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The Cop21 Process from the Point of View of the Social Sciences

Jan-Erik Lane[1*]

[1] Public Policy Institute, Belgrade

[*] Jan-Erik Lane, E-mail: janeklane@googlemail.com

Address: 10 Charles Humbert, 1205 Geneva; 559 A, 3rd Floor, Thuya Street, 9th Quarter, Yangon. Myanmar.

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Abstract

Thus far, all the debate about climate change in the myriad of UN conferences and special meetings has been about the application of the theories of the natural sciences to the global warming phenomena. Now, that there is a decision by the governments of the world countries to go ahead with a radical decarbonisation policy in the 21st century, the lessons from the social science theories must be taken into account. The COP21 project is a case of policy implementation, but implementation is difficult. Greenhouse Gases (GHG) like CO2:s stem from the anthropogenic sources of carbon emissions from the factors that drives not only the universe but also all social systems, viz. energy. This article spells out the energy-emissions conundrum of mankind.

Keywords

decarbonisation, energy-GDP link, GDP-emissions link, policy implementation, Kaya's model, country conundrums

1. Introduction

The United Nations Framework Convention on Climate Change has just hold another round of meetings meanings transaction costs. Despite recent activities to stem the use of stone coal in favour of modern renewables like solar, wind, geo-thermal as well as sometimes nuclear power, the website *Earth CO2* (Keeling curves) indicates that we have passed the 400 ppm limit on CO2:s permanently. It is not difficult to explain, because additions cancel out subtractions. Thus, international transportation keeps augmenting with new airport and new aircraft, cars multiply especially bigger ones and the rain forests are reduced with desertification in some areas. When countries are forced, they go back to fossil fuels, like for instance Japan. And the use of wood coal is increasing in poor countries.

The COP21 Agreement is just a set of promises and the social sciences teach that they can be reneged upon when convenient. Indian intellectual Ramesh (2015) admits openly that India cannot engage in massive decarbonisation due to development reasons, India's first problem is the electrification of 300 million household. In the paper I will show how far way most countries after from the fulfillment of the basic COP21 objectives:

- GOAL I: Halting the upward trend for CO2:s;
- GOAL II: Cut CO2:s by 40 per cent up until to 2030;
- GOAL III: Decarbonise the country fully up to 2075.

The goals are completely non implementable in most countries, unless massive economic support is forthcoming from the promised Super Fund, yet to be set up according the Stern (2007) model. To explain my position, I resort to a few well-known models in the social sciences, which have received much corroboration.

2. Wildavsky: Policy against Implementation

The theory of policy implementation entailed a profound gap between goals and results (Pressman & Wildavsky, 1973, 1984). The recognition of this gap between high level policy-making and legislation on the one hand and low level policy execution and enforcement had not been adequately theorized in the discipline of public administration (Wildavsky, 1979, 1987). This social science insight has not been incorporated into the COP21 project, which involving the governments of almost all the countries in the world in a giant implementation project supposed to last some 50 years or more. Can the goal of complete global decarbonisation really be achieved? And if so, with what means or instrument, by whom?

Two rounds of implementation studies may be identified with different lessons for policy-making, both relevant to the concerns of global climate policies. First, we have the Wildavsky gap between policy and implementation:

- Divergence between primary goals and later goal developments;
- Resistance to change from local groups;
- Goal reinterpretation to handle non-conformity of outcomes;
- Dynamic evolution of policies to adapt to implementation difficulties;
- Own goals with the implementors deviating from officially stated ones;
- Long drawn out implementation processes reduce the likelihood of successful goal fulfillment;
- The occurrence of policy-implementation paradoxes, as goals are pursued but resulting in opposite outcomes;
- Goals may find no relevant outcomes, or goals may be conducive to dysfunctional outcomes.

These results were supported by empirical finds, examining huge welfare state programs, and made understandable in terms of standard decision theory—*instrumentalism or bounded rationality*. New advances in game theory—*asymmetric information and opportunism*—support the negative conclusion

even stronger.

An interesting example of policy dys-functionality is the recent global decision on the so-called HFCs: hydro fluorocarbons, which is a very harmful greenhouse gas. It was put into refrigerators and air-conditioners as a result of the Ottawa protocol (1987) to try to heal the ozone layer hole. But it proved to be noxious for global warming, while at the same the ozone layer has hardly healed very much.

In the second round of implementation enquiry, Sabatier and associates took the initiative to theorize how policy implementation may succeed, if at all (Sabatier, 1986, 1993, 1998; Mazmanian & Sabatier, 1989). His answer was the "*policy coalition*" framework or the "*policy advocates*" approach. This innovative model emphasized that a number of important elements had to be added to policy implementation process besides standard public administration, if there were to be a chance of successful goal fulfillment:

- Private-public partnerships;
- Team work or networks;
- Dynamic goal evolution;
- Relevance of incentives;
- Bottom-up instead of top down approach.

Now, the COP21 objective of decarbonisation must take the lessons from the two implementation rounds of study into account when it now mover forwards, from the stage of talking to the stage of performing, delivering outcomes.

It cannot be enough underlined that the COP21 Agreement resects a key principle in Public International Law (PIL), namely state sovereignty. This entails that the chief responsibility for taking action against global warming rests with the country governments. Some minimum oversight from international governance is foreseen, but the main activity of the international bodies, active in climate programs, is to set up and run a giant global fund for helping countries make the crucial energy transition involved in decarbonisation—the Super Fund with 100 billion dollars per year in the coming decade.

Now, what has been completely lacking from the COP21 project discussion is the recognition that the fulfillment of its objectives requires massive energy management, monitored by international governance. The costs of a tremendous energy transformation, from fossil fuels and wood coal, to renewables in a short period of time of about 1-3 decades will be astronomical. The talk about a Super Fund along the ideas of Stern (2007) is most appropriate, as many countries are in dire need of financial assistance.

The energy-emission problematic is much aggravated by the ambition of almost all nations to increase their energy consumption up to 2050. Thus, not only have old energy sources been replaced but also new ones erected—what a burden for investments in solar, wind and geo-thermal energy besides the controversial atomic power plants. The COP21 is not attempting to replace the global market economy

with sustainable economy (Sachs, 2015).

Next, we move from well-known political science models to the central economics theory, viz. Kaya's model. It models the CO2 emissions from *anthropogenic* sources, which is also what the CO21 projects targets.

3. Kaya: Emissions, GDP and Energy

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)mpact against 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).

3.1 Theory

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 per cent, 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*:

(E1) Kaya's identity projects future carbon emissions on changes in Population (in *billions*), economic activity as GDP per capita (in *thousands 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://www.climatemodels.uchicago.edu/kaya/kaya.doc.html).

Concerning the equation (E1), 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:

(E2) Multiple Regression: $Y = a + b_1X_1 + b_2X_2 + b_3X_3 + ... + b_tX_t + u$

Note: 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.

Note: 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:

(E3) CO2:s = F (GDP/capita, Population, Energy intensity, Carbon intensity), in a stochastic form with a residual variance, all to be estimated on data from some 59 countries. I make two empirical estimations of this probabilistic Kaya model, one longitudinal for 1990-2014 as well as one cross-sectional for 2014, *Empirical findings*:

a) Longitudinal Analysis

I make an empirical estimation of this probabilistic Kaya model—the longitudinal test for 1990-2014, World data 1990-2015: (E4) Ln CO2 = 0,62 * LN Population + 1,28 * LN(GDP/Capita) + 0,96 * LN(Energy/GDP); R2 = 0.985.

Going to the latest information about CO2:s, we have the following picture that fully confirms the relevance of Kaya's model (Figure 1).

