

# Energy transition & roadmaps



Business Development

9 januari 2018

# Responsibility



Our water



Our atmosphere

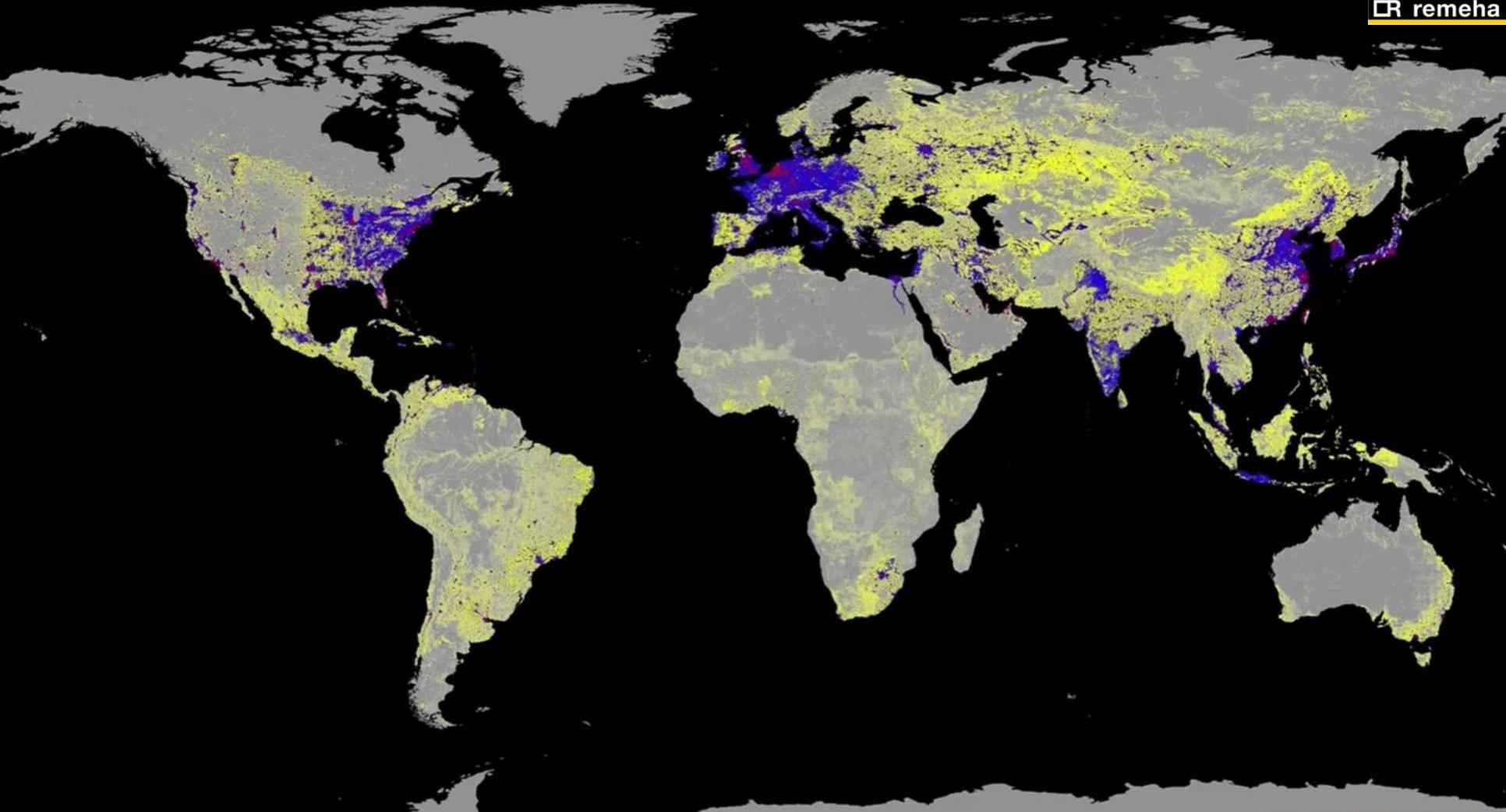
# Moving to 2050

No carbon allowed from residential applications

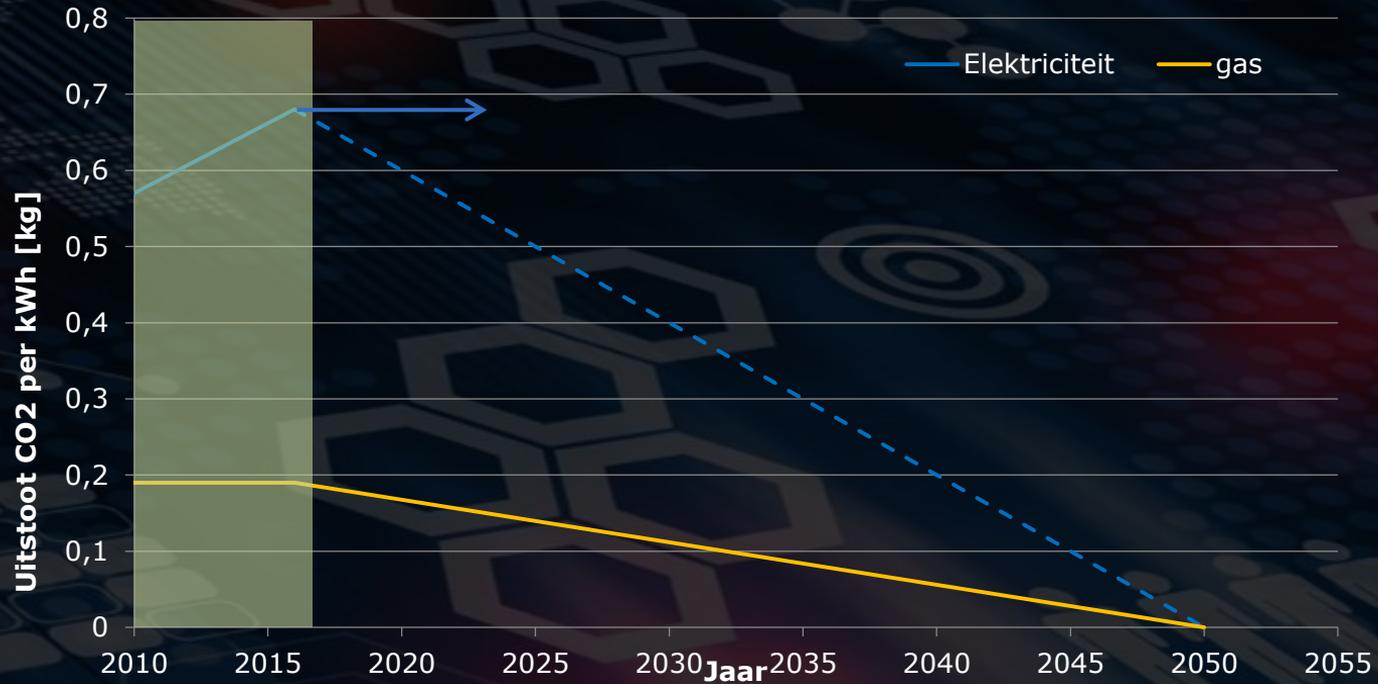


## Energy transition

- Clean from source to end user
- CO<sub>2</sub> reduction/ €
- Route towards 2050 (85% of the dwellings already exists)
- Climate deal Paris → no carbon in residential buildings

