Movements of the Environmentally Symbiotic Housing Theory and Practices in Japan

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1. BACKGROUND

1.1 Beyond the "Scrap and Build" Housing

During the last decade, the Japanese building industry has maintained an average construction level of approximately 1,400,000 dwelling units per year (**Fig.1**). These homes have an average lifespan of 30 years (**Fig.2**), a significantly short period of usefulness compared to European or American average. This is however not surprising for Japanese, because the lifespan of urban timber houses used to be very short due to frequent fires or to the natural disaster caused by typhoons and earthquakes.

A historian of lifestyle reported that the expected lifespan of timber townhouses in Edo Era (former Tokyo during 1600-1868), was as short as merely 3 years in average (Sugiura, 1998), according to accounting reports of carpenters. However, they had a very quick and prefabricated rebuilding system through forestry-timber manufacturing and supply industry within a cyclical eco-system（Ishikawa, 1997）. That could only be possible due to totally natural materials of houses, produced and supplied by the local industry in the adjacent regions.

Such tradition of wooden houses could be a reason of the short lifespan of housing in Japan. In addition, other post-war social and administrative systems, including housing loan, pricing and tax system on real estate, and the extremely high inheritance tax (max:70%), have been the major incentives to demolish the houses before they reach their potential lifespan. The result is the quite high proportion of new construction (55%) to renewal (45%) in terms of floor area built per year in 1990 (**Fig.5**). Therefore, the industry's massive output is largely dependent upon what has been called the "scrap and build" attitude.

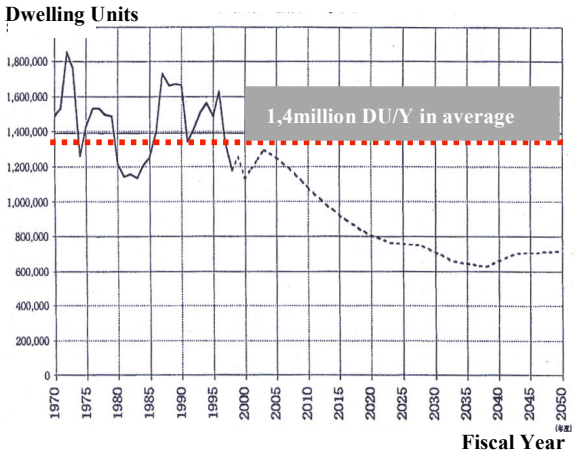


Fig.1 Annual New Construction of Dwelling Units in Japan (Mitsubishi Research Institute)

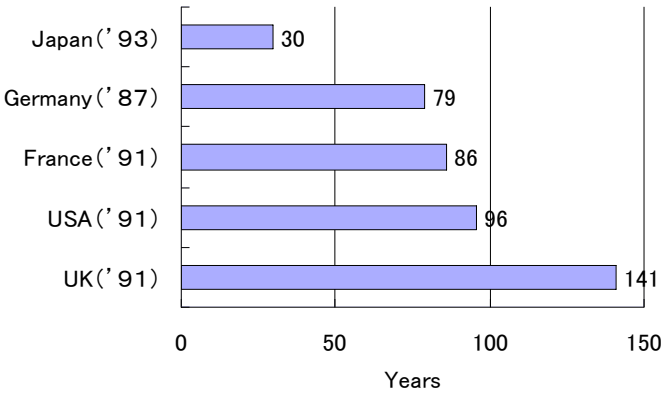


Fig.2 International Comparison of the Average House Life Spans (Management & Coordination Agency, 1993)

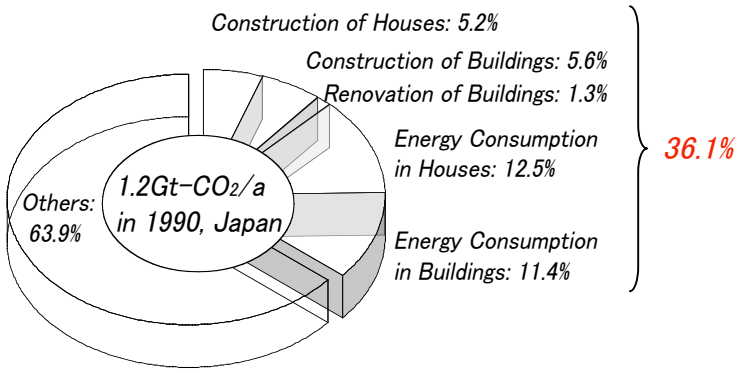
1.2 Housing and Global Environmental Issues in Japan

While this rapid rate of housing production has been an indispensable propeller of the post-war Japanese economy, it has been a source of grave problems as well. These problems include the consumption of large amounts of energy and natural resources, over 90% of which are imported from abroad, during the whole lifecycle of housing (**Fig.3**), and the resulting minced and mixed disposal of demolished houses, unable to put into the material recycling process. These were scarcely recognized as environmental issues until the beginning of the 90's, when the global environmental problems became an internationally political issue, which Japanese government could not overlook anymore.

