International Journal of Managerial Studies and Research (IJMSR)
Volume 4, Issue 8, August 2016, PP 16-42
ISSN 2349-0330 (Print) & ISSN 2349-0349 (Online)
http://dx.doi.org/10.20431/2349-0349.0408002
www.arcjournals.org

Politics of COP21 Implementation

Jan-Erik Lane

Fellow with Public Policy Institute in Belgrade, Serbia
janeklane@gmail.com

Abstract: *The policy sciences (politics and applied economics) has developed two models of implementation that are highly relevant for the start of the gigantic COP21 process, covering some 195 states for more than 50 years, at least so it is hoped. The optimistic efficiency theory claims that implementation success is feasible or even probable, once goals are clear and realistic, the means can be identified in reliable technologies and the incentives of the participants altruistically operating. The skeptical failures theory argues that this positive model is a figment of imagination merely. Policies, domestic or international, do not implement themselves. Outcomes are bound to miss objectives and may be unintentional and dysfunctional for the policy. After the natural sciences have researched climate change, the poliy sciences must look at the now unfolding COP21 process.*

Keywords: *Policy sciences, implementation theory, strategic management, country settings, GDP-GHC links, energy mixes., COP21 implementation process.*

1. Introduction

Scientific debate about the existence and strength of the climate change process continuous, with some still forthcoming to entirely challenge the predominant view. Thus, there is still on lingering uncertainty about what is going on. Evidently, scientists look upon the risks involved differently. A few politicians declare their grave doubts, but the global governance of COP21 Agreement has decided to embark upon three objectives:

- stop the increase in CO2 emissions by 2020;
- reduce these emissions by 40% in 2030;
- decarbonise the world economy in the second half of this century.

Now, the core set of questions deals with how these 3 goals are to be promoted, by what activities and by whom? They may be approached by means of two alternative social science frameworks: implementation theory or management theories. Yet, there are no sure answers in neither approaches. The climate change problematic is entirely new and there are numerous unknowns. Thus, we are back to the concept(s) of uncertainty.

2. Uncertainty and Risks

Climate change harbours both uncertainty and risks. We do not know exactly what is going on and how grave it is. And the estimation of the risks for mankind runs all the way from 1-2 degrees warmer in some regions of the globe to total extinction of the *Cro Magnons* in a hundred years.

The concepts of uncertainty and risk are not on the level or order. Uncertainty carries no inherent connotation of the negative, or losses, because one may be uncertain about future prospects, opportunities or the positive, gains. On the contrary, the notion of risk is logically on the negative side, meaning future losses. Uncertainty may simply mean: I do not know, whereas risk entails I may lose much.

The classical analysis of these concepts come from economist Knight, who wrote this famous passage in 1921:

"Uncertainty must be taken in a sense radically distinct from the familiar notion of Risk, from which it has never been properly separated.... The essential fact is that 'risk' means in some cases a quantity susceptible of measurement, while at other times it is something distinctly not of this character; and there are far-reaching and crucial differences in the bearings of the phenomena depending on which of the two is really present and operating.... It will appear that a measurable uncertainty, or 'risk' proper, as we shall use the term, is so far different from an unmeasurable one that it is not in effect an uncertainty at all." (Page 19 (2002 edition, reprint of 1921 book))

Knight's distinction between ignorance and calculable losses, or probabilities on the negative side, has been debated at some length, but no one has pointed out that it is not exhaustive. In addition, we have the following meanings, for instance in relation to climate change:

- objective and subjective uncertainty: climate change processes may be stochastic, in the short or long run, meaning that periods of warming and cooling follow each other in an indeterminate fashion, as we do not know all the mechanisms of negative and positive feed-backs involved; or it is all a matter of subjective uncertainty, meaning that we are simply ignorant lacking a theory about the determinate properties of the global warming process;
- objective or subjective risks: when risks are objective, they stem from real frequencies in the negative, like smoking or gambling at casinos, but subjective risks simply stands for fear when confronted by nature or reality.

Now, the global warming process involves all of these forms of uncertainties and risks, natural scientists over-exaggerate or under-exaggerate the uncertainties and risks, and social scientists fail to point out how Utopian global governance is due to the logic of collective action– the most important discovery in politics and economics in the 20th century. Thus, developing Knight's scheme for climate change, we have:

Diagram1. Uncertainty and Risk with Global Warming

	Risk	Opportunity
Certainty	Negative determinism: GW as unavoidable	Objective chances: “Catch-up”
Uncertainty	Negative probabilities: Fear for the future	Sanguine cornucopians

At the moment, we are in the debate between environmentalists and cornucopians in the lower part of Diagram1, but we are moving towards the right hand box in the upper part. COP21 has been decided upon: What models to employ in the COP21 process? I will argue here that the specific nation predicament plays a big role, namely:

< GDP-CO2 link, energy consumption pattern>.

