Is Global Warming Man-Made?

The Atmosphere seen as an Autonomous System

Gerd K. Heinz[1]

Abstract:

Today, it is a question of belief to find carbon dioxide (CO2) as the climate killer number one. Observing the field, we try inter-disciplinary calculations and a qualitative *and* quantitative attempt to better understand the processes between natural sciences and economy. We find water vapour as the dominating greenhouse gas number one. The variation of solar radiation has absolute highest importance for global warming. Compared to water vapour, the rule played by CO2 is nearly negligible. CO2 follows the warming of the atmosphere as an indicator. We find desertification, following the population explosion of mankind as the second large heat- and CO2-source. This part of global warming is man-made. We find a correspondence between growing air traffic and growing CO2 values. By contrast to the common sense we see that every CO2 production produces water vapour too, cooling or heating the earth atmosphere. Reducing the CO2-production will reduce water vapour production. This could increase the temperature of the atmosphere. So, the abandonment of nuclear- and coal power plants, together with the abandonment of oil and gas combustion by "green" technologies could heat the earth. By the way we calculate the economy and the risks.

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[1] The retired author studied electronics technology, mechanics and microelectronics at TU Dresden. He received the PhD in microelectronics at the HU Berlin. He made the first integrated circuit in the Berlin territory. Behind other inventions, he found interference networks able to calculate nerve nets. He applied this theory to invent the acoustic photo- and cinematography (Acoustic Cameras). He has no financial interests in any energy industries nor is he affiliated with any political party.

1.   For Future?

As a question of economic and financial survival of human civilization, global warming has got a story of the most explosive political significance. Lots of journalists, politicians, teachers and pupils know exactly the reason of climate change (if there is any): *Man-made carbon dioxide*. The Greta-Youth demonstrates to stop the coal, natural gas and oil production immediately (and nuclear energy too). What they do not know: They demonstrate to stop their life. False assertions light the conflict.

But different scientist found other mechanisms for global warming to be much more important, then carbon dioxide. 700 years old barley corns (Gerste) in Greenland show, that the climate here was much warmer then today [1]. Under Alps glacier "Pasterze" an old tree came out [29], it was a larch trunk (Lärchenstamm). But this warm period was mutually not reasoned by men.

From the eruption of the Laki- and Grimsvötn- volcanoes 1783-85 in Iceland we know, it brought megatons of CO2 into the atmosphere, but instead of warming up, the *earth cooled down*. Snow in the summer reduced the agriculture production in Western Europe. People were hungry, thousands starved. The French Revolution 1789 and the wars of Napoleon were the consequences.

Dependent of the interpretation of the data sources used (geological, whether records, tree rings, volcano eruptions, sunspots, solar radiance etc.), different researchers come to very different approximations of data concerning the influence of solar radiation and CO2 on temperature and climate. For example, see the 2015 overview of W. Soon et al [34], see also [35], [36]. What they mostly forget, is the volcano story and the possibility, that clouds can cool.

In Germany, the CO2-themes got a *religious dimension*, as a note from the nation-wide "Protestant Church Congress and Meeting" in Dortmund, June 19-23, 2019 demonstrated. The organizer, Kirchentagspräsident Leyendecker, said: *"Wer nicht anerkennen will, daß der Klimawandel menschengemacht ist, hat beim Kirchentag nichts zu suchen."* (Who don't accept the man-made climatic change is not requested at the church's day!).

Thinking about the Greta-Youth "Fridays for Future", we have to understand, that the demonstrations are paid and *well organized by NGOs with political and financial interests*. They transport the pupils with busses, they install tribunes with microphones and loudspeakers. They print banners, flyers, bills and so on.

2.   The Rule played by IPCC

In his 2006 film "*An Inconvenient Truth*" the former US-Presidential Candidate Al Gore had shown, that the climate change occurred over 600.000 years without influence by men. Based on a graphic chart he demonstrated the *closed correlation of temperature and CO2 over the last 600.000 years*. His work in climate change activism earned him (jointly with the IPCC) the "Nobel Peace Prize 2007" [24].
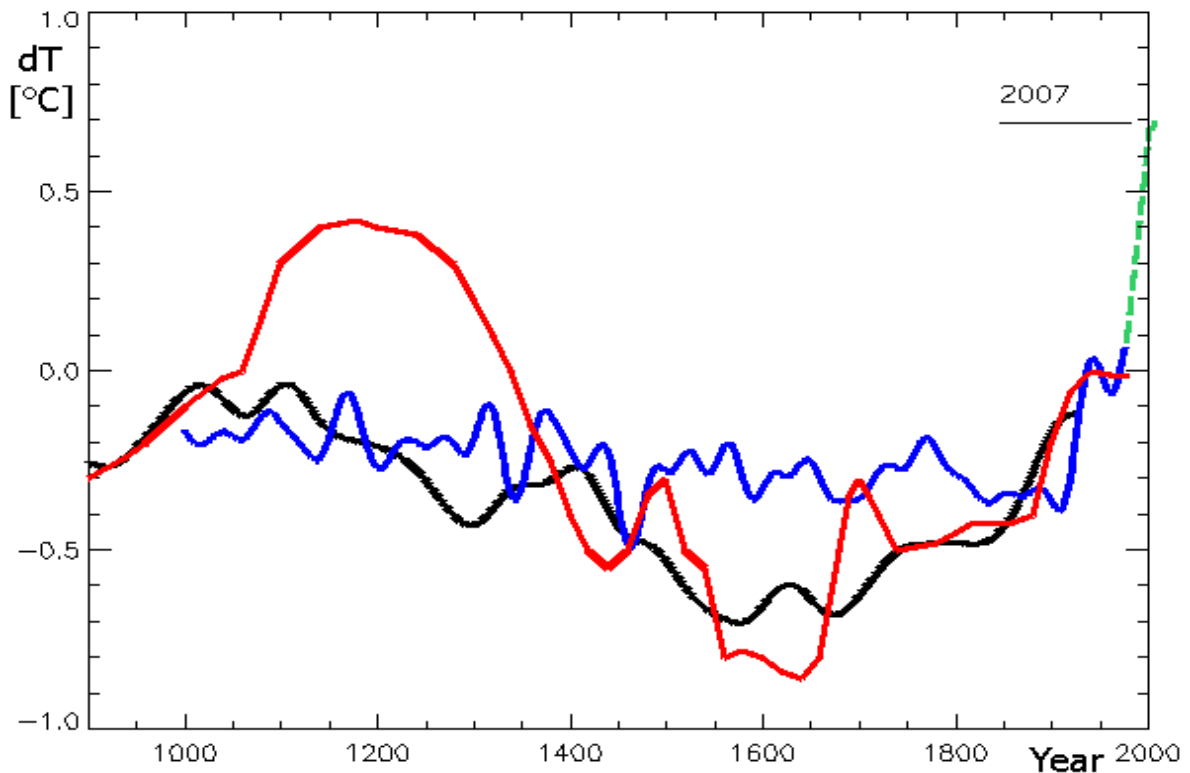
Fig.1:   Global warming curves published by the IPCC, [39]. Red: 1990, including the medieval cold- and warm-periods; blue: M.E.Mann 1998 (IPCC 2001); green: Jones, 2009; black: Moberg 2005.

