Ration cards for carbon dioxide are urgently needed

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Introduction

According to a letter from Lena Sommestad (Environmental Minister 2006) the government "strives to limit the global temperature increase during this century to stay below two degrees relative to pre-industrial level." [1].

Unfortunately, the current trend indicates that we may pass this limit much earlier [2].

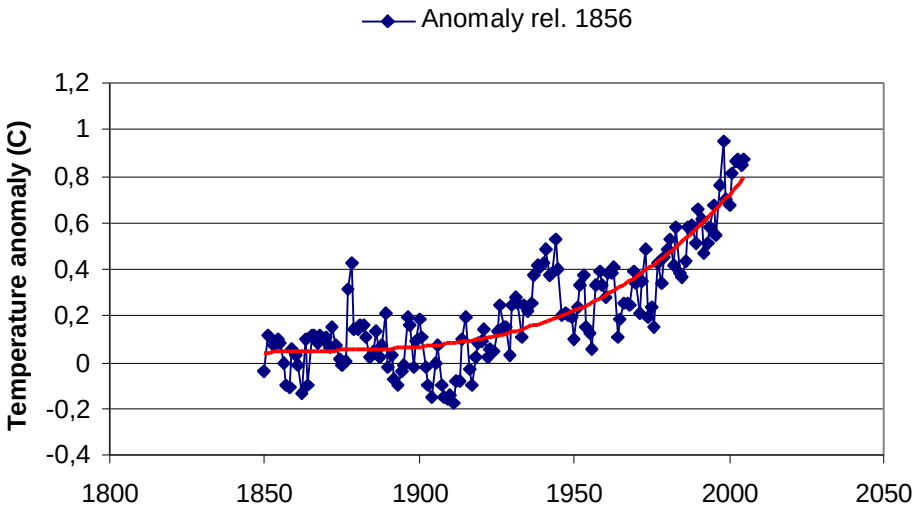
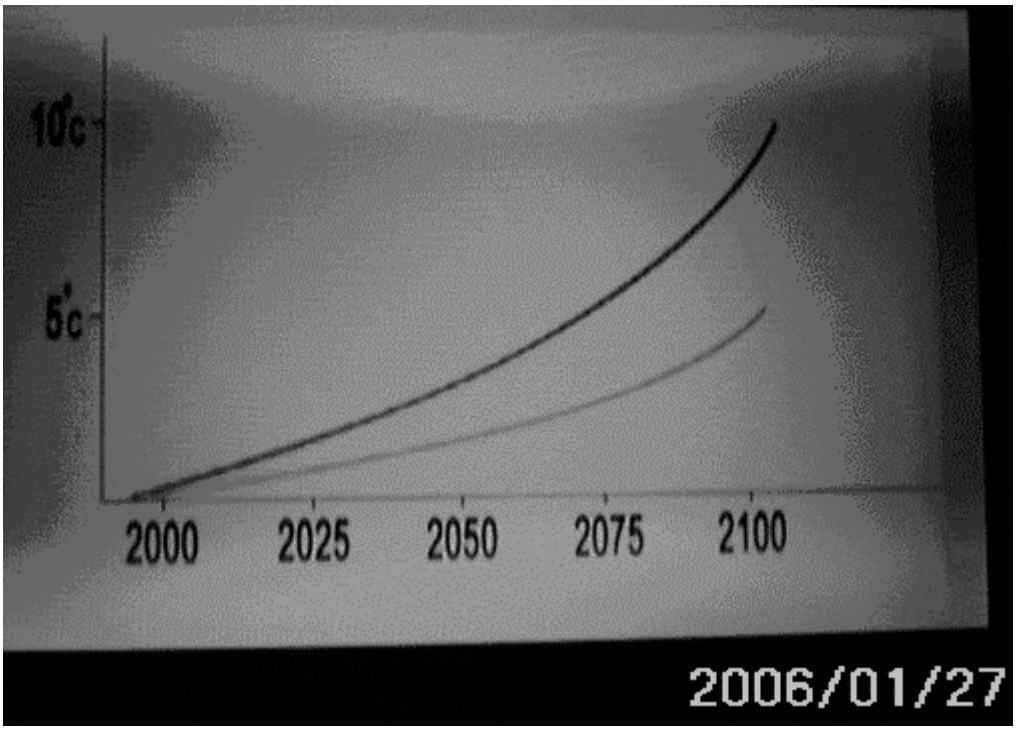


Figure 1. Global temperature anomaly relative to 1856 (IPCC).

