

# The need to revise our Building Codes

Leonardo Rignanese<sup>1</sup> and Maria Raffaella Lamacchia<sup>2</sup>

<sup>1</sup>School of Architecture - Polytechnic of Bari

via Orabona 4, 70125 Bari, Italy

Phone: +39 080 5460826, Fax: +39 080 5460881

E-mail: lerigna@tin.it

<sup>2</sup>School of Architecture - Polytechnic of Bari

Dottorato di Ricerca in Pianificazione Territoriale

(University of Reggio Calabria)

via Orabona 4, 70125 Bari, Italy

Phone: +39 080 5460826, Fax: +39 080 5460881

E-mail: lamacchia@tin.it

**ABSTRACT:** The practices involved in reorganising the environment with a view to ensuring quality of life and sustainable use of resources require individual and collective behaviour which is often at variance with the tools and regulations at present available. These are inadequate for their purpose and sometimes penalise rather than reward such efforts. Among these tools, the *Regolamenti Edilizi* (Building Codes) have gradually lost their true function of providing rules for correct building and now simply list parameters for new buildings, neglecting to provide any criteria for existing structures or for the city as a whole. The uniformity of these parameters, both for buildings and town planning has stifled and destroyed any variety among building practices, as well as the different uses and types of traditional materials that sprang from a wise appreciation of building needs and the best means of adaptation to environmental and climatic conditions.

Nowadays, different forms of control for building and town planning are required, that should propose an integrated approach to the environment and public health, guaranteeing sanitary conditions but also public safety, accessibility, quality, citizen involvement. Updating and revising the manuals could be a step forward in this process. Some recent Italian *Regolamenti Edilizi* are oriented toward this goal.

**KEYWORDS:** Building Codes; Urban sustainability; Manuals; Bio-edilizia; Existing buildings heritage.

## 1. PREMISES

One of the most innovative, fundamental forms of experimentation of sustainable development is based on *bottom-up* decisions. Local society – political, technical, economic – is increasingly taking on the task of determining the quality of the local environment<sup>1</sup>. This has led to an important new turning-point, and a move away from the view that norms should be externally imposed, towards the concept of self-regulation, or the drawing up of rules as a form of collaboration inviting citizen involvement.

The development of a different way of shaping the surroundings - the house, garden, district, city and territory - experimenting with new technologies, reviving ancient techniques, adopting new materials, reinstating traditional materials, now provides a chance to give new meaning to the processes of planning, maintenance and control of the territory.

This collaborative process entails first and foremost spreading awareness of the surrounding territory, its history and development, the actions taking place, the intentions and consequences of the policies adopted. In Italy there is little cultural awareness of the surrounding territory and little information readily available on this topic. An interesting program was shown on *RAI 3: Paesaggi rubati*, for instance, but the time chosen was during the summer on Sundays at 11 o'clock at night.

To encourage collaboration in the processes of shaping the surroundings - private and public - the planning tools must not be seen as limits imposed or arbitrary choices but as a common practice - every single citizen's responsibility to take care of the surroundings - in a process indissolubly associated with daily activities rather than only with special events and plans. Assessment of the actions is no longer on the basis of how well they respond to a particular abstract design, but of how transparent the decisions are, how simple the procedures, how readily available the resources, the skills and the ability to evaluate the practices.

Design activities are increasingly set up as a means of creating rather than predicting; they are measured according to

---

<sup>1</sup> See the *Codice concordato di raccomandazioni per la qualità energetico ambientale di edifici e spazi aperti*, promoted by ENEA at the *Conferenza Nazionale Energia e Ambiente*, Roma 1998.

their power to prescribe (not forecast) materials, techniques, building procedures, principles, etc. Improvement in the quality of the urban habitat is a goal that can be achieved above all through careful use of the resources.

The quality and sustainable development issues are concentrated and measured above all at the town level, because the «urban structure» is an expression of the relationships within the city and between the city and the surrounding territory, because most of the population is concentrated in the cities and, finally, because a better use of resources at this level could increase the efficacy of the environmental strategies adopted<sup>2</sup>. This, after all, is what is expressed in the Aalborg Charter.

The new practices for building and managing the territory are in strong contrast with many of the present tools, created essentially to guide expansion and build anew, and not at all oriented towards the questions of recycling existing buildings, renewing urban structures, saving energy and conserving local resources, either of a material or a cultural nature. A large part of these tools and regulations is unable to cope with the overall changes in society, and inadequate or even a hindrance to the new forms of regulation of urban territory. The present norms -laws, technical precepts, regulations - are still limited to controlling the functionality of a building (Vitruvio's *utilitas*) simply by means of a check list of requirements to be fulfilled. Our heritage of existing buildings is paid little attention in these regulations, and dealt with only by means of derogation. The creation of urban areas is confined simply to ascertaining that they conform to the set standards.

