

Changes in renovation policies in the era of sustainability

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ABSTRACT

The objective of this study is to review how renovation policies are changing, and what political strategies have guided the promotion of housing renovation in the era of sustainability.

In this study, renovation policies were compared and analyzed with emphasis on: (1) improvement of physical performance, (2) correspondence to the needs of the elderly, (3) improvement of energy efficiency and, (4) social cohesion and area revitalization.

These are the political objectives of renovation that recently emerged as social issues in France, Germany, Denmark and Sweden among European countries that actively conduct renovations.

First, Section 2 reviews various social issues relating to existing housing and the objective of promoting renovation. Section 3 describes changes in the role of renovation policies with a focus on changes in financial supports. Section 4 performs a country-by-country cross-analysis of the objectives of renovation and the characteristics of policies promoting renovation. In Section 5, policies designed to promote housing renovation are classified into extension type, individual type, combined type and integrated type depending on the renovation objectives, and the characteristics are identified. In the summary, Section 6, suggestions for policies in the field are proposed.

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1. Introduction

1.1. The background and objective of the study

Reuse of the existing housing stock in European countries is increasingly becoming a primary concern of European housing policy and practice because the annual production of new dwellings amounts to only about 1% of the housing stock [1].

However, changes in the social environment are changing the objectives of housing renovation policies in the era of sustainability. Though the intrinsic objective of improving housing quality remains the same, the political objective of renovation is changing little by little. For instance, in the past, when deterioration of housing quality became a social problem, improving the physical performance of housing by upgrading structural performance and maintenance was the main objective of renovation. However, since the 1980s when national welfare emerged as significant issue, improving housing for the elderly and the disabled became the main objectives of renovation policy in some countries.

In cities and countries that were experiencing social segregation, housing renovations were utilized as the main means for

integrating people into society. Also, in cities that were experiencing localized economic depression, housing renovation was utilized as a measure for local activation. Recently, as the issue of climate change has drawn increased attention, the improvement of energy efficiency in existing buildings has emerged as a priority issue.

Of course, the objectives of promoting renovation depend on the circumstances of a particular country or society. However, political, social and environmental issues are combined in most modern cities, and it is clear that housing renovation is an important element of solutions to these varied urban problems. Deliberate policy strategies are required to solve social problems related to existing housing. Hence, this study is intended to review how renovation policies are changing policies in the Era of Sustainability, and to identify strategies for housing renovation that are designed to promote a variety of political objectives.

1.2. The scope and method of the study

The countries compared in this analysis of housing renovation policies are France, Germany, Denmark and Sweden. They are:

1. countries with ratios of new construction in total stocks that are less than 1.5% (see Fig. 1),
2. countries with ratios of investments in existing stocks that are more than 50% in total amount of housing investment (see Fig. 2), and

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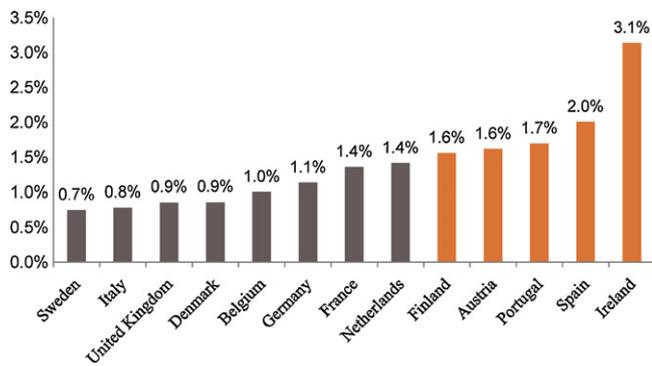


Fig. 1. The ratio of new construction occupied in total stocks.

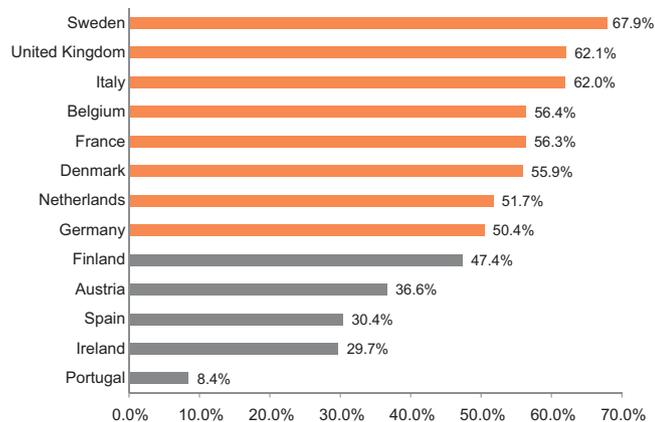


Fig. 2. The ratio of house renovation investment occupied in total houses.

3. countries that show high ratios of public investment for housing renovation (see Fig. 3).

We have arranged the objectives of renovation through a survey of existing studies [2–6] in Table 1A. The shaded portion of Table 1B indicates the fields where such renovation objectives were actually surveyed.

In this study, policies are compared and analyzed in fields that can be compared among the countries surveyed. Particular emphasis is placed on the following social issues:

1. improvement of physical performance,
2. correspondence to the needs of the elderly,
3. improving energy efficiency, and
4. social cohesion and area revitalization.

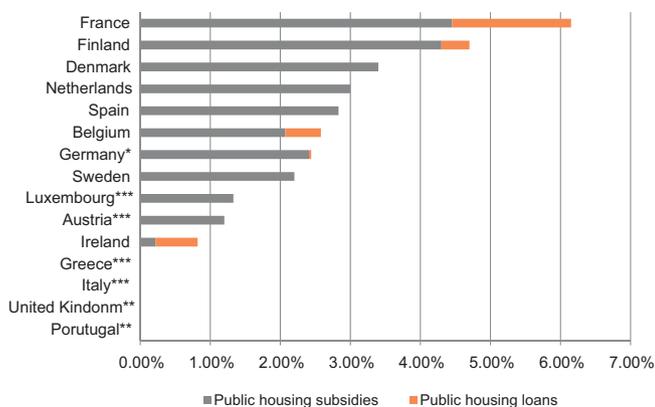


Fig. 3. Public housing support in % of state budget.

The methods used in this study include literature review and interviews with relevant organizations in each country. Literature review was used to gain an understanding of how existing policy measures were designed and implemented, and policy data were analyzed. Policy changes and specific policy measures were also surveyed through local visits and interviews with relevant researchers and policy makers.

2. Objectives of housing renovation policies

In this section, we identify the main political objectives and interests that drive public intervention in housing renovation in the countries selected for this study.

