Table of Contents

Views on climate change

ByPhilipp Freudenberg

Text inspired by Will Barnes ’Climate and capital’ (see Mute #2 Vol. 5) with a more scientific and technical approach.

Views on climate change

There are many important topics in the news these days, but none is as important for future generations as climate change. The decisions that are made in the next years, months or days [1] will be determining the future of mankind. Climate change is also a topic where political, social, technical, biological and physical science is so heavily intertwined that it´s almost impossible to grasp all aspects of it. The following text can therefore only be an attempt to show a rough picture and does not claim to be either scientific nor some ’green pamphlet’, it´s somewhere in the middle, I´d call it pseudo-scientific, since I´ll put numbers and facts on a scientific basis but leave the conclusions, especially the political and economical ones, to my opinions, which are only partial scientific.

The inspiration for writing this text came from an article by Will Barnes called „Climate change and capital“ [2] which showed the connections of the two topics and which I read with huge interest because he nearly took the words out of my mouth. But I wanted to go a bit further and also look at it from the scientific side. For more conclusions in the political, social and economical direction you can refer to Barnes´ text, since I´d agree with most of them.

I´ll split the text into three big chapters called ’past’, ’present’ and ’future’, where in the ’past’-section the reasons for climate change will be shown, the ’present’-part will deal with the situation we have right now and, you guessed it, in the ’future’-part there´ll be outlooks and things that remain to do.

I Past

When talking about climate change one first has to be clear what this ’change’ means. It is important to look at past development of the climate to compare it with todays. One of the conclusions of this first chapter has to be that earth and nature has seen many things so far and have to be considered as objects on which influences are inflicted. This is an important step, because we should realize that to earth it doesn´t matter what we do, if we raise the temperature or wipe out the rainforest, but it will matter to us. Evolution will take care of itselve and bring forth new species according to circumstances. There is no use in saying ’Poor earth’, but rather ’Poor humankind’ or to be more precise ’Poor children and grandchildren’.

Earth´s climate The geological structure, the composition of the athmosphere and the biosphere have changed several times during the life of our planet and therefore influenced its climate. The above mentioned objects are only three determinants that make up climatic conditions.
I want to explain some of these determinants sorted from long term influence to short term influence. One category of influences on earth climate includes phenomena that have their origin in earth´s movement in space. These are eccentricity of earth´s orbit around the sun, obliquity (tilt of the earthaxis) and precession. Without going into too many details [3] it can be said, that each of these runs in cycles that influence the amount of solar radiation [4], the length of seasons in the hemispheres and the temperature extremes between the seasons. Though the processes are not fully understood it can be derived, that there was (is and will be) an influence on earth´s climate especially in regard to

amount of insolation (solar radiation) and therefore temperature. Ice ages for example seem to occur at a 100.000 year cycle due to these changings. The last ice age ended 20.000 years ago and we are now in an interglacial warmth period, which can now almost be called ’superwarm’. Other effects on the climate which are rather long term result from the abiotic structure. By abiotic structure I refer to position of the landmass, height of mountains, but also thermohaline currents (e.g. gulf stream) and volcanism.

The influence of land-water-distribution can be seen by imagining that all landmass would be situated at the poles where less solar radiation would cause freezing, the building up huge of ice caps and therefore cooling down earth´s temperature. The opposite effect occured when there were only two continents on earth´s surface. The larger one of these, called Gondwana, was situated close around the equator, that was the time of huge rainforests and the dinosaurs. Gondwana was splitted around 30 million years ago and the continents moved into their current positions. Thermohaline currents have a great influence on local climate conditions (Europe without the gulf stream would look like northern Canada), while volcanism has been responsible for carbon dioxide emissions into the global atmosphere and therefore changing climate (see chapter on greenhouse effect). Constitution of the biosphere has both longterm and shortterm effects on micro- as well as on macro-climate. Forests may store huge amounts of carbon dioxide, bacteria and extensive animal life generate methane gas etc.

One of the influences on the climate which has effects on a very small timescale is the greenhouse effect. Greenhouse effects can be found on each planet that has an atmosphere. This atmosphere stores energy (especially heat) rather than letting it disappear into space [5]. An extreme example of planetary greenhouse effect can be seen on the planet venus where the atmosphere is so thick, that temperatures have risen to. On the other side of the scale we have for example the moon, where all the radiation from the sun is reflected. Since the greenhouse effect is the most important factor when talking about climate change I´ll make up an own chapter to explain the effects.

