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The New Building Regulations in Japan: Creating Opportunities for High-Tech Wood Products

The New Building Regulations in Japan: Opening Doors for High-Tech Wood

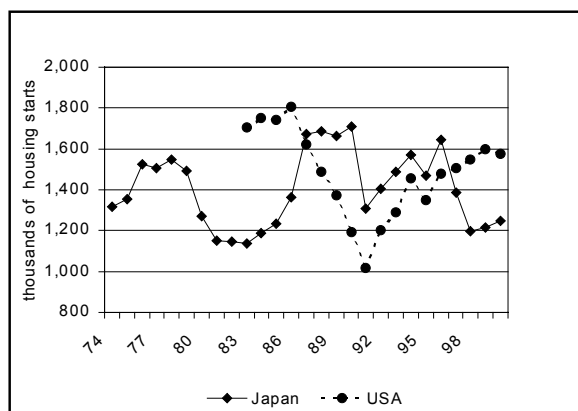
Introduction

In terms of number of housing starts, the Japanese housing market has rivalled that of the United States during the past three decades (see Figure 1). This is despite the fact that the population of Japan is only 126 million people compared to almost 300 million in the US. Despite similar numbers of housing starts in Japan and the US, the average house size differs dramatically. On average, the Japanese house is about the same size as houses in Europe but smaller than those in North America; between 50-60% of the area of a US or Canadian house (Anonymous, 1998a). However it is not just the sheer size of this market that makes it attractive. Japan has a tradition of wood housing and the Japanese people have embraced western styles of house design and construction during the past fifty years. In addition, Japan is only able to satisfy about a third of its own demand for wood from its own forests and the trend is declining harvests and self sufficiency.

The Housing Big Bang

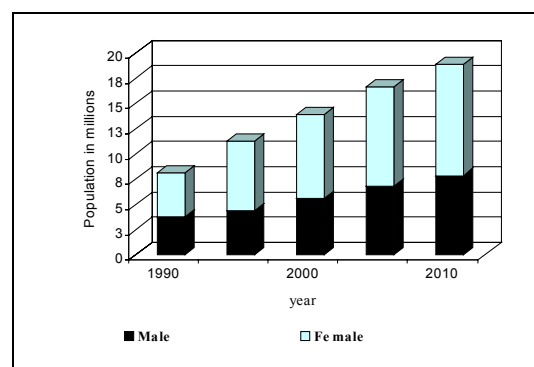
Japan is in the midst of a “big bang” in the residential construction sector driven by both mandatory and voluntary regulatory changes. It is expected that the entire industry structure of the residential construction business will undergo a major evolution due to the changes currently being implemented. These changes are no longer speculation but are rapidly becoming fact. This paper briefly reports on three of the important areas of regulatory change that contribute to the big bang in housing in Japan. The drivers behind these changes are myriad and include the following:

- ◆ the need to improve the quality of housing built in Japan,
- ◆ the need to ensure more structural stability during earthquakes and other common natural disasters,
- ◆ the need to develop more accountability among house builders
- ◆ the desire to ensure consumer choice based on accurate information, and,
- ◆ the need to adapt housing to a rapidly aging population (see Figure 2)



Sources: Japan MOC and National Association of House Builders in the US.

Figure 2: Japanese/US Housing Starts



Sources: Japan Statistical yearbook, 2000

Figure 1: Aging Japanese Population

Three important areas of change are 1) the Government Housing and Loan Corporation (GHLC) requirements for low interest loans initiated in November 1998, 2) a major revision to the Building Standards Law (BSL) and, 3) the new Housing Quality Assurance Law (HQAL) enacted on April 1, 2000. Each of these regulations, manuals or laws is complex and addresses a different aspect of the housing big bang. Table 1 shows the regulatory change, which law or regulation addresses this change most directly and the Japanese government agency or agencies responsible for this regulation or law.

