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Global Warming and Political Economy

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Abstract: *Can really global coordination on policy measures halting or reducing global warming succeed? Or should each country take measures to protect itself against the consequences of climate change? The forces driving global warming – population growth, economic development, need for cheap energy, the ambition by developing countries to catch-up with advanced nations, externalities, reneging, opportunism with guile, etc - are simply too formidable for global coordination to succeed. We have to accept living in a new evolutionary stage, viz the climate change period.*
Key Words*: climate change, global coordination, greenhouse gase emissions (GHG) emissions – total versus per capita, energy consumption, South Korea, China, India, Indonesia, Brazil, Pakistan, super fund, Stern.*

I. Introduction

The governments of the states of the world have to come up with the strategies to employ in the coming great global coordination meeting on climate change in Paris. They have been told by the "gurus" of globalization that time is short for avoiding a global disaster with long-term unavoidably dire consequences for mankind. What can and will the leaders of rich and developing countries reasonably offer in order to reduce the GHG emissions, given the basic fact that such reductions come with a cost?

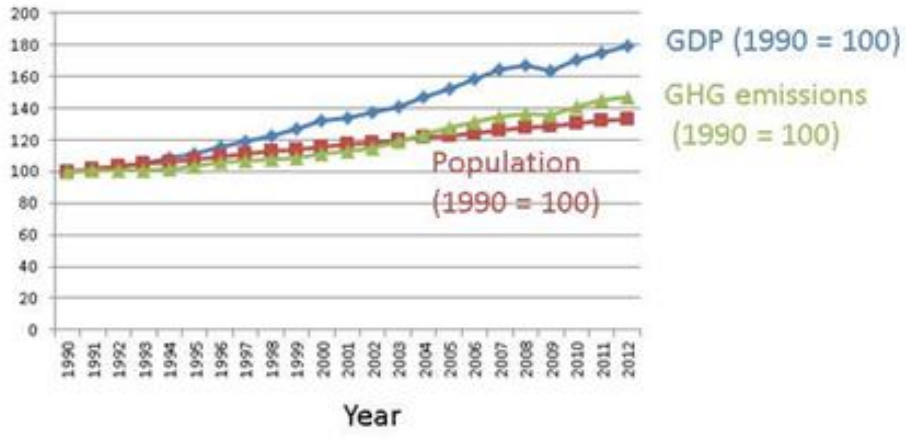
The global warming problematic is typically approached in terms of a natural science perspective: How much need the greenhouse gases be reduced in order to achieve the +2C objective and avoid the +4C or +6C outcomes? The natural sciences can do a lot to clarify what is at stake, measuring emissions, atmospheric composition and predicting the consequences of climate change. Yet, climate change is part of the general trend towards environmental degradation of Planet Earth, and it covers many aspects that properly belong to the social sciences: Why cannot mankind and its various social systems move decisively towards sustainable development with ecological protection in a wide sense?

Coordination upon global environmental policy-making and implementation is difficult, it should be acknowledged, due to the strategic decision problems involved, well analysed in game theory, pointing to a pervasive risk for *coordination failures*. The efforts to set up a common pool regime (CPR) for handling the emission of GHG stumble on these so-called collective action difficulties.

II. The Global Scene

Figure 1 presents the aggregated situation for Planet Earth. The curves for global population, total emission of greenhouse gases and total economic output – GDP – increase considerably from 1990 until today. The largest impact upon for total GHG emissions is the general life style, measured by the GDP, but population growth also leads to more of GHG emissions.