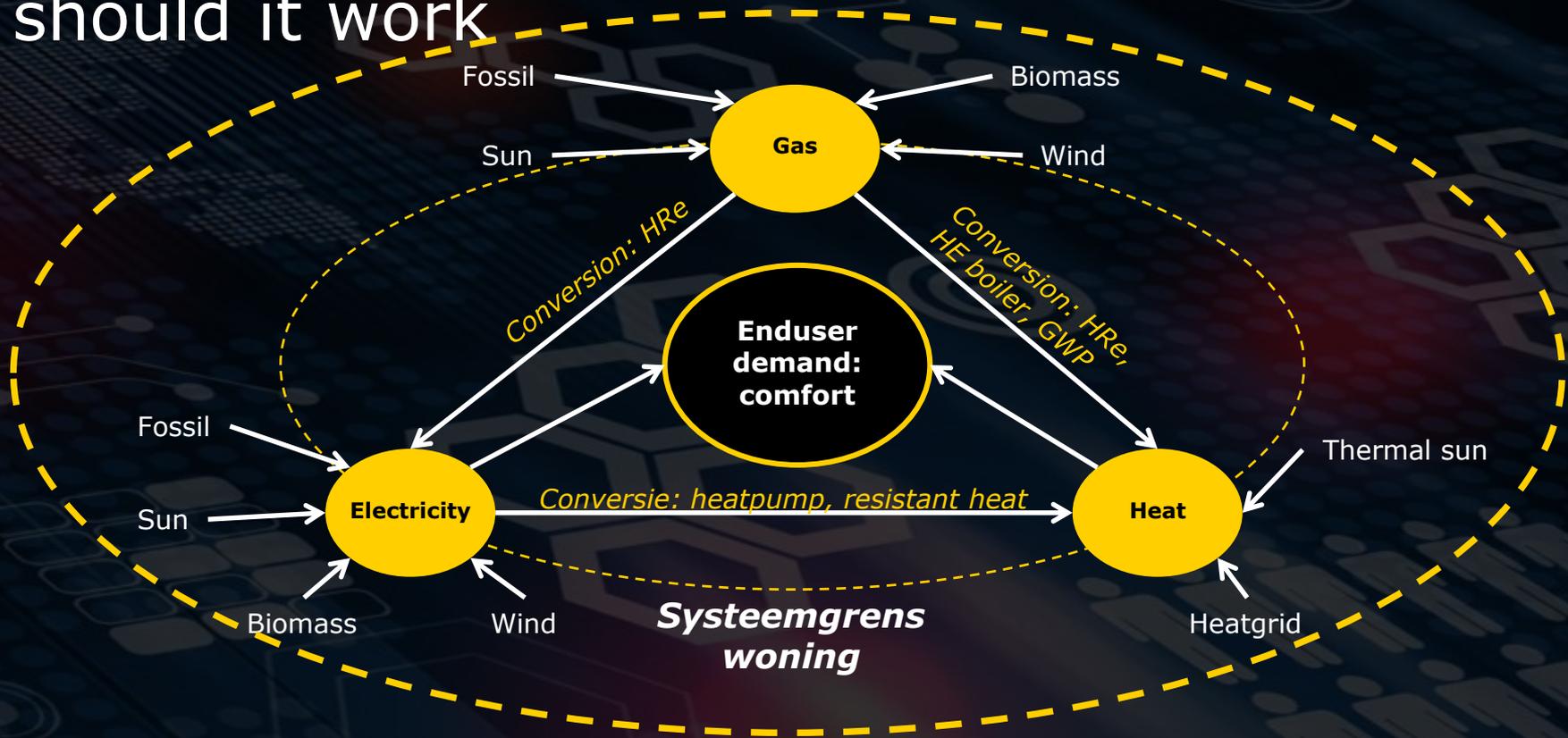


# CO<sub>2</sub> intensity



Breakeven COP →  $0,68/0,19 = 3,6$

# Energysystem en conversion and how should it work



# Energy transition...

How to move forward?



Clean from source to end-user → CO<sub>2</sub> neutral!

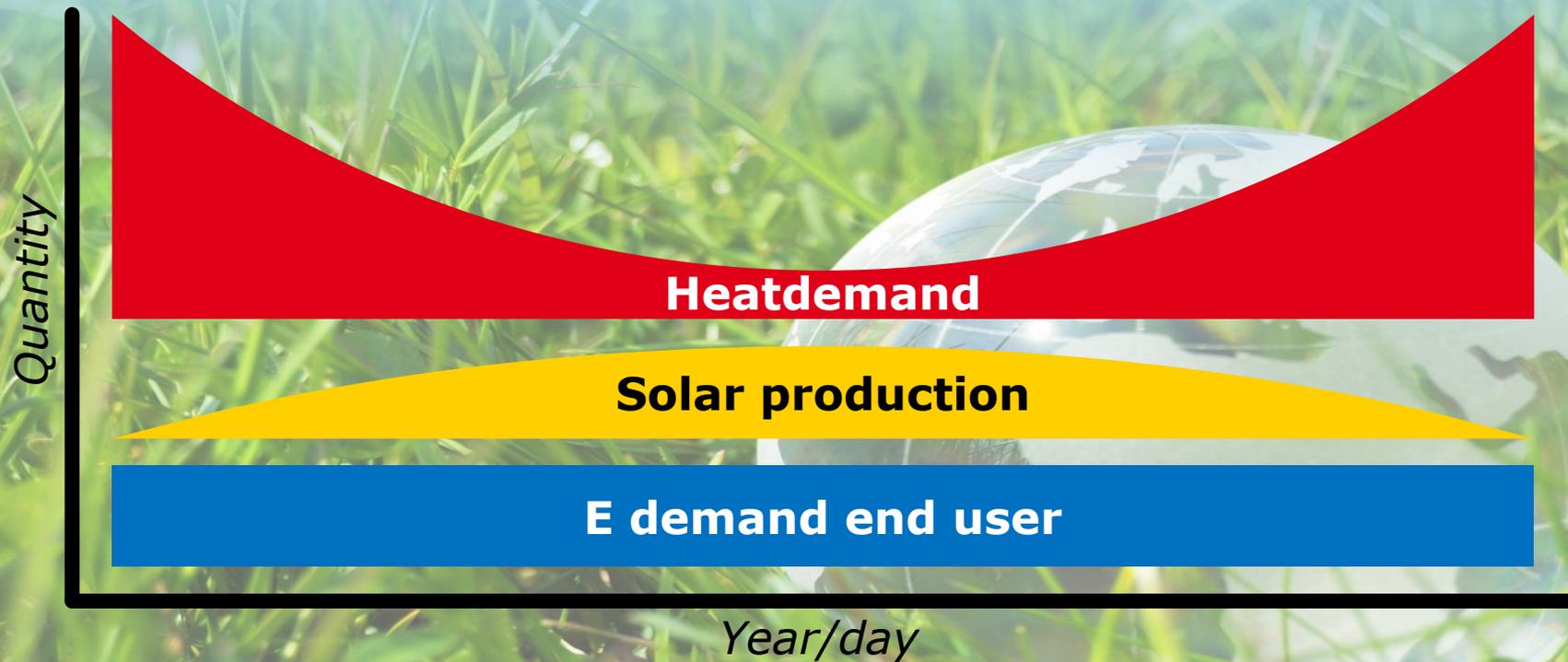


Lowest possible (socialized) costs!