3. Main Paradigms for the COP21 Process and its Outcome

Governments under the pressure from IGO;s and NGO;s are starting to handle their obligations under the COP21, while the private sector or market actors only look upon it as a set of opportunities. To promote the 3 objectives in COP21, one may consult implementation theory with Aaron Wildavsky or management strategy with Henry Minzberg or really various strategy concepts..

3.1. Policy Implementation

In Wildavsky's theory of public administration and public policy-making, all hinges upon the distinction between outputs/activities on the one hand and outcomes or real results on the other hand. COP21 is just meeting (costly!) and talking (cheap!) so far. Halting climate change is a goal that can only re realized the the measures on the existence of greenhouse gases turn around and start declining. All else is just theater by political elites and bureaucrats trying to convince ordinary people that things are done and we are heading in the right direct: “*Speaking truth to powe*r”, Wildavsky identified the crucial task of the policy sciences repeating Weber on objectivity and value neutrality in scientific enquiry.

The COP21 framework, now finally gathering pace, builds upon the model of naive top-down implementation: set the ends, find the means and act effectively! Wildavsky would inform them that policy implementation is far more difficult and complicated political business. Thus, we have:

- ends are not only partial, incomplete and ambiguous but tend to be redefined: COP21 targets only CO_2 emissions but there are other emissions that are equally or more detrimental, **like CFCs and HCFCs or HFOs AND HFCs in air conditioners or air coolers."**
- means are often based upon serious mistakes or omissions in beliefs, and they also tend to change over time; reductions in nuclear capacity may lead to more of natural gas burning; solar- and wind power may be unreliable, calling for fossil fuel backups; water power may exhaust itself,
- outcomes often deviate from beliefs or hopes about results, and some outcomes are clearly dys-functional; gigantic solar panel plats may foster terrorism; more of electricity production may lead to less, as water resources is declining; cutting emissions may require more energy that increases emissions – the *Catch-22*; renewable energies only reduce emissions if bio-mass is replenished fully; air-conditioners reducing global warming inside lead to global warming outside; etc.
- implementation is dynamic, as ends, means and beliefs change due to learning about mistakes and faulty results; one single policy for 195 governments for some 100 years is utopian.
- the policy-implementation process is always peace-meal and never holistically encompassing, as ends are revised, means improved and beliefs about outcomes evaluated and reconsidered.
- one shot implementation – let us fix the problem once and for all – is a mere figment of the imagination.

Thus, one must argue that implementation of policy is messy and transaction costs heavy. The COP21 process with its decentalised approach cannot avoid these difficulties, reducing the probability of policy success, if now climate change is so an ominous threat or challenge.

Given the findings in the implementation literature that entail difficulty, retries, learning and the need for the *policy fixers* of P. Sabatier, one may wish to turn to quite another social science framework, namely management theory(ies), which also has the Weberian roots in the means-end paradigm.

3.2. Strategy in GW Management

Management is strategy, taking interactions into account as well as opportunism with guile. Game theory has accomplished a revolution in the social sciences since the publication of Theory of Games and Economic Behavior (1945) and Games and Decisions (1957)after World War II. The recent addition of asymmetric information hypotheses has strengthen the strategy perspective immensely in the social sciences. Now, management theory may be empirically realistic or instrumentally rational. The various country governments and the IGO;s and NGO:s involved in COP21 would, of course, look for instrumentally based hypothesis about the relevant strategies to be successful in global warming coordination.

The elaboration of technologies for reducing CO_2:s must take into account the collective action problematic:

- free riding or reneging: the N-1 question;
- non-appropriation: the 1/N question.

Basically, each country has an incentive to do less in global coordination once it is sure the others will comply. Moreover, no country would by itself allocate CO_2 reductions voluntarily once it is certain the others will hesitate to comply or fail to comply. Overcoming these 2 collective actions difficulties in all their variations is extremely important in global coordination. It cannot be achieved by merely altruistic attitudes towards the dilemma – co-operation or defection, as Ostrom (1990) has claimed. There must be a hobbesian mechanism. but how in a world of sovereign states? The Ostrom strategy for achieving co-ordination – voluntary co-operation and mutual contracting – may certainly occur sometimes, but it does not constitute a sub-game perfect Nash equilibrium. This entail that COP21 must build up an enforcement structure.

