



**Hamburg ahead**

INTERNATIONAL BUILDING EXHIBITION HAMBURG

## **Smart Price House Basic Building and Do-It-Yourself Builders**

August 2013



**IBA\_HAMBURG** Building the City Anew

## Imprint

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# A Introduction

## A.1 Smart Price Houses

The development of an affordable range of housing in inner cities that enables people on middle and low incomes to own or rent urban property is one of the key tasks of any forward-looking city policy. The “Smart Price Houses” are primarily well-designed and aesthetically sophisticated modular constructions or designs involving inexpensive materials, as well as supporting self-assembly and encouraging input from building associations and groups. In short, this approach marks the reinterpretation of the prefabricated building as urban housing.

The “Smart Price” concept is focused on the implementation of cost-effective construction strategies that draw on experience and assets from the fields of prefabricated building, modular construction, pre-production, automation, and self-assembly in order to come up with ambitious and contemporary architectural solutions. The resulting building must not only be “contemporary” in terms of its architectural expression; it must also make a vital contribution to addressing socially relevant issues such as ecology, sustainability, energy, and resource conservation, and the shifting of trends in community living, if it is to be considered innovative. Three “Smart Price” designs were completed by March 2013, all of which make their own contribution to the “Smart Price” approach.

A central aspect of affordable construction is the way in which its models can be applied to other sites, particularly those that feature problems that are common in cities. This approach informed the themes for the “Smart Price Houses”. To what extent are the examples created here transferable without the additional assistance of IBA Excellence funding or other subsidies? The intention is that the development of the “Smart Price Houses” will set new standards and thus establish prototypes for constructing such buildings at other sites.

The architectural and building services concept behind the “Basic Building and Do-It-Yourself Builders” (“Grundbau und Siedler”) project, a “Smart Price House”, will be set out in detail in this booklet. This building is an example of the revitalisation and transformation of the DIY approach within an urban context. Another point of focus is the clear setting out of the planning process, as various changes were made between the design stage and the implementation of the model project. The reasons behind these changes were technical, financial, or functional, meaning that some original targets had to be adjusted.

Model projects are particularly liable to undergo planning changes; indeed, besides presenting innovative end products, building exhibitions also seek to test out construction methods and processes. Only when the planning process is examined is it possible to ascertain whether a model building project can serve as a good example for the use of “smart price” concepts in the twenty-first century, or whether the concept needs to be reworked. In addition to presenting technical details for experts, this white paper is intended to provide an objective assessment of whether the model project fulfils this aim, and whether and to what extent it has ultimately succeeded in achieving the goals established before the planning stage.

After this short introduction the “Basic Building and Do-It-Yourself Builders” apartment block will be presented in brief, and then explained in detail. In particular, this presentation focuses on the self-assembly process involved in the construction, as well as the choice of materials used in order to reduce costs, and the feasibility of the concept when applied to this building and subsequent projects.



## A. 2 Project Outline Basic Building and Do-It-Yourself Builders

### FEATURES

- Cost-effective building catering to individual housing needs
- High energy standard due to step-by-step implementation
- Adaptation to sociocultural and economic circumstances through step-by-step approach



Fig. 1: View of the southwest façade, April 2013



Fig. 2: View of the eastern side, May 2013

This self-build experiment by the BeL Sozietät für Architektur, based in Cologne, enables the building's users to develop it step-by-step, according to their circumstances and needs. Significant cost reductions can be made by employing the self-build principle in conjunction with expert guidance, making this a "Smart Price House".

"Basic Building and Do-It-Yourself Builders" comprises two phases. The first sees the preparation of the basic building components (the Grundbau): load-bearing elements (ceilings, supports), the main technical installations (house connections, vertical supply and disposal wells), the staircase, and the lift, as well as the utility and working rooms on the ground floor. In a second phase, which is not required to take place within a particular timeframe, the residents or "settlers" (the Siedler) are able to undertake the interior construction of their residential units themselves. The basic structure, therefore, does not place any restrictions on the residents, so that they can configure the ground plans to suit their own requirements, with as much flexibility as possible. According to BeL Sozietät für Architektur, this phase of DIY construction allows up to a quarter of the building costs to be saved.

## PROJECT PARTNERS

### Architecture

- Bel Sozietät für Architektur, Köln

### Investor

- PRIMUS developments GmbH, Hamburg

### Technical planning

- Energie & Technik GmbH, Sittensen

### Structural engineer/fire safety

- Jürgen Bernhardt, Köln

### Partner building materials

- Xella International GmbH, Duisburg
- Delmes Heitmann GmbH & Co. KG, Seevetal

### Other project partners

- Hamburg Energie GmbH, Hamburg
- Haubrich Freiräume, Hamburg

## PROJECT DATA

### Project costs

- approx. € 2.2 million

### Plot size

- 965 m<sup>2</sup>

### Gross floor area

- 1.670 m<sup>2</sup>

### Size of the functional units

- 30 - 150 m<sup>2</sup>

### Energy standard

- EnEV 09 minus 30 per cent

### Energy supply

- "Wilhelmsburg Central Integrated Energy Network"

### Construction Period

- February 2012 - March 2013

# B Basic Building and Do-It-Yourself Project Details

## B.1 Architectural Concept

The “Basic Building and Do-It-Yourself Builders” residential block contains twelve rented or owner-occupied apartments ranging from 30 to 150 square metres. The basic building has an interior access shaft and five floors. As a structure it offers the ideal conditions for a mix of functions, while the reserve areas provide a readily available basis for further building, conversion, or development. The open basic structure allows flexible use over a long period of time. The cost of the gross floor area is €