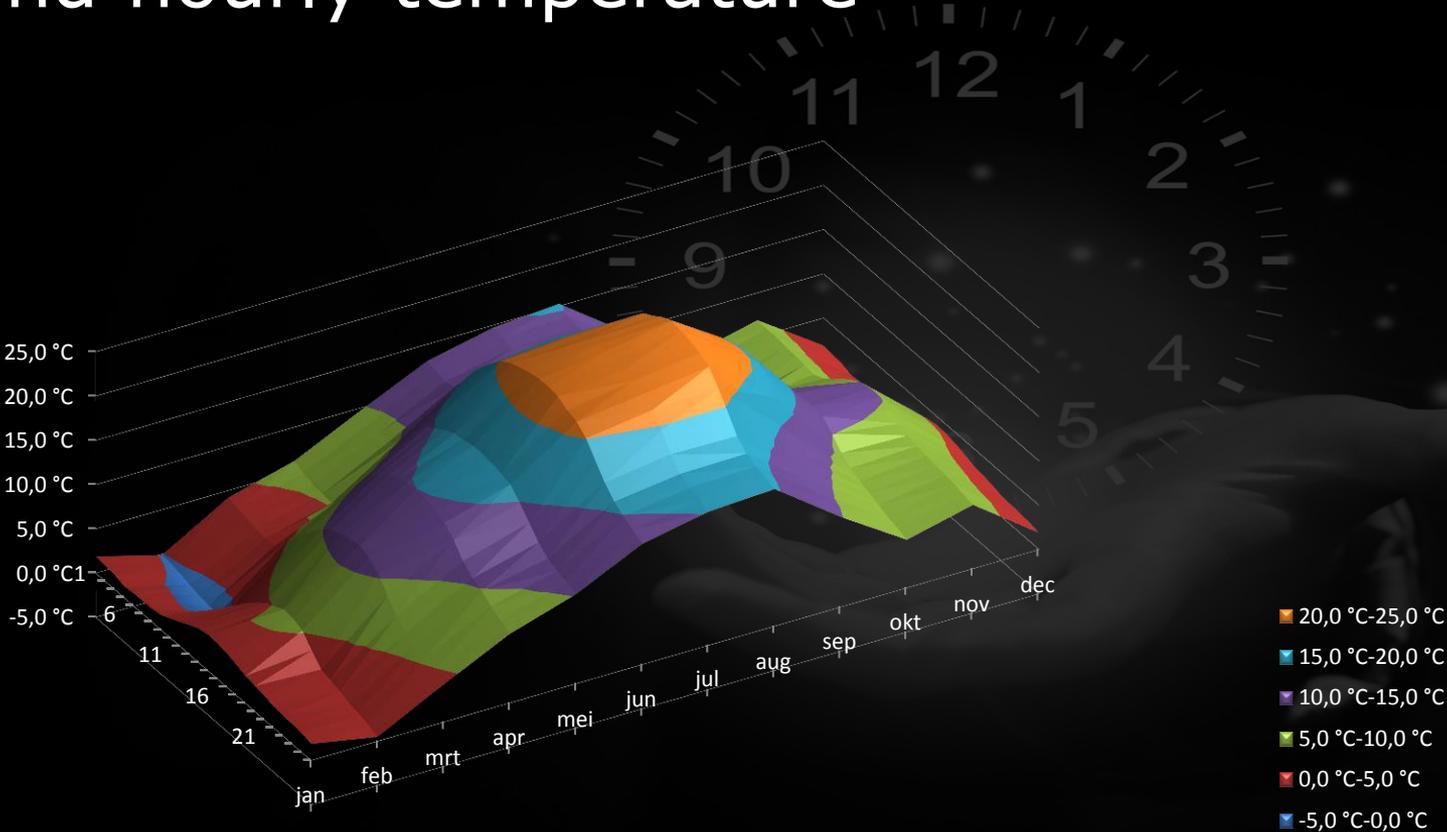


Realistic pathway (85% of the built environment exists already)!

