Bosch Power Tec - Smart Energy Solutions

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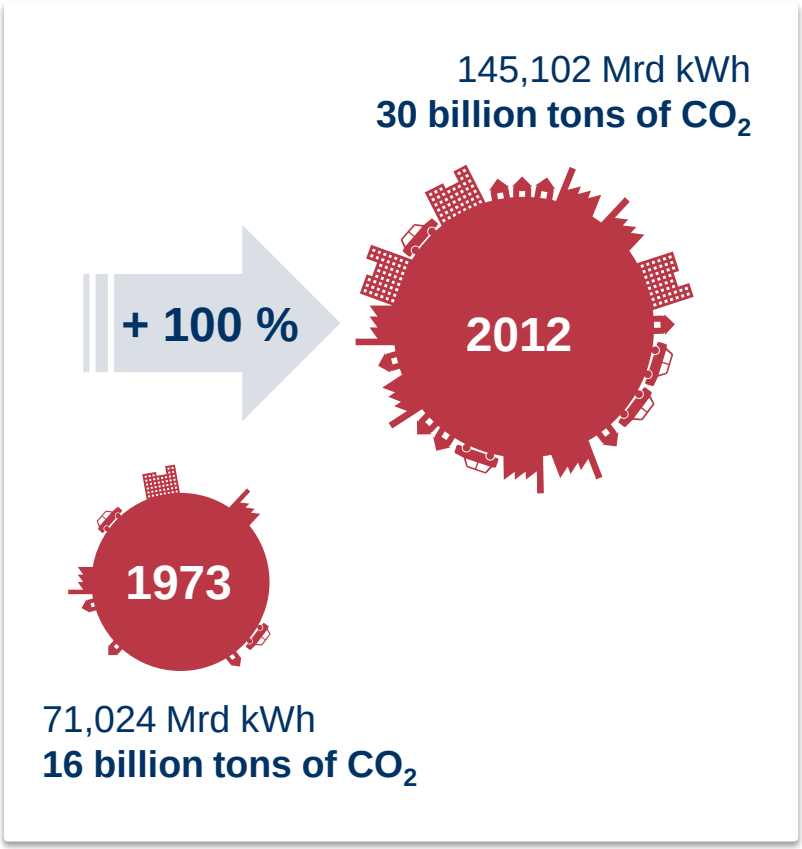
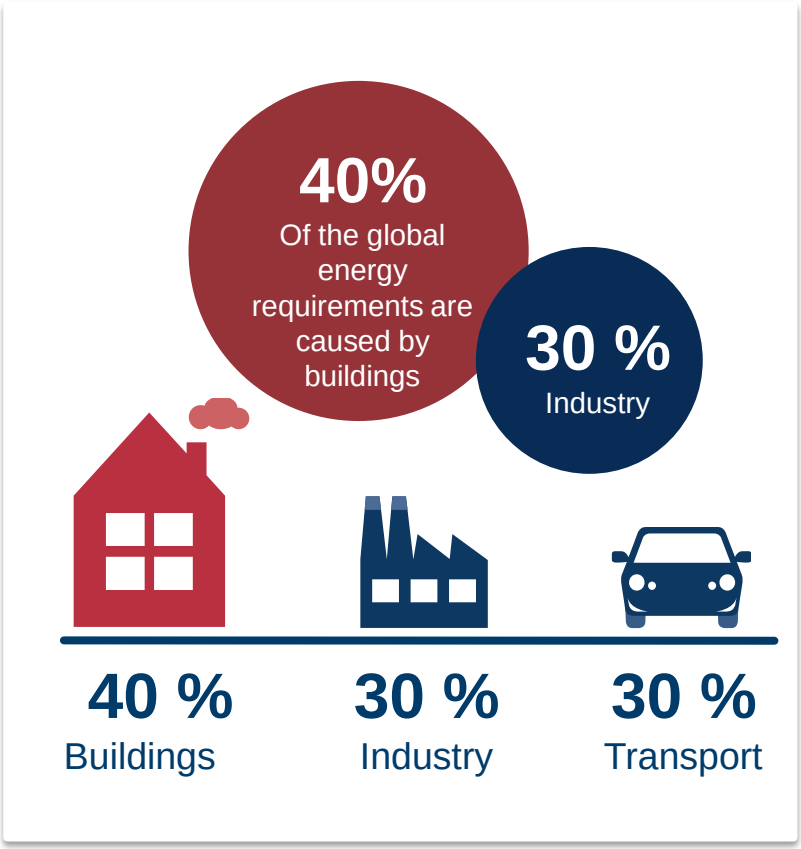
Global Energy Requirements: Past and present





The global energy consumption has doubled!

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Source: BP Statistical World Review of Energy 2013, International Energy Agency, 2009