Figure 1. The Global Picture: Population, GDP and Emission 1990

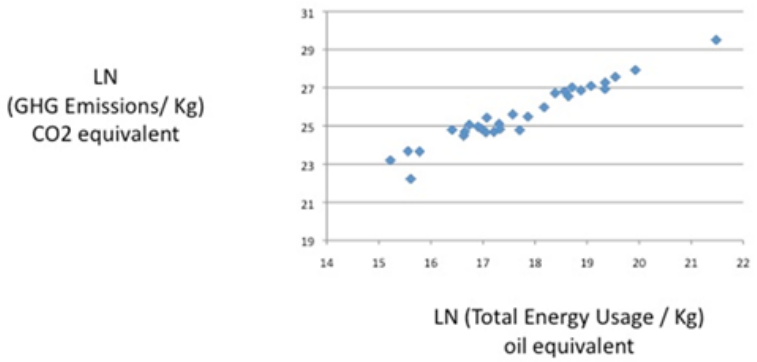


From Figure 1 appear the augmentation yearly in GHGemissions since 1990, amounting to some 50 trillion kilos. Generally speaking, in 2012 the following equations hold: GHG emissions = 8300*population; R2=0,87; life style as measured by the GDP is a major contributor: GHG emissions = 0.58*GDP; R2=0.53.
Now, the developmental goals of the UN, WB and IMF are strongly connected with economic growth. Thus, it is always feared by the markets, governments and global business commentators that the GDP curve could start declining,as with China today where minor adjustments in GDP growth results in financial market crisis. Economic growth is considered vital by everyone, because it delivers resources with which to reduce poverty and achieve UN developmental objectives. But there is another opinion, as with economist Jeffrey Sachs, stating thatreally halting GHG emissions growth would require a large reduction in global economic output, at least in the short run.

Can governments conduct a global ecology policy with measures that halt GHG emissions but allow for continued economic growth? This would be a high priority of environmental economist, betting upon renewable energy. If, on the other hand, reductions in emissions come with a hefty cost, who is going to pay? The cost problematic of GHG reductions is related to energy.

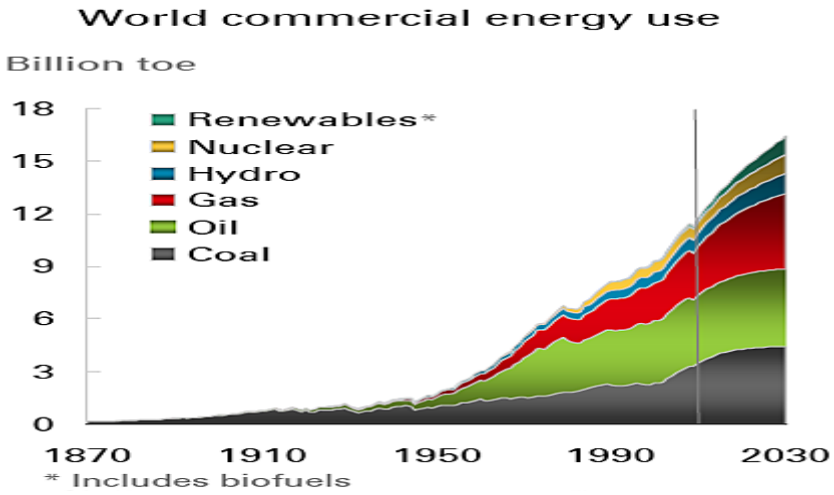
III. The Energy Link

The greenhouse gases are strongly linked with energy consumption in a broad sense, covering not only fuel, electricity but also food production and construction industry. Without additional energy, economic development would be considerably lower or come to a halt. Figure 2 shows this close link.
Figure 2.Energy and GHC emissions 2012. Equation: y=1.05x, R2=0.941



What appears in Figure 2 is the *macro level* link between energy and emissions. It does in no way exclude that energy consumption or production can be carbon neutral, demonstrated in several *micro level* projects. The problem is that traditional economic development tends to be highly energy consuming that in turn still is polluting, in general or an average projects. Globally speaking, more energy consumption still entails more GHG emissions.This raises the *global conundrum* for the 21rst century: How to reduce GHG emissions without reducing economic development that needs more and more of energy consumption?
Look at Figure 3 that contains a stylised projection of energy consumption up to 2035.

Figure 3. Energy consumption up to 2035 (projections)



These projections can be found with several agencies or energy companies, where no reduction in energy consumption is predicted. Moreover, the fossil fuels will increase their role as provider of energy, whereas the predicted augmentation for renewables is tiny in comparison.