What Al Gore "forgot" to name in his film was (behind 8 other details, heard by a 2007 court case [24]), that the CO2-curve *follows* the temperature curve all the time typically *in a distance of 800 years*, as the paleo-climatologist Ian Clark remarked [14], [17].

So *CO2 is not the reason, it is the effect of climate change*. It is to expect, that the time constants of oceans causes that delay. Got Al Gore the Nobel-Price 2007 for a lie? However, he has lots of political and financial interests in the field, see [24].

Looking into different papers of the 1988 founded United Nations organization "*Intergovernmental Panel on Climate Change*" (IPCC) we find the medieval warm period completely removed as an "event of local evidence" [2]. Is IPCC an organization with other then scientific interests?

Al Gore tried to push the US-government 1997 into the Kyoto-Protocol [25]. He was opposed by the Senate, which passed unanimously (95/0) the "Byrd–Hagel Resolution", which stated, Kyoto "would result in *serious harm to the economy* of the United States" [24].

In other words: By unknown reasons in the history of earth the climate changed, but CO2 played no rule. So, CO2 seems not to be a potent "climate killer" gas? Other effects or mechanisms have very much more potential?

We note:

> The medieval warm-period (950…1300) was removed by IPCC
> The CO2 of a volcano did not heat the atmosphere
> Temperatures varied all the time in earth history before men
> CO2 concentration *follows* temperature with 800 years delay

## 3.	World Population and World Economy

Between 1960 (3 billion) and 2000 (6 billion) we had the *shortest doubling of population, mankind ever had* [26]. Time for doubling the population becomes shorter and shorter. Each of us needs oxygen, heating material, food, we try to have clean water, electricity, a car, a flat or a house with roof, furniture, radio, television, internet; we produce gases and excrements. We need infrastructure, physicians, a supermarket, a bakery, a butcher, medicals, trains, busses, airplanes etc..

It can be supposed, that the amount of energy we need and the amount of CO2 we produce has a very closed relation (is proportional) to the exponentially growing population. Demands to remove the CO2 means in that consequence, to kill people? A growing number of wars in the world seems to indicate that.

Men need coal for steel and concrete production, oil for traffic, transportation and agriculture and gas for all kinds of heating. It is not possible, suddenly to switch over to other, unknown technologies. Neither we have the engineering knowledge to replace fossil energy per administrative command, nor we have the market economy for that attempt. And the costs by each technological change will explode.

Abrupt abandonment of fossil energy – as demanded by green parties around the world, or the "Fridays for Future" movement around Greta Thunberg, would replace industry, traffic and agriculture of mankind immediately by unknown technologies and even more, *by an unknown dictatorial planning system, excluding the market economy*. In Germany, we are on the way!

This could destroy civilization accepting the dead of million people worldwide. It could bring the biggest holocaust, mankind ever have seen. Electors, politicians or VIPs seem not to be clear, how dangerous it is, to play with this greenish fire. If we have removed industrial- and power plants, we do not have them anymore. If we remove the market economy, we lose each kind of democracy.

Last not least the size of the earth and the agricultural areas are constants and do not grow. Reasoned by population explosion, agricultural desertification grows up to a dangerous level. Desertification of giant areas each year becomes a growing problem witch influences the global warming process and the carbon dioxide production substantially, we will find.

4. Man-Made Carbon Dioxide and Water Vapour

Tab.1: World energy supply 2016, sources [9] and [3]. One kilogram oil unit has by definition the energy of 11.63 kWh.

World energy 2016	Giga tons oil unit	%	C in %	CO2 in kg/kg	Giga tons CO2	H in %	H2O in kg/kg	Giga tons H2O
oil	4.418	33.3%	72.4%	2.654	11.73	27.6%	2.484	10.97
coal	3.732	28.1%	95.0%	3.483	13.00	5.0%	0.45	1.68
gas	3.204	24.1%	79.7%	2.922	9.36	20.3%	1.827	5.85
nuclear	0.592	4.5%						
hydro	0.91	6.9%						
renewable	0.419	3.2%						
sum	13.275	100.0%			34.09			18.51
Total energy	154.388	TWh						

Partial sum fossil	11.354	Giga tons ou
Total fossil energy	132.047	TWh

C -> CO2	44/12	3,666	kg/kg
H -> H2O	18/2	9	kg/kg

Burning oil or gas produces carbon dioxide *and* in the same volume water. Coal power stations and nuclear power stations produce giant amounts of water vapour by the cooling towers. Volcanoes showed us, that water has the priority

over CO2: Water can cool *or* heat the atmosphere. In opposite to the general belief, our *fossil power generating technologies does not heat the atmosphere, they have the ability, to cool the atmosphere*.

To find out, how much water and carbon dioxide is man-made, Tab.1 shows a calculation between chemistry, atom physics and energy production. The columns "C in %" and "H in %" are raw approximations basing on the atomic weights (H=1, C=12, O=16) and the not exactly known molecular structure, so the following columns are approximations too.

Reading example: Mankind produced in 2016 around 4.418 gigatons oil. Burning the oil, we get 11.73 gigatons CO2 and 10.97 gigatons water. Mankind burned in 2016 11.354 gigatons fossil energy, relating to an energy of 132.047 TWh (terawatt hours).

5.   Scales and Units

We need scales to compare the potential effects of different heating sources. A good scale for direct warming is the world energy production (EW) [3], also known as "total power energy supply" (TPES). For CO2-production, the fossile, man-made CO2 mass MCO2 has importance.

To calculate the corresponding, average power production we have to divide the energy by the number of hours of the year. 365 days * 24 hours = 8760 h/y. The energy of 154.4 TWh corresponds to an average power production of 154.4 TWh / 8760 h/y = 0.0175 TW = 17.5 GW. By analogy we get the total fossil power production with 132 TWh / 8760 h = 15.1 GW.

"The scales"- important man-made values for 2016:

Energy production world	EW = 154.4 TWh
Energy production fossil	EF = 132 TWh
Power production world	PW = 17.5 GW
Power production fossil	PF = 15.1 GW
Man-made carbon mass	MC = 34.1 / 3.66 = 9.32 Gigatons
Man-made CO2 mass	MCO2 = 34.1 Gigatons
Man-made H2O mass	MH2O > 18.5 Gigatons

6.   The Greenhouse Effect

Wood and Nahle [10] have shown, that the main important effect of a greenhouse is not the radiation, it is the blockage of convection. They are totally right, but this is not the main question.

