Housing for Europe - Strategies for Quality in Urban Space, Excellence in Design, Performance in Building gathers the results of the Urbact II Working Group "Hopus – Housing Praxis for Urban Sustainability". It is a multidisciplinary reflection on urban development, encompassing strategies, governance models, guidance instruments and assessment tools, all considered in the wider framework of current European policies on the city, housing and building technology. The looking glass of a two-year transnational exchange project, bringing together universities and local administrations, allows us to understand the great challenge lying ahead in the 21st century: the quest to create cities which are beautiful, healthy, and attractive places to live.
Housing for Europe

Strategies for Quality in Urban Space, Excellence in Design, Performance in Building
The Urbact II Operational Programme 2007-2013
Working Group HOPUS - Housing Praxis for Urban Sustainability
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Housing for Europe
Strategies for Quality in Urban Space, Excellence in Design, Performance in Building

edited by Carola Clemente and Federico De Matteis

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The history of Europe is a history of cities: these are the places where everything took place, arts and inventions, philosophy and trade, wars and revolutions. They are the very embodiment of European culture, and have played this crucial role for centuries. For a long time they have also been the designated place of beauty: beautiful places where monuments and cathedrals acted together with ordinary houses, giving life to amazing streets and squares where people lived and thrived. Even the 20th century, with its convulsive history of splendor and destruction, saw cities flourish and grow. But while planners and architects were inventing new ways to build and experience urban space, something else was happening: for the first time, cities were growing out of control, becoming large and complex conglomerations where true urban space was absent, the environment was heavily damaged, and which were very difficult to govern.

This is our European urban present, a mixed-feeling situation where our extraordinary city cores are surrounded by anonymous city crowns, where quality goes from high to low, and beauty has often left the ground. Is it possible to take action against this urban decadence, imagining innovative ways to build and govern the city, allowing both new developments and the transformation of the existing to achieve a high quality? Does a European urban tradition still exist? Will Europe be able to strive for the aims of the Leipzig Charter, which calls for our cities to be the driving force behind our future?

Housing lies at the heart of urban space, and our project studied the ways in which good residential design can lead to the creation of a good city and vice-versa. There are few things as tightly connected to local culture as dwelling, while at the same time referring to universal matters embodied in human beings. In some ways, understanding this double nature of housing means capturing the very problems of a large, diversified community such as Europe, constantly seeking a balance between what is common to everyone and what is specific to each person. We know that Europe aims to be the place of differences, a community of cultures and people who have joined forces to move together in one direction and learn from each other. The cities in our continent well represent this: different traditions, different ways
of building urban space, some successful, others less so, but with a common intention to improve what we have now. The will and ability to learn and understand is the greatest enrichment which different – and at times very distant – realities can gain from each other. This is what our Hopus project has been all about: understanding. There is no way we can transport a good urban practice as it is from one place to the other: for cities are made of people and places, and you cannot change either as if by sheer magic. But we can understand the logic behind this good practice, and try to devise a gradual change in our own way of doing things, interpreting what has been done somewhere else in the light of our local reality.

What the Hopus project has been capable of understanding is that there are, today, good ways of building the city, of designing housing, of achieving a sustainable urban development through intelligent construction. But the overarching problem is that of merging the general with the specific, the universal with the local: a problem which has so far hindered Europe from truly taking action in this direction, since it could, in doing so, betray its very nature of harboring difference and specificity. It is no easy task, and the road ahead promises unparalleled complexity. Nevertheless action must be taken, and the Leipzig Charter was a first, important step in this direction: it is the promise of a brighter urban future for Europe, and its coming implementation, in the hope that it will be as far-ranging as possible, is a challenge we must all contribute to winning.

The two years during which Hopus was enacted were a time of learning, and we believe that the result may contribute a tiny piece to the enactment of a better urban future for Europe. It was the shared effort of many people, whom we thank for their support and contribution: the whole Urbact II Secretariat, who led the way and made a fruitful exchange inside the programme possible; our Thematic Pole Manager Philip Stein, who followed the project’s development from the beginning, providing precious advice all along the way; the many friends from other Urbact projects with whom we had a chance of exchanging views and experience; our project partners, who worked with us throughout the not-always-easy development of the project: Manuela Almeida, James Arnold, David Kemp, Piotr Lorens, Martino Milardi, Deborah Pennestri, Saverio Putorti, Milly Tambach, Gabriela Rembarz and all the people on their teams; our lead expert Matthew Carmona, who gave us invaluable insight into the project’s content; our administrative staff and our communication officer Manuela Pattarini; and, last but not least, our lead partner project team, who created Hopus from the very ground up and worked incessantly on it for two years: Carola Clemente, Livia De Andreis and Federico De Matteis.
Towards Energy Neutral New Housing Developments
Municipal Policy Instruments In The Netherlands

