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The Cop21 Project And Third World Countries: Emissions, Energy And Development

Jan-Erik Lane
Fellow with the Public Policy Institute in Belgrade, Serbia
Address: 10 Charles Humbert, 1205 Geneva

Abstract

Time has come for the governments of the world that signed the COP21 Agreement to deliver on their pr0mises of decarbonisation (Goals I-III). However, the implementation of the COP21 objectives requires a much greater effort and many more resources that hitherto claimed for the Super Fund. The role of the Third World countries is critical for the success of the COP21 project, but most of them have little preparedness for a major decarbonisation. This paper surveys the emission-energy predicaments of different kinds of Third World countries.dvdsf

Keywords: decarbonisation, GDP-GHG(CO2) links, energy consumption mix, BRICS, "catch-up" countries, poor Third World countries.

INTRODUCTION

It is often stated that many of the negative effects of global warming will fall upon the so-called Third World countries. They have thus a great interest in taking action against climate change. But they worry that any counter measures will reduce economic and social development. Reducing greenhouse gases requires energy transformation, which is not only costly but may diminish economic growth, making these countries even more poor, comparatively.

As most countries have now ratified the COP21 Agreement, Third world nations share the common obligation to start implementing COP21. Talking is cheap, but performing and delivering outcomes is hard and costly. Although, the CO21 project emphasizes decentralized implementation, there will have to be international governance, controlling that actions are taken to promote the three CO21 objectives, namely:

- Goal I: start decreasing the CO2:s:
- Goal II: reduce the CO2:s by 40 per cent until 030:
- Goal III: move towards complete decarbonisation after 2050.

Are these goals achievable by Third World countries? Let us look at a few of the major ones in this paper.

Among the Third World countries, the focus must be on those with state stability. The countries in anarchy and anomie can not deliver policies that promote the COP21 goals. Countries with huge total GHG:s tend to have large populations and experiencing a certain level of economic growth. Let us focus upon the so-called emerging economies, some of the BRICS but also describe the predicament for a few of the poor but stable Third World countries.

THEORY

One should distinguish between general environmentalism as a deep concern for the degradation of Mother Earth on the one hand and global warming on the other hand. The extent to which the global environment is declining in value has been a much debated topic between the so-called cornucopians (Simon) and the ecologists (Ehrslichs), the former accusing the latter of exaggeration. It is true that plastics are more and more to be found in the oceans, that oil spills have destroyed deltas in Nigeria and water resources in the interior of the Amazons. The endangered species diminish in number every day and overfishing is rampant around the globe. Lakes shrink in many places and rivers become polluted, like in the former USSR, Africa and China. Yet, global warming poses a different set of threats to especially Third world countries. Here, we have:

- Unsupportable heat for outside workers and farmers;
- Unlimited use of air conditioning despite polluting;
- Droughts on a large scale killing children and increasing poverty;
- The acidification and warming of oceans destroying fish and food;
- The reduction of glaciers causing water shortages;
- The rise of sea levers, overtaking land masses;
- Heat increase affecting agriculture and thus food supply negatively.

The outcome of global warming constitutes a direct threat to the survival of mankind at the present level of life condition. It will first hit the Third World. Thus, these countries have incentives to combat climate change. But the crux of the matter is that they also wish to have socio-economic development in order to "catch-up" with the advanced countries. To do that they need energy, but energy from fossil fuels and wood is the main cause of the anthropogenic global warming. The dilemma of the Third World countries is terrible: How to decarbonize and yet have more energy?

In the so-called Kaya approach to the explanation of carbon emissions, their growth and country variation, the literature targets the following determinants: population, GDP per capita, energy intensity of GDP as well as carbon intensity of energy. Here, we focus upon total GDP as well as the type of energy employed in the making of the GDP in a wide sense, including households.

Consider now Figure 1.

Figure 1. GHG and total GDP globally

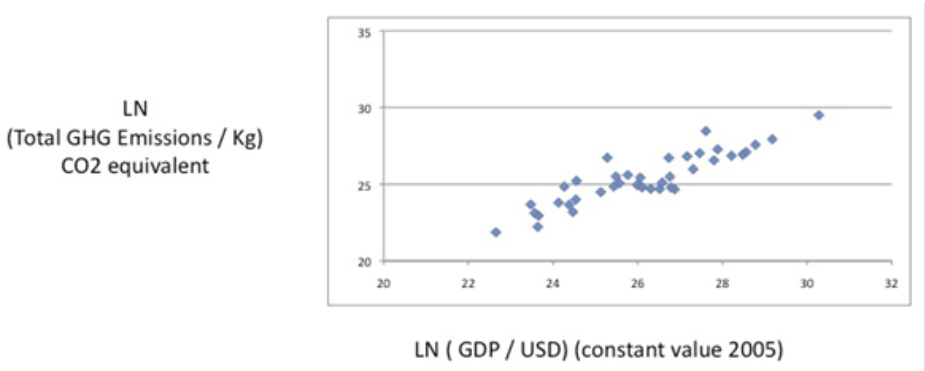
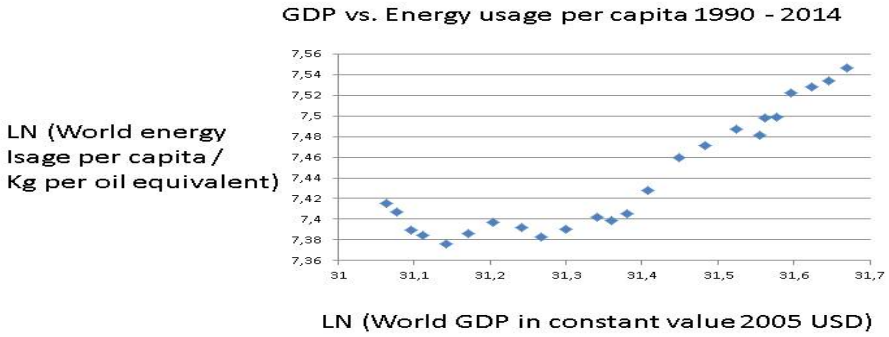


Figure 1 shows that total GHG:s go with larger total GDP. To make the dilemma of energy versus emissions even worse, we show in Figure 2 that GDP increase with the augmentation of energy per capita. Decarbonisation is the promise to undo these dismal links by making GDP and energy consumption rely upon carbon neutral energy resources, like modern renewables and atomic energy.

Figure 2.



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>,

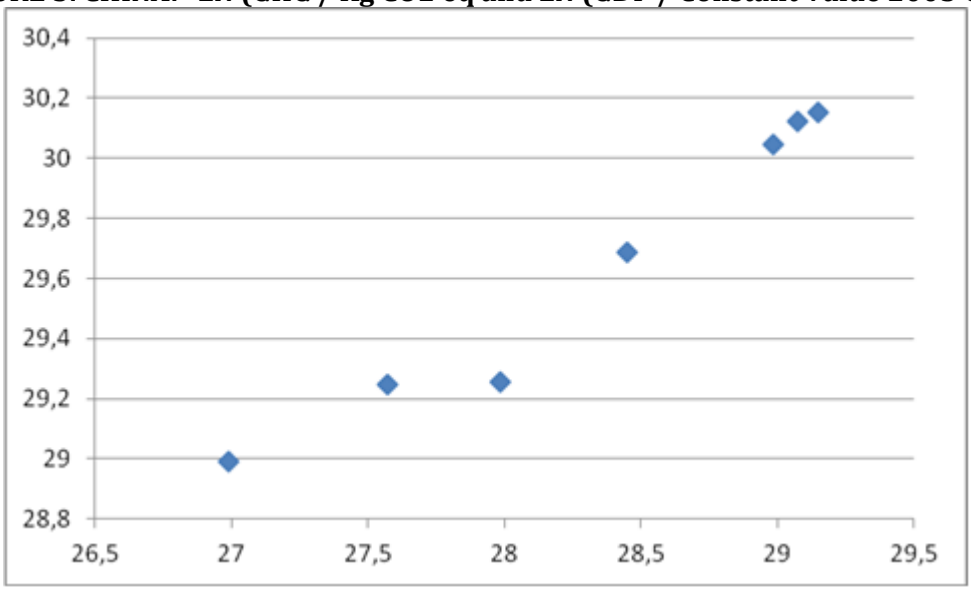
as a model of the decarbonisation feasibility in some Third World countries, to be analysed below, following the so-called "Kaya" model. The first concept taps the feasibility of Goal I: halting the growth of GHG:s or CO2:s, whereas the other concepts targets the role of fossil fuels and wood coal like 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.

EMPIRICAL FINDINGS

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 emissions are the largest in the world, totally speaking (Figure 3).

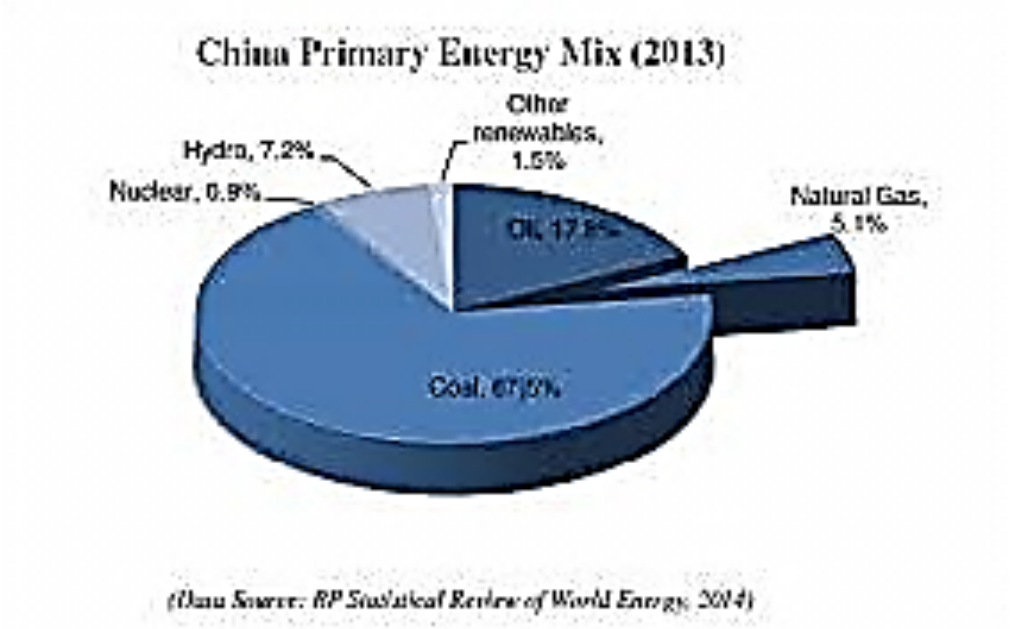
FIGURE 3. CHINA: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



Note: GHG = y-axis, GDP = x-axis

The sharp increase in GHG:s in China reflects not only the immensely rapid industrialization and urbanization of the last 30 years, but also its problematic energy mix (Figure 4).

FIGURE 4.



