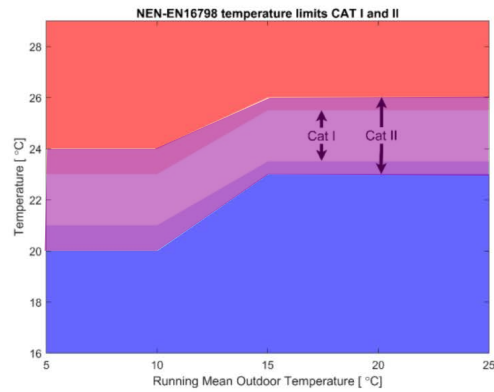
# De norm opnieuw normeren?

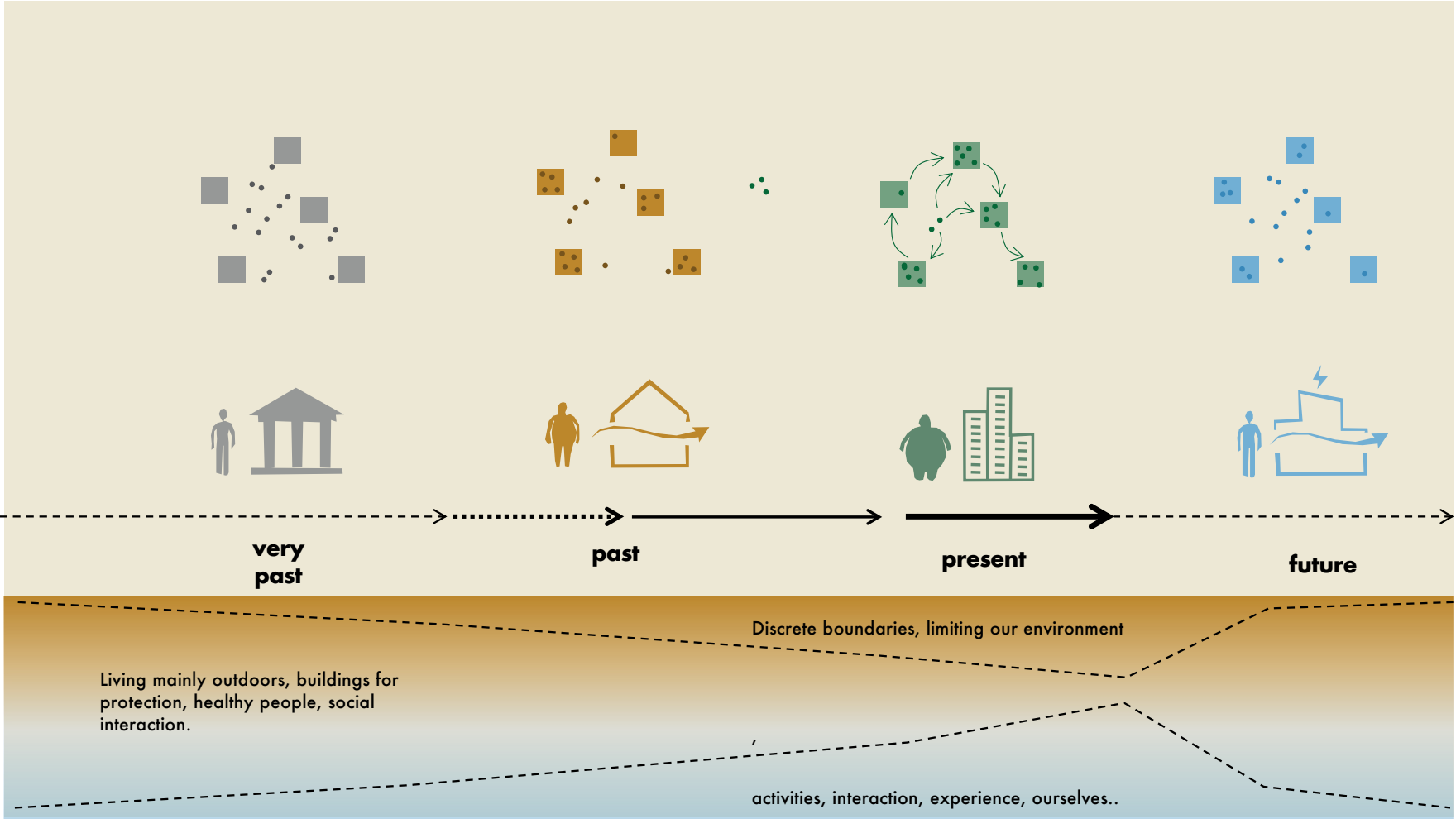


# “Gevangen” binnen de huidige eisen

## Ga dynamisch regelen

- Gebruik passief verwarmen en koelen
- Volg de buitencondities
- 30-40% energiebesparing





# Daarom dus wel betonkernactivering!

- Weinig materiaal
- Energiezuinig
- Comfortabel
- Lage onderhoudskosten
- Lage piekvermogens
- Stabiel
- Veel gebruik van vrije koeling
- Lage temperatuur verwarming

**Duurzaam en gezond!**

