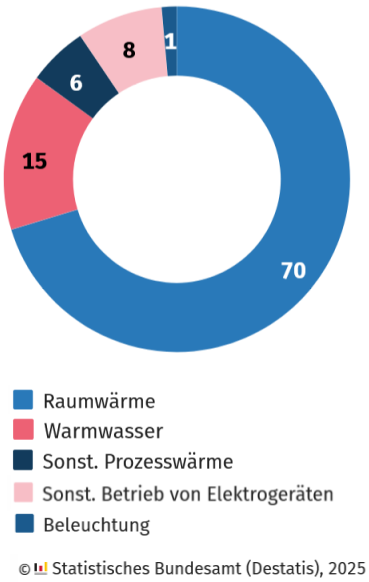
Modul 3: Reducing the energy consumption of a residential building with a smart home system

Notes on possible answers to the customer's questions

1. *What is the potential to save energy with the help of smart home, and how big is it?*



The following can be derived from the statistics on energy consumption in residential buildings (see graphs):

Heating (space heating) accounts for by far the largest energy consumption at 70%. The other items are also hot water (15 %) and other process heat (6 %). This is followed by other electrical appliances at 8 % and lighting at just 1 %.

This means that the most sensible place to start reducing energy consumption is with heating. The second starting point is to reduce hot water consumption.

2. *Can you give me a recommendation where a smart home system makes the most sense and where the cost/benefit ratio is most favorable?*

The area of application with the most favorable cost-benefit ratio is the replacement of radiator thermostats on panel radiators and bathroom radiators. The heat output can be controlled or regulated individually for each radiator: This can be done according to different parameters:

- Individual time control
- Coupling to windows and patio doors. If a window or patio door is open, the smart thermostats close
- Coupling to presence detector

The underfloor heating can also either be controlled or regulated by smart controllers for the underfloor heating circuits. Alternatively, an existing thermostat can be replaced by a smart thermostat for underfloor heating. Smart controllers or smart thermostats offer the same control and regulation options as smart radiator thermostats.

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However, it should be noted that smart components for underfloor heating systems are only offered by a few smart home manufacturers and that underfloor heating systems react much more slowly.

3. *Can you tell me how complex the installation of a Smart Home system is and what kind of work I will have to do?*

Internet access for communication with the manufacturer's cloud is a neccessary for installation.

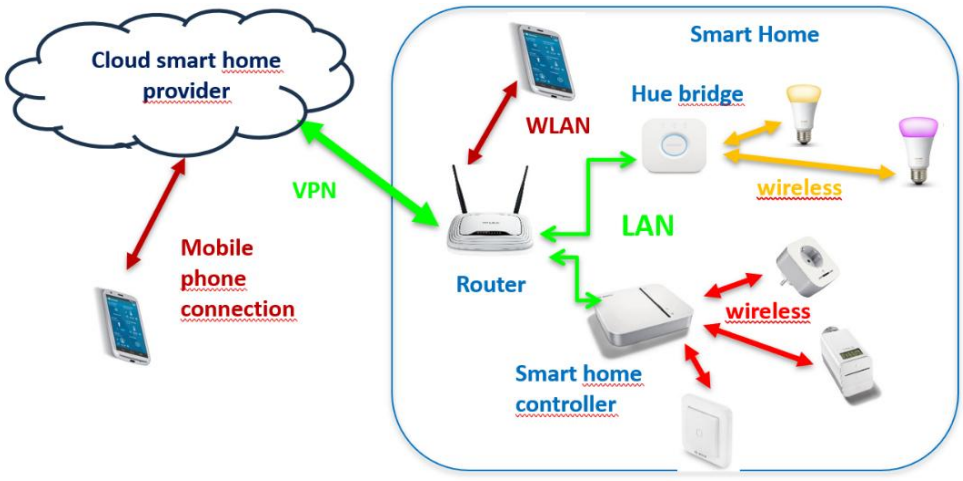
Useful is a WLAN access for communication between mobile devices such as smartphones or tablets and the smart home controller for programming and operating the smart home components.

The smart home controller is either connected to the internet router via LAN or, depending on the provider, integrated into the Wi-Fi router. The Smart Home Controller requires a 230 V power supply via a socket.

Communication between the Smart Home Controller and the smart sensors and actuators is wireless, depending on the manufacturer, using different radio protocols.

The sensors and actuators are powered by a battery or via the existing power connection (e.g. if toggle switches are replaced by smart switches).

It is not usually necessary to lay electrical cables. The installation effort is therefore low.



Communication structure smart home

Graphic: M.Sorger

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4. *Please suggest a suitable manufacturer and compile a list of all the components I need for my home*

The following points should be considered when selecting a suitable provider:

- Scope of the components offered:

  The choice of manufacturer depends on whether the customer wants to carry out further automation in their home in addition to the desired heating control. This could range from lighting control, control of roller shutters and shading, fire and burglar alarms to smart control of household appliances, integration of a PV system and garden irrigation.

- Compatibility:

  It should be noted that smart home components from different manufacturers are not always compatible with each other. A common communication standard ("Matter") is currently being introduced.

- Storage location of the data:

  User data (when what is switched on, when residents are at home and when not, storage of video recordings, etc.) can either be stored locally in the smart home controller or in the provider's cloud.

- Ongoing costs:

  There are smart home providers that require the use of a subscription.

The Bosch smart home system was selected for the following reasons:

- The data is stored locally in the smart home controller.
- There are no running costs.
- Underfloor heating can be integrated via smart thermostat
- There is a large selection of both smart home components and household appliances.
- Components support the Matter standard.
- Lighting control with Phillips Hue can be carried out via the Bosch app.

Link: https://www.bosch-smarthome.com/de/de/produkte/alle-produkte/

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Components required for the heating control of the existing building:

Quantity	Component	Type	Function / task	Installation location
1	Smart-Home-Controller	*Smart Home Controller II*	Control of communication between actuators and sensors as well as app and actuators / sensors Storage location for the parameters (e.g. times, temperatures) Storage location for scenarios	technical room
9	Smart radiator thermostat	*Heizkörper-Thermostat II*	Controls the flow rate of hot water according to the parameters stored in the controller (setpoint temperature, time, status of windows and doors, people in the room, etc.)	2 x Living room 1 x Bedroom I 1 x Bedroom II 1 x Bedroom III 1 x Bathroom 1 x Guest toilet 1 x Corridor 1 x technical room
18	Door/window contact	*Tür-/Fenster-kontakt II weiß*	Gives a signal to the controller as to whether a door or window is open. In relation to the heating control, the thermostats in the corresponding room then receive the command to close.	6 x Living room (Door T2, Windows F2 to F7) 3 x Bedroom I (Door T3, Windows F8, F9) 3 x Bedroom II (Door T4, windows F10, F11) 2 x Bedroom III (windows F12, F13) 1 x Bathroom (Window F14)

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				1 x Guest toilet (Window F15) 1 x technical room (Window F2)
1	Thermostat for underfloor heating	*Raum-thermostat II 230V*	Controls the valves for the underfloor heating coils. This thermostat replaces the conventional thermostat. It can be controlled via the controller or the app.	1 x Guest toilet and Bathroom
4	presence detector	*Bewegungs melder*	Monitors whether a person is in a room	1 x Living room 3 x Bedroom I, II, III
	App for smartphone and / or tablet		The app enables e.g. Programming scenarios (time or action-controlled).	

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