Aging-in-Place: A Challenge towards Sustainable Planning in the Dutch Housing Market

August A.M. van Vliet [1]*

[1] AAM-Beeld Architectuur, Waalwijk, The Netherlands
* Corresponding author (aam.vanvliet@planet.nl)

Purpose Aging-in-place is an economically sound alternative for the current Dutch policy and legislation for housing senior citizen. Preliminaries for establishing aging-in-place are a good urban infrastructure for daily provisions, a service-framework for care-giving at home, and the availability of good housing for all, including disabled or frail citizens. This paper focuses on the availability of home-features that enhance independent living for senior citizen with disabilities. Establishing appropriate housing for all senior citizen depends on the availability of existing homes that either already have suitable provisions, or that are easy to retrofit. Adding newly built homes that support aging-in-place is the most direct way to improve the housing stock. However, western, increasingly grey, societies have stable, or even shrinking populations. Therefore, the creation of quality housing stock tends towards converting and renovating existing housing stock. Success of the retrofitting depends on the technical features of the existing homes. This paper aims to conduct a quick scan of the technical quality of the existing housing stock and the suitability of these homes to be converted into homes needed to support aging-in-place. **Method** The amount of necessary homes for the age-cohorts for 2020 and 20304 and the composition of the Dutch housing stock by age and by home type5 were estimated through desktop research. Literature review produced preferences in the Dutch population towards affordable homes for seniors6. A valuation method7 that links the affordability to establish aging-in-place with technical features of the home by 4 performance indicators for affordable healthy housing quality was used. Each performance was linked to a parameter in technical features of home types. Five mainstream home types were reviewed for this set of parameters. **Results & Discussion** Most growth of households in period 2008-2030 is positioned in the cohort of senior citizen: from 1.6 to 2.7 million. Most existing homes are not provided with appropriate technical features to establish aging-in-place. Locating housing for seniors in existing neighborhoods would require large renovation programs which should include the home lay-out. Solidarity between generations is likely to become a problem in housing.

***Keywords**: Ageing-in-Place, healthy housing; performance, independent, urban planning*

INTRODUCTION

Between 1945 and 1980 Dutch housing policy focused on encouraging senior citizens to leave their family home and move to retirement housing. Although this was contrary to the general housing policies in Europe the Dutch were attempting to meet the housing needs of the post-war baby boom families in the Netherlands. In 1970, up to 30 percent of senior citizens were living in elderly homes in the Netherlands. Until 1980 housing legislation was merely intending to tackle a shortage in two- generation family-houses rather than that is was providing appropriate housing for elderly. After 1965, the birth rates stabilized towards the common values in Europe (below 2 children for each mature woman). Since this birth-gulf of the fifties is growing towards a status of third generation, the awareness of a grey growing society is rapidly gaining interest.

The awareness of the future national costs for care and medical supply is dominating the discussion.

In 1994 Houben[1] described a paradigm- change concerning care-giving in the Netherlands: from a system that delivered standardized provisions for passive elderly towards a frame of legislation in care that focuses on independent living. A further future development of the care-paradigm towards a society in which aging persons will participate actively was also foreseen. The common sense was that all seniors will end at least in a retirement home with nursing care, although already more than 95 percent of Dutch senior citizens were living independently at home. In most European countries the effects of an aging- or an even shrinking population are already visible for decades. The Netherlands, will have to cope rapidly with its gray growing future.

Aging-in-Place

The English saying “My home is my castle (till death)” reflects for many senior citizens their ambition concerning their housing. In 2007 the European Commission started for this reason an initiative program Ambient Assistive Living[2] that intends to promote a more active role in society for its European citizens. Preliminary requirements for establishing aging-in-place consist in a good urban infrastructure to facilitate obtaining daily provisions, a service-framework supporting care-giving at home and the availability of inclusive housing for all, including disabled and frail citizens. For older persons an extended independent living in the local neighbourhood

is providing much benefits. The nearness of neighbours, friends and family that are potentially providing informal help; the nearness of provisions for daily needs; and the embedding in social structures that is easing a continued social participation for the aging person. The restricted availability of dwellings that are suitable for housing even when disabilities appear remains a limiting factor.

