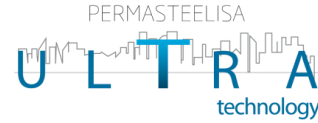


9. Example buildings with green label through façade contribution

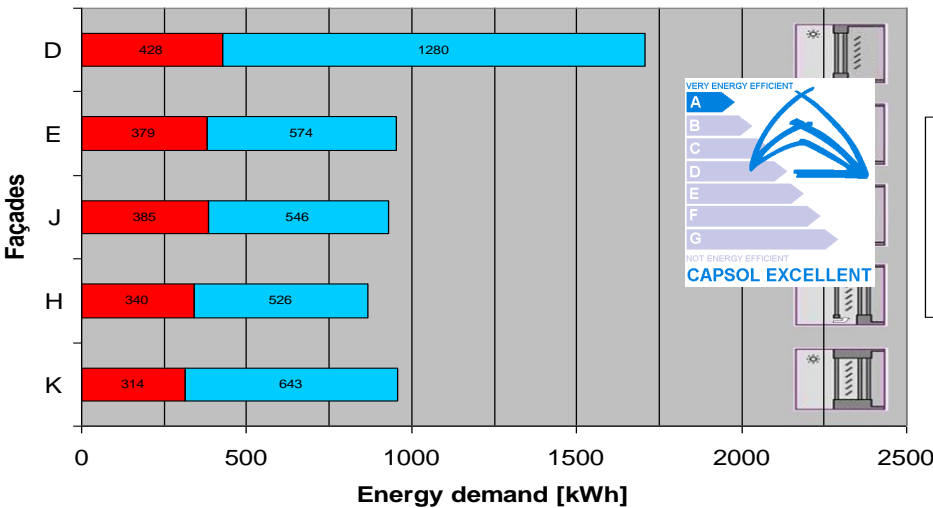


Mfree-S application and EPBD for UCLH project



	Curtain Wall Internal shading	Curtain Wall External shading	Active Wall	Interactive Wall	Closed Cavity Façade
	HP	HP	HP	Low	Low
The Matrix is only informative and project specific, e.g. dependent on internal heat loads, ventilation, climate, orientation.					
Heating	±	±	++	+	++
Winter comfort	±	±	++	++	++
Cooling	---	---	± / +	++	+
Summer comfort	---	---	± / +	++	+
Acoustic comfort	±	±	+	+	++
Visual comfort / transparency / Health	±	±	±	±	+
Energy consumption	±	+	± / +	+	+
Blind protection	±	±	±	±	++
Dust 'collection' on blinds / Hygiene	±	±	±	±	++
Dust 'collection' on blinds / Appearance	±	±	±	±	++
Disturbance due to cleaning	±	±	±	±	++
Condensation (mould/hygiene)	±	±	- / ±	±	++
Cleaning costs	±	±	- / ±	±	++
Initial cost façade	±	±	±	±	±
Long term cost building	±	±	±	- / ±	±
Architectural appearance (clear glass)	±	±	±	±	±

Yearly energy use; London, South, 80% glass, Decision Output



One of First BREEAM Excellent hospitals in the world

UCLH, London
Architect: Hopkins

Client: University College London Hospital NHS Trust

9. Example buildings with green label through façade contribution

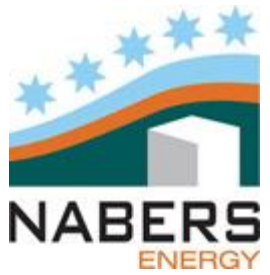
Mfree-S façade + BCS integration + wood application