In this report we will use a model to calculate the future temperature increase based on reported and expected CO_2 contents in the atmosphere and the temperature increase that has been reported so far, see Figure 1. An extended and further developed version of the model (the HIR-model)will briefly be described at the end of this paper.

Earlier this year new calculations were presented by the Swedish Television SVT where the temperature reducing effects from air borne particles had been considered. See Figure 2.



Figur 2.Diagram showing expected temperature increase with regard taken to "global dimming". (SVT 2006-01-26)

You may note the accelerating rate of temperature increase in Figure 2, an indication of a beginning thermal run-away? [3].

In a report from Hadley Centre [4] the following is stated:

"*We have also looked at natural methane gas emissions from wetland areas, and calculated how these would change as wetlands change and temperatures rise. We estimate that by the end of the century, man-made global warming could release as much extra 'natural' methane from wetlands as human activities are expected to emit by that time."*

If this additional CO_2-increase is considered in the HIR-model, the calculated temperature will increase by 5,7 C to year 2100 as shown in Figure 3: If the calculation is done without taking the Methane into account, the temperature increase by 2100 would be slightly less 5,2 degrees C, but still accelerating.

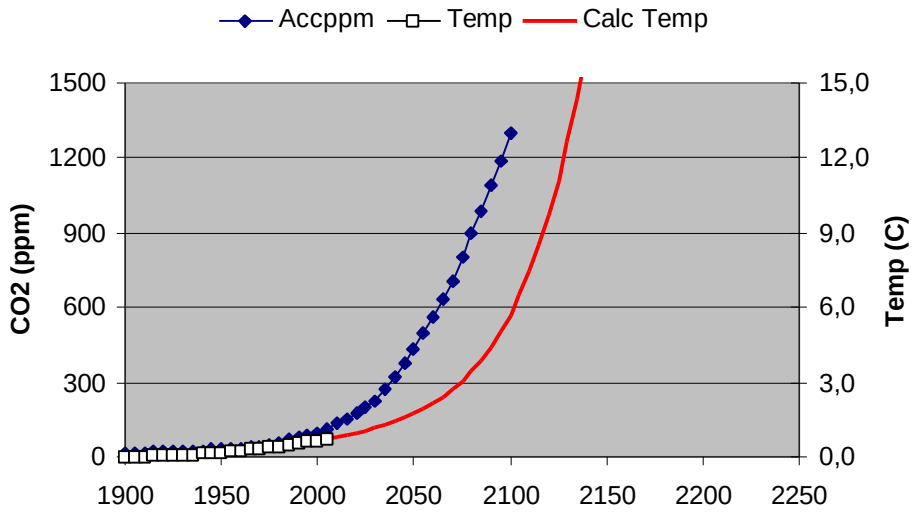


Figure 3. Calculated temperature increase when released Methane equates the amount of released CO_2 at the end of this century, giving an effective increase of 1300 ppm since pre-industrial levels in year 2100.

The temperature and level of CO_2 have always followed each other pretty well. Figure 4 shows that there is a very close relationship. When the temperature goes up, the CO_2-level peaks around 1000 years later. The driving force has always been the temperature. But now it seems to be reversed. The CO_2-level is rising and a response in form of an increased global temperature can be noticed. Figure 4 shows the variation during the past 410 000 years.

