

Data use in real Estate

indoor environmental quality
and building performance :
value trigger?

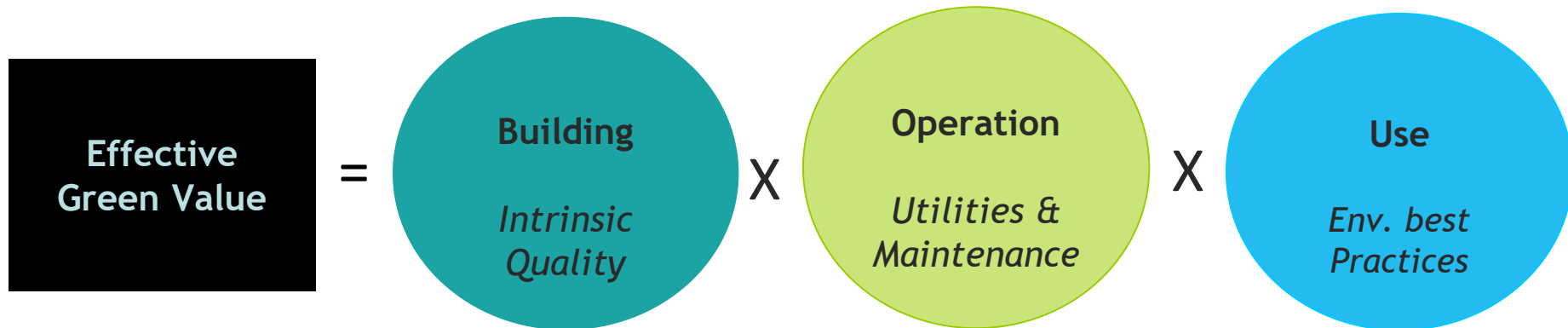
Frank Hovorka

French real estate developer federation : technical director

RICS : member

REHVA : president

How to define environmental quality of buildings ?



Time dimension : Life span and flexibility

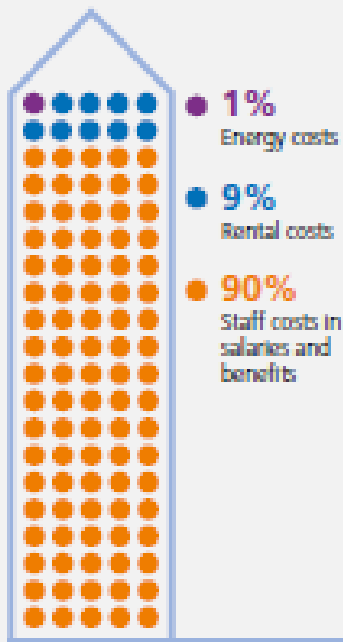
WORKPLACE PRODUCTIVITY AND HEALTH

- Evidence shows that green design attributes can improve occupant productivity, health and well-being.
- Investing in better indoor environments can lead to better returns on one of every company's greatest assets - its employees.



Staff costs, including salaries and benefits, typically account for about 90% of business operating costs.

