Tomorrows foundations

Sustainable buildings and areas

Ronald Voskens
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Gild, Barcelona

ronald@eco-creations.es
+34 678 603 874

www.eco-creations.es

Eco-creations | Ronald Voskens

Spanish premier José Luis Rodríguez Zapatero (above right, with Al Gore) pledged to boost Spain's renewable energy sector. Environmental consultant Ronald Voskens (right) calls offshore wind farms the next logical step for Spain's energy industry.

Part of the article "Tilting at Wind farms" in the USA business magazine Corporate Counsel (September 07)

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- What is a sustainable building?
- What are the measures?
- From efficient to energy producing buildings
- What can you do?

Sustainable buildings

- Sustainable buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:
  - Efficiently using energy, water, and other resources
  - Protecting occupant health and improving employee productivity
  - Reducing waste, pollution and environmental degradation

- Building areas
- Existing building

Sustainability items

For example BREEAM items

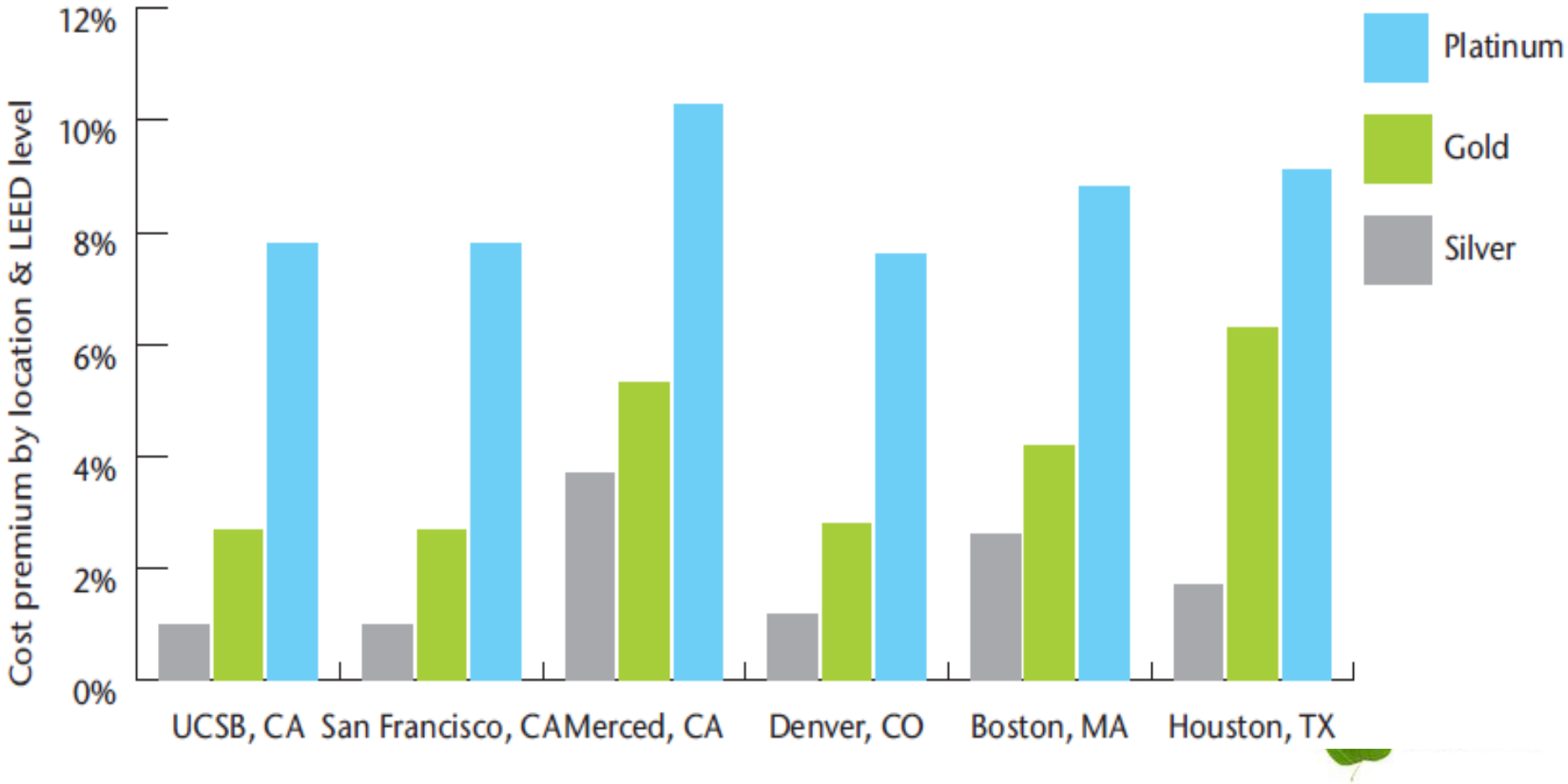
1. Management
2. Health and wellbeing
3. Energy
4. Transport
5. Water
6. Materials
7. Land use & Ecology
8. Pollution

Energy is most important

Facts and figures?