(Data Source: BP Statistical Review of World Energy, 2014)

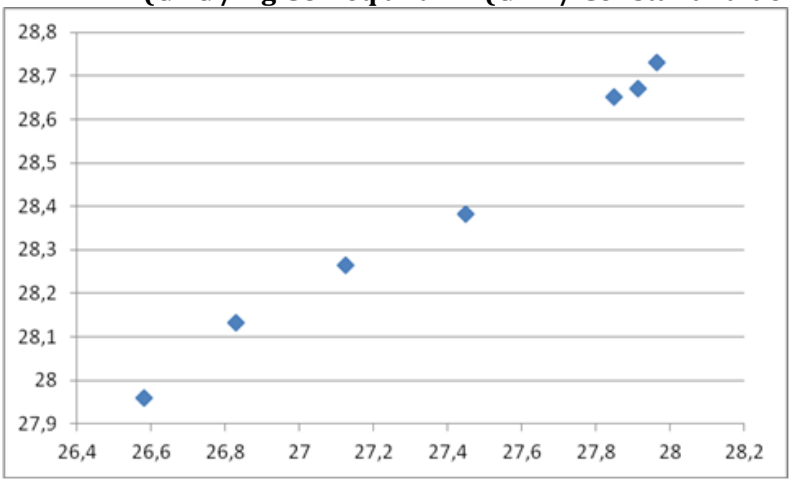
Almost 70 per cent of the energy consumption comes from the burning of coal with an additional 20 per cent from other fossil fuels. The role of nuclear, hydro and other renewable energy sources is small indeed, despite new investments. This makes China very vulnerable to demands for cutting GHG emissions: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

India will certainly appeal to the same problematic, namely per capita or aggregate emissions. The country is even more negative than China to cut GHG emissions, as it is in an earlier stage of industrialization and urbanization. Figure 5 shows the close connection between emissions and GDP for this giant nation.

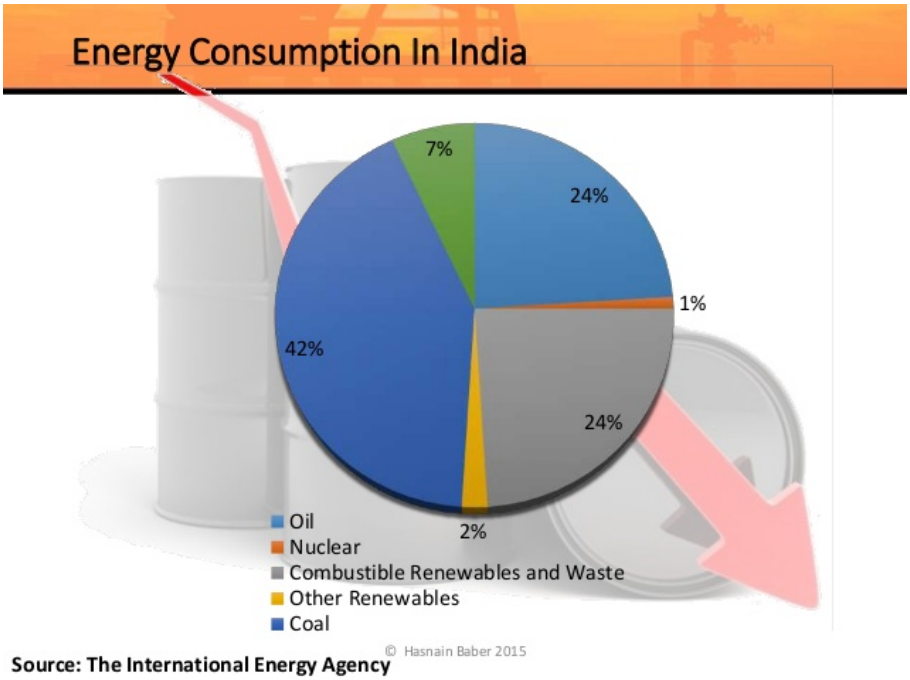
FIGURE 5. INDIA: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



Note: GHG = y-axis, GDP = x-axis

India needs cheap energy for its industries, transportation and heating (Figure 6) 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 6 shows its energy mix where renewables play a bigger role than in China.

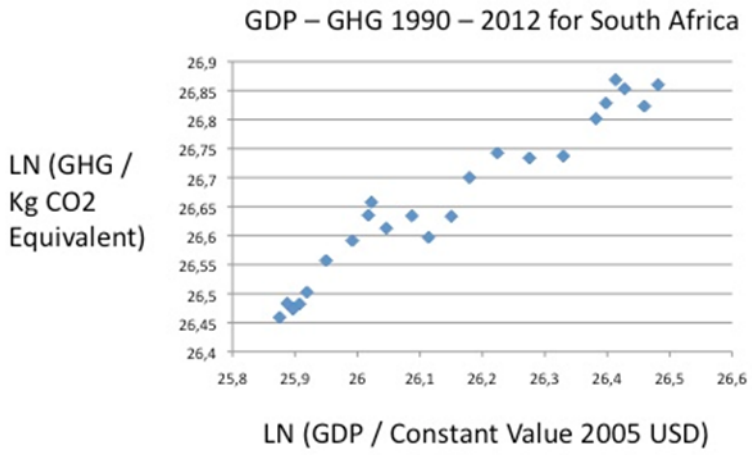
FIGURE 6.



Source: The International Energy Agency

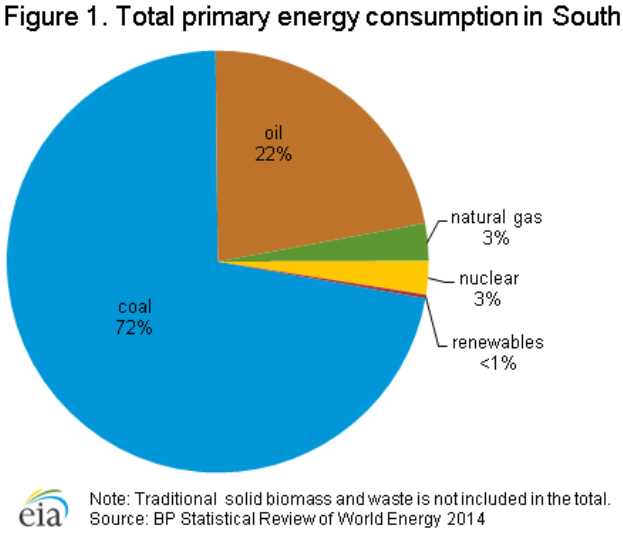
India needs especially electricity, as 300 million inhabitants lack access to it. The country is heavily dependent upon fossil fuels (70 per cent), although to a less extent than China. Electricity can be generated by hydro power and nuclear power, both of which India employs. Yet, global warming reduces the capacity of hydro power and nuclear power meets with political resistance. Interestingly, India uses much biomass and waste for electricity production, which does not always reduce GHG emissions. India's energy policy will be closely watched by other governments and NGO:s after 2018.

FIGURE 7. SOUTH AFRICA: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD) Emissions are high in the RSA, because South Africa uses a lot of coal to generate electricity (Figure 7). Decarbonisation will be difficult and costly.



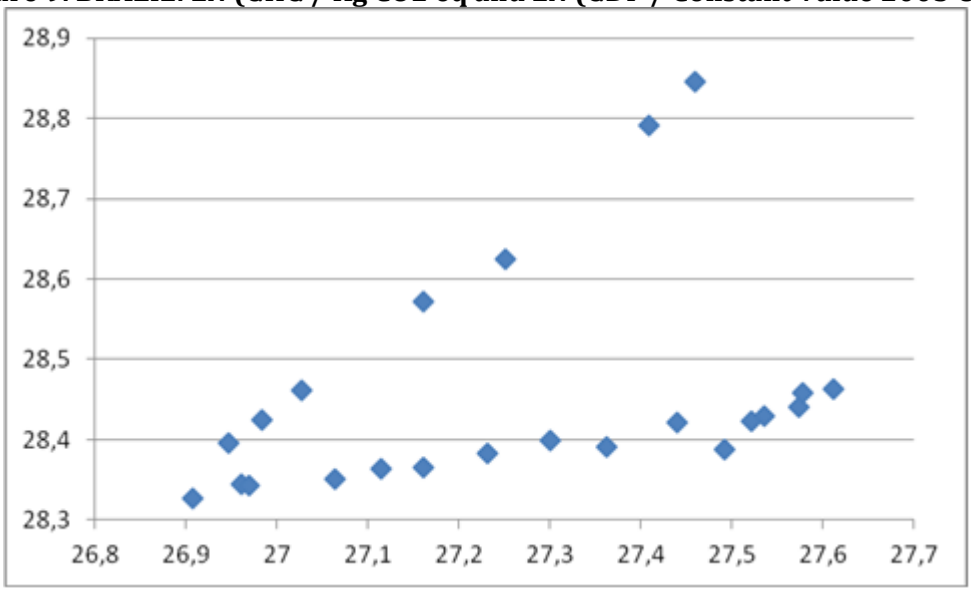
The reliance upon coal in this large economy in Africa is stunningly high (Figure 8). No wonder that the RSA has started to look for shale oil and gas.

FIGURE 8.



Let us look at the ethanol country par preference: Brazil. Figure 9 shows a considerable drop in total emissions, but it is followed by huge increases that tend to flatten out.

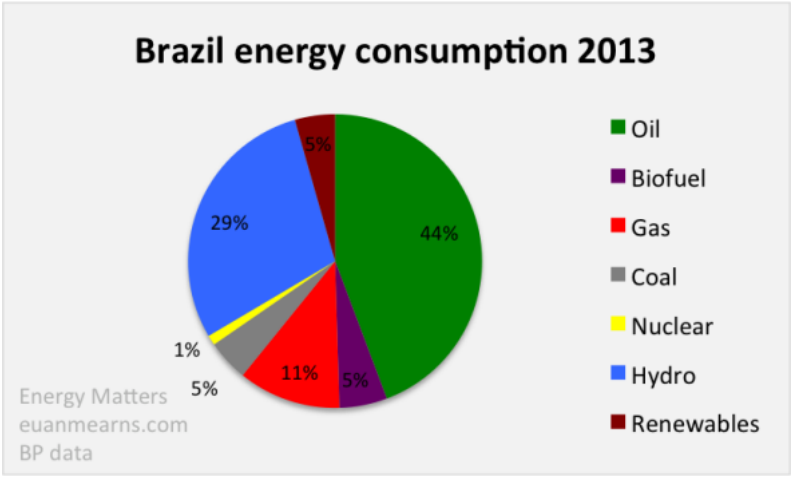
Figure 9. BRAZIL: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



Note: GHG = y-axis, GDP = x-axis

Brazil employs the most biomass in the world, but the emissions stay at a high level, which is a reminder that renewables may also have GHG:s. One advantage for Brazil is the large component of hydro power, but the overall picture for the largest Latin American country is not wholly promising when it comes to reduction of emissions. Global warming reduces the potential of hydro power, and Brazil has very little nuclear power (Figure 10).

FIGURE 10.