Drivers for Smart Energy Solutions

Energy prices are rising further

Decreasing PV and Storage Prices

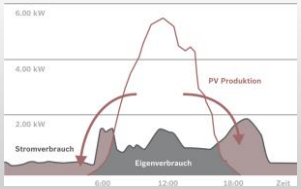
Increasing consumer interest

Increasing inter-connectivity

Thermal-electrical systems

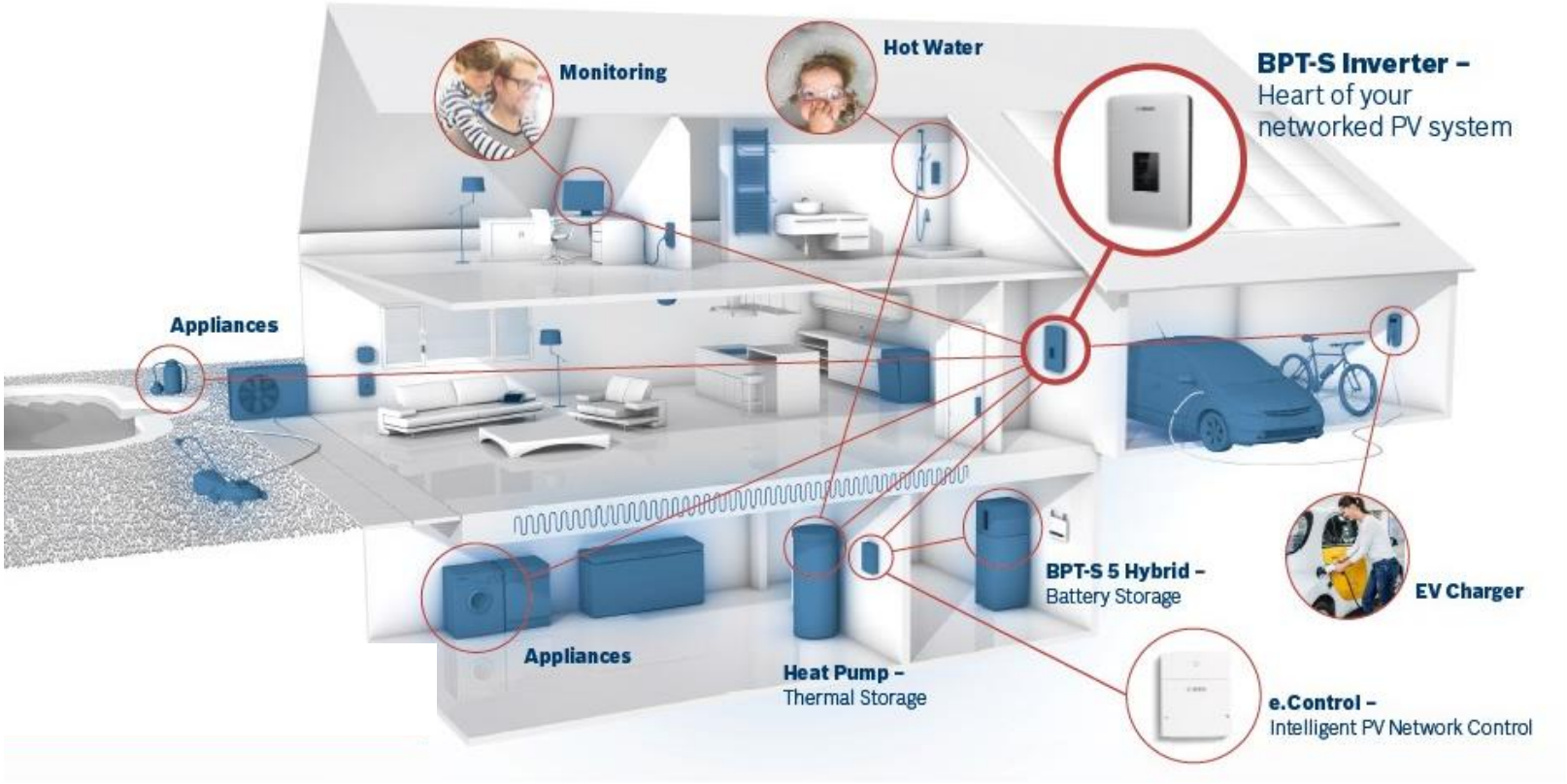
Monitoring and control of energy consumption

