

# CODES FOR EXISTING BUILDINGS: DIFFERENT APPROACHES FOR DIFFERENT COUNTRIES

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## ABSTRACT

Although all IRCC<sup>2</sup> member countries share a common interest in the development of performance approaches to building regulatory systems their discussions have normally been limited to codes and regulations for new construction. Many countries are however facing a major expansion of the construction activity from new construction to the renovation and transformation of existing buildings. IRCC member countries have undertaken work to better understand how different countries deal with regulations for the renovation or transformation of existing buildings.

This work began with the development of a survey with the aim of collecting key information that will subsequently be analysed and may lead to further study. The survey is addressing a number of key issues with respect to how countries deal with regulations for existing buildings:

- Are existing buildings covered by codes for new constructions?
- Is there a separate code for existing buildings?
- Do codes apply to all types of existing buildings?
- What are the triggering mechanisms for codes to apply to existing buildings?
- Do codes allow for relaxations or lower performance for existing buildings compared to codes for new construction?
- Is the performance-based or prescriptive approach used for existing buildings?
- What level of government is responsible for regulating existing buildings?

Preliminary analysis of the survey results seem to indicate a considerable variety of approaches for regulating existing buildings ranging from strict application of codes for new construction to explicit relaxations and lower performance expectations regarding the renovation or transformation of existing buildings. This survey was developed early in 2007 and IRCC work was still underway at the time of submitting this paper.

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<sup>2</sup> Inter-jurisdictional Regulatory Collaboration Committee is a collaborative of countries engaged in discussions, work and exchange on building regulatory policy issues with focus on the use of the performance concept. It currently consists of 11 countries and welcomes interest from other countries. Current IRCC member countries are Australia, Austria, Canada, China, England and Wales, Japan, New Zealand, Norway, Scotland, Spain, United States. For more information see [www.ircc.gov.au](http://www.ircc.gov.au)

This paper will report on work undertaken by IRCC to better understand regulations for existing buildings in various countries and the use of the performance-based approach in these regulations.

## **PERFORMANCE BASED BUILDING REGULATORY SYSTEMS**

Building regulatory systems around the world are going through dramatic change in response to changing stakeholder needs and political environments. The common element resulting from the changes however is the introduction of greater flexibility for the building code users. This is achieved through the explicit statement of the objectives or goals of the regulations and an increased use of performance-based requirements. This characteristic of these new building regulatory systems is an important feature for those wanting to encourage innovation and the advancement of new technologies. All IRCC members share this common goal and use this collaborative to develop a greater understanding of their different regulatory environments and promote basic principles that they can share and adapt for use in their respective jurisdictions.

### **Priority Issues and Drivers for Building Regulations**

Building regulations have traditionally been well established in most countries to mitigate certain risks for which there is a broad consensus that regulation is the preferred mechanism. The most widely recognized risk-based building regulation issues are those of safety (against fire, structural failure, accidents in the use of a building, etc.) and health (indoor air quality, hygiene, etc.). In most countries it is also agreed that building regulations play an important role in protecting the community from catastrophic losses with requirements to mitigate losses resulting from fire conflagrations and natural hazards such as earthquakes and hurricanes.

Recent years have seen the emergence of new political and social pressures on building regulations to address issues associated to raising expectations for the protection of human rights and of our global environment. These emerging regulatory issues have been recognized in most countries as being those of accessibility to buildings for persons with physical disabilities and those related to the conservation of non-renewable resources such as energy and water. Broader sustainability and climate change issues are also being considered in many countries. Unlike the more traditional risk-based health and safety issues, these emerging regulatory issues are associated to new social aspirations. They do not aim at mitigating losses or harm from certain hazards but rather aim at providing a certain level of social dignity or sustainability for issues of concern to a growing number of people.

Decision to regulate certain aspects of building construction is generally the result of a series of steps that form part of the normal policy development process in most countries. This process aims at limiting to a strict minimum the burden of building regulations and to make use to the greatest extent possible of other available mechanisms. Such mechanisms vary considerably from one country to another but generally include the use

of promotion tools, incentive programs, consumer education, market forces, etc. In recent years however many countries have seen rapidly changing priorities at the political level, characterized by a sense of urgency to act in areas such as climate change, which lead to pressures for the development of new building regulatory instruments.

