



Energy and Architecture

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Index

01. energy
02. CO² emission
03. emergency
04. call for solution
05. climatic regions
06. architecture
07. sustainability target
08. sustainability process
09. future goals
10. discussion
11. conclusions

Indice a REVER

NEED FOR CHANGE

A WORLD IN CONSTANT CHANGING: FROM TO 2010-2020

30.6 **32**

Global emission of CO², GT

6.8 **9.0**

Global population, billion people

50.6 **54.9**

People living in cities, %

7 **20**

Share of renewable in the EU out of total energy production, %

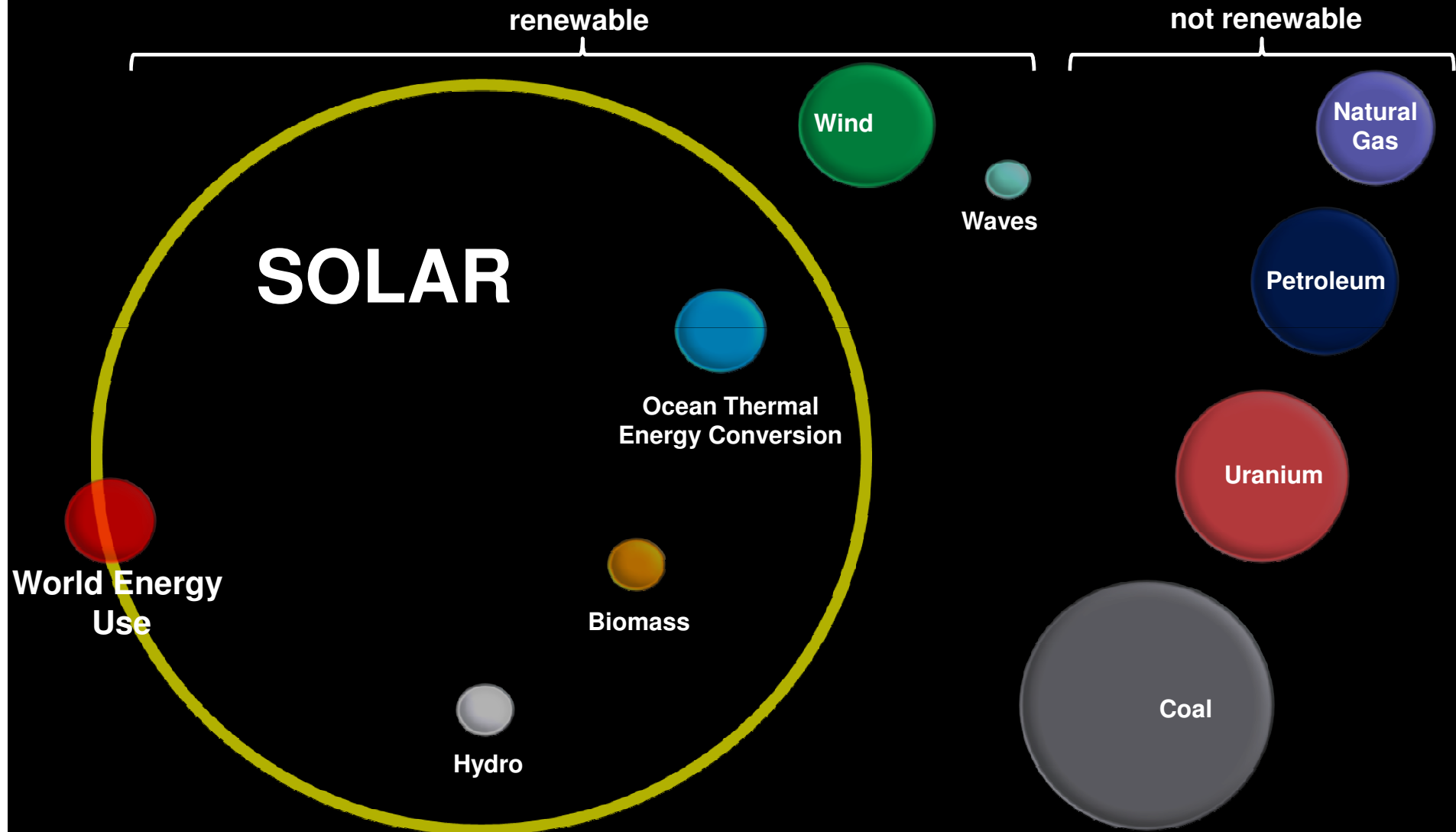
49.4 **45.1**

People living in rural areas, %

1.9 **9.1**

Share of wind energy in the total electricity production globally

01. primary energy sources



01. renewable energy generation



Moura Photovoltaic Power Station,
Amareleja, Portugal



Itaipu Dam Hydro Power plant,
Brazil



Blue Lagoon Thermal Electricity
plant, Reykjavik, Iceland



Roscoe Wind Farm, Texas, USA



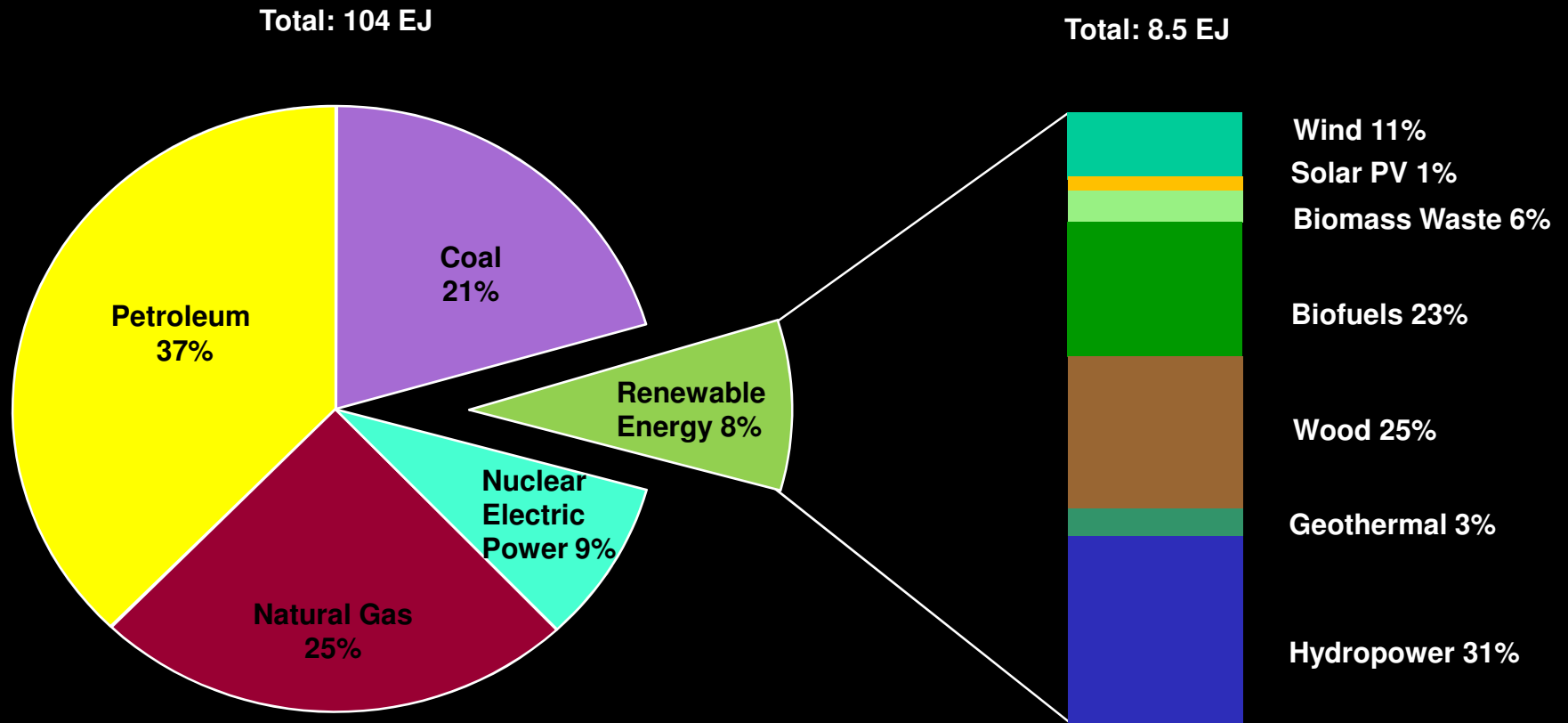
Biomass power plant, Moerdijk
Netherlands