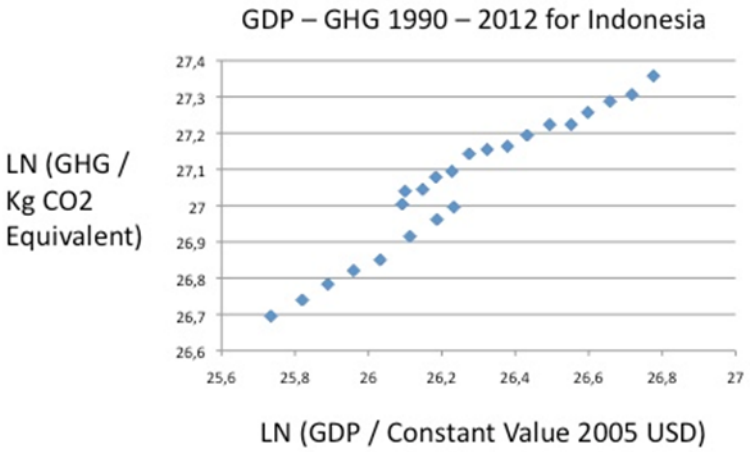


Summing Up: The BRIC:s have huge GHG:s emissions, following their push to "catch up" quickly. Just to meet GOAL I in COP21, they have to make great changes. I doubt whether India will ever comply with any CP21 objectives, given their emphasis upon development and electrification. Both Brazil and the RSA lag behind. To help the BRIC:s comply with COP21, the Super Fund may provide much needed financial assistance, especially for India, Brazil and South Africa.

MORE "CATH-UP" COUNTRIES

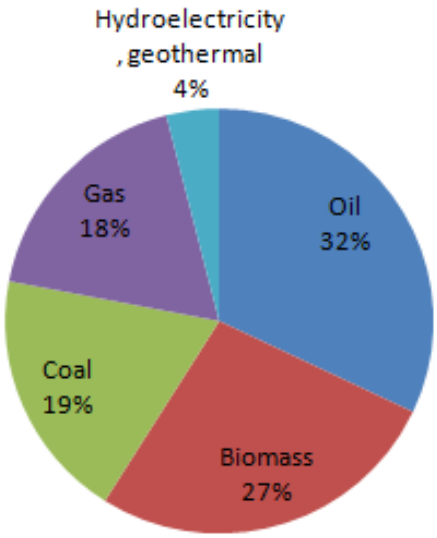
One may guess correctly that countries that try hard to "catch-up" will have increasing emissions. This was true of China and India. Let us look at three more examples, like e.g. giant Indonesia – now the fourth largest emitter of GHG:s in the world (Figure 11).

Figure 11. INDONESIA: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



Indonesia is a coming giant, both economically and sadly in terms of pollution. Figure 11 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 12 presents the energy mix for this huge country in terms of population and territory.

FIGURE 12. (http://missrifka.com/energy-issue/recent-energy-status-in-indonesia.html)

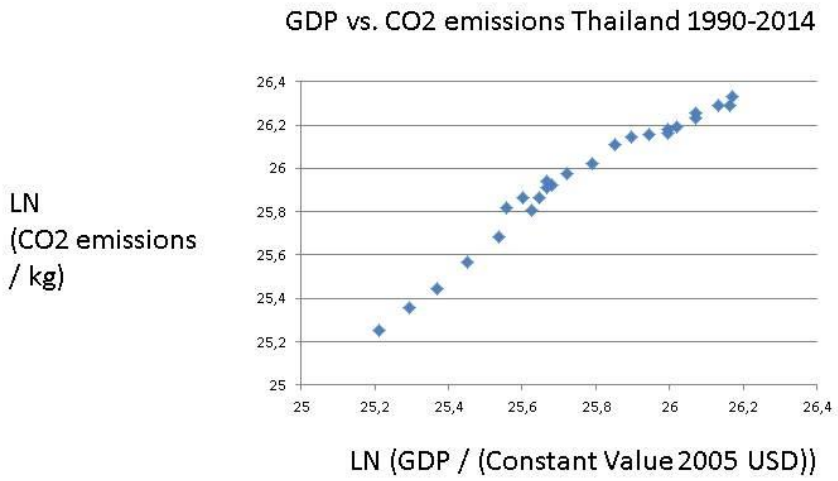


Distribution of Energy Consumption in Indonesia in 2009

Only 4 per cent comes from hydro power with 70 per cent from fossil fuels and the remaining 27 per cent from biomass, which alas also pollutes.

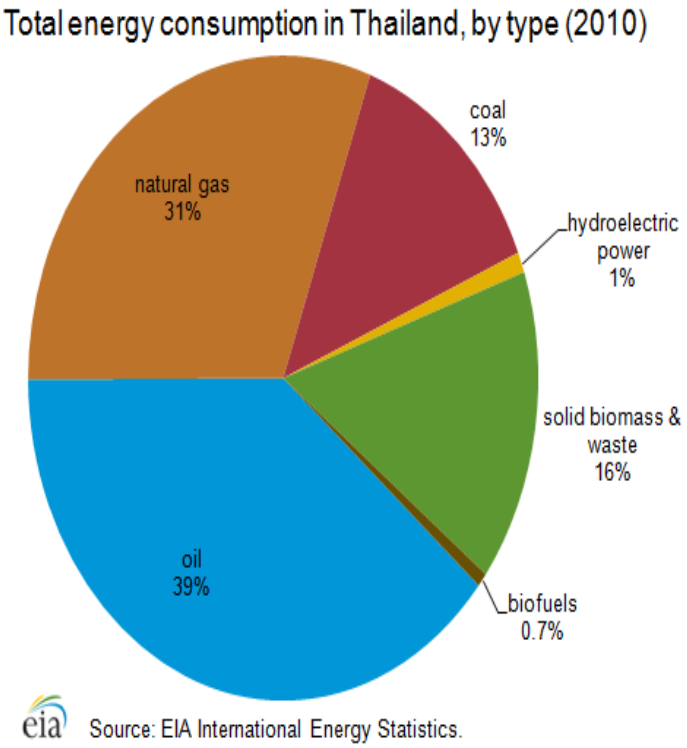
One may guess correctly that countries that try hard to "catch-up" will have increasing emissions. This was true of China and India. Let us look at three more examples: Thailand, Malaysia and Iran – all emerging economies. Figure 13 begins with Thailand that has become a major car producer.

FIGURE 13. Thailand ($y = 1,07x$, $R^2 = 0,96$)



The CO2 emissions in Thailand are quite high, reflecting the economic advances in South East Asia. The trend is up and up. Can it be reversed without serious economic impact? Figure 5 shows the energy mix of this dynamic country, economically.

FIGURE 14.

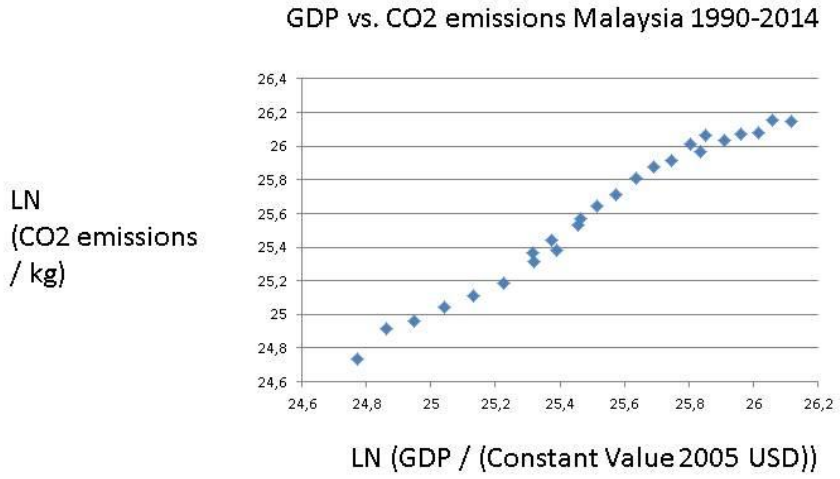


The reliance upon fossil fuels is high, or over 80% of energy consumption coming from the burning of coal, oil and natural gas. Hydro power is marginal, but bio-energy plays a major role, but it is really not carbon neutral. Thailand needs to come up with far-reaching reforms of its energy sector in order to comply with COP21 objectives.

Malaysia

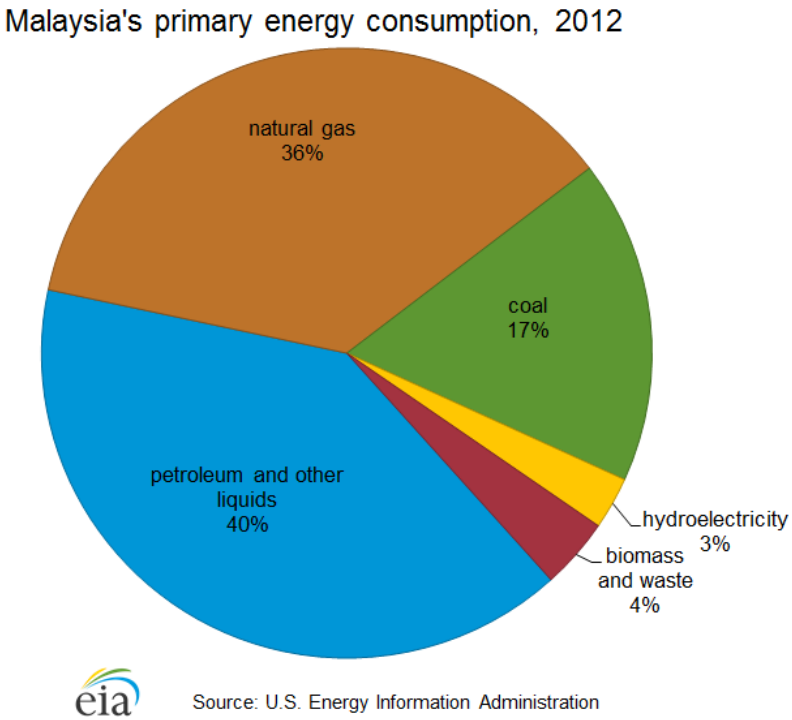
The overall situation – fossil fuels dependency – is the same for Malaysia as for Thailand. And the CO2:s are high, following the GDP trend (Figure 15).

FIGURE 15. Malaysia ($y = 1{,}13x$; $R^2 = 0{,}98$)



Yet, Malaysia employs energy of a very mixed bag (Figure 16), but still its emissions augment in line with economic development. There may be a planning out of the growth trend in emissions recently, but Malaysia use very little of carbon neutral energy sources. There is hydro power, but the country must move to solar and wind power rapidly.

FIGURE 16.

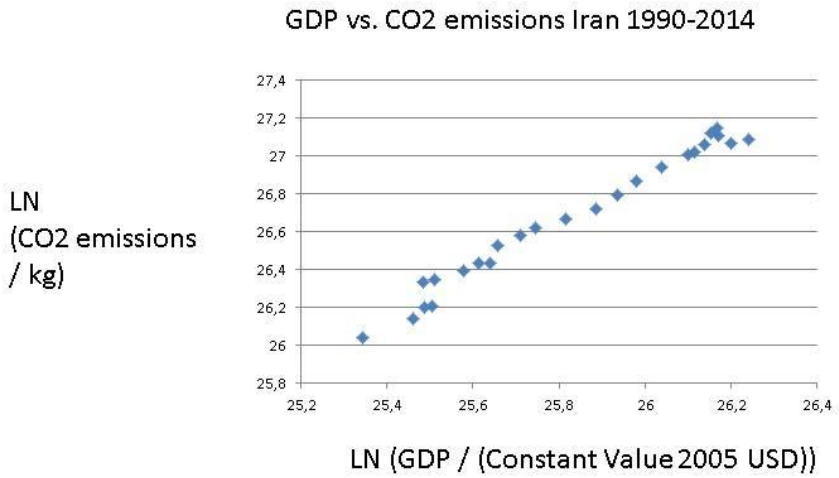


Renewables are not a major element in the energy consumption mix of Malaysia, as fossil fuels dominate, but not coal luckily.

