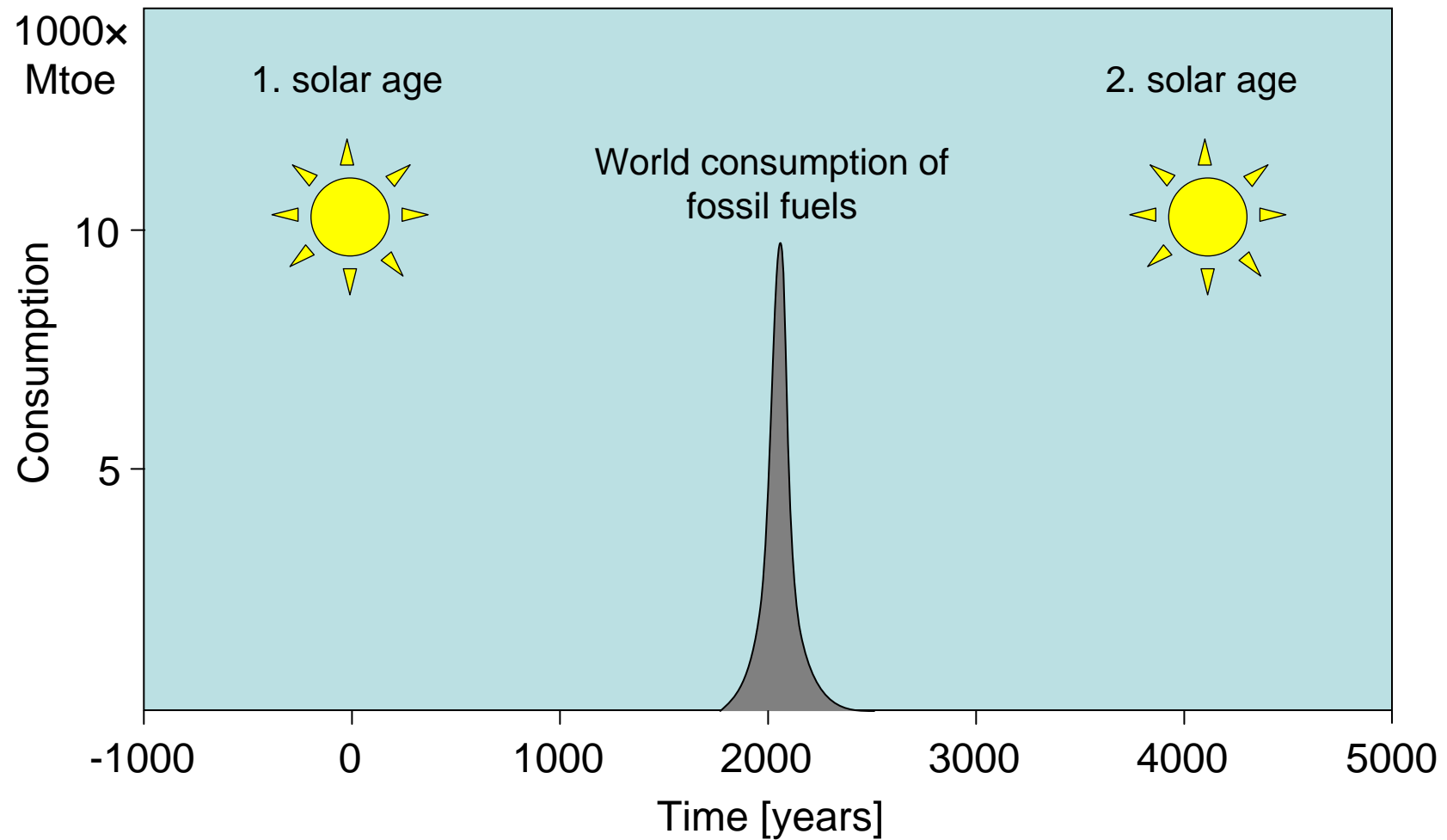


Why solar cells?



Why solar cells?

- Photovoltaic (**PV**) energy conversion will become an important energy source in the world energy production.
- Photovoltaic energy conversion takes place in advanced semiconductor devices: **solar cells**.
- Noble mission:
contribution to **sustainable** human progress.