Voith Hydro-Wave power plant,
Mutriku, Spain

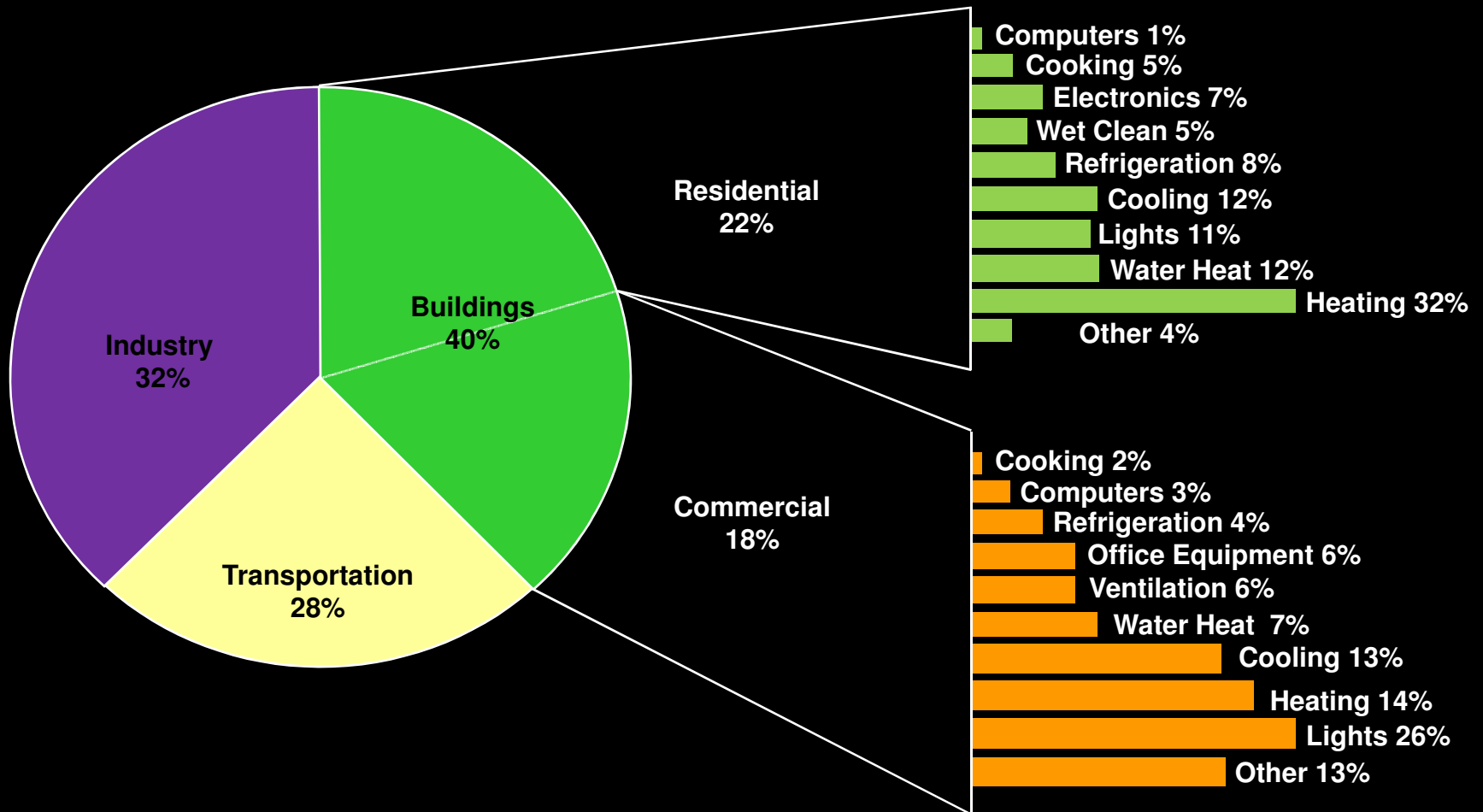
01. energy consumption

renewable energy as share of total primary energy consumption, 2010



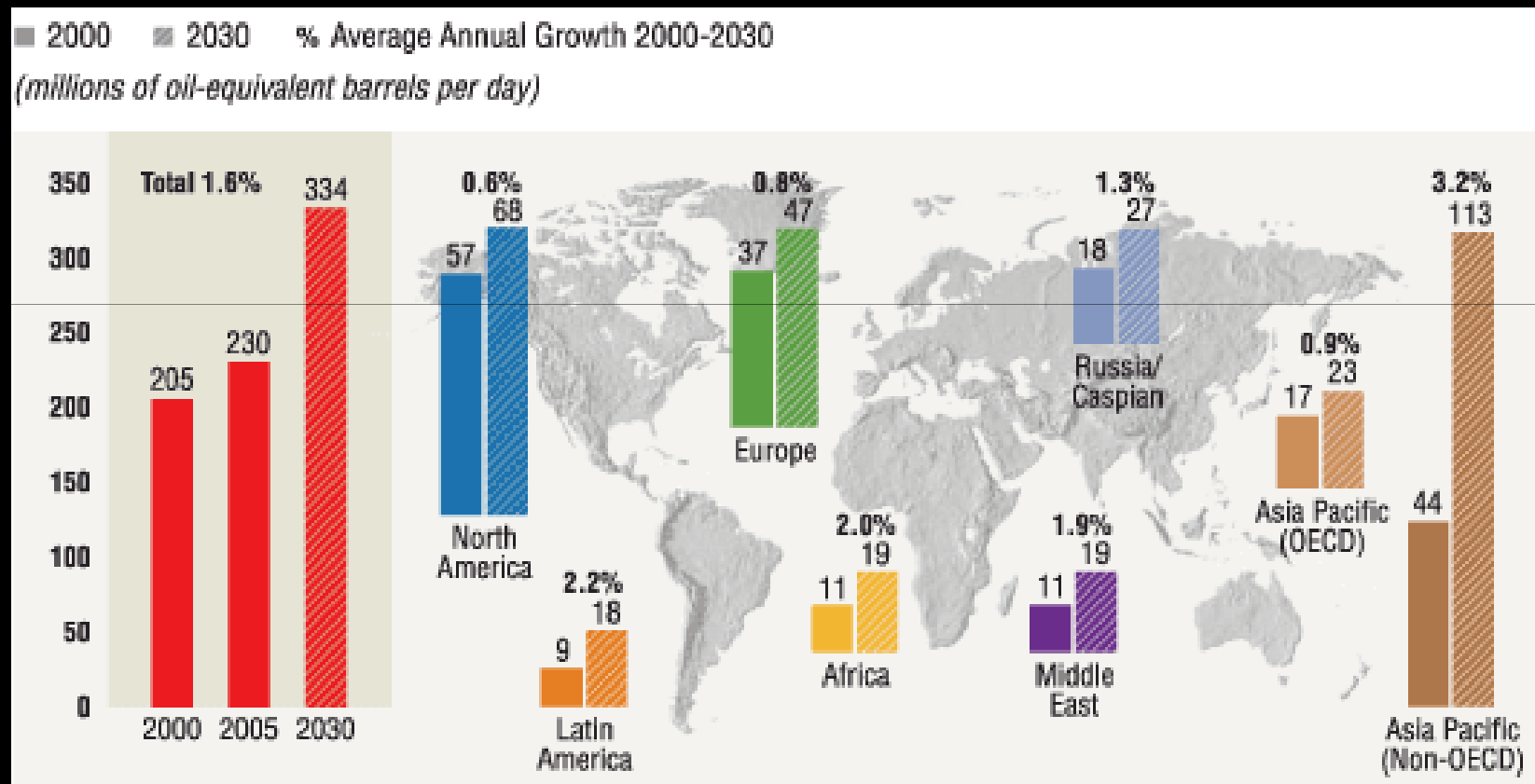