2.1. Improvement of physical performance

Housing policy traditionally has concentrated on providing “a decent home for every family at a price within their means,” in which “decent home” is defined in terms of the physical attributes of the dwelling and the occupancy of that dwelling [4]. Slum clearance was an important part of housing policy in the 1950s and 1960s with the goal of providing decent homes for residents, contributing to an increase in the housing supply and to urban renewal, but it dramatically changed many neighborhoods in both architectural and a social senses. In the late 1960s, there was increasing opposition to slum clearance from residents in the areas where such clearance was to be carried out and also from the general public. This led to a general shift in redevelopment policies and practices in the 1970s toward preservation and renovation of buildings and urban areas in cooperation with the residents. Since the 1970s, the transition of housing policies to renovation has mostly focused on upgrading physical performance by means of improvements in structural performance, home amenities and maintenance.

Because the improvement of physical performance requires a considerable investment, this goal could impose heavy financial burdens, particularly on low-income households [2]. An analysis of expenditures on maintenance work in Great Britain indicates that the proportion of maintenance expenditures expressed as a percentage of income could reach 6% for the lowest-income households (Table 2).

Otherwise, low-income households in general are low in physical performance. Therefore, it is necessary that public authorities offer financial support for physical performance improvements for low-income households.

2.2. Correspondence to the needs of elderly people

Major trends related to aging pose substantial challenges for policymakers in European countries. There is currently massive growth in the elderly European population, owing to a decline in birth rates and an increase in life expectancy. There are about 60 million people at least 65 years of age within the EU, which amounts to 15% of the area’s total population. By the year 2030, that number will be around 90 million.

Until the 1980s, welfare policies related to housing for elderly people were mainly focused on the construction and supply of large-scale facilities for the elderly. However, due to the negative images associated with such facilities [7] and the financial burdens these facilities imposed on governments, housing policies for the elderly were converted from “facility care” to “home care.” At present, most elderly people in Europe spend their daily lives in their housings, and do so for as long as possible. The percentages of elderly people staying in their housings are 96% in Denmark, 94% in Finland and 92% in the Netherlands [8].

The growth in owner-occupied housing and the aging of the population make it inevitable that in the future, increasing

Table 1
Objectives of housing renovation policies.

| A. Objective of House Regeneration | | B. Whether survey was done by the objectives of house regeneration | | | |
|---|--|--|---------|---------|--------|
| Sub-Class | Class | France | Germany | Denmark | Sweden |
| • Improvement of housing performance • Better quality of life | Improvement of physical performance | | | | |
| • Correspondence to needs of elderly people • Housing adjustment for disabled people | Correspondence to needs of elderly people | | | | |
| • Energy conservation • Reduction of GHG emission | Improving energy efficiency | | | | |
| • Social cohesion •area revitalization • Utilization of urban infrastructure | Social cohesion -Area revitalization | | | | |
| • Generator of employment • Economic revitalization | Economic revitalization | | | | |
| • Preservation of historic building • Preservation of city landscape | Preservation of houses that carry historic value | | | | |
| •Improvement of hygienic matter •Disaster prevention, safety •Health of nationals | Health of nationals | | | | |

numbers of the elderly will continue to live in their housings and may have difficulty affording maintenance and repair costs. This situation is expected to worsen as housing stocks becomes older [9–11]. To enable elderly owners of dwellings to enjoy appropriate living environments, it is necessary to promote maintenance and renovation (e.g., improvement of barrier-free attributes) of their dwellings by addressing the difficulties that elderly people face in securing financing.

2.3. Improving energy efficiency

Climate change has become an important topic on both the public and political agendas. International agreements such as the Kyoto Protocol reveal this to be a global concern. CO₂ emissions caused by the use of fossil fuels are known to be a crucial factor contributing to global warming.

The 164 million buildings in the EU-25 (193 million in EU-25) account for about 40% of final energy demand and about a third of greenhouse gas emissions, of which about two-thirds are attributed to residential and one-third to commercial buildings [12]. International Energy Agency (IEA) analysis [13] of targeted countries belonging to the Organisation for Economic Co-operation and Development (OECD) reveals that the potential savings from measures pertaining to buildings could save around 32 EJ/year and 1.4 GtCO₂/year by 2030. This is more than the combined CO₂ emissions from France, Germany and Belgium in 2005.

Existing buildings represent a major source of energy saving potential [2,14–16]. With respect to the reduction of gas emissions that contribute to global warming, the importance of existing

buildings can be examined from two aspects: quality and economic efficiency.

In European countries, the ratio of 1–1.5% of new construction as a percentage of the entire housing stock is very low. Because new construction makes up such an extremely limited portion of the entire housing sector, any measure impacting new construction may not have a significant effect, regardless of whatever policy measures are adopted to improve the energy performance of new construction. Also, when viewed from an economic standpoint, new construction has benefited from technical advances that improve energy savings. Owing to the strengthening of energy-design criteria over time, the energy efficiency of new construction is much improved over that found in existing houses. The CO₂ reduction potential of existing houses is illustrated in Fig. 4. In the figure, the heating requirement in 2006 and the new heating requirements are related to a typical single-family building, and for the multi-family building a five-story building is considered. The new heating requirements are expected to be reduced to approximately 70% of the heating requirements in 2006 [17]. It indicates that CO₂ reduction potential of existing housings is at least three times higher than new housings.

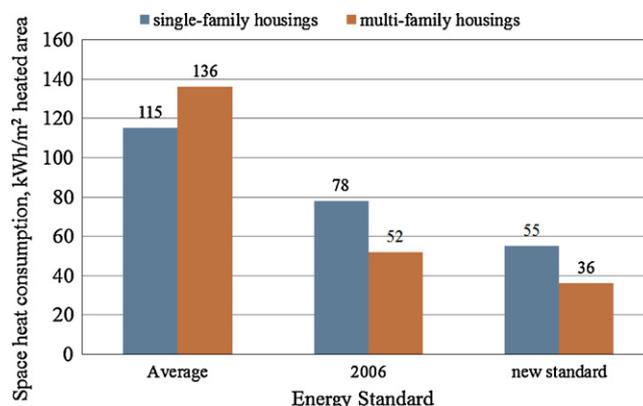
In general, when considering construction that is designed to improve energy efficiency, the higher the energy performance of a house, the lower the effects are over cost. According to an analysis by Pezzey regarding the effects of rooftop heat insulation over cost

Table 2
Expenditure on repairs, maintenance and decoration by owner-occupiers at different income levels, United Kingdom, 1992.

| | % of all owners | GBP per week | Expenditure as % of income |
|--------------------------|-----------------|--------------|----------------------------|
| Under GBP100 per week | 5 | 4.72 | 6.3 |
| GBP 100–174 per week | 11 | 5.18 | 3.8 |
| GBP 175–274 per week | 15 | 6.73 | 3.0 |
| GBP 275–474 per week | 33 | 8.86 | 2.4 |
| GBP 475 or more per week | 37 | 14.44 | 2.1 |

Source: UK Central Statistical Office, 1992.