Table 1: Regulatory Changes Leading to Big Bang in Japanese Residential Construction

Regulatory Change	Regulation or Law	Ministry Responsible
Change to how home owners and builders can qualify for government supported low interest and long term loans	GHLC Building Manuals	Ministry of Agriculture Fish and Forestry (MOAFF) and Ministry of Construction (MOC)
Shift from prescriptive building code to performance based building code	Revised Building Standard Law (BSL)	MOC
Improve quality and accountability of home builders to home buyers	Housing Quality Assurance Law (HQAL)	MOC

Adapted from Japan Lumber Journal, 1999-2000

Government Housing and Loan Corporation (GHLC)

The GHLC has been the venue by which the Japanese government has actively promoted the design and construction of new houses in Japan since the Second World War. This organization not only provided financial support through low interest long-term loans but also directed the style and type of house that was constructed. According to Onobayashi (1995), it has been a tool to support government policies regarding social issues (e.g. promotion of the nuclear family since WWII) and practical issues (e.g. encouraging workers to move to urban centres). The GHLC has both fiduciary and regulatory responsibilities. However, many of the GHLC regulations are voluntary since they only are required to qualify for the GHLC approved loan. However, few houses are built in Japan without some financial support from the GHLC resulting in their “voluntary” policies translating to practical requirements.

As of June 2000 the GHLC can provide loans of up to 12.7 million Yen (CAN\$176,000 or 133,000 ECU) for new house construction. Interest rates are low (2.75% per annum) and are fixed for over 70% of the 35 year term. On average, this loan covers the cost of about a third of a new house purchase in Japan (including land) but slightly less in the Tokyo region. For owner built homes the GHLC provides about 45% of the funds with another 45% coming from personal savings and the final 10% coming from banks and other lending institutions. Developers responsible for apartments and the houses built for sale receive about 48% of their funding from the GHLC, 23% from savings and the rest from various sources. From 65-80% of all funds borrowed to build houses in Japan came from the GHLC in 1999 (Anonymous,1998a). The result is that their voluntary regulations are de facto required regulations. The GHLC manuals which detail what criteria must be met to qualify for a GHLC loan were revised in November 1998. These changes were dramatic and have undergone interpretation and updating since that time. There are three classifications for housing: 1) barrier free, 2) energy saving, and, 3) durable. Each classification has detailed prescriptive standards that must be met for a house to qualify.

The objective of **barrier free** housing is to make a house “friendly” in case one of its inhabitants is disabled or has decreased physical capacity. This objective should ensure that the next generation of houses in Japan is suitable for the rapidly aging population and can accommodate the surge of seniors shown in Figure 2. The regulations include specifics about interior opening size, width of passageways, size of bathrooms, type of non-slip floor surfaces, use of handrails and more. Most particulars can be explained as ensuring future houses are easily adaptable to those in wheelchairs or walkers. The specific regulations are detailed in the Government and Housing Loan Corporation Building Manuals¹.

Energy saving houses have a structure that is insulated for heat conservation in accordance with GHLC specifications and standards provided by the MOC Energy Organization. The GHLC specifications provide specific details to meet government guidelines regarding air tightness, ventilation and window performance. The details ensuring energy efficiency are expected to become more rigorous given the existing attitudes of both the Japanese government and consumers towards energy efficiency and global warming. Recent studies have illustrated that the completely airtight house remains a serious problem in Japanese (unpublished research from the Harvard School of Public Health).

Durability is specified for all aspects of superstructure from foundation to wall systems. Included here are durability of individual support members by species group, an increase in the allowable foundation height, improved crawl space and attic ventilation requirements and much more. Specific details are provided in the revised GHLC Manuals. The focus on durability is due to the Japanese concern with stability during earthquakes after the Kobe quake of 1995. No loan will be issued by the GHLC unless the house design and construction will meet the durability guidelines.