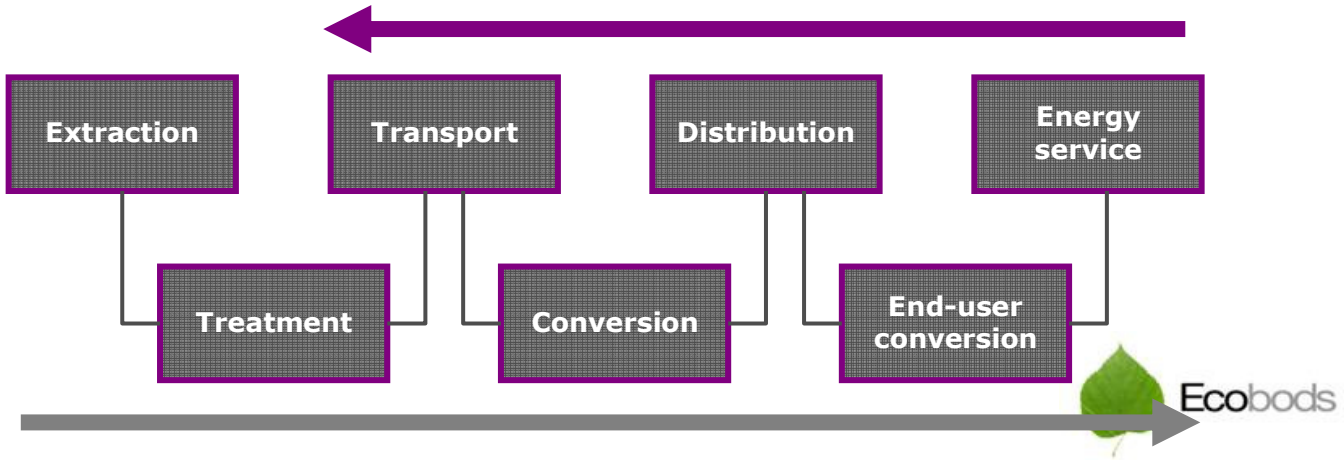
- 40% of all energy is consumed in the built environment
  - Building professionals: 19%
- Estimated cost for a certified sustainable building 5%
  - Building professionals: 17%
- The total worldwide energy efficiency is only 2%
- The global solar irradiation that is received by the earth can cover at least 10.000 times present world wide energy consumption

Facts and figures?



Is it technologically possible?

- Renewable energy is everywhere but dispersed
- Traditional energy chain
- Sustainable energy chain



Segmentation building sector

- Commercial versus Residential
- New versus existing
- Developed versus developing countries
- Climate variations

