The sixty years crisis

A short history of a huge problem

Part 10 So where do we go from here
Compiled by Carl Ohlen

When you have gone through this history
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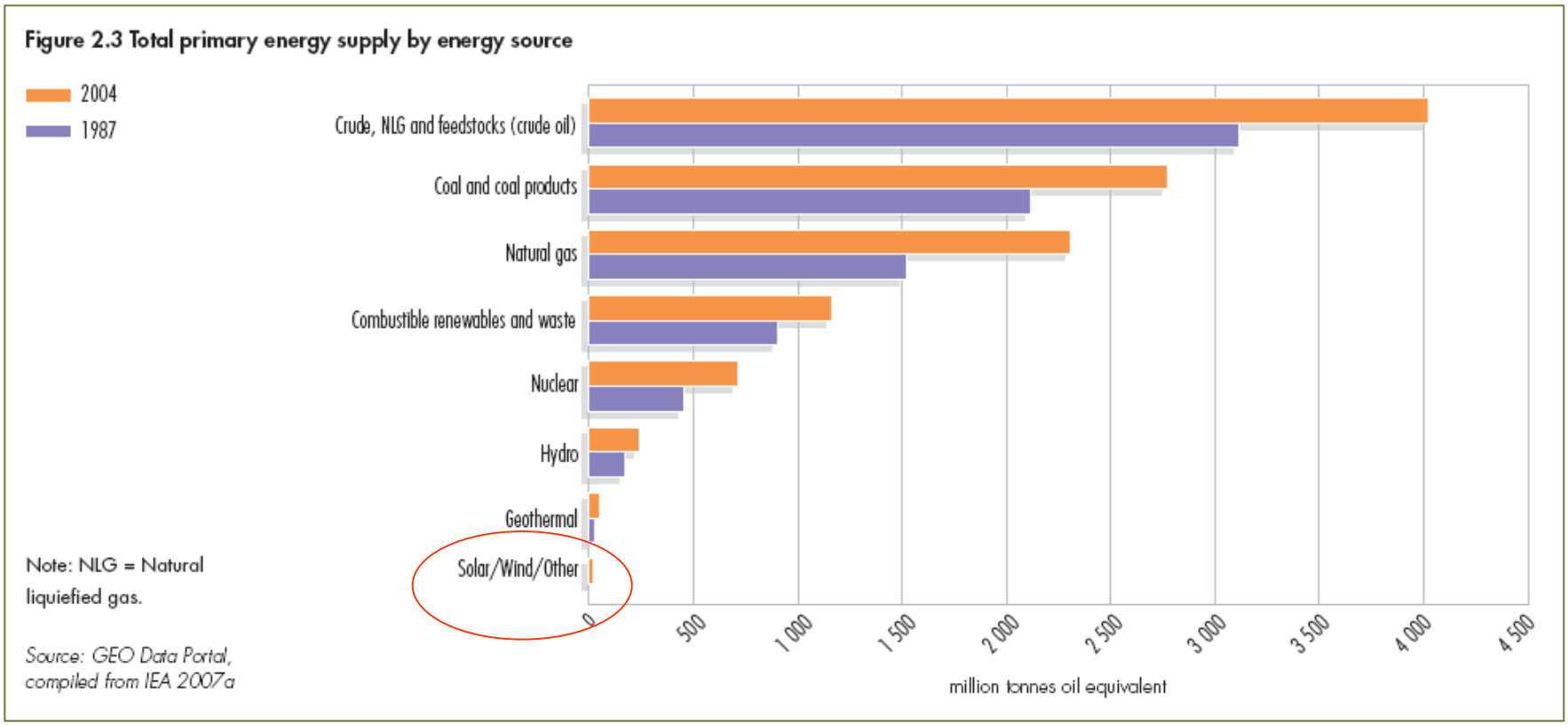
So where do we go from here?

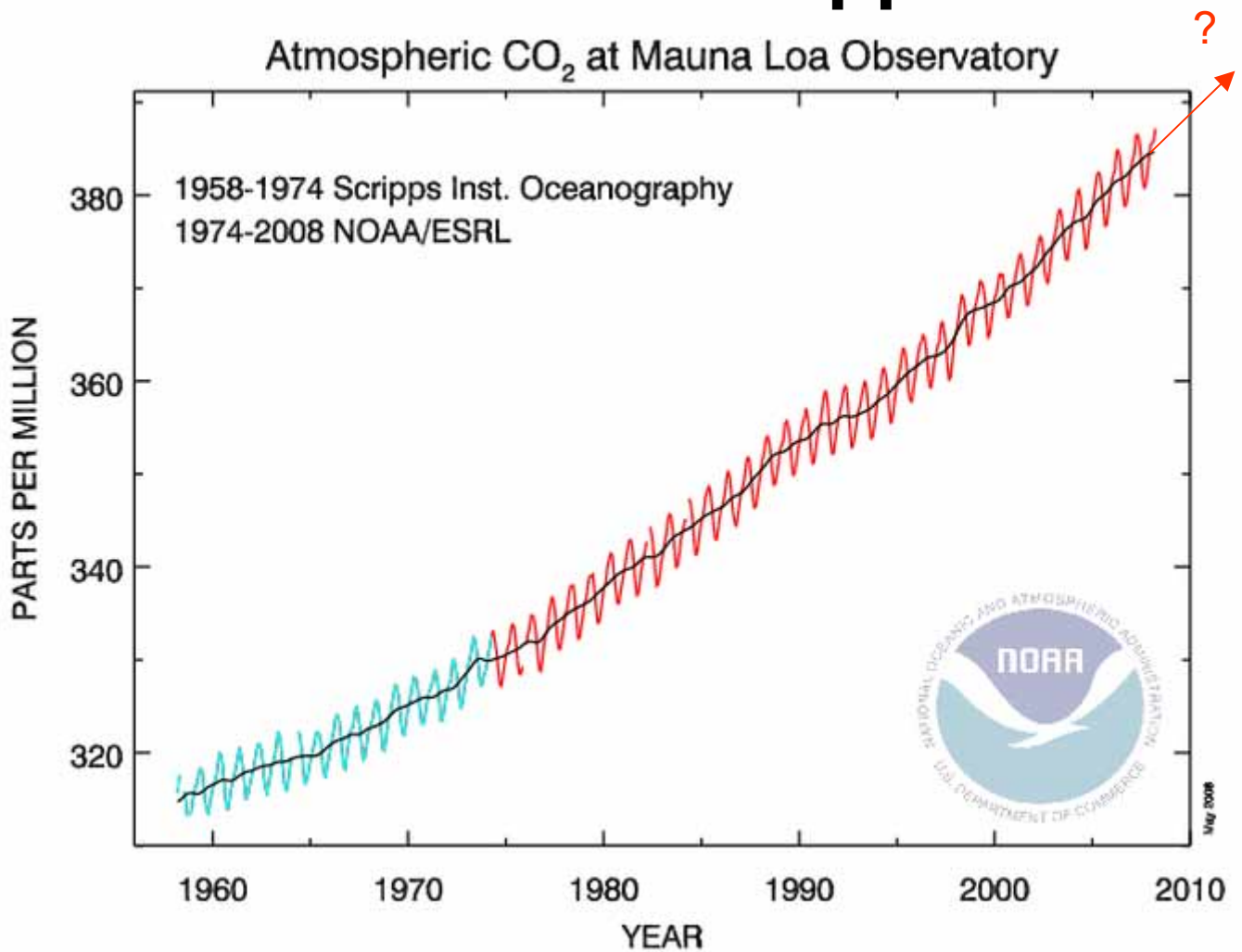


So once again the same conclusion. Our world is today depending on fossil fuel for almost all activities. And although we have know for a long time about the global warming we have increased the use of fossil fuels. Nuclear energy can be used for electricity generation but with unreasonable risks and long term environmental effects. Hydropower has already been utilized. And although we have known about sustainable energy like solar, wind and other it's share is still very, very small.

So how can we now replace all this fossil fuel? Now!

My answer is= I don't know! Nobody knows since it is not possible.

So what will happen?



The answer is simple if we continue as today.

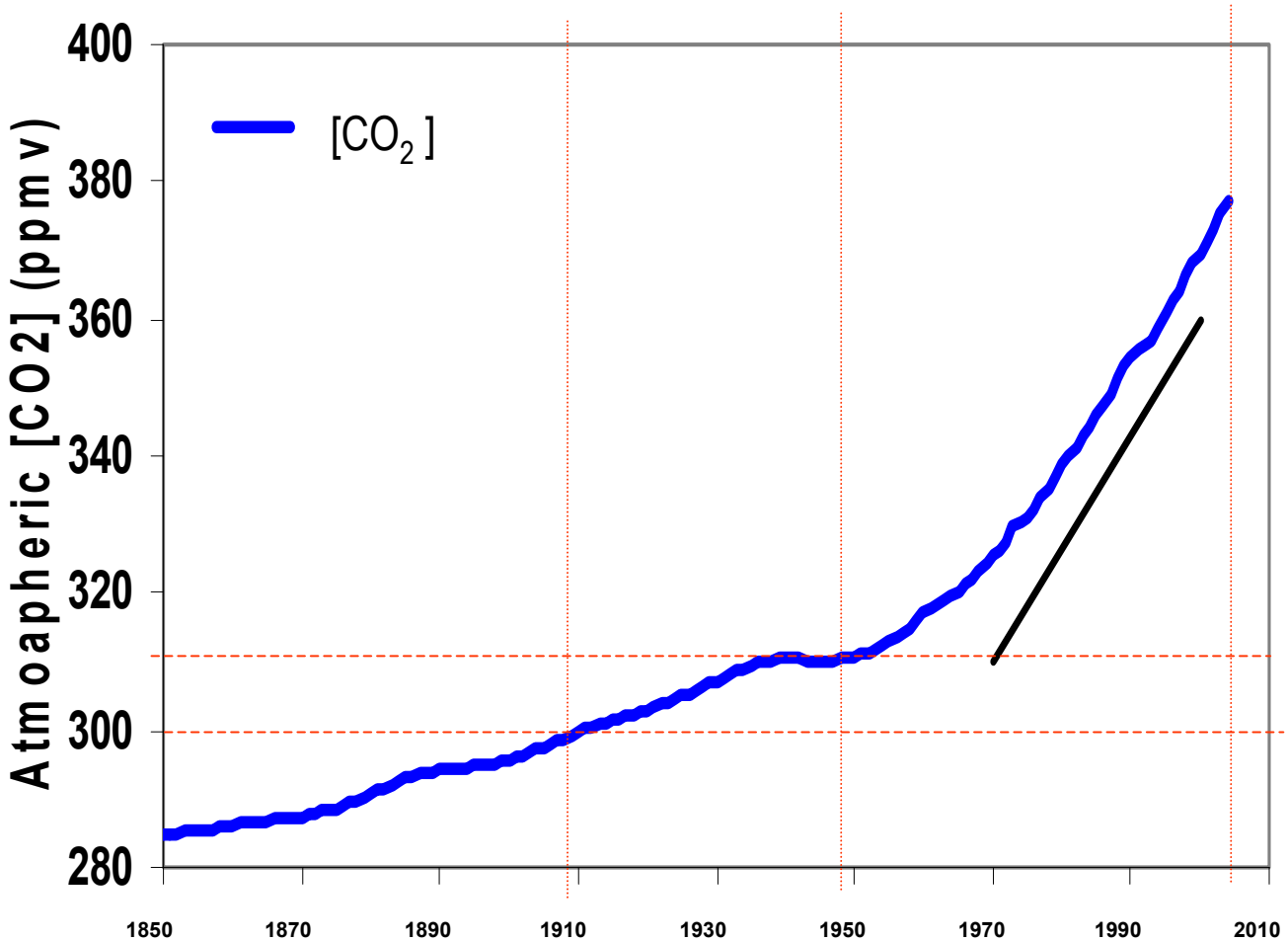
We will use more and more of resources and pollute more and more waste, gases, chemicals etc. until we have severely damage the eco system beyond repair for what we today call our living earth.

The high way to hell!

The exponential development

ppm	Year	ppm/year
385	2008	2,0
365	1998	1,5
350	1988	1,5
335	1978	1,2
323	1968	0,8
315	1958	0,5
310	1948	0,3
300	1908	0,3
284	1848	0,1
278	1748	0

The increase of CO2 concentration in the atmosphere was 0,3 ppm/year up to 1948, then increased to 1.2 ppm/year 1978. The last ten years it has been 2.0 ppm/year



The exponential development means that the increase is increasing. This phenomena was described in the report “Limits of growth” from 1972. A report criticized and forgotten but with exact predictions of population, urbanization...and CO_2 concentration. The big focus is today on CO_2. But the same exponential development has been seen for the use of many resources. It is the result of our consumption!