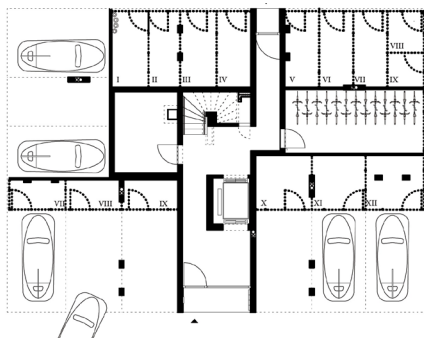


Fig. 3: Ground floor ground plan

1,670 per square metre, while the energy concept is in line with the minimum standard established by the Internationale Bauausstellung IBA International Building Exhibition Hamburg, which is 30 per cent below the 2009 energy conservation regulations (EnEV).

There are three units on each of the four upper floors, while the ground floor contains private workshops for the residents, car parking spaces, a building services room, and the entrance to the staircase. The outside space can also be customised. Like the winter quarters of a travelling circus, the outdoor spaces are open to traffic, rather than being closed off, and are not designed with any particular purpose in mind – the residents “occupy” this space and can treat it as a neighbourhood area and meeting place.

The project works with two different components: the supporting structure (the “Basic Building”) and its “Do-It-Yourself” development by the residents. The conceptual aim of the project is

to encourage the residents to carry out as much of the work on each floor as possible themselves. This DIY approach is thus lifted from the individual home and applied to the multi-storey apartment building.

### Basic Structure

As a construction made up of load-bearing walls and ceilings, with a reinforced concrete staircase core, the basic structure is able to support all of the building’s weight. In addition, several service

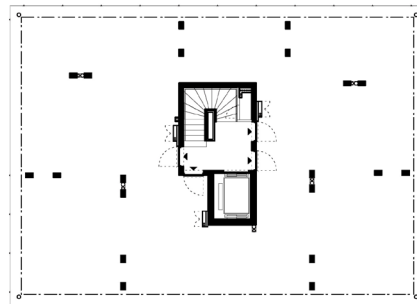


Fig. 4: Ground plan of the upper floors, basic structure

ducts run through this, offering connections for supply and disposal at various points. The structure allows up to four residential units to be set up on each floor, but the whole floor could also be used as one large apartment. The basic structure is statically scaled in such a way that it would be able to withstand the load transfer of the maximum possible development. The concrete itself is not insulated, so heat protection has to be installed for each unit.

The property is connected to the municipal infrastructure in the conventional way, at the southern edge of the site. The building service facilities include a district heating transmission station on the ground floor, which is connected to the “Wilhelmsburg Central Integrated Energy Network”. The building does not have a basement, and only the supply lines are sunk into the ground. The foundations are formed by pillars. At the bottom of the structure, the ground floor acts as a multi-purpose work area, and also offers



Fig. 5: Type 1 ground plan, upper floors



Fig. 6: Type 2 ground plan, upper floors

space for parking.

The floor-and-ceiling elements, supporting walls, staircase core, and flights of stairs are all made of cast-in-place concrete. A rail runs around the ceiling plates, forming part of the fall protection. This rail has eyelets, allowing nets to be hung between the floors. This enables work to be carried out at any time without scaffolding. The fall protection will be enhanced with an additional terrace structure of up to 25 centimetres, to be built at the development stage. In line with the terms of the development plan, the flat roof is planted with a substrate layer.

The stairs are scaled in such a way as to make them ideal for transporting materials. The lift is designed as a goods elevator, so that materials can be carried up and down. The concrete stair walls have four openings on each floor for potential apartment entries, three of which are used. The fourth is sealed by masonry and can be reopened if necessary during rebuilding.

The building services are housed centrally on the ground floor. Heat is supplied, as mentioned, by the connection to the district heating grid (see Section B.3, page 15). A central duct for electricity and water supply, located alongside the stairwell, supplies the units that are in use via a permanently accessible duct on each floor, which allows additions or changes to be made at any time.

Waste water is conducted along five vertical shafts running from the ground floor to the roof. Fire safety finishes are integrated into the ceilings with moulded bulkheads.

Each of the storeys is 3.20 metres high, built completely of masonry with highly insulated lightweight blocks. The outer façade is pure monolithic 48 centimetre thick masonry, consisting of stone specially developed for the project. The interior and exterior surfaces are not insulated, but simply plastered.

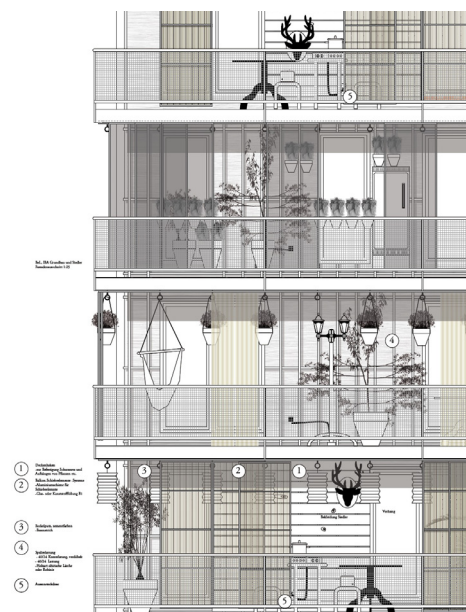


Fig. 7: Façade details



By leaving the interior insulation to be installed by the self-builders, the clearance of each floor is increased by 30 centimetres. DIY insulation increases the residents' personal contribution to their homes. Each unit can be configured independently of the units that lie above and below it, but in some circumstances complete insulation on the floor and below the ceiling must be applied to guard against cold air from the outside.