01. energy consumption

U.S. primary energy consumption, 2008



01.growing world energy necessity

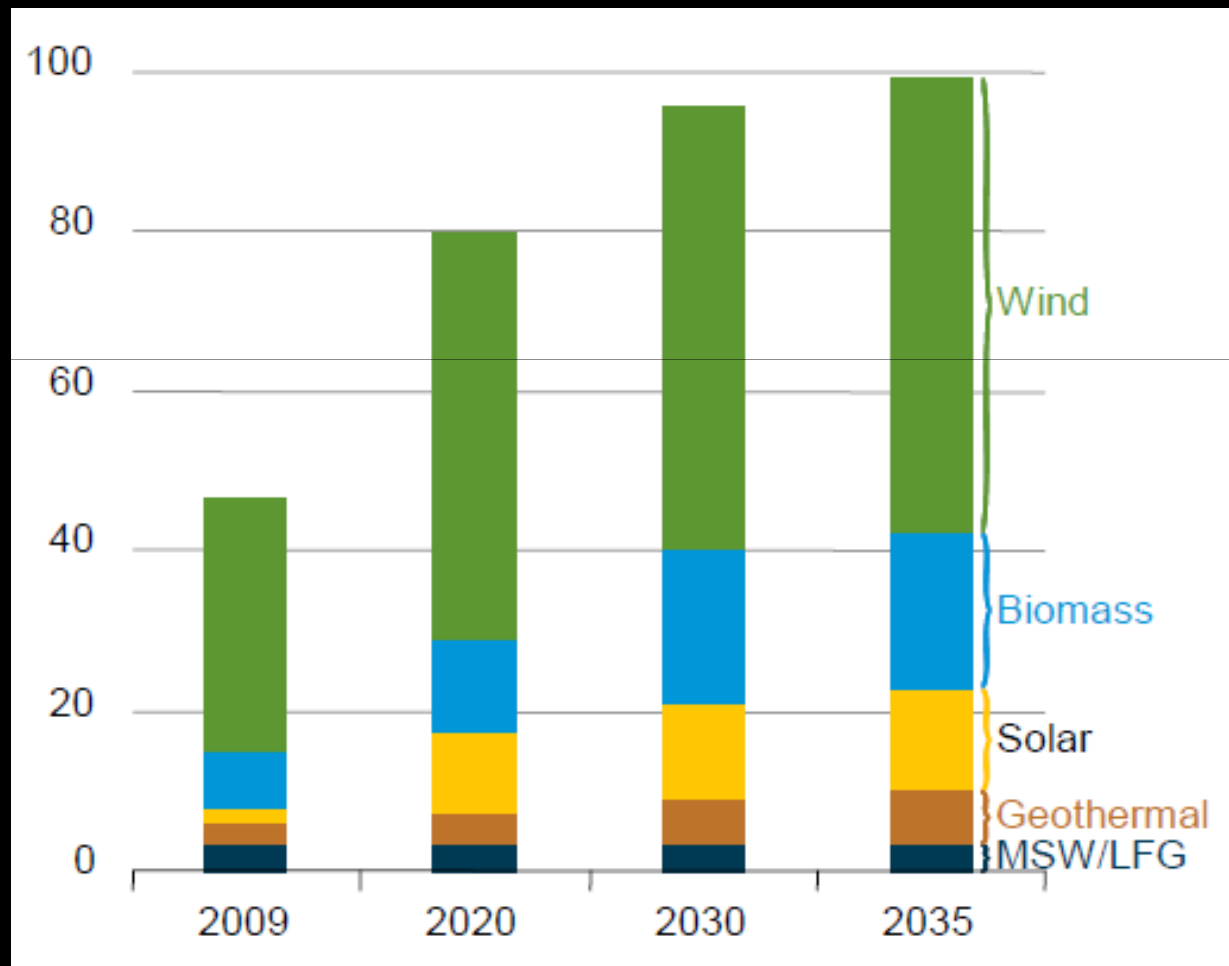
global energy outlook from now until 2030