Note: 1 GBP = 1.754 USD (average in 1992).

**Fig. 4.** Mean net energy consumption for space heating in the Danish housing stock and according to 2006 and new housing energy regulations for new housing.

in the UK [18], the effects of 100 mm of heat insulation materials that are installed to reduce energy cost per unit investment cost under standard conditions decrease by 30% or less when 25 mm heat insulation material already exists, and by 10% or less when 100 mm heat insulation material exists, compared to a reference case without heat insulation material.

When considering the effects that such heat insulation materials have on energy efficiency, the greater the difference in energy performance between new construction and existing housing, the greater the discrepancy in terms of cost. In other words, adopting a strategy that emphasizes new construction as a way to reduce greenhouse gases would be tremendously costly. Therefore, to achieve national goals of greenhouse gas reduction, a more desirable strategy may involve establishing a policy to target existing houses to achieve that goal at less cost. A considerable amount of research provides a basis for investigation into environmental impact of existing building renovation measures [19–24].

Although improving an existing dwelling's energy efficiency may be technically and commercially feasible, many market barriers hamper the realization of this goal. These barriers include lack of financial incentives, lack of information and lack of perception [25].

European countries are preparing to impose institutional measures to deal with the challenges of improving the energy efficiency of existing housings to meet the goal of reducing greenhouse gases.

2.4. Social cohesion and area revitalization

The general increase in affluence after World War II led to a growing demand for owner-occupied single-family suburban housings. High- and middle-income groups moved from the central parts of cities, and some of the dwellings they vacated were abandoned and demolished. Others were occupied by people with lower incomes and thus with less ability to pay for good maintenance. The process whereby well-to-do residents of a neighborhood are replaced by low-income households is called "succession" [26]. Many researchers see succession as the primary cause of urban decay [27,28].

Since the 1970s, succession has occurred in large social housing estates in European cities. People who were pushed out of the inner city due to redevelopment were moved to social housing, and underprivileged people like the poor, the jobless and immigrants were concentrated in large estates. The image of large-estate social housing was significantly damaged as these estates were plagued by vandalism and other crimes and due to increases in the numbers of residents who were delinquent in their rent payments [29–32]. These days, European countries place far more emphasis on social cohesion to address problems during this kind of succession.

Revitalization programs that focused on the improvement of obsolete housing were undertaken in various European countries to revitalize areas depressed by succession, but their outcomes were not successful. Therefore, programs were developed to integrate strategies that would regenerate these areas. These programs addressed such issues as culture, education, transportation and economic activation as well as housing improvements.

However, housing improvement still constitutes a large portion of the integrated approach to revitalization, and it is an important measure of social cohesion.

3. Changes in the roles of housing renovation policies

Because the economic capabilities of residents and the quality of housing are usually closely linked, financial support is a very important element in renovation policy. Therefore, this section clarifies

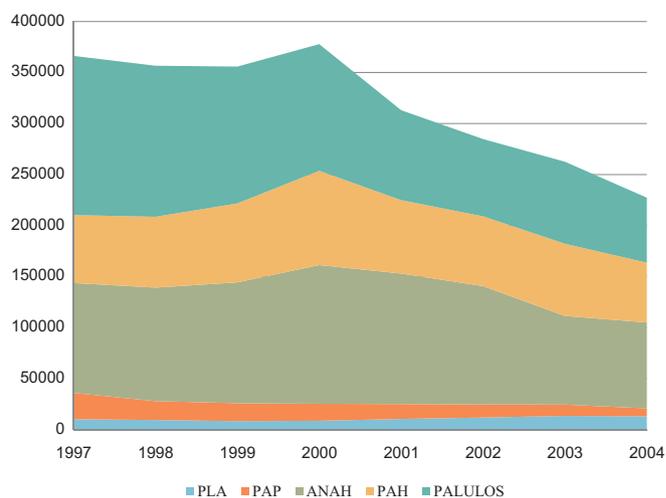


Fig. 5. Number of renovated housing receiving subsidies in France.

changes in the role of housing renovation policy by focusing on the transition of financial support.

Since the mid-1990s, public financial support for the improvement of physical housing performance has decreased dramatically. In France, the number of beneficiaries of housing renovation subsidies exceeded 350,000 households each year until 2000. However, since 2001, that number has decreased dramatically (Fig. 5). In Sweden, subsidies for physical improvements have decreased rapidly since 1993, and low-interest subsidies for renovation were abolished on January 1, 2007 (Fig. 6). In Germany and Denmark, subsidies for the physical improvement of housing have been reduced.

The reasons for these decreases in the subsidies for physical improvements in housing are as follows.

The first is the increase in the financial burden on government. As budgetary deficits have increased, the privatization of social housing has accelerated. Policies have been changed to encourage homeowners to take the initiative to improve their own housings, and renovation subsidies have been reduced.

The second reason is that the renovation industry has settled. Over the past 10 years, the ratio of renovation in the European housing industry has exceeded 50%. Because the renovation market is moving in a stable fashion, despite the fact that subsidies for renovation have been cut, the need for such subsidies has been reduced. In Sweden and Denmark, subsidies for renovation were cut significantly but the renovation industry was virtually unaffected [33].

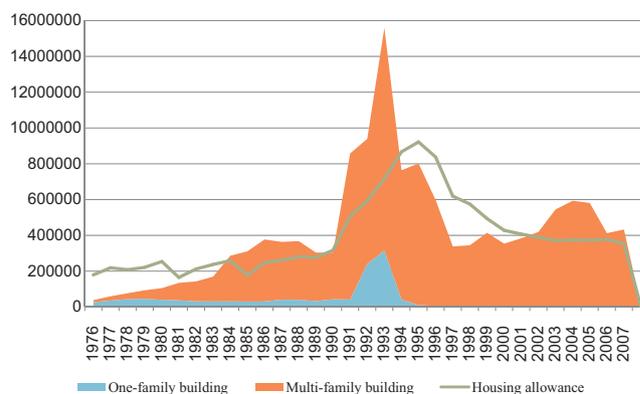


Fig. 6. The trend of interests subsidy for house renovation in Sweden.

| | Public Needs | Private Needs |
|---|--------------|---------------|
| Improvement of physical performance | → | ↑↑ |
| Correspondence to needs of elderly people | ↑ | ↑↓ |
| Reduction of GHG emission | ↑ | → |
| Social cohesion and area revitalization | ↑ | ↑↓ |

↑ Needs are high ↑↓ Needs are high, but the situation of occupant are bad (financial deficit, lack of capability etc.), so they maintain the status quo.
 → Needs are low

Fig. 7. Public needs and private needs on political objectives.

The third reason has to do with changes in governments. Because the scale of financial support is closely related to the ideology of political parties, the renovation subsidy system has changed as the parties in control of governments have changed. In Sweden and Denmark in the 1990s, financial supports for renovation were abolished or dramatically reduced as right-wing parties came to power that advocated neo-liberalism.