The energy-emission dilemma has two horns: Either energy consumption is lowered, especially of the fossil fuels, or the global economy manages to stage a technology innovation of great scale, introducing massively carbon neutral energy. As a matter of fact, neither is likely, as economic development trumps environmental sustainability in general.

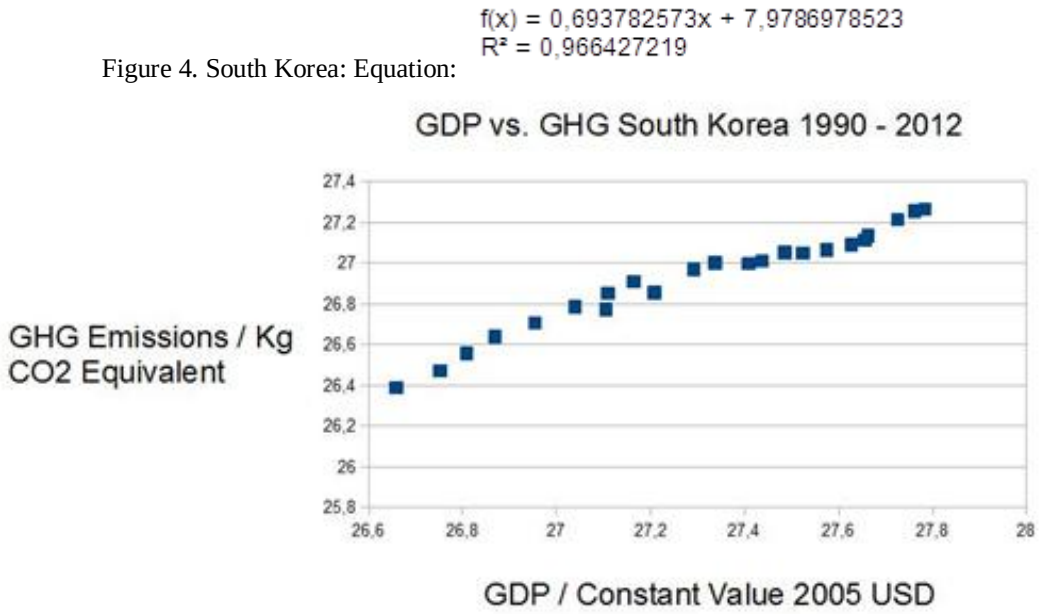
Country Predicaments: Asia

The relationship between economic growth and emissions growth can only be one of increase in both, as Asia has become « *l'usine du monde* ». Although the countries in this region has had their so-called « take off » time points in different years after the Second World War, in general one finds heavy emissions of greenhouse gases in this growth region: ASEAN plus 3. Consequently, the large Asian nations will be critical in the elaboration of any global ecology policy concerning climate change.

South Korea

This country has in an astonishing speed become one of the most technologically advanced countries in the world. However, its emission of GHG:s is huge, following its GD growth rates (Figure 4).

Figure 4. South Korea: Equation:



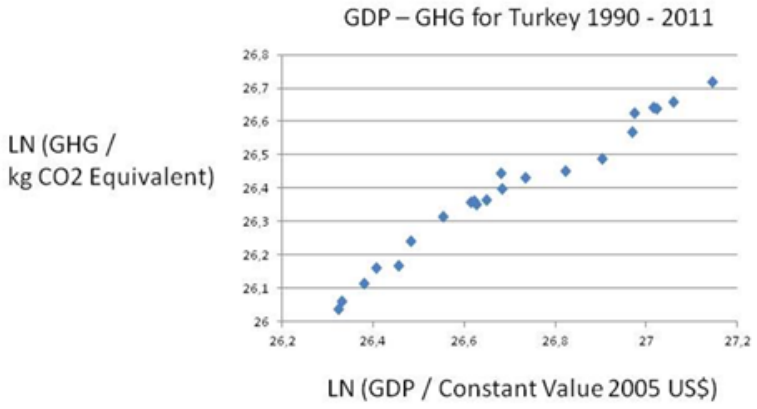
The close match between the two curves in Figure 4 is no surprise, confirming the general observations above for the Planet Earth.

