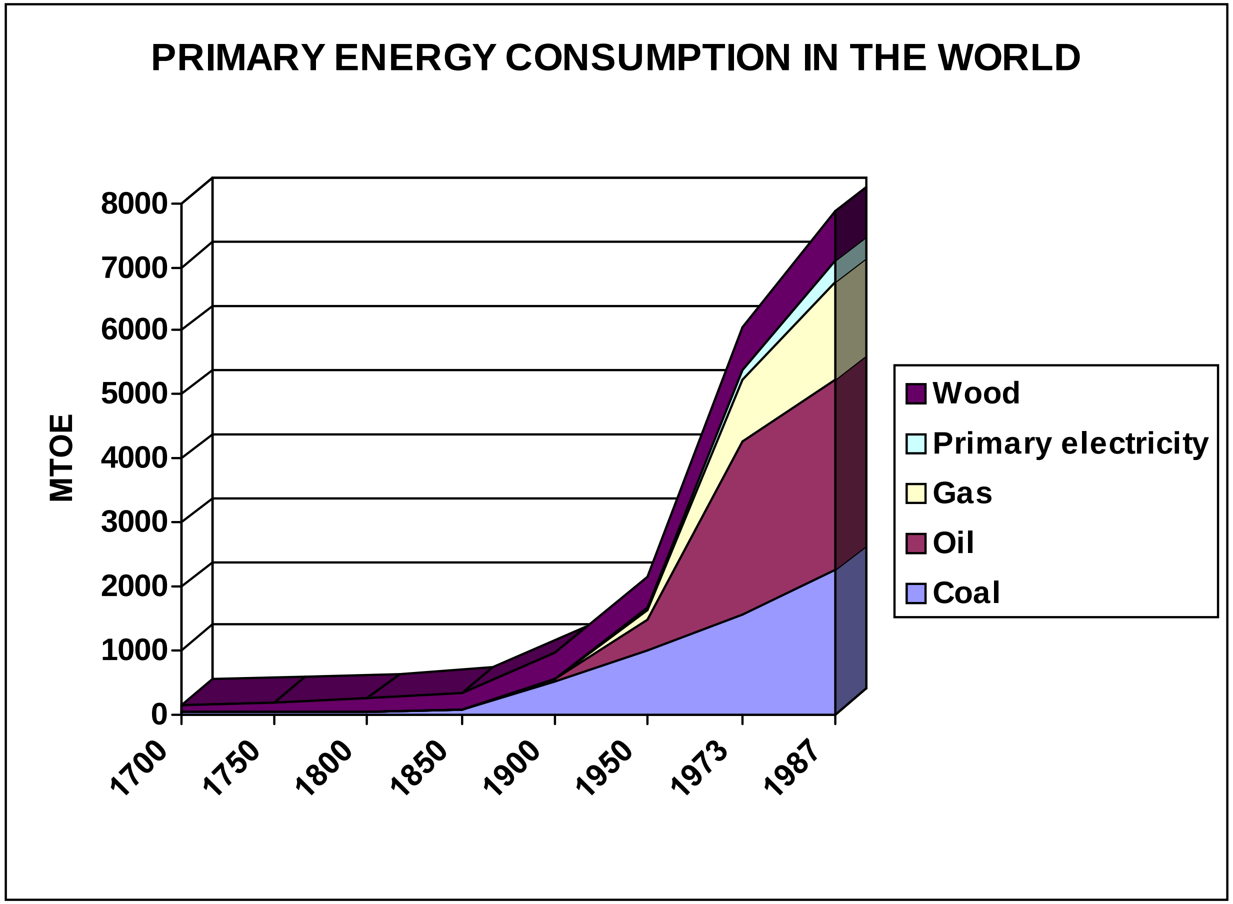
CRISI ECONOMICA

FABBISOGNO ENERGETICO

CRISI AMBIENTALE

SCENARI ENERGETICI

Da dove? Verso dove? Come?