Town planners cannot alone give impetus to sustainable development but they can draw up tools that make it possible to deal with the biophysical limits of the territory (the available resources according to their power of renewal); they can create the conditions for a different - more friendly - relationship between man and nature. This also entails laying the foundations for long-term projects, on a consensual, bottom-up basis<sup>3</sup>; it entails making plans for changes in the urban structure and in individual and collective behavioural models; it entails launching actions that can lead to positive effects in the medium-term on the quality of the environment and of society as a whole.

The proposals for town-planning reform, the new regional laws, some new plans and building codes are directed towards this goal.

## 2. THE NEED FOR RULES

In view of these premises, there is clearly a need to define and formulate behavioural rules for our territory<sup>4</sup>; to create a set of rules governing the various forms of maintenance, building and restructuring of our towns and their surrounding territory.

Such rules have always existed and have always served to guide the shaping of our habitat. There have been agricultural rules, and manuals establishing norms for buildings and roads. Many of our present regulations address activities that have a profound bearing on our surroundings and their control. Nearly all the corporations that deal with the territory have their own rules, although we are often unaware of the existence or import of such rules, despite the fact that we increasingly delegate issues to the authority of such corporations.

Proposals for sustainable development and citizen involvement could be positively supported by rules defined to improve our habitat. These rules - both technical and morphological - could have their strongest impact - immediately visible and actuable by all - and their most profound effect, from the cultural point of view, too - if they were made to radiate out from small urban units - the house, the road, the gardens, the district. These rules must enable building of the town surroundings - that intermediate area that has been so little dealt with by the present norms - and set up immediate actions, both individual and collective, for shaping the surroundings in an innovative way, mediating the relationships between the economic, political, social and civic systems and the ecological/natural system<sup>5</sup>.

An essential requirement for citizen involvement to become a reality is for technical jargon to be made intelligible. The regulations for using the resources must be entrusted to a direct understanding of the operations to be carried out both for conserving and transforming structures, rather than just to simple legislative and parametric points of reference. The rules must include criteria, behaviour, precepts, suggestions and recommendations; they must provide indications on how to proceed right now.

The norms must deal with conservation, restoration, maintenance and transformation of buildings and territory; this concept of «norms» must suggest a less bureaucratic approach and invoke behaviour identifying building as a historical and cultural process of development, not merely a mechanical process. The rules must be behavioural «codes», not a list of «styles», and must be drawn from the historical, cultural and environmental models of their operative area. The governing principles of mutual aid, responsibility and autonomy and, lastly, sustainable development, demand that the

---

<sup>2</sup> Nijkamp P., Pepping G. (1999) «Una valutazione meta-analitica delle iniziative per la città sostenibile», in Lombardi P., Micelli E. (Eds), *Le misure del piano. Temi e strumenti della valutazione dei nuovi piani*, FrancoAngeli, Milano.

<sup>3</sup> Fusco Girard L. (1999) «Lo sviluppo sostenibile come questione culturale e la valutazione», in Lombardi P., Micelli E. (Eds) Op. cit.

<sup>4</sup> Rignanese L. (1998) «Le norme e le regole per il governo del territorio», in Atti del XXII Congresso INU, *Il governo del territorio nella riforma delle istituzioni*, Perugia 18-20 June 1998.

<sup>5</sup> Fusco Girard L. (1999) Op. cit.

rules be formulated and managed at the local level.

Obviously, the technical rules must be connected with decisional rules - what aims, what skills, what assessments be adopted - and procedural rules that enable budgeting and give meaning to such technical rules; in short, they should constitute a «systematic, harmonious combination of legal forms and substance»<sup>6</sup>.

## 2.1 REPERCUSSIONS ON PRESENT TOOLS AND NORMS

The present town planning tools must be radically changed as regards content, choices, strategies, and operative methods, the establishment of rules for maintaining, transforming and building houses, districts, parks and squares, rural areas.

The proposals for new town planning laws, some regional laws and some *Regolamenti Edilizi Comunali* (council building codes) have defined tools, methods and rules that can orient and channel urban and territorial development in environmentally compatible directions; ascertain and verify that transformation projects of the territory are sustainable on the basis of the resources available, by means of assessment systems that identify objective criteria on which to base the operative decisions or the promotion of actions, behaviour and activities.

It is essential for these tools to be based on a redefinition of their true target - all aspects of the geographical area, built-up or not - and grounded in the principles of citizen involvement, mutual aid, conservation of resources, new forms of assessment - increasingly a problem of know-how and increasingly *ex ante*, *ongoing* and *ex post*.

The Tuscan Regional Law n. 5/95 - "*Norme per il governo del territorio*" - expressly states, in article 1, the need to institute sustainable development, transparent decisional processes, citizen involvement in governmental decisions having to do with the territory and the right to self-determine aspects to do with lifestyle and work. These aims are pursued by:

- individuating the territorial resources (natural resources - air, water, land, plant and animal ecosystems - and essential resources - natural resources, cities and built-up areas, countryside; material documents recording the cultural heritage, infrastructures and technological systems),
- and the norms for safeguarding the territory and its use, that establish that:
  - no natural territorial resource may be significantly or irreversibly depleted in relation to the balance of the ecosystems to which it belongs;
  - actions transforming the territory are subject to preventive procedures to assess their environmental impact;
  - actions transforming the territory must be assessed and weighed up on the overall balance of their effects on all the essential resources present in the territory;
  - new uses of the land for housing or infrastructural purposes are normally sanctioned only when no alternatives are available in the sense of recycling and reorganising existing structures and that, in any case, such new facilities must serve to improve the existing systems and overall territorial balance and to reclaim environmentally degraded zones.

