turning standard to Surplus

DR. WOLFRAM TRINIUS

INGENIEURBÜRO TRINIUS GMBH

Proud to share that our surplus energy & carbon neutral building in Hamburg is

activehouse

category winner

activehouse award 2018

Can a single family house be sustainable

- Location and un-intensive use:
- Use of land
- Urban sprawl
- Traffic generation
- Demand of infrastructure
- Material- and energy demand

- Previously built parcel in existing, grown neighbourhood
- Adaptation in size and shape
- Deconstruction and clean-up (asbestos, mould, faulty oil-tank, …)
- Locally generated renewable energy
- Local rain water management
- Surplus energy performance, applied for mobility
- Preservation of old trees
- Nature-friendly landscape gardening

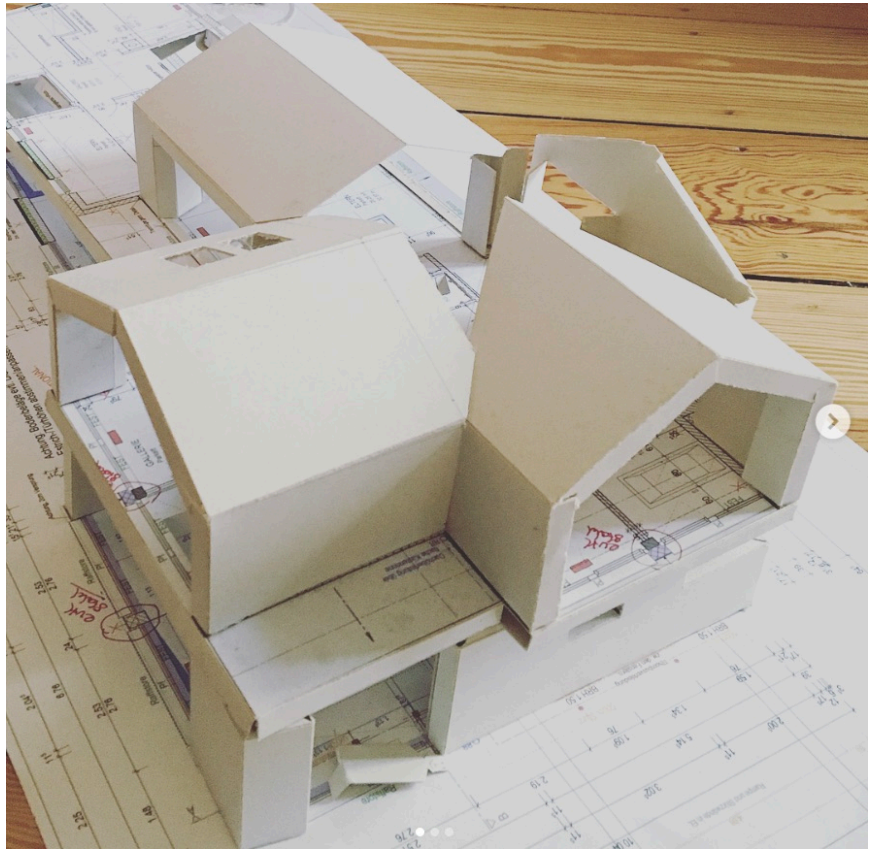
Starting point

- Puchase of land included preliminary project and contracts
- Solution with developer and planning team while competing for the lot
- Can they build what we want to build?
- No experience in high energy performance – but interest
- „we appreciate your intentions“

Square One
our goals

– daylight
– Open and adaptable floor plan
– Views and connections inside / outside
– Energy efficiency
– Indoor climate / comfort
– Design
– Materials