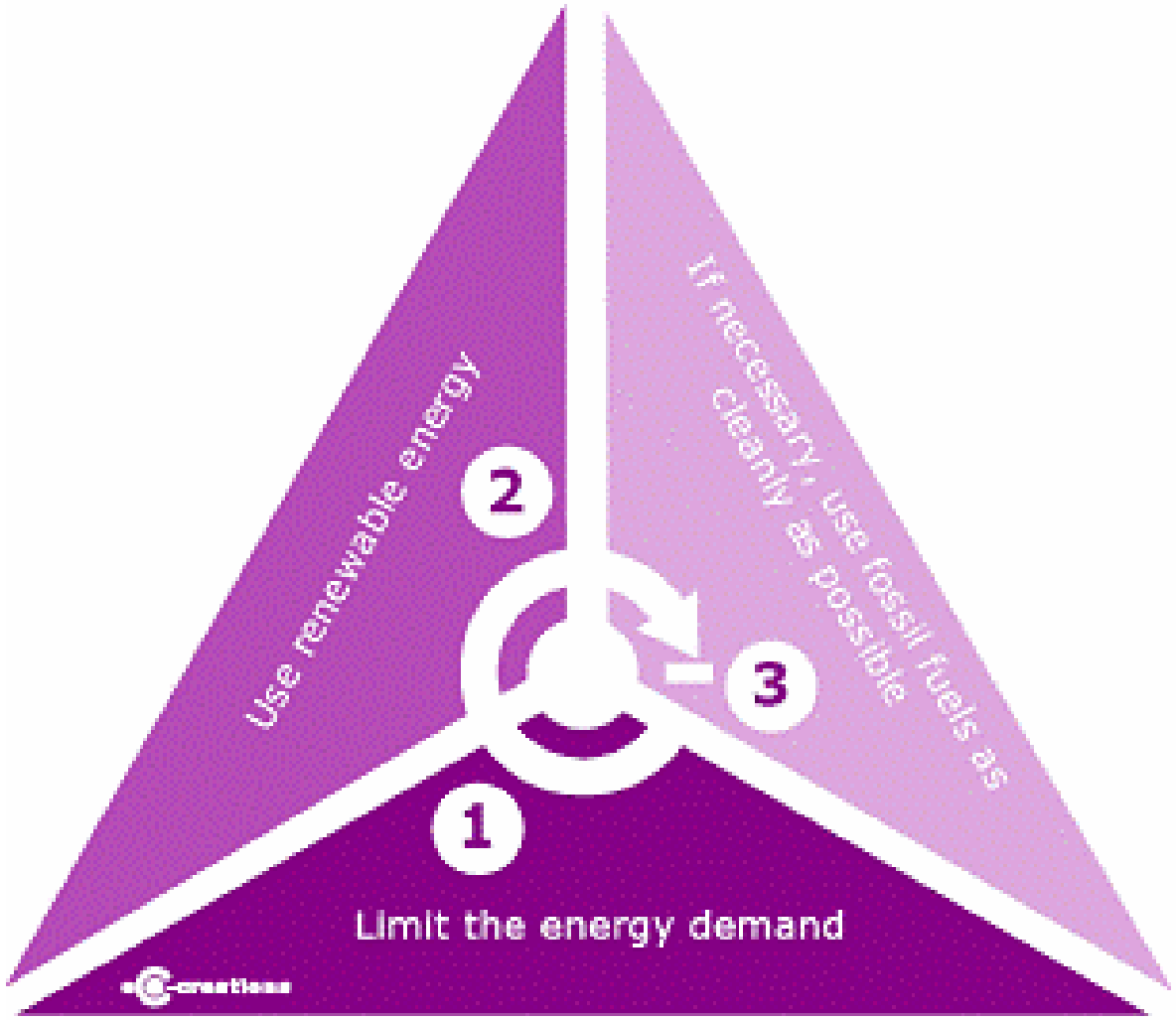
- Other drivers for energy use:
  - Comfort level
  - Demographics
  - Economic development
  - Lifestyle changes
  - Availability of technology and equipment

Life time

Item	life time (y)
• Urban planning	> 100
• Buildings	~ 40-100
• Energy infrastructure	~ 25-50
• Installations	~ 10-15
• Appliances	< 10

- About 85% of total energy is consumed during lifetime (50y)

Sustainable energy | Energía sostenible

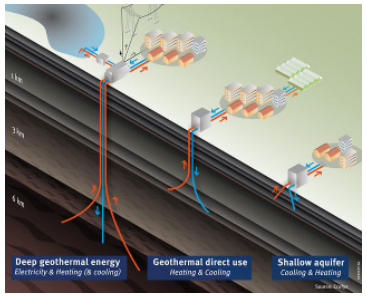


Limit energy demand

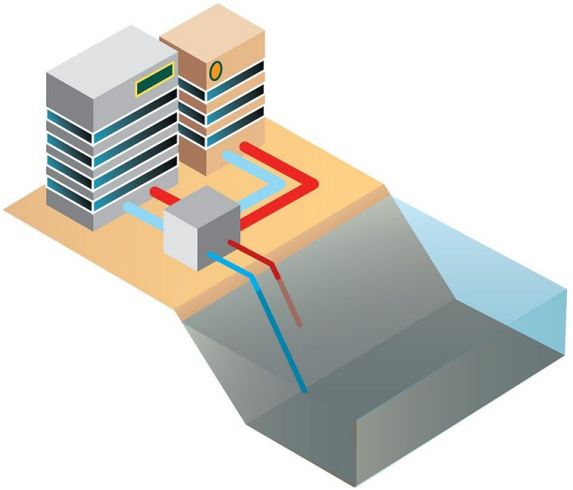
- Orientation, form, compactness
- Window openings
- Insulation
- Shading elements
- Air tightness
- Eliminate cold bridges
- Low energy appliances and lighting
- Smart control: lighting, ventilation
- Heat/cold recovery
- Phase Change Material (PCM)