Greenhouse effect [6] Sun radiates 1367 W/m² on earth7. Since we calculate globally we have to take the average amount of energy, that means dividing it by 48, which gives us approx. 342 W/m². Of these, only 239 reach the surface, the rest is reflected by the clouds. If that would be the only source of energy, earth´s temperature would be -18°C [9]. The atmosphere (greenhouse gases to be more precise) absorbs and emitts 150 W/m², so the overall energy reaching earth´s surface is 389 W/m², making the current average temperature +15°C. Of these 389 W/m² 90 are reflected back into space and the remaining 299 are absorbed by the atmosphere were half of it (150 W/m²) is radiated into space and the other half back onto earth. Reflection on the clouds, reflection on the surface and radiation from the atmosphere sums up to 103 + 90 + 150 = 343 W/m² radiated back into space which is approximately the same amount radiated in. This is logical since otherwise earth would have an energy surplus or deficit and therfore become warmer or colder over the time. Human influence on this radiation is called radiation forcing (positive or negative). We´ll come back to this later, but to give you the number now: Overall anthropocentric radiation forcing is 2.5 to 3 W/m², making less than 1 % of 389 W/m². [10]

Other sources that release energy into the atmosphere are heat-currents from inner earth and of course industrial production (almost every energy used end up as heat). Their contribution is negligable in the big picture (0,06 W/m² and 0,027 W/m²) [11] but industrial production, pollution or conglomeration of heat sources (cities) can well change local climate patterns. There are also processes which reduce the energy input. One of these is called ’global dimming’, a process where clouds are ’produced’ by fine aerosols. These clouds add to the reflection of sunlight therefore dim the light of the sun.

The results of this process are not yet fully researched but it is seen by some as a solution to slow down the greenhouse effect, which can prove to be very dangerous in my opinion. Very aprupt and influential changes in sun radiation can come from big eruptions of volcanos. It is estimated that the explosion of Kraktoa in 1883 produced a negative radiation forcing of around 6 W/m² and the eruption of Pinatubo in 1991 of 3 W/m². As shown before, without the natural greenhouse effect earth´s average temperature would be -18°C instead of 15°C, a difference of 33 K. These 33 K are the direct result of the natural greenhouse effect. Temperature in the last 100 years has risen by 0,8 K which is more than 2% of these 33 K. This rise is the direct result of the anthropcentric (manmade) greenhouse effect. To see how this could happen we have to take a closer look at the chemistry of the effect. To go into detail, I have to introduce two termini: greenhouse potential (GHP) and climate sensitivity. Each greenhouse gas has a certian potential of contributing to the greenhouse effect [12]. Since carbon dioxide is by far the most important greenhouse gas, it´s GHP was set to 1 as standard (another name for GHP is CO2-Equivalent) . The amount of energy absorption of other gases are compared with this potential.

The table below shows some gases, their GHP and their overall contribution to the greenhouse effect (contribution can be seen as GHP x concentration) [13]. CO2 CH4 (Methane) N2O HCFC O3 (Ozone) GHP 1 23 296 8500 1800 contribution 61% 15% 4% 11% 7% Climate sensitivity refers to the change in global temperature when the amount of the particular gas is raised. For example it is estimated that twice the amount of carbon dioxide in the atmosphere will lead to a rise in temperature of about 2 to 4,5 K [14]. Twice the amount in this case means a rise from (preindustrial) 280 ppm [15] to 560 ppm. Right now we are at 385 with a rise of approx. 1,5 ppm per year, so we´ll reach a concentration of 560 ppm CO2 around 2110. But since carbon dioxide is not the only contributor we have to take the other gases into account to and thats where the greenhouse potential comes into play. Roughly estimated it can be said, that 560 ppm CO2-Equivalent will be reached maybe earlier than 2050. Human influence Carbon dioxide [16]: 75 % of carbon dioxide emmisions comes from burning of fossil fuels, 20 % from forest reduction. Overall emmision is around 30 Gt. To see the real problem we have to take a look at raising rates. Emmision grew by factor 20 (since 1900), primary energy use by 12 and worlds population by 3, meaning each person is using 4 times more energy which is produced almost with twice the amount of emmisions. What we call comfort and advancement goes hand in hand with destruction of the environment.