1.3 Problems of Housing Quality

It is true that post-war Japanese housing production has developed very rapidly both qualitatively and quantitatively. However, the following qualitative aspects of housing bring to light the many issues still to be coped with in this country.

- Lager size of a dwelling unit (Governmental guideline for a household of 4 person: 72㎡)



CO_2 emissions were assumed using the 1990 Input/Output table of Japan (T.Ikaga)

Fig.3 CO2 emissions by construction and operation of houses and buildings in Japan

- Longer durability and better adaptability according to the site's and residents' requirements
- Appropriateness of housing techniques according to the regional and residents' conditions
- Health and comfort of the indoor as well as the outdoor
- Improvement of town-scaping and natural landscaping
- Costs of measures related to the above

Japan has been facing a decade of economical recession, and the demographic forecast shows a drastic decrease of population after 2007(**Fig.4**), that will bring far less demand for new building construction works in Japan in long term as shown in **Fig.5**. Such situation will automatically create national demand for high-quality housing that deals with the above mentioned issues.

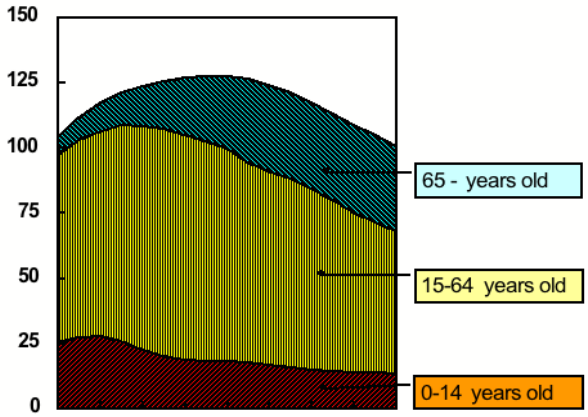


Fig.4 Assumption of Japanese population

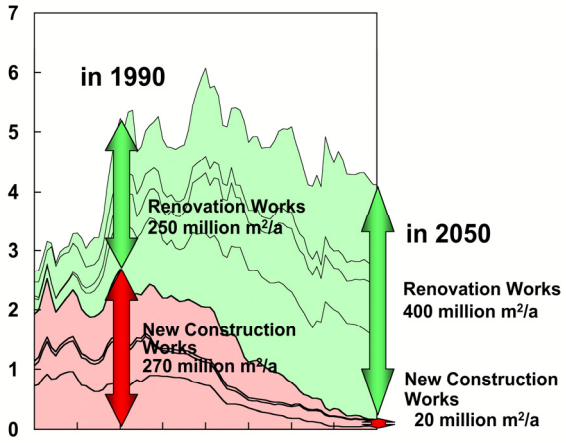


Fig.5 Decrease of new construction Works by floor area (T.Ikaga, S.Murakami, University of Tokyo. 1999)

1.4 Towards Sustainable Housing and a Sustainable Society

It is, therefore, the responsibility for all the stakeholders, involved in housing production, distribution, construction and use (including clients, owners, developers, users, authorities, designers, industry, contractors, maintenance organizations and institutions for education and training), to be aware of the environmental problems confronting housing and community development for a sustainable society. At the end of the 80's in Japan, there arose a tendency of thoughts to recognize the necessity to come up with all these issues of resource, energy, immediate loadings, health & amenities as a comprehensive environmental issue to support for the creation of a sustainable society. The former Ministry of Construction took a strong initiative to guide this tendency towards creating a new national policy, under the banner of "Environmentally Symbiotic Housing (ESH, hereinafter)".

1.5 Movement of the Environmentally Symbiotic Housing

Having foreseen such a state of affairs, in 1990, a group of professionals and firms from public and private sectors joined forces, first functioning as a research body then as an organization for the promotion and realization of ESH from north to south in Japan. For six years it studied, from a wide variety of approaches, technologies and organizational systems that help address problems in housing and community development. National subsidy schemes set up during this period has helped to carry out over forty projects around the country. These are primarily projects by public corporations and independent groups, with the completed works playing an important role in furthering the understanding and experiencing ESH. Among those, the FUKASAWA Symbiotic Housing Complex is the most successful and symbolic project that was planned and implemented during this early stage (**Fig.6**). And recently, a complex of 50 public housing units on a sub-tropical island, Yakushima, has been built under the banner of ESH in South (**Fig.7**).