These precepts are of a general nature and prevail over all subsequent norms introduced. The activities on which assessment are to be based must be listed in directive plans such as the *Piano Territoriale di Coordinamento* or the *Piano Strutturale*. Assessment of the environmental impact particularly addresses the following aspects: the land, water, air, microclimatic conditions, cultural heritage, plant and animal life, built-up areas, socio-economic factors.

The subsequent regional law dealing with agricultural zones requires that council urban planning tools take account of new rural buildings, establishing size, materials and type with a view to safeguarding the local architectonic traditions, promoting biobuilding and conserving energy. Although this law refers only to new building, it is the first official mention of biobuilding<sup>7</sup>.

### 2.1.1 Indications at the design level (structural)

Structural plans must address and regulate all those factors and elements - and not only by placing limits (environmental, supply limits etc., and safety limits: water supply, antisismic precautions, etc.) - that lead to a better integration in the bio-ecological context and reduce the overall energy consumption in the area, by means of preventive assessment of sources, energy saving methods, and the most suitable use of the resources.

Assessment of the energy requirements and of the impact on the surroundings, environment and energy resources must be a prerequisite, a basis on which to build the contents of the plans themselves, unlike the present norms which only stipulate a geological analysis and geological feasibility study. In the new terms, such an assessment will be closely related to the new issues addressed in the plan: structural design, sustainable use of resources and equitable division of these<sup>8</sup>.

The factors and elements that characterise the environment (air conditions, noise, surface waters, permeability of the

---

<sup>6</sup> De Vergottini G. (1998) "L'ordinamento del territorio: illogicità e ovvietà", in *Paesaggio Urbano*, supplement to n. 3-4/98.

<sup>7</sup> Tuscan Regional Law 14 April 1995, n. 64, modified in Tuscan Regional Law. 4 April 1997, n. 25, «Disciplina degli interventi di trasformazione urbanistica ed edilizia nelle aree con prevalente funzione agricola».

<sup>8</sup> The plan for Reggio Emilia is one example of the new plans defining an urban-ecological strategy, that pose the problem of the registry of biotopes just as much as that of land impermeability.

terrain, sources and consumption of energy) may, on a preliminary basis, be desumed from the procedures listed in the *Environmental Impact Assessment (VIA)*. The structural plans must therefore contain continually monitored, easily accessible data.

We have to consider the importance of solar and wind charts for studying the thermal status of buildings and introducing technical adjustments - of a mechanical or plant/tree nature - to obtain greater comfort and energy saving; of the plant species present in the area that can confer environmental compensation within the area itself, to maintain and increase the natural shelter afforded and the level of permeability, to regenerate the water supply, purify the air and create a balanced microclimate as regards temperature, level of humidity, etc.

### 2.1.2 A step beyond zoning

As a tool, zoning is not far-reaching enough to control and guide the transformation of the urban fabric - renewal and reclaiming operations - either from the functional or the morphological points of view. Going beyond zoning means going beyond the rigid functional approach to cities.

A more flexible and global approach to cities is important in many ways. The view of the city that considers it just as the sum of the buildings making up homogeneous units only as regards their functional aspects neglects the fact that buildings have relationships with their surroundings. A district has many dimensions: physical, social, community, ecological (water cycle and permeability of the terrain, green belt areas, biological lanes, biodiversity), energy (consumption, air and noise pollution, solid waste, cogeneration and district heating, public lighting, mobility). This environmental unit has a bearing on the questions of public spaces, green areas - and on the plans for creating these - that goes beyond mere compliance with set standards.

Nowadays, individual and collective rights are measured against the true inhabitant, not a theoretical subject. Different populations and different cities can no longer be reduced to a common denominator by the «mean» of standards. The demand for services and public spaces, expressed not only by residents but also by city users, expects such spaces to be quality, integrated, complex and accessible. The problem of standards is a paradigm of the relationship between cities and welfare state policies<sup>9</sup>. It is not easy to define and measure objective standards, responding both to people's needs and to the inherent function of the item at issue, nor to establish who is competent to do so: a *Legge Quadro* (orientative type law) is needed, to provide local corporations with rules and tools on which to base their territorial policies and set up projects reflecting the specific regional and urban identity.

Some tools, however, are already immediately available. For example, up to now green areas within the urban fabric have only been accounted for in the context of the standards, without there having been any assessment of their incidence on the city's environmental equilibrium. Instead, it is already possible to assess the role of green areas in the sense of facilities and natural environmental elements; to analyse the interactions between public and private green areas or between public green areas and open spaces. Ecological and urban regeneration cycles - permeability, retreeing index etc. - can be inserted in the projects for public green areas, as well as devices for reducing and mitigating noise pollution. In the same way, facilities and plants for waste disposal and recycling and for reclaiming polluted areas can be included in the standards under the heading of facilities of public interest.