Use renewable energy



- Solar energy
  - Passive
  - Heating
  - Cooling
  - Electricity
- Wind energy, urban turbines
- Bio energy
- Geothermal (heat pumps)
- Marine, SWAC



Ecobods

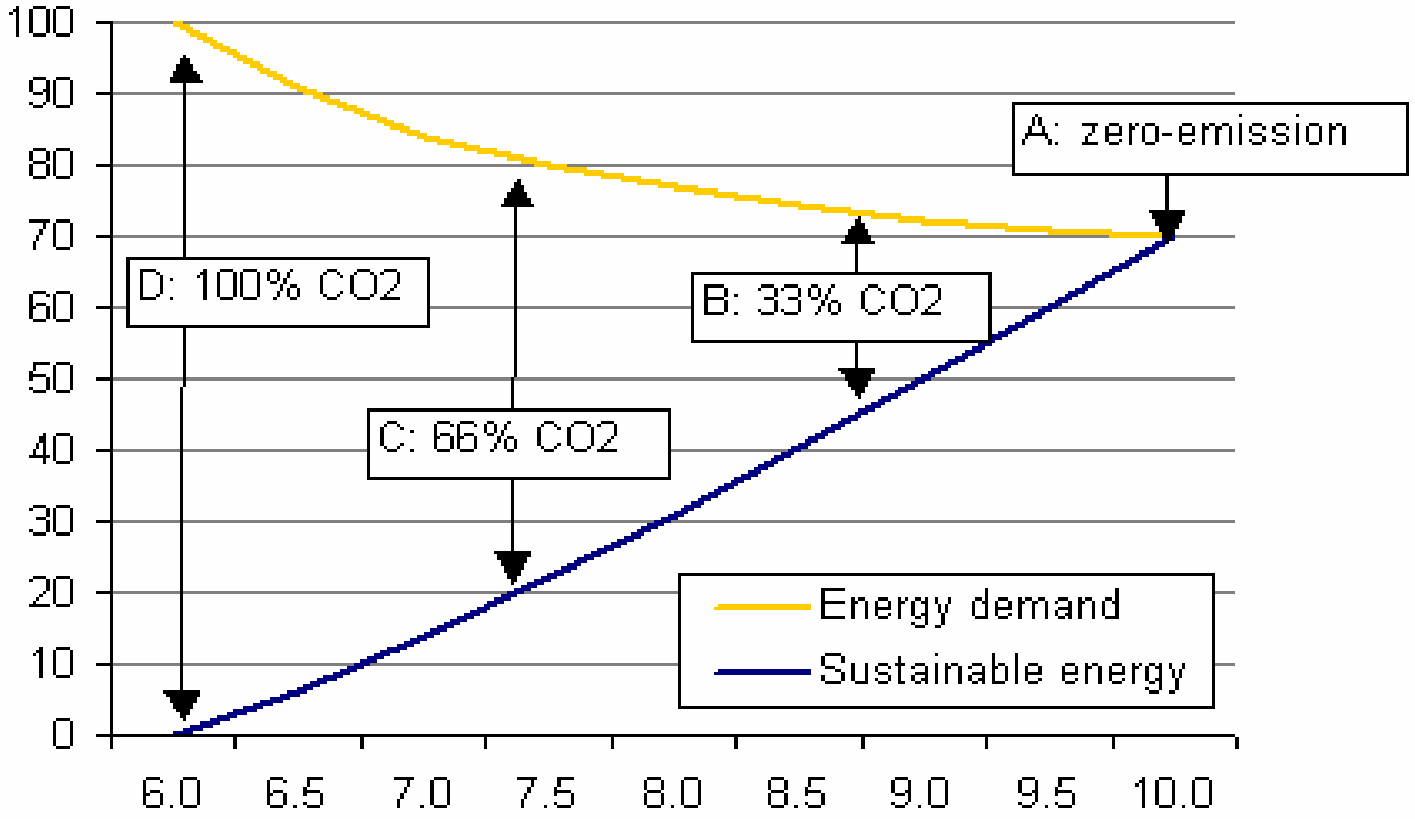
Clean fossil fuels

- Condensing boilers + LT heating
- A+ class cooling/heating equipment
- Combined Heat and Power (CHP)
  - Urban level (CHP)
  - Block level (mini CHP)
  - Dwelling level (micro CHP)
- Fuel cells
- Share energy