To qualify for the standard GHLC loan the house must qualify as both durable and barrier free or both durable and energy saving. It is clear that durability is of prime importance. This is shown in Figure 3. There are both mandatory and recommended practices necessary to qualify for each of the three standard loan criteria. These may need to be adjusted due to regional conditions. For example there are adjustments for the North Island of Hokkaido and a cold climate. While only the mandatory requirement must be met to qualify for loans, in the future the more rigorous recommended practices could become the revised mandatory requirements. It is very important to note that these regulations apply to all house construction including traditional post and beam as well as 2 by 4.

The increased performance requirements not only for the design and construction of houses but also for material selection will open the door to higher quality wood products. Wood is the primary material for single family residential construction and the most used material for all construction in Japan (see Figure 4). To meet many of the stability requirements detailed in the GHLC building manuals, the existing trend towards engineered wood products and kiln dried wood will be accelerated (Gaston, Cohen & Fell, 2000). Previous studies have already indicated the growth potential of engineered wood products among builders in Japan (Cohen, 1993; Cohen & Gaston, 1998). The new GHLC manual will increase the rate of adoption and create opportunities for additional new high tech wood products.

¹ Much of this information is derived from various articles in the Japan Lumber Journal and a translation of Japanese Government Housing Loan Corporation Building Manuals. The Council of Forest Industries, Vancouver, BC, has translated, published, and sold manuals in Canada.

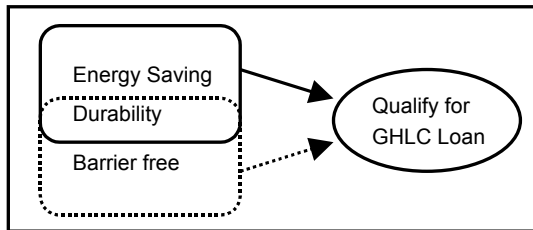
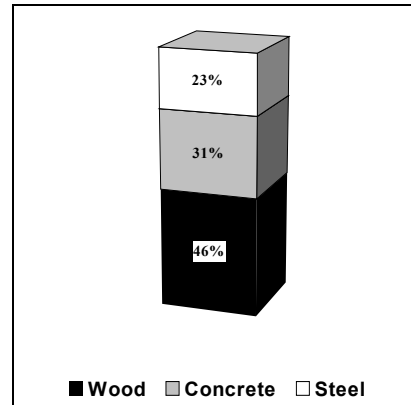


Figure 3: Qualifying for GHLC Loan



Source: Japan Statistical Yearbook

Figure 4: Structural Material in House Construction in Japan

Revised Building Standard Law

For the first time in fifty years, Japan has introduced significant revisions to the Building Standards Law (BSL) of Japan. These revisions are a fundamental component of the Housing Big Bang that is creating so much uncertainty among the building industry in Japan. While dramatic change in industry structure is expected, exactly what this change will be is a matter of speculation.

The most significant change from the previous BSL is the move from a prescriptive-based building code system to a performance-based one. This shift was influenced by the Great Hanshin Earthquake of 1995 and reinforced by recent problems with builder/contractor bankruptcies. The move to the performance-based BSL of 2000 is very much directed toward the protection of the homeowner and a shift of responsibility from government to builder.

Building codes and standards have historically been prescriptive. Rules are developed that create “recipes” that must be followed to ensure adequate safety due to structural integrity, fire resistance, durability or serviceability. Experts determine which rules will guarantee adequate performance. These rules then form part of the detailed building codes, which cover every aspect of building. Builders concern themselves with meeting these minimum requirements and site inspections ensure that they are following the “recipe book”. If the recipe fails the fault lies with the regulation and not the builder. Performance-based codes and standards outline how a building or component should perform without detailing how this performance is to be achieved. To fully understand the distinction, consider the example of fire safety, an objective common to all housing codes. A prescriptive code would specifically state what can or cannot be used for materials in a wall assembly. A performance-based code would state something like the wall must be able to contain a fire of a certain temperature for a certain period of time. The engineers, architects and designers would then decide how this performance is met. If the building does not perform the fault lies with the builder and not with the regulations. Performance based codes, in theory, allow more innovative solutions to performance difficulties (Foliente, 2000).²

² Much of this paragraph summarized personal communications with Dr. Chris Gaston, of Forintek Canada Corporation.

