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South Asia in the 21st Century: "Catching-Up" yet Overheating

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Abstract

Economist Stern (2016) asks now why so little is concretely done against global warming. But consider the huge countries in South Asia and their mighty neighbours. South Asia is poised to become the next set of Asian economic miracles. Yet they face a terrible threat from the environment, as global warming picks up speed together with more and more environmental degradation. Can these more than 2 billion people work and find food and water, if temperature rises more than 2-3 degrees? Can peasants work and survive? And how to generate enough electricity for housing, given increasing water shortages? Without massive financial assistance, there will occur widespread reneging on the COP21 objectives (Goal I-III). The system of UNFCCC with yearly big meetings does not offer an organization that is up to the coordination tasks involved in halting climate change—too much transaction costs. South Asia needs the promised Super Fund badly that Stern anticipated 2007.

Keywords: global warming, South Asia, Kaya model, energy-emissions-GDP links, Super Fund, Stern

1. Introduction

It is true that climate change and its implications are given much more attention now, after the COP21 Agreement in Paris. There are almost weekly conferences about global warming and the debate is intense all over the globe. This is a positive, but one must point out the exclusive focus upon natural science and technological issues, which actually bypasses the thorny problems of international governance and the coordination of states. The social science aspects of global warming policy-making will be pointed out in this article. This is a problematic by itself that reduces the likelihood of successful implementation of the goals of the COP21 Agreement (Goal I, Goal II and Goal III in global decarbonistion).

2. Uncertainties: Implementation of Decarburization

It is quite understandable that the focus in all the international conferences, some of which are now speaking of COP22 meetings, is upon the natural science issues in climate change. They deal with how dangerous the global warming process could be as well as the feasibility of halting this trend in the 21st century by various measures, like for instance carbon capture. Yet, by neglecting some very relevant social science models, the COP21 approach of decarbonisation will run into major difficulties, already in the next decade. Can really international governance together with states coordination deliver policies and will they be implemented in a decentralized approach? This question is most relevant, even when the natural sciences and technology arrives at conclusive answers to the major issues in climate change.

It seems to me that the key issues in the global climate change debate concerns inter alia the following:

1) What more precisely is the link between the amount of carbon in the atmosphere and the rise of temperature, in sea and n land? Is it a linear or non-linear link? Thresholds? Reversibility?

2) How and when will rising temperatures in sea and at land affect basic environmental aspects, like the ice layers and the frozen waters as well as glaciers?

3) How much carbon will be stocked in the atmosphere in this century, given alternative scenarios of emissions and natural carbon uptake? How dangerous could increasing GHG: s like methane be?

4) Is it at all feasible to accomplish massive decarbonisation of the air by means of carbon sequestration at what costs?

Having full knowledge about all these issues would improve much upon the theories of global warming and would be extremely useful in practice when policies are to me made about decarbonisation.

Yet, they do not comprise the implications of lessons of the social sciences for global governance, coordination and policy making. The crux of the matter is what I call the *Wildavsky hiatus*: policies however appealing are bound to fail when put in practice, as no policy is self-implementable (Pressman & Wildavsky, 1973, 1984). To grasp the feasibility of the COP21 project and its three goals of decarbonisation, one must understand the implementation deficit and the coordination failures. I will spell out these concepts here in relation to the COP21 framework, and its three objectives, namely:

a) Halting the increase in carbon emission up to 2020 (Goal I);

b) Reducing CO2: s up until 2030 with 40 percent (Goal II);

c) Achieve more less total decarbonisation until 2075 (Goal III).

It is up to the governments of the countries to implement these goals with rather weak overview from international governance but with the promise of assistance from a huge Super Fund. What, then, are the *INCENTIVES* involved in decentralized decarbonisation a la COP21? To discuss decarbonisation feasibility along the three goals—Goal I, Goal II and Goal III—one need to take into account the restrictions on human action and interaction in social systems, spelled out in economic theory and game theory.

3. The Economy and Climate Change: Kaya's Model

The basic theoretical effort to model the greenhouse gases, especially CO2: s, in terms of a so-called identity is the deterministic Kaya equation. The Kaya identity, "I=PAT"—model type, describes environmental (I) mpactagainst the (P) opulation, (A) ffluence, and (T) echnology. Technology covers energy use per unit of GDP as well as carbon emissions per unit of energy consumed (Kaya & Yokoburi, 1997).

In theories of climate change, the focus is upon so-called anthropogenic causes of global warming through the release of greenhouse gases (GHG). To halt the growth of the GHG: s, of which CO2: s make up about 70 percent, one must theorize the increase in CO2: s over time (longitudinally) and its variation among countries (cross-sectionally). As a matter of fact, CO2: s have very strong mundane conditions in human needs and social system prerequisites. Besides the breading of living species, like Homo sapiens for instance, energy consumption plays a major role. As energy is the capacity to do work, it is absolutely vital for the economy in a wide sense, covering both the official and the unofficial sides of the economic system of a country. The best model of carbon emissions to this day is the so-called Kaya model. It reads as follows in its standard equation version—*Kaya's identity*.

(E 1) Kaya's identity projects future carbon emissions on changes in Population (inbillions), economic activity as GDP per capita (inthousands of $US (1990)/person year), energy intensity in *Watt years/dollar*, and carbon intensity of energy as *Gton C as CO_2 per Tera Watt year* (http://climatemodels.uchicago.edu/kaya/kaya.doc.html).

Concerning the equation (E 1), it may seem premature to speak of a law or identity that explains carbon emissions completely, as if the Kaya identity is a deterministic natural law. It will not explain all the variation, as there is bound to be other factors that impact, at least to some extent. Thus, it is more proper to formulate it as a stochastic law-like proposition, where coefficients will be estimate using various data sets, without any assumption about stable universal parameters. Thus, we have this equation format for the Kaya probabilistic law-like proposition, as follows:

$$\text{(E2) Multiple Regression: } Y=a+b_1X_1+b_2X_2+b_3X_3+ \dots +b_tX_t+u \quad (1)$$

Y=the variable that you are trying to predict (dependent variable); X=the variable that you are using to predict Y (independent variable); a=the intercept; b=the slope; u=the regression residual (http://www.investopedia.com/terms/r/regression.asp#ixzz4Mg4Eyugw).

Thus, using the Kaya model for empirical research on global warming, the following anthropogenic conditions would affect positively carbon emissions:

$$\text{(E3) CO2: s=F (GDP/capita, Population, Energy intensity, Carbon intense)} \quad (2)$$

In a stochastic form with a residual variance, all to be estimated on data from some 59 countries. I make an empirical estimation of this probabilistic Kaya model-the cross-sectional test for 2014:

$$\text{(E4) k1=0,68, k2=0,85, k3=0,95, k4=0,25; R2=0.90} \quad (3)$$

LN CO2=k1*LN (GDP/Capita) +k2* (dummy for Energy Intensity) +k3* (LN Population) +k4* (dummy for Fossil Fuels/all) Dummy for fossils 1 if more than 80% fossil fuels; k4 not significantly proven to be non-zero, all others are (N=59).

