Strong impact of EU legislation on HVAC installations in buildings

Over the past decade several types of EU legislation came into force affecting the HVAC sector in Europe, both Regulations (which are automatically applicable in member states) as well as Directives (which have to be transposed into the national legislation of member states). Over the last five years several of these regulations and directives have been reviewed. Most of these legislations have the target to reduce the energy consumption, stimulate the use of renewable energy and reduce the CO_2 equivalent emissions in order to minimize the global warming impact.

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Sometimes directives can be implemented by member states with a lot of national "freedom", a typical example is the Energy Performance of Buildings Directive, which is implemented for example in France as RT2012 and in the Netherlands as NEN7120. **Figure 1** is showing an overview of the most important directives and the level of interaction.

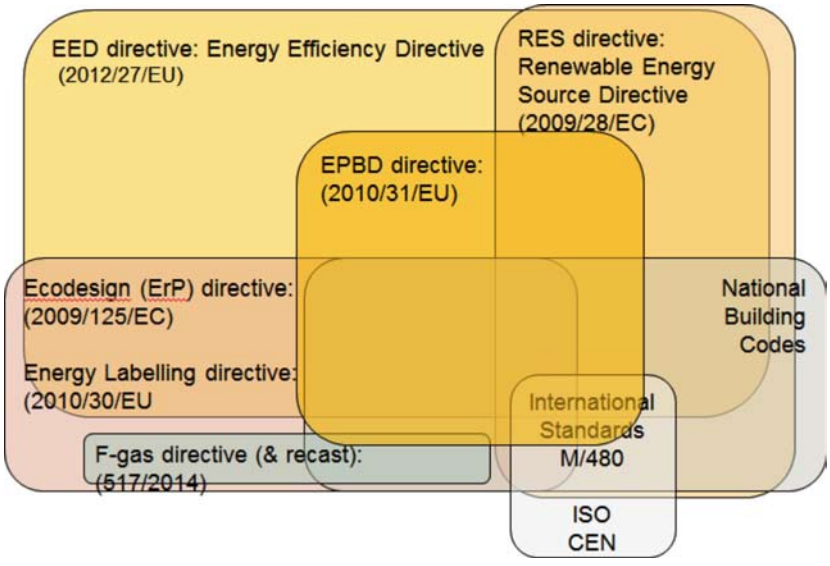

Figure 1. Effect of EU legislation in building sector.

Reduction on the use of f-gases

One of the latest legislation getting into force was the revision of the f-gas Regulation in order to reduce the emissions of f-gases, expressed in CO_2 equivalents. Whilst the original 2006 F gas regulation mainly focused on reduction of emissions through certification of installers, regular inspection of systems and logbooks, the revised F gas regulation adds an important additional measure : a gradual reduction of HFC consumption (also in CO_2 equivalents) by imposing quota on producers and importers of bulk HFCs. In addition, the revised F gas regulation adds a number of product bans, eg. HFCs with the highest global warming potential (GWP ≥ 2.500) will be banned in stationary refrigeration systems from 2020 , HFCs with a GWP ≥ 150 will be banned in domestic refrigerators and freezers from 2015 and in commercial domestic refrigerators and freezers from 2022. The GWP150 limit will also apply to multipack centralised refrigeration systems for commercial

use with a rated capacity of 40 kW or more, except when they use cascade systems where the primary refrigerant circuit is limited to a GWP below 1500.. Another example, starting from 2025, small single split air conditioning systems with less than 3kg of refrigerant should use refrigerants not exceeding a GWP of 750. It is important to understand that the main driver towards refrigerants with a lower GWP value compared to today will not come from the bans but from the imposed "consumption phase down" – the quota system for importers and producers of HFCs.

Global warming impact, have to look beyond GWP

The phase down on consumption of HFCs can be achieved with a combination of measures, some applications may be able to use non-HFC refrigerants, while others will change to HFCs with a lower GWP value. It is also beneficial to reduce the refrigerant charge amount, as the phase down is based on CO_2 equivalents, so kgxGWP, not only GWP. And finally, the phase down applies only to new HFCs placed on the market, so recovering and reusing existing HFCs will also become very interesting in the future.

