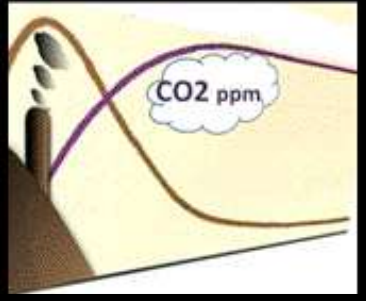


The Post Peak Oil 2010 World Energy Outlook

International Energy Agency

IEA

World Energy Outlook 2010

2010 The Outlook for Energy:

A View to 2030

ExxonMobil

Taking on the world's toughest energy challenges.

bp

BP Energy Outlook 2030

London, January 2011

The International Energy Agency (IEA) is an autonomous organisation which works to ensure reliable, affordable and clean energy for its 28 member countries and beyond.

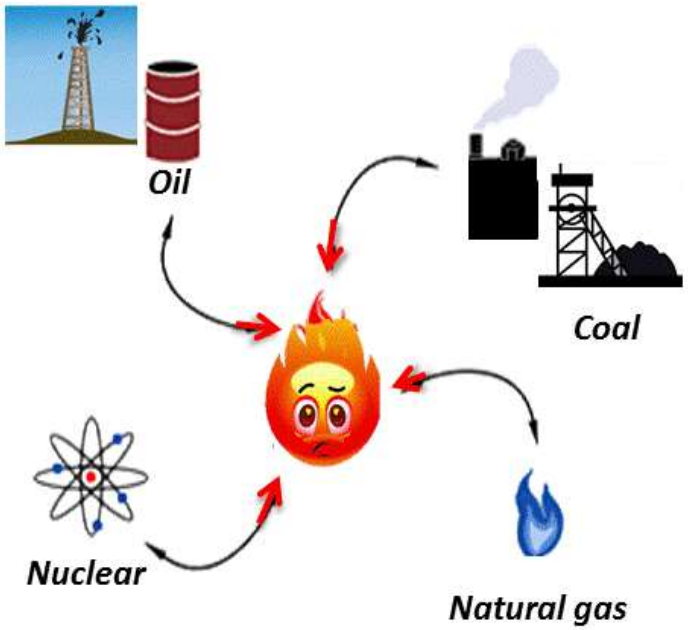
Founded in response to the 1973/4 oil crisis, the IEA's initial role was to help countries co-ordinate a collective response to major disruptions in oil supply through the release of emergency oil stocks to the markets.

While this continues to be a key aspect of its work, the IEA has evolved and expanded. It is at the heart of global dialogue on energy, providing authoritative and unbiased research, statistics, analysis and recommendations.

IEA website

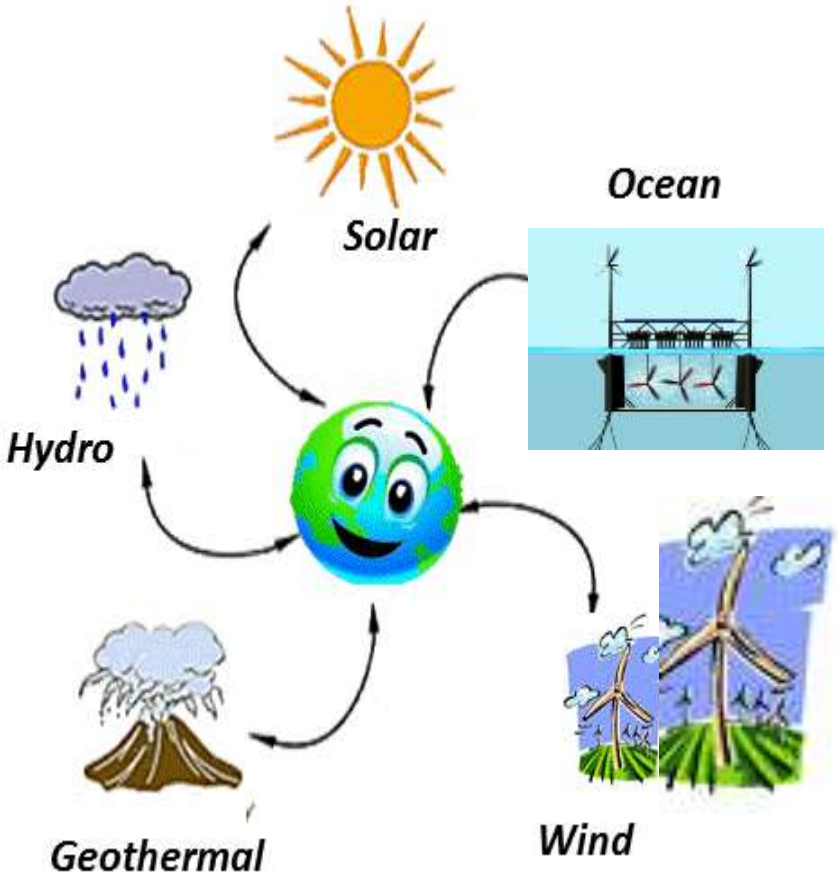
NO FUTURE
DEAD PLANET

**Dangerous, polluting,
rising cost, unhealthy,
global warming, ocean acidifying,
war making,
depleting energy.**

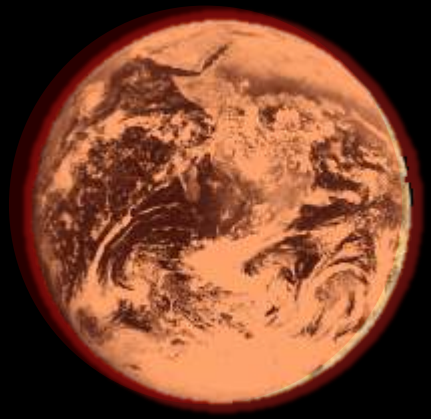


OUR ONLY FUTURE
FOR LIFE

**Safe, affordable, clean,
zero carbon, peaceable,
everlasting energy.**



What if the World Energy Outlook looked like this …



If we burn all the coal, we might kick in a runaway greenhouse effect, and if we burn all the tar shale and tar sands we definitely will.

James Hansen

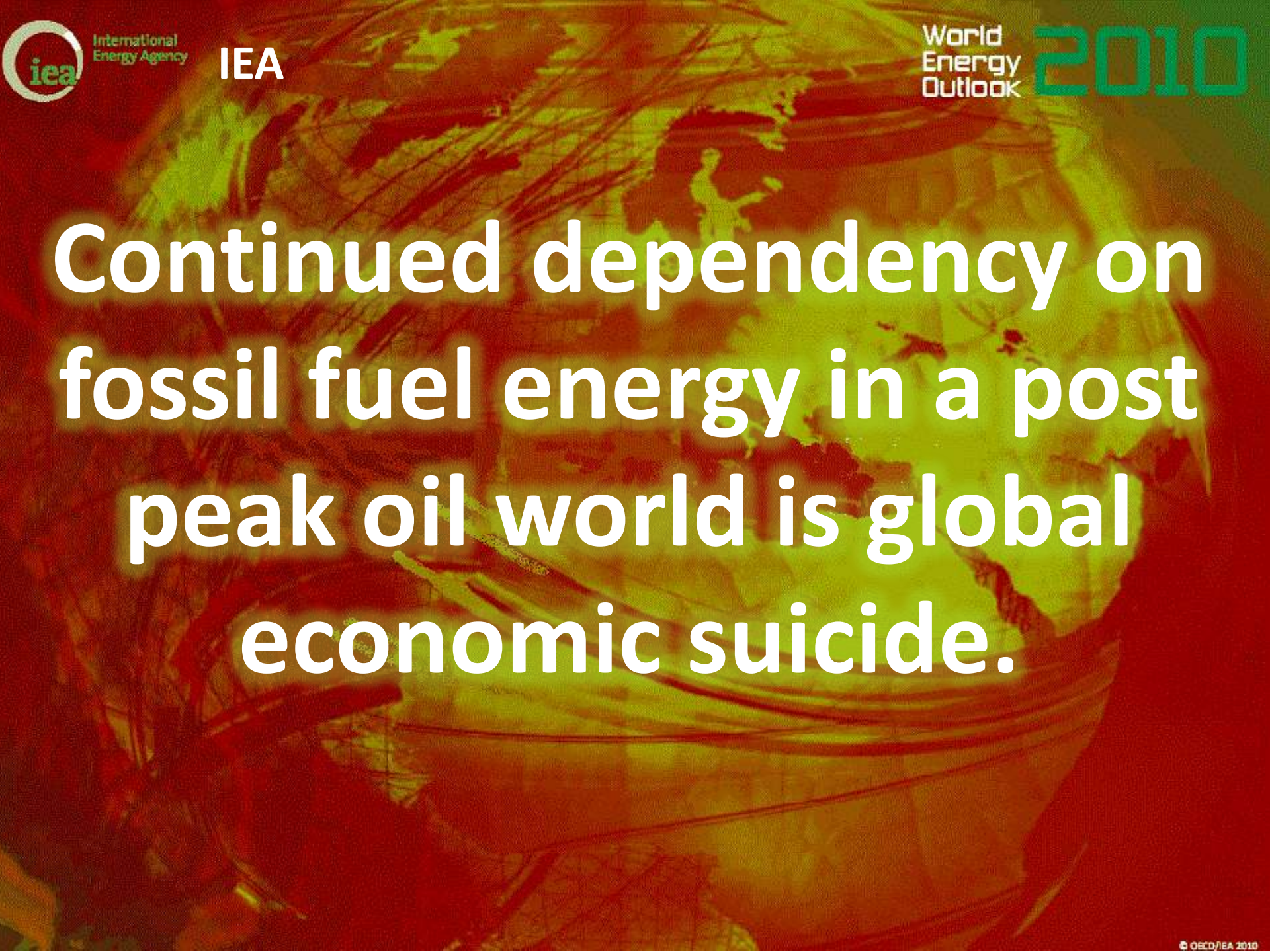
IEA

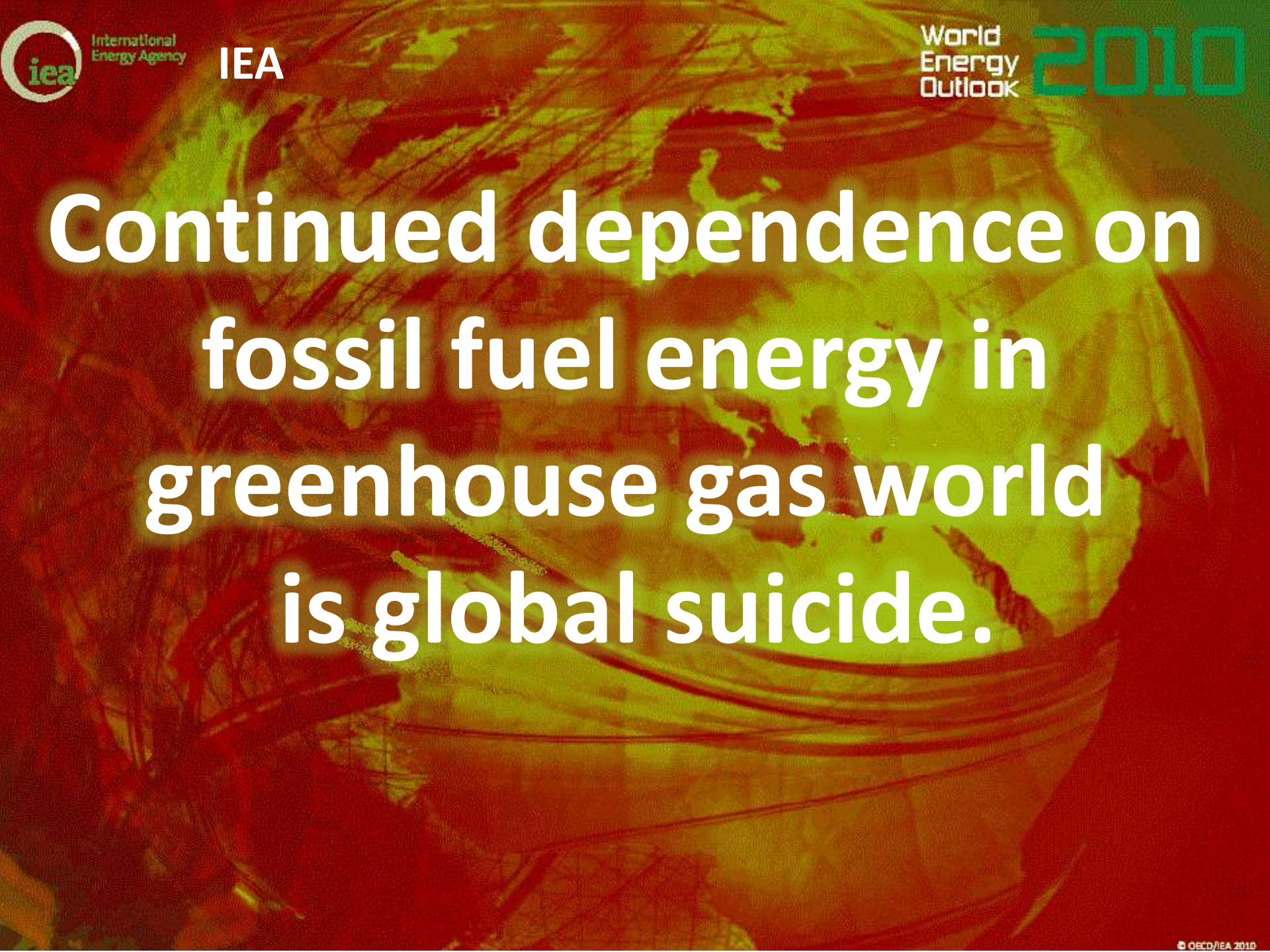
World Energy Outlook 2010

The 2010-11 World Energy Outlook:

post peak oil

and headed for the end of the world.


International Energy Agency
IEA
World Energy Outlook 2010
Continued dependency on fossil fuel energy in a post peak oil world is global economic suicide.
© OECD/IEA 2010


International Energy Agency
IEA
World Energy Outlook 2010
Continued dependence on fossil fuel energy in greenhouse gas world is global suicide.
© OECD/IEA 2010

International Energy Agency

World Energy Outlook 2010

The Energy Outlook is to burn the last of all possible fossil fuels and burn up our planet.

If we burn all the coal, we might kick in a runaway greenhouse effect, and if we burn all the tar shale and tar sands we definitely will.

James Hansen

What if there was a world energy outlook of safe, affordable, non-polluting, zero-carbon, limit-less, ever-lasting energy ?


Safe
clean,
affordable
perpetual
energy,
anyone?

The World Energy Outlook has the world headed for an uninhabitable 6°C planet by 2100

From The Times November 11, 2009

Nobuo Tanaka, executive director of the IEA, said that a deal at Copenhagen was vital.

In the absence of a deal, the IEA said that global emissions of carbon dioxide from the burning of fossil fuels including oil, gas and coal were set to rise by almost 40 per cent by 2030.

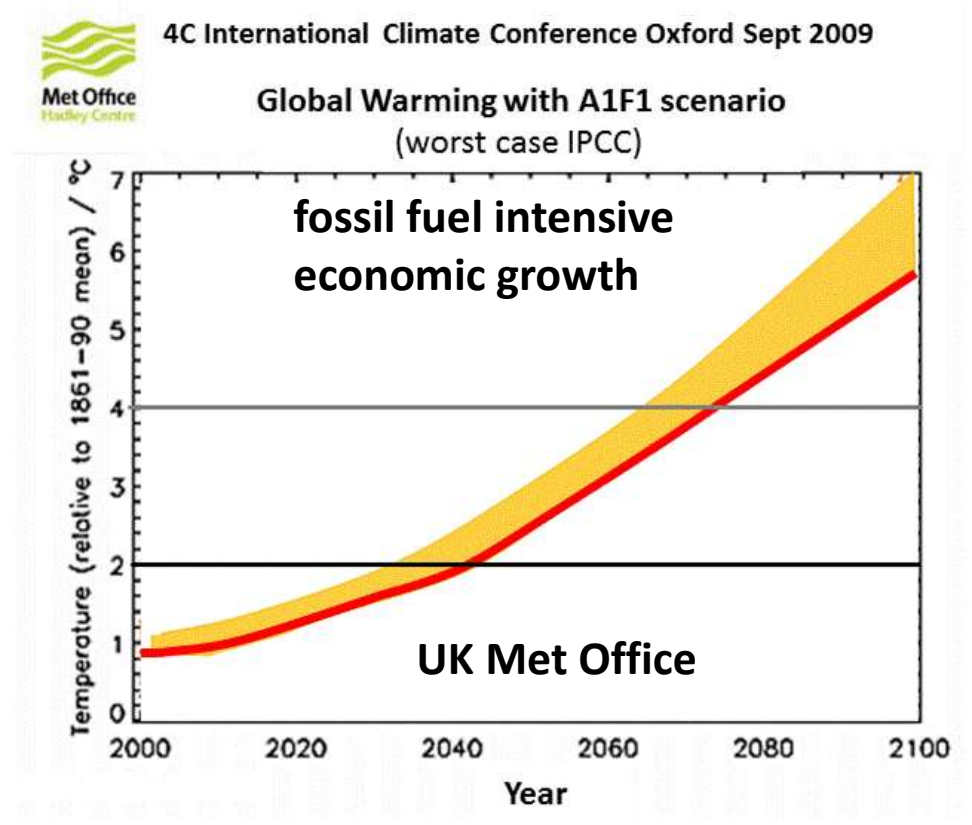
The IEA said that this rapid increase would trigger a rise in average global temperatures of about 6C by the end of the century — "with catastrophic consequences"

