WELCOME

Principles for Nearly Zero-Energy Buildings

BPIE, 09.11.2011
Aeropolis II, Brussels

BPIE

Agenda

14.30 **Welcome and introduction**, *BPIE*

14.40 **Policy context, existing concepts, initiatives and nZEB implementation at Member State level**, *SBi*

15.00 **Principles for nearly Zero-Energy Buildings**, *BPIE*

15.20 **nZEBs – Checking the principles**, *Ecofys*

15.50 **Panel and Q&A,** *BPIE, Ecofys and SBi*

16.10 **Coffee break**

16.30 **AEROPOLIS II**

- **The challenge of low-energy houses in practice**
  Architects + engineers of AEROPOLIS II
- **Financing low-energy houses**
  Mr. Spiessen, ARCO financial holding investing in green

16.45 **Panel and Q&A: Implementing nZEBs**

17.15 **Final remarks**

17.30 **Cocktail**

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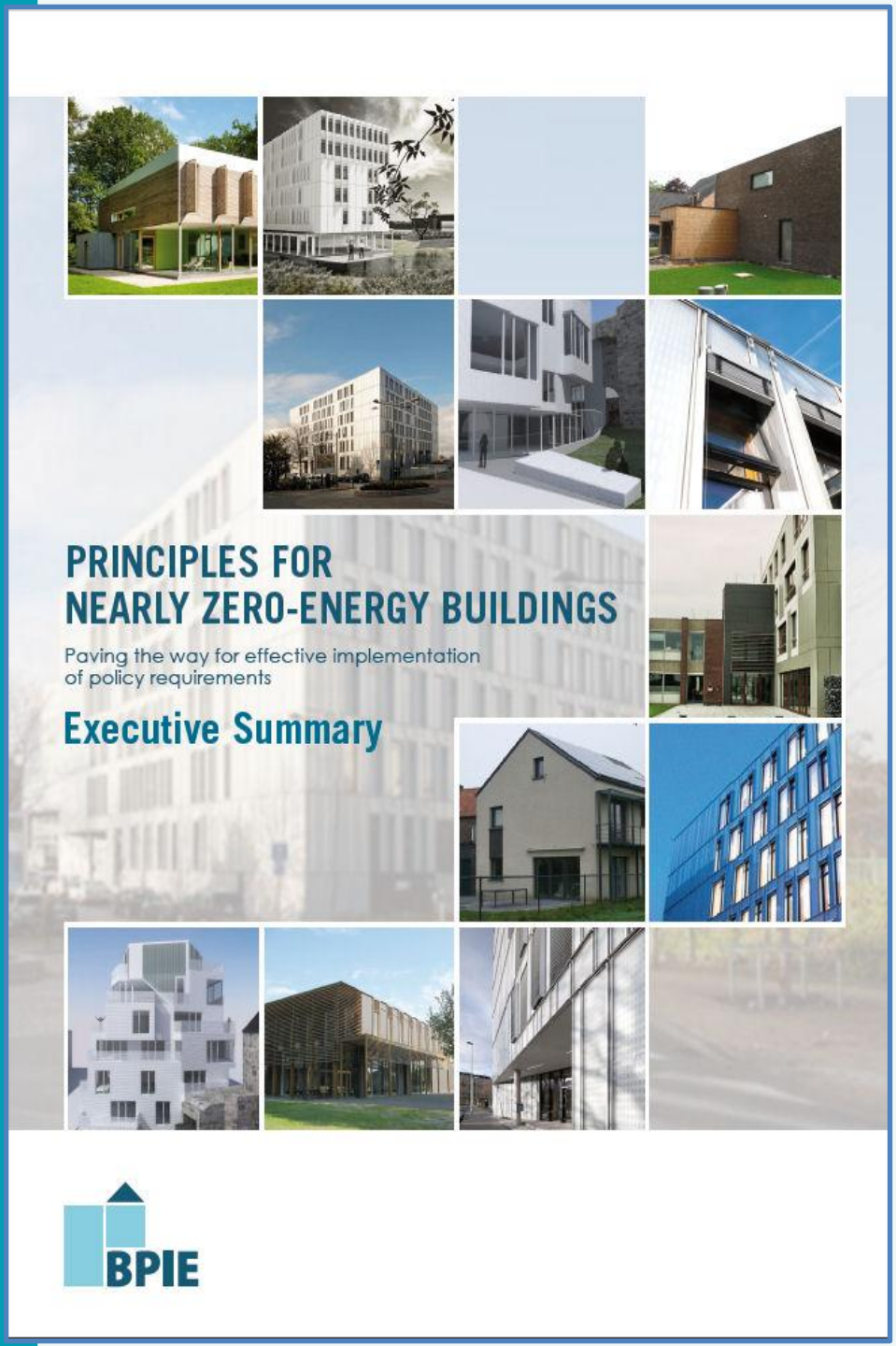

PRINCIPLES FOR NEARLY ZERO-ENERGY BUILDINGS

Paving the way for effective implementation of policy requirements

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Content

- EU targets for CO_2-emission in 2050
- EPBD definition of nearly zero-energy buildings
- CA-EPBD
- BPIE study
  - Currently existing concepts and solutions
  - Possible discrepancies between calculation methods and requirements
  - Planned initiatives towards nZEB

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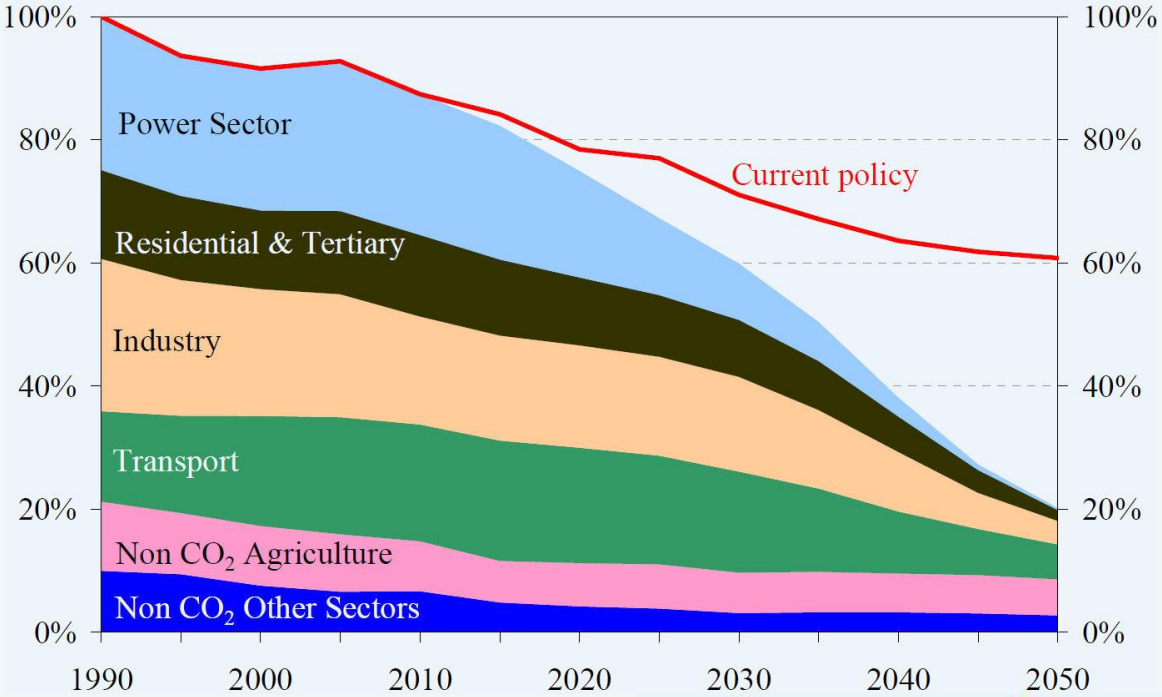
“A Roadmap for moving to a competitive low carbon economy in 2050” – EU Commission



EPBD recast – nZEB - MS responsibility

a. by 31 December 2020, all new buildings are nearly zero-energy buildings as defined in Article 2

b. after 31 December 2018, new buildings occupied and owned by public authorities are nearly zero-energy buildings as defined in Article 2

EPBD recast – nZEB (Article 9)

Member States shall

- draw up national plans for increasing the number of nearly zero-energy buildings. These national plans may include targets differentiated according to the category of building

- following the leading example of the public sector, develop policies and take measures such as the setting of targets in order to stimulate the transformation of buildings that are refurbished into nearly zero-energy buildings

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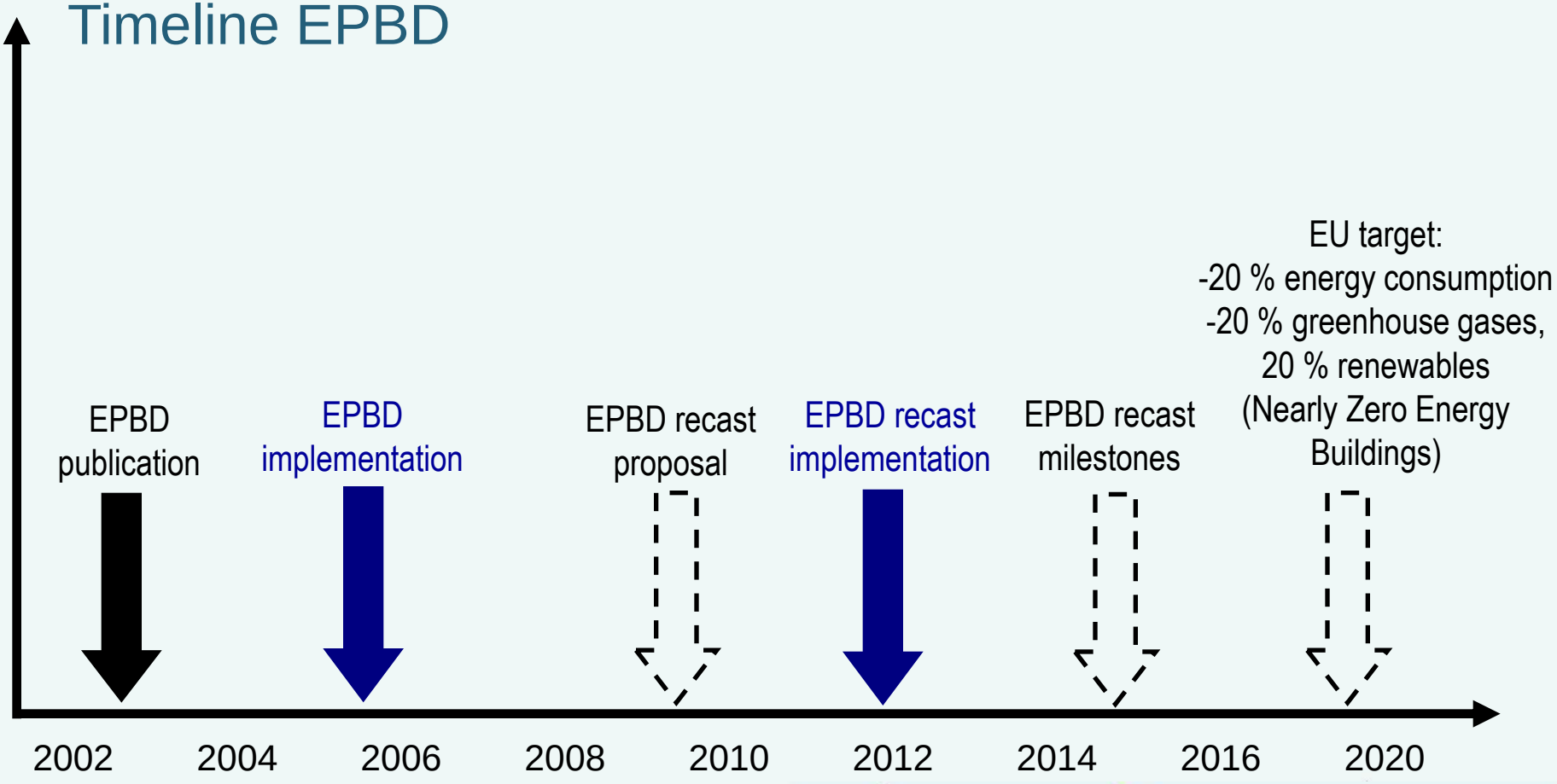
EPBD recast – definition of nZEB

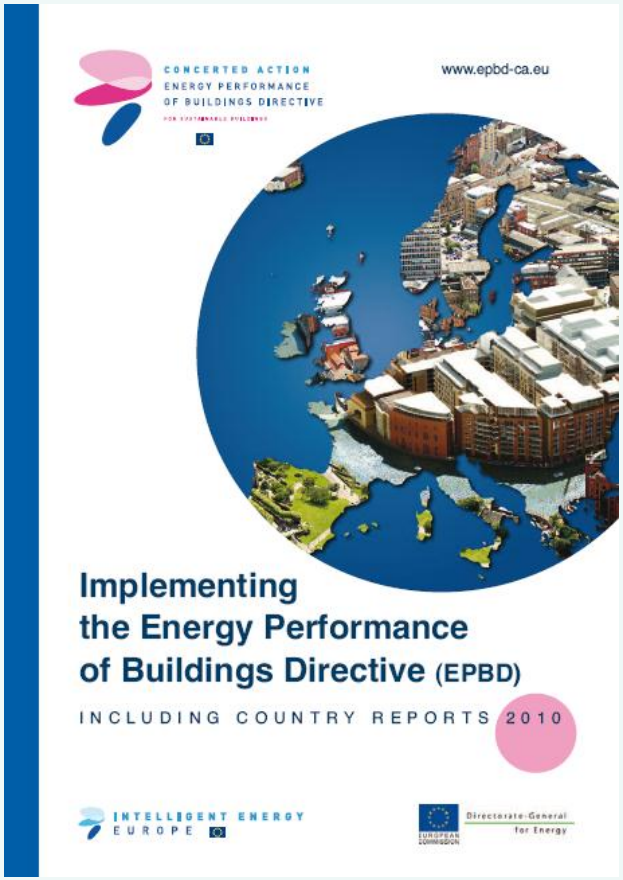
‘nearly zero-energy building’ means a building that has a very high energy performance, as determined in accordance with Annex I

The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby

Timeline EPBD



Concerted Action EPBD (CA-EPBD)



CA-EPBD was launched by the European Commission to promote dialogue and exchange of best practice between MS

An intensely active forum of national authorities from 29 countries, focusing on finding common approaches to the most effective implementation of this EU legislation

More information: http://www.epbd-ca.org/

CA-EPBD Core Themes

1. Certification schemes
2. Inspection of heating and air-conditioning systems
3. Training of experts and inspectors
4. Energy performance requirements using the cost-optimum methodology
5. Towards 2020: Nearly zero-energy buildings
6. Compliance and control of EP requirements and certification systems
7. Effectiveness of support initiatives

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BPIE project –
Principles for nearly Zero-Energy Buildings

Authors

- BPIE, Ecofys, SBi

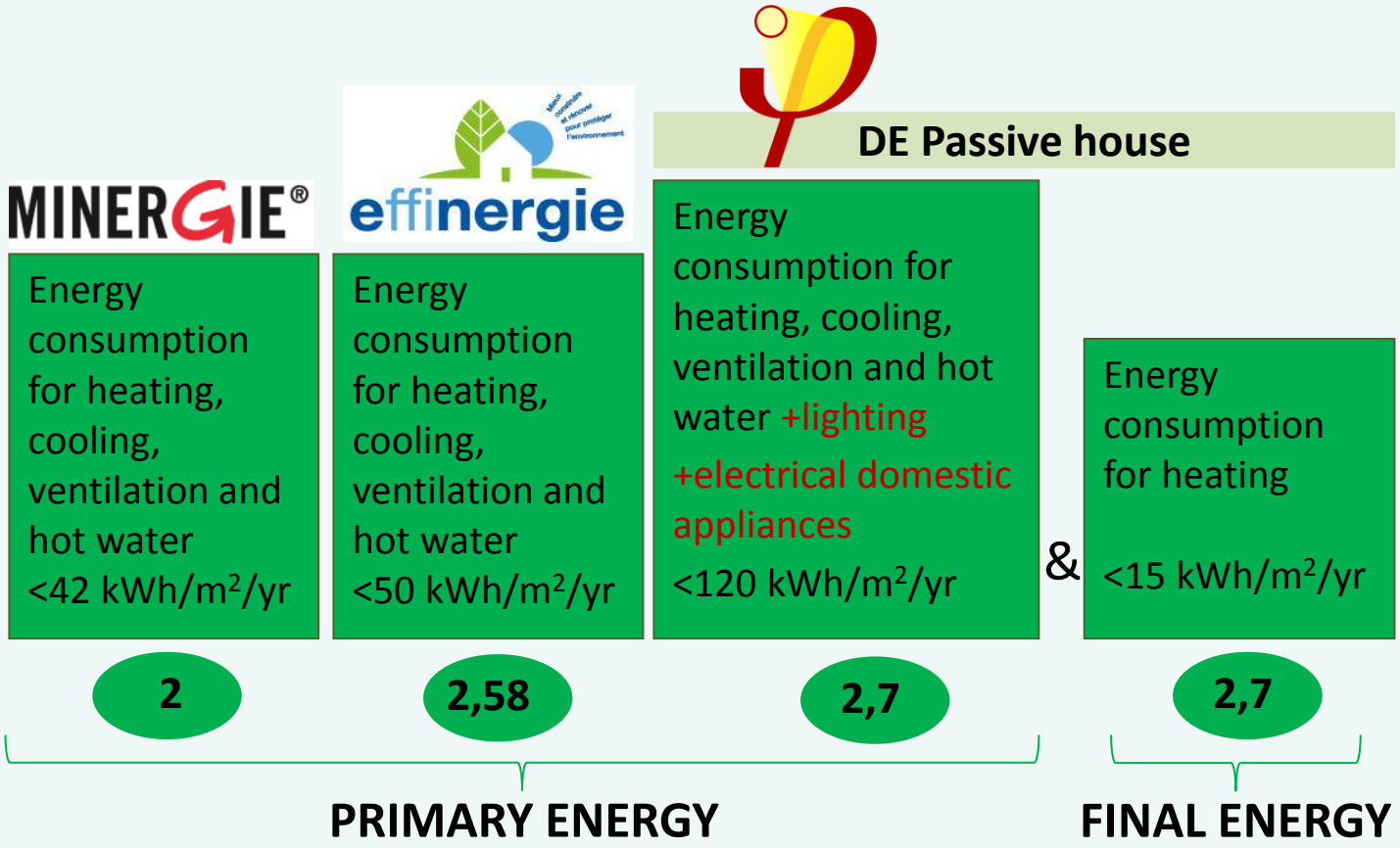
Time-planning

- Kick-off-meeting (7.12.2010)
- Draft report/Workshop (10.5.2011)
- Second workshop/Final report (9.11.2011)