Turkey

Turkey has become a heavy-weight in the Asia Minor thanks to a rapid economic development of the country with huge population. Figure 5 supports this picture of Turkey as no longer a developing country.

Comparing the picture for Turkey with that of the US and Germany, one may state that Turkey has the most typical one. Strong economic development is combined with heavy emissions increase. Since the world organisations – the UN, WB and IMF – opt for more of economic growth, one must ask whether emissions growth really can be halted.

Figure 5. Turkey: Equation: Y = 0,7837x; R^2 = 0,972



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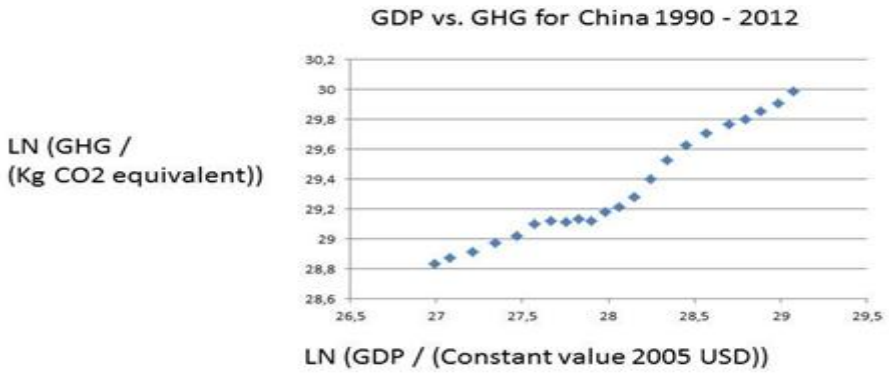
China

It is well-known that mainland China today ranks as the largest GHG polluter in the world, when we look at aggregate totals. It has « dethroned » the US recently with India rapidly moving upwards too. Relating GHG emissions to population size, China earlier had rather small per capita emissions, given its enormous population. Yet, the per capita figures have gone up for China, although it is not in the top in the world. Actually, the per capita figure for Qatar (44) is much higher than that of China (6.7) (http://data.worldbank.org/indicator/EN.ATM.CO2E.PC). Now, look at Figure 6.

Figure 6. China: Equation:Y = 0,5736x; R^2 = 0,9578



In China, economic development has been achieved by means of employing resources – mostly coal, gas and iron from Australia - that emit much greenhouse gases, like fossil fuels, cement and steel. Especially, China operates a large number of coal-fired power stations in order to generate electricity, and they lack anti-pollution filters, and thus hurt environment quality. In addition, China now has the largest car market in the world, burning oil and gas.

Chinese ecology policy is hardly much reflected upon by government or developed by officials and bureaux. Its leaders talk much about « green values », actually more and more every day, but concrete measures are lacking. The promise of halting GHG emissions in relation to growth after 2030 is an ambiguousposition, as economic growth still powers ahead. This is chiefly a *relative* target, but is the *absolute*or aggregated totals that must be decreased. Moreover, the 2030 promise can be reneged upon. In any case, the time table is for this reduction is far ahead in tome and perhaps too late for global policy-making to be very effective in reversing climate change.

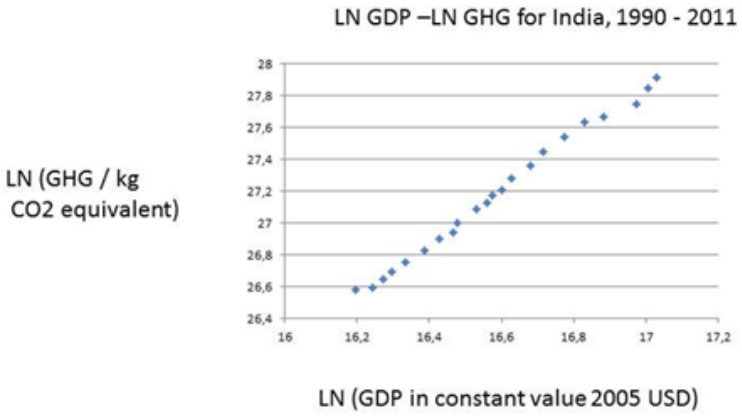
The findings for advanced South Korea and rapidly developing Chinamay be compared with the GHG outcomes for a few giant countries that weight heavily in global matters. It is almost always the case that the higher the affluence of a country, the more GHG:s this nation emits. Thus, one would find lower total levels of