International Energy Agency

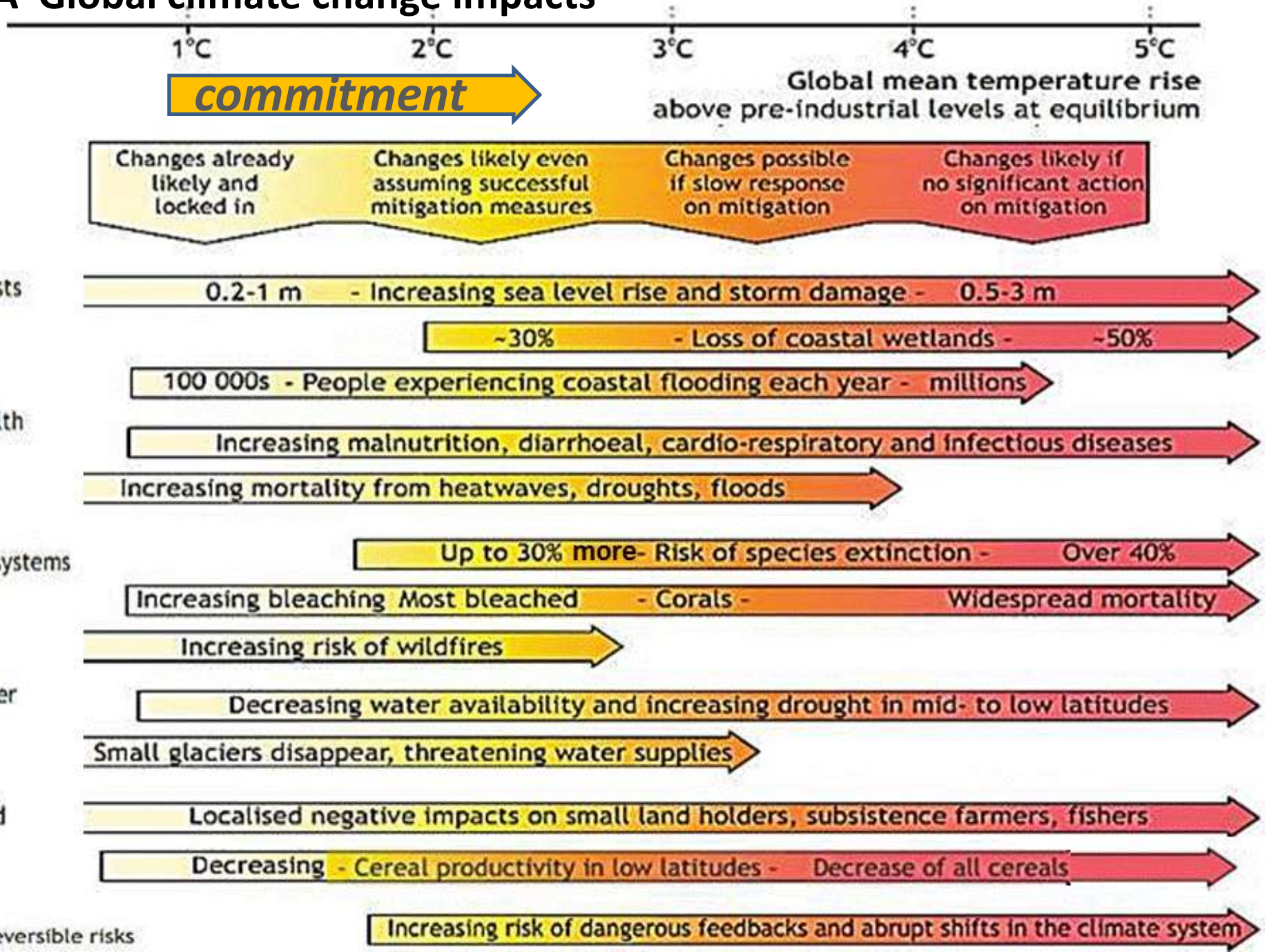
IEA

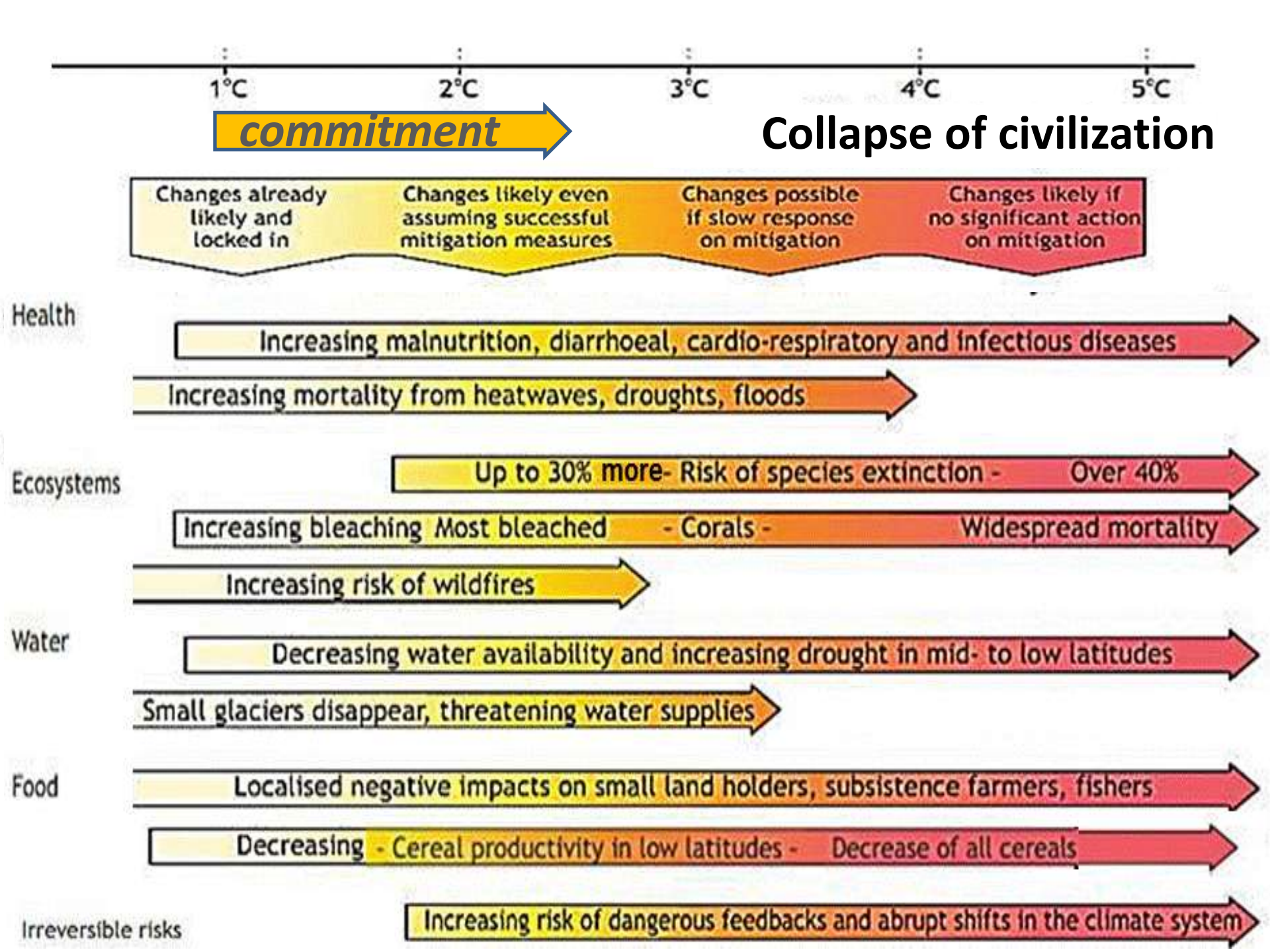
World Energy Outlook 2010

The End of the World Energy Plan



IEA Global climate change impacts




1°C
2°C
3°C
4°C
5°C
commitment
Collapse of civilization
Changes already likely and locked in
Changes likely even assuming successful mitigation measures
Changes possible if slow response on mitigation
Changes likely if no significant action on mitigation
Health
Increasing malnutrition, diarrhoeal, cardio-respiratory and infectious diseases
Increasing mortality from heatwaves, droughts, floods
Ecosystems
Up to 30% more- Risk of species extinction - Over 40%
Increasing bleaching Most bleached - Corals - Widespread mortality
Increasing risk of wildfires
Water
Decreasing water availability and increasing drought in mid- to low latitudes
Small glaciers disappear, threatening water supplies
Food
Localised negative impacts on small land holders, subsistence farmers, fishers
Decreasing - Cereal productivity in low latitudes - Decrease of all cereals
Irreversible risks
Increasing risk of dangerous feedbacks and abrupt shifts in the climate system

IEA 2008

Commitment by world economy and national energy policies, plans, and projects

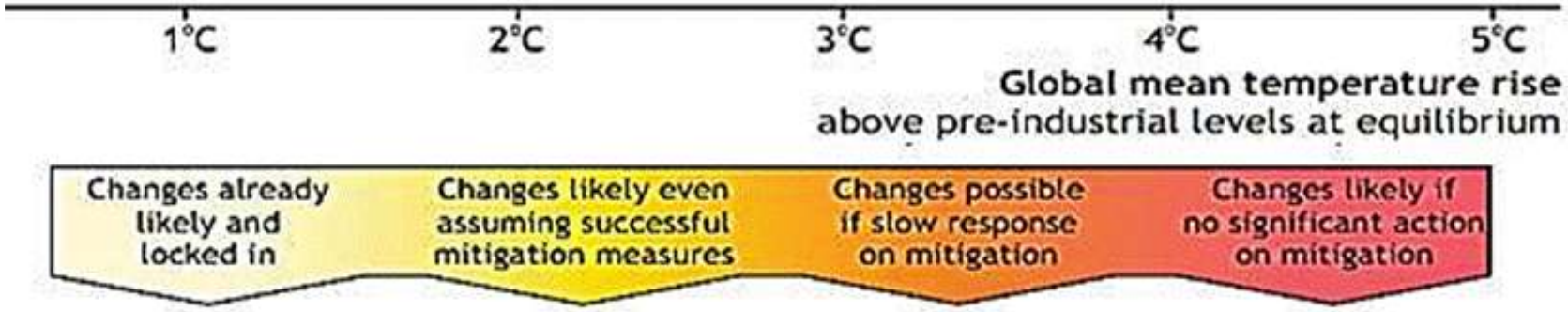
Commitment by national 'pledges' (proposals)

climate science commitment (Ramanathan, Feng 08)

(barring capacity to safely cool the planet and remove atmospheric CO2)

Global agricultural decline (see NSF)

leading to collapse of civilization

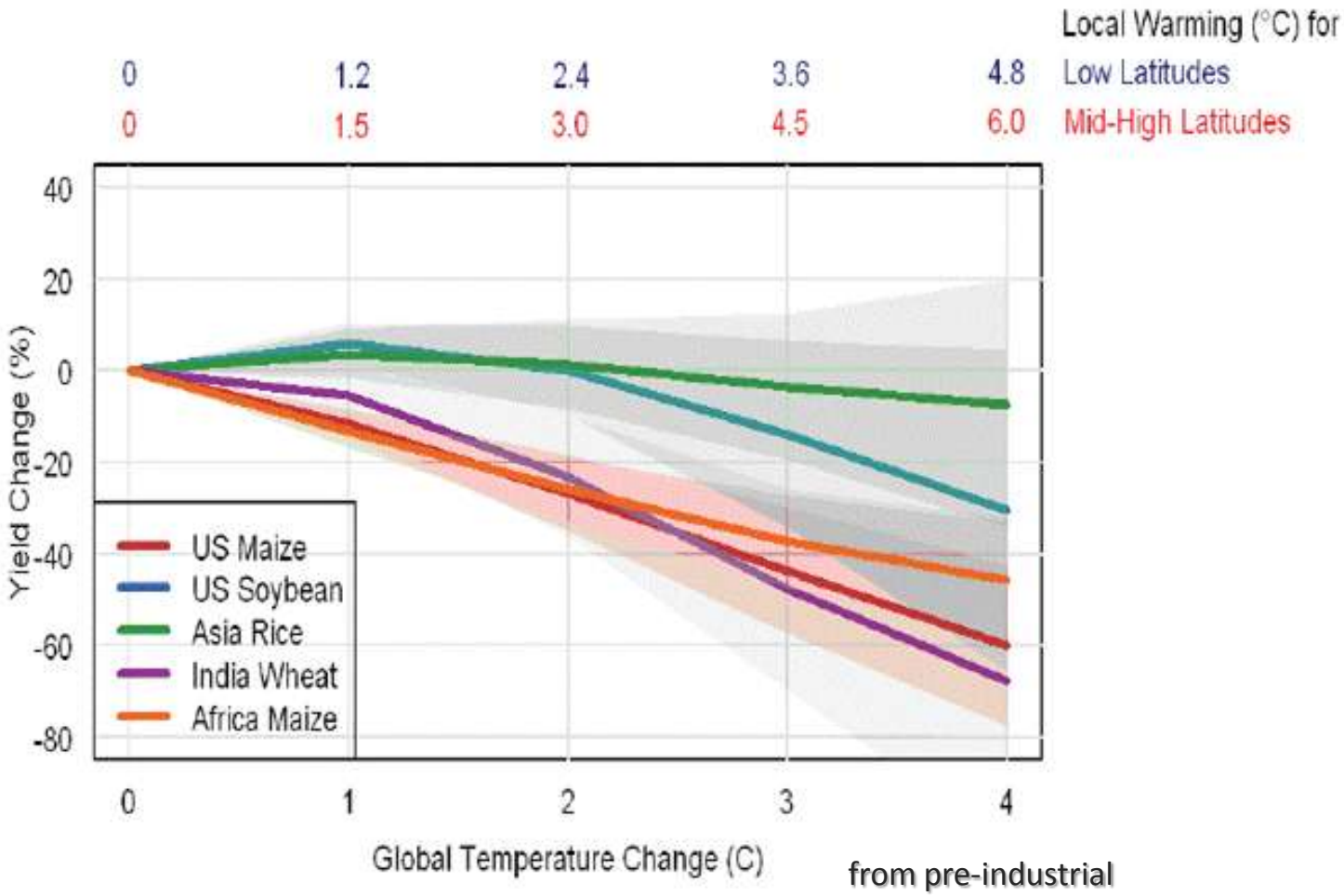


Irreversible risks — Increasing risk of dangerous feedbacks and abrupt shifts in the climate system

IEA 2008

National Science Foundation NSF 2010

Fig 5.1



from pre-industrial

The real world impact on crops can only be expected to be much worse than the model results.
The climate crop models do not capture about half of the adverse impacts.
There is no accounting for damage to agricultural land.
There is no accounting for combined or cumulative impacts. (comment)

The expected impacts illustrated in Figure 5.1 are useful as a measure of the likely direction and magnitude of average yield changes, but fall short of a complete risk analysis which would, for instance, estimate the chance of exceeding critical thresholds. The existing literature identifies several prominent sources of uncertainty, including those related to the magnitude of local warming per degree global temperature increase, the sensitivity of crop yields to temperature, the CO2 levels corresponding to each temperature level (see section 3.2), and the magnitude of CO2 fertilization. The impacts of rainfall changes can also be important at local and regional scales, although at broad scales the modeled impacts are most often dictated by temperature and CO2 because simulated rainfall changes are relatively small (Lobell and Burke, 2008).

In addition, although the studies summarized in Figure 5.1 consider several of the main processes that determine yield response to weather, several other processes have not been adequately quantified. These include responses of weeds, insects, and pathogens; changes in water resources available for irrigation; effects of changes in surface ozone levels; effects of increased flood frequencies; and responses to extremely high temperatures. Moreover, most crop modeling studies have not considered changes in sustained droughts, which are likely to increase in many regions (Wang, 2005; Sheffield and Wood, 2008), or potential changes in year-to-year variability of yields. The net effect of these and other factors remains an elusive goal, but these are likely to push yields in a negative direction.

Two planets that started out much the same

Earth: the only living water planet

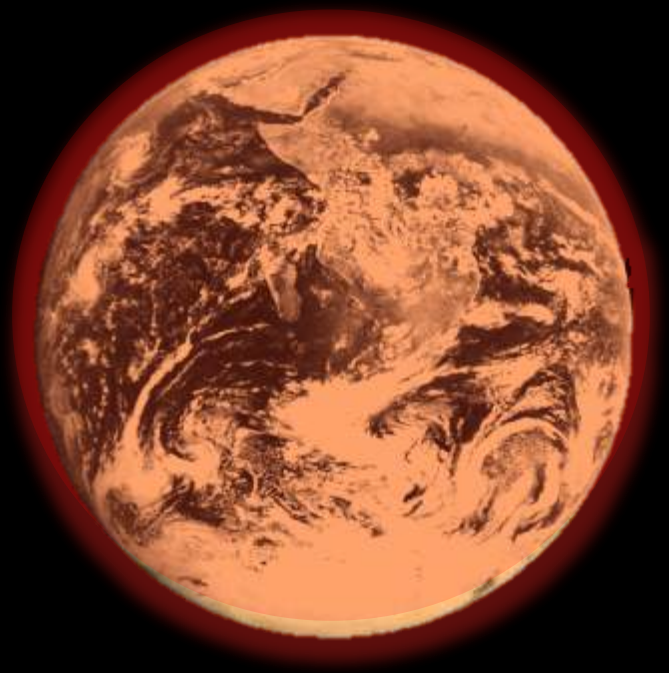
Venus: the runaway greenhouse effect superheated dead planet

If we burn all the coal, we might kick in a runaway greenhouse effect, and if we burn all the tar shale and tar sands we definitely will.

James Hansen

We're going to have to figure out how to power ourselves without it anyhow so why not do it sooner rather than later?"

The 2010 World Energy Outlook plan is to burn all the fossil fuels- including the tar sands and shale oil.

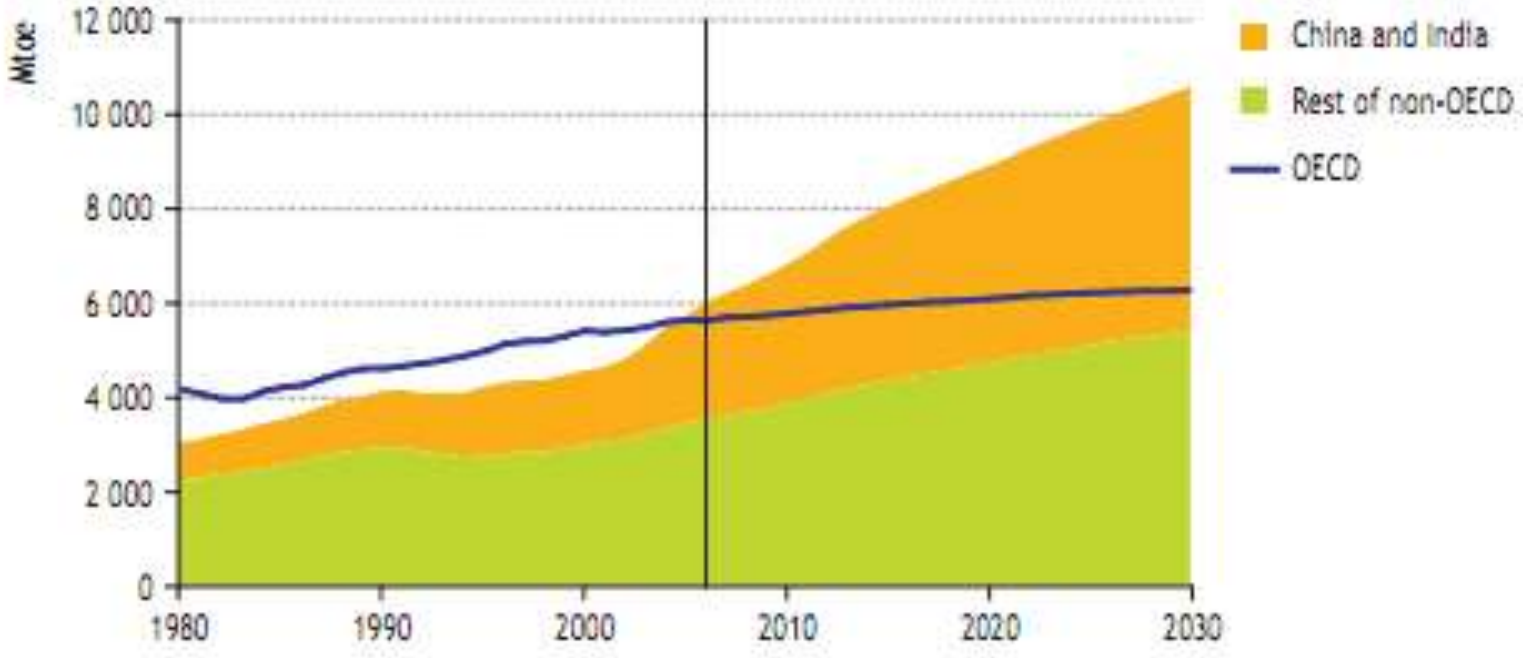


That is a plan to end all life.