Depleting energy sources

BP oil platform

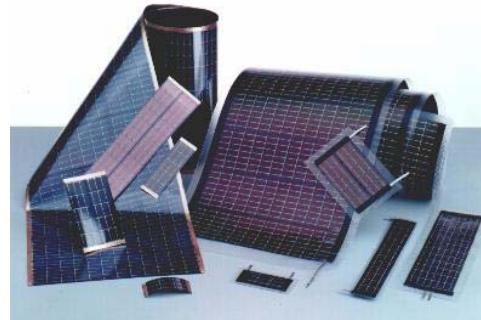


Nuclear fast-breed reactor

Coal power plant in Thailand



Renewable energy sources



Why solar cells?



Creating the future

Why solar cells?

ENERGY

Increasing energy need

Exhaustion of fossil fuels

Diversification of energy sources

Energy for all (2 billion people without electricity)

ECOLOGY

Pollution of environment

Climate change

ECONOMY

We want to make money

! Custom-made energy !

Added value (building elements)

Fossil-fuel energy consumption

Two major global problems:

1. Shortage of energy
2. Climate change

Solutions:

1. Efficient use of energy
2. Renewable energy source

Brent Crude Oil \$/barrel 2007 (source BBC)



Mexico, Tabasco floods, November 2007 (source BBC)



Energy consumption



6×10^9 people

Active young man:

2500 kcal/day

1055 kWh/year

0.120 kW

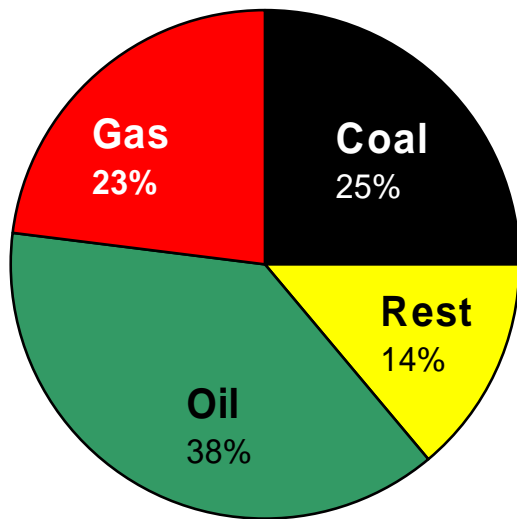
Primary energy global use:

120×10^{12} kWh/year **19500** kWh/(person*year)

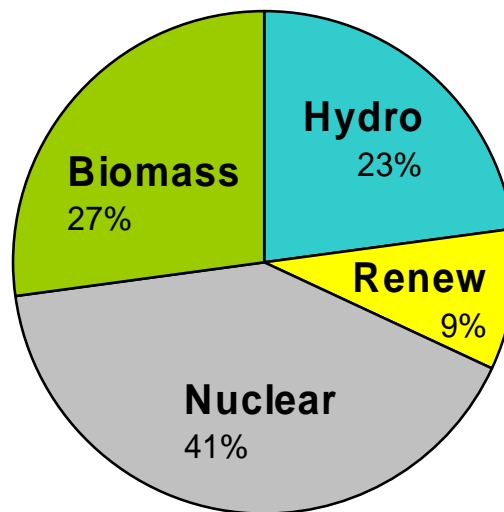
1.4×10^{10} kW **2.30** kW/person

World energy consumption

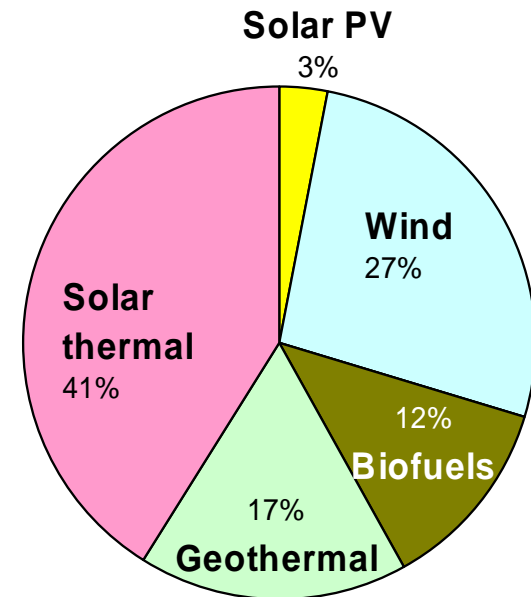
2004:



Total: 473 EJ



Rest: 66 EJ



Renewables: 6 EJ

Source: BP, Statistical review of world energy, June 2006

10 000 Mtoe = 420 EJ, 1 PJ = 278 GWh, 1 PJ ~ 32 MW installed power

Future energy consumption

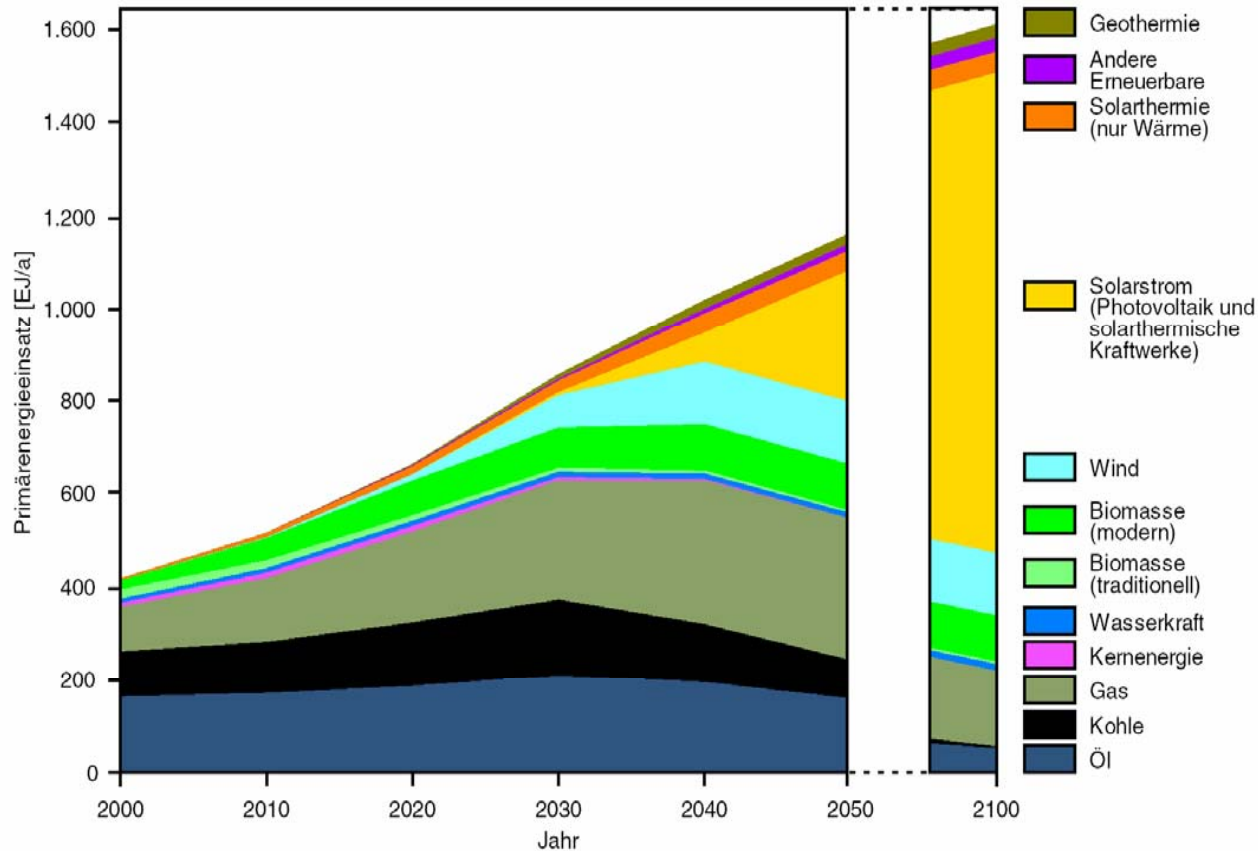


Abbildung 4.4-3

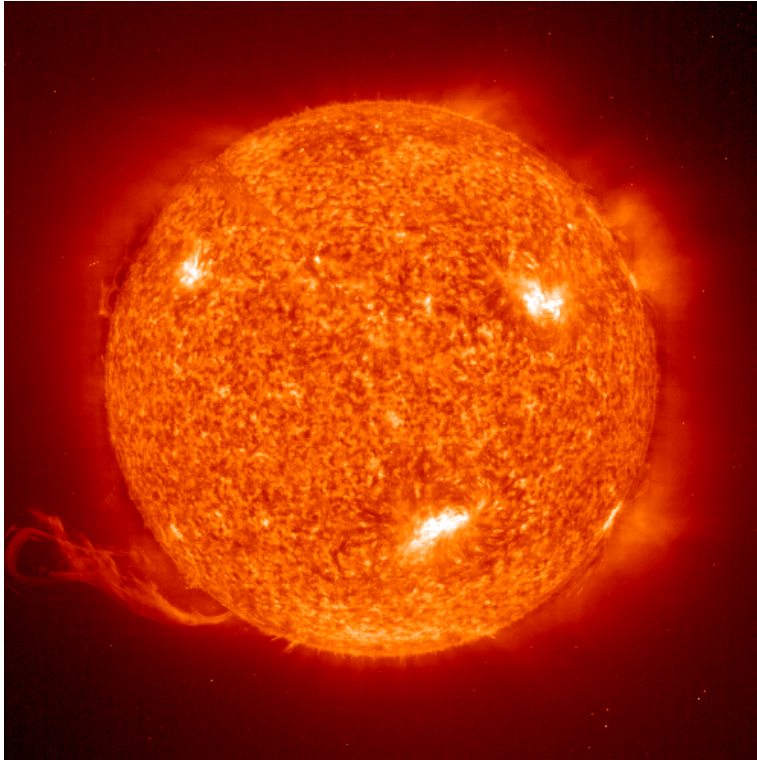
Energieeinsatz nach Energieträgern für den exemplarischen Transformationspfad. Dieser Pfad demonstriert, dass der nachhaltige Umbau der globalen Energiesysteme technologisch möglich ist. Ein anderer Technologiemiex bei den erneuerbaren Energien könnte dies ebenfalls leisten.

Quelle: WBGU



Advisory Council
to the German
government on
global climate
change WBGU
(2003)

Sun



Energy radiation:

380×10^{21} kW

3.2×10^{27} kWh/year

Earth receives:

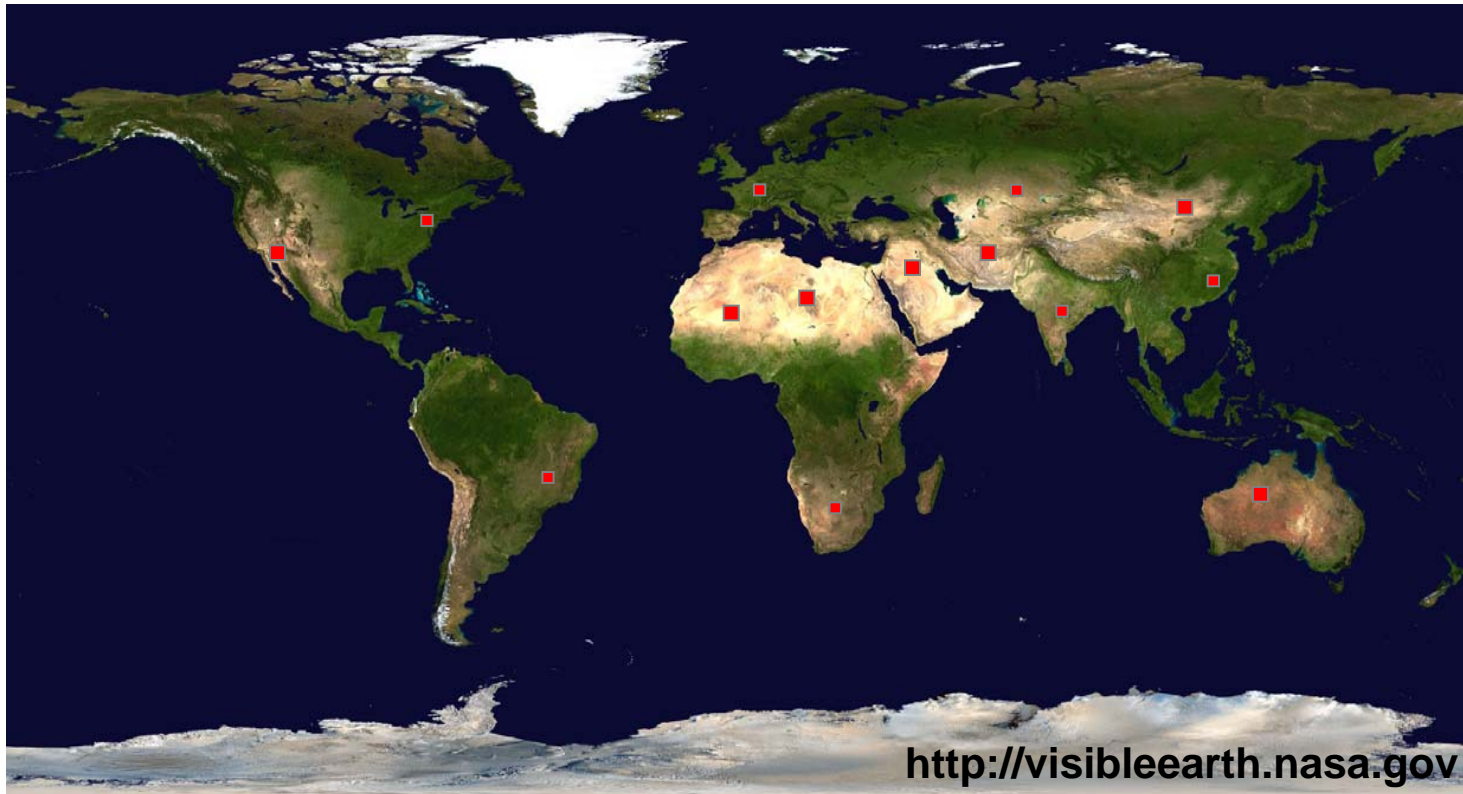
6000×10^{10} kW

1×10^4 kW/person