A changing housing-market

A possible mismatch between changed housing needs of an aging inhabitant is not merely a simple problem for the involved aging person. It also impacts on the housing market. The gray grown birth gulf in the population will be confronted at large scale with their changing housing demands. While the number of suitable dwellings that meet this housing demands falls short, many persons will not obtain appropriate housing that addresses their declined health status. Thus their quality-of-life is threatened by an urban-planning that has failed to anticipate the foreseen needs of a graying society. The challenge is to plan sufficient dwellings that meet the requirements for Aging-in–Place.

Sustainable Dwelling Design

A grey growing society exists by the fact that a large part of its inhabitants are obtaining a higher age. This higher age is not predicting for the individual person whether he will suffer chronic impairments or that he will enjoy a vital health status. So far, the gain in years-to-life is hardly accompanied with a gain in healthy-years-to-life. A fine understanding of the causes for a declining health-status of its inhabitants is not that important for a housing-planner. The planner's scope is the Life Cycle of a construction "dwelling", which has to function for more than 40 years. From the point of view of sustainable production and use[3] of dwellings, a continuous use of the dwelling without major adjustments for changing housing-needs is highly important. An extended independent-living in the same house is preferable, since it produces less waste of building materials by both refurbishing and renewing the home.

The maximum level of grey-growing in the population is expected within the planned exploitation-period of a dwelling, designed to last at least 30 years.

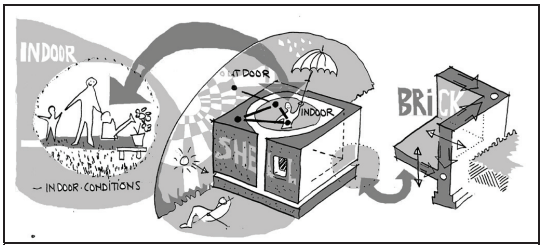
Changing housing needs

In 2002 a housing corporation in Eindhoven conducted a large research[4] on the housing-needs of all its renters, aged over 50. A majority of the renters opted for Aging-in-Place in a dwelling with garden, with three or four rooms on ground level and with a rather high level of comfort. Outcomes of other research[5,6] showed the same results.

In an earlier study older inhabitants of a Dutch retirement home[7] were interviewed about their motives for choosing to give up their independent living. Four types of motives were dominant: chronically failing health, lacking social contacts, and poor quality of the existing dwelling and precaution for future burden. Since 1992 poor health-status has remained the only valid argument for admission into a retirement-home. This study indicated that the lack of suitable housing conditions strongly influences the choice for extended independent living.

From senior inhabitant towards the "the bricks"

This paper focuses on the availability of appropriate dwelling features supportive for aging-in-place. The ambient shell of building structures provides healthy- and comfortable living-conditions for its inhabitants. In figure 1 is given a scheme[8] in which the housing-demands for the "indoor" living environment are connected with the technical features of the ambient building construction. In this scheme are connected the domains related to the quality of indoor-environment with the provision of appropriate building-components by means of building performances. The indoor-environment and its interaction with the human inhabitant is, to a high extent, linked with generic rules in the domain Building Physics. The dwelling-shell however has a giant variety of shapes and is constructed in a large range of different components. Given a restriction to the warmer humid climate zones the building-codes of West European countries such as The Netherlands and Great Britain provide specifications for maintaining an appropriate indoor-climate suitable for an average person most of the year. The generic building-codes however do not take the physics of aging-persons as a standard for its requirements. Thus a dwelling type, that meets the standards in the building-code, does not automatically address the requirements of the older segment of the population.



Required	Interaction Indoor-Climate	Offered
Indoor Climate	↔Ambient Dwelling-Shell Constructions	
Housing-Demands	**Building-performance**	**Features**

Fig.1. Living Environment, Dwelling Shell and Bricks: Relationships between Inhabitant, his living environment that defines the performance-indicators , the ambient shell of dwelling-construction and its composing "bricks" that define the material features of the building

Planning versus free market

Why should we plan, let the housing market itself solve this problem of changing housing-demands?

