

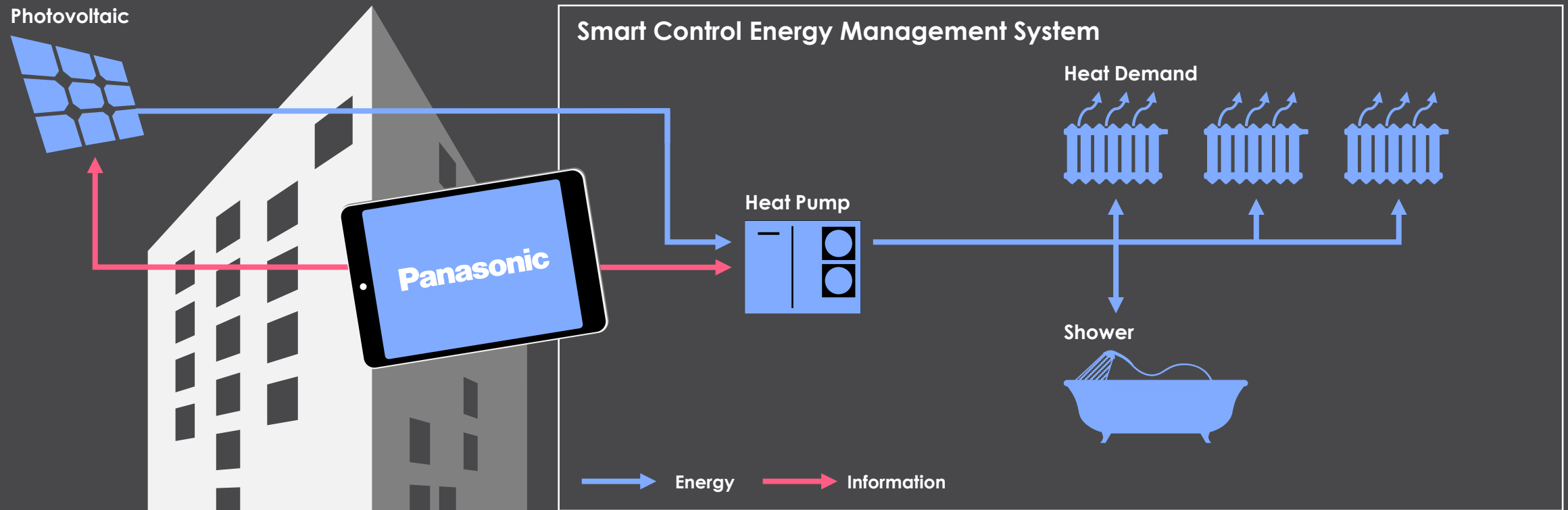


INTELLIGENT CONTROLS FOR EFFICIENT ENERGY USE

RALF BECKER | PROJECT LEADER ENERGY GROUP, PANASONIC R&D IN EUROPE

MAKING BEST USE OF PHOTOVOLTAIC ELECTRICITY

Surplus PV Energy Powering Intelligently the heat pump



Prio 1: From PV surplus energy to Heat Pump to Space Heat (comfort)

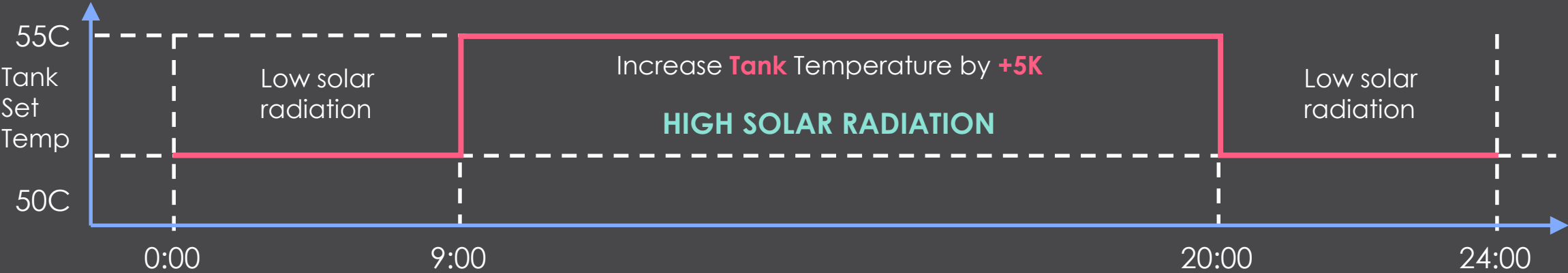
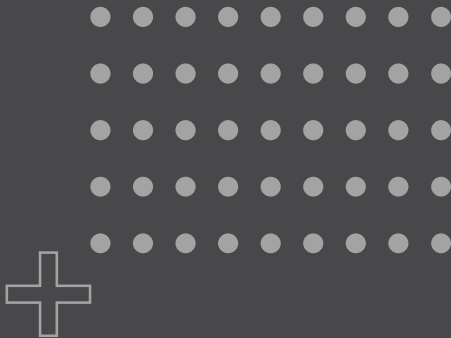
Prio 2: From PV surplus energy to Heat Pump to Domestic Hot Water