Each of the units provides heat protection against the neighbouring units. As a super-structure, the "Basic Building and Do-It-Yourself Builders" approach allows the spaces to be configured independently of the load-bearing arrangements. The floors can be adapted individually and at different times by dividing up the space. The structure can be divided into apartments of different sizes. Covered outdoor spaces are also possible. A floor plan system is pre-specified by the building concept, which allows flexible use of the space. It is not stipulated which rooms should be used as the bathroom, kitchen, or bedroom. The resident can make this decision for themselves - the space system leaves it open. The building has a 50 per cent excess quantity of vertical ducts (for sewage and ventilation) in order to facilitate a range of options for using the space. Self-assembly requires flexibility.

The basic structure contains everything that you need to build and run an apartment. The residents can begin using their workshop spaces from the very day on which they move in, and set up their own building site from there. The structure has a rail running around it as fall protection, all of the connections are in place on each plot, and the staircase and lift are ready for service. Scaffolding is not needed, as all work can be carried out by the residents on the 70 centimetre wide balconies. The concrete edges and the surrounding rails are part of the building's design principle.

### Self-Building

Residents purchase a complete assembly kit for setting up a typical apartment. This kit contains all of the construction materials, from the outer walls to the finished surfaces. A detailed manual describes all of the steps that need to be carried out and points out tasks that require approval by a specialist. Xella, the project partner, explains the processing of the materials - products from the Xella range. Delmes, another project partner, supports the residents during the construction process.

The way in which the ground plans are configured is not dependent on the load-bearing structure and the neighbouring floors. Different housing needs demand flexible ground plans. While one person might want a large bathroom with a view, another might want to use the same space as a nursery. Each unit is supplied by two installation lines, allowing a range of different layouts. The purpose of each room is decided by the residents. Flexibility comes into play via the way in which the residents decide to use the room, not by changing the existing purpose of the space.

During the planning stage, possible configurations of the individual ground plans were set out in conjunction with the residents, as part of a series of discussions. Using a configuration model with a 1:50 scale, the residents could test out which layouts would work for them. Anyone who wanted to was free to ignore the recommendations and features of the kit, and improvise instead.

The walls dividing the apartments were built with two outer casings in order to comply with fire safety and noise insulation requirements. The interior walls are self-assembled on the finished floor-and-ceiling elements as specified by the manual, and are made of Ytong aerated concrete blocks. The manual sets out the necessary steps for erecting these walls.

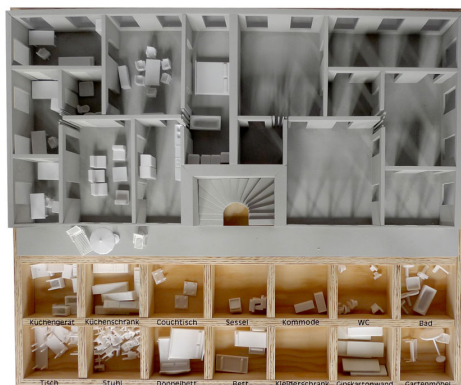


Fig. 8: Construction kit model with 1:50 scale

The monolithic outer walls, made of 48 centimetre thick stone that can be easily manufactured due to its low weight (net dry bulk density  $< 0.25 \text{ kg/dm}^3$ ), provide the necessary sound and heat insulation. The wooden window frames for the outer façades meet the high noise prevention requirements, as well as the particularly high heat insulation needs, 30 per cent below the 2009 energy conservation regulations (EnEV). Built as French doors, each is a metre wide and 2.50 metres high, but they differ in terms of their site-specific noise prevention requirements. They are either set singly into the stonework or strung together as glazed terraces. The window frames and sashes are made of varnished conifer wood.

The necessary floor and ceiling insulation is installed by the residents, following the construction guidelines supplied by Ytong Multipor (building material class A1, non-combustible). The development work for each unit is carried out as though it were taking place in a free-standing building: each unit is insulated independently of the others. Porous concrete blocks and plaster fibreboards are used in conjunction with insulating material. The masonry is self-supporting and does not take on any other load transfers, so it provides only weather and heat protection.

Unless they decide otherwise, the residents are in charge of fitting out the infrastructure, including

the supply lines for sanitary installations, the kitchen, and laundry facilities. The purpose of the rooms is therefore flexible.

During discussions with the residents, two typical layouts proved to be particularly effective and popular. The first of these avoids corridors and other connecting spaces, opting instead for a system of neutral rooms. All of the rooms are joined to one another, and each room opens onto the neighbouring rooms. These can be fitted with doors, or closed off using plasterboards. There is no hallway, and a room can serve as a study, interconnecting bathroom, kitchen, or bedroom. The residents are able to decide on the use for the particular room.

Flexibility comes into play through the way in which the residents decide to use the room, not through alterations. By leaving the function of the rooms open and placing them within a ground plan structure without a hallway, the residents are required to take charge of the space and interpret it in their own way.

