Prospects for a World Powered Predominately by Solar and Wind Energy

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2011

Global Energy Use 2010

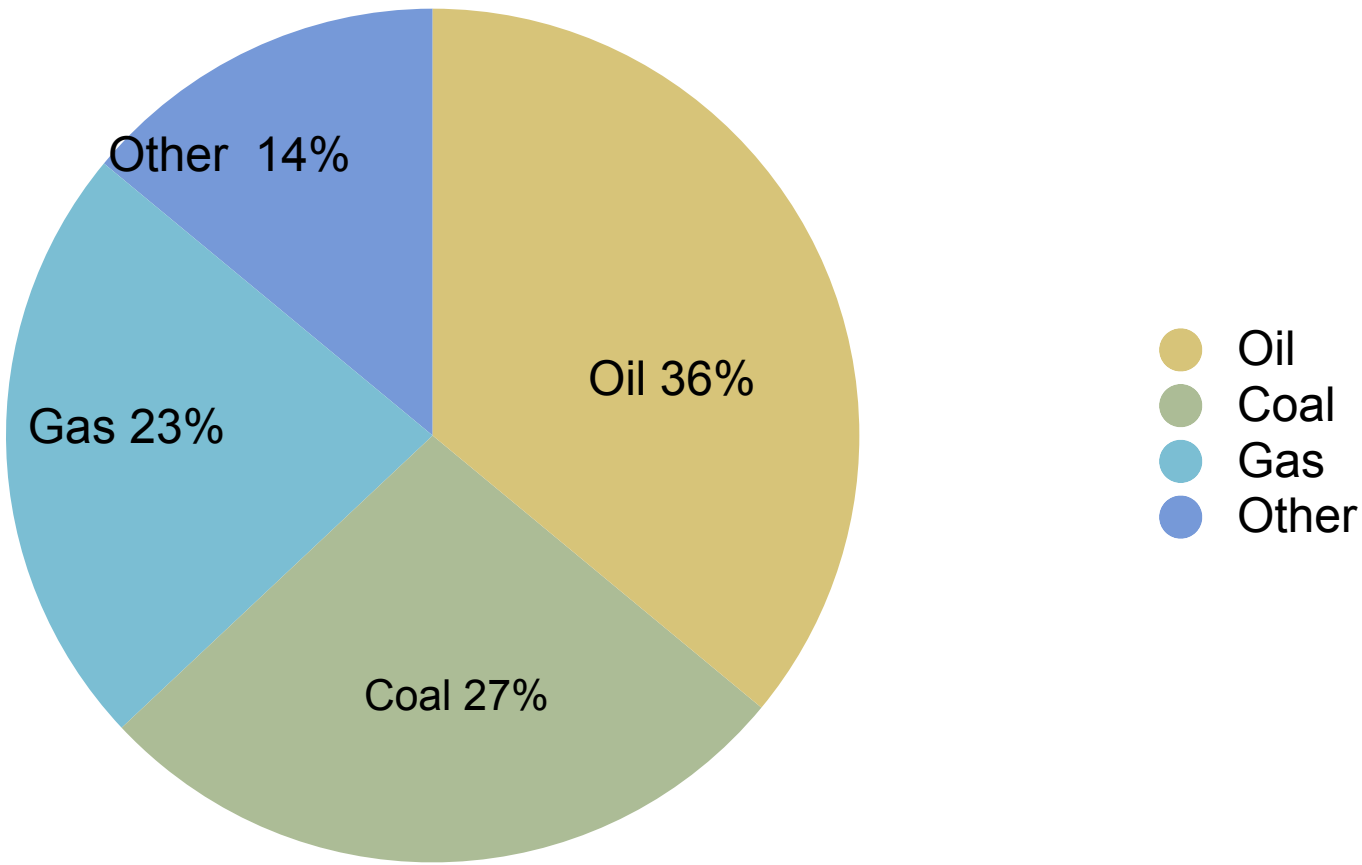