Square two: understand your idea…

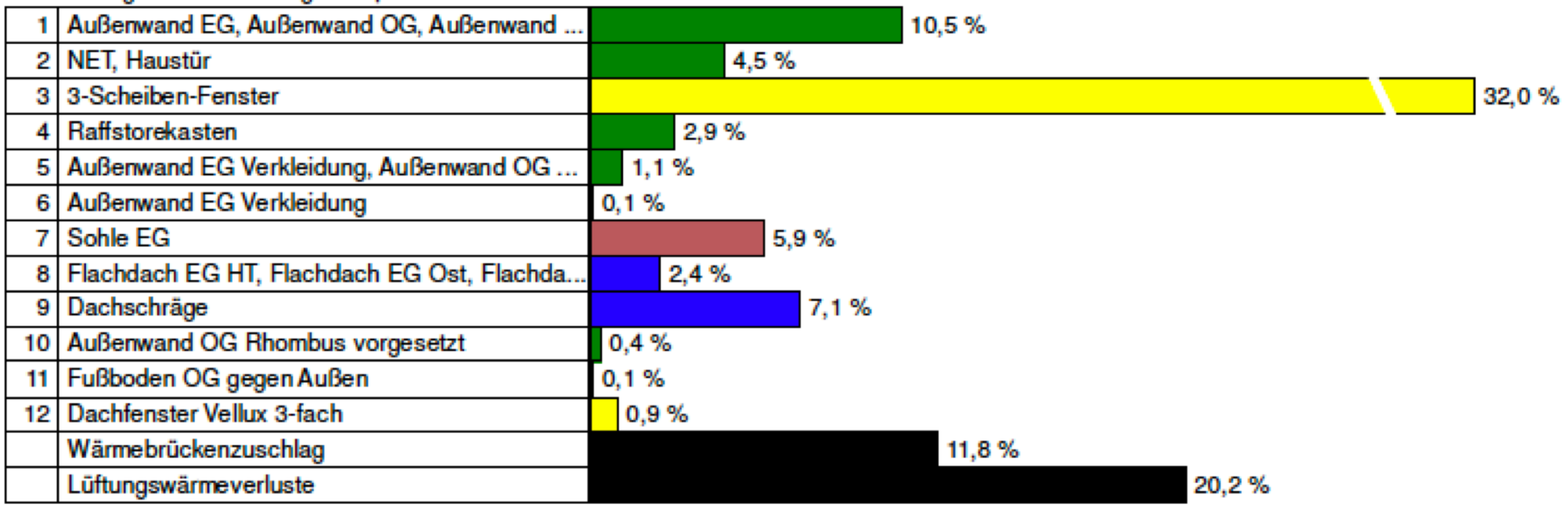


Energy concept

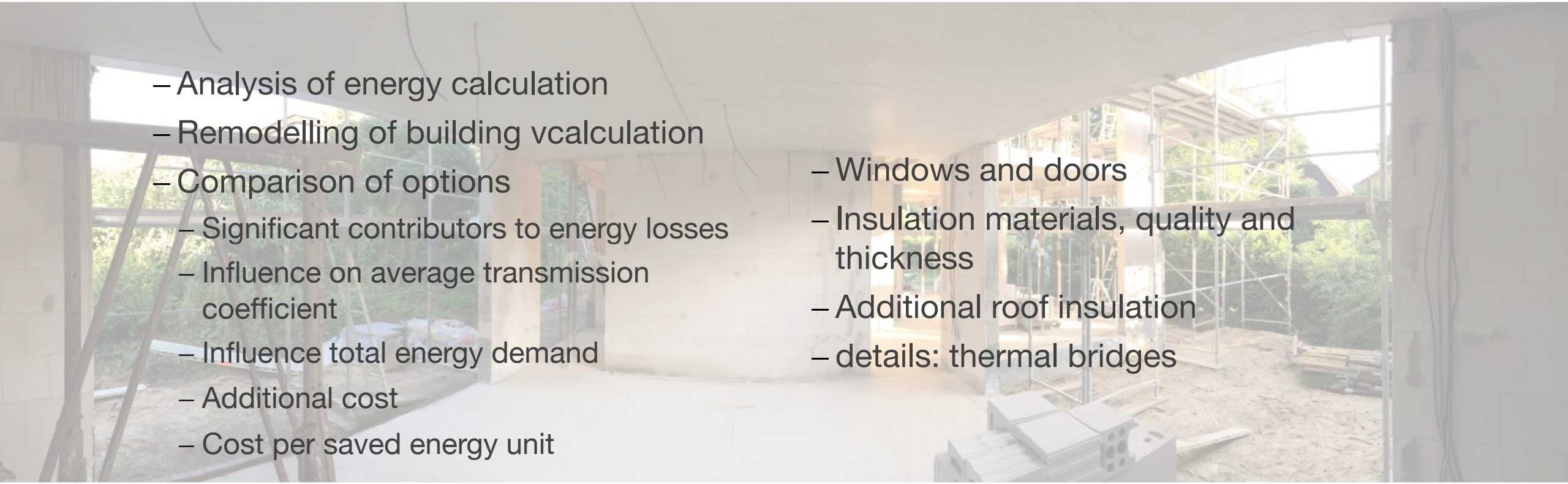
- Thermal envelope
  - „Passivhaus“-windows and doors
  - Insulation materials, quantities, qualities
  - Details, thermal bridges
- Energy supply
  - Geothermal-heatpump (COP>5)
    natural cooling Function
  - PV with 8,8kWp
- Recovery, storage
  - Massive construction
  - Controled venitilation with heat recovery
- Decoupling generation and demand
  - Power storage 17kWh at 400V (pot: 40kWh)
  - Hot water storage