We show in Figure 1 that GDP increases with the augmentation of energy per capita. Decarbonisation is the promise to undo these dismal links by making GDP and energy consumption rely upon carbon neutral energy resources, like modern renewable—solar, wind, geo-thermal-and atomic energy.

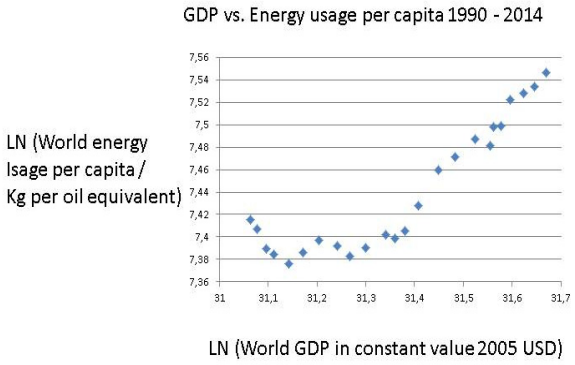

Figure 1. GDP against energy per person, globally

The implications of Figure 1 for the South Asian countries will be spelled out below. They need massive energy to end their 2000 year record of dismal poverty.

4. Framework of Analysis

We need to model this energy-emission dilemma for the countries of the COP21 project. To understand the predicament of Third World countries, we need to know whether GHC: s or CO2: s are still increasing (Goal I) and what the basic structure of the energy mix is (Goal II). Thus, I suggest:

<GDP-GHG (CO2) link, energy mix>, as a model of the decarbonisation feasibility in some Third World countries, to be analyzed below, following the so-called "Kaya" model. The first concept taps the feasibility of Goal I: halting the growth of GHG: s or CO2: s, whereas the other concepts target the role of fossil fuels and wood coal like charcoal.

The difference between global warming concern and general environmentalism appears clearly in the evaluation of atomic power. For reducing climate change, nuclear power is vital, but for environmentalism atomic power remains a threat. From a short-term perspective, the global warming concerns should trump the fear of radioactive dissemination, as global warming will hit mankind much sooner. In the Third World, nuclear power plants are increasing in number, whereas in the mature economies their number is being reduced. New nuclear technology is much safer, why also advanced countries should use this option, like for instance the UK.

5. The Tragedy of South Asia

Just because there is an agreement it does not entail it will be respected. Even if respecting the promises made is the best strategy for all partners to the deal, each individual has an incentive to renege upon the agreement. In two-person game theory, a few much discussed models portray coordination failures, and they are applicable to governments as well as international governance. If, as shown above with the Kaya model, decarbonisation may be costly, hurting economic development, then perhaps a country may simply go its own way, leaving it up to the other(s) to handle the externalities in global warming. Why make costly contributions to collective action? Remember that small countries do not matter much (N-1 problematic) and huge countries would have to share the benefits with all others (I/N problematic).

The interaction between nations and their governments can be of two kinds: zero sum game or variable sum game. Halting the climate change process constitutes a Pareto optimal goal for all participants with means of collective action, coordination either by themselves or with a third party, an international governance body like that of the UNFCCC. However, coordination may fail to reach a set of Pareto optimal outcomes, as the choice participants.

I will analyze a few important countries in a comparative fashion so that they can be compared systematically. Two diagrams will be presented for each country, related to the research approach above. First, the COP21 Goal I will be tapped by looking at the curve between GDP and CO2: s (GHG: s), whether is rising or declining and whether it slopes outward or inward. Second, the COP21 Goal II is enquired into, as the energy consumption mix is portrayed: the more reliance upon fossil fuels and charcoal, the more costly the energy transition. What matters in both diagrams are both absolute and relative numbers? Thus, the coal share of energy resources may go down, but if total energy consumed is up, emissions will remain at a high level.

A set of countries with huge population at a low level income per person will find the COP21 objectives too exigent. They have to plan for more of energy in order to strengthen economic development against widespread poverty amidst string population growth. These countries can only promote Goal I and Goal II, if supported by the Super Fund.

5.1 India

India will certainly appeal to the same problematic, namely per capita or aggregate emissions. The country is more negative than China to cut GHG emissions, as it is in an earlier stage of industrialization and urbanization. Figure 2 shows the close connection between carbon emissions and GDP for this giant nation.

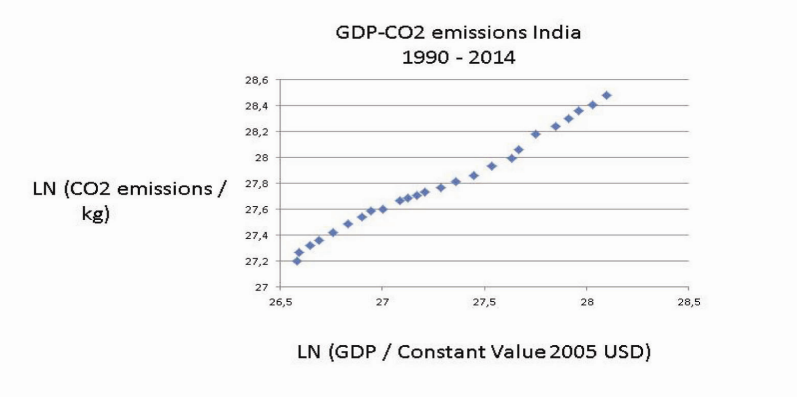

Figure 2. INDIA: Link between GDP and CO2: y=0,77x+6,79; R^2=0,99

India needs cheap energy for its industries, transportation and heating as well as electrification. From where will it come? India has water power and nuclear energy, but relies most upon coal, oil and gas as power source. It has strong ambitions for the future expansion of energy, but how is it to be generated, the world asks. India actually has one of the smallest numbers for energy per capita, although it produces much energy totally. Figure 5 shows its energy mix where renewables play a bigger role than in for instance China.

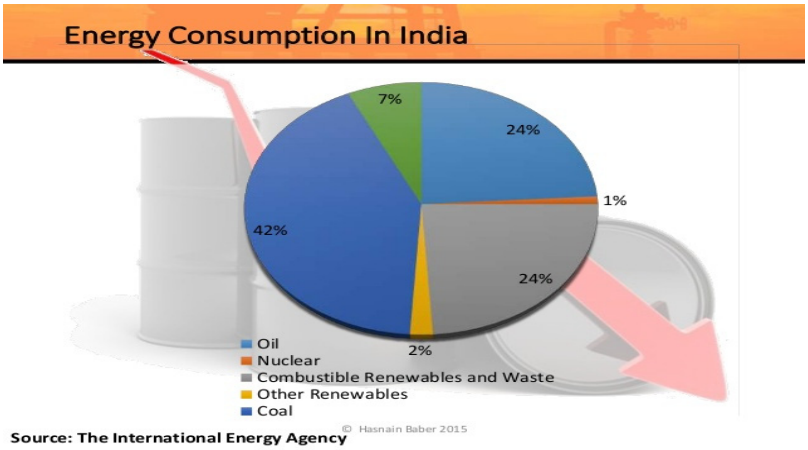

Figure 3. India's energy mix

India needs especially electricity, as 300 million inhabitants lack access to it. The country is heavily dependent upon fossil fuels (70 percent), although to a less extent than China. Electricity can be generated by hydro power and nuclear power, both of which India employs. Yet, global warming reduces the capacity of hydro power and nuclear power meets with political resistance. Interestingly, India uses too much biomass, charcoal and waste for electricity production, which does reduce GHG emissions. The use of wood coal must be reduced in South Asia, as it is detrimental for people and the environment: deforestation and desertification. India's energy policy will be closely watched by other governments and NGO: s after 2018.