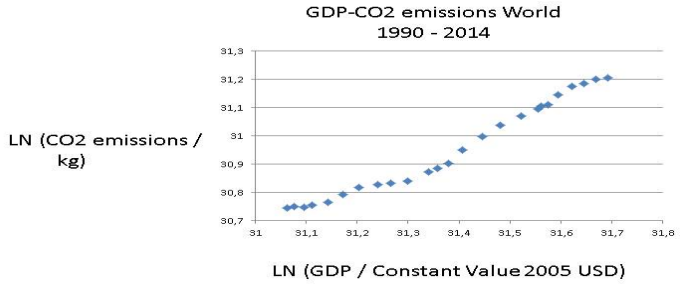


Figure 1. Global GDP-CO2 (y = 0,80x + 5,96; R^2 = 0,97 (N = 59))

There is today much discussion whether the upward trend for the CO2:s has peaked, but it is far from sure. In any case, what is needed is that the curve in Figure slopes downward but outwards, fulfilling the requirement that economic development not be hurt.

b) Cross-Sectional Analysis

In a stochastic form with 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:

(E5) k1 = 0,68; k2 = 0,85; k3 = 0,95; k4 = 0,25; R2 = 0.90. Note: 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). The Kaya model findings show that total GHG:s go with larger total GDP. To make the dilemma of energy versus emissions even worse, we show in Figure 3 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.

In order to verify the cross-sectional findings, I will enquire into a few key countries to show that GDP, population and energy are the key determinants of the global warming predicament of a country.

4. Growth and Energy Implications of COP21

The COP21 project does NOT intend to move mankind towards a sustainable economy, according to the idea of well-known economist Sachs (2015). On the contrary, most countries plan for increases in their energy consumption, knowing the economic growth implications. Thus, we have the following future scenario: on the one hand cutting of carbon emissions with 40 per cent in some 10-13 years' time, whereas on the other hand we have standard projections for 30-50 per cent energy increase to 2050 from oil giants and countries. Both achievable with an enormous push for modern renewables, especially solar ower plants? No. Something has to give, and economics will trump environmentalism again. When countries over-comit themselves, they simply renege upon their promises. Let us examine the energy part of the conundrum somewhat closer.

Energy is the capacity to do work, Thus, with energy change is impossible. If the 4 forces of energy govern the modern Hubble universe, then energy is at the centre of social systems, without which human beings would die. Energy provides the possibility to change the status quo, but hitherto it has resulted in the global threat of climate change. More than 80 per cent of energy is today derives from coal—wood and stone, oil and natural gas, which when burned releases CO2:s massively. But affluence can only be based upon work, stated Scotsman Adam Smith. Ths is the energy-emissions conundrum. Figure 2 shows where we are coming from, namely the GDP-energy link 1990.

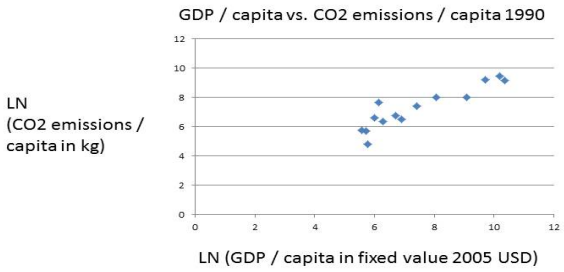


Figure 2. GDP per Capita and CO2:s per Person 1990 (N = 34) (y = 0,75x; R^2 = 0,84)

We observe that affluence in 1990 could only be gained by an upward sloping curve for CO2:s per person, just as predicted by Kaya. Richer countriesas well as bigger countries pollute more, ceteris

paridus. Now Figure 3 displays our present predicament according to latest available data.

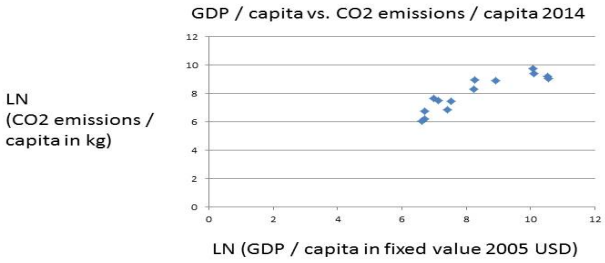


Figure 3. GDP per Capita and CO2:s per Person 20 (y = 0,75x; R² = 0,82)

All the countries included in the two Figures have the same change trend, i.e., upward and outwards from 1990 to 2014. This is what must be halted during the 21st century. But can GDP keep rising while emissions fall?

Economists dealing with the GDP-emissions conundrum put their faith in energy efficiency or the Environmental Kuznets Curve (EKC). Energy per GDP unit would fall over time, meaning that also emissions per energy unit would fall. Or the fossil fuels part of energy would first rise with affluence and then fall with richness, Lots of research has been done on these two phenomena that would certainly ameliorate the conundrum.

Here, we look for some simple surface evidence of these two effects. Figure 4 shows that more affluent or richer countries do not really economise upon energy per person.

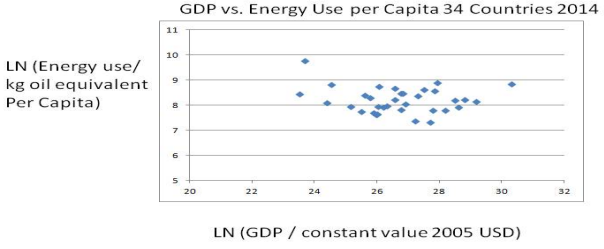


Figure 4. Fossil Fuels' Efficiency of Energy (y = -0.018x, R2 = 0.0222, N = 59)

The findings here entail that economic growth and population increases are the key determinants of carbon emissions. This creates a formidable challenge for the signatories of the COP21 Agreement. The government face the management task of a complete overhaul of national energy systems, from fossil fuel, especially coal, to renewable like solar, wind, geo-thermal and atomic power.

One hand hoped that the energy part of GDP would go down when economies mature. Figure 5 shows that this is very doubtful on a global scale for 2015.

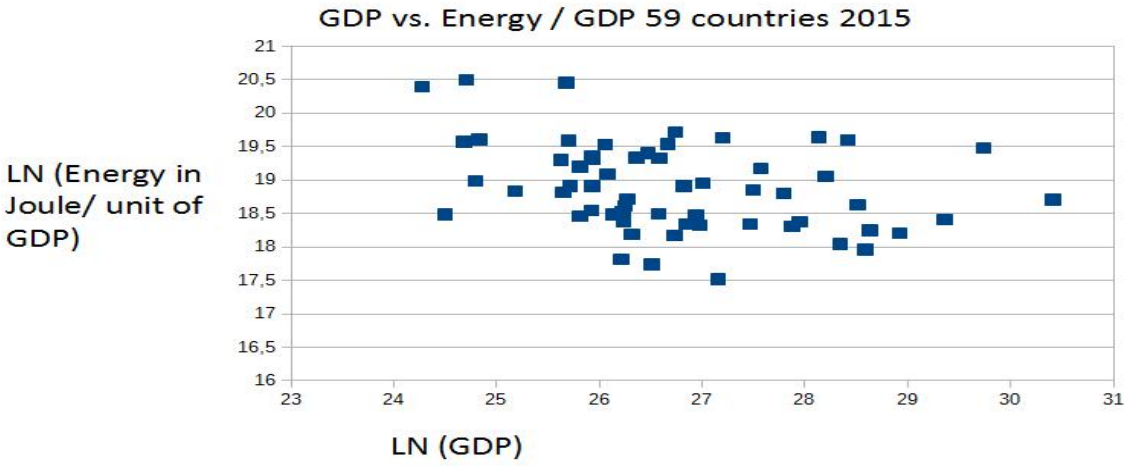


Figure 5. Energy Efficiency and GDP (y = -0,048x; R^2 = 0,021)

Figure 5 shows not tendency to minimize energy/GDP as countries grow richer. A few countries use an incredible amount of energy person to deliver electricity for very high standards of living, viz, the Gulf States. As global warming proceeds, more and more people need air-conditioning all the time.

