

General philosophy of an energy performance regulation

Matheos Santamouris and Vassilios Geros
Group Building Environmental Studies
University of Athens, Physics Department,
Panepistimioulos, 157 84, Athens, Greece
msantam@cc.uoa.gr

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Introduction

Buildings consume more than 40 % of the energy in Europe. Recent trends show a almost stable consumption in the Northern countries while energy consumption in the South increases continuously mainly because of the important improve of the standards of life and the rapid penetration of air conditioning.

The recent engagements of the European Commission to decrease carbon emissions impose the application of a strict legislative frame. Existing legislation in European countries needs to be updated for a number of reasons described below.

The paper discusses the main objectives that an energy performance regulation should satisfy, the real needs for such a regulation while discusses the main challenges that should be covered.

Objectives of an Energy Performance Regulation

Three should be the main objectives of an energy performance regulation :

- a) To contribute to a substantial decrease of the energy consumption of the buildings sector in a country. In particular to contribute to decrease all the specific components of the consumption and in particular heating, cooling and lighting energy consumption.

- b) To contribute to improve the indoor environmental quality of buildings and in particular thermal and visual comfort as well as indoor air quality.
- c) To contribute to improve the global climate through decrease of the emissions from energy sources.
- d) To provide specific information to the building users in order to improve consciousness of the public on energy and environmental issues.

Why an Energy Performance Regulation ?

The main reasons that a new approach for the energy performance regulations in Europe is needed are described in the following :

- a) Existing regulations are mainly based on the minimisation of the heat losses through the building envelope while some of the regulations consider as well, solar gains through the glazed surfaces. However, the recent dramatic progress on building products, systems, techniques and building components as well as the rapid penetration of air conditioning asks for a new legislative frame that consider in a more efficient way and incorporate the new developments.
- b) The existing legislative frame considers mainly the heating energy consumption of buildings and neglects almost completely the cooling and lighting demands. The very rapid penetration of air conditioning asks for a new legislative frame that should consider all the specific components of the energy consumption.
- c) The extremely rapid development of renewable energy sources and in particular of the solar energy components and techniques ask for a new legislative frame that incorporates thermal and electrical gains from active and passive solar systems and techniques
- d) The development of a new European platform on the energy behaviour of buildings that is based on the European Directive for Construction Products, the CEN standards and the new, under preparation, Directive on the energy performance of buildings, impose a new policy that has to be followed by all member states.

Challenges that should be satisfied by an Energy Performance Regulation and standardization

To prepare an energy performance regulation and standardization that satisfies the above mentioned objectives and characteristics a whole range of challenges have to be dealt with, (Figure 1). (Figure and idea is taken from 2). These challenges are presented in details in the following :

1. The Energy Performance Regulation has to focus on all components of the energy consumption in a building. In particular the heating, cooling and lighting as well as the specific consumption of the appliances has to be considered. The boundary conditions and in particular specific target energy consumption have to be considered.
2. Aspects related to Indoor Environmental quality have to be seriously considered. In particular aspects related to thermal and visual comfort as well as the indoor air quality has to be regulated.