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The Dutch government has expressed the intention to increase the current energy performance standard of the national building regulations for new buildings (EPC) step by step to an energy neutral level by 2020. In their climate policies, municipalities are preparing to meet this level for new buildings, some of them even earlier. Nevertheless, the possibilities to impose energy performances, higher than laid down at national level, are limited for municipalities: Article 122 of the Dutch Housing Act prohibits municipalities to undertake an act of civil law regarding issues covered by the Dutch Building Decree, e.g. the energy performance standard for new dwellings. National (UKR an SLOK) subsidy schemes for municipalities are financially limited, and not permanently available. Although Dutch municipal authorities can reach a voluntary agreement with developers on a higher EPC for new dwellings, this doesn’t alter the fact that outside ‘excellent areas’ - limited to 13 - they cannot impose an EPC, which surpasses the current standard. This paper investigates, how and by which policy instruments Dutch municipal governments can plan for and realize highly energy efficient new houses, which in some cases lead to surpassing the current EPC. The research was conducted under the framework of the EU URBACT II project HOPUS, focusing on design and sustainability in housing and its regulation through municipal guidance and control. It included a literature and documentary study, three case studies in different municipalities, and open interviews with civil servants and developers (housing associations). All three municipal governments seek to structurally embed energy performance indicators for new dwellings, among others, in climate and/or sustainable building
policies, plans, tenders, and in agreements with housing associations. Nevertheless, performance indicators vary, which may make comparison and monitoring of energy conservation policies on local and national level more difficult. Regional collaboration of municipalities and coherent policies of province, city-region and municipal government in the renewable energy sector may strengthen the regional economy and create new jobs in this sector. Innovative public-private financing together with housing associations or energy companies lies behind area (re)developments, which include energy efficient new houses. By investing in renewable energy technologies and the quality of public space, municipal governments can function as change agents for private investors. Communication and knowledge transfer with developers, businesses and citizens is applied in all three case studies to gain a broad social basis. Moreover, a sustainability tender for several municipal lots, disposed of in building packages and with fixed land prices on Buiksloterham industrial estate (Amsterdam) seems both a promising policy instrument and to offer a legal valid answer to the aforementioned Article 122 dilemma of the Dutch Housing Act. Design criteria in this tender make use of the first two trias energetica steps, which imply the reduction of energy demand and the use of sustainable energy sources. Apart from a focus on the sustainable quality of a design, a focus on a location’s identity can belong to the merger of interests in public-private area (re)developments. A location’s identity can be shaped or enhanced by renewable energy technologies in building or landscape design, and steered towards by municipal codes, which make use of such technologies in building or landscape design, but leave room for creativity.

1. Introduction

In 2008, the Dutch housing stock consisted of around 7.000.000 dwellings. For the next years, the Dutch government aims at an annual production of around 70.000 new dwellings, mainly located within or at the borders of large towns and some of it appointed in middle-sized towns that will grow considerably (cf. Todaro et al., 2008a,b). New housing estates will mostly form a mix of social rented houses owned by semi-public housing associations, a major share of owner-occupied, and a minor share of commercial rented houses. New dwellings are introduced e.g. as a function to reduce the environmental burden of a location, such as of an industrial estate within the city (Korthals Altes, Tambach, 2008). “Although the energy performance of newly-built dwellings has improved, the total average energy consumption of dwellings built after January 1st 2006 under the current Dutch energy performance standard (EPC of 0,8), and equipped by high-performance gas boilers, is still 20 GJ” (Van de Griendt, 2010 and forthcoming). Therefore, the energy performances of both new dwellings and of the areas, where new developments take place, will be of increasing importance, and adaptation to climate change effects will have its influence on housing design. The national government has expressed the intention to increase the energy performance standard for new buildings step by step to an energy neutral\(^1\) level.

\(^1\) We define ‘energy neutrality’ as in Klimaattafel (2008, p. 13), meaning that for the total energy consumption in buildings fossil energy supply is no longer needed.
by 2020 (see section 2). Whereas minimum physical requirements are determined at national level, municipalities have major influence on planning aspects and the architectural appearance of dwellings. Today, municipalities are in the process of formulating high-ambitious local climate policies (cf. Tambach, 2009), which may imply that building regulations based upon the Dutch Building Decree (2003)\(^2\), in particular the current EPC for new dwellings, need to be surpassed. A barrier for the realization of such aims lies in Article 122 of the Dutch Housing Act (1901) revised in 1991 and 2007, which prohibits municipalities to undertake an act of civil law regarding issues covered by the current Dutch Building Decree (2003), among what the EPC for new dwellings (cf. Hoekstra, Van der Veen, 2008). Although Dutch municipal authorities can reach a voluntary agreement with developers on a higher EPC for new dwellings, this doesn’t alter the fact that outside ‘excellent areas’ (see section 2) they cannot impose an EPC, which surpasses the current standard. In addition, Article 121 of the Dutch Housing Act prohibits municipalities to sharpen Building Decree standards, such as the EPC, in local acts (in Dutch: gemeentelijke verordeningen) (cf. Fieten, 2008). National (UKR an SLOK) subsidy schemes for municipalities are financially limited and are not permanently available (Tambach et al., 2010).

The research was conducted under the framework of the EU URBACT II project HOPUS, focusing on design and sustainability in housing and its regulation through municipal guidance and control. Carmona (2009) found that design codes focus on urban design principles, aimed at delivering better quality places, for example the requirements for streets, blocks, massing and so forth, but may also cover landscape, architectural and building performance issues such as those aiming to increase energy efficiency. With regard to Dutch national legislation limiting municipalities in their freedom to realize higher energy performance standards, higher than laid down in the current Building Decree (2003), we consider municipalities as problem holder, taking on the role of ‘code designer’ (cf. Carmona, 2010, p.27). We consider design codes as municipal policy instruments to deliver highly energy efficient new houses and to deliver better quality design and places. The research question in this paper is how and by which policy instruments Dutch municipal governments can plan for and realize highly energy efficient new houses, which in some cases lead to surpassing current (sustainable) building standards, in particular the EPC. The aim of our research was to determine policy approaches and instruments used by Dutch municipal governments to plan and realize highly energy efficient new houses, which may lead to surpassing the current EPC. Three case studies were conducted, including a literature and documentary study, as well as open interviews with civil servants at municipal housing and development departments, and developers (housing associations).

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\(^2\) In the Netherlands, the national Housing Act (1901) poses technical building requirements to all buildings, and the connected national Building Decree (2003) contains technical building regulations for both new and existing buildings, for different building functions, and includes minimum requirements in the field of safety, health, usability, energy efficiency and the environment. The latter field is not yet filled in the current decree (2003).
All three municipal governments seek to structurally embed energy performance indicators for new dwellings, among others, in climate and/or sustainable building policies, plans, tenders, and in agreements with housing associations. Nevertheless, performance indicators vary, which may make comparison and monitoring of energy conservation policies on local and national level more difficult. Regional collaboration of municipalities and coherent policies of province, city-region and municipal government in the renewable energy sector may strengthen the regional economy and create new jobs in this sector. Innovative public-private financing together with housing associations or energy companies lies behind area (re)developments, which include energy efficient new houses. By investing in renewable energy technologies and the quality of public space, municipal governments can function as change agents for private investors. Communication and knowledge transfer with developers, businesses and citizens is applied in all three case studies to gain a broad social basis.