Typical business operating costs¹



10% Variation

A 10% variation applied equally to each cost has a far from equal impact

+/- 0.1%

Energy costs

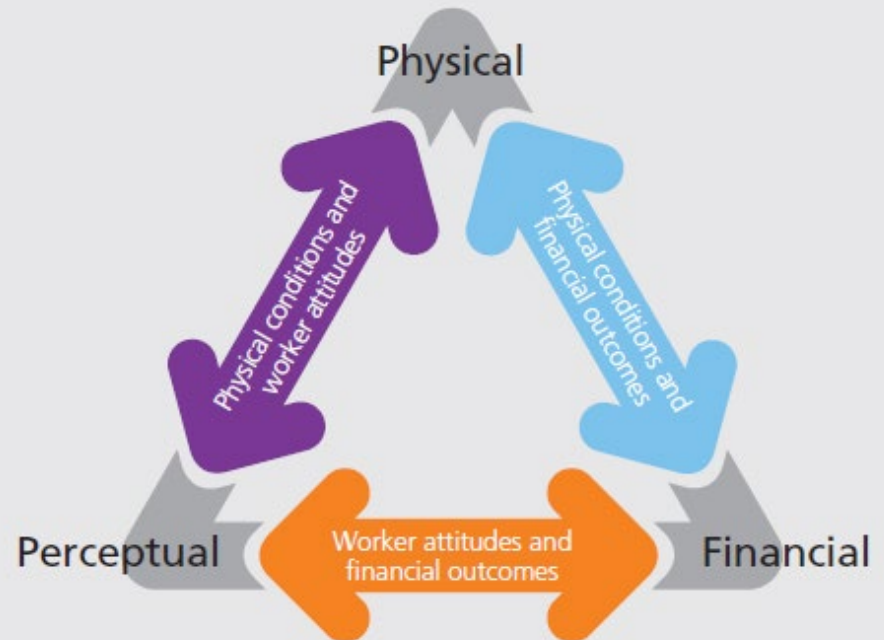
+/- 0.9%

Rental costs

+/- 9.0%

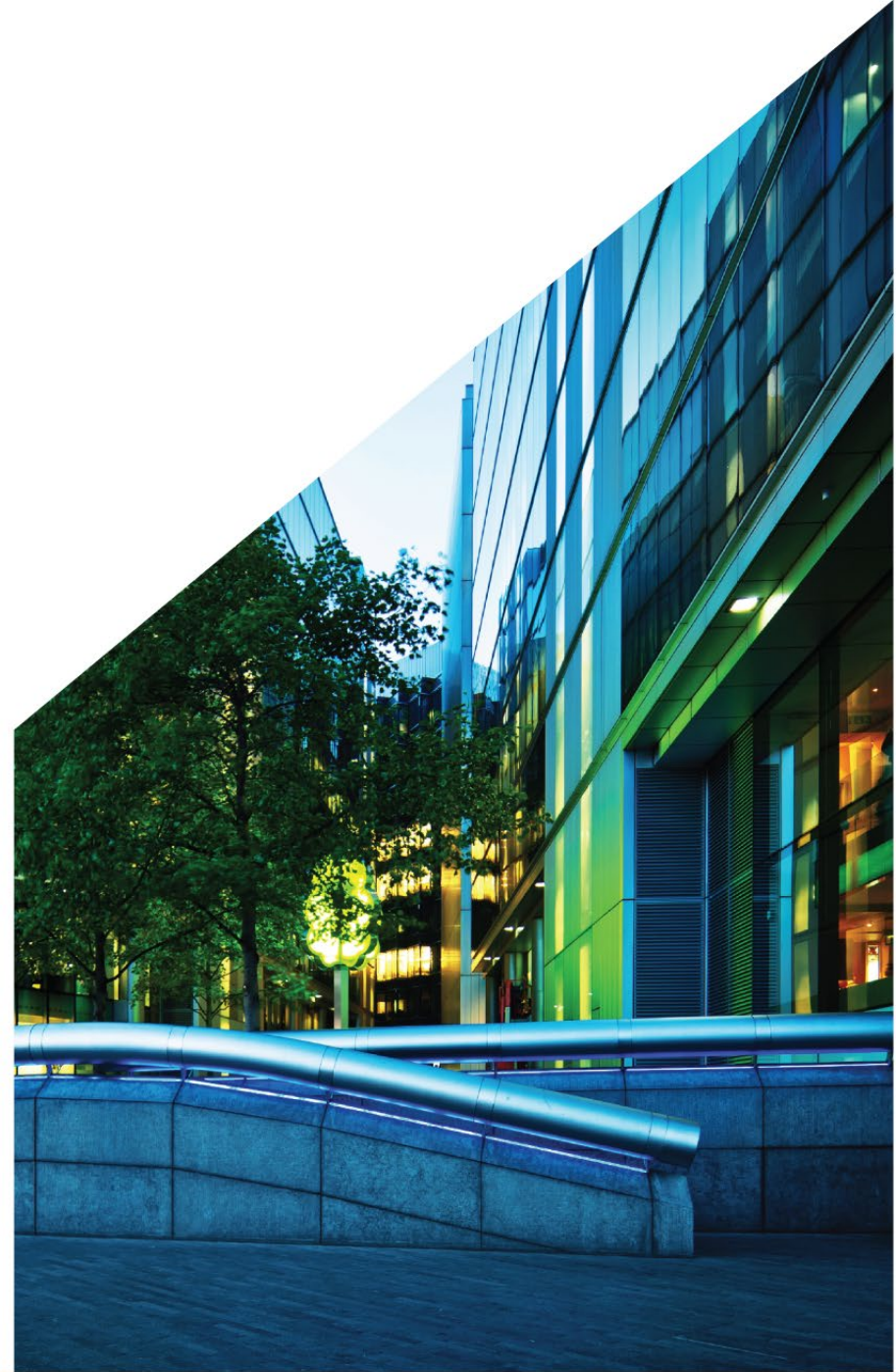
Staff costs

Summary of metrics framework and key relationships



RISK MITIGATION

- Sustainability risk factors can significantly affect rental income and the future value of real estate assets, in turn affecting their ROI
- Changing tenant preferences and investor risk screening may translate into risk of obsolescence for inefficient buildings



Energy linked to a building: 4 main blocks

Building energy

Actual new building:
130 to 250 kWh_{ep}/m²/an

NZEB :
40 to 65 kWh_{ep}/m²/an

Specific electricity

Housing :
10 à 50 kWh_{ep}/m²/an

Office:
30 to 300 kWh_{ep}/m²/an

Embodied energy

New building :
≈ 1200 kWh_{ep}/m²

« As usual » NZEB:
≈ 1600 kWh_{ep}/m²

Transport

French average daily distance:
16km

20 km :
by car : 6450 kWh_{ep}/an
bus: 630 kWh_{ep}/an

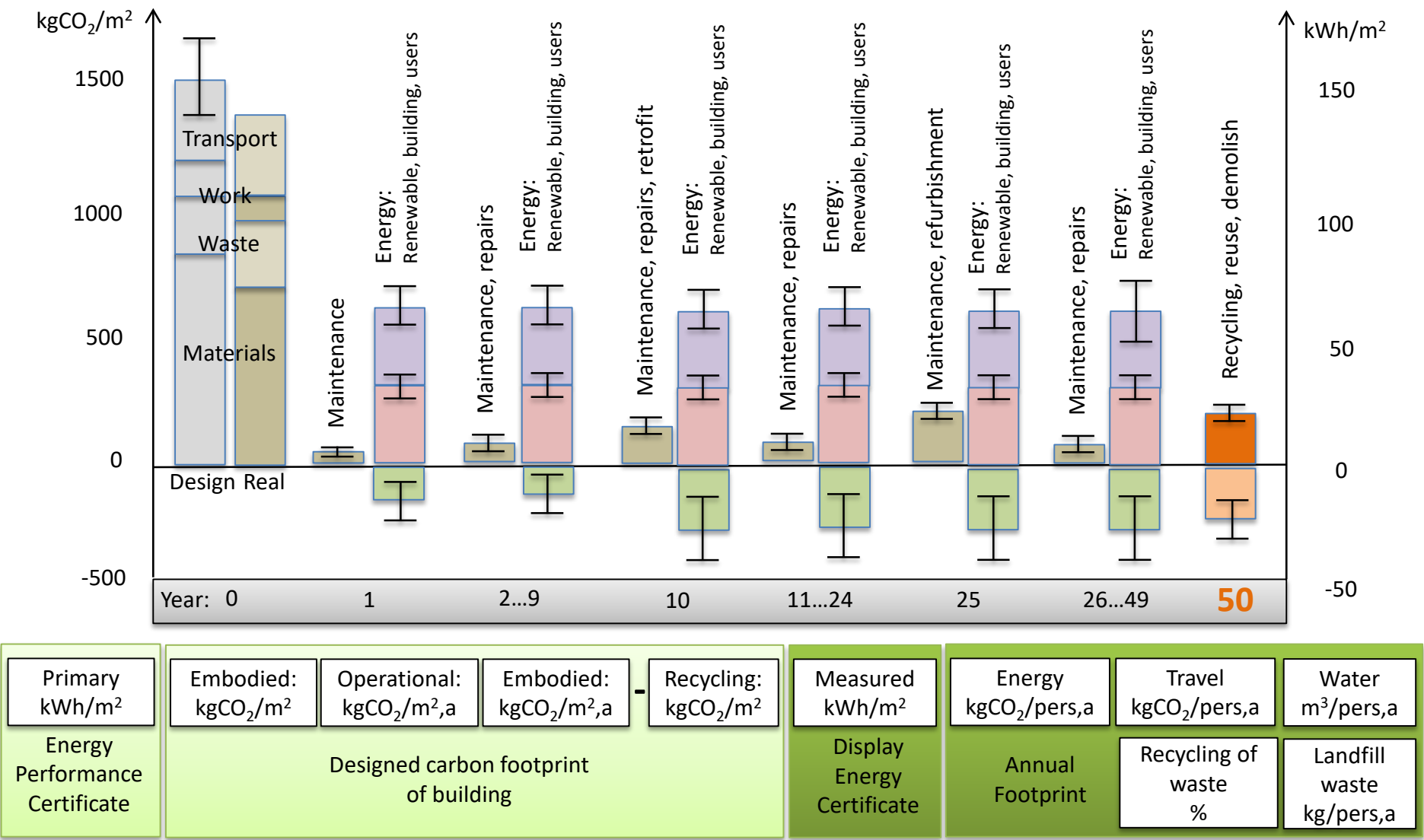
Building Passport

Name:
Address:
Year of completion:
Heated floor area:
Number of occupants:

Designed indoor climate class:
A/B/C

Measured user satisfaction:
%

Indoor Environment Quality



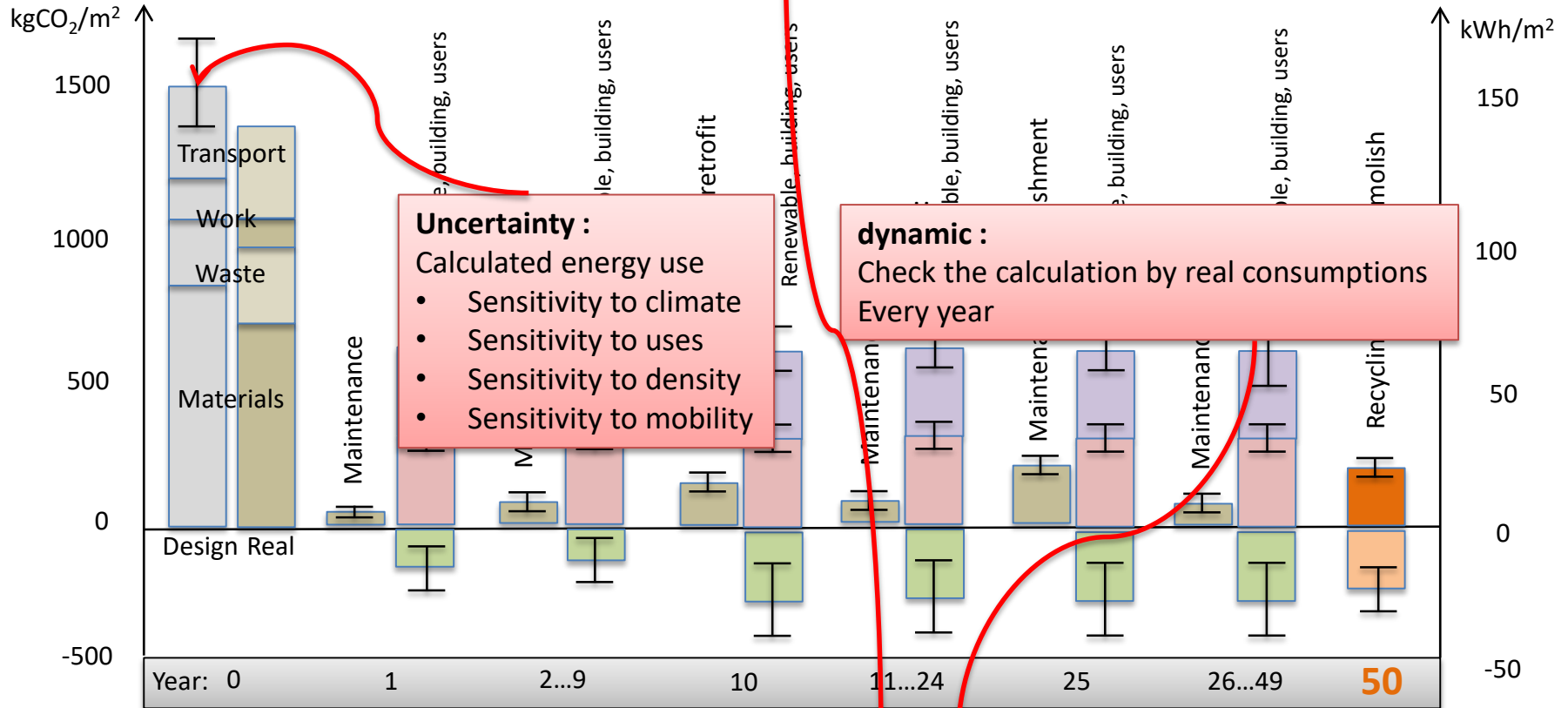
Building Passport

Name:
Address:
Year of completion:
Heated floor area:
Number of occupants:

IPMS and IPMVP :
Measurement definition

Designed indoor	Measured user
	satisfaction:
	%

Indoor Environment Quality



Primary kWh/m ²	Embodied: kgCO ₂ /m ²	Operational: kgCO ₂ /m ² ,a	Embodied: kgCO ₂ /m ² ,a	Recycling: kgCO ₂ /m ²	Measured kWh/m ²	Energy kgCO ₂ /pers,a	Travel kgCO ₂ /pers,a	Water m ³ /pers,a
Energy Performance Certificate	Designed carbon footprint of building				Display Energy Certificate	Annual Footprint	Recycling of waste %	Landfill waste kg/pers,a

Building Passport

Name:
Address:
Year of completion:
Heated floor area:
Number of occupants:

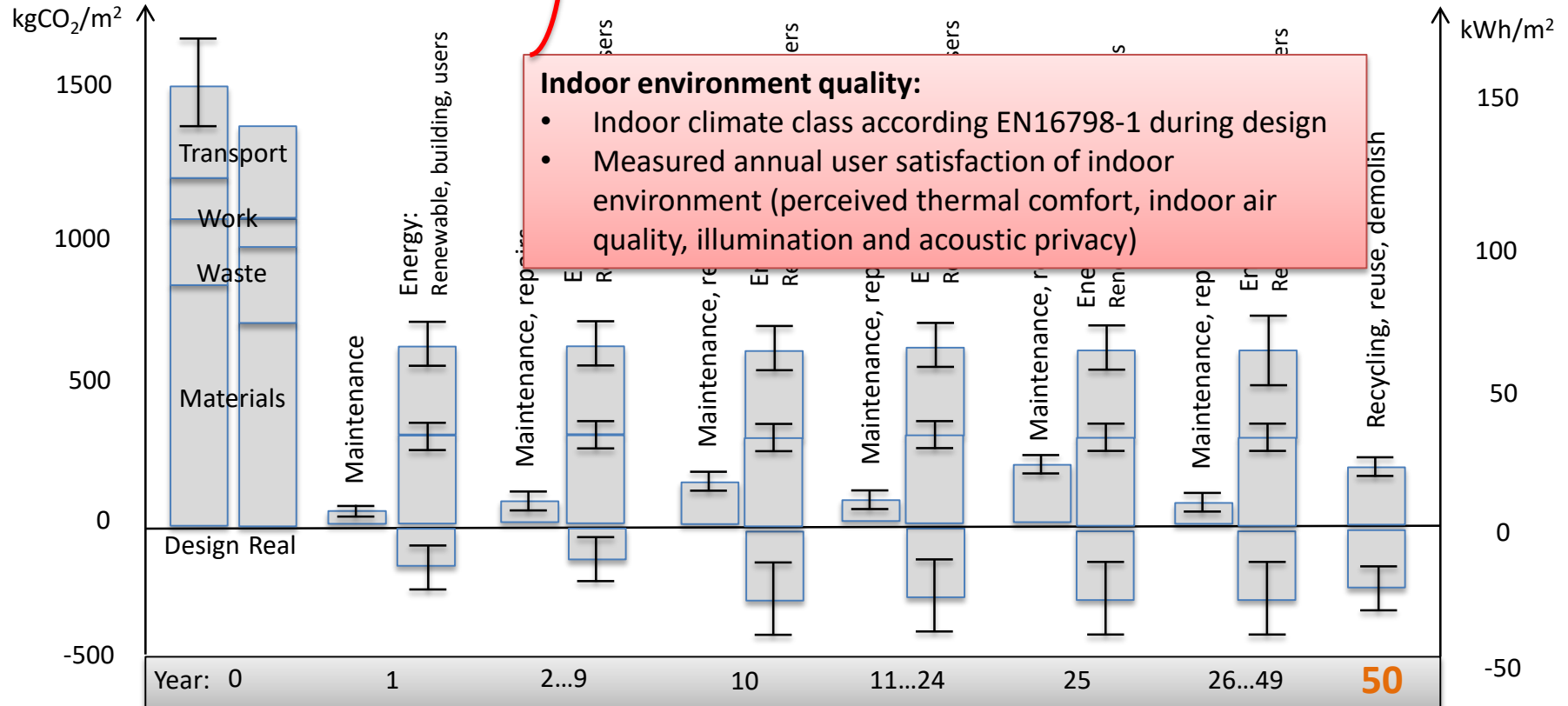
Designed indoor
climate class:

Measured user
satisfaction:
%

Indoor Environment Quality

Indoor environment quality:

- Indoor climate class according EN16798-1 during design
- Measured annual user satisfaction of indoor environment (perceived thermal comfort, indoor air quality, illumination and acoustic privacy)



Primary
kWh/m²

Embodied:
kgCO₂/m²

Operational:
kgCO₂/m²,a

Embodied:
kgCO₂/m²,a

Recycling:
kgCO₂/m²

Measured
kWh/m²

Energy
kgCO₂/pers,a

Travel
kgCO₂/pers,a

Water
m³/pers,a

Energy
Performance
Certificate

Designed carbon footprint
of building

Display
Energy
Certificate

Annual
Footprint

Recycling of
waste
%

Landfill
waste
kg/pers,a

LIFE CYCLE ASSESMENT

Embodied
carbon
footprinting
process

Quantity of
materials

Weight of
materials

Embodied
carbon
factors

Contractor

Maintenance/
replacement

Uncertainty /
complexity.