Energy producing building

- A very energy efficient building can be developed by using the trias energetica, but…
- We could do even better by taking into consideration:
  - Heating and cooling is not an energy problem, but a storage problem
  - Even lighting is in principle no energy problem but a storage problem
  - Use the building and its surroundings to produce and store energy (solar, wind, waste, temperature)

Towards zero-emission



With this ingredients we can develop:

- Efficient buildings (e.g. class A y B)
- Passive buildings (very efficient)
- Zero energy buildings
- Energy producing buildings

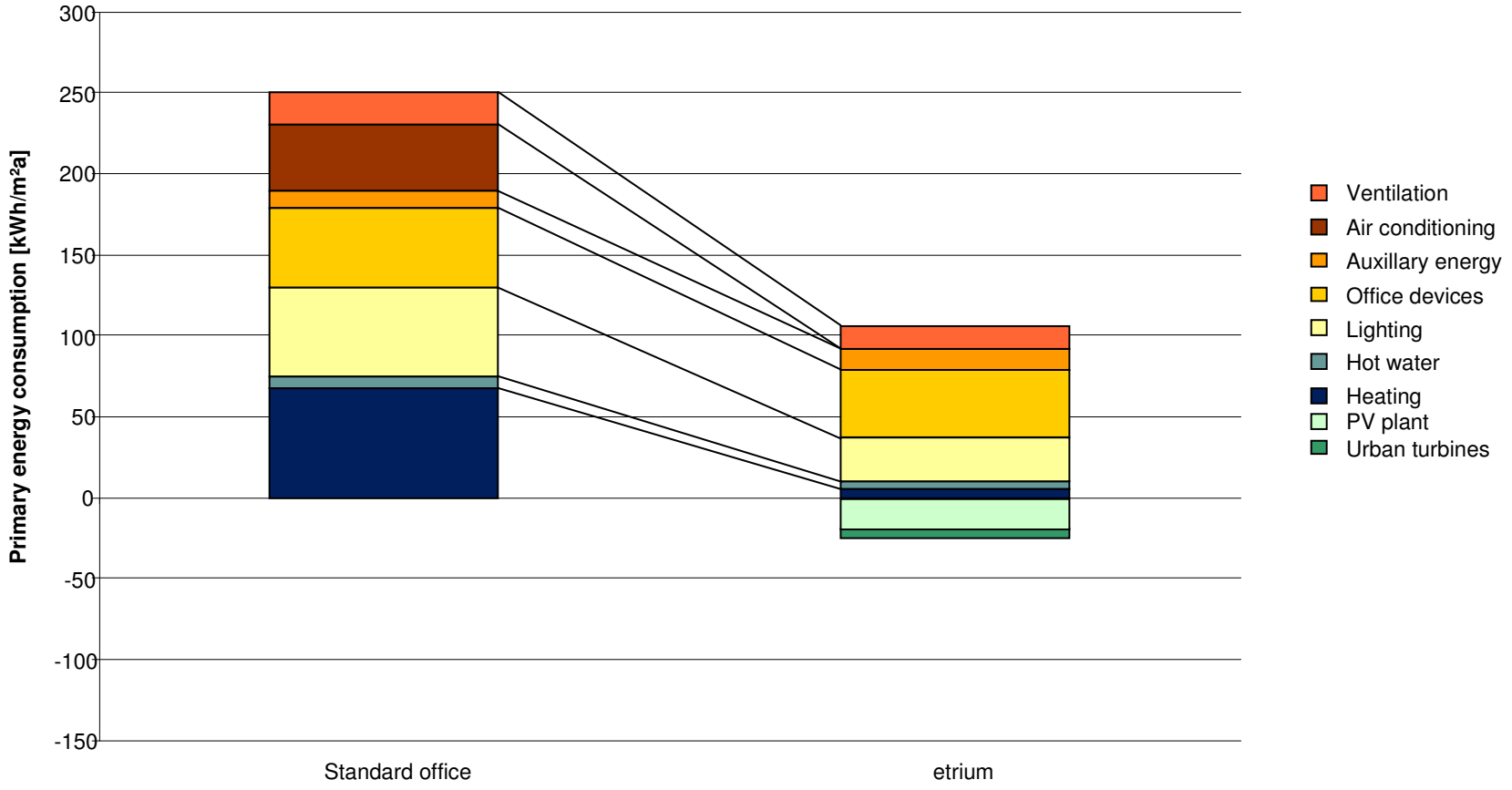
24 dwellings Zwaagwesteinde (Netherlands)