The important idea behind the greenhouse comparison is the spectral absorption of CO_2 and H_2O in the Mid-IR-range, Fig.3. The electromagnetic wavelength corresponds inverse to the temperature. The range around 10 µm marks a temperature of 255 Kelvin ~ -18°C, while the wavelength around 0.5 µm marks the incoming radiation of the sun. But the radiation energy is proportional to the frequency, that is inverse to the wavelength.
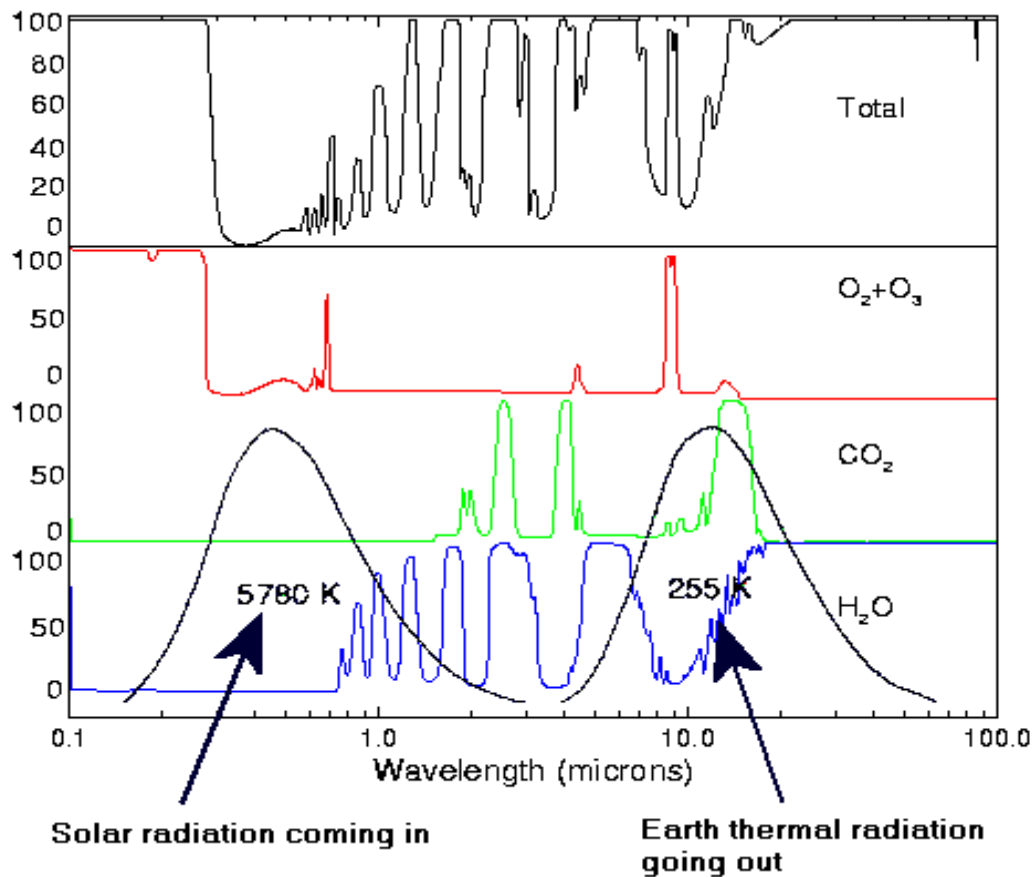
Fig.2: **Absorption spectra of water vapour, carbon dioxide and oxygen. We find oxygen blocking the UV-range, while water vapour and carbon dioxide blocks the cold back-radiation of the earth in the far infrared range. Image source [11].**

The higher the frequency, the higher the energy. Incoming solar radiation has thousand times more energy, as the 10 to 15 µm range, blocked by carbon dioxide. So the reflected energy becomes smaller, as higher the wavelength is,

see Fig.2. And the water absorption in the whole infrared range is much higher the CO_2 absorption, to see in Fig.2 and Fig.3.

If we multiply the efficiencies of water vapour and CO_2, we find the mid-IR back-radiation of water approximately 5-times stronger then CO_2 [3]. And the atmospheric concentration of water can be up to 170-times higher as CO_2 [3].

So *water is the very better greenhouse gas* with an up to 170*5 = 85*0-times higher efficiency then CO2* [3], Anh.3. And it is the greenhouse gas with the absolute highest amount in the atmosphere (by natural production). Looking into NASA-satellite observations [31], we see oceans and rain-forests as the big sources of water vapour.

We note, that *natural water vapour is in quantity and quality the most dangerous greenhouse gas*. It should urgently be remarked in an Annex to the Kyoto-protocol [25].

What the figure does not tell us: *water blocks the entire spectrum*, if it reaches the saturation point (also called dew point or condensation point). Although not known, this is the *most important point for all climate evaluations*. It is more important, as the whole rest of the figure. Why? If water blocks the incoming radiation completely, and the outgoing radiation too, any other "climate killer gas", like CO_2, has no chance to modify the radiation anyway.

Hug [37] calculated 1998 the extinctions coefficient (absorption) of CO_2 in a concentration of 357 ppm for a wavelength of 15 µm to 20.2 m²/mol. Over a height difference of *10 meters he got an absorption of 99,94%* (practically all back-radiation is stopped over ten meters). The assumption is, that the atmosphere "is saturated" with CO_2, any further CO_2 will change nothing of interest.

We note:

> The troposphere does not work at all like a greenhouse
> Water has up to 850-times higher efficiency then CO_2 as a greenhouse gas, it is by far the most productive greenhouse gas
> If it reaches the saturation point (clouds), water blocks the entire spectrum, giving other greenhouse gases no chance for any influence

7. Men-produced gases versus gases in the Atmosphere

Seen as a ball, the earth has an average diameter of 12730 km. The corresponding surface has 509e12 m² or 5.1e18 cm². With a pressure of approx. 1 kg/cm² the atmosphere has a weight of 5.1e18 kg = 5.1 Pt (Petatons) [3] (5.1 Petatons = 5.1e15 tons = 5.1e21 g = 5.1 Zg). Wikipedia [5] says 5.15 Zg.

Natural water vapor in the atmosphere has a volume of 12900 km³ [32], the corresponding mass is 12.9 Terratons. With the mass of men-produced MH2O = 18.5 Gigatons we have a factor 12.9 Tt / 18.5 Gt = 697 ~ 700. So men's influence to the natural water vapour cycle is 1/700 = 1.4 promille.
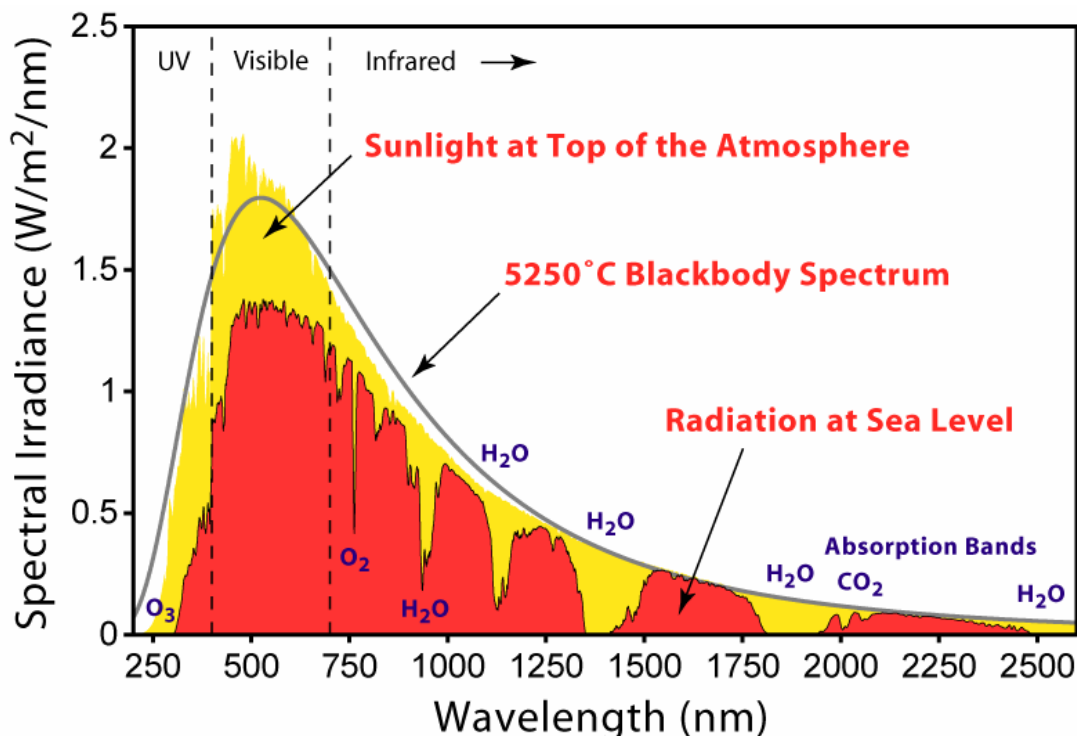
Fig.3: **Solar radiation spectrum. The absorption bands of CO2 are very small compared to H2O. If there is a greenhouse effect, it depends from water many times stronger then from CO2. Image source [8].**