BPIE project – Purpose

- Assess the starting point for a nZEB definition and the first steps that have already been taken within the EU Member States
- Highlight main challenges and potential solutions for a definition
- Compile a possible set of principles for nZEBs
- Apply such principles to reference buildings and assess related effects
- Derive related technological, financial and policy implications on EU level
- Provide an outlook on necessary further steps towards a successful implementation of nearly zero energy buildings

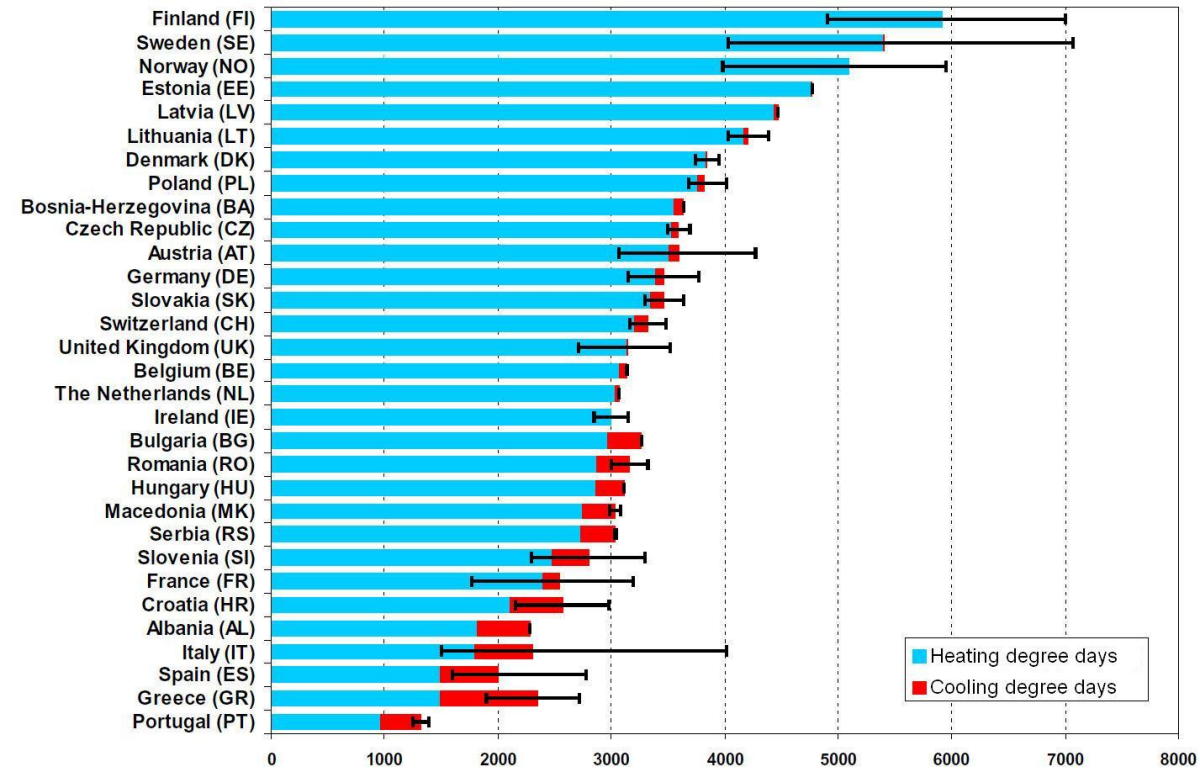
Currently existing concepts and solutions



Possible discrepancies between calculation methods and requirements

- Use of internal or external dimension of the heated floor area,
- Variation in internal loads,
- Different ways of handling the summer comfort issue,
- Inclusion of unheated spaces in the calculations,
- Energy flows that are included in the primary energy consumption,
- Different conversion factors for different energy carriers,
- External climate conditions
- Different system boundaries/allocation (e.g. heat recovery seen as energy saving measures or efficient supply)

Climate conditions (Source: Schild, Klinski and Grini, 2010)



Planned initiatives towards nZEB (Source: Erhvervs og Byggestyrelsen,2011)

Country/year	Existing	2010-11	2012-13	2014-15	2016	2020
Austria	66.5 kWh/m²/year (final energy)	-15 %		Passive house		
Belgium	119-136 kWh/m²/year (primary energy)	-25 %				
Denmark	2010: 52,5-60 kWh/m²/year (primaryl energy)	-25 %		-50 %		-75 %
Finland	65 kWh/m²/year (heating demand)	-15-30 %	- 20 %	Passive house for public		
France	Until 2012: Fossil fuels: 80-130 kWh/m²/year Electricity 130-250 kWh/m²/year (primary energy)		LEB Effinergie 50 kWh/m²/year			Positive E+
Germany	2009: 70 kWh/m²/year (primary energy)		-30%			Climate neutral buildings not using fossil fuels
Ireland	2011: 64 kWh/m²/year (primary energy)	-60 %	CO_2 neutral			
Netherlands	Regulated through EPC factor 2008: ~100-130 kWh/m²/year (primary energy)	-25 %	Climate neutral public building	- 50 %		Energy neutral buildings
Norway	2010:150 kWh/m²/year (net heating demand)			Passive House		ZEB
Sweden	2009:110-150 kWh/m²/year (delivered energy)	-20 %		25 % of all new is ZEB		ZEB
Switzerland	2011: 60 kWh/m²/year (primary energy)			Minergie-P 30 kWh/m²/year (delivered energy)		
United Kingdom	Regulated through CO_2 demands 2010: ~100 kWh/m²/year (primary energy)	-25 %	-44 %	-	Zero Carbon	

Relation of existing concepts to Article 9

- More than half of the MS do not have a definition of a low or zero energy building
- Most of the countries that have definitions specify the maximum primary energy per m^2
- Existing definitions do not include specifics about the share of renewables in the energy supply (except in Germany for current building regulations)
- Various elements of existing concepts can be used for a nZEB definition, e.g. overarching targets accompanied by “sub-thresholds” on specific issues

BPIE project – Challenges and principles

A sustainable, robust and optimal nZEB definition should

- take into account the current starting point and existing concepts
- meet challenges that should be properly addressed and discussed with policy makers, industry, building experts and other stakeholders

10 main challenges have been identified before a definition containing 3 main principles and thresholds has been developed

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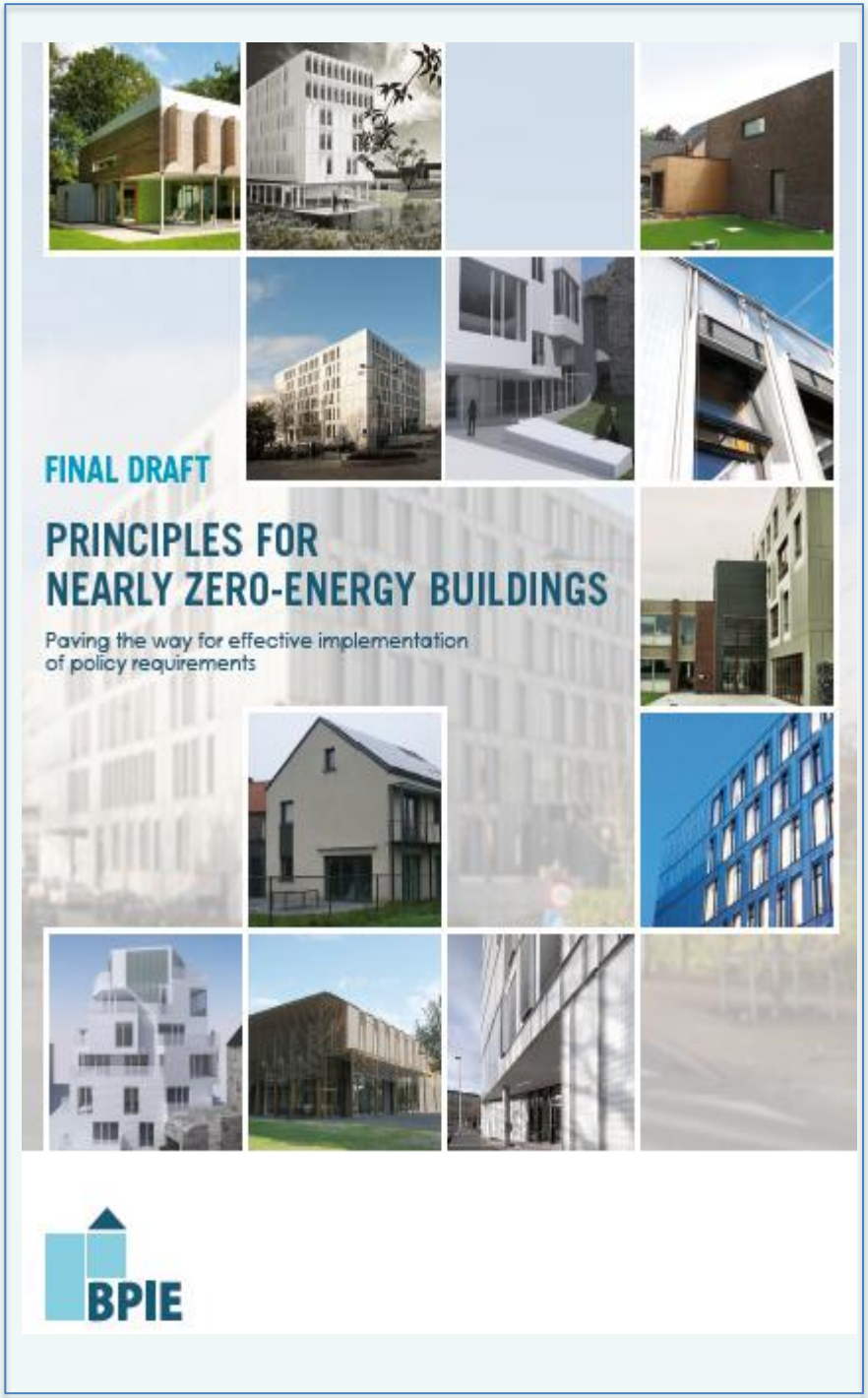

Brussels, 9 November 2011

Challenges and Principles for nearly Zero-Energy Buildings

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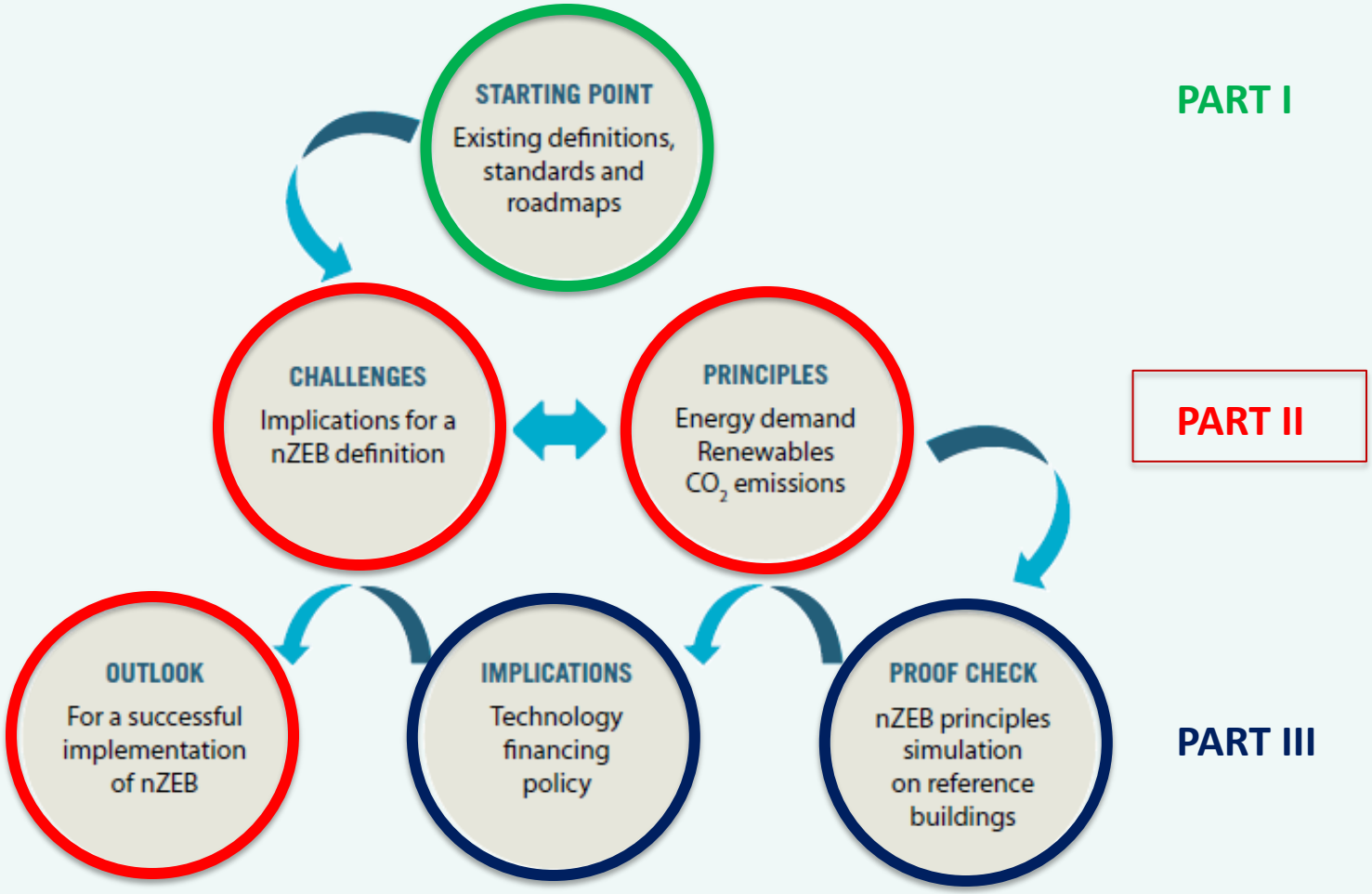
BPIE Study on nZEB Principles



PART I

PART II

PART III

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Nearly Zero-Energy Buildings (nZEB) and EPBD

'nearly zero-energy building' […] has a **very high energy performance**. The **nearly zero or very low amount of energy required** should be covered to **a very significant extent by energy from renewable sources, including on-site or nearby RES.** (EPBD)

- **Art. 9, recast EPBD: Nearly Zero-Energy Buildings**
  - by 31 December 2020, all new buildings are nZEB
  - after 31 December 2018, new buildings occupied and owned by public authorities are nZEB

  - National plans for nZEB & public sector leading example
    - interim target by 2015
    - national definition for nZEB (including public buildings retrofit towards nZEB levels)
  - Prepare and present support financial instruments and measures

We have a policy requirement. How to proceed?

Clearly stipulated by EPBD:

- Nearly-zero or very low-energy demand - high energy performance
- Energy performance of a building – based on the energy needed to meet the energy demand of heating, cooling, ventilation, hot water and lighting (the latter in case of non-residential buildings)
- Renewable energy use to a very significant extend

Large flexibility given by EPBD:

- **nZEB is not a technical standard but a policy requirement leading to tightening the future buildings' standards.**

- **Specific definitions and implementation to be decided by the MSs**

There is a need for more guidance to MSs for implementing sustainable but yet feasible nZEB definitions!

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10 challenges for a robust and practical nZEB definition

Analysis the implications of:

1. Meeting current sectorial and overall EU climate & energy goals
2. Bridging the gap between (nearly) zero CO2 and zero energy
3. Dealing with temporal and local disparities between produced and consumed energy
4. Having an open concept and avoiding the lock-in effects
5. Having transferability to different climates, building types etc.
6. Including or not the household electricity
7. Having or not a life cycle approach
8. Groups of buildings vs. a single building
9. Proper balance of energy efficiency and renewable energy
10. Convergence between cost optimality and nZEB

Challenge no. 1: nZEB and the EU long-term goals

GHG reduction vs. 1990	2030	2050
Total	-40 to -44%	-79 to -82%
Power	-54 to -68%	-93 to -99%
Industry	-34 to -40%	-83 to -87%
Transport	+20 to -9%	-54 to -67%
Residential and services	-37 to -53%	-88 to-91%
Agriculture	-36 to -37%	-42 to -49%
Other non-GHG emissions	-72 to -73%	-70 to -78%

Source: Roadmap for moving to a competitive low-carbon economy in 2050

1st nZEB implication:

nZEB should be also nearly zero CO_2 , most likely below 3kg CO_2/m^2year.

Otherwise, it will be an unrealistic ambition level in renovation of the 2010 building stock (>90% CO_2 savings).

