EC720

Energy performance improvement actions
*Release 6*

According to UNI CEI EN 16247-2, UNI/TR 11775, UNI EN ISO 15459 and UNI/TS 11819

The **EC720** software allows energy audit of building to be carried out in compliance with the **UNI CEI EN 16247-2** standard and the **UNI/TR 11775** guidelines (guaranteeing compliance with the requirements of **Legislative Decree no. 102/14**). In conjunction with the **EC700** basic calculation engine, the software allows all the essential steps constituting a correct energy audit to be carried out sequentially:

- **validation of the calculation model** by comparing calculated and actual consumption and construction of the **energy inventory**, representative of the energy input and its use;
- modelling of possible energy upgrading measures;
- economic evaluation of interventions in a simplified or detailed manner, according to **UNI EN 15459** standard;
- filling in the **energy audit report**.

The software also allows, if you have the **EC705 Energy Performance Certificate** module, to automatically fill in the "Recommendations" section of the Energy Performance Certificate as requested by **DM 26.06.15**.

Finally, the software allows to fill in the **technical report for exemption from the obligation to install accounting and thermoregulation devices** whose calculation methods are adapted to the requirements of **Technical Specification UNI/TS 11819:2021**.
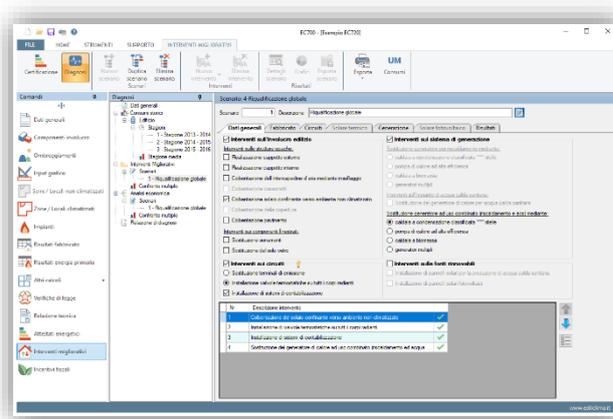
Validation of the calculation model and construction of the energy inventory

The software allows the validation of the building's calculation model by **comparing it with the real consumption measured**: it is possible to create several reference **seasons**, each divided into observation periods, understood as intervals between two successive readings. For each period, the start date, end date, average external temperature value and consumption corresponding to the individual meters (one per energy carrier) are defined.

Once the data input has been carried out, the comparison can be made, for each season or for the average season, in two different ways: **on an annual basis** or through the **energy signature** (understood as the correlation between the value of the average outdoor temperature of each period and the corresponding value of the power delivered by the carrier considered).

The comparison can be made for every service in the building or only for the services chosen by the user.

With a focus on heating and cooling services, it is possible to take into account the **seasonal adjustment factor**, given by the ratio of calculated degree-days to actual degree-days. Otherwise it is possible to validate the calculation model by entering **actual climatic data** of the season (measured on site or provided, for example, by a weather station) as indicated by **UNI/TR 11775**.

Finally, an **energy inventory** of the building is produced, showing actual consumption disaggregated by individual energy carrier and service.
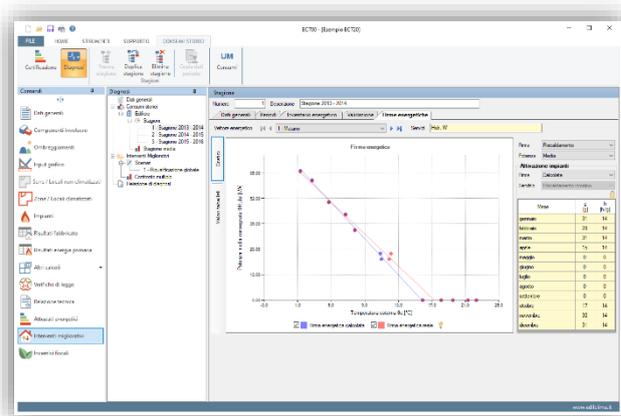
Modelling of improvement interventions

The software allows different **energy requalification scenarios** to be simulated so that they can be compared with each other. Each scenario consists of different interventions, characterised at user's discretion. Scenarios can be simulated through the choice of **pre-constructed interventions** or by means of a **comparison works.**

The **pre-constructed interventions** includes a series of typical interventions on the envelope and on the plant:
- **building** interventions:
  - internal and external insulation;
  - floor and roof insulation;
  - shutter boxes insulation;
  - attic insulation to unconditioned room;
  - air cavity insulation by insufflation;
  - replacement of window frames and glass only;
- interventions on **utility circuits**:
  - installation of temperature control systems or replacement of emission terminals;
  - installation of accounting systems;
- interventions on the **generation subsystem:**
  - replacement of the generator for heating and/or domestic hot water production with a new single generator (i.e. condensing boiler, heat pump or biomass generator) or with multiple generators;
- interventions on **renewable sources**:
  - Installation of solar collectors or photovoltaic modules.
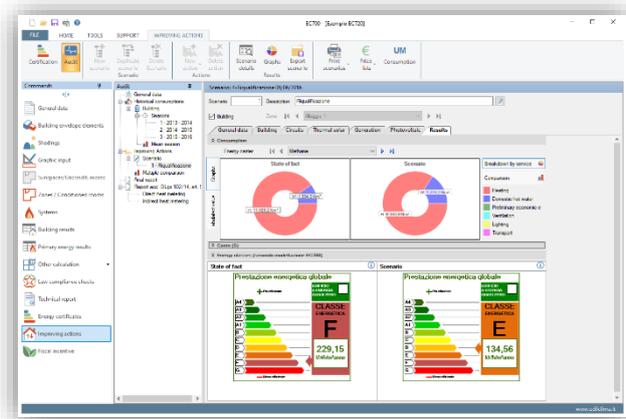
Instead, in the case of **"Comparison works"**, the simulation of improvement works is carried out by comparing the current EC700 file (actual state) with a second job, which can be called up automatically, in which the possible energy-saving works are modelled. This mode allows any type of intervention to be simulated, without any limitations, ensuring a total degree of freedom and any level of detail in the execution of the diagnosis.