The fourth reason has to do with the overall improvement of housing quality. The problem of housing quality, once viewed as so serious that it required public investment to correct it, has been ameliorated to the point where it no longer needs to be addressed by urgent government measures. Public financial support was thought to have been cut due to the deterioration of the economic situation in Europe, but renovation subsidies were sustainably reduced even after Europe's economic situation improved in the 2000s.

As mentioned earlier, renovation has been on the rise in recent years due to other political factors, and the objective of renovation has not merely been to improve the physical performance of housing. Improving physical performance is not a final objective, but rather serves as a means of accomplishing other political objectives. In other words, houses are renovated to reduce greenhouse gases, to promote social integration and to satisfy of the needs of the elderly.

Renovations designed to meet these objectives require the involvement of the public sector. When market forces do not benefit the entire society or do not move according to government policy, the public sector gets involved in the market. In this study, we defined "the profits of whole society or concerns of the public" as "public needs," and "the goal of individual profit and satisfaction" as "private needs."

Fig. 7 shows the public needs and private needs for each political objective.

Because improving physical performance is strongly influenced by the needs of individuals (residents), voluntary renovations are often carried out, particularly in the owner-occupied sector [34], even though there is no involvement of the public sector. On the other hand, when the quality of housing reaches a certain level, public need for the improvement of physical performance is not very high.

As discussed in Section 2, issues related to existing housing, such as problems of the elderly, global warming and social segregation, have recently become increasingly important to the public sector. However, because such problems are not directly related to their own profit or because the people directly experiencing such problems are often underprivileged and so are incapable of solving

them, it is unrealistic to expect the residents themselves to take the initiative to renovate their housings.

Therefore, the public sector concentrates on renovation to achieve objectives such as meeting the needs of the elderly, improving energy efficiency and improving social cohesion rather than improving the physical performance of structures.

4. Analysis of nationwide housing renovation policies

A national strategy to stimulate housing renovation can comprise policies that are classified as either indirect or direct measures (Table 3).

Indirect measures signify that public authorities establish a general regulatory framework and develop market mechanisms for properties, maintenance and improvement, with no direct involvement in the actual renovation work. A strategy based on indirect measures leaves decisions to renovate the housing and the nature of the renovation up to the individual homeowners.

Direct measures are undertaken when indirect measures have failed and the market does not move in a favorable direction, or in cases where quality-related housing problems occur in specific housing groups and areas. Direct measures are classified into "compulsory control" and "inducement control." Compulsory control means that public authorities directly order the renovation of housing or expropriate properties when problematic deterioration and obsolescence have occurred. In cases of inducement control, public authorities try to make it more attractive for owners to renovate their properties and preserve them rather than demolish them. This is usually done by means of financial support.

When renovation policies are studied, indirect measures are found to be applied primarily for renovation for the improvement of physical performance and energy efficiency rather than for political objectives. The reasons for this are related to public needs and private needs as identified in Section 3. In other words, in cases where physical performance must be improved, indirect measures are effective because private needs are high. But in cases where the goal is to meet political objectives, direct measures are generally undertaken because private needs are low.

4.1. Indirect measures

Indirect measures could, for example, be embodied in building codes, in loan provisions for renovation, in rental acts, or in reserve funds for renovation. The economic conditions of residents critically affect housing maintenance and the quality of improvements. For these reasons, most European countries offer loan systems for renovation. The maximum loan-to-value (LTV) ratios for renovation in France, Germany, Denmark and Sweden are, respectively, 60%, 70–80%, 80% and 90–100%. According to these LTV ratios, it seems that the incentives for owners to invest are greatest in Sweden, Denmark and Germany, followed by France.

Rent control normally implies that rent levels are not entirely dictated by the quality of housing as judged by the market. In the economic literature on the effects of rent control [35–37] it is commonly concluded that landlords can be expected to cut back on maintenance and improvements. The simple argument is that if renovation does not affect rental incomes, it is not profitable to maintain the quality of the housing. It is easy to conclude that rent control will inhibit investment in renovations if it is not possible to increase rents. Therefore, although increases in ratios of rents and the conditions of renovation may differ, each country allows rents to be increased [5,38–40].

On the other hand, in some countries, laws governing rental properties require landlords to maintain and improve those properties. Under Danish housing law, landlords are obliged to carry out

Table 3
Policy measures to stimulate housing renovation.

| | | | |
|--|------------------|---|--|
| Policy measure to stimulate housing renovation | Direct measure | Compulsory control | Order of the renovation Expropriation of properties Restriction of community development |
| | | Inducement control | Financial support Subsidy Low interest loan Tax benefit |
| | Indirect measure | Development of market mechanism for the renovation | Provision of loans for renovation Rules for the organization of owner occupied flats of decisions about renovation Building codes Rent control Housing allowance Tax rules Housing performance rating system |
| | | Providing of information Promotion of home ownership | |

necessary maintenance on their properties and can be ordered by a rent tribunal to repair building defects if tenants complain about them. If the landlord does not follow such orders, the landlord can be deprived of his right to administer his property [5].

Many countries have adopted a reserve fund system for the maintenance of social housing. Although each reserve fund system is generally conducted by a housing association, there are cases where portions of rents are saved in a central fund. This is the case in Denmark. Denmark saves portions of rents from old houses in a central fund to reduce the quality gap between new social housing and old social housing. Low-interest loans from the central fund are used to finance renovations. Swedish housing law has a provision that requires that a certain amount of money per unit area must be set aside from rent for building maintenance and improvements. However, it seems to be a common problem that many social housing estates built in the 1960s and 1970s have not collected enough resources to address their maintenance problems.

Another indirect measure is to stimulate residents to perform renovations themselves by providing information on the benefits of renovation. An example of such an indirect measure is energy performance certification of buildings. In all European countries, energy performance certificates must be submitted whenever housing is sold or rented out according to Energy Performance of Buildings Directives (EPBD). This legislation is intended to persuade owners to conduct renovations designed to save energy by supplying future buyers and tenants with various kinds of information on energy performance and adding energy performance to consumer selection standards along with guarantees of the transparency of the transactions [14,17,23,25].

In European countries, these indirect measures have recently been emphasized in policies pertaining to the improvement of physical performance. In particular, Denmark and Sweden are less inclined to promote direct public involvement and more inclined to make private investment in housing renovation attractive by changing the market conditions by promoting direct cooperation between public and private agents. An effort was made to replace or simplify existing legislation to make this process more efficient.