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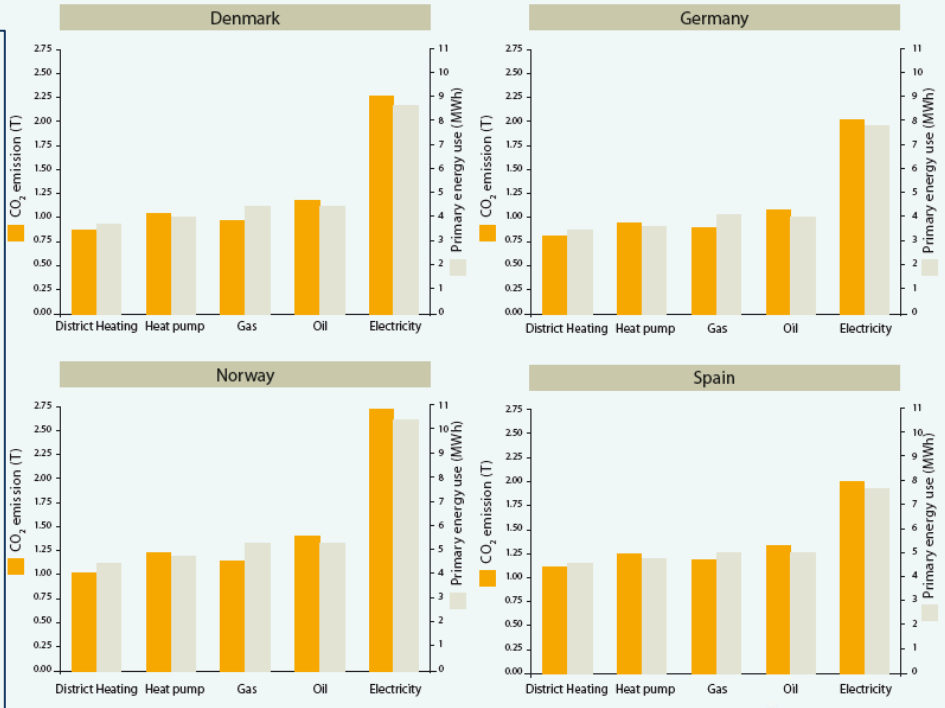
Challenge no. 2: zero energy vs. zero carbon buildings

-EPBD asks only for nZEB but also aims to nZCB
-EU climate goals indicate the need of nZEB ~ nZCB
-Need for an energy indicator, closely linked to CO_2 emissions and independent of climate

2nd nZEB implication:

- **Energy performance indicated in primary energy** (as EPBD requires)
- **CO_2 emissions** should be added **as supplementary information**
- **Additional requirements** for matching nZEB to nZCB, i.e.
  - **Final to primary energy conversion factors** should **reflect reality and regularly adjusted**



Challenge no. 3: temporal and local disparities

Local disparities

- On-site RES:
  -No risk of double-counting but lock-in inevitable
- On-site + nearby
  -Low risk of double-counting but lock-in almost inevitable
- On-site + nearby + off-site
  -High risk of double-counting but no risk of lock-in

Temporal disparities

- Annual/monthly balance
  -Full utilization of grid possibilities
  -Risk of zero energy not resulting in zero CO_2
- Daily/hourly balance (direct use)
  -Very limited utilization of grid possibilities
  -Zero energy ≈ zero CO2

3rd nZEB implication:

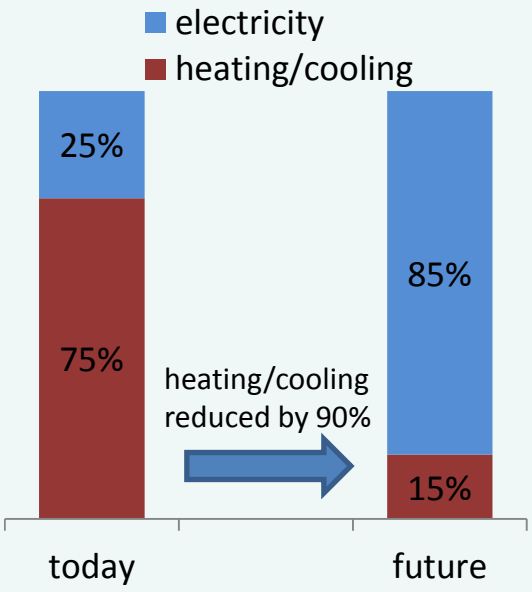
Local disparities

- On-site + nearby + off-site (grid) should be accepted to avoid lock-in
- Specific rules/guidelines to avoid double-counting

Temporal disparities

- Annual balance should be accepted
- However, necessary to move towards monthly balance

Challenge no. 6: buildings electricity consumption



-the electricity consumption of households appliances, ICTs, of buildings' services in multi-storey buildings (i.e. lifts, security lighting etc.) are outside the EPBD scope even there are some good reasons to be within the scope

-buildings electricity consumption has a significant impact in terms of CO2 emissions

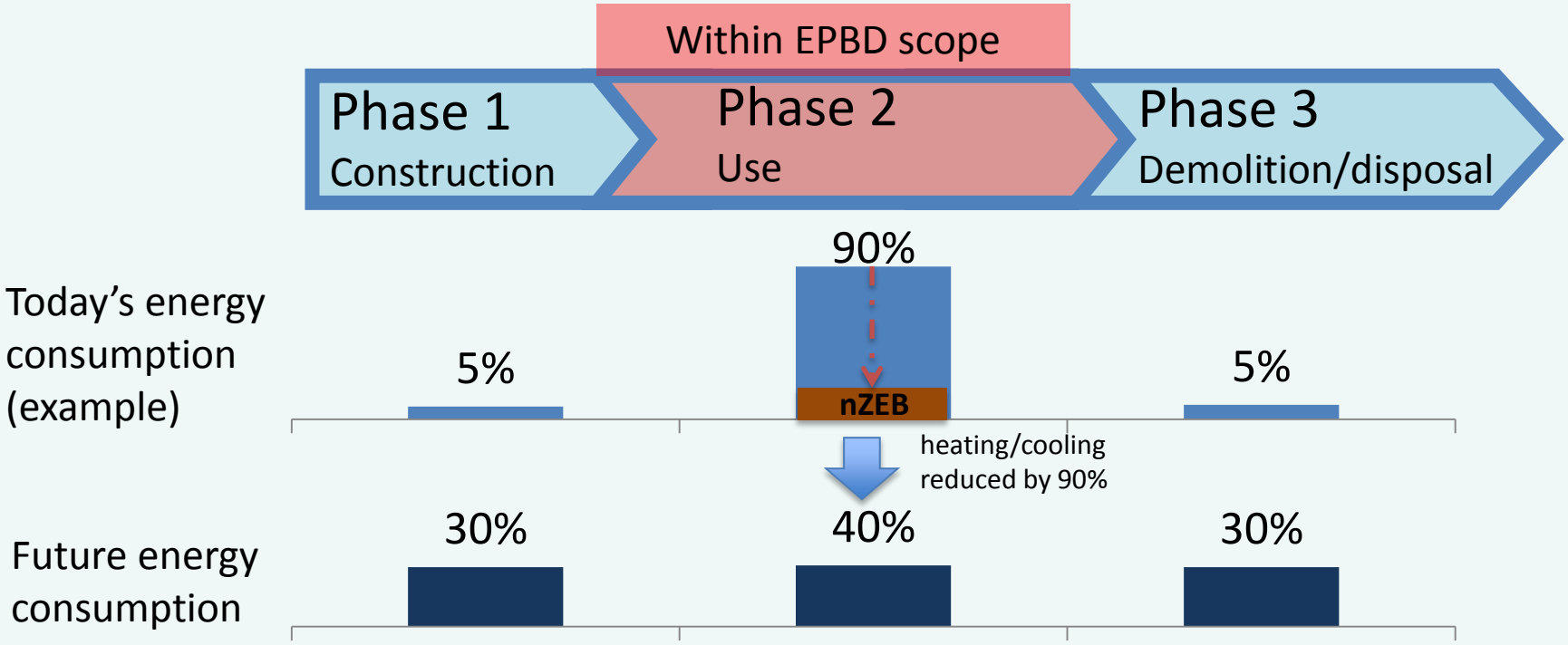
-the trends indicate an increase of the electricity consumption in buildings

-by decreasing the energy consumption for heating/cooling will result a higher share of the electricity consumption in the building's energy balance

6th nZEB implication:

- Now it is not recommended to include the buildings electricity under EPBD scope. However, should be considered for the future.
- An advisable interim solution is to include the electricity consumption as an additional indication

Challenge no. 7: Beyond EPBD – Building's Life Cycle



7th nZEB implication:

- A life-cycle assessment for nZEB is definitely far beyond the current intention of the EPBD, but might not be in a future recast.
- Potential solution: the energy need for building's construction and disposal may be included as an additional information

Challenge no. 9: balance between energy demand and RES

nZEB definition EPBD:
- very high energy performance
- a very significant extent of the energy need covered by energy from RES

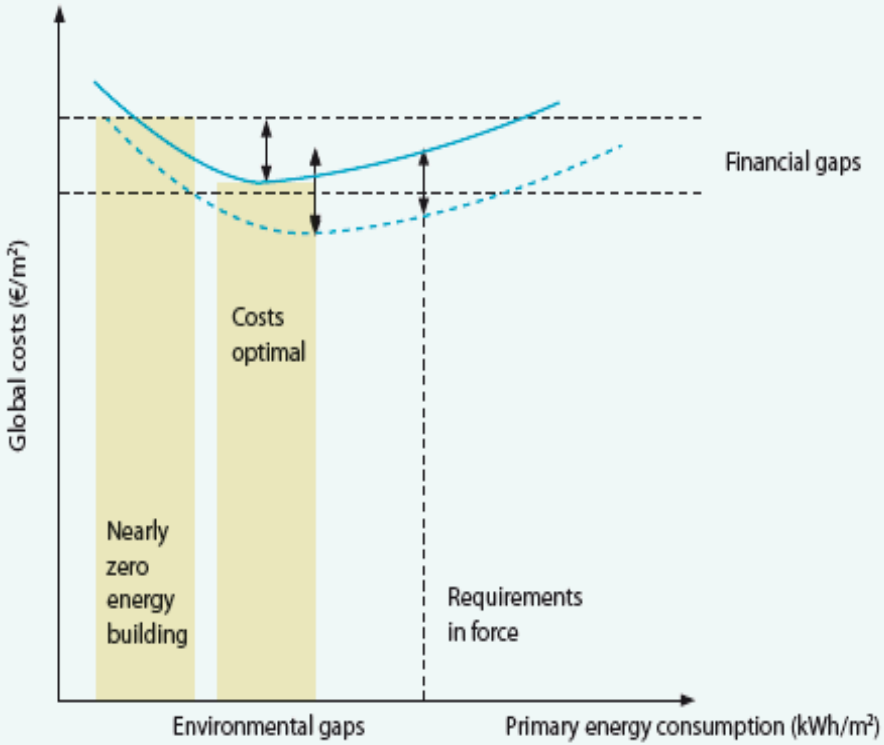
However:
- Efficiency has its limits and it is not possible to drive energy demand down to zero
- Renewable energy have a price and local disparities

9th nZEB implication:

It is necessary and also in line with the EPBD's nZEB definition to have:
- a threshold for maximum energy demand (e.g. somewhere below 40-50 kWh/m^2 year)
- a requirement for the minimum renewables share, i.e. RES share between 50%-90%

Challenge no. 10: Convergence - cost-optimality and nZEB

The methodology to calculate cost optimal requirements and the definition of nZEBs seem to be two independent mechanisms to be applied for new buildings until 2020 (cost optimality) and after 2020 (nearly zero energy buildings).



10th nZEB implication:

For having convergence, it is necessary to fix a threshold for the primary energy demand of an nZEB, within a certain corridor, which could be defined as follows:

- The upper limit: by applying the cost-optimal levels
- The lower limit: set by the BAT

Principles for Nearly Zero-Energy Buildings

November 2011, Brussels

First nZEB Principle (on energy demand)

There should be a **clearly defined boundary** in the energy flow related to the operation of the building **that defines the energy quality of the energy demand** with clear guidance on how to assess corresponding values.

Implementation approach:
-energy need of the building, i.e. the sum of useful heat, cold and electricity needed for space cooling, space heating, domestic hot water and lighting plus distribution and storage losses within the building.

Addendum:
The electricity (energy) consumption of appliances and of the other building technical systems may also be included in the nZEB definition as an additional indicative fixed value

Corollary of First nZEB Principle (on energy demand)

A **threshold for the maximum allowable energy need** should be defined.

Implementation approach:
For the definition of such a threshold, it could be recommended to give the Member States the freedom to move in a corridor such as:

- The upper limit: by applying the cost-optimal levels
- The lower limit: set by the BAT

Member States might determine their individual position within that corridor based on specific relevant national conditions.

Second nZEB Principle (on renewable energy share)

There should be a **clearly defined boundary** in the energy flow related to the operation of the building **where the share of renewable energy is calculated or measured** with clear guidance on how to assess this share.

Implementation approach:
The eligible share of renewable energy is all energy produced from renewable sources on site (including the renewable share of heat pumps), nearby and offsite being delivered to the building. Double counting must be avoided.

Corollary of Second nZEB Principle (on RES share)

A **threshold for the minimum share of renewable energy demand** should be defined.

Implementation approach:

-The share of energy from renewable sources which is considered to be "very significant" should be increased step-by-step between 2021 and 2050.

-Starting point: determined based on best practice

-A reasonable corridor seems to be between 50% and 90% (or 100%).

Third nZEB Principle (primary energy and CO2 emissions)

There should be a **clearly defined boundary** in the energy flow related to the operation of the building **where the overarching primary energy demand and CO2 emissions are calculated** with clear guidance on how to assess these values.

Implementation approach:

-primary energy demand and CO_2 emissions related to the total energy delivered into the building from active supply systems.

-if more renewable energy should be produced than energy used during a balance period, clear national rules should be available on how to account for the net export.

Corollary of Third nZEB Principle (primary energy and CO2 emissions)

A **threshold for the overarching primary energy demand and CO2 emissions** should be defined.

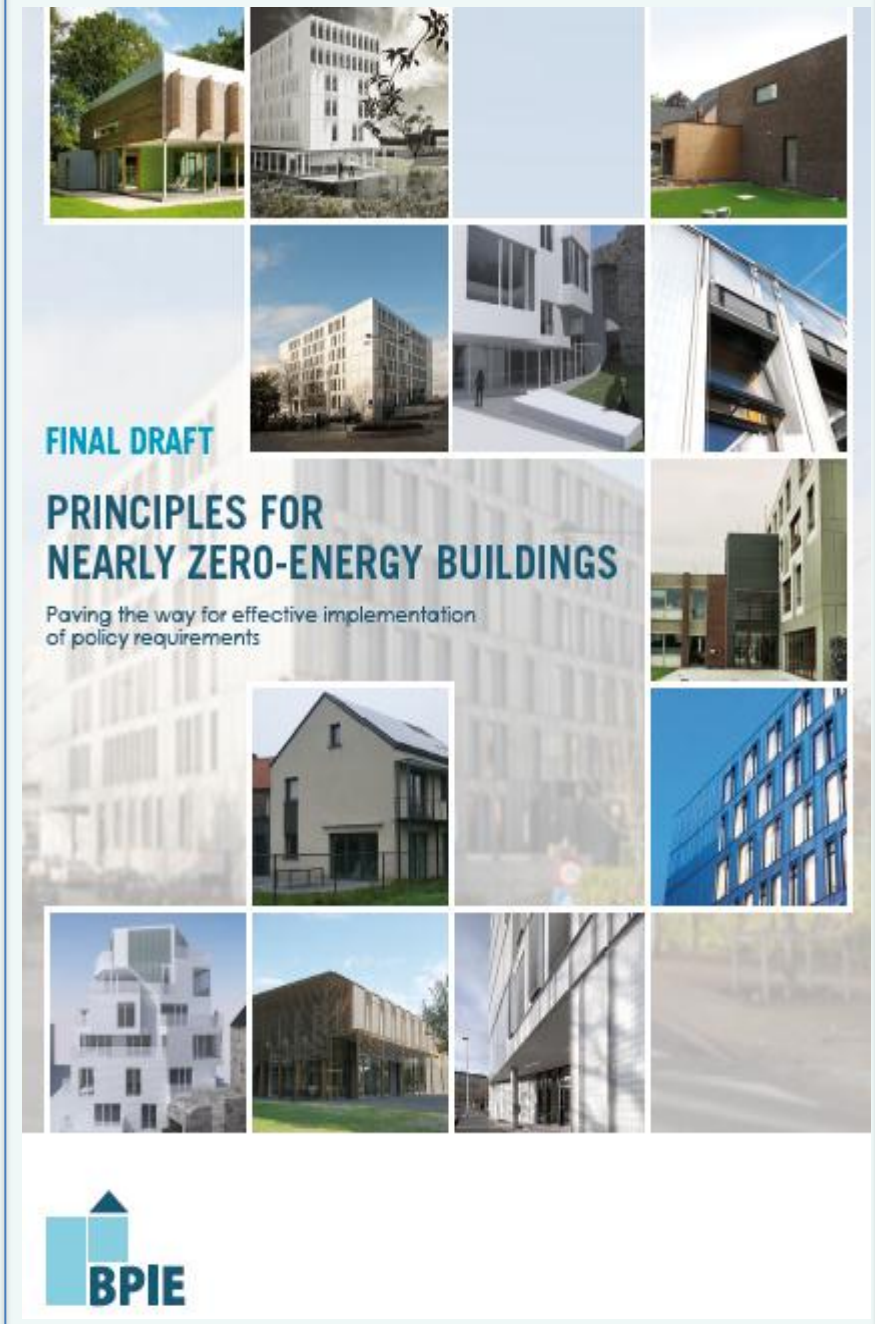
Implementation approach:

- For meeting the EU long term climate targets, the buildings CO_2 emissions related to the energy demand is recommended to be below 3 kg $CO_2/(m^2yr)$.