Load management and grid stability



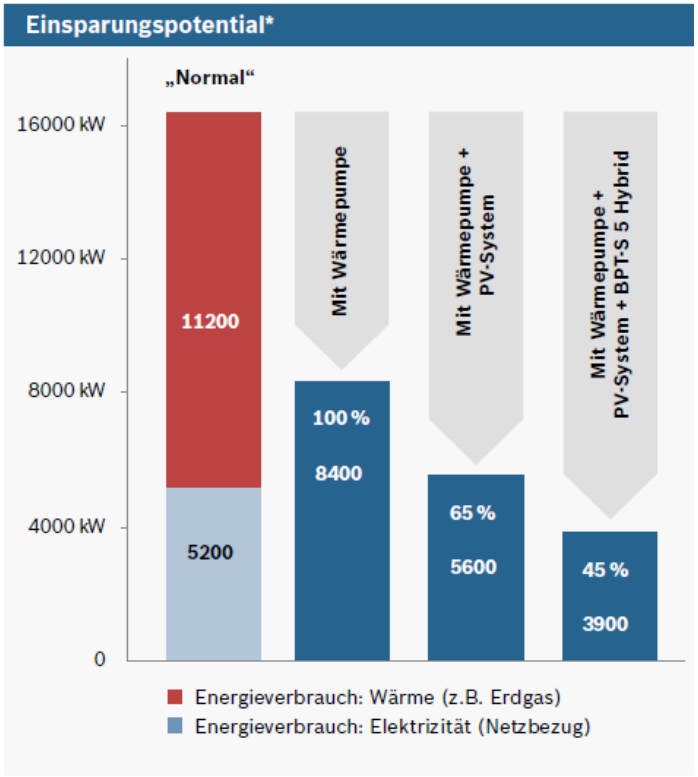
E-Mobility and fast charging capacity

Smart Energy Management

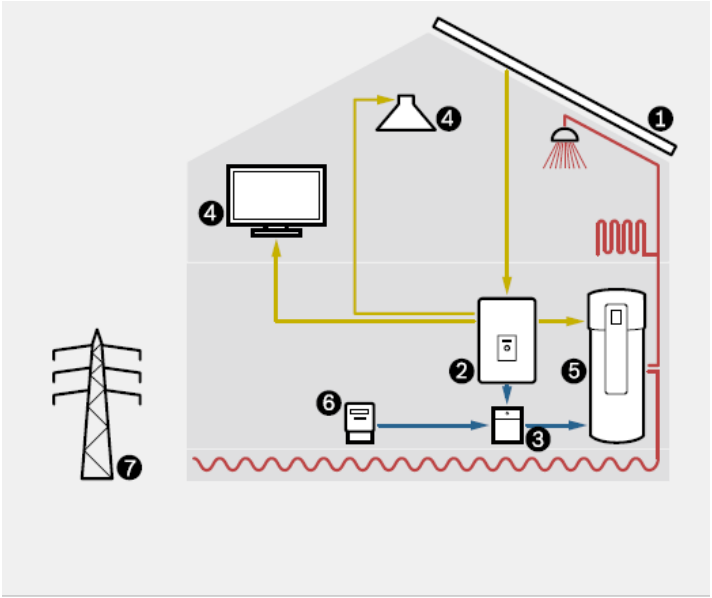


Intelligent management of PV, Storage Systems and Consumption with e.Control

Thermic-electric Energy Solutions



* eigene Darstellung Bosch Power Tec GmbH



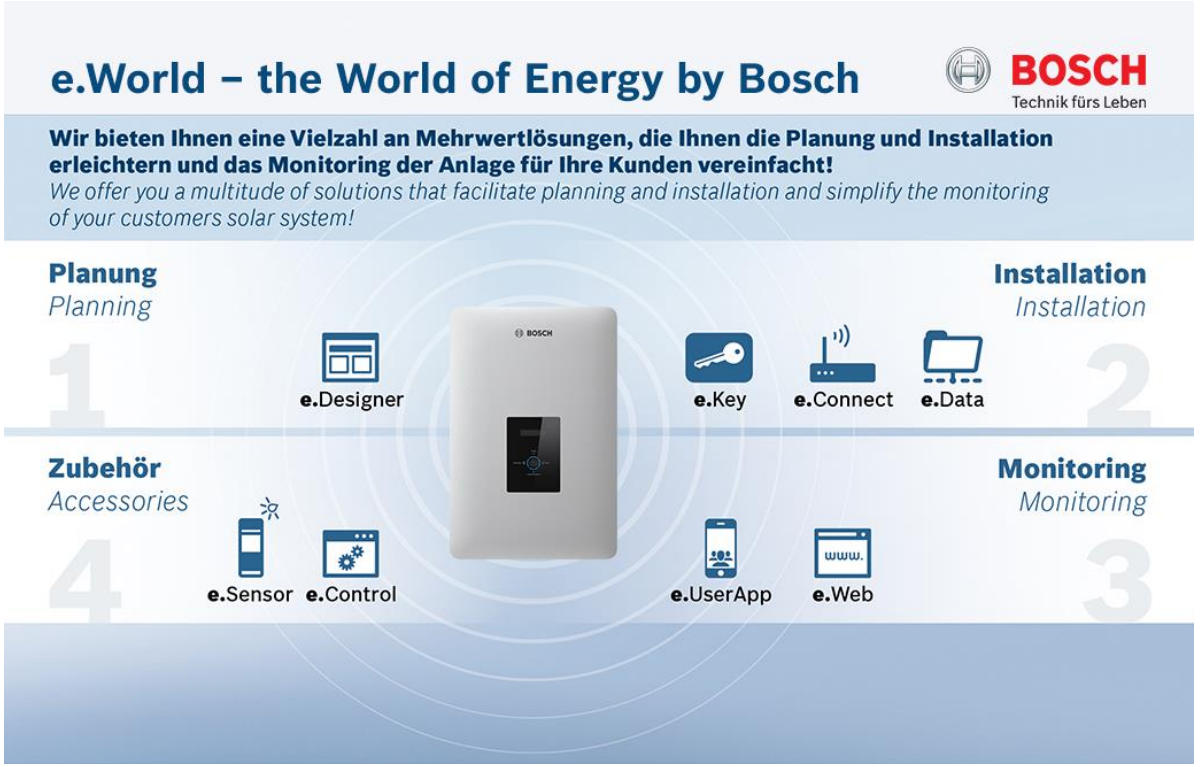
❶ PV-Generator
❷ Strangwechselrichter BPT-S Serie
❸ Steuerungseinheit e.Control
❹ Elektrischer Verbraucher
❺ Wärmepumpe
❻ Energiezähler
❼ Öffentliches Stromnetz
Strom aus dem öffentlichen Netz
PV-Strom
Kommunikation

High cost saving potential by combination of heat pumps (therm. storage) with PV und electric-chemical storage