Transmissionswärmeverluste

Bild 1 : Diagrammdarstellung der spezifischen Wärmeverluste

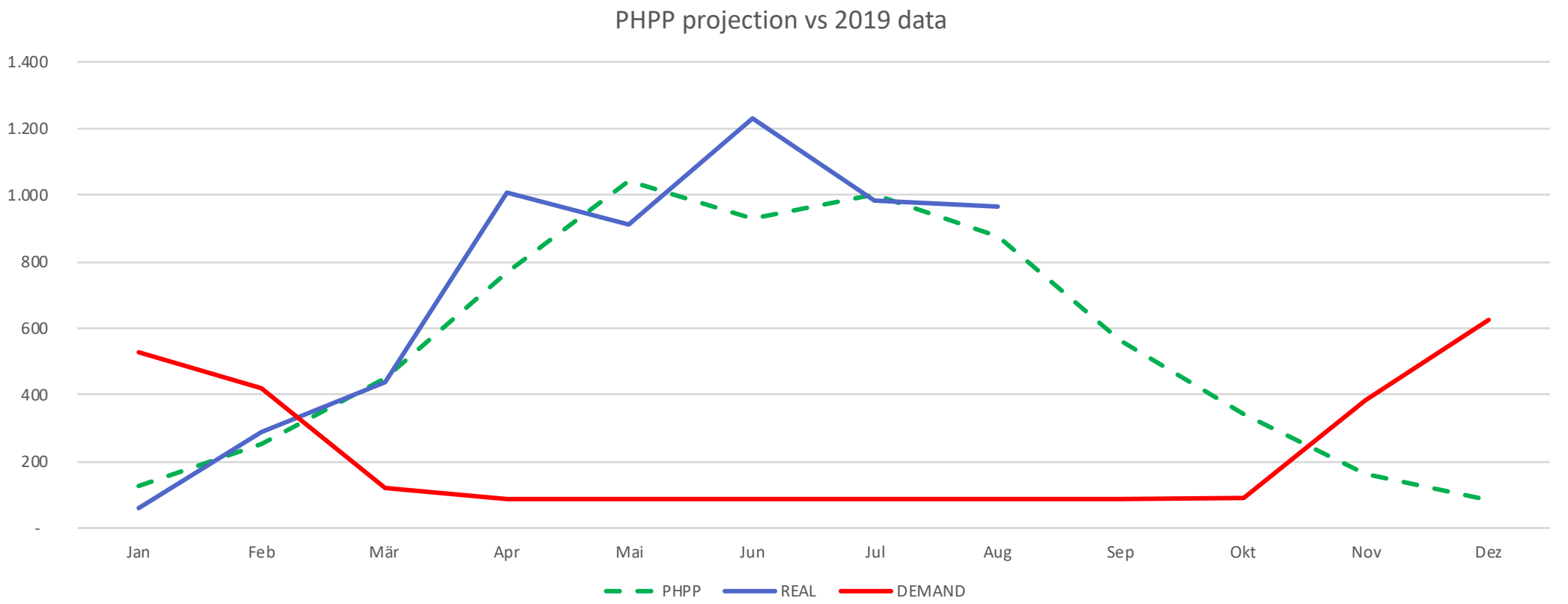


Last mile measures to increase energy efficiency



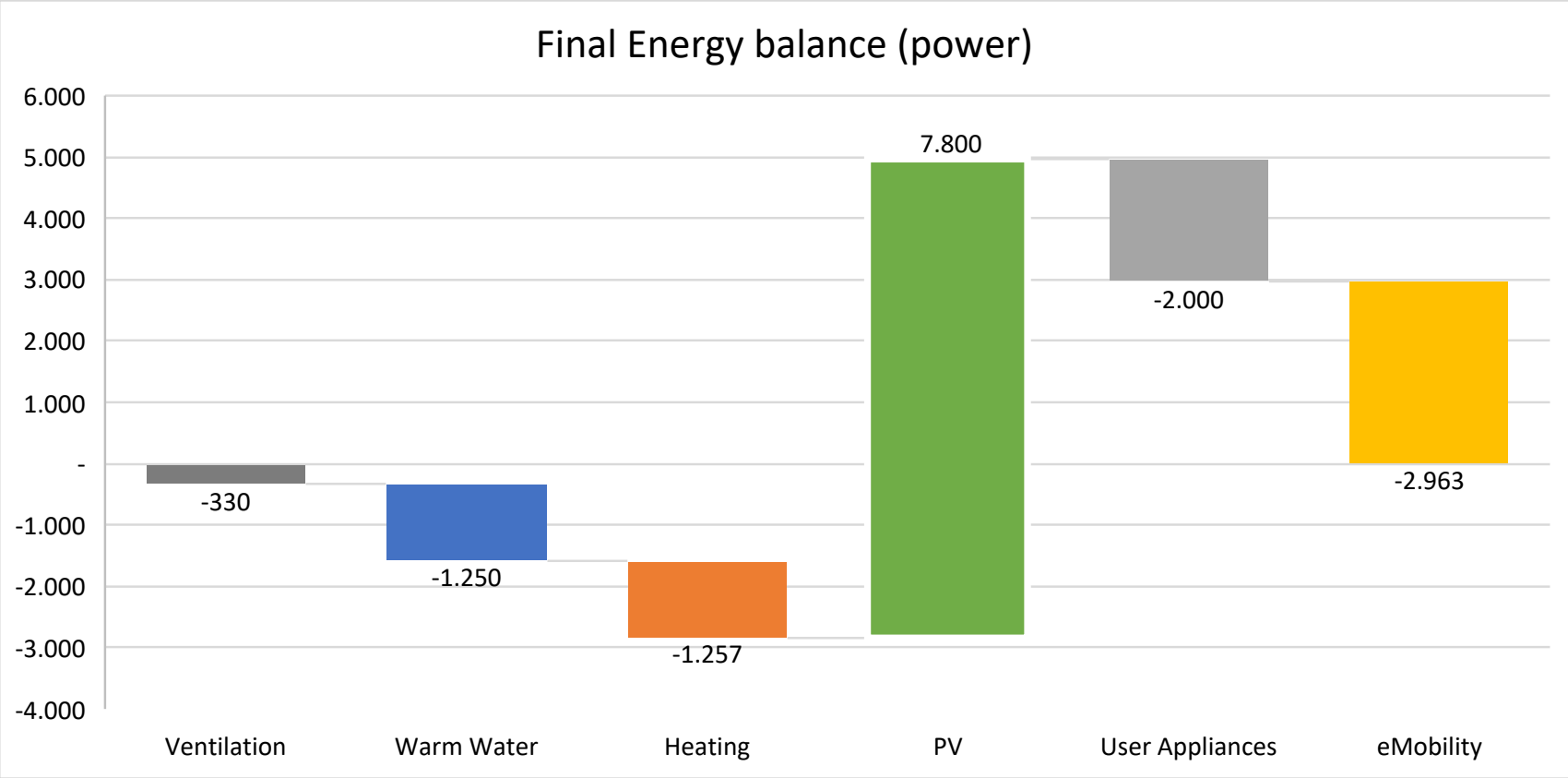
- Analysis of energy calculation
- Remodelling of building vcalculation
- Comparison of options
  - Significant contributors to energy losses
  - Influence on average transmission coefficient
  - Influence total energy demand
  - Additional cost
  - Cost per saved energy unit
- Windows and doors
- Insulation materials, quality and thickness
- Additional roof insulation
- details: thermal bridges