Former minister and public intellectual Ramesh (2015) admits that India will need coal (stone and wood) for a long time in order to catch-up decently. But the country suffers from global warming-droughts-that reduce access to water from drinking and hydro power stations. India has passed its economic "take-off" stage (Rustow, 1960) by turning to market incentives (Hayek, 1991). It now pursues a consistent "catch-up" strategy (Barro, 1991, 1992, 1995) that it will not give up upon in order to comply with the COP21 decarbonisation goals.

5.2 Pakistan

The same upward trend for emissions holds for another major developing country with huge population, namely Pakistan (Figure 4).

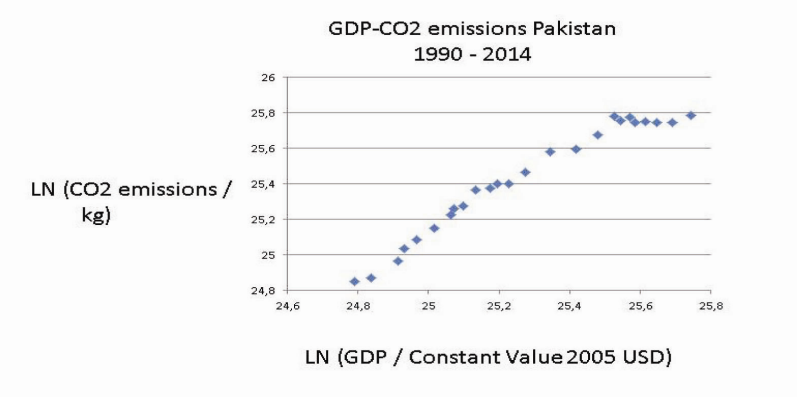

Figure 4. PAKISTAN: GDP-CO2: y=1,05x-0,97; R^2=0,96

The amount of GHG emissions is rather large for Pakistan, viewed on aggregate. Pakistan is mainly reliant upon fossil fuels (Figure 5).

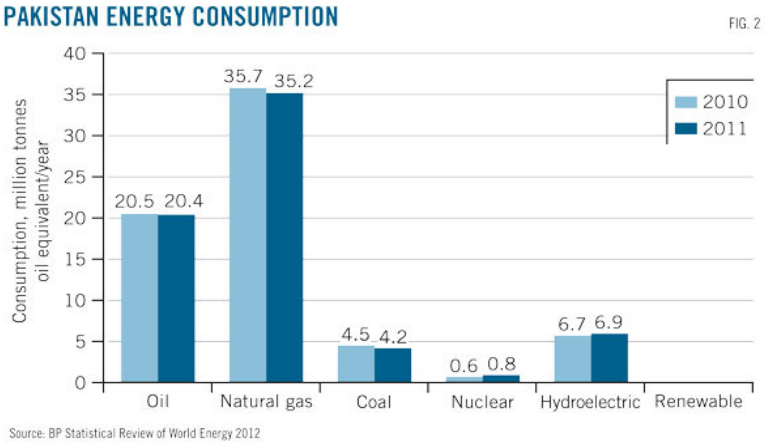

Figure 5. Energy consumption in Pakistan

But Pakistan employs a considerable portion of hydropower—13 percent, and a minor portion of nuclear power, which is a positive.

5.3 Bangladesh

Moving on to another giant nation in South Asia, Bangladesh, we find an entirely different set of conditions for implementing COP21. Figure 6 shows that the major GHC of CO2: s follows economic development closely.

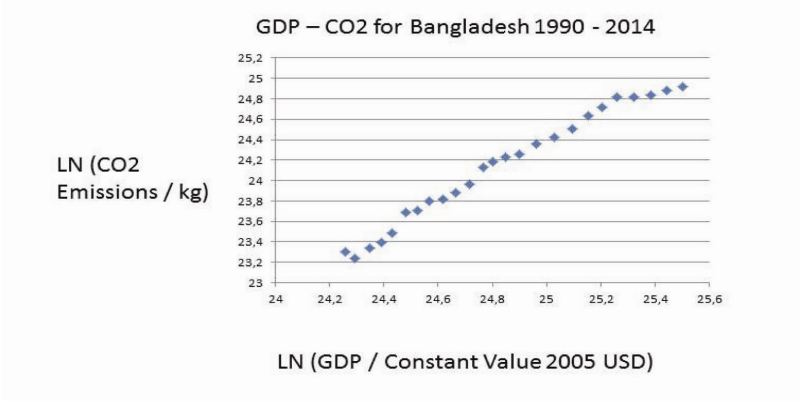

Figure 6. Bangladesh's GDP-CO2 link (y=1,43x; R^2=0, 98)

Yet energy consumption is based on a different energy mix, compared with for instance India. Figure 7 pins down the large role of traditional renewables like wood, charcoal and dung as well as the heavy contribution of oil and gas. Bangladesh needs external support for developing modern renewables, like solar, wind and geo-thermal power sources.

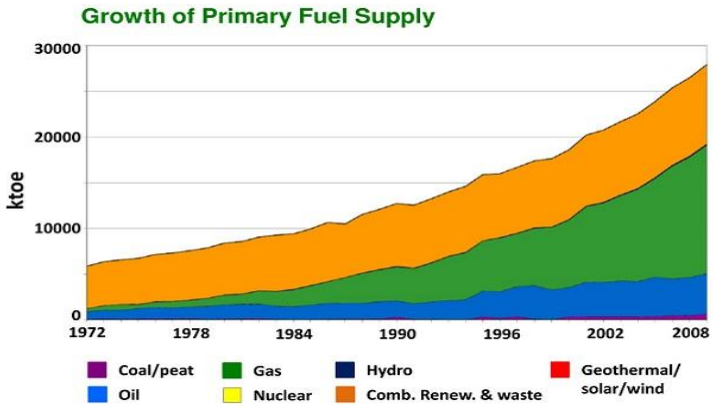

Figure 7. Energy mix in Bangladesh

Source: Energy Scenario in Bangladesh from 1972-2008 (Orange: Biomass, Green: Gas, Blue: Oil).

5.4 Sri Lanka

When examining small but populous Sri Lanka, one sees again the strong connection between GDP and CO2: s—see Figure 8. It seems that the CO2: s was halted in their expansion for some time, but now they increase again.