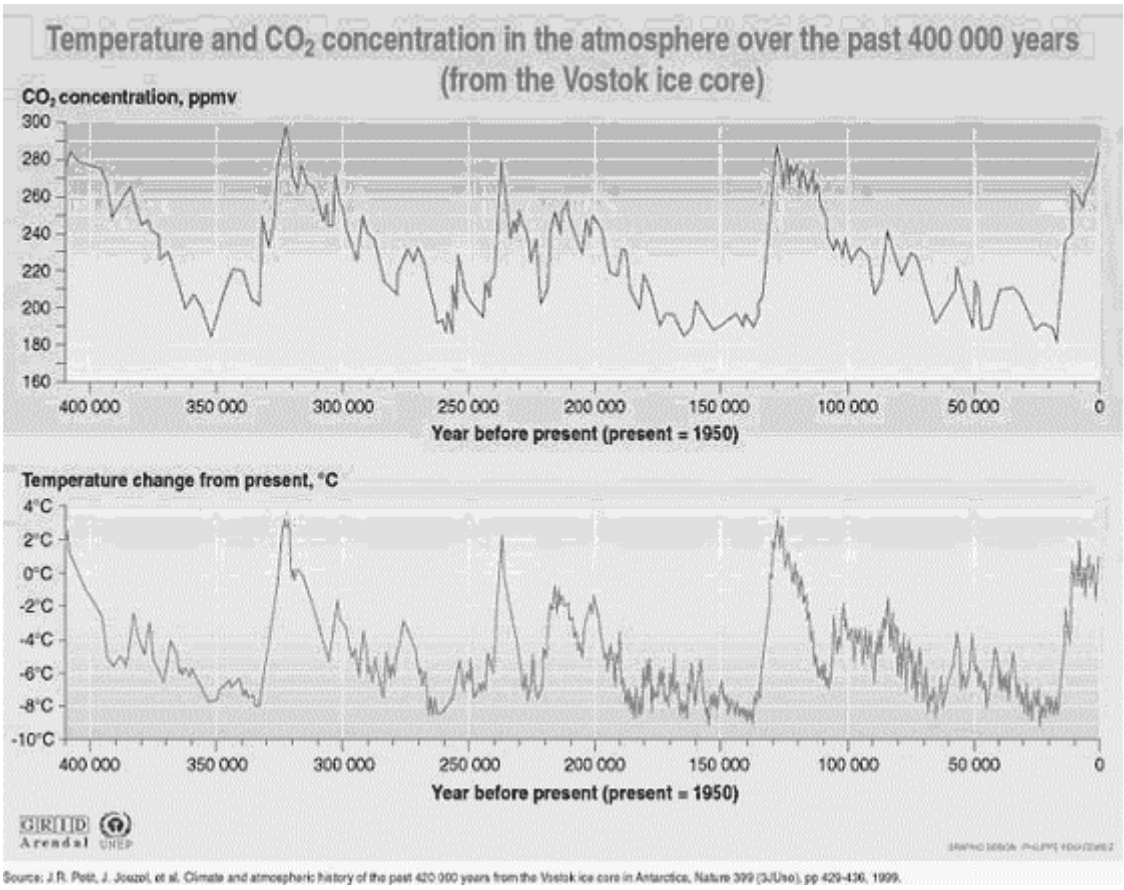
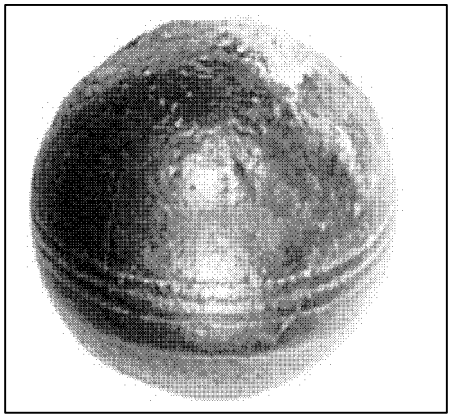


Figure 4. Temperature and concentration of CO_2 in the atmosphere over the last 410 000 years.

The literature about the planets in our solar system tells us that during the past billions of years also Venus and possibly Mars have had a climate similar to that of the Earth today. Venus, unfortunately, experienced a sudden temperature increase that triggered a thermal run-away. This did not stabilize until the temperature had reached 480 C and the atmospheric pressure became 92 Atmospheres [6].