Side kick PV demand & supply Projected vs. Real 2019



Building energy demand NOT supplied from PV: 12kWh/m2a (Nov to Feb)

Energy balance
final energy - electricity

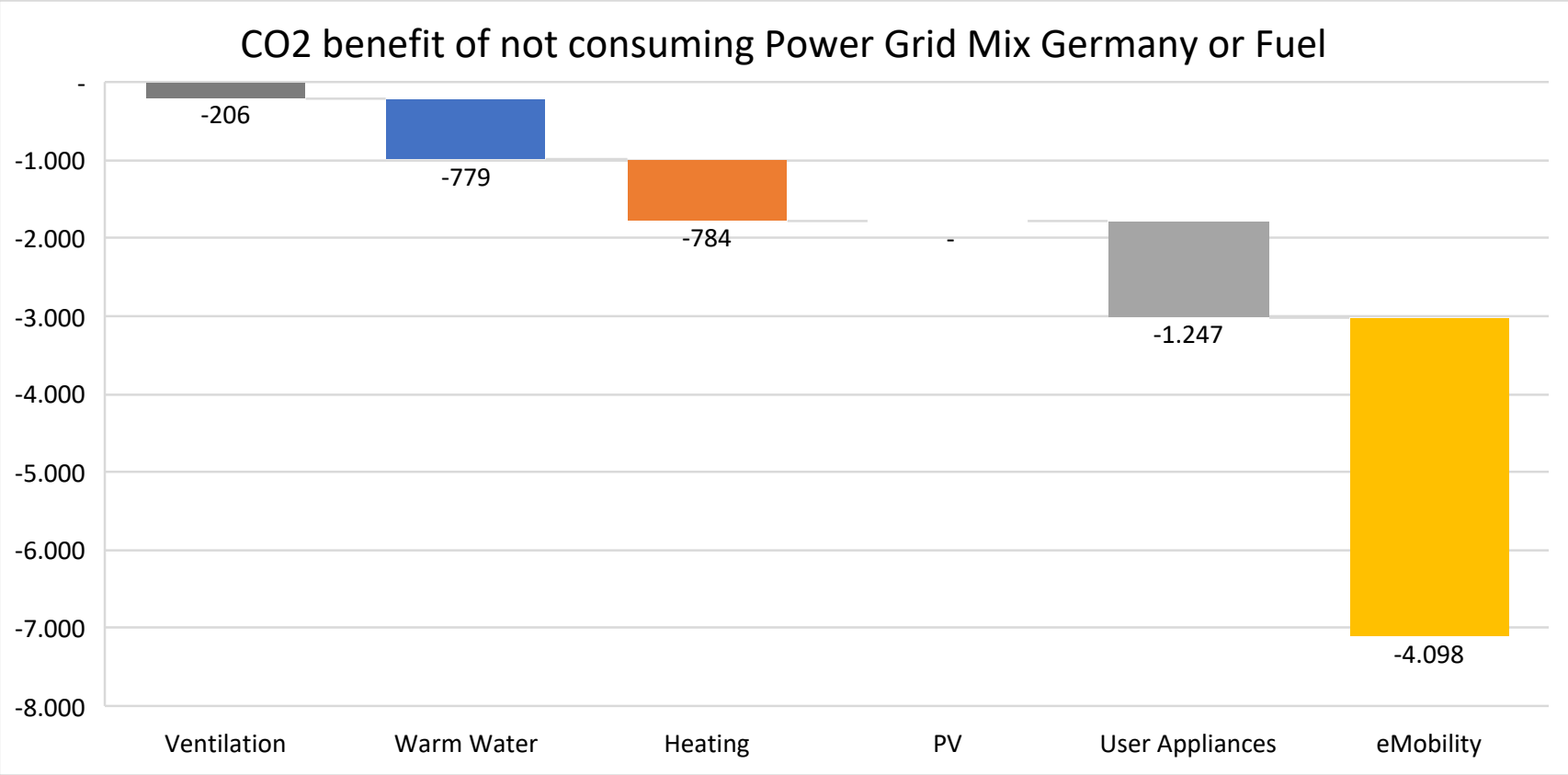


Energy surplus generates economic benefit

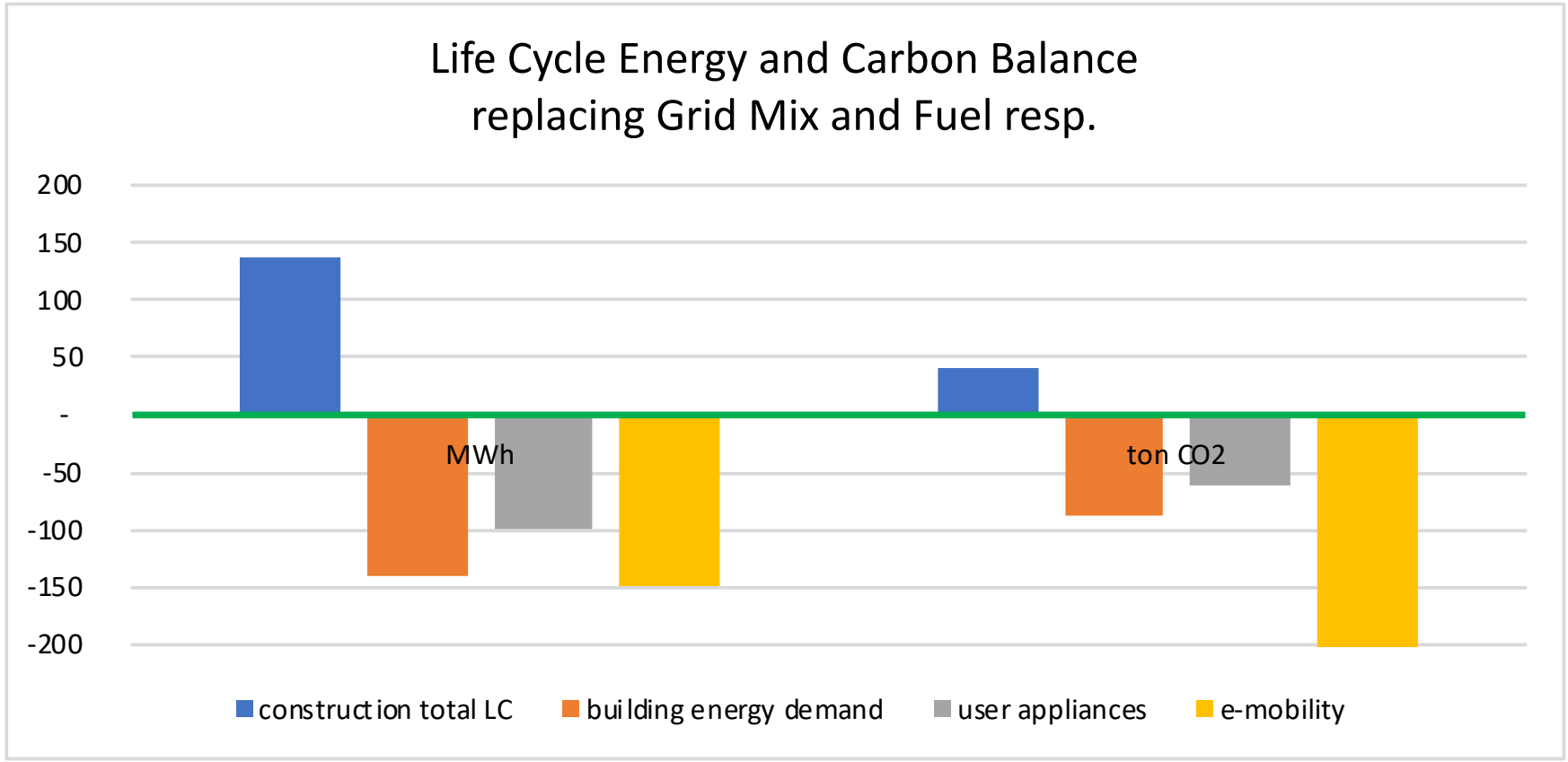
Side kick
PV powered e-Mobility

conventional	**electric**	**effect**
– 10.000 km/a	– 10.000 km/a	– „same“ car
– 7 l/100km	– 15 kWh/100km	– (Audi A3 vs A3 plug-in)
– 10 kWh/l	– 1 kWh/kWh	– Same use pattern
– 1,4 EUR/l	– Lost opportunity 6 ct/kWh	– Same driving style
– 700 l/a	– 0 l/a	
– 7.000 kWh/a	– 1.500 kWh/a	– Factor 4.6
– 980 EUR/a	– 90 EUR/a	– Factor 10.9
– Direct CO_2 160g/km	– Direct CO_2 0g/km	– Factor #DIV/0!

