

WebTool – User Guide

Tobias Loga and Jens Calisti / IWU / 17-11-2011
www.building-typology-eu

Supported by
INTELLIGENT ENERGY
EUROPE

1 Purpose of the TABULA WebTool

The TABULA WebTool has been created within the framework of the Intelligent Energy Project TABULA. The objective of the development was to disseminate the general idea of national building typologies to building experts from all European countries and to give them an understanding of the concrete implementation according to the TABULA agreements:

- the division of residential building stocks in size and age classes;
- data of exemplary buildings: visual appearance, commonly found construction elements and corresponding U-values;
- data of exemplary heat supply systems: commonly found system types and their energy performance indicators;
- typical values for the energy consumption by energy carriers;
- energy saving measures on two quality levels and their impact on the energy consumption;
- standard reference calculation procedure based on an agreed data format, user conditions and national climatic data;
- calibration of the standard calculation procedure to the typical level of measured consumption.

More information about the building typology systematics can be found at:
www.building-typology.eu.

2 Country and Building Selection

The screenshot illustrates the Tabula WebTool interface for building selection and energy performance analysis. Key features highlighted include:

- menu item "Building Types"** (1) located in the left sidebar.
- country selection** (2) indicated by a red circle on the flag icon in the top navigation bar.
- building selection** (3) indicated by a red circle on the selected building photo in the matrix grid.
- sidebar chart** (4) showing energy need for heating (kWh/(m²a)) for three states: Existing State (red), Usual Refurbishment (yellow), and Advanced Refurbishment (green).
- status bar: general information** (5) providing real-time data on country, charge organization, charts, primary energy, energy carriers, and building type.

The webtool always starts at the menu item "Building Types" ①. At this page a country can be selected by click on the respective flag ②. All those countries are listed for which a building typology on the basis of the TABULA definitions has been elaborated.

A matrix will appear which is ordered by building size (4 columns) and by construction year class (a certain number of rows, depending on the country). The matrix symbolizes the generic building types of a country, in some cases also special types are mentioned at the bottom part of the building type matrix. Each building type is represented by an example building, which consists of the photo and the dataset of the building (see clause 6 below).

By click on a building photo ③ the dataset of the building is selected and a calculation of the energy performance is executed. The result is immediately displayed by the side bar chart ④: The quantity "energy need for heating" is an indicator for the thermal performance of the building envelope. The red bar is visualizing the existing state, the yellow and green bar are representing the building envelope quality after refurbishment by "usual" measures (commonly realised during renovation) and "advanced" measures (usually only realised in very ambitious renovations or research projects).

The status bar ⑤ continuously provides information based on the current country & building selection and settings: Apart from the country and the organisation in charge of the dataset elaboration the status of the settings are presented (see chapter 8). On the right side the status bar shows whether an old or a more recently built house has been selected: For the newer buildings (building size class starting at 1995 or later) only the existing state is considered by the webtool since the focus is lying on renovation of existing buildings.