Bosch String Inverters and Accessories

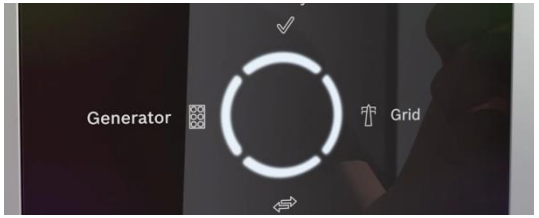
BPT-S 3 / 3.68

BPT-S 4 / 4.6



e.World – accessories of the BPT-S String Inverters

BPT-S 3-4.6kW String Inverters – smart & easy



Robust

Simple

Reliable

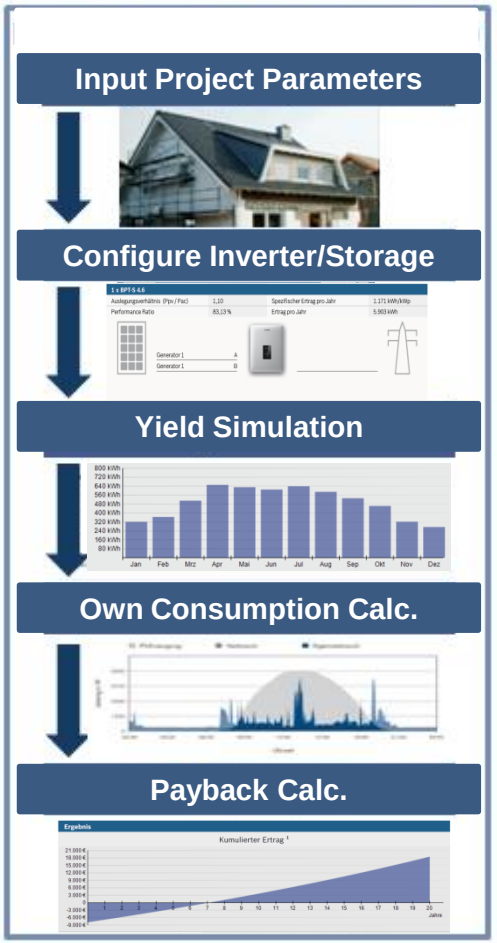
Touchless

Fast

Intuitiv

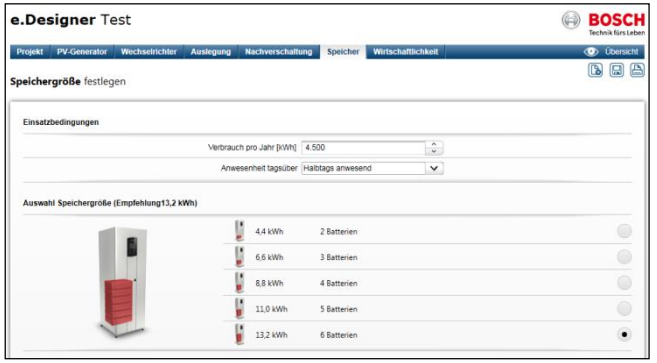
e.Designer 1.0

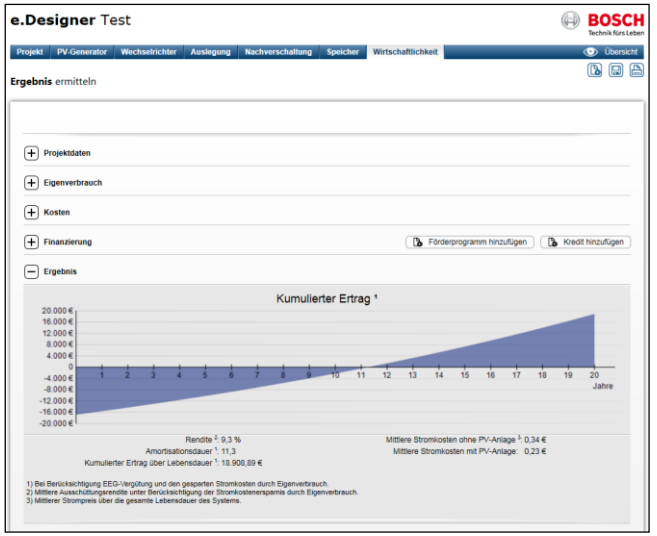
- Software for planning of PV systems
- Project based calculation
- Modul Data Base
- Inverter and Energy Storage Design
- Calculation of own consumption
- Profitability Calculation



e.Designer 1.0

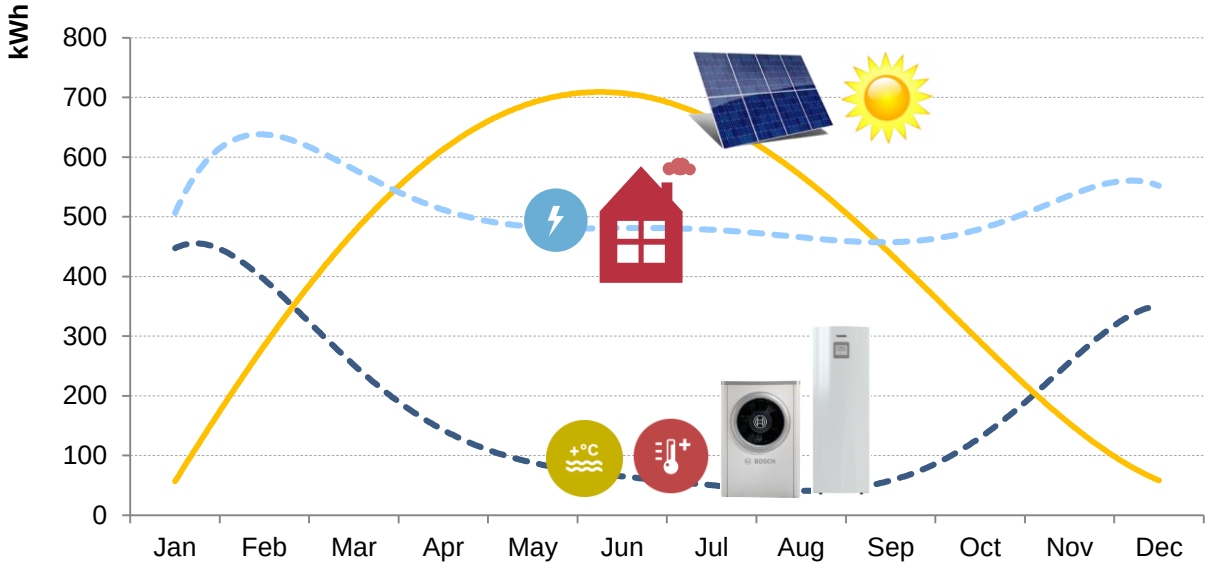
- Battery Dimensioning
  - Integrated Yearly Load Curves
  - Calculation based on yearly total consumption
- Profitability Calculation
  - Calculation of Energy Yield
  - Flexible FiT Inputs
  - Own Consumption Calculation
  - Financing & Incentive Programs
  - Economic Total Result





