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The Cop21 Agreement and Asian Economies

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Abstract

The global agreement on climate change – COP21 – will have immediate consequences upon the large emitters of greenhouse gases (GHG) in Asia. From 2018 there can be no increases of GHG:s and preferable some decreases. The unique global agreement speaks little about the economic consequences, but emissions and GDP are strongly linked through energy consumption. This article shows the situation for major economies in Asia with regard to the connection between GDP and GHG:s. It remains to be seen how the implementation of this global treaty will play out. Whether it has the force of public international law remains to be tested as well as whether all countries will ratify the treaty and abide by it. Several Asian countries have only 2 years to make major changes.

Keywords: COP21-agreement, Climate change, Global coordination, Greenhouse gases emissions (GHG) – total versus per capita, Energy consumption, South Korea, China, India, Indonesia, Pakistan, Singapore, Japan, Super fund, Stern.

Contents

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1. Introduction

The governments of the states of the world have come up with the strategies to employ in the 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. The occurrence of anthropogenic or anthropomorphic global warming makes mankind enter a new evolutionary stage where the climate of Planet Earth is affected by the social systems of men and women, especially their economic activities (GDP), This in turn transforms the climate change problematic - +1.5, +2, +4, $_6$ or more – to a set of very difficult problems for the social sciences: Can really global coordination on emission reduction policies be made and also work? The literature on the implementation of policies teaches us that successful achievement of goals by efficient means is hard to accomplish, even on a local or national government level. With so many players involved in global state coordination, there is a clear and large risk of *coordination* failures in what is basically an ocean Prisoners' dilemma game. And time is pressing, even though the COP21 framework speaks of a policy for the entire century. Already from 2018-20 must the increase in greenhouse gases (GHG) or CO2:s be halted in order to start decreasing to zero over the 21rst century. But policies reducing emissions are costly and may decrease economic development or growth in world with mass poverty. What policy measures will be employed in which countries? Administrative decisions closing down coal plants, installing filters on coal burning? Subsidising renewable energy sources- at what cost? Using market mechanisms like carbon tax or emission trading schemes? The social sciences will have lots to contribute to climate change policy-making, complementing the natural sciences. Energy, emissions and GDP go together. The standard projections for energy need speak of an almost doubling of energy consumption to meet economic growth predictions, but how can these projections become reality under the restrictions from the COP21 Agreement?

2. The Present Picture for Planet Earth

Figure 1 presents the major existing trends in population, emissions and GDP globallyup to now. There has taken place a considerable of not huge augmentation in global population, total emission of greenhouse gases and total economic output – GDP – from 1990 until today. What impacts most upon total GHG emissions is the general *life style*, measured by levels of GDP, but population growth of sourse leads to more of GHG emissions.

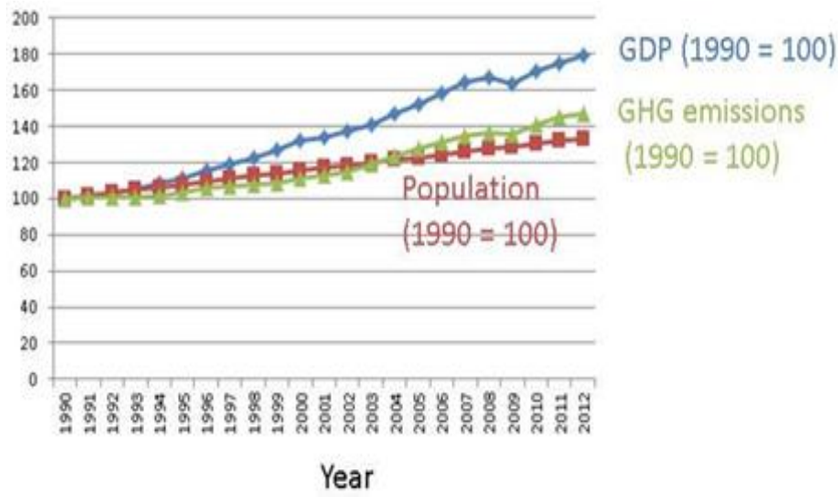

Figure-1. Planet Earth: Population, GDP and Emission 1990
Source: GHC: World Resources Institute, GDP: World Bank, Population: United Nations Population Division

From Figure 1 appears the augmentation yearly in GHG emissions 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. In September 2015, the UN agreed upon 17 Global Goals to achieve: end extreme poverty, fight inequality and injustice as well as halt climate change. Yet, it is 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 global financial market crises. Economic growth would deliver the resources with which to reduce poverty. Can really these three new UN developmental objectives be achieved or could they conflict? Economist Jeffrey Sachs, however, states that really halting GHG emissions growth rapidly would require a large reduction in global economic output. Can governments in developing countries like e.g. China, India and Indonesia conduct an effective global ecology policy with strong measures that halt GHG emissions growth as well as reduce them, but at the same time allow for continued economic growth? This would be a high priority from the point of view of environmental economics, betting upon renewable energy. If, on the other hand, reductions in emissions come with a large cost, one must ask the Stern (2007) question: who is going to pay for correcting *externalities*? The cost problematic of GHG reductions is related to energy.

