SMART E-BUILDINGS
Opportunities to Create Quality in the Built Environment – Crisis, the Mother of Innovation
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www.construcaosustentavel.pt
We are 7 billion people: 1/7 are hungry and don’t have access to clean drinking water – How can we promote food security? Cities have poor air quality (indoor and outdoor), insufficient sanitation, noise levels, discomfort and unemployment are high: yet 1/2 of the world population lives in cities – How can we improve quality of life in cities? 1/3 of people ever reaching 65 years of age are alive today – How can our built environment become more age friendly? In some first world countries 1 in every 2 people suffers from a chronic medical condition – How can we promote health? Social unrest and revolt are becoming common occurrences in the developed world – How can we increase Social Resilience based on Collaborative Governance? Relying on the finite natural resources our planet offers, to fuel our society and to make it function, is not a lasting solution: 40% of the world’s energy consumption is required to operate buildings – How can we improve the energy environmental performance of the built environment? The construction sector accounts for 50% by weight of all material taken from the Earth’s crust and the building industry depletes natural resources beyond sustainable levels – How can we live in harmony with the natural environment?
Our challenges in Europe?

How do we work our way out of:

- hunger & poverty (also fuel)
- old age vulnerability
- unemployment
- chronic medical condition
- high energy consumption
- natural resource depletion
- poor air quality, bad sanitation, noise levels, discomfort
- social unrest and revolt
Our challenges in Europe?

How do we **design** our way **into**:

- hunger & poverty (also fuel)
- old age vulnerability
- unemployment
- chronic medical condition
- high energy consumption
- natural resource depletion
- poor air quality, local sanitation, and floods
- social resilience and equity

...food and energy for all

...old age friendly environments

...while there is things to do there is work

...health

...efficient use of finite resources

...renewable resources

...healthy and comfortable urban environments

...social resilience and inclusive collaborative governance

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How can we do better?
EUROPEAN COMMISSION goals:

The built environment is responsible for:
- 40% of greenhouse gas emissions;
- 40% of primary energy consumption;
- 50% (in weight) of raw materials extracted from the earth’s crust;

The European Commission has defined goals for 2020:
- Greenhouse gas emissions 20% lower than in 1990;
- 20% of energy from renewable sources;
- 20% increase in energy efficiency.
Smart E-Cities
... offer Resilience

Identity
Collaboration
Flexibility
Diversity (Biodiversity)
Redundancy
Decentralization
Autonomy
Design for Resilience in our cities

VALUES OF URBAN RESILIENCE
Our **SOCIETY** is demanding:

A better performing **built environment**:
- long lasting
- healthy
- comfortable
- affordable (buy / rent / operate)

Our political model needs to facilitate mainstreaming of good practices in refurbishment of existing buildings, promoting a higher **Quality of Life** and **Prosperity** for people.
Smart E-Buildings
... offer Quality of Life

Robust
Efficient
Transparent
Effective
Intelligent
Prepared
Connected
Design for **Sustainable Construction**

VALUES OF SUSTAINABLE CONSTRUCTION & RENEWABLE PROSPERITY
Our **Economy** must add Value

We need to **create** new economic models

“The new economical model can’t associate progress with quantitative growth. It needs to focus on **qualitative improvement**, that relies on the fact that nature is a finite, non growing and materially closed system.”

Herman Daly, *Beyond Growth*

“A **circular economy** is a regenerative economy that allows its waste to safely become part of the system again. In economic terms that would mean the waste of one product becomes the input to create a new cash flow…”

“**Renewable prosperity** - is an urban model that relies solely on renewable, endogenous resources to provide growth.”

Livia Tirone
Our **Economy** must add Value

Can we have an economic model that intrinsically **promotes Value adding** activities?

Can we go for a **paradigm shift** in our economic model?

- **Cost** must be addressed in the context of the **integral life cycle of buildings**
- If **growth** is unavoidable in our economic model, then it needs to become sustainable and rely **predominantly on renewable resources** (energy, water and recycled and upcycled materials as well as good will, creativity and innovation)
- **Finance** must support the **activities that add value to Society** (as opposed to lateral and intermediary processes)
- **Incentives** must not distort positive market dynamics
- **Externalities** must be systematically included in cost analysis
Our **Economy** must add Value

We need to **design** new urban models

**Renewable Energy**

Decentralized E-Storage

Intelligent Grid

Renewable E-Buildings

Efficient E-Buildings

Renewable Prosperity
We must add value to the Environment

We need to learn to relate positively with the environment

“The natural world - an ecosystem which is finite, non growing and materially closed…”
Herman Daly

“We must only use natural resources coming from well managed ecosystems, using them in the most efficient and productive way taking care of all modifications we impose on nature.”
Karl-Henrik Robert – The Natural Step

“Food is waste is food - all materials must be reintegrated in the biosphere or the technosphere to be up-cycled…”
Michael Braungart - Cradle to Cradle
We must add value to the **Environment**

Can we live in **harmony** with the natural environment? Can we go for a **paradigm shift** in the way we relate to the environment?