The main points of the revisions to the Building Standard Law of Japan are: (adapted from Anonymous, 1998b):

1. *To rationalize the content of building regulation by shifting from a prescriptive code to a performance-based code.* This means that there is more freedom to try innovative building systems and high tech materials as long as their performance meets the criteria set out in the revised BSL. Section 37 will allow for foreign testing agencies to approve materials and systems concerning their performance. The details of how an organization becomes an accredited foreign testing agency are not yet finalized. This process has the potential to create non-tariff trade barriers as well as open up the Japanese market to increased high tech foreign building materials and components. Only time will tell whether the intent to open up the market is implemented or subverted to protect domestic suppliers.
2. *To rationalize building confirmation procedures by increasing the number and rigour of onsite building inspections and consigning them to private organizations.* Japan has significantly fewer building inspectors than other developed nations. For example Japan has only 5.8 building officials per 100,000 of population compared to 25.7 in the United States. Since changing regulation does little good unless these changes are put in place during construction, there is a well-defined need for additional inspections during construction. The decision has been made to use private inspectors rather than increase the state building bureaucracy. This requires the development of a building support infrastructure outside the direct control of the government. It will require significant training and the establishment of guidelines to certify private organizations to ensure similar standards in all regions of Japan.

The BSL does require interim on-site building inspections, which are detailed in other pieces of legislation. There has been an attempt to revise the BSL so that it will not require further modification. The details to achieve some of the objectives stated in the BSL are included in other pieces of legislation which could be revised with much less time delay or need for broad consultation. In fact most of the protection for the consumers has been relegated to the Housing Quality Assurance Law discussed in the following section.

The shift to a performance based building code opens the door for more innovative, high tech wood materials as well as building components. It is still too early to determine exactly how this opportunity will present itself, however, there will be significant opportunities for high tech wood materials which can prove their engineered performance characteristics over time.

This far-reaching law was enacted on April 1, 2000. There are three important parts of this law. The first aspect is the requirement for interim and final building inspections leading to a mandatory 10-year warranty. The second aspect requires a completion guarantee for all new houses being constructed. These two are mandatory requirements for all houses being constructed in Japan. The third aspect is not mandatory but will most likely become a market necessity rather than a legal requirement. The HQAL encourages the use of voluntary performance measures for new house construction. Each of these three aspects will be discussed below.

Mandatory 10 Year Warranty

The HQAL requires homebuilders to provide homebuyers with a 10-year warranty on all new houses built in Japan. This warranty must cover the house against structural defects and poor durability where durability refers to the longevity of the house. Included in the definition of low durability is rain penetration into the structure. This is a global problem in residential construction and Japanese authorities are being proactive in trying to prevent this problem as they move towards air tight housing. Homebuyers may make a claim against the homebuilder if the during the first ten years after construction the house does not meet a specific set of criteria. These criteria are still being finalized but should be available very soon. Unlike the revised BSL, they will be prescriptive rather than performance based. An example of the detail of one of the prescriptive standards would be that a floor should not have a slope exceeding 6 per 1,000 or the builder would have to make the floor level. The homeowner could make a claim anytime within the first 10 years should this requirement not be met. Because this is the first such warranty in Japan there are no mechanism in place to resolve disputes that arise between homebuilder and homeowner.