- introducing an indicator on the CO_2 emissions of buildings (linked to the primary energy indicator for the energy demand) is the single way to ensure coherence and consistence between the EU energy and environmental long-term goals.

Further steps for a successful implementation of nZEBs

What to do	Whose responsibility
Agreement on a concrete outline for nZEB definition	EU MSs, EU Commission, EU Parliament and main stakeholders.
Create benchmarks for suitable nZEB in different EU MSs as a basis for comparison.	EU MSs, EU Commission and main Stakeholders.
Agree on a corridor for the value of an overarching threshold for nZEB.	EU Member States, EU Commission, EU Parliament.
Generate a common format for EU MSs reporting national nZEB plans.	EU MSs, EU Commission.
Support to the investors to deal with higher up-front investment to elaborate planning and build capacities.	EU MSs, EU Commission.
Elaborate a definition for buildings renovation at nZEB level.	EU MSs, EU Commission, EU Parliament and main stakeholders.



Thank you!

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Nearly zero energy buildings

Checking the principles: Simulation on reference buildings

Markus Offermann
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Selection of reference buildings

Aim:

Maximum coverage with a straightforward set of variants

Selection of reference buildings

Two building types:

1. Detached single family house (129 m²) 2. Four-level office block (1600 m²)

Three European climate zones:

1. Cold (Copenhagen) 2. Moderate (Stuttgart) 3. Warm (Madrid)

Seven heat supply systems:

1. Air heatpump 2. Brine heatpump 3. Biomass boiler 4. Gas boiler 5. District heating

6. Gas- Micro-CHP 7. Biogas- Micro-CHP

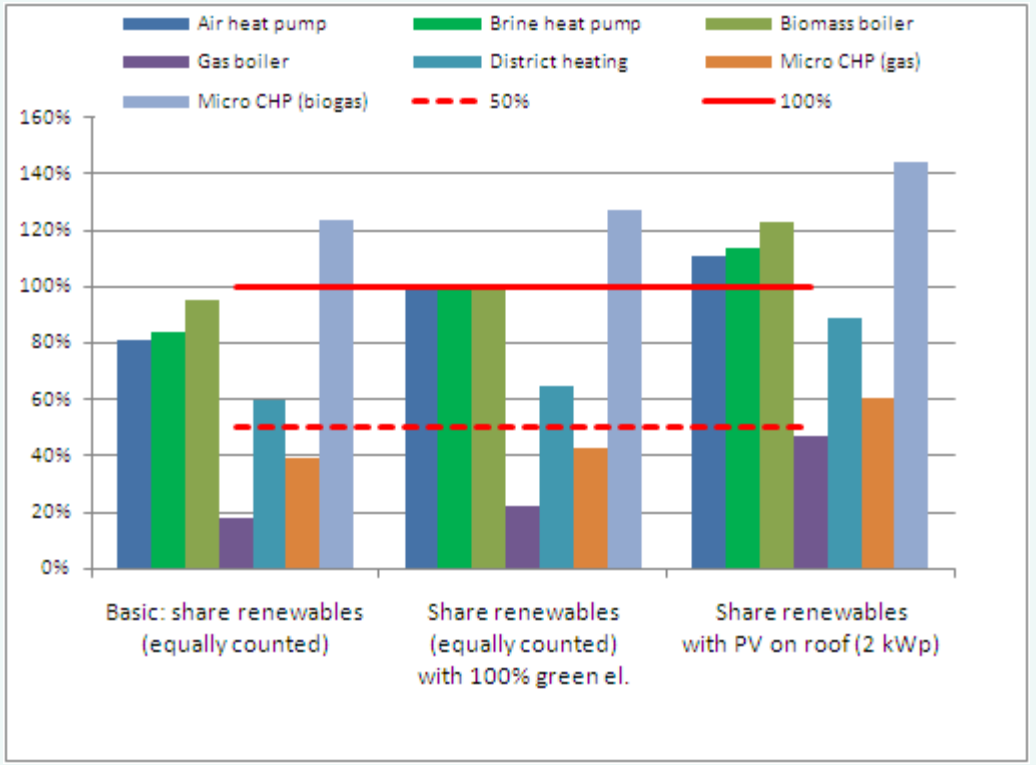
Thermal building quality:

Well-sealed and insulated building shell with highly efficient ventilation systems (close to passive house standard)

Achievable shares of renewable energy

- Fossil fired solutions are already struggling to achieve a renewable share of 50%
- At the office buildings only biomass and heat pump solutions reach a share of renewable energy of 50%
- By using additional offsite green electricity or on-site renewable energy (PV), the heat pump and biomass options can mostly secure even a 100% renewable energy share

Share of renewable energy* of different nZEB solutions for a single family house at the moderate climate zone



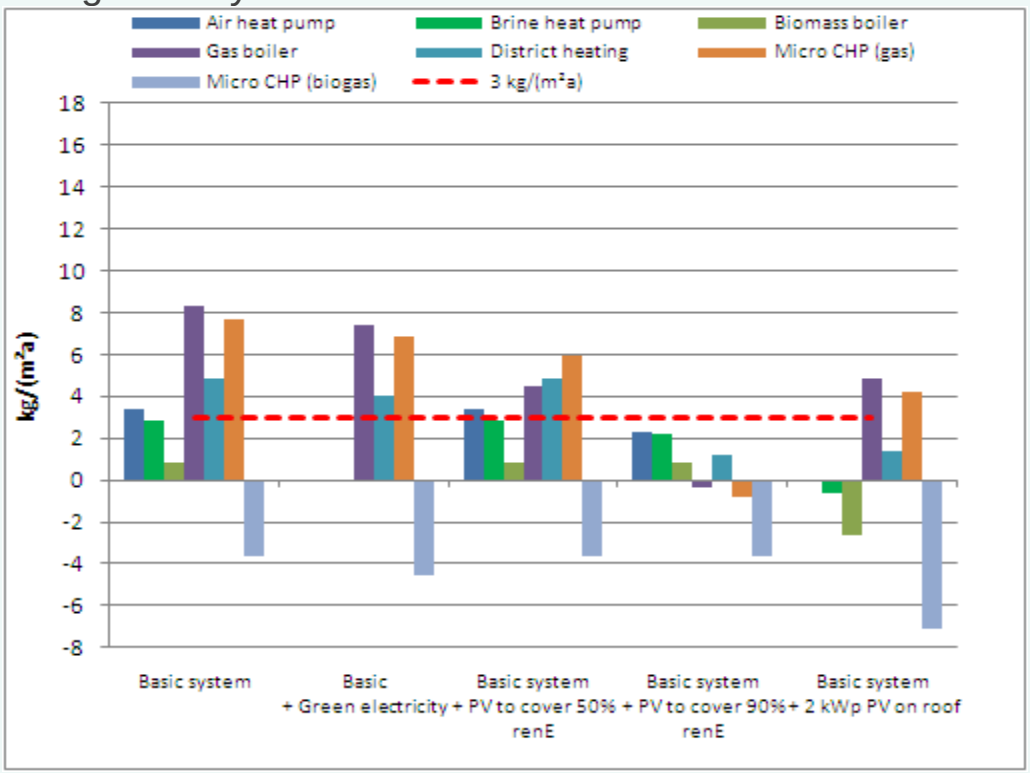
*) excluding appliances

Achievable specific CO_2-emissions

- For the office buildings, only the biogas CHP, for the SFH also the biomass boiler solution, is below the 3 kg/(m²a) threshold

- Additional offsite green electricity or a significant amount of on-site renewable energy (PV) is necessary to meet the threshold

Specific CO_2-emissions* of different nZEB solutions for a single family house at the moderate climate zone



*) excluding emissions from appliances

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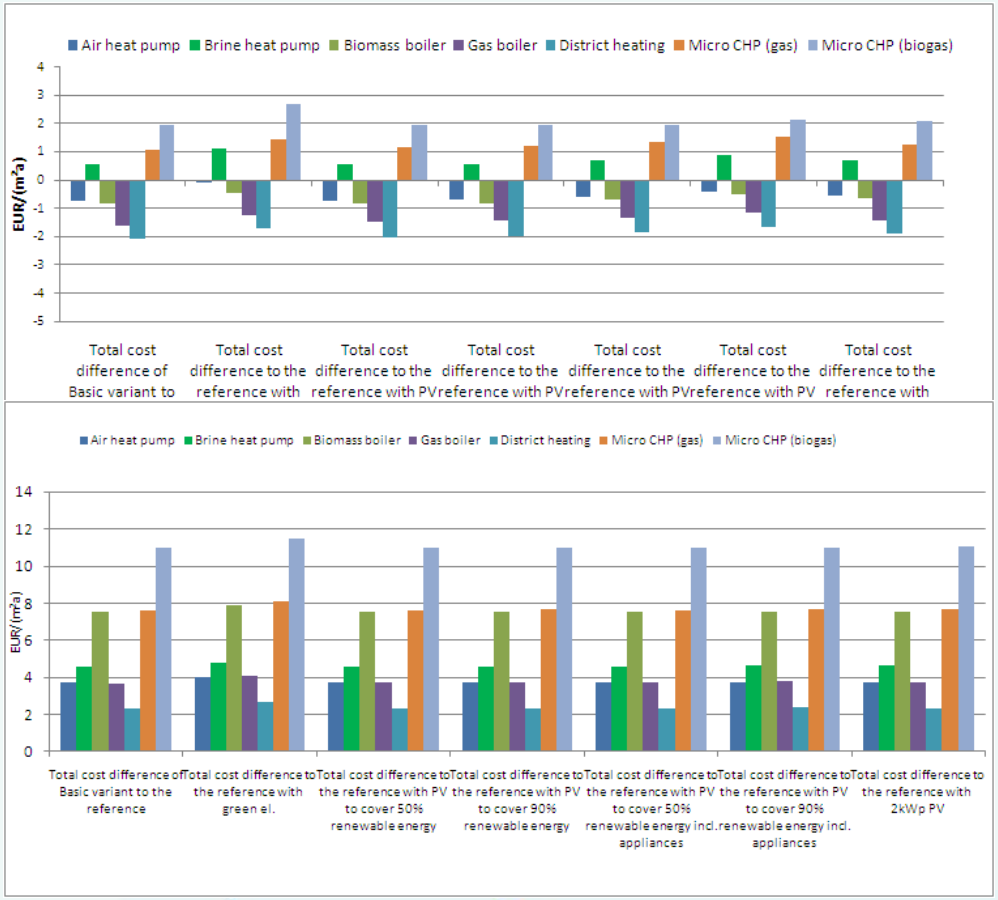
Costs

- The specific capital costs related to the actual local building standards range for all examined variants from savings of 3 €/(m²a) to additional costs of 20 €/(m²a) (= savings of 5 % to additional 30 % referring to total costs)
- Southern Europe: The more PV is added the more financially attractive the nZEB solutions become

Specific additional capital costs of different nZEB solutions related to the actual local building standard
Top: Office building; Bottom. Single family house
at the moderate climate zone



*The average investment costs for using different heating technologies vary largely according to the local market circumstances, contract negotiations, sales volumes etc. and might differ substantially from one case to another.

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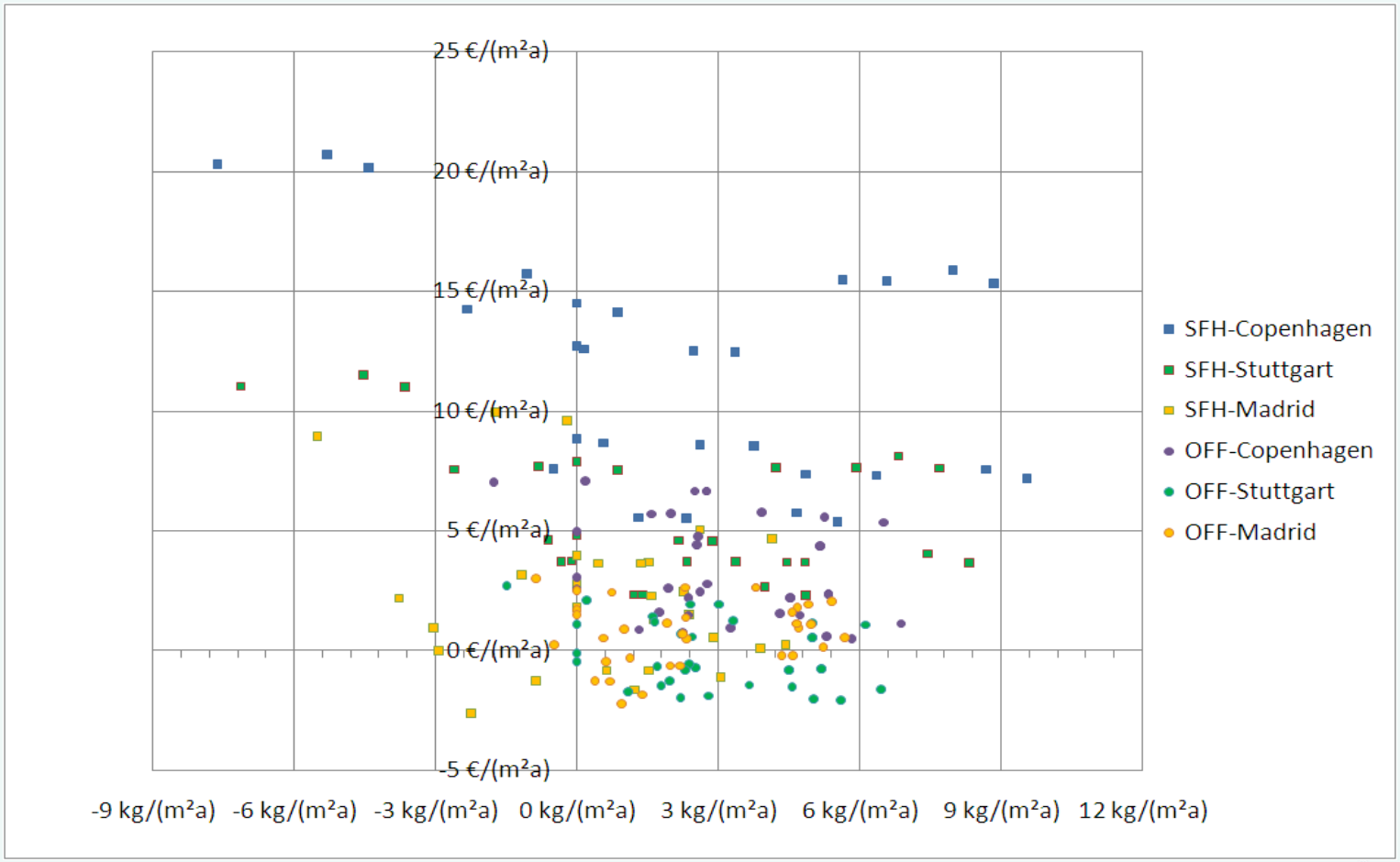
Specific additional capital costs of the examined nZEB solutions related to the actual local building standard (y-Axis) vs. specific CO_2-emissions (x-Axis)



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Nearly zero energy buildings

Technological, financial and policy implications at EU level

Thomas Boermans
Ecofys Germany GmbH
09 11 2011

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Technology and resources

Markets	Required growth factor	Current market size	Unit
Insulation materials	2-3	2 010	Mio EUR
Ventilation systems with heat recovery	8-10	130 000	units
Triple glazed windows	>10	1 500 000	m^2
Heat pumps	2-3	185 000	units
Pellet boilers	2-3	43 000	units
Solar thermal systems	2-3	3 700 000	m^2

- **Market development** and **capacity building** needed

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Financial impacts at EU level

- Turnover in the EU building industry in 2009 was about EUR 1 trillion, about half of that amount (EUR **470 billion**) is due to new buildings.
- Current investments in new buildings for heat pumps, pellet heating systems, ventilation systems with heat recovery, triple glazed windows and insulation materials at EU level are estimated to reach about EUR **23 billion**.
- To implement nZEB requirements for every new building, the investments are estimated to reach about EUR **62 billion** per year
- This increase of EUR **39 billion** would represent an overall increase of about **9%** (related to EUR 470 billion), being a considerable growth that seems achievable when taking place over the years until 2020 (approx. 1% p.a.).

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Legal feasibility

nZEB and general EU policies and targets

• The definition of nZEBs has to fit in with general and cross sectoral targets, such as those related to **lowering energy consumption**, **use of renewables** and **climate protection**.

