

Energy change in order to reduce climate change

What can we do on local level – and where?

by Kerstin Bernecker¹

Background – The basic problem, its major reasons and its consequences

Meanwhile nobody can deny it anymore:

We undergo a serious and rapid, man made climate change. According to the recent publications of the Intergovernmental Panel on Climate Change (IPCC)², there can be no doubt anymore.

Due to man made greenhouse gas emissions (CO₂, Methane and others), global warming is ongoing at a rate reported increasing from one IPCC publication to the next. The major cause for the greenhouse

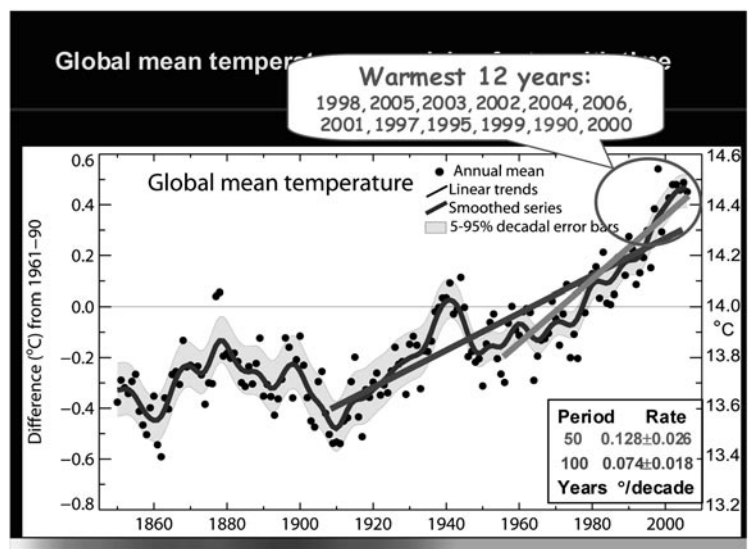
gas emission is the exaggerated use of fossil energy: Mineral oil, natural gas and coal deposits represented a kind of “final hydrocarbon deposit”: These were hydrocarbons which had been withdrawn from the atmospheric circuit long before mankind existed due to meteorological and geological processes and events. During the last century, these “final deposits” were increasingly brought back into the atmospheric circuit with the logical consequence of significant increase of greenhouse gas content in the atmosphere. The changed composition of the atmosphere disturbed the previously existing balance between “incoming and outgoing” radiation, a kind of greenhouse effect takes place now (therefore the term “greenhouse gas”). Since recently, each year is now called one of the warmest since meteorological records exist.

Previously, some scientists had suspected solar activities being a major reason for temperature increase, but since some ten years, these activities decreased while temperature goes on to increase. According to

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² The Intergovernmental Panel on Climate Change (IPCC) has been established 1988 by WMO (World Meteorological Organisation) and UNEP (United Nations Environmental Program) to assess scientific, technical and socio-economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation. See www.ipcc.ch. “Hundreds of experts from all over the world are contributing to the preparation of IPCC reports as authors, contributors and reviewers. They are selected by the Working Group Bureaux from nominations received from governments and participating organisations or identified directly because of their special expertise reflected in their publications and works. The composition of lead author teams for chapters of IPCC reports shall reflect a range of views, expertise and geographical representation”. IPCC 4th Assessment Report, 2007, see www.ipcc.ch.

Figure 1: IPCC – 4th Assessment Report 2007: Global mean temperatures are rising faster with time



Klaus Töpfer³, former head of UNEP, the time of the „three Ds“ is over now, after the most recent scientific results:

- Denying (that climate change is happening and man made),
- Delaying (any action against it),
- Doing nothing (against it).

How could it happen that mankind manoeuvred itself into such a critical situation – putting it’s own base for survival at risk?

With the industrialisation, initially the industrialised countries and recently the whole world got into the “fossil energy trap”, following more and more a comfortable but unsustainable development path: For most time, mankind used little energy and simply renewable energy (e.g. wood, water and wind power, vegetable oil, human and animal muscle power).

Even during the first decades of industrialisation, this was still the case to a certain degree: Rudolf Diesel, father of the Diesel engine, used vegetable oil for his first engines, and Henry Ford I worked with bio-ethanol fuelling his engines, intending a large co-operation project with the American agriculture.

But during that time, petrol as a cheap and comfortable source of energy was discovered. The upcoming petrol industry pushed its product – for engines/ vehicles, then for heating, air condition all over the northern hemisphere and then the urbanised parts of the whole world. Also power plants were fuelled with mineral oil products and natural gas – in addition to the coal power plants equally using fossil energy.