Using the current CO2-concentration of 410 vol_ppm (volume parts per million ~ 628 mass_ppm) we find MPPM = 628 ppm * 5.1 Pt = 3.2 Tt (Teratons) *CO2 in the atmosphere*.

To understand, if and how men influences the atmosphere, we have to ask for the relation between men-produced CO2 and CO2 in the atmosphere. The result surprises: *The atmosphere can store 938 times the fossile, men produced CO2 of 2016.* (MCO2 = 34.1 Gt; MPPM = 3.2 Tt; 3.2 Tt / 34.1 Gt = 938).

Different sources talk about a reduction of CO2 by natural processes in the range of 10 Tt (Terratons; 10e12 tons) per year. Compared to 34.1 Gigatons man-made CO2 we find a factor of 300 (10 Tt / 34.1 Gt = 294).

The *ability of nature to remove CO2 is estimated to be 300-times higher* the production of mankind [3], [6]. And CO2 has a 1.5-times higher density then air, it tries to sink to the bottom.

So CO2-sources near the ground (industry, traffic, power plants) have mutually only small influence on the CO2-concentration in the higher atmosphere?

It seems to be like a great wood-fire in our garden in deep winter. In the near it is hot, but the neighbor can not feel anything of the heat. The smoke reaches a height of some meters before it falls down. We can smell the smoke only some hundred meters in wind direction.

We note:

> Because of the 1.5-times higher molecular mass, CO2 sinks faster to the ground, while water vapour stays in the air for a long time
> Atmosphere carries 938-times more CO2, then produced by men
> Nature reduces 300-times more CO2, then men produce

8.   The dual Rule Played by Water Vapour

Air has a density of 28.7 g/mol (oxygen 2*16, nitrogen 2*14, argon 18; air: 78.1% N_2 + 20.9% O_2 + 0.94% Ar = 28.73 g/mol) [3].

By contrast, the density of CO2 (12+2*16 = 44 g/mol) is 1.5-times higher then air, so CO2 sinks steady to ground.

Water vapour has a molecular mass of 18 g/mol (16+2*1 = 18 g/mol). It is much lighter then air.

So *humid air rises up*, while dry air, also carbon dioxide, sinks down. So air accumulates water vapour for a long time. Condensation stops the accumulation in form of rain or snow.

All other "climate killer gases" have higher densities then air, they all sink faster to ground.

Fig.2 and Fig.3 show, that water acts for the back-radiation as a stronger greenhouse gas then CO2.

The water concentration in air [40] varies rough from 63 mg/m³ at -50°C to 63 g/m³ at +43°C. So the quantitative efficiency compared to 400 ppm CO_2 (628 mg/m³) varies between *1/10* at -50°C and *100* at +43°C.

Multiplied by a suggested five times higher spectral efficiency to warm up the atmosphere in the mid-IR back-radiation zone, the *impact of water vapour can be approximately up to 850-times higher* then CO_2 [3], Anh.3. More then CO_2, *water vapour is the most dangerous greenhouse gas* on the earth! So it is dangerous, to focus our whole attention to carbon dioxide. *Water vapour is the "climate killer gas" no.1*. We see it each day in the cloudily sky.

Water has a *second, much more important function* in the atmosphere. Sinks the temperature of air with a relative humidity of 100% under the dew point, the water condenses, building clouds. They stop the solar radiation and the back-radiation radically, nearly complete. The earth cools down at day, or stays warmer at night.

All big volcano eruptions brought strong falling temperatures reasoned by dark, cloudily sky and the blocking of sun radiation. They show, that the cooling down effect of water vapour in form of dark clouds is much more important, then the warming up by carbon dioxide or other "climate killer gases". *If clouds block the incoming solar radiation completely, the earth can not warm up*!

Burning oil or gas produces carbon dioxide *and* water vapour in nearly comparable quantity [3]. Because of the density, water vapour has a higher time of survival in the atmosphere, so the efficiency to influence climate changes is supposed to be higher compared to CO_2.

So, *global warming can be effected by the missing cooling by water vapour*, appearing as a *side product of all burning process of oil or gas*, or the *cooling process of coal power plants or nuclear power plants cooling towers*.

If we stop to use oil or gas, or if we stop the water vapour production of the cooling towers of energy plants, we reduce the accumulation of clouds with the effect of a higher incoming solar radiation. Growing temperatures could follow.

That means: The *reduction of CO_2 could bring us the risk of a higher global warming* reasoned by reduced water vapour and cloud generation.

We note:

> Water vapour has a up to 850-times stronger greenhouse effect then CO_2

Water vapour is the most dangerous greenhouse gas
Water vapour can block the incoming solar radiation
If solar radiation is blocked by clouds, earth cools down
All fossil burning- processes produce water vapour
CO2 reduction could bring us a global warming problem

9.   Men Produced Desertification

We know, that deserts have most of the time cloudless sky. In [3] the author calculated the influence of cloudy sky relative to cloudless sky.

Calculation for the area of the Sahara (source [3]): The Sahara has a surface of 9 million km² = 9e12 m² (Wikipedia). We suggest rough a difference of 800 Watt/m² between cloudy and cloudless sky. For 8 hours per day sunshine at 365 days per year, the energy difference ES is approximately

ES = 9e12 m² * 800 W/m² * 365 d * 8 h = 21e18 Wh/y = 21 EWh/y (Exa Watt hours per year).

Compared to the world energy production per year (EW = 154.4 TWh) , 2016 the Sahara produced 21 EWh / 154.4 TWh = 136-times more heat, as men.