Now, we can also show that the ratios fossil fuels/energy resources are not displaying any economy of scale with GDP (Figure 6). Had this been the case, it would have been an example of the Environmental Kuznets Curve (EKC).

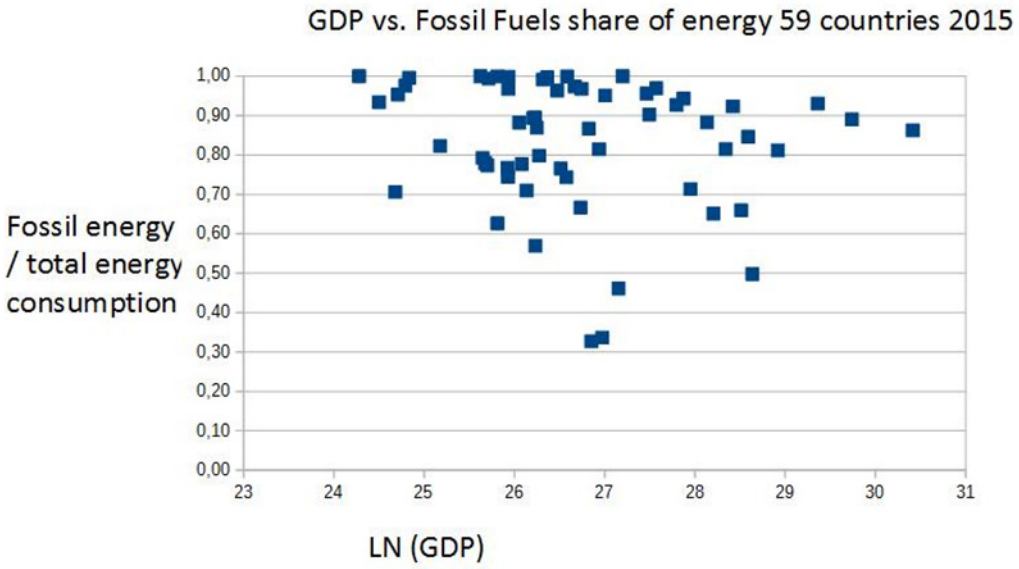


Figure 6. Fossil Fuels' Efficiency of Energy (y = -0.018x, R2 = 0.0222, N = 59)

The prevailing dominance of fossil fuel is most of the countries in the world appears from Figure 6 in a very illuminating way. What does this mean for individual countries?

5. Comparative Country Inquiries: Energy-Emission Conundrums

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 the following framework of analysis or approach for empirical inquiry below: < GDP - GHG (CO2) link, energy mix >.

The first concept in this framework taps the feasibility of Goal I: halting the growth of GHG:s or CO2:s, whereas the other concept in the framework 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

Below we give a few telling examples of what the management of the COP21 project involves at the nation level. Governments have accepted he responsibility to promote the COP21 goals: Goal I: halting the augmentation in CO2:s; Goal 2: reducing CO2:s by 40 per cent up until 2030.

In each of these countries, governments will have to work with the markets and civil society. But the

probability of implementation success is low, unless the Super Fund can make a huge difference, which I doubt very much, given the financial situation in Western nations.

6. Catching-up Countries

One must insist upon the relevance of the distinction between total emissions of Greenhouse Gases (GHG) or CO2:s on the one hand and per capita emission on the other hand. They do definitely not go together, with the exception of the USA. For halting global warming, total emissions are absolutely the first priority, as their trend upwards must be turned downwards. But emissions per capita are also relevant, as they will have to be considered from the point of view of global justice. Let us look at a few nations, using the above framework of analysis.

India

India will certainly appeal to the fairness problematic, namely per capita *contra* 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 6 shows the close connection between emissions and GDP for this giant nation.

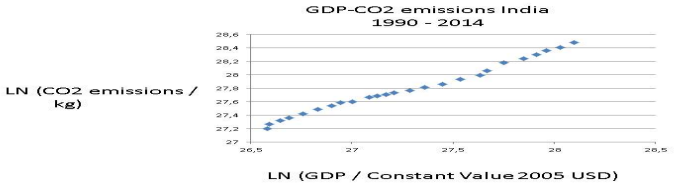


Figure 6. Link GDP-CO2 for India (y = 0,77x + 6,79; R^2 = 0,99)

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 7 shows its energy mix where renewables play a bigger role than in for instance China.

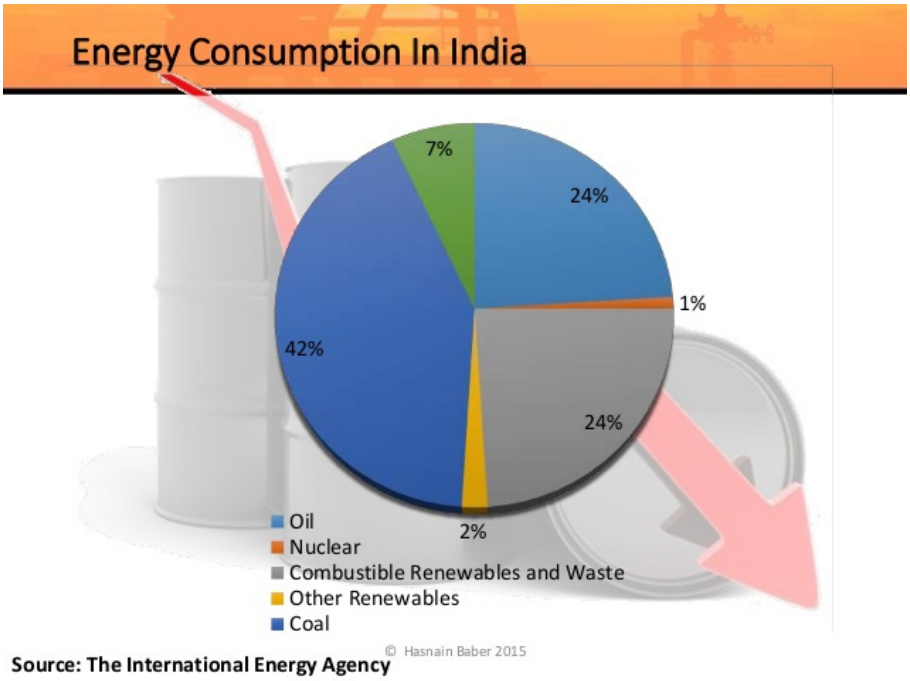


Figure 7. India Energy Mix

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.

Indonesia

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 8).

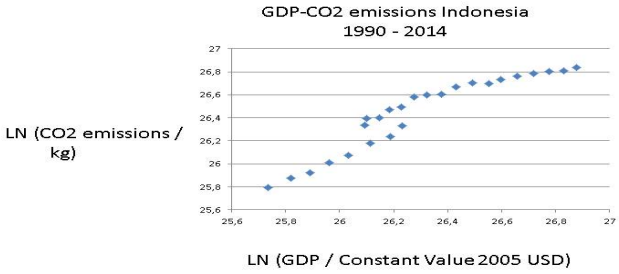


Figure 8. Indonesia: Link GDP-CO2 ($y = 0,95x + 1,58$; $R^2 = 0,89$)

Indonesia is a coming giant, both economically and sadly in terms of pollution. Figure 6 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 9 presents the energy mix for this huge country in terms of population and territory.