Iran

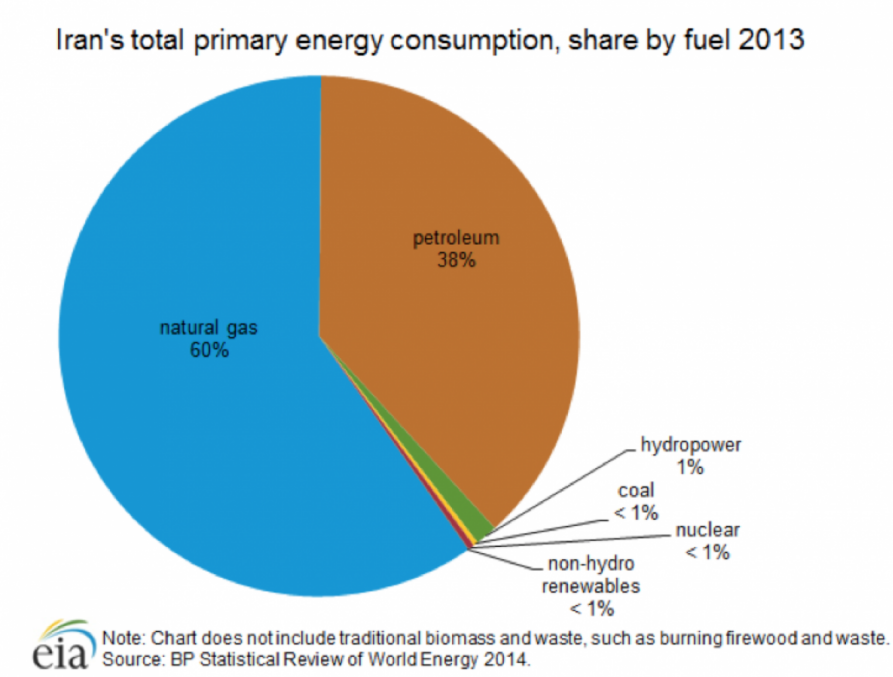
Countries may rely upon petroleum and gas mainly – see Iran (Figure 17). CO2 emissions have generally followed economic development in this giant country, although there seems to be a planning out recently, perhaps due to the international sanctions against its economy.

FIGURE 17. Iran: GDP-CO2 ($y = 1,2229x - 4,91$; $R^2 = 0,98$)



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 18).

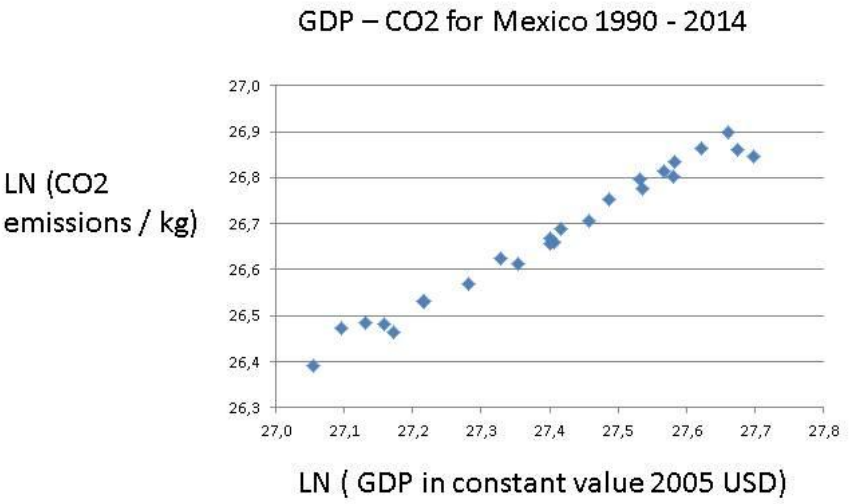
FIGURE 18. Iran: Energy mix



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.

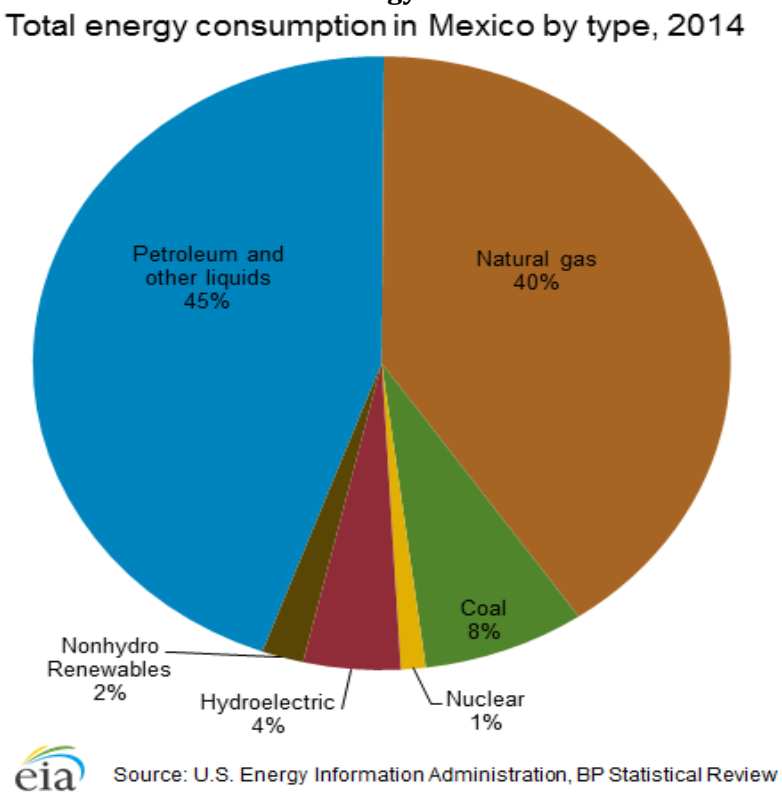
One would expect to find huge CO2 emissions in this large emerging economy with lots of oil production. Countries like the Gulf States have massive CO2:s because they drill and refine oil and natural gas. For Mexico holds the following situation (Figure 19).

Figure 19. GDP-CO2 in Mexico (y = 0,77x; R^2 = 0,98)



The close link between economic development and CO2 is discernable in the data, but the emissions growth seems to stagnate in the last years. This is of course a promising sign, whether it is the start of a COP21 inspired 40% reduction in CO2:s remains to be seen. I doubt so, but let us enquire into the energy mix of this huge country that is of enormous economic importance to both North and South America.

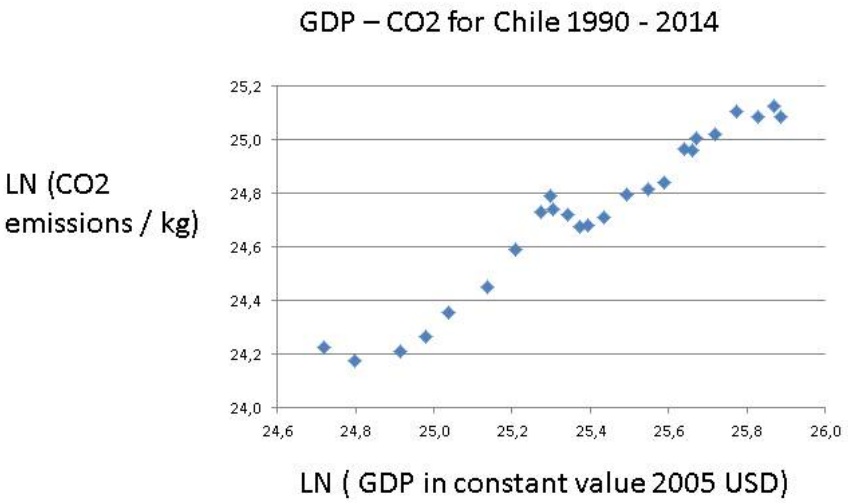
FIGURE 20. Energy mix for Mexico



Few countries are so dependent upon fossil fuels as Mexico (Figure 20). One find the same patter with the oil exporting Gulf States. The Mexican government must start now to reduce this dependency, by for instance eliminating coal and bringing down petroleum, instead betting upon solar, wind and nuclear power. Mexico will face severe difficulties with the 40% reduction target in COP21. It has a fast growing population with many in poverty and an expanding industry sucking electricity. Can economic growth and decarbonisation go together here?

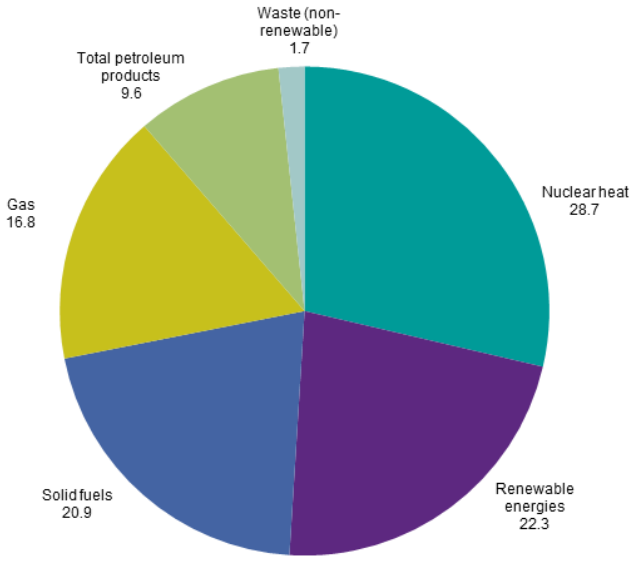
Figure 21 indicates that Chile, perhaps more advanced that the others, has managed to halt its yearly increases of CO2:s.

FIGURE 21. GDP-CO2 in Chile: y = 0,88x R^2 = 0,95



One should emphasize that CO2 emissions are big in this country with an advanced economy and lots of mining. And they have followed the rate of economic growth for a number of years, just to stall recently. One reason for the halting of these emissions is the successful turn to massive solar power in the large mining fields in the North, at high altitudes in the Andes with plenty of sun. Yet, also Chile needs fossil fuels – see Figure 22.