●
3%

15%

20%

30%

30%



GHG Emissions globally

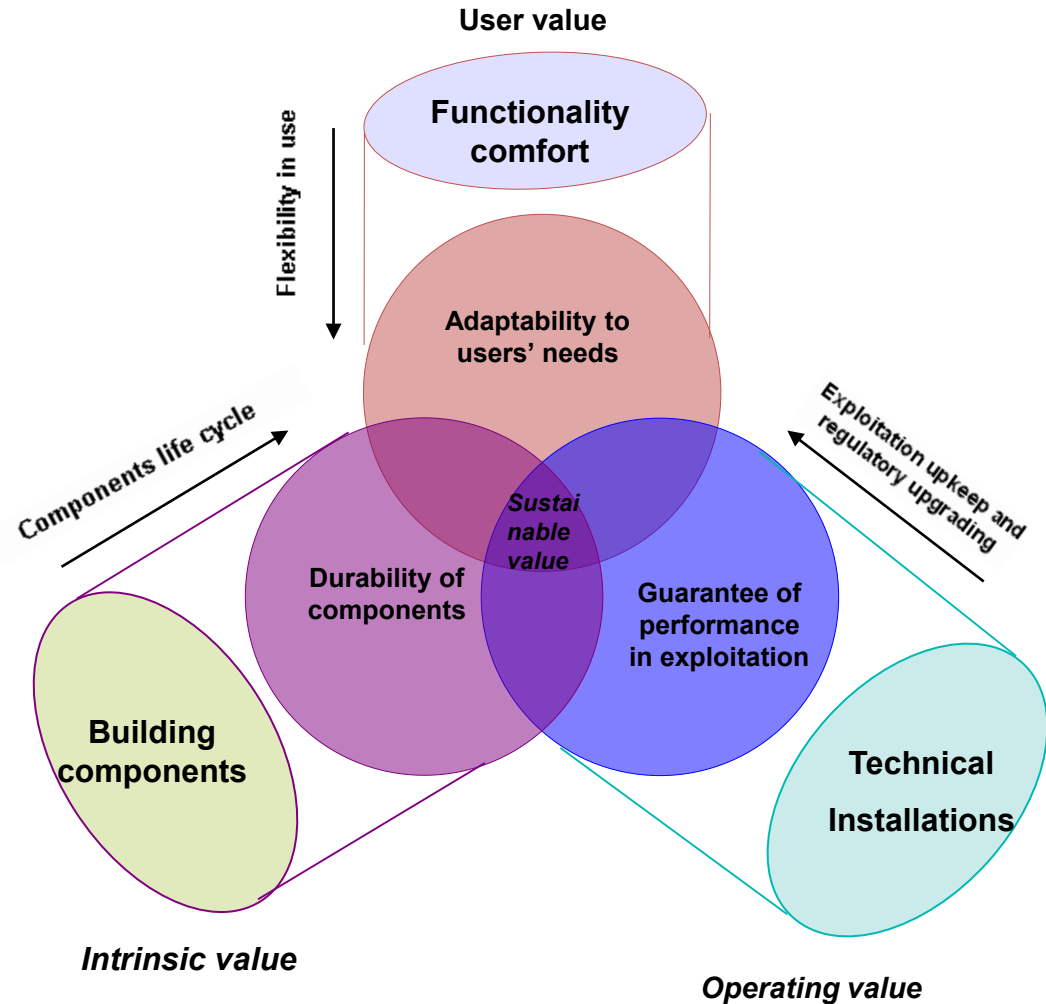
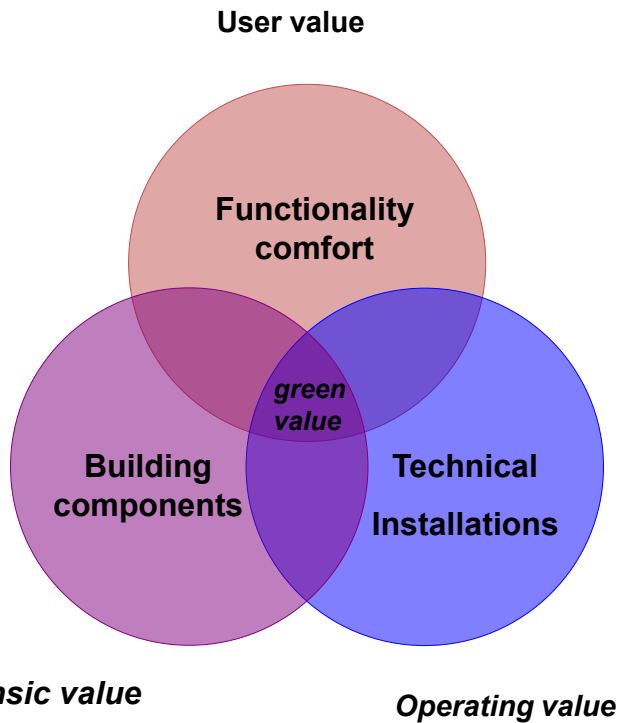
Carbon impact of the built environment