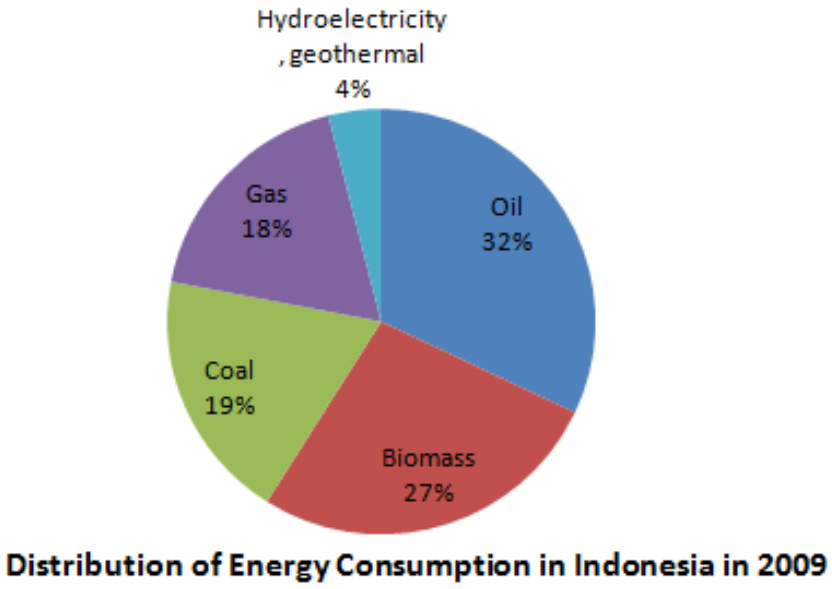


Figure 9. Indonesian Energy

http://www.missrifka.com/energy-issue/recent-energy-status-in-indonesia.html

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.

China

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 emissions are the largest in the world, totally speaking (Figure 10). China was a Third World country up until yesterday.

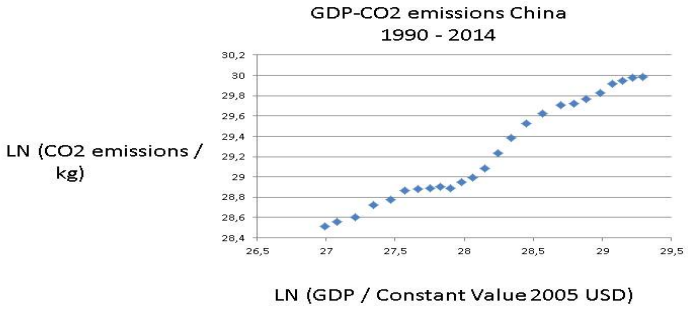


Figure 10. China's Link GDP-CO2 (y = 0,70x; R^2 = 0,97)

The sharp increase in GHG:s in China reflects not only the immensely rapid industria lization and urbanization of the last 30 years, but also its problematic energy mix (Figure 11).

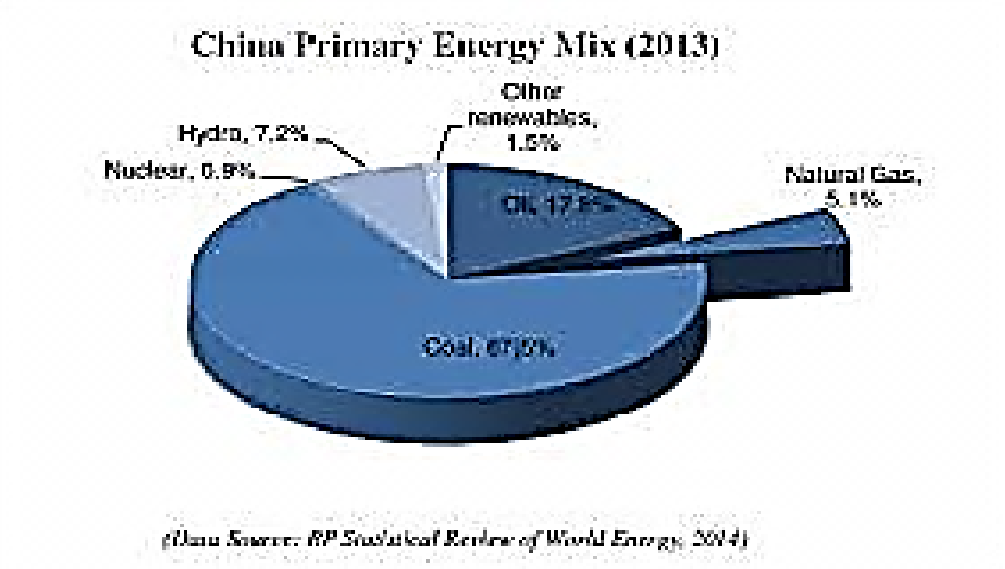


Figure 11. China's Energy Consumption

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). 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 per cent while supply almost 50 per cent more energy power, according to plan?

7. Vietnam and the Philippines: Sharp GDP-Energy-CO2 Links

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 12).

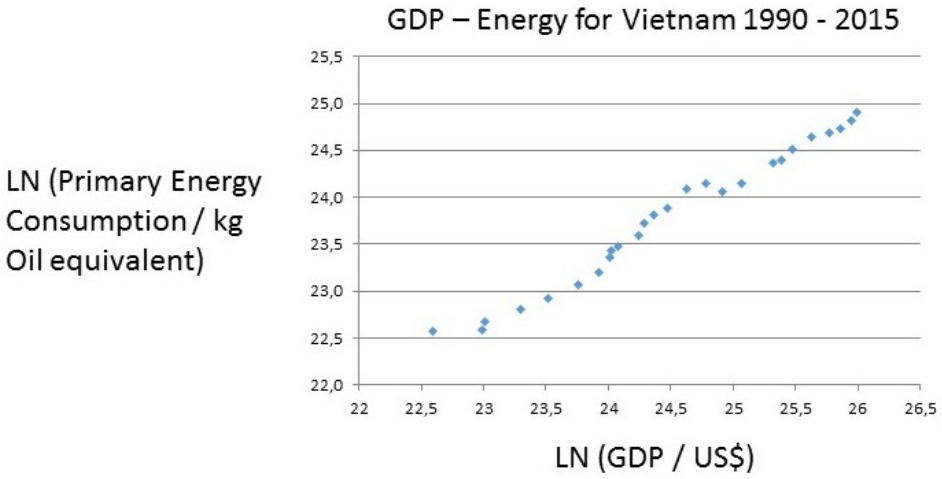


Figure 12. Vietnam: GDP and Energy (y = 0,74x; R^2 = 0,98)

The benefits of such a strong economic development is of course raising affluence and diminishing poverty. But the costs involve much more emissions (Figure 13).

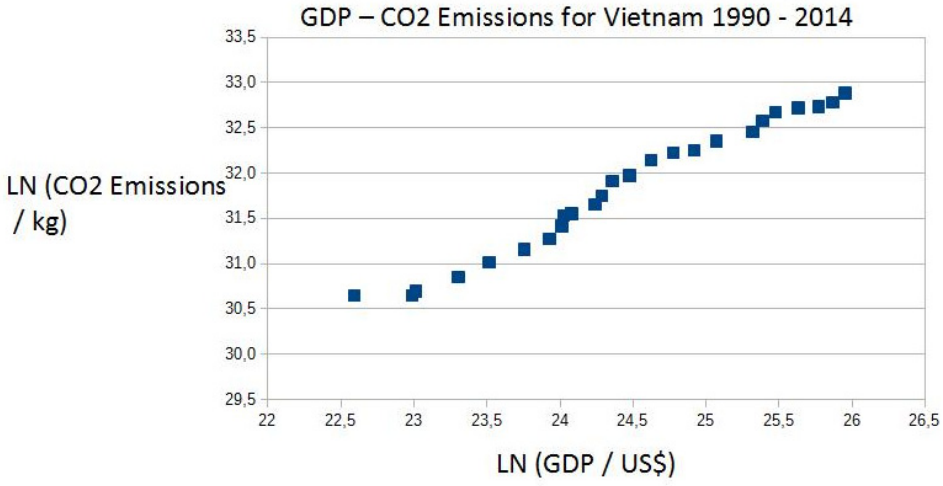


Figure 13. GDP and Emissions for Vietnam (f(x) = 0.75x + 13.37; R^2 = 0.98)

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 14.