FIGURE 22. Energy consumption in Chile

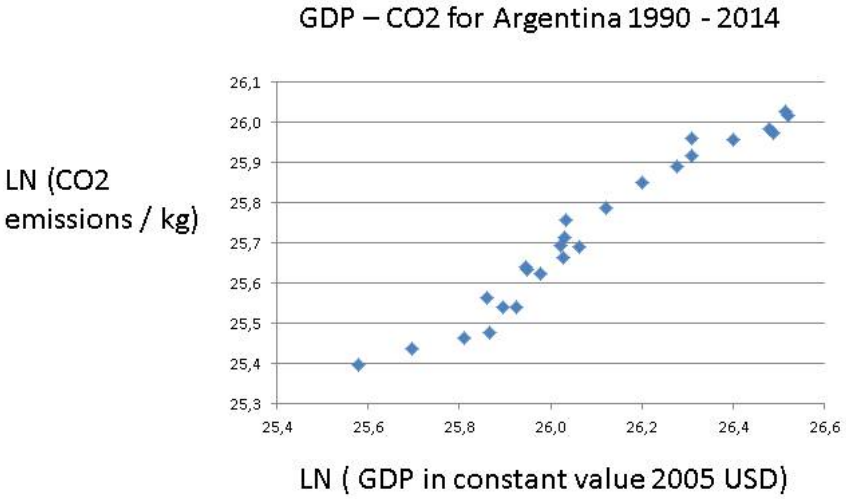


Source: Primary_energy_production_of_non renewable_and_renewable_sources,_shares_by_product,_EU-28,_2012.png (553 × 480 pixels, file size: 17 KB, MIME type: image/png)

Although Chile has diversified considerably towards renewables and nuclear power, it still relies to more than 50% upon fossil fuels, coal, natural gas and petroleum. However, it possess the technology for augmenting the share of renewables and atomic power. And hydro power is essential for Chile, which is also true of Colombia, Equador and Honduras.

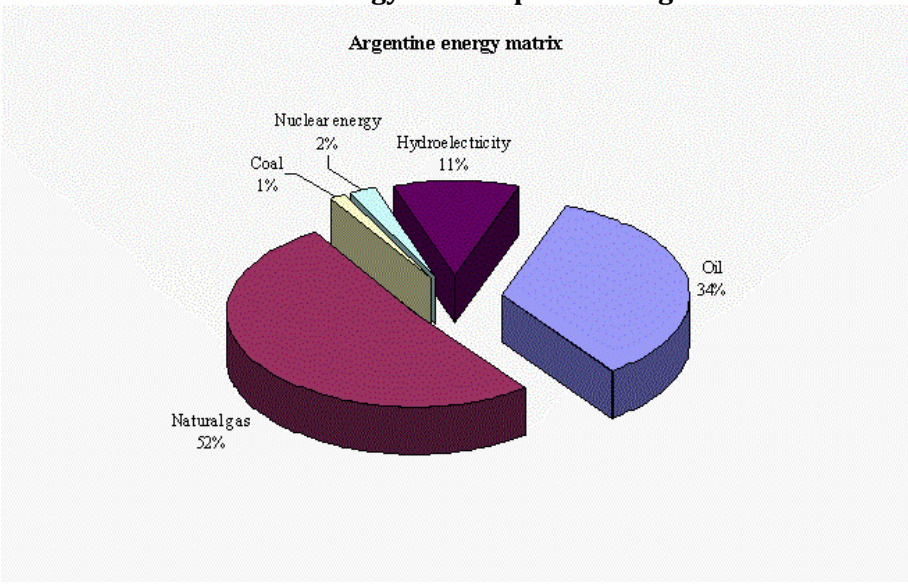
Although Argentina has had a volatile raid economically, it keeps expansing its CO2 emissions as a function of GDP. Figure 23 shows a smoth linear growth trend between GDP and CO2:s for the last 24 years, exceptfor the years of the economic collapse.

FIGURE 23. Argentina's GDP-CO2 link: y = 0,7409x R^2 = 0,96.



Now, what is the energy mix behind this increase in CO2:s that is quite substantial? Figure 24 has the answer.

FIGURE 24. Energy consumption in Argentina



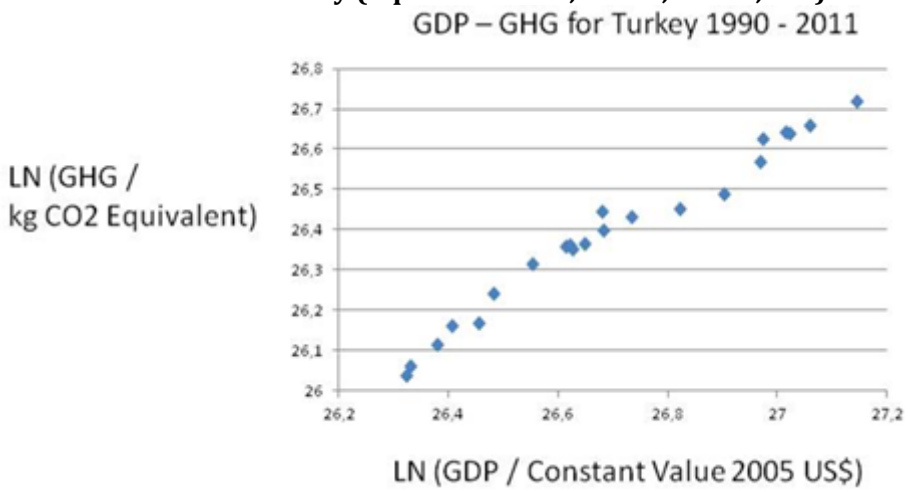
Source: BP Statistical Review of World Press (information corresponding to 2011)

Argentina depends to more than 85% on fossil fuels, but it is not coal that figures prominently in this energy mix but natural gas. This reminds of Qatar and Iran. Natural gas is better for halting global warming than coal, on the condition that it does not leak out before burning. But there is bound to occur leakages.

Argentina disposes of hydro power, but the snow over the Andes is diminishing just as the glaciers are melting fast. The country needs to turn to solar power or nuclear power in order to accomplish the promised 40% reduction with COP21.

Turkey has become a heavy-weight in the Asia Minor thanks to a rapid economic development of the country with huge population. Figure 25 supports this picture of Turkey as no longer a poor developing country. Comparing the picture for Turkey with that of "catch-up" nations, one may state that Turkey has the typical GDP-GHG link, despite lots of hydro power. 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 25. Turkey (Equation: Y = 0,7837x; R^2 = 0,972)

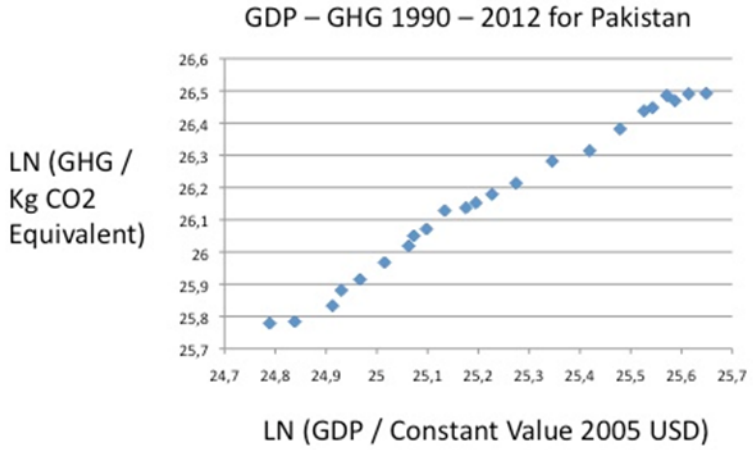


To sum up: The trend for GHG emissions is up in all these countries except perhaps Chile. Thus, Goal I is in danger here. And fulfilment of Goal II will require fundamental transformations of energy consumption, which will be extremely costly, unless financed by the Super Fund.

SOME POOR BIG THIRD WORLD COUNTRIES

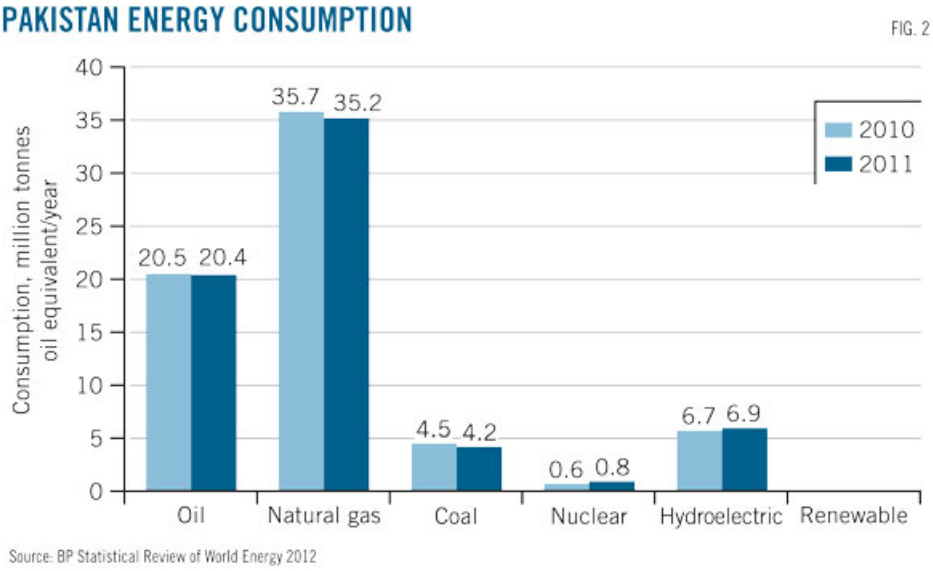
The same upward trend for emissions holds for another major developing country with huge population, namely Pakistan (Figure 26).

FIGURE 26. PAKISTAN: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



The amount of GHG emissions is rather large for Pakistan, viewed on aggregate. Pakistan is mainly reliant upon fossil fuels (Figure 27).

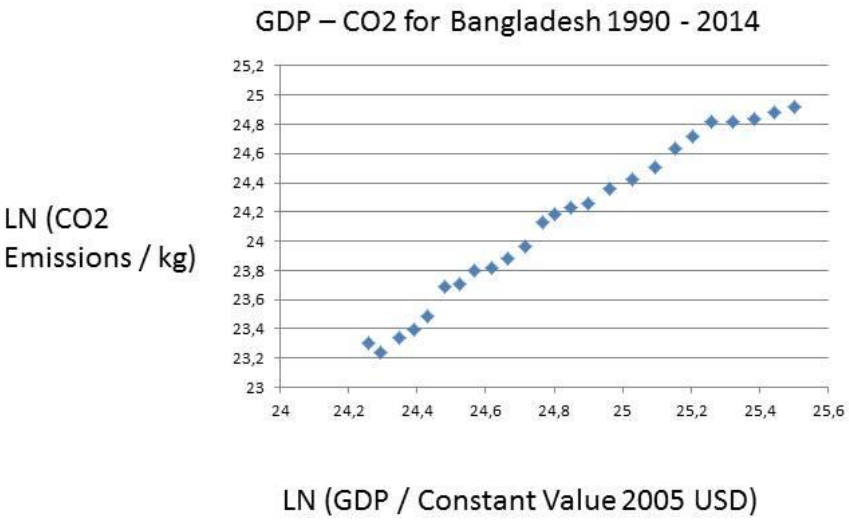
FIGURE 27.



But Pakistan employs a considerable portion of hydropower – 13 per cent – and a minor portion of nuclear power, which is a positive.