3.3. THE CHALLENGE FOR COP21: Constrained Maximisation

The COP21 global process sets out to maximise global decarbonisation given the restriction that economic development must continue delivering more and more of affluence to a growing world population where billions live in despicable poverty. Thus, we have:

(I) Decarbonisation (D) = - (coals + oil + natural gas) + (solar + wind + water power)– traditional renewables + modern biomass;

(II) Economic development (EG) > population growth or > 3-4 per cent.

Thus, COP21 must maximise D (I) subject to EG (II). Feasible? How to manage this max D subject to EG?

First, the states of the world have to come up with a set of strategies. Second they have to be approved and performance controlled in global governance by the IGO;s and the NGO;s. Remember now that many states cannot do anything postie because they have failed governments and bureaucracy. They are to be found all over the Third World: Africa, Middle East, South Asia, East Asia, Latin America and the Caribbean as well as the Pacific. Let me exemplify what is involved in these parameters from the models I and II with the most recent available data. First we bring out a few country specific situations and in the conclusion the aggregates will be pinned down. Examining the nations of the world, their situation with regard to COP21 is uniquely determined by the following:

<gdp-co2 link, energy consumption pattern>.

4. COUNTRIES WITH TYPE I CURVE FOR GDP - CO2/GHG

4.1. Asia

How, then about CP2 emissions from human activities in Asian countries, i.e. mainly of an economic import? Start with Figure 1. The link between total CO2 emissions and overall GDP is to be found in the early 1990s for Asia, as the richer countries pollute more than the poorer ones. Yet, the connection is not very strong. Figure 1 shows how things developed during the two decades of mainly quick economic development and the spread of the Asian economic miracle from the 4 tigers to almost all Asian countries, especially the giants, viz China, India and Indonesia.

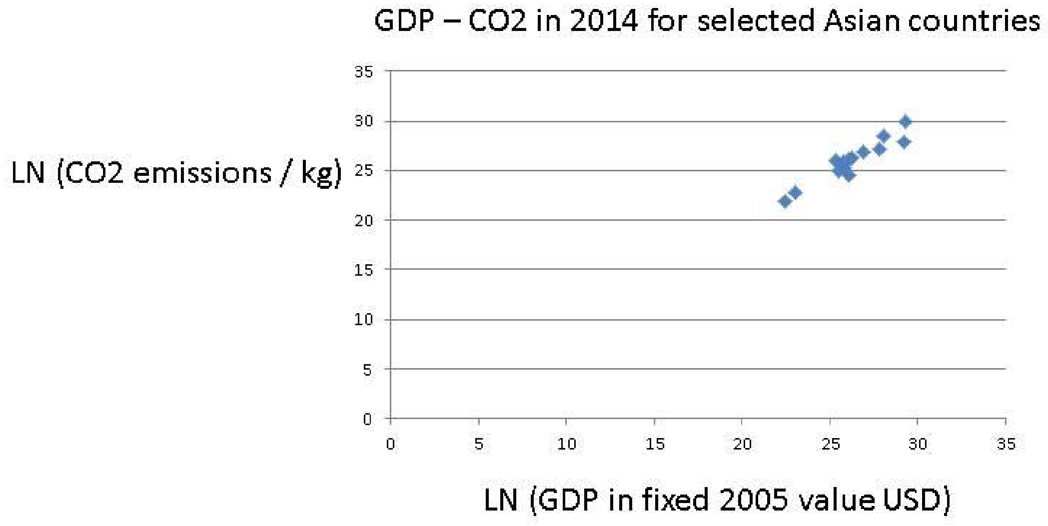


Figure1. *The 2014 Situation: Total GDP and CO2 in Asian Countries (y = 1,02x, R^2 = 0,91)*

CO2 emissions are much larger for all Asian countries, following the increase in economic output, or GDP closely. These enormous emissions of CO2 put the Asian region in the top most polluted regions in the world, besides North America and The EU. The consequences are visible in the huge cities in Asia, where smog levels have skyrocketed, hurting the health of ordinary people, like in Delhi, Beijing and Bangkok, etc.

It has often been pointed out that practical environmentalism would be much in the self-interest of Asian peoples, but the reasons of environmental degradation in this region is not a lack of theoretical environmentalism in the minds of people but the clash between ecology and economic development or growth. The immense increase in both GDP per capita and emissions per capita would have been impossible without the massive use of energy, i.e. fossil fuels.