3 Selection of Heat Supply Systems

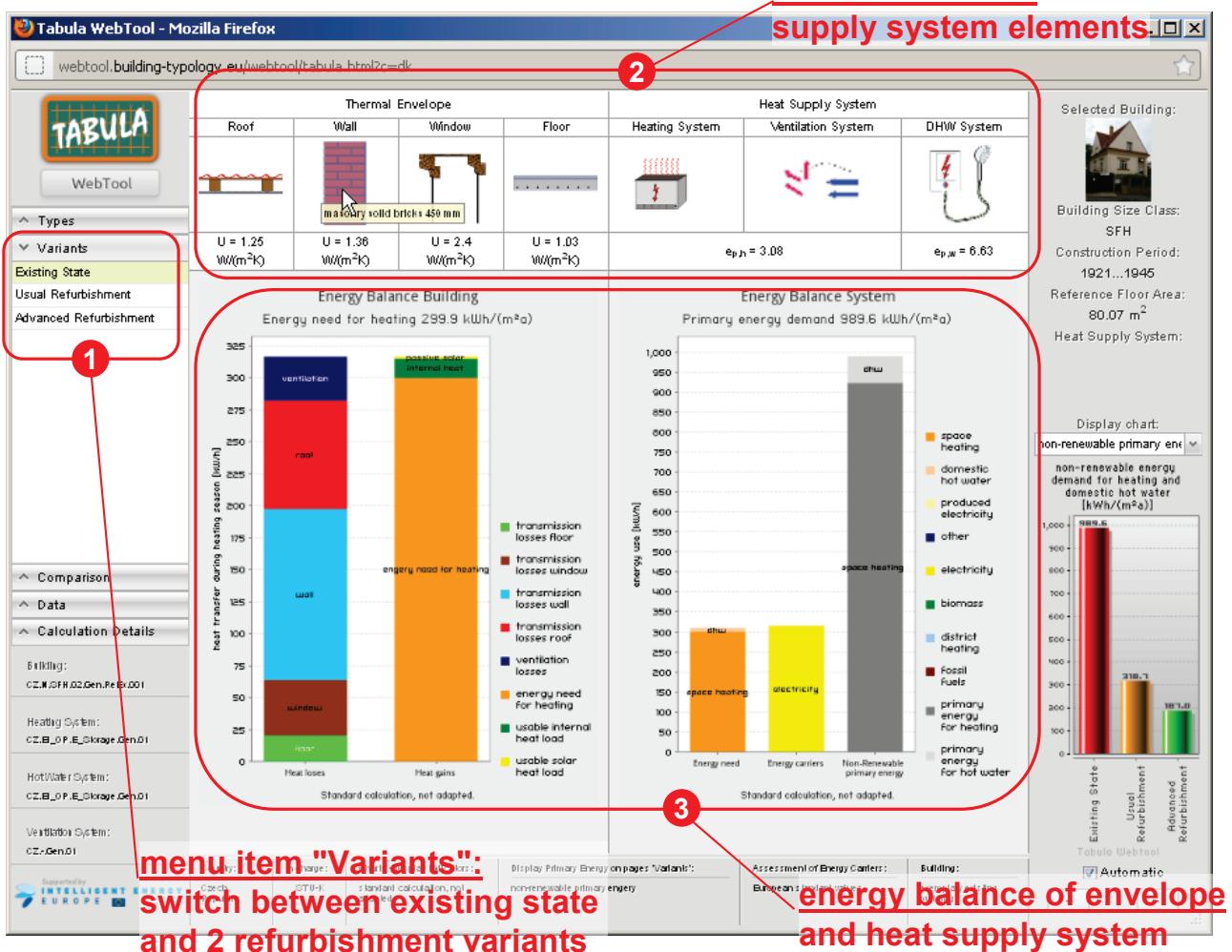
menu item "System Types"

The screenshot shows the Tabula WebTool interface for selecting heat supply systems. Key features highlighted include:

- menu item "System Types"**: Circled in red.
- selected example system**: A detailed diagram of a gas-fueled central hot water system.
- existing state**: A green box containing two system types: oil central heating + decentral electric hot water, poor efficiency (multi-unit housing).
- Refurbishment Package 1 - "Standard Measures"**: A green box containing four system types: oil central heating, higher efficiency (multi-unit housing); condensing boiler + solar system; oil central heating system, high efficiency (condensing boiler, good insulation of pipes); and oil-fueled central hot water system, high efficiency: heat generation combined with heating system (condensing boiler) + thermal solar system, well insulated circulation loop.
- Refurbishment Package 2 - "Advanced Measures"**: A green box containing four system types: biomass central heating, high efficiency (multi-unit housing); woodpellets-boiler + solar system + ventilation system (80% heat recovery); biomass central heating system, high efficiency: woodpellets boiler, good insulation of pipes; and woodpellets-fueled central hot water system, high efficiency: heat generation combined with heating system (woodpellets boiler) + thermal solar system, well insulated circulation loop.
- codes**: A section on the left showing building codes: DE.NF.H.05.Gen.ReBi.001, DE.II.6_NC_LT.MUH.DI, DE.II.6_NC_LT.MUH.DI, and DE.GE.01. Circled in red.
- expand selection**: A callout pointing to the small arrow icon next to the existing state entry. Circled in red.
- calculation**: A section on the left showing calculation parameters: Building: DE.NF.H.05.Gen.ReBi.001, Heating System: DE.II.6_NC_LT.MUH.DI, Hot Water System: DE.II.6_NC_LT.MUH.DI, Ventilation System: DE.GE.01. Circled in red.
- sidebar chart quantity selection**: A bar chart comparing energy performance across three states: Existing State, Usual, and Advanced Refurbishment. The Y-axis represents energy values from 0 to 300. The X-axis categories are Existing State, Usual, and Advanced Refurbishment. The bars show values of approximately 133.0, 168.6, and 148.6 respectively. Circled in red.