01. green energy potential

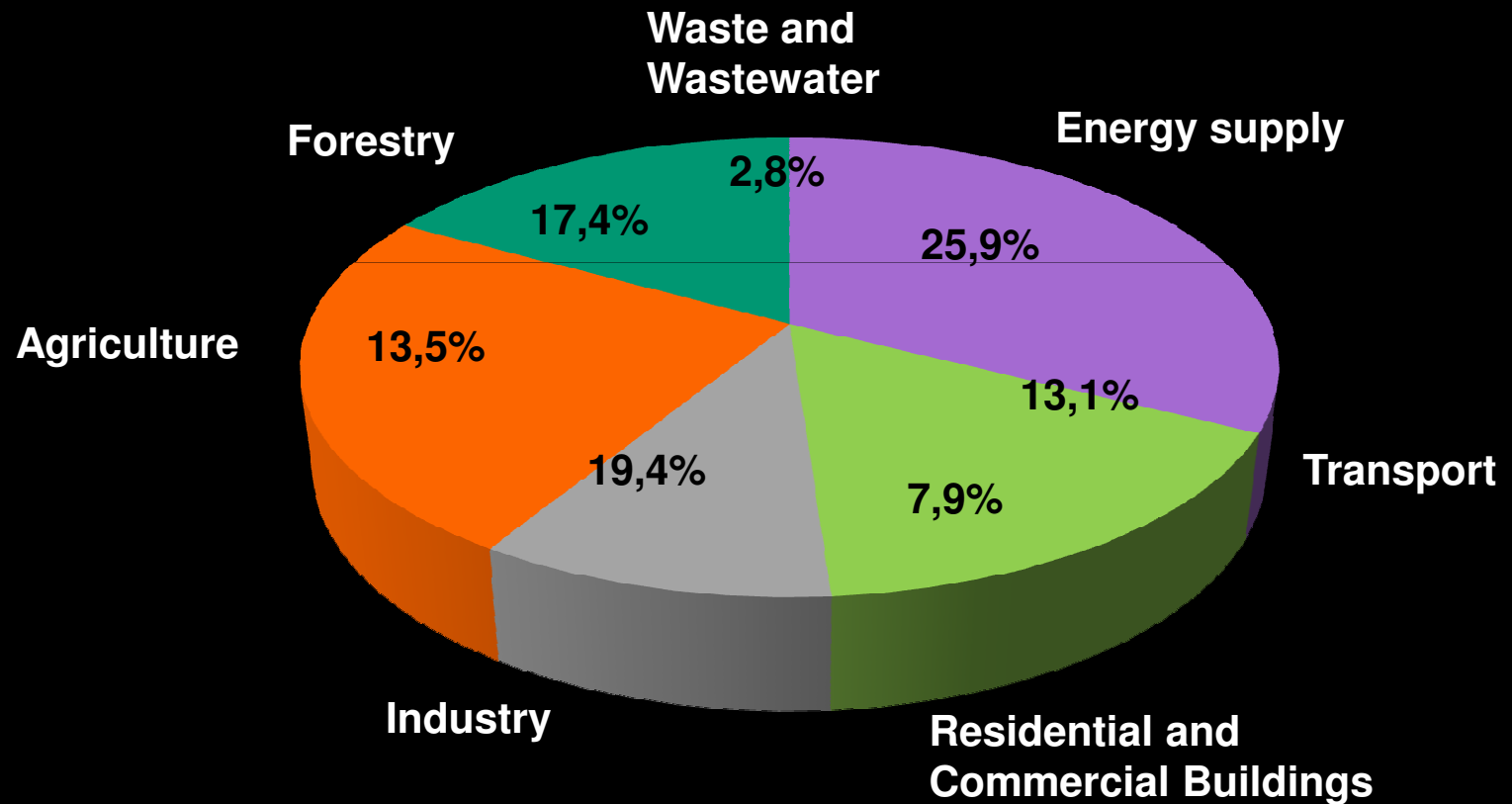
renewable energy generation capacity by source, 2009-2035

gigawatts

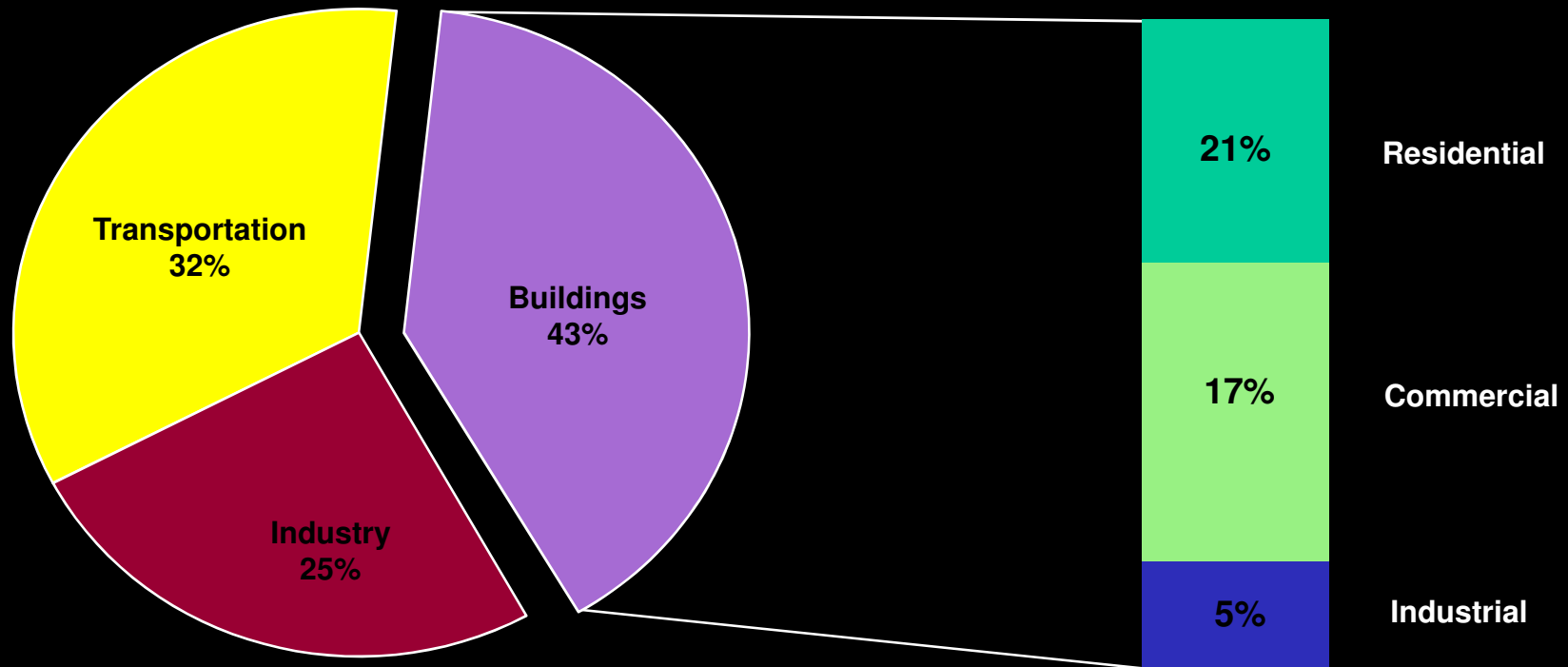


02. CO₂ emissions

sources of World's CO₂ emissions



02. CO₂ emissions



- GHG emissions increased 70% from 1970 to 2004
- GHG levels in the atmosphere are the highest in 650.000 years
- Mitigation costs are estimated to 1% of global GDP per year
- Costs of no action is estimated to 20% of global GDP per year