The second type of layout follows the principle of open-plan common areas and defined separate zones. Here flexibility is expressed via the way in which the open areas are appropriated. Fixtures, fittings, and furniture allow the flowing, interconnected surfaces to serve a wide range of functions and go some way towards creating unusual spatial relationships.

The exterior surface of the outer walls is covered in textured plaster, in a design specified by the architects. The residents have the option of adding battens to the façade, within the confines of a specified system, so that they can also engage with the design of the exterior walls. This allows the façades to be covered with wood or trellised according to individual taste. These additional design options are set out and described in the manual.



Fig. 9: Interior view, upper floor



Fig. 10: Southwest façade, May 2013

building.

It was essential to add battens at regular intervals due to the energy protection requirements. The very thick walls thus compensate for the cold gaps, which was necessary due to the building's location. The windows that were inserted into the façades in the conventional way, are not affected by the usual dew point difficulties, as the mineral qualities of the walls were specifically designed to combat this problem.

The fall protection installed as part of the basic structure is a frame structure made of hot-dipped steel with a sheet steel inner core. The whole pedestal area beside the entrance doors is clad in hot-dipped trapezoidal sheet metal.

The primary escape route is down the requisite interior staircase. The French doors (0.90 - 2.40 metres) in the south façade form a second escape route. The hard-standing area for the fire brigade alongside the south façade allows all of the apartments to be reached. The floor of the top storey is +12.45 metres above ground level.

All load-bearing parts of the basic structure have an F90 fire resistance rating. Installations that form part of the ceilings have fire bulkheads. A central duct beside the stairwell (F90) supplies the units in use. The occupied apartments are supplied by bulkheads underneath the doors. The walls dividing the apartments also have an F90 rating, as does the whole of the stairwell on the ground floor, which extends to the edge of the

## B.2 Smart Price Concept

The Dom-ino House principle devised by Le Corbusier in 1914 has proven itself to be a successful system of construction for informal housing estates in warmer climates. Aashwa'i in Cairo, polykatoikia in Athens, gecekondu in Istanbul, and favelas in São Paulo all attest to the advantages of this Dom-ino structure, for more than simply economic reasons.

As a stacked basic structure, it offers the ideal conditions for a mix of functions, while reserve areas serve as a ready foundation for expansion, conversion, and upgrading. The open basic structure allows flexible use over a long period of time. The aim is to develop adjoining parcels of land in a cost-effective way, due to the low demands placed on the basic structure, allowing the design to be applied in series at a low cost. The residents then have the opportunity to develop their plot at their own pace, according to the amount of time and money that they have available.

The city contains a number of leftover areas, or “metrozones”, at the interface between different types of urban use. These are underused, yet have good connections and favourable land prices. The “Basic Building and Do-It-Yourself Builders” model is ideal for these inner city peripheries, which are neither fully urban nor fully rural. It uses space; indeed, it gives it value. This philosophy seeks to bring together multi-storey buildings and the greenery that is found all over Wilhelmsburg.

The contemporary application of the Dom-ino principle in Germany requires highly insulating concrete building materials and/or insulating masonry. In order to meet the demand for comfort, economic value, and ecological soundness, which are typical of a developed, post-industrial society, the residents' housing units must be thermally insulated. The load-bearing reinforced concrete skeleton remains cold. The aim of this project is to establish an approach that is as sparing as possible in terms of the materials used, yet is also as simplified as possible in using them. The

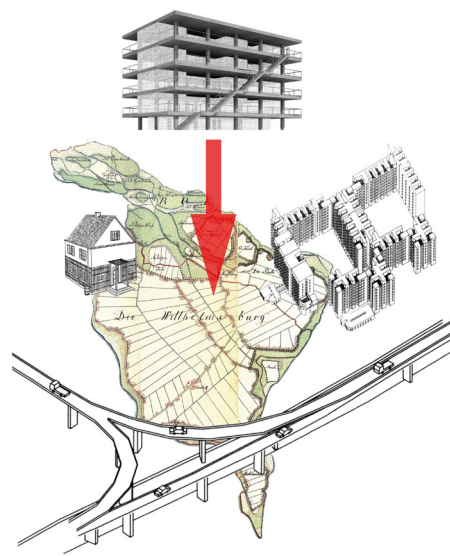


Fig. 11: The basic structure, located in a densely populated yet green area

key feature of the development is its use of walls as the basic form of construction, in conjunction with highly insulating stone. Everything is brick-built: the outer walls, the dividing walls, and the insulating layers in the floors and ceilings.

Modern urban societies need to offer large sections of the population the chance to own their own homes, and in the light of the current housing situation in large cities alternative models for creating living space are being sought out. In line with the aims of the project, those who are set to undertake the DIY work tend to be in the low- and middle-income brackets, yet are upwardly mobile in social terms – often inhabitants from an immigrant background. Despite their own ambitions, people are often forced to adjust their living situation and thus an important part of their lives to the supply of rental housing. This leads to passivity and thus dissatisfaction due to the compromise that they have had to make.

The idea behind “Basic Building and Do-It-Yourself Builders” is to reduce the entry threshold for home ownership through low costs, thus

unleashing the potential for home ownership and self-driven action. Due to its simplicity, the concept can be applied to almost any location in the city. All it needs is a good site, an investor or building owners' association to erect the basic building, and partners or a community structure to support the residents as they undertake the self-assembly stage.