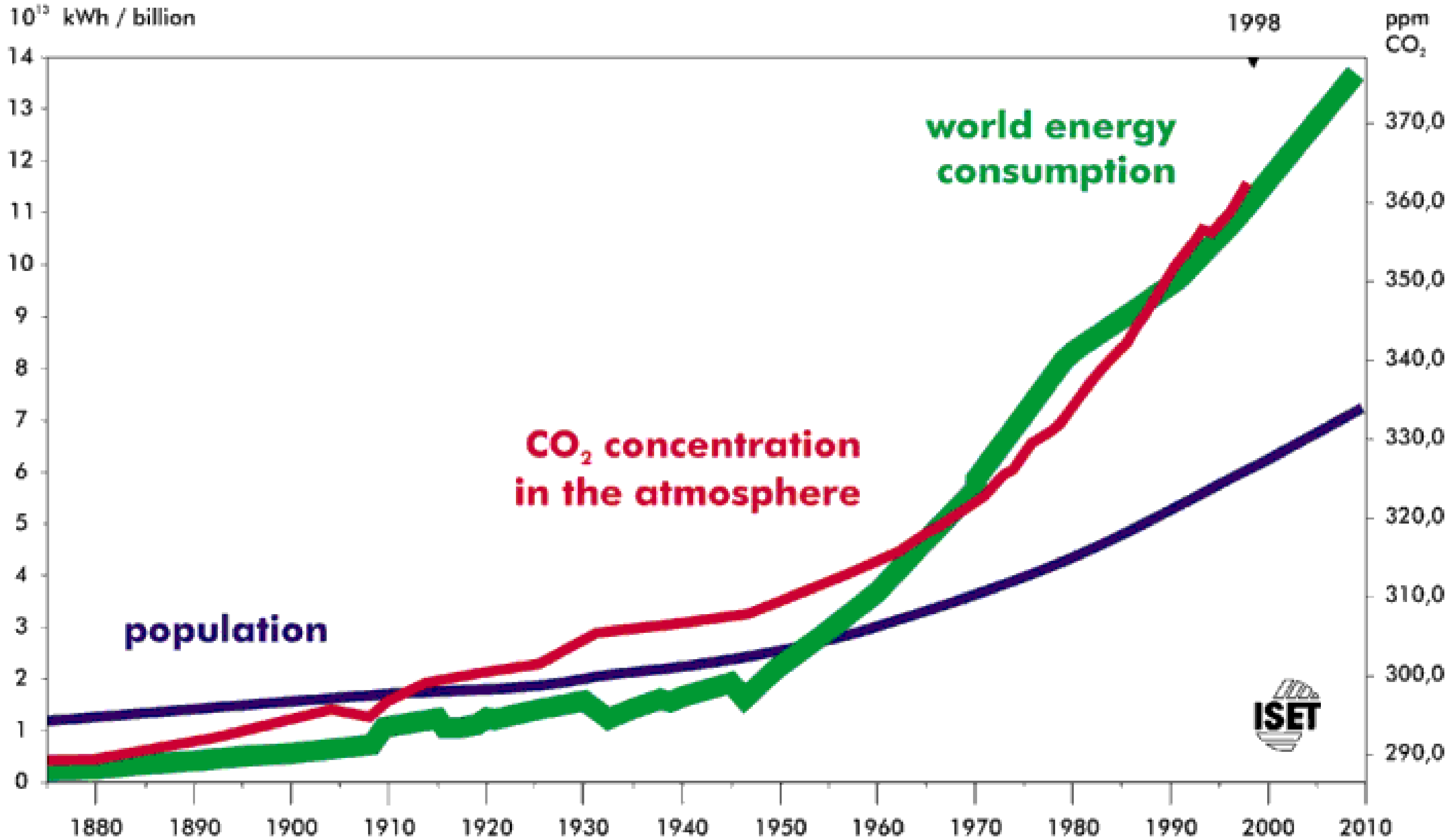


1700 : 150 MToe

2008 : 11 300 MToe

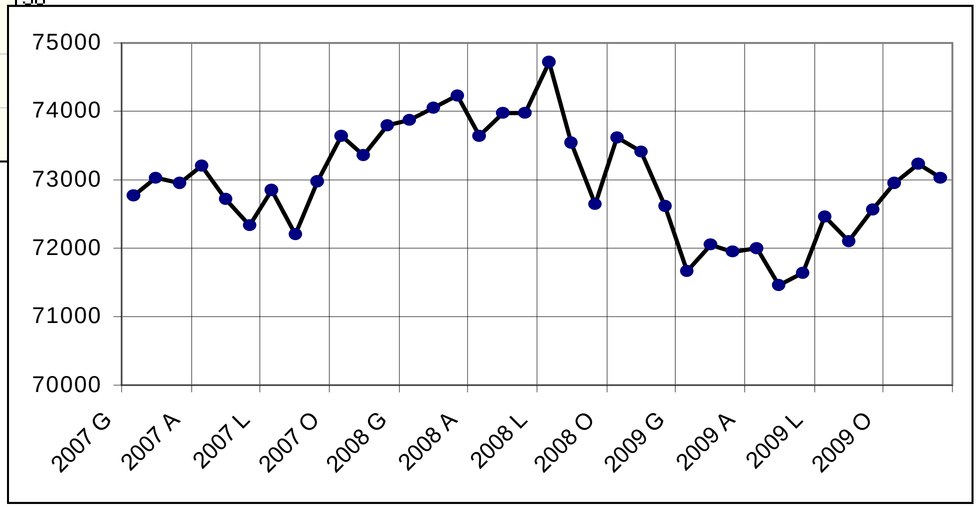
2030 : 17 700 MToe

Growth rates for population, energy consumption and CO_2 concentration in the atmosphere