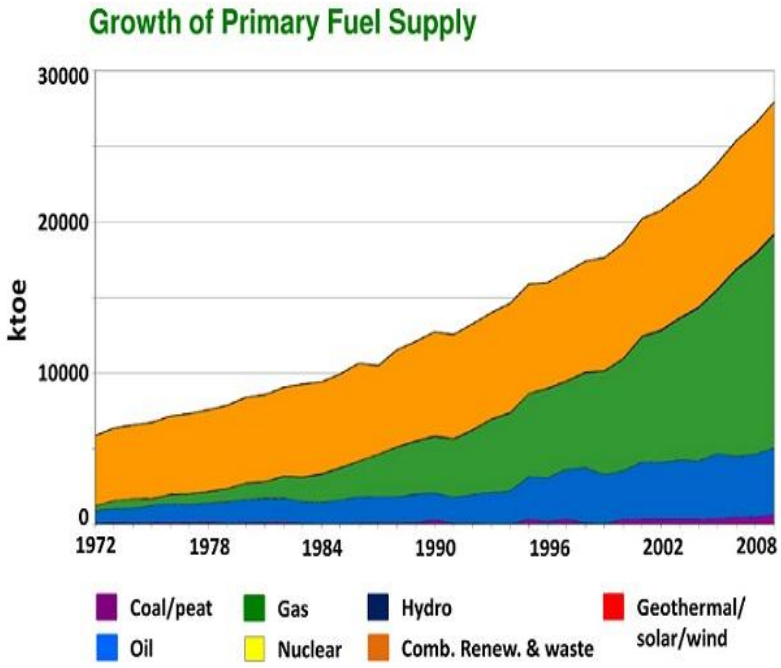
Moving on to another giant nation in South Asia, Bangladesh, we find an entirely different set of conditions for implementing COP21. Figure 28 shows that the major GHC of CO2:s follows economic development closely.

FIGURE 28. Bangladesh (y = 1,43x , R^2 = 0,98)



Yet energy consumption is based on a different energy mix, compared with for instance India. Figure 29 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.

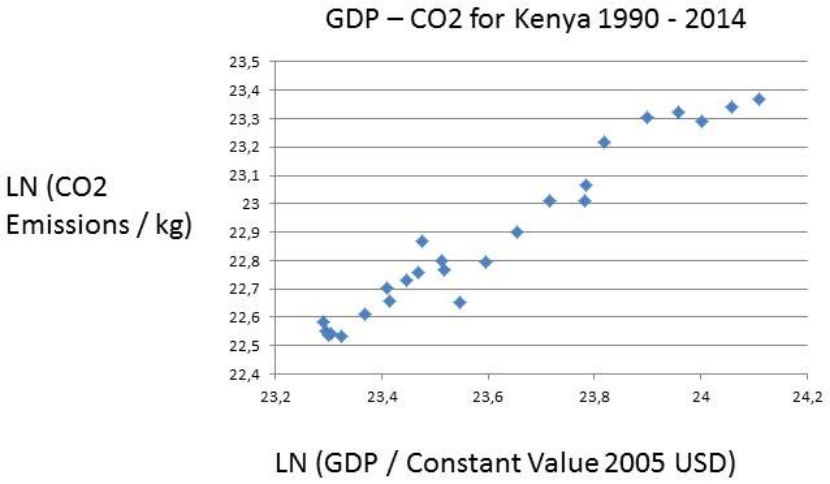
FIGURE 29.



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

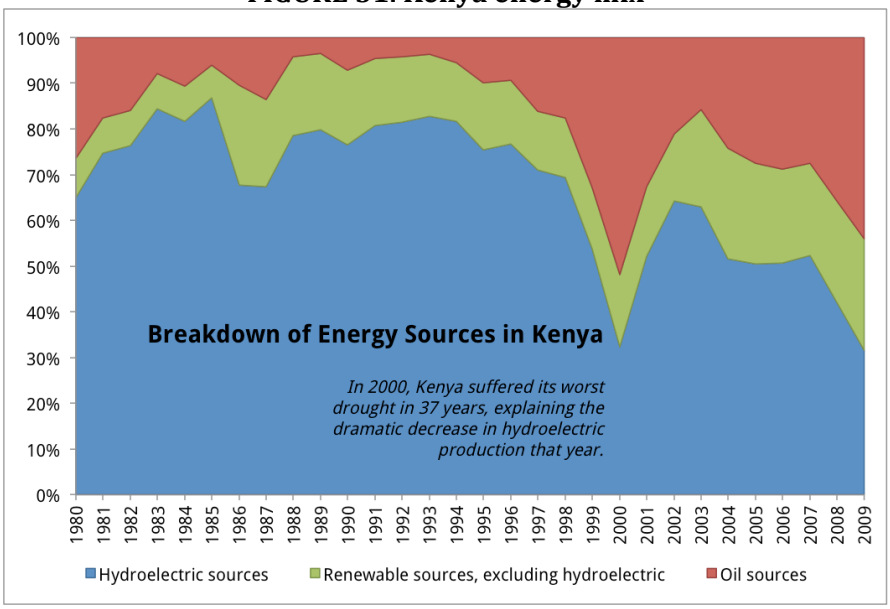
Look now at an African country, economically important Kenya in Figure 30.

FIGURE 30. Kenya: y = 1,08x, R^2 = 0,95



As a matter of fact, Kenya:s curve for GDP and CO2:s resembles that of another African country, namely Ghana, both countries experiencing economic progress. The basic energy resources are also the same: renewables, hydro and petroleum – see Figure 31.

FIGURE 31. Kenya energy mix

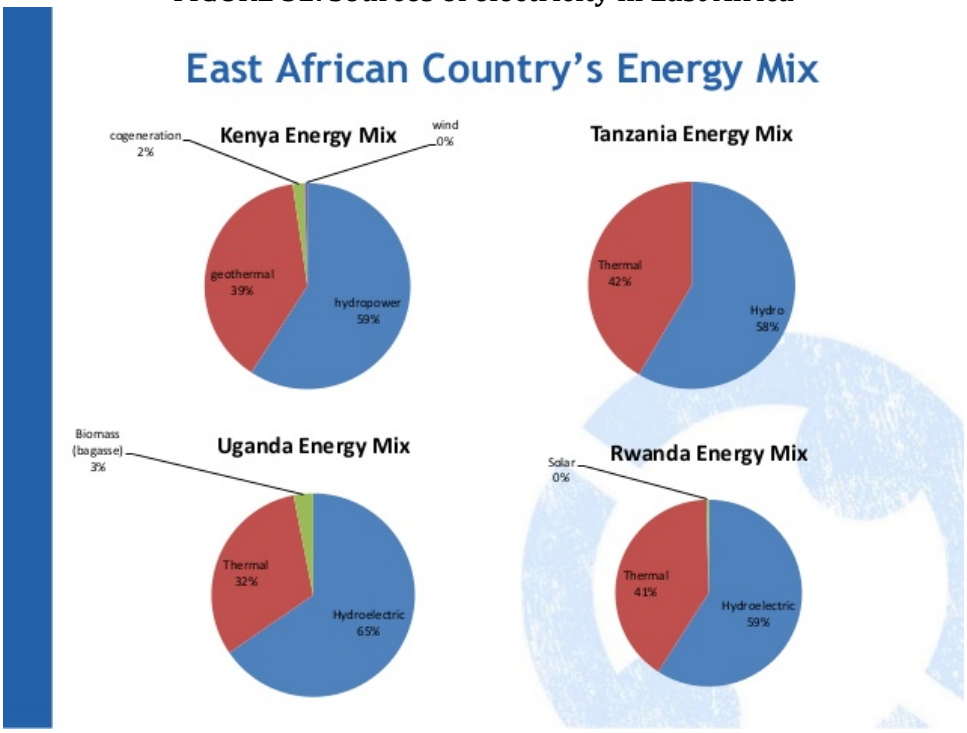


http://investeddevelopment.com/blog/2012/08/energy-in-kenya-and-the 6-potential-for-renewables/

However, these renewables are not all carbon neutral: charcoal and dung besides the normal renewables like solar, wind and thermal power.

One may expect that countries with the possession of big rivers resort to hydro power, like Senegal, Kongo, Angola and East African states. Figure 32 substantiates this observation by showing that hydro power matters for the generation of electricity in East Africa.

FIGURE 32. Sources of electricity in East Africa



Sources: http://www.slideshare.net/e4sv/12-smart-villages-energy-access-in-ea-summary

However, hydro power is nowhere dominant as general energy source. Many poor African nations employ traditional renewables that are far from carbon neutral. An example is the giant Democratic Republic of Congo, where wood and charcoal dominates very much. It is of course a matter of deforestation and desertification when wood and charcoal are used so heavily.

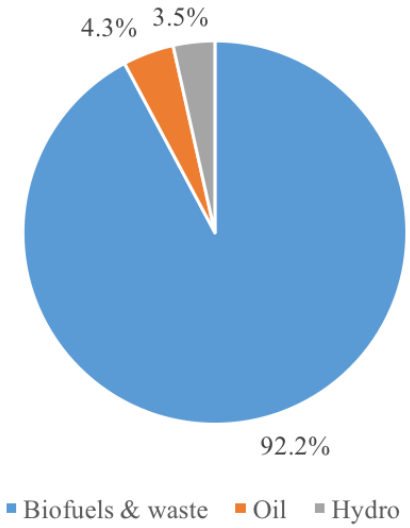
One may speculate as to what hydro power is not more used in several African countries. One reason has already been mentioned, anarchy. Another is of course the enormous investments costs. Hydro power should be more used in countries like Nigeria, Angola and Kongo. But it is not without risks, namely water shortages.

A general tenet in the climate change debate is that renewables should be preferred over non-renewables. Yet, this statement must be strictly modified, as there are two fundamentally different renewables:

- Traditional renewables: wood, charcoal, peat and dung. They are not carbon neutral. On the contrary, employing these renewables results in severe pollution, not only outside but also inside a household;
- New renewables: solar, wind, geo-thermal and wave energy that are indeed carbon neutral, at least at the stage of functioning.

In the poor African countries with about half the population in agriculture and small villages, traditional renewables constitute the major source of energy (Figure 33).

FIGURE 33. DR KONGO

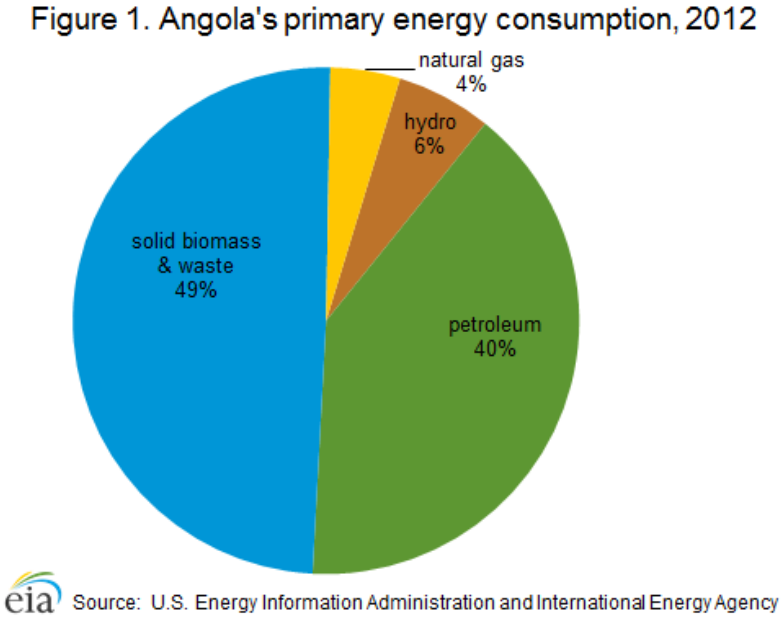


Source: Democratic Republic of Congo - Energy Outlook, Kungliga Tekniska Hoegskolan

One notes how little of hydro power has been turned into electricity in Kongo, but economic development and political instability, civil war and anarchy do not go together normally. At the same, one may argue that an extensive build-up of hydro power stations would pose a severe challenge to the fragile environment in the centre of Africa. Kongo can now move directly to modern renewables like solar power.