Methane: There are many contributors here, the most important are: 27 % fossil fuel burning, 23 % cattle, 17 % rice growing, 11% biomass burning, furthermore waste dumps, wastewater and animal excrements. Overall emmision is around 400 Mt. There are of course other antropocentric emmisions that influence local limatic conditions or even lead to global change in atmospheric composition. For example the decrease of the ozone layer caused by HCFC [17], acid rain caused by sulfide emmisions or the phytotoxic effects of photooxidants. Human influence sure goes beyond influencing the greenhouse effect, but we don´t want to go into too much detail, since this would fill books.

II Present

Human activity results in many changes to the environment, for example ’Smog’ (artificial word for the combination ’smoke’ and ’fog’), reduction of rainforest, acid rain, changing chemical composition of tropos- and stratosphere, destruction of the ozone layer, melting of ice caps and glaciers, change of local climate patterns etc. Some of these phenomena have happened in earth´s history a few times ago but never so fast. Some, like acid rain, are new and consequences cannot be derived from experience. The whole system with all its dependencies is not yet fully understood. To keep consistency through the text and to not let it become unreadable because of an overload I´ll concentrate only on greenhouse effect. This is not sufficient for an understanding of the whole problem, but the alteration of the greenhouse effect is by far the most important, global phenomena with direct effects when talking

about climate change. Current situation As seen earlier the biggest manmade influence on the greenhouse effect comes from CO2- emmisions. 80% of these emissions is produced by burning fossil fuels. The carbon in these resources that has been stored over millions of years is released into the atmosphere in almost 150 years to produce energy for us to live.

We will now take a look at energy production and consumption. Since there are good, reliable sources and because it´s a good example I´ll take Germany as an example to show the flow of energy. [18]

Before I start with numbers I´ll explain three essential termini: ’Primary energy’ is the amount of energy inherent in each resource, for example 1 kg of oil contains 43 MJ chemical energy (approx. 12 kWh), sun radiates 11 MJ (3.1 kWh) on 1 m² on an average day in Germany. ’Secondary energy’ is primary energy brought into a useable form, e.g. gasoline refined from oil or electricity from solar panels (if there is more than one step in converting it is spoken of ’tertiary energy’, but we leave that aside). ’Used energy’ finally is the energy used for its purpose, e.g. kinetic energy of a car or thermal energy in a heated room. Nearly all used energy is in the end turned into heat and leads to accumulation of entropy in the universe. As mentioned earlier this radiation forcing is negligable compared to the suns radiation on earth. Germanys primary energy use in 99 was about 14200 PJ [19], of which 85 % were fossil, 13 % nuclear and 2 % regeneratives. Secondary energy produced was 9300 PJ, one third from the primary energy is lost during conversion or transport. Used energy was 4730 PJ, meaning only half of secondary energy is transformed in useable energy forms. 19 % of primary energy is used for room heating, this is also the part with the highest potential to save energy by using better insulation or constructing low-energy houses. There are also possibilities to substitute the fossil fuels used by using solarthermic installations or small heaters fired with biomass. Around 18 % of primary energy is used as fuel for cars, planes, buses etc. The potential here is quite huge too, the technical possibilities for a 3 l car are there. But as long as there is no consciousness the potential remains untouched.

Somebody said that green has to be sexy to be accepted, but thats only half the story. The car industry is very big here and people are proud of fast, strong cars and thats what they are buying, thats what is produced. There is research by BMW, VW or Mercedes for better, cleaner cars but they just don´t offer them. And as long as fuel prices keep low, people keep gasing. [20] There are more potentials for saving energy and reducing emissions, e.g. shorter, cleaner production lines, recyclable products and of course the production of electricity. The solution to the electric energy problem will hopefully be resolved with the invention of fusion reactors. These power plants run on hydrogen and deuterium which are infinitetly available, produce no waste and if there is enough research will be able to compete with prices. Unfortunately the first commercial fusion power plant will be operational around 2050 and till the technology is accepted and widespread it´ll take some more decades. Till then the electrcity will be produced mostly with coal, gas or fission. By burning fossil fuels the carbon dioxide amount in the athmosphere will rise and regenerative energies still need some years to establish themselves on the market.

Nuclear power seems a solution if there would not be the problems with mining the resources and the disposition of the waste. In my opinion there are a lot of misconceptions on nuclear power though. Just two things: One gramm of uranium holds as much energy as 2,7 t coal, you´ll have problems finding a more efficient source. And concerning the disposal of the waste: Whats the problem in storing it in secure containers 2 km below the ground in salt rock? I´m not a fan of the way how this energy is used right now, but the alternatives are scarce and bear many problems too.