Energy 'Demand' : Globalization of corporate fossil fuel energy dependency

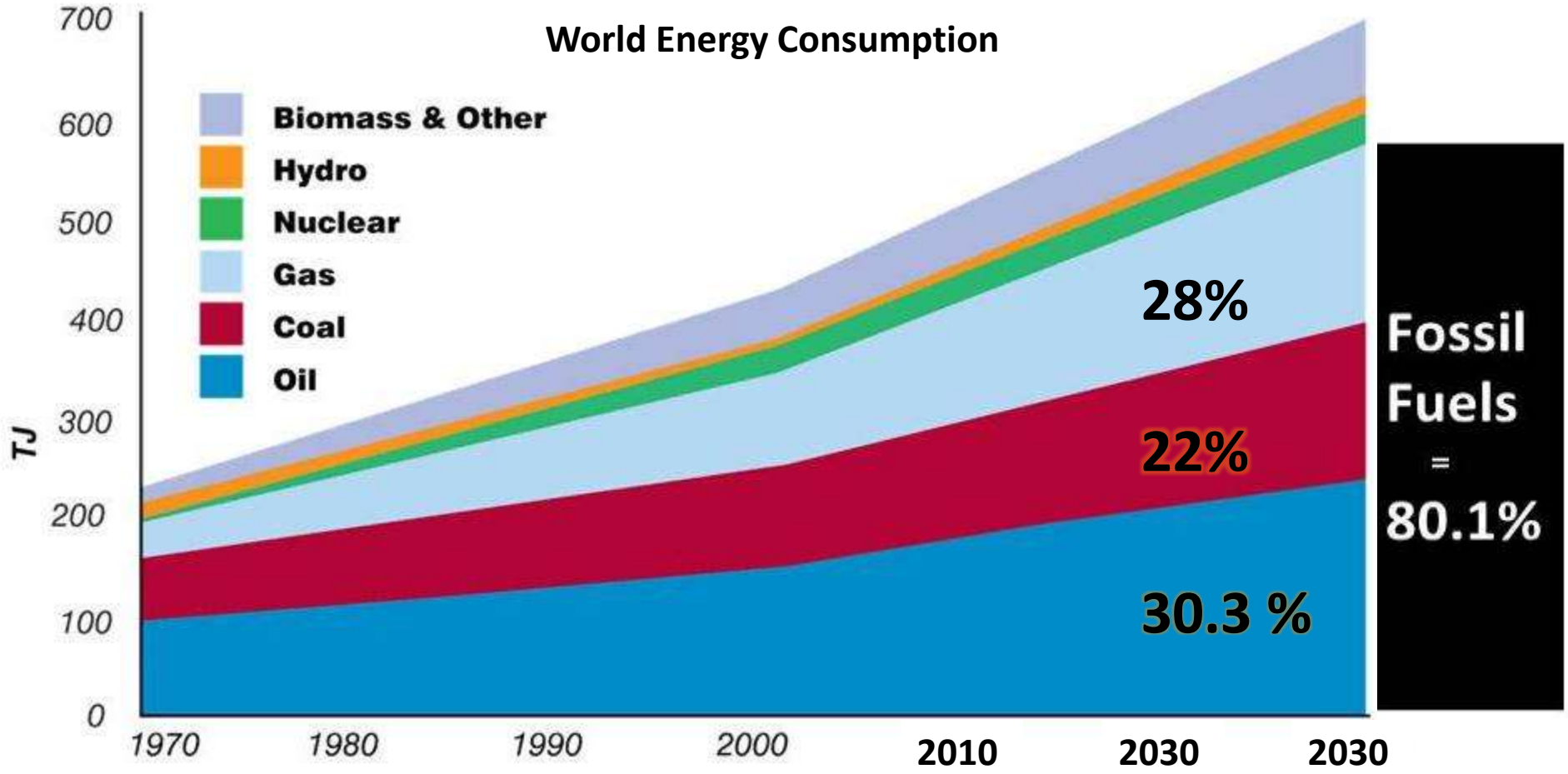
2030. Steady economic growth and industrial expansion, population increase and higher urbanisation rates drive demand growth in non-OECD countries. The replacement of fuelwood and charcoal with oil and gas also plays a major role. Growth in energy demand is fastest in the Middle East and Asia (Table 2.2).

Figure 2.2 • World primary energy demand by region in the Reference Scenario



IEA

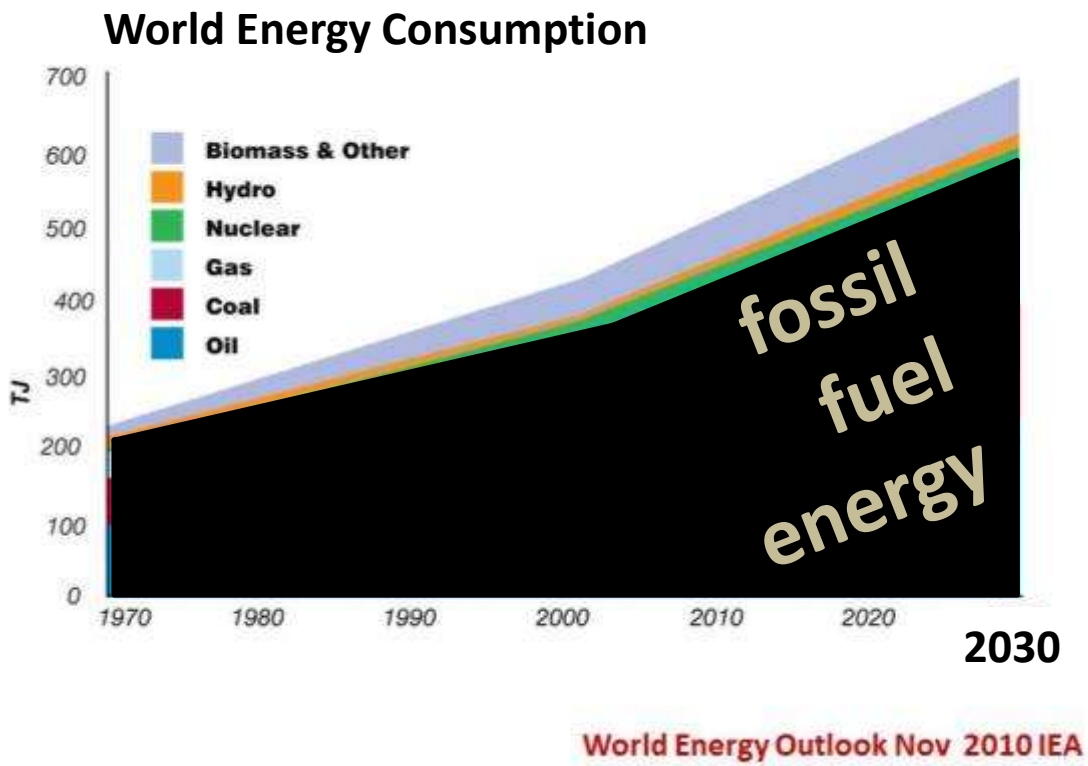
The World Energy Outlook (World Energy Plan) is to keep emitting carbon - at an increasing rate



World Energy Outlook Nov 2010 IEA

The World Energy Outlook (World Energy Plan)
is to keep emitting carbon - at an increasing rate

With no new UN treaty and
no carbon pollution change economic agreement –
this is the world energy plan already being implemented.



Where is more oil going to come from?

- *Deepwater and ultra-deepwater* resources could deliver over 160 billion barrels at a cost of up to $65 per barrel.
- *Arctic resources* could amount to 90 billion barrels at a cost of between $40 and $100 per barrel.
- *Extra-heavy oil* and *oil sands* resources total more than 1 trillion barrels and could be produced at costs ranging from over $40 to about $80 per barrel.
- *Oil shales* production costs are estimated to be in the range of $50 to well over $100 per barrel. Because of a lack of major commercial projects, the prospects for improving oil shales production technology are very uncertain.

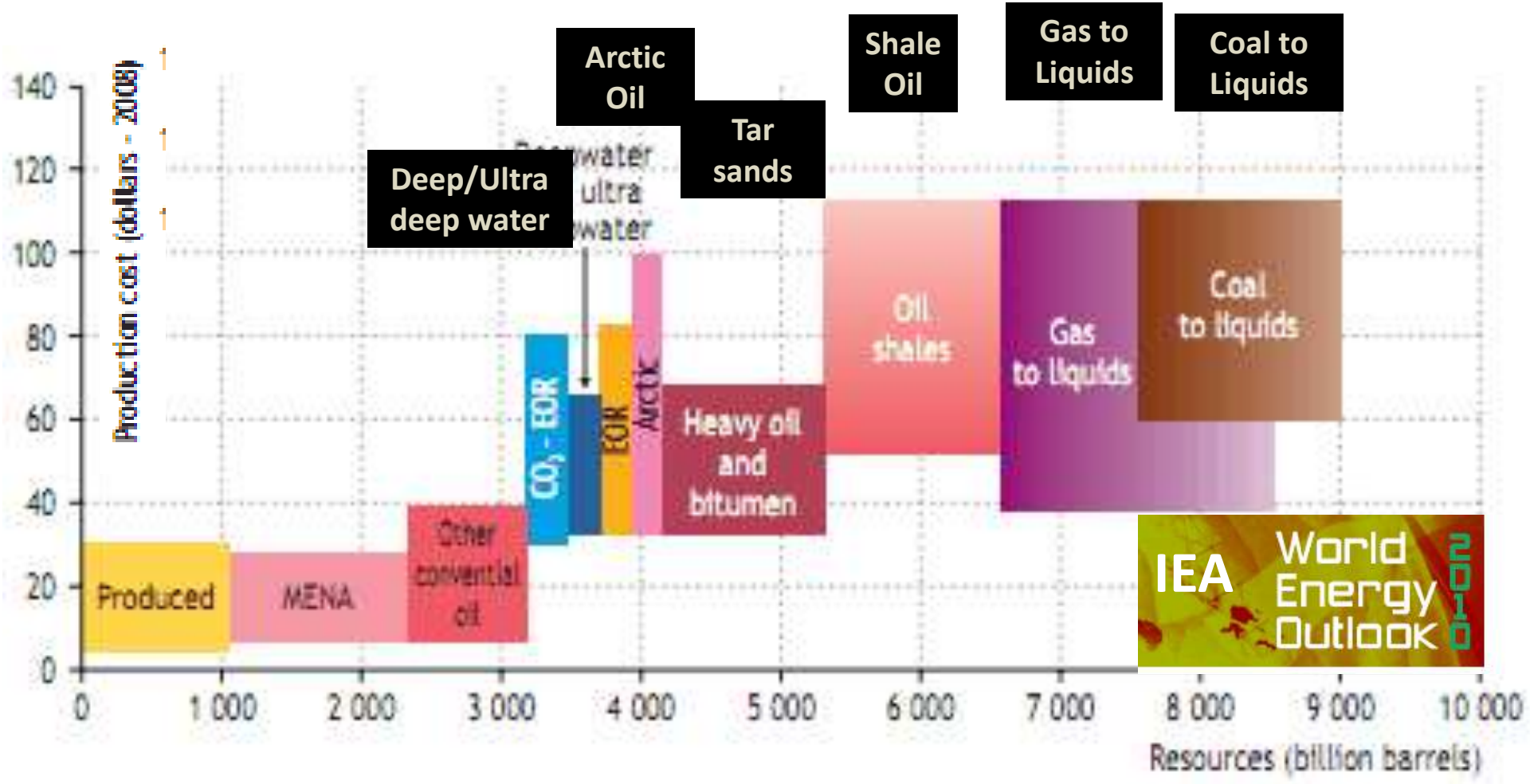
Political, environmental, regulatory and fiscal factors will strongly influence the extent to which this potential is exploited and the costs to oil companies of bringing the resources to market. Production of non-conventional resources, in particular oil sands as well as oil shales in the future, leaves a large environmental footprint, including through the greenhouse gases emitted in the production and use

IEA

Where more oil is going to come from.

Harder to get oil is more expensive and more global warming.

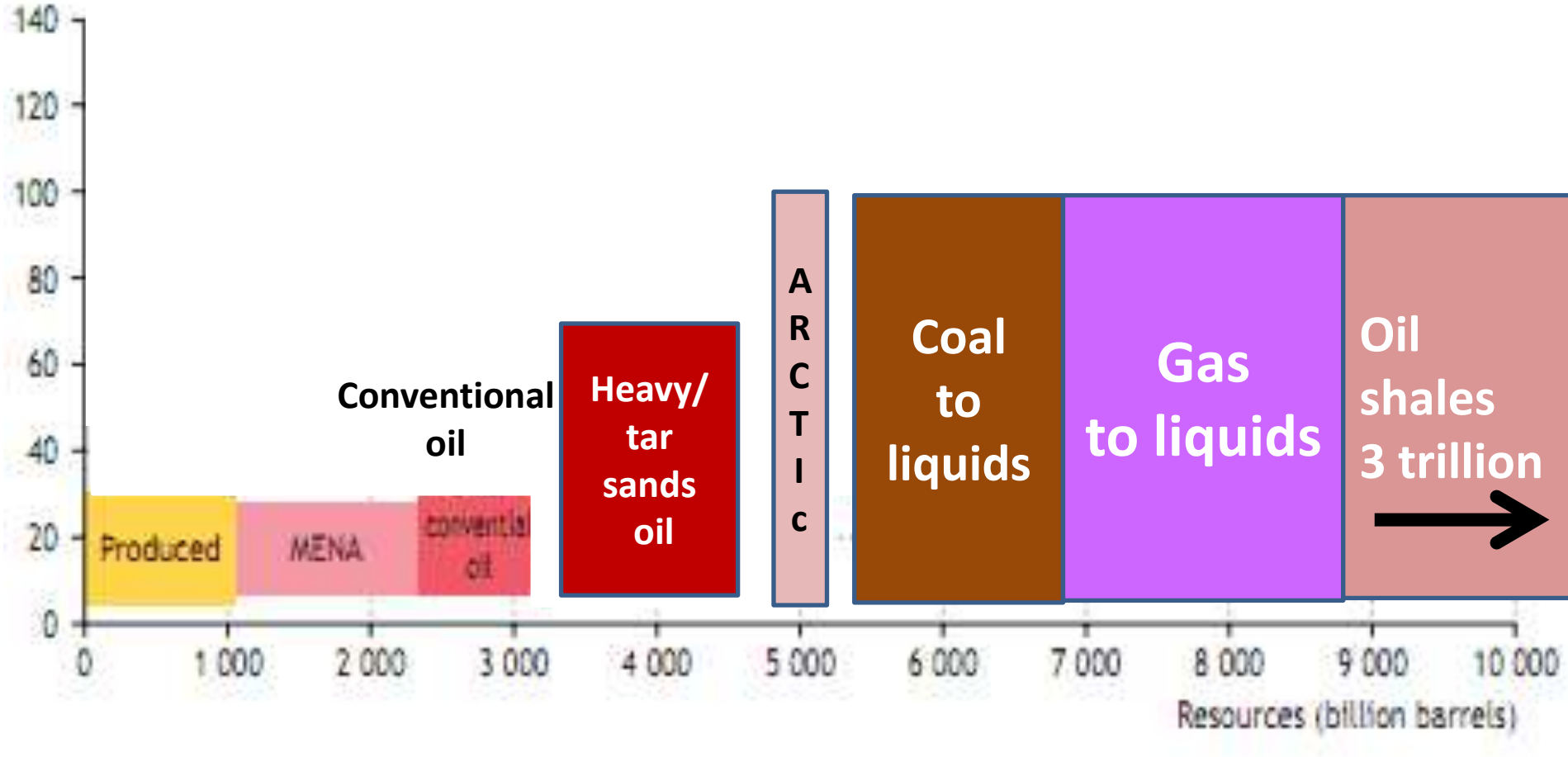
Figure 9.10 • Long-term oil-supply cost curve



There are more than enough fossil fuels left for the industries to keep increasing output and to end life on Earth.

Figure 9.10 • Long-term oil-supply cost curve **IEA**

The world energy plan is clearly to burn all the coal oil and gas including Arctic oil/gas, tar sands and shale oil.



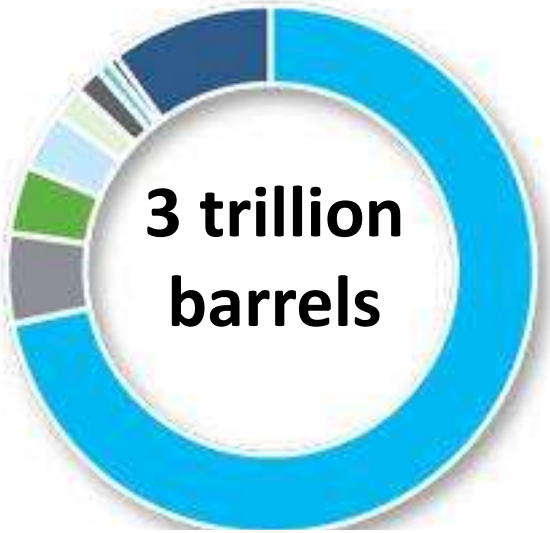
Harder to get oil is more expensive and causes more global warming.

- Tar sands
- Gas to Liquids
- Deep & Ultra deep water
- Arctic Oil
- Coal to Liquids
- Shale Oil

Shale Oil

World-wide technically-recoverable reserves have recently been estimated at about 2.8-3.3 trillion barrels of shale oil.

The largest reserves are in the United States, which is thought to have 1.5-2.6 trillion barrels.



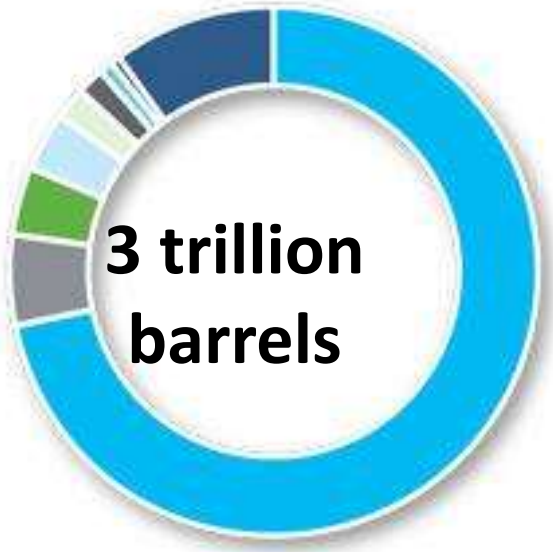
72%	USA
5.4%	Brazil
4.2%	Jordan
3.5%	Morocco
2.1%	Australia
1.5%	China
1.1%	Estonia
0.3%	Israel
10%	Other

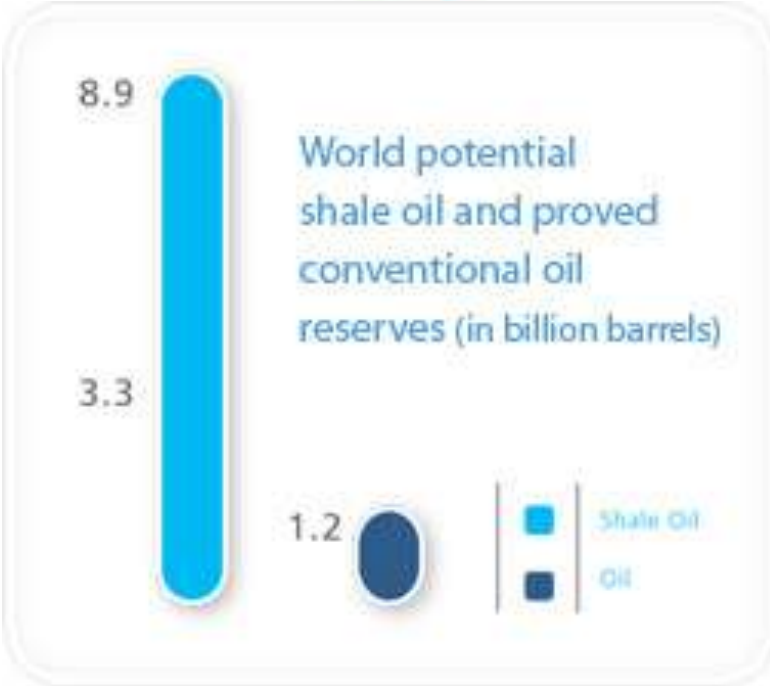
Source: The Boston Globe, 2005-12-11

Shale Oil

Estonia has been relying on shale oil energy for years (13 million tons per year) .