e.Designer 2.0

Generating solar power vs. electricity demand including heat pump in a 4-person household



Example of a system (1 Year):

- Gas heating value= 9100 [kWh_{th}]
- WP = 2275 [kWh_{el}]
- COP = 4
- PV = 5 kWp
- PV production = 5546 [kWh]
- Household electricity: 6168 [kWh_{el}]
- 62% own consumption

Basis for own consumption calcultation in e.Designer 2.0

PV Yield

Usual electricity consumption per household

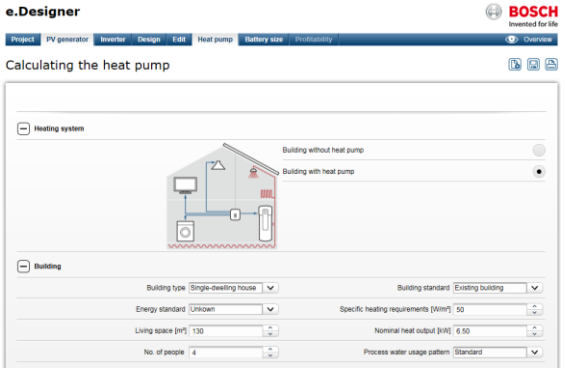
Electricity consumed by the heat pump

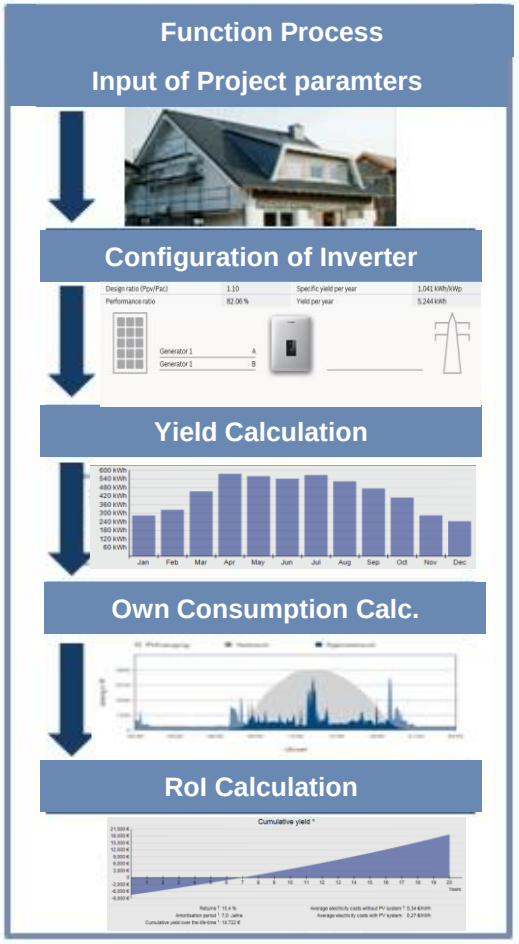
15min values

Expecting own consumption in **%**

e.Designer 2.0

- Software Tool for Planning of PV Arrays
- Project specific Calculation
- Data base of modules and roof set-up
- Profitability and own consumption
- Heat pump calculation
- NEW: Energy Management (e.Control)