www.permasteelisa.com



200 George street, Sydney, Australia
Architect: Francis-Jones Morehen Thorp (fjmt)

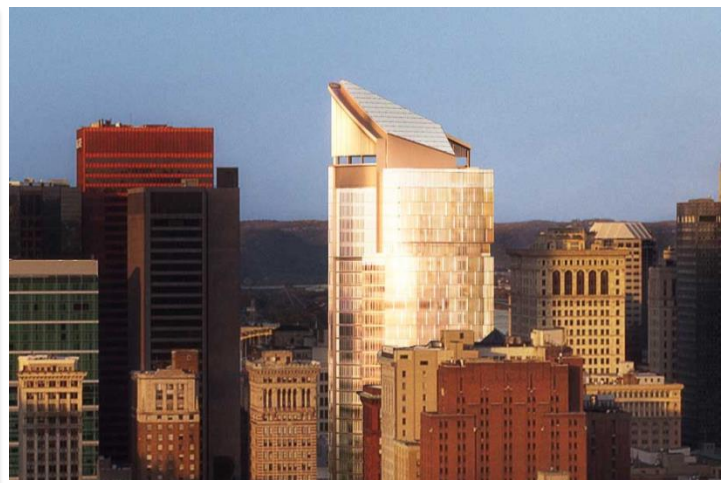


7. Better LCA by use of alternative materials

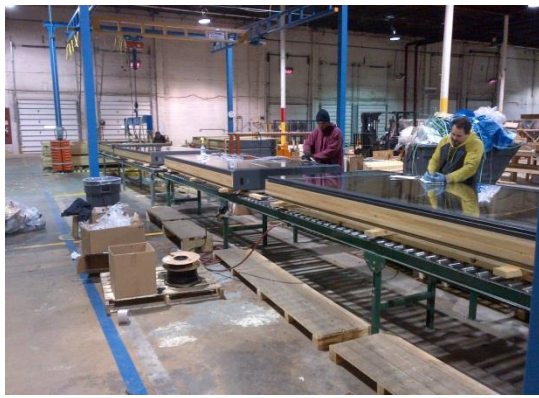
Use of wood in facades



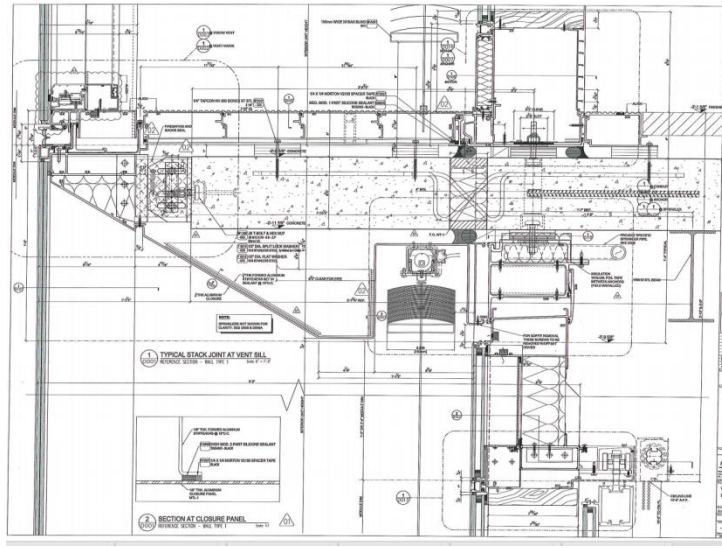
200 George Street
Sydney | Australia



Tower at PNC Plaza, Pittsburgh, Pennsylvania



Development of 200,000km wooden slats for 2900 blinds suitable for mfree-S cavity



GENERAL	
PROJ.	PERMASTEELISA
REV.	01
SECTION 2 - CURTAIN WALLS	
THE TRIMMER AT FINISH PLANE	
CONSTRUCTION OF CURTAIN WALL	
PERMASTEELISA	
WELL TYP. 1	
DOUBLE FRAME	
D001	
03	