4.2. Direct measures

4.2.1. Compulsory control

In cases of new construction, no comprehensive general regulation system exists to cover existing houses when the framework of construction regulation is completed from before the planning stage. For these reasons, the introduction of new regulations governing existing housing results in significant administrative costs. In addition, because existing houses received legitimate approval at the time they were constructed, even if they do not comply with current construction standards, retroactively applying

strengthened new regulations to existing buildings is bound to cause difficulties in terms of deducing the agreement of the concerned parties. Therefore, compulsory controls like expropriation, orders, restrictions on use and preemptions are used only in limited circumstances as exceptional measures. However, there are times when compulsory controls are required to accomplish certain governmental policy goals. The enforcement of building controls designed to improve the energy efficiency of existing houses is a major example of a goal of this nature.

In most countries, minimum levels of energy performance for existing housing are permitted only when governments conduct large-scale renovations. However, there are some recent cases in a number of countries in which controls on the energy performance of existing housing were enforced to meet Kyoto Protocol goals [12]. In this context, energy performance-related controls [41,42] on existing housing in the surveyed countries will be studied broadly. More in-depth examinations will be performed in the case of Germany, which is strictly enforcing regulations.

In France, regular tests are administered once every three years on boilers exceeding 300 kW. In Denmark, regular inspections are also administered each year on all boilers in houses, but there are no regulations calling for equipment replacement. However, roof renovations, exterior wall heat insulation renovations, window replacement, boiler installation or heating equipment replacement are required to meet current standards regardless of building size. In addition, with the aim of persuading owners of existing housing to change from electricity to other energy sources in heating, the Heating Act (*Lov om varmforsyning*) was revised and took effect in January 1994. Driven by the revision of this act, the number of houses with electric heating is anticipated to decrease to about 7000 households.

For existing houses that were constructed in compliance with regulations in force at the time they were built, it is very difficult to enforce improvements in these structures that would parallel the energy performance of newly constructed dwellings. Implementing such improvements would be tremendously costly and time-consuming. Therefore, most countries enforce regulations only for equipment that can be easily replaced and that does not require the renovation of structural elements. However Germany, despite being in a similar situation, is applying regulations to existing housing that are even more strict than those in other European countries.

In Germany, current energy standards must be met when indoor heating systems and hot water systems are replaced. In cases where the structural elements of buildings are replaced in air-conditioned spaces, each structural element must comply with a particular standard (*U-value*), or the energy consumption of the entire building must not exceed 140% of the standard for new construction. With respect to windows, doors and exterior walls, new construction

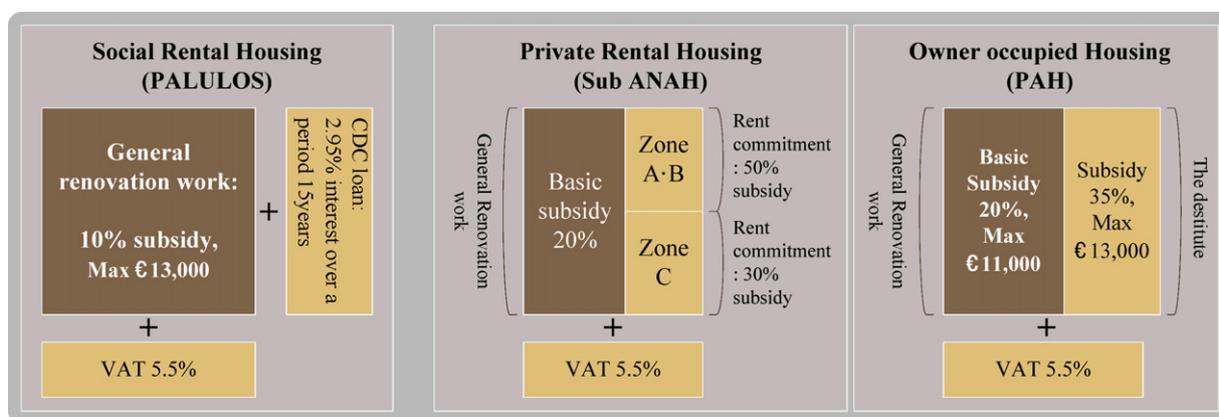


Fig. 8. Financial scheme supporting improvement of physical performance in France.

standards should be followed in cases where 20% or more of all these elements are replaced [34].

In addition, it is now mandatory that boilers installed before 1978 shall replace ones complying with the present standard until December 31, 2006. Regulations also decree that pipes for hot water and heating for rooms without heating systems shall be given heat insulation measures until December 31, 2006, and that rooms with heating systems shall meet at least $0.3 \text{ W/m}^2 \text{ K}$ of U -value until December 31, 2006.

To alleviate resistance to these bold measures mandating improvements for old equipment with high environmental loads and to promote housing renovation for the purpose of improving energy performance, the government of Germany actively supported the replacement of equipment subject to its control by extending and improving its KfW Energy-efficiency renovation program at the end of 2005.

Germany's Ministry of Federal Construction and Transportation released figures showing that the scale of loans for energy performance improvement was 3.4 billion Euros for the year 2006, and that 230,000 households used low-interest loans to fund renovations [43]. It also made an internal evaluation that in 2006 the number of houses that improved energy performance by using the KfW program more than tripled compared with 2005, and thus the series of measures was considered to be very successful.

In cases where regulatory measures are introduced that impact existing building sectors, the lack of an existing system of regulation and resistance to the new measures may have a negative effect. In the surveyed countries, control subjects were selected in limited settings through a system of field surveys to check elements with high environmental loads or validity as minimum level. Housing heating and water heating account for 80% or more of the total energy consumption in European housing, and thus building controls regulating energy performance in the surveyed countries are concentrated on heating and hot water-related equipment that is old and carries high environmental loads.

To summarize: With regard to building controls that regulate the energy performance of existing houses, it seems worthwhile to specify elements with high environmental loads by developing a system based on the evaluation of the energy performance of existing buildings. It also seems worthwhile to enforce the regulations on equipment that can be easily replaced or improved. In addition, incentives such as subsidies should be adopted to minimize resistance by affected parties.

4.2.2. Inducement control

4.2.2.1. *Improvement of physical performance.* This study found that France is the European country that facilitates the subsidy system for renovation work most actively and in the most ramified fashion.

France applies a differential subsidy rate using family composition, the presence of spousal income and area as the bases of a means test. The subsidy differs in support scale and type depending on the type of tenure. Fig. 8 shows the financial system supporting improvement of physical performance.

To improve existing social housing, the French government uses Prime à l'Amélioration des Logements à Usage Locatif et à Occupation Sociale (PALULOS) to pay a 10% subsidy, associated with a value added tax (VAT) rate of 5.5%, which applies to renovation work for social rental housing that is more than 15 years old. The cumulative advantage makes for an overall aid package worth 22%. The complementary loan, combined with the PALULOS subsidy is financed by a 2.95% interest rate over a period of 10–15 years.