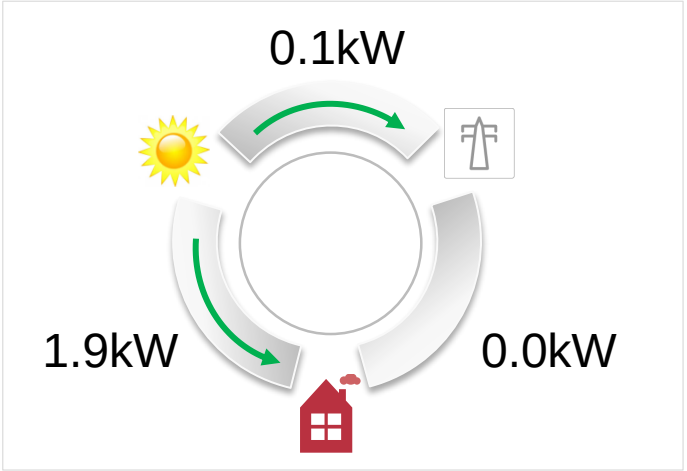




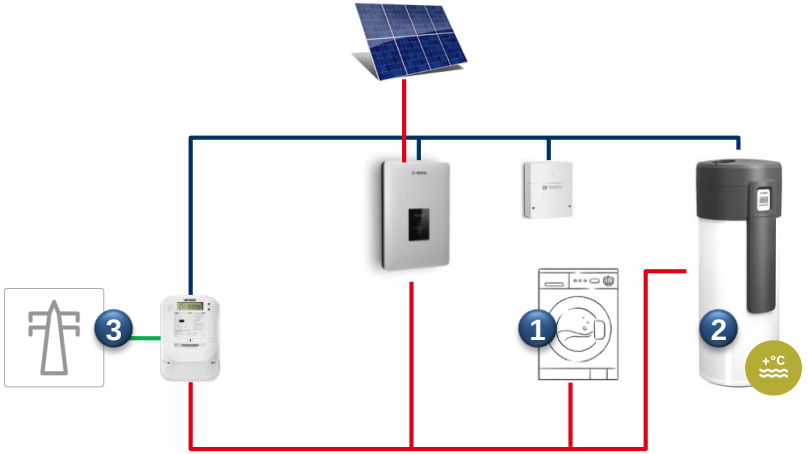
e.Control - Highlights

- Increase of Own Consumption
- Reduction of (Grid-) Energy Consumption & Costs
- Interface for Heat Pump and Energy Counter
- Integrated User Interface for Configuration
- Easy Installation and Commissioning
- Control of PV Power (via Ripple Control Receiver)
- Permanent Power Reduction (if required, Zero Export)

e.Control as heat pump control device



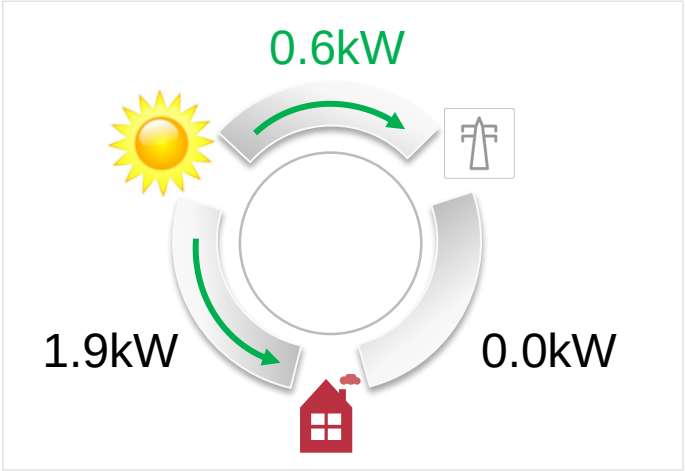
PV Generator	2.0kW
Grid feed-in	0.1kW
Self-consumption	1.9kW
Purchased electricity	0.0kW



1. Direct consumption
2. HVAC stores the thermal energy
3. Grid feed-in

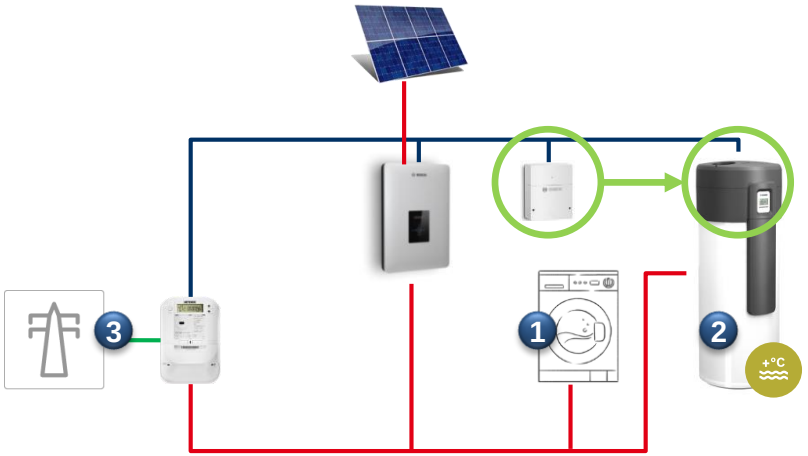
Exemplary setup of PV Inverter, e.Control and hot water heat pump

e.Control – Simply Explained



PV Generator	2.5kW
Grid feed-in	**0.6kW**
Self-consumption	1.9kW
Purchased electricity	0.0kW

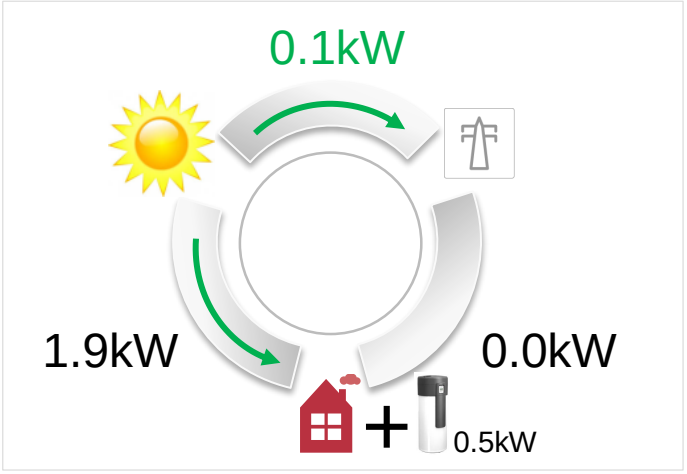
Energy Delta: >200W during >30 sec.