So for the area of the Sahara we find 2016 a 136-times higher warming potential, related to the world energy production (EW). All warm deserts together bring a warming energy of approximately 300 to 500-times the world energy production EW. *This is very much more energy, then all man-made effects can produce together*!
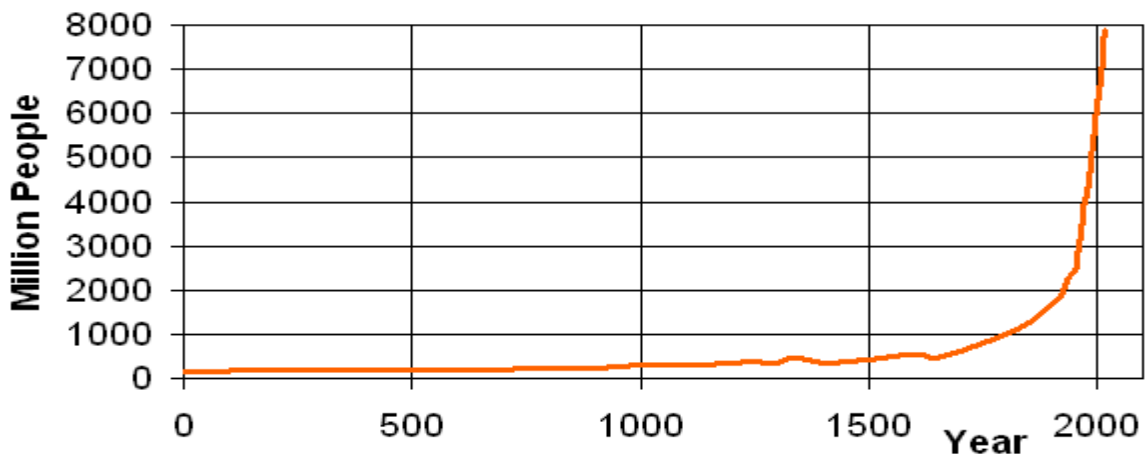

Fig.4:   **World population explosion over the time, data source [26].**

Thinking about men-produced desertification [3], we find other important sources for warming-up. Between 1960 (3 billion) and 2000 (6 billion) we had the *shortest doubling of population, mankind ever had*, Fig.4, [26]. Time for doubling becomes shorter and shorter. Mathematicians know, this process is called *exponential growing*. Exponential functions describe any kind of explosion processes. So we should call it "*population explosion*" [26].

Leading cities are Casa Blanca and Teheran, the population exploded here in 100 years by a factor of 100. The patterns are comparable: A village needs firewood, range land and acres. The land is cleared from forests. Depletion of the ground and desertification follow. Simultaneously the village grows to a concreted city inside a desert. We find these pattern in thousands of cities, from Syria to Afghanistan, from Morocco to Yemen, from Argentina to Mexico.
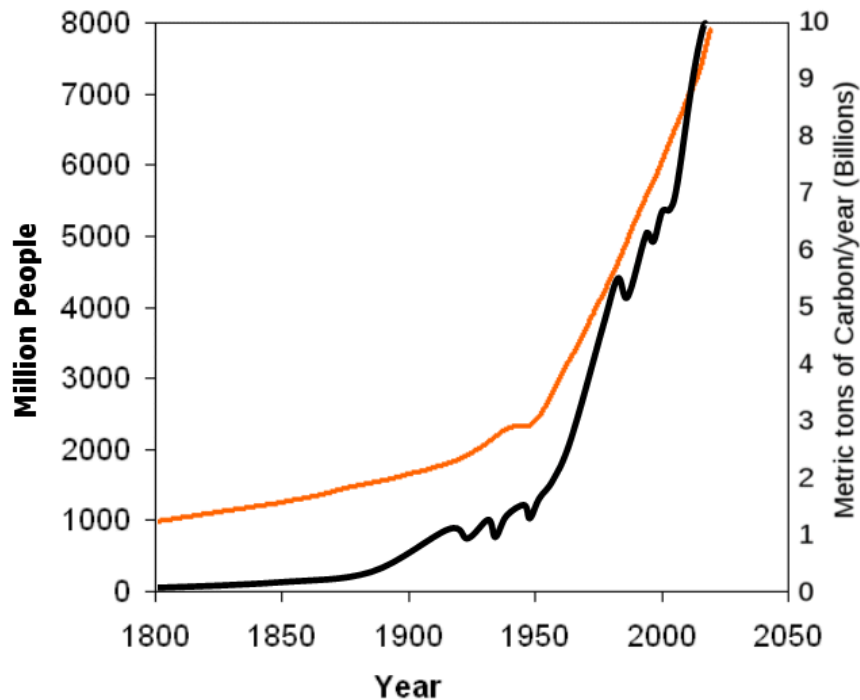
Fig.5:   **Population red and carbon production black, sources [4] and [26]**

At the same level, the population increases, the *world energy consumption, the heat production, the water vapour and CO2-production increase*.

But the surface of the earth has a constant size. Areas for agriculture do not grow with the explosive growing society. More and more people need something to eat. So the efficiency of agriculture must grow, for example by the use of insecticides, fertilization and industrial animal husbandry.

Also people try to occupy forbidden areas for agriculture production, for example in rain-forests [3]. The permanent removal of rain-forest, the expansion of mega-cities, the over-production and depletion of agricultural areas and the succeeding, hermetic sealing of the ground by traffic infrastructure, buildings and roofs (also by solar-panel fields) reduce the natural ability to produce water vapour. IPCC [2] says, an area of the *size of Germans agricultural area (0.12 km²) dries out each year*. Rain-forests change to deserts.

If 0.12 million km² rain forest becomes a desert each year, this is 0.12 Mio km² / 9 Mio km² = 1/75 of the Sahara area. Drying-out, two things appear with relevance to climate change:

First, the cloudless sky over a desert warms up the earth with about *2 EW more (1/75 * 136 ~ 2) each year* (EW: world energy production of mankind). Each year two EW more means, *every 75 years we have a further Sahara, heating the earth* [3] with 136-times of the energy world production EW.

Second, if the rain forest's carbon is equivalent to a 50 cm thick layer, it produces *up to 25-times the mass of the man-made CO2-production* (MCO2) each year [3]. So, both effects influence the climate substantially [3].

So man-made desertification is the *CO2-producing process with highest importance*. If we stop all fossil burning now, *we can only save 1/25 = 4% of the man-made carbon dioxide*!

We note:

> Sahara warms up the earth 136-times more then men (EW)
> All warm deserts together produce 300- to 500-times the EW
> Earth population grows explosive, producing growing desertification
> Desertification dries out 0.12 million km² each year
> Desertification produces 2-times of EW *more heat per year*
> Desertification produces 25-times more CO2, then fossil sources
> We can save 4% of CO2, stopping fossil world production complete

10.   The Influence of Solar Radiation: Black Spots on the Sun

Black spots are heavy explosions on the sun surface caused by magnetic fields. While the flare-material blows out, it cools down. So we find this explosions as black spots. By changing black spots activity, the solar radiation can vary up to five percent [3], [27]. Which energy is behind such a variation, Fig.6?

Seeing the earth as a plate perpendicular to the sun, it has a surface of 510 million km². The solar constant is 1366 W/m² (Watt per square meter). Suggesting, clouds on the earth reflect 30% back into orbit, the other 70% reach the surface.

Fig.6:   A solar flare of the sun has many times the size of the earth, source NASA [27], modified

The total incoming energy is supposed to be 70% * 510 million km² * 1366 W/m² = 488 PW (Petawatt). For a sun radiation variation of 5% we get a power variation of 488 PW * 5% = 24.4 TW.

    5% solar power variation   PV = 24.4 TW
   Power production World   PW = 17.5 GW

Dividing the solar radiation variation by the world's power production, we get a factor of 24.4 TW / 17.5 GW = 1394 (Wikipedia says up to 10891-times more [33]).

That means, a *5% variation of solar radiation has an effect, that is 1300- to 11000-times higher as the world energy production* (EW). Thus the variation of solar radiation is found to be the most important effect on climate changes.