The case studies also suggest that apart from a focus on the sustainable quality of a design, a focus on a location’s identity can belong to the merger of interests in public-private area (re)developments. A location’s identity can be shaped or enhanced by renewable energy technologies in building or landscape design, and steered towards by municipal codes, which make use of such technologies in building or landscape design, but leave room for creativity. Moreover, a tender on sustainability for several municipal lots, disposed of in building packages and fixed land prices on Buiksloterham industrial estate (Amsterdam) seems both a promising policy instrument and to offer a legal valid answer to the aforementioned Article 122 dilemma of the Dutch Housing Act. Design criteria in this tender make use of the first two of the three distinctive steps of the sustainable design method ‘Trias Energetica’ (Duijvestein, 1997)\(^3\):

1. Reduce the energy demand, by taking energy saving technologies;
2. Use sustainable energy sources as much as possible;
3. If there is still an energy demand left, use fossil fuels as efficient as possible.

This is in line with Carmona’s (2009) findings, which suggest that in regulating future urban development, design coding ‘does not stifle the potential for creativity and value generation, and may even enhance these critical contributions to place-making’. Section 2 presents the Dutch government’s energy policy for new dwellings, and important agreements on the energy performance of new dwellings. Section 3 describes the case study results by treating the approaches and instruments applied by three municipal governments to plan for and realize highly energy efficient new houses. Section 4 provides a brief summary with conclusions.

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\(^3\) Design strategy, which follows three steps to achieve a sustainable energy supply, to reduce the dependence on fossil fuels, and save the environment. The notion of ‘Trias Energica’ was first introduced in 1996 by Novem (E. Lysen), but was further developed by TU Delft (C.A.J. Duijvestein).
2. Dutch national policy: towards energy neutral new housing developments

Since 2007, Dutch policies and plans seek to respond to the need to reduce the use of fossil energy in the built environment, among what the Energy Transition Plan PeGO (2007), of which transition management is the plan’s main strategy, organized by coupling research and innovation to the realization of large-scale demonstration projects and to scaling up. ‘Leaders among research institutes, municipalities, principals in the construction and the supply industry will form the transition groups’ (PeGO, 2007, p. 42). The plan aims at an 80% reduction of fossil fuel consumption in all buildings by 2050, compared to 1990 levels, and at the realization of 80 large-scale demonstration projects (2008-2012) with rising ambition levels of 45%, 60% and 80% CO₂-reduction in three consecutive cycles.

The Dutch government has expressed the intention to increase the energy performance standard for new dwellings (home construction) to an energy neutral level by 2020 (MVROM, 2007). To reach this aim, their current Dutch Energy Performance Coefficient (EPC = 0,8) will be sharpened by 25% in 2011 and by 50% in 2015, and the Dutch government has signed the following agreements⁴:

- Climate Agreement (2007) with the Association of Dutch Municipalities (VNG), which also aims at dwellings’ energy consumption to be reduced by more than 50% and at all municipal purchases to become sustainable by 2015, among other things.
- Spring Agreement (2008) with branch organizations construction industry (Bouwend Nederland), project developers (NEPROM) & developers and building contractors (NVB), which also aims at a reduction of the standardized energy consumption in the entire new production (housing, commercial and industrial buildings)⁵ of 25% by 2011 and 50% by 2015, and at the development of a new energy performance norm, which better fits in with actual energy consumption and with consumers’ experience (comfort and housing costs). 10 areas will be selected to experiment with highly energy-efficient new developments (at least surpassing the Spring Agreement’s ambitions by 25%) on large scale (including 5-10% of the total annual new building production), among other things.

The first UKR subsidy tender ‘Towards energy-neutral housing’ (2008), based on the Dutch ‘Regulation for Unique Chances’ (UKR), a driver behind transition experiments and demonstration projects (cf. Tambach et al., 2010), granted up to € 500,000 to municipalities, housing associations or project developers for highly energy efficient housing projects comprising at least 50

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⁴ Beside these two agreements, the Dutch government signed the Energy Saving Covenant Housing Associations (2008) with the branch organisation of Dutch housing associations (Aedes) subscribing to reduction aims of the Spring Agreement, and with Woonbond, the federation for Dutch tenants and tenant organizations.

⁵ Compared to the building-related energy consumption in buildings, built under 2007 building regulation and under scope of Dutch energy performance norm ‘EPN’.
dwellings, and a reduction of at least 45% CO₂-emissions on the total energy consumption\(^6\), compared to 1990 levels. New housing projects needed to achieve an EPC of less than 0.55. The tender intended to come to concepts, suitable for extensive upscaling and further energy saving (SenterNovem, 2009a), and was open for proposals for several months in 2008. The SLOK subsidy scheme succeeded the BANS climate subsidy scheme\(^7\) and runs from 2008 until 2013. It is introduced to stimulate municipalities and provinces to undertake structural activities and measures and aims at the reduction of greenhouse gas (GHG) emissions by reducing project costs for personnel, research, communication, and education among other things. Municipal projects have to meet programme performance targets in the reduction of GHGs, per building type, and preconditions to strengthen organizations (see also Tambach et al., 2010). A first application period was organized from July 2008 until September 2009.