# Production $\neq$ demand

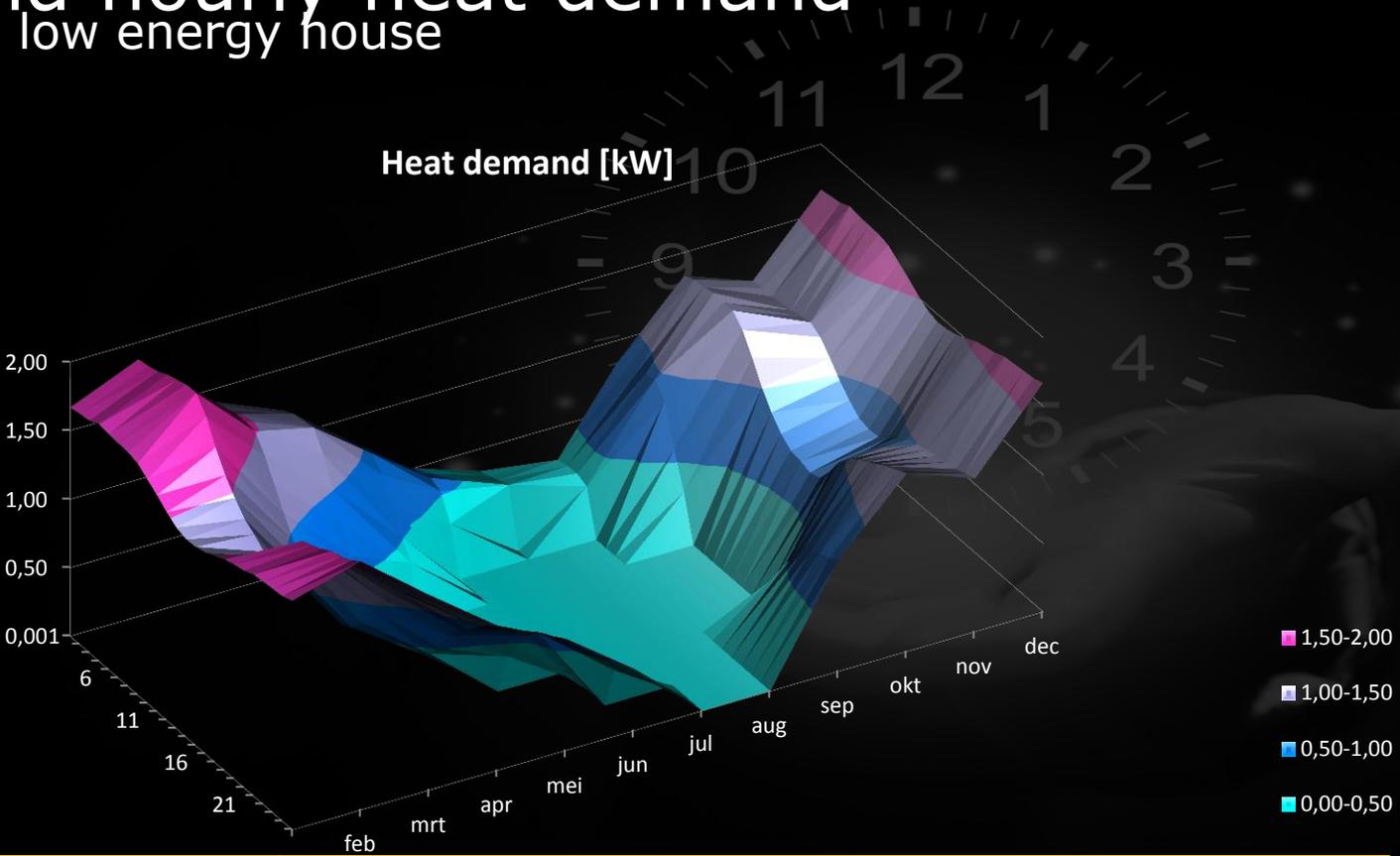


# Year round hourly temperature



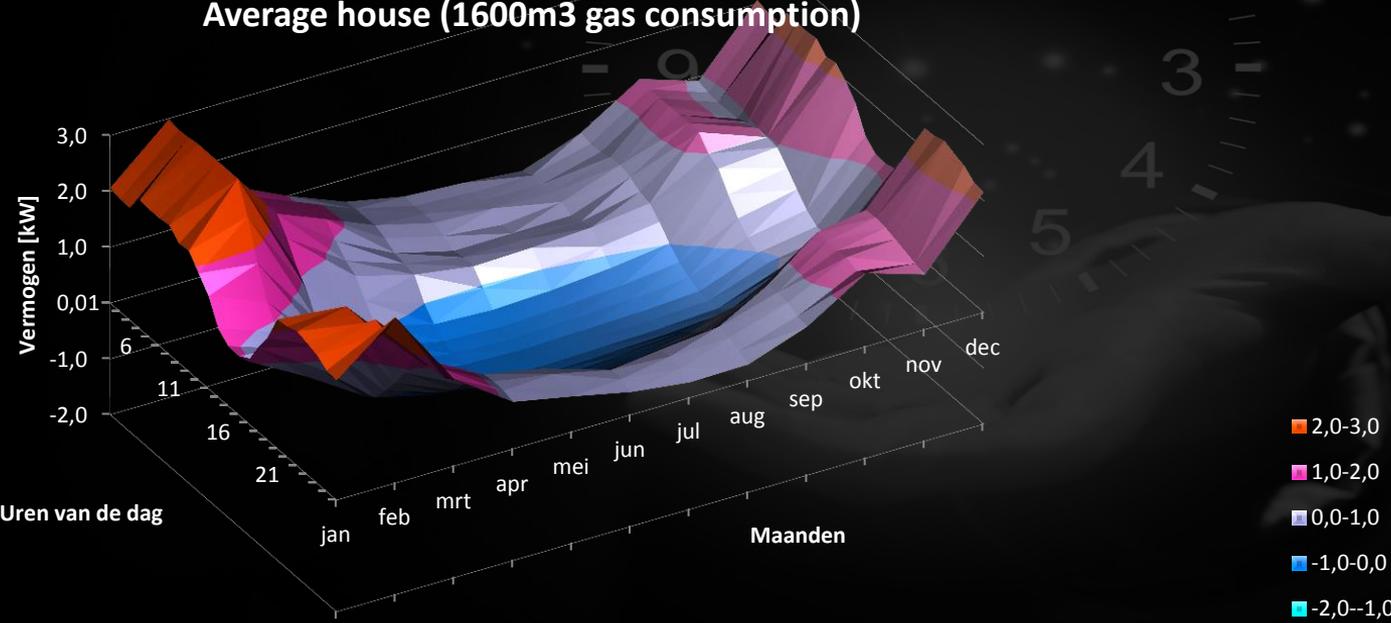
# Year round hourly heat demand

Well insulated low energy house



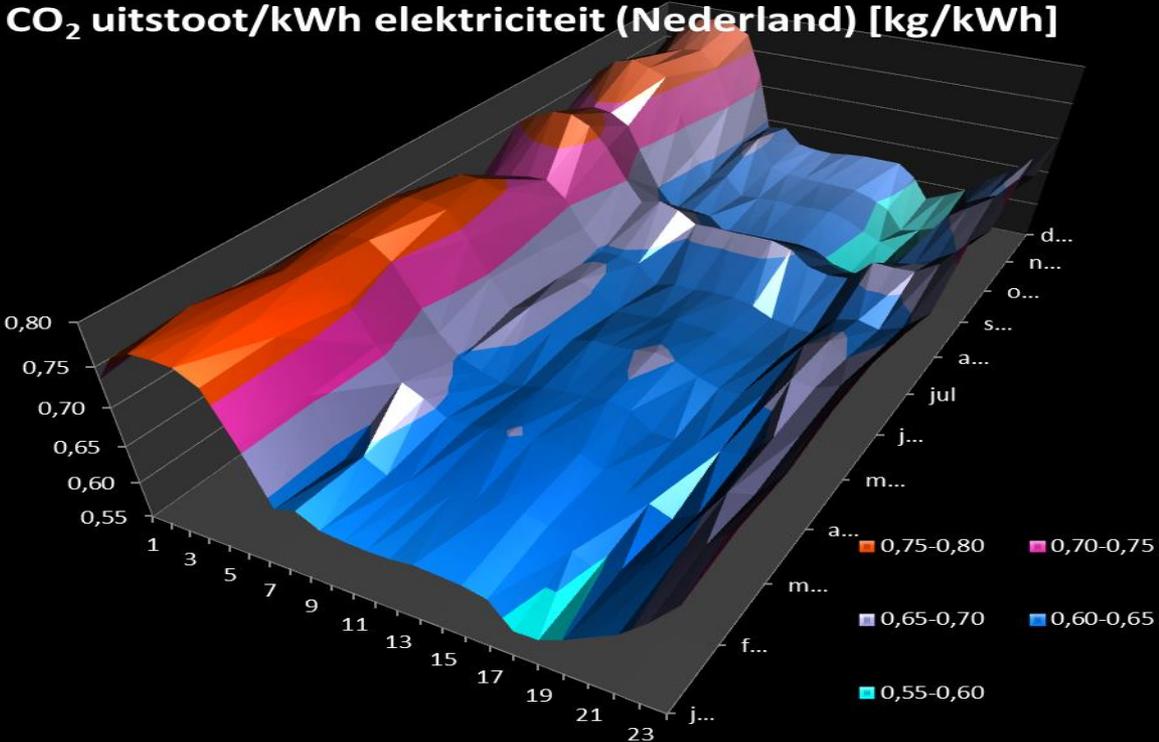
# Year round hourly Electricity import and export of the total house

Electricity demand and production (total) [kW] )  
Average house (1600m3 gas consumption)

