PATCH22, stacked villas in a timber highrise

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1. The architect as developer

Figure 1: Patch22, south-west view. Photo: Luuk Kramer

PATCH22, a 30m tall high-rise in timber, was one of the winning entries to the Buiksloterham Sustainability Tender in 2009. As initiators, we (architect Tom Frantzen and building-manager Claus Oussoren) wanted to achieve independently what we had never been able to achieve when working on commissions for our previous clients: an outsized timberen building with a great degree of flexibility, striking architecture and a high level of sustainability, not because that was what was required but because that is what ought to be done.

The project was developed for our own account and risk in the middle of the crisis years of 2009-2014, and innovative financing solutions were conceived and implemented to meet this challenge. The project also incorporates numerous innovations in the technology used and application of technical rules, all aimed at achieving the desired flexibility without having to make compromises. Examples include the hollow floors and removable top floor, the lack of shafts in the apartments — achieved by having the piping and cabling taken horizontally to central shafts in the core — and agreements for a fixed ground lease with flexible positioning of the functions within the building. But the most unusual feature is the use of a timber as the main structure for the 30m-tall building. Moreover, the timber has largely been left visible, making this a key factor in the ambience of the apartments and the exterior.

2. Sustainability, energy neutral

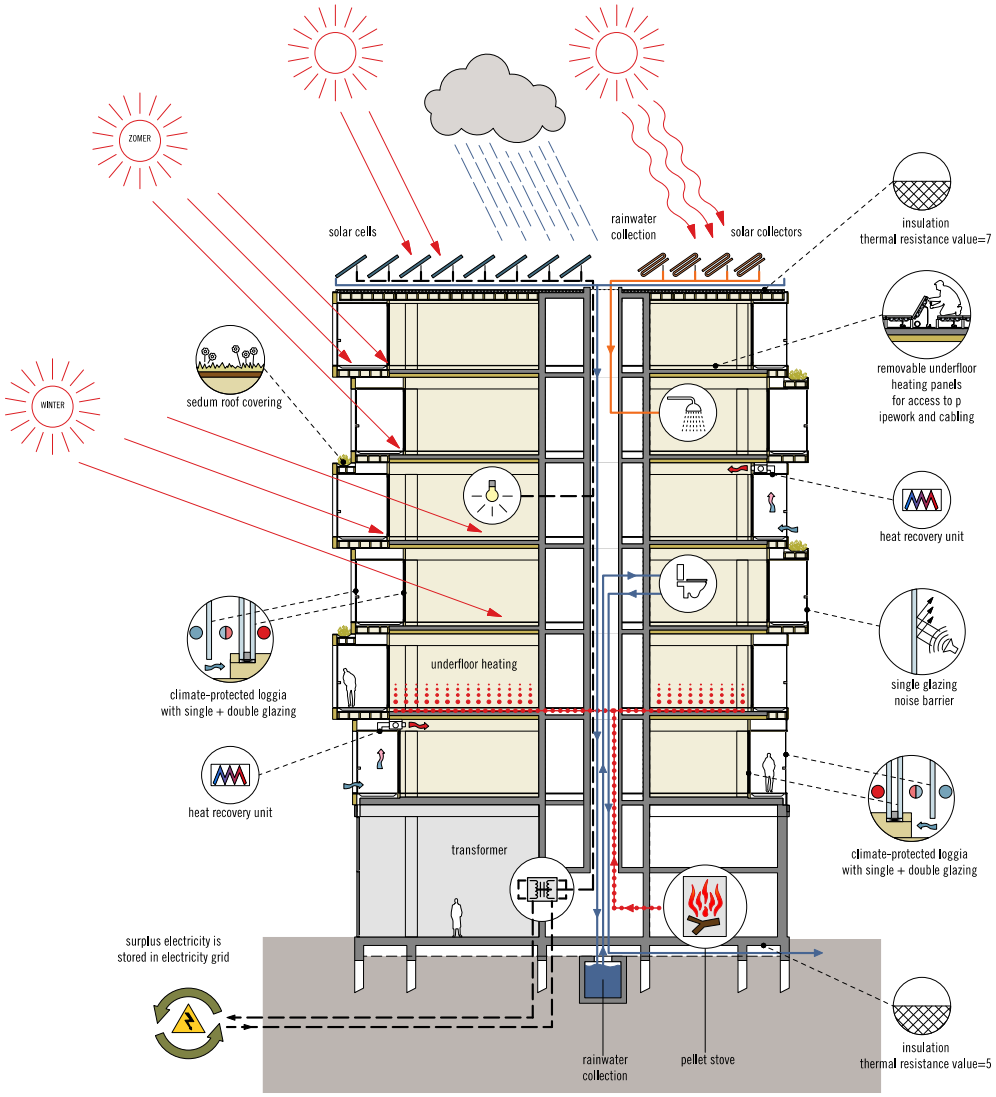

Figure 2: Schematic section showing the sustainable solutions

In Patch22, 'sustainability' is achieved through energy efficiency, the use of renewable materials and great flexibility in the floor plan layout options. The 2009 design for Patch22 had a GPR score (a Dutch governmental Benchmark score) for sustainability of 8.9 and an EPC for energy efficiency of 0.2. The roof is entirely covered with PV panels, making the building energy-neutral. Rainwater is collected and reused in a grey water system. Heat is generated using CO2-neutral pellet stoves that use compressed waste timber from the timber industry as fuel.