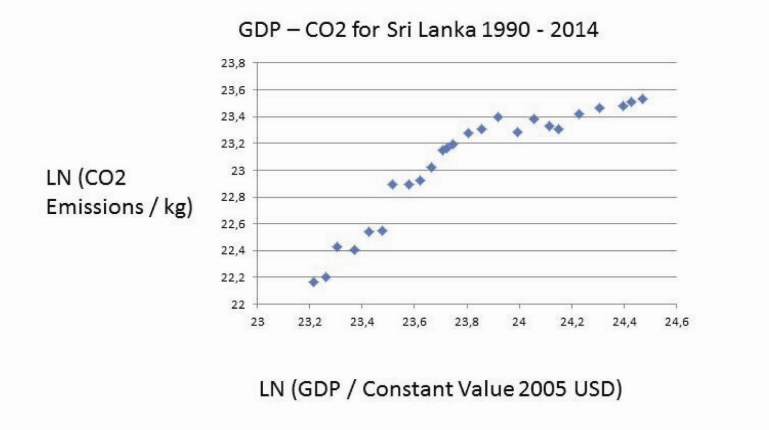

Figure 8. Sri Lanka: GDP-CO2: (y=1,03x, R^2=0,84)

In this island state, the dominant energy source is traditional renewables, which leads to deforestation and CO2 emissions on a large scale (Figure 9). It has been argued that the forest will grow up again, eating the carbon emissions. But it is mainly wishful thinking, as climate change and draughts make forest rehabilitation difficult.

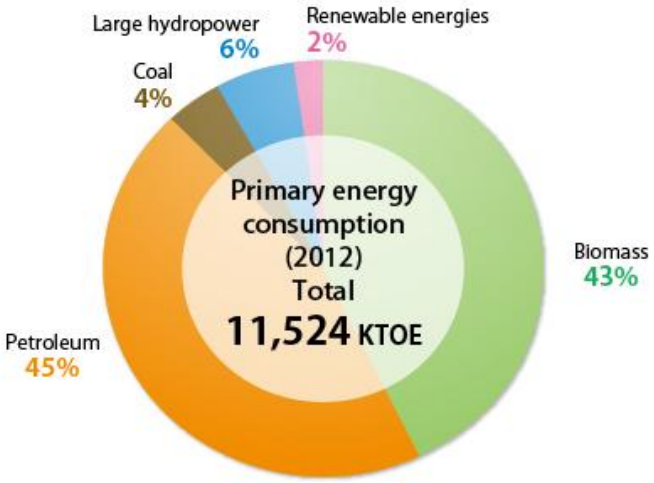

Figure 9. Sri Lanka's energy consumption

Source: Primary energy consumption in Sri Lanka (2012); http://www.info.energy.gov.lk/

For the poor nations in Asia with huge population holds that they cannot by themselves accomplish the objectives of COP21: Goal I: reverse current CO2 trend, Goal II: reduce by 40 percent the CO2: s by 2030 and Goal III: full decarbonisation by 2075. As a matter of fact, they will need massive financial assistance from the Super Fund, which has still not been founded.

Yet, this requires that the COP21 or CO22 sets up a management structure to assist these countries involving project evaluation, policy execution and implementation, control of financial flows and outcome assessment—a gigantic task with many pitfalls involved.

6. The Precarious Neighbours of South Asia

6.1 Indonesia

One may guess correctly that countries that try hard to "catch-up" will have increasing emissions. This was true of India. Let us look at three more examples, e.g., giant Indonesia—now the fourth largest emitter of GHG: s in the world (Figure 10).

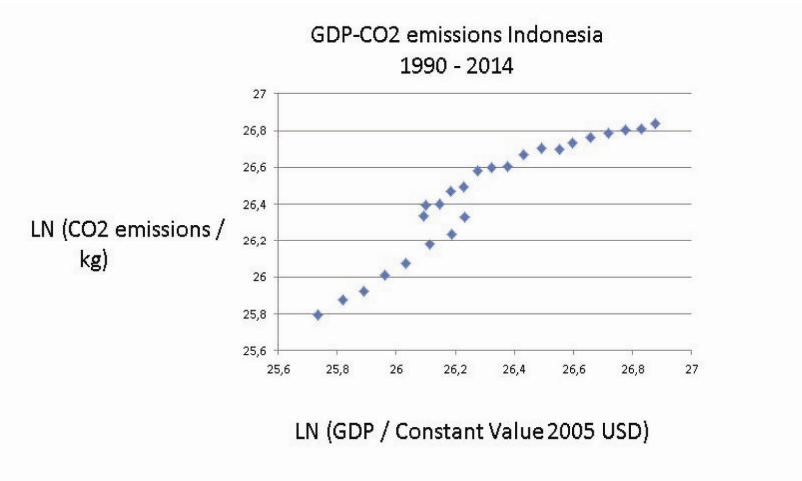

Figure 10. Indonesia: GDP-CO2 link: y=0,95x+1,58; R^2=0,89

Indonesia is a coming giant, both economically and sadly in terms of pollution. Figure 10 reminds of the upward trend for China and India. However, matters are even worse for Indonesia, as the burning of the rain forest on Kalimantan and Sumatra augments the GHG emissions very much. Figure 11 presents the energy mix for this huge country in terms of population and territory.

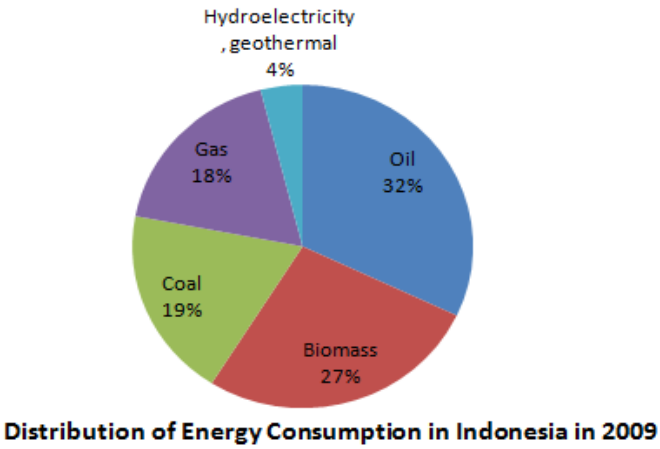

Figure 11. Indonesian energy (http://missrifka.com/energy-issue/recent-energy-status-in-indonesia.html)

Only 4 percent comes from hydro power with 70 percent from fossil fuels and the remaining 27 percent from biomass, which sadly enough also pollutes.

6.2 Iran

Countries may rely upon petroleum and gas mainly—see Iran (Figure 12). CO2 emissions have generally followed economic development in this giant country, although there seems to be a planning out recently, perhaps due to the international sanctions against its economy.