The bureaucratic nature and tendency for the Japanese to avoid confrontation contributed to few claims under a previous and limited 10-year warranty. Many homeowners preferred to live with the problems rather than enter a protracted and often confrontational process for redress. To ensure improved consumer service the HQAL includes the establishment of a mechanism for resolving disputes. The HQAL provides the authority to set up Alternative Dispute Resolution (ADR) bodies. These will be established in each prefecture in Japan to settle disputes arising from this new warranty. Their goal is to reconcile differences between homeowners and builders during the 10 years that the warranty is in effect. By using alternative dispute resolutions, the cultural propensity to avoid confrontation should be alleviated.

Each ADR body will be staffed by lawyers who will use the “Judgement Standards for Defects” to determine whether a defect is sufficiently severe to require correction or compensation. These standards are prescriptive in nature. The purpose of these detailed and prescriptive warranty standards are to create a national benchmark of quality for housing. This benchmark would apply to all houses regardless of construction method or material. The warranty resolution criteria will create a means for homeowners to have these standards met and provide a mechanism to improve houses below the prescribed quality benchmark. Similar to the GHLC, the HQAL is a means of improving the quality of residential construction without the appearance of undue prescriptive regulation in the Building Standard Law. It also allows changes to these standards without the typically onerous and time-consuming process of changing the building law itself.

Housing Completion Guarantee

Much of the new house construction in Japan is rebuild³. Small builders construct many of these. In fact there are over 100,000 small builders that construct less than 5 houses per year and over 70% of all single family housing starts are built by contractors who build less than 100 houses per year (Japan Lumber Journal Oct.15/99 pp 1). The Asian economic crisis of 1997 resulted in an unprecedented number of bankruptcies of small businesses. Many

³ In 1999 43% of all new starts were rebuilds according to the MOC of Japan.

of these small businesses were komuten (i.e. small traditional house builders) unable to secure loans from the banks who overreacted to the criticism of sloppy loan policies by halting all new loans for a period of time. This caused some of the small builders to go bankrupt while building houses for homeowners.

In Japan homeowners pay the builder prior to completion of each construction activity. The owner pays one third prior to the start of construction, a further third after walls are framed and the final third upon completion of the house. Tightened credit combined with the more than 25% reduction in housing starts from 1996 to 1998 caused many small builders to go bankrupt leaving consumers in a triple bind. Consumers had 1) partly finished houses, 2) outstanding liens on building materials, and, 3) increased construction costs to finish the construction job.

To prevent this situation from reoccurring there is a provision in the HQAL that protects homebuyers against the default or bankruptcy of the builder or contractor through the Completion Guarantee System. This system will provide homeowners with insurance so that if their contractor or builder goes bankrupt there will be sufficient funds to complete construction of the house. The legislation provides no prescribed method indicating how builders are to offer this insurance. Larger builders are of sufficient financial strength and size to offer this insurance on their own. However, for most of the small builders several new approaches are needed to provide both the 10-year house warranty and the completion guarantee. Since this law is just being introduced in 2000, new approaches are still being developed. To date the financially stable builders can access a variety of schemes to provide insurance. Building material and product wholesalers are offering insurance to selected small builders, large builders are offering franchise opportunities to some small builders and pre-cutters are banding together in order to offer insurance and security to selected small builders. However not all small builders will qualify and a significant restructuring of this important segment of the residential construction sector in Japan is expected over the next few years. This assumes that the government does not react to increased unemployment of the small builders by offering this insurance to all regardless of construction quality or financial stability.

Impact of Mandatory Warranties and Guarantees

There will be significant impacts due to the required 10-year warranty and the completion guarantee. To protect themselves builders are selecting higher quality and better performing materials for construction. This trend is already reflected in the dramatic increase in use of dimensionally stable kiln dried lumber and glue laminated posts and beams in house construction. This trend is also reflected in increased domestic kiln capacity that still falls far short of satisfying Japanese domestic demand for kiln dried material. This has led to a dramatic growth in the import of kiln dried lumber from Europe and a desire for more uniform and stable structural components.