A graying society has to face its higher need for housing that meets the requirements for Aging-in-place. This depends on the availability of dwellings that either already contain suitable provisions or are easy to refurbish at low investments. When the housing-market is populated by appropriate dwellings, older inhabitants may easily move home to a dwelling that better suits their changed housing needs, and the housing market has worked.

However, when large parts of a population "suddenly" have changing housing-needs, conversion of the quality-level of the housing-stock works too slowly.

Sustainable planning for a gray growing society

Adding new dwellings that support aging-in-place is the most direct way to improve quality in the housing stock. However, aging societies in the Western Hemisphere are facing stabilising- or even shrinking populations[9], and as a result the number of households will stabilize also. Thus the opportunities for realising additional dwellings will decline in the coming decades. In urban planning the production of new dwellings will change its focus from enlargement of cities towards large-scale renewal of old-fashioned dwellings and reconstruction of housing-complexes that lack sufficient technical quality. Reconstruction in the existing neighborhoods is gaining favor as a result in this conversion towards aging-in-place. The planning of appropriate housing for seniors must first estimate the number of dwellings in the existing housing-stock that meet the requirements for aging-in-place. The fortunate aspect of this planning is that the foreseen composition of the demand-side, the adult population, is easy to estimate. The problem lies in estimating the supply-side: what part of the existing housing-stock is already meeting the requirements for aging-in-place?

Is it possible to generalize dwelling-quality?

Quantifying this part focuses on specific features of dwellings that are present in a variety of typologies. However, in most statistics on national level the subdivision of dwelling-types is restricted.

For the low cost-sector in social-housing the appropriate maximum of quality is more characteristic of the minimal quality standard allowed by the building code. The Building-Code rigidly applies many minimal technical standards and the design of low cost-dwellings was enhanced to produce standard-solutions for lay-outs in a limited range of preferred dwelling types. In the post World-War-II housing of the Netherlands more than 80 percent of dwellings fell into the low cost-sector. The development of standards in the Building Code is traceable in successive dwelling types with specific technical features. The local situation in the Netherlands showed a range of successive typical dwelling types that resulted from a successive revisions of the building-code.

Conversion in an existing housing market

The presence of more or less standardised dwelling types opens an opportunity to go into more detail concerning the technical suitability of the housing stock in meeting the changed housing-demands in a grey growing society; in this case the features that ensure aging-in-place. Which part and what features of the existing housing stock is opportune for conversion? What can be learned from data mining, of rather standardized dwelling-types in the Netherlands a country which has had a rigid building-code for decades, like?

From the point of view of public housing a relevant question is: *To what extend is the existing house stock suitable for establishing ageing-in place, whether directly or after minor (within months, not years) adjustments to the dwelling-construction?*

In the same line of building planning, what part the dwelling-stock is not meeting minimal standards for appropriate living in the future? Including the opportunity to realise thermal-insulated dwellings that afford inhabitants to more easily withstand the foreseen rising energy-costs for heating.

Answers to these questions in universal-housing firs rely on a set of well-defined building-standards, secondly on a clear sub-division of dwelling-types and thirdly, on locations with homogenous climate conditions.

This paper presents *a quick scan of the technical quality of the existing housing-stock which would allow conversions to support aging-in-place in a country with highly standardized dwelling typology, the Netherlands*.

MATERIAL AND METHODS

Criterions are defined for suitable dwelling that are easy to refurbish., Desktop research has yielded estimates of the numbers of necessary dwellings for age-cohorts in 2020 and 2030.

Estimating volumes in dwelling types

Desk top research has yielded estimates of the actual house stock, subdivided for year of realisation and dwelling type. National statistical comparison however is limited to a very rough subdivision: ground-bound dwellings versus apartments, rental home versus bought home. For this study the proportions of the dwelling-categories Detached, Semi-detached, Row House and End-of-Row house found in surveys of sold houses are estimated equal with the proportions in the dwelling stock. For the Dutch national situation, a large part of hired dwellings is in

the budget sector and owned by housing corporations. Which nearly is a preliminary for renovation.