The sky is the limit

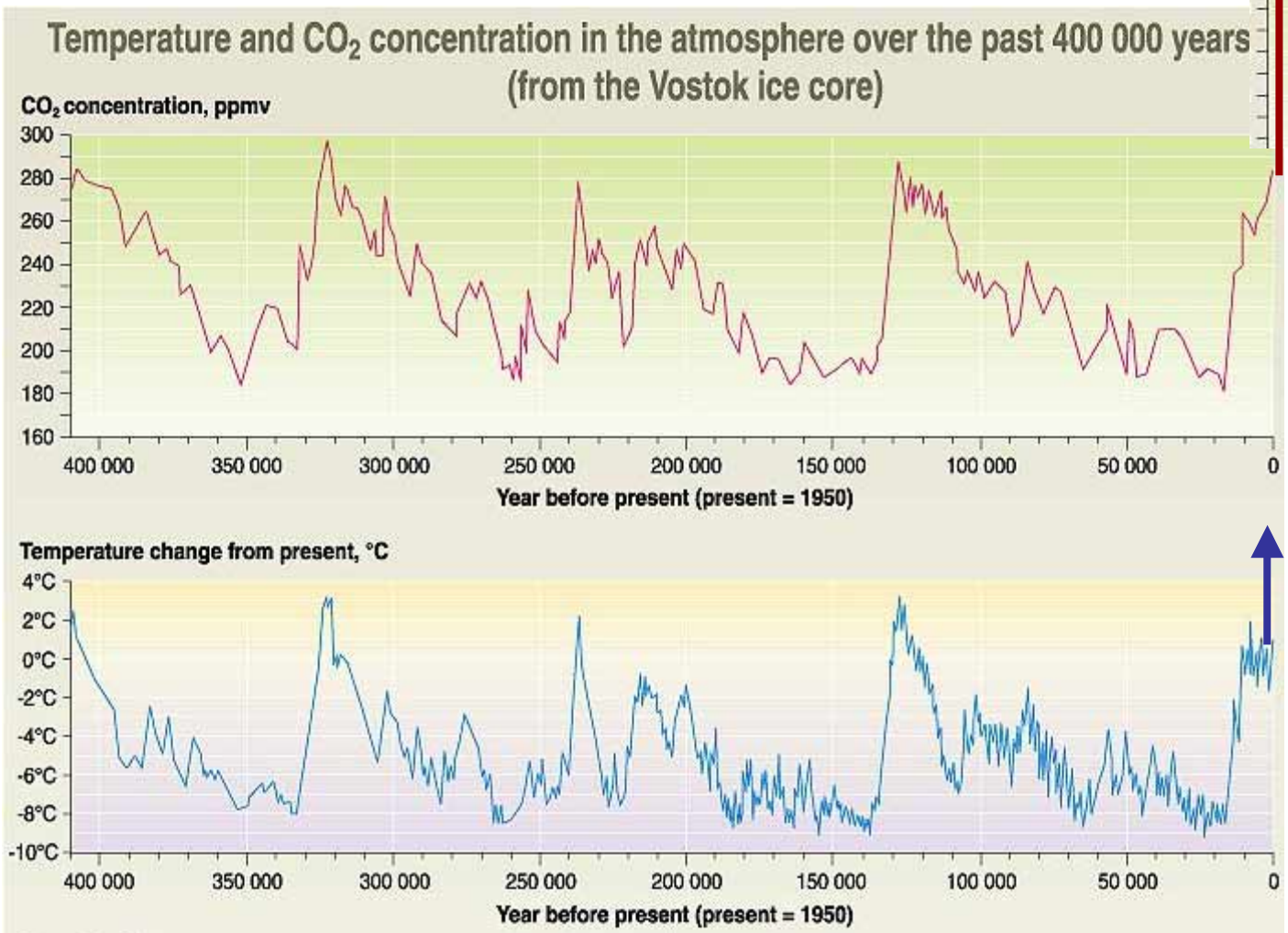
During the last 400 000 years the climate on earth has varied causing ice ages and warmer periods. These changes follows the CO2 concentration. No we have managed to break the record. we are now far above the maximum level eve during this period. But even more problematic is the forecast. We will end up between 520 and 900 ppm. What the result will be God only knows.

520

385

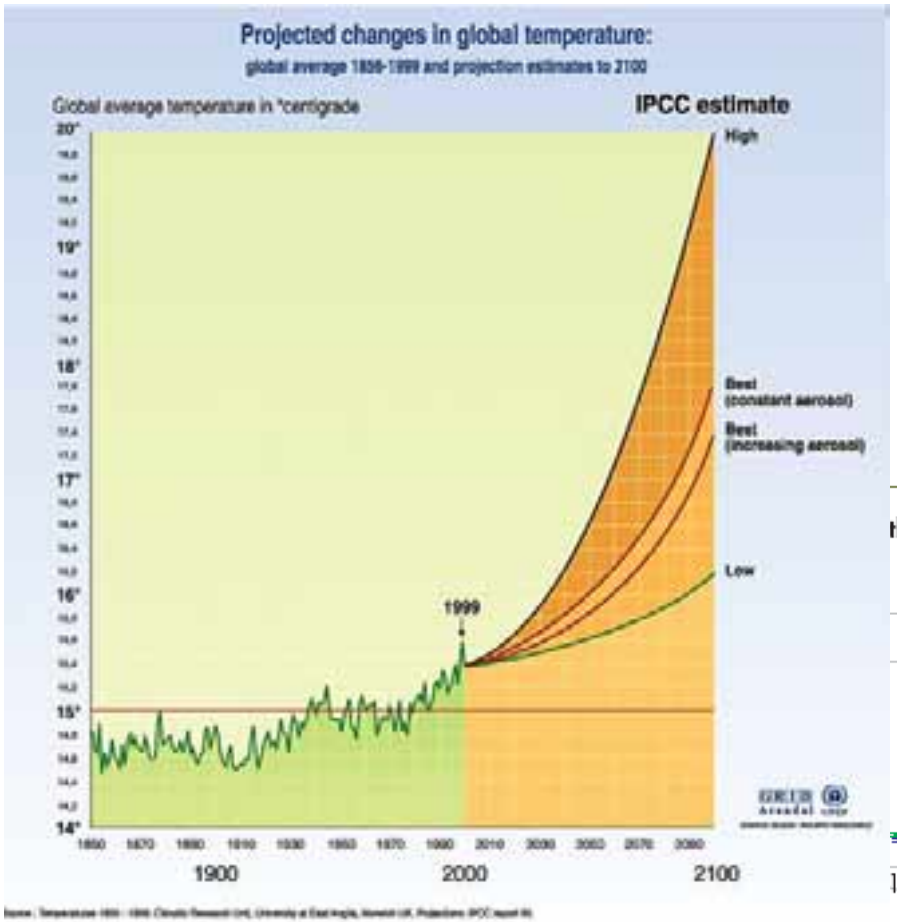
900 year 2100??
520 year 2100 ?

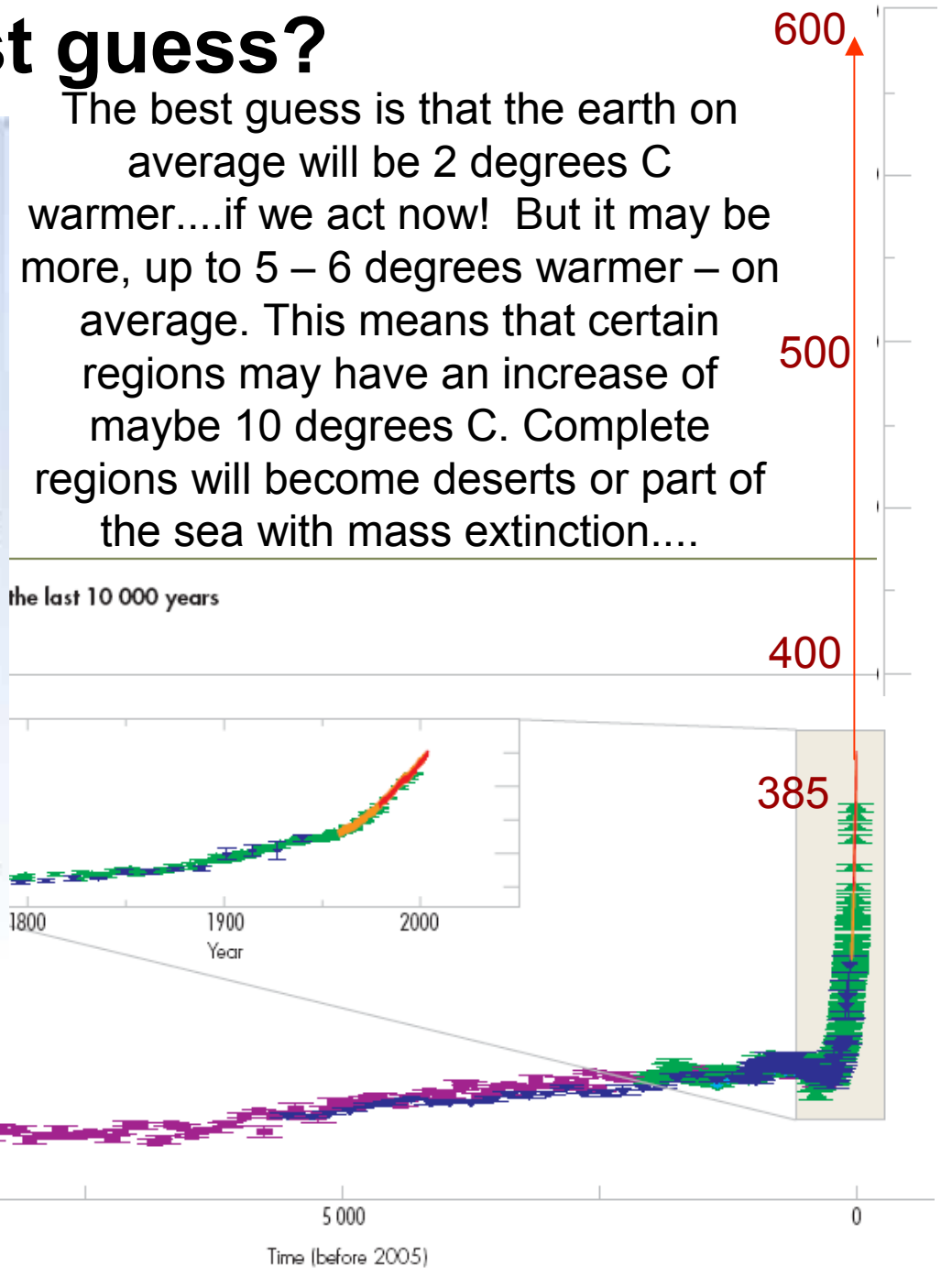
385 year 2008
368 year 2000
280 year 1860



The best guess?

The best guess is that the earth on average will be 2 degrees C warmer....if we act now! But it may be more, up to 5 – 6 degrees warmer – on average. This means that certain regions may have an increase of maybe 10 degrees C. Complete regions will become deserts or part of the sea with mass extinction....





Note: Measurements of CO_2 are shown from ice cores (symbols with different colours for different studies) and atmospheric samples (red lines).

Source: IPCC 2007

The best gas?

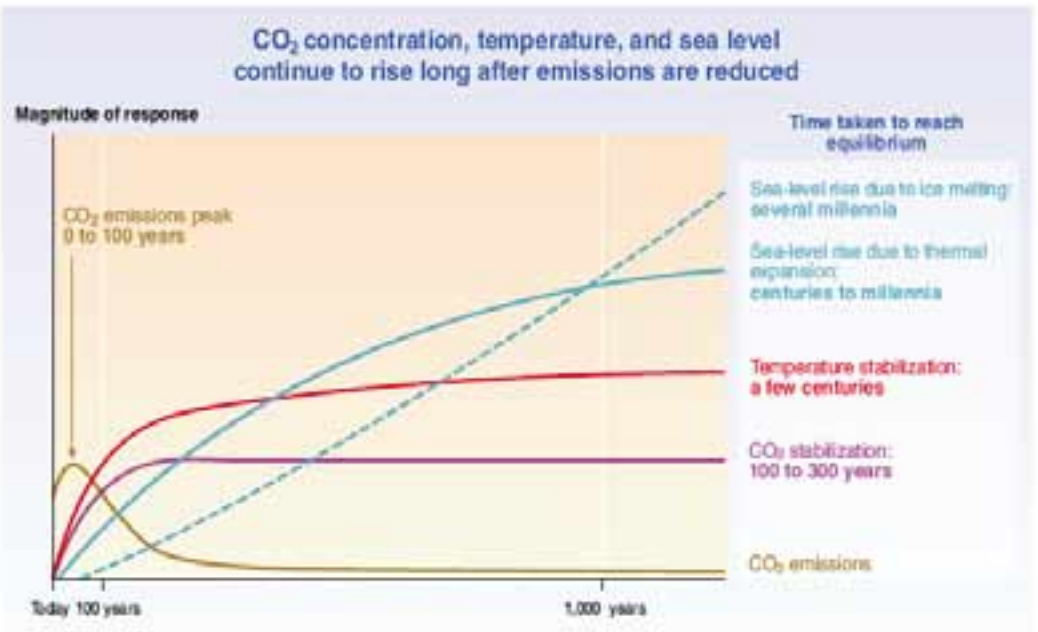
The best gas is surprisingly CO_2. Most other gases we are emitting have much higher global warming potential. Methane is 21 times more powerful and SF_6 is 23 900 times more powerful. It is naturally also important how much gas we are polluting. And here CO_2 by far is winning.
But there is another important aspect and this is how long time the gas stays in the atmosphere. Here methane is short-lived with around 12 years while CF_4 stays for 50 000 years. The problem is that CO_2 also stays for many years although we do not exactly know this. The best guess is between 500 to 5000 years. So even if we completely stop polluting today the damage is already there and for a long time. For generation after generation to come. Maybe as long as the age of our civilization...or longer.