The Agence Nationale pour l'Amélioration de l'Habitat (ANAH) provides housing renovation subsidies for private rental housing that is more than 15 years old. Subsidies vary between 20% and 50% of the cost of the work depending on the geographical area, on the nature of the work being carried out and the rent commitment made by the owner. The ANAH also provides housing renovation subsidies to low-income owners of owner-occupied buildings. These subsidies are normally based on 20% of the overall cost of the renovation work, and are subject to a ceiling of 11,000 Euros. For owners with very low incomes, this can be extended to a 35% subsidy, limited to 13,000 Euros [44].

Rent contract additional taxes (taxe additionnelle au droit de bail: TADB), a kind of tax on rental income, were appropriated directly to ANAH until 1987. Ever since TADB became a component of the government's budget in 1988, the ANAH budget (420 million Euros in 2004) supported through National Assembly resolution and the tax revenue (24.28 million Euros in 2003) on vacancy are used as the funding source of ANAH.

Direct subsidies are not offered in Germany, but low-interest loans are available through the Housing Modernization Program. The target of this program is the improvement of physical performance by means of such renovations as repairing floors, installing new bathrooms, redesigning layouts and improving the external areas of multifamily housing complexes comprising at least three housings. Loans are financed up to 100% of the renovation cost, to a maximum of 100,000 Euros.

In cases of owner-occupied housing in Denmark, direct subsidies are offered in amounts up to 25% of renovation cost. However, because houses eligible for support are limited to those constructed before 1950 that do not have heating and toilets, the scope of the subsidy is very limited. In cases of rental housing, two-thirds of rent exceeding DKK155 per square meters is supported for renovation.

No direct subsidies are offered in Sweden. However, interest subsidies are offered for social housing and private rental housing condominiums. The amount of the annual interest subsidy is

calculated by multiplying subsidy interest and the subsidy rate by the construction cost. The subsidy rate was 30% until January 2007, but decreased gradually thereafter, and after 2012 the subsidy will be eliminated.

4.2.2.2. Housing adjustment for the elderly. In France, subsidies for the elderly are offered through PALULOS and ANAH instead of through a separate support program, and supports are given on eligible scope and conditions like subsidy rate more favorable than physical performance improvement work. In other words, social housing and private housing subsidy rates are further extended respectively from 10% to 40% and from 20% to 70%. There is no limitation on the age of the housing.

The Care Insurance law was passed in Germany in 1994. Renovations for housing for the elderly are eligible to receive support of up to 2563 Euros per case under this law. All German nationals are insured under this law, and no government subsidy is offered. Renovation subsidies from the government can be offered either as direct subsidies or as loans through “Senior Housing Conversion.” For direct subsidies, 3500 Euros can be received within the limit of 5% of the total construction cost in construction work costing 6000 Euros or more. For senior-friendly conversions, up to 50,000 Euros per housing unit can be financed at particularly favorable interest rates.

Denmark and Sweden are identifying favorable support for housing renovations for the elderly as a component of current welfare policies. In Denmark, housing renovations for the elderly are conducted by the “law of social service” (lov om social service). The entire cost is supported without limit on the subsidy amount or on application frequency under the principle of “necessary support for necessary people.”

In Sweden, housing renovations for the elderly are covered under the House Renovation Subsidy Act (Bostadsanpassningsbidrag, SFS 1992:1574). As is the case in Denmark, there is no upper limit on the amount of the subsidy or limitations on how often it may be used. Also, the Swedish standard for eligibility for subsidies is broader than that of Denmark. Subsidies are offered for rental housing in cases where long-term nursing is required for elderly or disabled individuals. Also, subsidies are offered for renovations relating to the rehabilitation and functional training of elderly or disabled individuals and hobby activities. And in cases where subsidized renovations of a housing facility are no longer needed, a subsidy is offered to restore the structure to its original condition. However, with regard to restoration construction, subsidies are offered only in cases where the permitted cost exceeds SKK5000 for each application.

4.2.2.3. Energy efficient renovation. In France, renovation to improve energy performance is supported through PALULOS and ANAH. PALULOS for social housing offers subsidies under the same conditions as those offered for the improvement of physical performance. However, ANAH for private housing offers grants for several types of individual projects. In addition, regardless of tenure, renewable energy installations and insulators with outstanding performance are eligible for tax deductions of 40% and 25% respectively.

Government programs aimed at promoting energy savings in housing have been in place in Germany since the 1970s. The KfW, the investment bank of the federal and regional governments, is the main source of funding for investment in energy efficiency and renewable energy, rather than the federal government itself. The government negotiates conditions with the KfW, including access to assistance, the amount of loan funding available, and the level of subsidy to reduce interest rates on loans [45]. The KfW energy-efficient renovation program for residential buildings offers long-term, low-interest loans for renovation projects aimed at

| | Direct subsidy | Loan |
|---------------------------------|----------------------------------|--|
| KfW Efficiency House 55 | 17.5% subsidy Max. EUR 13,125 | 100% loan, Max EUR 75,000 12.5% Repayment grant |
| KfW Efficiency House 70 | 15% subsidy Max. EUR 11,250 | 100% loan, Max EUR 75,000 10% Repayment grant |
| KfW Efficiency House 85 | 12.5% subsidy Max. EUR 9,375 | 100% loan, Max EUR 75,000 7.5% Repayment grant |
| KfW Efficiency House 100 | 10% subsidy Max. EUR 7,500 | 100% loan, Max EUR 75,000 5% Repayment grant |
| KfW Efficiency House 115 | 7.5% subsidy Max. EUR 5,625 | 100% loan, Max EUR 75,000 2.5% Repayment grant |
| Individual measure | 5% subsidy Max. EUR 2,500 | 100% loan, Max EUR 5,000 |

Fig. 9. KfW Energy-efficient renovation program.

reducing energy consumption. The program also offers direct subsidies for investment costs. Repayment grants are provided if the renovated housing meets KfW Efficiency House standards, which set limits based on energy consumption and heat-loss permitted for new buildings in accordance with the Energy Conservation Ordinance (Energiesparverordnung/EnEV).

Subsidies are supported in a variety of ways depending on degree of energy efficiency improvements (Fig. 9). KfW has defined five levels of support for a “KfW Efficiency House.” Simply put, the figures indicate the percentage of how much of the maximum primary energy requirement specified by the EnEV the house consumes. The best standard (KfW Efficiency House 55) receives the highest support. To meet the high energy standard of a KfW Efficiency House, extensive investments such as the renewal of heating systems, thermal insulation and the replacement of windows are usually required.

Denmark has subsidies for individual energy-saving projects. However, the energy performance of Danish housing is upgraded through compulsory controls such as making the application of current energy standards mandatory when buildings are renovated. In Sweden, subsidies are offered for individual projects such as the installation of heating equipment or renewable energy equipment rather than integrative energy performance renovation.