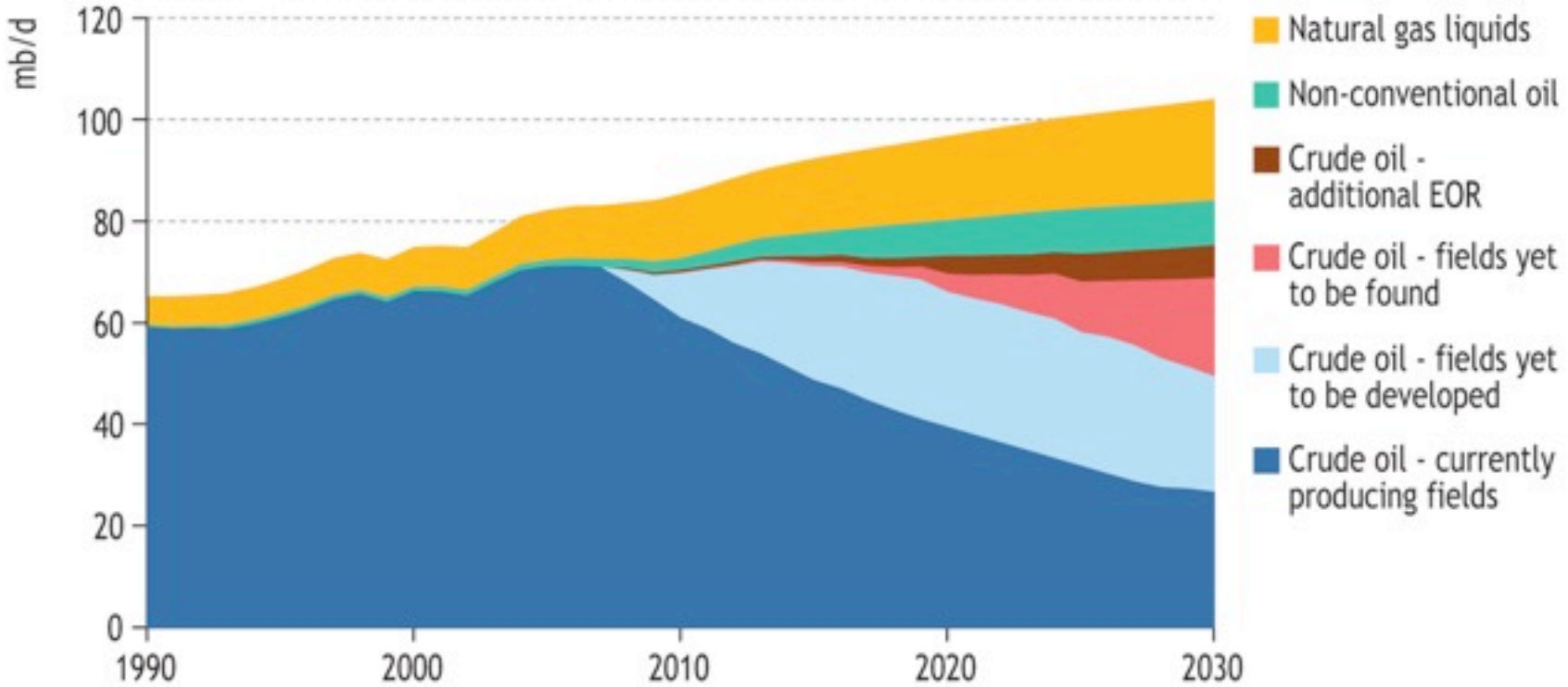
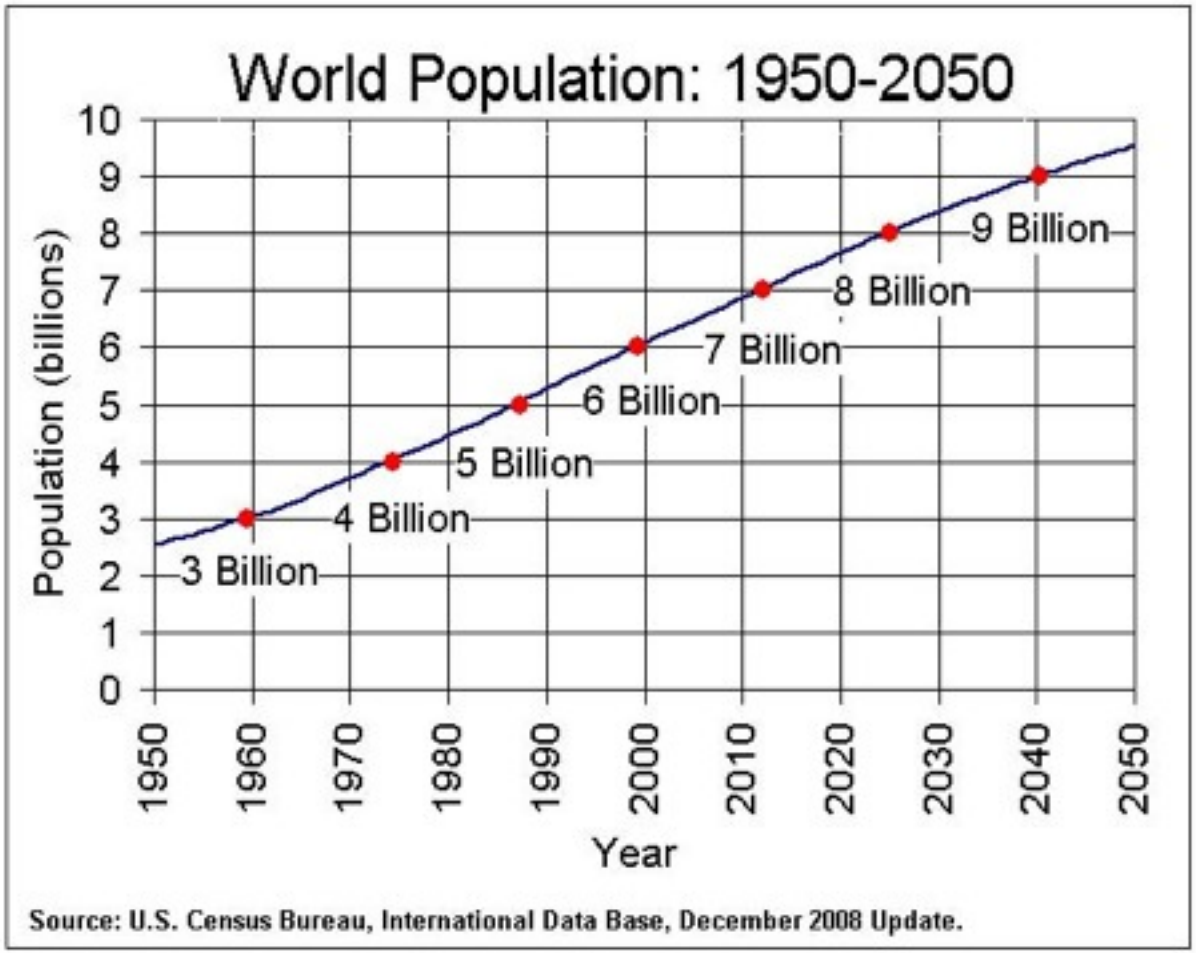