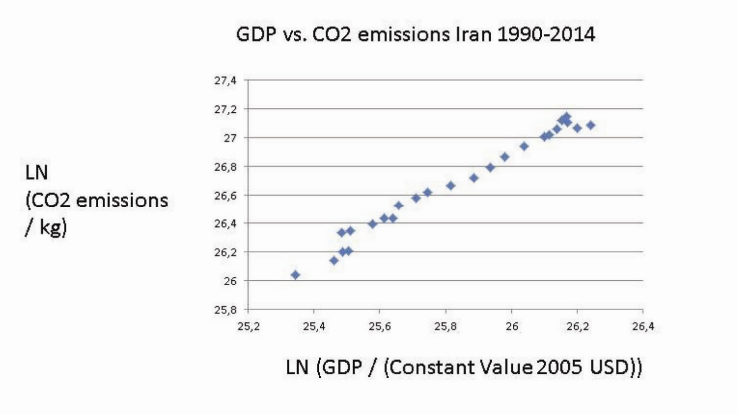

Figure 12. Iran: GDP-CO2 link (y=1,2229x-4,91; R^2=0,98)

Iran is together with Russia and Qatar the largest owner of natural gas deposits. But despite using coal in very small amounts, its CO2 emissions are high. Natural gas pollute less than oil and coal, but if released unburned it is very dangerous as a greenhouse gas. Iran relies upon its enormous resources of gas and oil (Figure 13).

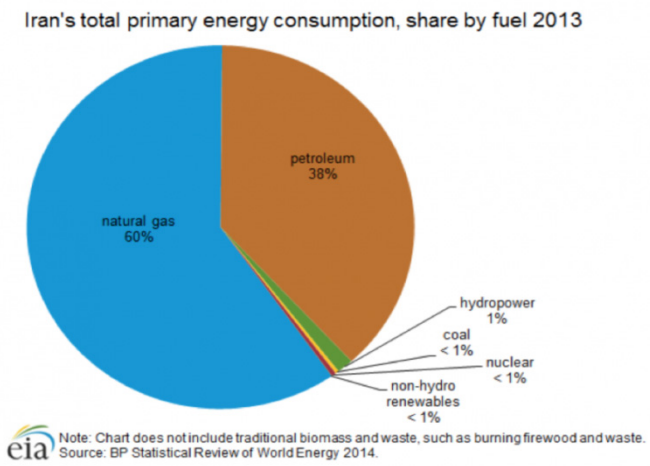

Figure 13. Iran: Energy mix

Iran needs foreign exchange to pay for all its imports of goods and services. Using nuclear power at home and exporting more oil and gas would no doubt be profitable for the country. And it would also help Iran with the COP21 goals achievement.

6.3 Kazakhstan

Here we have a nation very much occupied with the catch-up strategy. It wants to copy the Asian miracles, moving to affluence in a few decades, using its immense fossil energy resources (Figure 14).

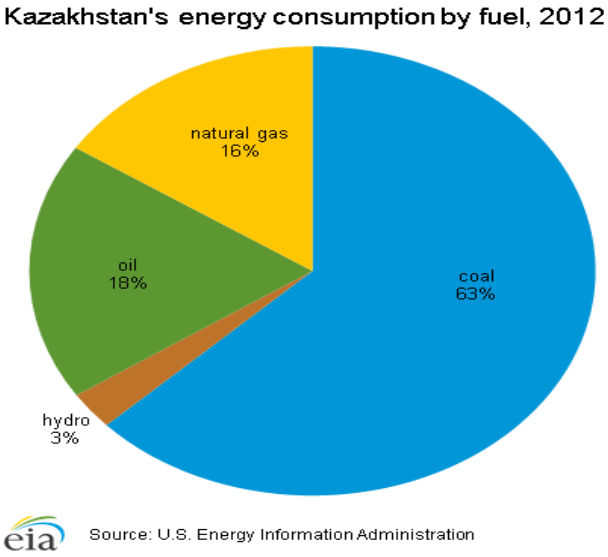

Figure 14. Kazakhstan's energy consumption by fuel

However, this energy consumption leads to enormous emissions (Figure 15). The stunning economic development, including the great project of a modern Silk Roan from China to Germany through Kazakhstan implies that the CO21 goals cannot be accomplished here. Catch-up and huge infrastructure trumps climate change.

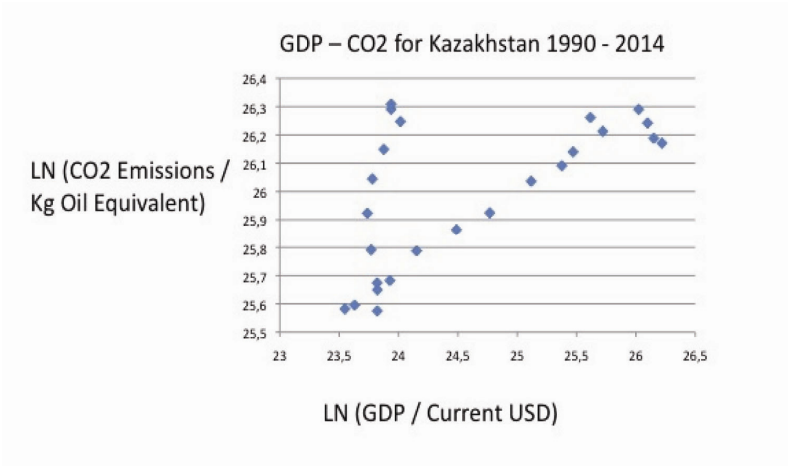

Figure 15. Kazakhstan: Link GDP-COP: y=0,17x; R^2=0,38

6.4 Vietnam and the Philippines

To further substantiate the argument about the CO2-energy conundrum that countries all over the world face, we may look at two populous nations in Asia with quickly expanding economies: Vietnam and the Philippines. They have both upward sloping trends for emissions, energy consumption and GDP, as the Kaya model entails.

Vietnam is now the perhaps most dynamic economy in Asia, after years of socialism and a planned economy. Such fast economic growth requires one thing especially, namely energy (Figure 16).

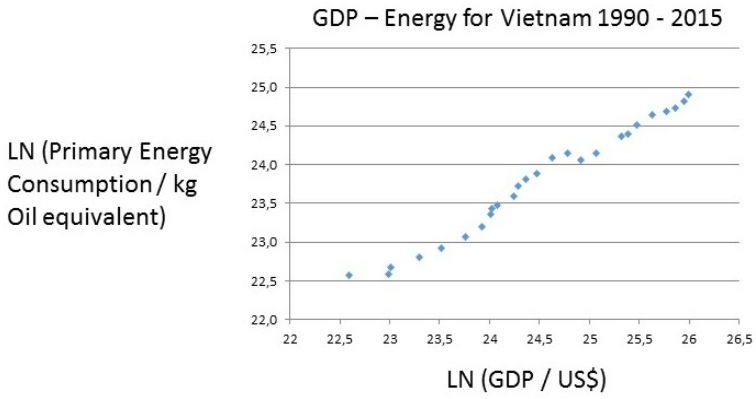

Figure 16. Vietnam: GDP and energy (y=0,74x; R^2=0,98)

The benefits of such a strong economic development is of course raising affluence and diminishing poverty. But the costs involve much more emissions (Figure 17).