**THE QUESTION IS NOT IF BUT
HOW MUCH TIME ?**

03. present global emergency



- **population growth and depletion of natural resources**



- **energetic crises**



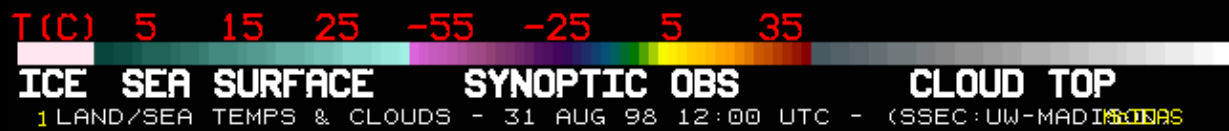
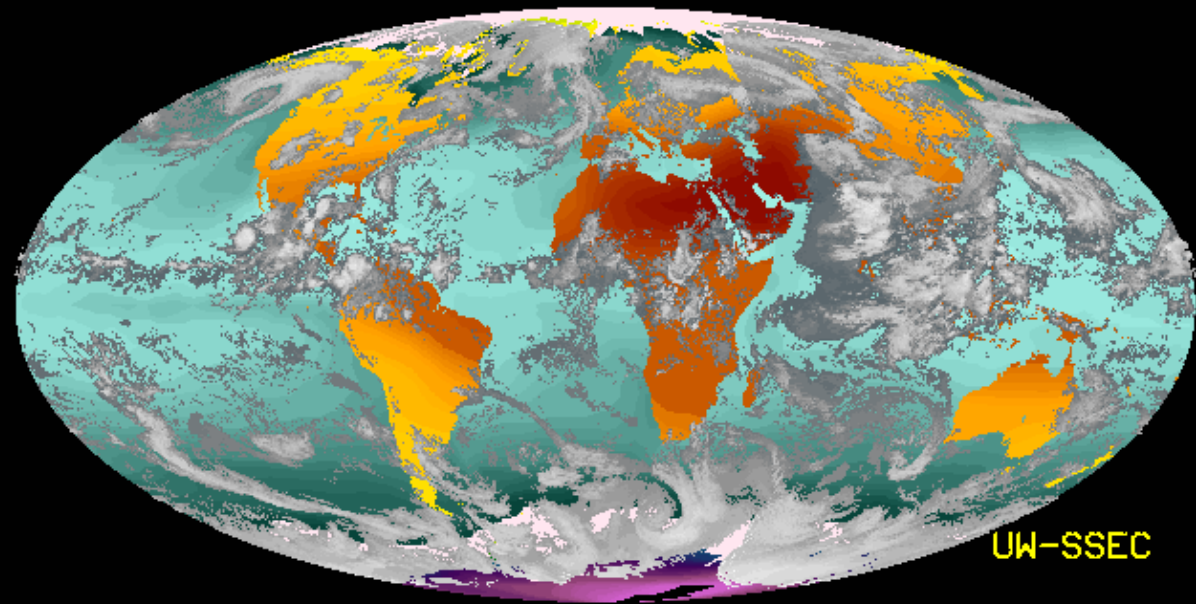
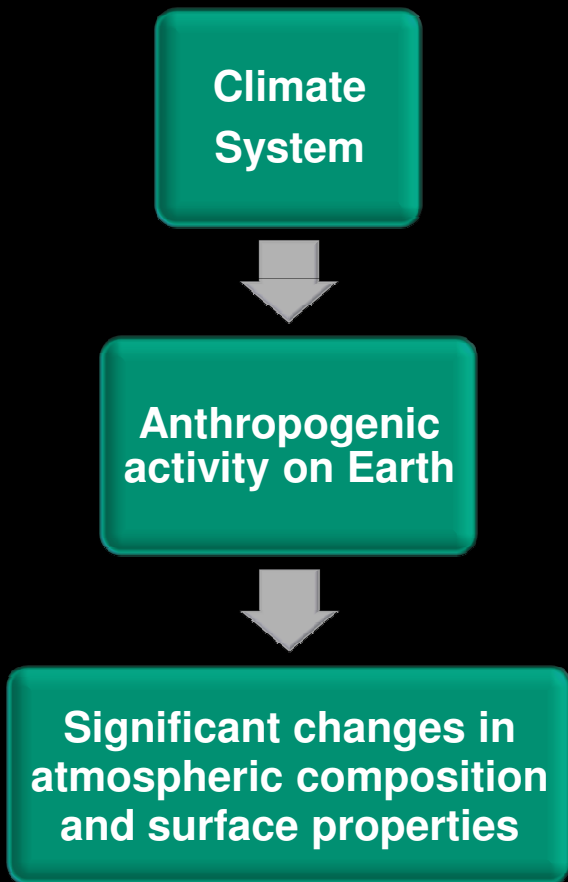
- **diffuse urban sprawl**

04. call for solutions

- *“Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Report 1987)*
- How many people are affected by a ton. of CO₂ emitted? How knows?
- □ **reduce consumption is the challenge to sustainability !**
- *“The scientific evidence is now overwhelming: climate change is a serious global threat, and it demands an urgent global response.” (Stern Review 2006)*
- How much time do we have?
- □ **the most sustainable energy is the saved energy !**
- *“Sustainable design integrates consideration of resource and energy efficiency, healthy buildings and materials, ecologically and socially sensitive land use and an aesthetic that inspires, affirms and enables.”*
(UIA – Declaration of interdependence for a Sustainable Future, Chicago 1993.)
- What is the approach?
- □ **local energy generation is the way !**

05. climatic regions

Understand how the global motion system in the atmosphere have reflects in the distribution of solar heating over the globe