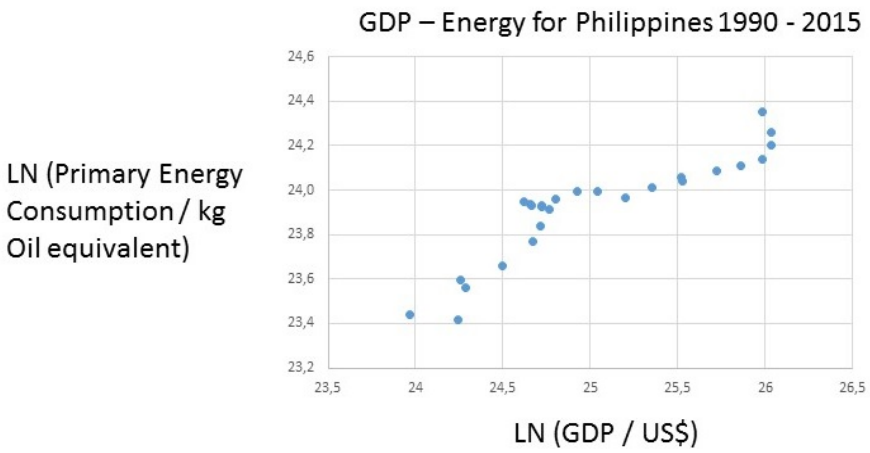


Figure 14. The Philippines, GDP-Energy Link (y = 0,34x: R^2 = 0,81)

No wonder that the next Figure has a strong up ward trend for emissions. How to turn this trend downwards without it also turning inwards? The problem of growth versus decarbonisation!

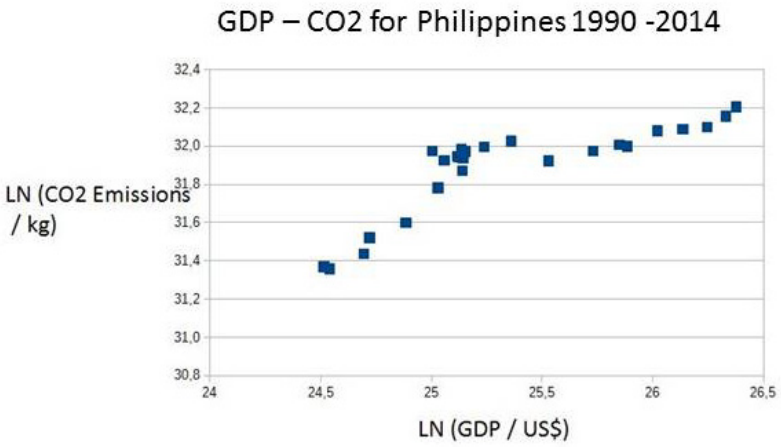


Figure 15. The Philippines (f(x) = 0.35x + 23.01; R2 = 0.68)

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 per cent, as in other populous and rapidly developing nations. The Philippines definitely needs help from the Super Fund.

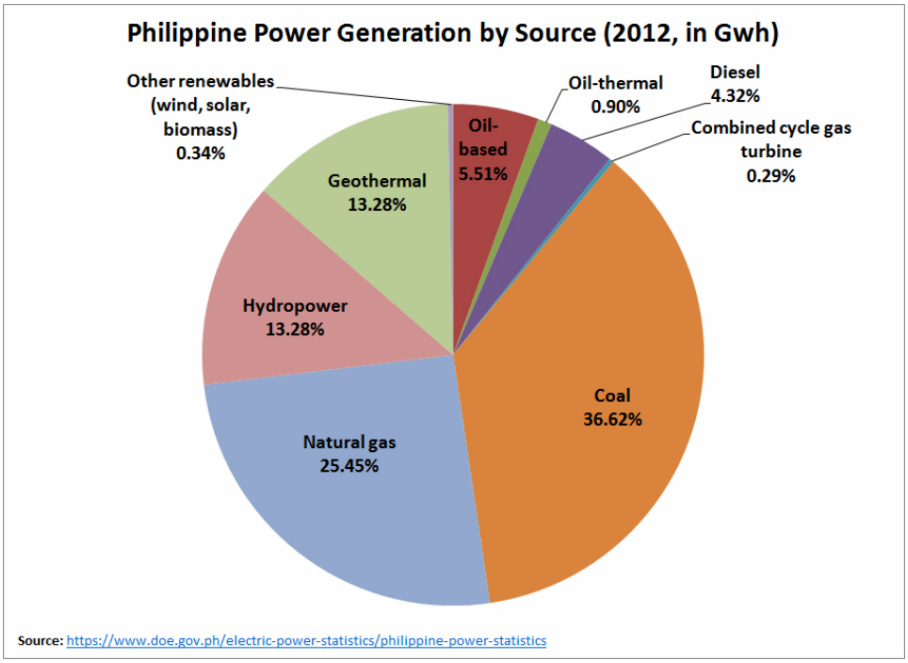


Figure 16. Energy Mix in the Philippines

The Philippines claim they decarbonise by their own efforts, relying upon mainly geo-thermal. It is merely talk, as the socio-economic development of this huge poor country requires much more energy than today.

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.

8. Fairness in the COP21 Project

Since the emissions of GHG:s or CO2:s per capita are much higher in super rich countries than poor nations, the United Nations Conference on Climate Change will have to discuss “fair” cuts in emissions, given the implications for cheap energy and economic development. The emissions per capita in the Gulf States are just unbelievably high on a per capita basis, giving these state inhabitants access to a fleet of very modern luxurious cars and massive electricity.

How to enter the concept of energy or emissions fairness into the UN Conferences on climate change? No doubt the Third World will raise the issue when real implementation of COP21 objectives gets going the next years to come.

Two solutions to the energy fairness problematic:

1) The Super fund: Make energy transition in the Third World come with a huge rebate, including both financial and technical assistance.

2) Charge the rich and energy gusting nations a much higher carbon tax or fee.

Let us look at some of the countries that could not possible make the transformation out of fossil fuels on their own, given the time perspective of COP21 for decarbonisation. Consider for instance a BRIC country like the RSA (Figure 17).

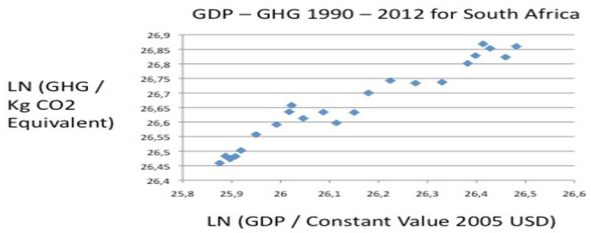


Figure 17. South Africa: LN (GHG/Kg CO2 eq and LN (GDP/Constant Value 2005 USD)

Emissions are high in the RSA, because South Africa uses a lot of coal to generate electricity (Figure 13). Decarbonisation will be difficult and costly.The reliance upon coal in this large economy in Africa is stunningly high (Figure 18). No wonder that the RSA has started to look for shale oil and gas.