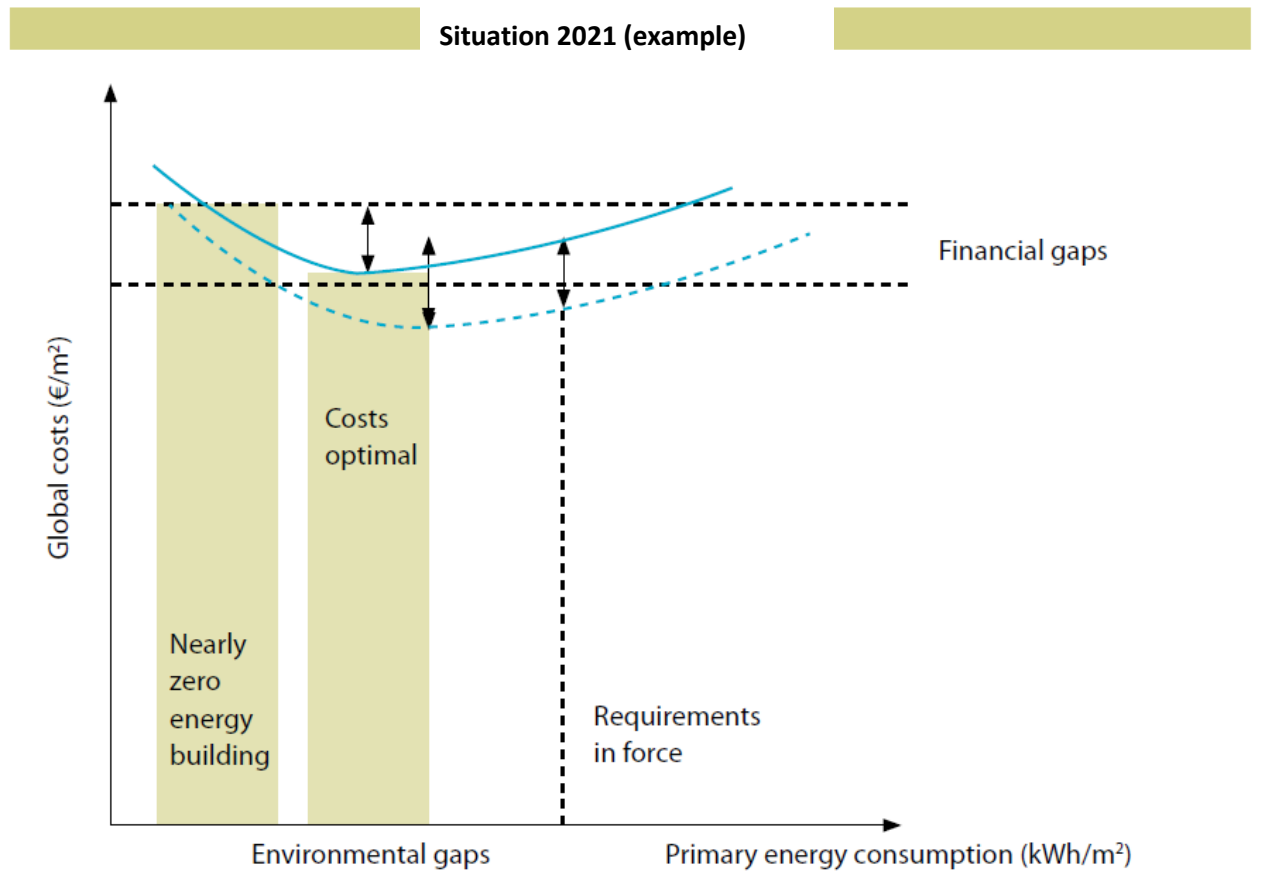
•The proposed nZEB principles fit with the European Union's energy and climate targets.

•Moreover, the proposed nZEB principles can **support EU job creation targets** by stimulating construction activity as well as innovation and production processes in the supply chain industry.

• the implementation of nZEBs in the proposed way might create about **345,000** additional jobs.

Legal feasibility

Bridging the gap between cost-optimal and nZEB levels



Legal feasibility

nZEB implications on national policies of EU Member States

- To comply with the proposed nZEB principles, current national codes in general need to be gradually **strengthened** towards more ambitious levels.
- beyond tightening the existing requirements it is necessary to **adapt and improve the structure** of the legal requirements.
- It would be useful to e.g. **merge the regulations** for renewable energy with the existing building regulations or to broaden the scope of the existing buildings regulations by introducing renewable energy requirements.

Thank you !

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Agenda

14.30 **Welcome and introduction**, *BPIE*

14.40 **Policy context, existing concepts, initiatives and nZEB implementation at MS level**, *SBi*

15.00 **Principles for nearly Zero-Energy Buildings**, *BPIE*

15.20 **nZEBs– Checking the principles**, *Ecofys*

15.50 **Panel and Q&A,** *BPIE, Ecofys and SBi*

16.10 **Coffee**

16.30 **AEROPOLIS building**

- **The challenge of low-energy houses in practice**
  Architects + engineers of AEROPOLIS II
- **Financing low-energy houses**
  ARCO financial holding investing in green

16.45 **Panel and Q&A: Implementing nZEBs**

17.15 **Final remarks**

17.30 **Cocktail**

BPIE

Panel and Q&A

Moderation: Oliver Rapf, BPIE

- Bogdan Atanasiu, BPIE
- Thomas Boermans, Ecofys
- Markus Offermann, Ecofys
- Jorgen Rose, Sbi
- Kirsten Engelund Thomsen, SBi

Coffee Break

See you back here at 4.30 pm!

Agenda

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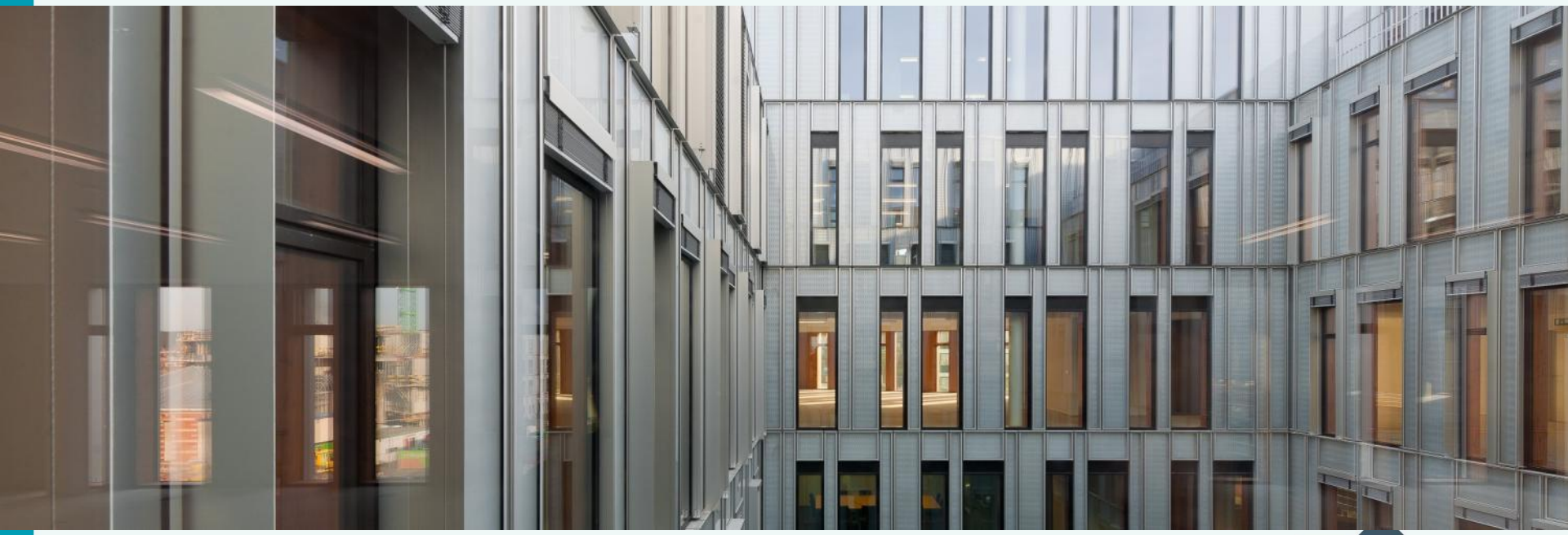
BPIE

AEROPOLIS II BPIE conference 2011

introduction



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building presentation

team

Client	Groep Arco, KWB, KAV, KAJ
Project manager	Dexia Real Estate Eric Gobert - Baudouin Vreven
Architect	sca Architectes Associés sprl m. desmedt - m. lacour - s. leribaux - d. van cauwenberghe Elodie Léonard
Structural engineer	Setesco Luc Sottiaux - Grigori Caberis
Durability - Service engineer	Cenergie Geert De Bruyn - Lionel Wauters - Anne -Laure Maerckx
Service engineer	Cenergie (with Istockman) Piet Delagaye- Johan Sap
Contractor	Jacques Delens - Vanderstraeten Paul Kinget - Peggy Sepanski
Technical control consultant	Seco
Healty & safety coordinator	Health & Consulting sprl
Acoustical	Venac
Facade	Belgométal (Kyotec Group) Thierry Foucart - Manu Lievens - Frank Vangeertruyen

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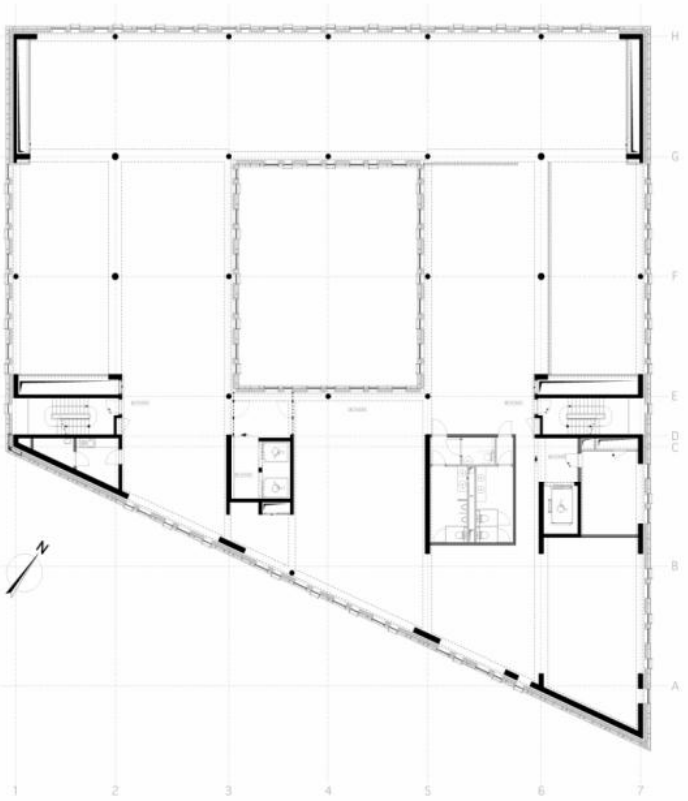
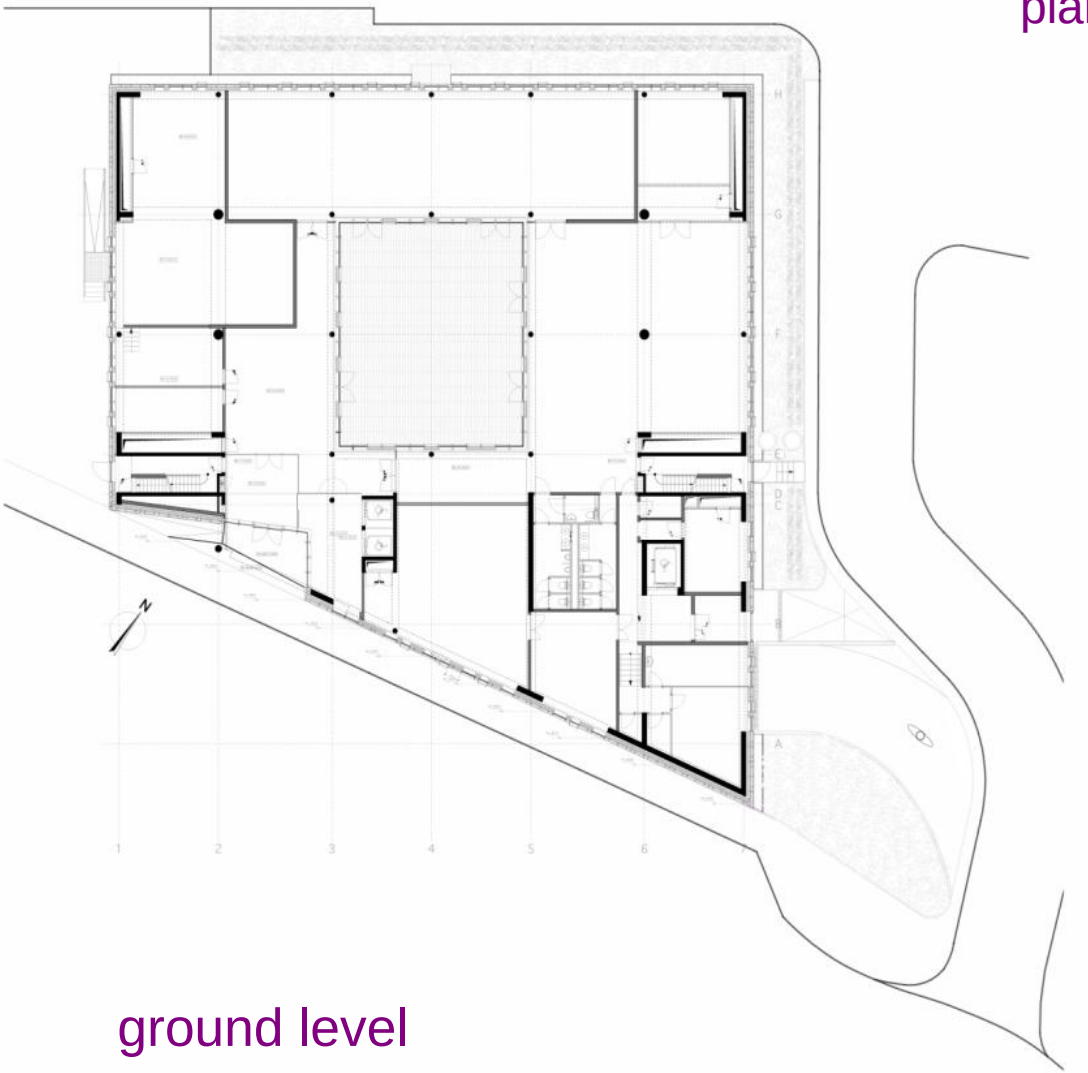


typical floor plan



ground level

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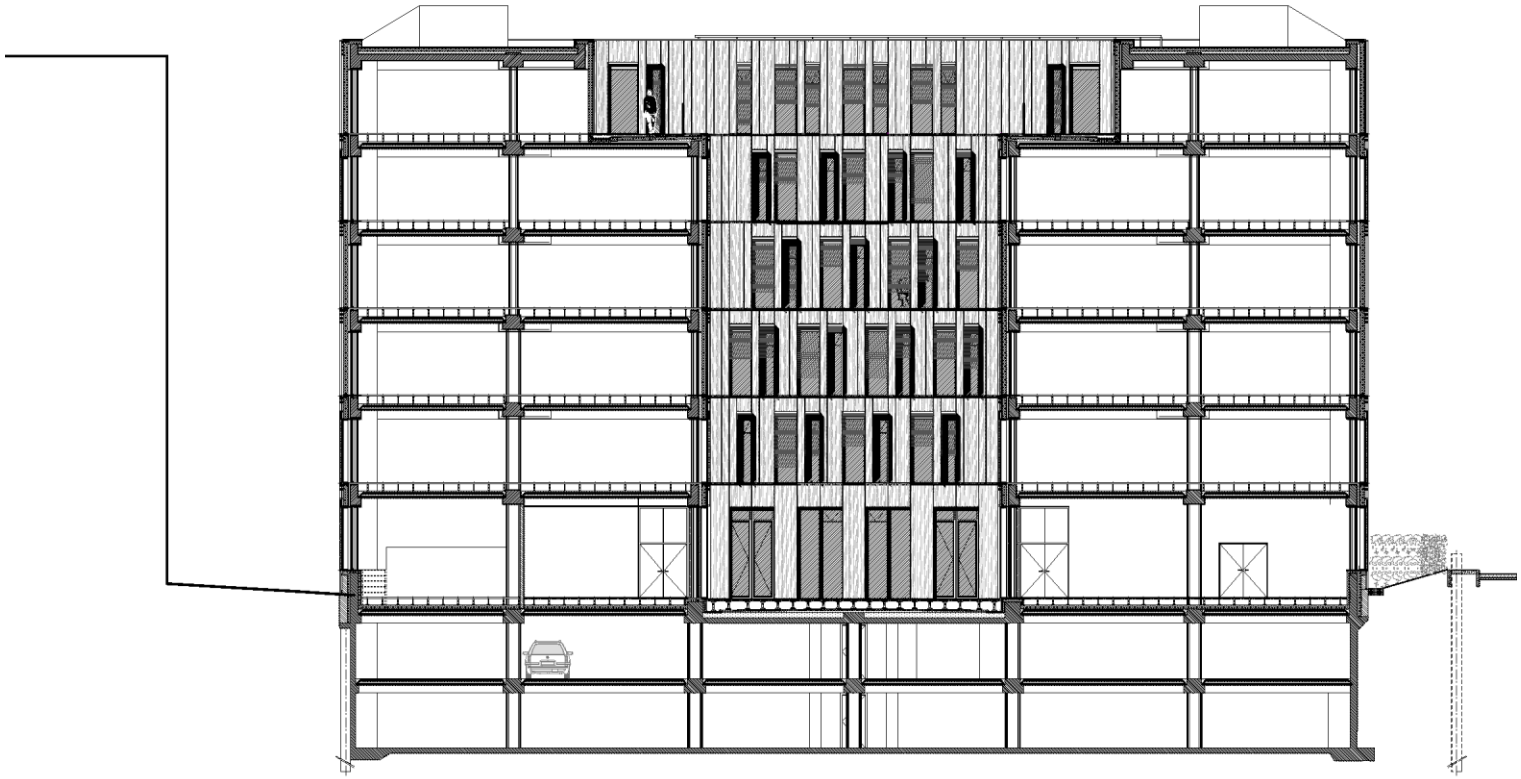
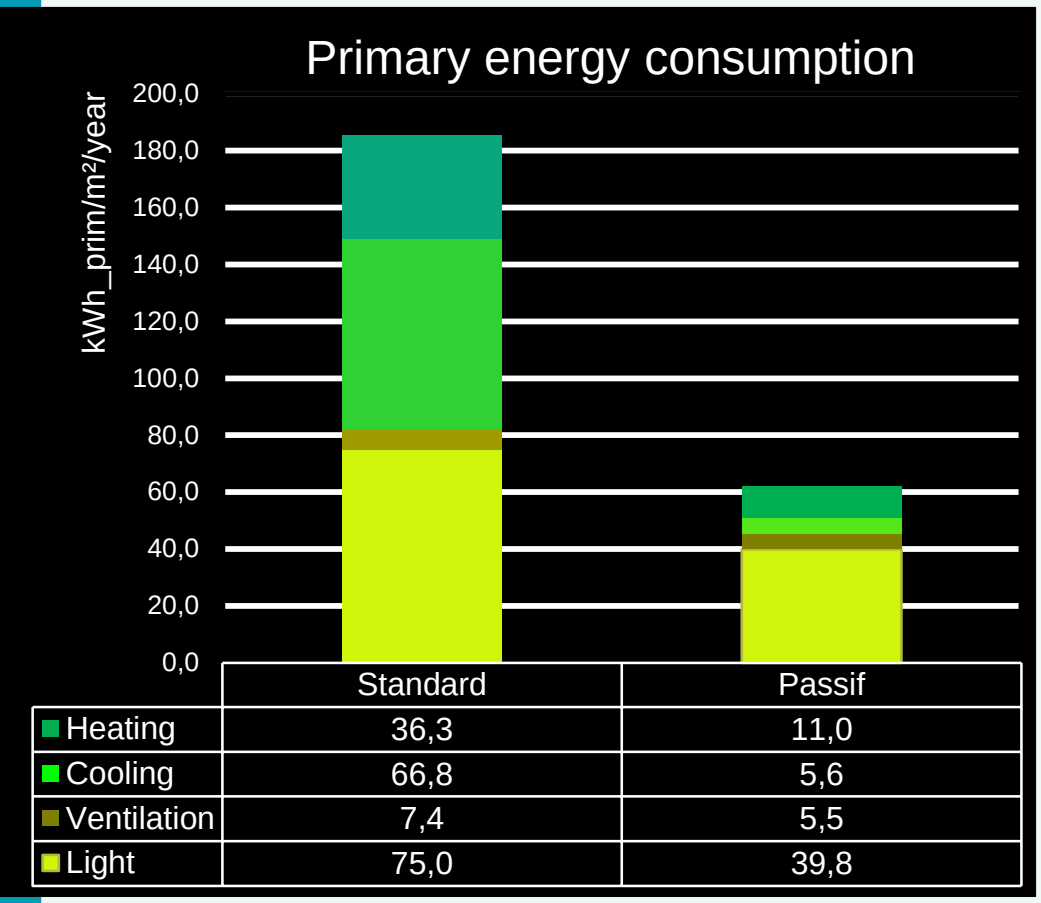