GHG for major developing countries than for advanced countries, all other things equal like population. Yet, the connection to GDP would still apply, meaning more GHG:s with economic development or GDP growth.

India

Except recently,ecological policy-making has bowed to the overarching preference in India, namelyrapid economic development, driven by energy consumption like coal and oil. India also has a rapidly expanding car market, which besides the huge number of highly polluting scooters creates sometimes breathing problems inits mega-cities (Figure 7).

Figure 7. India: Equation: Y = 0,6093x + 4,7605; R^2 = 0,9954



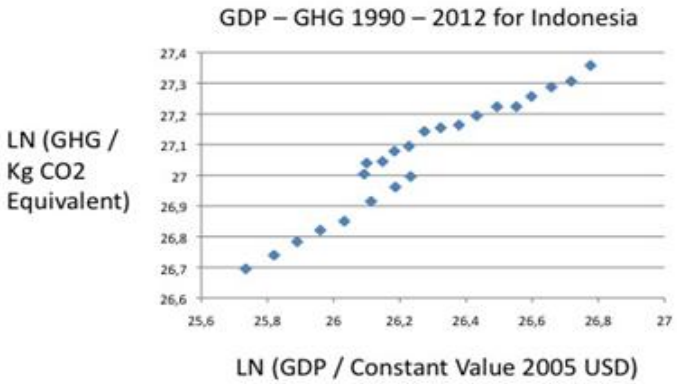
There is no tendency to any form of halting or decrease of emissions growth, as seen in this Figure 6. The government of India has a clear preference for economic growth > 5 per cent, which is necessary for lifting millions out of abject poverty. Thus, India favours the employment of cheap energy line coal. Cutting emissions must involve reducing economic growth rates – so the argument goes at least.

The preoccupation of the Indian government and several economists, dreaming about the great « *catch-up* » with China and the West, is to negotiate exceptions for India, if a global ecology policy is enacted. Redistribution looms large in India's strategy, arguing that affluent countries should cut back the most or help financing advanced technology in poor nations.

Indonesia

Developing countries have in general one over-archingpriority, namely to « catch-up »withdeveloped countries. The catch-up strategy uses lots of cheap energy to raiseeconomic outputfast. Energyconsumptiontends to result in GHG emissions, except for wind, hydro and nuclear power. So far mostdeveloping countries have optedfor rapideconomicgrowth, at the expense of environmentalconcerns. Thus, weexpect to findconsiderableincreasesbelow for GHG:s, lookingat a dynamicdevelopingcountry thatisfinally « *taking off* », namelygiantIndonesia (Figure 8).

Figure 8. Indonesia : Equation :