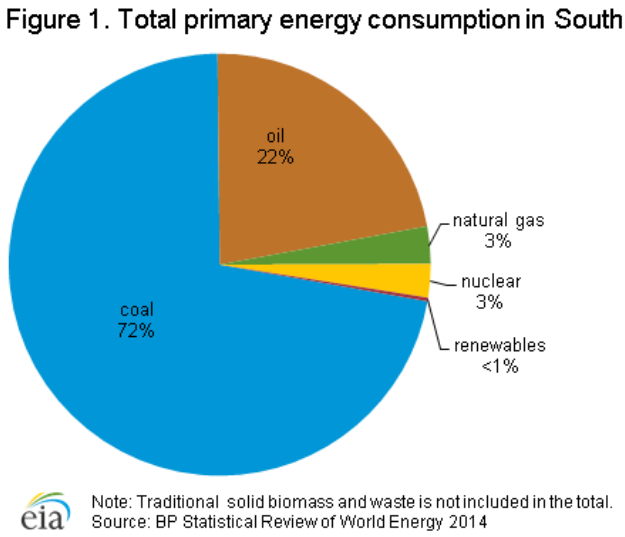


Figure 18. RSA: Energy Mix

Or let us look at another BRIC nation, namely the ethanol country *par preference*: Brazil. Figure 19 shows a considerable drop in total emissions, but it is followed by huge increases that tend to flatten out.

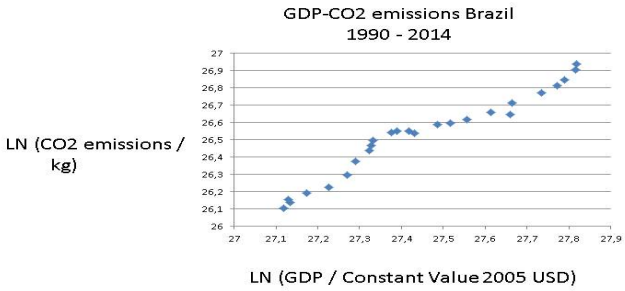


Figure 19. Brazil's GDP-CO2:s Link (y = 1,03x - 1,72; R^2 = 0,95)

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 20).

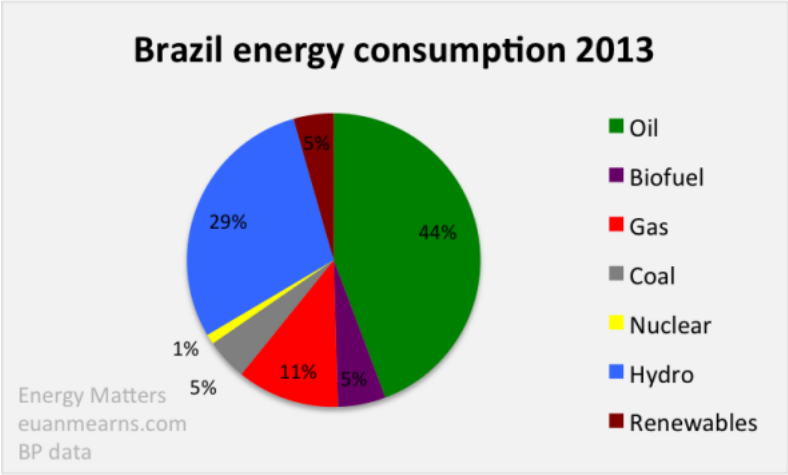


Figure 20. Brazil's Energy Consumption

A most pessimistic example would the huge and poor Egypt constiture, tas it has neither much hydro power nor oil and gas assets. But itstemission trend is clear. It has a huge delta 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 21).

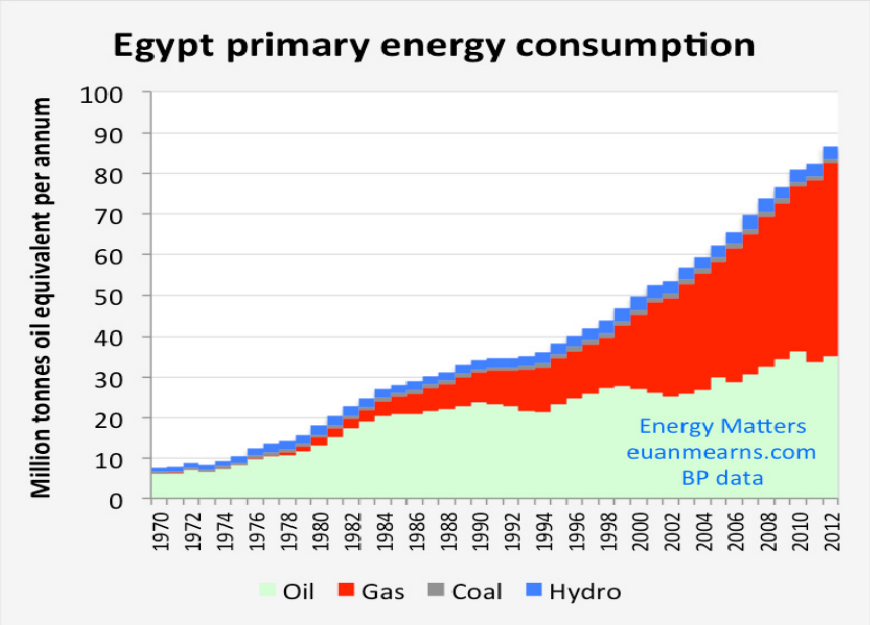


Figure 21. Egypt's Energy Mix

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 22).

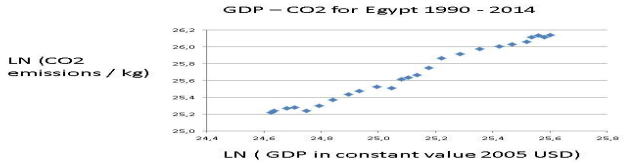


Figure 22. GDP-CO2 for Egypt (y = 1,02x; R^2 = 0,99)

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?

9. The Oil Pruducing Countries

Countries prmise much but often delivers little. Public international law provides their governments with sovereignty, which is a set of power competences, little restrained by the universal princiles of mankind. When facing adversity, governments renege. The COP21 project has no mechanisms that

forsee such state behaviour. Let us look at a few of the oil and gas producing nations. They emit CO2:s stemming from both the production and consumption of oil and natural gas. They would go for new renewables, if they can sell their oil and gas at a higher price abroad.

Iran

Countries may rely upon petroleum and gas mainly—see Iran (Figure 23). 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.

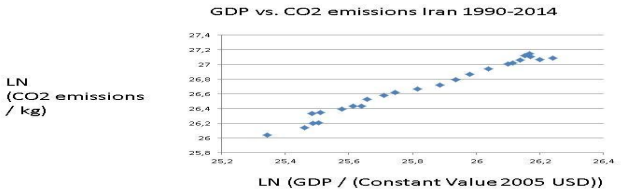


Figure 23. Iran: GDP-CO2 Link (y = 1,22x - 4,91; R^2 = 0,98)

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 24).