This enormous reliance upon traditional renewables is to be found also in Angola and Nigeria, although both have access to both hydro power and fossil fuels. Figure 34 describes the energy mix for Angola.

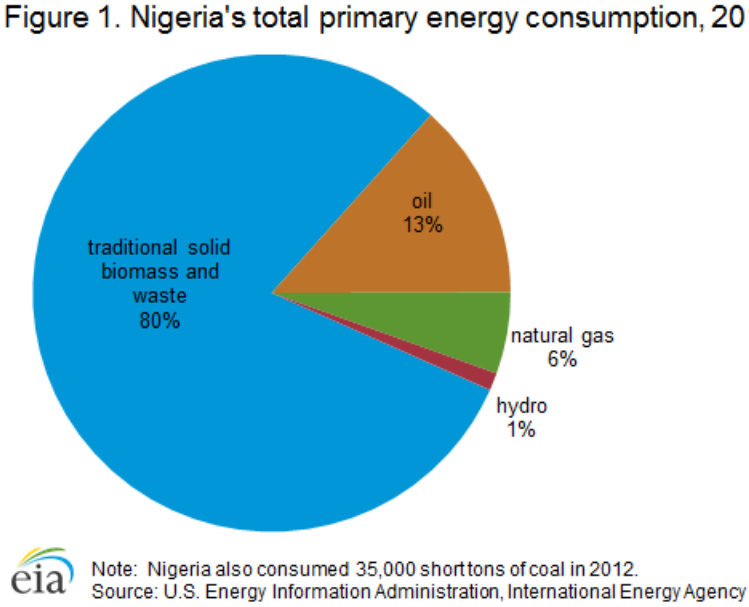
FIGURE 34.



Angola like Kongo has suffered from long and terrible civi war. In the mass of poor villages, energy comes from wood, charcoal and dung – all with negative environmental consequences. Angola has immense fossil fuels – oil and gas, but the political elite family may prefer to export

these resources instead of using them for electricity generation. Giant Nigeria has a resembling energy mix – see Figure 35.

FIGURE 35.



Nigeria would have to diminish the use of traditional renewables in order to meet the COP21 goals. The very same policy recommendation applies to two countries in the Nile valley, namely Sudan and Ethiopia – extremely poor countries relying mainly upon traditional renewables.

Surely, both Ethiopia and Sudan would want to utilise the great Nile river for their electricity consumption. However, Egypt wants to have a SAY over the energy planning of these two countries up the river. Thus, far many rounds of negotiations have resulted in the construction of only a few power plants, a few in Sudan (Merowe Dam, etc) and one another huge in Ethiopia – Grand Etiopian Renaissance Dam. The problem is the common pool of the Nile, where one country, Egypt, may find that the water level has shrunk too much for its own needs, electricity or irrigation. Actually, the risk of draughts is a real one for all countries trying to exploit the Nile.

Energy is an interesting aspect of Venezuela, which is now in turmois because of the lack of it, despite the immense oil and gas resources of this country. Just as with otheroil producing countries, one expects the CO2:s to be quite substantial. Figure 36 confirms this expectation, but one may note many yearly ups and downs. Why this link is not a smooth one may be explained both by the energy mix and the volatile politics of Venezuela.

FIGURE 36. GDP-CO2: y = 0,8739x R^2 = 0,8473

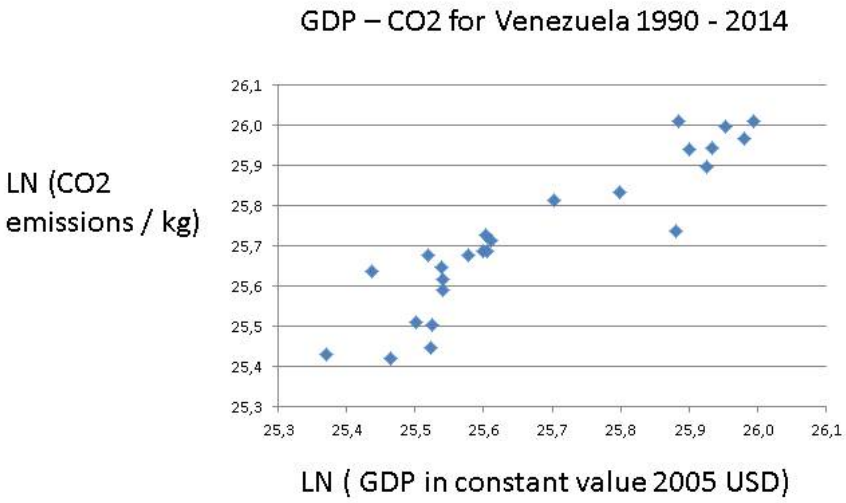
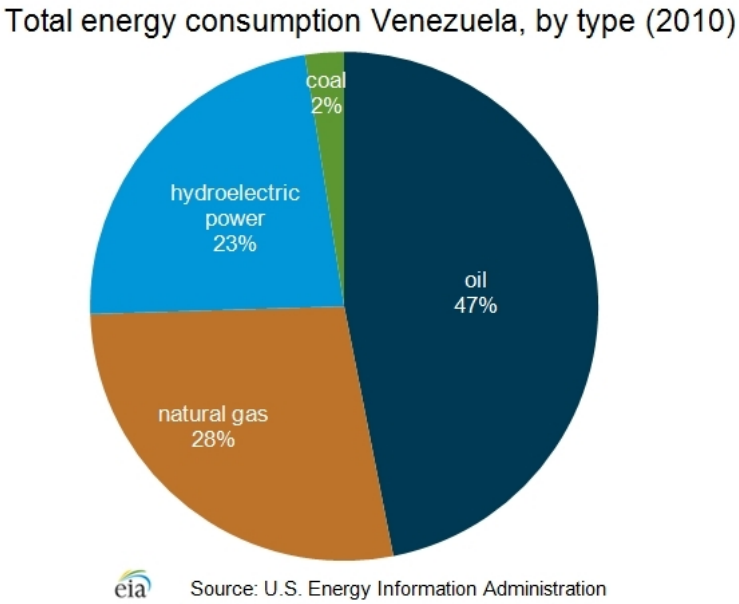
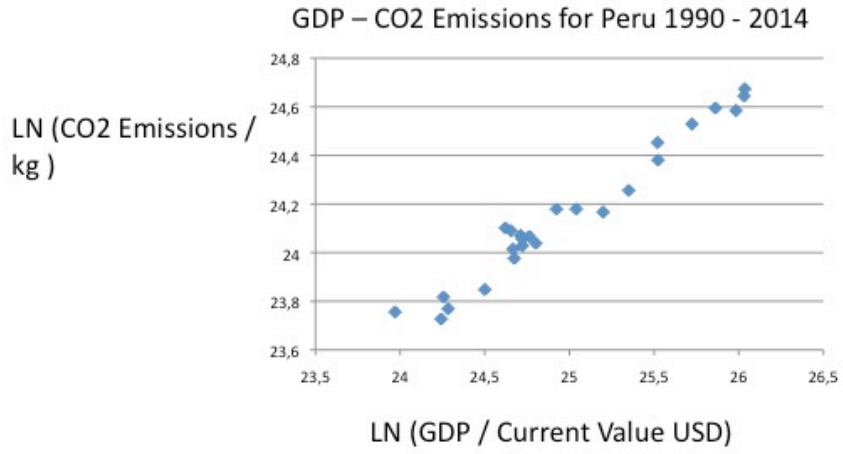


FIGURE 37. Venezuela energy



The dependency upon fossil fuels is high in Venezuela, but the country differens from Mexico in that it disposes of considerable hydro power. Typical of Latin America is that several countries make use of hydro power to mitigate their dependency upon fossil fuels, mainly oil and natural gas. In the case of Venezuela, it is the water resources that have failed, causing such electricity chaos, resulting in loss of output and work. Strangely, the Venezuelan government has not taken any steps towards precaution, building back up generators based upon its massive oil and gas reserves. Perhaps the hope of a totally carbon free society is an illusion: What happens when water dries up for instance? Peru has to consider this too (Figure 38).

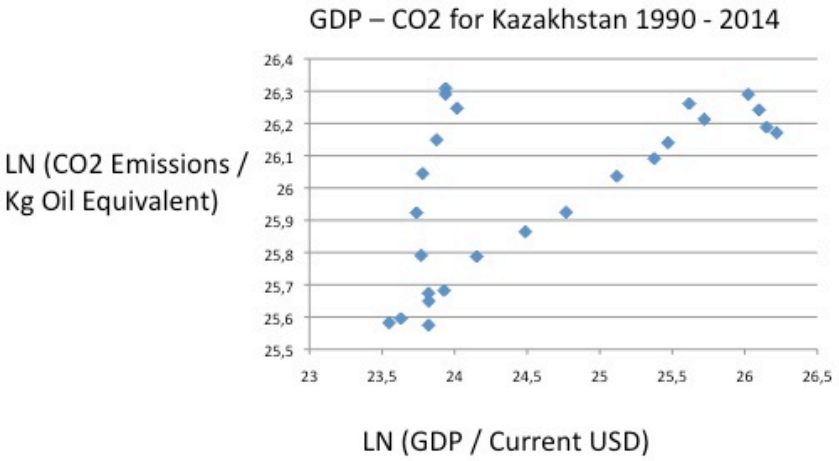
FIGURE 87. Peru (y = 0,47x; R^2 = 0,97)



Peru relies much upon hydro power, but still its emissions are just increasing. This por nation needs help from internatonal governance to change.

Also countries with no hydro power display increasing trends for emissions. Consider an oil and gas rich country in Asia (Figure 39).

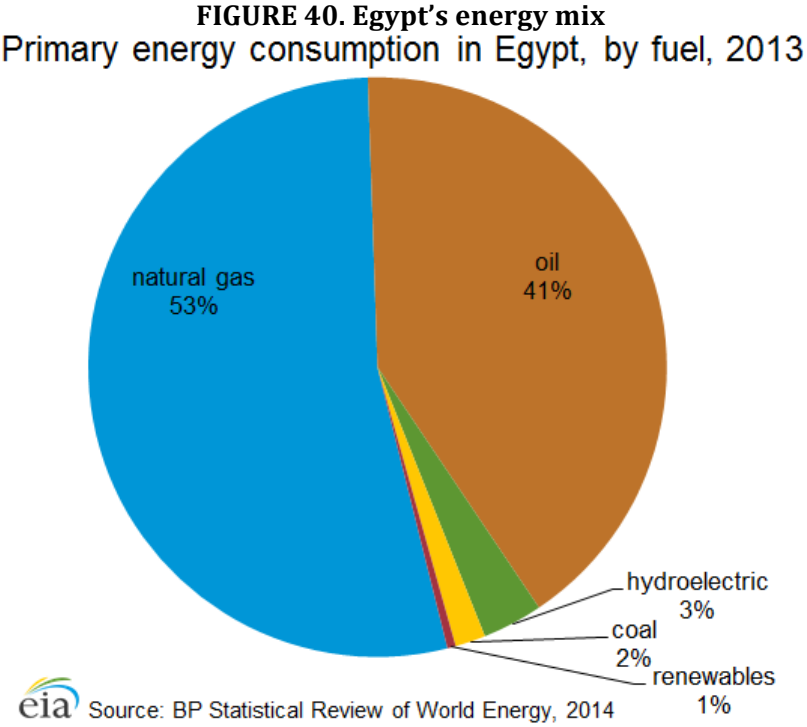
FIGURE 39 . Kazahkstan (y = 0,17; R^2 = 0,38)



Kazahkstan employs its vast fossil fuel resources for energy consumpton besides exporting a lost.