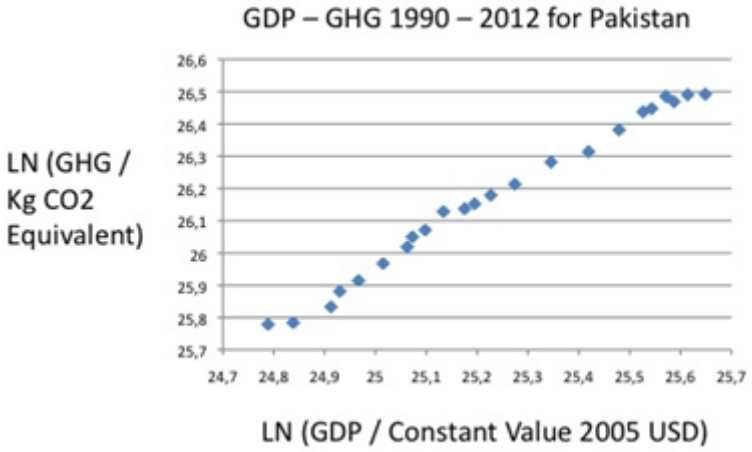


The upward trend for GHC emissions in Indonisiareflectscloselyitseconomicgrowth rates. Givenitshuge population, this country is a major polluter, including the hazefrom Kalimantan, or IndonisanBorneo. Indonesiahas drawn one correct conclusion, namelybuilding a giantwall protection for its capital, Jakarta, against future sealevelrise

Pakistan

Considerthen Pakistan (Figure 9) - anothergiant nation in South Asia ! It has alreadylost land to sealevelrise.

Figure 9. Pakistan : Equation :

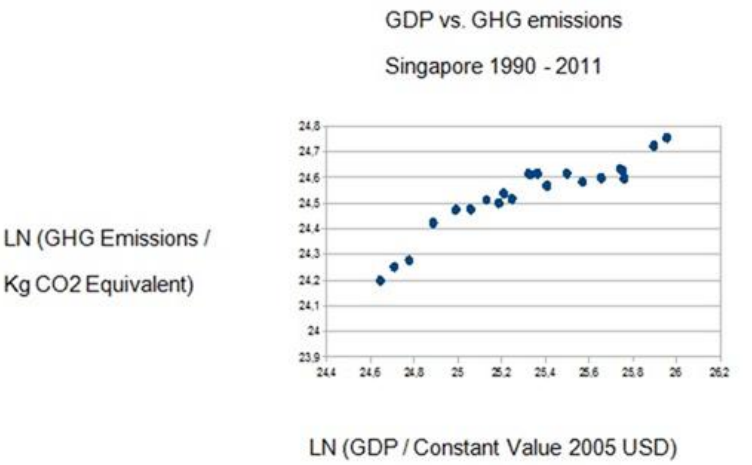


The trend is the same for thishugedeveloping country as for alreadydeveloped South Korea, i.e. GHC emissions up and followingeconomicdevelopetment. How to halte missions and stillmaintaineconomicgrowth in thispoor nation ?

Singapore

Singapore – itspolitcal leaders, public officials as well as the scholarsatuniversities and collegesspeakmuch about theclimate change predicament. Thus, the city-state mentions a lot of activities and programs aimedatreducingcarbonemissions and the outflow of othergreenhousepollutants. Singapore claims itis a model city for the future, betting upon the use of renewables. Let us look at the facts in Figure 10.

Figure 10. Singapore : Equation:



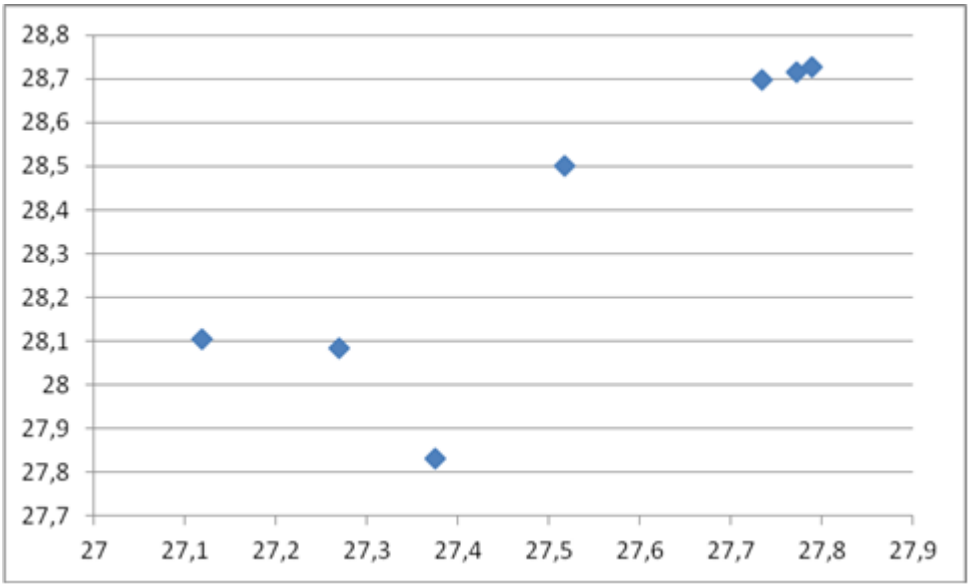
The city-state is extremely affluent, meaning that it employs massive amounts of energy to run a huge airport, a world harbour and an omnipresent use of air-conditioners. In addition, it cleans its waste water up to 100 per cent, which requires lots of energy. It burns oil and gas for electricity generation.