In addition, municipalities can now apply for grants, stemming from the 2008 Spring Agreement, up to €300,000 per project for extra process and support costs (Van der Laan, 2009a). Up to 13 projects will be appointed as ‘excellent areas’ by the Minister of Housing, Communities and Integration, in which municipalities and market parties can experiment in building highly energy efficient and innovative new houses. A project needs to contain new dwellings with an EPC, which surpasses the current standard: e.g. by at least 25%, if building works start before January 1\(^{st}\), 2011. First projects must start on December, 31\(^{st}\), 2011 at the latest. Municipalities must work together with developing parties, and in the excellent areas, they are allowed to enforce a higher than current EPC, upon which they have agreed with developing parties. Therefore, the way in which compliance (by developing parties) and enforcement of a higher EPC standard (by municipalities) is regulated is a further selection criterion. In addition, projects need to entail at least 1500 new dwellings (Van der Laan, 2009b), and have a learning effect for other areas. Innovations and renewals may be in the field of technology, organization or applied (e.g. economic) instruments. Experiences will be gathered and spread via a knowledge and learning route.

Beside the aforementioned energy policy for new dwelling’s, energy makes part of sustainable building policy, formulated in the policy letter sustainable building of April, 16\(^{th}\), 2002, and covering three spearheads: energy, materials and health. Sustainable building and renovation are also included in the 2008 Dutch cabinet’s approach for sustainable development (MVROM, 2008). With regard to sustainable building and renovation, the aim is to make buildings and urban development sustainable, by innovation in new-construction processes and the renovation of existing buildings. By 2020, all new developments must be energy neutral. Nevertheless, the Article 122 Housing Act prohibition for municipalities to impose an energy performance standard for new dwellings surpassing the current standard remains into force.

\(^6\) Inclusive of household consumption. Source: SenterNovem, 2008.

\(^7\) In the first BANS (‘bestuursakkoord nieuwe stijl’) climate covenant (1999), national and local governments agreed to dedicate themselves to reduce CO₂-emissions.
3. Case study results

This section presents the policy instruments used and developed by the municipal governments of Heerlen, Amsterdam and Almere to develop highly energy efficient new housing projects, which in some cases lead to surpassing national sustainable building regulation, in particular the EPC. The pallet of municipal instruments is neither complete, nor can it be considered a panacea for surpassing national building regulation, but reflects local trends, unique to the Dutch context.

3.1 New complex ‘Gen Coel’ as part of the Mine Water Project (Heerlen)

Climate Policy Heerlen

In the ‘Climate Policy Plan Heerlen 2004-2010’, the Municipality of Heerlen intends to take responsibility in the climate change problemacy, and to work on the identity of the city. In Heerlen’s philosophy, “energy first needs to become a familiar phenomenon, before people can become aware of the true value of energy (...). Starting from this point, one can start working towards a behavioural change in the field of energy saving and investments in renewable energy” (Municipality of Heerlen, 2004, p. 5).

In the first BANS (‘bestuursakkoord nieuwe stijl’) climate covenant (1999), national and local governments agreed to dedicate themselves to reduce CO₂-emissions. Heerlen applied for BANS subsidy to cover costs of activities, contributing to the covenant’s aim. Its climate policy plan (2004) makes use of the ‘performance card for municipalities’ of the BANS subsidy scheme with 6 themes and 3 ambition-levels. For new housing projects, the following ambitions were formulated: ‘front-running’, by applying an EPL of at least 7.0 in housing projects with more than 250 dwellings, and to realize a sharpening of the EPC with 10 to 15 % for the construction of new housing (Municipality of Heerlen, 2004, p. 21). In addition, the ambition-levels ‘innovative’ and ‘active’ were worked out, the latter also including an energy vision, to be integrated in a development plan (‘bestemmingsplan’) for housing projects with more than 250 dwellings.

Today (2009), Heerlen aims at the realization of climate neutral dwellings from 2011 onwards, and intends to come to new agreements with housing associations on dwellings’ energy consumption: for newly-built dwellings the municipality aims to achieve an A-label (Dutch buildings’ energy certificates range from A- to G-labels). Together with housing associations, the municipality will investigate how climate- and energy targets can be achieved and will take the initiative to draw up a new plan, which is expected in 2010 (Municipality of Heerlen, 2009).

Parkstad Limburg’s mining history and its cooperating and communicating municipalities

From 1800 to 1975, the winning and production of energy in the form of coal has formed the city of Heerlen. But at the end of the sixties, the mines were closed, ushering in the energy transition from coal to natural gas. Today, the socio-economic consequences of these closures are still palpable. Parkstad Limburg, a
‘WGR\textsuperscript{a}-plus region’ and collaboration of 7 municipalities, faces the problem of a shrinking population - restructuring has become preferable to new housing. It obtained a key role in the field of sustainable energy in the Province of Limburg’s plans to boost the regional economy and create new jobs. Its municipalities successfully cooperate on demonstration projects and on knowledge transfer towards organizations and citizens. To gain a broad social basis among citizens for the Mine Water Project, a first meeting with former mineworkers was held in 2004 by the municipality. The idea of reusing the mines evoked enthusiasm among Heerlen’s population, among what former mine workers, and public and private parties, also in other municipalities in the region.

**Gen Coel as part of the Mine Water Project**

One of Heerlen’s international demonstration projects is the Mine Water Project (Interreg III B), which Heerlen executed together with Midlothian (Scotland). The Municipality of Heerlen invested in drilling five wells to subtract mine water from mine galleries up to 700 metres below the Heerlen surface: it finances the primary net (wells, main transport pipes, certain pumps, etc.) for delivering a half-fabricate. In this sense, the municipality functioned as ‘change agent’ (cf. Van Hal, 2000), giving the good example by re-investing in the mines for the use of renewable energy. Housing association Weller invested in the construction of a mine water power station (Figure 1) for upgrading heat and cold (to useful heat, cold, and hot tap water for end-users) and became owner. It invested in the main installations, such as the great heat-pumps, the central-heating boilers, and the secondary and tertiary net.