If this development was a consequence of "intelligent" activities, similar to what is going on here on the Earth, it would not be so surprising that we have found obviously machine made metal spheres as shown in Figure 5. Each sphere has three bands around the center. They are found in sand stone layers in South Africa. The age is determined to 2,8 billions years. The three rings might refer to the Earth, the third planet from the Sun. More information and photos can be found on ref [7].

Figure 5. The 2800 millions. years old sphere.



So, what can be done?

It appears that we have very little time to react in a proper way, if any at all. It would not be feasible to try to cool down Siberia by putting refrigerating tubes in the soil of Siberia to stop its release of Methane.

No, the authorities need to consider introduction of ration cards for CO_2. Every time you go to the shop, you will have to use your ration card so that the declared carbon dioxide amount can be drawn from your CO_2 account. Every month you will get an automatic refill to your account and you will have to stay within your budget, no matter how rich you are.

Actually, this ration card may become the new money, making all your bank savings less valuable.

In Sweden we generate in average 6-7 tons of CO_2 per person and year, equal to about 500 kg per month. The Green party wants to reduce the release to about 15% of that amount or 75 kg/month and person [8] by year 2050. Since the breathing alone generates about 40 kg of CO_2, there is only 35 kg left to spend on car queuing, vacation travels abroad etc. It seems unlikely that we will reach that goal just by supporting family purchase of bio-gas fuel driven cars.

Today the question about green house gases (GHG) seems to be a matter for countries or big companies alone. There is less interest in moving the question further to the source of CO_2 release, namely individuals. During the war it was natural to introduce ration cards for sugar and coffee so that everyone at least had something of it each month. Today, it would be even easier to start using modern forms of ration cards to reduce unnecessary release of CO_2 into the atmosphere.

But will the authorities do anything? The stock market might be affected. And all big bosses born in the 40's may want to live their remaining lives in peace without too much of restrictions on travels etc. Let's hope that their nice houses are not too close to the sea-shore, since the sea level may start rising quite soon…

What will happen anyway?

Figure 4 shows that an increase of 100 ppm CO_2 corresponds to an increase of 10 C in global temperature. Since we live at the top of one of these temperature peaks right now we have no experience of the effects from an additional 100 ppm from earlier history. A best estimate is to assume a similar relationship; that the 100 ppm of increase we have already caused since 1800 will cause up to 10 C of temperature increase. So far, the temperature has increased by around 1 degree centigrade, so there is more to come.

An analysis of the data we have gathered until today gives the worst case scenario as shown in Figure 3, assuming that wetlands release of Methane will match manmade CO_2 release by year 2100. If we, however, manage to completely stop the increase by, as an example, year 2010 the long term effects might be reduced.

The calculations were done using an extended version of the model presented in ref. [2]. This rather simple Excel application assumes that 100 ppm can cause a temperature increase of 10 degrees C as indicated by Figure 4. Every annual increase in the atmospheric contents of CO_2 is also assumed to cause a corresponding temperature increase according to a statistical distribution, whose parameters are varied to give optimum match to already reported data. According to these optimum parameters, the temperature response to a sudden increase of CO_2 content in the atmosphere is: Time to 50% of the final level: 167 years, Saturation after about 500 years. See Figure 6. Similar, somewhat longer times have been reported for the response in sea-level rise to GHG increases [9].

In ref [10] global temperatures have been calculated as a response to a doubling or quadrupling of pre-industrial CO2 content in the atmosphere. The graphs are shown after 1 year, 100 years, 300 years and 500 years, clearly indicating a stabilization after around 500 years. IPCC states in their Third Assessment Report - Synthesis Report, Figure 4.1 that the characteristic time for the increase of atmospheric temperature is 125-150 years [11], not too far from the 167 years we found in this study as shown in Figure 6.