1. Direct consumption
2. HVAC stores the thermal energy
3. Grid feed-in

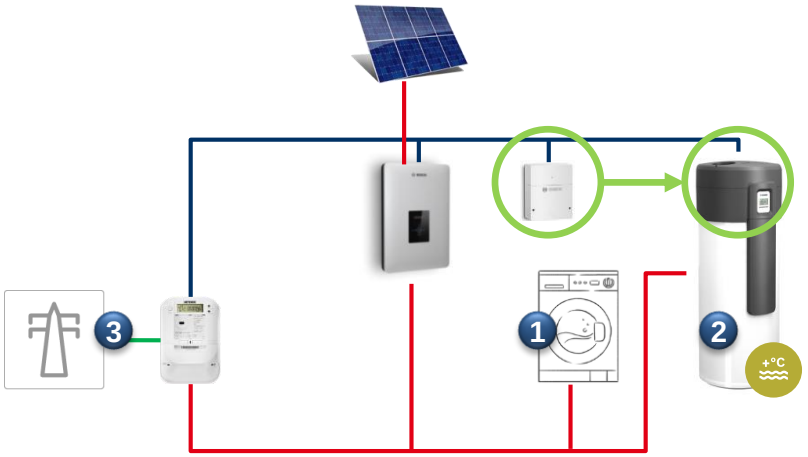
Reaction of e.Control in favorable irradiation and consumption conditions.

e.Control – Simply Explained



PV Generator	2.5kW
Grid feed-in	**0.1kW**
Self-consumption	2.4kW
Purchased electricity	0.0kW

Energy Delta: >200W during >30 sec.



1. Direct consumption
2. HVAC stores the thermal energy
3. Grid feed-in

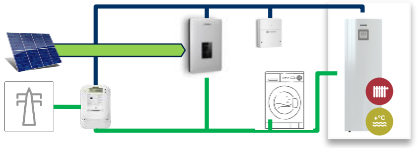
Higher self consumption and low feed-in with e.Control.

e.Control & SAO-2

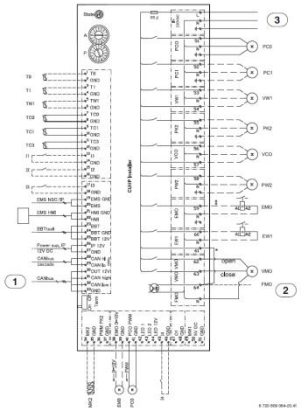
New generation air-to-water HP SAO-2 / Compress 6000

- ➔ optimized solution for new build and renovation
- ➔ available in EU countries
- ➔ USPs:
  1. When the sun shines, the HP starts and utilizes own produced energy for warm water and heating
  2. The degree of own consumption of the PV array can be increased (up to 7%)
  3. Integrated “SG Ready Smart Heat Pumps” interface available via potential free contacts, no accessories needed

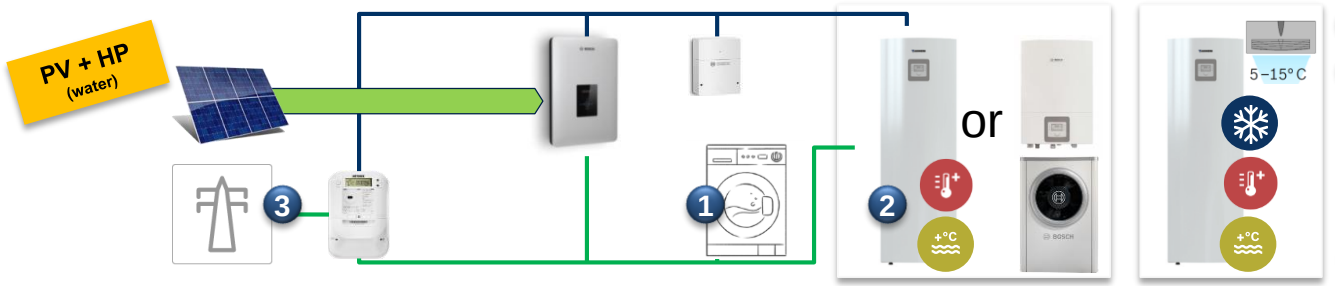
Installation Details:



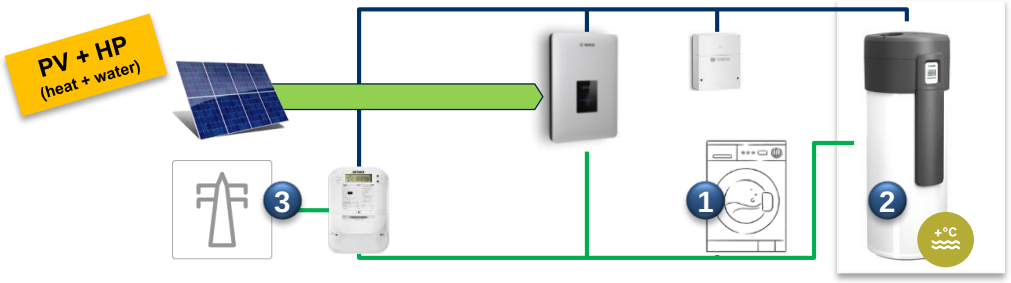
- ➔ 2 potential free contacts I2 & I3 are available for interface to e.Control



