EnergyRes 2008

Climate change and the need for a real

Energy Revolution

Nikos Charalambides



IEA 2004 reference senario

ENERGY REVOLUTION

Commissioned by EREC – Greenpeace from the Department of Systems Analysis and Technology Assessment at the German Aerospace Centre

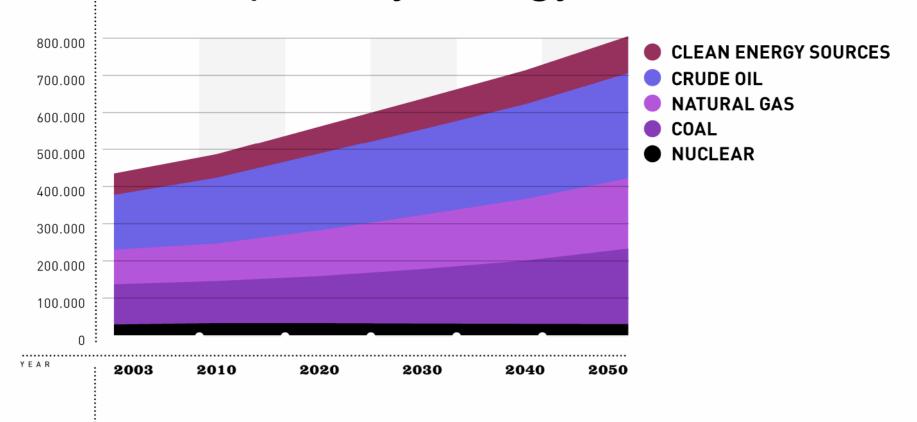


ENERGY REVOLUTION

Energy supply scenarios adopted in the ER report calculated using MESAP/PlaNet simulation model further developed by the Ecofys consultancy