Brazil

The largest South American country is known for its "green" orientation, when it comes to energy production, because it makes massive use of bio-fuel: ethanol. Bio-fuels are always said to be more environmental friendly than coal and oil for instance: fewer emissions and more uptake of carbon dioxide. But the burning of ethanol still leaves GHG emissions! Yet, this may be more propaganda than honest ecology, as this nation is also well-known for its policy failure concerning the protection of the Amazon basin.

Allowing for the successful ethanol industry in Brazil, we must though check the aggregate numbers on the increase in emissionsof greenhouse gases – see Figure 11.

Figure 11.Brazil : Equation: Y = 1,2983x; R^2 = 0,9909



The trend in Figure 11 hardly supports the standard image of Brazil as a nation who cares very much about greenhouse gases. The strong increase in emissions lately follows the GDP growth, corroborating the basic idea in this paper that economic growth trumps the concern for ecology, even when a great opportunity exists in the form of ethanol. Brazil is in dire need of an environmental policy with several program legs.

It must be underlined that the production and consumption of ethanol as energy results in emissions, although not so much as the burning of fossil fuels. In no way is ethanol carbon neutral, but if a country has lots of sugar canes, it is good business to develop this source of energy. A practical example is the islands of Fiji where know-how is lacking for ethanol production. Its traditional industry besides tourism is ineffective and uncompetitive since many years, but the government cannot handle a transition to ethanol production, the country importing all its oil – a combined economic and ecological foolishness.

Strategies

Developing countries all display increasing emissions of GHC, as they employ lots of energy to close the GAP to the developed world. When faced with a demand for reductions of emissions from the developed nations, developing countries may respond with the following strategies:

a) Counter demand for cuts by countries with high emissions per capita;
b) Demands for financial assistance to help make the energy transition;
c) Acceptance of a halt to emissions growth but no reductions until 2050.

Total emissions or emissions per person

How is the necessary reduction in GHG emissions to be distributed onto the countries in the world? The policy relevant question is: the same percentage figure for all, or more by the rich countries and less by the poor? The confusing fact is that total emissions and emissions per capita do not at all coincide – see Figure 12.

Figure 12. Total emissions and per capita emission; Equation: Y = 0,2116x + 3,267; R^2 = 0,17

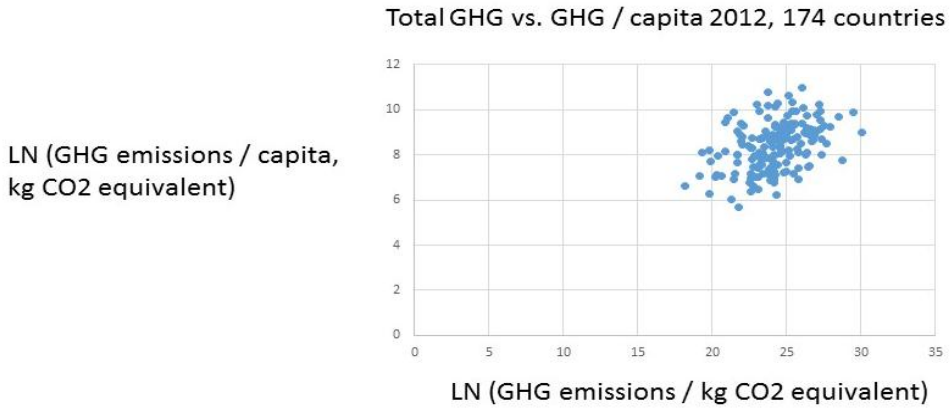
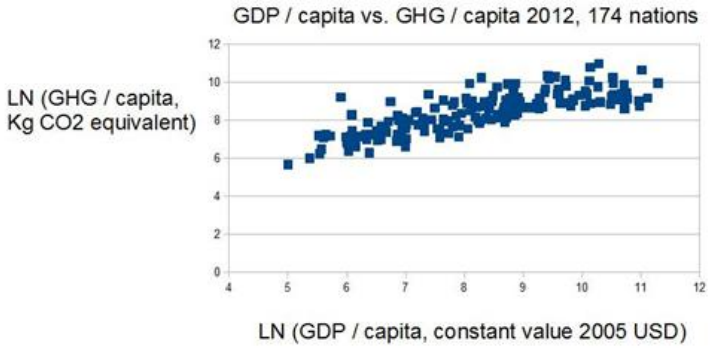