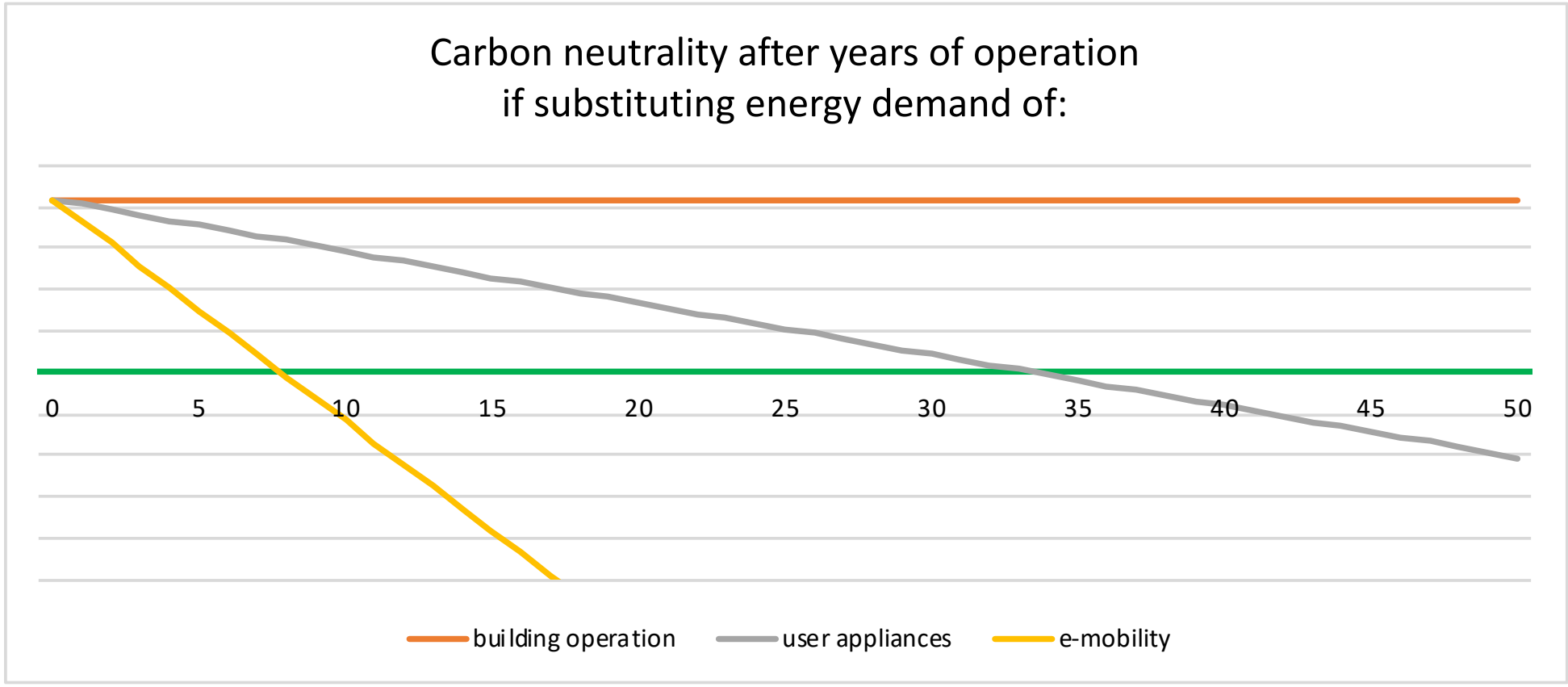
Energy balance carbon relevance



Energy and carbon balance (50a)



Time to carbon neutrality




Energy efficient building are ugly
Thanks for your attention