- Energy package includes:
  - High insulation 5 W/m2/K
  - Heat pump
  - Floor heating
  - 3 kWp PV panels
  - Heat recovery on ventilation
  - Heat recovery on shower water

Ecobods

Passive office Etrium (Köln, Germany)

• U-values	0,09 – 0,17 W/m2K
• Uw-value - windows	0,76 W/m2K
• Heat recovery	85%
• Maximum ventilation volume	14.600 m3/h
• Annual heat consumption	10 kWh/m2a
• Primary energy consumption	116 kWh/m²a

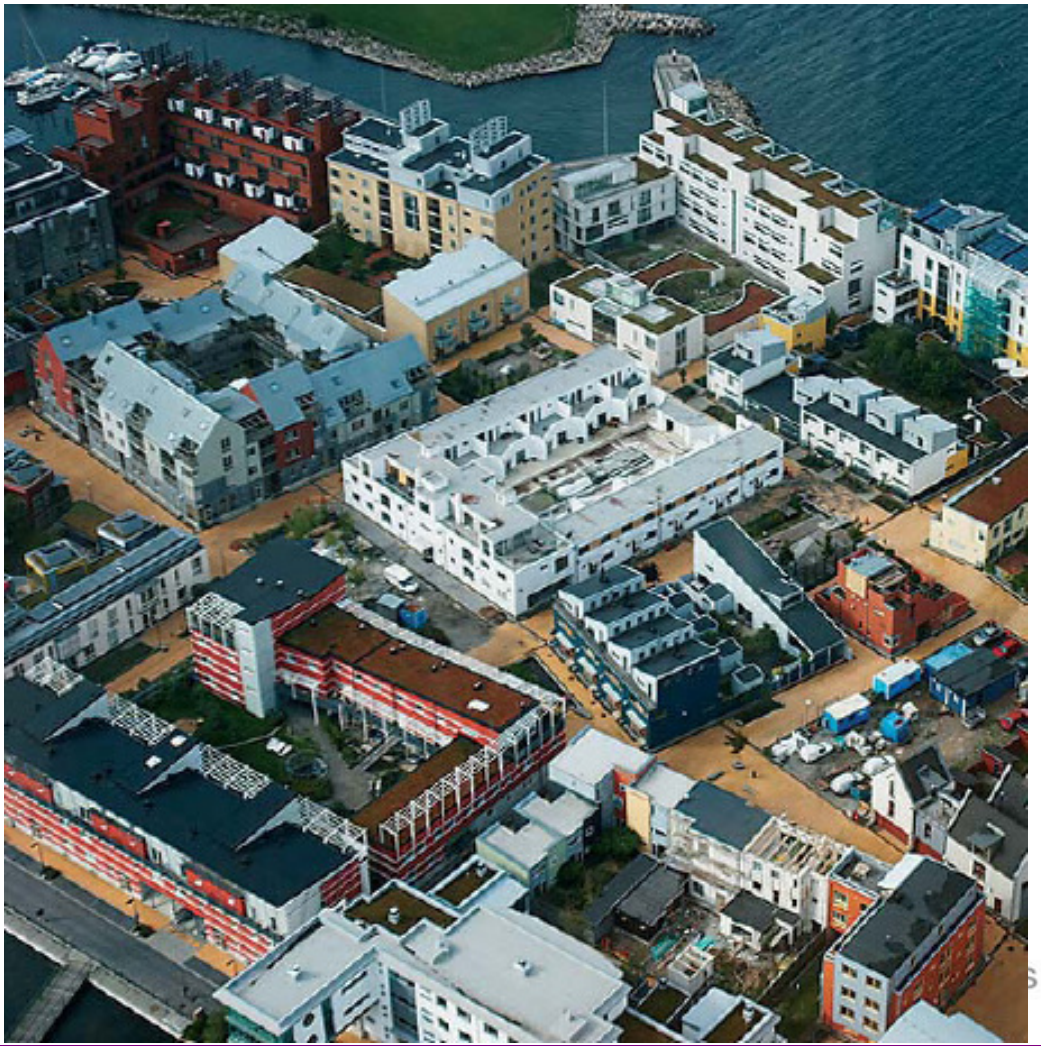

Primary energy consumption [kWh/m²a]
300
250
200
150
100
50
0
-50
-100
-150
Standard office
etrium
Ventilation
Air conditioning
Auxillary energy
Office devices
Lighting
Hot water
Heating
PV plant
Urban turbines