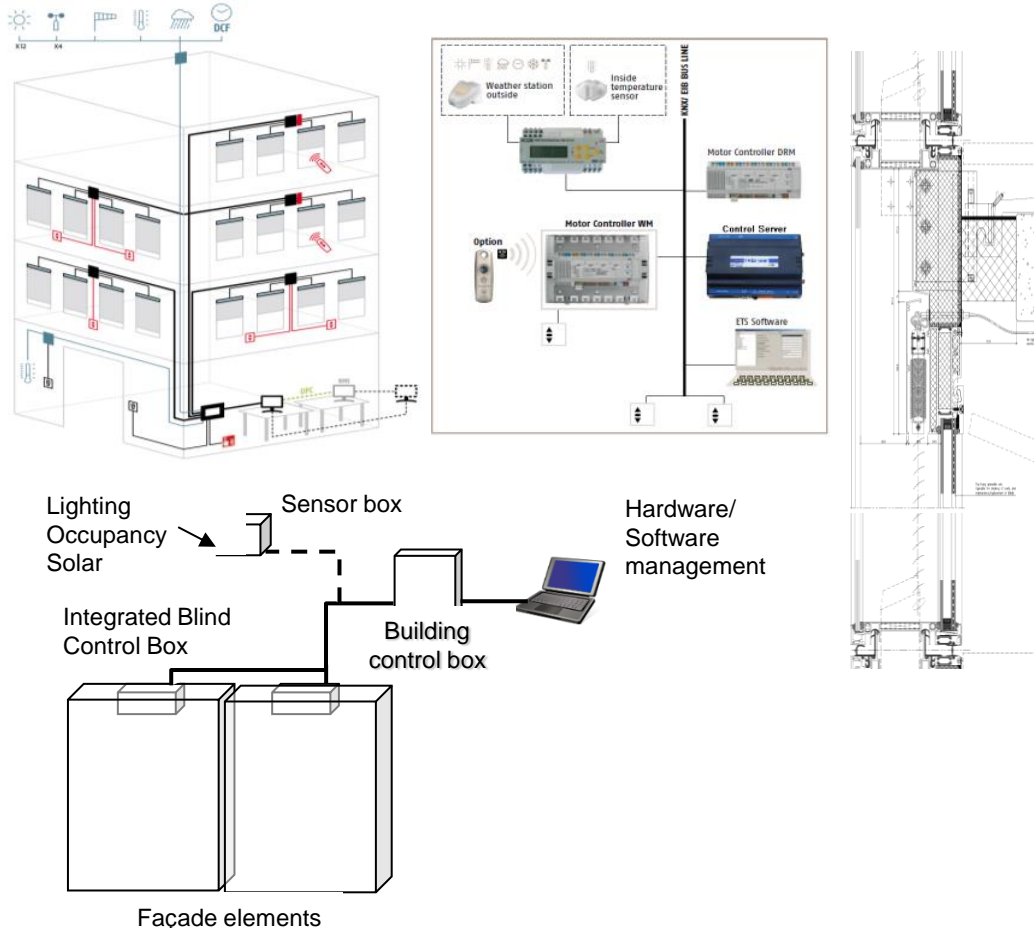
6. Whole building energy consumption

Mfree-S , BCS integration and EPBD software application

Integrated blind control system allows the optimization of the dynamic properties of the facade in terms of energy and light performances by means of the prediction by EPBD software.



200 George Street, Sydney



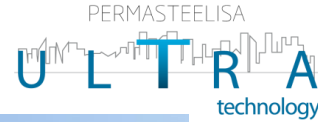
Traditional triple glazed façade system Traditional DSF system Advanced MFREE-S