The cultural centre with the mine water power station (Figures 2 and 3) functions as landmark (Lynch, 1960) and ‘brand’ for Heerlerheide Centre, accentuating the ‘genius loci’ and creating a new identity or ‘sense of place’ by referring to the cooling towers of the mine history, and by its valuable public spaces for pedestrians. The energy station is used to heat and cool about 200

\textsuperscript{a} City-regions (WGR plus-regions), are based on a so-called ‘Joint Arrangements Act plus’ and consist of a large city with surrounding municipalities, forming part of the same daily urban system. City-regions have several areas of responsibility within the field of transport, housing, the environment and the regional economy, and its budgets are considerable, although not comparable to the size of the budgets of large cities or of provincial budgets. Source: OECD, 2008.
dwellings, shops, a supermarket, a library, a district office and community centre.

The EC CONCERTOII project REMINING-Lowex (2007-2012) intends to develop sustainable communities in mining and former mining areas with a transition to renewable energy by using water of abandoned mines in combination with other local renewable sources for heating (LTH or ‘low temperature heating’) and cooling (HTC or ‘high temperature cooling’) of buildings.

**Integral system approach for the total built environment**

The Lowex-approach for the Mine Water Project Heerlen is based on balancing the supply side of RES (mine water, biomass and solar energy) with the demand side (buildings, suitable for the use of low-valued energy, meaning LTH and HTC) on the basis of low exergy principles with an integral system approach for the total built environment. There are three grids: a primary (municipal) distribution grid runs from the wells to the energy station, which is connected to the secondary grid for heat and cold delivery. Finally a tertiary net runs in the buildings. The primary distribution grid connects the wells and the districts Heerlerheide Centre, Maankwartier, possibly the Campus area (Arcus, HS Zuyd, OU), as well as the old and new office of ‘Statistics Netherlands’ (CBS) and the existing ABP office. The programme for Heerlerheide Centre exists of 312 apartments, commercial buildings, public and cultural buildings, health care and educational buildings, and an energy station. The programme for the Maankwartier district includes 110 apartments, commercial buildings, hotels and offices (Op ‘t Veld, Roijen, 2009). The Municipality of Heerlen will establish Corio Energy NV, the mine water production company. Weller Energie BV is the name of the exploitation company. Calculations
indicate that mine water energy rates will not exceed those of traditional energy sources.

**Making buildings suitable for mine water: surpassing national building regulations**

According to Op ‘t Veld and Roijen (2009) extra conditions, surpassing national building regulations, needed to be set up “to make a building mine water proof”, among what “extra thermal insulation (but not to passive house standard) with transmission value \( U < 0.25 \) for the building envelope \( U_{\text{envelope}} = 0.37 \) in Dutch building regulations), and \( U < 1.2 \) for glazing \( U_{\text{glazing}} = 3.0 \) in Dutch building regulations); demand controlled mechanical ventilation and heat recovery system with an energy efficiency of 95% (no system requirements for ventilation in Dutch building regulations); air-tightness \( n_{50} < 1 \) \( n_{50} = 3 \) in Dutch building regulations); an emission system by floor heating (LTH) and cooling (HTC), whereas Dutch building regulations don’t pose any requirements for the emission system; and an EPC for dwellings of 0.5 instead of 0.8. Low-temperature floor heating and floor cooling for dwellings creates comfortable, constant indoor climate” (Op’t Veld, Roijen 2009).

**Open business model**

An open business model with a clear financial forecast would appoint the economic and energetic return of the system, as stated by Op t’Veld and Roijen (2009).

### 3.2 Redevelopment of industrial estate

**Buiksloterham (Amsterdam)**

**Climate Policy Amsterdam**

Amsterdam aims at a 40% reduction of CO\(_2\) emissions by 2025 (compared to 1990). Over the coming years, Amsterdam aims to focus on climate and energy, but doesn’t intend to neglect other environmental aspects. The city council has decided that starting from 2015, all new dwellings and commercial and industrial buildings need to be built ‘climate neutral’. Amsterdam’s climate policy is laid down in the Air Quality Action Plan (Actieplan Luchtkwaliteit), the Climate Vision and the programme ‘New Amsterdam Climate’, which intends to implement climate policy aims in plans and in the municipal organization, but also offers a framework for public-private cooperation. To provide the necessary support, the Amsterdam Climate Office has been established, and to implement ‘New Amsterdam Climate’, the municipality established a ‘Climate Table’ to set up sustainable, public-private alliances. As a first result of the climate table, ABN AMRO, Cisco, Amsterdam Chamber of Commerce, Koninklijke BAM Groep, KPN, MKB-Amsterdam, Nuon, PricewaterhouseCoopers and the Municipality of Amsterdam agreed to carry out a joint study, on how the Buiksloterham area can be developed ‘as CO\(_2\) neutral as possible’ (Nuon, 2008). On September 10\(^{th}\) 2008, the city council decided positively on a municipal policy note ‘Sustainability in new buildings’ which distinguishes two ambition levels (Municipality of Amsterdam, 2009, p.2): (1)’climate neutral’: all energy for heating, cooling, tap water and all building-
related electricity-use will be saved or renewably generated ‘on location’ without the use of fossil fuels; (2) ‘half climate neutral’: half of all building-related energy is saved or renewably generated ‘on location’. As rule for area-bound energy performances, the municipality uses EPL\(^9\): whereas climate neutral means an EPL-score between 9 and 9.5, half climate neutral means an EPL-score of 8. For building-related energy performances, the Passivhouse method needs to be applied: a dwelling is climate neutral, if the standardized primary energy consumption for heating and cooling is 15 kWh/m\(^2\) to the maximum (Municipality of Amsterdam, 2009a).