After selecting the menu item "System Types" ① a list of supply system types will appear ②. The types are represented by data of exemplary systems of the respective country. For each country this list is supposed to reflect the most commonly found supply system types. For single-unit housing (building size classes SFH = "single family house" and TH = "terraced house") and for multi-unit housing (building size class MFH = "multi-family house" and AB = "apartment block") the supply system lists are different. The selection of the existing system can be expanded by clicking on the small arrow on the left side ③. Then two possible types of system refurbishment are shown. The measures are exemplary and do not represent the whole spectrum of possible supply system upgradings. For a better orientation the database codes of the current supply system type are displayed on the left side of the status bar ④. In order to get a first overview of the energy performance of the building/system combination the sidebar chart can be switched to the quantities non-renewable and total primary energy, carbon dioxide and heating costs ⑤. The steps of these calculations can be tracked in the calculation sheets (see chapter 7).

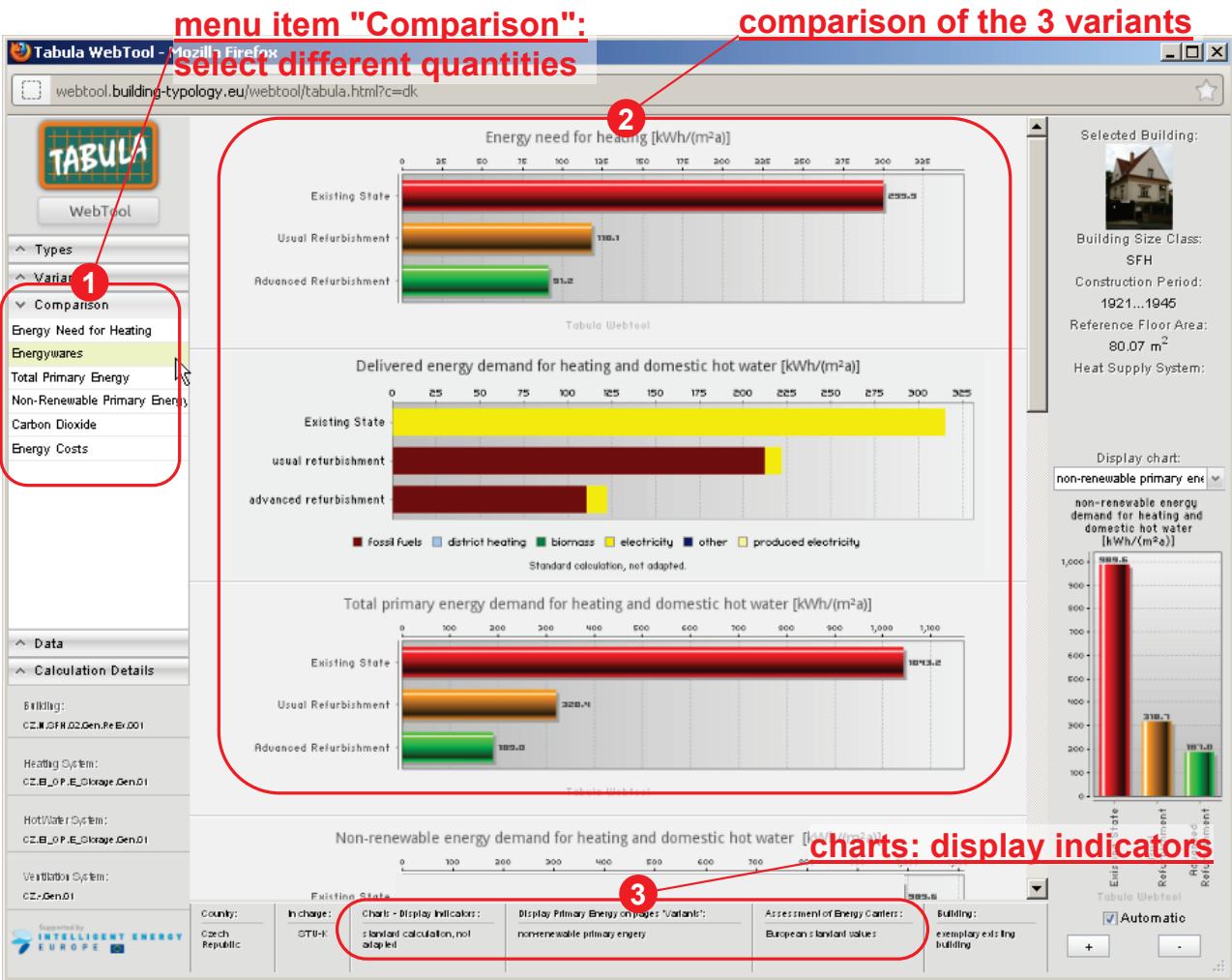
4 Energy Balance of 3 Variants



Under the menu item "Variants" an overview of the three variants of building/system combination is given ①. It includes the pictures and U-values of the construction elements as well as the pictures and primary energy expenditure factors of the heat supply systems ②. By moving the mouse pointer over the pictures a description of the elements will appear.

The energy balance of the building, the energy use by energy carriers as well as the primary energy demand of the building variant is displayed by the two charts ③. These values are an output of the calculation sheets (see chapter 7).

5 Energy Carrier Assessment



This page enables a direct comparison of the three building variants in terms of the most important energy performance indicators. A click on one of the quantities ① will unhide the respective bar chart ②. The results also depend on the settings (see chapter 8) ③.