London Climate				FAÇADE 4	FAÇADE 6	FAÇADE 7	
INPUT	GLAZING TYPE			TGU	IW	CCF	
	OUTPUT (glazing comparison only) Steady state / ISO 15099 / WS	WINTER $T_{e,inc} / T_{e,ext} [^{\circ}C]$ In: 5000h/m²	U [W/m²K]	no blinds	0.78	1.16	1.07
blinds				0.68	0.93	0.89	
T _{a,min} [°C]			no blinds	18.1	17.2	17.4	
			blinds	0.52	0.53	0.55	
SUMMER $T_{e,inc} / T_{e,ext} [^{\circ}C]$ In: 5000h/m²			g [-]	no blinds	0.38	0.13	0.15
				blinds	53.3	33.7	35.6
LT [-]		no blinds	0.67	0.69	0.69		
		blinds	0.03	0.03	0.03		
OUTPUT (façade comparison) Dynamic / Capso Excell(ent)		Yearly total primary energy consumption per square meter of plan [kWh prim / sqm]					
		RED heating BLUE cooling GREEN total heating & cooling				13	18

More than 25% saving

9. Example buildings with green label through façade contribution

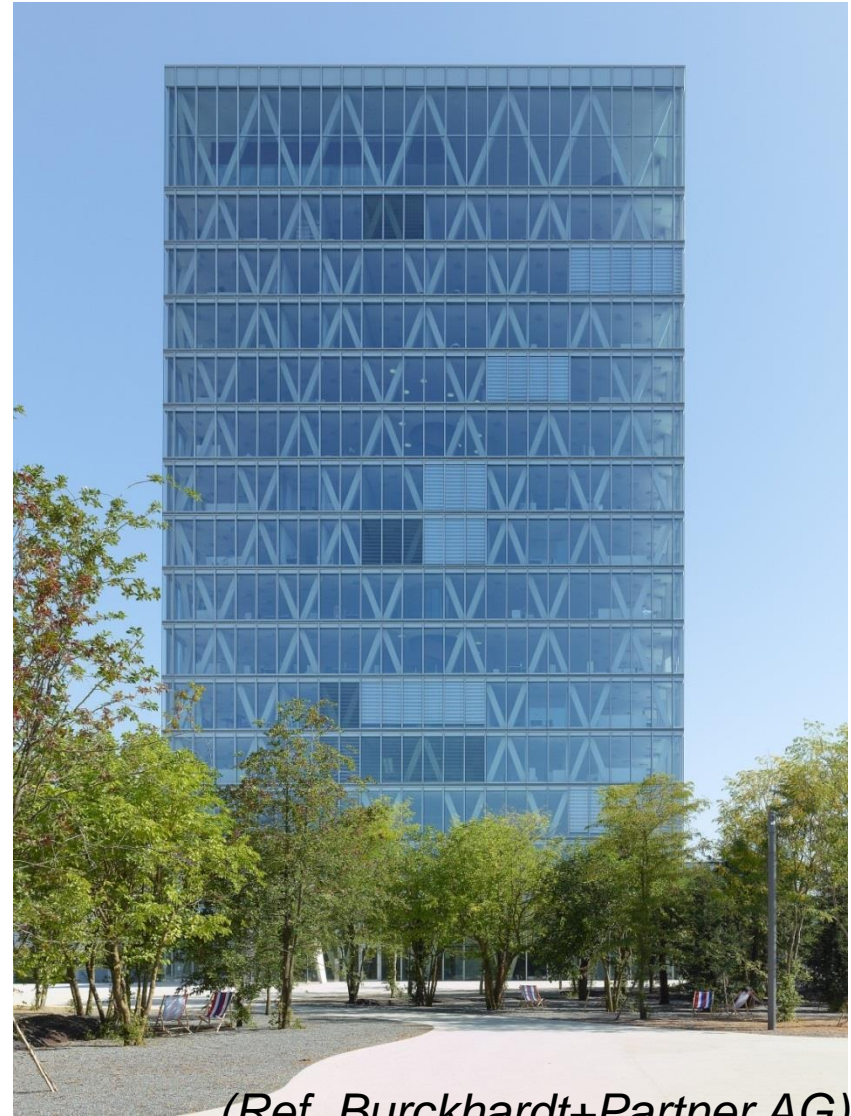
Mfree-S integration



Roche Diagnostics

**Administration Building No. 5,
Roche Diagnostics, Rotkreuz**

Received Minergie certificate



(Ref. Burckhardt+Partner AG)