**Municipal set of instruments**

A working group of the municipality’s climate office, its environment and building inspection department, as well as its development corporation has made the aforementioned climate ambitions more explicit. For dwellings, the following set of instruments is developed (the use of this set depends on the specific circumstances in the projects) (Municipality of Amsterdam, 2009a):

- **Technical (energy saving) measures.** The municipal environment and building inspection department has developed a calculation model, which shows, how climate neutral building can be achieved by a proven set of measures and extra costs: two variants, following the ‘trias energetica’ have been worked out for stacked apartments in Amsterdam: one making use of city heat and solar energy, the other making use of Passiv house building combined with heat-and-cold-storage.

- **Financial feasibility and financing system.** Climate neutral building of stacked apartments in Amsterdam seems to be financially possible (Municipality of Amsterdam, 2009a, p. 1) with around € 13,000 additional costs, an investment expected to be paid back via the energy bill. Financing solutions for both rental and owner-occupied sector will be developed.

- **Selection of market parties (procedural instrument).** The municipal development corporation has developed a procedure, in which sustainability plays a role in the selection of market parties and in the allocation of building packages, and which fits in with the European tendering regulation. The intention is to ‘root’ this starting point more structurally in ‘Policy rules for selection processes for real estate development’, in which sustainability must weigh substantially, respectively significantly, in the selection of market agents and in granting projects (Municipality of Amsterdam, 2009a, p.5). The extent to which sustainability will weigh in the selection and granting procedure, as well as the exact criteria will be determined per project. Buikslotheram functions as a pilot, and results of the tendering process will be evaluated, and the developed rules will be tested on usefulness and applicability for other Amsterdam’ projects. The precise criteria will be laid down in a ‘Manual for the selection of market parties’ (Municipality of Amsterdam, 2009a, p.5).

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\(^9\) EPL (Energy Performance on Location) is a measure (with maximum score of 10) for the energy quality of an entire building location, including the energy supply for or in this location (SenterNovem, 2009b), and used as communication instrument and calculation method by the municipal government - and other local parties - to support the realization of a reduction of fossil fuel consumption and in their decision-making processes in choosing an optimal energy infrastructure. EPL is also used in the aforementioned BANS subsidy scheme.
Energy visions (policy instrument). The Amsterdam Plaberen (Plan- en besluitvormingsproces ruimtelijke maatregelen) obliges project owners (urban project groups and districts) to draw up an ‘energy vision’ in the research phase (Municipality of Amsterdam, 2009a, p. 5). The municipality will organize expert meetings, in which the consequences of climate neutral building on urban development will be mapped. This is intended (together with housing associations and districts) to result in a manual with building blocks, criteria and a procedure for making energy visions.

Pilot Buiksloterham to become climate neutral area. Buiksloterham is undergoing a gradual transformation from an industrial estate to a mixed-use urban area. Around 2,000 dwellings will be realised by 2015, of what 30% social housing. The municipality intends to invest largely in the quality of the area’s public space. Industrial noise is an important barrier to the development of housing, and for this the municipality needs to communicate well with the industries involved to downsize noise nuisance (cf. Korthals Altes, Tambach, 2008). The municipality owns 75% of the Buiksloterham area, mostly bare ownership, and is acquiring land and rights of emphyteusis, an enduring title, comparable in some aspects to freehold with a restrictive covenant that may be assigned to private agents. The land is disposed of in ‘building packages’ with a specific redevelopment programme for larger lots, to give market agents more scope for optimizing functions within each lot (Korthals Altes, Tambach, 2008). The ambition is to develop Buiksloterham climate neutral. UKR subsidy was granted to a housing association for a new housing development.

Sustainability tender: unique in the Netherlands. As the enforcement of an EPC, which surpasses national regulation, is prohibited for municipalities by Article 122 of the Dutch Housing Act, the Municipality of Amsterdam has put out a first public ‘sustainability tender’ for 5 lots, in which the municipality selects developers on sustainability criteria, with a fixed land price by the municipality. Per lot, the developer with the ‘most sustainable plan’ is selected on the basis of the GPR©gebouw-score 4.0 to measure ‘sustainable building’, and the Amsterdam ‘calculation table climate neutral building’, to measure ‘climate neutral building’. The latter includes an EPL-score as selection criterion, but also ‘stepping stones’ for climate neutral building (with scores), including energy saving measures for heating, cooling, tap water and electricity, sustainable heat/cold, renewably generated electricity on location. The scoring system for climate neutral building supports the execution of only the first two steps in the trias energetica: eg. by the integration of PV panels in building design, developers can both obtain a higher score on climate neutral building, and achieve a more innovative design. GPR©gebouw 4.0 is a communicative performance instrument and label with a 10-point rating scale for buildings to calculate their environmental burden. It is used by civil servants, architects, developers and housing associations to formulate ambitions in the field of energy, environment, health, usage quality, and future value, and also supports integrated design approaches. For every field, the highest score is 10.
The tendering procedure. The selection procedure of the sustainability tender includes one public and one nonpublic round, and tenderers have to sign for the entire course of the selection process (cf. Municipality of Amsterdam, 2009c). Prior to the tender, developers are provided all necessary background information, among what the policy note ‘Sustainability in new buildings’, which includes the climate ambitions for both city and for Buiksloerham, definitions in the field of sustainability (Municipality of Amsterdam, 2008), building packages including a ‘sustainability paragraph’\(^\text{10}\), and an entry (tendering) brochure with the legal protocol, among other things. The artist impression (Figure 4) makes part of the preselection and definite selection brochure for tenderers. Figures 5

\[^{10}\text{Including requirements in the field of energy saving, sustainable energy generation, waste, use of materials, at least 30% plants and trees per lot, and flexible use of space, by referring to GPR\@gebouw and the aforementioned calculation table.}\]

Figure 4. Artist impression Buiksloerham area after redevelopment. Source: Projectbureau Noordwaarts, 2009.


and 6 further presents the way in which the municipality envisaged the area’s future with quality public spaces and green and water elements.