The main greenhouse gases

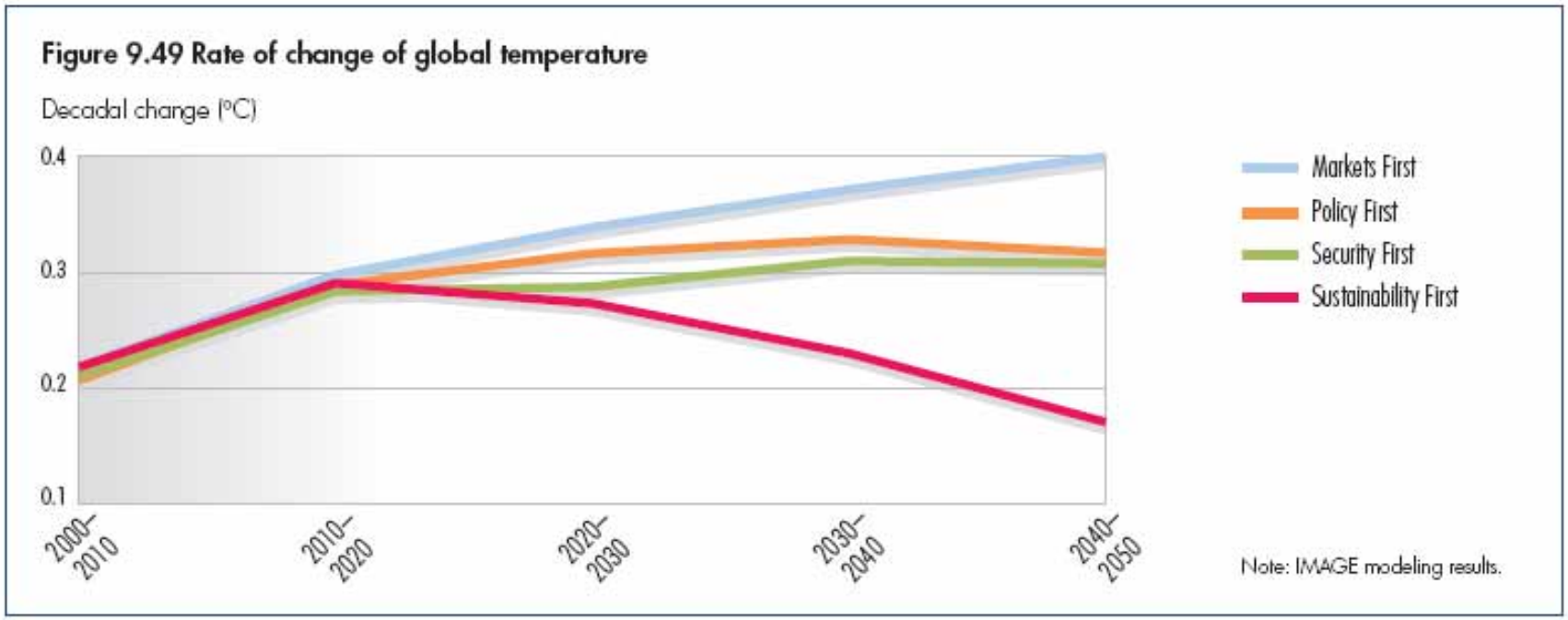
Greenhouse gases	Chemical formula	Pre-industrial concentration	Concentration in 1994	Atmospheric lifetime (years)***	Anthropogenic sources	Global warming potential (GWP)*
Carbon dioxide	CO_2	278 000 ppbv	358 000 ppbv	Variable	Fossil fuel combustion Land use conversion Cement production	1
Methane	CH_4	700 ppbv	1721 ppbv	12.2 +/- 3	Fossil fuels Rice paddies Waste dumps Livestock	21 **
Nitrous oxide	N_2O	275 ppbv	311 ppbv	120	Fertilizer industrial processes combustion	310
CFC-12	CCl_2F_2	0	0,503 ppbv	102	Liquid coolants Foams	6200-7100 ****
HCFC-22	$CHClF_2$	0	0,105 ppbv	12.1	Liquid coolants	1300-1400 ****
Perfluoromethane	CF_4	0	0,070 ppbv	50 000	Production of aluminium	6 500
Sulphur hexa-fluoride	SF_6	0	0,032 ppbv	3 200	Dielectric fluid	23 900

Note : ppbv: 1 part per billion by volume; pptv: 1 part per billion by volume, ppm v: 1 part per million by volume

* GWP for 100 year time horizon, ** Includes indirect effects of tropospheric ozone production and stratospheric water vapour production, *** On page 13 of the IPCC SAR. No single lifetime for CO_2 can be defined because of the different rates of uptake by different sink processes, **** Net global warming potential (i.e., including the indirect effect due to ozone depletion).

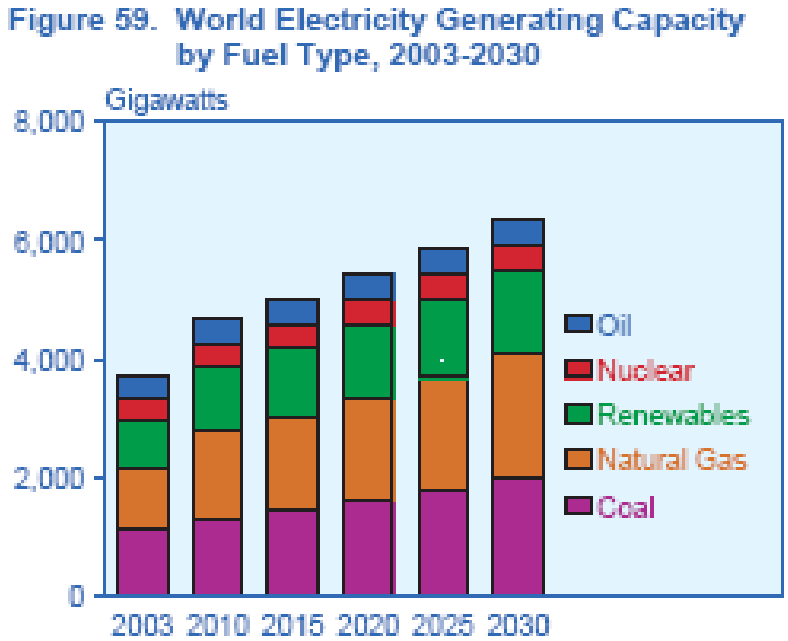


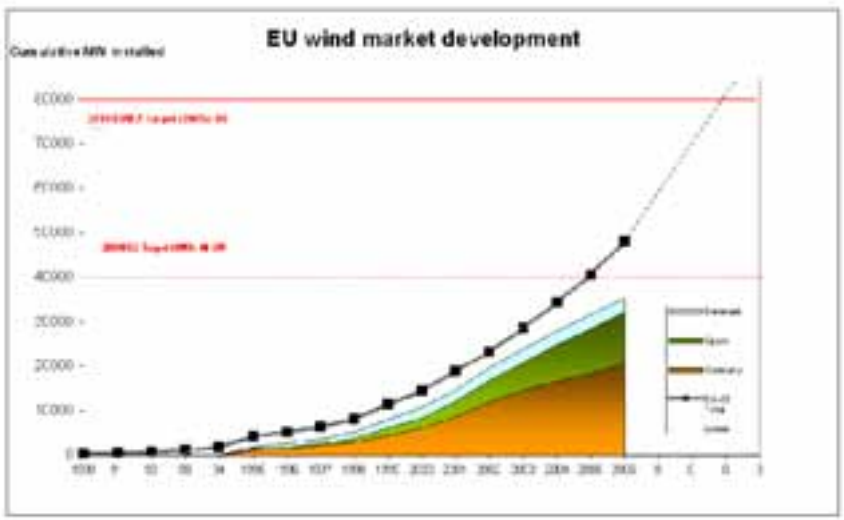
The UN sustainable direction



We still have a choice. Shall the future be bad or shall it be horrifying? The minimum rise in temperature will be 2 degrees even with UN sustainability first scenario. BAU, business as usual scenario with market first will see an increasing increase of temperature up and above at 0.4 degrees per decade. It is quite clear that the only possible direction is something similar to what United Nation calls the sustainability first alternative. All other alternatives leads towards a total break down of the ecosystem and a world we do not want to live in. The challenge is that this will require a complete u-turn of the already developed rich countries and a new direction for the developing countries. So how can we do this?

Can wind power generate all electricity?





No it can't. Europe is now investing heavily in wind power and this is very good. But wind power is only available when we have wind. So the total energy is limited and has to be combined with other sources, hydro for example. Once again the Scandinavian countries have a very good situation, better than most, especially Norway and Sweden with hydro power. But many other countries are lacking both hydro and wind possibilities. Today wind represents just a fraction of a percent for the global energy need. Even with a massive increase this is not going to replace all fossil and nuclear power. And building wind plants requires resources as well. The diagram to the left shows what EIA estimate up to 2030 which is 100% increase of fossil fuel!

TWh	DK	FI	NO	SE	TOTAL
Hydro	0	14	137	72	222
Nuclear	0	22	0	70	92
Heat	28	32	1	12	73
Wind	7	0	1	1	8
Production	34	68	138	155	395
Consumption	36	85	126	147	394

Can bio fuel replace gasoline in all cars?

Box 5.11 Top biofuel producers in 2005 (million litres)

Biodiesel	
Germany	1 920
France	511
United States	290
Italy	270
Austria	83
Bio-ethanol	
Brazil	16 500
United States	16 230
China	2 000
European Union	950
India	300

Source: Worldwatch Institute 2006

Brazil is today constructing 150 new plants for alcohol and most new cars is ”flexi fuel” that can use either gasoline or alcohol. This is naturally good for Brazil. Their sugar cane production is also much more efficient than the American corn based production, but....

USA has about 250 million cars.On average these cars consume 4000 liter fuel per year. This means that 1 000 000 million liters of bio fuel is needed. Today's production is 16 500 or 1.7% of what is needed....

....and yes. In order to produce 1 liter of bio fuel by corn in USA, 90% is required for the production of bio fuel.....

So the conclusion is that it is not by far possible to produce enough bio fuel for the growing world population of cars in the world. It can be an alternative for some countries and for some transportation.

The WWF solution = more and less!

WWF suggest that a combination of new sustainable energy resources and with saving in more efficient processes, buildings and transportation we could meet the energy demand. But do we achieve this transformation – today!