## 3. BUILDING CODES

The content of these *Regolamenti Edilizi* is defined in article 33 of *Legge Urbanistica Italiana* (Town Planning Law) n.1150, enacted in 1942. «Local councils must establish building codes, in accordance with the ordinances decreed in the present law and the single law in the public health issue[...], dictating norms on the following matters and, if necessary, treating apart the existing built-up nucleus from those areas destined for expansion and the remaining territory under the council's jurisdiction».

A careful reading of this law n.1150, leads to the conclusion that it aims to control the single territorial areas (not only new development) and urban quality («the specific building precepts to be observed in given city districts or avenues or squares» - comma 10), rather than the building practices. In practice, the norms of the *Regolamento Edilizio* have become packed with questions of building hygiene, norms for buildings, especially new ones while existing ones are largely ignored, relegating the problem of cities to the apportioning of housing numbers and not much else. Many of the present building codes lack any rulings that could be more than minimally satisfied by existing buildings. For this reason, derogation are the order of the day, as regards the size of the windows, for instance or the layout of the living spaces.

In short, the *Regolamento Edilizio* and the *Regolamento di Igiene*<sup>10</sup> have become repetitive, if not contradictory, tools that increasingly entrust control to different authorities, which certainly does not tend to increase the quality of the final product.

---

<sup>9</sup> Karrer F. (1999) «Metri e misure, valori e valutazioni», in *Urbanistica Dossier* n. 21, supplement to n. 165/99 of *Urbanistica Informazioni*.

<sup>10</sup> Hygienic controls of new buildings and transformed existing buildings were introduced in our legislation well before the *licenza edilizia* (building authorisation).

### 3.1 PROBLEMS OF SIZE

The problem of size is one of the many examples of the inflexible nature of the *Regolamento Edilizio* when issues such as energy saving are at stake. Insulation of buildings, for example, requires considerable wall thickness, like the walls of old buildings. The present town planning laws penalise such choices, as they dictate measurement of the volume of the covered area, not the net usable area<sup>11</sup>.

The present regulations oblige the designer to face two requirements:

- maximum exploitation of the building potential of the area without considering the energy supply;
- high quality design, at the expense of the surface building area.

The building codes establish fixed norms for the rooms, neglecting the fact that heating and airing problems are different in Trapani from in Bolzano. In the past, buildings had different heights in the different regions to make them warmer or colder according to need.

Uniforming the indexes on a national basis - established both for public and private buildings - has in practice abolished any differentiation among building practices, typologies, and uses of materials in the different regions. These different typologies, techniques and materials reflected centuries of experience and building knowhow, affording solutions to the various problems of energy supply, of availability of materials - without the problem of transport costs - and mirroring different lifestyles and forms of adaptation to the environment and the climatic conditions. Apart from destroying these specific solutions and knowhow, the act of uniforming and homologating building has led to an increase in overall costs. How can this local knowhow be recovered, in view of the imposition of national norms established for virtual buildings, houses, public areas, obtained from the calculation of the mean of technical and functional requisites, which do not correspond to any objective reality? How can the same indexes and hygiene parameters be applied in all the different regions? How can indexes and parameters defined for new buildings be adjusted to make them apply to existing ones?

Climatic conditions are very different in the various regions and in the different areas of the various regions. Some areas have problems of insufficient insulation and need as much sun as can be captured - others have the reverse problem: how to protect against too strong sunlight. The same applies to public areas: some need as little shade as possible and others as much as can be created. The distance between buildings, and hence the shadows they throw, are planning elements that must be matched to the various climate and energy situations.

We must not try to fit our heritage of existing buildings into the required metrics; they must be studied and conserved for historical reasons and for the lessons they can teach us about how to respond to the challenges posed by the local climate and environment.

### 3.2 RULES AND MANUALS

It will not be a quick and easy matter to overcome the present regulations and set up new performance requirements introducing efficient, efficacious forms of assessment and quality parameters referring to existing residential and urban areas, energy supplies and services.

First of all, an integrated view of the environment and health requirements is needed: a move towards a *Testo Unico* (single Law) controlling building and addressing different sectors - hygiene, safeguards against fire, accessibility, safety, quality etc. - at different levels - urban, environmental etc.<sup>12</sup>. Linking these norms would make procedures more transparent, information more complete, control more certain. The regulations on hygiene and building should be unified within a single regulation controlling building, which should then act as a set of manuals prescribing the rules for building (see Florence, Modena).