06. architecture: **past**, present and futur

Development of the “bioclimatic design” concept



GREECE ARCHITECTURE



ROMAN ARCHITECTURE



GOTHIC ARCHITECTURE



RENAISSANCE ARCHITECTURE

06. architecture: **past**, present and future

development of the “bioclimatic design” concept



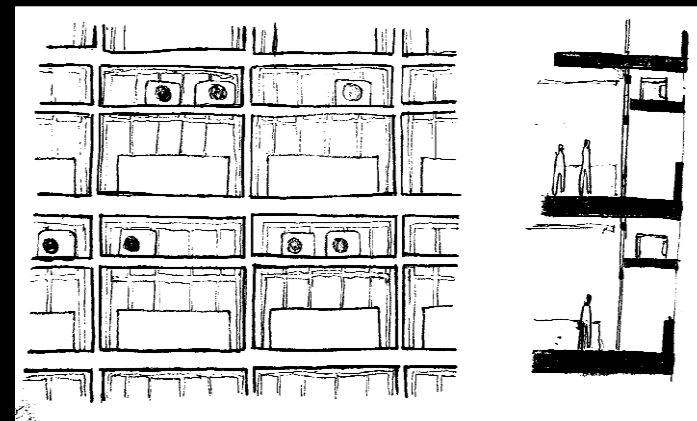
BAROQUE ARCHITECTURE



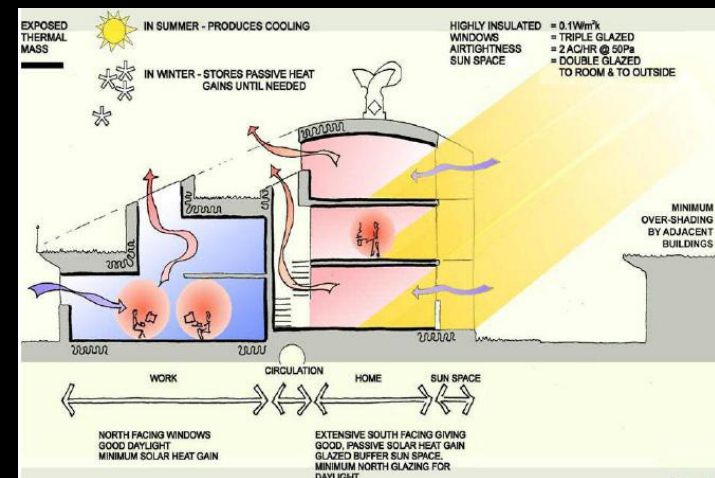
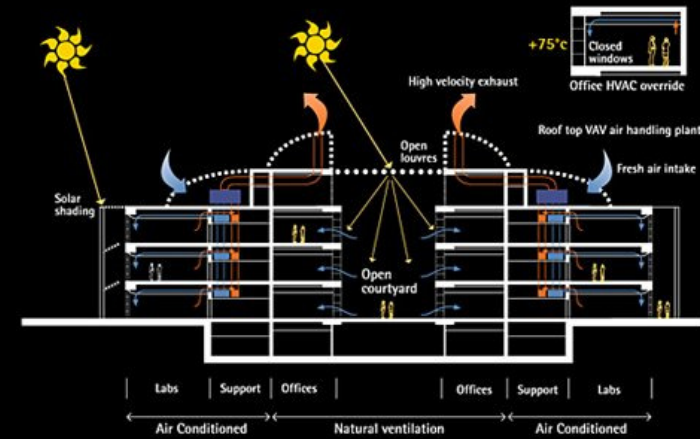
ARCHITECTURE OF INDUSTRIAL REVOLUTION



MODERN ARCHITECTURE



06. architecture: past, **present** and future



06. architecture: past, present and **future**



07. sustainability key

the heart of the EU's Europe 2020 Strategy



Energy Performance of Buildings Directive (EPBD)

Requires that by the end of 2020 all new buildings are nearly zero- energy buildings

"20-20-20" targets



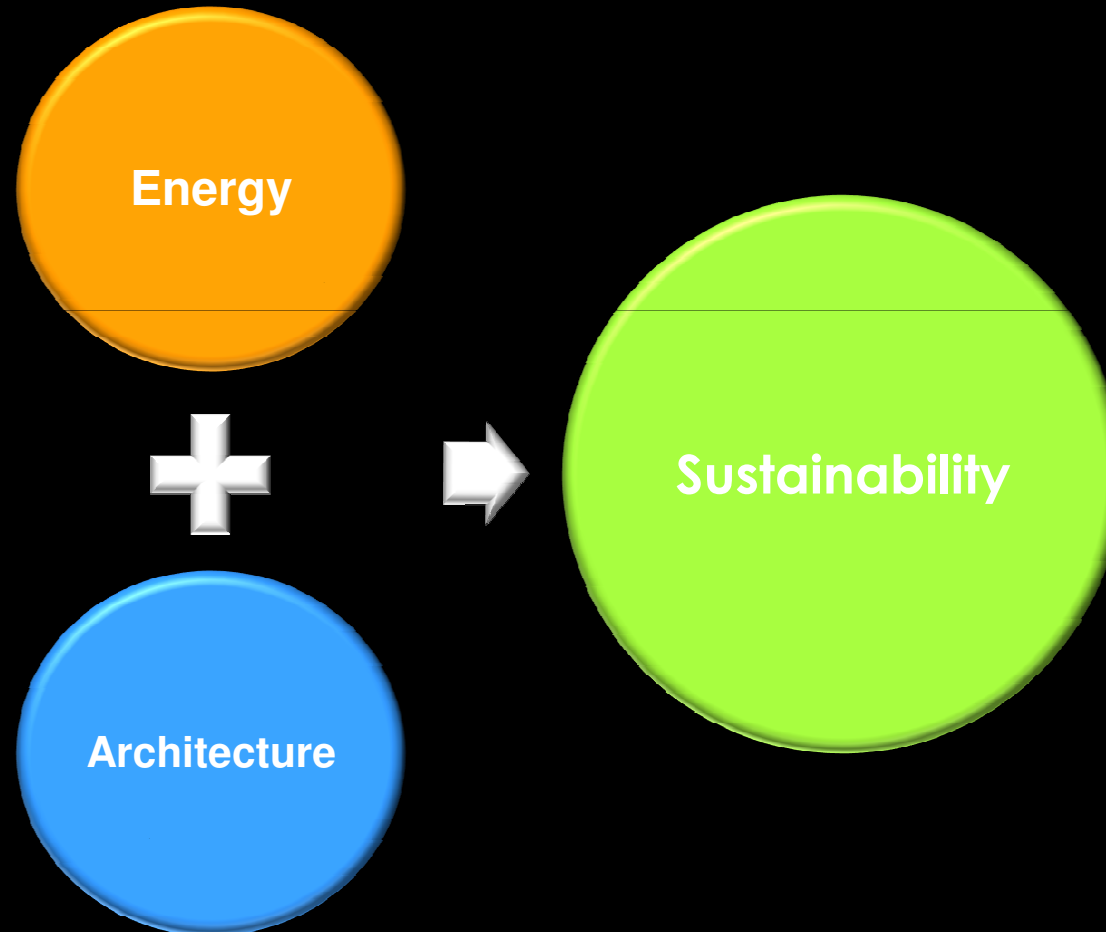
A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels

20% of EU energy consumption to come from renewable resources

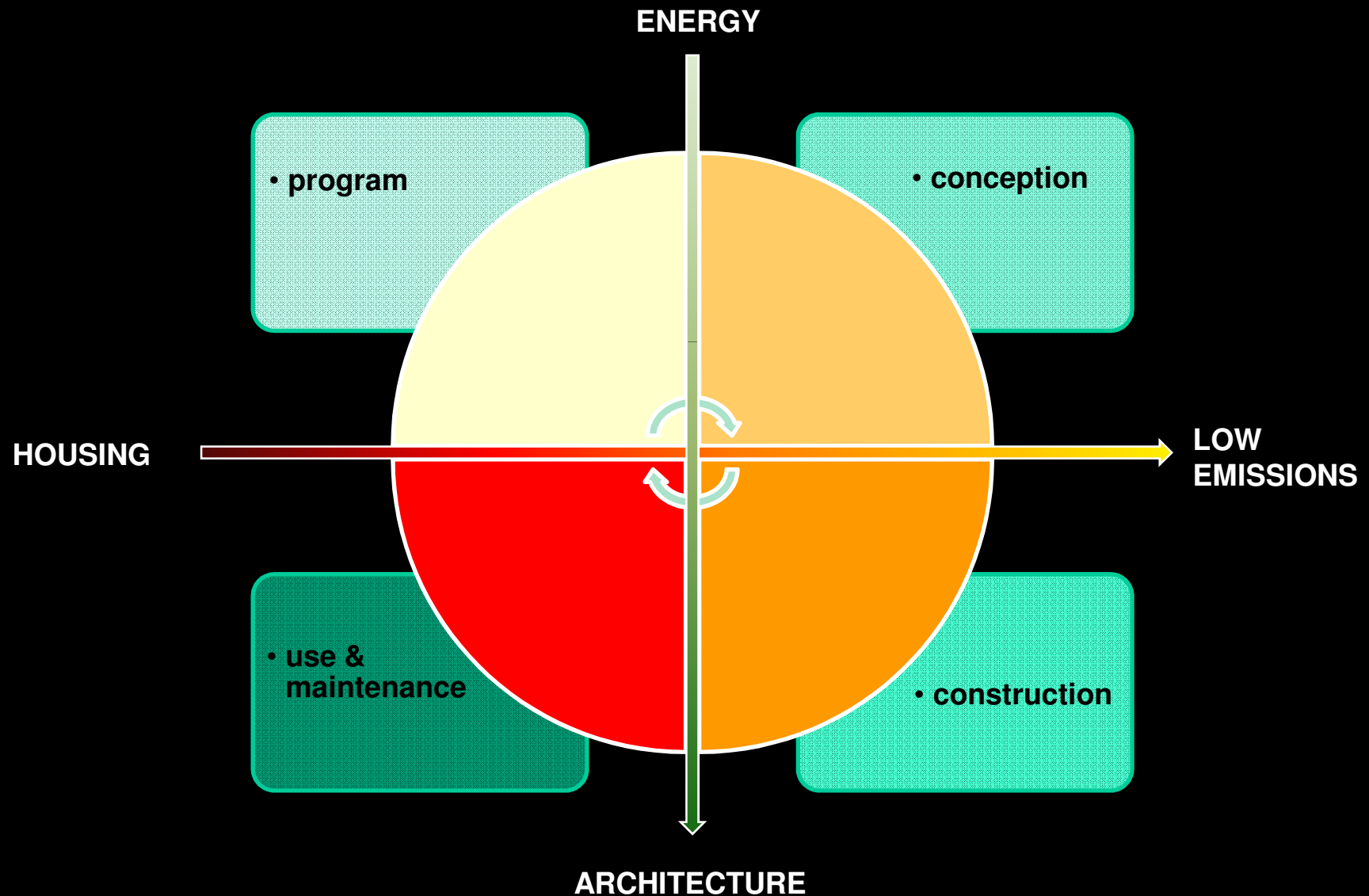
A 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency

08. sustainability process

relationship that leads to sustainability



08. sustainability process



09. future practical ways to invest in energy efficient generation



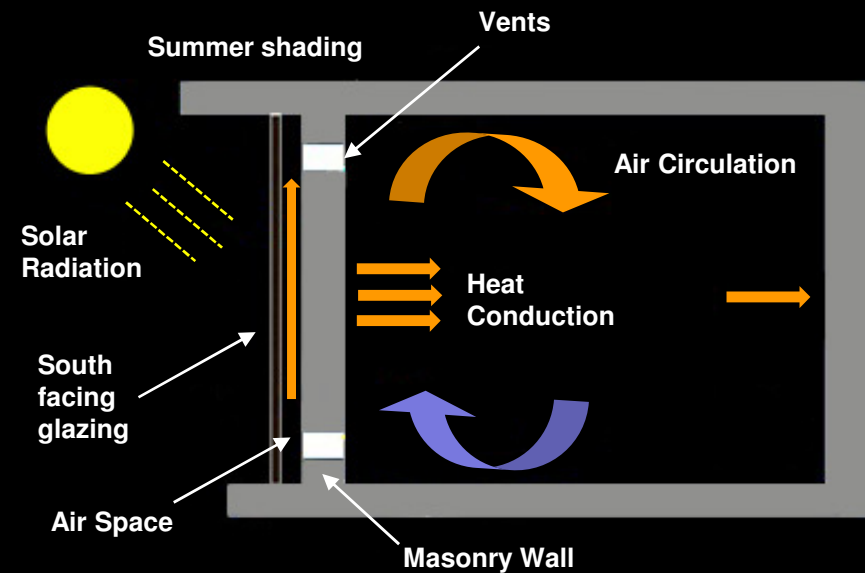
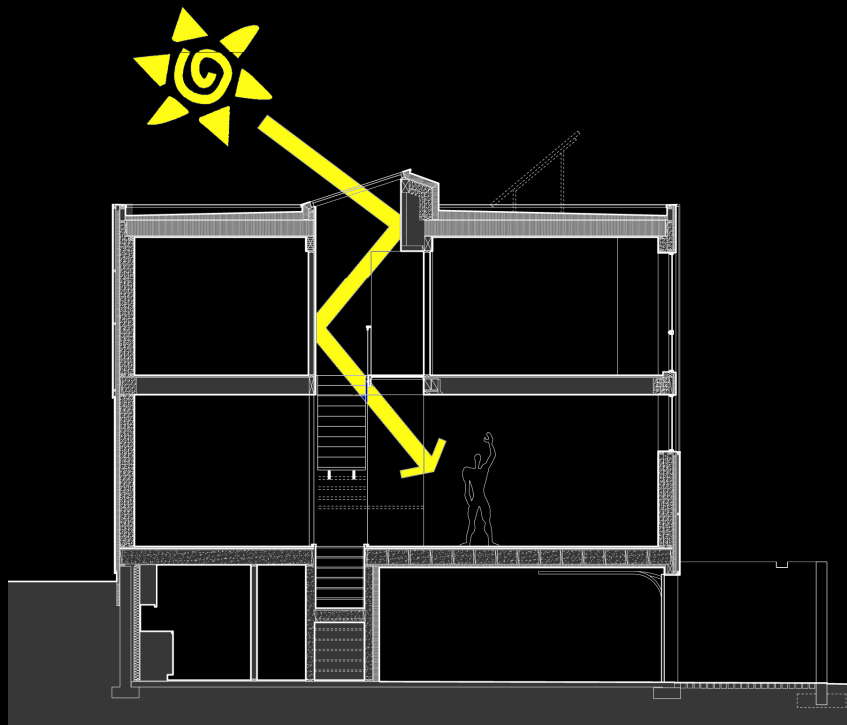
PASSIVE SOLAR ENERGY

passive utilization of solar energy improves also the energy performance of buildings in three areas:

Heating

Lighting

Cooling



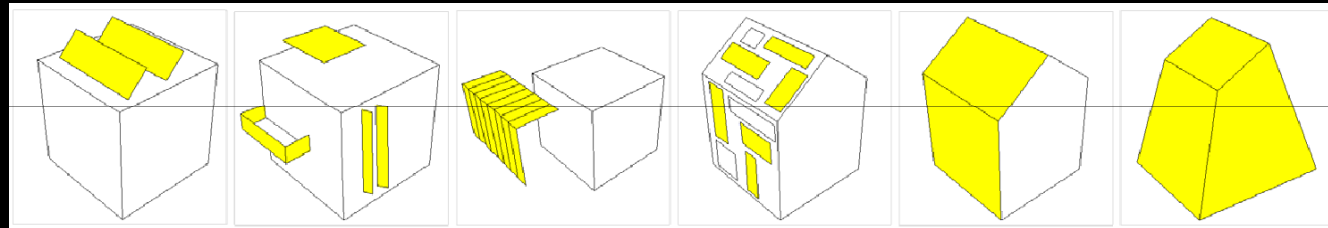
09. future solutions

to invest in energy efficient generation



ACTIVE SOLAR ENERGY

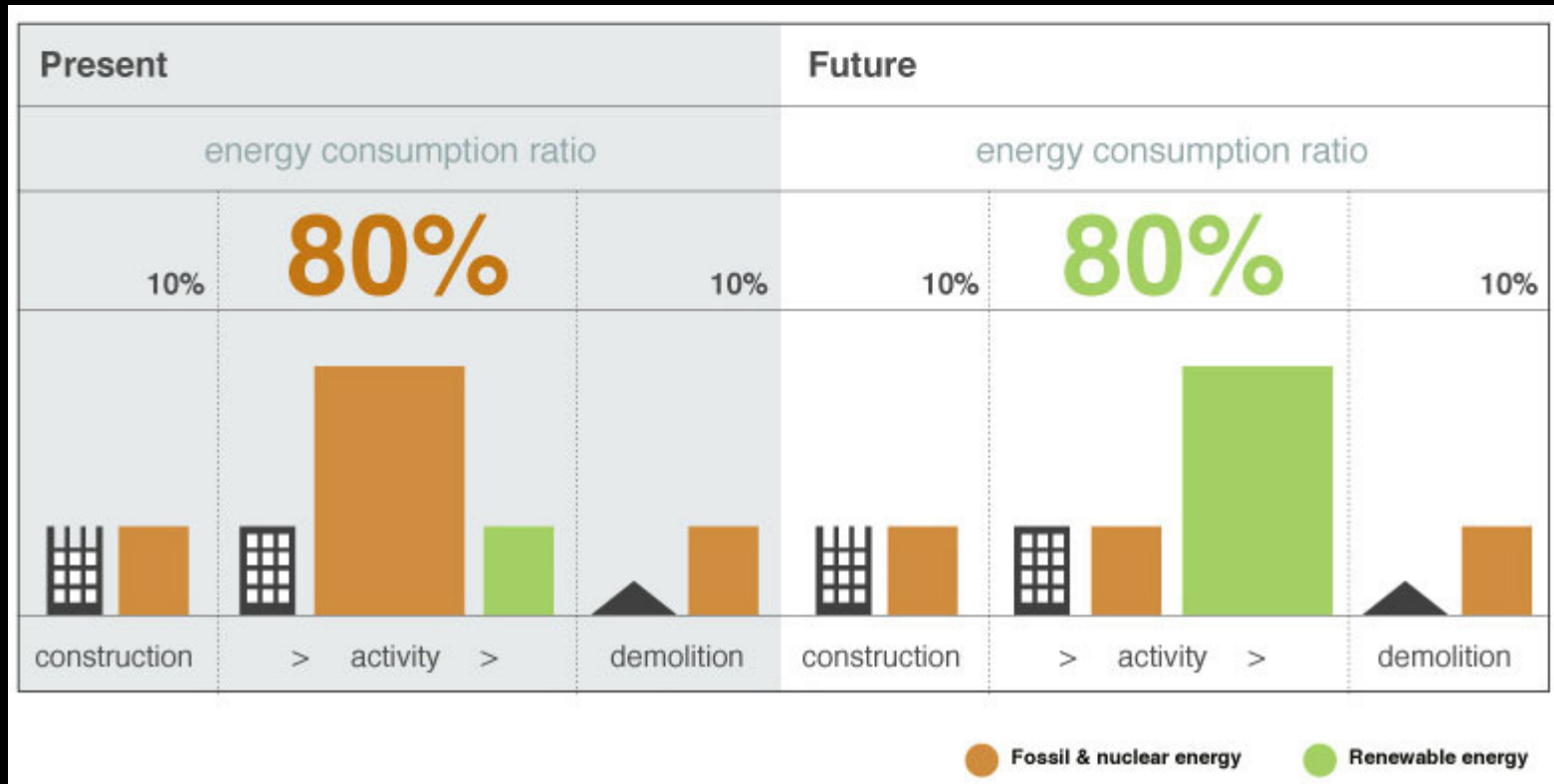
Active solar energy systems are solar collectors, photovoltaic panels, power towers, solar ponds, hydrogen generating solar centrals and ocean thermal conversion centrals.



Solar access is the pre-condition for both active and passive solar design strategies.

09. future goals

to balance energy consumption



10. discussion

HOW CAN WE CONFRONT OUR CURRENT ENERGY ISSUE ?



- ❑ **Reducing consumptions !**
- ❑ **Re-formulating land-use !**
- ❑ **Planning sustainable cities !**
- ❑ **Designing healthy, well-lit, affordable and efficient houses !**
- ❑ **Breaking down barriers of solar photovoltaic !**

11. conclusions

- The reduction in both energy and consequential carbon emissions has to be achieved, the thermal performance of buildings plays a fundamental role.
- Every single action in favor of renewable energy generation is a precious contribute.
- Energy awareness can lead to changes in the way energy is used, but “education” must be sustained to ensure long-term energy reductions.

"The problems we face today can not be solved if we keep the same thinking we had when we created"

Albert Einstein