4.2.2.4. Area revitalization programs. In France, Germany and Denmark, area revitalization programs are conducted in areas where social segregation is a serious problem. These programs touch upon a broad range of different topics, e.g., physical renovation of housing, job creation, traffic planning, environmental improvements, and various third-sector activities aimed at the social integration of residents. In France in particular, area revitalization programs have been actively conducted since the 1980s, mostly in large social housing estates. The area revitalization programs of France are operated in connection with housing renovation subsidies, and the subsidy rate is increased by PALULOS and ANAH.

The objectives of these area revitalization programs are not strictly to improve obsolete housing, but rather to solve the problem of social segregation. Renovation of housing is used as means of achieving this objective.

Table 4
Cross-national analysis of renovation promotion schemes.

| | | France | Germany | Denmark | Sweden |
|---------------------------------------|---|---|--|-----------------------|-----------------------|
| Improvement of physical performance | Selected housing of program | | | | |
| | Tenure | O, R, SR | All | O, R | R, SR |
| | Means-test | ● | × | × | × |
| | Building age | ● | × | ● | × |
| | Type of Support | SR: S+I+T O, R: S+T | All: I O/A: T | O,R: S | R, SR: I |
| Housing Adjustment for elderly people | Selected housing of program | | | | |
| | Tenure | O, R, SR | All | All | All |
| | Means-test | ● | × | × | × |
| | Building age | × | × | × | × |
| | Type of Support | SR: S+I+T O, R: S+T | All: I A/R: T | O,R: S | R, SH: I |
| | Number of possible application | In limited | In limited | Unlimited | Unlimited |
| Energy efficient renovation | Selected housing of program | | | | |
| | Tenure | O, R, SR | All | All | All |
| | Means-test | ● | × | × | × |
| | Building age | ● | × | × | × |
| | Type of Support | SR: S+I+T O, R: S+T+G Individual measure: T | Package measure: S+I+RG Individual measure: S+I | Individual measure: S | Individual measure: S |
| Area revitalization program | Comprehensive approach | ● | ● | ● | |
| | Connected with housing renovation program | ● | | | |

Note: Tenure: O = owner occupied sector, R = private rental sector, SR = social rental sector, A/R: acquisition/renovation. Type of support: S = direct subsidy, I = interest subsidy, G = grant, RG = repayment grant, T = tax incentives.

4.3. General opinions

Table 4 offers a synopsis of the financial support system of each country for housing renovation.

As a result of sustainable public investment dedicated to improvement of the physical performance of housing, housing quality has dramatically improved throughout Europe. This means that the role of renovation policy has changed. In other words, public investments have been concentrated on providing accessibility for the elderly, on boosting energy savings and on revitalizing areas rather than on improving physical performance.

In all of the countries studied, subsidies for the improvement of physical performance have tended to decrease over time, and Denmark and Sweden have nearly abolished support for such subsidies. Instead, these countries have made greater efforts to make private investment in housing renovation attractive by changing market conditions, which we call indirect measures. An effort was made to replace or simplify existing legislation to make the process more efficient. Meanwhile, in France, support for physical performance improvements has tended to decrease, but are still more robust than in other countries. France has undertaken a strategy of effectively using public resources to offer intensive and selective support for housing renovation. In doing so, France has developed the most differentiated systems, with separate programs for owner-occupied housing, for private rental housing and for social housing in general. In addition, differential subsidy rates are applied with respect to family composition, the presence of spousal income, area, and other factors as the basis of means testing. Subsidies differ in support scale and type depending on the type of tenure. In other countries, programs for housing renovation usually include all tenures, and rules for public support do not differ.

The public investments of Germany are concentrated on improving energy efficiency. While France supports differential subsidies based on means testing, Germany operates each support program depending on types of energy performance improvement

work, and is pursuing improvements in existing housing energy efficiency by supporting projects that can raise energy performance. On the other hand, Sweden and Denmark are giving priority to public policy in housing renovation for elderly people.

5. The objectives of renovation and the characteristics of promotion policies

As a result of analyses of the renovation policies of each country described in previous sections, policies to promote renovation can be schematized as in Fig. 10 depending on each objective.

Extension type means the type of strategy that it exist measures for base of renovation policy, and extends and applies the measures to renovation work for other objective from them. In the extension type, inductive measures like increasing the subsidy rate and relaxation of condition are often used to promote renovation work to meet a particular objective. Among the countries compared, a representative country of extension type is France (Fig. 11). The merits of extension type are that since renovation works of various objectives are supported by one measure frame, the process of subsidy is relatively simple. In addition, extension type is effective in improving overall housing quality. However, because all the renovation works are supported in one frame, there lies an apprehension that expertise of policy may be deficient. For instance, developing specialized support plans for the elderly or to promote energy savings is difficult.

Individual type describes the type in which each measure supports housing renovation only for specific objectives. Representative examples may be the subsidies for elderly people in Sweden and the energy saving support program of Germany. Individual type in many cases is executed to accomplish a specific outcome in fields to which public authorities assign high priorities. Therefore, this type can set measures suitable for renovation objectives, and has a higher potential to accomplish policy goals.

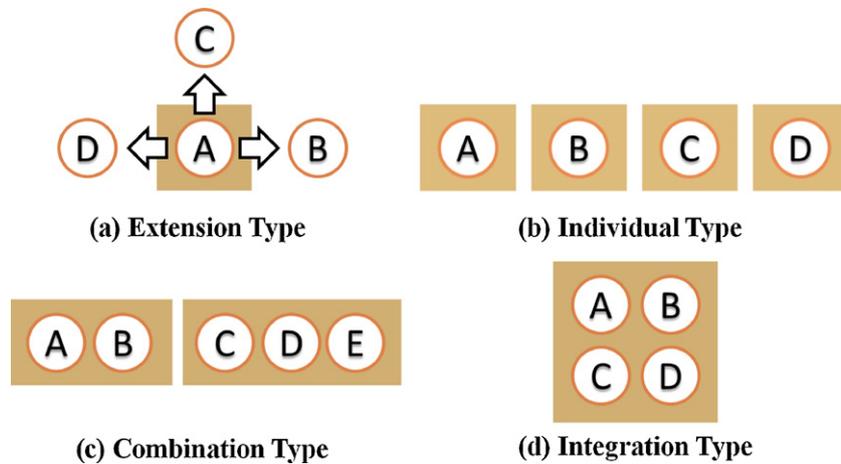


Fig. 10. Types of housing renovation policy.