3. The Energy Link

CO2 emission s and all the greenhouse gases (GHG) are strongly linked with energy consumption in a broad sense, covering not only fuel, electricity but also transportation, food production and construction industry. Without additional energy, economic development would be considerably lower or may even come to a halt. Figure 2 shows this close link.

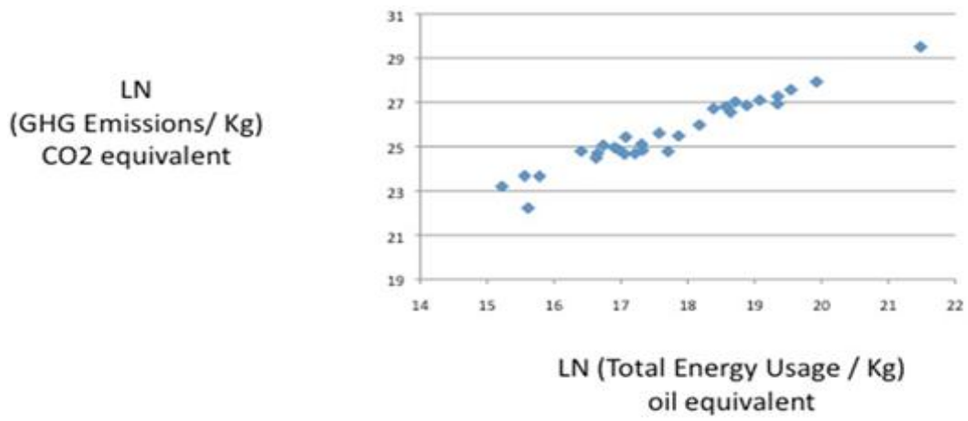

Figure-2. Energy and GHC emissions 2012. Equation: y=1.05x, R2=0.941
Source: GHC: World Resources Institute, Energy: International Energy Agency Statistics

Figure 2 depicts the link between energy and emissions at the *macro level*, meaning that energy consumption or energy production could in small projects be carbon neutral, as demonstrated in several *micro level* projects. The problem is that generally speaking economic development is highly energy consuming, which in turn is polluting, as mostly fossil fuels. Globally speaking it holds that higher levels of energy consumption are conducive to more GHG emissions. Here, we have the *global conundrum* for the 21rst century: How to reduce GHG emissions without reducing economic development or economic growth that needs, it is true, more of energy consumption, or are really the three major objectives of the UN above internally consistent?? Look at Figure 3 that contains the global picture of energy consumption today and the great part that goes to Asian countries. It shows how large Asia (East, South East and South Asia) is in global energy consumption. The COP21 agreement will force Asian economies to start decarbonising and increase energy efficiency much. Figure 3 projects that Asian economies could suffer from lower energy consumption growth rates. Still, Asian economies must go find additional energy and new sources of energy.

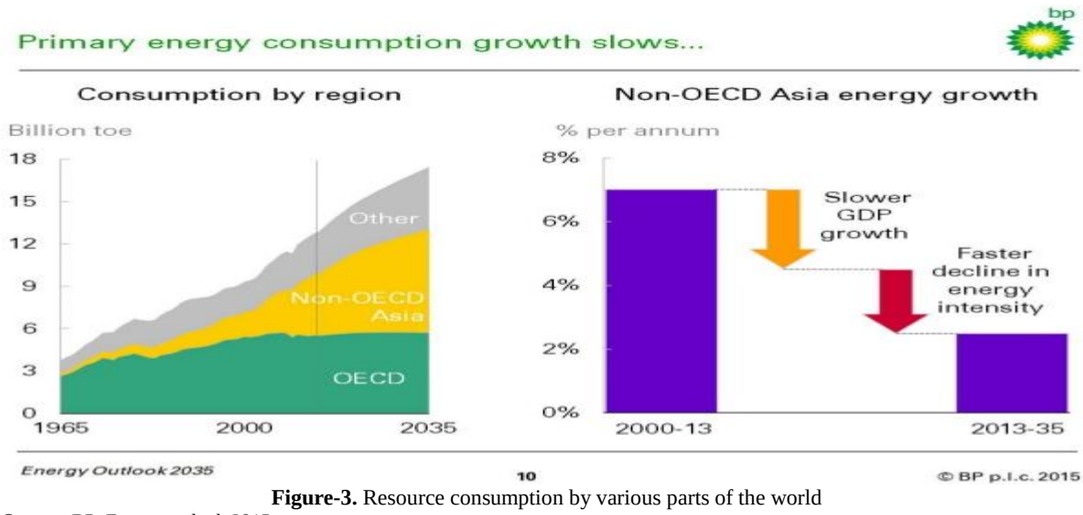

Figure-3. Resource consumption by various parts of the world
Source: BP: Energy outlook 2015