1.6 Development of the Movement

This movement has already 12 years experiences and has been run by the Association of Environmentally Symbiotic Housing (URL=**http://www.kkj.or.jp**) since 1997, uniting member groups of diverse business types and conditions, design methods, construction techniques and marketing methods. Whether involved in the planning, design, production, marketing, or maintenance of housing and community, member groups share a common destination that is to investigate, propose, create, and evaluate ESH and related methods, systems and attitudes. In cooperation with the Ministry of Land, Infrastructure and Transport, as well as with the related Institute of Building Environment and Energy Conservation (IBEC), the labeling and evaluation guideline of ESH was established in March 1999 (**Fig.8, Table 1**). Since then, more than 80 types of houses and housing complexes have been evaluated and labeled.

2 DEFINITION AND OBJECTIVES OF ENVIRONMENTALLY SYMBIOTIC HOUSING

According to the official definition, set by the Ministry of Construction in 1991,

> *an Environmentally Symbiotic Housing shall be developed from the standpoint of preserving the global environment by conserving energy and resources, while reducing waste at the same time.*
>
> *It refers not only to housing itself, but also to the surrounding local environment. Its next goal, therefore, is to exist in harmony with both natural and man-made surroundings, as well as to provide residents with amenity-rich healthy life, thus encouraging them to participate in construction process, and then taking care of the environment.*

The following three basic objectives must be realized to achieve Environmentally Symbiotic Housing：

A) Global Issue: Protection of the Global Environment (*Low Impact*):

This includes energy and resource conservation and minimum waste production in various ways and upon various levels. Especially energy and resource consumption of the building construction and operation should be promptly minimized to meet the COP3 requirements. Such activities already have some part in most people's daily lives, but they should be organized on a neighborhood and regional scale as well, and be thought about and practiced by every resident. The huge amount of concrete rubble produced when buildings are demolished, is an example of building waste that must be recycled. Such recycling should not be planned case by case; in order to achieve a significant difference, it must be established as a social system.

B) Local Issue: Harmony with the Surrounding Environment (*High Contact*)

The etymology of the word "landscape" suggests not only the beautiful scenery of a location, but its condition in every sense, including its climate, its geography and the organisms that inhabit it. Building ecology reveals the relationship among the human beings, the building and the environment as a whole, for the sake of creating the best balance of human habitat. Therefore, it is essential to investigate environmental elements such as light, wind, water, earth, and organisms, and to apply the findings to development decisions. In other words, development should be appropriate to the history, landscape, and inhabitants of the site and its surrounding area. This will influence, too, the kind of community to be created there for a sustainable society. This issue should be a top priority of the country's policy to be implemented.

C) Residential Issue: A Healthy Residential Environment with Amenity (*Health & Amenity*)

Since the mid 90's, the relationship between housing and residents' health has become a serious social issue, due to toxic chemical stuffs used in indoor building materials and components. These brought houses the risky potential, especially within indoor spaces that are increasingly airtight. The air-tightness of housing had never been the issue in the building history of Japan, where the openness for summer's hot and humid climate was the top priority, and the idea was brought from North America to cope with energy saving for heating. Without actually noticing it, our homes may produce chemical substances, mold, and dust linked with allergic reactions as eczema. The elderly, the handicapped, infants, and housewives, who spent the longest hours at home, are especially at risk. Closely related to health is the idea of "comfort", with light, temperature, humidity, and ventilation being some of the issues that need to be reexamined as well.

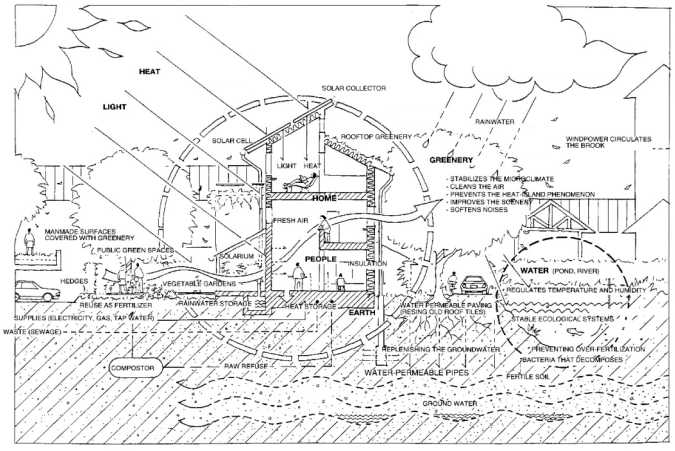
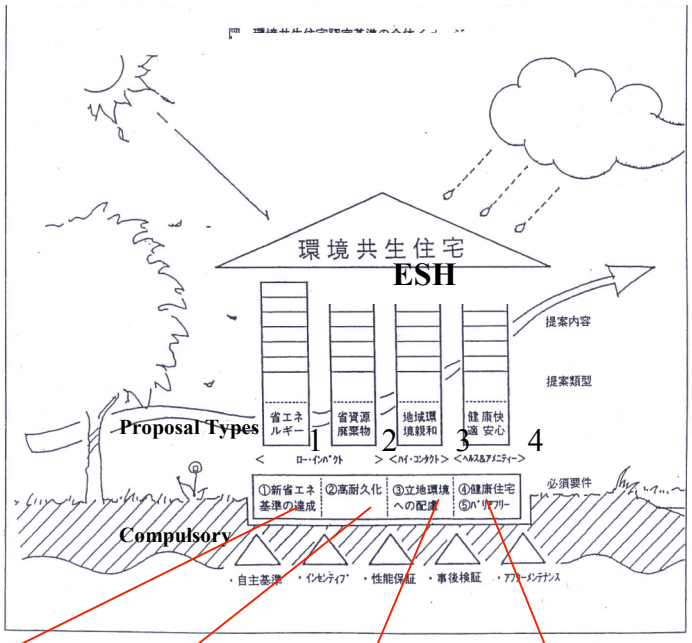