The impact of building on the environment and man should be assessed. The idea of assessing the internal qualities of a building - air, light, energy supply etc. - without being allowed to assess the climate, the place, the exposure to the elements etc., and without any specific norms and rules regulating this operation, reveals a narrow and inefficacious view of what the sector really needs. Many of the negative features of present buildings are due to their context: walls, facades, spaces, materials are more than just component parts. Each new building is inserted in a particular context and so the regulations and norms must bear precise reference to all those factors and elements that combine to determine a better environmental quality of the building and the urban area. This will make it possible to weigh in the balance a whole building, a part of the city, the whole city.

Our heritage of existing buildings cannot be considered as a residue and dealt with by means of derogation. We must not be renounce our purpose because of the difficulties that arise because these buildings are not all the same - a medieval contexture is very different from those of the 18th or 19th centuries or from modern building. On the contrary, the fact of setting up rules, inspired by general principles and based on local specific conditions, should help us to understand the value and characteristics of these buildings and contextures. In the case of existing, diversified buildings that cannot be

---

<sup>11</sup> Some regional laws and building regulations are oriented in this direction: exclusion from calculations of the volume and the *Rapporto di Copertura* of walls exceeding 30 cm, up to a maximum of 25 cm; 15 cm for roofs (Apulia, Lombardy and Veneto); exclusion from calculations of the volumes of energy saving plants and installations, and those for the use of renewable sources (greenhouses etc.) - Modena, Florence.

<sup>12</sup> Draft of the *Regolamento di Igiene Tipo* for Lombardy.

homologated, the values we aim to preserve are the very basis of the requisites to be observed. These buildings often do not satisfy the single requirements but they can be subjected to an overall, global assessment.

If we aim for the regulations to act as tools disciplining correct building, they must tell us what to do and how to do it, not forbid activities. All the components of a building and a city must be defined. Manuals can constitute useful tools for spreading knowledge of «codes of practices». This does not mean that everyone should be obliged to use the solutions proposed in the manuals, but only that yet other controls are not needed. In the case of existing buildings, or if the designer wishes to find other solutions, these should be possible, authorised and welcome, provided they attain the goals they aim at.

Rules do not «instill genius» but they «prevent many mistakes and protect us from the traps that imagination can cause us to fall into»<sup>13</sup>. Only if there are rules can there be exceptions to the rule. They provide a framework within which greater or lesser degrees of freedom can be allowed.

If abacuses could be drawn up for the single aspects of maintenance and transformation of areas - tree-planting, colours, fencing, flooring, paving, lighting, typologies, roads, etc. - they would save us from much ugliness and incongruence that is often the result of not knowing what to do and how best to place a tree or a gate. Some experiences of drawing up guide-lines for plans for maintaining, reclaiming and recreating public, urban and agricultural areas have addressed this solution<sup>14</sup>.

### **3.3 PROS OF A NEW *REGOLAMENTO EDILIZIO***

The *Regolamento Edilizio* must establish the rules for urban, building and land conservation and transformation. All public and private subjects, including the individual citizen, must be able to get work done without being hindered by individual judgements and interpretations, and must be responsible for what is done. Everyone should know what is allowed and how to obtain authorisation; what is forbidden and why, so that transparent administration can be achieved. Building codes - however and wherever they are drawn up - must guarantee the rights to transparency, to subsidiarity, citizen involvement, responsibility and certification; as well as the rights to access to information and acts of law:

Norms based on performance should be preferred to norms based on precepts; subjects should be informed, rather than forbidden to act. The *Regolamento Edilizio* can become an educational tool.

Requisites - functional, technological and morphological - must be subdivided into two categories: those that cannot be waived - prescriptive norms - as they belong to the public interest (all housing must have drinking water on tap, must be safe, etc.) and indicative or behavioural norms.

The contents of the regulations must respond to the new needs for safety of buildings - protection against domestic accidents, delinquency, and of the elderly or the sick - and for environmental protection and energy saving. They should increasingly address building-town planning issues and contain typological-morphological indications bearing reference to the overall urban context they belong to.

The regulations must include a number of types: true regulations; manuals; illustrative pamphlets showing examples; abacuses of the possible solutions, materials, green areas, decorative elements etc. Manuals can also include indications (do-it-yourself manuals that are easy for the layman to use) on how to solve problems of maintenance and minor work, that can nevertheless have a considerable overall effect on the surroundings: the creation of gardens, what trees are planted, how often and how to perform maintenance; the facades of buildings; paving.

#### **3.3.1 Relationships between ecosystems and certification of energy supplies**

The *Regolamento Edilizio* must prescribe systemic relationships between the various elements making up the overall work undertaken: overall compliance with the requirements, overall assessment of the energy supply and the quality of the product.

Certification of the energy supply is an essential prerequisite for correct assessment of a building; this is addressed in the EC directive n. 93/76 and is operative, in different forms, in Austria, Denmark, France, Germany and Great Britain, while it has been voluntarily adopted in Lombardy. A description of the parameters for energy supplies could provide a user manual, and a source of information on the efficiency of the energy supplies for potential users of a building.

#### **3.3.2 Incentives and tax duties**

In addition to specifying technical town-planning aspects, incentives and norms for council tax duties payable should be detailed, to encourage safe, energy saving building.