Fig.7 shows measuring results of Shaviv [21], substantiating the calculation, that the sun has highest impact on temperature variation on earth. Suggestion

for Fig.7 was the ice smelting at the poles and the correlation with earth temperature. As more ice smelts, as more the sea level increases.

Observing black spots and the solar constant, different astro-physicists registered a stronger solar activity *within the last 70 years*. The activity is as high, as in the Holocene warm period 8000 years ago.
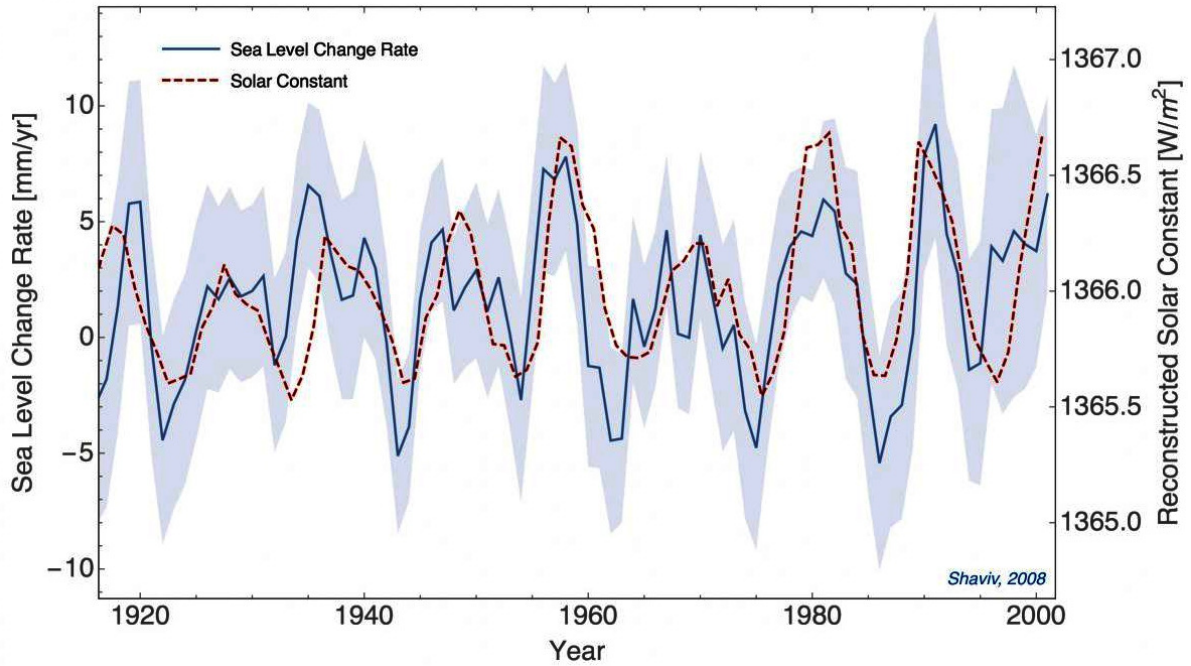
Fig.7:   The relation between solar radiation and sea level.
Red dots: solar constant, blue line: sea level variation, source [23].

It is known, that high solar radiation brings the water vapour over the dew point. Clouds tend to disappear with higher solar radiation. We know the effect, if we observe the sky in hot regions in the early morning. Clouds disappear fast.

Dependent on their strength, solar flares have velocities between 1200 and 300 km/sec [22]. With a sun-earth distance of 149.6 million km they arrive earth between 34 and 138 hours ($t = s/v$ = 149.6 Mio km / 1200 km/s ~ 34 h).

Because a solar flare reaches the earth after days, Dr. Piers Corbyn started to use that knowledge for the long-term weather forecast, see [14] 27:45. And he has success.

What does it mean? It means not more and not less, as the *solar radiation causes the climate change* most substantially.

11. Emission by Airplanes

Gases with different densities try to split into fractions, where the weighty gas sinks down. CO_2 has three times the density of air, water has that of air.
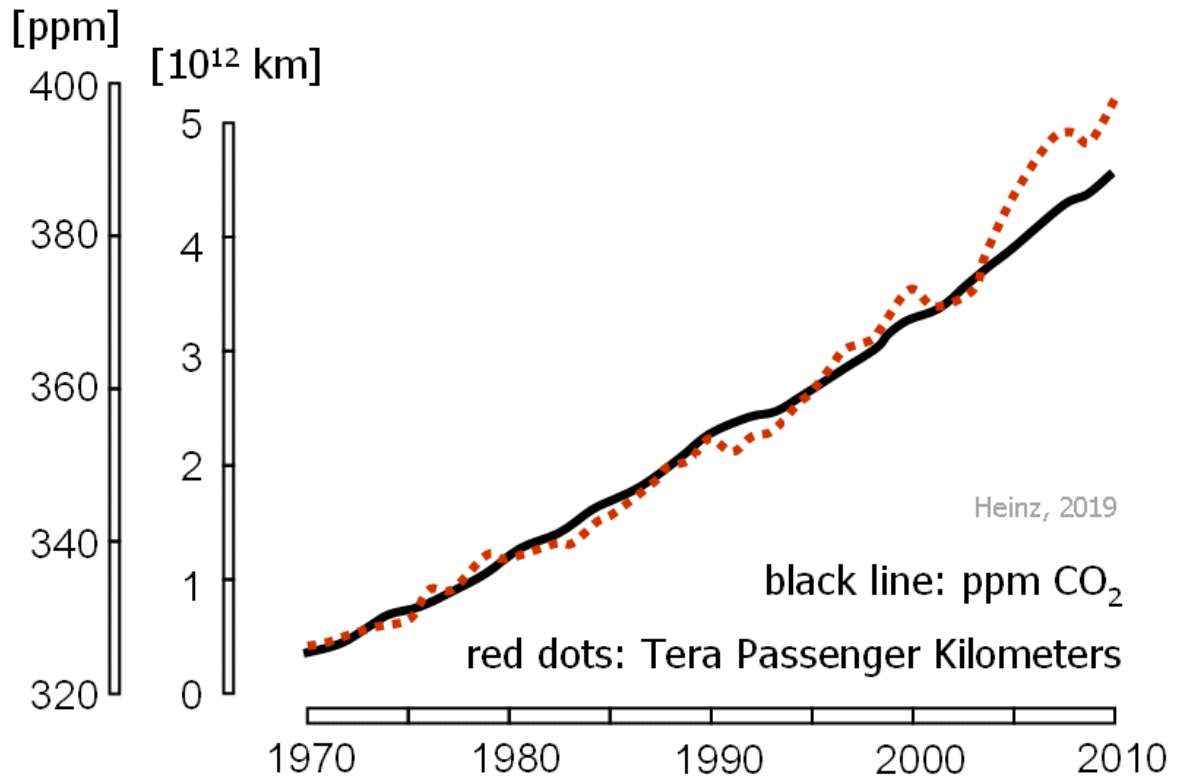
Fig.8:   **Only coincidence? Keeling's CO2 measure on Mauna Loa (black) and total passenger kilometers of airplanes worldwide. The kerosene consumption of modern airplanes decreases, so they produce mutually after the year 2000 more passenger kilometers with a decreasing CO2 rate, source [3].**

If the atmosphere would integrate over ground-near CO2, we should find coincidences between the atmospheric CO2-content (Keeling-curve) [7] an the fossil energy production (EF) on men by year. But we can not find coincidences, the *Keeling-curve does not represent the EF*.