6 Data Overview for the selected Example Building

**menu item "Data":
select building or system data**

**descriptions and data
of the 3 variants**

	Existing state		Refurbishment Package 1	Refurbishment Package 2
			Usual Measures	
Roof or top ceiling	surface area	39.3 m ²	39.3 m ²	39.3 m ²
	type of construction / refurbishment measure	Roofing tiles, battens rafters Lignopor or heraklit střecha z pálených tašek s izolací Lignopor nebo Heraklit	insulate cavity between rafters 160 mm (increase the height of purlin section if necessary), leave 20 mm ventilated gap vložení 160 mm izolace z min. vláken, zvýšit průřez krovkí, je-li třeba, zachovat větranou mezera 20 mm	insulate cavity between rafters 12 cm + add 10 cm insulation layer above the rafters vložení 12 cm izolace z min. vláken mezi krovkou+10 cm izolantu nad krovkou
	U-value	1.25 W/(m ² K)	0.26 W/(m ² K)	0.17 W/(m ² K)
Roof or top ceiling	surface area	33.12 m ²	33.12 m ²	33.12 m ²
	type of construction / refurbishment measure	concrete ceiling Betonový strop s trámečky monolit s tenkou vrstvou izolace	insulate cavity between rafters 160 mm (increase the height of purlin section if necessary), leave 20 mm ventilated gap vložení 160 mm izolace z min. vláken, zvýšit průřez krovkí, je-li třeba, zachovat větranou mezera 20 mm	insulate cavity between rafters 12 cm + add 10 cm insulation layer above the rafters vložení 12 cm izolace z min. vláken mezi krovkou+10 cm izolantu nad krovkou
	U-value	1.33 W/(m ² K)	0.26 W/(m ² K)	0.17 W/(m ² K)
Roof or top ceiling	surface area	88.5 m ²	88.5 m ²	88.5 m ²
	type of construction / refurbishment measure	masonry solid briks 450 mm zed' z plných cihel pálených	add 10 cm of insulation + plaster (external insulated render system) vnější kontaktní zateplení s 10 cm fasádního polystyrenu nebo minerálního vláknina	add 16 cm of insulation + plaster (external insulated render system) vnější kontaktní zateplení s 16 cm fasádního polystyrenu nebo lnitého vláknina
	U-value	1.33 W/(m ² K)	0.26 W/(m ² K)	0.17 W/(m ² K)