### **Shared Technical Principles**

The IRCC members recognized that a number of technical principles have been commonly adopted as the fundamental basis of their building regulatory systems.

Traditionally building regulations were set by prescriptive specifications (a door must be a certain width; a wall must have a certain thickness). The key distinguishing factor of the IRCC is the commitment by members to develop regulations for new buildings that are based on functional or performance requirements. Instead of stating what must be built, requirements are given in the form of what function the building must fulfill (functional) or what the building must achieve (performance). While it would be highly desirable that such functional or performance requirements be expressed in quantitative terms and be verifiable by approved methods the reality is that in most countries the functional or performance requirements are expressed in qualitative terms essentially because of the unavailability of sufficient knowledge to determine in measurable terms their performance level.

As the building regulations must be legally enforceable it is quite reasonable, and probably essential, that they be supplemented by guidance that outlines how compliance can be achieved. Such guidance might be performance or prescriptive based and have some form of legal status. However in most IRCC member countries it is only guidance and there is allowance for flexibility in showing compliance with building regulations.

Another point of common recognition is that building regulations shall constitute a minimum level of functionality or performance below which it shall not be possible to build. As such building regulations shall not represent levels to which the industry, society or the general public aspire. It follows that building regulations are concerned only with those issues for which there is a need to regulate for reasons of health, safety or other widely supported social or economic goals (accessibility; resource conservation). It is recognized that issues of appearance and taste are not appropriate for building regulations and are better addressed by planning measures or the market forces.

### **Diverse Legal Practices**

The IRCC members however recognize that the legal, political, social and economic environments may vary considerably from one country to another and that the technical principles adopted as the basis for building regulation systems have been adapted for use in their respective countries.

In most countries responsibilities for setting regulations and for their implementation involve many actors from the central and regional levels. Models vary but there is generally an effort to increase uniformity of regulations within a country through a

centrally developed set of regulations, while allowing flexibility in the enforcement and compliance mechanisms at the regional or local level.

Verification of compliance with building regulations can be achieved in a number of different ways. It can be through public bodies, private companies licensed by the government or by recognized professional institutions. It may also be an assessment of the design or of the competence of the builders and may be performed before the work starts, during construction or before occupation of the building. The common principle however is a legal requirement for independent verification of compliance in some form and at some stage.

Although building regulations cover new buildings there is an application to existing buildings in most IRCC member countries. The application of building regulations to existing buildings varies considerably between countries and is the object of this paper.

## **BUILDING REGULATIONS FOR EXISTING BUILDINGS**

In most countries new construction accounts for a very small fraction of the total building inventory. For some building regulatory issues of key importance there is a need to have a more rapid impact on the performance and quality of the entire building stock, which results in the application of building regulations to existing buildings. We have seen earlier that it is very difficult to develop a common approach to building regulations for new buildings because of different legal practices in various countries. In regulating existing buildings this is further complicated by the huge differences between countries with respect to the age and condition of the existing building stock and also with respect to the cultural and social environment. For example there may be substantial differences between countries on the notion of the rights of a homeowner and regarding societal preferences for preservation as opposed to replacement of old buildings.

The work done by IRCC to better understand these differences and how each country sets its own framework for regulating existing buildings is the result of a survey and discussions on the responses received from eight countries. The questionnaire addressed several aspects of building regulations for existing buildings and the responses revealed that on some aspects the differences between countries - and sometimes within the same country - are such that it is very difficult to report on common principles or practices that are shared by most countries. This paper does therefore concentrate on those aspects of the survey where there appears to be a more common approach among IRCC members.