PERMASTEELISA GROUP

Backup

Example 1: UCLH: *mfree-S*

BREEAM & Sustainable design approach

(Ref. Edward Williams Architects)

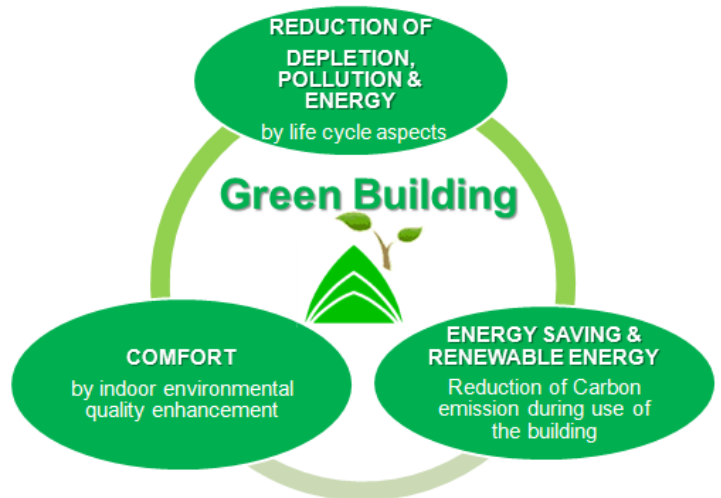
BREEAM 2008 (Healthcare):

- Achieved a score of 71 (70+ = Excellent / 85+ = Outstanding)
- Hospital design presents particular difficulties
 - e.g. 80% occupied floor area to achieve 2% daylight factor

9 CATEGORIES: Façade impact:

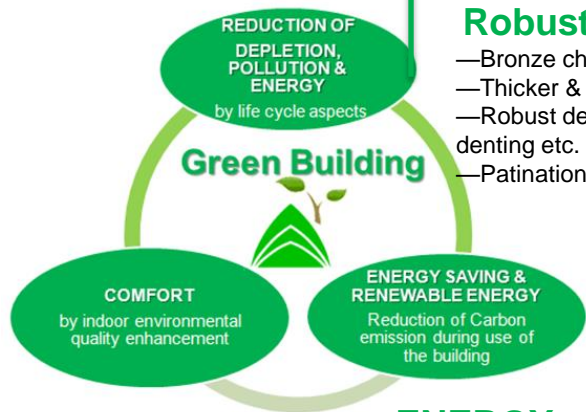
- Management	12%
- Health & Wellbeing	15%
- Energy	19%
- Transport	8%
- Water	6%
- Materials	12.5%
- Waste	7.5%
- Land Use & Ecology	10%
- Pollution	10%

Total	100%
Innovation (awarded separately)	10%



Example 1: UCLH: *mfree-S*

BREEAM & Sustainable design approach *(Ref. Edward Williams Architects)*



MATERIALS

Embodied life cycle impact of materials:

- Embodied carbon very difficult to measure
- BRE provides a calculating tool and has rated multiple products & materials

Materials re-use:

- Maximize reuse where possible aluminium etc.

Responsible sourcing:

- Avoidance (e.g. timber chain of custody certification)

Robustness:

- Bronze chosen for durability and robustness
- Thicker & more robust than aluminium
- Robust detailing at ground floor, specially backed panels to prevent denting etc.
- Patination process slows natural weathering of the bronze

HEALTH & WELLBEING

Daylight:

- Large area of glazing: *mfree-S*/ clear glass –
- Privacy blinds & Solar control blinds: **BCS** –
- User control & central re-set: **BCS** –

Occupant thermal comfort:

- Some very fragile patients –
- Façade system minimises cold zone (low U_{cw} 1.2W/m²K): *mfree-S* –

Acoustics:

- High acoustic performance essential for central urban location
- LARGE** –

Indoor air & water quality:

- Natural ventilation not possible –

Lighting:

- Good quality lighting much of it driven by clinical need (500lux) –

ENERGY

- CO2 emissions / Low or zero carbon technologies
- Energy sub metering & Energy efficient building systems

Lean, Green approach:

- Lean minimise energy consumption
- Energy efficient lighting & ventilation aided by the **high performance façade**
- Green..... Use low or zero greenhouse gas emitting energy supplies
- PV array on roof. High efficiency chillers. Link to district heating system

Significant Achievement:

- An **18% reduction in CO2 emissions** relative to PartL2006
- + reduction of 20% by us of PV arrays & link to district heating system
- Gives an overall reduction of 42%

EXAMPLES OF FAÇADE CONTRIBUTION AS PART OF A GREEN BUILDING

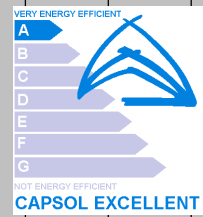
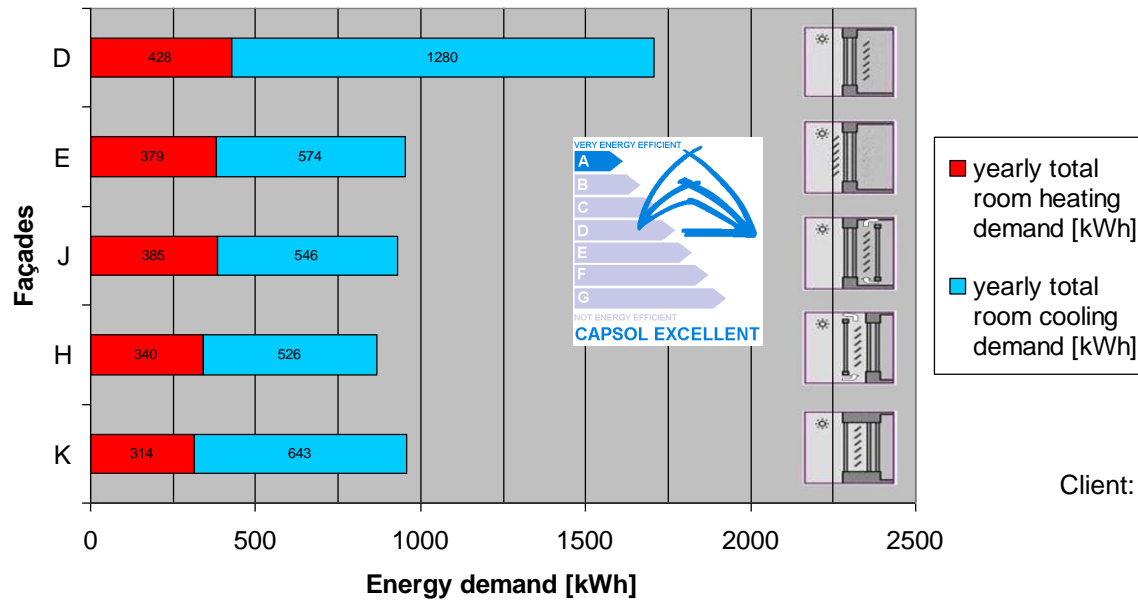
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Heating	±	±	++	+	++
Winter comfort	±	±	++	++	++
Cooling	+	+	± / +	++	++
Summer comfort	-	+++	± / +	++	+
Acoustic comfort	±	±	+	+	++
Visual comfort / transparency / Health	±	±	±	+	+
Energy consumption	±	±	± / +	+	+
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Initial cost façade	+	+	±	±	++
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Architectural appearance (clear glass)	+	+	+	+	+

Yearly energy use; London, South, 80% glass, Decision Output



UCLH, London
 Architect: Hopkins
 Client: University College London Hospital NHS Trust

Example 1: UCLH: *mfree-S*

Sustainable design approach **GOING FORWARD** (Ref. Edward Williams Architects)