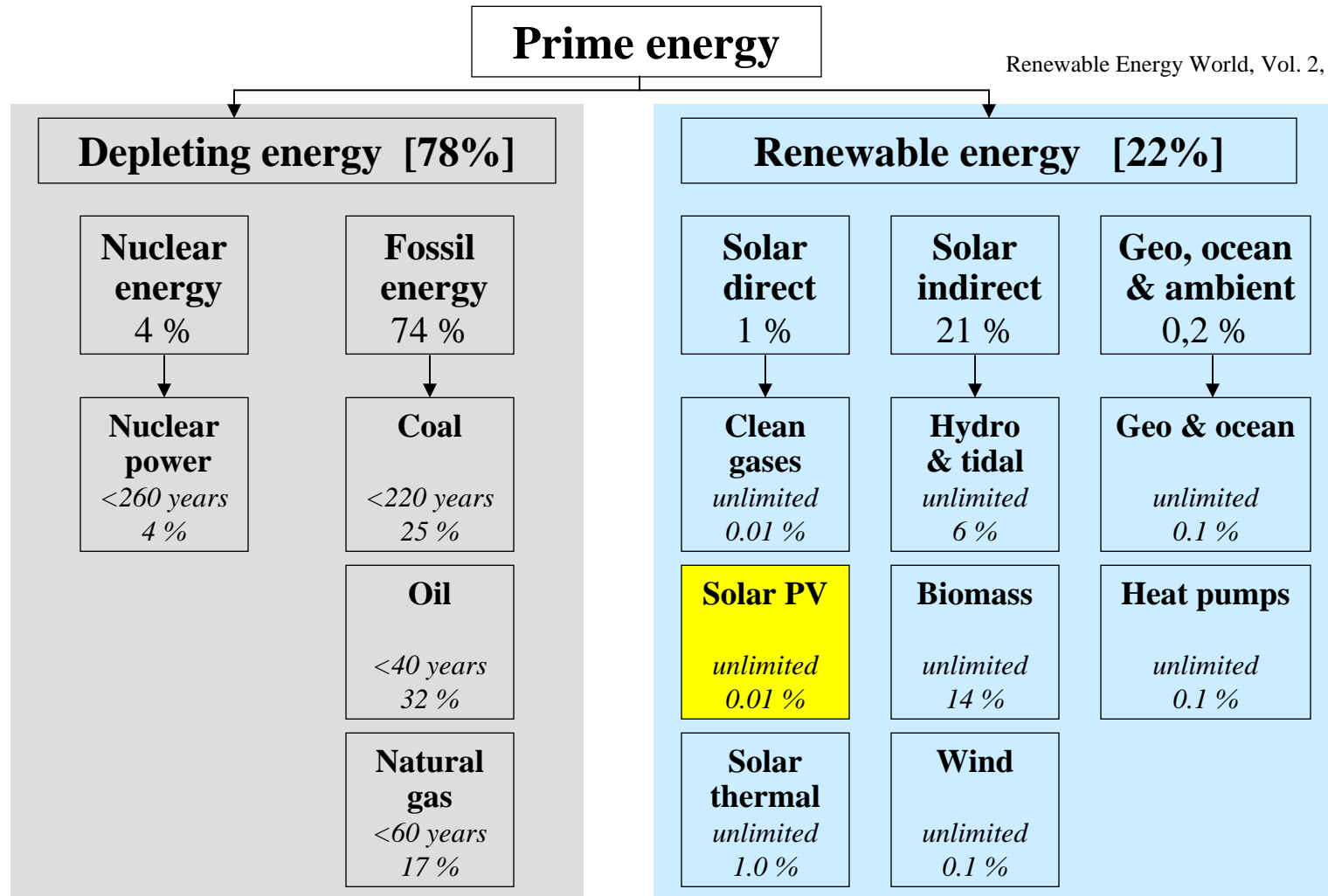
2.30×10^0 kW/person (global use)