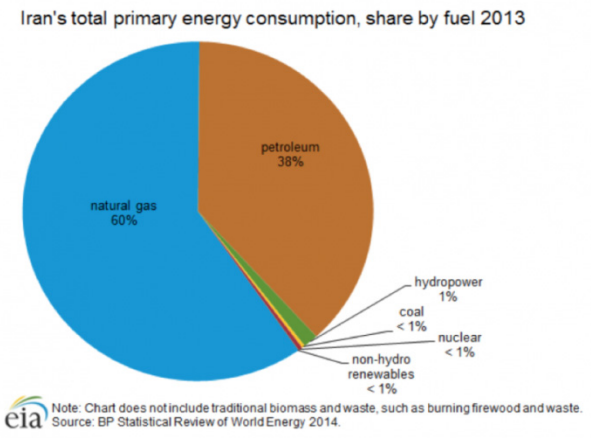


Figure 24. Iran: Energy Mix

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.

Mexico

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 natutal gas. For Mexico holds the following situation (Figure 25).

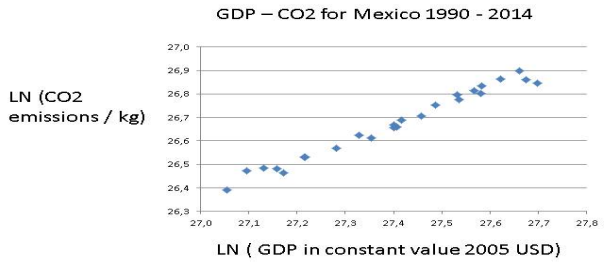


Figure 25. GDP-CO2 in Mexico ($y = 0,77x$; $R^2 = 0,98$)

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.

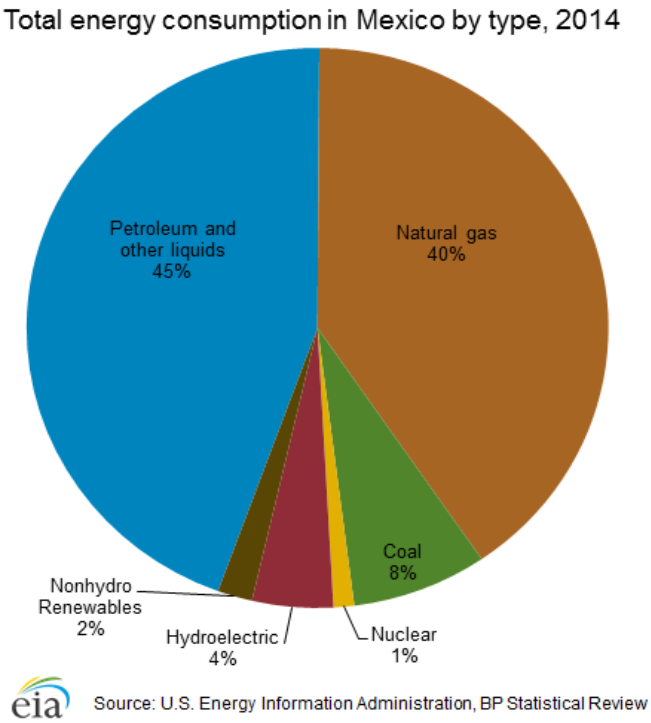


Figure 26. Energy Mix for Mexico

Few countries are so deependent upon fossil fuels as Mexico (Figure 26). One find the same patter with the Gulf States. The Mexican government must start now to reduce this dependency, by for instance eliminating coal and bringing down petreoleum, 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?

Venezuela

Energy is an interesting aspect of this nation, 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 27 confirms thiss expectation, but one may note many yearly ups and downs in reWhy this link is not a smooth one may be explained both by the energy mix and the volatile politics of Venezuela.

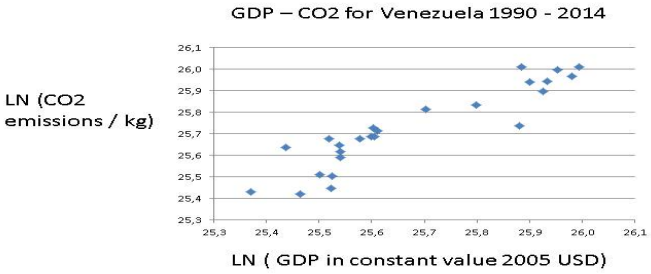


Figure 27. GDP-CO2 for Venezuela (y = 0,87x; R^2 = 0,85)

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 (Figure 28). 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?

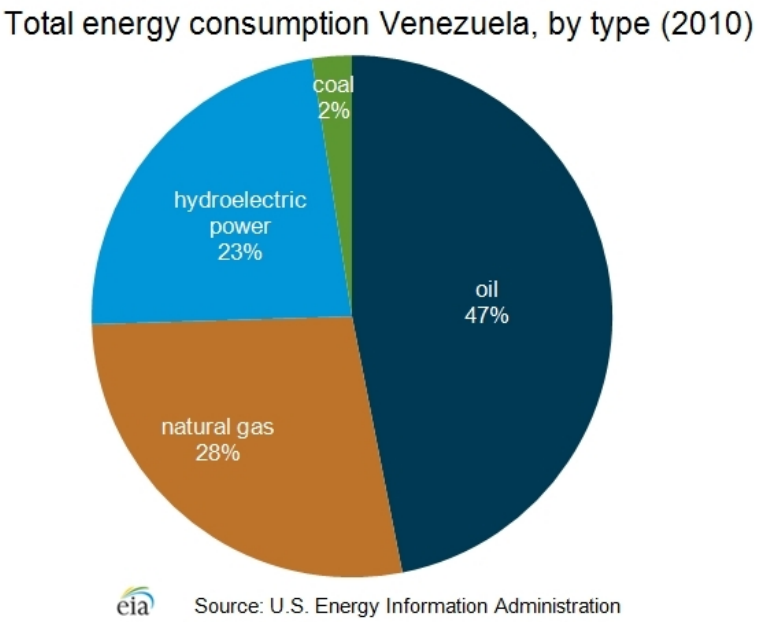
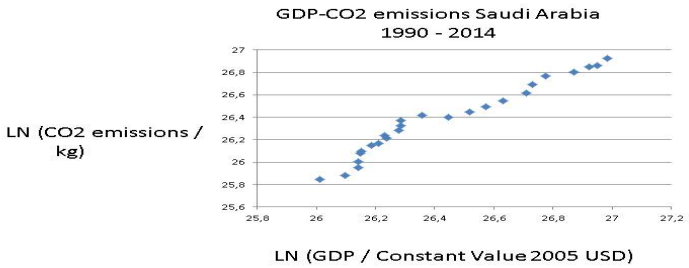


Figure 28. Venezuela's Energy Mix

Saudi Arabia

One may of course look at the leader of the OPEC, but it is trivial. Saudia Arabia burns oil and gas to maintain a very high standard of living, based upon abundant electricity (Figure 29). They have so much electricity that they can construct Green Lush Towns.



Fgure 29. Link GDP-CO2:s for Saudi Arabia ($y = 1,03x - 0,77$; $R^2 = 0,95$)

The recent economic downturn for this oil richest country in the world may spark a real turn to modern renewables. Atomic power is an attractive option, as long as the oil price stays moderately high. Solar power would of course be an option, but it is far less effective that burning oil and natural gas.

10. Can Rich Countries Be Trusted on COP21

The distinction between talking and its modes on the one hand and doing and its various activities on the other hand is the most basic conceptual separation in the social sciences. When governments over-commit themselves, they do as ordinary citizens: renege. The opportunities to renege upon the COP21 objectives are multiple, as there is a card hidden I all agreement, namely economic development.

South Korea

Industrial giant South Korea is very interesting from the perspective of the COP21 Agreement, because the basic trend violates both Goal I and Goal II. An entirely different trend than that of other mature economies is to befound in South Korea (Figure 30), which has 'caught up' in a stunning speed but with enormous GHG emissions.