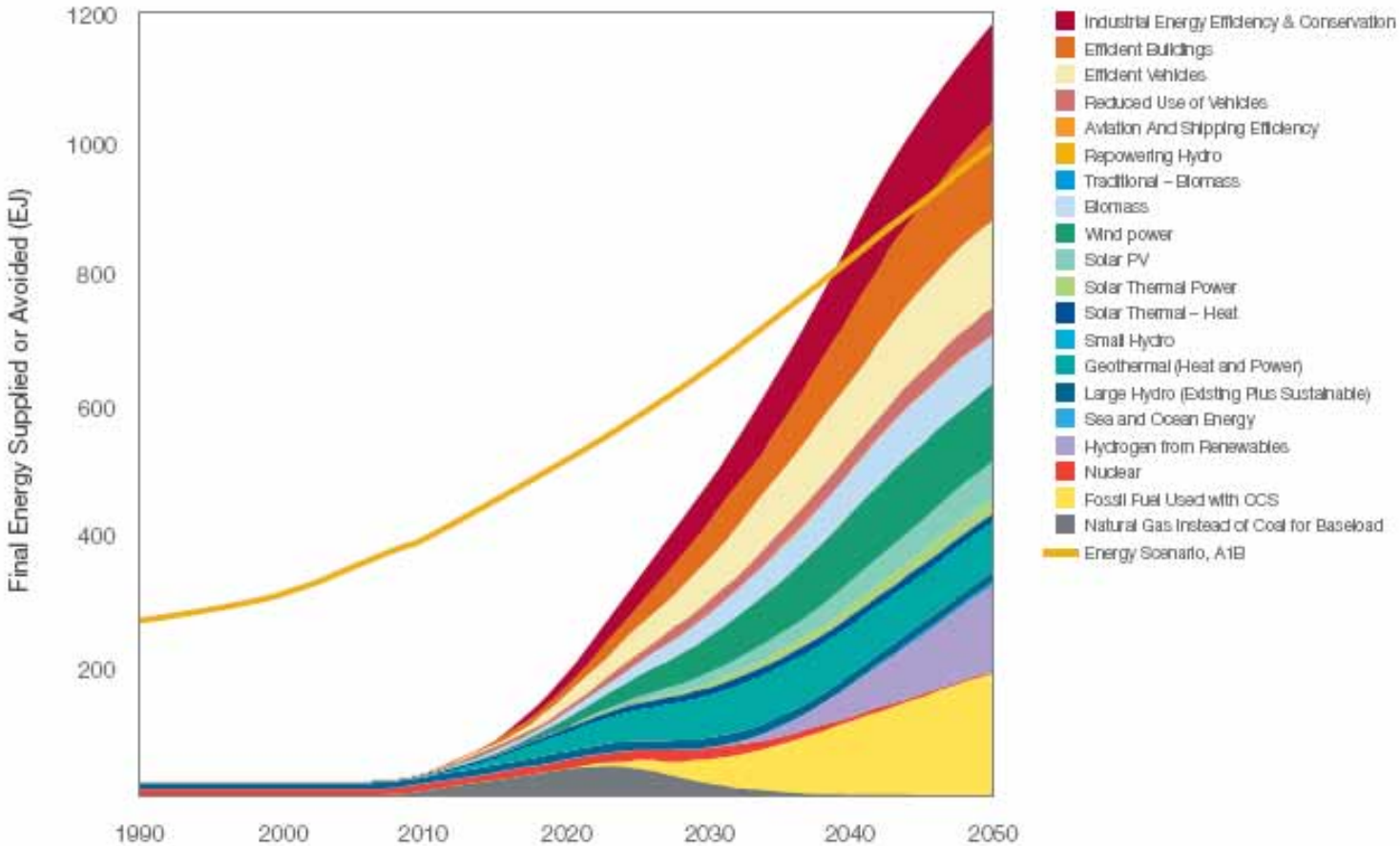
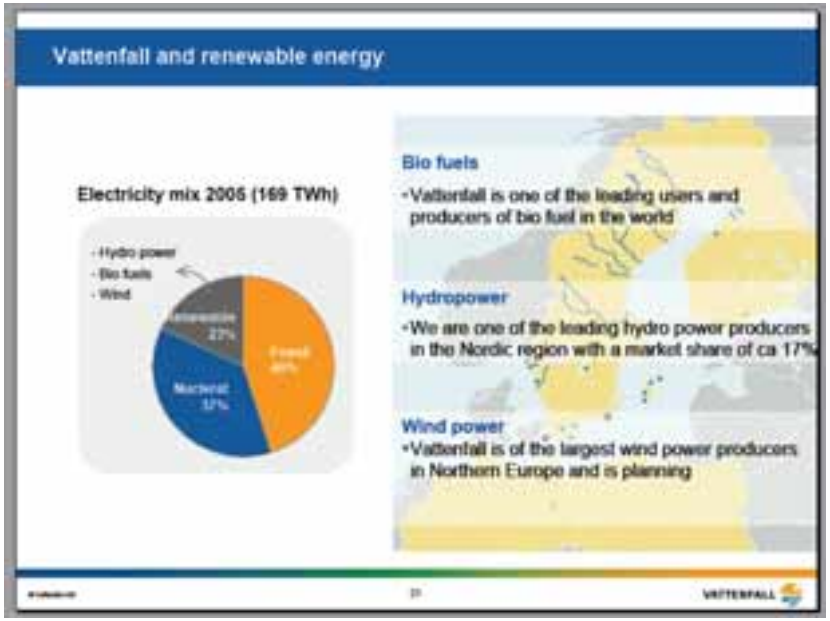


Figure 4. A representative scenario of the Climate Solutions Model depicting technology wedges capable of averting dangerous climate change. Each climate solution wedge grows over time and the sum of all wedges becomes significant as industrial capacity and deployment increase in scale. The top yellow line refers to the energy demand projection in the SRES A1B scenario. Note that since energy-efficiency technologies are shown alongside energy supply from low-emission sources, the results are expressed in final energy supplied or avoided (rather than primary energy production).

Some corporations are finally responding

Within the energy sector some corporations are responding to the threat and this is naturally a very good Iniative. Most large companies will later present similar agendas. Even oil and car manufacturers. It is necessary for their image. The question is what this will give in real result. But it is quite clear that those companies that can develope and use new sustainable technology are going to be very, very sucessful and profitable. So for them there is no conflict between profit & environment.

Vattenfall is one of them

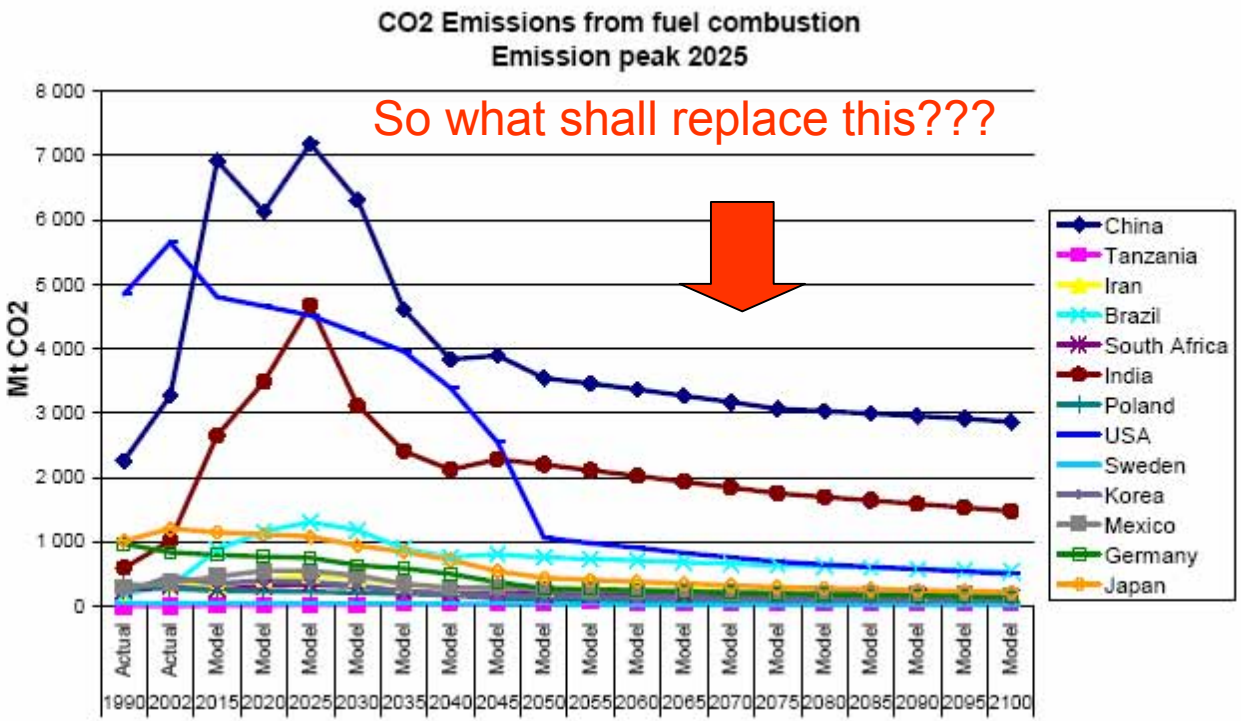


Vattenfall is state owned utility in Sweden. After the deregulation of the power utility market during the 1990ies Vattenfall has grown to one of the major utilities in Europe operating both hydro, nuclear, fossil and wind power generation in Scandinavia, Germany and Poland. Their initiative is therefore a good start. But there is a long way to travel and many other problems to solve.

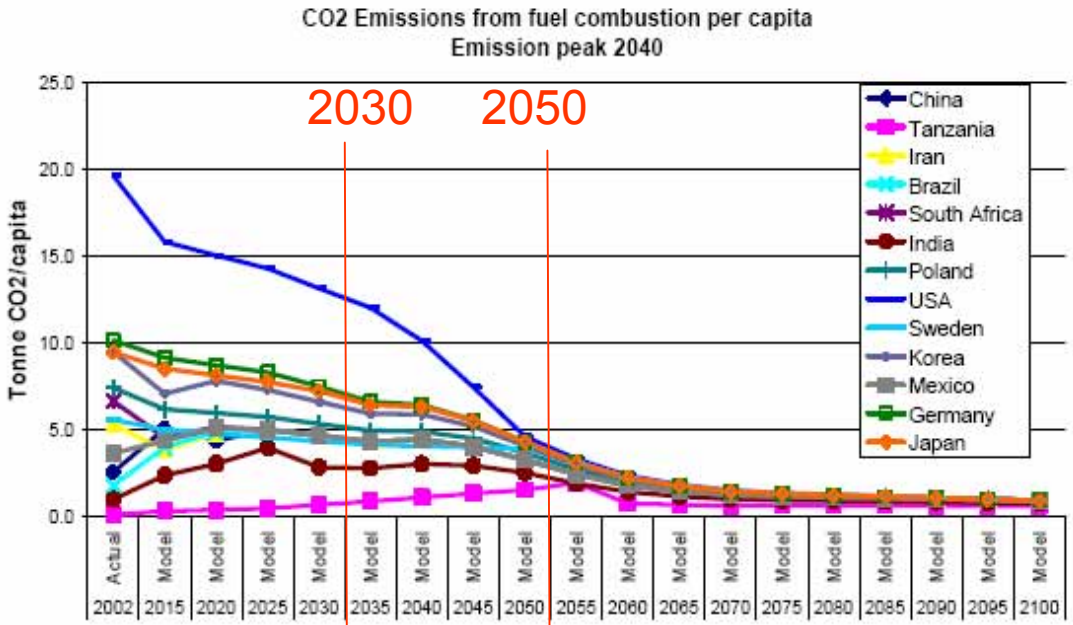
I worked for several years at Vattenfall during the 1970s when Sweden was expanding it's energy supply with hydro and nuclear power. We were all engineers and we are good at solving technical problems. The advantage was that Sweden as one of the very few countries could phase out fossil fuel for power production. But instead Sweden got more and more depending on Nuclear Power with it's long term risk. And we still are. Germany and Poland are depending on fossil fuel. So how can we both reduce fossil & nuclear energy?

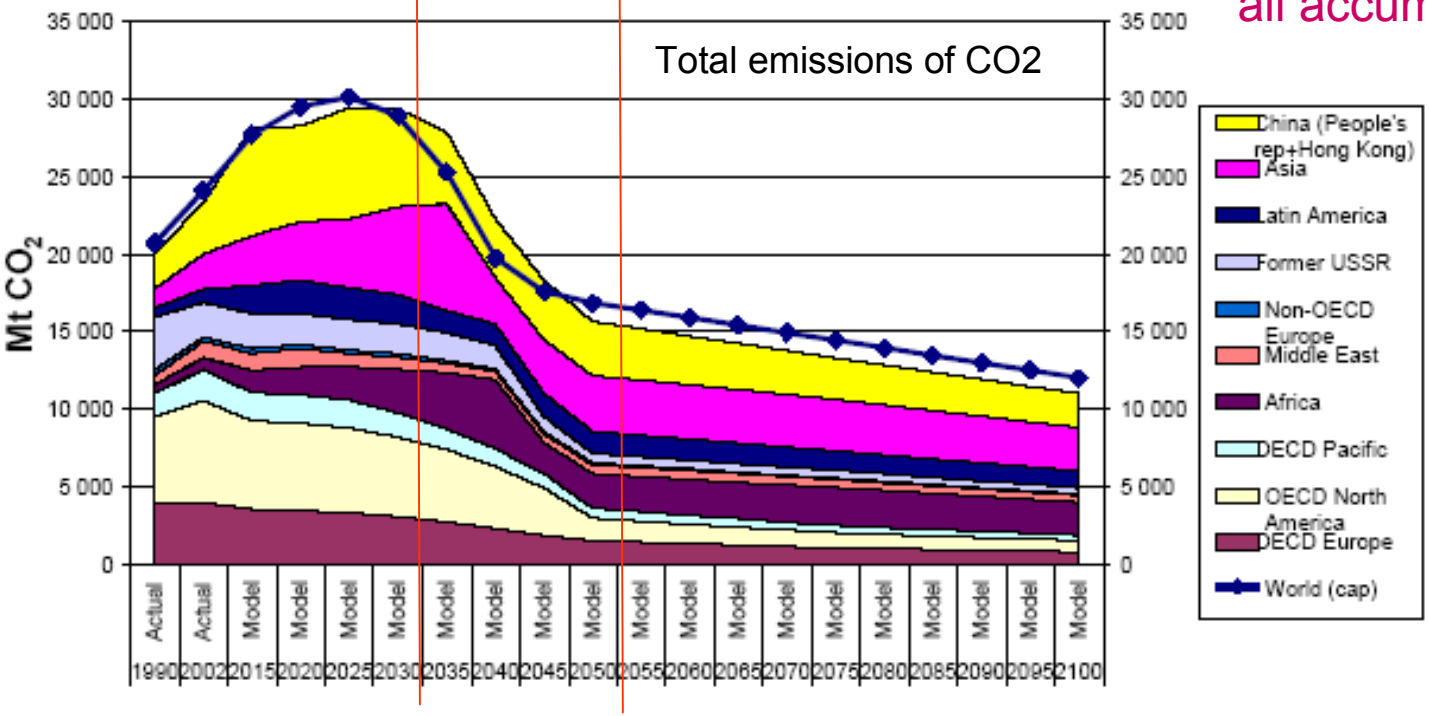
Curbing climate change - later

So if we now that we have to drastically and immediately reduce the use of fossil fuels and reduce CO_2 emission – why don't we start. There are two answers. We can't. We do not want to. We do not have the resources nor technology to immediately replace fossil fuel and maintain economic growth. So what Vattenfall but also UN and others are proposing is to allow future consumption growth in the developing countries but start now to decrease in the already rich countries. Maybe this is the only possibility now – but what shall replace fossil fuel when we further has increased our present model based on consumption?