Shale oil investment is growing and making huge profits in the US.





Sources: BP Statistical Review of World Energy 2007; Põlevkivi - Õlikivi, Oil Shale - Source of Oil, Vello Kattai, Tallinn 2003

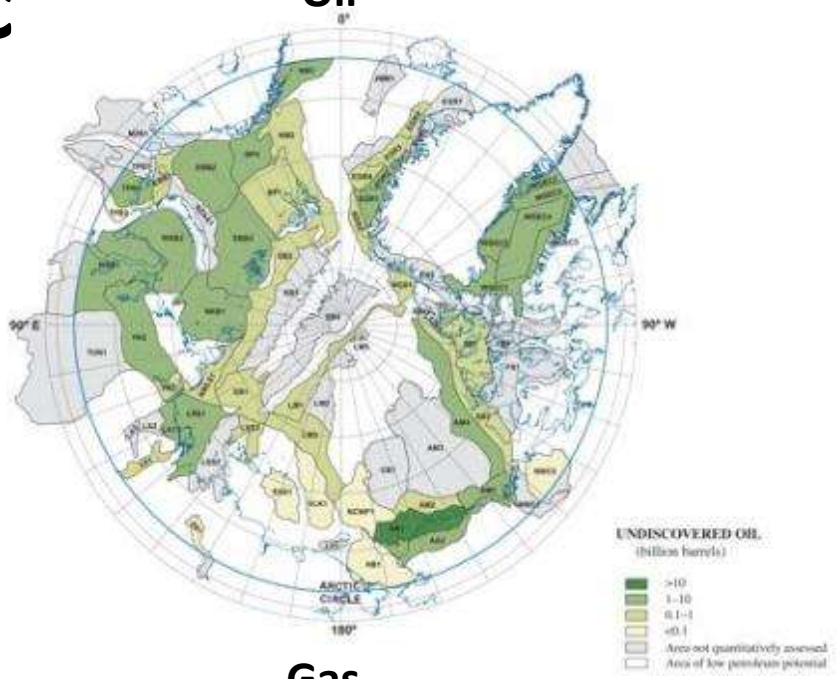
Arctic

There is just a few years of oil and gas in the Arctic but the corporations are going it all anyway.

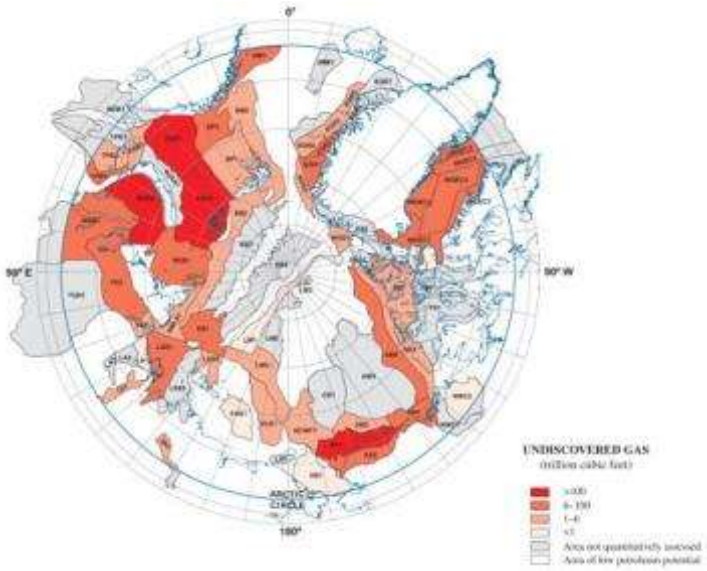
The USGS report estimates Arctic reserves as follows.

Probability	Oil (BBO - billion barrels)	Gas (TCF - trillion cubic feet)
95%	44	770
50%	83	1547
5%	157	299

Oil

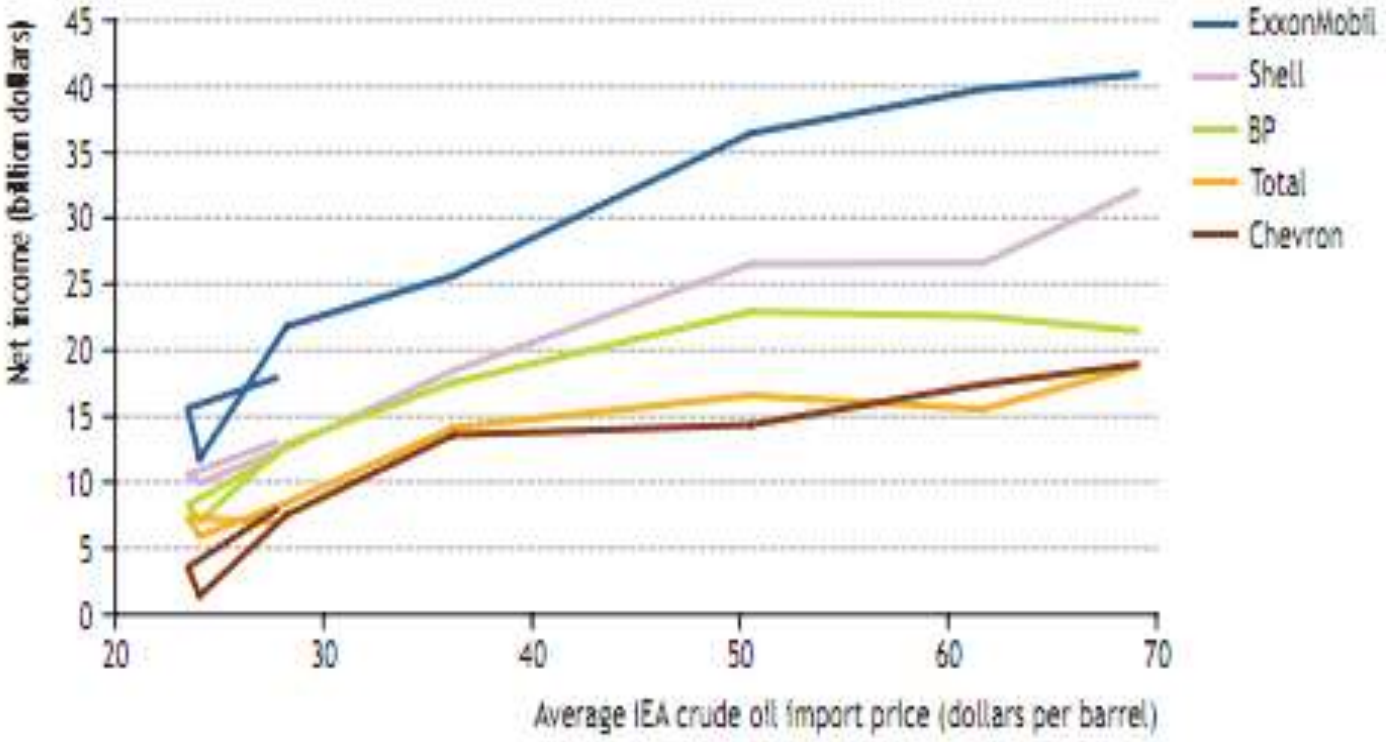


Gas



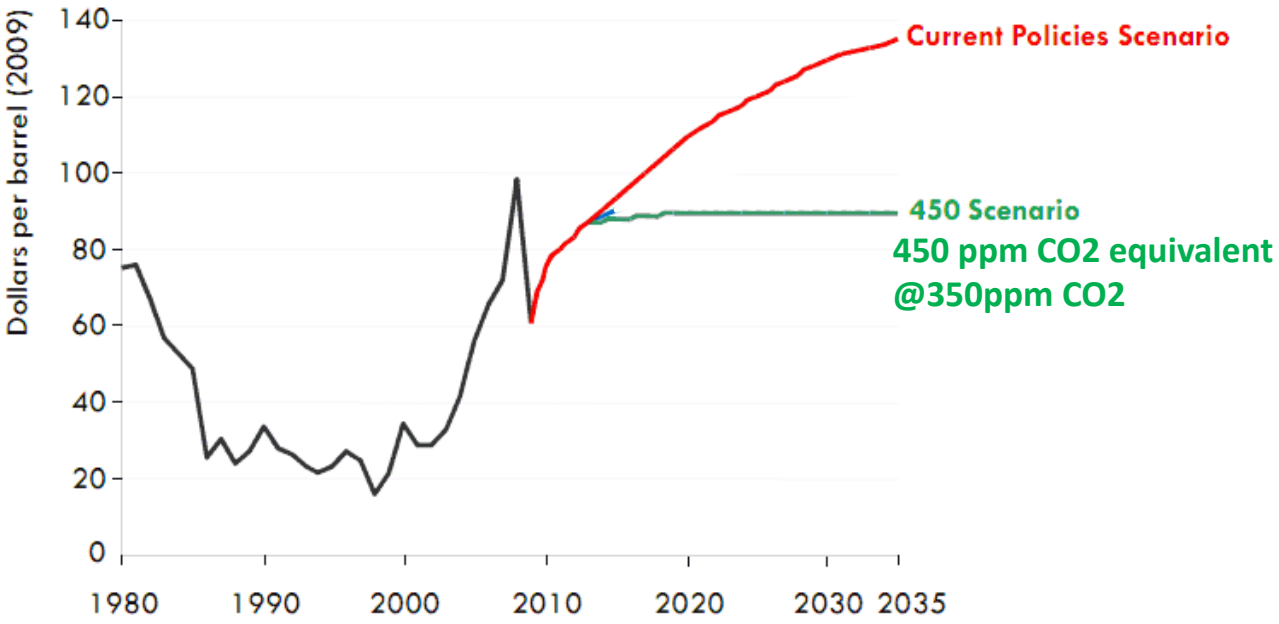
As the world oil price rises
the profits of the oil corporations increase- even more.

Figure 14.5 • Net income of the super-majors versus the average IEA crude oil import price, 2000-2007



IEA

International oil price assumptions IEA World Energy Outlook 2010



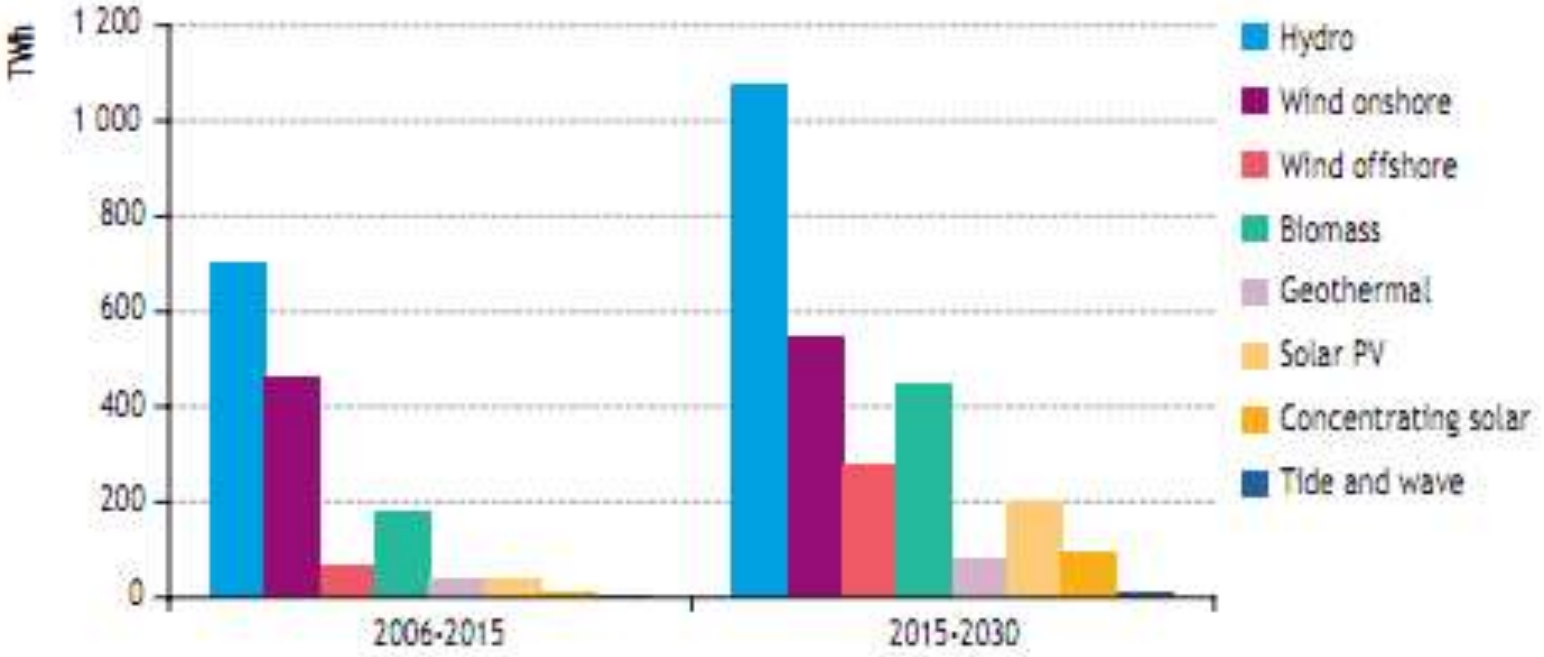
Just look !

The price of energy does not increase in a 350 CO2 policy world and the price will never go up.

The age of cheap oil is over, though policy action could bring lower international prices than would otherwise be the case

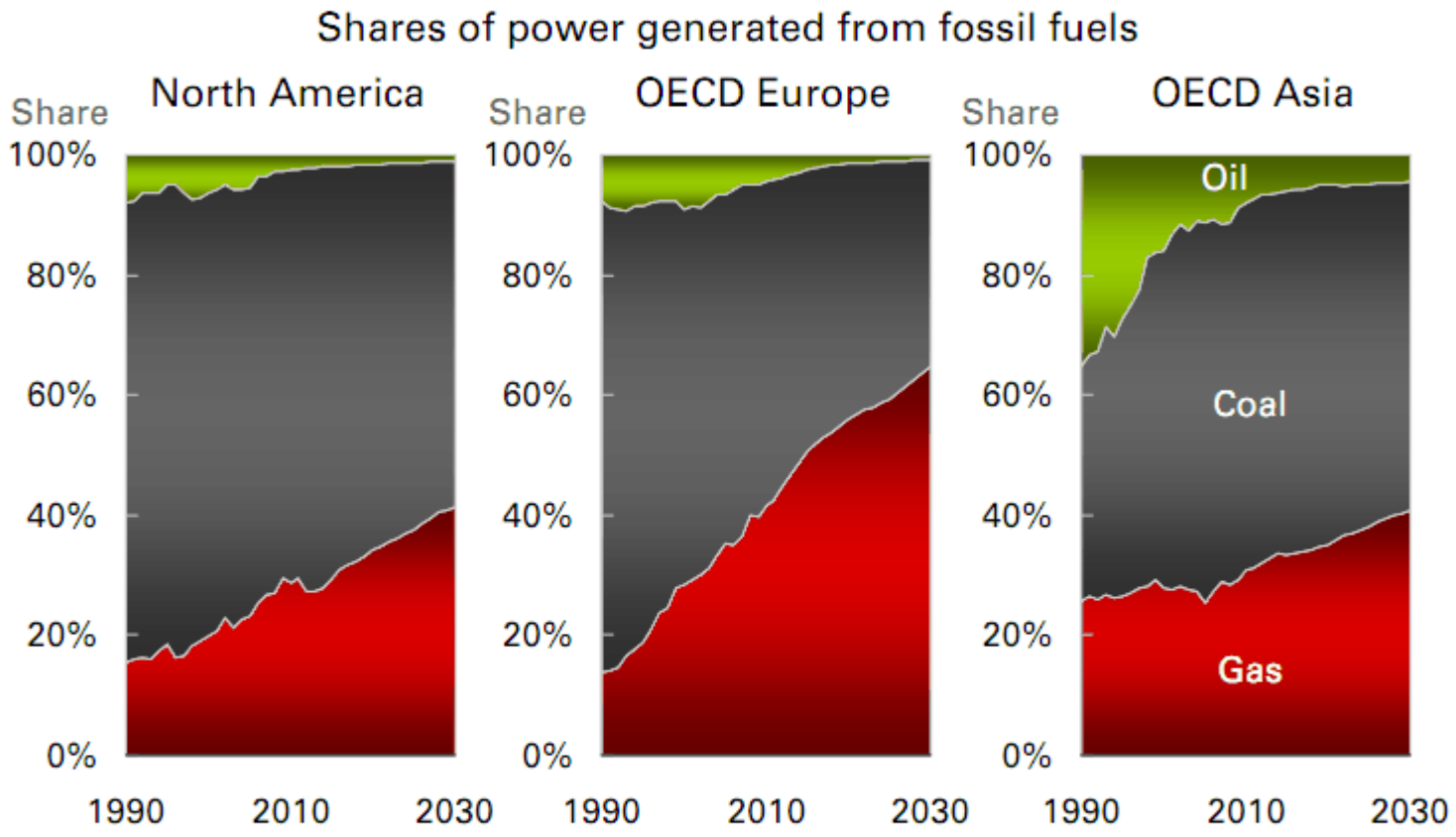
The world energy post peak oil plan is NOT to switch to renewable zero carbon energy.