Solar energy resource

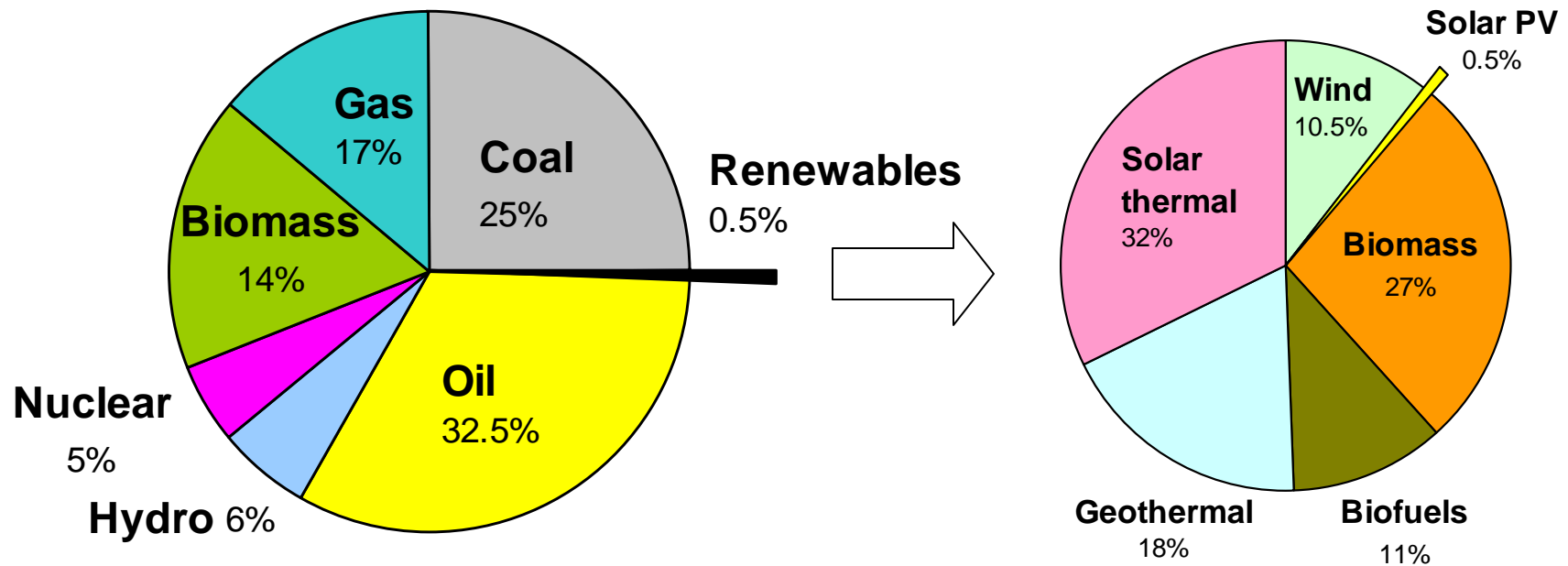
At 10% overall efficiency (generation & storage):
1200x1200 km² to supply 2050 energy needs (~1000 EJ)



Primary energy sources



Primary energy sources



Renewable Energy World, Vol. 2, No. 4, July 1999

Electricity generation