One finds that the emissions of CO2:s follows economic development closely in many countries, like China, South Koreas and most Latin American countries. The basic explanation is population growth and GDP growth – more people breathing and searching for higher life style. Take the case of China, whose emissions are the largest in the world, totally speaking (Figure 2). Interestingly, China has begun a fundamental change of its energy policy in 2015, reacting to mostly domestic demands for cleaner air and environment.

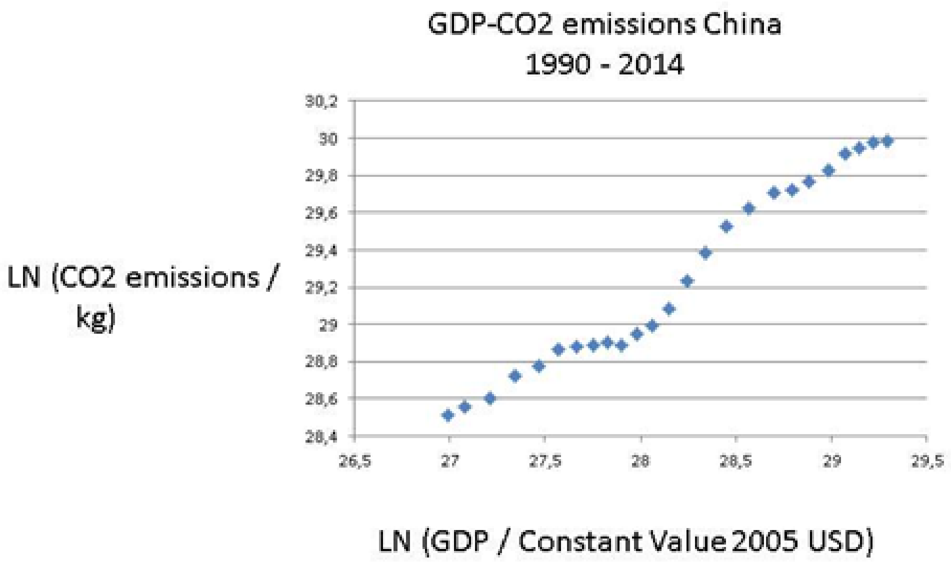


Figure2. *CHINA: LN (CO2/ Kg and LN (GDP / Constant Value 2005 USD) (y = 0,7x; R² = 0,97)*

The sharp increase in CO2:s in China reflects not only the immensely rapid industrialization and urbanization of the last 30 years, but also its problematic energy mix (Figure 3), which is now up for overhaul.

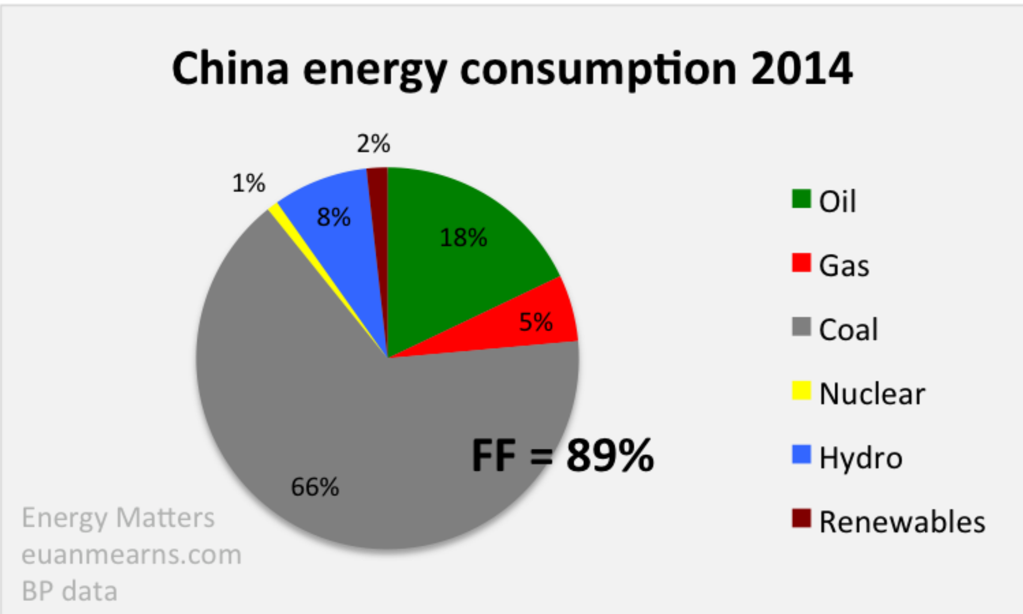


Figure3.