In Appendix 1 we show energy consumption projections up to 2030, which can be found with several agencies or energy companies, where no reduction in energy consumption is actually predicted. Moreover, the fossil fuels will increase their role as provider of energy, whereas the predicted augmentation for renewables is a tiny increase in comparison.

The energy-emission dilemma is as follows: Either – *horn I* - energy consumption is decreased, especially of the fossil fuels and particularly carbon, or – *horn II* - the global economy manages to stage a rapid technology innovation on a huge scale, introducing massively carbon neutral energy. However, neither is likely, as economic development *trumps* environmental sustainability in general. Figure 4 shows how large Asia (East, South East and South Asia) is in global energy consumption. The COP21 agreement will force Asian economies to start decarbonising and increase energy efficiency much as well as innovate on a greater scale. Let us look more closely at a few countries and how they face the energy-emissions-GDP dilemma.

4. 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 populous Asian nations will be critical in the elaboration of any global ecology policy concerning not only climate change but also in general ecological sustainability.

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).

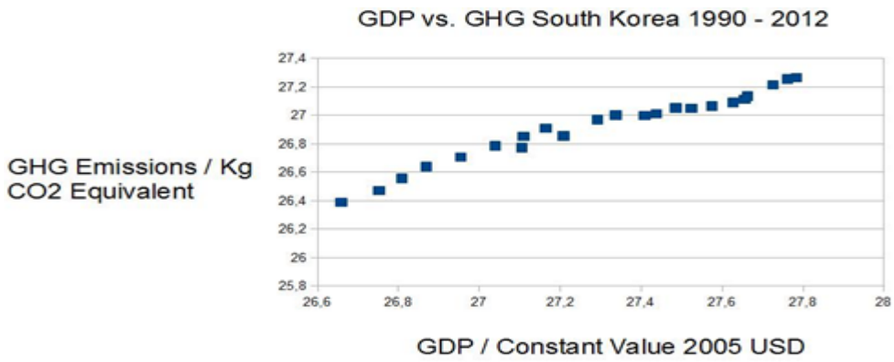

Figure-4. South Korea: Equation: y = 0.693783x + 7.98; R2 = 0.97
Source: GHC: World Resources Institute, GDP: World Bank

The clear link between the two curves in Figure 4 comes as no surprise, confirming the general observations above for Planet Earth.

Turkey

Turkey has become a most important country, politically and economically in the Asia Minor thanks to a rapid economic development of a country with huge population. Figure 5 supports this picture of Turkey as no longer a developing country but as a developed nation and member of the OECD.

Typical of the Turkish scene is the combination of strong economic development with heavy emissions augmentations. Since the economic world organisations – the WB and IMF – wish to have more of economic growth and look upon Turkey as a growth engine, one must ask whether emissions growth really can be halted in this economic super power.

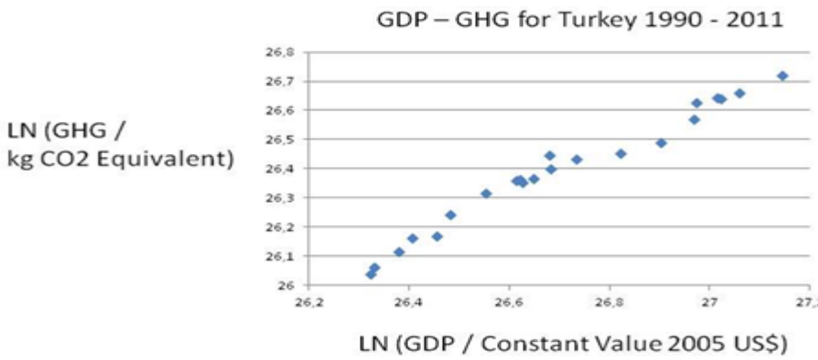

Figure-5. Turkey: Equation: Y = 0,7837x; R² = 0,972
Sources: GHC: World Resources Institute, GDP: World Bank

Turkey has a huge influence in the new nations in Asia, replacing the Soviet republics, as they have considerable Turkish speaking populations. Often their trade is going through Istanbul.