Criterions for Aging-in Place

An existing Valuation Method[10] that links performance-indicators for healthy-housing to the affordability for independent living in the dwelling was used. In this method nine performance-criterions were given that determined the affordability[10]. Four criteria that were linked with the architecturall- or urban shape, and five criteria linked with technical features, including thermal-insulation. A comprehensive assessment was made using these 9 criteria on the items related to the typology of dwellings and traceability in statistics on housing.

Performance indicators

Based on the development in the Dutch Building Code and Construction Standards for 4 technical features (1908[11], 1964, TGB 1968[12], 1976, 1977[13], 1992[14], 1995, 2002[15] and 2012) the origin of the Dutch Housing production was separated in 5 periods of origin of the dwelling. Four performance indicators were each linked with a parameter in the technical features of dwelling types.

Five main-stream dwelling types in the Dutch context were reviewed for this set of parameters.

Typology of dwelling types

Existing typology of dwellings was used and was extended with the item “guarded-settlement” in order to achieve connection with the international variety in housing types on the feature Social Security.

Likely renewal towards Aging-in-Place

Analysis of the functional ability of dwellings to meet the requirements of aging-in-place was executed with Affordance[16] Typology. An affordance is a mirror-shape of a function. I.e. a dwelling may be affording aging-in-place by its design, though it was not designed to do so. For the used performance indicators some combinations of negative result will however score positive at the aspect: suitability after renewal. The most negative result, older dwelling-type is not suitable for aging-in-place because of the very high construction costs which argues for reconstruction, if located in an existing neighborhood.

RESULTS

Three levels of suitability for establishing aging-in place concern:

I, Direct usability for aging-in-place;

II, Usable after minor renewal (less than 3 months);

III, Unusable, optionally part of reconstruction.

Increase in housing for seniors

The Dutch ministry for Housing(2010)[17] had estimated a growth in the number of households for senior citizens from 1,577 million in 2008 towards 2,648 million in 2030. The complete Dutch housing-stock will grow with nearly 1 million households towards 8,231 million in 2030.The number of rental homes in the budget-sector however will decline. The complete growth in households is located in 1,111 extra owned dwellings. Table 1. Shows the future developments in households. Approximately half of theof future houses will be rental in the budget sector, an increasing half of contingent with a garden, the other half in apartments. This is in line with studies Housing needs of senior citizens in Eindhoven (2002)[4] and Parkstad (2008) [5] and the brief for senior dwellings SIR 55+ VAC[18]. The housing demands in these studies tended towards a dwelling with 2 to 3 bedrooms. Demands for the dwelling itself and its outside room (garden, balcony) emphasized comfort and ease in housekeeping. The decline of 451.000 hired dwellings in the cohort 30-65 years provides an opportunity for new dwellings in the neighbourhoods.

Mid-scenario Netherlands	X Thousands households		
	2008	2030	Balance
Nursing Home (beds)	300	**350**	**+50**
Households, total	7.242	**8.231**	**+989 A**
--Hired dwellings total	2.917	2.802	**--115**
In it 30-64 years	1.656	1.205	**--451 B**
--Owned dwellings	3.914	5.024	+1.111
Senior households	1.577	**2.648**	**+1.071**
Hired by seniors	871	1200	**+329**
60 % highest income	255	450	+195
40% lowest income	616	750	+134
--Owned by seniors	706	1.448	**+742**
60% highest income	421	845	+423
40 % lowest income	285	603	+318
Senior population households			**2.998**

Table 1. Development in households from 2008 to 2030 specified for age cohort, for owned – and rented dwellings Source data Ministry BIZA Netherlands 2010

Dwelling Typologies

Dwelling types in National Dutch Statistics are firstly divided in independent living and temporary living in a nursing house/ hospital. Independent living secondly in ground level dwellings and apartments, in hired status versus ownership. Fourthly for ground-level dwellings in Detached, Semi-detached, Row-mid and Row-End Dwelling type. Patio-bungalows are part of the detached type. Fifthly, for location, a guarded intermediate terrain between the public street and the private entrance door of the dwelling, versus a ill-defined intermediate zone, such as in gallery-apartment buildings, or an absence of a intermediate terrain. In the Netherlands apartments in nursing house or nursing hospital are of the guarded

type, nearly all other dwelling-types are lacking guarding. The quantities of dwellings per type is given in table 2.