Source: *http://euanmearns.com/china-post-industrial-revolution*

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 and renewable energy sources except hydro power is very small indeed. This energy mix makes China very vulnerable to demands for radically cutting CO2 emissions: use other energy sources or massive installation of highly improved filters for carbon capture? It is true that China has turned to wind power, solar power and nuclear power massively recently, but the task of achieving a 40% reduction is enormous. China evidently hopes to respect its COP21 commitments while still enjoying an economic growth rate of above 5%, but it is realistic? New coal plants have actually been opened recently, replacing out-dated old ones in order to propel growth. China bets much upon solar power, but it also aimes to augment its energy consumption considerably during the 21rst century.

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 like the rich Gulf States cut most or the biggest aggregate polluters, like emerging economies China, India and Indonesia for instance? At COP21 this issue about redistribution was resolved by the proposed creation of a Super Fund to assist energy transition and environment protection in developing counties, as proposed early by economist Stern (2007)

India is even more negative than China to cut CO2 emissions, as it is in an earlier stage of industrialization and urbanization. Figure 4 shows the close connection between emissions and GDP for this giant nation.

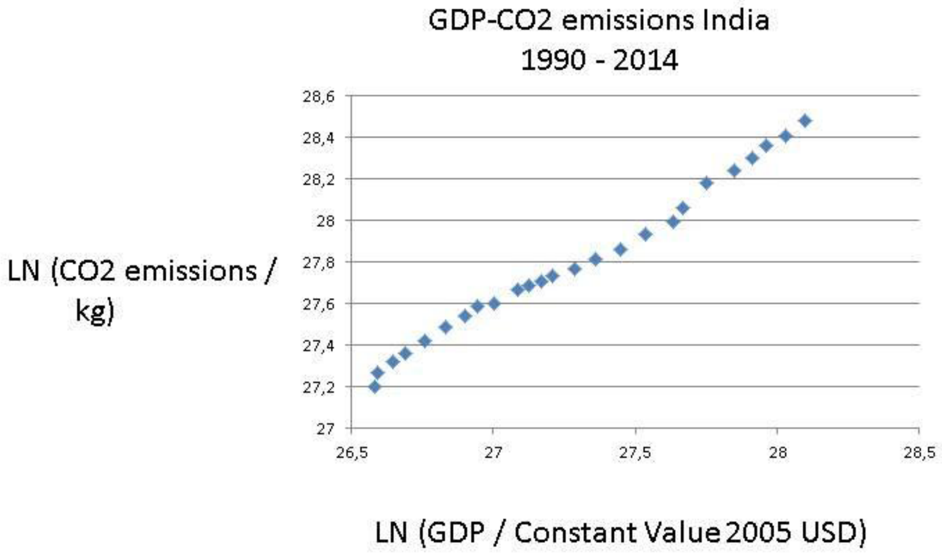


Figure4. *INDIA: LN (CO2/ Kg and LN (GDP / Constant Value 2005 USD)*

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

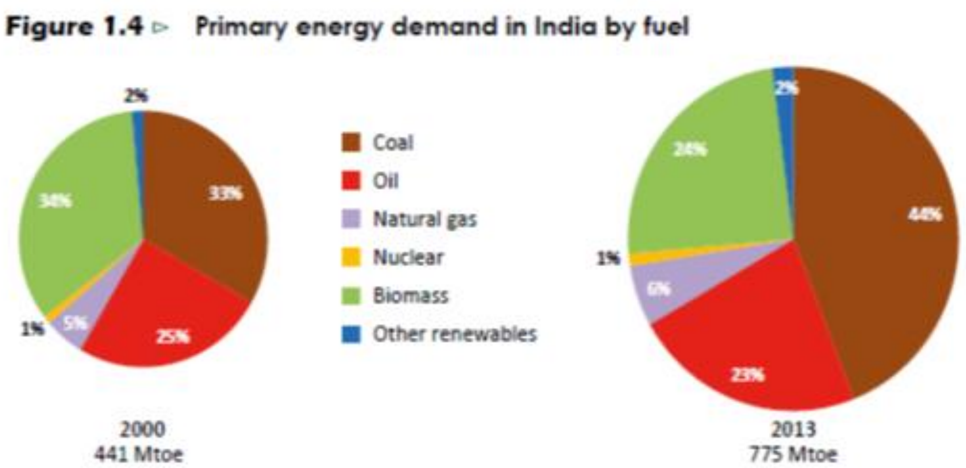


Figure5.