This DIY work saves 20 per cent of the costs, and also raises the residents' self-esteem by giving them greater control of their own lives. This form of "settlement" means defining one's own home on one's own plot of land, as well as handling shared issues in discussion with neighbours. Each plot is independent, and in the basic structure it is part of a series of units that encourage mutually beneficial community living, with eight to twelve apartments. This size has been proven to



Fig. 12: Visualisation of the unoccupied basic structure



Fig. 13: Visualisation of the basic structure once it is occupied

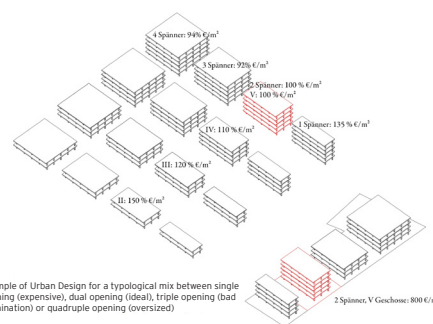


Fig. 14: Possible building types

be most advantageous for multi-storey residential buildings, and is sufficiently profitable for the investor due to its size, while also being easy to manage (see Figure 14).

The "Basic Building and Do-It-Yourself Builders" project features self-assembly within a multi-storey building, and is composed of two stages. The basic structure is an optimised shell construction, a load-bearing skeleton with access and necessary installations, and is equally accessible to all of the residents upon purchase. All of the provisions for the DIY assembly of an apartment have been made: fall protection running all the way around the building, installation lines, a staircase, and storage areas on the ground floor for each resident's building materials. The second phase of construction – self-assembly by the residents – begins after the completion of the basic structure.

From the planning phase onwards, the self-assembly element is accompanied by guidance and planning support for the individual residents, and structural guidance and advice are given throughout the whole construction process. The residents receive a manual that provides technical information for their DIY work, and explains all of the steps that need to be carried out, including marking up the walls, grouting the blocks, installing the insulating material, and positioning the windows.



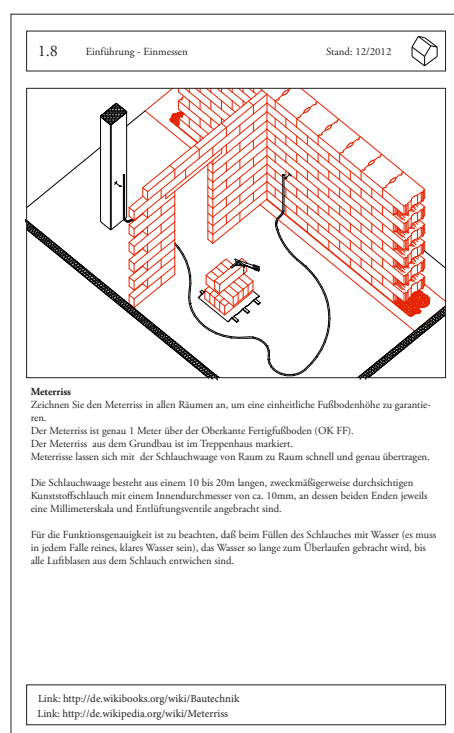


Fig. 15: Extract from the residents' manual

The "Basic Building and Do-It-Yourself Builders" apartment block is classed as a "Smart Price House", as it uses simple, cost-effective materials and self-assembly to ensure low purchase or rental prices that are significantly below the market average. The versatility of its ground plans allows each unit to be configured on the floor itself. The whole development is thus seen as a cost advantage, as it makes the multi-storey building something positive. Due to its use of in situ concrete, the basic structure allows recourse to a wide range of market players. The cost-effective design afforded by the use of simple materials that can be handled by the residents themselves means that the DIY approach presents few hurdles, while also allowing the future users to determine for themselves the extent and style of their work.

A number of different self-assembly models are possible, from complete self-assembly of the unit

to development of the surfaces alone. Of course, if the residents take on less of the self-assembly work the costs for the unit increase significantly. According to calculations, the concept used here breaks down into 50 per cent for the basic structure, 24 per cent for the additional material for developing the units, and 20 per cent for the residents' self-assembly work.

## B.3 Building Services Concept

A home connector head can be found in the building services room, which supplies the building with low-voltage electricity from the distribution grid. General utilities and the district heating supply are set up in a separate meter panel for direct readings within each of the twelve apartments.

After a reading has been made, it is forwarded directly from the units in use to the central distribution board for general consumers. The routing of the main lines is carried out in the services room, fixed to the C-profile rail with bolt clamps, in the central vertical duct on a rising line. From here each apartment is reached by an empty conduit under the floor of the stairwell. The cable itself is inserted during the development stage as required.

The building is connected to the "Wilhelmsburg Central Energy Network" and meets the IBA's minimum energy standard, which is 30 per cent below the 2009 energy conservation regulations (EnEV). This relates to both the primary energy requirements and the specific transmitted heat loss according to the standard established by the reference building, as specified in Appendix 1, Table 1 of the 2009 EnEV for residential buildings. The apartment block's heating load is approximately 35 kW per square metre per annum. The power required for heating water is added to this, so that the building has a total heat energy requirement of about 45 kW per square metre per annum.