- **Finite resources should be used minimally** – renewable resources and already sourced and transformed materials must become the new raw materials
- **Endogenous resources must be given priority** (a lot of waste results from transport) – local resources add to security of supply
- **Waste must be eliminated** (not hidden)
- **All ecosystems must be well managed**
We must add value to the Environment

“Ceci n’est pas une pipe.”

“Do not repair what is not broken, do not remanufacture something that can be repaired, do not recycle a product that can be remanufactured”

Walter Stahel - Product Life Institute in Geneva

“32 Second Chair - Steelcase”

Michael Braungart - Cradle to Cradle design
Our **Society** must create Value

The built environment needs to support new social models

The city’s public spaces are its first level of identity - the more people **identify with the built environment** they inhabit, the more they will care about it and the better they will contribute to maintaining it: Attractive urban contexts promote connected and collaborative communities and enjoy proportionally lower operating and maintenance costs.

Klas Tham

**Inclusive collaborative governance** leads to a higher level of Social Resilience – communities often need help by **facilitators** to identify their common ground and objectives. But once communities identify and **co-own solutions** and learn to collaborate positively, their prosperity grows.

Lia Vasconcelos

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Our **Society** must create Value

Our cities must provide **quality of life** for all people! Can we go for a **paradigm shift** in the way our society functions?

- Governance models must be mainstreamed
- Communities must be inclusive and collaborative
- The built environment must adapt to its users needs
- **Empower the individual** by providing real time information on the critical indicators
Our **Society** must create Value

Inclusive & Collaborative Governance

In times of Crisis Volunteer work is a precious renewable resource
Efficient E-Cities
Efficient E-Cities

\[ H = 0.6 \, d + h \]

- **H**: Height of building 2
- **d**: Distance between buildings
- **h**: Height of Ground Level of building 1
Efficient E-Buildings

Torre Verde in Lisboa – no heating January 2001 Monitorization Results

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Efficient E-Buildings
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New, responsive Buildings

Reject
Store
Temper
Admit
Redirect
Efficient E-Buildings

Existing, responsive Buildings: E-Refurbishment

Reject
Store
Temper
Admit
Redirect

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Renewable E-Cities

Solar Radiation in Europe

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Baixa, Lisbon
Urban Plan integrating Solar Potential

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Torre Verde in Lisbon – 70% of DHW supplied by collective solar thermal system
Renewable E-Buildings
What can the **European Commission** do?

**Discourage** bad building practices that result in poor energy performance:
(at present it is easier to promote average and low energy performance buildings, than excellent ones)

**NO to unhealthy indoor environments and to discomfort**

**NO to fuel poverty**

**NO to profit on sale of finite energy resources**

**NO to low resource efficiency**

**NO to waste and obsolescence** (superfluous, peak demand, distance of transport…)

**NO to “disposable” construction**

**NO to non-transparent and insufficient information**
What can the **European Commission** do?

**Facilitate** compliance with good building practices that contribute to reaching established 20/20/20 goals:

- **On-going and rigorous monitoring** of good practices that contribute to reach the 20 / 20 / 20 goals – finger on the EU pulse
- **Life Cycle Cost** approach in market procurement - low maintenance and operation costs
- **Flexibility of use** – to make the built environment longer lasting
- Building solutions that are **robust and efficient** – offering comfort and healthy indoor environments over a long life span
- Buildings with **low embodied CO₂** per year of use
- **Energy environmental refurbishment** of the existing built environment
What can the European Commission do?

Stimulate excellent building practices that contribute to reaching established 20/20/20 goals:

- Community lead initiatives improving the energy performance of the built environment
- Demonstration projects with innovative combinations of excellent and good practices
- Financial models that facilitate investment in excellent practices
What can the **European Commission** do?

**Create** legislation and recommendations contributing to reaching established 20/20/20 goals:

- **Demanding Member States Targets** within the **Energy End Use Efficiency and Energy Services Directive – 2006/32/CE** – soon to be revised - **Energy services** to replace finite energy resource trading
- **Direct taxes** and **higher tariffs** to make real costs apparent (peak demand)
- **Incentives waving the direct taxes** for good practices (peak demand smoothing)
- **Waver global taxes** (such as VAT) for excellent practices
- ...
There are so many **Opportunities** to create quality in the built environment ...