patio



	Standard	Passif
Heating	36,3	11,0
Cooling	66,8	5,6
Ventilation	7,4	5,5
Light	75,0	39,8

Passive house	heat < 15 kWh/m²year airtightness < 0,6 vol/h
Passive koeling	inteligent shading heat gain reduction nightcooling ground heat exchanger
Light	natural light optimisation efficiency < 2W/m²100lux regulation
Ventilation	mecanical ventilation heat recovery humidity recovery

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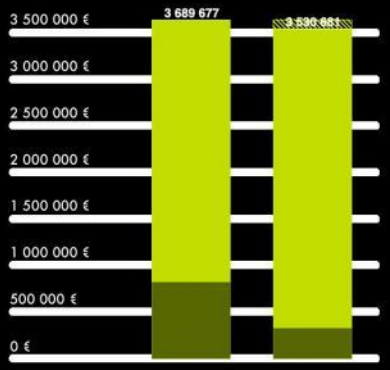
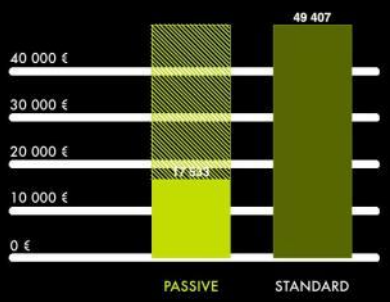
	PASSIVE		STANDARD
Extra construction investments	826 122 €	>	369 050 €
Technical investments	2 863 544 €	<	3 161 631 €
TOTAL =	3 689 677 €		3 530 681 €
Extra cost for passive	158 996 €		



Annual consumption	17 533 €	<	49 407 €
Savings	31 873 €		
	return on investment : 5 years		



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PRE-DETERMINED OPTIONS

Compact volume _

Flexible space _

Optimal **glazed / opaque** ratio _

Simple **prefabricated** construction principles _

Highly insulated and air-tight prefabricated **skin** _

Low-tech **passive** technology _

Special attention to **material life-cycle** _

Reduction of **finishes** _

RESULT

1 _ **White prism** with shared central void (patio)

2 _ Hyper **modular plan** based on a 3x90 grid

3 _ Glazed / opaque ration down to **21%**

4 _ **Standard concrete structure** with prefabricated beams, columns and slabs

5 _ Standard prefabricated frame facade, only **3 modules**
(90cm glazed, 90cm opaque, 90 cm mixed glazed + opaque)

6 _ Thermal concept based before all else on **reduction of heat gain or loss** ...
and completed by **passive technology**

7 _ **Certified, recyclable, native** sources as much as possible

8 _ Reduction of **suspended ceilings**, inner finish of prefabricated
facade frames included, reduction of **plaster rendering** (painting concrete)...

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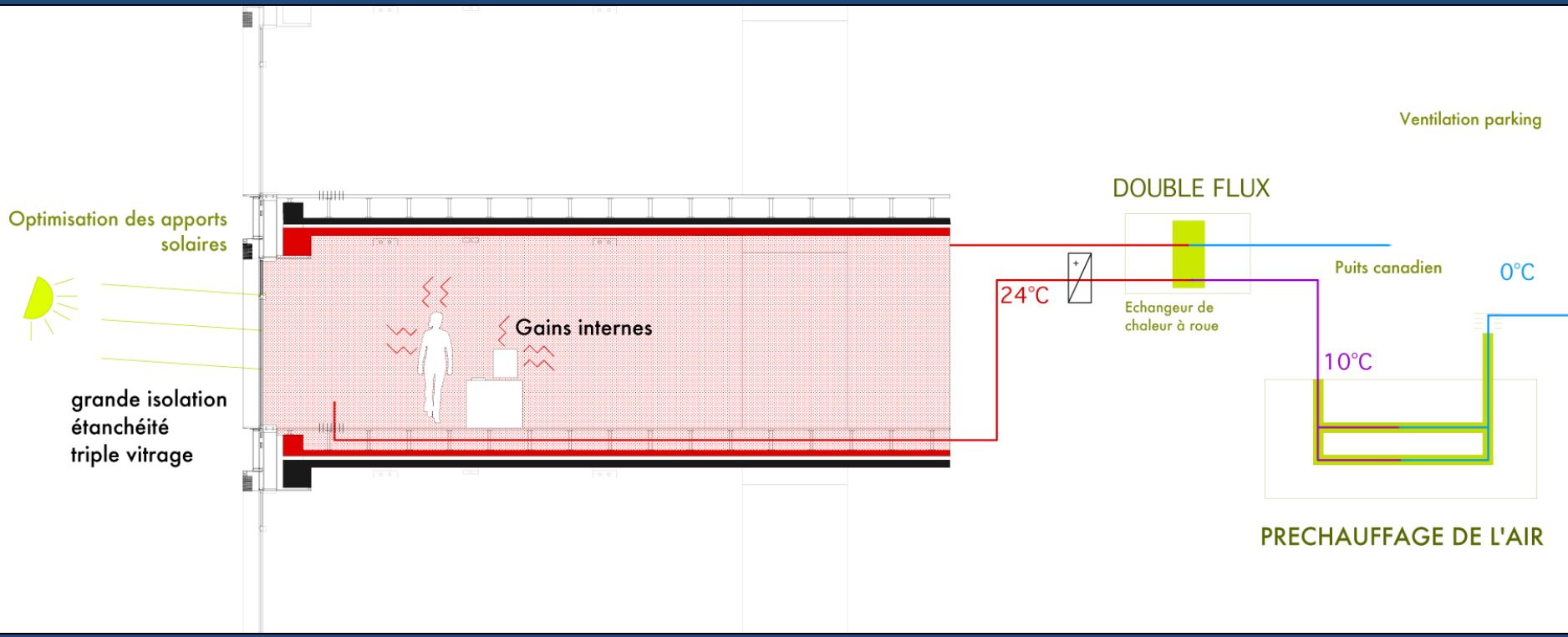
energy concept - winter



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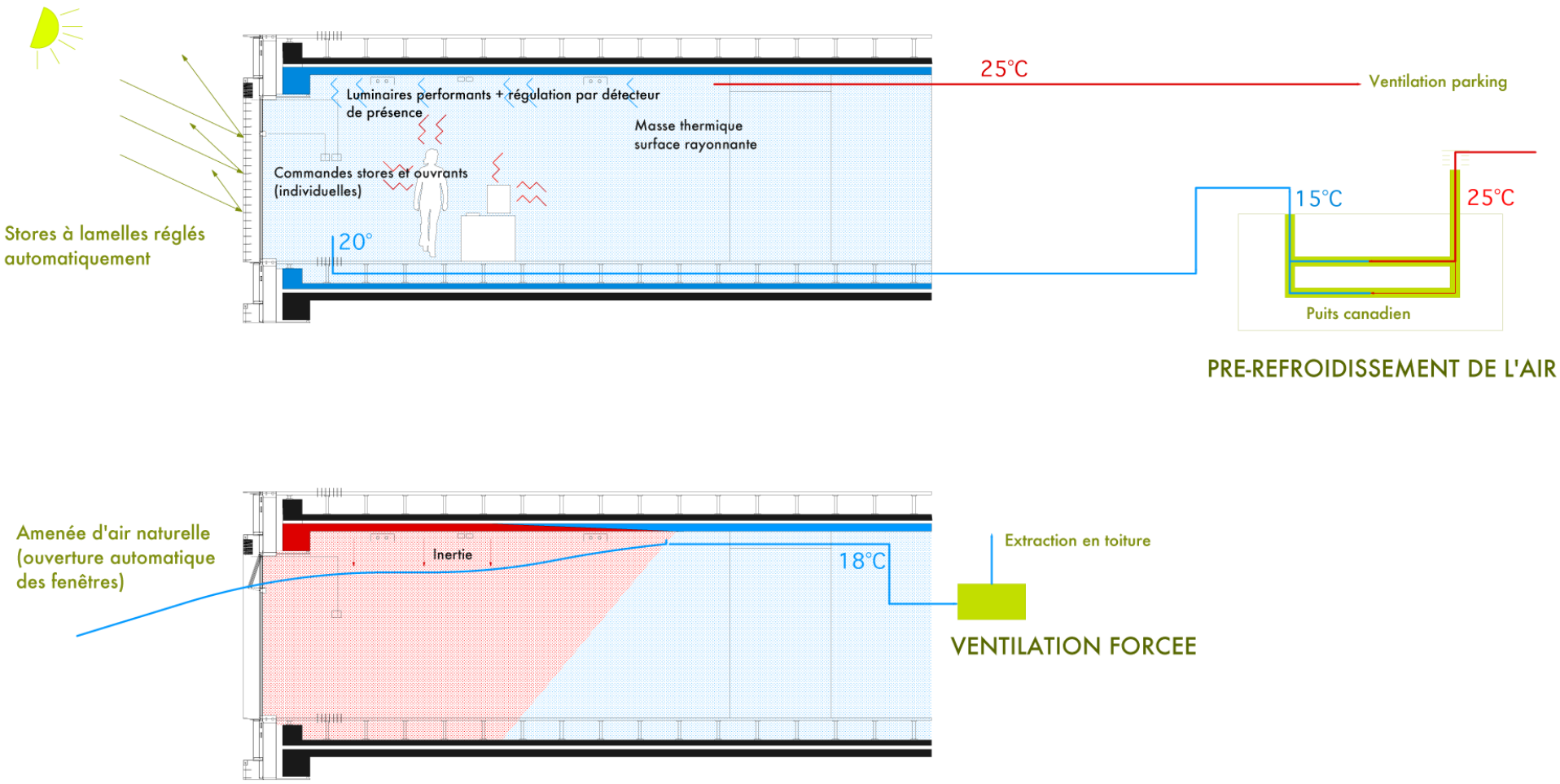
Luminaires performants + régulation par détecteur de présence
Masse thermique surface rayonnante
Commandes stores et ouvrants (individuelles)
20°
Stores à lamelles réglés automatiquement
25°C
Ventilation parking
15°C
25°C
Puits canadien
PRE-REFROIDISSEMENT DE L'AIR
Amenée d'air naturelle (ouverture automatique des fenêtres)
Inertie
18°C
Extraction en toiture
VENTILATION FORCEE

ground heat-exchanger 1

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ground heat-exchanger 2

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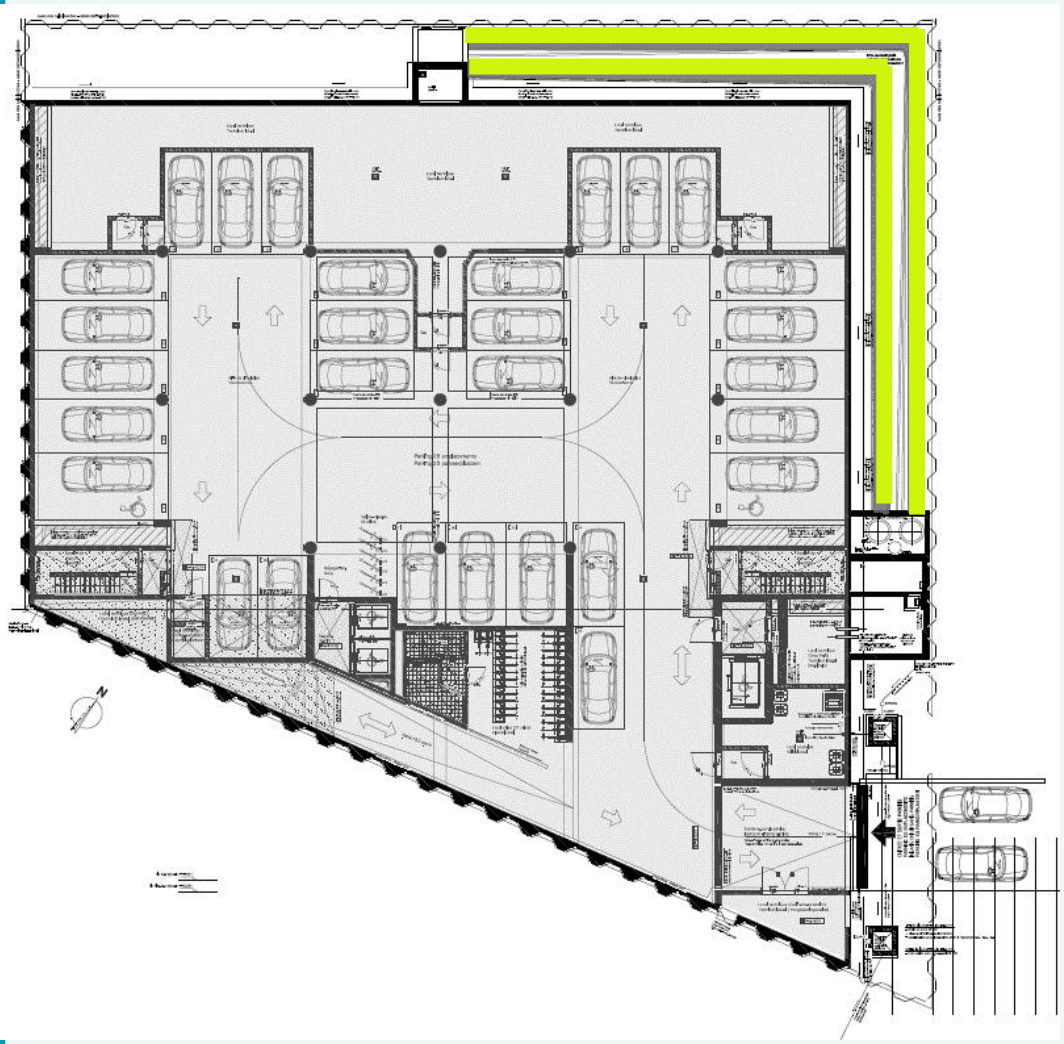
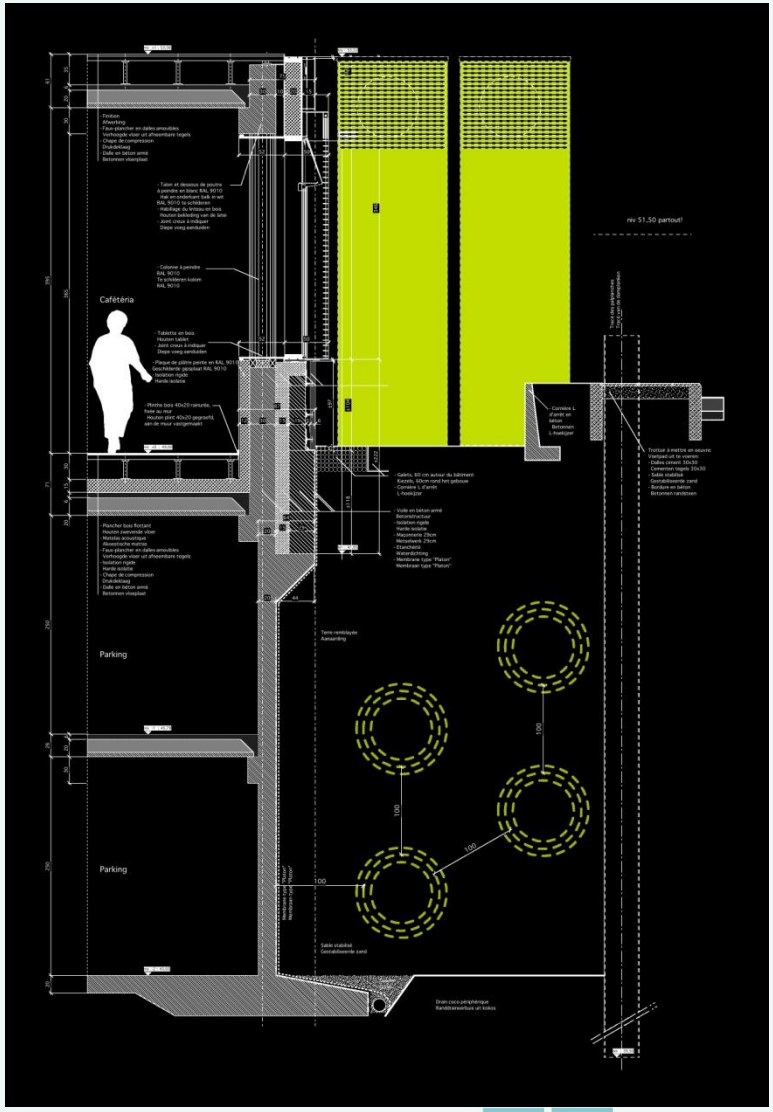
ground heat-exchanger 3