Storico S&P 500

BRENT PRICE AND PRODUCTION

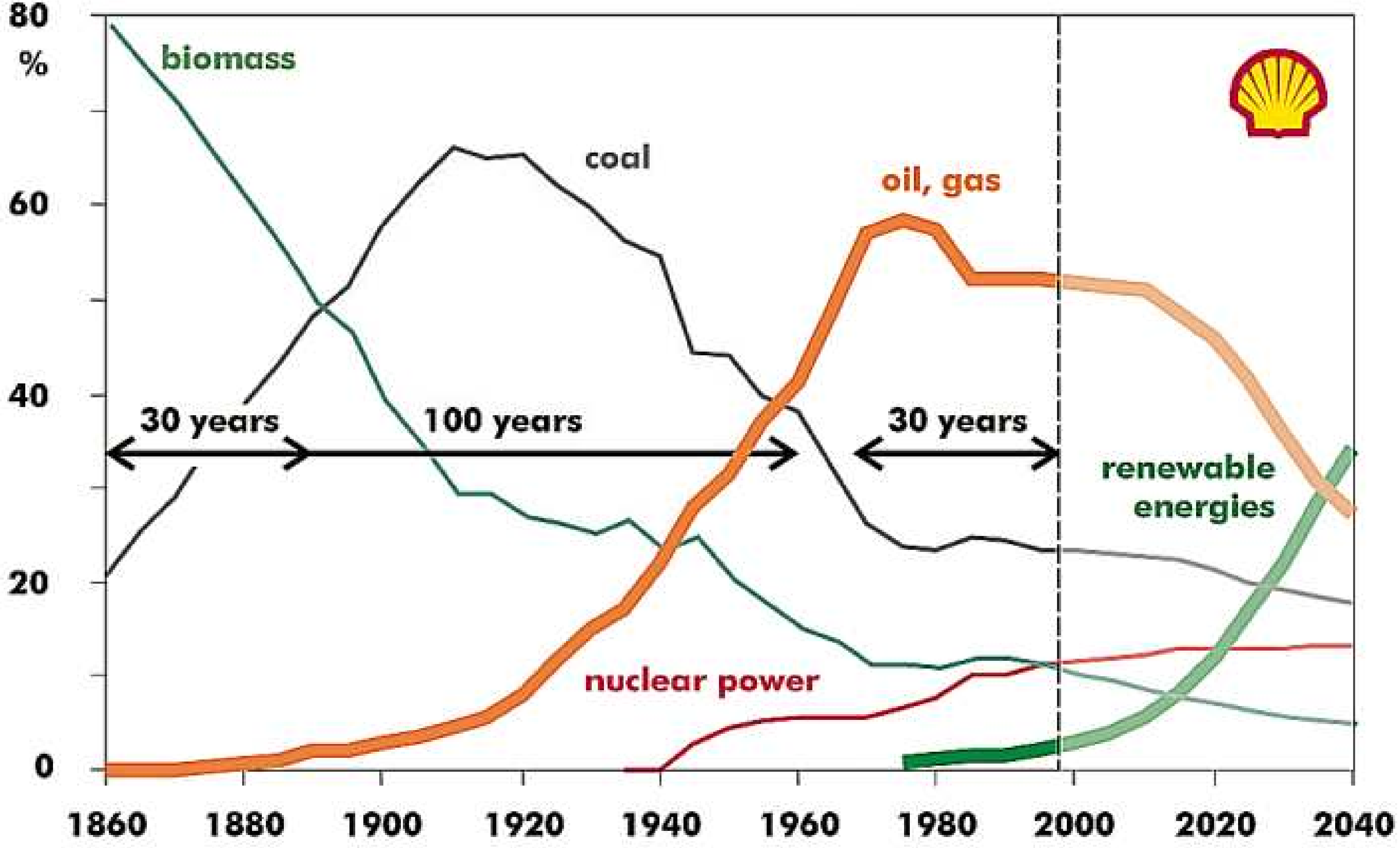


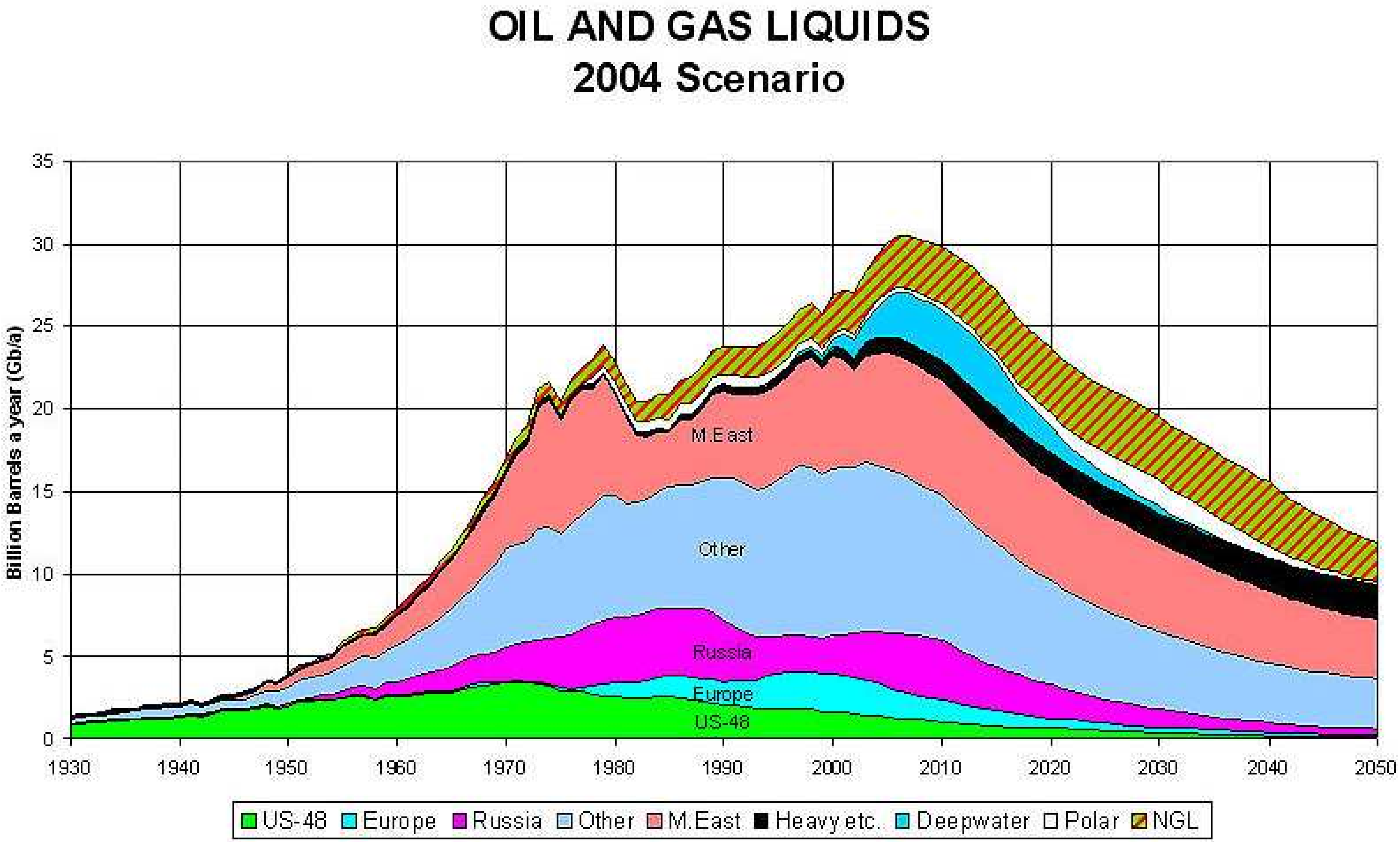
WORLD OIL PRODUCTION

(source DOE US)

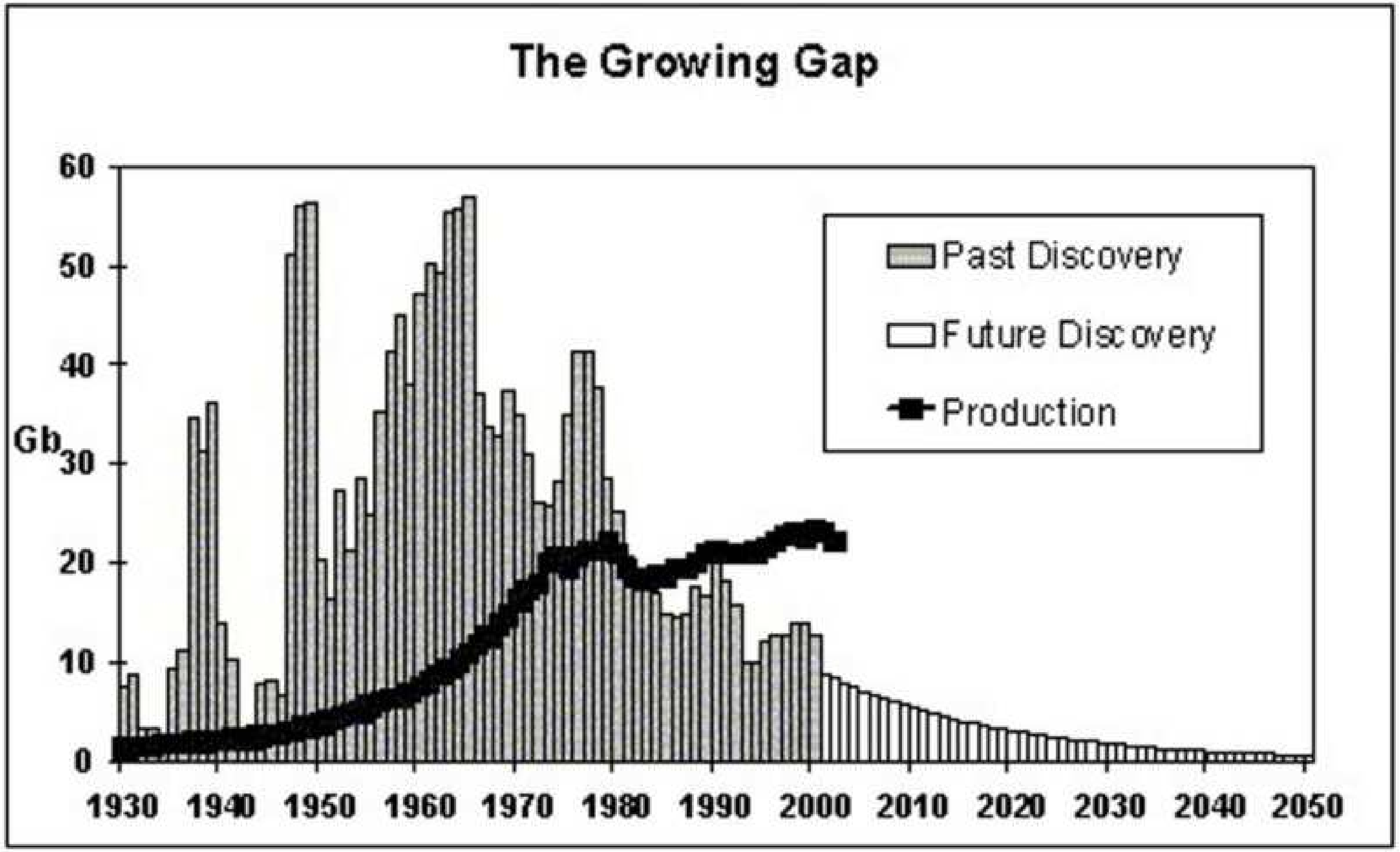
S&P 500 (2004-2009)