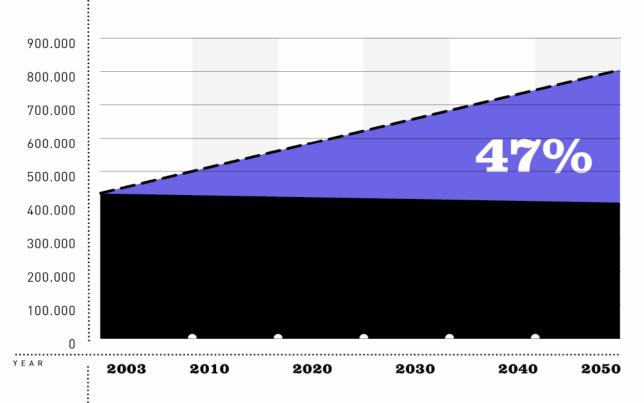


Reference scenario world primary energy demand





Final energy demand



TOTAL SAVINGS



primary energy demand energy revolution

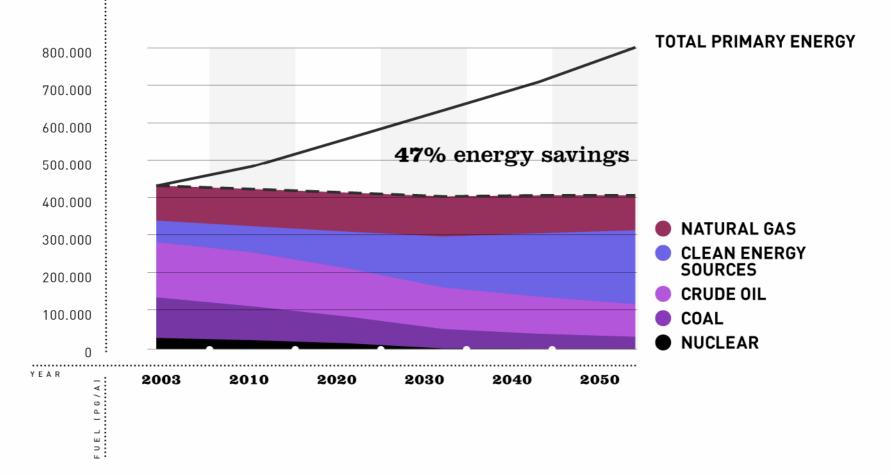




figure 30: energy resources of the world

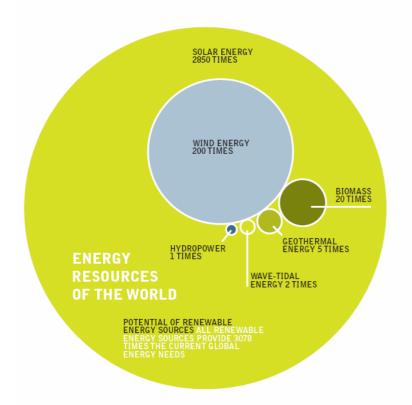


table 12: technically accessible today

THE AMOUNT OF ENERGY THAT CAN BE ACCESSED WITH CURRENT TECHNOLOGIES SUPPLIES A TOTAL OF 5.9 TIMES THE GLOBAL DEMAND FOR ENERGY.

Sun	3.8 times
Geothermal heat	1 time
Wind	0.5 times
Biomass	0.4 times
Hydrodynamic power	0.15 times
Ocean power	0.05 times

source DR. JOACHIM NITSCH



figure 1: development of primary energy consumption under the energy [r]evolution scenario ('EFFICIENCY' = REDUCTION COMPARED TO THE REFERENCE SCENARIO) 800,000 -700,000 -'EFFICIENCY' NATURAL GAS 600,000 -SOLAR THERMAL/GEOTHERMAL/OCEAN CRUDE 01L 500,000 -COAL BIOMASS 400,000 -300,000 -HYDRO, WIND, PV LIGNITE 200,000 — NUCLEAR 100,000 -PJ/a 0 — 2003 2010 2020 2030 2040 2050



figure 22: OECD europe: growth of final renewable electricity supply under the energy [r]evolution scenario, by source

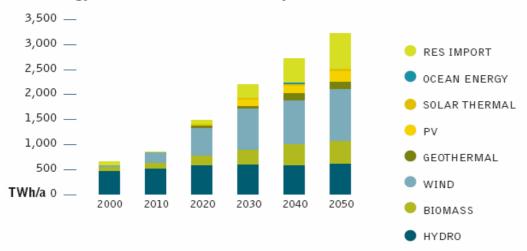


table 7: OECD europe: projection of final renewable electricity generation capacity under the energy [r]evolution scenario

Total	164,000	263,000	482,000	677,000	865,000
Ocean energy	0	1,000	3,000	5,000	7,000
Solarthermal	0	0	2,000	7,000	9,000
PV	1,000	11,000	51,000	113,000	205,000
Geothermal	1,000	1,000	3,000	7,000	25,000
WInd	21,000	84,000	230,000	339,000	386,000
Blomass	18,000	30,000	47,000	57,000	89,000
Hydro	123,000	135,000	146,000	149,000	144,000
IN MW	2003	2010	2020	2030	2050







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ydropower	123 GW	135 GW	146 GW	149 GW	147 GW	144 GW
YX	DP DP	12-12-2 12-12-2 12-12-2 12-12-2	מימימימימים מימימימים מימימימים	מימימיקיקימים מימימיקיקימים מימיקיקיקיקימים מימיקיקיקיקיקיקיקיקי	קיקיקיקיקיקיקיקיקיקיקיקיקיקיקיקיקיקיקי	
ind	21 GW	84 GW	230 GW	339 GW	350 GW	386 GW
		S	55 55 55 55		55555 5555 5555 5555	55555 55555 55555 55555
notovoltaics	1 GW	11 GW	51 GW	113 GW	165 GW	205 GW
		BER			202 202 203 203	222 22 22 22
ioenergy	18 GW	30 GW	47 GW	57 GW	72 GW	89 GW
				2		2
eothermal	1 GW	1 GW	3 GW	7 GW	17 GW	25 GW
*				59	5	59
olarthermal ower Plants	o GW	o gw	z gw	7 GW	8 GW	9 GW
				ret .	res.	ru.
cean Energy	o GW	1 GW	3 GW	5 GW	6 GW	7 GW
ار						
ticiency	O TWh	319 TWh	569 TWh	761 TWh	911 TWD	DESERVED DE

GREENPEACE www.greenpeace.gr

Nukes is the answer (or a part of it)?



Figure: Past and projected uranium production. Forecasts are based on reasonably assured resources below 40 \$/kgU (red area), below 130 \$/kgU (orange area) and additionally including inferred resources. The black line shows the fuel demand of reactors currently operating together with the latest scenarios in the World Energy Outlook (WEO 2006) of the International Energy Agency.