Heat is supplied from the district heating grid operated by HAMBURG ENERGIE GmbH, via the "Wilhelmsburg Central Energy Network". There is no central storage for hot water; instead, water is heated within the individual apartments. This set-up was selected as the most space- and cost-efficient version of a flow system without storage. Water can thus be heated separately in each apartment, preventing hot water supply and circulation from being held up by apartments that have not yet been developed.

By using the flow principle for the water heating system, the total power needed for hot water is 107.5 kW. To avoid having to have this peak load constantly available, a buffer tank is installed in the boiler room, which reduces this peak power so greatly that no significantly greater power is necessary than that required to cover the heating load. The system temperatures are 70/50°C on the primary side.

Heat is distributed from the heating system to the individual apartments via a central supply duct. A central disposal duct with differential pressure adjustment for each floor is located in the installation shaft, with three outlets for three possible apartments on each floor. Adaptors for heat meters are located in the installation shaft. As previously mentioned, each apartment has a substation. These offer heating and water heating for each unit and can be regulated individually. This concept allows such services to be customised for each apartment. The particular advantage of this is that it is not necessary to provide water pipes for optional use. This is especially important given that water pipes do not have to be kept full to avoid contamination.

The type of heating for each apartment has not yet been established. The residents can decide whether they want to use radiators, underfloor heating, wall heating, or another solution, using the apartment station.

Each unit has a stub connection to the water supply from the central supply shaft. This connection is made only during the development stage of construction. The distribution network is constructed of copper pipes in accordance with DIN 1786 standard, while the pipe connections in the press-fit system have a visible press safety standard (SC - Contur). Water is heated using the apartment stations (see above).

The installation or supply shaft runs from the building services room to the roof, and has a fire resistance rating of F90 in the stairwell. The shaft has bulkheads across the floors, so that smoke extraction at the head of the shaft is unnecessary. The F90 partitioning is, nevertheless, in place because the shaft has a fire load.

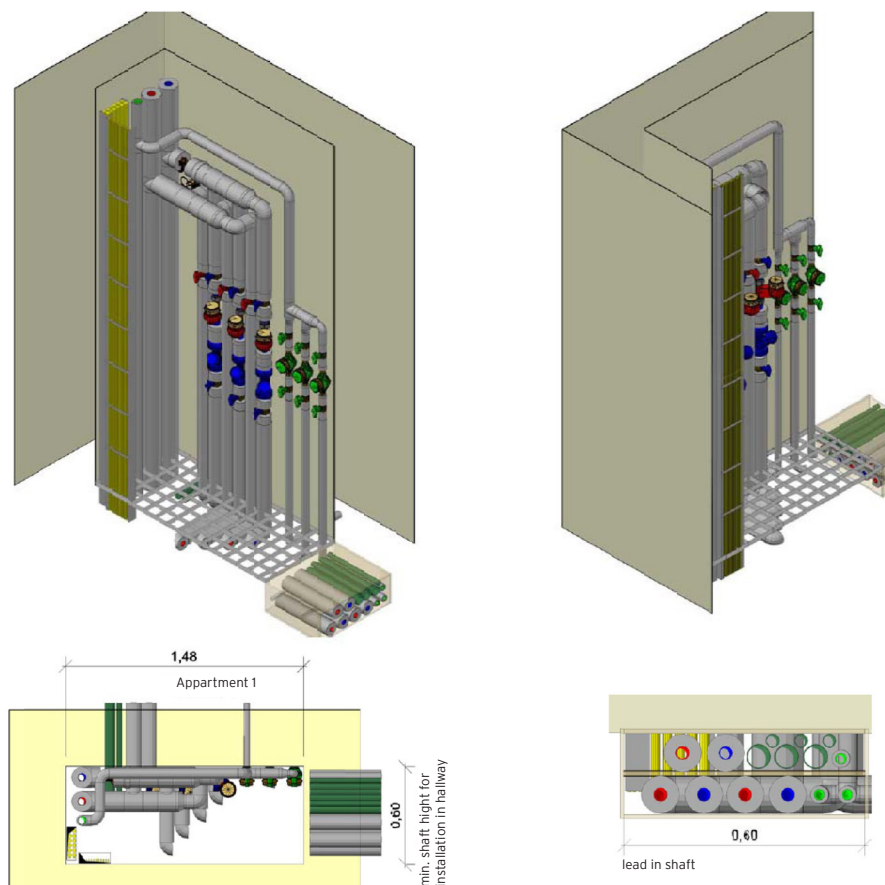


Fig. 16: Detail of the supply shaft structure

## B.4 Planning Process

### Changes to the Competition Design

The entry submitted by the BeL. Sozietät für Architektur for the 2010 competition was partially revised and updated. Initial adjustments were made just before the start of construction work in March 2012, as the result of energy requirements. These were followed by further alterations due to experience gained during the marketing and self-assembly phases.

The competition design originally envisioned a structure made of masonry and infra-lightweight concrete for the ceilings and outer walls. The project partners suggested the use of infra-lightweight concrete, but in further planning it was found that this would prevent the building from achieving the hoped-for level of insulation, making it necessary to alter the basic structure that would later be developed. The basic struc-



Fig. 17: Image from the competition design

ture was built in the conventional way, of in situ, waterproof concrete, while all insulating material is applied in the development stage. In order to allow as much space for the windows as possible, the thickness of the walls was increased from 40 to 48 centimetres, thus meeting the energy conservation regulation guidelines (EnEV). According to the original design, there were to be two units of different sizes on each floor. This was raised to three units, so that the four upper floors of the building now house twelve apartments, instead of eight, with three units per floor.