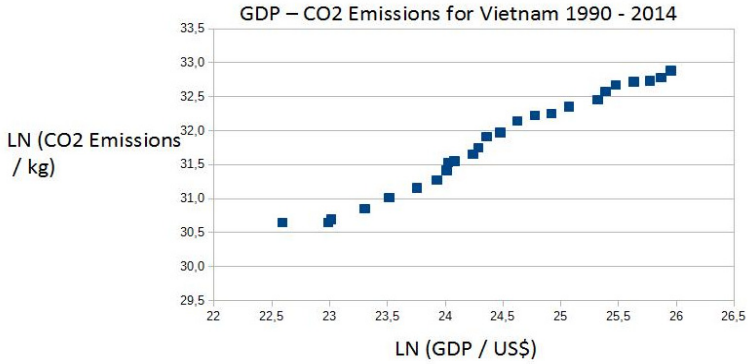

Figure 17. GDP and emissions for Vietnam: y=0.75x+13,4; R^2=0,9

How Vietnam is to change in order to promote the COP21 goals, Goal I and Goal II within a short period of some 10 years, given the ambition to maintain raid economic growth, is very difficult to understand. Can really renewables do the trick? It is a highly relevant policy question, despite the massive employment of hydro power in this country.

Giant nation the Philippines is very interesting, as they claim that they can handle the implementation of the COP21 goals. This may simply be rhetoric, which is just another form of reneging upon promises. Consider first the upward sloping trend in Figure 18.

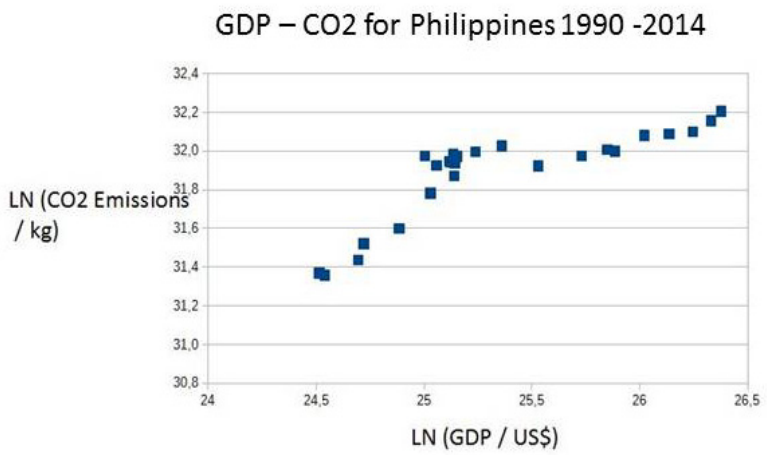

Figure 18. The Philippines: y=0,36x+23; R2=0,68

No wonder that this figure has a strong upward trend for emissions when one examines its pattern f energy consumption (Figure 19).

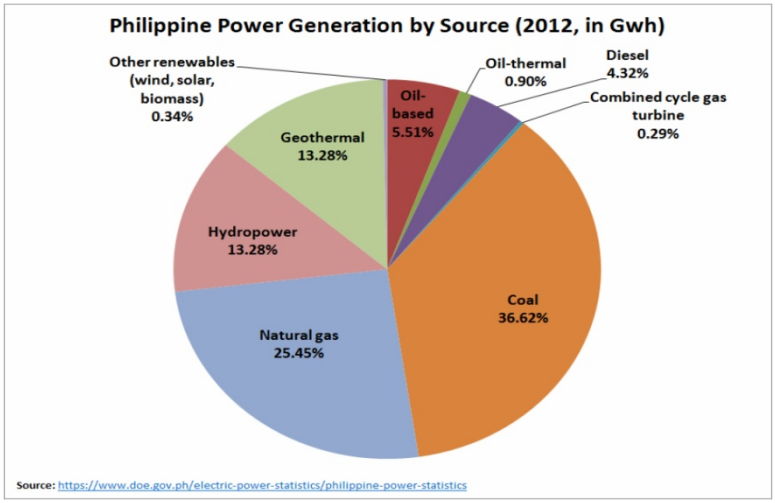

Figure 19. Energy mix in the Philippines

The energy profile of the Philippines is actually more positive than several of the countries above, including a huge part of geo-thermal energy. Yet, fossil fuels dominate to a high 70 percent, as in other populous and rapidly developing nations. The Philippines definitely needs help from the Super Fund.

The caching-up countries all have increasing slopes for the GDP-CO2 link, which entails profound difficulties to come for the accomplishment of Goal I in the CO21 project. In relation to the achievement of Goal II, one can say only note that tremendous investments have to be made by these countries in renewable energy and atomic plants, which they will find difficult to do.

A few nations do not depend upon any foreign assistance, because they are highly developed technologically and can draw upon own substantial financial resources. One may find that the emissions of GHG: s follows economic development closely in many countries. The basic explanation is population growth and GDP growth—more people and higher life style demands. Take the case of China, whose CO2 emissions are the largest in the world, totally speaking (Figure 19). China was a Third World country up until yesterday.

6.5 China

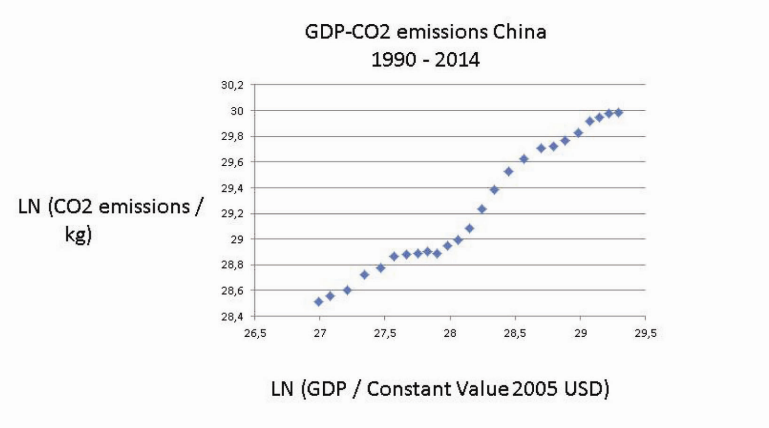

Figure 20. CHINA: GDP-CO2 link: y=0,70x; R^2=0,97

The sharp increase in CO2: s in China reflects not only the immensely rapid industrialization and urbanization of the last 30 years, but also its problematic energy mix (Figure 21).

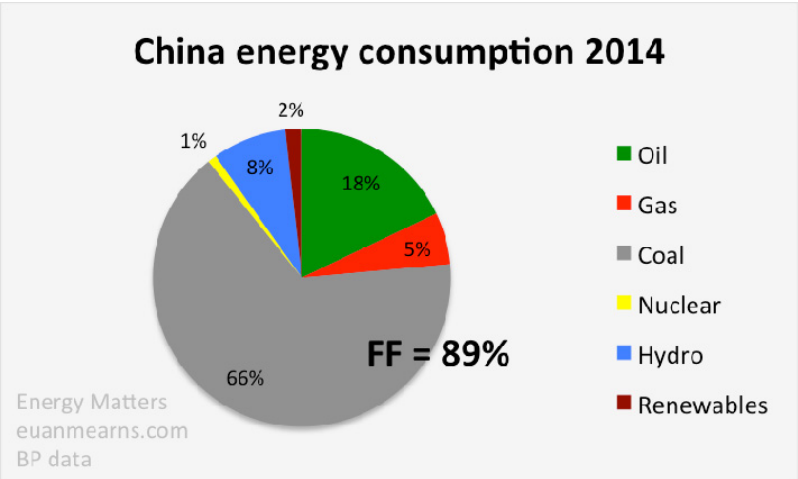

Figure 21. China's energy mix

Almost 70 percent of the energy consumption comes from the burning of coal with an additional 20 percent from other fossil fuels. The role of nuclear, hydro and other renewable energy sources is small indeed, despite new investments. This makes China very vulnerable to demands for cutting GHG emissions: other energy sources or massive installation of highly improved filters?