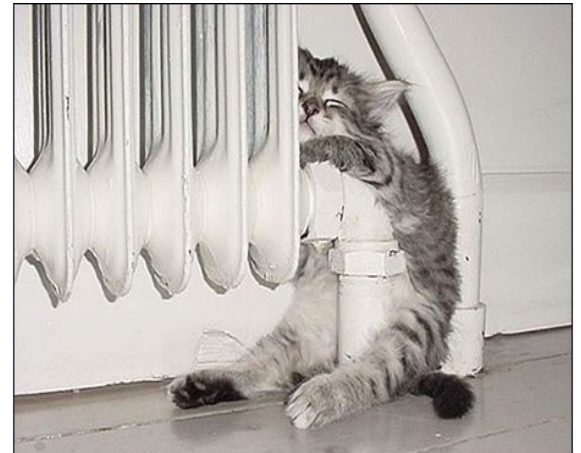
Quality, value, worth

From a static vision

To a dynamic vision of value

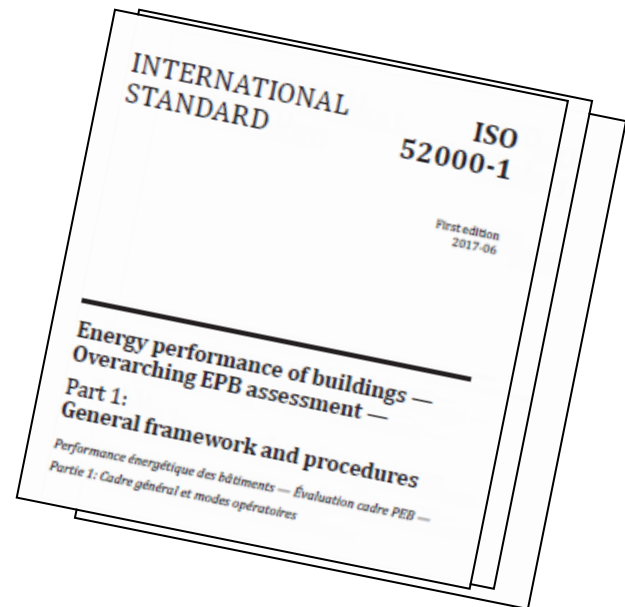


To avoid



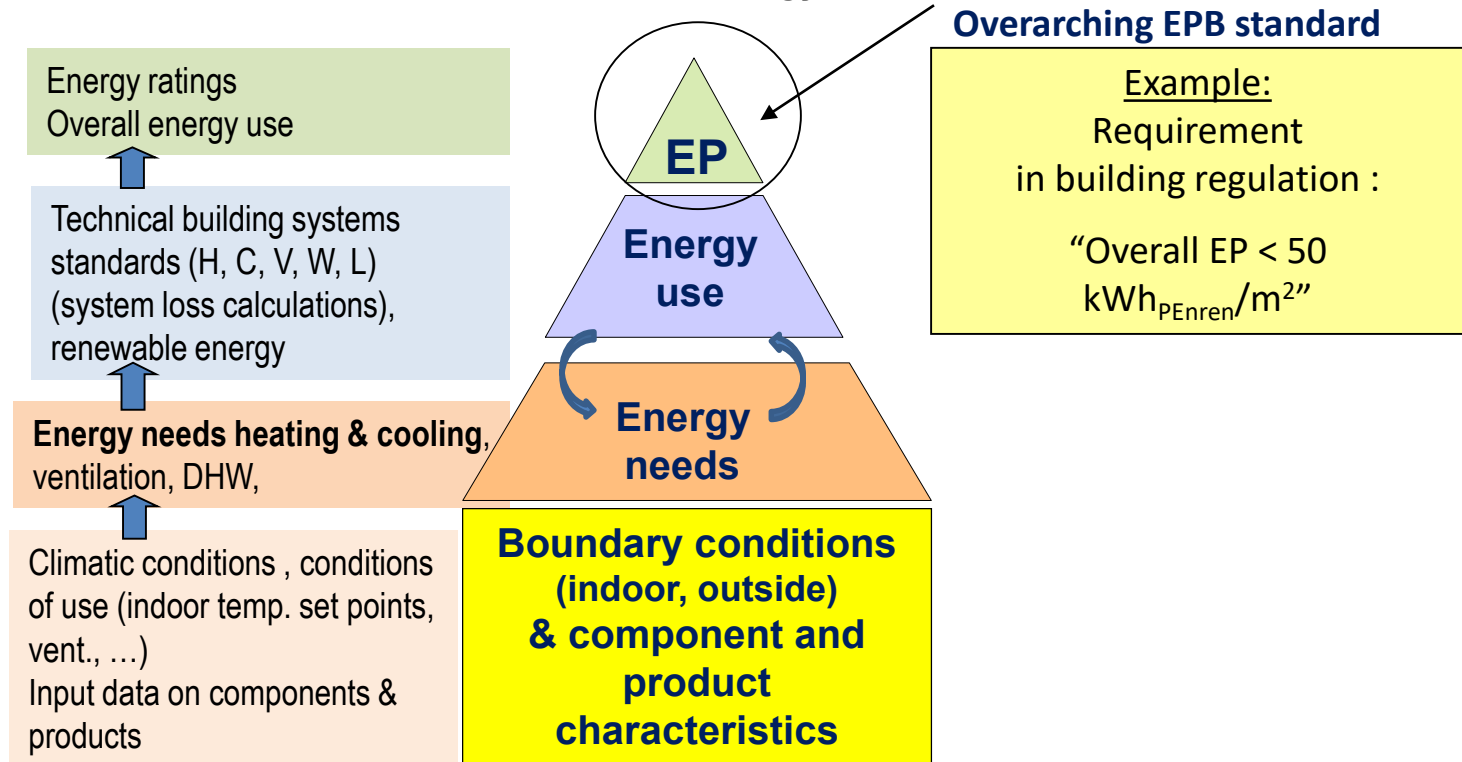
Set of CEN standards on Energy Performance of Buildings (EPB)

- The SET of 53 standards is based on a holistic (systemic) approach:
- To assess the **integrated impact** on the energy performance of buildings (EPB)
 - Covering e.g. heating, cooling, ventilation, DHW, lighting and the impact of building automation and smart controls,
 - Also covering energy-using and renewable energy producing appliances
 - Respecting the IEQ requirements
- All published in 2017-2018
Full and coherent set of 53 European EPB standards (CEN)
 - and subset (key EPB standards) also already at global level (ISO):
The (EN) ISO 52000 family



Set of EPB standards: the holistic approach

From *product* standards to *overall* energy use



Translation to achieve



KEY QUESTIONS



- 1** Is there something like a «HVAC benefits value» part of the building market value?
- 2** What is the correct way to quantify the HVAC benefits?
- 3** Are the conventional valuation approaches suitable for the quantification of HVAC benefits?

| TERMS OF VALUE EQUATION |

RENT

OTHER INCOME



RISKS

$$\text{MARKET VALUE} = (\text{income} - \text{expenses}) + \text{residual value}$$



OPERATING
EXPENSES

OTHER
EXPENSES

| TECHNICAL SYSTEM IMPACT |



RISKS

Physical risk

*Occupant satisfaction
Increasing of noise
HVAC inability to satisfy IEQ
levels*

Technology risk

*Indoor flooding
Fire
Losses of refrigerant
Obsolescence of HVAC
technology
Increasing of operating
costs*

Risk due regulation

*Inability to compete with
greener buildings
Inability to compete with
buildings with a better
energy label
Inability to lease due to new
regulation*

Market risk

*Change in discount rate
Increased speed of
depreciation
Lower occupancy rates
Shorter tenancies*

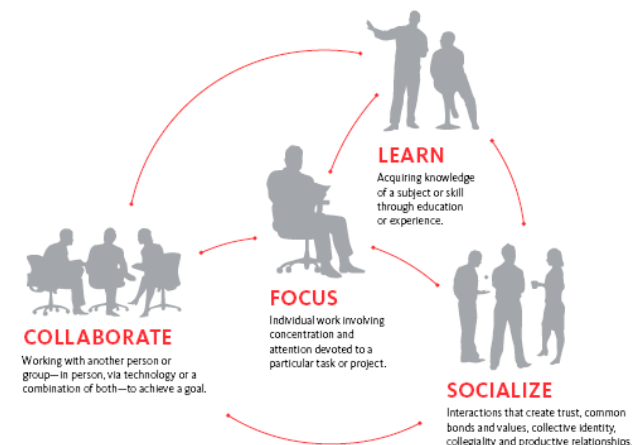
WORKPLACE REVOLUTION:

The workplace is ripe
for reinvention.