China

Mainland China is now ranked as the largest GHG polluter in the world, when we look at aggregate totals, although not so when emissions per capita are examined. It has « dethroned » the US recently with India rapidly moving upwards too. Relating GHG emissions to population size, China used to a rather small per capita emission, given its enormous population. But the per capita figure has gone up for China, although it is far from 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.

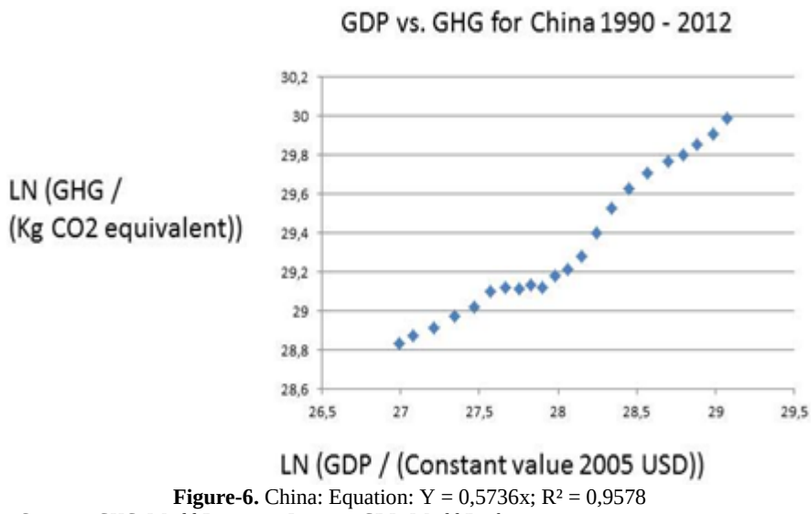

Figure-6. China: Equation: Y = 0,5736x; R² = 0,9578
Sources: GHC: World Resources Institute, GDP: World Bank

Chinese economic development has been driven by massively using resources – mostly coal, gas and iron from Australia - that emit much greenhouse gases, like fossil fuels and cement. Especially, China operates a large number of coal-fired power stations – often without filters - in order to generate electricity. Thus, coal-fired power stations in the millions often lack anti-pollution filters, hurt environment quality for ordinary citizens daily. In addition, China now has the largest and fastest growing car market in the world, burning oil and gas.

Chinese ecology policy has hardly been given much thought or high priority until lately by government or been seriously developed by officials and bureaux. Its leaders talk much about « green values », actually more and more every day, but concrete measures are often lacking. The promise of halting CO2 emissions in relation to economic growth after 2018=2020 is perhaps a meaningless posture, as economic growth still will power ahead, although not as the same pace as between 1990-2010. A relative target will not do, as it is the *absolute totals* that must be decreased. The 2030 promise to effectively reduce GHG:s can be reneged upon. And the time table is for such *relative* reductions is too late for global policy-making to be effective in halting climate change.

The Chinese picture above may be compared with outcomes for a few other major developing countries in order to arrive at a comprehensively true global picture. Generally speaking, the higher the total affluence of a country, the more this nation emits and the larger the population, the more of GHG:s. Thus, one would expect to find lower total levels for small developing countries. How about a giant like India, predicted to overtake China in the size of population and eagerly pushing for economic growth around 6-7 per cent?

India

Except recently, ecological policy-making has bowed to the overarching preference in India, namely rapid 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 in its mega-cities (Figure 7).

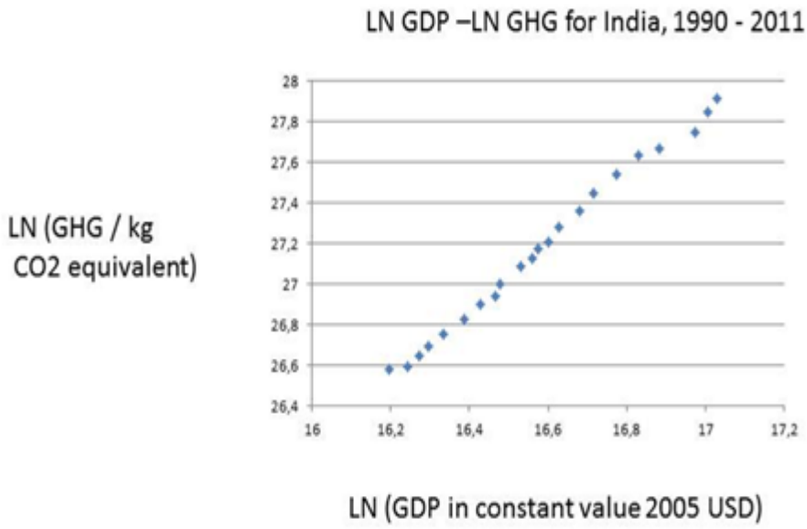

Figure-7. India: Equation: Y = 0,6093x + 4,7605; R^2 = 0,9954

Sources: GHC: World Resources Institute, United Nations Framework on Climate Change GHG inventory submissions, GDP: World BankSource