It should be pointed out that several small countries have much higher emissions per capita than China. This raises the enormously difficult problematic of *fair cuts* of emissions. Should the largest polluters per capita cut most or the biggest aggregate polluters? At COP21 this issue was resolved by the creation of a Super Fund to assist energy transition and environment protection in developing counties, as proposed by economist Stern (2007). But China can hardly ask for this form of foreign assistance. It is true that China energy consumption is changing with much more of renewables ad atomic plants. But so is also demand increasing with new and bigger cars all the time plus increased air traffic on huge new airports. Can China really cut CO2: s with 40 percent while supplying almost 50 percent more energy power, according to plan?

7. Reneging Asian Partners?

Defection in a game of state coordination is always a relevant strategy option. It may be triggered by various reasons, like changing beliefs or preference for economic growth over the environment. What the new US administration, South Koreas and Australia decides will have global repercussions. If they renege, South Asia will also defect from the restriction of the COP21.

7.1 Australia

In Asia and Oceania, one finds only two cases of declining GDP-COP curve: Australia and Japan. Japan has for a long time substituted coal for atomic power, although recently with a crucially negative set-back. But Australia has always been the country of fossil fuels, exporting coal and iron in huge amounts. However, it has reached its CO2 peak recently (Figure 22).

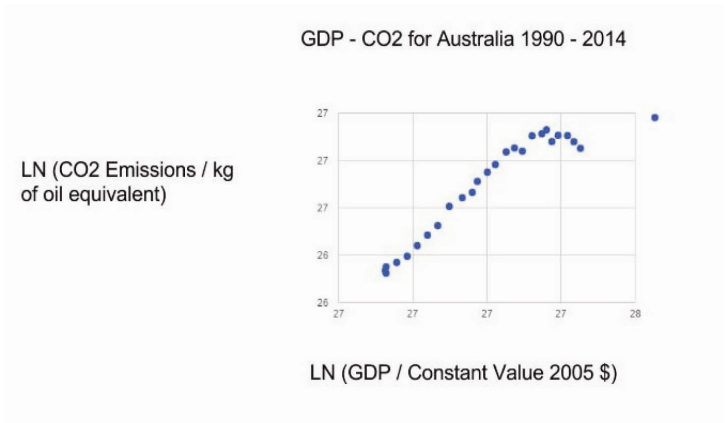

Figure 22. Australia's GDP-CO2 link

Australia has been extremely dependent upon fossil fuels, domestically and in exports in Asia. Cutting back its coal dependency will allow the country to halt its CO2 emissions, while moving to renewables. The fossil fuel dependency of Australia is simply stunning (Figure 23).

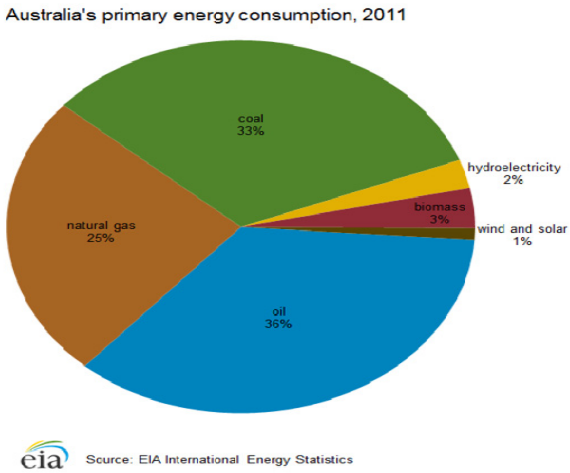

Figure 23. Energy mix in Australia

Australia has often been accused of fuelling climate change. These accusations appear to be vindicated in the Figure above that shows an extreme reliance upon fossil fuels. Add then all the export of raw materials! One prime minister of Australia has declared that the country will reduce CO2: s only if economic growth is not hurt.

It remains to be seen how Australia tackles Goal I and Goal II. Prime ministers have expressed an Australian preference: first growth, second decarbonisation. Can the country really give up coal?

7.2 South Korea

A major industrial country in East Asia is South Korea with an advanced economy and large population. It deviates from the pattern of mature economies to display a slowing down in the CO2: s (Figure 24).

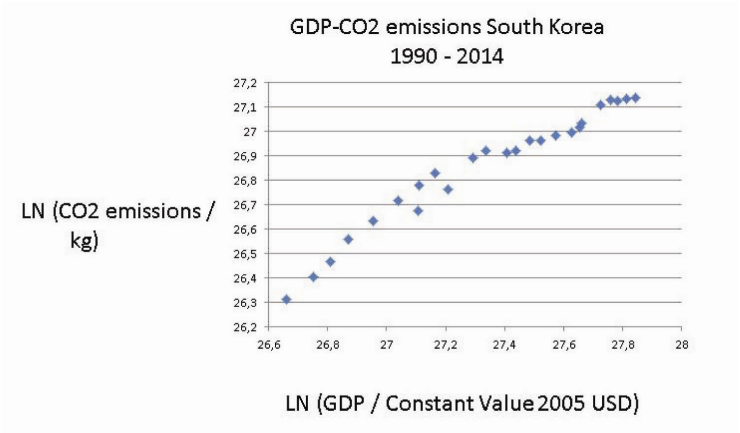

Figure 24. South Korea: GDP=CO2 link: y=0,65x+9,19; R^2=0,96

Lacking much hydro power, South Korea has turned to fossil fuels for energy purposes, almost up to 90 percent. Now, it builds nuclear plants, but South Korea needs to move aggressively into solar power to reverse trends. It differs from China only in the reliance upon nuclear power, where the country is a world leader in plant constructions. Reducing its GHG emissions, South Korea will have to rely much more upon modern renewable energy sources, as well as reducing coal and oil for imported gas or LNGs. Its appetite for energy is not slowing down (Figure 25).