Source: *http://www.eia.gov/beta/international/analysis.cfm?iso=IND*

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 much 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 – water shortages - and nuclear power meets with political resistance. Interestingly, India uses much biomass and waste for electricity production, which does not always reduce CO2 emissions. India's energy policy will be closely watched by other governments and NGO:s after 2018. The constant tension between the demand for economic growth on the one hand and environmental protection on the other hand is sharply portrayed in Ramesh (2015).

The same upward trend holds for another poor developing country with huge population, namely Pakistan (Figure 6).

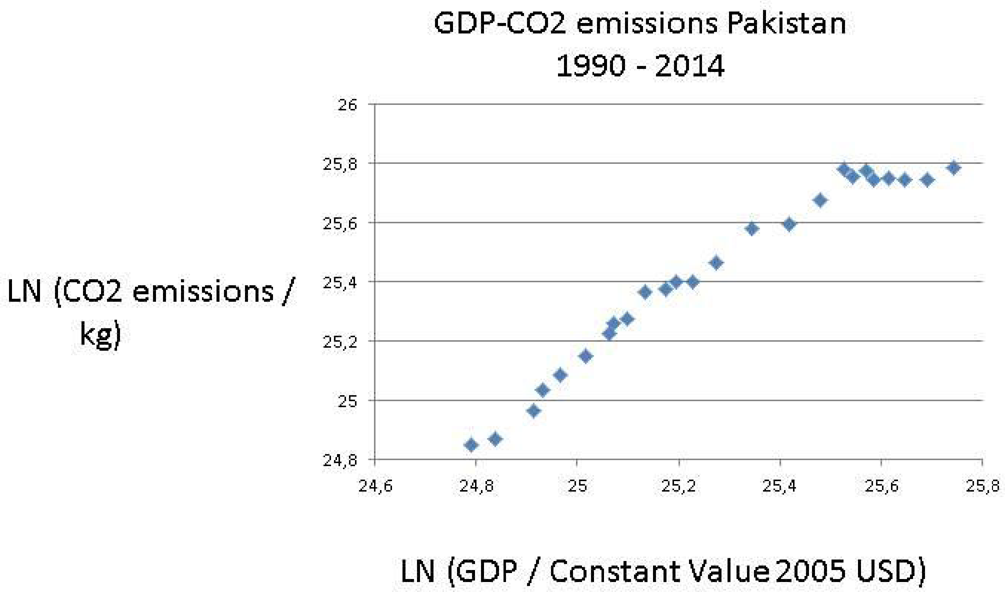


Figure7. *PAKISTAN: LN (CO2 / Kg and LN (GDP / Constant Value 2005 USD)* (*$y = 1,05x - 0,97$; $R^2 = 0,96$*)

But Pakistan employs a considerable portion of hydropower – 13 per cent – and a minor portion of nuclear power (Figure 8). Can it further develop nuclear and hydro power, or start using solar power on a large scale?

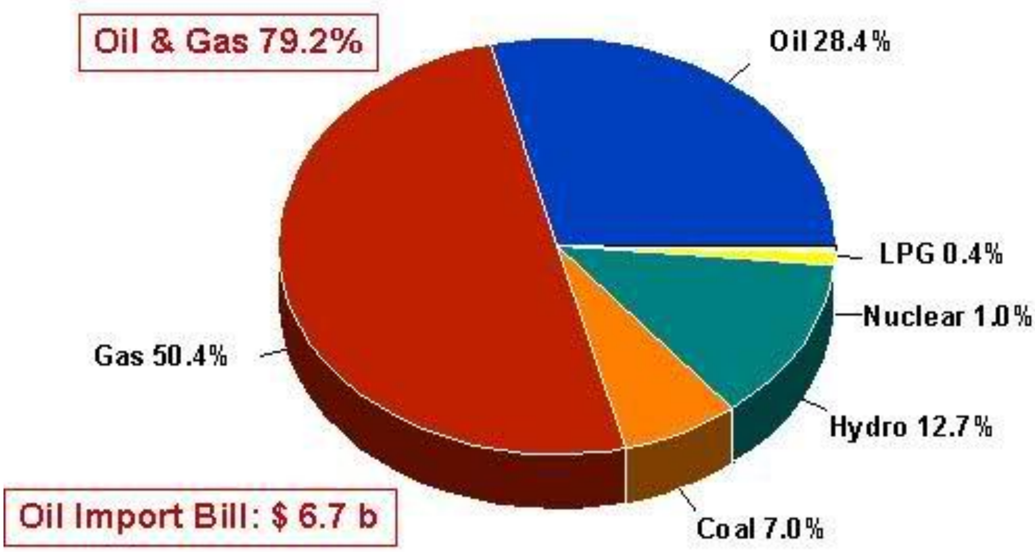


Figure8.