Beddington Zero Energy Development (UK)

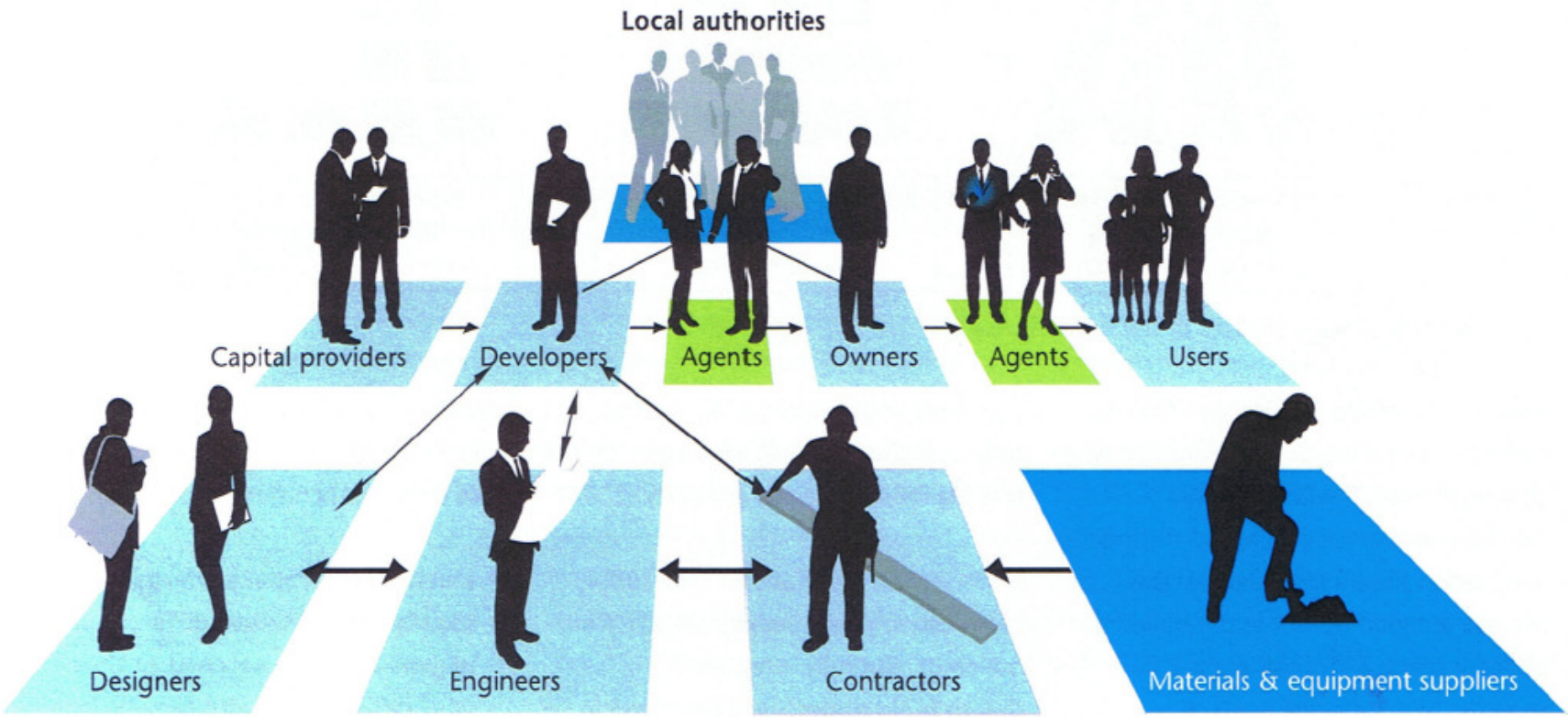
- 99 dwellings
- 2000-2002

Sustainable urban development (Vastra Hamnen, Sweden)