Figure 7.3 • Increase in world electricity generation from renewables in the Reference Scenario



IEA

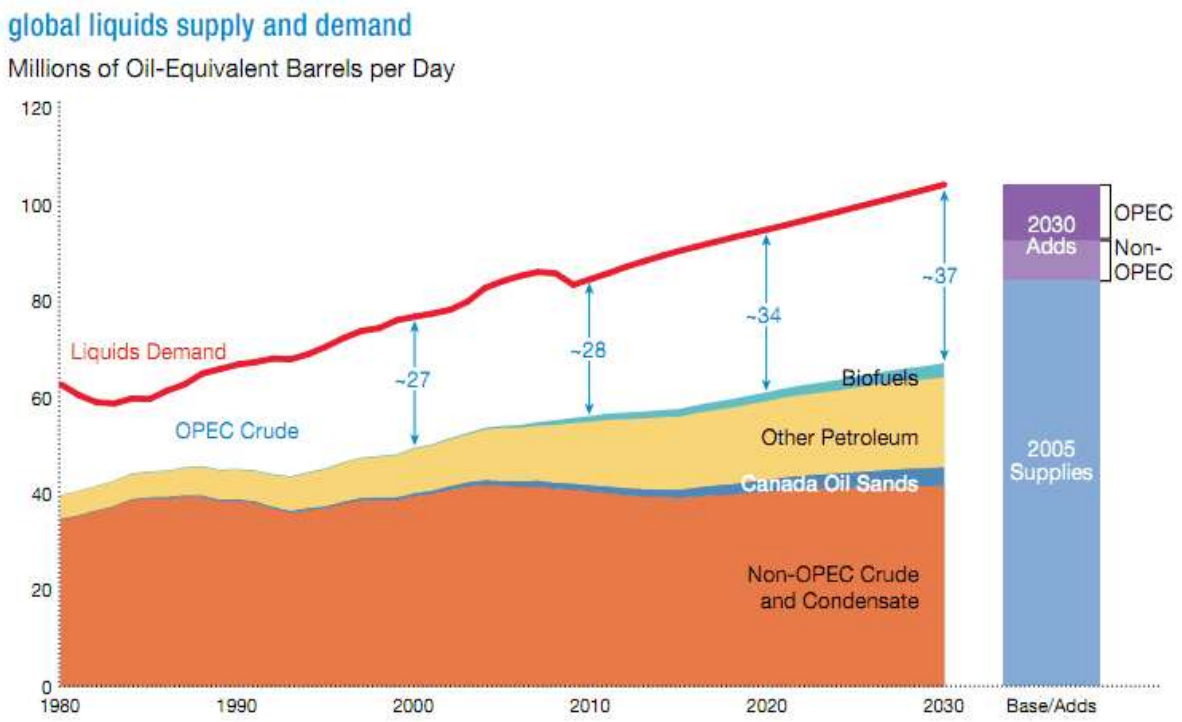
Large increases in coal and natural gas take over from oil



Exxon World Energy Outlook 2010

Global liquids supply grows

More Oil



Through 2030, OPEC and non-OPEC sources will combine to meet an expected

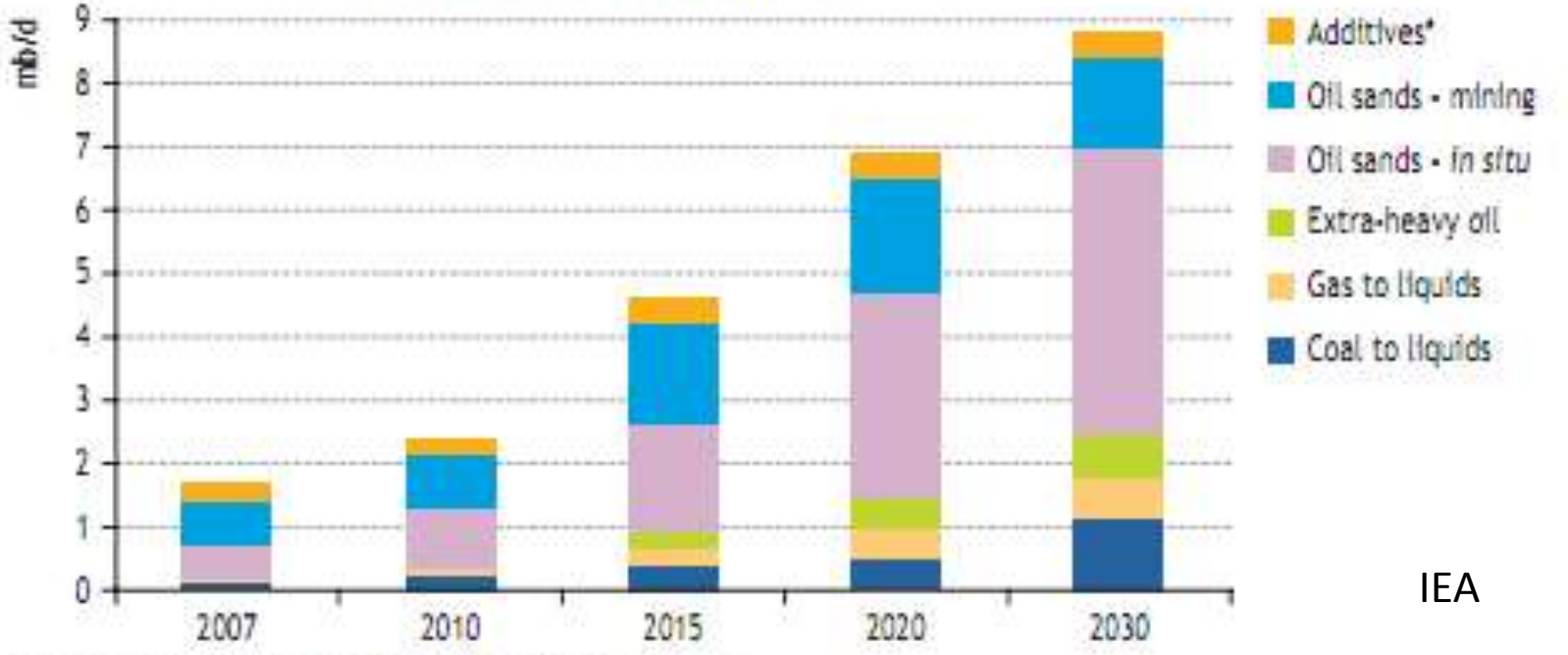
24%

increase

in liquid fuels demand.

The world energy post peak oil plan to increase production of the worst sources of oil and liquid fuels

Figure 11.12 • World non-conventional oil production by type in the Reference Scenario



*Methyl tertiary butyl ether (MTBE) and other chemicals.

IEA

All industrial nations are quietly developing coal to liquids

In the IEA's main scenario,
oil production from tar sands
found mainly in Canada and Venezuela,
would triple in the next 25 years.

Alberta Tar Sands

Table 9.4 • Extra-heavy oil and oil sands resources (billion barrels)

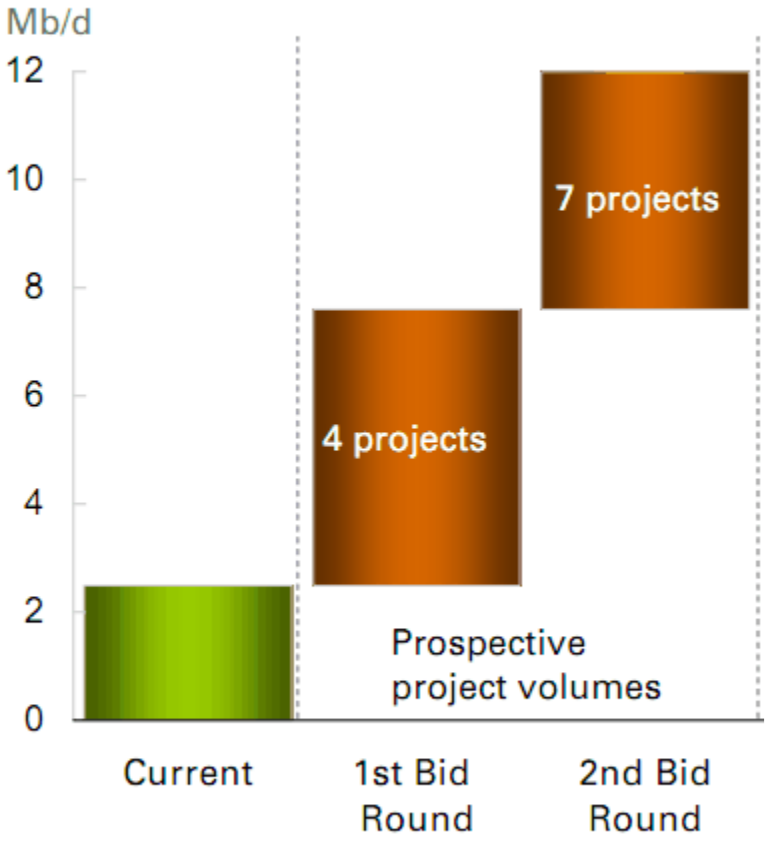
	Extra-heavy oil			Oil sands		
	Oil in place	Recovery factor	Technically recoverable	Oil in place	Recovery factor	Technically recoverable
North America	184	0.19	35	1 659	0.32	531.0
South America	2 046	0.13	266	1	0.01	0.1
Middle East	650	0.12	78	0	0.00	0.0
Other regions	423	0.13	55	1 135	0.13	120.0
World	3 303	0.13	434	2 795	0.23	651.0

Source: WEC (2007).

IEA

Iraq Blood for Oil

Iraq is an important component of future oil supply..



bp

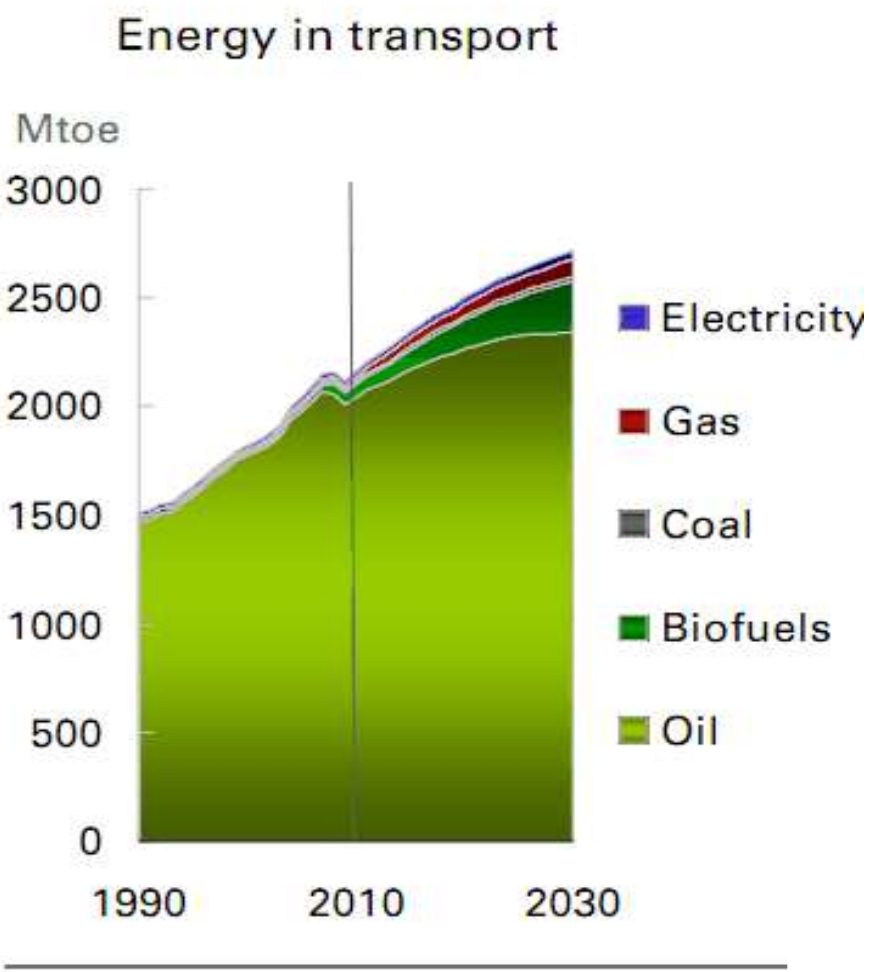
World Energy Outlook : A World of Wars

Oil dependency in a post peak oil world means more wars - for control of oil.

More global climate change means more wars over declining essential resources – like food and water

Transport/ cars and trucks globalized

Oil growth in the transport sector

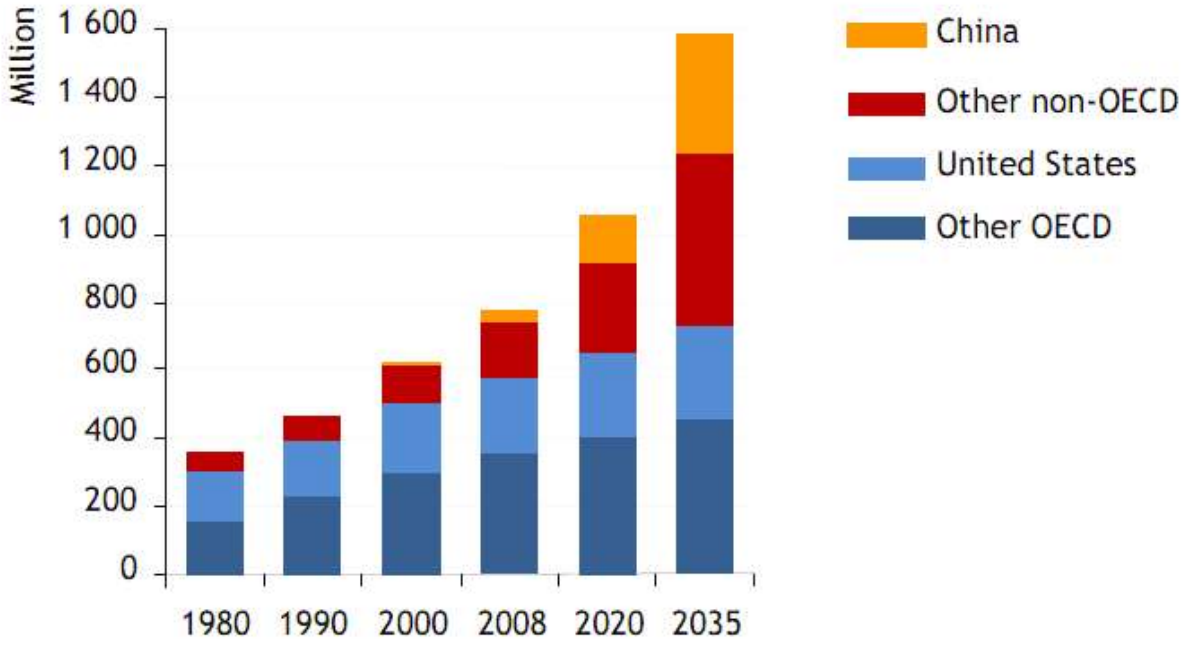


Energy Outlook 2030

Booming demand for mobility in the emerging economies drives up oil use

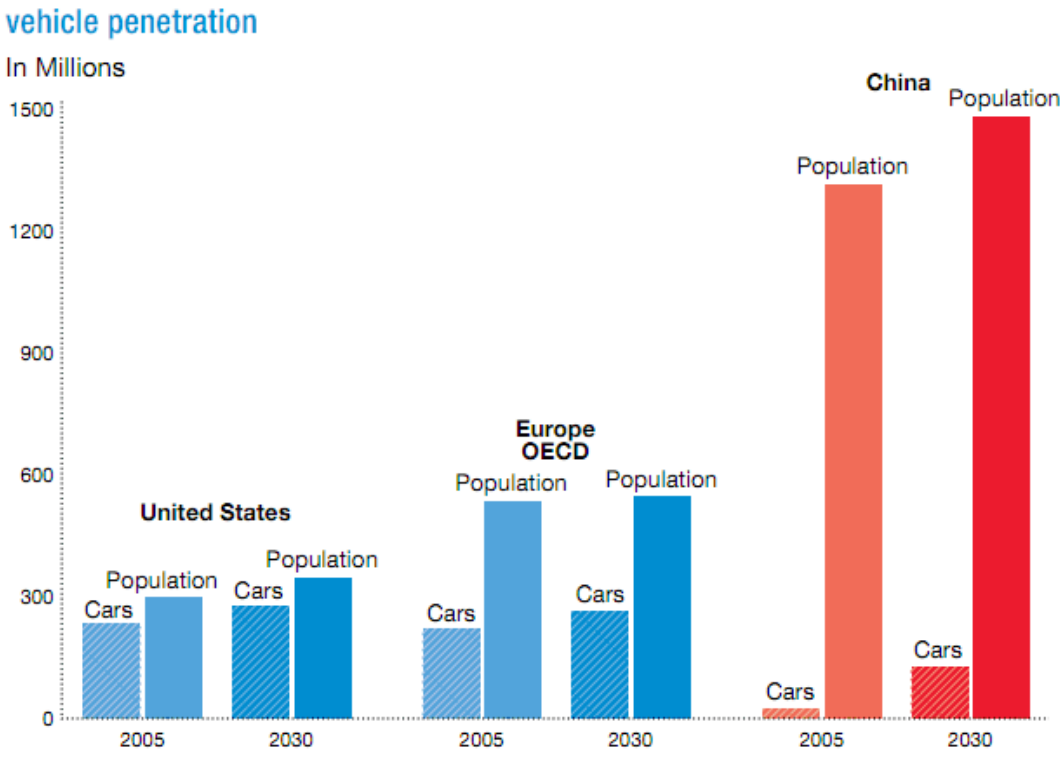
IEA World Energy Outlook 2010

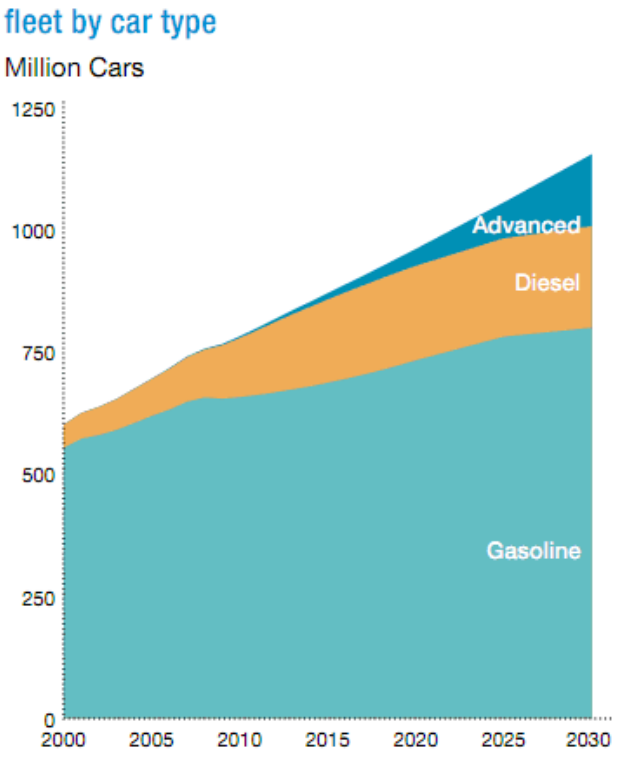
Passenger vehicles in the New Policies Scenario



The global car fleet will continue to surge as more & more people in China & other emerging economies buy a car, overshadowing modest growth in the OECD

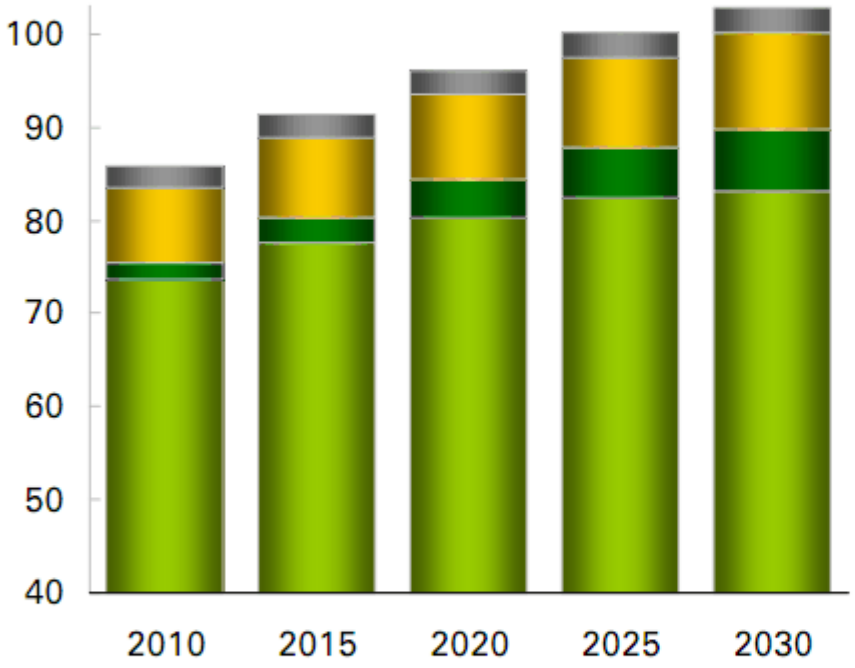
Personal vehicle fleet is growing





Exxon World Energy Outlook 2010

Refiners face competition from various supply sources…



Growth 2010-30

Other liquids:*	1
Non-refined NGLs:	2
Biofuels:	5
Total non-crude:	8
Crude runs	9
Liquids demand	17