CONTROLS FOR HEAT PUMP ACTIVATION

Hot water tank of the heat pump for storage

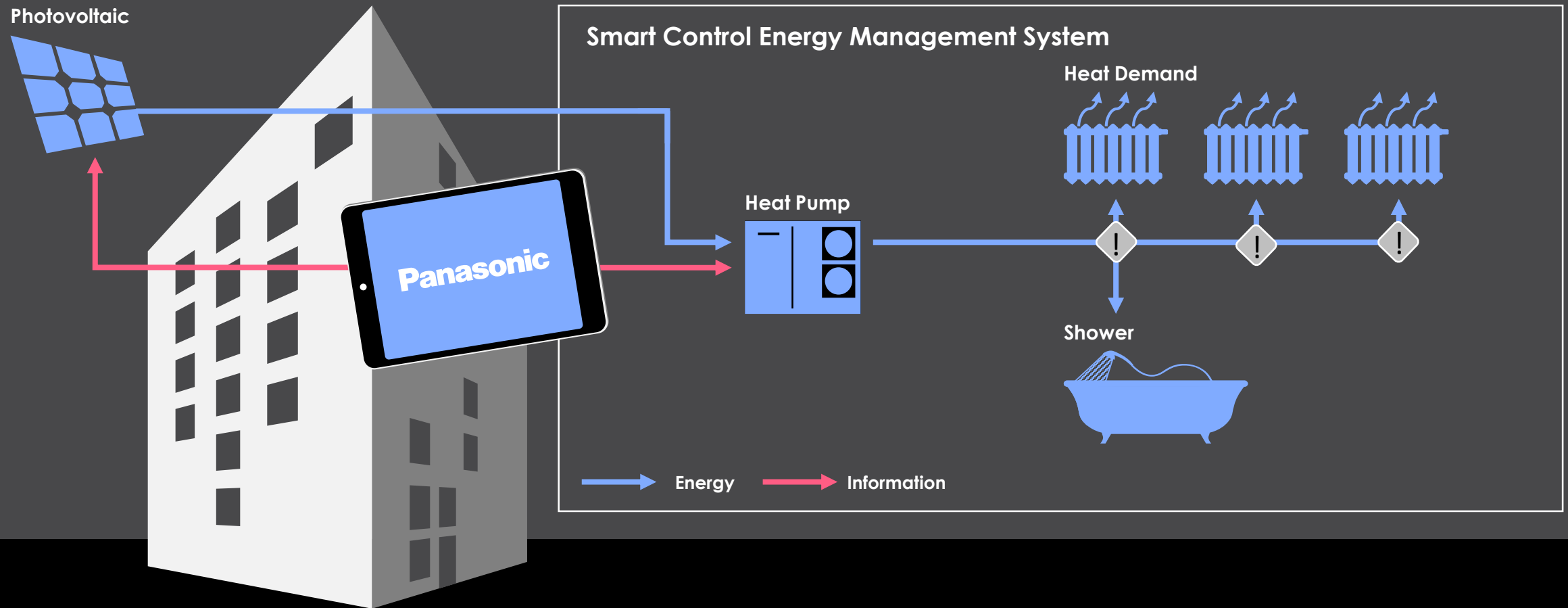
DYNAMIC SET POINT CONTROL

Increase of **thermal energy storage** for space heating and hot water.