There is no one-size-fits all solution regarding the future refrigerants to be used. Each manufacturer will have to evaluate the options, taking into account not only GWP or kgxGWP but also looking at energy efficiency, safety and economic affordability.

In the air conditioning and heat pump sector, the refrigerant R32 has promising characteristics. The energy efficiency is higher compared to the commonly used R410A, whilst the GWP is only 1/3rd of R410A. In addition, for the same capacity output, the refrigerant charge amount can be reduced.

Point of attention in certain member states may be: the mild flammability of R32. Although very well controllable, certain member states have ruling in their building codes that certain buildings may not contain any flammable refrigerant at all. A good example how different directives, local building codes and industry innovations are not supporting each other but in fact could work contra-productive. It is obvious, it is important to watch continuously if one legislation or ruling is not conflicting with another one and to avoid double work.

Growing market

Heat pumps, reversible air conditioning systems are more and more seen as sustainable systems to realize energy savings in the built environment. In today's newly built offices and large renovations, the use of heat pumps with heating and cooling functions in one integrated system are more standard than exception. Besides real estate sector realizes a good climate system is important to improve the health, well-being , thus productivity of people working, residing in these buildings. Taking a higher productivity into consideration, an investment in a heat pump solution, using renewable energy, is often earned back in an acceptable time period. The market for heat pumps with cooling function, or in other words a reversible air conditioning is growing and fitting with the different European targets in terms of energy reduction, CO_2 reduction and use of renewable energy. Was cooling seen as "luxury" in the past, in todays, new well insulated buildings cooling is as important as heating to secure the well-being of people.

As this technology is still rather new for stakeholders like: architects, installers, investors, but also for building codes and standards developers, a proper training is required, but also an understandable integration in building codes and standards.

Last but not least, investors should have the opportunity to see and experience the best practises in the market and not feel frustrated about the lack of know-how among other stakeholders in the building industry chain. **Figure 2** is giving an example of a low energy multi-functional building.

Figure 2. Need for innovative systems.

Never ending attention to educate skills

The demand for qualified people will grow strongly. In the future, after 2020 we may expect every new building and/or renovated building will make use of (reversible) heat pump technology. Today the capacity to fulfil this demand is far from sufficient. Not only on the installation

level but also on level of design and engineering. Strong focus on education has to be made to succeed in the ambition making all newly build buildings energy neutral by 2020. Every company in the building sector will have to pick-up its own responsibility to invest in increasing the know-how level on low energy buildings and integrating smart systems to allow energy neutral buildings.

New concepts

This period allows to come with innovations in the building industry. Not only because of the f-gasregulation, but also because of the focus on energy saving, the awareness besides energy saving also health and well-being in buildings are important. Technological innovations will follow in the field of smart grids , phase change materials, ventilation and air quality, user interfaces etcetera. A central role is expected for (reversible) heat pumps as they address all targets set by the EU in terms of energy efficiency, CO_2 reduction and use of renewable energy.

The challenge is up to the building industry to review the building process to give sufficient space for innovations to make energy neutral buildings while keeping a high level of comfort, safety and health. Current best available technologies are already available. Now it is up to the mind-set of the people involved in the building process and the flexibility of the persons involved in standards and rules to allow best available technologies. ■

REHVA Guidebook on Mixing ventilation

Mixing ventilation is the most common ventilation strategy in commercial and residential buildings. Introduced will be the new design guide that gives overview of nature of mixing ventilation, design methods and evaluation of the indoor conditions.
The Guidebook shows practical examples of the case-studies.

REHVA Guidebook on GEOTABS

This REHVA Task Force, in cooperation with CEN, prepared technical definitions and energy calculation principles for nearly zero energy buildings requi-red in the implementation of the Energy performance of buildings directive recast. This 2013 revision replaces 2011 version. These technical definitions and specifications were prepared in the level of detail to be suitable for the implementation in national building codes. The intention of the Task Force is to help the experts in the Member States to define the nearly zero energy buildings in a uniform way in national regulation.