Fig.6 Holistic Image of Environmentally Symbiotic

Fig.7 Yakushima ESH

Fig.8
Structural Image of
the Environmentally Symbiotic
Housing Evaluation Guideline
(Iwamura, 1998)



To be labeled as ESH, it shall meet first every compulsory performance requirements, and at the same time, shall be provided with higher performances of at least two proposal categories, shown as the columns in **Fig. 6.** The submitted proposals are to be evaluated and judged by the committee of experts, according to the guideline.

Table 1: The Basic Frame of the Environmentally Symbiotic Housing Evaluation Guideline (as of 1999)

Proposal Types	1.Energy Saving	2.More Effective Use of Natural Resources	3.Compatibility and Harmony with the Local Environment	4.Health and Amenity – Be Safe and Feel Safe
Proposal Contents as Examples	1) Greater efficiency in reducing heat losses 2) Greater efficiency in controlling solar radiation capture 3) Passive use of solar energy 4) Active use of solar energy 5) Efficient use of unused energy 6) Use of highly efficient equipment 7) Miscellaneous	1) More durable skeleton 2) Structural and building methods for flexibility 3) Low emission 4) Active use of recycled building materials 5) Highly effective use of water resources 6) Sorting of household wastes 7) Miscellaneous	1) Better harmony with the local ecological system and environment 2) Greater consideration for the natural water system of the area 3) Greening efforts 4) Creating rich buffer spaces between indoor and outdoor 5) Greater consideration of townscape 6) Integration of the local culture and regional industry 7) Miscellaneous	1) Through universal design both indoors and outdoors 2) More suitable and adequate ventilation 3) Through choice of safe and eco-materials 4) High sound insulation efficiency 5) House performance guarantee though ongoing property management 6) Information services on housing 7) Miscellaneous

	Low Impact		**High Contact**	**Health & Amenity**
Compul-sory Perfor-mances	(1) Conformity to the Energy-Conservation Standard as of 1992	(2) Long-life Durability; Conformity to the GHLC* Standard as of 1998	(3) Consideration regard-ing the surrounding envi-ronment	(4) Conformity to the guideline for indoor air quality (5) Conformity to the barrier-free design stan-dard of GHLC*

*GHLC=The Governmental Housing Loan Corporation

Source: Institute for Built Environment and Energy Conservation, 1999

3. IN CONCLUSIONS

When housing is thought about from the vantage point of symbiosis with the environment, the problems that plague modern housing – and architecture in general – become obvious. Along the path of progress, we have thought fit to discard or forget the traditional ways of living that were based on biological knowledge. These methods were in fact protecting the richness of the environment, supporting the continuity of peoples' lives through the preservation of ecological balance. While solving these problems in one sweep would be an overwhelming and difficult task, it is important to start with things we can do in our immediate surroundings.

In the aftermath of the Great Hanshin Earthquake, when we heard of how the victims reacted to this hitherto unthinkable disaster with spontaneous, local cooperation, we were made to recognize how important it is to build not only large-scale systems, but also smaller, independent systems of energy and water distribution. It showed us, too, in a extremely striking way, the true meaning of "living together" with our neighbors, and the importance of maintaining strong ties with each other. When a neighborhood is created through participation by all the residents, such relationships could develop and flourish. In order to realize a sustainable society and development, the element of human relationship is impossible to ignore. This is one of the most meaningful cultural aspects of the Environmentally Symbiotic Housing.

The issues concerning ESH touched on above are not extraordinary in themselves. They are basic ideas from which most discussion on housing and neighborhood start. It is time to use these ideas, reconstructing our techniques, administrative systems, and attitudes accordingly.

4. REFERENCES

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