Lifecycles of energy sources

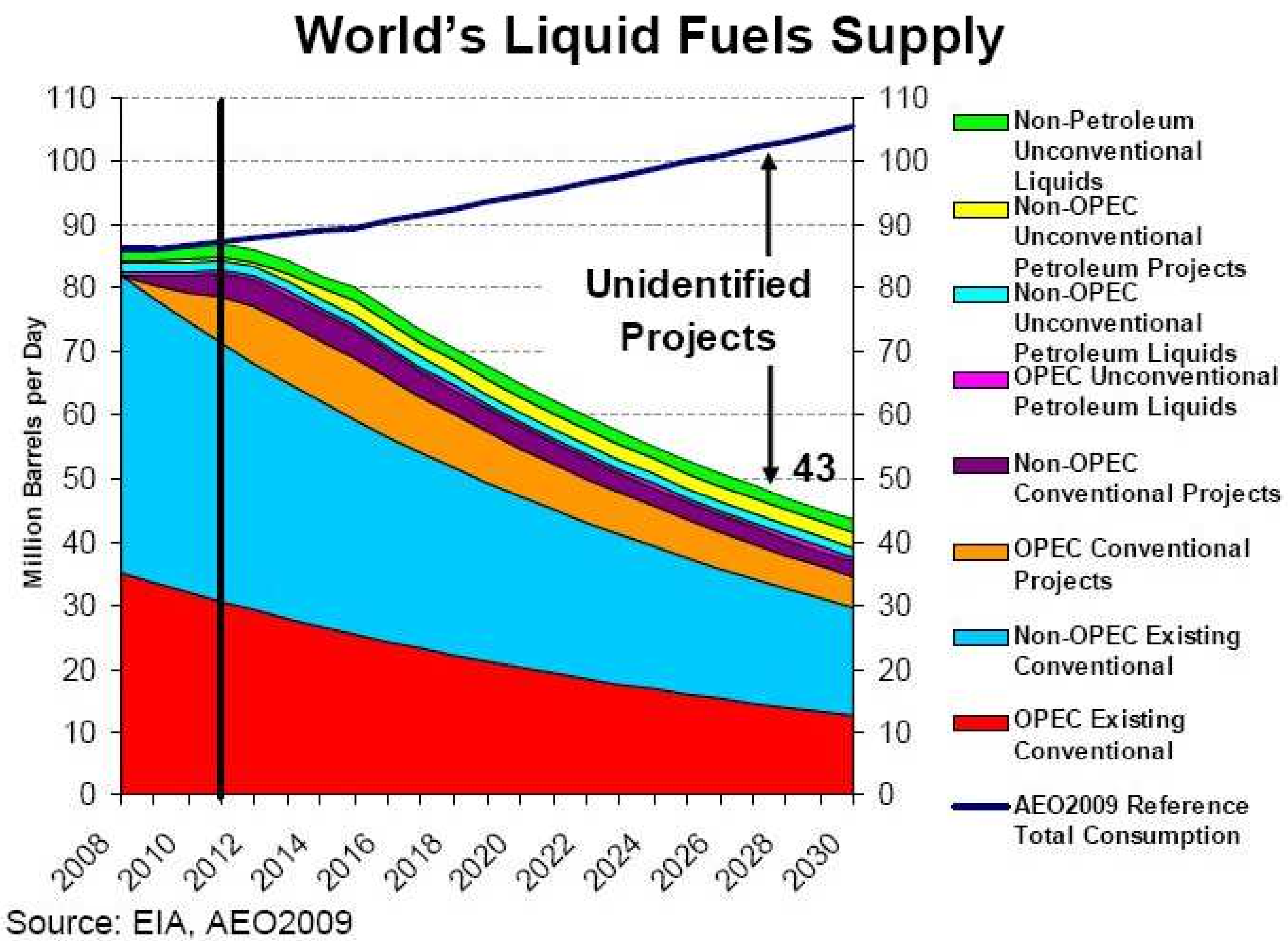




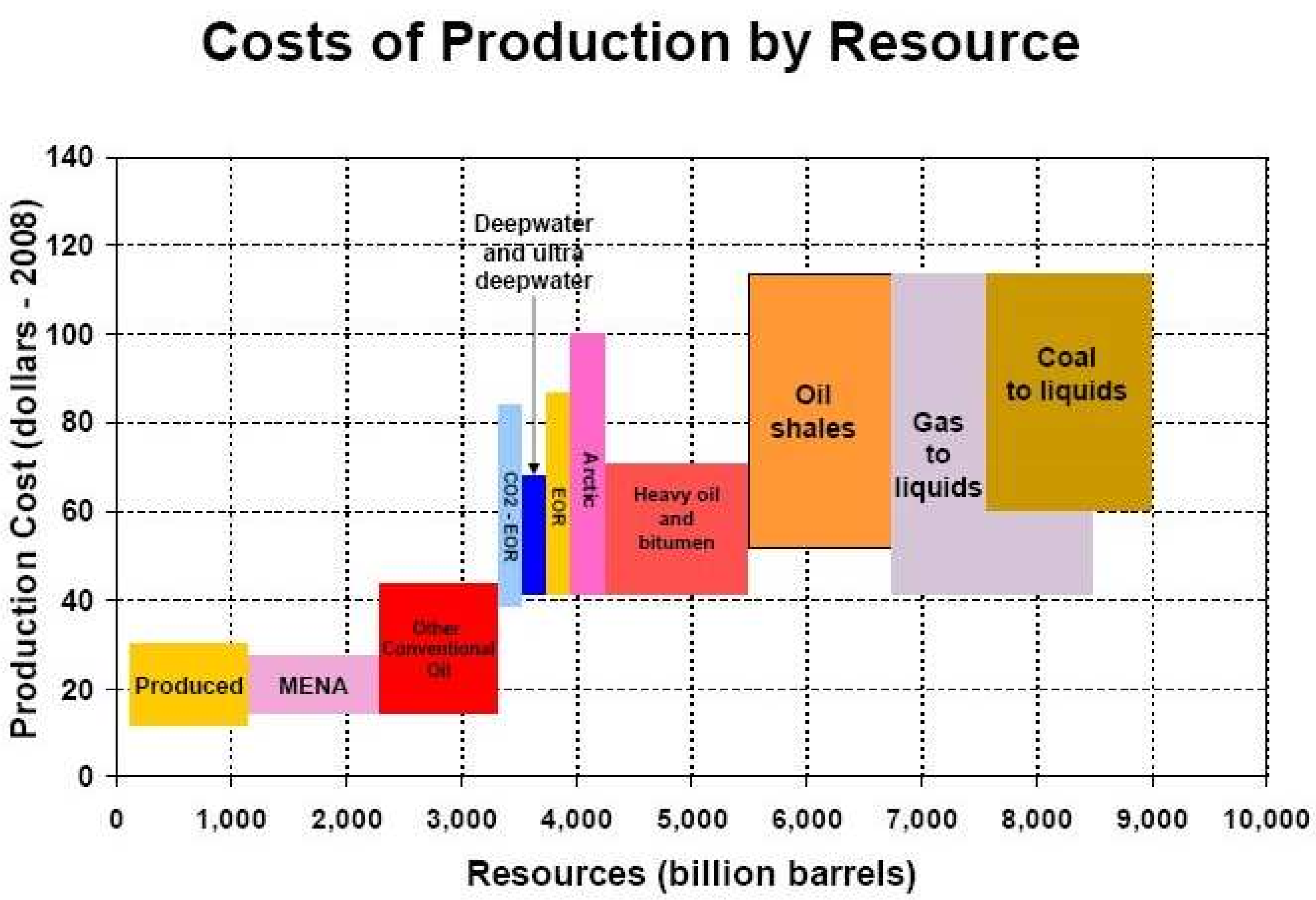
www.peakoil.net



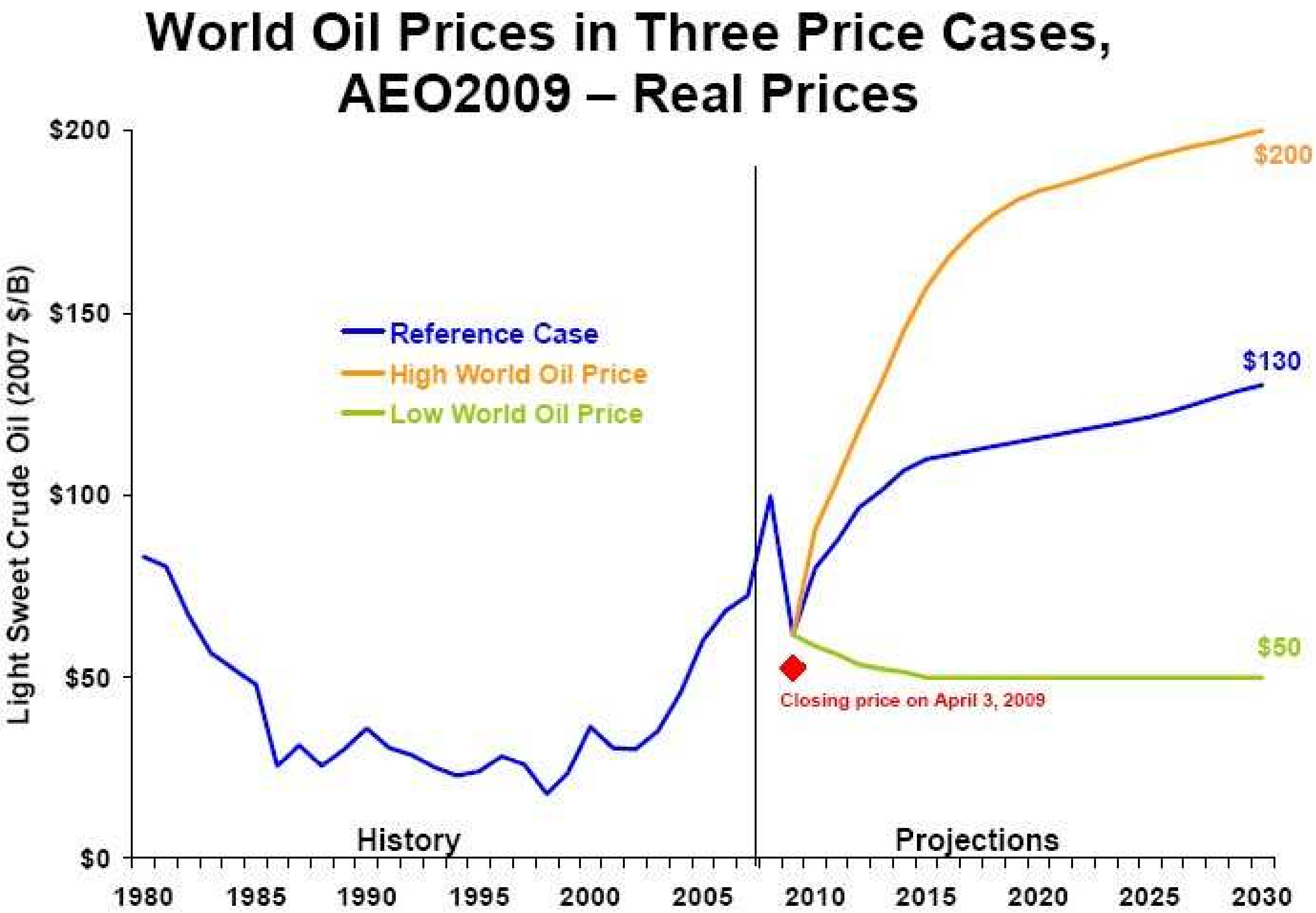
www.peakoil.net


World's Liquid Fuels Supply
Million Barrels per Day
110
100
90
80
70
60
50
40
30
20
10
0
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Unidentified Projects
43
Non-Petroleum Unconventional Liquids
Non-OPEC Unconventional Petroleum Projects
Non-OPEC Unconventional Petroleum Liquids
OPEC Unconventional Petroleum Liquids
Non-OPEC Conventional Projects
OPEC Conventional Projects
Non-OPEC Existing Conventional
OPEC Existing Conventional
AEO2009 Reference Total Consumption
Source: EIA, AEO2009