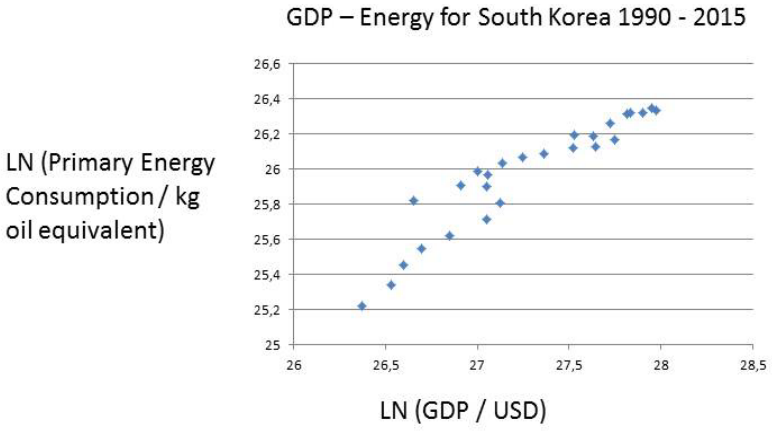

Figure 25. GDP-energy for South Korea: y=0,622x; R^2=0,88

South Korea is of course a mature economy, but it still pursues an aggressive catch-up strategy with strong claims in electronics and nuclear power technology besides shipping and car industry.

Lacking much hydro power, South Korea has turned to fossil fuels for energy purposes, almost up to 90 percent (Figure 26). Now, it builds nuclear plants, but South Korea needs to move aggressively into solar power to reverse trends.

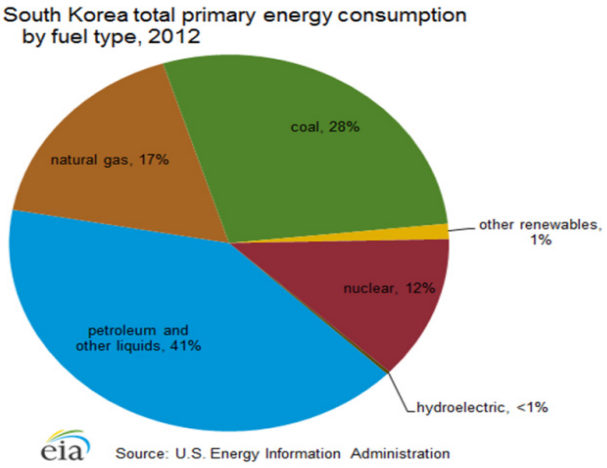

Figure 26. Energy in South Korea

South Korea differs from China in the reliance upon nuclear power, where the country is a world leader in plant constructions. Reducing its GHG emissions, South Korea will have to rely much more upon renewable energy sources, as well as reducing coal and oil for imported gas or LN.

8. The South Asian Drama: Towards Sustainable Economic Development?

World famous economist J. Sachs argues now that time has come from a fundamental shift to the model of sustainable economic development. South Asia will not endorse his proposals, but instead demand financial assistance for large scale energy transformation that allows these to continue their "catch-up" strategy in relation the advanced First Word.

Take the example of Sachs' stating about SDG (sustainable development goals) the following:

"… the SDGs need the identification of new critical pathways to sustainability. Moving to a low-carbon energy system, for example, will need an intricate global interplay of research and development, public investments in infrastructure (such as high-voltage direct current transmission grids for long-distance power transmission), private investments in renewable power generation, and new strategies for regulation and urban design. The task is phenomenally complex".

But Sachs does not inform us how something so "phenomenally complex" is to come about, going from the IS to the OUGHT. He continues:

"Market-based strategies (such as carbon taxation) can help to simplify the policy challenge by steering private decisions in the right direction, but politics, planning, and complex decision making by many stakeholders will be unavoidable" (Vol 379, June 9, 2012, p. 2010, http://www.thelancet.com).

Sachs realizes the gap between desirability and feasibility, but he confronts the gap by almost religious make beliefs, saying:

"The SDGs will therefore need the unprecedented mobilization of global knowledge operating across many sectors and regions. Governments, international institutions, private business, academia, and civil society will need to work together to identify the critical pathways to success, in ways that combine technical expertise and democratic representation. Global problem-solving networks for sustainable development—in energy, food, urbanisation, climate resilience, and other sectors—will therefore become crucial new institutions in the years ahead" (Vol 379, June 9, 2012, http:// www.thelancet.com).

What is at stake for most people who understand the risks with climate change is not the desirability of decarbonisation in some form or another. The crux of the matter is: How to promote decarbonisation so that real life outcomes—socio-economic development-come about?

One may come up with a wish list like SDG: s for how to save the Planet, but how likely is it that governments can or will embark upon them? The problem is the enormous size of energy transformation, the immense costs involved and the gaming strategies of the players involved. Proposals for a turn to huge solar and wind plants, for massive carbon sequestration, for huge carbon sucking schemes, for total elimination of coal, for the

electrification of billion cars, for giving up cow meat, etc., are launched from time to time. But however important such innovations are, they cannot realistically solve the energy-emission conundrum. How are all the new demands for electricity to be supplied? Who pays for huge wind and solar plants? And what to do when the sun does not shine or the wind is calm? South Asia can only make a huge transition, if supported massively from the planned Super Fund.

What India, Pakistan, Bangladesh and Sri Lanka needs urgently is not the utopian plan for all the SDG: s, but quick assistance to reduce all forms of coal, stone and wood, in favour of modern renewables and atomic power as well as to improve efficiency and cleanness in transportation.

9. Conclusion

Ominously, the countries in South Asia and its neighbours above have upward sloping GDP-CO2 (GHG) curves and rely much upon coal (stone and wood), oil and gas.

South Asia and its neighbouring countries are engaged in a struggle for catch-up, meaning reducing the income and wealth gap to the mature economies in the world, just like the Asian miracles have achieved recently. But there is a cost to be paid, namely the environment in general and the carbon or GHG emissions in particular. The Kaya model entails that carbon emissions explode with GDP growth and population size. This is exactly the overall predicament of South Asia and its neighbours.

Since these countries count so heavily globally speaking, the overall picture in Figure 27 is the same, i.e., upward sloping GDP-COP link.

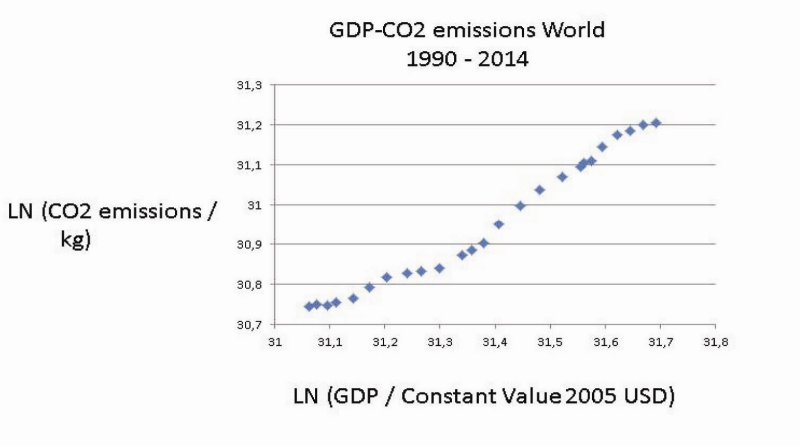

Figure 27. y=0,79x+5,96; R^2=0,97

If climate change goes out of hand, the consequences for these countries will be dramatic on the negative side. They must participate fully in the COP21 project, receiving massive support from the promised Super Fund.

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