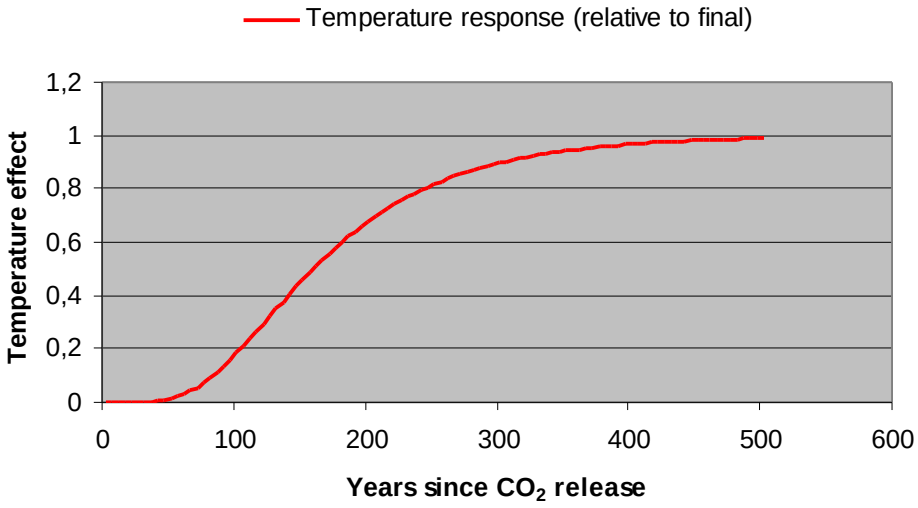


Figure 6. The temperature response to a suddenly increase of atmospheric GHG that best fits reported data.

By summation of the partial temperature responses over time from all these annual CO_2-increases, the total temperature response is calculated. This method also allows to calculate the outcome from a reduced or completely stopped increase of the CO_2 contents of the atmosphere from e.g.2010, as shown in Figure 7. But how shall we stop the bubbling Siberian Methane? And can we stop manmade CO2 in only 4 years?

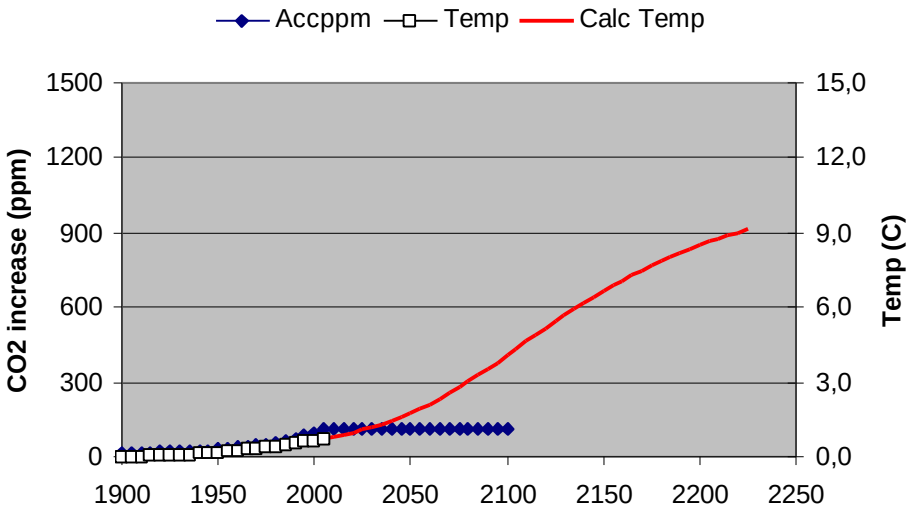


Figure 7. Calculated temperature increase if the increase of CO_2 content can be limited to 110 ppm (=Total 390 ppm including the effects from bubbling Siberian Methane up to the year 2010).

Conclusions

The main messages from this study are:

? There is a time delay in the temperature response from an increased content of CO_2 in the atmosphere that must be considered in calculations.

? The temperature increase we are experiencing today, is mainly the result of added CO_2 contents since the 1950's and yet to a much less extent due to the last years release of GHG.

? An immediate stop of increasing levels of GHG will limit the temperature increase to 4,1 C in year 2100 but still increasing to 9,1 C by year 2225.

? If proper actions are not taken, there is no way the world could survive much longer. Business as usual may lead to a temperature increase of 14,4 C in year 2135, still accelerating. According to climate experts [3] the stabilizing conditions would be around 475 C and 90 atmospheres, very much like the present conditions on our sister planet Venus.

Referenses

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