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# World Population Growth, Energy Demand and Increasing Carbon Dioxide Emissions Towards Global Warming — Estimation of $CO_2$ Contribution of Turkey


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## Abstract


Beginning with the First World Climate Conference in 1979 in Geneva "*Greenhouse Effect and Carbon Dioxide Problem in view of the World Population Growth and Energy Demand*" are being discussed in various international and national conferences, commissions of parliament and/or of governments as well as in research institutes, through which a number of publications were released during the last decade *(see References)*. The final conference statement of the scientific and technical sessions of the Second World Climate Conference held in Nov. 1990 in Geneva concludes the present results of various research studies in this respect (based on one year-work of about 150 experts, i.e., Intergovernmental Panel on Climate Change -see Ref. IPCC, 199C and Schönwiese, 1990-).


## Keywords


Fossil Fuel Emission Factor Carbon Dioxide Emission Fossil Fuel Burning World Climate

*These keywords were added by machine and not by the authors. This process is experimental and the keywords may be updated as the learning algorithm improves.*

# WORLD POPULATION GROWTH , ENERGY DEMAND AND INCREASING CARBON DIOXIDE EMISSIONS TOWARDS GLOBAL WARMING - ESTIMATION OF $CO_2$ CONTRIBUTION OF TURKEY

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## Introduction / Summary

Beginning with the First World Climate Conference in 1979 in Geneva *"Greenhouse Effect and Carbon Dioxide Problem in view of the World Population Growth and Energy Demand"* are being discussed in various international and national conferences , commissions of parliament and/or of governments as well as in research institutes, through which a number of publications were released during the last decade *(see References)* . The final conference statement of the scientific and technical sessions of the Second World Climate Conference held in Nov. 1990 in Geneva concludes the present results of various research studies in this respect (based on one year-work of about 150 experts,i.e., Intergovernmental Panel on Climate Change -see Ref. IPCC, 1990 and Schönwiese,1990- ).

At first,some important aspects of these studies will be reviewed in my contribution in this Congress to supply to the listeners,who come from various countries and disciplines,the recent background information, as well as to prepare the basis for our carbon dioxide-estimations for Turkey . Yearly carbon dioxide emissions of Turkey (from 1970 to 1989) are presented here for the fuel types used and the sectors in which energy potentially is consumed(based on the fuel data of Turkey given in Ref.TEK,1990 and carbon dioxide-emission factors estimated from us and/or published in Germany in Ref.Walbeck and Wagner,1987; Birnbaum et al,1991a,b). *Although in the world scale, emissions of Turkey are relatively low* i.e., about 140 million tons carbon dioxide from only burning of fossil fuel, in 1989 ( or on average, less than 3 tons per person) but they will rise in the future considerably, due to the relatively large population growth and energy demand towards realizing the economical-progress-rate projected. Using the energy planning data of Turkey ( given also in Ref.TEK,1990 ) yearly emissions until 2010 are also estimated. *Turkey´s carbon dioxide-emission from fossil fuels would probably be a factor of 3 larger in 2005 than in 1989,* if the energy planning estimation of 1990 is realized in the future accordingly (i.e., 410 million tons from only fossil fuel burning in 2005). If Toronto-Limits (Recommendation of Toronto Congress,1988) were applied, this amount should have to be lowered about a factor of two. Considering other sources of carbon dioxide emissions in Turkey such as from cement produc-

tion, burning of wood,biological residues,forests and wastes ( uncertain) total emissions of 200 , 515 and 670 million tons of carbon dioxide have been estimated for 1989, 2005 and 2010 respectively.

A comparison of our results with the earlier ones (i.e., of ORNL,1989,USA) for the carbon dioxide emissions of Turkey ,showed a good agreement ( less than a few per cent difference).

Turkey`s situation and contribution can be considered as an example in this respect, since, as is known, there are a number of countries in the world with similar "population and economical growth problems", so that total carbon dioxide emissions of the world will consequently increase potentially in the future, if no world-wide measures are taken to reduce them.

## 1 . Recent Developments

### 1.1. Sources and sinks of carbon dioxide

About 85% of the *commercially primary energy consumption* of the world originates from fossil fuels, the residual part from *nuclear and regenerative energy sources* such as water, solar,wind and geothermic.

About 26 billion tons of " man-caused" (anthropogenic) carbon dioxide are world-wide released in the atmosphere yearly, (IPCC,1990). Nearly 80 % of this total amount originates from the combustion of fossil fuels , i.e., *from* coal, petroleum and natural gas (Ref. di Primo,1990). Total amount in 1988 is about 5.6 billion tons of carbon,which corresponds to *about 20.5 billion tons of carbon dioxide,* considering the fraction of molecular weights of"$CO_2$" and "C", i.e.., 44/12= about 3.67.

Nearly 70% of this total amount originates from the industrialized countries (including the East Block,without China),which make up only one quarter of the world population.Three quarters of the world population in developing countries contribute about 30% of the global emissions.However, in developing countries, during last decades, carbon dioxide emissions indicate large increase rates, due to a large rate of population growth and the energy consumption accordingly (not only for food-supply but also for progress towards better living conditions in some countries). This tendency in developing countries is expected to continue in the future,probably at a larger rate,because of these reasons (Ref.IPCC,1990).

Emissions of industrialized countries seem to be stabilized after 1973,but not due to measures taken to protect the atmosphere, rather as a result of economical recession after two oil crises. Rational use of energy,and *operation of new nuclear power plants as well as using more regenerative energies ( both of which does not release carbon dioxide emissions,as is known)* ,more use of natural gas (which has the lowest carbon dioxide emission factor among fossil fuels) and a low rate of population growth contributed apparently to this stabilization of emissions after 1973 in industrialized countries (e.g., in Germany yearly carbon dioxide emissions from 1973 to 1987 were reduced from 872 to 769 million tons respectively-see Ref. Kolb ,1989). There is almost a

( Toplam 12 sayfa . Burada yazıyı tanıtmak için ilk sayfalar ve Referans'lar bulunuyor/ Türkiye'nin ilk CO2 hesaplanma yol ve yöntemiyle sonuçları da yazıda yer alıyor )

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