Preselection is based upon a public tender on the basis of the entry brochure. Preselection criteria are (1) a ‘general vision on sustainability’ (philosophy of the company, experience in the field of sustainable project development) as well as a ‘vision on sustainability in Buikslootersharm’ (ambition in the field of project development, technology, consumer: occupant/entrepreneur, future value), (2) the company profile, and (3) the financial situation of the developer. Per lot, a jury selects the (maximum) four most promising tenderers. Preselected tenderers participate in a nonpublic second round, in which they submit their building plans (designs) for definitive selection, and an evaluation on sustainability aspects (SenterNovem, 2009b), which must consist of a proposal for a ‘quality score’ in the field of ‘sustainable building’ and ‘climate neutral building’ with a corresponding design proposal. To calculate the ‘quality score’ of the building package, tenderers must use GPR©gebouw 4.0 for ‘sustainable building, and the ‘calculation table climate neutral building’, including EPL. Together, both quality scores form the ‘score in the field of sustainability’, which weighs the highest in the definitive selection. Moreover, plans are assessed on the architectural/urban development translation of ‘sustainability’ in the design and on consistency and coherence with the vision on sustainability, submitted in the preselection phase. Both the ‘score in the field of sustainability’, and the ‘design score’ form the definitive score of the plan. The plan with the highest score is nominated by the selection committee (Municipality of Amsterdam, 2009 a,b,c).

Often, the best plan is selected by an EMAT (Economically Most Advantageous Tender) norm (scoring), in which normally the provider of the best price/quality ratio is chosen (SenterNovem, 2009b). But in this case, ‘quality’ is what counts with sustainable building, climate neutral building, consistency with the vision on sustainability, and the architectural/urban development translation of ‘sustainability’ in the design as final selection criteria. The land price is fixed, and building costs of dwellings and business accommodations and the future exploitation are paid by and for the risk of the developer. The selection committee has recently selected four winners of the sustainability tender, mainly small developers, cooperating with small architectural firms, and with innovative, climate neutral designs (cf. Van Poelgeest, 2010).

Kroese et al. (2009) found that small architectural design firms are often excluded from Dutch tenders for public buildings, commissioned by municipalities, which tend to interpret the European Directive for tendering architectural services too strict by giving priority in preselections to financial turnovers of these design firms. Our findings suggest that by laying the emphasis in preselections more on a firm’s general and site-specific vision on sustainability and more on the sustainable quality of the design in the definitive selection of tenders, those stalemates can be overcome. One of the winning designs is projected on a lot, on which at least 35% up to 70% dwellings, as well as at least 30% businesses must be realized, with PV panels, city heat and cooling is presented in Figures 7 to 9. This mixed-use building plan has an average GPR-score of 9.37. The new blocks of flats have 9 for energy, 9.9 for health, 9.8 for future value, 9.7 for usage quality and 8.8 for environment.
Solar island, Almere

Local climate policy Almere
Since the 1970’s, Almere has committed itself to a programme of sustainable development (Crrescendo, 2007). Almere’s policy note ‘sustainable new living environments’ (1997) and the letter of intent Sustainable Building Flevoland (1998) laid down the minimum level for sustainable house-building, among what a 10% lower EPC standard than required by the Building Decree at that time (Municipality of Almere, 2003). Almere’s commitment for a sustainable development of the city is continued in its Environment Plan 2003-2007, which aims at 20% CO2 reduction within 6 years, 25% sustainable energy for housing by 2010 and the inclusion of a large scale wind energy network (Crrescendo, 2007). Today, the municipality aims at an ecological, economical and socially sustainable development of Almere by 2030. To realize this aim, the ‘Almere Principles’ were formulated, based on the Hannover Principles by William McDonough Architects (1992) (DLG, 2009, 18). In short and simplified:

1. diversity – as characteristic of robust ecological, social and economic systems
2. connect place and context - make identity stronger
3. combine city and nature - increase human bond with nature
4. anticipate on change – include flexibility in plans and programmes
5. keep innovating – in processes, technologies, infrastructures
6. design healthy systems – ‘cradle to cradle’ (McDonough, Braungart, 2002) in urban systems
7. people make the city – citizens are driving forces behind the making, preserving the city and making it more sustainable.

**Design healthy systems: Solar Island**

Solar island (Figure 10) has a surface of 15,000 m² with around 7,000 m² solar collectors heating water, which is pumped into the city heat net, which supplies 2,700 dwellings of heating and hot tap water. With the new solar island, the municipality of Almere intends to create a new icon and entry to the Noorderplassen-West district. In 1997 the municipality put out a tender for the integral energy supply of the Noorderplassen-West district. Requirements were a minimum CO₂ reduction of 30%, an EPC-sharpening by 10%, and energy to be sustainably generated for 10%. The tender by Nuon (1998) was selected as the best, including a proposal to connect the district to the existing city heat net of Almere Stad with collective solar collectors to renewably generate part of the city heat.

The final contract was signed in 2008 by the municipal authorities of Almere and Nuon. Nuon Warmte will build an oval island covered by solar collectors, generating 9,750 GJ per year, 10% of the total yearly energy demand of 2,700 new dwellings. 90% of this demand will be supplied by a power plant’s waste heat nearby. Energy is generated by a heat power plant and by solar island, bundled by a heat transmission station, and distributed via a district heating grid to the households (tap water). Solar island is public-privately financed: about half of the costs are beard by Nuon, about 1/3 by EU subsidy, and about 1/6 by some buyers of private lots and of new houses in the district and the municipal government (detailed information: cf. Almere City Council, 2009). Solar island’s collectors combined with district heating is expected to cut CO₂-emissions by 50%. 2000 ‘eco-homes’ are being built in the Noorderplassen-West and the Columbus district. “Specific innovations with these developments include the integration of RES and the application of energy efficiency measures in city planning, area development, public tendering, architecture and building. 500 of the new dwellings will be certified as so-called ‘solar homes’: wood-built, low-energy homes with solar power supply” (Crrescendo, 2007).
4. Summary & Conclusions

The Dutch government aims at a production of around 70,000 dwellings per year to be realised in existing and new urban areas, and the energy performances of both dwellings and areas will be a key quality issue. The Dutch government has expressed the intention to increase the current energy performance standard of the national building regulations for new buildings (EPC) step by step to an energy neutral level by 2020. For new dwellings, the energy performance standard will be gradually increased. In housing design, building towards energy neutrality marks the shift from houses that merely consume energy towards houses that also generate energy.