Now, Egypt has neither much hydro power or oil and gas assets, but the emission trend is clear. It has a huge population with high unemployment and mass poverty besides a certain level of political instability, resulting from religious conflicts. But surely it has electricity from inta giant Assuam dam and the Nile? No, it does not count for very much, where most people live in the Nile delta (Figure 40).

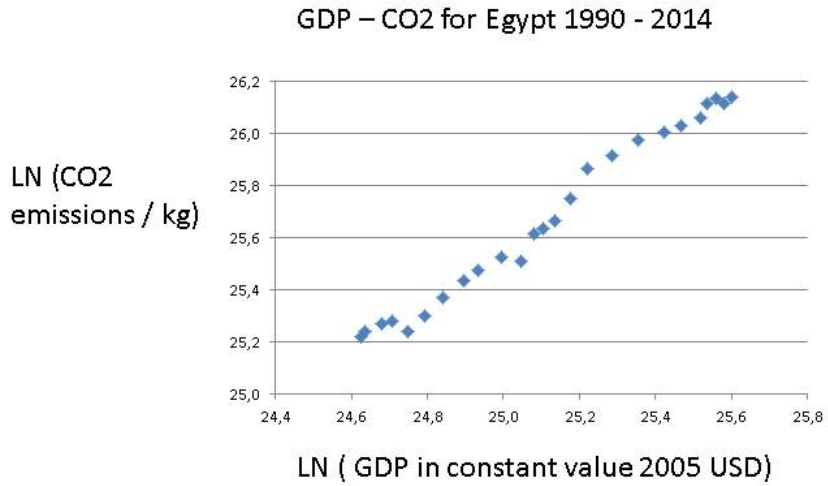
FIGURE 40. Egypt's energy mix



The share of hydro power is stunning low for a country with one of largets rivers in the world. Actuallu, the water of the Nile is the source of interstate confrontation between Egypt, Sudan and Ethiopia.

As Egypt relies upon fossil fuels, it has massive CO2 emissions, the trend of which follows its GDP (Figure 41).

FIGURE 41. GDP-CO2 for Egypt: y = 1,02x; R^2 = 0,99



It will be very difficult for Egypt to make the COP21 transformation, at least without massive external support. But where to build huge solar power plants in a country with terrorism, threat or actual?

Summing Up: Poor Third World countries are not major global polluters, neither totally or per capita, from the point of view of climate change, i.e. CO2:s. In terms of general environmental concerns, they are actually very polluting, displaying lots of litterings and chemical spills.

However, also these countries must comply with the COP21 objectives (Goal I-III). They need financial assistance from the Super Fund, as their emission trends are upwards without any doubt.

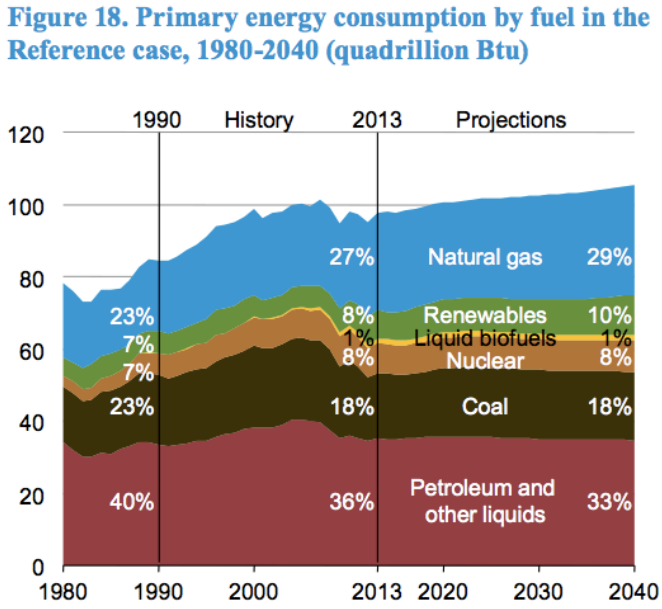
CONCLUSION

The findings in this short overview indicate the enormous importance of the Third World for the accomplishments of the COP21 project. Several of the major emission polluters are Third World countries and even when their emissions are medium or low, they count for COP21 objectives. Third World countries rely much upon fossil fuels and traditional renewables, i.e. wood, charcoal and dung. If they are emerging economies, they can shift to atomic power, build hydro dams and invest in solar and wind power. If they are poor, they need the Super Fund, so much talked about but not yet known in details.

The governments of the world and the international organisations must concentrate exclusively upon the dangerous global warming process. No time for war games in the South China See over unimportant islands that will be flooded soon. Stop the destruction of the Syrian nation! The civil wars in the Islamic civilization are basically meaningless: Why do Muslims kill each other or innocent Westerners or Hindus over interpretations of the Holy Book? There are several peaceful mechanisms for conflict resolution that are highly relevant for the Koranic civilisation. If not employed, Islam will crumble in viciously deadly struggles between groups, sects and governments. Moslem governments and regional organization must finally assume responsibility for peace in Muslim societies all over the world. One may theorize why the Koranic mechanism of SHURA (consultation) never developed into a people's referendum. The terrible Syrian conflict could have been resolved by a few referenda together with habeas corpus guarantees for the Shia minority of the Alawites.

The price of fossil fuels must increase with a global carbon tax, used to finance the Super Fund. Third World countries need massive financial and technological assistance for ENERGIWENDE. The standard energy projections are completely out of tune with the COP21 project that can save mankind from a climate disaster of major proportions (Figure 41).

FIGURE 41. Energy projections
(https://www.eia.gov/forecasts/aeo/section_energyconsump.cfm)



If this is the real future, then the COP21 project will fail. Using the Kaya-model, the carbon emissions will increase instead of decreasing with 40 per cent. And after this come the methane emissions.

Sources

GDP: World Bank national accounts data - data.worldbank.org

OECD National Accounts data files

GHG and CO2: World Resources Institute CAIT Climate Data Explorer - cait.wri.org

EU Joint Research Centre Emission Database for Global Atmospheric Research - http://edgar.jrc.ec.europa.eu/overview.php

UN Framework Convention on Climate Change - http://unfccc.int/ghg_data/ghg_data_unfccc/time_series_annex_i/items/3814.php

Sachs, J. (August 10th, 2015) "Sustainable Development for Humanity's Future" (http://jeffsachs.org/2015/08/sustainable-development-for-humanitys-future/)

Trends in Global CO2 Emissions – 2015 Report. The Hague: Netherland's Environmental Assessment Agency.

Energy: International Energy Agency (IEA). Paris.

Energy Information Administration (EIA). Washington, DC.

Literature

Kaya, Y. and Yokoburi, K. (1997) Environment, energy, and economy : strategies for sustainability. Tokyo: United Nations University Press.

Akpan, G. E. (2012). Electricity consumption. Carbon Emissions and Economic Growth in Nigeria, 2(4), 292–306.

Alam, M. J., Begum, I. A., Buysse, J., Rahman, S., & Van Huylenbroeck, G. (2011). Dynamic modeling of causal relationship between energy consumption, CO2 emissions and economic growth in India. Renewable and Sustainable Energy Reviews, 15(6), 3243–3251.

Alkhathlan, K., & Javid, M. (2013). Energy consumption, carbon emissions and economic growth in Saudi Arabia: An aggregate and disaggregate analysis. Energy Policy, 62(2013), 1525–1532.

Ang, J. B. (2008). Economic development, pollutant emissions and energy consumption Malaysia. Journal of Policy Modeling, 30(2), 271–278.

Arouri, M. E. H., Ben Youssef, A., M'henni, H., & Rault, C. (2012). Energy consumption, economic growth and CO2 emissions in Middle East and North African countries. Energy Policy, 45(2012), 342–349.

Bloch, H., Rafiq, S., & Salim, R. (2012). Coal consumption, CO2 emission and economic growth in China: Empirical evidence and policy responses. Energy Economics, 34(2), 518–528.

Halicioglu, F. (2009). An econometric study of CO2 emissions, energy consumption, income and foreign trade in Turkey. Energy Policy, 37(3), 1156–1164.

Jahangir Alam, M., Ara Begum, I., Buysse, J., & Van Huylenbroeck, G. (2012). Energy consumption, carbon emissions and economic growth nexus in Bangladesh: Cointegration and dynamic causality analysis. Energy Policy, 45(2012), 217–225.

Kaygusuz, K. (2009). Energy and environmental issues relating to greenhouse gas emissions for sustainable development in Turkey. Renewable and Sustainable Energy Reviews, 13(1), 253–270.

Khan, M. A., Khan, M. Z., Zaman, K., Khan, M. M., & Zahoor, H. (2013). Causal links between greenhouse gas emissions, economic growth and energy consumption in Pakistan: A fatal disorder of society. Renewable and Sustainable Energy Reviews, 25(2013), 166–176.

Kraft, J., & Kraft, A. (1978). On the relationship between energy and GNP. Journal of Energy and Development, 3(2), 401–403.

Lotfalipour, M. R., Falahi, M. A., & Ashena, M. (2010). Economic growth, CO2 emissions, and fossil fuels consumption in Iran. Energy, 35(12), 5115–5120.

Menyah, K., & Wolde-Rufael, Y. (2010). Energy consumption, pollutant emissions and economic growth in South Africa. Energy Economics, 32(6), 1374–1382.

Ozturk, I., & Acaravci, A. (2010). CO2 emissions, energy consumption and economic growth in Turkey. Renewable and Sustainable Energy Reviews, 14(9), 3220–3225.

PACJA (Pan African Climate Justice Alliance). (2009). The economic cost of climate change in Africa.

Pressman, J. and A. Wildavsky (1973, 1984) Implementation. Berkeley: Univ of California: Berkeley.

Sachs, J. (2015) The Age of Sustainable Development. New York: Columbia University Press.

Soytas, U., Sari, R., & Ewing, B. T. (2007). Energy consumption, income, and carbon Emissions in the United States. Ecological Economics, 62(3), 482–489.

Stern, N. (2007) Economics of Climate Change. Oxford: OUP.

Wolde-Rufael, Y. (2006). Electricity consumption and economic growth: A time series experience for 17 African countries. Energy Policy, 34(10), 1106–1114.

Xepapadeas, A. (2005). Economic growth and the environment. In K. G. Maler, J. R. Vincent (Eds.), Handbook of environmental economics (Vol. 3, pp. 1219–1271).

Zhang, X.-P., & Cheng, X.-M. (2009). Energy consumption, carbon emissions, and economic growth in China. Ecological Economics, 68(10), 2706–2712.