Moving on to another giant nation in South Asia, Bangladesh, we find an entirely different set of conditions for implementing COP21. Figure 9 shows that the major GHC of CO2:s follows economic development closely.

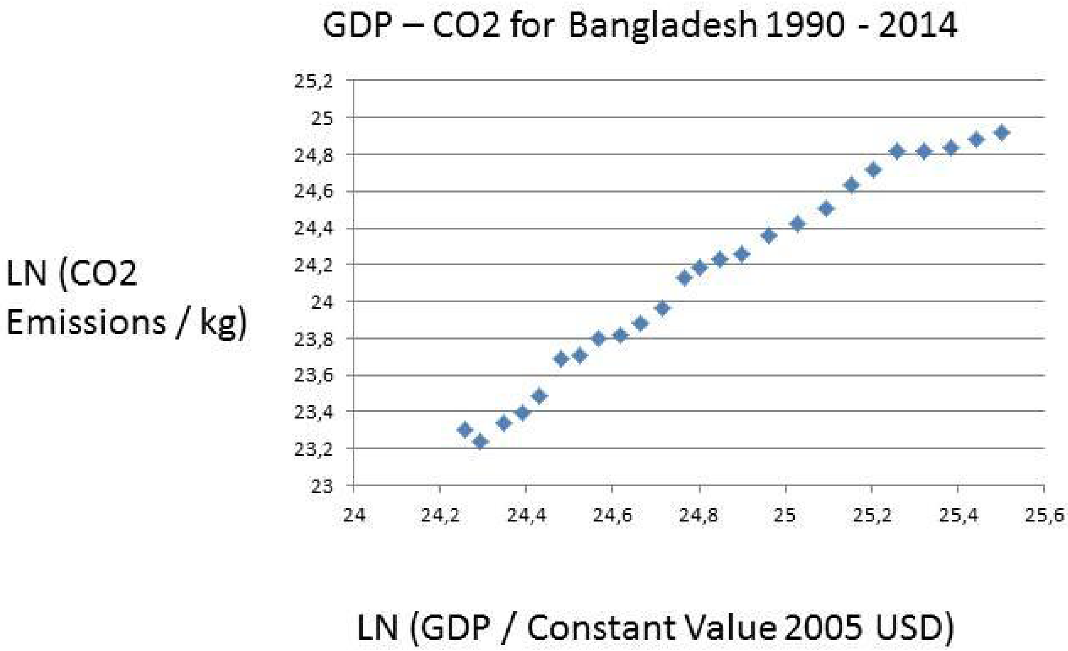


Figure9. *Bangladesh (y = 1,43x, R^2 = 0,98)*

Yet energy consumption is based on a different energy mix, compared with India. Figure 10 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.