Focus must be on zero emissions (0GG) of greenhouse gases in:

- Construction
- Maintenance
- Refurbishment / replacement

Current UK approach on lowering energy consumption

- Too prescriptive
- Not allowing for approaches to solve the key focus of zero carbon emissions
- Phase 4 building next door we are now talking about U value in the range of 0.65-0.7W/m²K, this is almost a reduction of 50% on the level required for Phase 3 over a design period of 5 years!
- Our view is that we should be defining in energy terms a successful sustainable solution as one that has total 0GG emissions. Thinking is moving in this direction with the new approved documents but has further to go
- This would allow for ideas that traded off sustainable energy use with possibly reduced thermal performance but better lifecycle and design performance to achieve overall superior result.

One example might be the use of single glazing in multiple skin façade systems to achieve:

- A better long term performance (e.g. no degradation in glazed seal unit performance)
- A more economical, elegant set of design solutions (reduced size frames, reduced mass, simplification of replacement etc.)
- Coupled with a complete 0GG energy supply solution

This approach would be more flexible, performance driven & actually address the key driver of global warming rather than confuse it with other policy drivers

Example 2: Roche Diagnostics: *mfree-S*

Administration Building No. 5, Roche Diagnostics, Rotkreuz

(Ref. Burckhardt+Partner AG)

