

## Chapter 23

# Smart Cities and Municipal Building Regulation for Energy Efficiency

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### ABSTRACT

*The “Smart Cities & Communities Initiative” of the Strategic Energy Technology Plan is the strategic European response to lead cities and regions to a carbon free future. In this contest energy efficiency in buildings has a crucial role and must be considered in a holistic approach to the urban planning. In order to implement the minimum requirements stated by the European Directive about the Energy Performance of Buildings, and in order to consider different planning layers with the view to a smart city planning, local regulations are a key factor aiming at sustainable territorial planning. This paper investigates the possibility to draft a basic structure of Municipal Building Regulations in order to guide local administrators and technicians and to limit discretionary power of bureaucracy. The paper is organized as follows. First, a review of the most common practices for building regulations in Europe is proposed, then the basic structure of a municipal building regulation for the city of Palermo (Southern Italy) accounting for sustainability is discussed.*

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## INTRODUCTION

It is well-known that the policy orientations of EU strongly address towards sustainability in cities, buildings and technical infrastructures. The European “Smart Cities & Communities Initiative” of the Strategic Energy Technology Plan (SET-Plan) supports cities and regions in taking ambitious measures to progress by 2020 towards a 40% reduction of greenhouse gas emissions through sustainable use and production of energy (Kylili & Fokaides, 2015). Innovations in the field of energy, infrastructures systems and ICT have to accelerate the transformation of our urban areas in “smart cities”, meaning a city in which a multi-sectoral planning is put in place. Such type of planning takes into account the specific features of the territorial context in which the City is, and develops different and appropriate strategies to integrate the various aspects of a smart city (Mattoni, Gugliermetti & Bisegna, 2015). As an example it is possible to increase quality of life of citizens through a sustainable and low-carbon environment and efficient urban facilities, but also through measures to support the active participation of citizens in the city governance.

A city is not a mere addition of single and non-communicating parts, but an organism consisting of subsystems (Dirks & Keeling, 2009; Riva Sanseverino, Riva Sanseverino & Vaccaro, 2015), like infrastructures (e.g. energy, water, transport, waste, communication), buildings (that are linked because they are expression of complex urban functions), people and business. “Human beings and the urban and territorial elements are the nodes of the networks: they are sensors, processors and communicators of information and data at the same time. If each node performs more than one function, the activities in the city are optimized, and more efficient results and performances can be achieved” (Mattoni, Gugliermetti & Bisegna, 2015, p. 107), so intelligent urban planning should pursue the same principles and consider the mutual influences that the actions planning can have on a cross-sectoral levels.

For this reason Mattoni, Gugliermetti, & Bisegna (2015) has redefined the main ambits of development of the smart city in mobility, energy, environment, community and economy. Each ambit includes possible actions to be taken with respect to various territorial levels (regional, city, district), in terms of territorial jurisdiction and economic resources. The study also specifies what actions are more synergic in order to create inter-sectorial networks, in view of a smart planning.

In this framework, buildings and district - as we shall see - have a crucial role. In fact at European level, the main policy driver connected to energy use in buildings is the Energy Performance of Buildings Directive (Directive 2002/91/EC), implemented in 2010 with the EPBD recast (Directive 2010/31/EU) which introduces, at Article 2, the concept of *Nearly Zero Energy Buildings* (NZEB is a “buildings that has a very high energy performance and in which the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources”) and other ambitious provisions (all new buildings ought to be nearly zero-energy from 2020; the Member States should develop policies, financial measures and other instruments for the promotion of the cost-effective transformation of all existing buildings into nearly NZEB). Another directive belonging to the climate and energy package known as 20-20-20 is the Energy Efficiency Directive (Directive 2012/27/EU) which explicitly refers to automation as a tool to attain energy saving through the implementation of Demand Response (DR) policies and the wide spread application of smart meters (Ippolito, Riva Sanseverino & Zizzo, 2014). So the reduction of energy consumption in buildings, the rational use of energy, the integration of Renewable Energy Sources (RES) in buildings and of Building Automation Control (BAC) and

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