Airplane emissions occur up to a height of 11 km (36000 ft). At open sky, sometimes we see the condensation trails (contrails). We know the long, high and diffuse cloud-figures of the type *cirrus aeroplanus*.

Keeling's research institute was on the Mauna Loa (Hawai) in a height of 3400 meter. Hawai has no important industrial infrastructure. Where should the CO2 come from? Maybe from airplanes? The idea appeared stupid, but was tested in May 2019. I was surprised. If we compare the Keeling curve with the total

billion passenger kilometers of airplanes over the years, we find a nice correspondence, see Fig.8.

The total amount of CO_2 and water produced by airplanes has a volume of 1.8 Gigatons, whereof CO_2 has 0.869 Gigatons, water has 0.355 Gigatons [3]. In comparison to the amount of CO_2 in the atmosphere (3.2 Teratons) *this not so much.* What could it mean?

Airplanes saturate the atmosphere by CO_2 within 3000 years (3.2 Tt / 0.869 Gt = 3682). But the gas has a long way to come back to earth. So CO_2 can influence the back-radiation at 10 km height.
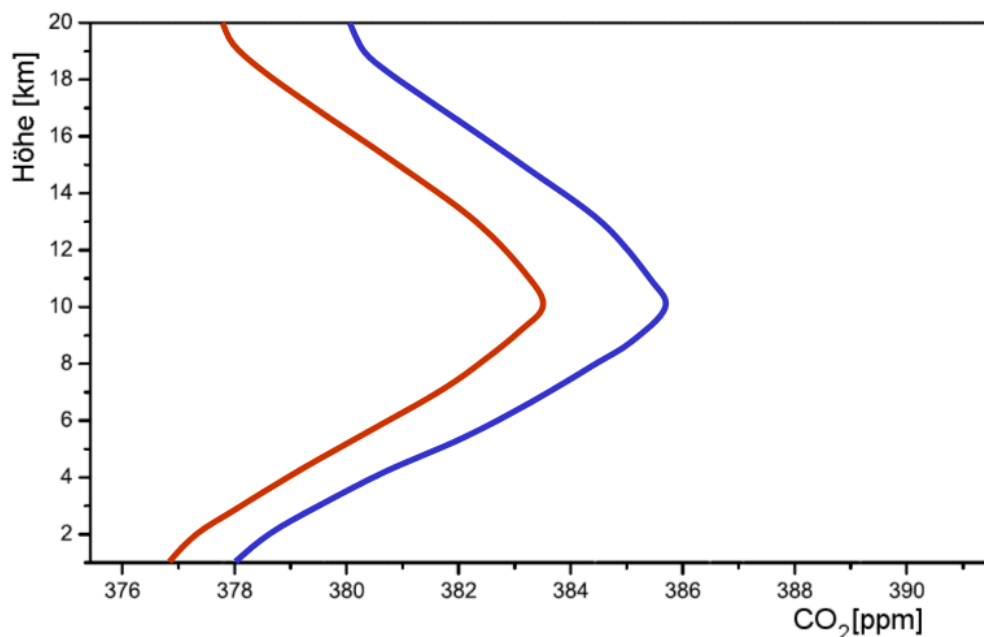
Fig.9: Two examples for a vertical distribution of CO2 in the atmosphere influenced by air traffic. FTIR-data sources see [3].

In great height, the higher CO_2-concentration, together with water vapour of airplanes, can create a *second isolating roof around the earth* and can influence global warming. The (water-) *contrails diffuse the solar radiation*, bringing *more radiation* to the earth.

In relation to desertification (497 Gt per year), airplane emissions are comparable small, the amount of CO_2 (0.869 Gt) is *1.7 promille of the volume of desertification* (497 / 0.869 = 572).

Natural water vapor in the atmosphere has a volume of 12900 km³ [32], the corresponding mass is 12.9 Terratons. We have seen, airplanes produce about

0.672 Gigatons. This is a factor 12.9 Tt / 0.672 Gt = 19196 ~ 20000. So air traffic has only an influence of 1/19196 = *0.05 promille compared to natural water in the atmosphere*. This is little. For further reading, see [28], [38].

So climate change is influenced by airplanes? With a small probability it is possible by the accumulation of CO2 and water vapour in a height of 10 km.

12.　Germany's Energy Revolution, called "die Energiewende"

Oil, gas and coal reserves of the earth are limited. So the "Energiewende" appears as a very good action. But by a closer view, a fast introduction of unknown technologies appears as an economic disaster, substituting market economy by hidden subventions and state-dictatorship. The high volatility and the high prices of energy delivery by solar and wind power stations cause problems [7], just as necessary restrictions against customers.

Germanys contribution to CO2-avoidance can be estimated: The man-made fossil mass per year is 11.354 Gt (billion tons) oil units (Tab.1). If Germany consumes a volume of 317.8 Mt (million tons) oil unit [9], *Germany's world contribution is 28 promille* (317.8 / 11354 = 0.02799 ~ 28 promille). To less, to have relevance?

If the natural CO2-resources are 300-times bigger the man-made fossil mass of CO2 per year, *Germany's contribution is less then 0,1 promille* (28 promille / 300 = 0.0933 promille), related to all CO2 sources together. For that reason, we are about to destroy our industry and economy?

Although known by lots of scientists, that the atmosphere is not influenced by our CO2 substantially [35], [36] and that fossil carbon dioxide plays no substantial rule for the climate, Germany has started a revolution, that remembers to Kaiser Wilhelm's words "Am deutschen Wesen soll die Welt genesen!".

Germany decided after the Fukushima accident 2011 to abandon all 17 nuclear power plants until 2022. By end of 2015, *nine were shut down* [11]. 2011 they produced 20% of the electric power of Germany [7].

Moreover, Germany announced for 2020, to reduce the CO2 emissions by 40% versus 1990, especially by the reduction of coal-generated power [18], [7].

Coal power stations gets the new task, to compensate the deficits of energy, caused by volatility of wind power and solar power. Thus they have to produce on demand, *increasing their costs per kWh to more then 200%* [3], [7].

Because they are not able to deliver for current market prices, *solar and wind power plants can only survive, if they deliver to their (much higher) production costs.* Although *hidden by subventions, this doubles the prices* for energy production too.

Energy buffers are needed. The necessary, permanent storage and release of energy by pumped-storage stations *consumes a substantial part of energy*, to pay by the customer again.

Taking all together, the total energy costs (for electricity) will increase roughly by a factor of 500%, *politically hidden by subventions that are tax-paid*.

To reduce the pump-station storage volume and so the costs, the customer is forced to buy new devices (washing machines, tumble dryers, dishwashers, heatings, E-cars), that have to be remote-controlled via internet by the energy-delivering companies. Regulated by energy costs, they tell the device, if energy is available. So the devices could wait some days, before they work.

Not only the energy production industry is named. Also the people. Government introduced hundreds of restrictions *to destroy the market economy* in perfection.