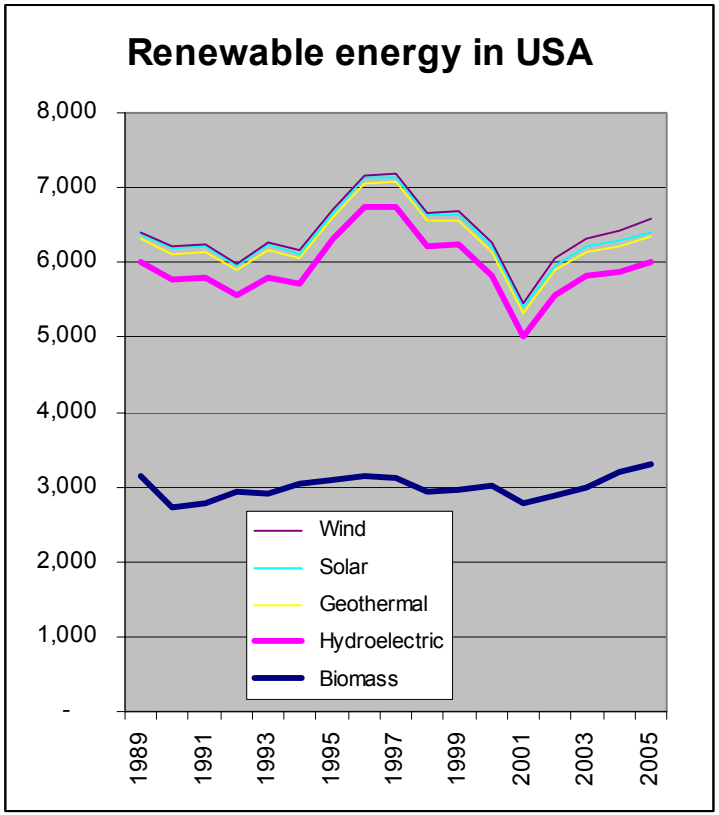
Vattenfall "Curbing Climate Change"





The difficult task is to get an agreement on how to share the responsibility. This is the allocation proposals for the Vattenfall late peak scenario based on the GDP approach for sharing. 2030 we reach the peak. In 2040 we are back to 1990 emission levels. and remember that CO_2 concentration will build up for all accumulated emission.

The US challenge



US Energy mix	2005
Fossil Fuels	85,6%
Coal	22,6%
Coal Coke Net Imports	0,0%
Natural Gas	22,7%
Petroleum	40,4%
Electricity Net Imports	0,1%
Nuclear Electric Power	8,1%
Renewable Energy	6,5%
Conventional Hydroelectric	2,7%
Geothermal Energy	0,3%
Biomass	3,3%
Solar Energy	0,1%
Wind Energy	0,2%

2005 USA consumed 85.6% fossil fuel, 0.2% wind energy and 0.1 % solar energy. A large potential to improve. But looking at the total renewable energy from 1989 to 2005 this did not increase at all. And the consumption of oil increased from 795 million ton to 951 million ton during the same time. And this continuous without any sign of changing.

The increase of fossil fuel consumption from year 2001 to 2005 was 20 times higher than the total wind energy production in USA 2005.

Findings of the U.S. Climate Change Science Program Synthesis and Assessment Report 2.2:

The First State of the Carbon Cycle Report:

North American Carbon Budget and Implications for the Global Carbon Cycle

North America contributes about a quarter of global fossil-fuel emissions.

- North America contributed 27% of global fossil-fuel emissions in 2003, approximately 85% of the North American emissions were from the United States, 9% from Canada, and 6% from Mexico.

The atmospheric concentration of carbon dioxide increased by 31% between 1850 and 2003, and the present concentration is higher than at any time in at least the past 420,000 years.

In North America, more carbon dioxide is emitted to the atmosphere from energy use than is removed by plants and soil.

- In 2003, growing vegetation in North America removed approximately 30% of the fossil-fuel emissions produced from North America. The imbalance between the fossil-fuel source and the sink on land is a net release to the atmosphere.

Forests play a critical role in removing carbon dioxide from the atmosphere.

- Approximately 50% of North America's terrestrial sink is due to the regrowth of forests in the United States on former agricultural land that was last cultivated decades ago, and on timberland recovering from harvest.

Actions to reduce fossil-fuel emissions will likely be required.

- The large difference between current sources and sinks and the expectation that the difference could become larger suggests that addressing imbalances in the North American carbon budget will likely require actions focused on reducing fossil-fuel emissions.

Amazing! The US report acknowledge the fact that North America contribute with 27% of the global fossil fuel emissions and that only 30% is removed by sinks. But even more amazing is the conclusion that this “will likely require actions”. “When will they ever learn”

What are the management options for reducing atmospheric carbon dioxide concentrations?

- **Options to enhance sinks** (*e.g.*, growing forests) can contribute to reducing carbon dioxide concentrations, but enhancing sinks alone is likely insufficient to deal with either the current or future imbalance.
- **Options to reduce emissions** include efficiency improvement, fuel switching, and technologies such as carbon capture and geological storage (see also back page).
- **Implementing these options** will likely require an array of policy instruments at local, regional, national, and international levels, ranging from the encouragement of voluntary actions to economic incentives, tradable emissions permits, and regulations.

So the main problems are growth in commercial floor space (Shopping Malls etc,), larger houses (Air conditioning etc.) and an estimated increase of transportation with 46%. So what are "the management options"? Enhance sinks (growing forests), carbon capture and geological storage, tradable emission permits....The inability to change! "The same procedure as last year...."

The conversion of fossil fuels to energy (primarily electricity) is the single largest contributor, accounting for approximately 42% of North American fossil emissions in 2003.

More than half of electricity produced in North America (67% in the United States) is consumed in buildings, making that single use one of the largest factors in North American emissions.

- The carbon dioxide emissions from United States buildings alone were greater than total carbon dioxide emissions of any country in the world, except China in 2003.
- In the United States, the major drivers of energy consumption in the buildings sector are growth in commercial floor space and increase in the size of the average home. Carbon emissions resulting from electricity use in buildings are expected to grow with population and income.

North American emissions, accounting for 31% of total emissions in 2003.

- 87% of North American emissions from transportation comes from the United States.
- The growth in transportation and associated carbon dioxide emissions has been steady during the past forty years and has been most rapid in Mexico, the country most dependent upon road transport.
- The growth of transportation is driven by population, *per capita* income, and economic output. Energy use in transportation is expected to increase by 46% in North America between 2003 and 2025.

The competition with food

When the Europeans discovered America they also discovered corn and potatoes that became the foundation for the western food. But not only to feed people but to feed the increased meat industry so we could eat more steak, hamburgers, fried chicken and French fries. And not only for our frying food culture but also for our cosmetic industry we needed more vegetable oil. This is one of the reasons the Asian rain forest is converted to palm oil and soya bean plantations.
The American meat culture therefore consumes a lot of corn. But now also corn is needed to produce ethanol for cars.

Christopher Flavin writes May 12, 2008 for the World watch Institute regarding the plans to double the corn production for bio fuels:
"Efforts to replace oil with bio fuels in the United States are at a critical juncture. Double-digit growth in the production of corn-based ethanol has contributed to a sharp increase in grain and soybean prices while failing to deliver the environmental gains that had been hoped for.... Increasing bio fuels production so dramatically presents an array of environmental risks, including increased nitrogen runoff and the loss of biodiversity as lands are cleared for bio fuel crops. And recent studies indicate that corn-based ethanol could actually produce more carbon dioxide emissions than gasoline-due to the oil and coal needed to produce corn and convert it to ethanol and to the fact that as U.S. cropland is planted in bio fuel crops, pressures will grow to convert forests and grasslands elsewhere, releasing large amounts of carbon dioxide.

The California model

California has got it all. Oil, gas, hydro, wind, geo, solar and great climate. I worked with all when I lived in California during the "boom" in alternative energy in the 80s. California alone use 15% of all hydro and 25% of all other renewables in USA. That is naturally good but basically no increase since when I left 1989. And this also demonstrate how little renewable energy the other states have. But out of all energy only So how shall USA now be able to replace their complete energy consumption from fossil fuel ?

CA Wind plants

Hoover Dam

CA Solar plant

California Quick Facts

- California ranks third in the Nation in refining capacity and its refineries are among the most sophisticated in the world.
- California's per capita energy consumption is low, in part due to mild weather that reduces energy demand for heating and cooling.
- California leads the Nation in electricity generation from non-hydroelectric renewable energy sources, including geothermal power, wind power, fuel wood, landfill gas, and solar power. California is also a leading generator of hydroelectric power.
- California imports more electricity from other States than any other State.
- In 2000 and 2001, California suffered an energy crisis characterized by electricity price instability and four major blackouts affecting millions of customers.

The Swedish (old) Model

Sweden is since long co-operating with the other Nordic countries in NORDEL. This is a common electrical system mainly based of hydro and nuclear power but with increasing windpower. The connections to Europe and other main links are done with HVDC.

Sweden is mainly known abroad for the Vikings, The Nobel price and sometimes it's women. The Swedish language has a word = "lagom". This means not to big or not to small. Not to warm or not to cold etc. The whole culture has been formed accordingly. Sweden has for most of the 20th century had a social democratic government. Sweden is on top in women's liberation and equality but it is a monarchy and is the birth place for some of the richest people in the world, the founders of IKEA, H&M and Tetra Pac. Sweden has for 200 years been neutral and did not participate in any of the two world wars. This allowed the Swedish industry and technology to continue with own resources and also further develop a domestic industry for cars (Volvo & SAAB), telecommunication (Ericsson), Airplanes (SAAB) and Electrical Engineering (ASEA now ABB). In a corporation between the state (Vattenfall and SJ) and ASEA/ABB hydro power and nuclear power was constructed to reduce the need for oil and the railroad was electrified. The first 400 kV transmission system and the first HVDC system in the world was built here – The land of the middle way.

The Nordic countries vs. the world

Electricity	1995					2002					2005
TWh	Total	Thermal	Hydro	Nuclear	Wind	Total	Thermal	Hydro	Nuclear	Wind	Total
Sweden	147	10	67	70	0	146	11	67	68	1	158
Denmark	38	37	0		1	39	34	0		5	36
Finland	64	32	13	19	0	75	42	11	22	0	70
Norway	123	1	122		0	131	1	130		0	138
Nordic	372	79	202	89	2	391	88	207	90	6	402
Nordic %	100%	21%	55%	24%	0%	100%	23%	53%	23%	1%	
Russian Federation	860	583	177	100	0	891	585	164	142	0	953
Russia%		67%	21%	12%	0%		66%	18%	16%	0%	
World	**13 133**	**8 268**	**2 526**	**2 284**	**55**	**16 321**	**10 875**	**2 698**	**2 637**	**94**	**18 263**
World %	**100%**	**64%**	**19%**	**17%**	**0%**	**100%**	**67%**	**16%**	**16%**	**1%**	