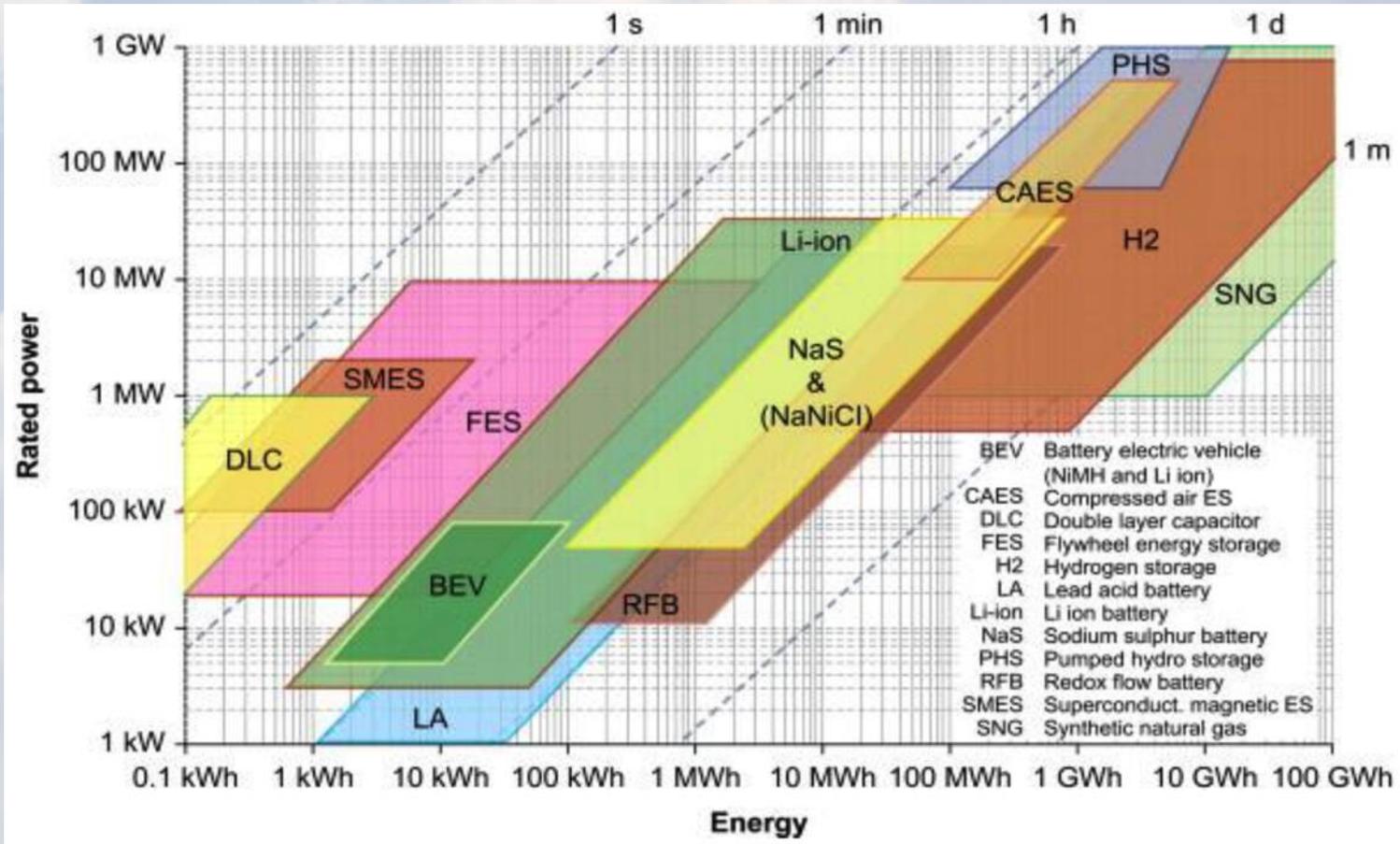


# Hoe erg is dat?

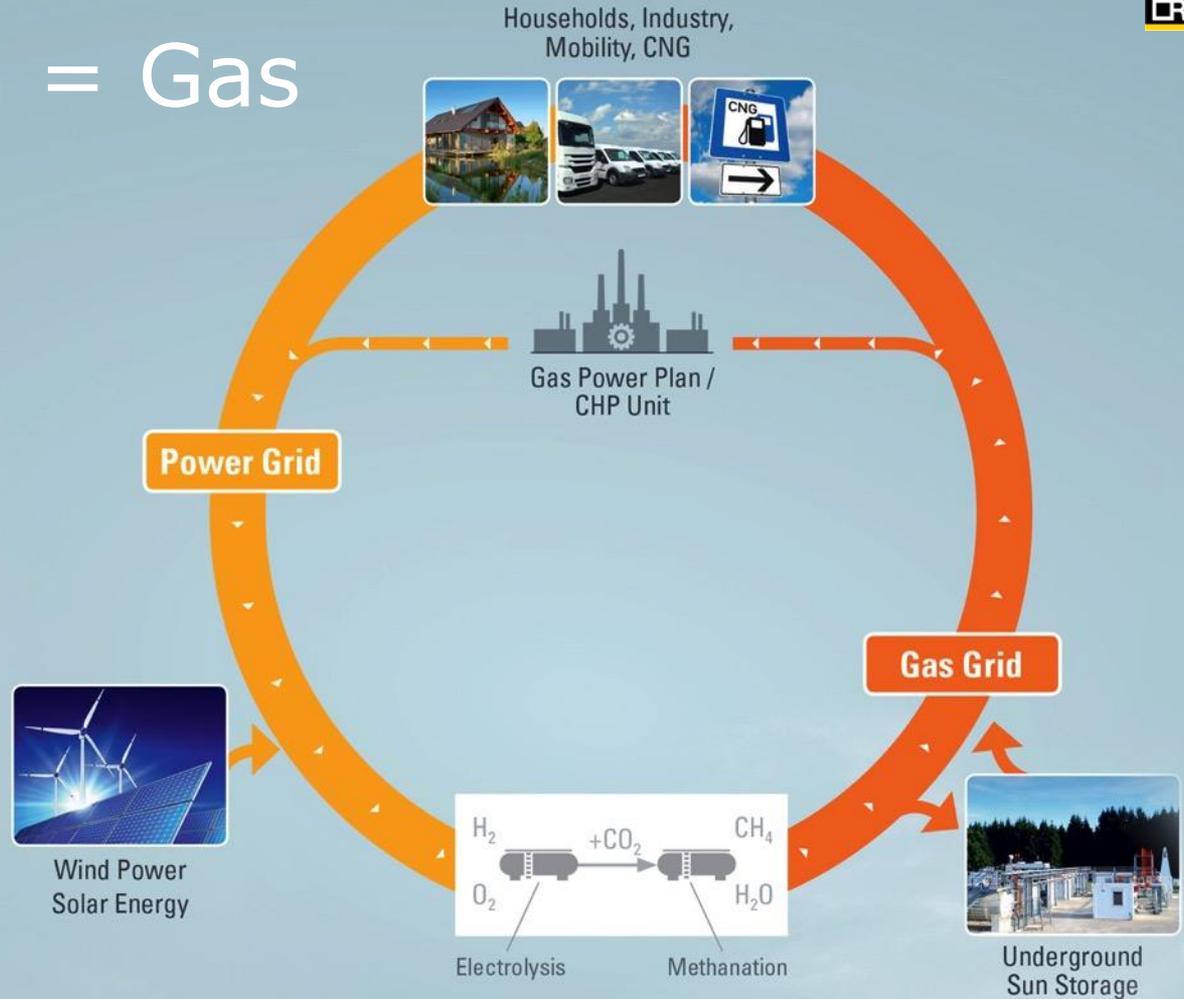
CO<sub>2</sub> uitstoot/kWh elektriciteit (Nederland) [kg/kWh]