The Tuscan Regional Law n. 41/84 "*Norme per la edificabilità dei suoli*" allows a 1% tax rebate on the cost of building in cases of:

- the use of solar systems and plants for heating and air conditioning;

---

<sup>13</sup> Quatremère de Quincy A. C. (1985) *Dizionario storico di architettura. Le voci teoriche*, (Eds) Farinati V. and Teyssot G., Marsilio, Venice.

<sup>14</sup> Cfr. The *Piano guida* of the Provincia di Firenze, drawn up to safeguard the historical surroundings on the hills. This offers guidelines for drawing up the *Programmi di paesaggio*, experimental tools introduced in the Piano Territoriale di Coordinamento. An outline of this plan is included in *Paesaggio urbano*, supplement to n. 5, 1998.

- the use of load-bearing masonry systems.

Moreover, differences could be introduced in the rates for buildings with energy saving devices and low emission of pollutants.

#### **4. REGOLAMENTI EDILIZI ANALIZED**

An analysis of some recent *Regolamenti Edilizi* is reported below. This intends to list and compare the new contents and new form they are tending to take on, on the basis of the elements they present:

- aim and object of the regulation;
- inclusion of norms for outside areas;
- problems of size;
- methods indicated for work on existing buildings;
- indications of materials and typologies;
- provision of guidelines for planning;
- details on requirements and performance prerequisites;
- energy saving criteria;
- introduction of building certification;
- typology of incentives.

The regulations analysed were enacted for cities belonging to two different regions: Modena in Emilia-Romagna and Florence in Tuscany. The Emilia Romagna region has drawn up a *Regolamento Tipo* (prototype regulation)<sup>15</sup>, while Tuscany has as yet only defined a draft for a *Regolamento Edilizio Regionale* (regional building codes).

The most innovative section of the Emilia-Romagna regulation regards the specifications for performance prerequisites and quality requirements, and their level of compulsiveness.

The analysis of the *Regolamento Edilizio* for Modena yielded very interesting results from various points of view.

All the building and town-planning parameters are referred to and developed in a highly complex case series. Work - building and town planning - on all scales is defined in considerable detail. The work categories range from maintenance to all forms of conservation, transformation and new building, and take into account all types of building work - stable, temporary, agricultural, productive etc. - and the creation of public areas - greens, sports facilities etc.

There are references to bioarchitecture - bioclimatic greenhouses. The requisites for such work expressly regard quality. There are also effective references to outside areas, including not only the surrounding areas but the entire homogeneous zones.

The regulation for Florence has much in common with the one for Modena, especially as regards content: extension of the tools for actuating projects, reports of case series, references to the principles of bioarchitecture. The latter, together with energy saving, are most amply dealt with and emphasised. Another new element is the guide to planning: *le linee guida*. This is a manual, in which the requirements are explained in the form of indications of the possible ways of actuating them and of satisfying the criteria for energy saving. The elements of the design, the maps and technical report, are also described in detail. From this point of view, they provide an example that it is well worth following.

#### **4.1 MODENA**

The *Regolamento Edilizio* for Modena was adopted by the *Consiglio Comunale* (city council), deliberation 116 of the 29 April 1999.

##### **4.1.1 Aims and objectives**

The form of the *Regolamento Edilizio* is based on definitions of the technical and performance requirements, subdivided into buildings and outside areas.

##### **4.1.2 Outside areas**

Outside areas for common use include public areas or those opened to the public, but also, such parts as are visible of private exteriors that have sufficient importance or a position such as to have a significant influence on the image of the city or the surroundings.

##### **4.1.3 Problems of size and standards**

Sizes refer to the net surface covered, not to the volume.

These calculations are exclusive of *superfici accessorie* defined as balconies, terraces, loggias, roof-gardens and other open areas, together with verandas if they act as «bioclimatic greenhouses» exploiting solar energy.

Works defined as *urbanizzazioni primarie*, to which standards are applied (those surfaces that belong by right to public use and that are therefore donated to the Council) includes: pedestrian passages and ways; cycle paths, noise protection barriers, areas for the collection of solid waste; public transport stops.

---

<sup>15</sup> LR. 26 April 1990, n. 33 "Norme in materia di regolamenti edilizi comunali"; Of the G.R. 28 February 1995, n. 593 'Regolamento tipo'.

#### **4.1.4 What the requirements involve**

The technical prescriptions in the building codes are formulated as requirements, in other words they are based on a recognition of the general needs that buildings - and outside areas for public use in urban or even country contexts - must satisfy according to the activities that they are destined to fulfil.

The requirements can be considered as complying with a minimum level or as references to the methodology for attaining the planning aims, in which case the single requirements need not be verified singly. Performance requirements are expressed as general conditions to be fulfilled.

#### **4.1.5 Needs, requirements and technical performance**

Requirements are subdivided into *compulsory* and *recommended*.

*Compulsory* requirements include essential elements as regards resistance, safety, environmental hygiene, usability, accessibility, protection from noise, energy saving, lasting qualities, morphology and management issues.