TOP PRIORITY FOR THE SMART CONTROLS AND THE ALGORITHM

Maintain customer comfort at all times



SEASONAL DIFFERENCES IN EFFICIENCY

Benefit of algorithms within the year

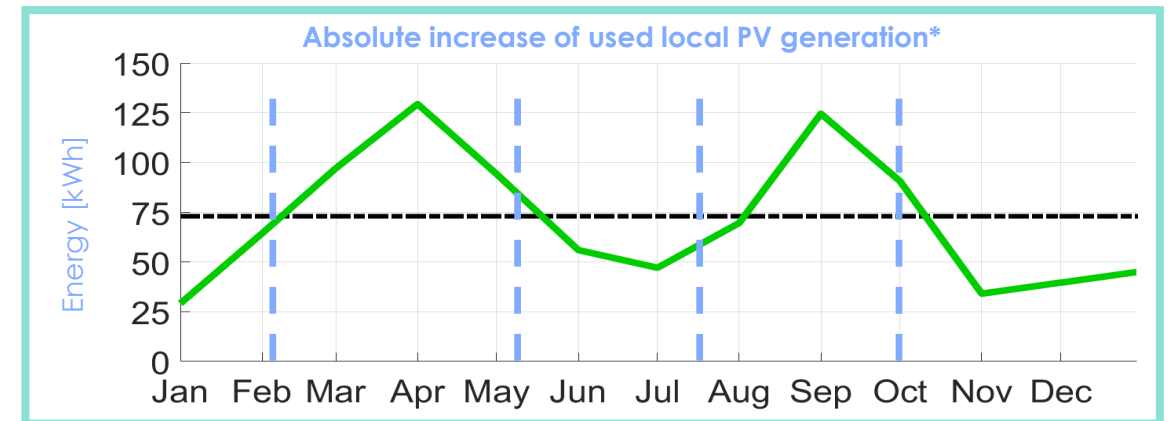


PV to heat pump energy - most efficient in spring and autumn

In **spring/autumn** time, the algorithm makes best use of **space heating** and **hot water** generation → **showing biggest efficiency gains**

In **summer** time, surplus PV energy can only be used for **domestic hot water generation**, heating is turned off → **average efficiency**

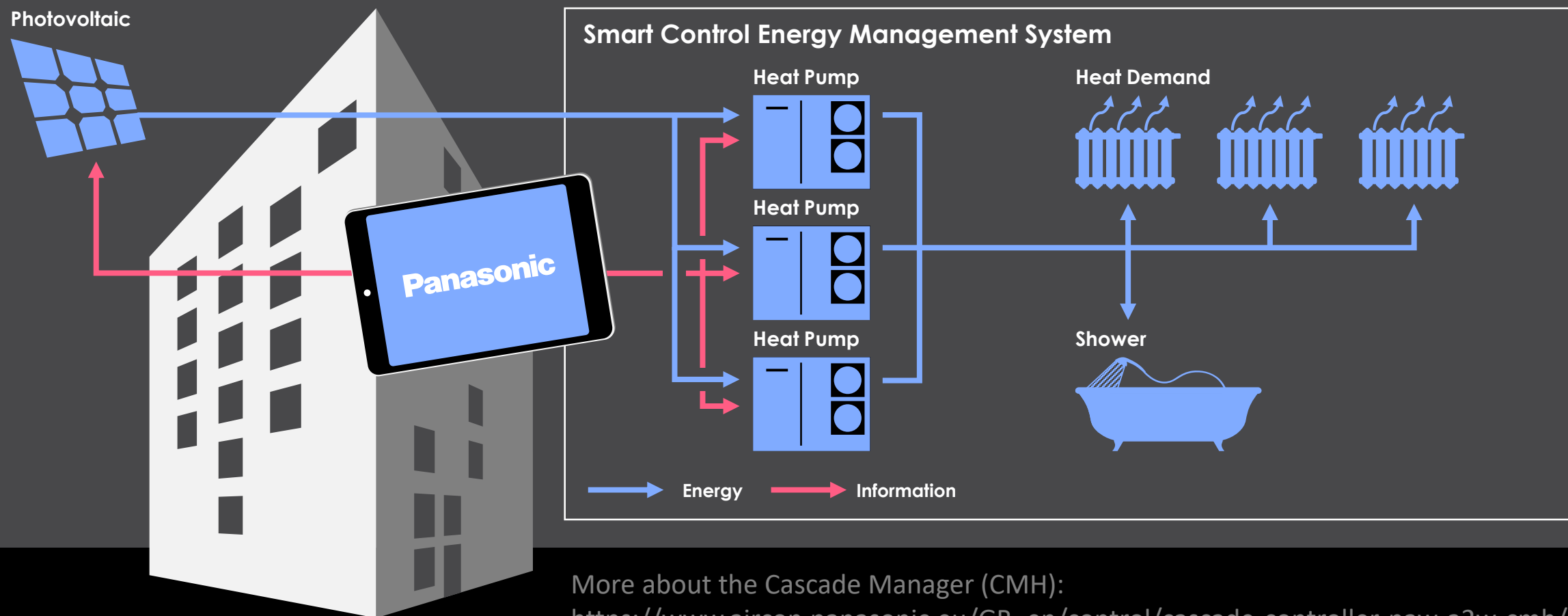
In **winter** algorithm benefit is small due to **low PV energy generation**