Regardless of the mode adopted, the software allows, for each scenario, to calculate the estimated cost, savings (energy and economic), **achievable energy class** and **payback time**.

The comparison of building performance before and after interventions is carried out both in numerical and graphical form. In particular, detailed buttons provide **calculation partials** of the main energy indicators and a rich set of **interactive graphs** (pie charts, histograms or energy signatures) to describe the most significant parameters of the comparison (primary energy and consumption). Finally, winter and summer energy signatures are provided for the actual state and scenario.


Economic analysis according to UNI EN 15459 standard

The software enables the economic analysis of energy-saving works, in accordance with **UNI EN 15459:2018**, taking into account:
- **initial costs** (due to components, materials, works and activities);
- **operating costs** (periodic maintenance costs, one-off replacement costs, final disposal costs, other periodic costs, other one-off costs);
- **operating revenues** (periodic revenues from energy savings, periodic revenues from deductions, final revenues from residual value of components, other periodic revenues, other one-off revenues).

Having defined all the cost or revenue items, their respective annuities and the time period considered, the software allows each individual cash flow, input or output, to be discounted to the initial year so that the **net present value** of the operation and the **overall cost** can be determined. Evaluations can also be carried out taking into account price development rates differentiated by category: energy, labour, products, water and services. The comparative payback time is also determined ("Payback period", **according to UNI EN 15459**).
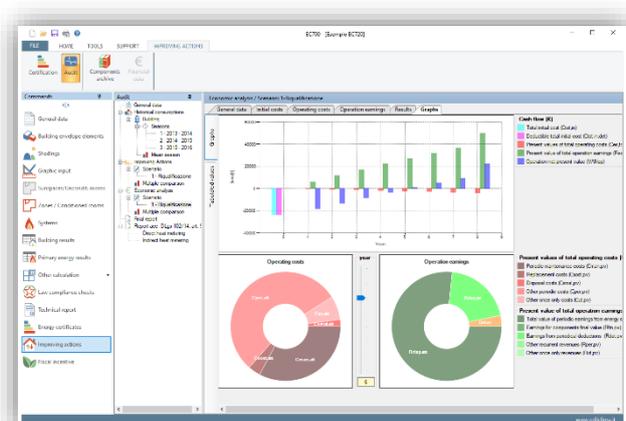
Compilation and export of the energy audit report

Once the validation of the model has been carried out and the simulation of the energy requalification interventions has been elaborated, the software allows for the collection of the evaluations that have emerged and the results obtained in the **energy audit report**. The purpose of this document is to include the different steps of the analysis conducted, while at the same time meeting the specific requirements of the regulations in force on the subject.

The audit report is divided into **different chapters**, including a preliminary summary, the energy analysis of the building (concerning the building and installations), the validation of the calculation model, recommendations for possible interventions as well as an economic analysis of the planned works. The main results of the calculations, regarding the actual state and the scenarios, are provided through both summary tables and detailed graphs.

The complete document can be exported in RTF format, so that the user with any word processing programme can customise it.
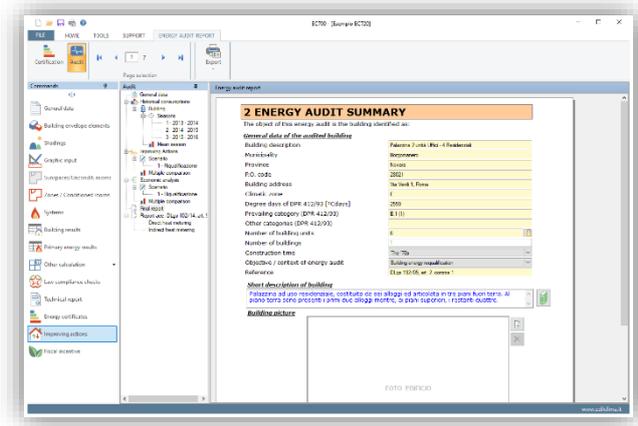
Derogation technical report on accounting and thermoregulation devices

The software makes it possible to compile and export the t**echnical report for exemption from the obligation to install accounting and thermoregulation devices** (Legislative Decree no. 102/14 and subsequent amendments and additions, art. 9), in particular with reference to the two types of accountings: direct and indirect.

For both types, the software allows the display of an on-screen preview of certain pages of the relevant report, particularly those where specific descriptions are to be entered. After the on-screen data entry phase, the report will be exportable in RTF format, which can be edited using any word processing programme.

The calculation methods offered and the technical report are adapted to the requirements of **Technical Specification UNI/TS 11819:2021.**

Prints

The software allows the following reports to be generated in RTF format:
- summary of energy requalification scenarios;
- energy audit report;
- technical report for derogation from the obligation to install accounting and thermoregulation (Legislative Decree no. 102/14 as amended, art. 9).

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