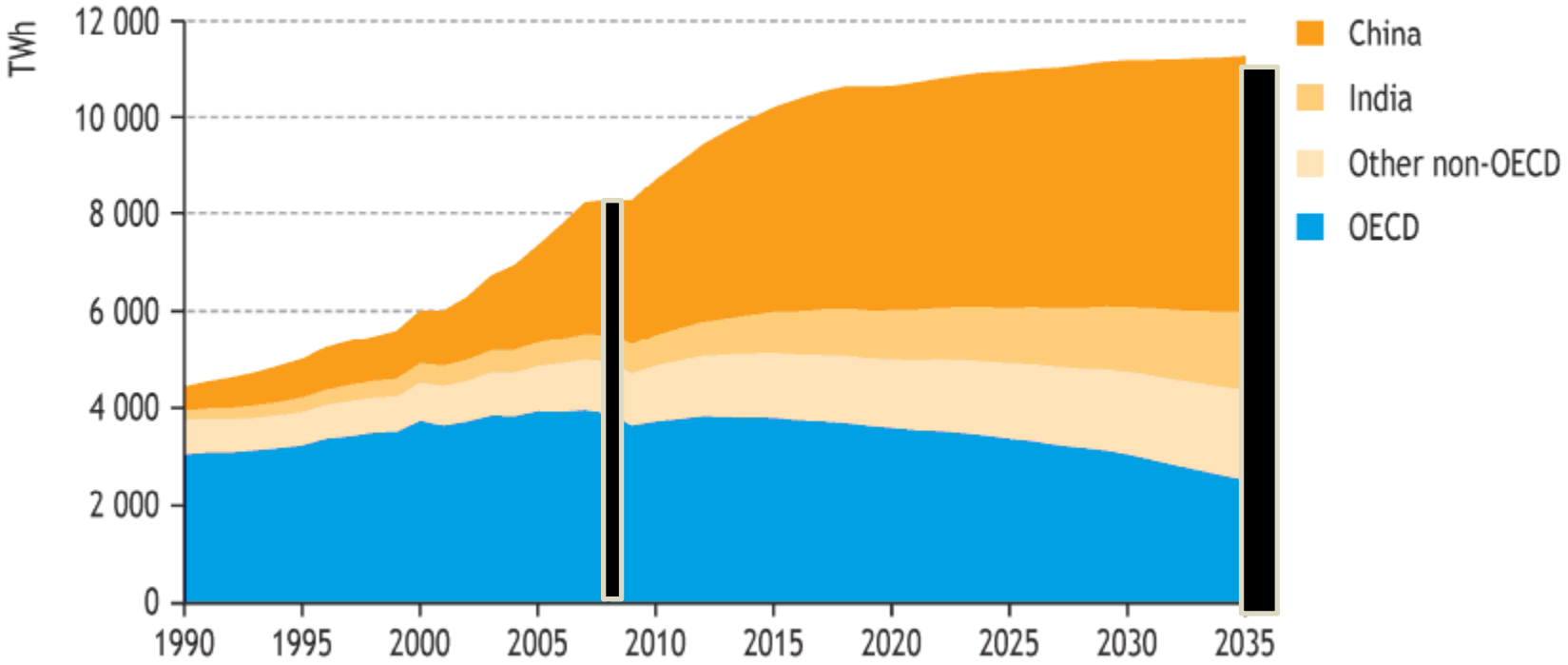
*includes processing gains

Coal

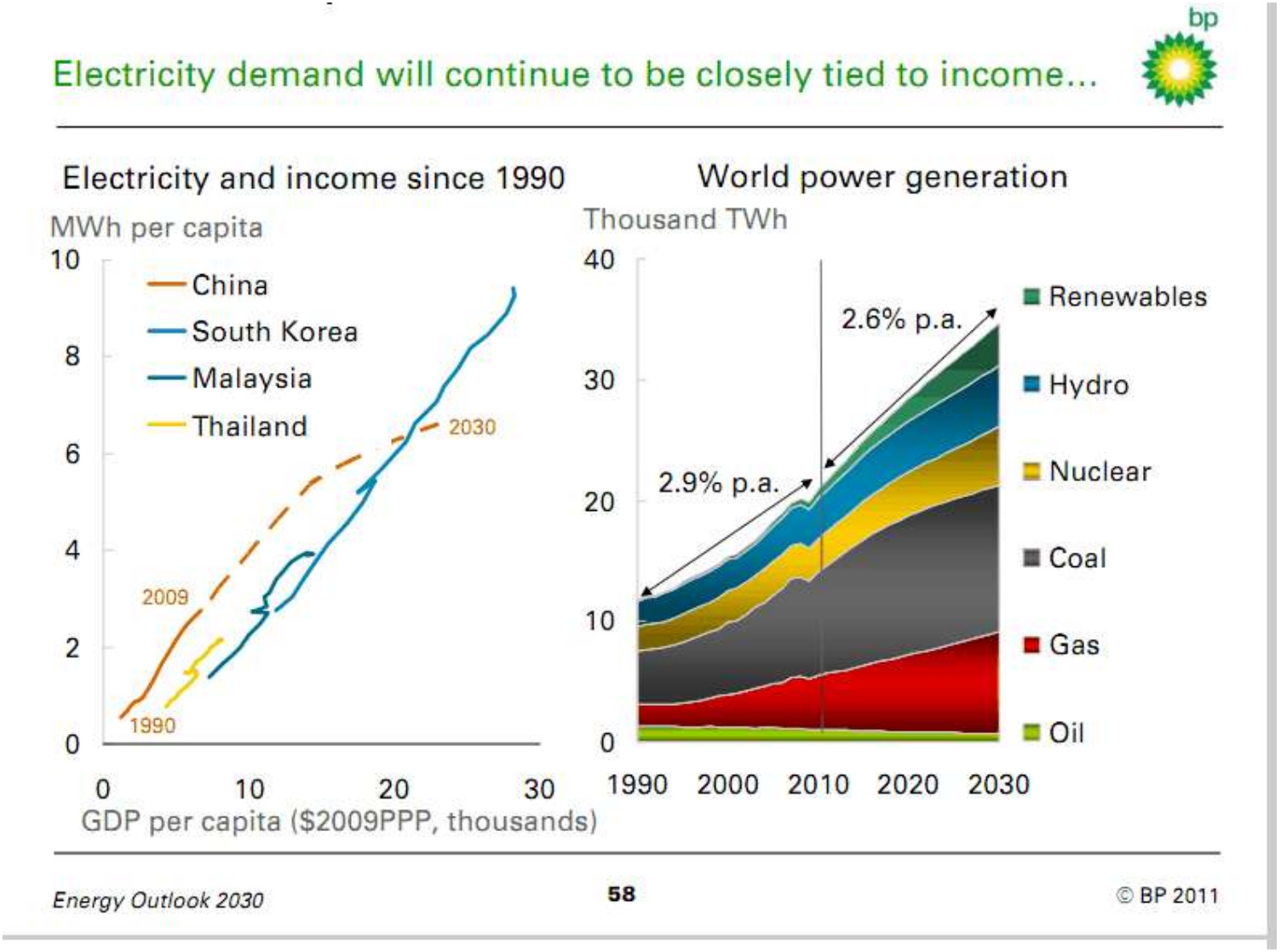
Coal remains the backbone of global electricity generation

World Energy Outlook 2010

A drop in coal-fired generation in the OECD is offset by big increases elsewhere, especially China, where 600 GW of new capacity exceeds the current coal capacity of US, EU & Japan



Large increases in coal and natural gas take over from oil for electricity generation



World coal power generation

Coal

In the IEO2010 Reference case, world coal consumption increases by 56 percent from 2007 to 2035, and coal's share of world energy consumption grows from 27 percent in 2007 to 28 percent in 2035.

Increase of 56% from 2007 to 2035

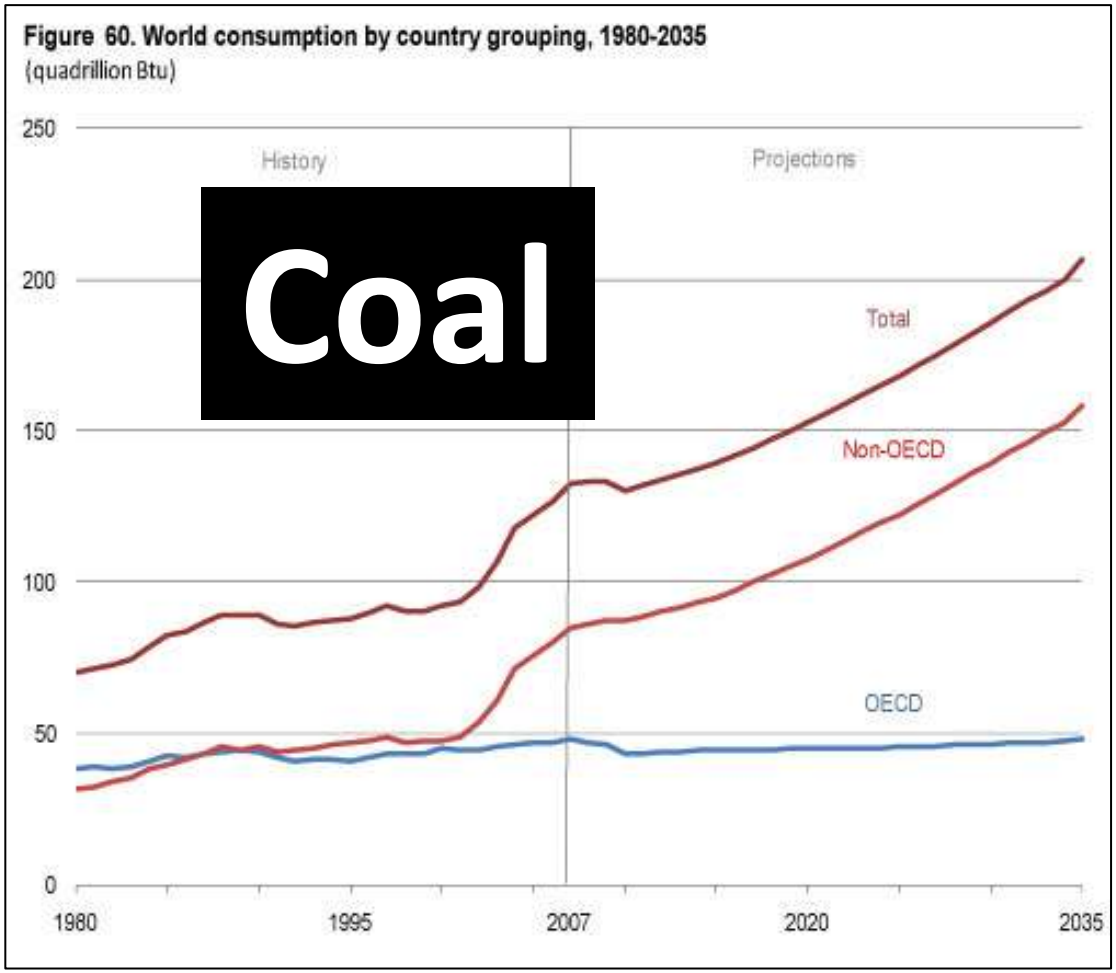
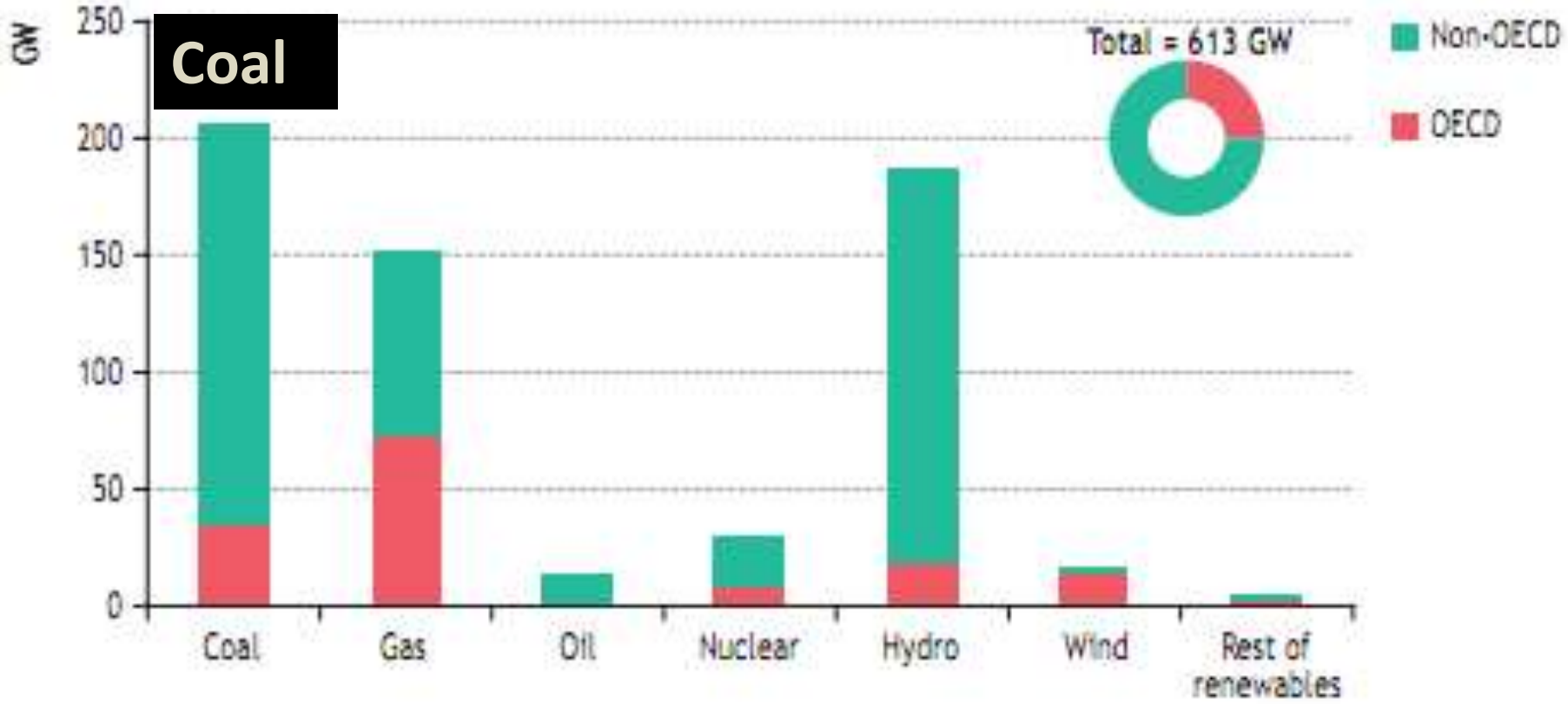


Figure 6.4 • Power-generation capacity under construction worldwide



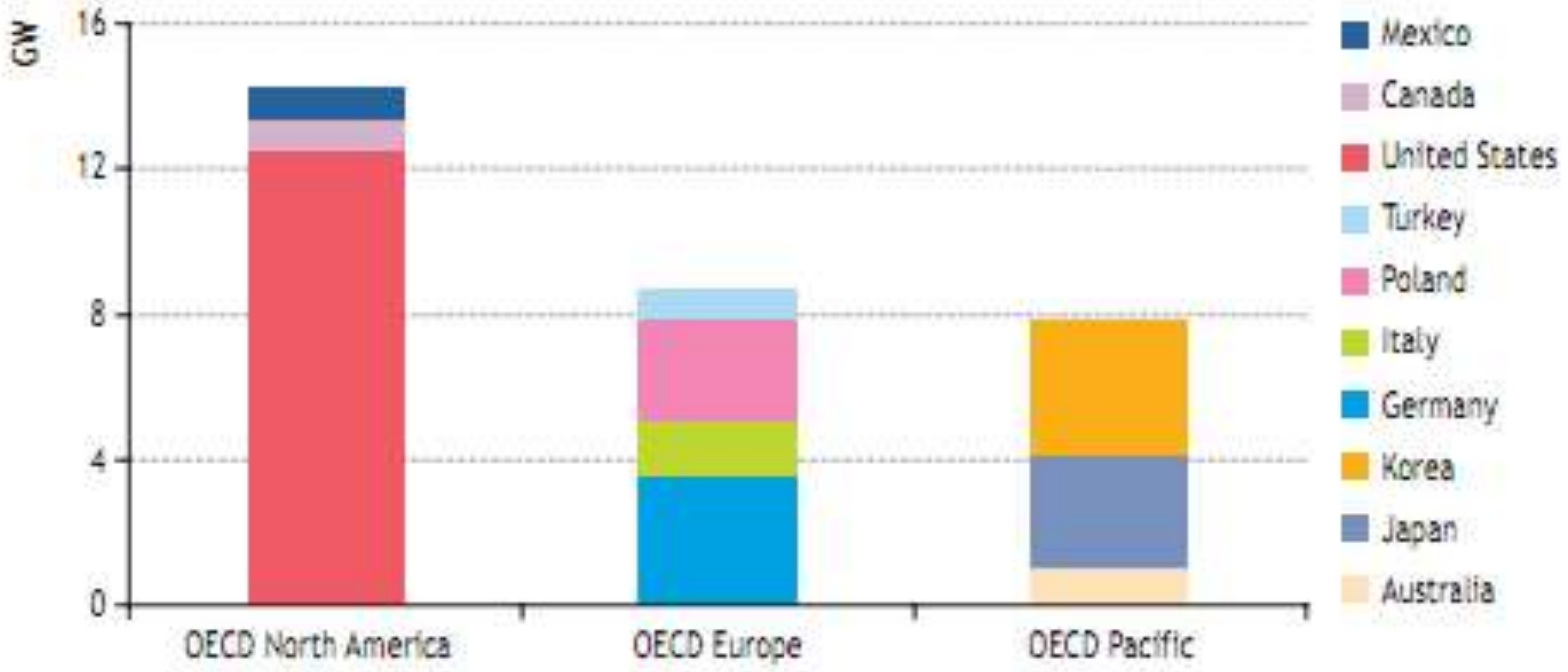
Note: Includes power plants considered as under construction in 2007.

Source: Platt's World Electric Power Plants Database, January 2008 version.