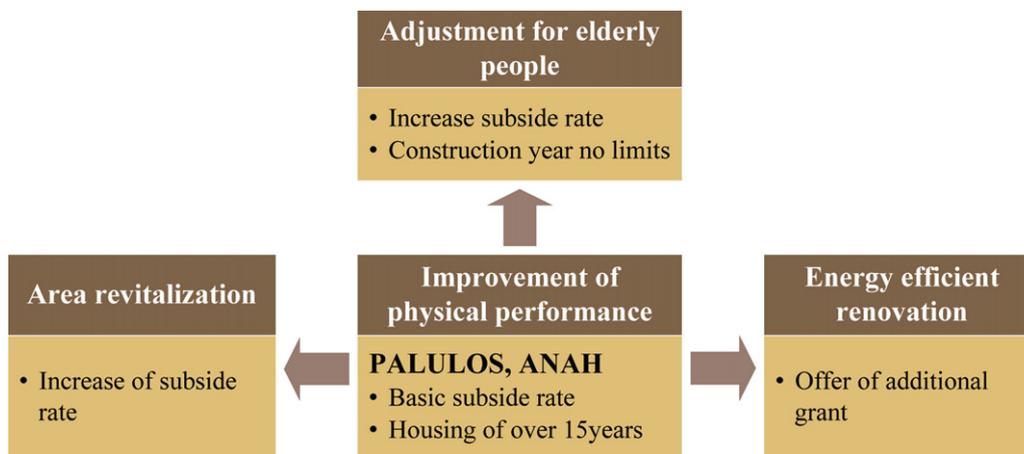


Fig. 11. Renovation financial support measure (France).

Combined type describes the strategy that two or more objectives promote housing regeneration within one frame, and is the type most generally used in promoting policy. Unlike extension type, in this type, the same standards are applied even in cases where renovation projects have different objectives. For this reason, this type is generally simple in terms of procedures and the operation of measures, but has the drawback that the setting of measures suitable for particular objectives is difficult.

Integrated type describes the type that supports renovations undertaken for all political objectives with one frame. The ROT program (1983–1990) of Sweden supported all types of housing renovations such as housing improvement, barrier-free projects, energy efficiency renovations, public facility remodeling, and the upgrading of unhygienic housing. Integrated type has merits and drawbacks similar to extension type.

6. Conclusions

In this study, social issues pertaining to existing housing and the objectives of renovation promotion were reviewed (Section 2). Based on an examination of changes in renovation policy roles with an emphasis on changes in financial support (Section 3), the objectives of the renovations and the characteristics of promotion policies were cross-analyzed on a country-by-country basis (Section 4). Finally, in Section 5, promotion policies by renovation objectives were classified into extended type, individual type, combined type and integrated type, and the characteristics of each were

identified. In summary, the following conclusions were made, along with suggestions related to the field:

First, the roles of existing housing renovation policies have changed from improving the physical performance of houses to other purposes policies in the era of sustainability. Recently, public investments in physical performance improvements, which used to be the traditional objective of renovation promotion, are decreasing dramatically. This trend has been caused by increases in the financial burdens borne by governments, by the settlement of the housing renovation industry and by the replacement and improvement of housing quality. Instead, policies designed to deal with the increase of the elderly population, to improve energy efficiency and to prevent social segregation have been on the rise. Public investments designed to encourage renovation for such purposes have been identified as meeting public needs and private needs.

Second, European policies designed to improve the physical performance of houses are now focusing on indirect measures to create systems to promote the smooth operation of market mechanisms. As this happens, direct government involvement in the field decreases. This is presumed to be related to public needs and private needs as shown in Section 3. That is to say, in the case of the improvement of the physical performance of housing, private needs are high, and thus indirect measures for housing improvement activity by owners are effective. On the other hand, policies adopted to achieve political goals, which are not as relevant to private needs, are conducted with a focus on direct measures rather than indirect ones.

In particular, Denmark and Sweden are concentrating on organizing laws so that market mechanisms may work smoothly to improve housing performance, thus reducing direct involvement. However, such indirect measures can hardly guarantee effectiveness in countries where the market for recycled housing is weak. Countries where the housing industry is dominated by new construction will need to do the groundwork for the renovation market to settle down through direct measures such as financial support so that the industry may be reorganized through the recycling of existing housing.

Third, compulsory controls like performance-related legal regulation imposed on existing housing are used only in limited settings as exceptional measures. Recently however, more and more countries are using compulsory controls for the purpose of improving the energy efficiency of existing housing.

Energy performance-related controls on existing housing are highly effective for reducing greenhouse gas emissions that contribute to global warming, but it is difficult to apply such controls in practice due to the resistance of homeowners. Therefore, most countries are enforcing regulations on equipment that can be easily replaced or improved by the extraction of elements responsible for high environmental loads. When a country intends to apply such controls, it will first be necessary to identify elements that can be applied on a minimal level while demonstrating that the controls will be highly effective in reducing greenhouse gases. Also, organizing a survey system that selects control subjects will be required.

Fourth, the types of financial supports for the renovation of existing housing vary greatly among countries. Such variations arise from the differing social and political situations in each country. In Denmark, where the welfare of the elderly is valued above other political considerations, supports are offered regardless of the amount of money needed for construction, the content of the construction and the economic condition of the applicant seeking a subsidy to renovate housing for the elderly.

In Germany, improving energy performance is the focus of policies governing the renovation of existing housing, and the level of that support is classified according to the degree of energy performance as it pertains to the policy goal rather than the economic condition of applicants. In France, the amount of support depends on the objective of the work based on the basic physical performance subsidy rate. However, the fundamental size of the subsidy is configured according to the income, locality and family composition of the household. This is presumed to be because social integration is valued above other renovation purposes. When a country designs policies to promote the recycling of existing housing, the focus should not just be on the improvement of the physical performance of the housing. The policies should also reflect various situations of the country or area identified through detailed review.

Lastly, the policy objectives of renovation can be classified according to extension type, individual type, combined type and integrated type. In the case of an extension type like that found in France, supports are offered to renovation undertaken for such purposes as barrier elimination or energy performance improvements achieved through integration with general housing renovation projects. This kind of extension type can achieve other purposes in addition to the main purpose of the renovation. For instance, extension type offers many opportunities to improve the energy performance of housing as renovations of this type are undertaken together with projects such as the replacement of windows and doors or the replacement of old equipment. Even though the purpose of the renovation is to improve the physical quality of the house, energy performance is improved as well. Germany, Denmark and Sweden favor an individual type that intensively manages and supports renovation undertaken for a particular purpose.

Individual types have the advantage of being able to intensively support and manage subjects that are needed for a particular

purpose though not obtaining renovation of additional purpose. More studies are needed to address issues of what type may be appropriate in designing a renovation policy. In countries such as Korea and Japan, where recently constructed houses make up a high percentage of the housing inventory and thus the physical quality of most houses meets a certain level, individual type is deemed effective. This is because it induces intensive public funding for policy areas to which governments assign high priorities, rather than extension type or combined type, which improve overall housing quality. At the same time, it is worthwhile to review a plan that selectively prioritizes support subjects into such categories as type of house owned, household income level and construction year, as in France, to derive maximum effects from limited public resources.

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