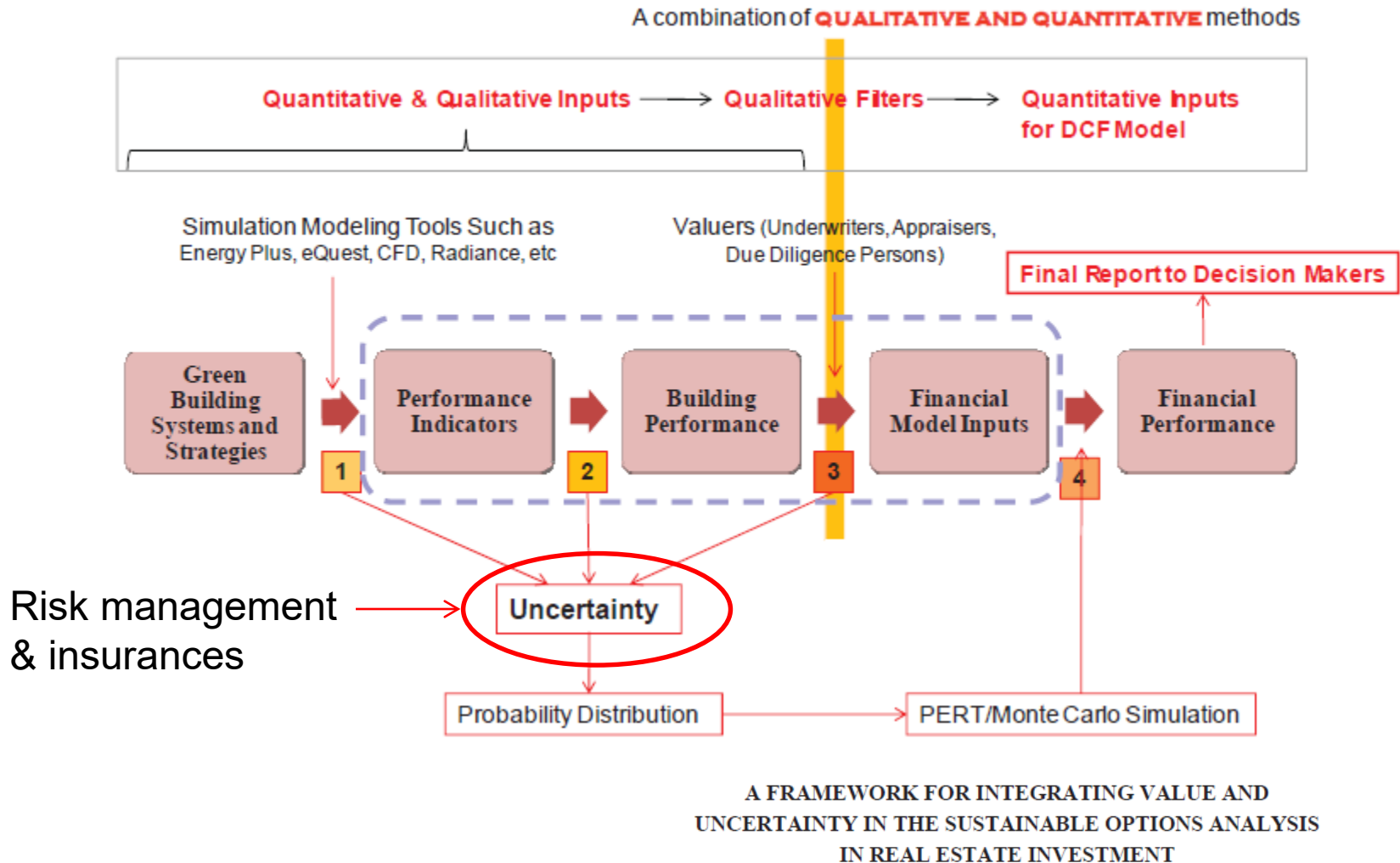
► Flexible building services

- to subdivide a floor into multiple tenancies while being able to maintain quality lobby and reception facilities.
- to change individual office workstation configurations with minimal difficulties

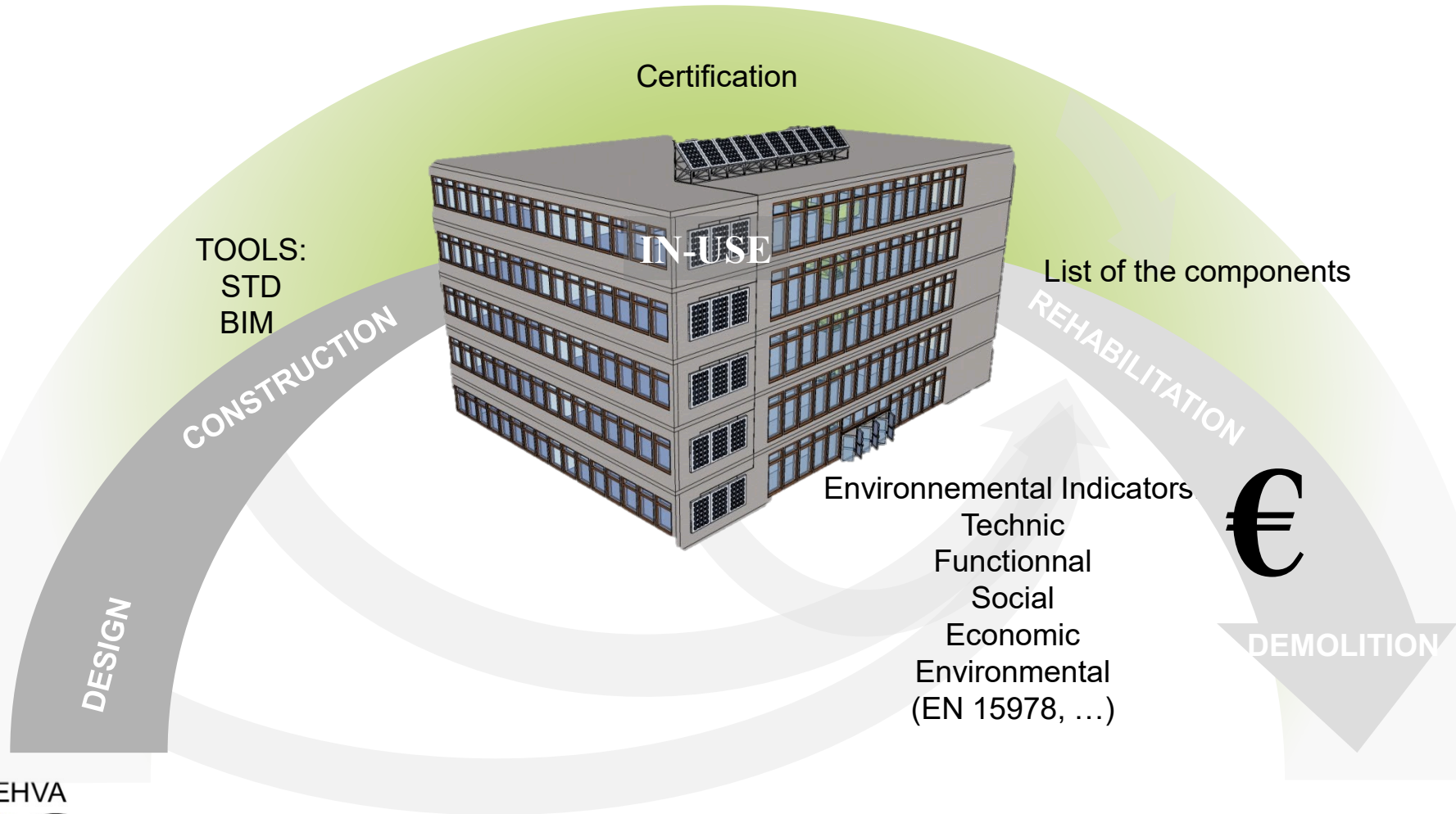
- **Flexibility** costs: supporting rapid short-term changes in work setting arrangements (construction costs tied up in the design of flexibility)
- **Adaptability** costs: supporting large-scale and long-term changes in use and function