Actors The climate politics of the US government is quite easy to describe: ’Whatever is against our industry we don´t sign or even consider it as a threat.’ One cannot expect any useful contribution to promote energy conservation, reduce carbon dioxid emmisions or pushing regeneratives from them.

Well, at least there are small things going into the right direction. Some mayors decided to reduce emmisions (even Mr. Schwarzenegger seems to have a green spot in his heart), there are environmental community structures and even in Silicon Valley companies switch from IT to environmental business. There is no question though that energy production has to made green. The monstrous lifestyle will go green sooner or later, rising oil prices and debts will take care of that, like everywhere else in the western world. The problem is that the USA are the only remaining superpower in militaristic terms on this world and who has the guns has the power. So they can basically take what they want and they showed the world with the Iraq-war how their lifestyle is defended. Maybe it´s just because of the actual government, but I wonder what they want with all those weapons? The thought that a nation might go very far to defend something abstract like a lifestyle makes me shiver. Brasil, China and India, the upcoming states, need support to turn into green countries. As one can see in the Kuznets-curve they are now at a turning point concerning ecological matters. Either they keep stagnant and will try to keep pace no matter what the costs or they have the feeling of being industrialised and may contribute to save the earth. It´s quite a dilemma, because there´s no way the environment can endure 2 billion people more living the standard we have in the western world today. They need to be industrialised based on alternative energy, energy saving technology, low emmision techniques, but also with social empowerment, waste saving product chains and consciousness development towards a healthy environment. Though this is the long way it´s the only possible way. Russia has huge resources of oil and especially gas and their government is using them politically to put pressure on unfriendly states (see the Ukraine gas scandal in January 2006) or to stay on the good side with the western world despite their catastrophic social and political circumstances. In environmental terms I´d consider them even worse than the USA, because in Russia it´s also only money that counts plus the facts that the population is forced to keep quiet and that no western state will critizise them for they are dependent on Russia´s gas.

The western world may be the big loser during the next century. It is obvious, that they have to adapt their lifestyle to the coming changes. Or rather sacrifice it. The problem is that this lifestyle we created is like a habit and is taught everywhere and people tend to be pessimistic about changing habits and get angry if they have to.

There is of course a rather small social and green movement, alternative technologies get promoted and environmental topics are in the media. If these movements survive and gain influence then there is hope for a green revolution. In my point of view 'green' technology in combination with a developed consciousness about using it is the only solution for a lifeworthy future. Technology alone is worthless if nobody uses it and consciousness without the technology is like walking through a forest in the night without a headlight. It´s just a question of time till we hit a tree.

III Future

An appropriate reaction to the threat we face would be to change our way of producing energy, our lifestyles, our relationship with our environment. Actually this is happening but very slow, too slow. There are several reasons for this reaction. One reason is that climate change has no identity like bin Laden or Sadaam, it´s a faceless, nameless, abstract opponent. This is why nobody feels angry or responsible. Another point is that environmetal policy today is in the hand of states. This has several connections: Responsibility is taken from the people since they just have to stick to the laws and not actively take part in the process of doing something. Furthermore a state has other obligations too (social security, providing infrastructure, education etc.) which may collide with environmental policy. And the biggest problem is that states today are under huge influence by industry and capital and guess who cares least about a healthy planet, an intact society, about the people? Social effects One of the big issues with climate change is, that those who can do nothing about it will suffer most. This is one of the biggest, if not the biggest unjustice ever happened to mankind. Destruction of the environment,

carbon dioxide emission etc. are results of the industrial megalomania of the western world. The effects of climate change will be felt most in the developing countries though. Desertification in Africa forces people to give up their home ground with nowhere to go. The border to Europe is well guarded, in african cities slums are growing like nothing filled with exactly those refugees. Rising sea levels will hit Bangladesh and force Millions to move. [21] Of course there will be problems in the western world too. We already experience dry summers, floodings and New Orleans was overrun by Katherina. [22]

Bad events for sure, lots of suffering, but the industrialised countries are more capable of relieving themselves and regain strenghts faster from such catastrophes. But what is most important are the long-term effects which will hit developing countries way stronger than Europe etc.