Figure 11.1 • World oil production by source in the Reference Scenario




World Population: 1950-2050
Population (billions)
0
1
2
3
4
5
6
7
8
9
10
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
Year
3 Billion
4 Billion
5 Billion
6 Billion
7 Billion
8 Billion
9 Billion
Source: U.S. Census Bureau, International Data Base, December 2008 Update.

"We have met the enemy and he is us"

Pogo quote of 1971

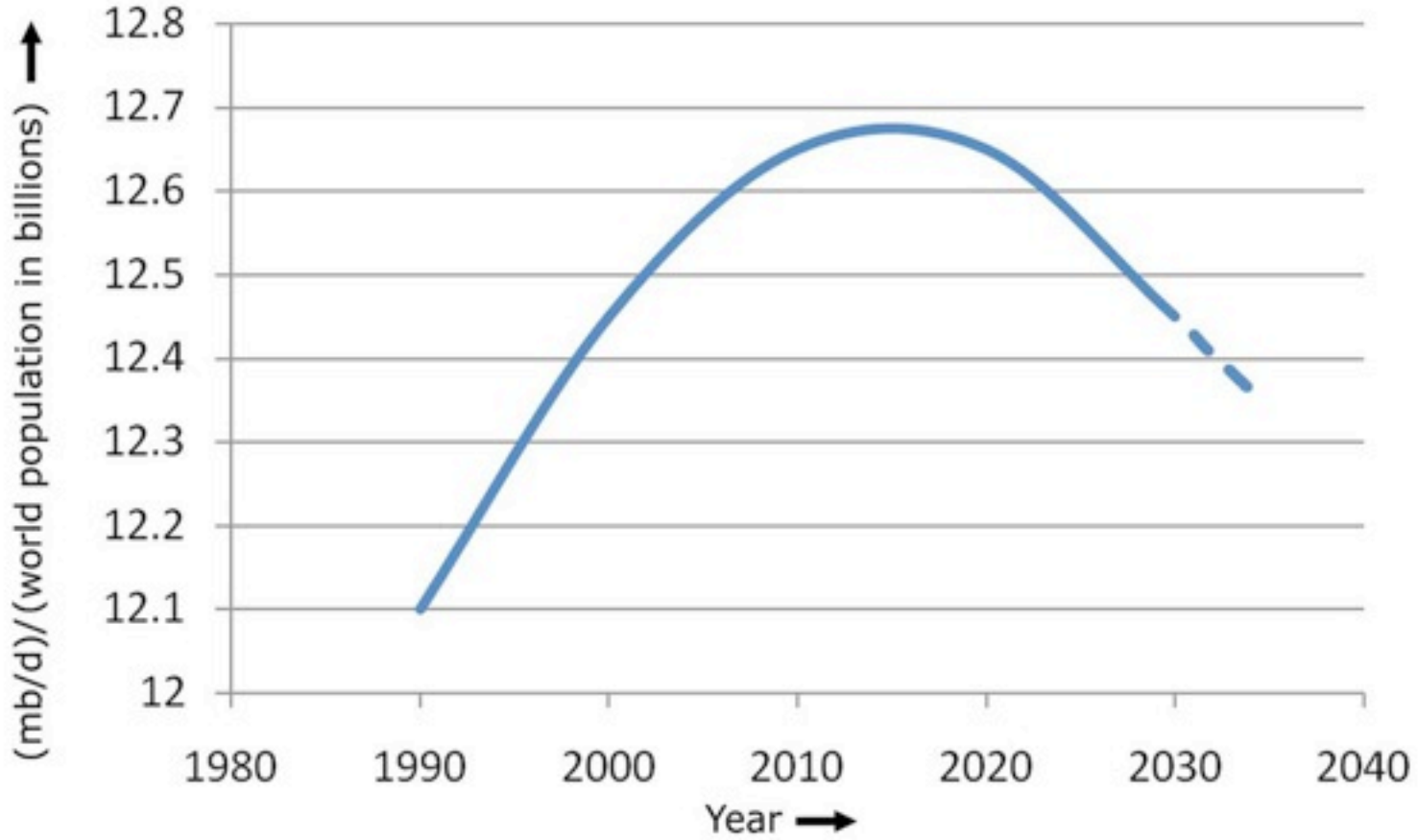


Fig. 4. Global oil production per person

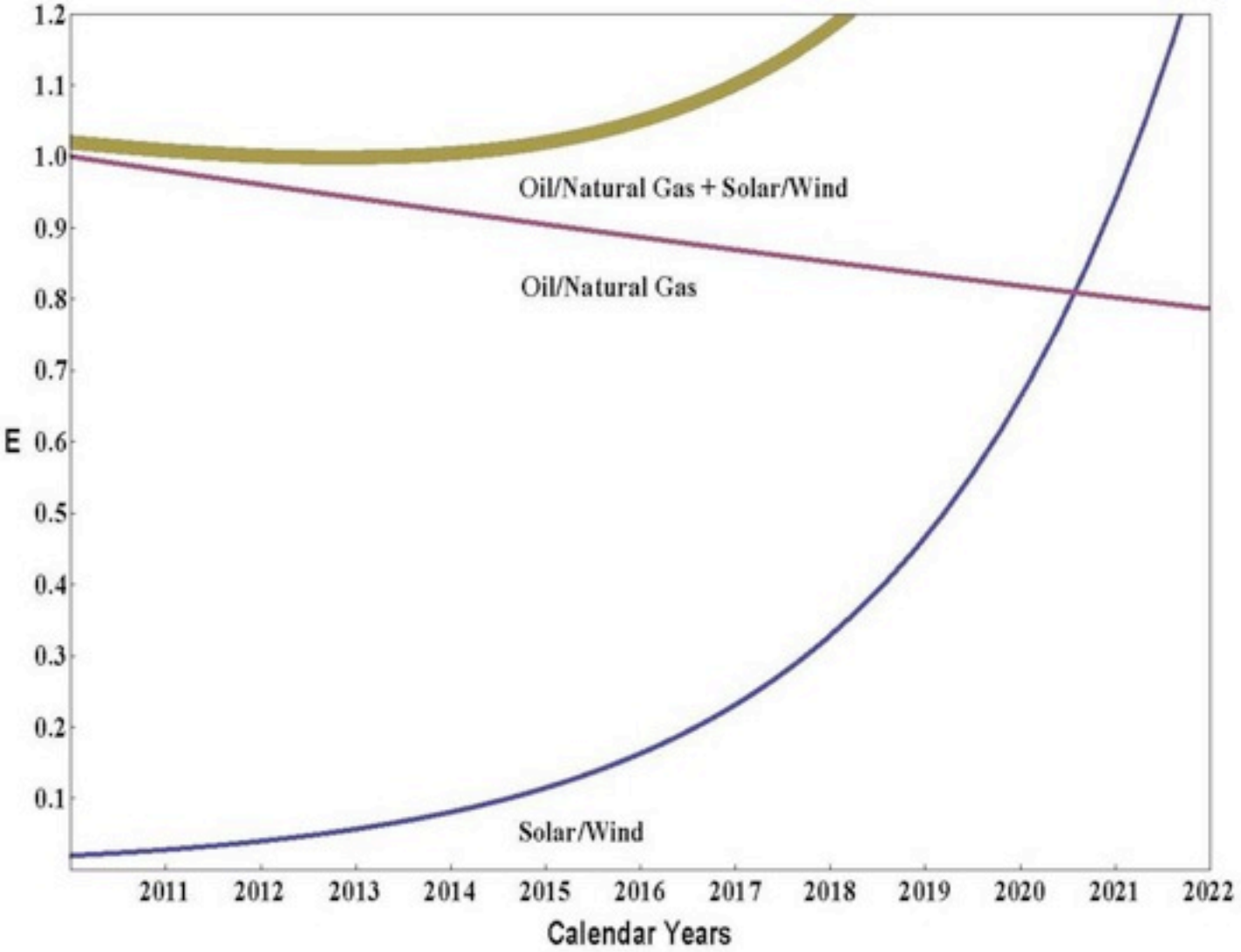
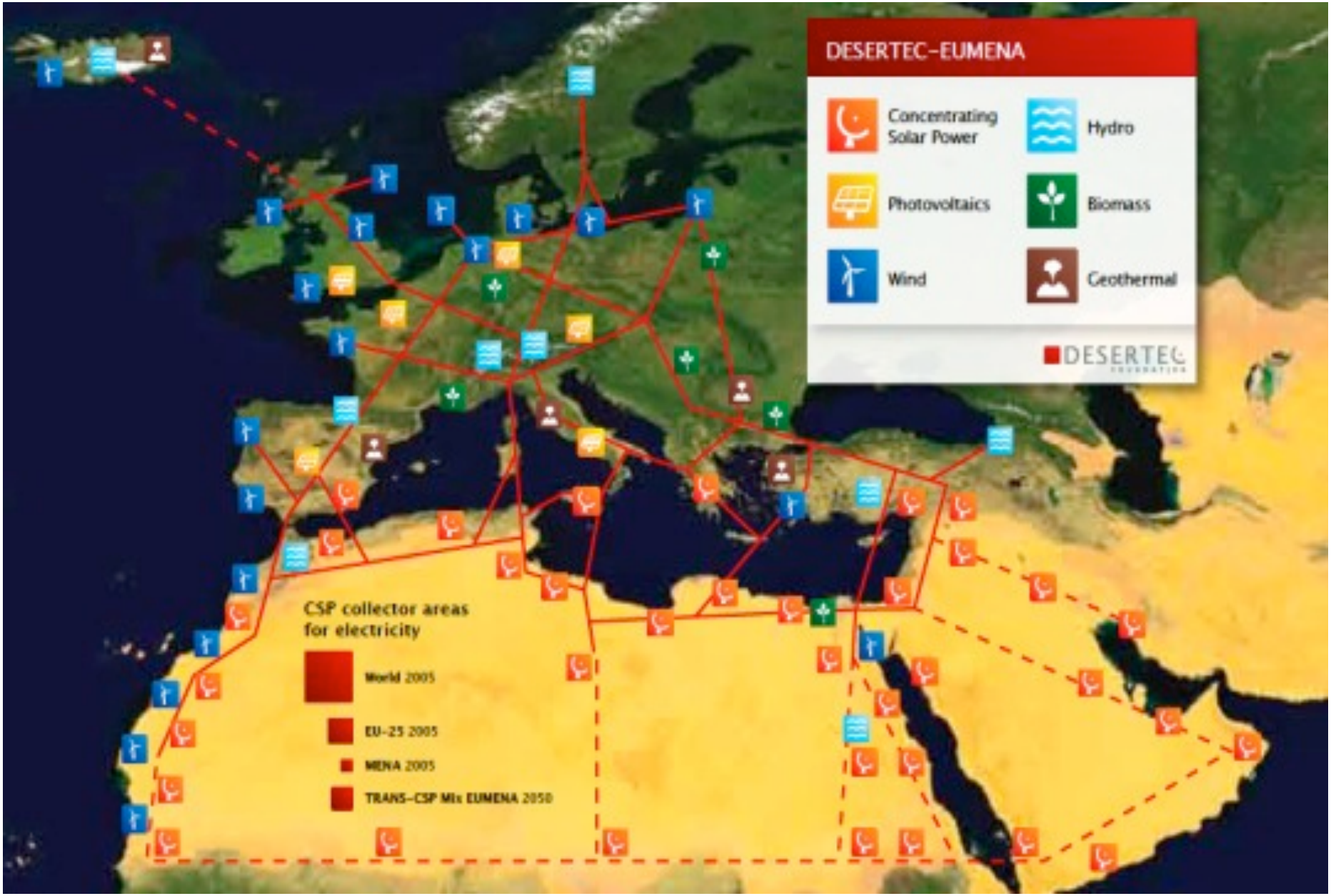