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HVAC floor

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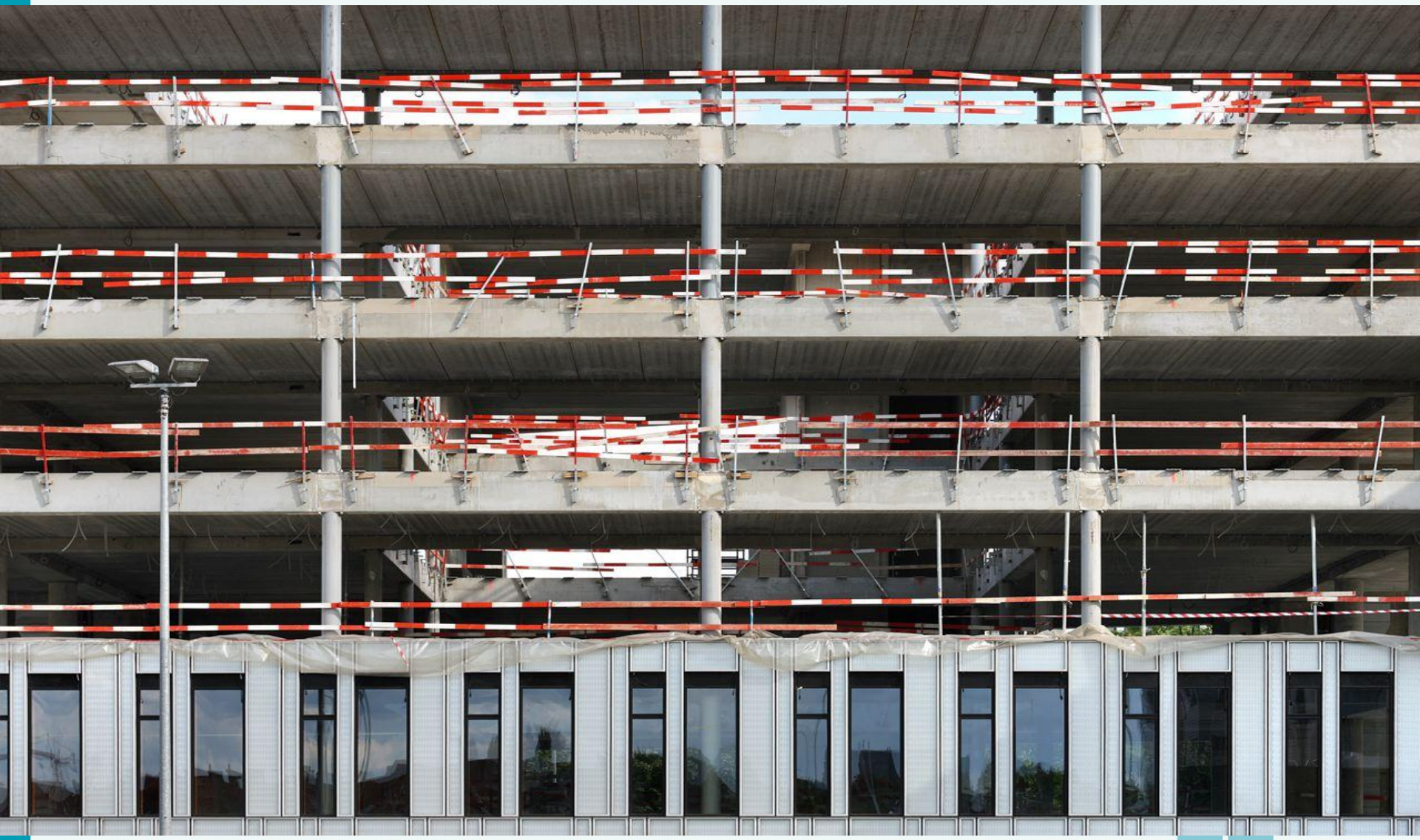
pre-fabricated skeleton / re-use



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pre-fabricated

frame-cladding

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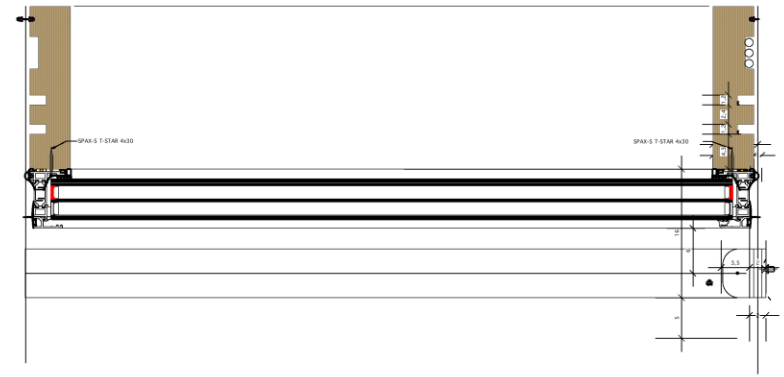
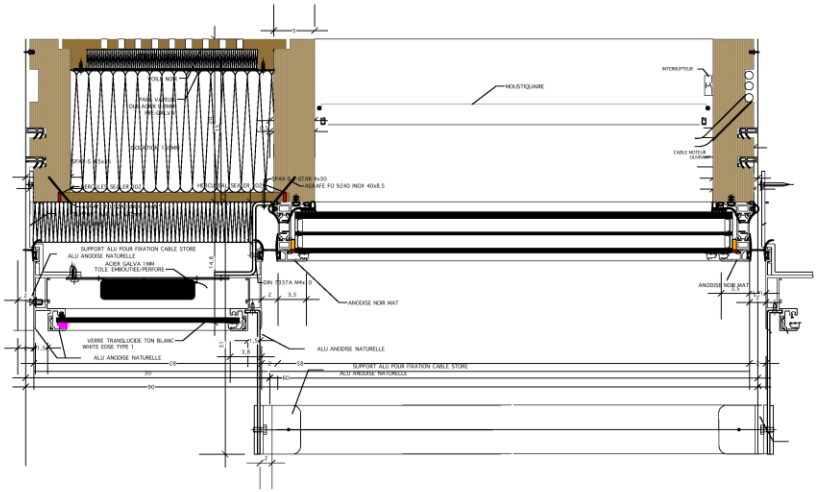
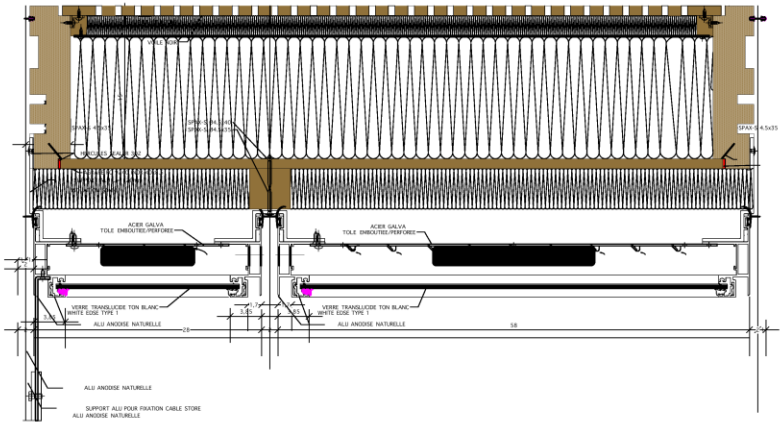
facade details 2







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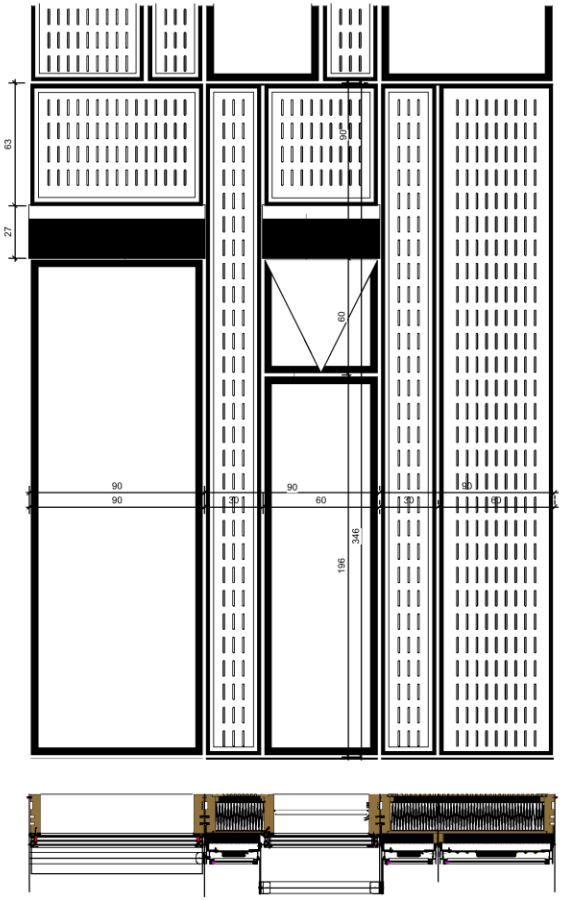
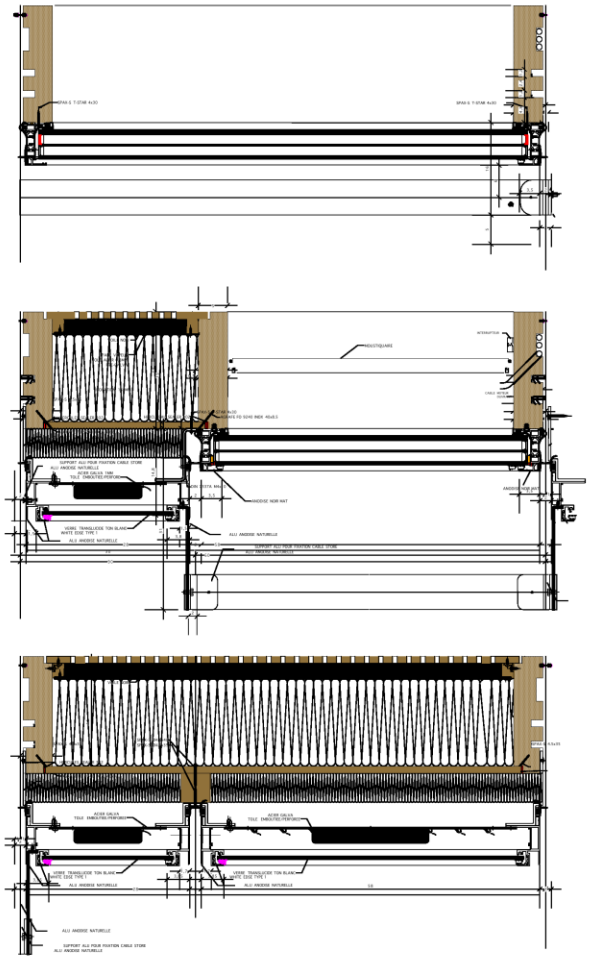
facade details 1





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thermal and acoustic

performance

on-site efficiency

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daylight performance / modular grid

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problem:
motor + dimensional
tolerance between
wood and aluminium

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problem: wood fragility

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problem:
complicated facade logistics
+ narrow frames

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fit-out info late

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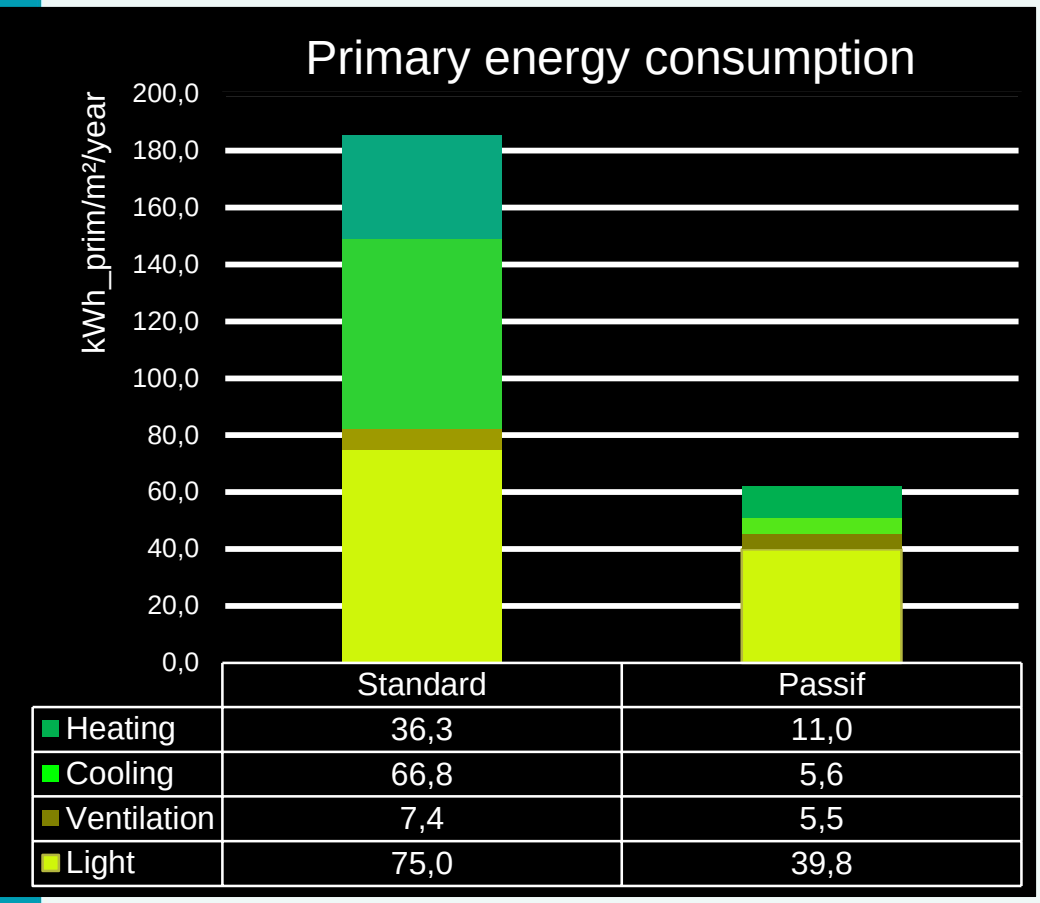

	Standard	Passif
Heating	36,3	11,0
Cooling	66,8	5,6
Ventilation	7,4	5,5
Light	75,0	39,8

Ventilation	less pressure loss natural ventilation
Lighting	more natural light
Ventilation	mechanical ventilation heat recovery humidity recovery
Renewable energy	photovoltaïcs cogeneration ground heat pomp

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towards more flexibility

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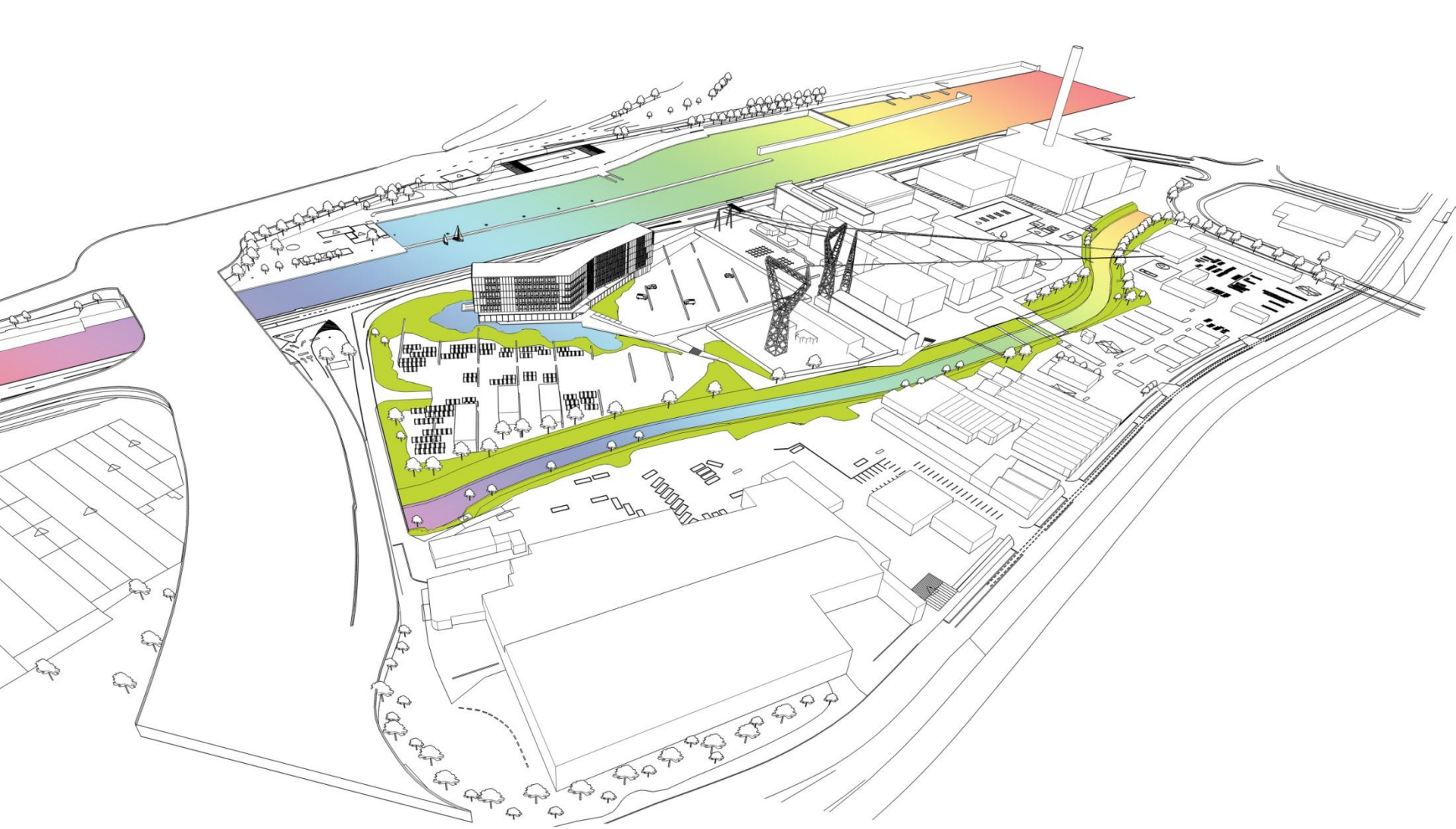