DLD gem: 0,6357      NL: gem 0,68



# Wind + Sun = Gas

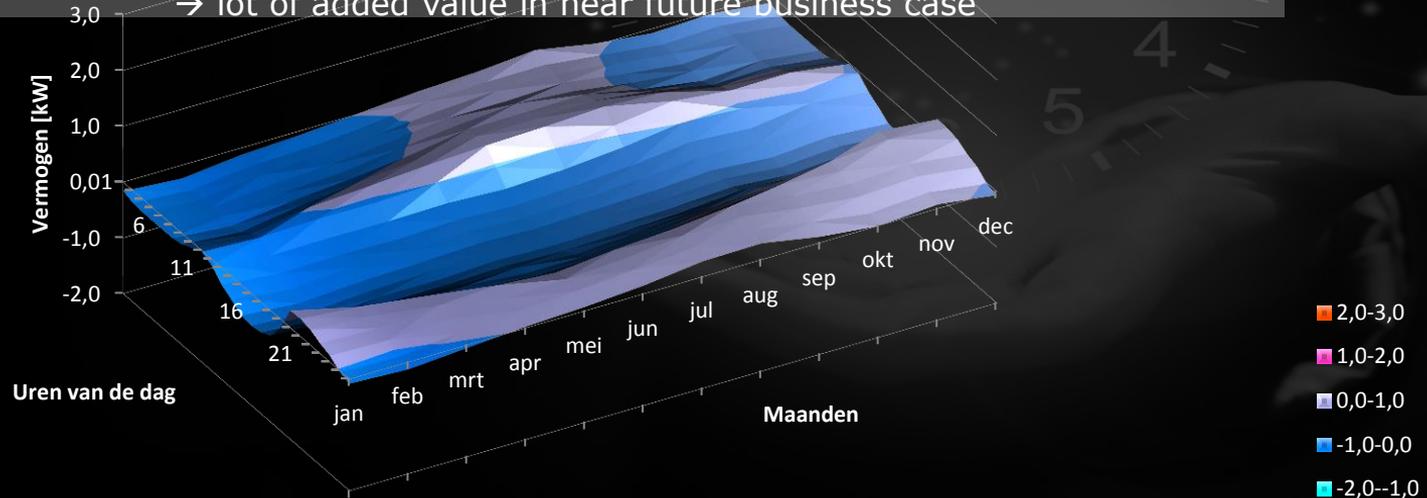


# Year round hourly Electricity import and export of the total house

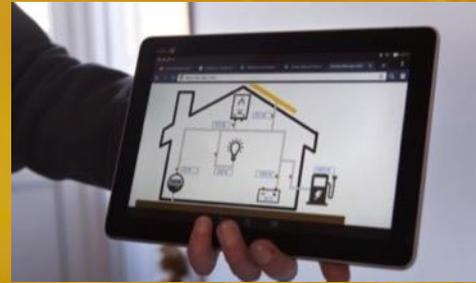
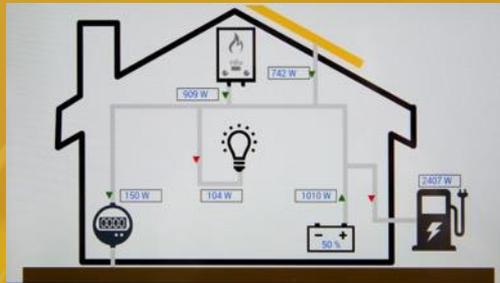
## Electricity demand and production (total) [kW]

### Average house with PV and u-chp

Configuration from u-chp in combination with PV avoids import and export of electricity to the grid, avoiding CO2 production and creating spare capacity in the grid  
 → lot of added value in near future business case