US DOE

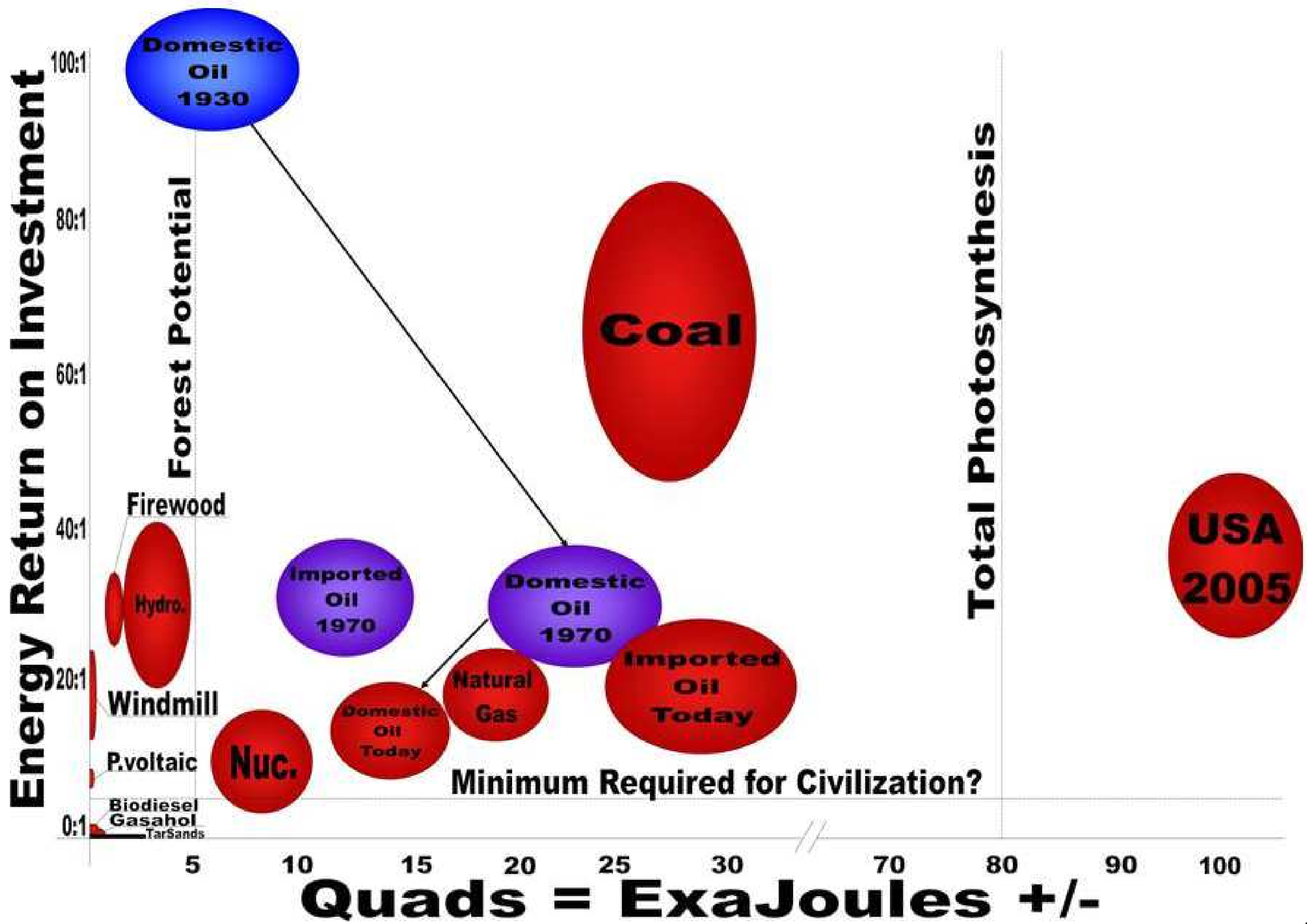

Costs of Production by Resource
Production Cost (dollars - 2008)
Resources (billion barrels)
0
20
40
60
80
100
120
140
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
Produced
MENA
Other Conventional Oil
CO2 - EOR
Deepwater and ultra deepwater
EOR
Arctic
Heavy oil and bitumen
Oil shales
Gas to liquids
Coal to liquids

US DOE


World Oil Prices in Three Price Cases,
AEO2009 – Real Prices
Light Sweet Crude Oil (2007 $/B)
$200
$150
$100
$50
$0
Reference Case
High World Oil Price
Low World Oil Price
$200
$130
$50
Closing price on April 3, 2009
History
Projections
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030