There will also be positive effects of climate change, for example longer growth periods for plants or warmer winters. Ironically more or less only the developed countries will profit, making the situation even worse. To summarize the situation in one sentence one could say that one part of the world is responsible for huge catastrophies in the other part. If you additionaly take the distribution of worlds population into account, the picture gets more sad. Horror szenarios in the oceans and in the permafrost huge reservoirs of methane-ice are estimated [23]. Now, because of its influence as greenhouse gas (23 times more than CO2), the reduction process of methane [24] and the amount of methane in these reservoirs compared to methane in the atmosphere it is quite certain that a sudden (spoken in terms of months or years) outbreak of a certain amount of this ’caged’ methane would lead to aprupt climate changes which are not manageble by humankind. Fortunately the probability of such outbreaks are very very low. But three points need to be mentioned here. First, there are attempts to excavate frozen methane from the oceans to use it as fuel, which can be compared to the process of burning oil or natural gas: fossil fuels in which carbohydrates have been stored over millions of years are burned in an instant and the ’sleeping’ carbohydrates are blown into the atmosphere as greenhouse gases. Second, with a rise in global temperature and sea temperature the reservoirs in the oceans may become instable. Third, with a rise in temperature the permafrost starts to melt and releases the frozen methane into the atmosphere. First signs of this already starts to show. There is one bigger horror szenario though, one that is happening right now, one that we live through daily. I´d call it ignorance. Every civilised human on this planet knows whats going on, climate change and all that is everywhere, media is full of it. But how is it treated? As a side phenomena. What is happening, where are the changes? Nowhere. And why? Because of ignorance, because we gave ourselves in to our leaders who sure know what to do and fool us day by day. Old man, who want their share of the bounty from the war between the rulers, the ’Herrenmenschen’, the captalists against the working class, the small men, the huge silent mass. A war that has been won long ago by the further and the remnants of which we are exposed to now. I hope, that a topic like the actual climate discussion will change the attitude of the fortcoming generation, our generation, and bring people closer together. It wasn´t us who did this, but it´s only us who can change it. So, let ´s not be ignorant about what is happening but rather strip away the pink glasses and see with open eyes. What can be done by us? There seems to be an equivalent built up over years. It is uncertain what would happen if there is a sudden rise in methane concentration. With ’us’ I mean in this case us as citiziens, each living according to his/hers heritage and lifestyle, wherever that may be. I may describe two approaches here which are somewhat extreme and I think the right way to deal with the situation can be found somewhere in the middle. The first approach can be described as the ’green’ approach or as I would call it, the ’bucket’-approach. The basic intention of this kind of lifestyle would be to preserve nature and dedicate a lot of one´s energy, time and money into things to leave an ecological footprint as small as possible. Actions could be: be vegetarian [25], be politically active or support environmental parties or organisation, save energy or try to avoid where possible, work in the environmental sector, ride bike or drive bus, educate others... Most important is to see one´s actions in a global context and think about consequences. Good things may happen out of accident or luck, but the core of this approach is thinking and living consciously

and see earth as a huge system in which oneself is just a very small part. One individual is just like a drop dripping into a bucket, one alone makes no difference but eventually the bucket will be full of water. This is why I´d call it bucket approach. Each one living this lifestyle has to be clear that his/her influence is both, negligable and important. The second approach I´d call the 'laissez-faire'-style. It´s the exact opposite in terms of thinking about environment and whats going on in this world but it´s roots run deeper. The core here is the point that we never had a chance to choose in which world we wanted to be born in. And our world, our achievements, our technical development, our political systems can be considered pretty advanced. In most terms this period of humankind we have today is one of the best there ever was. So why not use it to get the maximum of fun and exitement out of it? This approach is very ego-centered, it views the earth as a playground with the ego in the centre. And climate change, environmental problems, crises at the other side of the world...why should one care? This is something too big, something, where one has no influence on. So each individual could say: Me first, this is my only chance to life and I´m not gonna waste this opportunity, I want to life. As I said I don´t believe in each of these approaches, there are truths and illusions in both, a 'good way of life' would contain aspects of the two but never fully embrace one. The first way requires complete dedication and awareness, lots of energy and endurance, it´s like swimming against a stream with strong currents here and there. I always have huge respect for people who are able to live life like this. There is an undeniable truth in the second approach though and that is the fact of being thrown into something unchosable. The world is as it is no matter if I am here or not. In the end each one´s influence is negligable, so it is also correct to say that each individual is the architect of solely his/her life without regard to what has been or what will be. And if that lifestyle includes wasting energy, producing lots of trash or polluting the environment one always has the excuse of just swimming with the stream, there´s nothing wrong about that. There is only one chance to live [26] and that is here and now and there is no point in wasting it by thinking about consequences all the time, individual freedom is one of the highest values on this planet. So, my approach would be to think and act consciously, that means to see my actions in a larger scale (also on a timescale) and their further connections, but on the other side see life as a strange gift which is somehow the best thing that could ever happen. It´s like a balance act between a green and conscious view towards the world and enjoying life to the fullest no matter what.