Figure 7 indicates no halting or decrease of emissions growth at all for this true giant nation. The government of India has an outspoken preference for economic growth > 5 per cent no matter what, which is considered necessary for lifting millions out of abject poverty. Thus, India favours the employment of cheap energy line coal for electricity production – 300 million lacking that. Cutting emissions would entail 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-arching priority, namely to « catch-up » with developed countries. The catch-up strategy uses lots of cheap energy to raise economic output fast. Energy consumption tends to result in GHG emissions, except for wind, hydro and nuclear power. So far most developing countries have opted for rapid economic growth, at the expense of environmental concerns. Thus, we expect to find considerable increases below for GHG:s, looking at a dynamic developing country that is finally « *taking off* », namely giant Indonesia (Figure 8).

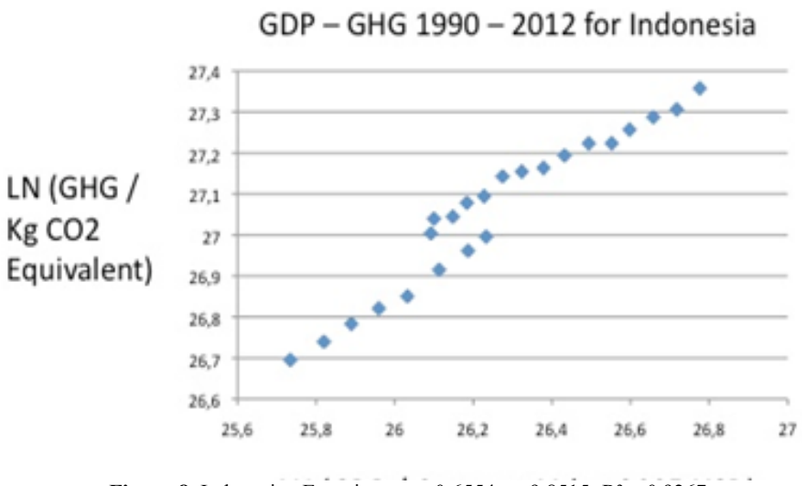

Figure-8. Indonesia : Equation : y = 0,6554x + 9,8515; R² = 0,9267
Sources: GHC: World Resources Institute, GDP: World Bank Source:

The upward trend for GHC emissions in Indonisia reflects closely its economic growth rates. Given its huge population, this country is a major polluter, including the haze from Kalimantan, or Indonisan Borneo. Indonesia has drawn one correct conclusion, namely building a giant wall protection for its capital, Jakarta, against future sea level rise

Pakistan

Consider then Pakistan (Figure 9) - another giant nation in South Asia ! It has already lost land to sea level rise.

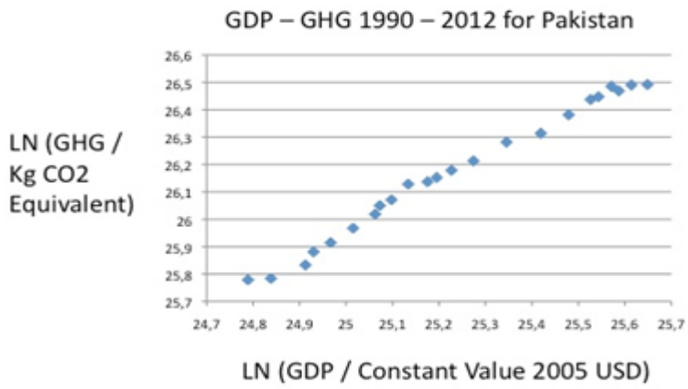

Figure-9. Pakistan: Equation: y = 0,8948x; R² = 0,9989
Sources: GHC: World Resources Institute, GDP: World BankSource:

The trend is the same for this huge developing country as for already developed South Korea, i.e. GHC emissions up and following economic developetment. How to halte missions and still maintain economic growth in this poor nation ?

Singapore

Singapore – its politcal leaders, public officials as well as the scholars at universities and colleges speak much about the climate change predicament. Thus, the city-state mentions a lot of activities and programs aimed at reducing carbon emissions and the outflow of other greenhouse pollutants. Singapore is assertive about its aim to be an ecology model for the future, betting much now upon the use of renewables. Yet, let us look at the facts in Figure 10.