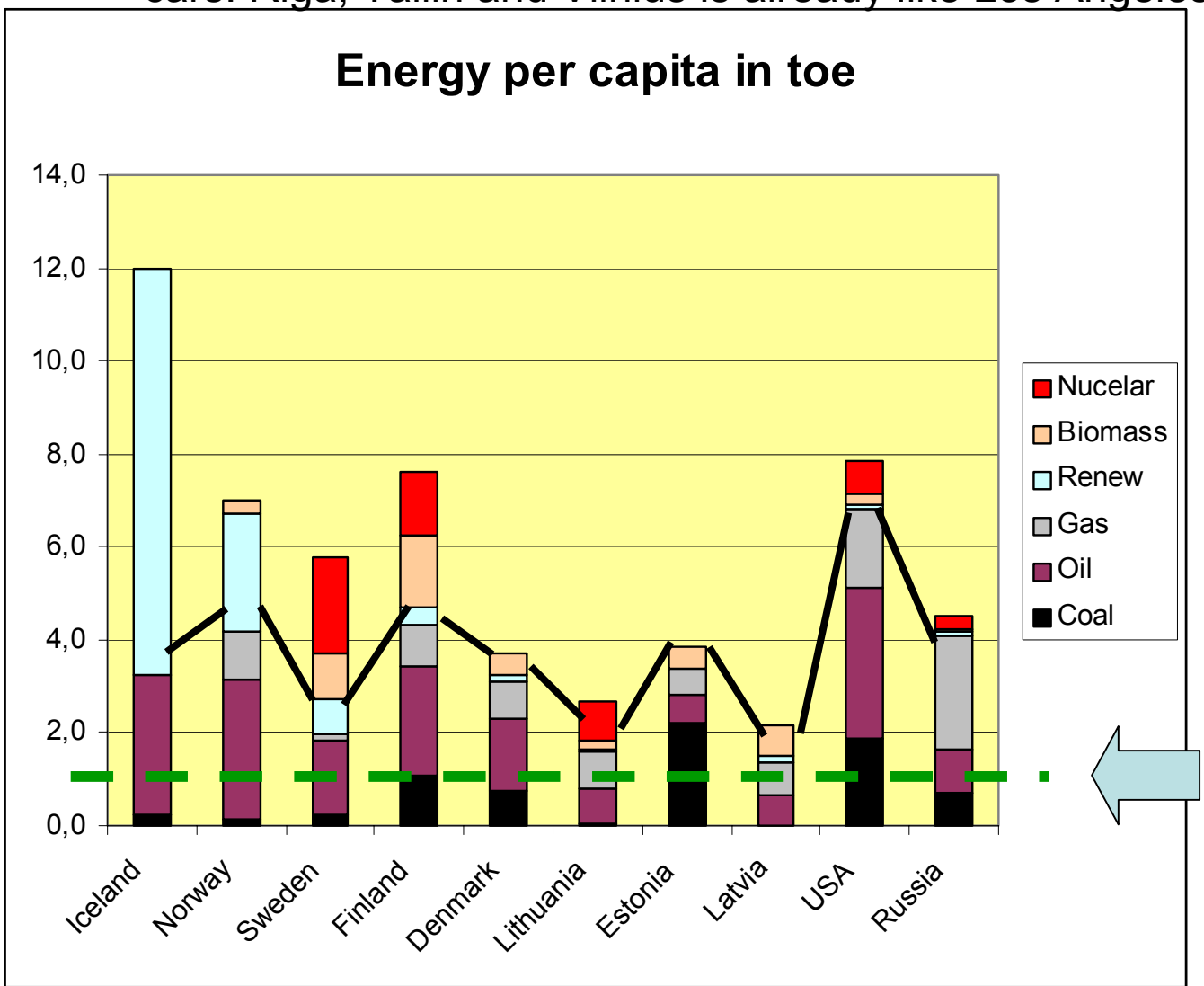
Stockholm

Moscow

The Nordic countries have together with Russia a colder climate compared to the rest of Europe. At least we used to have. The peak electricity consumption is during the dark and cold winter months. Both Norway and Sweden has the big advantage of hydro power. This can be stored and used at winter. For Norway this is almost 100% and in Sweden about 40% for electricity production. Now these countries are like Denmark also adding wind power. Totally for the Nordic countries the distribution is 54% renewable hydro and wind. For Russia this is only 21% and for the total world it is only 19%. ABB is one of the electrical engineering companies with state-of-the-art technology where I have worked for many years. One visionary idea is combining wind, solar and hydro with hydrogen fuel cells by utilizing the ABB DC (Direct Current) technology.

The transisition markets energy consumtion

Different countries have different challenges. The Baltic countries is now "transition markets" rapidly entering our western life style in it's most extreme form. Luxury cars, prostitution, drugs is driving the economy. But also a growing middleclass can afford cars. Riga, Tallin and Vilnius is already like Los Angeles in rush hour.



Estonia is burning their brown coal. Latvia has hydro and bio fuel and relatively little fossil fuel. Lithuania need to clsoe down the Ignalina nuclear plant and will most probably start burning gas from Russia. But in all counties the traffic is rapidly increasing.

We need to reduce fossil fuel below this level - NOW

Europe 20XX Scenario according to ABB

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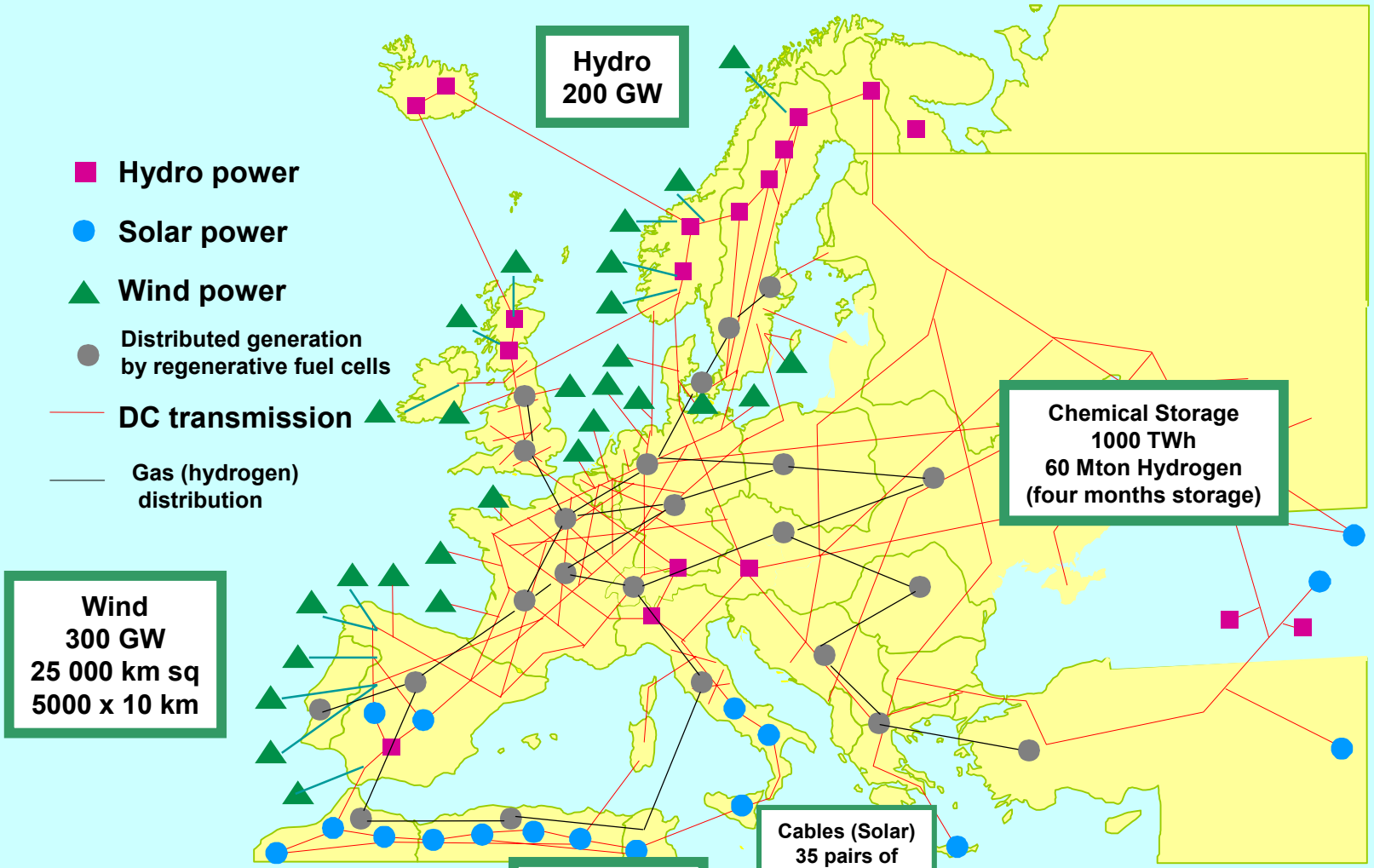
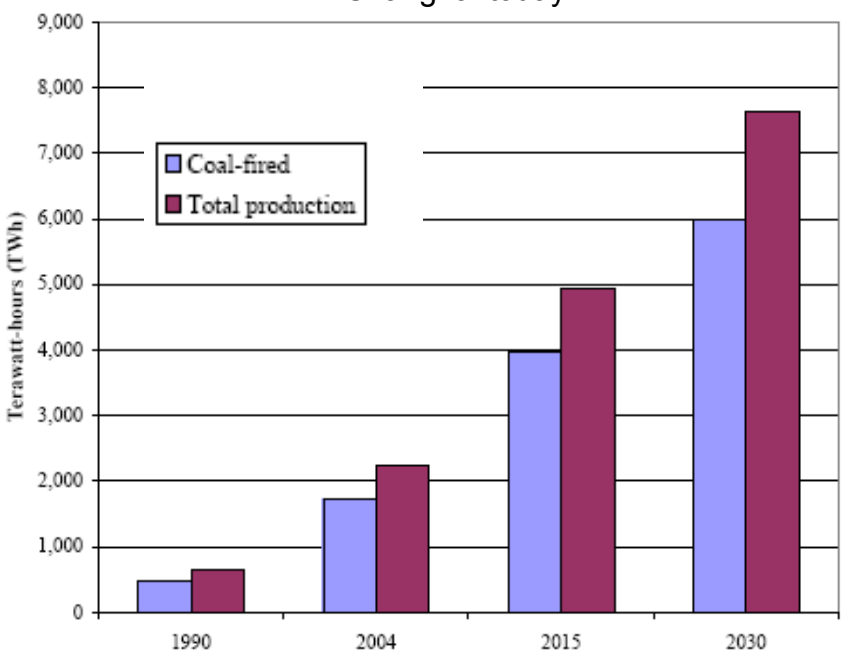


In this ABB scenario DC transmission will replace AC. One reason is that HVDC more efficiently can transmit energy DC can also easier use underground or underwater cables instead of over head lines

China according to IEA

Shanghai today



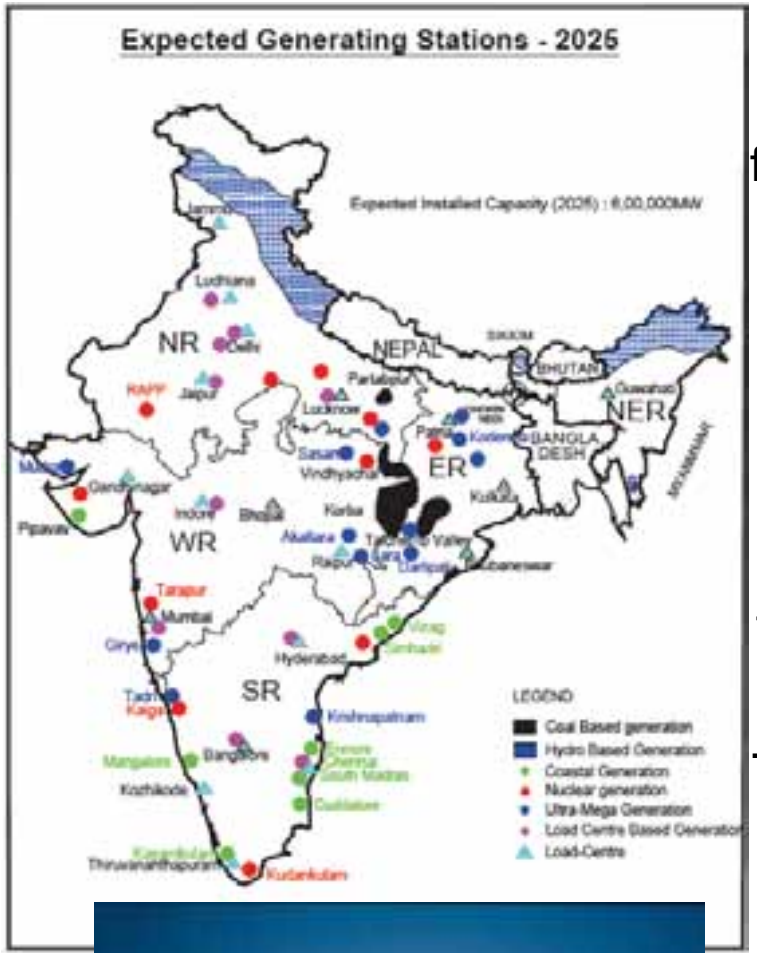
I visited China the first time 1989. A land of people on bicycles. I have regularly been back and I am astonished every time. Only during on year 2005 about 60 GW was added to a total of 500 GW. Still the installed power is just 1/10 of the Swedish per capita value.

China has the world's third largest coal reserves after USA and Russia. Coal fired plants represent 70% of electricity production in China. This means that China is competing with United States as the largest emitter of CO_2. So they can produce and export to our shopping malls.

Still the per capita consumption of fossil fuel is much lower than in USA. So the question is shall China continue to copy the US high energy model or find their own sustainable way. China is right now constructing the largest hydro power station in the world in Three Georges. Also this affects the environment and millions of people. And it just a drop in the ocean....

So is China allowed to do this? That is to copy our life style, or.....

The bright future of India



During more than twenty years I have been back and forth to India in my job. The change is seen but not as rapid as in China for good and bad. The poverty is still a major problem. But Indians are still not converted o meat, whisky and cars.

But now when India is part of the globalization the speed of what we call development is accelerating. 2007 India had 140 GW of installed power. This is only 1/3 as per capita compared with China and 24 times less than in Sweden. So can we really question a future expansion?