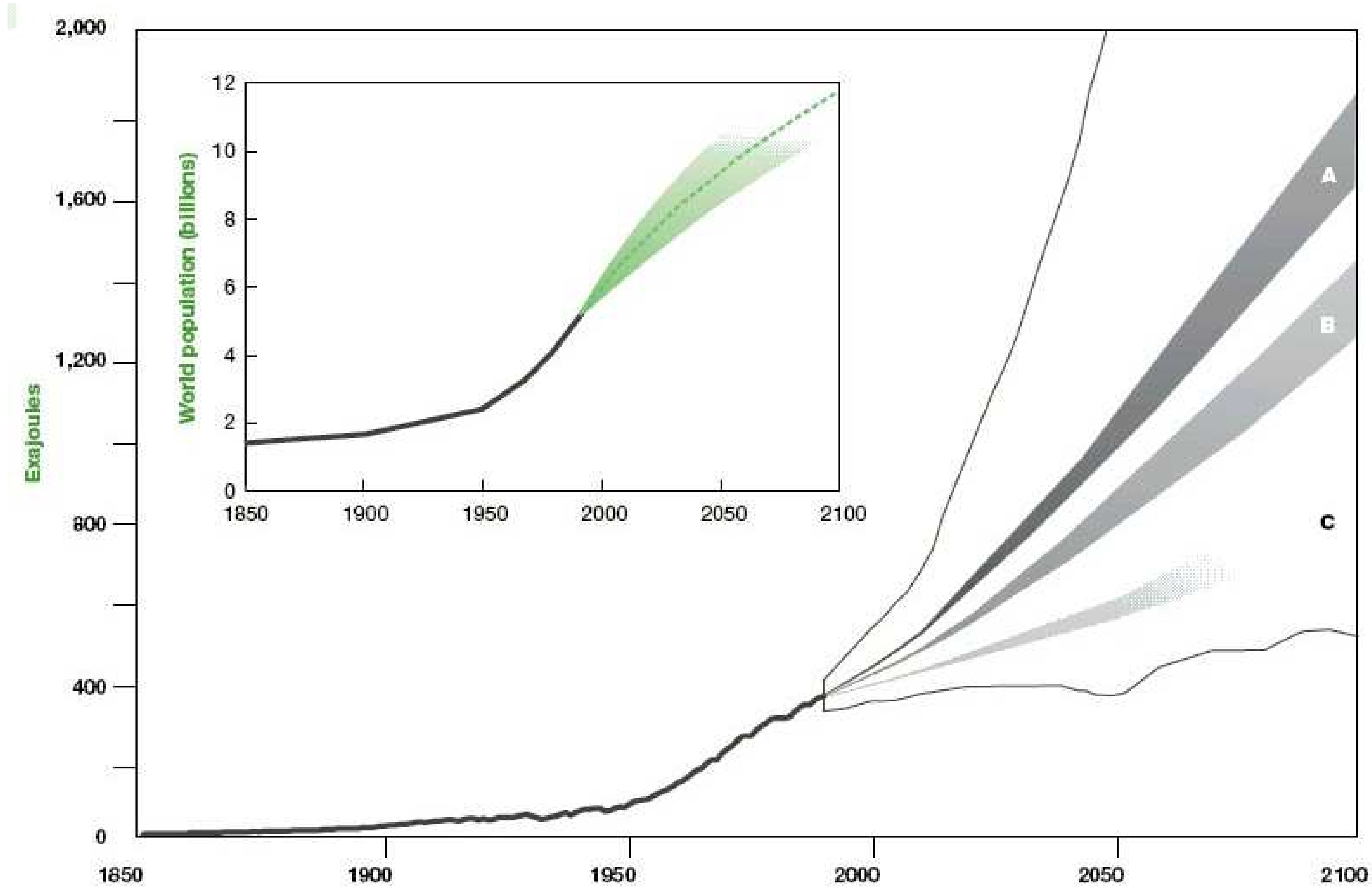
US DOE

EROEI



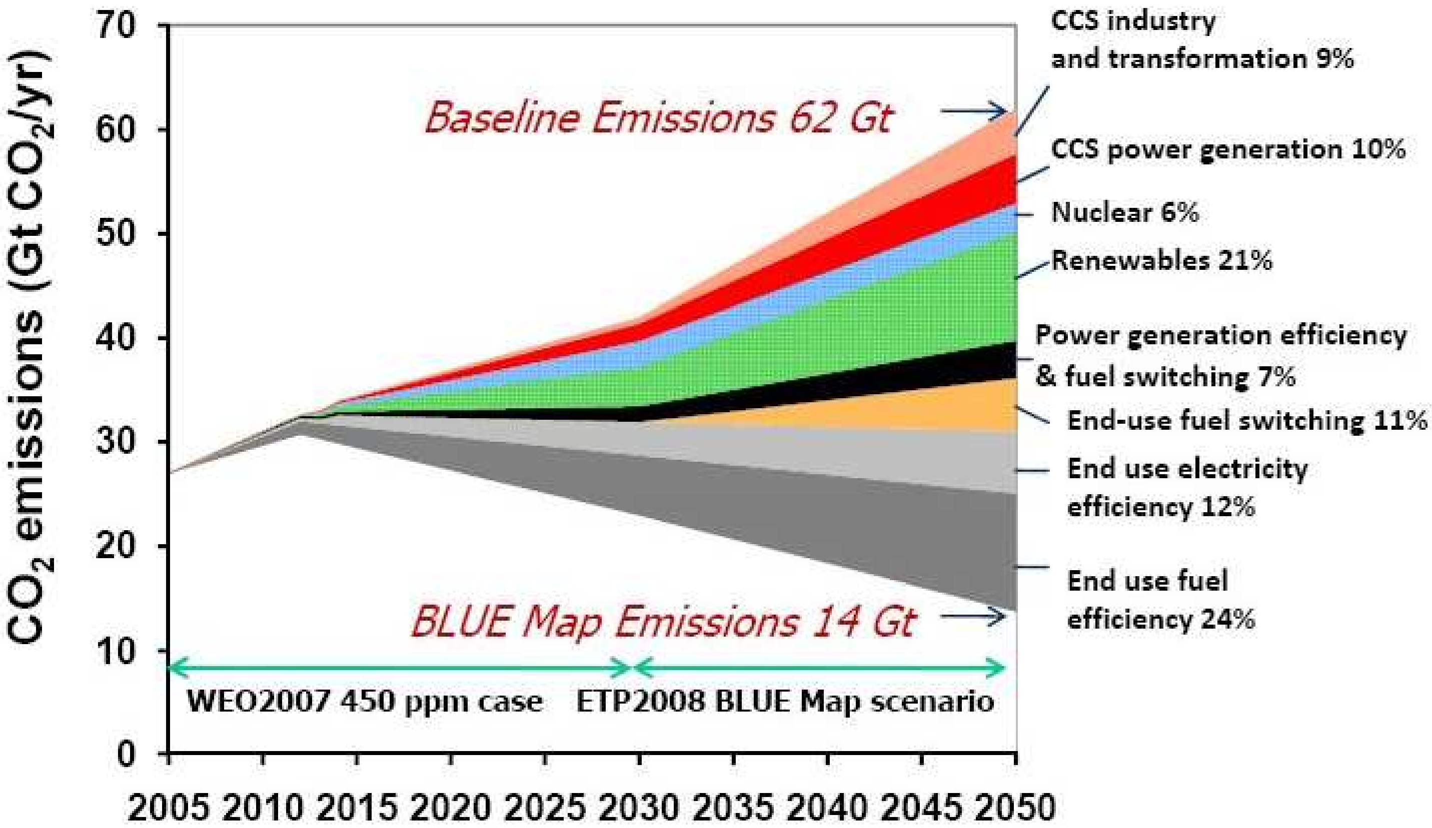
www.theoildrum.com

Energy demand scenarios



Nakicenovic, IAASA/UNDP

CO2 cut pathways



IEA 2008

$$I = P \times A \times T$$

$$(I = P \times E)$$

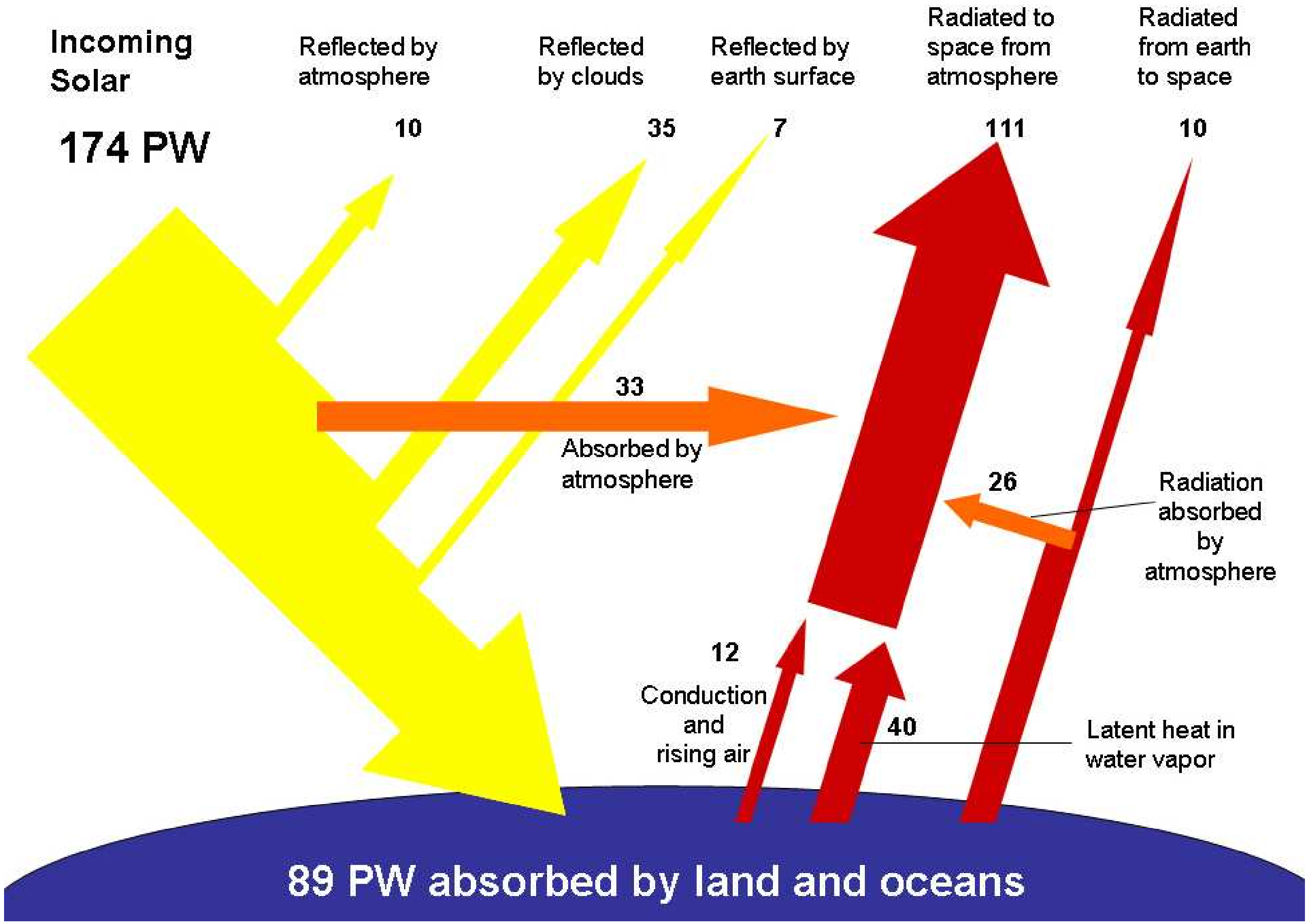
I = IMPATTO

P = POPOLAZIONE

A = BENESSERE (PIL)

T = TECNOLOGIA