*Recommended* requirements are those that, although important, are not binding, and approval of the projects and certification of compliance with building norms do not depend on them.

Requirements are classified according to the needs they satisfy and the use the building will be put to. Performance requirements are detailed according to degree of performance, methods for verifying conformity and any experimental trials made.

#### **4.1.6 Requirements and pre-existing buildings**

In cases of work on existing buildings, both performance requirements and contents can be included, that must in any case aim to improve the building.

#### **4.1.7 Technical requirements and performance for buildings**

Building requirements and relative performance are always referred to:

- the use the building will be put to;
- all the environmental subsystems the building is inserted in;
- the building's technological components.

#### **4.1.8 Technical requirements and performance for outside areas**

The requirements and performance for outside areas are always referred to:

- the *Zone Omogenea* (homogeneous territorial zones) the area belongs to;
- the public use the area will be put to;
- all the environmental subsystems the area is inserted in;
- the area's technological components.

#### **4.1.9 List of needs**

For buildings the list of needs is as follows:

- Mechanical resistance and stability
- Safety in case of fire
- Environmental hygiene
- Safety during use
- Accessibility and usability: catering to the needs of children, the disabled or poorly mobile
- Protection against noise
- Energy saving

For outside areas the list of needs is as follows:

- Usability: especially by children and the disabled
- Safety
- Hygiene and environmental quality
- Salubrity
- Lasting qualities
- Management and maintenance
- Recognisability and morphological quality

#### **4.1.10 Technical specifications and relative declarations**

The technical report on the project and the descriptive pamphlet of the work carried out must contain declarations - undersigned by the *Progettista* (designer) and *Direttore dei lavori* (work overseer) - that the required performance levels of the compulsory requirements have been attained. These documents must also indicate the levels attained for recommended requirements, serving only to obtain the quality certificates for private work carried out on the building in question.



## 4.2 FLORENCE

The *Regolamento Edilizio* for Florence was deliberated by the *Consiglio Comunale* on 19 April 1999.

### 4.2.1 Content

The regulation contains precepts based on national and regional norms and compulsory precepts of an essentially local nature, associated with town planning and building problems that characterise the Florentine region.

The regulation is subdivided into chapters that deal with the single aspects and issues.

The requirements are both general - including indications on the use of materials - and specific according to the type of use.

The *Regolamento Edilizio* has appendixes that address specific aspects of the regulations and methods prescribed, norms for energy saving and the forms of incentive offered. The most important of these are:

- Work techniques allowed in the absence of specific plans for protected buildings;
- Guidelines and planning recommendations for efficient energy use and promoting the use of renewable energy sources inserted in existing buildings, in large areas destined for transformation and development, in new buildings and restructuring.

### 4.2.2 Reduction of impermeable surfaces

All new building or restructuring in cities, together with the creation of outside areas - car parks, pedestrian passages and roads - are subject to the precepts for reducing impermeable surfaces.

### 4.2.3 Energy saving, exploiting renewable sources and correct use of energy

Until a specific council plan is drawn up promoting the development of renewable energy sources, energy saving and the correct use of the various forms of energy, the *Regolamento Edilizio* provides prescriptions, addresses and indications on how to act in: *Linee guida per la progettazione* (Guidelines for planning). The use of safe materials according to the *UniBioedilizia* norms is explicitly recommended.

### 4.2.4 Solar greenhouses

The *Regolamento Edilizio* defines those spaces obtained by covering loggias or terraces with transparent glass as solar greenhouses, having energy saving aims. If they conform to the prescriptions given, they are counted as technical volumes.

The specific energy saving aim must be stipulated in the technical report, which must also assess the true energy saving, after subtracting the effect of the sunrays, that can be obtained during the period when the heating system will be turned on.

### 4.2.5 Incentives for experimental projects

Incentives are applied for new plants; for urban restructuring and extensive building restoration, when these operations feature high building quality together with improvement, from the point of view of energy consumption, i.e. when they conform to the criteria listed in the guidelines.

These incentives may be:

- economic: affording a percentage reduction in the concession tax;
- normative: involving the application of corrective coefficients that take into account the greater surface volume required to achieve the same functional purposes.

### 4.2.6 Guidelines and planning advice

The guidelines are formulated to address the strategic aim of planning «sustainable development from the points of view of energy consumption and environmental impact», by means of integrated planning of resources and simultaneous reduction of the absolute and specific power needed ( $\text{kW/m}^2$ ), absolute and specific energy consumption ( $\text{GJ/m}^2/\text{year}$ ) and hence reduction of the atmospheric emissions for the same or better service.

These guidelines establish technical-construction, typological and plant-system criteria for facilitating and promoting the use of renewable energy sources and similar systems for heating, cooling, hot water, lighting, the use of electrical devices, according to the use the building will be put to and its relationship with the city and surrounding territory.