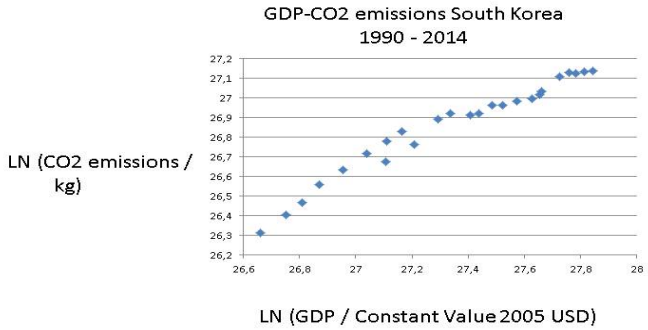


Figure 30. South Korea's GDP-CO2 Link ($y = 0,65x + 9,2$; $R^2 = 0,96$)

Lacking much hydro power, South Korea has turned to fossil fuels for energy purposes, almost up to 90 per cent (Figure 31). Now, it builds nuclear plants, but South Korea needs to move aggressively into solar power to reverse trends.

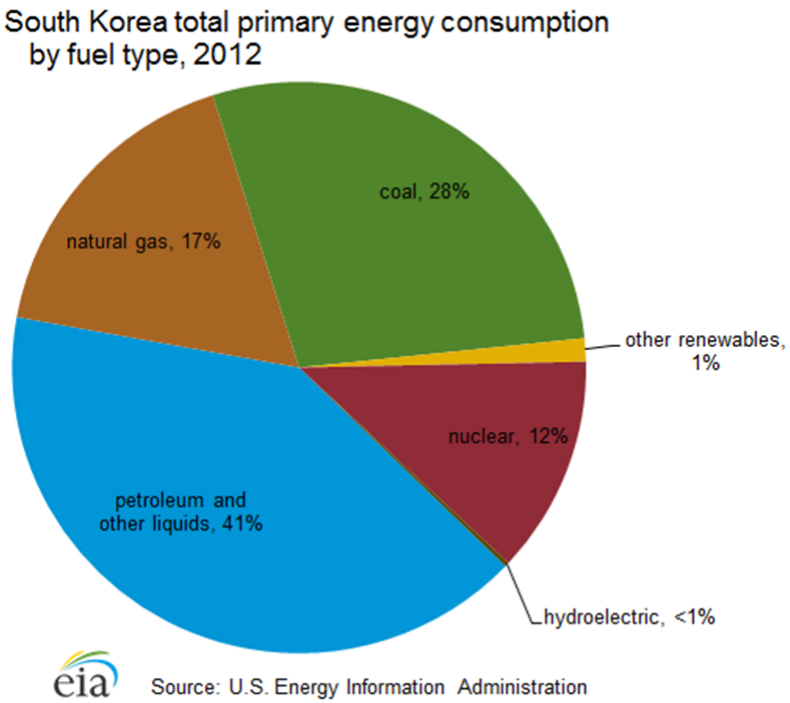


Figure 31. Energy in South Korea

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 renewable energy sources, as well as reducing coal and oil for imported gas or LNGs.

Japan

The amount of CO2 in the atmosphere is still augmenting and the acidification of the oceans is up. No plan how to build up the Super Fund has been delivered—how to finance such a huge fund with what kinds of charges or taxes?

It is true that some countries reduce coal energy, which is a positive. But at the same time the number of cars and their size increases. Nothing has been done to reduce emissions from air or sea transportation that is simply speaking just enormous. Instead, many countries plan for extensions of their airports and the airlines launch huge plain orders. Soon China can produce its own aircraft for civilian purposes at its immense airports.

It is also true that renewable energy is rapidly expanding—another positive. But the management tasks of supply solar and wind energy on a gigantic scale are mind-boggling. Atomic energy is cut back in some countries, which is negative, but expanded in a few others. Nobody knows what to do with the reliance upon wood coal in poor nations or how to stop the cutting down of forests, not only the rain forests, for having wood coal or for agricultural produce or conspicuous consumption like Gabon.

In reality, the coordination needs are daunting. How to make sure that governments simply sign the COP21 Agreement and then renege upon the implementation of its goals, citing poverty, lack of funding and no technological expertise?

Governments make plans, but they may not hold for unforeseen developments. Take the case of Japan (Figure 32).

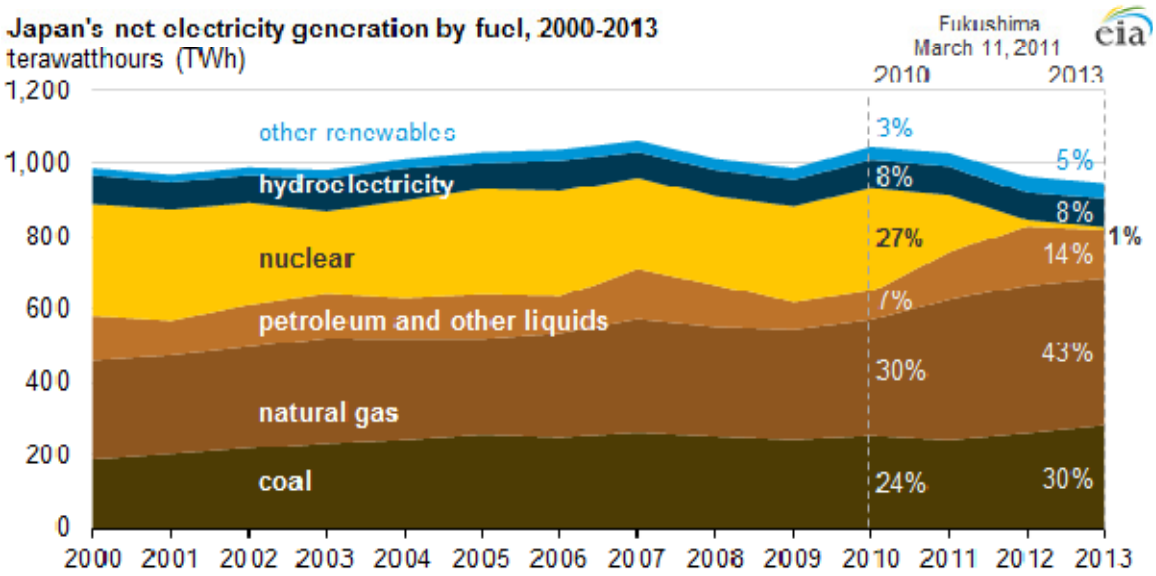


Figure 32. Energy for Electricity in Japan

Japan is today more dependent upon fossil fuels than earlier due to the debacle with its nuclear energy program. Could it not happen elsewhere too? When forced, governments will turn back to the fossil fuels, as for them economic growth trumps the environment. After all, nations are brutally egoistic, at least according to standard teachings in international relations.

11. Conclusion

The COP21 project presents the largest and most complicated set of management task ever in the history of mankind. Putting people on the Moon or on Mars is simple for a country like the US or China when compared with the project of total decarbonisation of the world, economies and societies as well as households, for all countries. The future of mankind is in Space, says genius Hawkins. No. Energy to get there for Earth's populations is missing. And how to generate electricity on the galaxies?

Although awareness is growing about the risks with climate change for mankind, and despite many new initiatives to develop renewables energy sources, the basic parameters of the human conditions have not changed. The United Nations Framework Convention on Climate Change has little awareness of how a colossal task decarbonision is in terms of country management and international governance.

What is completely lacking is the application of social science models that teach how difficult state coordination is and how transaction cost heavy international governance tends to be. Implementation of policy goals constitutes an art for the management science. It is problematic to arrive at successful policy accomplishment, especially when mundane incentives play a major role, as in the GDP-energy-emissions conundrums in every country almost (except Paraguay and Uruguay).

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