Commoner, Ehlrich, Holdren 1973



F van Mierlo, 2007

POTENZE TIPICHE

Potenza solare: 174 000 TW

Potenza solare al suolo: 89 000 TW

Potenza ciclo acqua: 35 000 TW

Potenza biosfera: 500 TW

Potenza venti: 870 TW

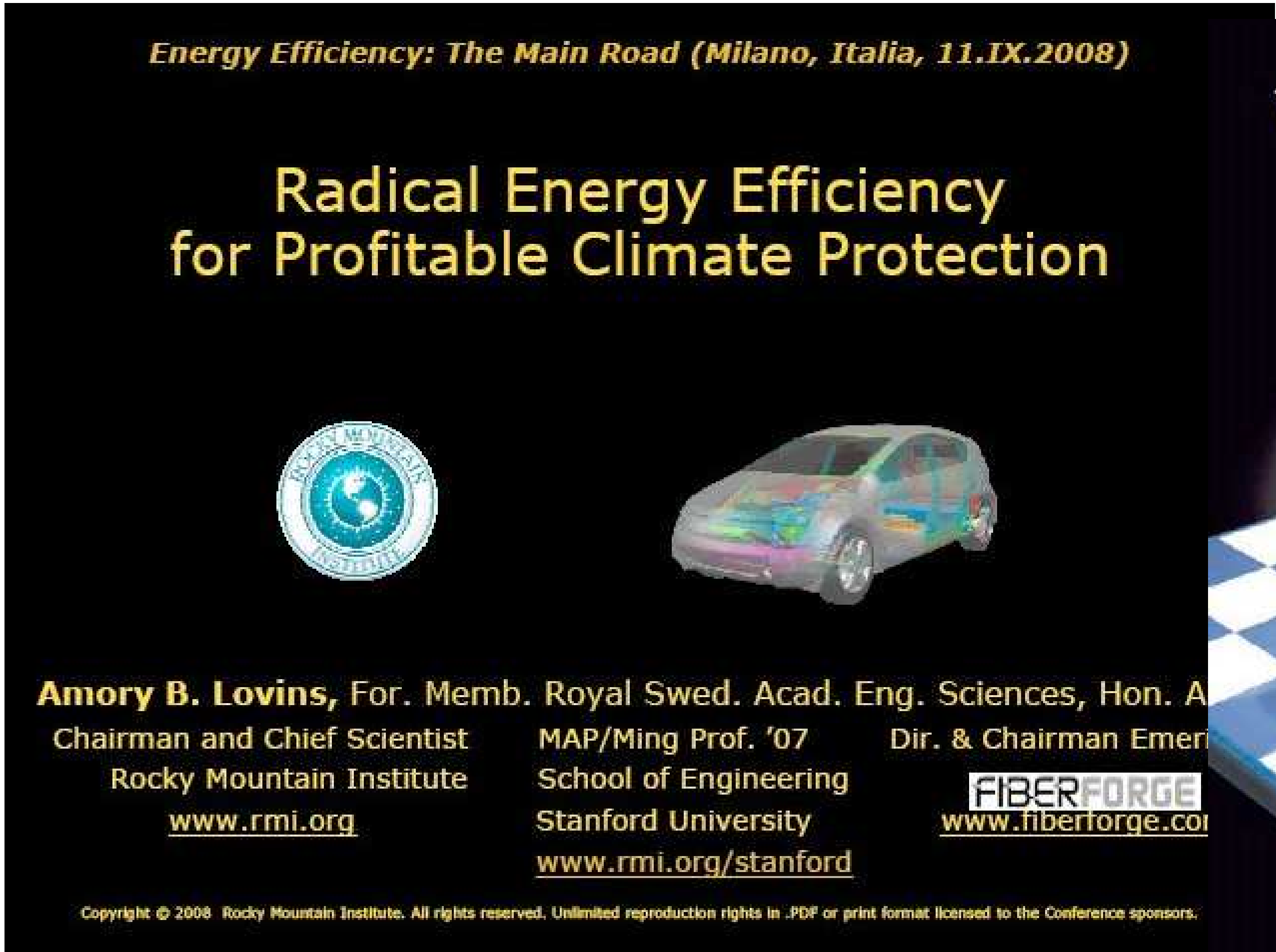
Consumi globali: 15 TW

Consumi pro-capite: 2 kW

(US: 12 kW - EU: 7 kW - ROW: ~ < 0.1 kW)

Limiti: ??? - Potenzialità ??? - Modi???