Figure 10 shows that all possibilities exist: big total emission and low per capita emissions, small total emissions and high per capita emissions, etc. Which country is to cut back emissions the most?
Developing countries with huge *total* emissions may argue that it is countries with *high per capita* emissions that should make most reductions. Per capita emissions follow the affluence of a country, i.e. GDP per capita – see Figure 13.

Figure 13. GDP per capita and GHG per capita; Equation: Y = 0,5496x + 3,8985; R^2 = 0,6537



Developing countries could say that rich countries with high per capita emissions to the right in Figure 9 can not only afford the reductions but that it is all *fair*. The problem is only that several countries with high per capita emissions have tiny populations. The biggest countries in the world – the G20 – are responsible for almost 80 per cent of all GHG emissions! From a global point of view concerning *efficiency*, cuts by the large emitters make most sense, like China, India, Pakistan, Indonesia, Brazil, Nigeria, South Africa, the US and Canada. How about economic development and *fairness*?

IV. Compensation, Exemptions And A Giant Global Fund

Already economist N. Stern (2007) argued that reducing emissions would be extremely costly, either lowering economic growth or requiring enormous new investments. To overcome this objection, he launched the idea of a global fund to transfer money from the rich to the poor countries as well as accepting a moratorium for certain developing nations.

The proposal of a huge global redistribution is still on the cards, whereas the suggestion that some countries could be excluded from a reduction scheme for some time period seems impractical. When some cut, other could expand – the perfect PD game!

Given the economic stagnation in the OECD world, the idea of a super fund also appears impractical. Why would the US pay to China to lower its emissions, when it is in the interest of China itself to do so?

V. Conclusion

Global warming is rapidly becoming the major problem in political economy. But it is not likely that global coordination will work. Instead each country has to develop a strategy to *cope with* the consequences of climate change – *resilience*. Climate change is driven by both population growth and more and more energy consumption. The universal call for economic growth trumps any consideration of holding back GDP and the

life style of freedom from poverty. The only hope is major technological breakthroughs allowing for carbon neutral energy. It exists but its scale is too small.

In standard energy projections up to 2050 (see Appendix), Planet Earth will continue to rely heavily upon the fossil fuels, resulting in more of GHG:s. Global warming is unstoppable!

Sources

International Energy Agency Statistics
United Nations Framework on Climate Change GHG inventory submissions
GHG: World Resources Institute (Washington, DC)
GDP: World Bank (Washington, DC)
Population: (1) United Nations Population Division. World Population Prospects, (2) United Nations Statistical Division. Population and Vital Statistics Report (various years), (3) Census reports and other statistical publications from national statistical offices, (4) Eurostat: Demographic Statistics, (5) Secretariat of the Pacific Community: Statistics and Demography Programme, and (6) U.S. Census Bureau: International Database.
BP Energy Outlook 2015.
Stern, N. (2007) The Economics of Climate Change: The Stern Review. Cambridge: Cambridge University Press

APPENDIX. Mid-century projections for energy consumption