Selected Building:
Building Size Class: SFH
Construction Period: 1921...1945
Reference Floor Area: 80.07 m²
Heat Supply System:

Display chart:
non-renewable primary energy
non-renewable energy demand for heating and domestic hot water [kWh/(m²a)]

Existing State: 989.6
Usual Refurbishment: 318.7
Advanced Refurbishment: 187.8

Under the menu item "Data" the building as well as the system data can be displayed ①. Both pages consist of 3 columns showing the data of the variants: Existing State as well as Refurbishment Package 1 and 2 ②

7 Online Calculation Sheets

**menu item "Calculation Details":
select building or system calculation**

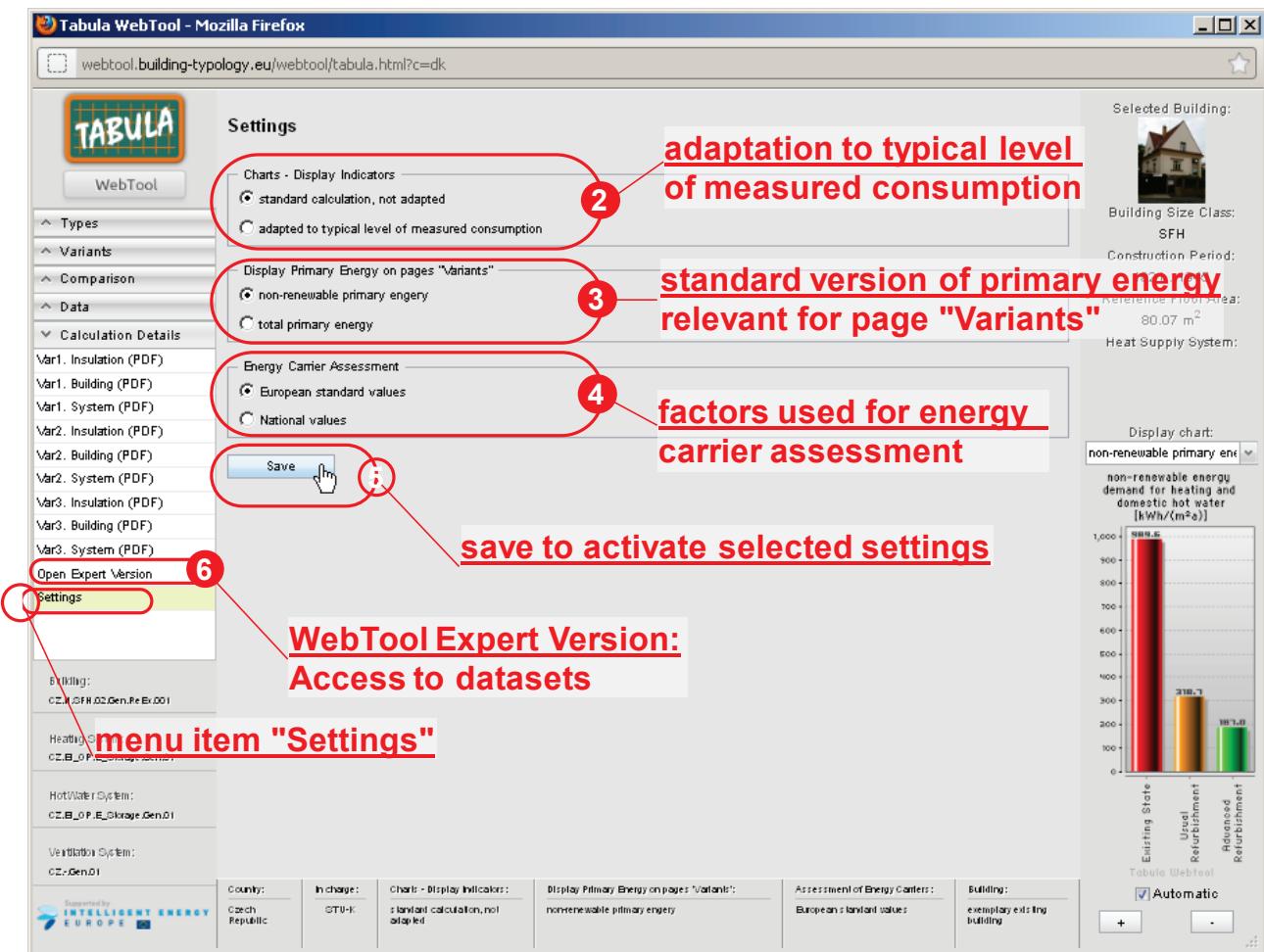
PDF calculation sheet

The screenshot shows the Tabula WebTool interface with the following details:

- Left Sidebar (Details):** Contains a list of calculation variants:
 - Var1. Insulation (PDF)
 - Var1. Building (PDF) (highlighted with a red box)
 - Var1. System (PDF)
 - Var2. Insulation (PDF)
 - Var2. Building (PDF)
 - Var2. System (PDF)
 - Var3. Insulation (PDF)
 - Var3. Building (PDF)
 - Var3. System (PDF)
 - Open Expert Version
 - Settings
- Main Content Area:**
 - Energy Balance Calculation:** Standard Reference Calculation - based on: EN ISO 13790 / seasonal method.
 - Building Performance:** Selected Building: [Image of a house], Building Size Class: SFH, Construction Period: 1921...1945, Reference Floor Area: 80.07 m², Heat Supply System: [details].
 - Table:** Energy Balance Calculation (U-values, areas, adjustment factor soil, heat transfer coefficient H_{ext}).
 - Formulas:** Thermal bridging surcharge on the U-values, Heat transfer coefficient by transmission H_{ext}.
 - Graph:** Display chart: non-renewable primary energy demand for heating and domestic hot water [kWh/(m²a)].
 - Buttons:** County: Czech Republic, In charge: BTU-K, Standard calculation, not adapted, Display Primary Energy on pages (Variant): nonrenewable primary energy, Assessment of Energy Carriers: European standard values, Building: exemplary existing building.

The menu item "Calculation Details" ① allows a tracking of the energy balance of the three building variants. After clicking on one of the sheet labels a PDF sheet is generated by loading the selected building and system dataset from the TABULA web database and populating a predefined calculation sheet ② with the corresponding values. This simple energy performance calculation procedure is based on the respective CEN standards. For more detailed information consult the TABULA website at www.building-typology.eu.

8 Settings



A number of calculation options are available on the page "Settings" ①:

- **Toggle between standard calculation and calculation adapted to the typical level of measured consumption ②:** In order to enable realistic statements as regards energy performance indicators and energy savings the ratio of typical levels of measured consumption to the standard calculation is supposed to be determined or estimated for each country. In case of estimations the calibration to the typical level of consumption is deemed preliminary - up to the time when statistical analyses of the correlation have been performed. If these values have not yet been determined for a country the adaptation factor 1.0 is used for all building and system types. The actual used factor is displayed at the bottom of the PDF calculation sheet for the energyware assessment.
- **Change of the primary energy type for the charts on the pages "Variants" ③:** The columns representing the primary energy can be switched between "non-renewable" and "total" (including renewable energy).
- **Change of factors for the assessment of energy carriers ④:** As default values the factors from EN 15603 Annex E are used. After changing this option national factors are applied – as far as available. The actual used assessment factors can be tracked in the respective PDF calculation sheet.

After changing an option the new parameters are activated by clicking on the "Save" button ⑤.

Also the access to the Expert Version of the TABULA WebTool (see following chapter) can be found in this menu item ⑥.

9 Expert Version

Detailed Data, Filter Functions and Online Calculation for individual Combinations of Buildings and Systems