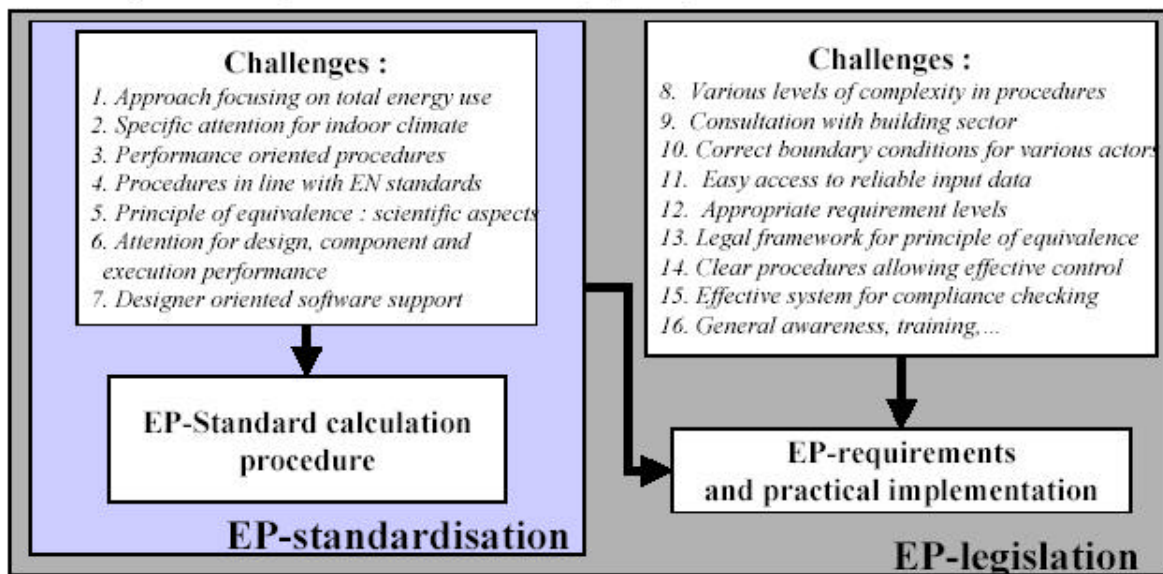


Figure 1. Challenges for and interaction between EP standardisation and legislation, (Original figure taken from 2)

3. The energy performance regulation should be based on a performance oriented approach and philosophy. This is very important as the principle of equivalence has to be considered to allow integration of innovative techniques and technologies
4. The Energy performance regulation should be in line with the CEN standards and the overall European directives.
5. In order that the EP regulation considers innovative techniques and technologies the principle of equivalence has to be considered.
6. Specific attention has to be paid to the quality of design and execution. Thus, the Energy performance regulation has to consider all three aspects : the component performance, the design and the quality of the execution. The overall performance of the building should be considered mainly on its final results.
7. Support by means of designers oriented software
8. Various methodologies to prove compliance with the minimum standards have to be considered. In particular, for small projects the use of extensive and detailed calculation methodologies may not be the more appropriate one, and more simplified techniques as well as descriptive procedures may be considered.
9. All market actors should participate in the preparation of the energy performance regulation. In particular, designers, industry, building contractors, consumers organisations etc, have to participate and achieve a consensus.
10. The boundary conditions for the various stakeholders like the architects, building contractors, building owners, administration have to be well defined in order to motivate them to apply in a correct way the regulations.
11. All necessary data about the used products should be available. This means that an appropriate system and procedure to characterise the performance and the quality of

building products and components should be established. The necessary links and collaboration with the building's industry should be established.

12. Requirement levels that are performance oriented and achievable by the market. The targets of the EP legislation should be sufficiently severe in order to stimulate the market and contribute to a better energy and environmental performance of the buildings sector, but on the other hand should be realistic and achievable by the building's society. In parallel, the application of the energy performance regulation should be done in various and continuous steps. In a first step the building actors should become familiar with the new approach while later on the requirements should be gradually increased.
13. A clear legal framework for the application of the principle of equivalence should be created in order to allow the performance evaluation and finally the use of innovative systems and techniques.
14. A legal frame to assess the final performance of the building after construction should be established.
15. Also, an effective system for checking compliance with regulation should be created and used.
16. And finally, actions to enhance the general awareness and training should be designed and applied.

Conclusions

The Energy performance regulation is the most effective tool to decrease the energy consumption of buildings, improve the indoor environmental quality and protect the environment.

The design of the EP regulation should satisfy certain conditions and objectives and requires a consensus by all the market actors playing a role to the buildings sector.

The role of the ENPER-TEBUC project is to make an important contribution in order to assist the European countries to prepare and implement a successful EP approach.

References

1. Proposal for a Directive of the European Parliament and of the Council on the Energy Performance of buildings (presented by the Commission); *Commission of the European Communities*; Brussels, 11.5.2001; COM (2001) 226 final; 2001/0098 (COD)
2. Peter Wouters, Jan Porrez, Dirk Van Orshoven, Luk Vandaele : European collaboration on Energy performance regulations: why and why now? Proc. Of the first ENPER – TEBUC Workshop, Brussels, 2001.