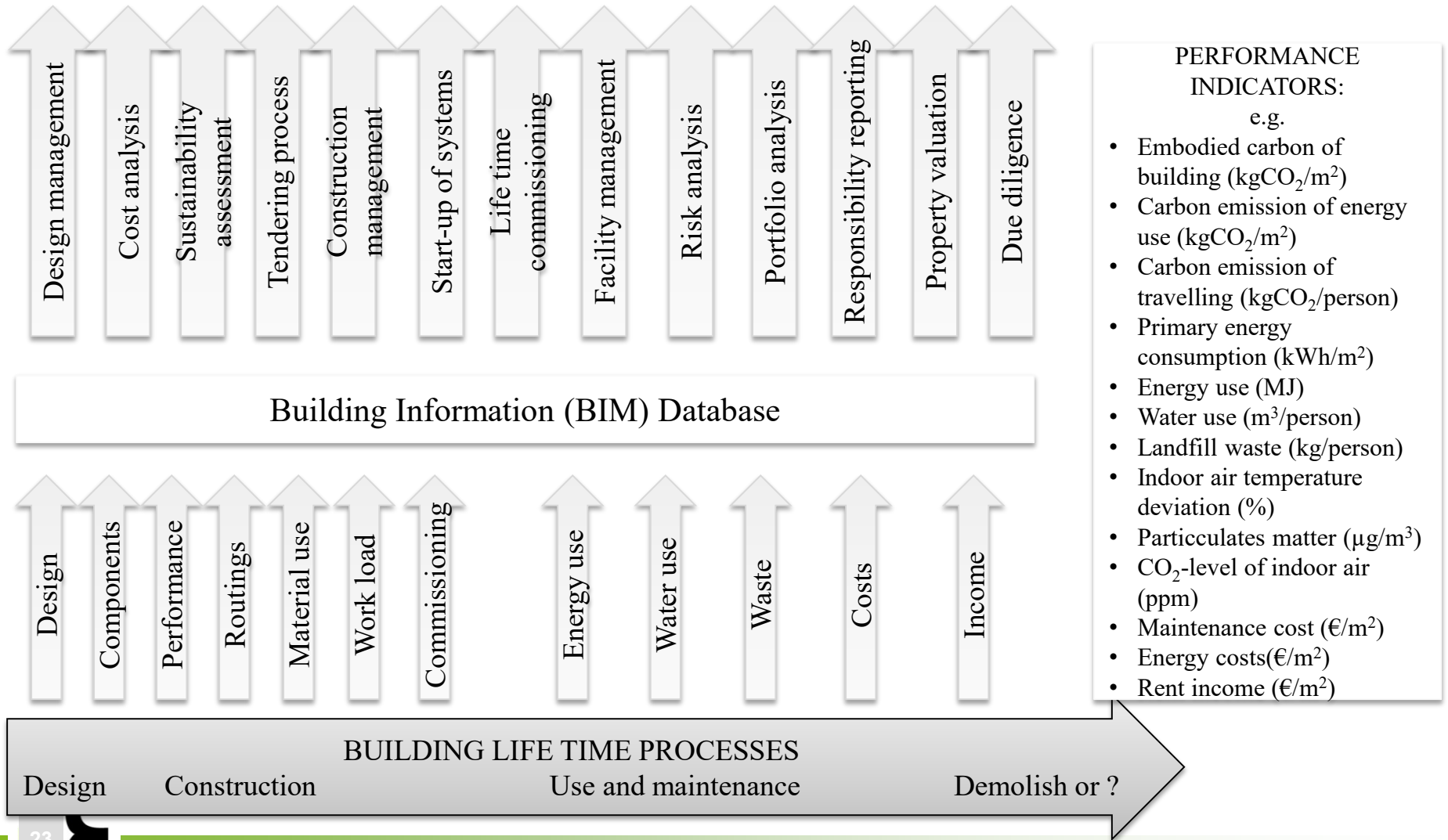
The challenge



DATA FLOW



DATA FLOW



Accounting for uncertainty

“When incorporating sustainability-related risks and opportunities into a DCF model, it is very important to use a set of ranges for potential adjustments to DCF input variables. This will help to avoid the impression of unrealistic levels of precision.” (UNEP FI, 2014, *Sustainability Metrics Report* p85)

Sustainability–related information represents a new source of uncertainty:

Market uncertainties	<ul style="list-style-type: none">- market sentiment on sustainable properties (Evolution in the rental gap and reletting period between sustainable and non sustainable properties)- Energy price volatility- evolution of users' expectations
Technical uncertainties	<ul style="list-style-type: none">- Installations remaining lifespan- Evolution in the replacement costs of component- Uncertainties on sustainability metrics
Legal uncertainties	<ul style="list-style-type: none">- Evolution in the regulatory context

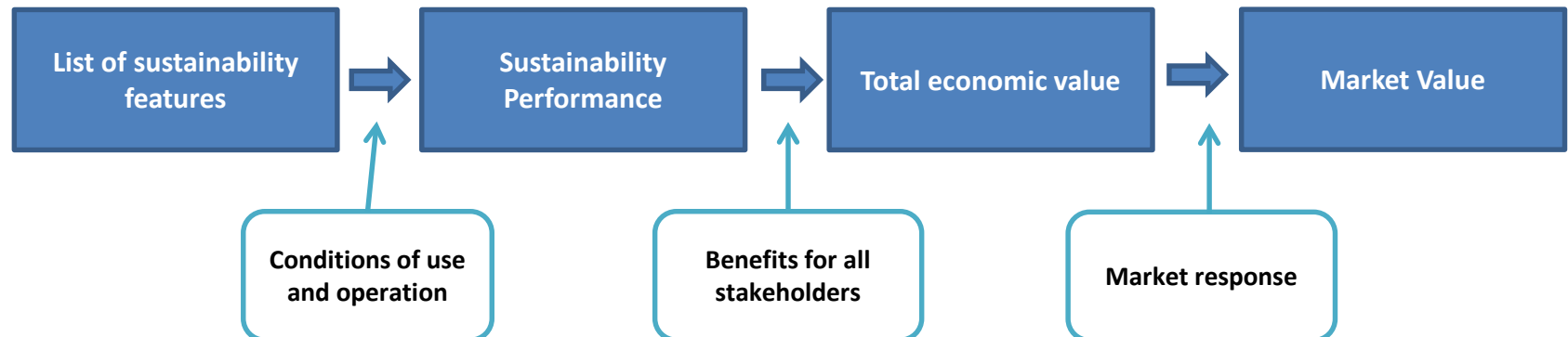
From data transparency to valuable information

It is all about:

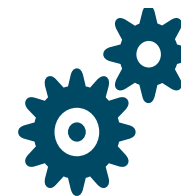
data collection

uncertainty management

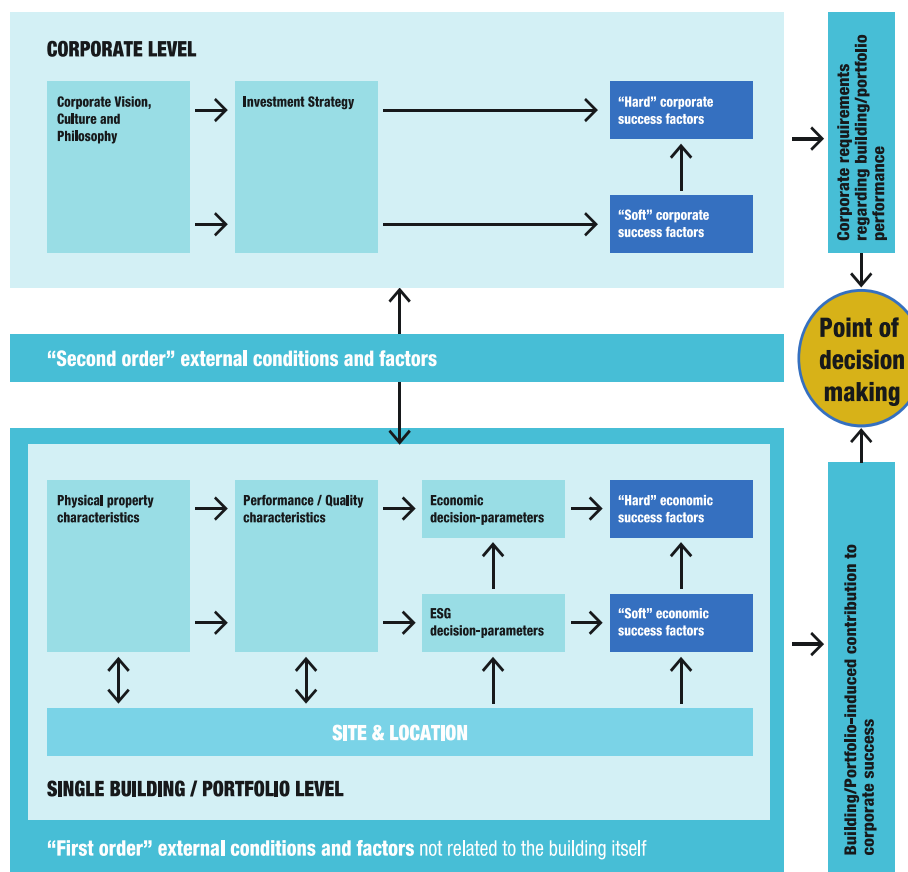
translation mechanisms through the market filters!



Translating information for decision-making



“From the boiler room to the board room.”



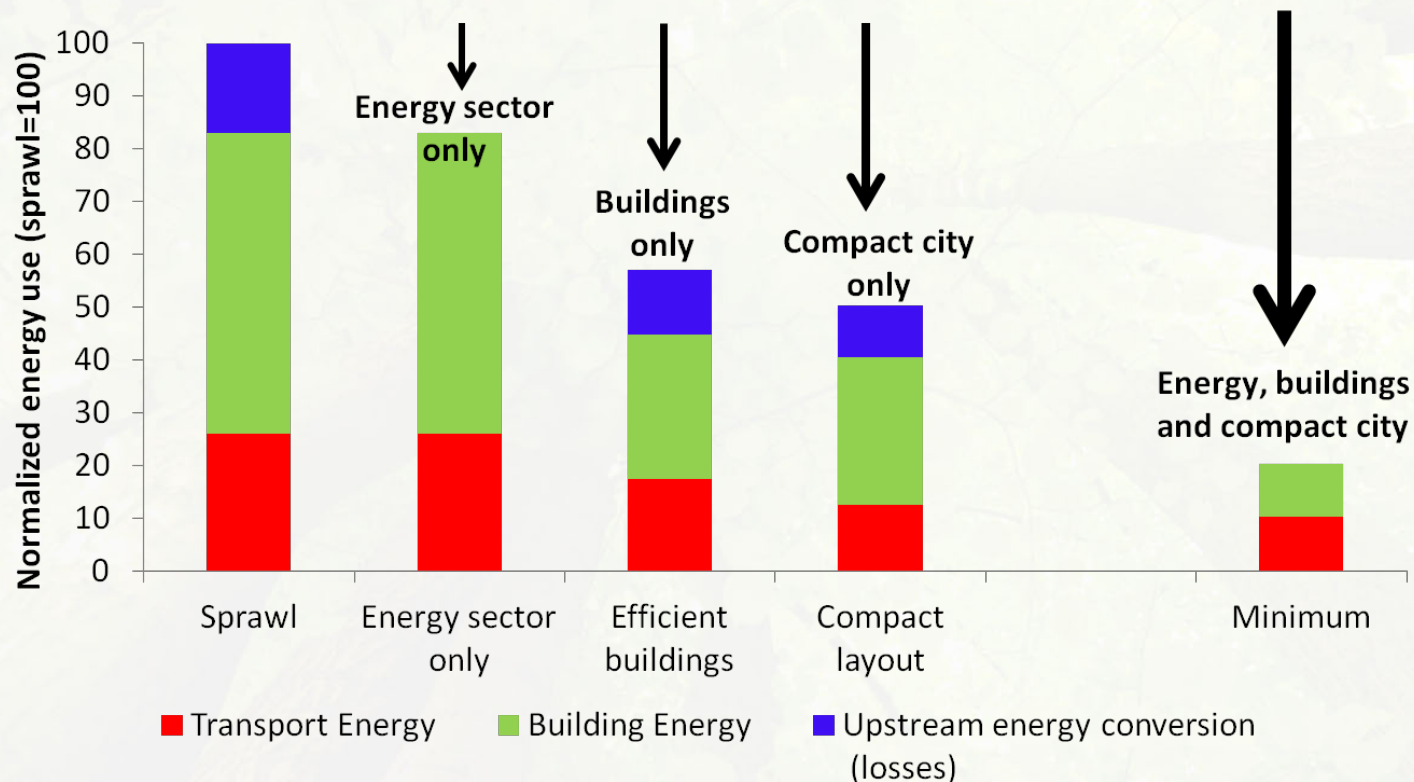
How to get there: A selection of recommendations for best practice

Recommendations for Best Practices for Corporate Real Estate Sustainability Management (CRESM)



Relative impact of individual policies

Compact urban form is the most powerful leverage



Adapted from GEA, 2013

Building Long Term Value Assessment :

- Location
 - Connectivity infrastructure (grid & IT)
 - Local services and shops (positive impact density)
 - Security
 - Attractivity (image...)
- Quality
 - Indoor environmental quality
 - Energy performance
 - Lifespan
 - Flexibility / Mutability

Conclusion:

Policy

- **Change land regulation and taxes: To support investment in “infrastructure” instead of energy needs increase**

Finance

- **Change to long term assessment integration into valuation investors**
- **Change to valuation of building quality (services & lifespan)**

Designers

- **Change to flexibility and dynamic strategic vision based on citizens life and expectations**

Construction

- **Change to quality efficiency instead of low cost competition**

users

- **Change occupier behaviour**