* Based on a simulation.

MANAGING CASCADED HEAT PUMPS

Multi-family house set-up: 2 – 5 clustered heat pump systems



More about the Cascade Manager (CMH):

https://www.aircon.panasonic.eu/GB_en/control/cascade-controller-paw-a2w-cmh/

Part of:

https://www.aircon.panasonic.eu/GB_en/control/

Panasonic

FROM PLAN TO IMPLEMENTATION

A smart energy solution comes to life



Computer Based
Simulation



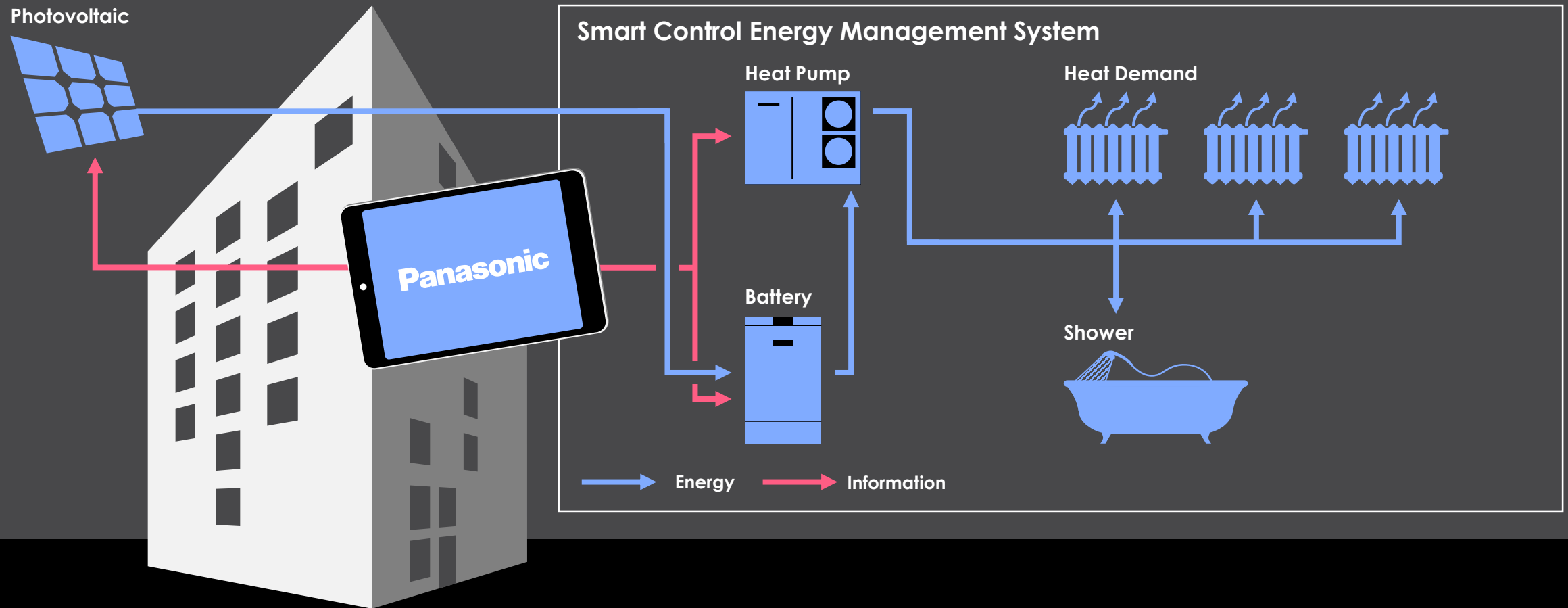
Lab testing



Field testing

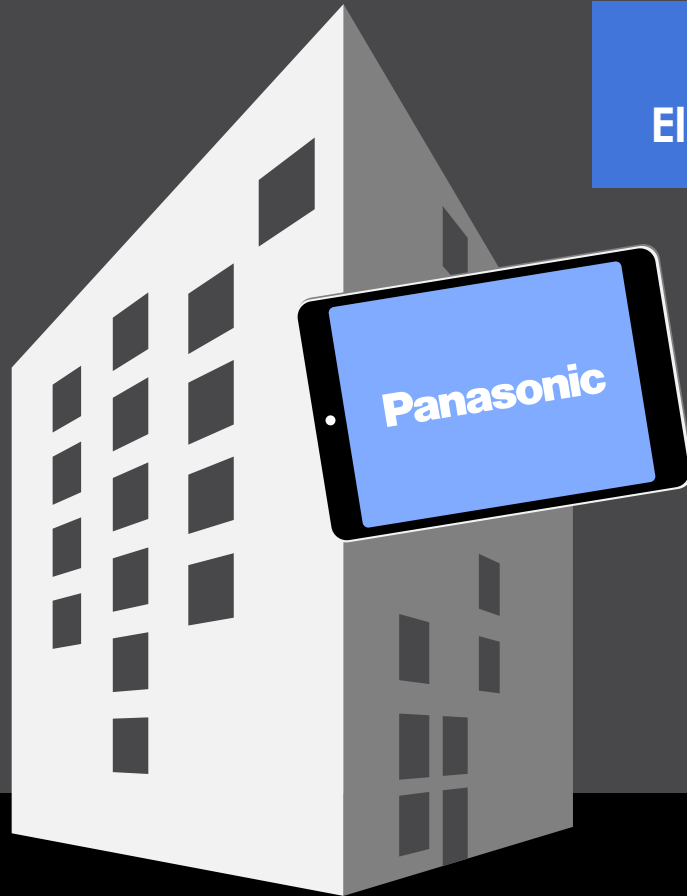
POTENTIAL INTEGRATION OF BATTERY STORAGE

Increase of overall flexibility

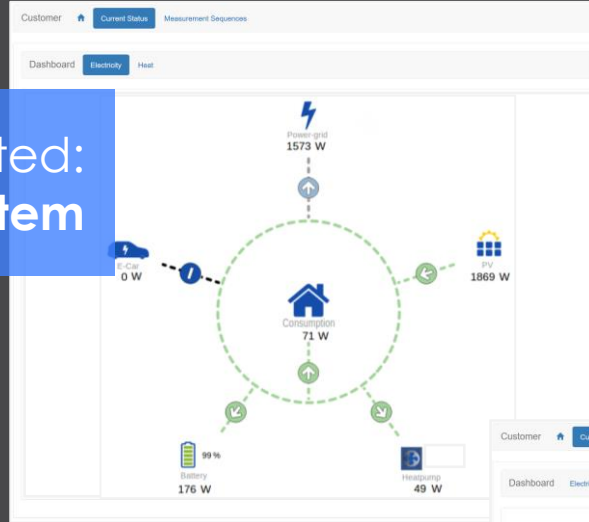


FUTURE APPLICATIONS

Making the technology even smarter – for even more areas of application



View selected:
Electrical System



View selected:
Thermal System