Energy – fuel and power – was cheap and was used wastefully, its consumption increased and is still increasing world wide.

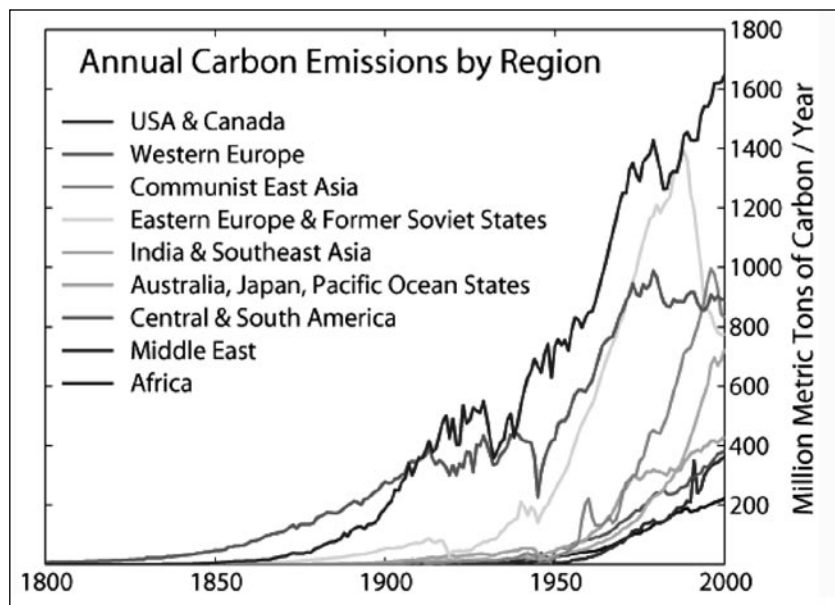
³ Statement in “Wissenschaftsforum Petersberg”, Phoenix, February 2007.

⁴ See Al Gore: *An Inconvenient Truth*, New York 2006.

Contributions to global warming are very unevenly distributed over the planet⁴:

- the USA are responsible for nearly a third (about 30%) of the global greenhouse gas emissions (with about 20 tons of CO2 per person and year),
- followed by Europe (nearly 28% – but less than 10 t/person, year),
- then, with about an eighth each, Russia (nearly 14%) and Southeast Asia with India and China (above 12% - less than 1 t per person and year),
- and the smaller emitters: Central and South America as well as Japan – nearly 4% each, Middle East nearly 3%, Africa 2.5% Australia and New Zealand 1.1%, – however increasing.

Figure 2: Annual carbon emissions by region



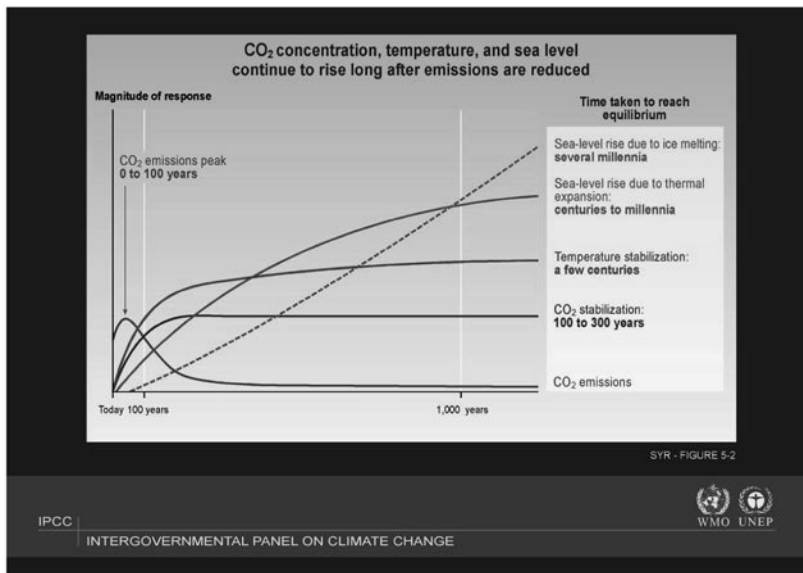
Source: Wikipedia – Kyoto Protocol

The consequence of this unsustainable development approach is the present critical situation: temperature is rising – according to IPCC estimates between 2 and 4+ °C by the end of this century, glaciers and polar ice caps are melting, decreasing at an alarming rate, sea levels are rising.

Even if we manage to reduce our CO2 emissions, the effects of the yet emitted greenhouse gas will lead to a still increasing concentration in the atmosphere. Stabilisation of CO2 concentration is expected in 100 to 300 years only, temperature stabilisation in a few

centuries while sea level rise will continue for several millennia. Former US vice president and author of the recent book and film “An Inconvenient Truth” Al Gore states: “Global warming has become a true planetary emergency”.