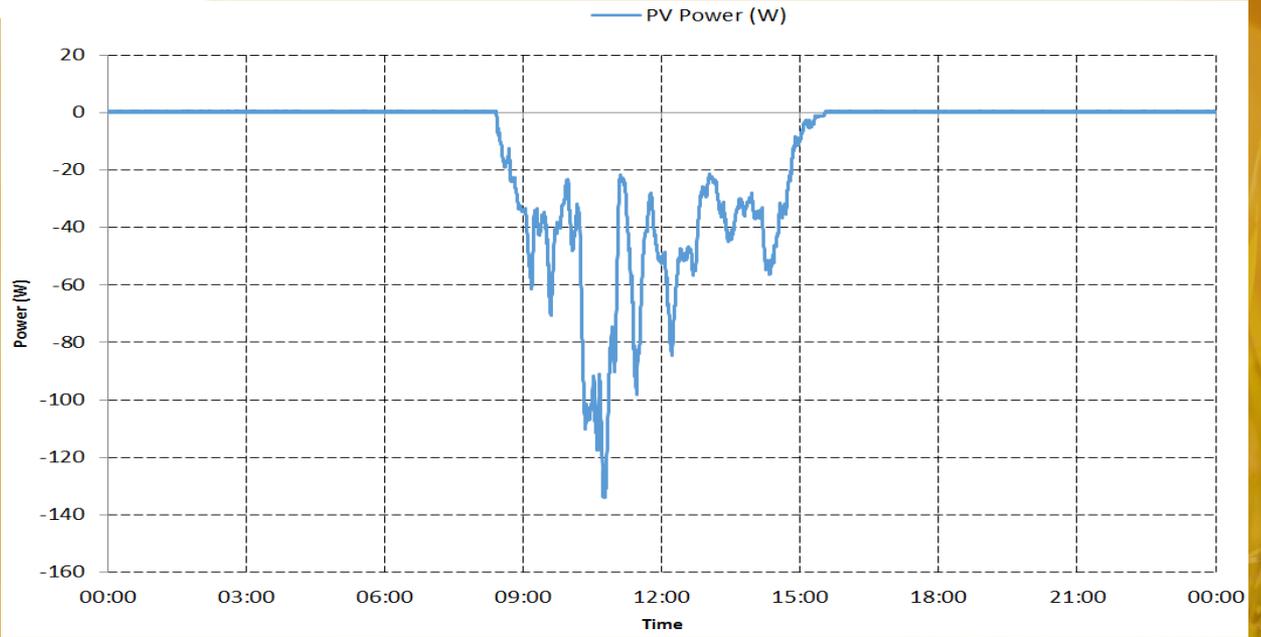


# Field test



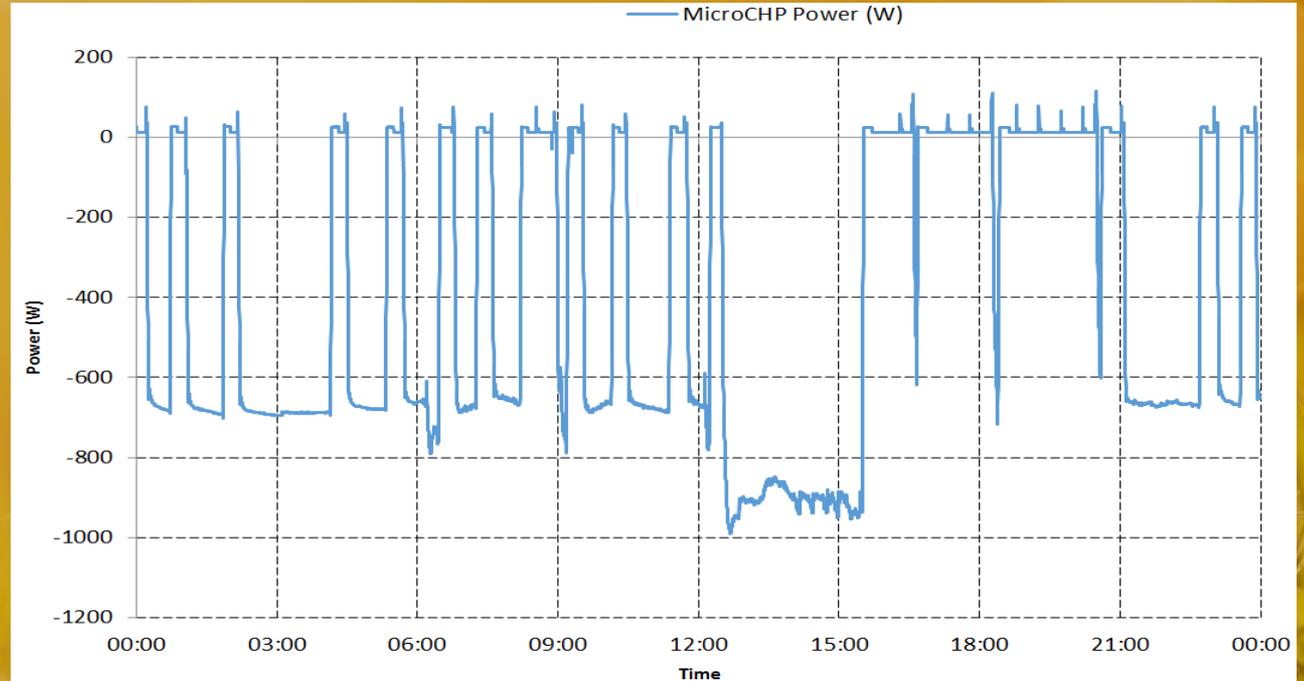
# Field test, first results: PV

07-11-2016



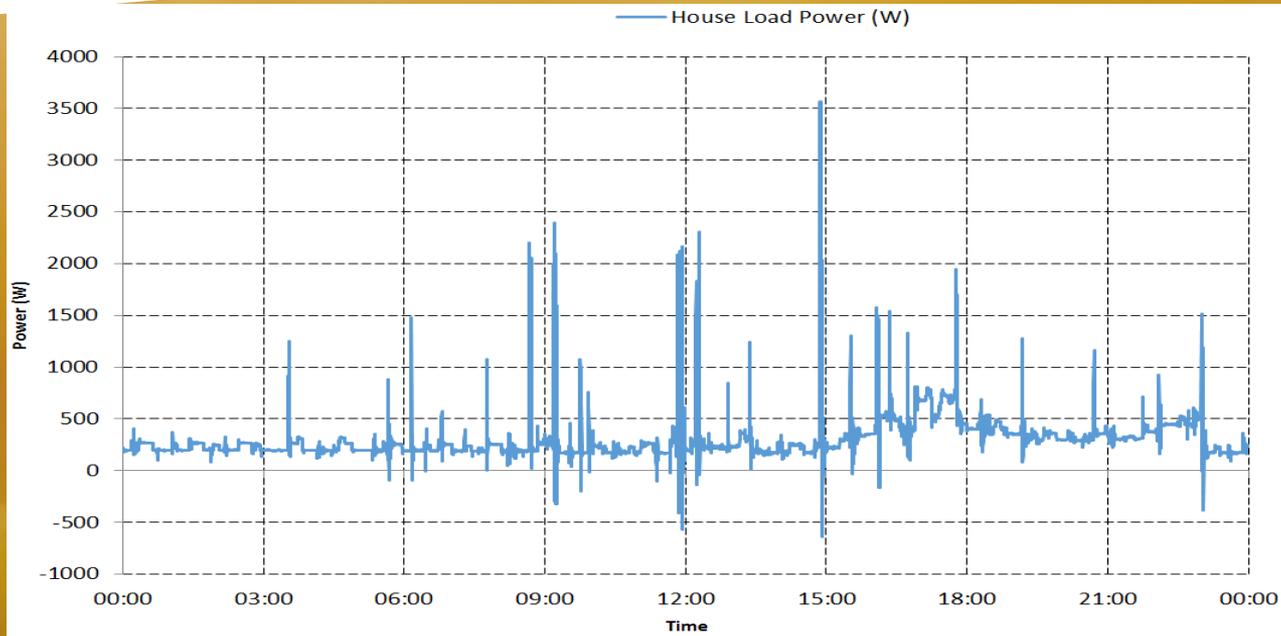
# Field test, first results: u-chp

07-11-2016

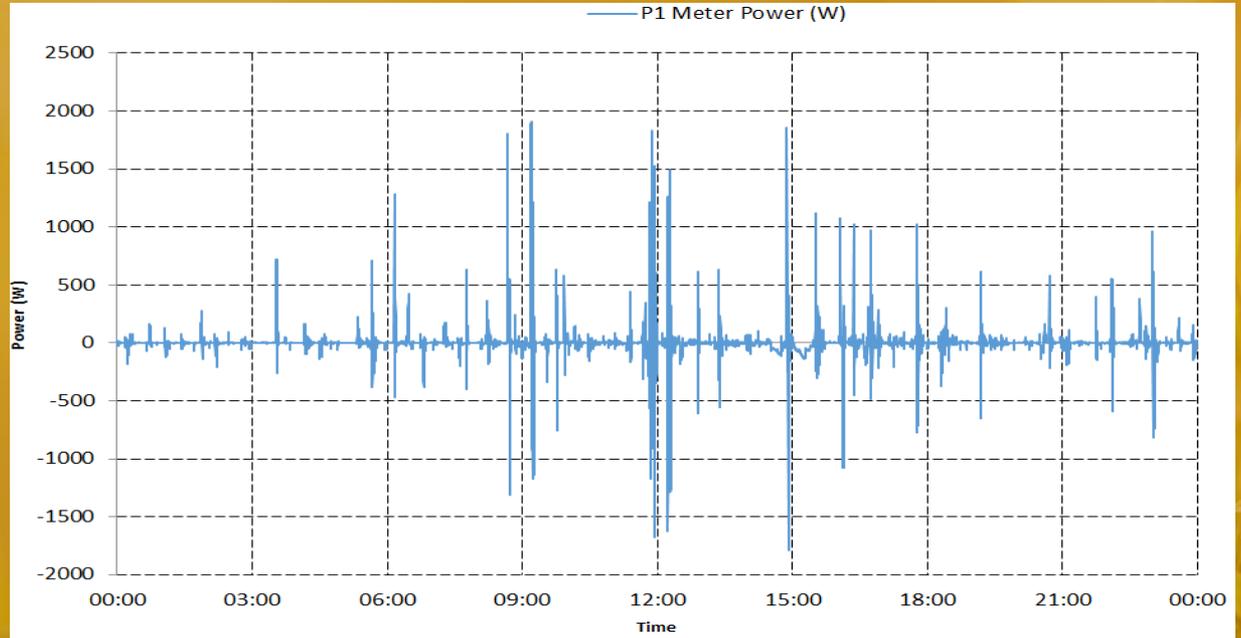


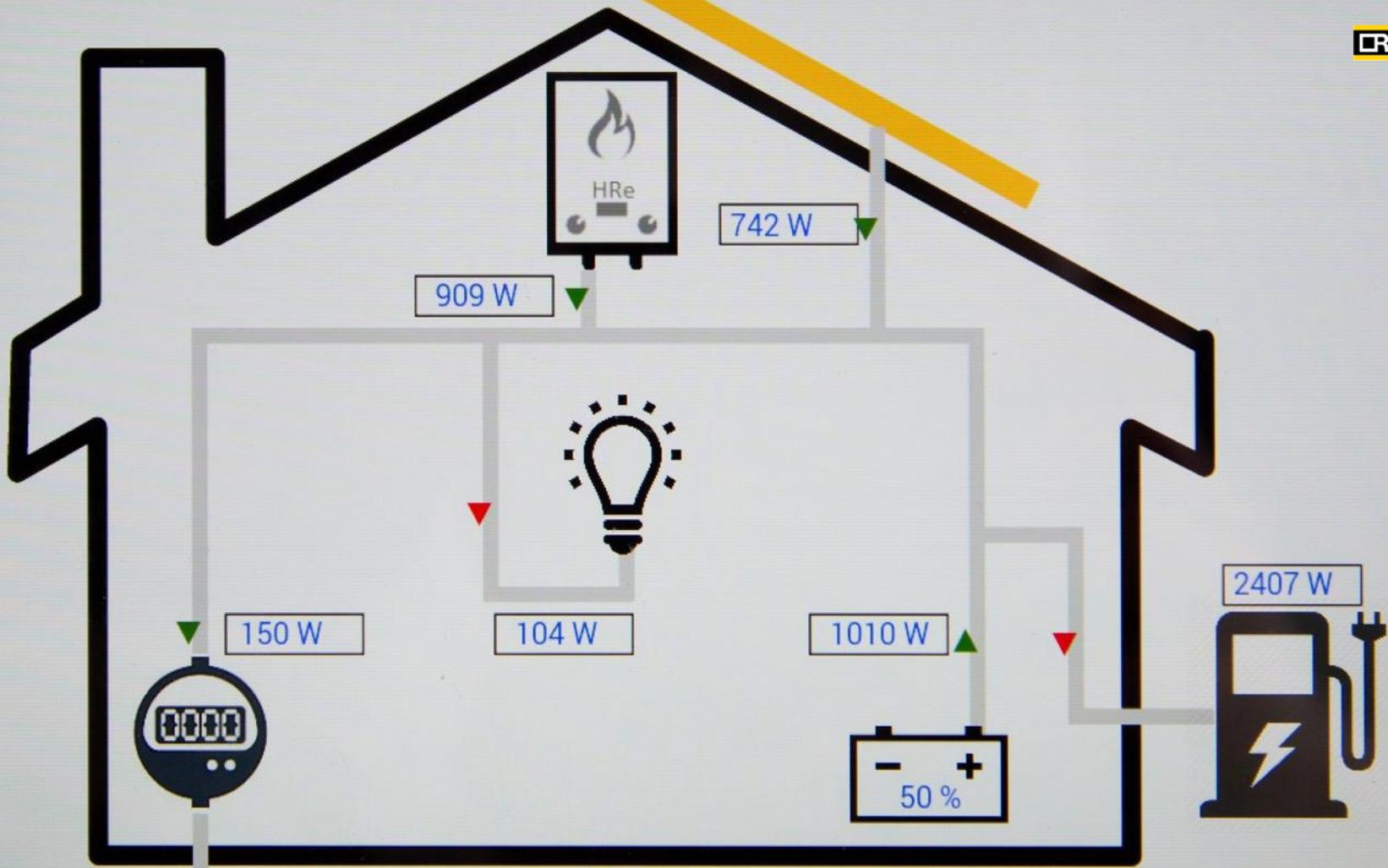
# Field test, first results: consumption