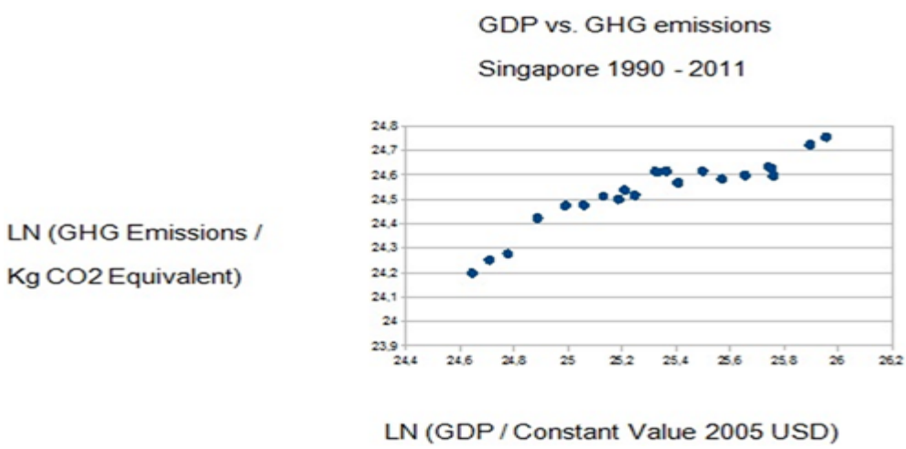

Figure-10. Singapore: Equation:y = 0.34056 + 15.91 ; R2 = 0.85
Source: GHC: World Resources Institute, GDP: World Bank

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 everywhere, consuming electricity and emitting GHC:s. In addition, it cleans its waste water up to 100 per cent, which requires lots of energy. It burns massive amounts of oil and gas for its electricity generation.

Japan

Japan will no longer rely much upon nuclear power, having one power plant is use today. Its emissions have gone done recently, but seem to be on the rise again due to use of fossil fuel increasingly again (Figure 11).

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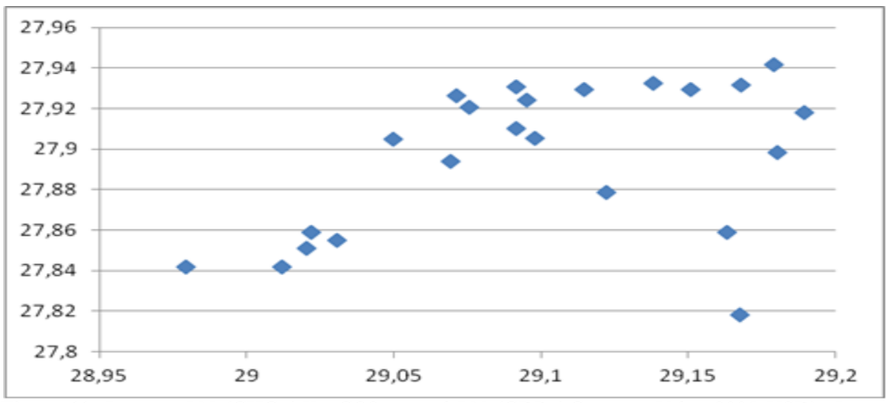


Figure-11. Japan: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD); Japan: Equa.: 0,0828x; $R^2 = 0,1729$

Sources: GHC: World Resources Institute, United Nations Framework on Climate Change GHG inventory submissions, GDP: World Bank

The decrease in emissions for Japan reflects the country's post-industrial developments. Production sites have been moved out of Japan with heavy investments in other Asian countries as well as the EU and the US. But the loss of energy from some of its nuclear power stations poses a great problem for the country – what to use instead along with the COP21 requirement of decarbonisation?

5. 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.

5.1. 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.