Beside national energy conservation policies, municipalities have formulated high-ambitious local climate policies and are in preparation to meet the energy neutral level for new buildings – some, earlier than 2020. Nevertheless, an important barrier for municipalities to demand energy performances for new houses that surpass the current EPC of the Dutch Building Decree (2003) is found in Article 122 of the Dutch Housing Act. In addition, national UKR an SLOK subsidies for municipalities are financially limited, and not permanently available (Tambach et al., 2010). Moreover, the latest grants for ‘excellent areas’ to experiment with house-building surpassing the current EPC are granted only to a maximum of 13 areas. This paper explores how and by which policy instruments Dutch municipal governments can plan for and realize highly energy efficient new houses, which in some cases lead to surpassing current (sustainable) building standards, in particular the EPC.

Energy performance aims for new dwellings are laid down in either a climate policy plan, in municipal agreements, e.g. in covenants, with housing associations on dwellings’ energy consumption and certificate (Heerlen); in a climate vision with a coherent implementing programme (Amsterdam); in a policy note on sustainable new living environments and in a letter of intent on sustainable building, including a minimum level for sustainable house-building with a sharpening of dwellings’ EPC, in an environment plan, including a rate of sustainable energy to be used for housing, as well as in guiding principles for a sustainable development of the city (Almere). Apart from plans, organisations and processes for daily municipal practice are ‘locations’, where energy conservation policy for new dwellings is structurally laid down. As for Amsterdam, a climate office and a climate table were established. The latter to set up sustainable, public-private alliances. EPC-values, Dutch energy labels, GPR©gebouw-scores, Amsterdam calculation table climate neutral building including an EPL-score, are among the performance indicators, municipal governments use in local climate policies and in their communication with developing parties – they are often combined in an integral approach of both area and buildings.

A municipal set of instruments is developed by the Municipality of Amsterdam, including technical measures and a calculation model climate neutral building, in which two variants for stacked apartments have been worked out: one making use of city heat and solar energy, the other making use of Passive house building combined with heat-and-cold-storage. Financing solutions for both rental and owner-occupied sector will be developed. A
procedure has been developed, in which sustainability plays a role in the selection of market parties and in the allocation of building packages, intended to lead to policy rules for selection processes for real estate development. Buiksloterham functions as pilot. A first public sustainability tender for several lots in the Buiksloterham area, in which the developer with - besides a design score- the highest scores on the sustainable quality of a design was finally selected seems to offer a ‘legal valid’ answer to the aforementioned legal problem for the Municipality of Amsterdam. In the sustainability tender, winners were mainly small developers with innovative, climate neutral designs (cf. Van Poelgeest, 2010). Design criteria make use of the first two steps of the trias energetica. The Amsterdam Plaberum obliges urban project groups and districts to draw up an energy vision in the project’s research phase. The Municipality of Heerlen has worked out several ambition levels for housing, among what the ‘active’ level, which includes an energy vision to be integrated in a development plan for housing projects with more than 250 dwellings.

Communication and knowledge transfer with both developers, businesses and citizens is of major importance in all three case studies: in its climate policy plan, the Municipality of Heerlen recognizes that energy first needs to become a familiar phenomenon, before people can become aware of the true value of energy, and that starting from this point, one can start working towards a behavioural change in the field of energy saving and investments in renewable energy.

To gain a broad social basis for the Mine Water Project, meetings with citizens, many former mineworkers, were organized by the municipality. The idea of reusing the mines evoked enthusiasm among Heerlen’s population. In addition, the policies of the Province of Limburg, Parkstad Limburg and Heerlen strengthened each other in the field of sustainable energy to strengthen the regional economy. The seven municipalities of Parkstad Limburg collaborate on demonstration projects and on knowledge transfer towards organizations and citizens. Apart from a focus on the sustainable quality of a design and on the Triple P of sustainable development (people, planet, profit), a focus on a location’s identity or genius loci (cf. Lynch, 1960) can belong to the merger of interests in public-private area (re)developments. A location’s identity can be shaped or enhanced by renewable energy technologies in building or landscape design, and steered towards by municipal codes, which make use of such technologies in building design, but leave room for creativity. This can create value in the area: e.g. in Heerlen, the Gen Coel complex functions as a brand for Heerlerheide; and in Almere, solar island functions as icon for the Noorderplassen-West district. This is in line with Carmona’s (2009) findings, which suggest that in regulating future urban development, design coding ‘does not stifle the potential for creativity and value generation, and may even enhance these critical contributions to place-making’. Innovative public-private financing such as in Heerlen and Almere lies behind area (re)developments, which include energy efficient new houses. Certification of sustainable and energy efficient ‘solar homes’ in Almere seems to function as marketing mechanism to sell these new homes. By investing in the use of renewable energy sources themselves, municipalities can set an example for developing parties.
Working out financing instruments for both rental and owner-occupied sector to stimulate energy efficiency investments will become an important and complex issue for municipalities and for other parties involved. Furthermore, there are different municipal climate ambitions and aims, as well as different performance indicators (besides the EPC) used by municipalities to measure dwellings’ performances in the field of energy efficiency and sustainability. This may make an inter-municipal comparison of municipal energy conservation policies’ progresses and successes, and a monitoring of such policies on local and national level more difficult.

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