### 4.2.7 Planimetric layout

To certify optimal integration of the site characteristics with the final use the building will be put to, and save energy both actively and passively, a report on the site must be drawn up detailing:

- the physical characteristics of the site: slope, water runoff, the path of the sun in the different seasons, etc.;
- context of the site: adjacent buildings and facilities, existing roads, surrounding panorama, position of the lot etc.;

- any shadow cast by existing buildings on the site or surroundings;
- the trees on or near the site, their position, species, size and conditions;
- direction and intensity of the prevailing winds in the different seasons.

On the basis of the above analysis, the layout of the roads, building lots and single buildings must aim to:

- guarantee optimal exposure to the sun even on the coldest winter day (21 December);
- ensure partial screening of the west facade of the buildings by other buildings or adjacent structures to limit excessive exposure to the sunrays beating directly down in the summer;
- guarantee optimal exposure to the sun throughout the day for all solar energy systems installed, planned or possible (roofs of swimming pools, sports facilities, toilet facilities, and other facilities using a lot of hot water);
- take advantage of the prevailing winds for strategic ventilation/cooling of the buildings and external leisure areas, (squares, gardens etc....);
- provide adequate screening of buildings and external leisure areas from the prevailing winter winds.

#### **4.2.8 Reducing the «heat pocket» effect: work on albedo tree-planting**

The guidelines indicate all those factors that can mitigate and reduce the «heat pocket» effect, by means of:

- controlling the albedo (total reflection coefficient, i.e. over all wavelengths) of paving public areas (roads, pavements, car parks, etc.),
- planning the planting of trees and bushes in such a way as to promote beneficial effects on the microclimate in the area, mitigating summer temperature peaks, creating shade and protecting the buildings and surrounding surfaces from the sun.

The indications regard

- the layout of the buildings,
- the layout of the planted areas – trees, bushes, climbers –,
- the need to set up a system for collecting and reusing rainwater and/or using it to water the planted areas.

Indications on shade are also specified for car parks or road-sides used for parking.

#### **4.2.9 Promoting the use of renewable energy sources in the various building typologies**

In *public buildings* or those used by the public, to satisfy the energy needs it is compulsory to have some recourse to renewable sources or similar systems inserted in the life-cycle of the plant, for heating, air conditioning, lighting and hot water requirements. This use of renewable sources must account for 20% of requirements.

For *new private property buildings*, whatever their use, the use of renewable sources should account for 10% of the energy supply.

For *all categories of buildings*, the technologies to be adopted for using renewable energy sources and for energy saving must be indicated, unless a specific report is enclosed with the plans detailing technical obstacles or lack of economic return to explain why such systems will not be adopted.

The suggestions do not apply if the building has been planned with the aim of exploiting natural or «passive» heating and air conditioning techniques and technologies.

#### **4.2.10 Building Certificates**

The *Regolamento Edilizio* requires a *Registro della Certificazione Energetica Comunale* (Council Registry for Energy Certification), to be instituted for registering all the buildings on the council territory, after meticulous diagnosis of their energy consumption, heating and lighting systems.

This diagnosis must be undersigned and presented by the owner of the building.

#### **4.2.11 Technical Report for presenting plans satisfying the requirements for energy consumption and safeguarding the environment**

The *Regolamento Edilizio* provides a list of items that must be addressed in building plans.

##### *A) environmental factors*

##### a1) area characteristics (map scale 1:2000 -1:200) showing:

- the morphology of the land;
- surrounding built-up areas, specifying distances and heights of the buildings;
- vegetation (trees and their seasonal characteristics favouring shade or sunlight);
- rivers, streams, lakes or ponds (seasonal height and any plans to use them to mitigate climatic conditions).

##### a2) local climatic conditions in the various months or seasons of the year:

- Temperature (in °C);
- Relative humidity ( %);
- Rainfall;
- Ground winds: direction (frequency and mean speed);
- Sunlight.

*B) typological factors*

- b1) features of the complex, and relative distances and layout of the buildings (the shadow typically falling on the days: 21 December, 21 March e 21 June, must be marked );
- b2) position and relative distribution of the residential units and single rooms in the building, referring also to the main use they will be put to;
- b3) distribution, orientation and type of systems for protecting transparent surfaces, relationship of these with the opaque surfaces as regards: exploiting direct sunrays in the winter; protecting against sunrays in the summer; natural lighting.;
- b4) the use of passive solar panel systems for direct or indirect exploitation of sunrays, and their heat accumulation capacity;
- b5) action of the dominant winds on the building structure and shutters and doors, as a factor determining infiltration and draughts in the winter and cooling in the summer.

*C) technical-construction factors*

- c1) the characteristics of the building structure determining what will occur in stationary and variable seasonal climatic conditions, aiming to exploit energy consumption to the best advantage;
- c2) the structural characteristics as regards surface and interstitial condensation, the presence of thermal bridges and the parameters aiming to ensure comfort, such as interior summer temperature, daylight entering the rooms;
- c3) the specific characteristics of the materials and components used, with particular reference to their thermal behaviour (insulation) and their impact on the environment and health (bioarchitecture);
- c4) certificates that the biocompatible materials used conform to requirements (*UNIBioedilizia* Norms).