The “settlement” concept was not fully implemented for the following reasons:

- Due to the complex thermal and noise in-



Fig. 18: Construction site, summer 2012

- sulation requirements, the future residents who had bought the units did not feel confident enough to undertake the work involved, and purchased this additionally from the building contractors,
- The first round of marketing did not attract enough future residents to occupy the entire building, although this was part of the competition concept, as was the subsequent customisation of the basic structure by the residents. The building contractors therefore decided to go ahead with just erecting the façade for the remaining units. This provided an additional aspect to the marketing of the project, as it now offered the possibility of renting a closed shell construction and making this into a rental-worthy property according to one's own tastes.
- Mixing resident-determined development and contractor-determined development allowed interfaces between the dividing walls of the apartments, the completion of the shafts, and the weather protection elements to be simplified.

### Search for “Settlers”

The search for “settlers” (residents) began in autumn 2011. It was launched with coverage in IBA\_Blick 4/2011, which resulted in 35 parties expressing their interest. The ostensible aim of the resident selection process was to find a suitable mix of people for the twelve residential units. In this respect, it was similar to the formation of a housing community and, indeed, the “Basic Building and Do-It-Yourself Builders”

## Siedler für Grundbau gesucht



Außerdem können Ihre Fenster einzeln, können die Installationen machen etc. Hierfür gibt es einen Bonus, den man erwirbt und mit dem man viele weitere Vorteile erzielen kann. Wenn man eine Einzahlung von 1000 Euro einlegt, ist es unschuldig, wenn man eine nuppie oder Wahrheit. In den nächsten Monaten wird es Hauptbestandteil unserer Arbeit sein, die Bausteine so zu schüren, dass sie genügend Freiheit bieten und für die „Siedler“ attraktiv sind, damit sie sich dann wiederfinden und damit glücklich sind, Vorränge Ziel dabei ist, niemanden zu

Fachkräfte zur Verfügung. Zudem soll es einen Ansprechpartner geben, der übergeordnet für alle anderen Sorgen zuständig ist. In der Primus Development GmbH sind wir heute ein Unternehmen, das sich mit der Unterstützung des Projekts realisiert.

Ich komme unglaublich gerne nach Hamburg und liebe den rauen Charme Wilhelmsburg. Als ich das erste Mal das Grundstück betreten haben und diese Scherbenparteiwartet dort gesehen haben, so nah am Hafen – das ist ein unglaublich

seine Träume verwirklichen. Wir sind davon überzeugt, dass es eine tolle Nachbarschaft mit Menschen werden wird, die alle das gleiche Interesse haben und sich gut kennenlernen werden. Ich glaube, das ist aus ökonomischer Sicht und aus Lebensführung etwas, wozu man bisher selten die Gelegenheit hatte.

**Grundstücksadresse:**  
Am Insepark 11, 21019 Hamburg

**Bei Interesse am Projekt** und für weitere Informationen wenden Sie sich bitte an:

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Fig. 19: Extract from IBA Blick 4/2011

apartment block behaves in much the same way as these: twelve parties live under one roof, and are in close contact with one another due to the development work on their apartments. This rapport continues to exist after the end of the development work, as there are many areas, according to the building's concept, that remain open to customisation, such as the communal areas on the ground floor and the outdoor space. It was therefore important to achieve an effective mix of people.

These individuals were selected by the property developers and their architects over the course of several discussions with the interested parties. The aim was to separate those who were genuinely interested in the DIY aspect of the project from those who wanted only to purchase a property cheaply and leave the complete development of their unit up to the developers. Overall, the selection process revealed that half of the prospective tenants hoped to carry out the development themselves, while the other half were simply looking for a property. The proportion of those interested in self-assembly was much higher among the prospective owners than among tenants. This was due to the not insignificant investment required at the start of the lease period, despite the low-cost design and the DIY element, which many were not able to afford, as payback periods of five years or more are apparently perceived as much too long in the rental sector. The interest in self-assembly was mostly limited to the finishes; the tenants considered the whole development package to be too extensive.

The tenants were offered different floor plans

from which to choose, while the self-builders could have an input into configuring their ground plans. They were advised by the architects on possible ground plans, simulated on a 1:50 model. It was striking that the self-builders tended to opt for very free and non-hierarchical ground plans. The first “settlers” began to develop their apartments in January 2013.

### Development by the “Settlers”

The interior is to be completely fitted out by the residents. Work has already begun on some units, while others still only comprise the basic shell. The "settlers" currently have the advantage that there are always craftspeople in the building developing the rental apartments. If they have any questions or uncertainties about the process they are therefore able to get tips from the professional craftsmen on site and observe techniques, as well as referring to the theoretical guidance set out in the manual. In some cases they can also borrow materials from the craftsmen, and the building contractor can instruct the craftspeople on site to offer certain services at cost-effective prices if the residents cannot or do not wish to undertake them themselves.