3. Sustainability: as much timber as possible

Figure 3: interior of a finished apartment. Photo: Luuk Kramer

The 30m-tall building uses timber, a renewable material, as its main material for the structure and facade. According to the cradle2cradle philosophy it is Ok to use a material exuberantly when nature provides us with it again and again. With this in mind we solved the fire resistancy issue that obviously arises when building a highrise in timber and keep all the timber used in plain view.

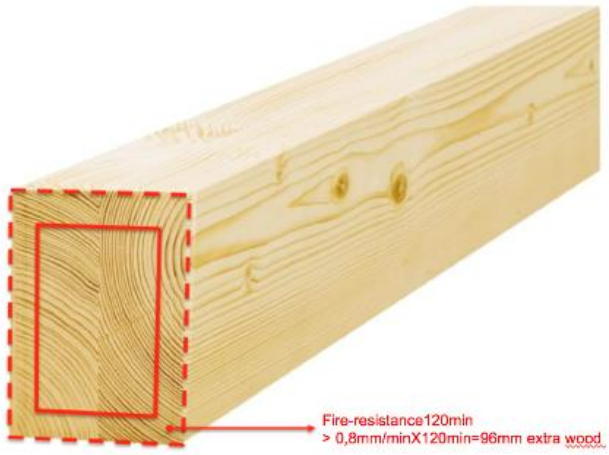

Figure 4: timber on the outside protects timber on the inside from fire

In the Netherlands fire resistancy is based upon the time structural integrity of the load bearing structure is not compromised. In the case of Patch22 we had to achieve the 120 minutes standard. How to achieve this is not specifically regulated in Dutch building requirements. Since timber is often used as a fire protective layer around steel structures we simply proposed to use timber on the outside of the structure to protect the timber on the inside of the structure from fire. In case of fire 0,8mm of timber is burned away and charred. To achieve the 120 min. fire protection, we added 96 mm of timber to all exposed surfaces of the timber structure. From a sustainability point of view, it complies with the cradle-to-cradle philosophy that if the source is renewable it is OK to use a surplus of material. Steel joints are used to connect all the timber elements and the structural timber itself is used to protect these joints in case of fire.

4. Sustainability: flexible installations

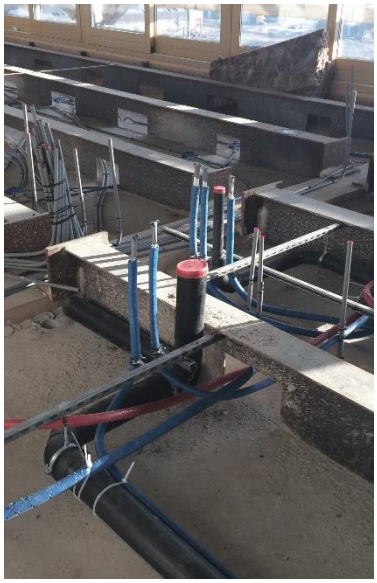

Figure 5: The hollow floor giving access to hollow space with pipes and cables as constructed, without the top floor.