By state-restricted economy and the *elimination of competition* the *customer is forced to buy high expensive things, that would not survive at a free market.*

For example: If I build a new house, government rules restrict the materials and devices I have to use. I have to take only energy sources with renewable energy (for example expensive air- or groove-water heat pumps) that have prices and running costs far away from a simple gas-heating. I have to use special isolated types of windows, the isolation of the building has to meet regulations, the hourly prices for solar and wind energies are regulated and so on.

All this needs *tax-generated subventions*. The *German government switches off the principles of the successful market economy* of the 1950th. 30 years after the financial and economic ruin of the dictatorial GDR-Planwirtschaft, the *German government substitutes the market economy by the next, state-restricted, GDR-like economy.*

And all this, without of any reason. The GDR-propaganda called this: "Überholen, ohne einzuholen!" (passing by without reaching).

It needs no intelligence, that in consequence the last sensitive or power intensive production lines left Germany or they plan to escape. This is a very dangerous experiment for economy. But the count down is running, and the Germans have to pay the price.

What the say, is: We can nearly not measure our influence (smaller then 0.1 promille of CO2), but we turn the climate! We are the Germans!

13.   E-Mobiles produce more CO2, then Combustion Mobiles

E-cars need to be charged. If they are charged at night, they can only use pump-stored solar energy or wind energy. Solar and wind energy cost much more as the today's energy. If there is not enough solar- or wind-energy, E-cars will be charged by coal. If they are charged nightly, they can use pump-stored solar- or wind-energy or coal energy.

Diesel- or Gasoline engines need only *one combustion step* with a efficiency by 40%, the coal power plant needs also this step with a comparable degree of efficiency. But 15 further steps follow to load the E-car's accumulator, if the energy is stored by a pump-station:

> *The primary electricity will by transformed to medium-level voltage. It will be transformed to high-level voltage. It will be carried by a long transmission line to the pump station. It will be transformed to the motor/generators voltage. It pumps the water up. The water falls down. The turbine with motor/generator produces voltage. It will by transformed to medium-level voltage. It will be transformed to high-level voltage. It will be carried by a long transmission line to the consumer side. It will by transformed to medium-level voltage. It will by transformed to power supply voltage (230/400 Volt). By the charge station it will be converted to cars voltage. It loads the accumulator. The accumulator gives its charge to the motor-controller of the car. Finally the E-motor produces the mechanical energy!*

Every of these fifteen steps has a limited efficiency, with maybe 5% to 15% energy loss per stage, that is transformed into heat. Multiplying the partial efficiencies, we get the overall degree n of efficiencies:

Averaged efficiency 95%: $n = (0.95)^{15} = 0.46$
Averaged efficiency 90%: $n = (0.9)^{15} = 0.21$
Averaged efficiency 85%: $n = (0.85)^{15} = 0.087$

What does it mean? In the best case, 46% of the coal energy is changed to mechanical energy, driving the E-car. In the worst case we get 8.7% efficiency compared to a Diesel- or Gasoline engine. 54% respective 91% heat the atmosphere.

Using a 50% "energy mix" with coal power to load E-cars means, we produce something between 2 to 10-times more CO2 in comparison to combustion engines to produce the same mechanical energy [3]. This is not green. So it is not productive, to use coal power to load E-mobiles anyway. In addition we get five times higher prices for electrical energy, compared to today's technologies.

In addition, the production of batteries produce unknown masses of CO2, so different scientist [7], [35], [36] calculate, that E-cars run more effective as an Diesel, if they have a *lifetime over 300,000 to 600,000 kilometres*. What they forget:

1) The batteries have mutually a shorter lifetime, so *they can never reach the point of a lower CO2-production,* compared to a combustion engine.

2) E-cars are mobiles for short distances. It is far away from each realism, that they will bring in average such high kilometer accounts.

Per kilowatt, *E-mobility will produce more CO2, then current technologies*.

The EU-legislation "Reduction in CO2 emissions of new passenger cars" "gives super credits as incentives given to manufacturers to register low-emitting cars" [30]. *These are not E-cars*!

So the German "Energiewende" will become a technological, technical, economical and financial disaster only comparable with the destruction of industry and economy by World War II. It will remove the successful "Marktwirtschaft" (market economy) by a dictatorial GDR-type "Planwirtschaft" (planning economy). Last not least, the exploding prices can inspire heavy protests by poor people, bringing the next *political revolution.*

14. Summary

Volcanoes show, that the cooling effect of cloud-building water dominates over all other greenhouse gases.

The density of non-saturated water vapour is lower then air, so it stays in the air for a long time, while all other greenhouse-gases (like CO2 or condensing water vapour) have higher densities and sink faster down.

Water is the *most dangerous "climate killer gas"* at all, with a 850-times higher potential then CO_2, [3], Anh.3. It plays a *dual rule for cooling and heating* the atmosphere. In condensed form (clouds) it cools down, in weak- or non-condensed form it can isolate or heat the earth. Men's influence to the natural water vapour cycle is negligible.

With 1300- to 11000-times of the world energy production (EW) by far the *highest influence on global warming has a 5% variation of sun radiation*, registered by a higher amount of black spots on the sun surface since 70 years. This part of global warming is not man-made.

Dry regions do not reduce CO_2, compared to wet regions of the earth. So *CO2 follows the warming of earth as an indicator*. If CO_2 would also be the source, we would get a feedback system, producing a *self-excitation*. Because this is not the case, and it is clear, that CO_2 is an indicator, we can follow, that *the thesis: "CO2 is the source for global warming" can not be true*.

Nature produces 300-times more CO_2, then fossil produced by men.

The atmosphere stores 100-times the mass of yearly produced fossil CO_2.

Desertification by population explosion has the highest man-made influence on climate change. Compared to the world energy consumption EP, desertification produces each year *two times more heat*, *producing every 75 years the next Sahara. Compared to fossil, man-made CO2, it produces up to 15-times the mass*. So we need programs, to stop the population explosion, which provokes desertification.

Combustion of fossil substances plays a dual rule. Combustion of oil or gas produces CO_2 together with nearly the same amount of water vapour. But the earth atmosphere is spectral saturated with CO_2 [37]. Within 10 meters we find a radiation absorption of 99.94% reasoned by CO_2 with 341 ppm.

Airplanes produce only 0.05 promille of the natural water of the atmosphere. They produce per year 1/3700 of the measurable atmospheric CO_2. We *find growing CO2-concentrations in 10 km height as the indicator for growing air traffic*. This could mean, that airplanes create a *second isolating roof around the earth* and can influence global warming.

Because all the time the CO_2 appears in closed combination with water vapour, any combustion of fossil energy can inspire clouds, cooling the earth down at day, or warming it up in the night.

With a 50% "Strommix" E-mobility will produce more CO2, then current combustion technologies. If they are charged with energy from gas- or coal-power plants, E-cars produce two *times more CO2* compared with combustion driven cars.

Conclusion: We find solar radiation variation as the most dangerous (natural) source for climate change. We find desertification by population explosion as the most important source for man-made climate change. If we'd like to do something for the climate, we have to stop the population explosion now! Last not least, a second "greenhouse roof" made by airplane traffic can have some relevance.

15. Acknowledgments

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17. Quotation

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> *Der eigentliche Fehler der Deutschen ist, daß sie,*
> *was vor ihren Füßen liegt, in den Wolken suchen.*
> *Arthur Schopenhauer*