A number of different development packages are offered for the "settlers". They can opt for the enhanced shell with windows and plastered outer walls, along with various external services. Everything else must be self-built. The materials required for this are supplied by Xella on behalf of the building contractors, if requested by the residents. Machinery can be rented at favourable prices from Demes Heitmann or OBI Harburg. Like Xella, these firms are able to give regular instructions for using materials, installing fittings,



Fig. 20: "Settlers" carrying out building work



## B.5 Assessment

Thus far, the building work carried out by the residents has been relatively free of conflicts. There have, however, been some difficulties. Problems arise, for example, at the interfaces between the self-building processes and the way in which these are coordinated with the services carried out by the craftspeople. The question is, to what extent can the different services be compartmentalised? Should a professional craftsman be commissioned for very minor jobs that the self-builders cannot undertake themselves? Or should certain services be offered only as part of packages that make financial sense for the craftspeople and self-builders alike?

Building services work is very complicated and is therefore often carried out by craftspeople rather than residents. The house connections, heat transmission station, and ascending pipes are all in place, but for everything else the “settlers” must follow the instructions given in the manual. Moreover, if the work is being done by them, the building services must be approved by a certified technician. This may be seen as too inconvenient, and the “settlers” often reject the idea of doing these tasks themselves.

Essentially, however, the development work is easy to implement, as help is on hand in the form of the manual, as well as extensive guidance by Xella. A Xella employee often visits the building site on Saturdays to demonstrate the basic steps and look at the next stages of the self-assembly work, before staying to offer advice. This employee also oversees the use of the tools and can



Fig. 21: Training by a building firm employee



Fig. 22: Final self-assembly work by residents

normally lend out suitable tools by requesting them from the materials partner, Delmes Heitmann.

The experience with the initial “settlers” has shown that doing the development work two by two, working exclusively at weekends and some afternoons in the week, has allowed relatively quick progress. The interior walls of one of the apartments were, for instance, completed by one resident in only four days. About a week should therefore be allowed for each task, and by using this time in a flexible way it is quite realistic to expect the development work to be completed in around three months.

Three building blocks are essential to the success of the self-assembly concept. Firstly, the residents will invariably require professional guidance, both in terms of the theory given in the manual, and through good product information. Secondly, they need practical assistance in the form of demonstrations, guidance, or checking by professional craftspeople, so they should be able to approach someone if they need help or encounter problems. Thirdly, they require the continuous employment of materials and building components that are easy to use and have as few different layers as possible, as this reduces the likelihood of errors; the elements are already prefabricated and simply need to be reassembled.

In its current form, the “Basic Building and Do-It-Yourself Builders” concept works as a model “Smart Price House”.

There are, however, requirements or possibilities for optimisation that would allow the costs of urban self-assembly to be reduced even further:

- A key point is the structural analysis, which is very heavily based on the intended flexibility of the project (open supporting structure, large spans). If these were not required to the current extent, the construction costs could be reduced.
- Enhancing the concrete by using high-performance insulating concrete could significantly reduce the cost of insulation, which is currently very high (each apartment is completely self-contained). This would allow the model to be made even simpler.
- The use of mostly dry construction materials that are made from a single substance has been shown to make sense, as this materials concept is less prone to errors when applied by the “settlers”.
- Self-assembling the outer façades would also be perfectly feasible under simpler conditions, but should still be weighed up on a case-by-case basis.
- The insulation is currently very expensive, and the cost could be greatly reduced when it is applied to other regional or climate conditions.
- The conditions of the plot have a significant impact on the cost structure: the plot price (in this case, a fixed price); the foundations design (in this case, pillar foundations were necessary due to major subsidence); plot modelling (in this case filling was required); and outdoor facilities (in this case, materials specifications).
- The key question is whether the costs incurred during the building of the basic structure from the outset rule out the model for subsequent development, since the “settler” is already landed with significant costs at this stage. Interestingly, the model could be applied to existing properties and office buildings, for example, that are no



Fig. 23: Southwest view, May 2013

longer in use, by converting them into apartments. This would allow sites encumbered by abandoned buildings to be transformed into useful properties.

The experience gained with the “Basic Building and Do-It-Yourself Builders” project involving a “Smart Price House” can be considered positive, although some areas, as mentioned above, require optimisation. PRIMUS Developments GmbH is currently working on applying the concept to a site in Hamburg. The concept has already won three design prizes: the Universal Design Award 2013, the Universal Design Consumer Favorite 2013, and the 2013 German Architecture Prize.

The fact that the concept is already being applied elsewhere is testament to its exemplary quality and transferability. The self-assembly aspect and its associated cost-saving potential are being put into practice.

When applied on a large scale, the concept of self-assembly in multi-storey buildings creates a high demand for materials. This approach offers an ideal platform for testing out new DIY sales concepts, and has opened up a significant DIY market. Using innovative financing models for this market, “Basic Building and Do-It-Yourself Builders” can be developed into a model total package solution. The DIY market benefits from building long-term consumer relations and profitable sales volumes, while the consumer benefits from cost-effective funding and good bulk

discounts. The DIY market can be an investor, finance provider, and supplier all at once.

The model project can be considered a partial success, as it offers space for sale at the intended end-user price of € 2,500 per square metre. This price falls within the “Smart Price” category and is well below the Hamburg average. Some of the potential savings would allow the price to be lowered to a minimum of € 2,300 per square metre. The high cost of the insulation required for this project accounted for much of the costs, with the building’s location playing a major role. In this respect, when applying existing savings to other buildings it remains to be seen whether “Basic Building and Do-It-Yourself Builders” in its current form can act as a model project for “Smart Price Houses” in northern latitudes. It would certainly fulfil this role in regions such as southern Europe, where there is no need for such heavy insulation, and where it can therefore serve unreservedly as a model for cost-effective home ownership within cities.

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