Figure 6: The interiors as handed over to the buyers, empty lofts with the timber structure in plain sight. Photo: Luuk Kramer

The owners of the apartments are able to design and install their own layout for the pipework and cabling thanks to the hollow floors with removable top layer. They can easily make changes later on. The piping and cabling run horizontally to a central shaft in the core. The division walls between apartments, with a slight gap for acoustic reasons, can easily be added or removed. This means apartments can be subdivided or merged, and the division into apartments will remain flexible in the future. The fire resistance requirement of 120 min. for the main load-bearing structure was satisfied by adding 80mm of extra timber to the timber structure on the fire-load sides.

5. Sustainability: flexible floorplans

The high-rise section of the 5400m2 building can be converted from commercial space into residential space and vice versa without any changes being needed to the structure. The storeys, which shift in and out in a playful manner, can be used as large loft apartments of up to 540m2 with huge balconies, as up to eight smaller apartments or as open office space covering the entire floor thanks to the lack of structural dividing walls, the generous storey height of 4m and the high floor load of 4kN. Apartments can be subdivided or merged, and the division into apartments will remain flexible in the future. The apartments themselves offer complete layout flexibility because the occupants are able to install the pipework and wiring to their own need and demands in the hollow floors with removable top layer.
Our office FRANTZEN et al architects did not design all the interiors but we coached all the owners in their process of designing their homes themselves. Some used interior architects; some used nothing more than drawing paper and a pencil. When all the designs were conceived, our office converted them into working drawings so all plumbing and electricity could be installed already in the hollow floors during the construction phase by the general contractor. After completion of the casco building the owners could start building their own interiors with their private contractors or even by themselves.

6. Stacked villas

We aimed at creating a structure in which all buyers would be able to build their own villa. On the other hand, we didn't want to create just an anonymous facilitating structure because the renewal of this post-industrial area needed a landmark to show the city that transformation has begun. It turned out that the expressive exterior and the completely open layout of the interior were the perfect combination to attract buyers to this part of the city, even in the middle of the creditcrunch period 2009-2014

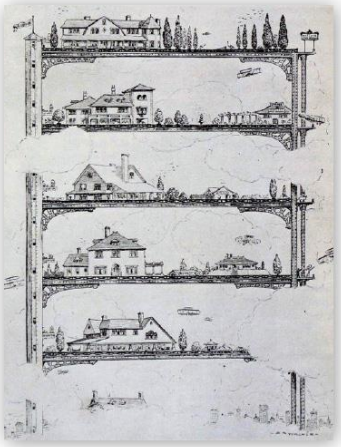

Figure 7: The architects' dream

Figure 8: The iconic architecture: loosely stacked timber boxes. Photo: Luuk Kramer

7. Iconic architecture

Given the fact that a timber building is so light that wind forces on the facades are the biggest structural challenge we shaped the building as if the wind already did it's work and shaked up all the floors. In a post-selling survey with our customers we learned that the iconic looks of the exterior in combination with the neutral casco interiors were very appealing to our customers and their main reason to take the risk to move to the yet undeveloped industrial area Amsterdam North in the middle of a financial crisis.

- Client: Lemniskade BV, Tom Frantzen & Claus Oussoren
- Design: FRANTZEN et al, Tom Frantzen, Karel van Eijken, Laura Reinders
- Building management & MEP Consultancy: H2O building management, Claus Oussoren, Marco Hijink
- Structural engineer: Pieters Bouwtechniek Amsterdam, Hubert Kuipers, Thijs van Schenk Brill
- Building Physics & Fire consultant: LBP sight, Frans Houtkamp, Bram Kersten, Janneke van der Weerd
- Contractor: Hillen en Roosen, Pieter Wassenaar, Remco van Achthoven, Joris Deley
- Subcontractor timber structure: Korlam Nederland, Sint-Oedenrode
- Subcontractor Installations: Bosman installatietechniek, Amersfoort
- Subcontractor eco-installations: ecomass.nl