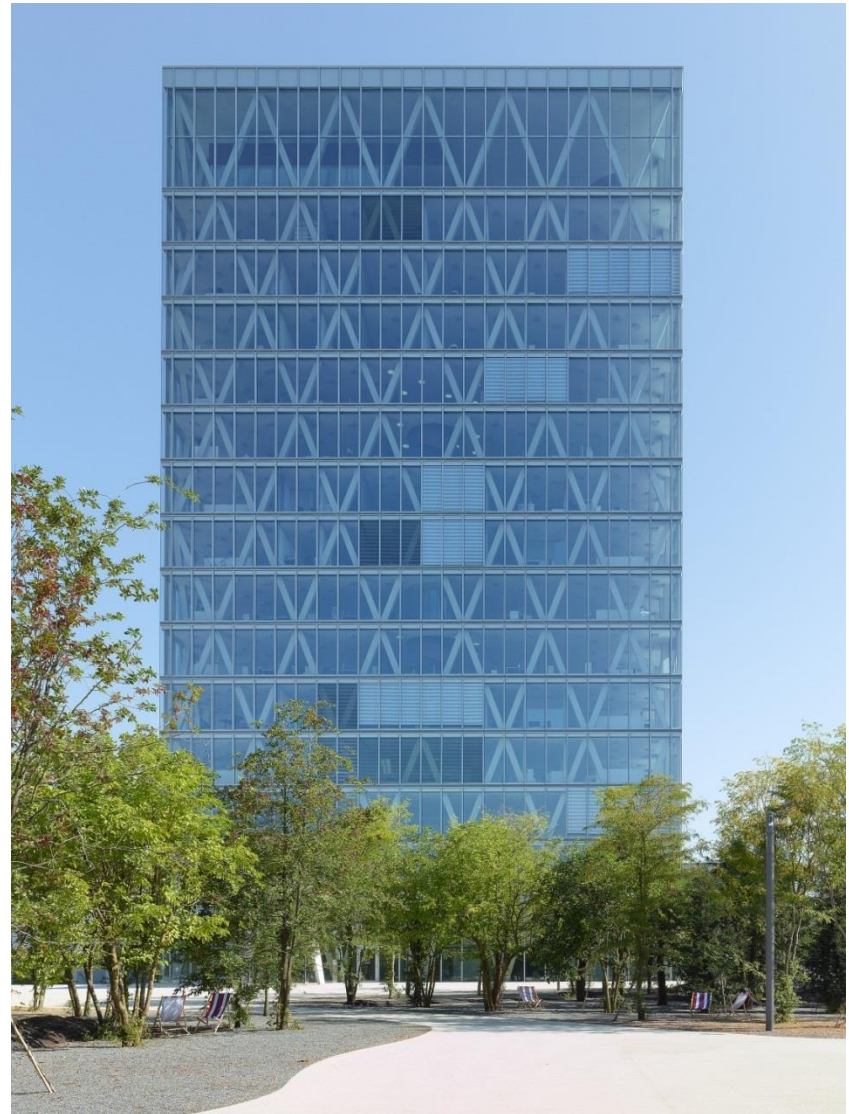
Key Figures

- Start of Planning: April 2008
- Hand over: June 2011
- 17 floors above grade, height: 67.60m
- total 625 employees
- 8.200 m² facade

Received Minergie certificate

MINERGIE®

Higher quality of life, lower energy consumption
Mehr Lebensqualität, tiefer Energieverbrauch



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Combining Energy and Building Concept

- activating thermal mass
- integrating room acoustics
- intelligent building envelope: *mfree-S*
($U_{cw} = 0.84 \text{ W/m}^2 \cdot \text{K}$ / g – value = 39%)
- natural ventilation



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- strips of absorbing material
- foamglass in fibre-cement shell
- imbedded in concrete ceiling

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Administration Building No. 5, Roche Diagnostics, Rotkreuz

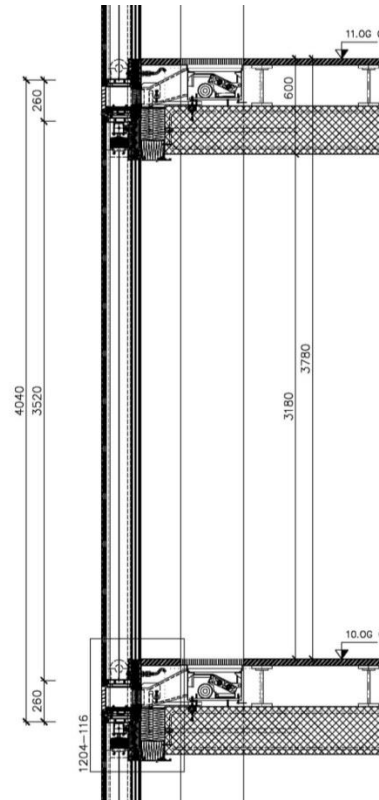
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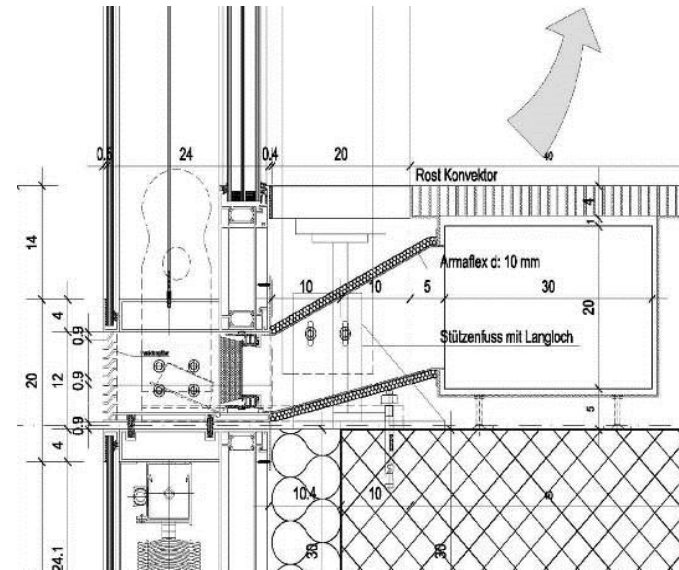
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Example 2: Roche Diagnostics: *mfree-S*

Sustainable Energy Concept

- heatpump / chiller
- energy supply by thermal storage
- waste heat recovery from exhaust air
- natural ventilation

Resulting in:

primary energy consumption of
82 kWh / m² / year