. 2010 this is 210 GW and 2025 it will be 600 GW. For this India is planning a massive construction of hydro power plants along the Himalayas (80 GW) and the implementation of new efficient UHVDC transmission on 800 kV and UHVAC transmission on 1200 KV.

But the major part is fossil (220 GW) and nuclear (90 GW). More CO_2 and nuclear waste. Still India will only 2025 reach the per capita level of China today (2007) and still be just about 10% of the per capita value in Canada. Is this OK?

Taj Mahal

Electrifying Africa

A coal fueled power plant in RSA

The plans to electrify Africa with the Westcor and Eastcor projects

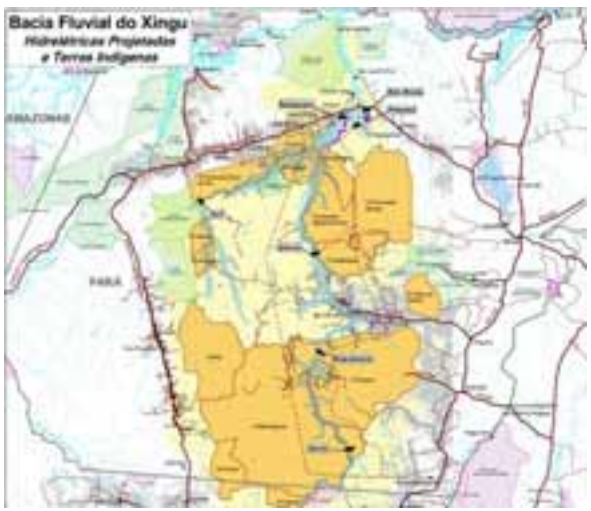
Africa has about 900 million inhabitants out of which about 85% lives in Sub Sahara. Africa is the poorest of all continents with a pre capita income of only 15% of world average.Africa has 14% of the world population but use only 3% of the worlds electricity and 3% of the world's total energy. Only 15% of the population has electricity. South Africa (RSA) represent almost 50% of the electricity consumption in Africa. RSA is very rich of natural resourecs including diamonds, gold but also coal which is the main fuel for power plants. This makes South Africa a large source for CO_2 emission while the rest of Africa is basically "clean".

So how can Africa reduce poverty and improve their life quality? Electricity is needed and there are rivers. Today only 4% of the 40 GW possible generation in the Congo river. Only 20% is used out of the potential in Zambezi river of around 10 GW. The Westcor project is planned to utlize the Inga falls in the Congo river in an environmental way. It is and African peace and economic development project. The installed capacity in South Africa is today around 40 GW but 2020 the estimated demand will be more tan 70 GW. But South Africa has only 5% of the African population. So how is this going to electrify the whole Africa?

Brazilian Energy

The construction of Itaipu 1981

Itaipu when ready



http://xinguvivo.blogspot.com

I have worked several years in Brazil and seen the construction of the worlds largest hydro power plant, Itaipu with 13 GW (Soon passed By 3G in China) and it's large dam drowning millions of plants and trees. . Just a few minutes from the power station you can visit the Iguaçu falls and one of the most beautiful sceneries in the world. Here you can see this conflict in reality. Not even hydro power is 100% "clean".

And now Brazil is planning for something even bigger. It is estimated that the hydro electric capacity in the Amazon region is 132 GW of which now the government is planning to harvest 43 GW or more than three times Itaipu. The first are Jirau (Rio Madeira), Marabá (Rio Tocantins) , São Luiz (Rio Tapajós) and Belo Monte with 11 GW in Rio Xingu. These will all affect the rain forest. Belo Monte will also affect the small remaining "reservation" for the few remaining indigenous people. Today the per capita consumption of electricity in Brazil is about 1/10 of in Canada. And hydropower is less of a problem than fossil fuel. So is Brazil entitled to harvest it's huge hydropower resources in the Amazon basin?

But electricity is only one part

And the smaller part. The energy consumption also includes transportation, industry, heating etc. So if we look at the full picture (but excluding bio fuel) the Nordic countries are to 48% depending on fossil fuel while Russia and USA require 89% and the world average 88%. And in addition we have the problem with methane from meat production, the effect of the deforestation, the melting tundra, the.....
We have a very long road to travel and we need “to walk fast together” as Gore said.

Primary Energy	2005					
Million tonnes oil equivalent	Oil	Gas	Coal	Nuclear	Hydro	Total
Sweden	15	1	2	16	16	51
Denmark	9	4	4			17
Finland	11	4	3	5	3	26
Norway	10	4	0		31	45
Nordic	45	13	9	22	50	140
Nordic %	32%	9%	7%	16%	36%	
Russian Federation	123	365	112	33	40	672
Russia %	18%	54%	17%	5%	6%	
USA	951	577	574	186	62	2350
USA %	40%	25%	24%	8%	3%	
OECD countries	2280	1282	1170	531	297	5560
OECD %	41%	23%	21%	10%	5%	
TOTAL WORLD	**3861**	**2512**	**2957**	**627**	**667**	**10624**
World %	**36%**	**24%**	**28%**	**6%**	**6%**	

The technological revolution

The scientific and technological development during the last one hundred years is astonishing. It is so amazing it is almost unbelievable. My own great grandmother could not in her wildest dreams imagine the world of today. This technology could give us not only food and housing but also a life with less must to do work and more want to do creativity and leisure.
The Information and Communication Technology opens up a new world where we all could meet and exchange ideas. And many of us do this. But we also continue in the old path. We work more instead of less. We buy more things although we have it all. We use more resources and we pollute more.

We could if we wanted now re-design our reality to a low energy and low environmental impact society in the western world. We could work from home instead of sitting in traffic jams or urban sky scrapers. We could use our free time for creativity. We could even be rich by “soft technology” if we give this priority. Just look at all the new millionaires or even billionaires like Bill Gates. Yes we have to change from meat and imported luxury “things” but isn’t nicer to go to the local market and find local bread and vegetables. And we could assist the poor part of the world to establish a low energy society in stead of convincing then to produce low cost gadgets for us. The technology is there and resources is there. We are just lacking the will to change.

The road ahead

No it is not technology, the market and globalization that can save us from our own mess. Because it is our technology, the market and globalization that gave us the problems by the way we live.

And it is not our present political, economical and industrial leaders who can guide us in a new direction because they have been guiding us in the wrong direction. We are the lost generation. In a dead lock when we can not see, hear or feel that something is very wrong. So the most important thing is for us to understand this. So we at least can admit to our children and their children that we have been wrong, very wrong. That we in our own greed or just ignorance have consumed our common resources so we could live this abundant life of our generation (If we were born among the lucky 10%)

It is very good to change from oil to something less dangerous. Naturally you should switch to low energy lamps. And it is great to buy “green” food. But it is not enough by far. Our whole concept is wrong. That fundamental error that increased consumption is equal to progress. When it is equal to destruction. This change demands a new generation with the ability to think freely in new patterns. So we need a (I almost do not dare to mention the word) REVOLUTION. A revolution in our minds.

A roadmap to change?

The change required is gigantic. So do not believe some of the statements from the establishment that we can solve this without changing so much. Because what is now happening when we finally has recognized the problem is that the establishment suddenly will turn “green”. Oil companies, car manufacturers, banks, basically all huge corporations will now “officially” change their “image” to be green. So will all political leaders. The Bali “road map” was a first step to do “something” but still just a weak compromise due to the US opposition. And this will not really change the direction. In the contrary it may be a threat because we believe that something is improving but is not.

So are these people now in control “evil”. Part of the “axis of evil”. A global conspiracy to destroy earth. Naturally not. But they are trapped in their own system of continuous economic growth by consuming more of everything. They can not think “out of the box.” The same people who has created the problem cannot solve it with “more of the same medicine”.

The greatest mystery to me is how this destructive development has been acceleration during the last 20 years. But if we watch all the messages and “information” penetrating us 24 hours per day through advertisement, entertainment, infotainment in TV and other media it is easy to understand. Yes we are being brainwashed to consume more, and more, and more.

The top of the ice berg

The global warming is only the top of the iceberg (Now melting way) . It is one of the symptoms that something is wrong. We have during the last 40 years "surprised" discovered one bad thing after the other. DDT, mercury in grain, lead in petrol, SO_x emissions giving acid rain, smog, Ozone hole and the extinction our plants and animals. Still we continue to "invent" and emit more and more substances into the biosphere. Now even genetically modified plants and soon animals. And we are doing this in an accelerating rate within a few years without any knowledge about the long term effects. We can not even spell to long term – being so addicted to our present "happiness".
Long term means several generations, hundreds and thousands of year.

Our inability to think and act long term and our inability to handle more than one issue at the time means we are missing the whole picture. That it is our very model and life style that is resulting in all of this. A life style that we now under the name "globalization" are exporting to the "emerging markets".

Many of us has yet not understood the consequences of what we call "development". So the main problem is still that we have not understood "that everything is connected" with our life style. And that we have o change the very fundamental concept of how we are living our lives.

So what has to change?

USA is since long the largest economy in the world. So it is no surprise that the US has been the main user of resources and main producer of pollution including CO_2. For this reason the US obstructive attitude to any reduction is naturally a big problem especially since USA and its allies in Australia and Canada continues to increase consumption and emission. So the absolute most important is a change in the US policy, attitude and way of living.

And not only because of USA itself but this economic model and way of living is now our only religion and political idea for the whole world. IMF, WTO and the large corporations are all preaching the new dogma on globalization. So are most politicians. So who is to blame is not USA per say but a very successful American model which turned out to be totally unsustainable.

And CO_2 is only one of the many problems. It is our western model and life style based on endless consumption and exponential growth which is unsustainable. We all have to change. The limitless consumerism of our generation is wrong. Against ourselves who now is suffering of "over consumption" deceases. For the large part of the world still suffering of "under consumption" deceases. For all the species now going extinct.
For our children and their children. For Gaia and our common future.

The white supremacy

Our present civilization is the Anglo-American empire. It is a culture created by and for the white man. It is men who control the world, is managing the giant corporations, the banks, the media and our political governance. It is men who go to war and who go to prison. And with one single example it is old white men that has written all the books I mentioned on the previous page.

We live in a very single minded world controlled by a very small percentage of the population – successful and rich white men. And we still call this a democratic world. Women, children, the poor populations of Asia, Africa, the original and few remaining natives of America and Australia as well as the animal kingdom is not part of the real decision making. So we are really living in a world where the development is dictated by a few powerful white men and sometimes a small number of black & yellow men – but still men and men working according to the rules of white men. We are responsible for the development of the world – the good and the bad including the mess we now are in. And I am one of them.

If we are going to change the world we need to integrate the thinking, values and abilities from the other majority of the world. East and west, yin and yang, male and female, humans and other life forms. Become whole again!

The Dead Sea in front of Jersusalem & Jericho

Tree corpses after the wild fire in Yellowstone

Walking through Volcano ashes on Hawaii

An abandoned sugar mill on Hawaii

The future?

Is this our common future? I don't know. Your guess is as good as mine. But if we just continue as we are doing now it is a good guess.

I have worked with energy and environment in my whole adult life in more than 70 countries. I am an engineer who should believe in science. And I do. But science can not solve our present environmental crisis. There is now way in hell that we can just substitute some fossil fuel and continue growing.
We have a system error. The whole idea is wrong. And what is very alarming is that most of us has not understood even the threat facing us.

The foot prints of the author in Death Valley California

The road to Las Vegas through Death Valley

So what shall we do?

There are so many good books written about us and for us. Telling us what is wrong and what we should do the “save the earth” but also “save our own souls” . The authors are within different branches such as Science (Lovelock, Capra, Asimov, Peat) , Economy (Henderson, Galbraith, Mander), Psychology (Fromm, Jung, Maslov), Historians (Harrison, Kennedy, Lukacs), Philosophy (Huxley, Wright, Russel), Management gurus (Toffler, Naisbitt, Drucker) and old future tellers (Orwell, Kostler, Huxley).

And many publications about our degenerating environment from Rachael Carson to now. GAIA – An Atlas of Planet Management from 1984 gives a good overview. ”Blueprint for a green planet” by Seymour & Girardel tells us exactly what we need to do and not do - 1987. A recent book is “Six Degrees” Mark Lynas that is very scary. And then you have all information available on Internet (See proposed links in the end of chapter 11)

So we have really an enormous amount of facts. We have also a number of conclusions and suggestions what we shall do. These are all basically the same as 1972 but they are now converging to one view of the reality. But the problem is that we still has not understood the severity and urgency. And we are still not doing anything to change the direction or even lowering the speed of our run away civilization.

Small is beautiful”

With so much information available it may be difficult to see the forest for all the trees. The problem is that this is very complex. It involves every aspect of what we do. There is no fast track solution but we need one. Especially now when we have lost 36 years since the first UN conference 1972. There is neither one political party or ideology that can state the “only truth”. In fact we need to combine what we traditionally know as liberalism with socialism, grass root democracy with top down global ruling, scientific discoveries with religious beliefs. But there is still some universal concepts that I do believe in. A world based on the love of truth, beauty and goodness. Out of all these books I still want to mention some simple conclusions – although written by white men.