Notes

[1] While writing these lines the climate convention in Bali/Indonesia takes place.
[2] Published in Mute Vol. 2 #5 (www.metamute.org) and at www.instcssc.org German version in Wespennest 147.

[3] Searching for „Milankovitch cycles" provides detailed information.
[4] See footnote 7.
[5] Of course it is a bit more complicated. For example reflectivity of certain wavelengths in greenhouse gases plays a big role. While they are transparent for shortwave radiation from the sun (light), they absorb or emitt longwave (heat) radiation coming from the sun or as reflection from the ground.
[6] Most of this chapter has it´s source in Wikipedia, which I think is alright, since the data presented here on the greenhouse effect is no speculation whatsoever and scientifically well proven.
[7] Solar constante. Since the way of earth around the sun is ecliptical it changes and here the effect of eccentricity of earth´s orbit on temperature gets clear. [8] This gets obvious when we consider that the sun shines only at a circle with Area = Pi x r², but we have to consider earth´s whole surface which is Area = 4 x Pi x r².
[9] See Planck´s law of radiation.
[10] All radiation forcing numbers from: Fabian, Peter: „Leben im Treibhaus". The original source is an IPCC-report from 2001.

[11] For those who want a calculation: Worlds primary energy use / Surface of the earth = 13,6 x 1012 W / 511 x 1012 m² = 0,027 W/m². I took 430 EJ as worlds annual energy production and 6378 km as earths radius. The result may vary since not all energy is turned to heat and anyway it´s difficult to get the real amount of primary energy used.
[12] Actually water vapor is the most influencial greenhouse gas when we talk about natural greenhouse effect, but since human influence on the concentration of water in the higher regions of the atmosphere is very low it is left out of the view.
[13] GHP for CH4 and N2O in the table are according to IPCC. GHP for HCFC and O3 and contribution for all are from a different source. All numbers are more or less approximates and differ from source to source.
[14] These are values from the IPCC, meaning they are scientifically proven. You´ll find many other values always depending on the climate modelling used. IPCC got the nobel prize though.
[15] Parts per million. 280 ppm = 0.028%.
[16] Numbers (also for methane) from: Guderian, Robert (publ.): „Atmosphäre – Band 1B“.
[17] The ozone layer is responsible for shielding the surface from high energy UV-radiation. Since it is decreasing, more energy gets to earth´s surface, especially in Antarctica, where the ice is melting rapidly. What can be seen from this is that the whole system of emmisions, atmospheric compositions, secondary products and effects etc. is a very complex one and small changes may lead to several, maybe unexpected results induced by indirect effects, feedback mechanisms etc. [18] The following theory and numbers are from the book „Energiehandbuch“ published by E. Rebhan. Data is from 99.
[19] PJ = PetaJoule. 1.000.000 is a million or 106, its sign would be ’Mega’. Next is ’Giga’ (109), then ’Tera’ (1012), then comes ’Peta’, meaning 1 PJ is a number with 15 zeros. Next in the row is ’Exa’ (1018). Worlds annual primary energy use today is approx. 430 EJ. Before industrialization it was approx. 4 EJ.
[20] Another chapter in the blockade of environmental laws by the automobile producers can be seen by looking at the discussion about fixing emmision standards for cars produced in the EU. The bargaining about numbers and deadlines is worse than at an arabian basar. Germany´s position is clear: Higher emmisions as late as possible. The bad thing is, that it´s not so much politicans that are discussing but rather lobbyists and ’experts’. You can guess by whom they are sponsored.
[21] Rising seal levels will also affect the western world (Tokio, New York, Hamburg).
[22] The question is of course if these occurences were natural.
[23] The amounts are not really clear, estimations are 30.000 Gt under the sea and 10.000 Gt in the permafrost. The amount in the atmosphere today is around 5 Gt, manmade emmisions sum up to 0.4 Gt. Source: See footnote 16.
[24] The reduction process depends on the amount of OH in the atmosphere.
[25] Vegan would be even better in environmental terms, but is considered not as healthy as vegetarian and what´s the use in living eco but short?
[26] I´ll leave religion out of this text. And even if there would be something like rebirth there is still no use in wasting each ’life’ according to moral codicies.