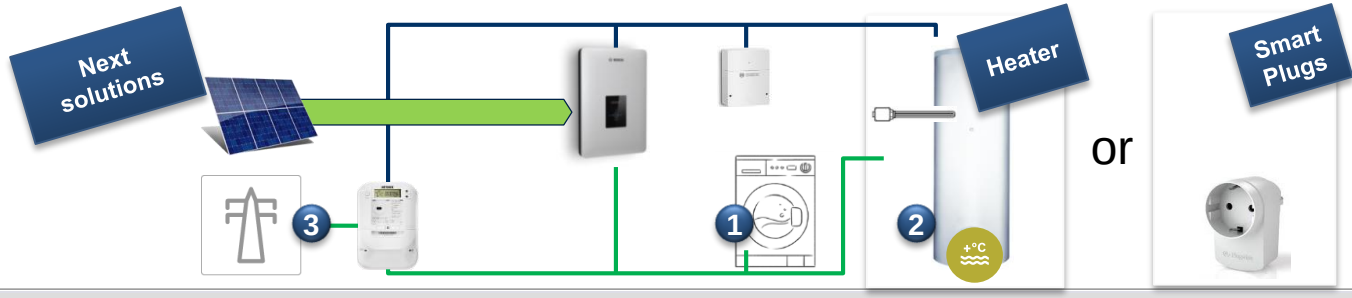
Smart Energy Solutions PV + heat pumps



1 Own consumption
2 Air-water HP Heating / warm water / Cooling (Summer / Wintermode)
3 Feed-in



1 Own consumption
2 Air-water HP/warm water
3 Feed-in



1 Own consumption
2 Buffer with heating element for heating and hot water or Smart Plugs
3 Feed-in

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Warm water *Heating* *Cooling* *Energy flow* *Data flow*

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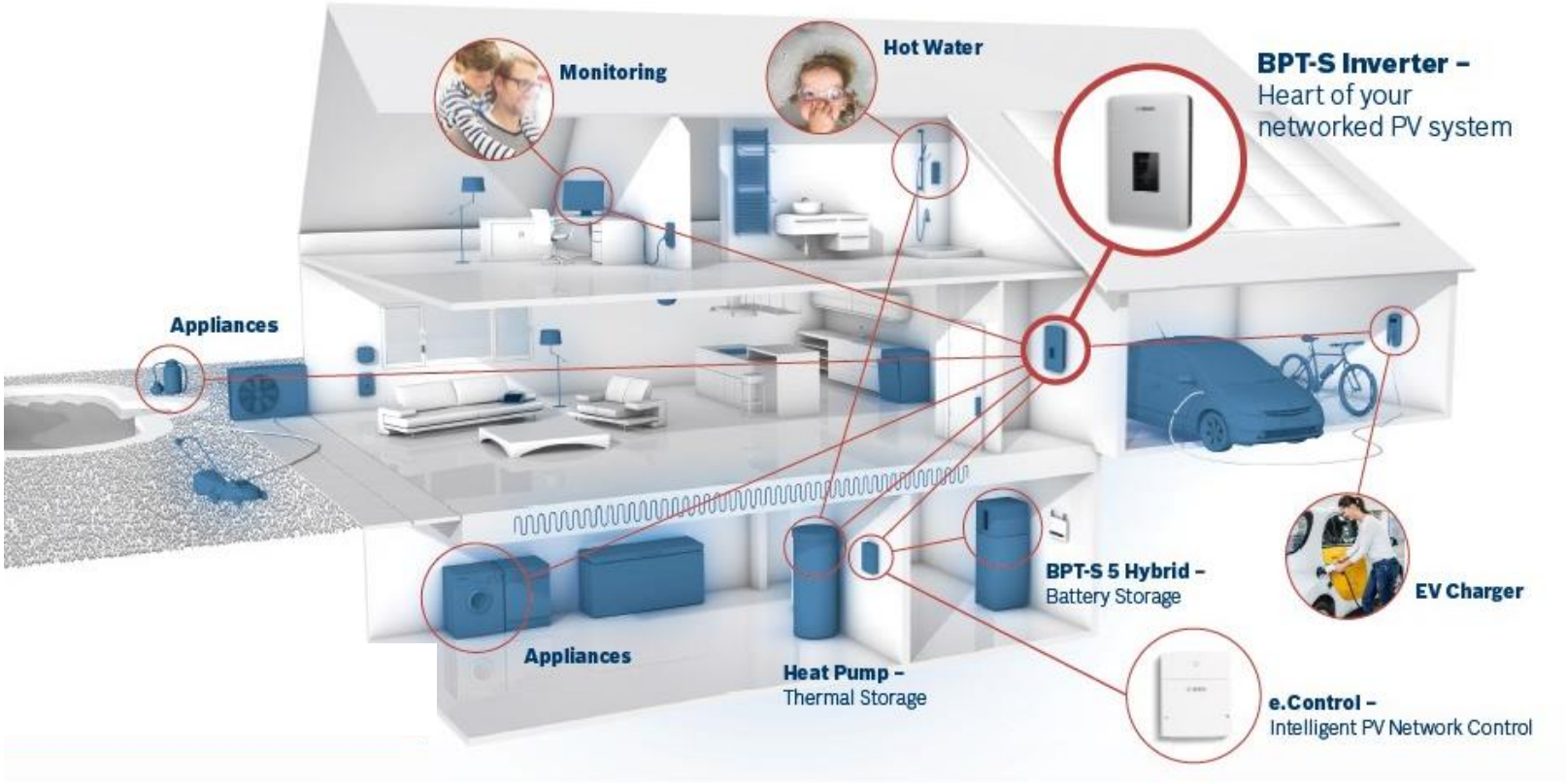
Smart Energy Management



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