Assessing criteria for aging-in-place

A comprehensive assessment was made for 9 criteria for aging-in place on the items: relation with architectural typology of dwellings and traceability in statistics on housing.

1. Ergonomics,elevator for apartments

Criterion Ergonomics is strongly related with the access[19] from the public domain into the building, the position of the dwelling in a building i.e. ground level or elevated level, and into the successive rooms in a dwelling , i.e. zero-level dwelling versus multi-storey dwelling with a stairs.

1. Ergonomics, zero level dwelling

This ergonomic criterion is related to the opportunity to realise at zero level a living room with kitchen, a master bedroom and a bathroom. In doing so it indicates a rule of thumb: width of a dwelling is larger than half of the sum of following rooms:

Width of sleeping zone, critical at length of bed 2,1 m plus passage for wheel-chair, 0,9 m In total 3,0 m.[20]
Width of living zone, most minimal measure 3,3 m
Width of kitchen zone, critical at sink depth 0,6m
Plus turning circle wheelchair 1,5 m. Total 2,1 m.
Entrance zone dwelling, minimal at circle wheelchair
Or entrance path 1,2 plus width of toilet 1,0 m
Building construction 0,3 m plus intersection wall
Theoretical minimum width is for a dwelling
the sum 3,3m+2,1 + 0,4= 5,8 m. Rule of thumb Universal width of aging-in-place dwelling at least 6,0 m

3. Social Security

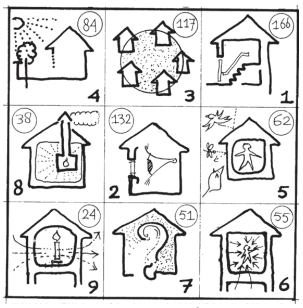
Criterion Social Security is strongly linked with an intermediate guarded zone between the public space and the private dwelling.

Several types of settlement are linked with this difference of dwelling entrance. However in the given example of The Netherlands this distinction is not made in statistics. This lack of security is optionally compensable by ambient intelligence, domotic-installations and services for alarm and follow-up

5. Stable Thermal Indoor Climate

Criterion Stable Thermal Indoor Climate is not related to the variation in typology of dwellings. However is strongly related to the year of origin of the building, since building standards for thermal insulation have progressed during the decades. Thus this criterion is retraceable in statistics of housing.

Thermal insulation concerns a preliminary condition since it determines the affordability of living-costs.



1.Ergonomics layout;
2. Visibility-Light;
3. (Social) Security;
4. Sunlight exposure;
5. Stabile warmth;
6. Emissions from building materials;
7.Acoustics;
8. Biologic agents;
9. Air-refreshment
A. City-provisions
B. Functional design
C.Joints building

Fig.2. Determinants for extended independent living. Nine determinants and 3 universal criterions[8]

2.4. 6.7.8.9.Four Other technical features

Criteria Sunny outside room, Visibility, Emissions from building materials, Acoustics, Biologic Agents, Air-refreshment were not directly related to the architectural design.

A. City Provisions

The general criteria City Provisions are not traceable in statistics. Since existing house-blocks in general are situated at locations with short distance to existing city-provisions for daily needs, this leads to a generic recommendation: situate aging-in-place favorably in existing older neighborhoods.

B. Functional Design

The criterion Functional Design itself is not traceable in housing statistics. Since the ergonomics has its effects on building standards and building codes, this criterion delivers decisive parameters for zero-level dwellings. As a result the Dutch house stock may be divided into the minimum standards for dwellings before 1977[21] and after that date. Three effects have to be mentioned within the Dutch context after 1977: first-level floors in concrete, standardized small openings for the stairs and a strong standardization in dwelling width. As a result of rigid urban planning the width of standard two-storey row-houses and semi-detached houses was fixed on 5,4 m1 since that time.

