Status of implementation of EN-EPB standards in Italy

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Energy performance calculation in Italy

Energy performance calculation has been required well before requirements by the EPB directive, like in several other European countries. Regulation 10/91 of 1991 and its application decree DPR 412/93 of 1993 first asked for an energy performance calculation and demonstration of minimum energy performance levels to get a building permit. At that time calculation and requirements were limited to heating service in new buildings. Later, requirements for new buildings were extended to other services (domestic hot water, cooling, ventilation, lighting, etc.) and partial energy performance requirements (e.g. maximum U-values and minimum system efficiencies) were introduced when renovating existing buildings.

Energy performance calculation for legal purpose (e.g. to get a building permit and to issue an EPC) shall be done according to the calculation method specified by the regulation. The national regulation always referred to UNI-CTI standards, that is UNI standards developed by CTI (Comitato Termotecnico Italiano, www.cti2000.it), which is the association in charge of standardisation in the HVAC sector.

Italian standards were developed by experts which at the same time were also participating into CEN working groups, so there has always been a strong connection between CEN standards and the corresponding Italian standards. Several EN standards are already referenced since a long time, like the former EN 832, then EN-ISO 13790 and now EN-ISO 52016 with all the supporting standards. The current general part about weighting is a subset of ISO 52000-1 because it was developed at the same time by experts participating in CEN work.

The main steps in the development of the Italian calculation method were:

- 1993 First set of standards, monthly calculation covering only heating with basic generators (boilers)
- 2003 Extension of scope to domestic hot water
- 2008 Complete revision of the procedure, the package is named UNI-TS 11300 with several parts (see **table** next page).
- 2010 Extension to cooling and ventilation
- 2012 Extension to the full set of heating generators (heat pumps, thermal solar, cogeneration, etc.) and renewable sources
- 2016 New general part for weighting (primary energy calculation), addition of people transport.

Step by step revision is needed to allow software manufacturers to prepare, update and submit for approval by CTI the calculation tools to be used for legal purpose.

The current set of energy performance calculation standards in Italy is described in the **table** below.

Why to change now?

In Italy there is consensus on the fact that the current set of energy performance calculation standards needs a major revision. The monthly calculation is well tested and provides representative results only when dealing with heating and domestic hot water, both for building envelope and technical systems. An experienced designer may support an energy audit about heating and domestic hot water using the UNI-TS 11300 calculation model. Experience and know how allow to tailor the input data to get results in close accordance with actual energy use.

The same cannot be said for the parts of UNI-TS 11300 concerning cooling, ventilation and air conditioning. There are two main technical issues:

- the monthly time step makes it difficult to calculate cooling needs and to consider complex usage patterns (intermittent occupation) of non-residential buildings;
- the calculation methodology for cooling systems and air conditioning (UNI-TS 11300-3) is very basic and cannot consider the variety of systems used for these services. This standard cannot be used as the calculation model for an energy audit on cooling, ventilation and air conditioning systems.

Standard number	Scope	Notes
UNI-TS 11300-1:2014	Building needs, including heating, cooling, ventilation and humidification	The first version was published in 2008. It mostly refers to ISO-EN 13790:2008 and supporting standards.
UNI-TS 11300-2:2019	Basic heating and domestic hot water systems.	The first version was published in 2008. Several parts are identical to EN 15316:2007 (example: boiler calculation is the same as EN 15316-4-1:2007) or use the same concepts. The revision published in 2019 is a minor review with some errata corrige and the addition of heat recovery on domestic hot water sewage.
UNI-TS 11300-3:2010	Cooling and air conditioning systems	This standard should cover cooling and air conditioning. It is very basic and doesn't cover the huge variety of possible HVAC systems.
UNI-TS 11300-4:2016	Heating and domestic hot water systems using renewables	The first version was published in 2012. Thermal solar part is identical to EN 15316-4-3:2007. Heat pumps are calculated with monthly bins.
UNI-TS 11300-5:2016	General part and delivered energy weighting	This standard deals with the global energy balance for electricity, weighting according to primary energy and calculation of RER. It is a subset of ISO 52000-1 (identical equations). Conforming to national regulation, exported energy is not considered into the building energy balance.
UNI-TS 11300-6:2016	People transport	It is a simple standard about elevators and travelators that is based on tabulated values
UNI 10349:2016	Climatic data	The first version was published in 1994. The new revision includes monthly and hourly data for more than 100 reference locations

New buildings are more and more insulated (legal requirements on new buildings envelopes is quite tough) and therefore most of the energy is used for cooling, ventilation, lighting and domestic hot water, not for heating. Dealing with these services, an hourly method makes it easier to capture the cooling needs, which are often a matter of some hours a day and also makes it simple to describe complex time schedules of non-residential buildings where there may be several categories of spaces in one single building.

Since the last major review of the energy calculation method in Italy dates back about 10 years ago and buildings are more and more performing, it's time for a complete review.

Why EN standards

Let's forget for one minute that in EU countries there should be no other standards than EN on topics covered EN standards: most large countries have indeed their own methods in force for energy performance calculation.

The first CEN-EPB package had coordination issues and could not be adopted as a whole. However, UNI-TS 11300 referred to well accepted and tested standards (like EN 13790) and incorporated methods from several other EN standards, indeed.

Now the second CEN-EPB package, developed thanks to the second mandate to CEN, is available, and:

- EN 52016 specifies a fully detailed hourly method to calculate heating and cooling needs, which relies on the same data input as the monthly method;
- EN 16798 about cooling and ventilation covers a wide range of systems;
- there is a wide possibility to customize calculation modules and to specify national application data via the Annex A/B system.
- several modules were tested, and demonstration spreadsheets are available
- the modular structure of the package allows to connect national modules to the general frame, if needed.

Adopting this package in the Italian context would solve several issues, such as:

- switching to an hourly method while keeping traceability and transparency of the method. A parallel calculation with XLS spreadsheet is possible, at least for simple cases. The alternative is switching to tools based on Energy plus, Transys and similar but modules are often black boxes and not suitable to routine energy performance calculation purpose.
- Switching to an hourly method while keeping nearly the same description of the building. This minimizes the impact on professionals (learning new input methods) and on software manufacturers (develop new interfaces)

The remaining issue is being sure that the overall package will work. Since switching from monthly to hourly time step is a big change, the risk of wrong calculation connections and of hidden issues must be controlled.

What's going on

National annexes have already been prepared for most EN-EPB standards.

A few **alternative national calculation modules** are being prepared. These are the transposition into the CEN-EPB modular structure of current national calculation modules. This is being done for a few EN modules where there are uncertainties and/or issues and keeping the current national procedure is the preferred option. These national modules will be later proposed to the relevant CEN TCs.

A general overarching document is being prepared to provide all the links and "details" that are not obvious (or hidden) until you really try to transfer the method into software. A simple example is that adopting an hourly method and using weekly profiles that differentiate between weekdays and weekend, you must decide which day is Monday. Another subtle issue is the definition of operating time schedule for intermittent occupancy. It is easy to decide that offices are occupied 10 hours per day, which is s a comfort requirement. Then you have to decide a default operation time of systems and if to allow a reduced time if an optimisation function is available. Another example is deciding all occupancy and use profiles.

Discussing and taking all these decisions takes some time and one must be sure that all chosen options are consistent before releasing the whole package.

So, work is going on and it will still take some time. Having everything ready in the second half of 2020 is an achievable target. ■