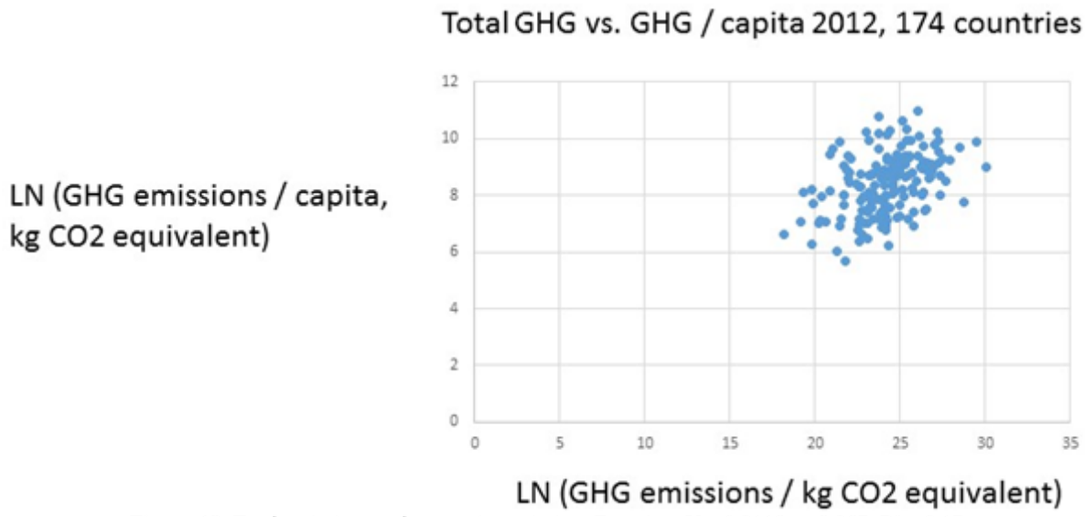


Figure-12. Total emissions and per capita emission; Equation: Y = 0,2116x + 3,267; $R^2 = 0,17$

Source: World Resources Institute, GDP: World Bank, Population: United Nations Population Division

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?

Some developing countries have huge *total* emissions, but they may argue that rich countries with *high per capita* emissions should make most reductions. It is true that per capita emissions follow the affluence of a country, i.e. GDP per capita – see Figure 13.

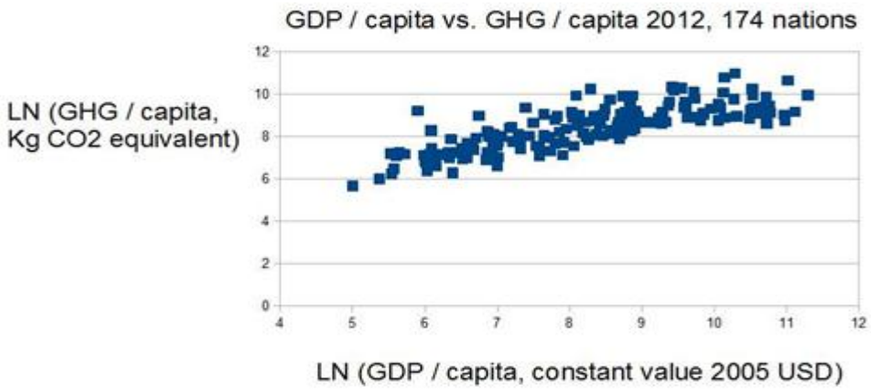


Figure-13. GDP per capita and GHG per capita; Equation: Y = 0,5496x + 3,8985; R^2 = 0,6537
Source: World Resources Institute, GDP: World Bank, Population: United Nations Population Division

Thus, poor countries could claim that rich countries with high per capita emissions to the right in Figure 9 can not only afford the reductions, but that this redistribution would also be *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 *emission efficiency*, decreases by the huge emitters make most sense, like China, India, Indonesia, Brazil, Nigeria, South Africa, the US and Canada as well as large EU countries. How about the UN ambition to maximise both objectives: economic development and ecological sustainability, with the basic notion of *country fairness*?

6. Fairness, Compensation and the Global Ecology Fund

Already economist Stern [1] 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 within the COP21 Agreement. The suggestion from the Kyoto Agreement that some countries could be excluded from a reduction scheme for some time period now seems unacceptable: 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 unrealistic. One could ask, and the US Congress will do so on the ratification of COP21: why should the US pay to China to lower its emissions, when it is in the interest of China itself to do so?

7. Conclusion

Climate change has become the major problem in international political economy. But is it likely that global coordination will work according to the COP21 Treaty? Each country now has to develop a realistic strategy to cope with the consequences of climate change – *resilience*. Climate change is driven by both population growth and more and more energy consumption for economic development or growth. The universal call for economic growth has so far trumped any efforts at holding back GDP, because the life style of freedom from poverty drives people. Themost realistic hope is that major technological breakthroughs will be forthcoming in time allowing for carbon neutral energy. It exists already such know-how but its scale is too small.

In standard energy projections up to 2030 (see Appendix), Planet Earth will continue to rely heavily upon the fossil fuels, which results no doubt in more of GHG:s! For the huge Asian countries, it is vital to embark on both decarbonisation – close the coal fired power stations - and innovation in energy with massive new technologies for renewable energy sources and much better filters for the use of fossil fuels. Economic development will depend more and more upon energy efficiency – see Figure 14.