Aalten 07-11-2016



# Field test, first results: the grid



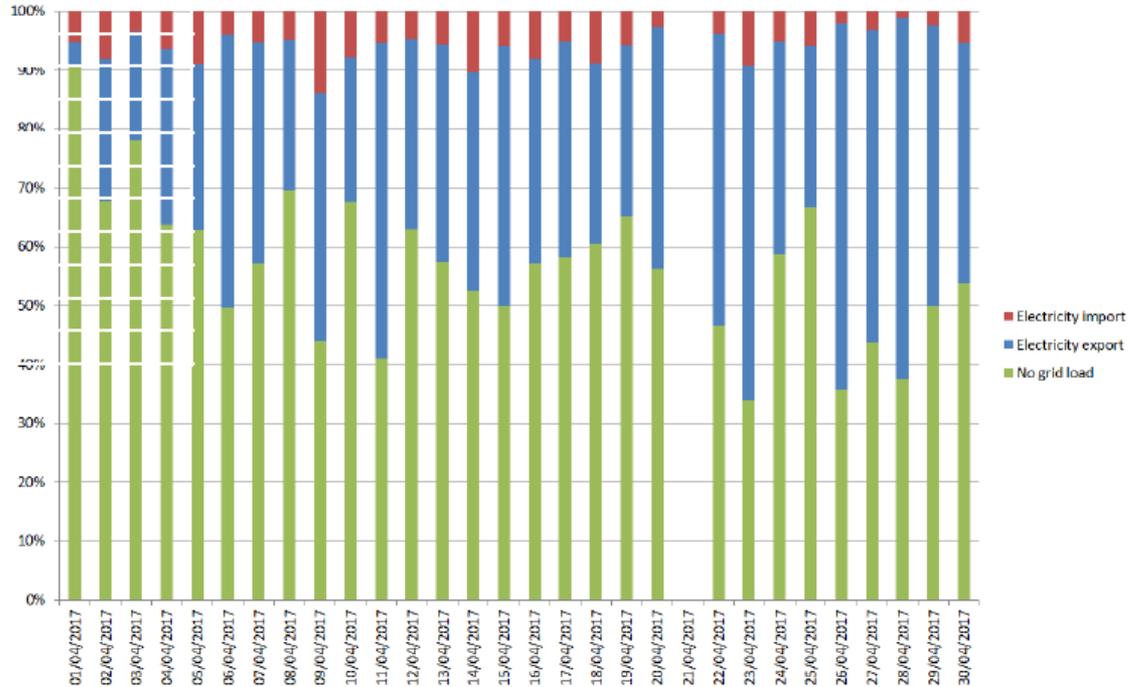


# Field test, first results: the grid

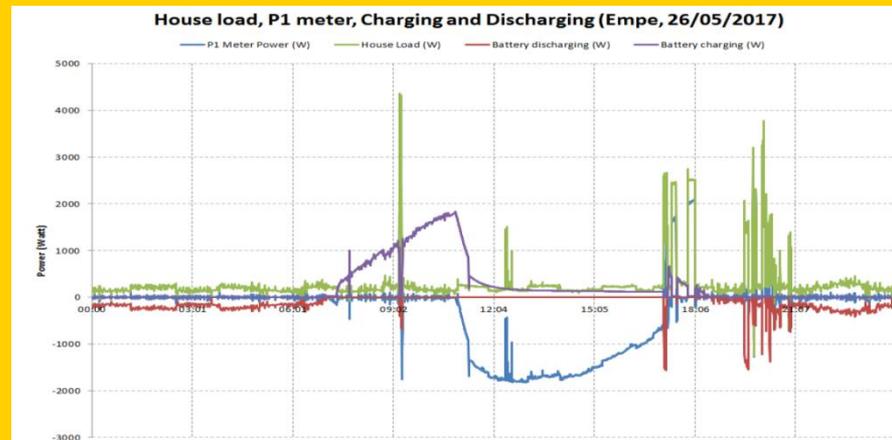
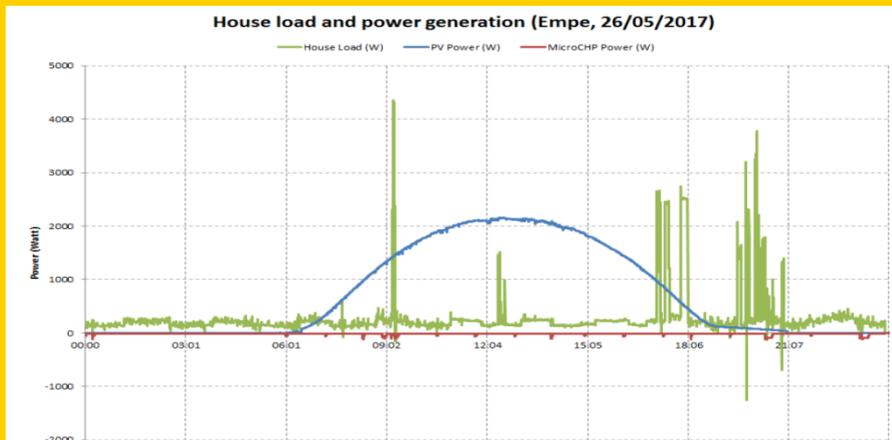
## April 2017 (29 days):

Grid independence (% of time):	57%
Export (% of time):	38%
Import (% of time):	6%
Average SoC:	N/A
Battery empty (% of time):	N/A
Battery full (% of time):	N/A
Electricity consumed:	225 kWh
Electricity generation PV:	461 kWh
Electricity generation eVita:	150 kWh
Electricity imported:	36 kWh
Electricity exported:	340 kWh

Relative grid load over time (%)

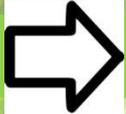


# 3. Results

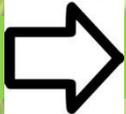


# Energy transition...

Impact



**Heat, electricity and gas as carrier!**



**(De)central production, storage & controls**



**New roles, business models, decision making & legislation**

# Our vision on technologies:

2017 to 2050 = 33 years → 2 replacements

1<sup>e</sup> replacement is now, condensing boiler

2<sup>e</sup> replacement is halfway 2050 → product(s) should already be halfway CO<sub>2</sub> target 2050!