select building and system dataset

dataset viewer

The screenshot shows the Tabula Advanced webtool interface. At the top, there are two tabs: "select building and system dataset" and "dataset viewer". The "select building and system dataset" tab is active, displaying two tables: "Complete Building data" and "Complete System data". The "Complete Building data" table has columns: Code_BuildingVariant, PL, Code_Country, Number_BuildingVariant, Code_BuildingSizeClass, Year_Living, Year_Building, A_C_Ref. The "Complete System data" table has columns: Code_SystemType, PL, Code_Country, Code_BuildingSizeClass_System, Code_SysH. To the right of these tables is a "dataset viewer" window with sections for "Code_StatusDataset", "Code_BuildingVariant", "Photo_Building", and "Code_DataType_Building". Red annotations with numbers 1a, 2a, 2b, 3a, 3b, 4, 5, 6, and 7 point to various UI elements: 1a points to the "Code_Country" dropdown in the building table; 2a points to the "Code_Country" dropdown in the system table; 2b points to the "Code_Country" dropdown in the system table; 3a points to the "apply" button in the building table; 3b points to the "apply" button in the system table; 4 points to the "dataset viewer" window; 5 points to the "Push onto Calculation Stack" button in the bottom left; 6 points to a column header in the calculation stack table; 7 points to a bar chart in the calculation stack area.

filter: country code + „apply“ button

push onto calculation stack

select column = quantity for chart

The expert version of the webtool gives direct access to the underlying data used by the standard webtool version. All available building and system datasets can be freely selected, combined and viewed in detail.

After starting the expert version a window will open with frames for selecting building ① and system ② datasets. Different types of filters can be used to select groups of datasets for buildings ②a and systems ②b. After entering filter parameters the "apply" button has to be clicked ③a ③b.

The selected datasets can be displayed by the dataset viewer ④.

After selecting a dataset of a building and of a system this combination will be pushed onto the calculation stack by clicking on the respective button ⑤. Any column in this area can be selected ⑥ to be displayed by the chart ⑦ (by clicking the column header cell).

Example Application of the WebTool Expert Version: Compare Energy Performance of Buildings of the same Type from different Countries

filter construction year: "1960"

filter building code: ".Gen." (generic type)

filter building variant: "1" (existing state)

filter building size: "MFH" (multi-family house)

→ all example buildings from the different countries which fit to the filter criteria

selection of one exemplary supply system

calculation and comparison of energy use for the selected buildings

7

Code_Building_Year	Code_Building_Country	Code_Building_Variant	Code_Building_SizeClass													
AT-1960-01	AT	1	MFH	1960	AT	1	MFH	1960	AT	1	MFH	1960	AT	1	MFH	1960
BE-1960-02	BE	1	MFH	1960	BE	1	MFH	1960	BE	1	MFH	1960	BE	1	MFH	1960
CH-1960-03	CH	1	MFH	1960	CH	1	MFH	1960	CH	1	MFH	1960	CH	1	MFH	1960
DE-1960-04	DE	1	MFH	1960	DE	1	MFH	1960	DE	1	MFH	1960	DE	1	MFH	1960
ES-1960-05	ES	1	MFH	1960	ES	1	MFH	1960	ES	1	MFH	1960	ES	1	MFH	1960
FR-1960-06	FR	1	MFH	1960	FR	1	MFH	1960	FR	1	MFH	1960	FR	1	MFH	1960
GR-1960-07	GR	1	MFH	1960	GR	1	MFH	1960	GR	1	MFH	1960	GR	1	MFH	1960

A possible application of the expert webtool version is to compare energy performance indicators for different buildings of the same age and class from different countries. This can be done by the following steps:

- select a certain year ① and apply the year filter.
- filter generic types (filter input ".Gen.") ②, a certain building variant (e.g. number 1 = existing state) ③, a certain size class (e.g. multi-family houses) ④.
- After applying the filter button the respective datasets from all available countries will be listed ⑤.
- If only the thermal envelope is in the focus all different example buildings can be calculated by use of one single supply system ⑥.
- You can now push the building / system combinations onto the calculation stack and compare different quantities by selecting a column to be displayed by the chart ⑦.

10 Technical Annotations

- The WebTool was optimised for Firefox 6, Google Chrome 12 and Internet Explorer 8 and requires Javascript and Cookies
- The WebTool will usually be started in it's own window. If you clicked on the "launch" / "open link" and no new window pops up: Check your popup-blocker!
- The calculation pages were designed in the Adobe Acrobat PD-Format (PDF). Normally PDFs are displayed inline e.g. directly in the Webtool browser window (Adobe Reader standard + browser standard settings). If your browser displays a "Save file"-dialog you can simply download the file, change the extension from ".iwu" to ".pdf" and view the file with your preferred PDF viewer software.