Figure 3: Rising of CO₂-concentration, temperature and sea-level



Source: IPCC 4th Assessment Report 2007

It is evident: We cannot go on doing “business as usual”. It is also evident: first of all, the so-called “developed” countries have to act, to provide better solutions than the unsustainable development spread all over the planet so far. However, the situation is so serious, that each and everybody, on every level and everywhere has to act **now**.

What is being done internationally?

On international political level, serious action started as follow up of the AGENDA 21 summit 1992 in Rio (World Summit on Environment and Development) with the “Kyoto Protocol”: During the Rio summit, the international treaty on climate change, UNFCCC – United Nations Framework Convention on Climate Change – was concluded. The publicly better known “Kyoto Protocol” was decided 1997 and entered into force in 2005 as an amendment to the UNFCCC, which had assigned mandatory emission limitations for the reduction of greenhouse gas emissions to the signatory nations.

The objective of the protocol is the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.” It foresees concrete quantified reductions in greenhouse gas emission for each adhering country. However, its objectives are only defined for the period ending 2012, and no serious and quantified follow-up treaty has been agreed upon so far, mainly blocked by the USA during the last G8 summit in June 2007.

According to the same philosophy, the USA as largest emitter world wide have not ratified the Kyoto Protocol even so far, especially pushed to refuse by their petrol and petrol based industries. However, as of March 11, 2007, 418 US cities in 50 states, representing more than 60 million Americans support “Kyoto”.

In view of the “planetary emergency” (see above), the international commitments have to be considered insufficient so far.

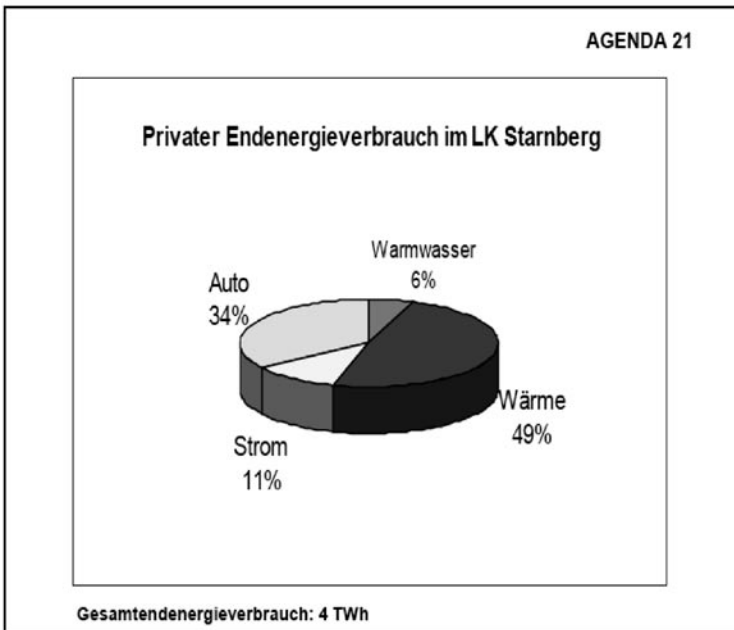
Example on regional level: Efforts of a Bavarian District

Several districts around Munich (Germany/Bavaria) decided to envisage basic and radical changes in their energy consumption. The example of the district of Starnberg, South of Munich in the pre-Alpine area, shall be summarised here:

The district council decided end 2005 to support an “Energy change”, i.e. a basic change in the approach of energy use and types of energy use common in the region so far. It is envisaged to have organised the energy supply in the region exclusively by renewable energy from the region itself by 2035.

The most important means to achieve this objective is to reduce energy consumption in all energy subsectors through energy savings and increasing energy efficiency. Therefore, a reduction rate of about 3% per year has to be achieved in all sub-sectors (electricity, heating and warm water, mobility).

Figure 4: Energy use according to sub-sectors



Heating 49%, warm water production 6%, electricity 11% and mobility by car 34% in Starnberg District; overall energy consumption in the district: 4TWh

The regional AGENDA 21 group prepared a basic study for the implementation of the concept, comprising a baseline survey of the present energy consumption, the reduction potentials as well as the potentials of renewable energy in the region: The total energy consumption of the region accounts for 4 TWh⁵, nearly half of which is for heating⁶, more than one third for mobility (cars), 11% for electricity and 6% for warm water.

With a population of some 128'000, this energy consumption corresponds to about 31'250 kWh per year and person.