- 2001
- 100% RE supply



The procces: the complex value chain

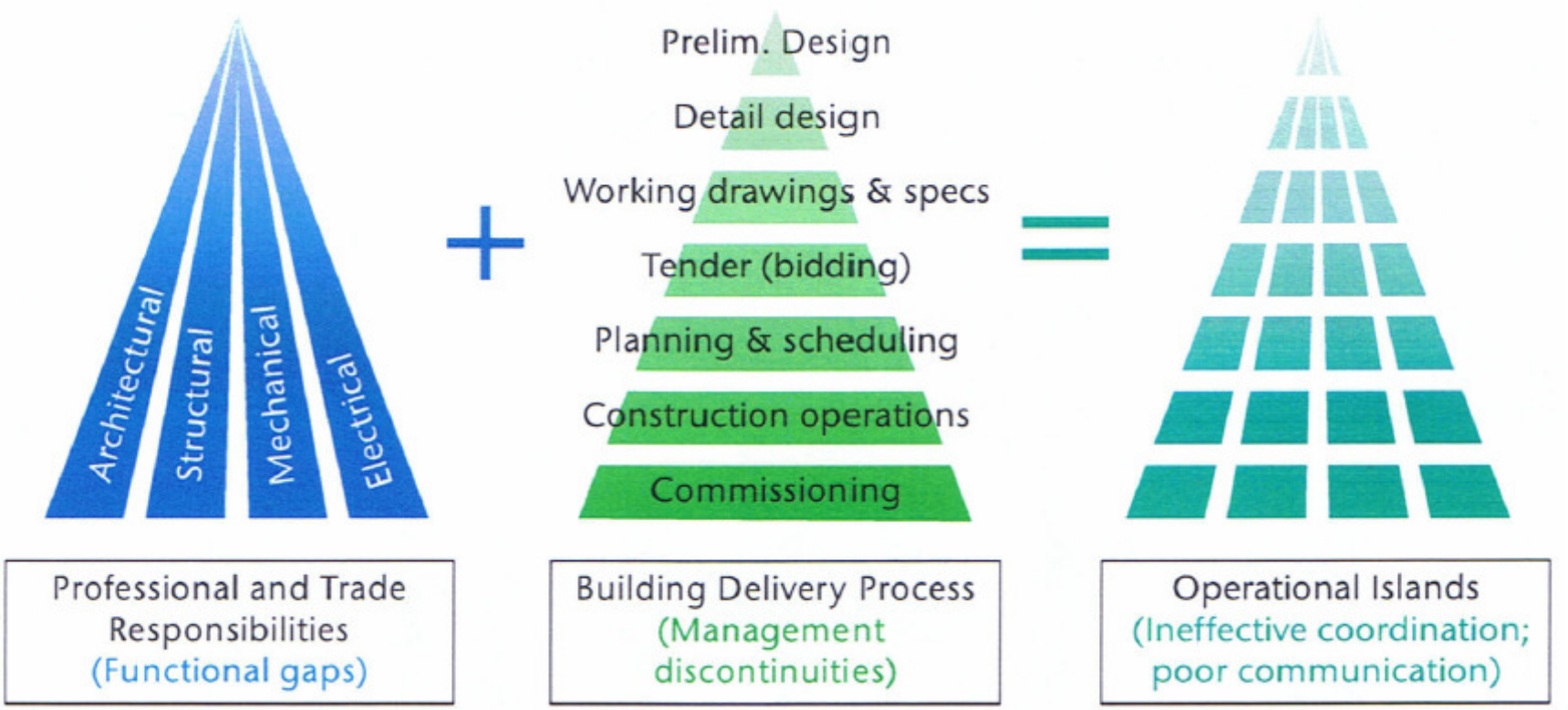


Conflict of interest

- (Local) authorities
- Investors
- Developers
- Architects
- Contractors/installers

Players and practise in the building market

- Lack of leadership



Investments versus operational benefits

- Investment by developer

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- Operational benefits for user/owner

- New forms of exploitation
  - Private Finance Initiative (PFI) or Public-Private Partnership (PPP)
  - ESCO's

Conclusions

- Technology is available, challenge is the process
- Integral approach
- Start from day 1, set your goal
- Look at local circumstances
- Using the Trias Energetica and select the appropriate combination of measures that will meet the goal
- Manage the whole process well from idea to realization (responsibility)

- Become the sustainable property developer
  - Start setting up a master/strategy plan for whole organization
  - Implement is the organization
  - Capacity building and training the organization

Start building tomorrows foundations…

…start today!

Ronald Voskens

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