IEA

Coal

Figure 6.5 • Coal-fired capacity under construction in OECD countries

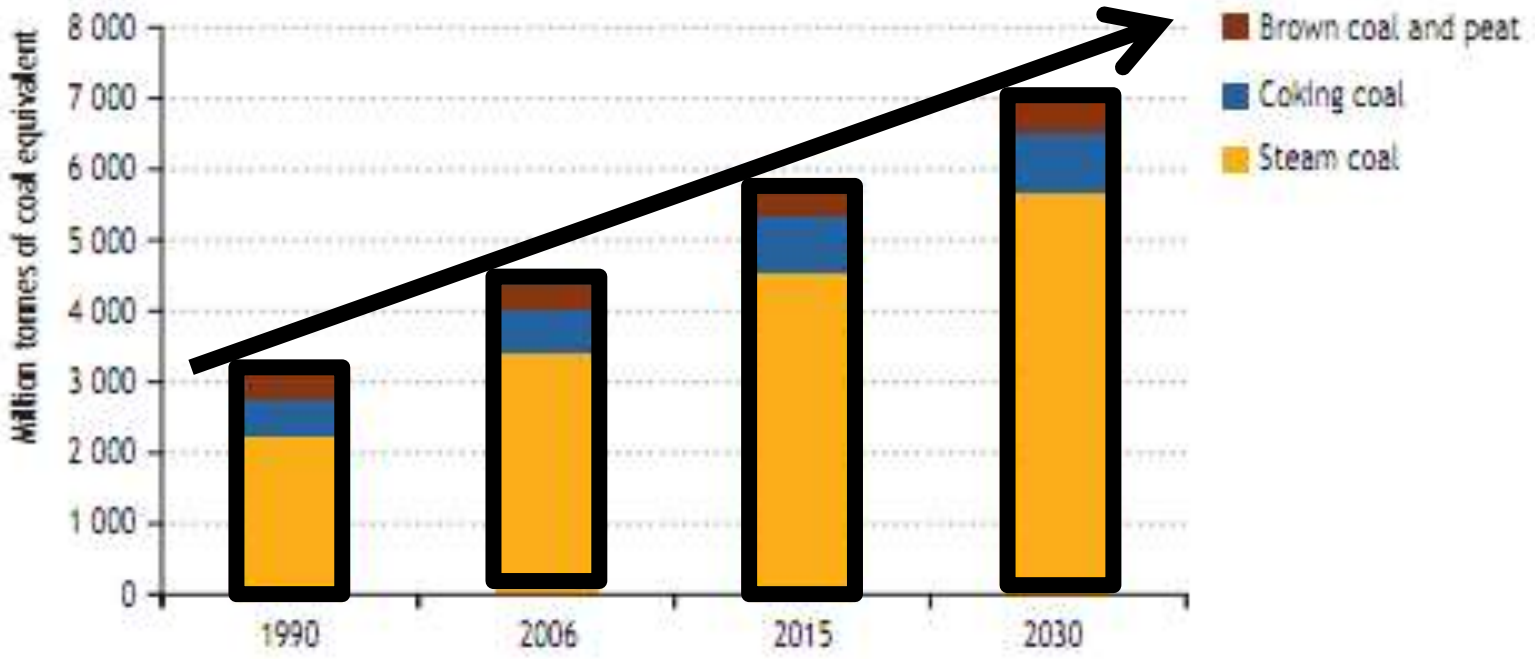


Note: Includes power plants considered as under construction in 2007.
Source: Platt's World Electric Power Plants Database, January 2008 version.

IEA

Coal production

Figure 5.5 • World coal production by type in the Reference Scenario



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The world economy End of the World energy plan

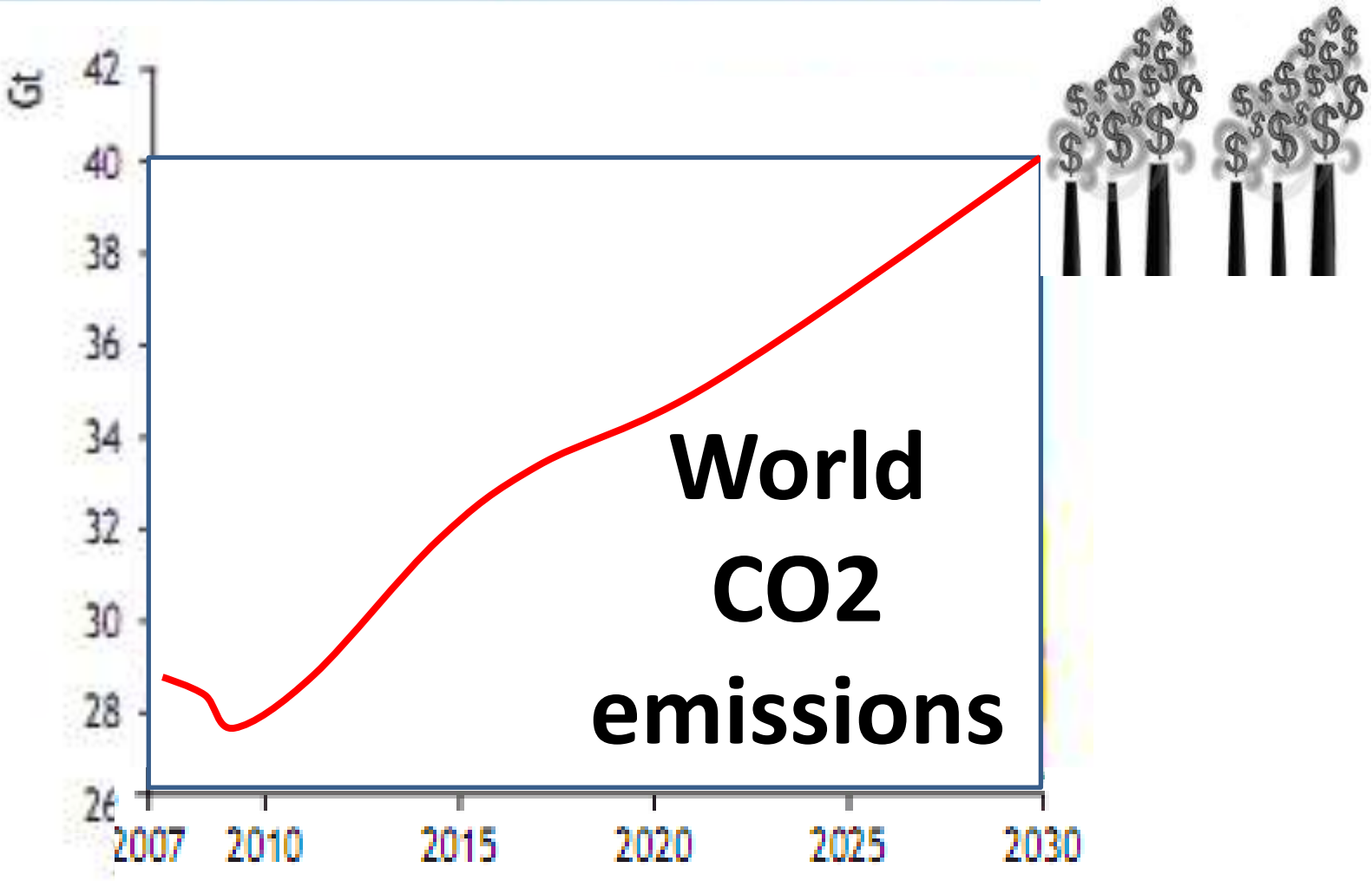

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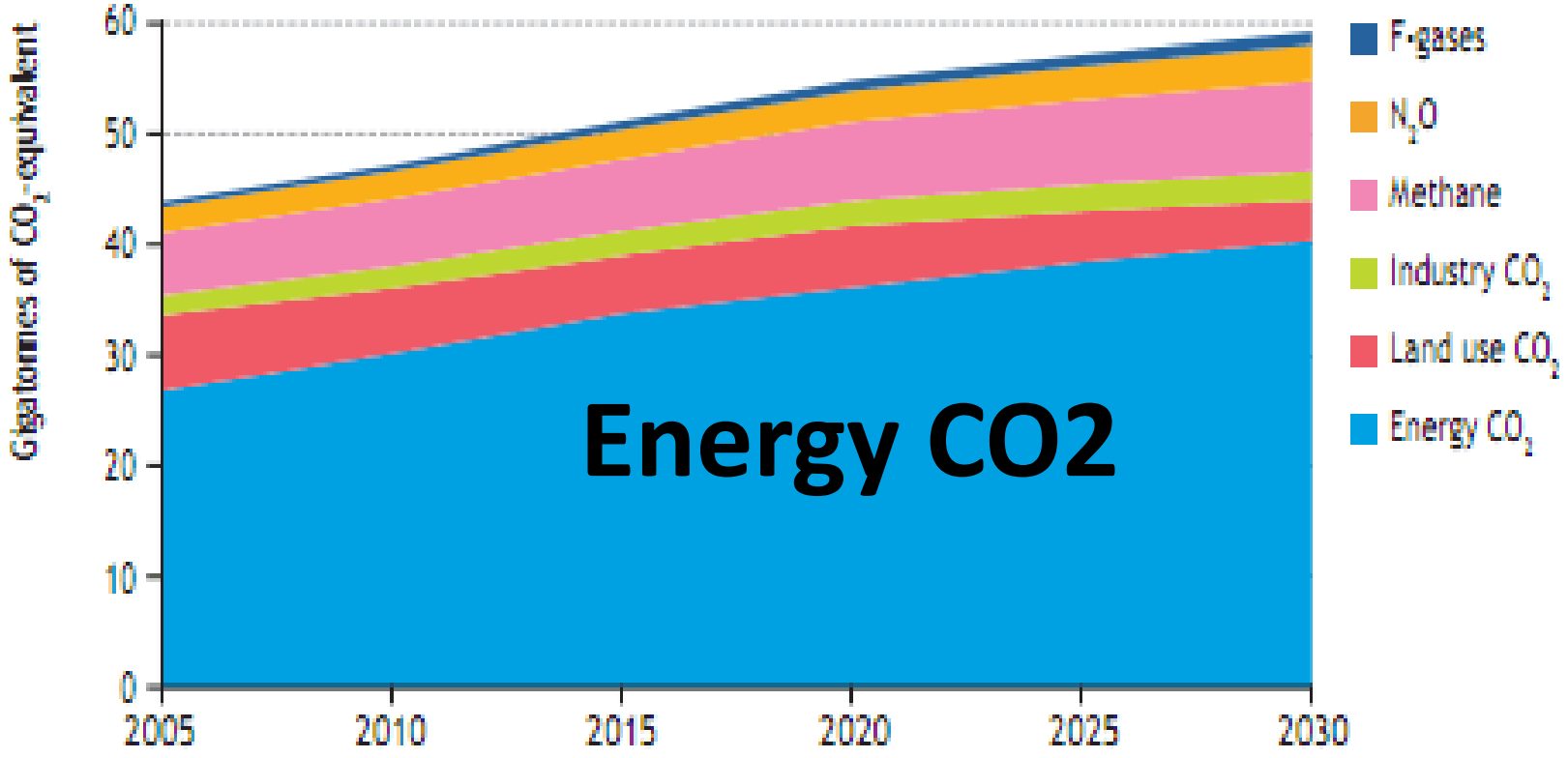
Figure 16.14 • World anthropogenic greenhouse-gas emissions by source in the Reference Scenario, 2005-2030



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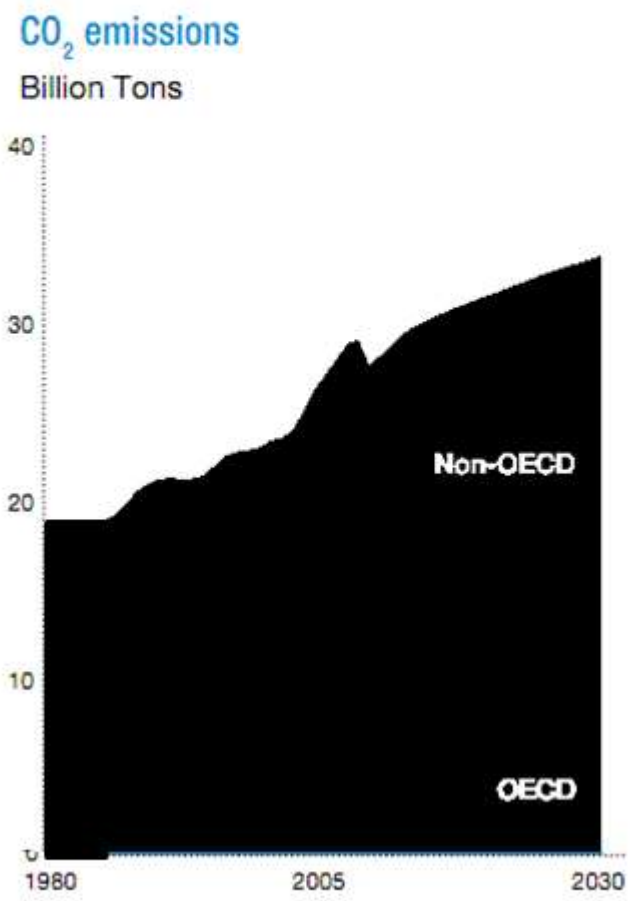
CO_2 emissions



Exxon World Energy Outlook 2010

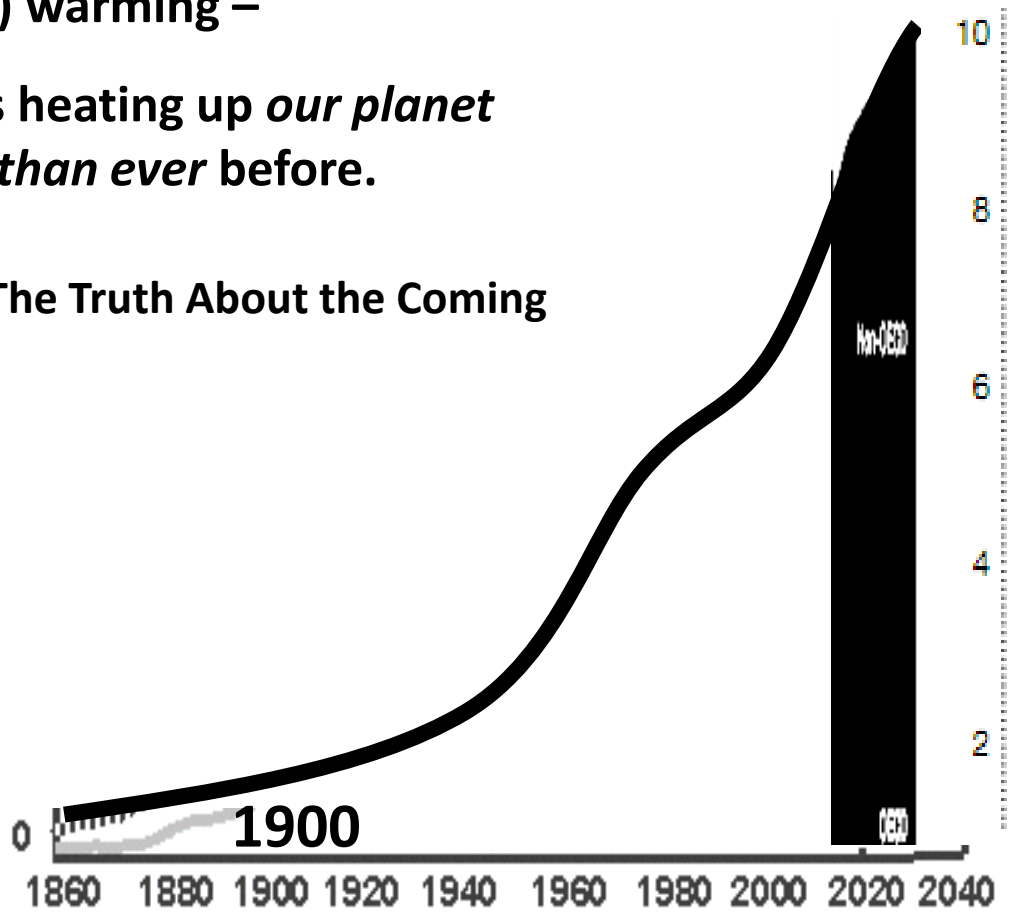
CO_2 emissions

in perspective

Carbon dioxide is being poured into the atmosphere <u>10,000 times faster</u> than the natural past increases of CO2 that have occurred during interglacial (ice age) warming –

and that is planet is heating up *our planet 10 ten times faster than ever* before.

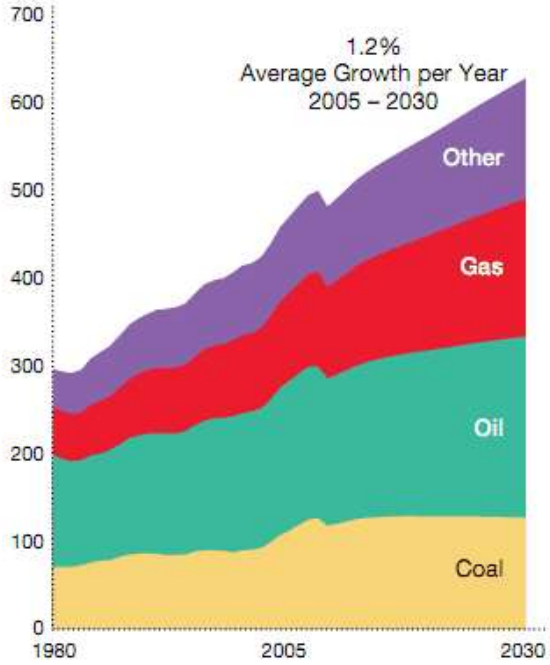
James Hansen 2010 The Truth About the Coming Climate Catastrophe.