The renewable energies basically available are

- solar energy (for photovoltaic – power production, and for solar heating/warm water),
- biomass – for biogas production – for fuelling of cars and combined production of power and heat, wood (mainly for heating), vegetable oil, mainly for fuelling of cars and for some small thermal power plants,

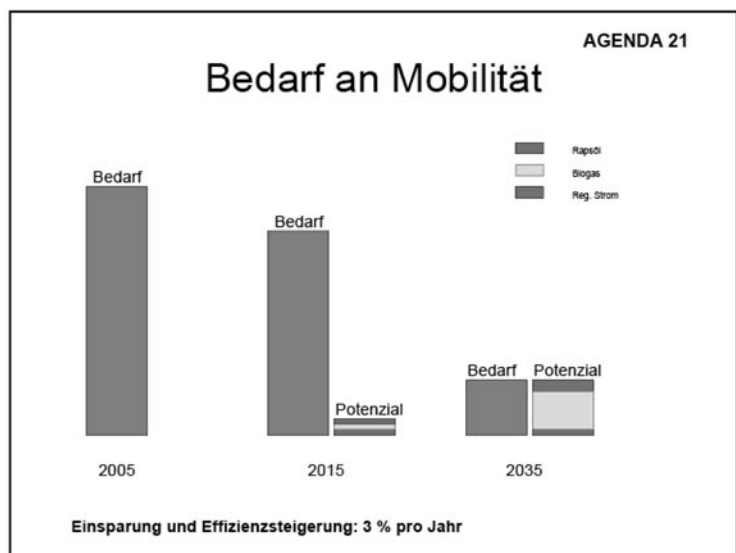
- geothermal energy – for power and heat production,
- some hydropower and some wind power.

They need all development or further development.

As an example, the energy scenario up to 2035 is presented below for the sub-sector of mobility. It is available similarly for the subsectors electricity and heating (including warm water).

To implement this concept, an association “Energy Change District of Starnberg” is about to be initiated. Thematic groups as well as community groups will work on the implementation. Management and monitoring according to an objectives oriented (logframe) approach will be carried out by the leaders of the association together with the district administration.

Figure 5: Energy use scenario for mobility with energy saving measures (reduced demand) and increasing use of renewable energy



Energy use for mobility – 2005 nearly exclusively fossil, in 2015 significantly reduced energy use with some renewable energy substituting part of the fossil energy and in 2035, where the remaining, by about 80% reduced energy requirements for mobility, are fully covered by renewables, i.e. some vegetable oil, a large portion of biogas and some renewably produced electricity.

Apart from information campaigns, training of community administration staff and technicians as well as networking⁷, the promotion of various exemplary model projects is foreseen. But most concrete implementation on the ground has to be done by the citizens themselves or the communities. The association has first of all the role of a catalyst. Some topics go beyond the capacities of the people involved (e.g. some of the biogas issues); there, support of a nearby University is sought.

Applicability of the Example “Elsewhere” – in the Rest of the World

For each region in the world, the specific situation has to be taken into account. But the basic approach of the above described project is quite universal.

An analysis of the following aspects is required

- present energy consumption and use – according to type of energy and sub-sector of use,
- possible energy requirements for further development (this especially in regions, where a need for change/“development” is felt),
- potentials for energy saving and increase of energy efficiency – for the present situation and for envisaged development,
- potentials of renewable energies in the region – for substituting the present, non-renewable energies used.

On this basis, scenarios for sustainable development can easily be derived, structured (in goal, objectives, sub-objectives and measures/activities to be imple-

mented) in order to achieve the goal of sustainable development based on efficient use of renewable energies. For the latitudes between about 45° North to 45° South, the abundant availability solar energy facilitates this undertaking – in direct form or via biomass, photovoltaic etc.

Especially in developing countries, there may still be a chance to prevent parts of the population to follow the unsustainable (North-Western) development approach and to start, instead, a sustainable development path – better for the local people, the climatic situation and thus the whole mankind.

Beyond that, everybody⁸, especially the educated elites in developing countries, should now take the chance and their responsibility to “live sustainable development examples”, in order to accelerate there, as well, the end of the “fossil era”, or avoid the real start of that era.

⁵ $4TWh = 4 * 10^9 KWh$

⁶ *Still a bad heritage of the „fossil“ era is the fact that most houses are very poorly insulated, but most rooms are well heated although technically the energetic “passive house”, needing hardly any external energy, is available.*

⁷ *E.g. between architects, planners, solar specialists and relevant community administration.*

⁸ *What could an individual do? – Just think before any fossil energy use, question the unsustainable North-Western lifestyle, switch to renewable energies (for cars, for electricity, warm water...) wherever possible.*