C. Building Joints

The criterion Building Joints, though not related to a specific architectural type, addresses the feature Stability of Construction and is strongly related to progress in building standards. For the Dutch legislation, the TGB 1968 is divisive. Multi-storey buildings designed before 1968 must be mistrusted for stability. Correction of this failure is only possible at high costs.

Resulting 4 used performance Indicators

Resulting were 4 performance indicators:

1- Thermal-insulation: year of origin 1980 or later

2- Stability of construction Apartment-Building with a year of origin after 1970
3- Width of dwelling 6,0 m or more
4- Elevator for Apartment-buildings, for mid-high apartments year of origin 1980 or later.

Periods of origin of dwellings

For the Dutch situation is used a sub-division in:
Period before 1945 with dwellings that are not insulated, that mostly are national heritage.
Period from 1945 until 1978, dwellings in large ranges, no thermal-insulation, for mid-high apartment-complexes (up to 4 floor-levels) no elevator
Period 1945 until 1970 apartments are lacking a stable construction.
Period after 1980, dwellings insulated, apartments in a stable construction and all with elevators.

Affording Aging-in –Place: remarks

Next to the above 4 performance indicators are positioned in table 2 remarks 1 to 9:
1. Dwellings of an origin after 1980 contain thermal insulation that affords low energy-costs for living.
2. Apartments before 1970 lacked both stability of construction and thermal-insulation. Reconstruction will bring appropriate housing in the neighbourhoods.
3. Mid-High apartment buildings after 1980 that lack an elevator afford a low-cost renovation at this point.
4. Budget-dwellings of the type row-house before 1970 had a standard width of 6 m, however were not thermal- insulated nor acoustical-insulated. Besides specimen of national heritage, an intensive large scale reconstruction of hired new dwellings following the existing property lots is a sound alternative.
5. In case of ownership of these row-houses refurbishment of the individual dwellings is a more likely plan.
6. Detached houses of all periods in general are ownership. Individual renewal of the layout of the dwelling for aging-in-place technically is a sound option, also when the dwelling is not insulated yet
7. Semi-detached dwellings with individual ownership also afford the same successful refurbishment.
8. Dwellings of origin before 1945 mostly are under national heritage. Not suitable for a large scale Renewal, thus these dwellings are not considered.
9. All low cost dwellings with an origin after 1980 have a width of 5,4 m, and mostly a concrete storey floor.

Direct usability of dwelling types?

Systems for domotics[22] have to be installed in all dwellings. Only a small part of the existing dwelling stock is directly usable for aging-in-place, category I. Some dwelling-types afford Aging-in-Place after renewal, category II.

Millions of dwellings		II Fitting after refurbishment				
Fitting Aging-in-Place		I Direct Usability				
Parameter	1.Comfort: Thermal Insulation					
	2.Stability of construction					
	3.Width of dwelling > 6.0 m					
	4. Elevator					
	Remarks 1 to 7					
Before 1945, all types		***8***				(1.3)
Before 1980	Apartments, 1945-1970	***2***		0	0	0	**0,72**
	Apartments 1970-1980	***3***	v	v	0		0.36
	Semi-detached, Row Hired, 1945-1980	***4***	v	v	0	0	0.74
	Ground level, Owner	***5***	v	v	0		1.4
After 1980 (1)	Apartments, hired	***3***	v	v	v	0.26	
	Apartments owner	*v*	v	v	v	0.55	
	Row-houses owner	9	0	v	v		0.7
	Row-houses rental	9	0	v	v		**0.32**
	Semi-detached owner	7	0	v	v	0.45	
	Detached, owner	6	0	v	v	0.22	
Result	I Directly suitable Aging-in-Place					0.81	
	II Suitable after Refurbishment					2.43	
	III Potentially demolished Fitting for urban reconstruction					**1.76**	

Table.2. Dwellings in the existing housing stock that are fitting for Aging-in-Place in the Netherlands, with 4 performance parameter and 5 dwelling types over 4 periods of origin of dwelling. Sources diverse[23,24,25]

The third category of dwelling-types, however, will not reach a quality-level that suits affordable housing without incurring extreme building-costs. Category III is a potential subject for urban reconstruction programmes within old neighborhoods. Table 2 gives an overview of the dwelling-types, their score for 4 performance indicators and the output in the above categories I,II,III.