It is expected that as warranties and guarantees are required from builders, they will require the same from their suppliers. Builders as well as distributors will be looking to push the warranty and guarantee responsibilities onto the suppliers of both building materials and products. Just recently a new consortium of pre-cut mills has developed a warranty system against defects which will be running in October 2000. Opportunities for high tech wood, which due to its design and manufacture can provide performance guarantees, will be in great demand in Japan as long as price does not prohibit their use.

Voluntary Performance Indicators

The HQAL also provides for the voluntary “Housing Performance Indication Standards”. They provide a set of standards for nine indicators against which the performance of specific houses can be compared. The overall objective is to provide consumers with an unbiased means of comparing houses based on nine important criteria that are measured in the same way by all builders. The nine performance indicators and a brief explanation of what is being measured are shown in Table 2.

Table 2: Nine Performance Indicators

Indicator	explanation	Indicator	explanation
structural stability	earthquake-proof, loading, foundation	air quality	ventilation & formaldehyde
fire safety	fire spread time, heat sensors, escapes, etc.	light environment	ratio of exterior openings to wall area
durability	decay & deterioration	acoustics	insulation for noise, transparency loss, etc
ease of maintenance	ratio of common pipes to common pipes	barrier free design	convenience for elderly & physically impaired
energy efficiency	insulation, window types, etc.		

Adapted from Japan Lumber Journal, Jan 31, 2000.

The Ministry of Construction has developed specific measures for each of the nine indicators. These are technical measures that have only recently been published. A house would be ranked on each measure based on its performance. To rank at the highest level for each of the nine indicators would be cost prohibitive. For example, in March 2000 durability was defined as the expected longevity of a house based on decay and deterioration of the structure. There were three performance levels representing longevity due to durability: 1) less than 50 years, 2) 50-75 years, and, 3) over 75 years. All of these, even the lowest, represents a longevity far greater than the current average life span of a single family dwelling in Japan which is between 20 and 30 years depending on the region⁴.

Private evaluation bodies will determine which houses meet which levels of each standard. This is expected to require building inspections during the foundation stage, framing and finishing. Houses that are judged to meet or exceed a specific level in the performance indication standards will receive certification as a “Performance Recognized House”. This will allow the builder to substantiate their claims and differentiate their houses from the competition. The HQAL also provides for manufacturers of building components that meet the performance standards to become certified as “Authorized Manufacturers of Performance Components”. This opens the door to high tech wood building components that can be evaluated based on the nine performance criteria.

One of the most important aspects of the nine performance indicators is the ability to segment the Japanese housing market based on performance criteria. It should facilitate the export of higher valued, more high tech materials by being able to identify who would be willing to pay the premiums for specific performance attributes.

⁴ In Japan two of the three most important reasons for replacing a house are to change style and to increase size. Thus many potentially durable houses are being replaced. This performance indicator evaluates longevity due to durability only and is not an accurate surrogate for overall house longevity.

Summary

The residential construction industry in Japan is undergoing dramatic change instigated by changing regulations. All of these changes provide a dynamic situation, which can lead to new opportunities for the increased use of high tech wood products that provide clear performance characteristics. Changing regulation is requiring increased clarity and assurances regarding the performance of materials, building components and housing systems. High-tech wood products provide many of these performance benefits at very reasonable costs. Requirements that place more responsibility on homebuilders will also generate increased interest in high performance, high-tech wood products. Performance required by these new regulations, both mandatory and voluntary, can often be engineered into the development of high-tech wood products creating a valuable competitive edge to the Japanese builder during these changing regulatory times.

However, the situation is far from stable and constant monitoring and observation is necessary to ensure the opportunity of this two-edge sword is explored without incurring the threats of the other edge. The negative aspects of these changes could include additional non-tariff trade barriers, a regulated preference for Japanese materials and products and a lack of implementation or enforcement on a national basis. Overall, the new building regulations in Japan are creating opportunities for high-tech wood products at an unprecedented –rate.

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