Global energy demand and CO_2 emissions

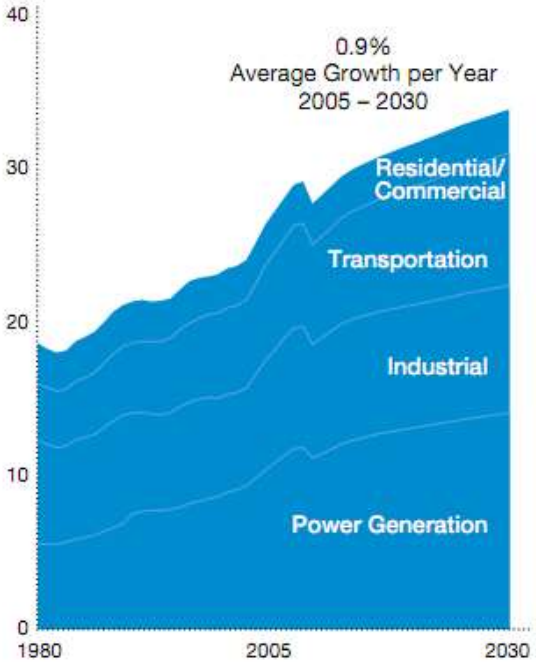
energy supply

Quadrillion BTUs



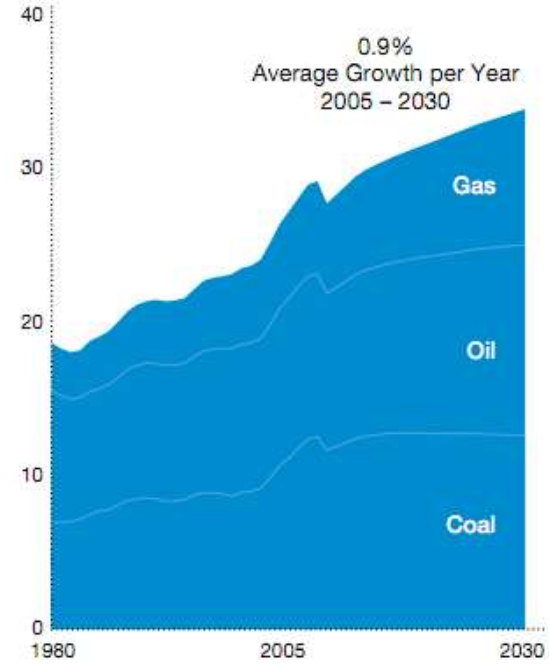
CO_2 emissions by sector

Billion Tons



CO_2 emissions by fuel

Billion Tons



World Energy Outlook 2010 Exxon

Exxon Mobil Energy Outlook 2010

CO_2 emissions

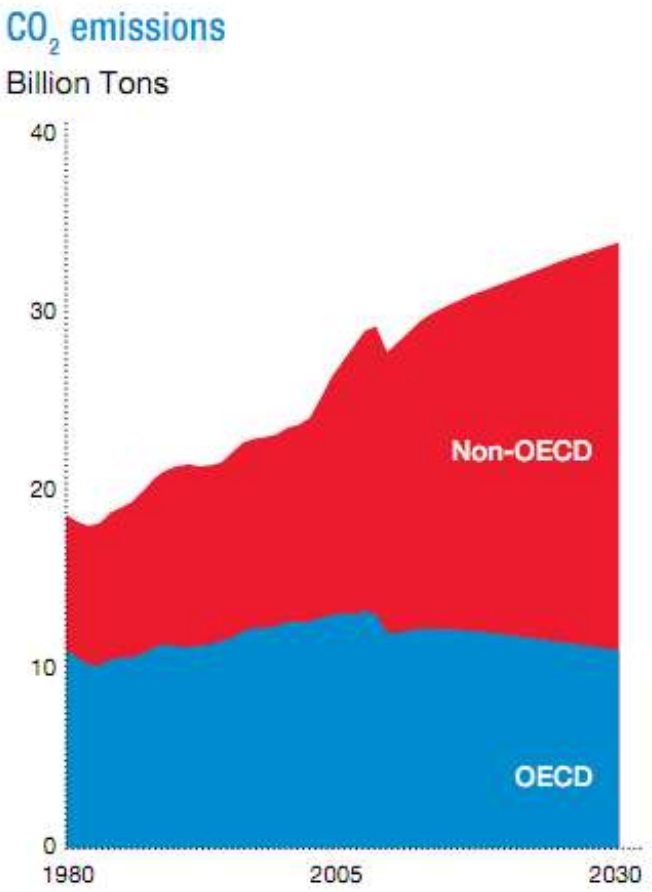
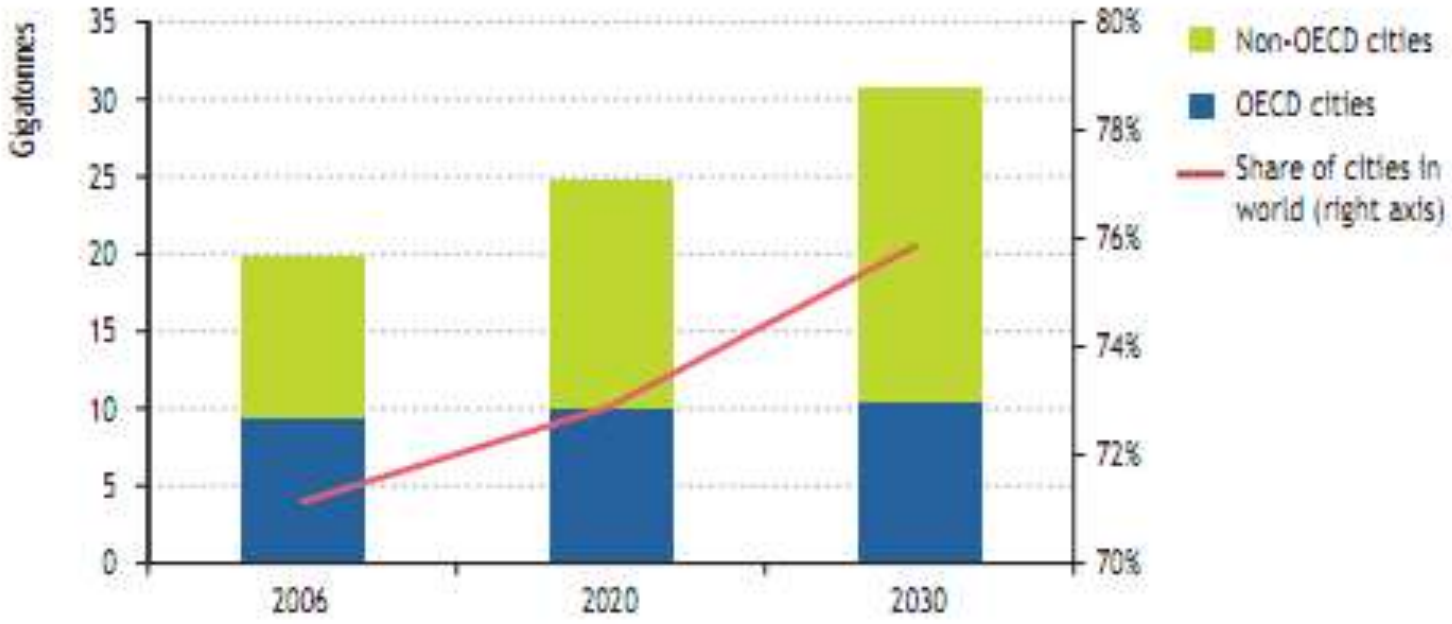
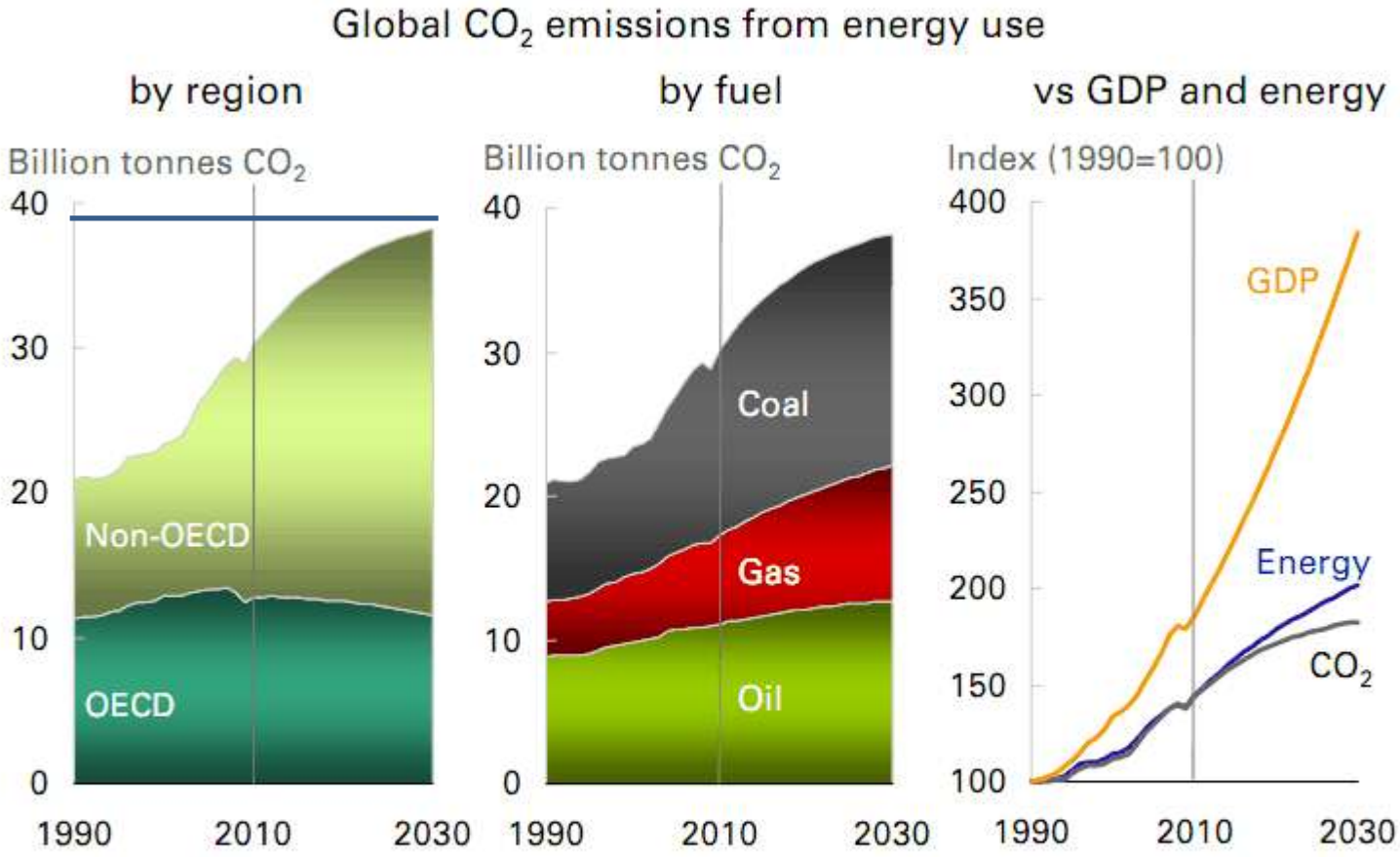


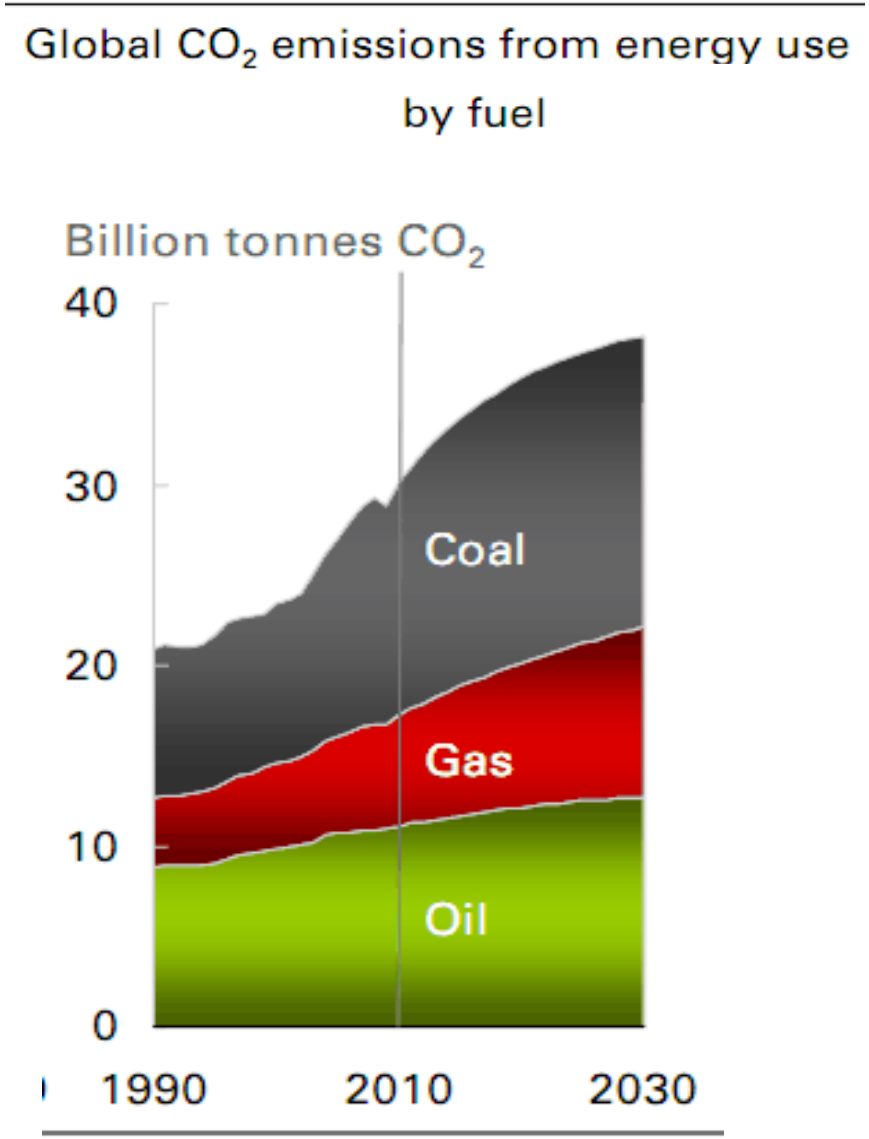
Figure 16.7 • Energy-related CO_2 emissions in cities by region in the Reference Scenario



IEA


Global CO_2 emissions from energy use
by region
Billion tonnes CO_2
40
30
20
10
0
Non-OECD
OECD
1990
2010
2030
by fuel
Billion tonnes CO_2
40
30
20
10
0
Coal
Gas
Oil
1990
2010
2030
vs GDP and energy
Index (1990=100)
400
350
300
250
200
150
100
GDP
Energy
CO_2
1990
2010
2030

Natural gas is a fossil fuel.
It emits CO2.

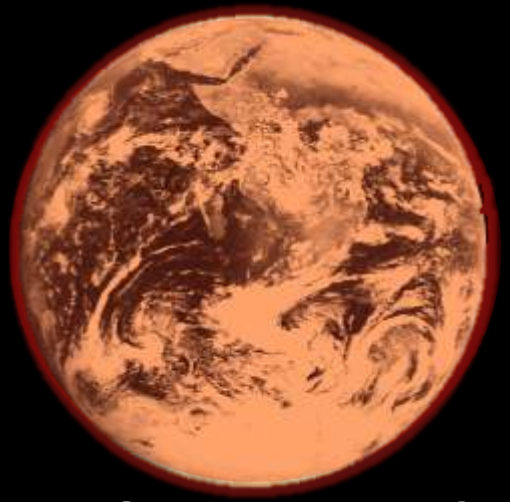


CO2 emissions to increase by 1.2 % every year

- Strong growth in non-OECD energy consumption, especially of coal, translates into continued growth of global CO_2 emissions. The growth of global CO_2 emissions from energy averages 1.2% p.a over the next twenty years (compared to 1.9% p.a. 1990-2010), leaving emissions in 2030 27% higher than today.

CO2 emissions by 2030 27% higher than today.

The 2010 World Energy Outlook plan is to burn all the fossil fuels - including the tar sands and shale oil.



This is a plan to end all life by runaway greenhouse super heating.

Zero fossil fuel energy

Only zero carbon can prevent planetary catastrophe

Below is the quote from the Technical Science report of the 2007 Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment (AR4), that could not be more clear and definite that only zero CO2 emissions can stop global warming- continuing to increase.

IPCC 2007 Assessment Science (Working Group 1) Technical Report. Question 10.3

If emissions of Greenhouse gases are reduced, how quickly do their concentrations in the atmosphere decrease?

While more than half of the CO2 emitted is currently removed from the atmosphere within a century, some fraction (about 20%) of emitted CO2 remains in the atmosphere for millennia.
Because of the slow removal process, atmospheric CO2 will continue to increase in the long term even if its emission is substantially reduced from its present levels.

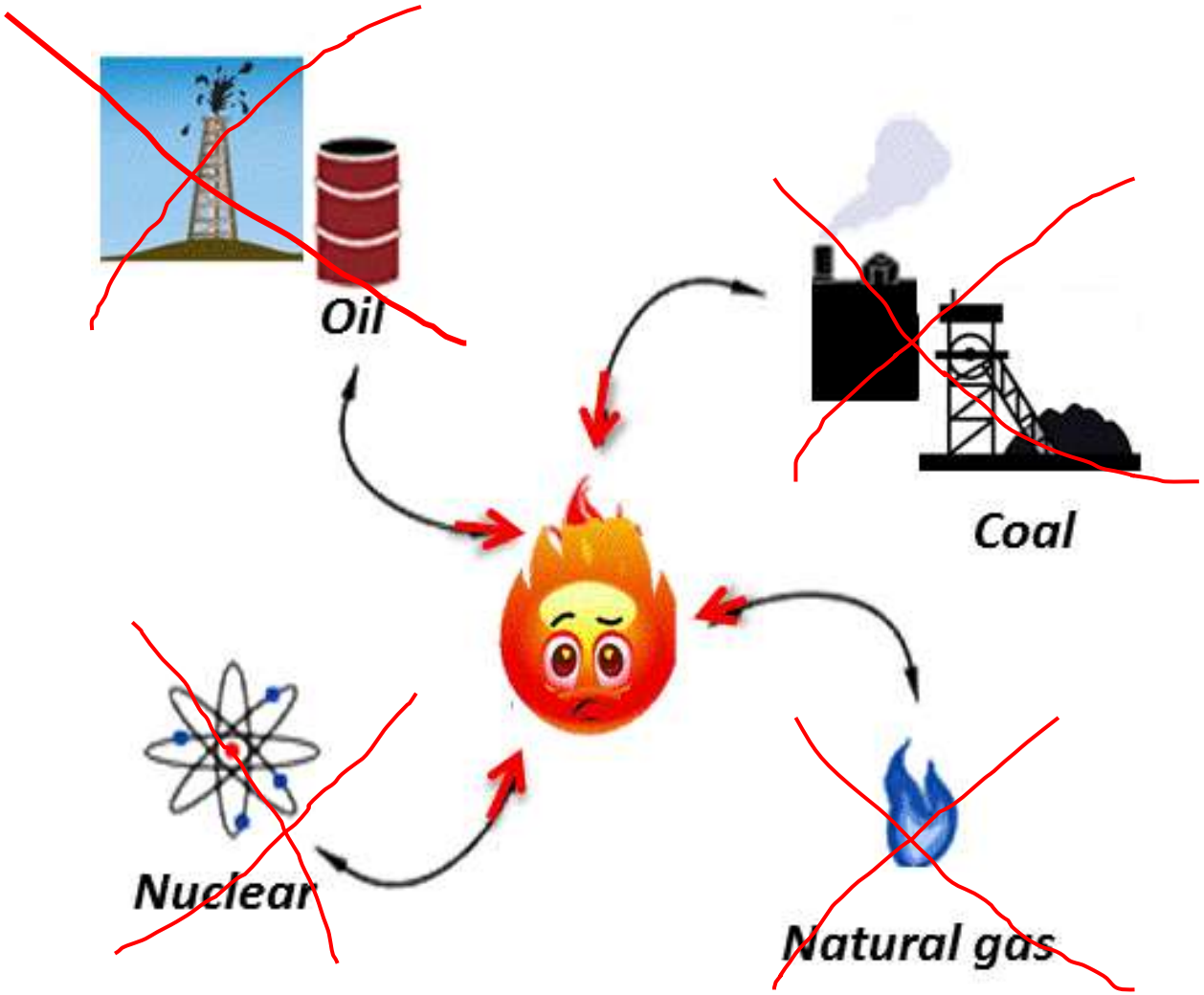
In fact, only in the case of essentially complete elimination of emissions can the atmospheric concentration of CO2 ultimately be stabilized at a constant level.

; for stopping ocean acidification rising.

concentrations by 30%. A 50% reduction would stabilise atmospheric CO_2, but only for less than a decade. After that, atmospheric CO_2 would be expected to rise again as the land and ocean sinks decline owing to well-known chemical and biological adjustments. Complete elimination of CO_2 emissions is estimated to lead to a slow decrease in atmospheric CO_2 of about 40 ppm over the 21st century. **IPCC 2007**

No more Nuclear

Zero Carbon



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FOR EVER