DISCUSSION

Apart from the results that have their relevance for the Netherlands some general remarks are to be made about the used quick scan method, that is using an analysis of housing stock by dwelling-type.

Variety in building codes

The use of dwelling-typology for achieving quick scan data relies on a strong intersection of dwelling-types resulting from both a building-code that is setting the minimum standard and economic rules, that determine whether the minimum level is the maximum result. In countries with less rigid building-codes, the variety of dwelling types will be larger.
Besides, the used ergonomic parameters reflect to a certain extend differences in prosperity of countries. As already stated in the text, the used parameters are also only valid in humid-, moderate-climate zones. From the point of view of building-physics,

the general starting points will easily result in parameters that cope with the regional-climate conditions.

Differences between countries and regions

For every country the proportion of dwelling types in ground-level and apartments, in hired or owned,in row-house or (semi)detached will differ. In countries like USA with a high proportion of Detached dwellings the conversion of a substantial part of the housing stock into a dwelling-quality that supports aging-in-place will be rather simple. In a country with a high proportion of two-storey row-houses or old high-rise apartment-buildings without elevator, more problems will occur. In the European discussion[9] rural regions with shrinking population will benefit from better planning of the required types and volume of dwellings and in arguing for more new dwellings that support Aging-in Place.

On a local level, quick scanning with dwelling-typology opens a new way for planning the conversion of dwelling-types within the existing neighborhoods. Local research will provide more details concerning features that determine the suitability.

Focus on outcomes example Netherlands

Table 3 presents the Dutch housing-stock combining the outcomes in demands from table 1 and in available appropriate dwellings from table 2. The Dutch situation achieves a balance between the required building effort in coming decades and the potential use of existing dwelling-types in the dwelling stock. Criteria for needed aging-in-place are informed by the co-morbidity rate. Reconstruction of not fitting dwellings in criterion III seems at least necessary. Criterion I implies that all senior citizens will achieve a dwelling, that affords Aging-in-Place. A large part of the dwellings for seniors is to be located in the existing neighborhoods. A quick view learns that the complete volume of new dwellings is equal to the volume of additional dwellings for senior citizens. This opens a conflict of interest between generations. However the seniors have to be housed in existing neighborhoods, while the additional dwellings are located at new town extensions- plans for second generation families.

From the point of view of sustainability an additional remark concerns the similarity in housing -needs of young citizens and the senior citizens. While the guarded stand-alone senior-citizens ghetto is no option, a strong focus on the changed housing-needs may stimulate flexibility in use of dwellings between the generations. The housing-comfort of Aging-in-place for all inhabitants. Inter-generational dwellings provide a benefit for a sustainable long-term planning of housing. Even beyond the maximum of a gray grown society in 2030.

Top down national urban-planning is no longer an issue in the Netherlands. A bottom-up awareness of shortages in dwellings that suit senior citizens has to find its way, most probably in the local planning.

In thousand households, Data from table 1 and table 2	Demand In 2030	Available In 2008
Senior households total	3.000	
20 % 3 or more disabilities[26] Nursing hospital/ home Directly suitable dwellings	600	 350 810
70 % 2 or 3 disabilities Available dwellings at criterion II	**1.500**	 2.430
100 % seniors in neighborhood Directly suitable dwellings, I Dwellings, Minor adjustments II Reconstruction new dwelling III TOTAL potential	**2.648**	 810 2.430 0- 1.760 ***3.250 to 5.000***

Table.3. Balance future required dwellings for seniors and Possibilities to use existing dwelling-types

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