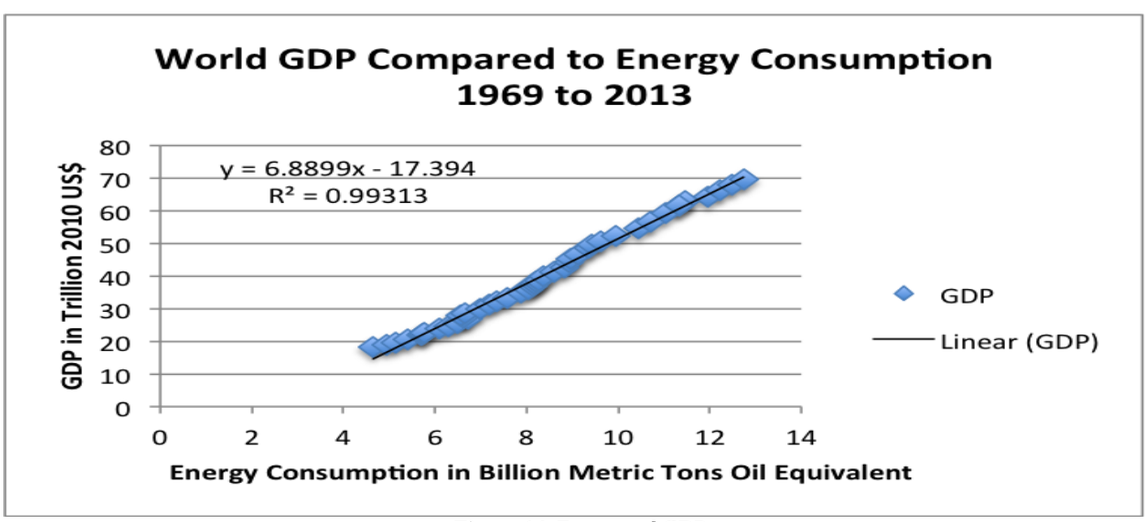


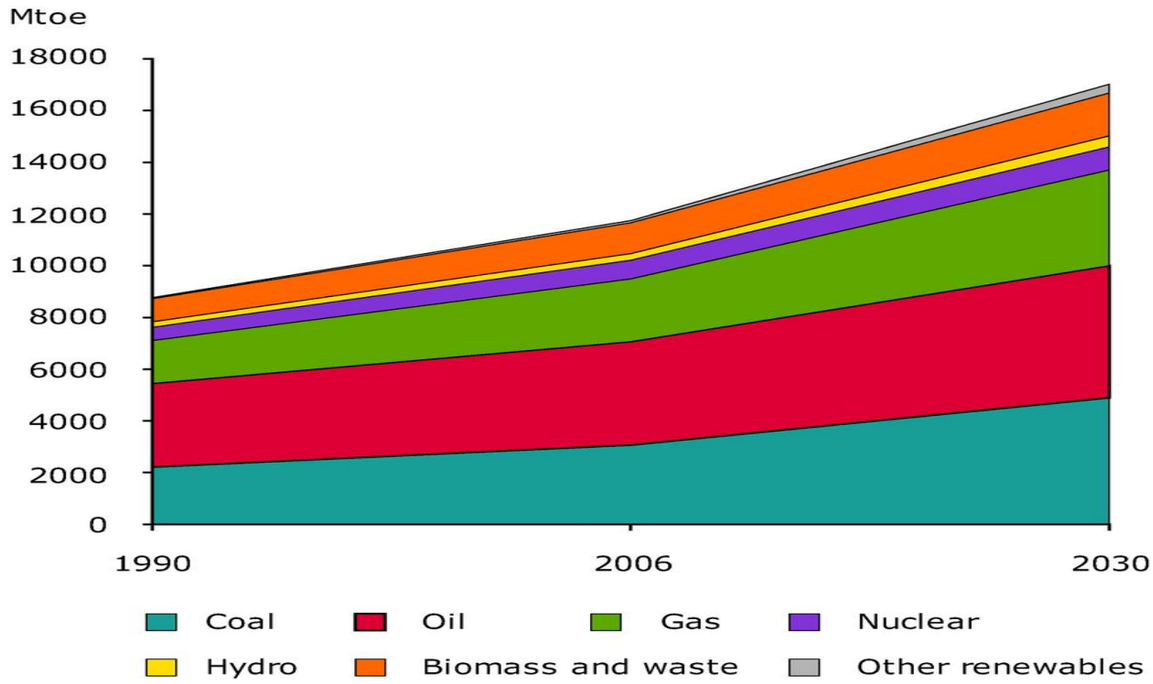
Figure-14. Energy and GDP
Source: Growth in world energy consumption (based on BP data) and growth in world real GDP

The COP21 agreement makes it imperative for Asian economies to develop advanced energy plans, finding new sources but also employing the existing ones more efficiently!

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.

Appendix 1. Energy consumption projections



Appendix-1. Energy predictions – 2030

Source: Global Total Primary Energy Consumption by fuel, www.eea.europa.eu911 2008.

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