### **IRCC Questionnaire on Building Regulations for Existing Buildings**

1. Do the building codes or regulations for new buildings also apply to existing buildings?
  - a. Under what conditions? E.g. major renovation, change of use or occupancy, etc.
  - b. What relaxations or alternative measures are used for the application of building codes or regulations for new buildings to existing buildings?
  - c. Is the performance (safety, health, energy, etc.) required of existing buildings similar or less than that for new buildings?
2. Does your country have building codes or regulations that specifically apply to existing buildings? In other words, do you have separate codes or regulations for existing buildings?
3. What triggers the application of codes or regulations to existing buildings? E.g.
  - a. Retroactive date,
  - b. Type of building (e.g. high rise) or occupancy (e.g. hospitals),
  - c. Inspection that identifies unsafe or unhealthy conditions,
4. Regarding the types of existing buildings (e.g. high rise) and occupancies (e.g. hospitals) covered by codes or regulations:
  - a. Could you specify what types of buildings or occupancies are covered by codes or regulations for existing buildings and under what circumstances?
  - b. Do codes or regulations for existing buildings have different provisions depending on the type of building or occupancy? E.g.
    - i. Different provisions for commercial vs. residential occupancies;
    - ii. Different provisions for owners/occupiers of residential buildings vs. provisions for landlords of residential “rental” buildings – occupied by others;
5. Do codes or regulations for existing buildings:
  - a. Address all aspects that are covered in building regulations for new buildings (safety, health, energy, etc.)? If not could you specify what aspects are covered and under what circumstances.
  - b. Require the same level of performance as the codes or regulations for new buildings?
6. What approach is used in codes or regulations for existing buildings? E.g.
  - a. Essentially prescriptive measures,
  - b. Risk based analysis,
  - c. Performance based methods,
7. What levels of government (national/federal, provincial/state, local/municipal) are responsible for the regulation of existing buildings?
  - a. Development and adoption of codes and regulations,
  - b. Enforcement,

## **Trigger Mechanisms**

In most IRCC countries the building regulations for new buildings also apply to existing buildings when there is a major renovation or alteration, an addition or extension of the building and also when there is a change of use of the building (for example the conversion of a building from a commercial to a residential use). This would normally be associated to a requirement to obtain a building or occupancy permit from the local authority. At this point many factors may be considered to determine what portions of the existing building shall be upgraded to comply with current regulations for new buildings. Such factors may include: the size of the building extension and how it is separated from the existing building; the size, condition and use of the existing building; the type of use affected by a conversion, etc. In some countries a renovation, extension or change of use of a portion of an existing building will require the entire building to be upgraded while in other countries only the portion of the building affected by this transformation will be covered by current regulations for new buildings and the rest of the building would not need to be upgraded. In at least one country the required upgrading as result of a building renovation or extension will be limited to certain aspects such as safety from fire and access and facilities for people with disabilities. A change of use may however be a key factor and a conversion to residential units would automatically require the upgrading of the entire building.

In some countries requirements for licensing of certain types of premises (residences for elderly people, liquor permits, large assembly halls, etc.) also constitute triggers for compliance to building regulations, which in most cases will require upgrading of key safety and health aspects of the building.

Some countries have developed separate codes or regulations for existing buildings and the survey results indicate that they may differ substantially from one country to another. In many countries fire safety regulations administered by the fire authorities are in place and apply to the ongoing maintenance and use of existing buildings. These regulations would typically focus on key fire safety aspects of buildings, which may include automatic alarms and fire suppression systems, means of egress, occupant load, fire separation and fire resistance of key building elements, etc. For specific fire hazards these regulations could require upgrading of fire protection measures. In at least one jurisdiction a requirement for mandatory fire risk assessment of all workplaces may lead to the upgrading of certain features of an existing building. In other countries however codes or regulations for existing buildings cover much broader aspects of buildings than fire and may include, for certain types of premises, requirement related to hygiene, indoor air quality, etc. In some countries such broad application of regulations for existing buildings would cause application and verification problems because, unlike fire regulations, the verification regime in place does not offer the framework and expertise necessary to verify compliance for non-fire safety related issues.