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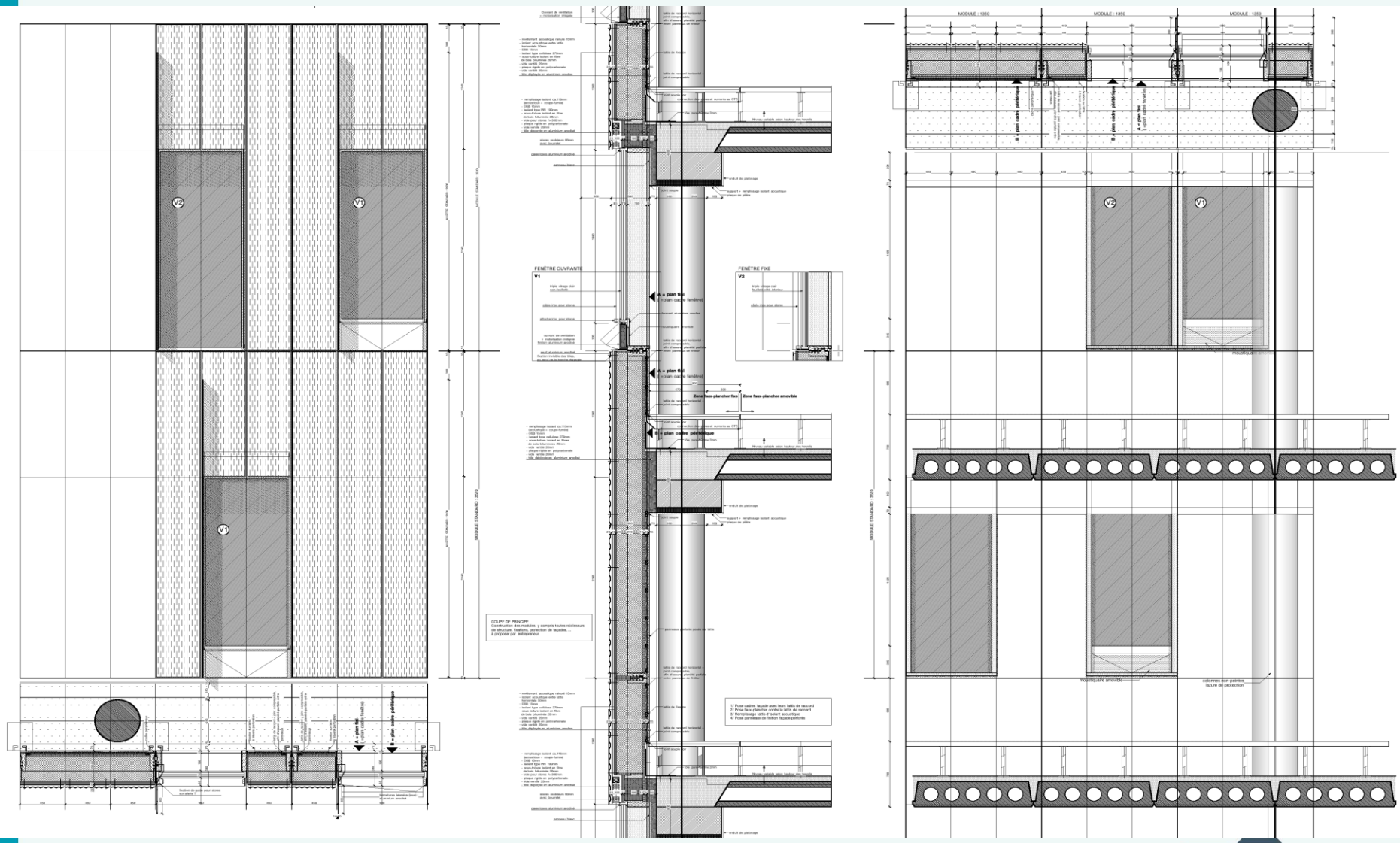
spending more time on material choice



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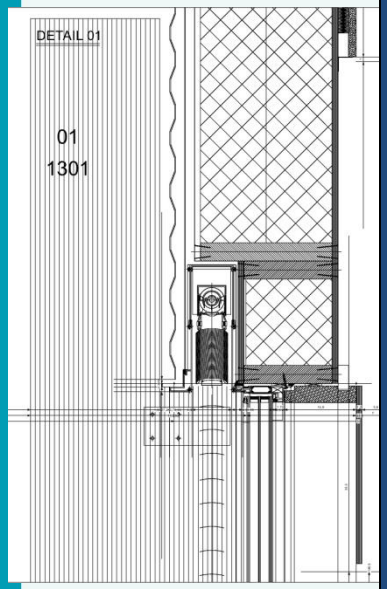
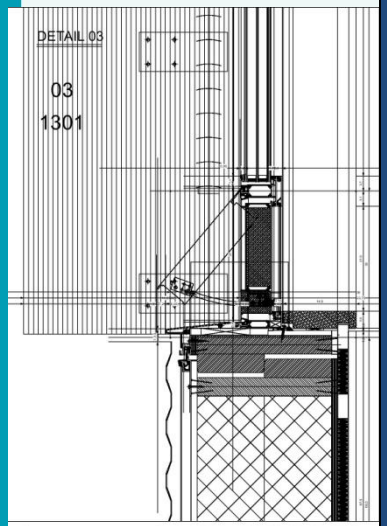
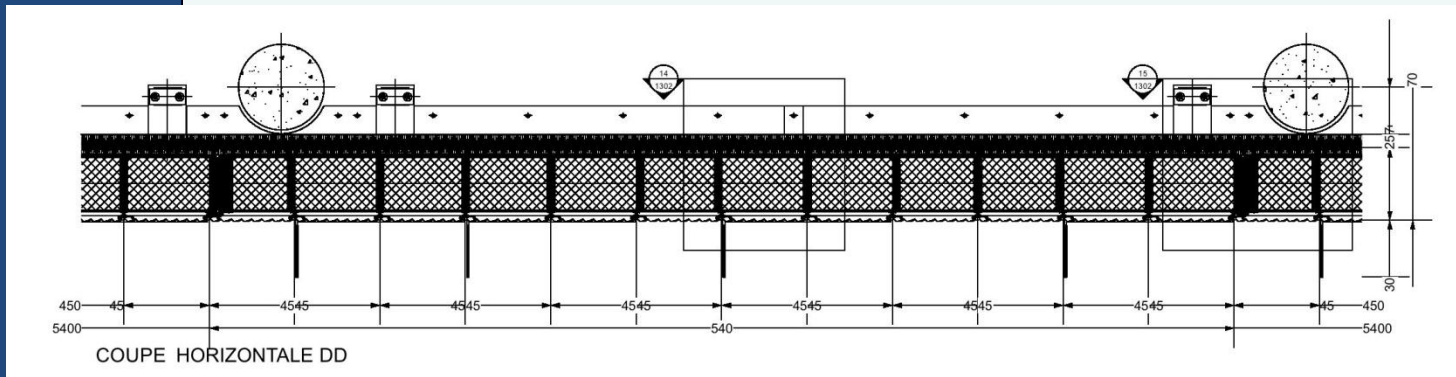
simplifying facade logistics
working with wider frames







COUPE HORIZONTALE DD

KYOTEC GROUP

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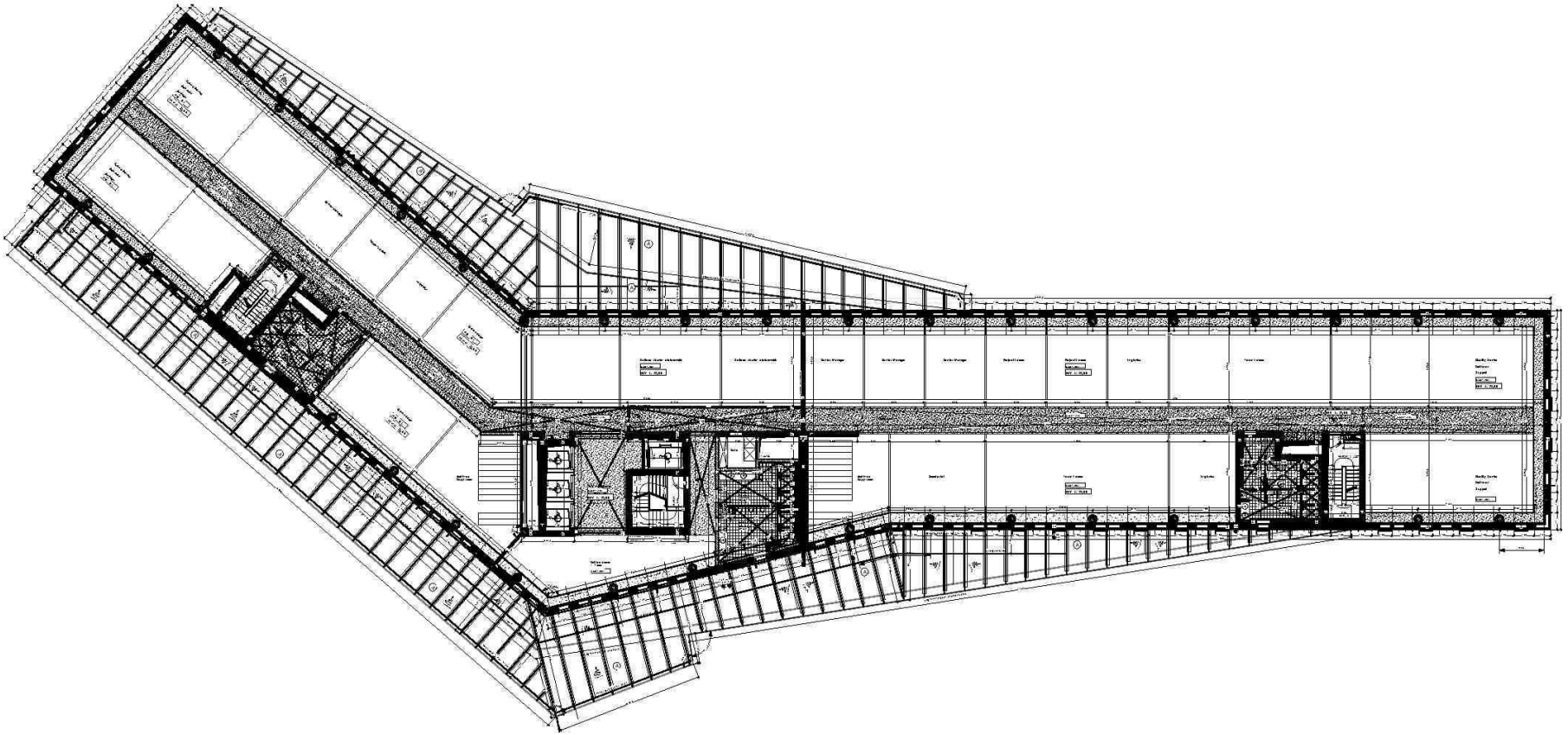
insisting on fit-out

information early



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developping teamwork

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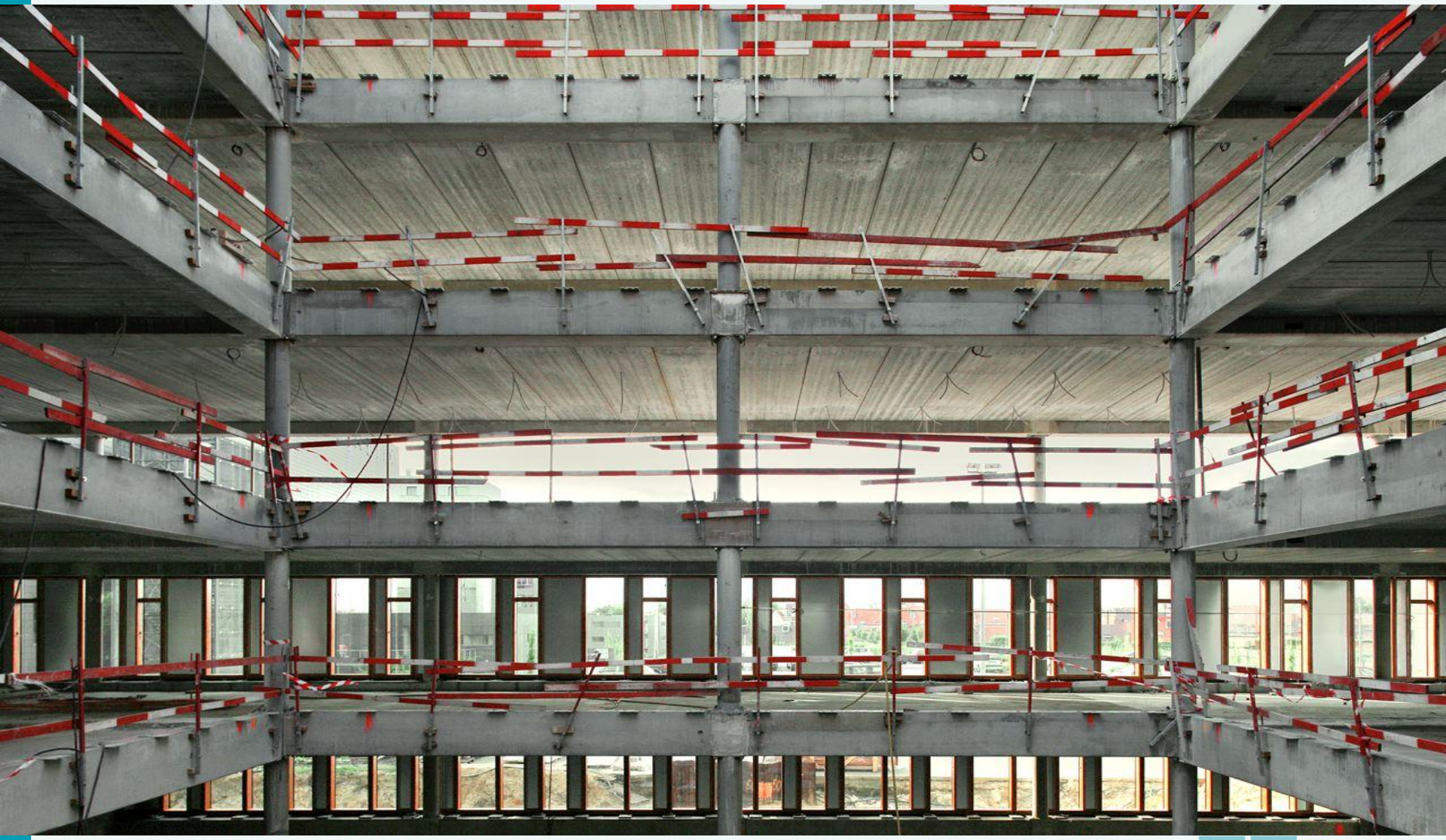
encouraging input from construction industry



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Panel and Q&A

Moderation: Eoin Less, President of the BPIE board

- Frank Baumeister - CEETB
- Ismaël Daoud - Government Brussels Region
- Robert Nuij – European Commission, DG Energy
- Alastair Blyth– International Energy Agency
- Gordon Sutherland - European Agency for Competitiveness and Innovation

Agenda

14.30 **Welcome and introduction**, *BPIE*

14.40 **Policy context, existing concepts, initiatives and nZEB implementation at MS level**, *SBi*

15.00 **Principles for nearly Zero-Energy Buildings**, *BPIE*

15.20 **nZEBs– Checking the principles**, *Ecofys*

15.50 **Panel and Q&A,** *BPIE, Ecofys and SBi*

16.10 **Coffee**

16.30 **AEROPOLIS building**

- **The challenge of low-energy houses in practice**
  Architects + engineers of AEROPOLIS II
- **Financing low-energy houses**
  ARCO financial holding investing in green

16.45 **Panel and Q&A: Implementing nZEBs**

17.15 **Final remarks**

17.30 **Cocktail**

BPIE

Final Remarks

Oliver Rapf, Executive Director BPIE