Buildings Model

Aggregation of results according to settings of simulation

***Figure 1:*** *Simple diagram of model flow*

**Building agent controller**

Creation of agent. The agent has the following characteristics:

* Construction year
* Age of its components (wall, window, roof and basement) and U-value of components. [Age of the components are assigned according to Weibull distribution within the limits of preset component lifetimes. U-values are assigned with a weighted choice function within the minimum and maximum values of the component standards of their age.]
* Building type and geometrical properties such as heated area, building surface areas according to orientation, thermal bridges, shading factor, person-specific areas, daily usage times etc.
* Climate conditions
* Heat system according to Weibull distribution

*Building Envelope Retrofit*

The components are individually checked if a retrofit is required (check if end of lifetime is reached). If so, annual investment costs are calculated according to country, component U-value, building type, discount rate (r), economic lifetime (n).

The utility function is calculated for the discrete choice model:

Extra discount factor specific to component in case of using same technology (%)

Price (EUR/kWh)

Useful Energy

Floor Area (m²)

Specific Space Heating Demand (kWh/m²)

The decision is made among the retrofit options via a weighted choice function of utility values.

*Heating System Retrofit*

The heat system is checked if a retrofit is required. If so, costs are calculated according to country, heat system type, heat system size, type of replacement (i.e. if same technology is renewed or switching to a different technology) and replacement year. Cost calculation differs among small and large heating systems.

*Small System*

A small system criterion () that is specific to the heating technology is used.

*Large System*

Investment Cost (EUR/kW)

Operation & Maintenance Cost (EUR/kW·a)

factor for tech. learning effect

Small system criterion (kW)

Cost multiplier

Cost exponent

Share multiplier

Share exponent

O&M multiplier

O&M exponent

Producer price index

Labor wage index

The utility function is calculated for the discrete choice model:

specific utility constant of heating technology

specific constant for market share of heating technology

relative weight of technology in the market among the heating systems of the same energy carrier

**Heat Submodel**

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Buildings