Mandatory upgrading regulations have been adopted in some countries to force the immediate upgrading of existing buildings with respect to certain regulatory goals or issues. These regulations may not be tied to any building work or transformation and are

generally administered using an upgrading schedule determined by factors such as age and condition of the building, size and use, etc. Several countries have been using this mechanism to force the upgrading of buildings to provide access and facilities for people with disabilities. More recently this mechanism is being considered or used in a growing number of countries for achieving performance targets in the areas of energy and water conservation and other sustainability related goals. In earthquake prone countries this mechanism is also used to require the upgrading of the seismic resistance characteristics of certain types of buildings when it is determined that their current performance level is below an established minimum threshold. Some jurisdictions also use this mandatory upgrading mechanism to mandate the installation of automatic sprinklers in certain types of buildings.

Through mandatory periodic inspections of certain aspects of existing buildings some countries use a different mechanism to mandate the correction of dangerous and unhealthy conditions and the upgrade of related building components. This mechanism is typically used in critical safety areas through the mandatory inspection of electrical and gas installations, elevators and lifts, pressure vessels and boilers, etc. In one country this mechanism is applied to broader issues and includes the mandatory inspection of buildings for structural sufficiency, general condition and maintenance of the building envelope (for example the water tightness of facades, roof, basements), etc. Upgrading may be required as result of these mandatory inspections and some governments offer financial assistance to the building owner to facilitate application of the regulation.

In addition to regulatory instruments most countries will also use a broad variety of voluntary compliance measures. They essentially aim at encouraging building owners to maintain their buildings in good condition and to voluntarily upgrade certain key building features to help the government achieve their performance targets. Depending on the country this approach can take the form of promoting building upgrades through the development and dissemination of guidelines and education material on issues as diversified as energy conservation, seismic resistance, safety, etc. In at least one country, governments offer financial assistance to building owners to improve the earthquake resistance of existing buildings.

## **Levels of Performance**

Recognizing that it is often impossible to directly apply to an existing building requirements intended for new construction all countries will allow flexibility in the choice of solutions to achieve the building regulatory goals. Where the survey indicates differences between countries is with respect to the performance level of the solutions for existing buildings compared to the requirements for new buildings.

With exception of two countries all respondents reported that there is a clear provision in the building regulations that the performance expected from upgrading of existing buildings does not necessarily need to be equivalent to that for new construction. In other words the performance level required of existing building upgrades may be less than that

for new construction work. These decisions as to what constitutes an acceptable level of performance are often made at local or regional government level. Some countries have developed sets of prescriptive requirements for existing buildings to express what constitutes an acceptable level of performance. In other jurisdictions where a functional or performance based approach is well established for new construction there may be allowance for use of risk assessment and similar decision-making tools to determine the acceptable level of performance of solutions for existing buildings.

At least two jurisdictions have indicated that only certain key aspects of existing buildings – generally those directly impacting occupant safety and health – would require to be upgraded to current standards for new construction and that for the other building components the building regulations in place at time of building construction would be used to govern upgrading work. In at least one country regulations for existing buildings have allowances for relaxations of the schedule of work, meaning that corrective work may be phased over a longer period of time than what would be expected for new construction.

Two countries where the functional or performance approach is well established have responded that the level of performance of existing building upgrades is equivalent to that of new construction work. Such building regulatory frameworks offer opportunity for alternative solutions to be proposed, provided it can be demonstrated that they provide an equivalent level of performance.

## **CONCLUSIONS**

Building regulations have traditionally been developed to apply to new construction. As a growing percentage of the construction activity is with the renovation, transformation, extension and upgrading of existing buildings more countries are engaged in developing regulatory tools for existing buildings. An important aspect of regulation for existing buildings is the determination of the performance level required from building upgrades.

In many countries this is achieved by comparing existing building upgrades to the performance levels required for new construction. A fundamental difficulty encountered is the unavailability of sufficient knowledge to express the performance target of building regulations in quantified measurable terms that can be verified. Developing tools and methods to help develop these performance parameters is essential to the success of this approach.

In other countries the regulations make allowance for risk-based approaches for determining what constitutes an acceptable level of performance. With the rapid expansion of the scope of regulations from the traditional fire and safety issues to emerging social objectives such as accessibility and resource conservation new decision-making tools need to be developed to support this approach.



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