L Sertorio, 2008


Energy Efficiency: The Main Road (Milano, Italia, 11.IX.2008)
Radical Energy Efficiency
for Profitable Climate Protection
Amory B. Lovins, For. Memb. Royal Swed. Acad. Eng. Sciences, Hon. A
Chairman and Chief Scientist
Rocky Mountain Institute
www.rmi.org
MAP/Ming Prof. '07
School of Engineering
Stanford University
www.rmi.org/stanford
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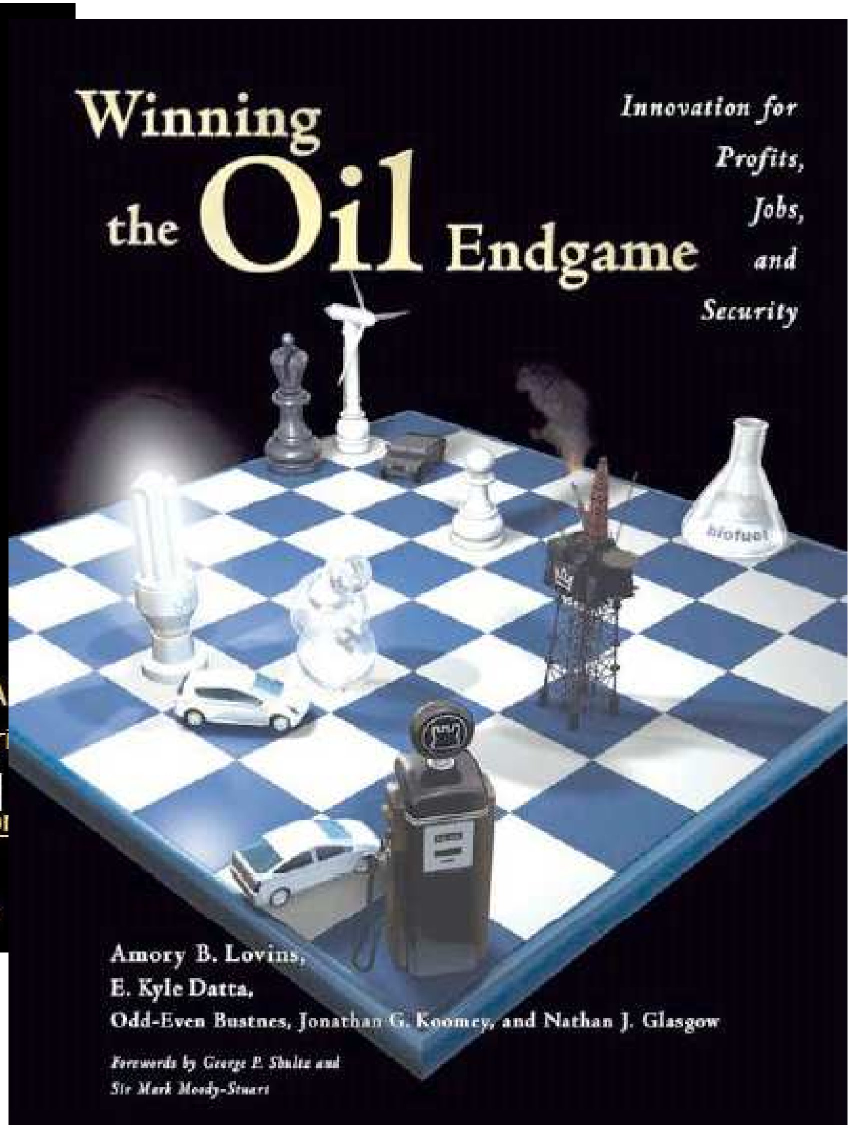
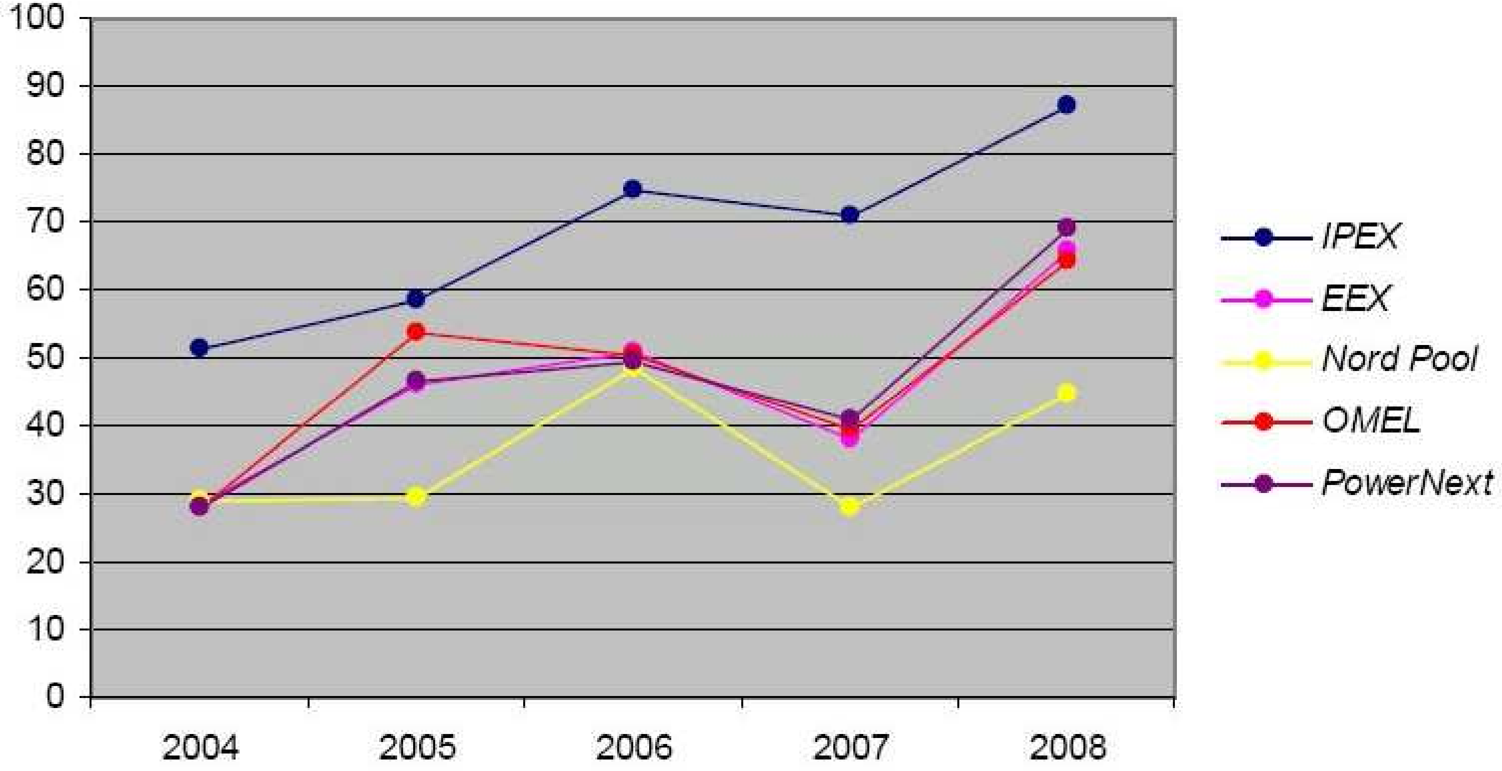

Winning the Oil Endgame
Innovation for Profits, Jobs, and Security
biofuel
Amory B. Lovins,
E. Kyle Datta,
Odd-Even Bustnes, Jonathan G. Koomey, and Nathan J. Glasgow
Forewords by George P. Shultz and
Sir Mark Moody-Stuart

MERCATI EUROPEI DELL'ELETTRICITA'



Lucarella (ERSE, GME) 2010

Consumi primari: 29% INDU - 34% TRASP - 37% TERT/DOM (186 MTOE)

Consumi finali: Oil 44% - Gas 31% - **Elec 22%**

INDU (38 MTOE): gas 39% - elec 33% - oil 16% - coal 11%

TRASP (44 MTOE): gasoil 55% - gasoline 30% - kerosene 9% - elec 1.8%

TERT (48 MTOE): gas 51% - elec 27% - gasoil 13% - RES 4.3%

Electricity generation: 360 GWh

Future: 4 * EPR 39 GWh (11% at 70% load factor) - 2.4% usi finali!!

50 GWh (14% at 90% load factor) - 3.1% usi finali!!

Potenziale di economia: (64% * 37%) 24% fossile per riscaldamento

EUROSTAT 2006