Fig. 5 The energy transition from (Oil/Natural Gas) to (Solar/Wind). We define the transition year as the year (2021) in which solar/wind energy begins to exceed oil/natural gas energy, and becomes the world's dominant energy source. E represents annual rates of energy production, in units of oil/gas production in 2010.

Moscone Center's

Solar roof panels

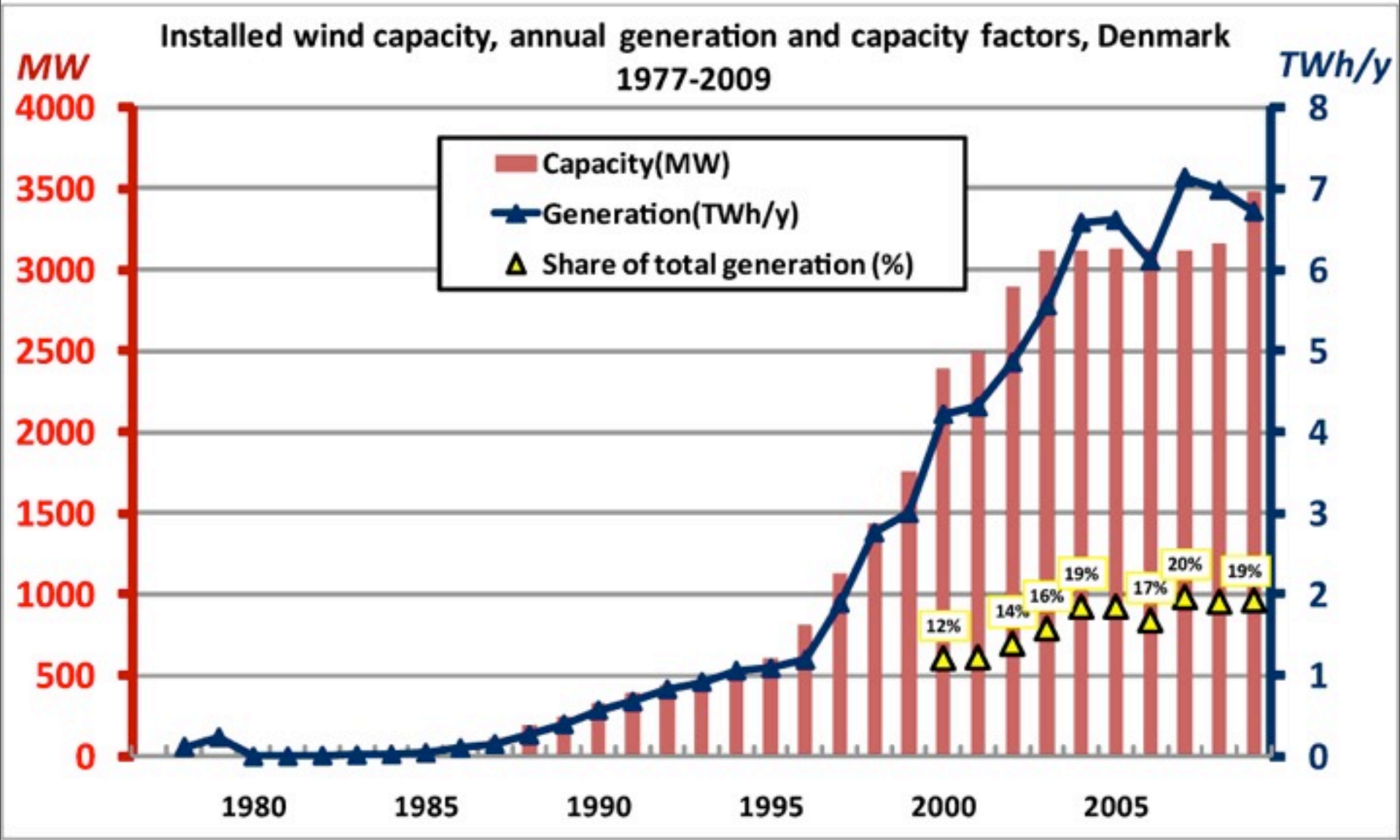


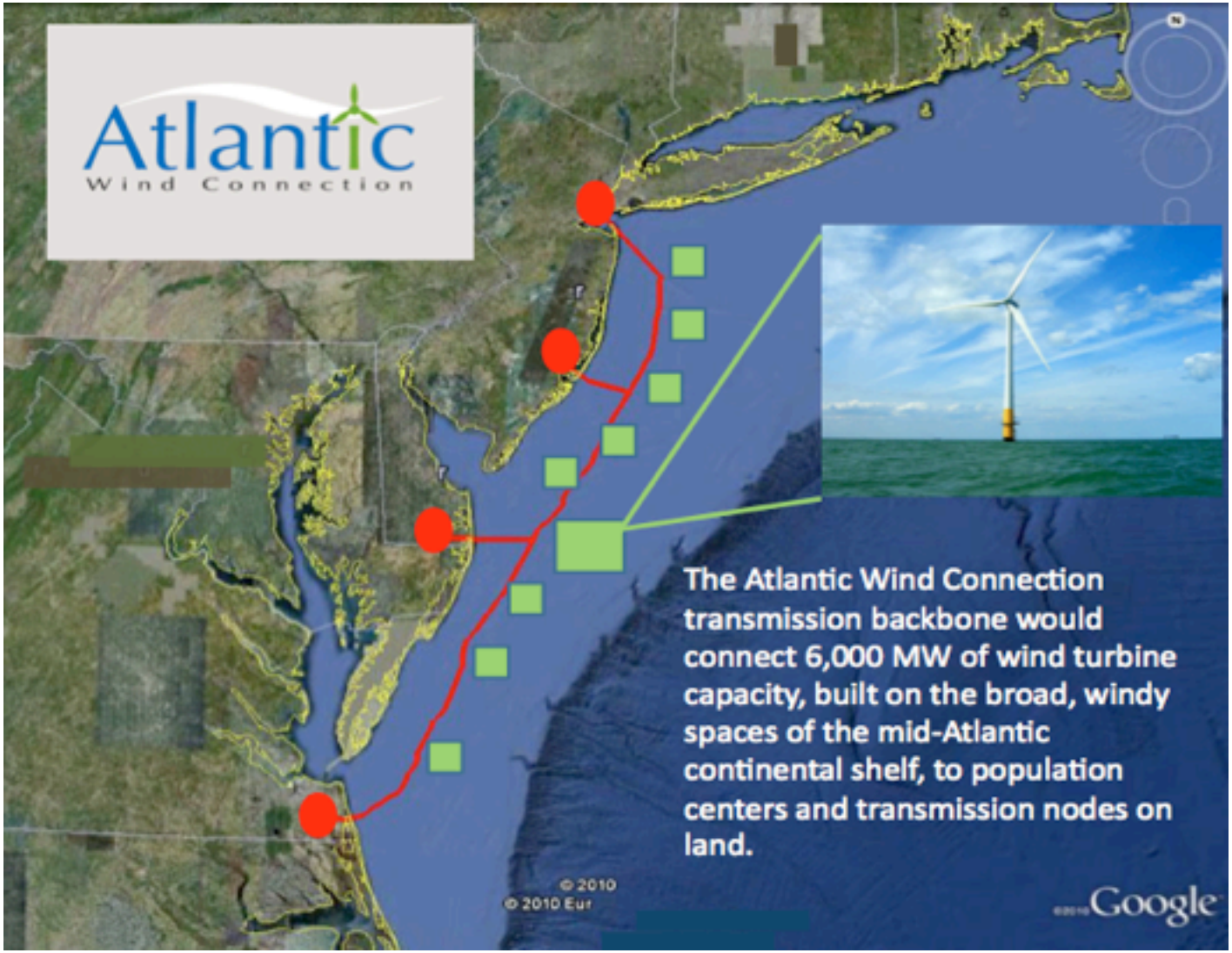
World's largest solar project planned for Saharan Desert

Solar concentration designs for the Sahara

Solar tower with circles of concentrators and desalination basins

One of the world's largest wind farms off the Danish Coast.


Installed wind capacity, annual generation and capacity factors, Denmark
1977-2009
MW
TWh/y
4000
3500
3000
2500
2000
1500
1000
500
0
8
7
6
5
4
3
2
1
0
Capacity(MW)
Generation(TWh/y)
Share of total generation (%)
12%
14%
16%
19%
17%
20%
19%
1980
1985
1990
1995
2000
2005



Sea-based transmission backbone (green) and land-based transmission nodes (red), 6000MW capacity and ~350 miles long between Newark, NJ and Norfolk, VA