The first one is E. F. Schumacher *“Small is beautiful”* from 1975:

“We avoid the truth if we believe that the destructive forces in the world can be controlled if we just mobilize more resources – money, education, research – to fight the pollution, to protect the environment, to discover new energy sources and to reach new international agreements on peaceful co-existence. Wee need more money , education , research and many other things but what is needed today is a revision of the reasons we are using these tools. And this means to develop a life style that put the material things in their right place which is secondary and not primary.”

The four laws of ecology

The second is "The closing circle" by Barry Commoner from 1972. His four laws of ecology tells us everything we need to know in order to improve our unsustainable way of living.

- Everything is connected with everything
- Everyhing needs to go somewhere
- Nature knows best
- There is no free lunch

The same year 1972, The Spokesman (Founded by Bertrand Russel) gave an interesting analysis from the left in "Socialism and the environment". One subject was the comparison of societies based on "hard" or "soft" technology. This was 1972. What happened to this thinking? What have done?

Ecologically dangerous
High energy consumption
One way use of material
Narrow time scale
Predominantly urban
World trade
Growth economy
Monoculture in agriculture
Quantity receives priority

Ecologically adapted
Low energy consumption
Recycling of material
Wide time scale
Predominantly rural or small towns
Local trade
Zero growth
Diversity in agriculture
Quality receives priority

A World Perspective 1956

Ruth Nanda Anshen was a philosopher, author and editor. She was born 1900 and became 103 years old. One of her remarkable series of books she edited was ”World Perspectives” with participants like Nils Bohr, Robert Oppenheimer & Erich Fromm.

Her introduction is: *”It is the thesis of World Perspectives that man is in the process of developing a new consciousness which, in spite of his apparent spiritual and moral captivity, can eventually lift the human race above and beyond the fear, ignorance, and isolation which beset it today. It is to this nascent consciousness, to this concept of man born out of a universe perceived through a fresh vision of reality, that World Perspectives is dedicated.... we are all bound together by a common humanity more fundamental than any unity of dogma.... the centrifugal force which has scattered and atomized mankind must be replaced by an integrating structure and process capable of bestowing meaning and purpose on existence.”*

She states 1956 that we can no longer treat man and nature as they are opposites. And she point out that in order to achieve balance each individual is responsible to integrate all parts to an organic whole within society and the Universe.
A remarkable woman working with remarkable men. One was Erich Fromm:
“The modern capitalism requires people who can cooperate without frictions, who continuously want to increase their consumption and with a standardized taste who is easy to influence and predict. These people have to be able to feel free but yet ready to be manipulated , to be led without a leader.” This was 1956!

Looking for a new age

Our environmental crisis is not caused by one thing. It is not only CO_2. And the solution is therefore not one thing. We cannot “solve” this with the same actions and model that is causing the problem. We need a new way of thinking both to understand our problem and to try to find the difficult way to a new sustainable future.

But to question our own behavior and even belief system is very, very difficult. To change even more so. It is not a scientific, political, cultural or religious question. It includes them all. We need to combine our body, mind, soul and spirit, male & female values, all races, religions & cultures in this search for a new age in harmony with Gaia.

A holistic thinking and an holistic approach is for me the only way out of the box. I have no ready solutions but I am ready to search for a new way.

I believe there is a core of human values represented in all our religions. I also believe there is a love for Nature in all humans. But somewhere we lost this connection. So although we are looking for a new age and we have the wonderland of new technology we also need to find our way back to these fundamental values.

The big change?

When Soviet union collapsed we celebrated and declared we "The New World Order". 1992 Francis Fukuyama from RAND corporation wrote "The end of History and The Last Man" as a love song to this victory of the American way of living. Other books described the post industrial society and information society. And things did change. Can we today even remember an era before Internet, DVD and cell phones although this was only 15 - 20 years ago. But the basic template for our civilization and development did not change. It just accelerated in the wrong direction – as we know it now.

So what happened to "The New Age" when Shirley MacLaine stopped writing books. The New Age movements was a women's movement but based on the new physics established by Bohr, Heisenberg etc. A new way to describe reality – a new world view. Capra, Rifken, Davies, Boom, Peat, Gleick, Lovelock etc. wrote about Quantum physics, Chaos theory, The Cosmic Blueprint, Entropy, Synchronicity, The Gaia theory. But also mixed with all sorts of new religions and self improvement recipes by Peck, Harman, Dyer, Hubbard etc. – All white men. And we had more white men write about eastern way of thinking, yin and yang.

Many of these book and courses helped women to change. Even some written by women like Shakti Gawain's affirmations. Often to rid themselves of bad experiences ...from men. But we white men did not change at all!

So how do we change?

As it looks now it will be by force. Either an economic collapse like the one Ravi Batra predicted as The Great depression 1990. Or a slower disintegration like the fall of the Roman Empire when USA, EU, China and Russia compete of the remaining resources while the rest of the world will become like a large Gaza refugee concentration camp. Peter Russel, the author of The Global Brain see this as a natural evolutionary step for our race. Either we evolve or...

George Land and Beth Jarman (Finally a woman) published 1992 the book Breakpoint and Beyond. This describes the need to change our thinking. They refer to a quote by Einstein; *"The world will not evolve past its current state of crisis by using the same thinking that created the situation".* What is called for is a massive change of mind – a new world view. The authors states that *"The onslaught of more technology will continue to create more problems than it solves because humanity continues reaping the benefits of the (new) third phase technology within the rules of the (old) second phase thinking."*

Or maybe we instead need to return to our true human state of mind. I can recommend two books by Lin Yutang; The importance of living from 1937 and the wisdom of India from1956. Lin Yutang stresses the importance to enjoy life and nature. *"No man who loves trees can harm an animal or another man."*

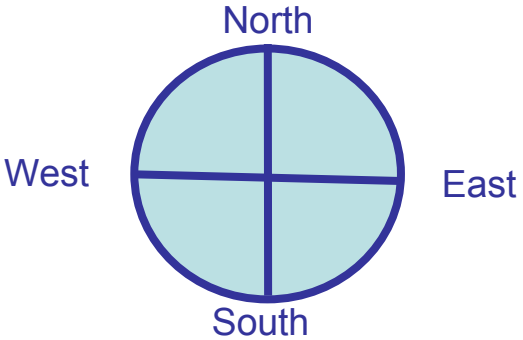
Looking for a newer new age?

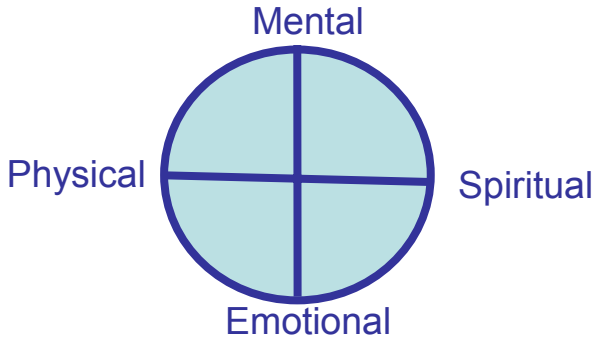
Finally I can refer to one book written by a woman. “The Aquarian Conspiracy” by Marilyn Ferguson from 1980. This prediction of the development of the human consciousness into a higher state became the hope for a new age. *“The paradigm shift of the Aquarian Conspiracy sees humankind embedded in nature. It promotes the autonomous individual in a decentralized society. It sees us as stewards of all our resources, inner and outer.”* Ferguson saw a shift from a power paradigm to a peace paradigm. And said *“We are changing because we must.”* She also stated that; *“Women represents the greatest single force for political renewal in a civilization thoroughly out of balance.”* *“Let there be transformation and let it begin with me.”*

In a new book from 2005 she reexamines the paradigm shift, and need to ask the question in Aquarius Now, *"Can we change"* and repeat again that we can and we must change. The Age of Aquarius will occur when we want it to occur. *“Now, more than ever, the world needs this change. There is no "they," instead, we are the "they," and, as such, we can change.”*

But unfortunately we see that our ability to change our thinking and behavior is almost impossible. Or is it. We have managed to convert a large part of the world to consume the same food, things and media. How did this happen?

A whole new human in a whole world





Mankind has for thousands of years lived in harmony with nature. Everywhere we discover the “magic circle”, the medicine wheel, Mandala to represent the balance between the four directions. This importance was understood by the Indians living in America but also my farming forefathers living in Sweden. In Asia the same balance was described as **Yin** (陰) and Y**ang** (陽) representing the female and the male. Our present male dominated western world has degenerated to the physical dimension with material wealth and economical growth as only goal. All other dimensions has been reduced to minimum. Culture, sport, people, ideas, the future and even plants and genes are branded and for sale. Today’s “wise men and women” are not to be found among scientists, priests, writers, philosophers or anyone from the non-western world. They have been replaced by “the rich and famous”, Wall street and the constant media message “Buy and consume” more and you will be happy.

In order to “save our planet” we have to first “save ourselves”.

To rediscover our four dimensions in life that the natural humans knew. To become whole again. Connect with Nature. Too recreate our ability to experience all the wonderful things that are free in life; love, solidarity, compassion, swimming in the ocean, walking in the forest, looking at the sky. To be creators instead of consumers.

So how do we change back again?

When I grew up we did have the present life style. No one had this except a growing middle class in America. We are the first generation to "enjoy" this demanding over consuming life style for some of us "fortunate" few. So naturally we can change. And as Fergusson says we have to! What I now am fully convinced of is that the same model and the same "stupid white men" that has created the problems can not "save the world" with more of the same medicine. We need a new vision for a common future!

I have no solutions for such a change but I dare to suggest a few things. These has to be done on both regional, national & global level:

1. *One fundamental problem is that our media round the clock is telling us to consume more.* A very simple action would be that all media has to use 50% of their time to inform about the environment and the need for us to change. Something like "Cigarettes and alcohol kill"
2. *Another major problem is that it is the same "stupid white men" in the drivers seat in corporations, banks, institutions and parliament.* A very simple action would be to link democracy with 50% female representation everywhere (Parliament, organizations, board of directors).
3. *A serious problem is that the gap between rich and poor is increasing.* A simple action is to implement a progressive scale with a cap and instead create a national fund to support infrastructure investment for the poor.

"Let it begin with me."

So how could we even dream about achieving this. Influencing our community, the big corporations, our government and even UN. We have to!

This is why the absolutely most important thing you can do is now to start the process and influence others. Become active everywhere. At home, at school at work. On Internet. To demand a change. We do not need new technology or more money. We need to change our values and behavior. To focus on what is really important for all humans and GAIA.

1. *There is a lack of urgency and speed. We need to change NOW.*

Work for the creation of a regional and national war time assembly. Because we are in a state of war. This 50/50 male and female assembly should involve all major sectors and political parties of the society and work out the basic frame and action plan for a sustainable society.

2. *We have failed in giving our children the teachings of a sustainable future.*

And this is an big understatement since we have been brainwashing them to become consumers like ourselves. So work to modify all education so it includes sustainability as the major subject including practical aspects.

3. *You are not living a sustainable life and probably not your family either.*

Yes naturally you should do everything you can to change your own life. <u>This is mandatory.</u> But it is NOT enough. You need to "change the world". To initiate a global mind change. This is your task for the rest of your life.




I have been living several years in Brazil as part of my work. My wife is Brazilian. And so are many of our friends and relatives. Brazil is a virtual paradise with it's tropical rain forests, the biodiversity of Pantanal and the Amazons. And it's people is equally a biodiversity of black, red, yellow and white. Such beauty! Such music! And such huge challenges for the future! I can not imagine this country to became a desert. But it may. And not primarily to deforestation but because of global warming. So buying a tree in the rain forest will not solve this.






Imagine this gone

Covered by water

Think globally
& act loacally

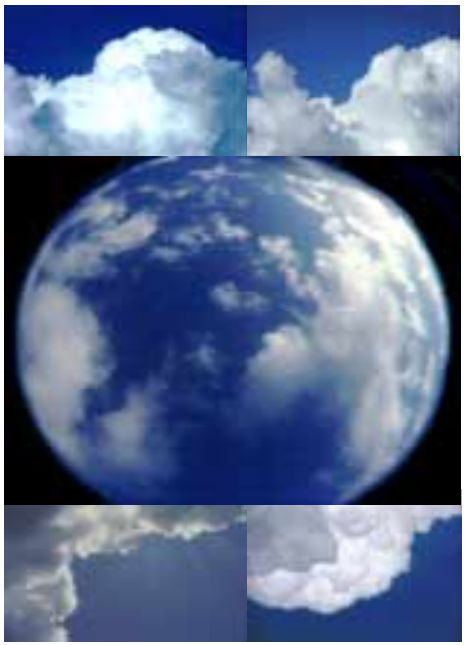
Start by cleaning up
your own back yard

We need to change in many respects. But the most important is our very relationship with nature. And first of all learn to enjoy the beauty!

And it is easy. We do not need to go to a national park. I am privileged also in this respect. These photos are within 5 minutes walk from my home in Sweden.

See!
Smell!
Hear!
Touch!

Just enjoy the sunset as it would be your last



Look at the clouds how they change and you will transcend the Universe