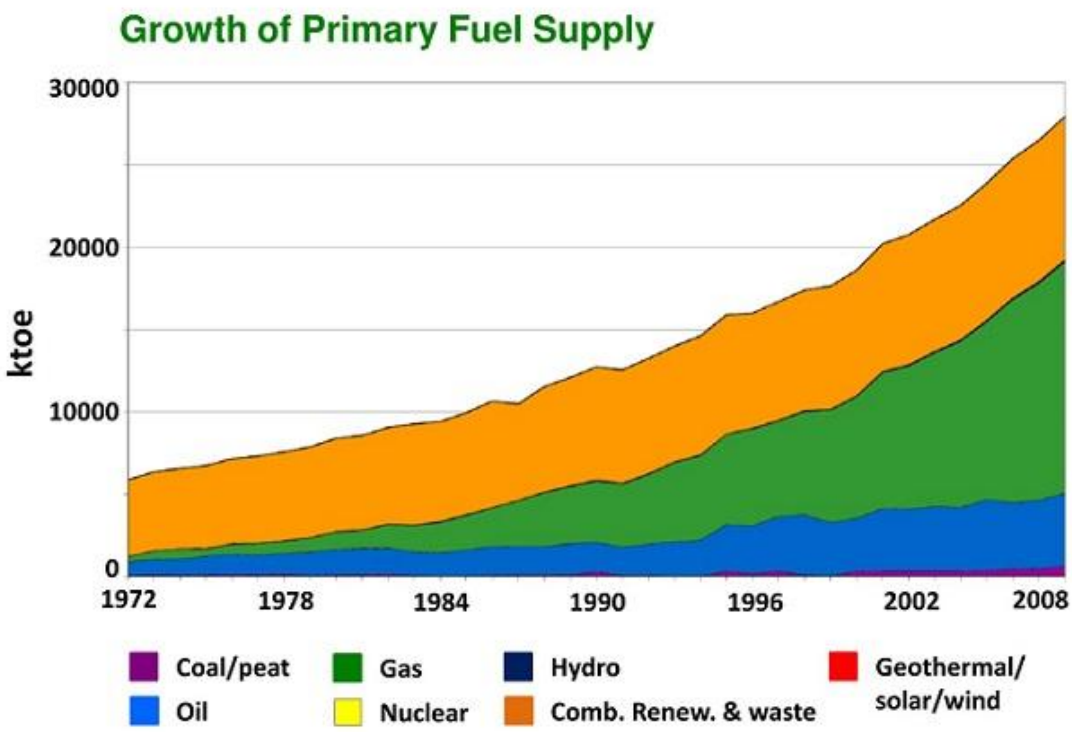


Figure10.

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

One may guess correctly that countries that try hard to “catch-up” will have increasing emissions. This was true of China and South East Asian countries. Let us look at three more examples, like e.g. giant Indonesia – now the fourth largest emitter of CO2: s in the world (Figure 11.)

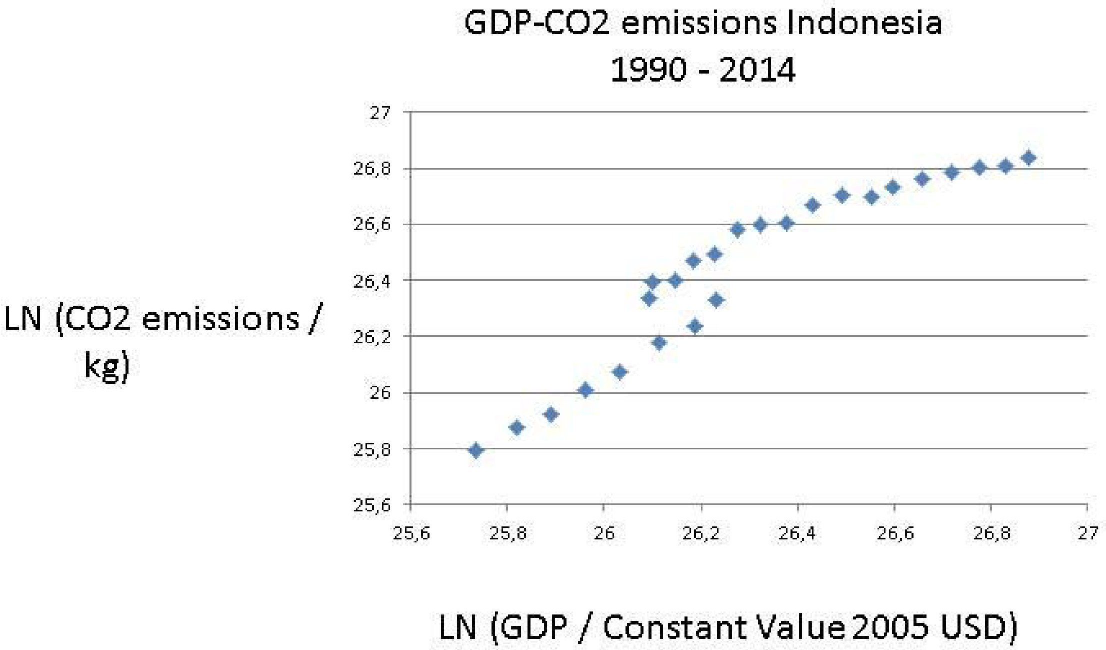


Figure11. *INDONESIA: LN (CO2 / Kg and LN (GDP / Constant Value 2005 USD)*

Indonesia is a coming giant, both economically and sadly in terms of pollution. Figure 6 reminds of the upward trend for East Asia, such as Thailand and Malaysia. However, matters are even worse for Indonesia, as the burning of the rain forests on Kalimantan and Sumatra augments the CO2 emissions very much. Figure 12 presents the energy mix for this huge country in terms of population and territory.

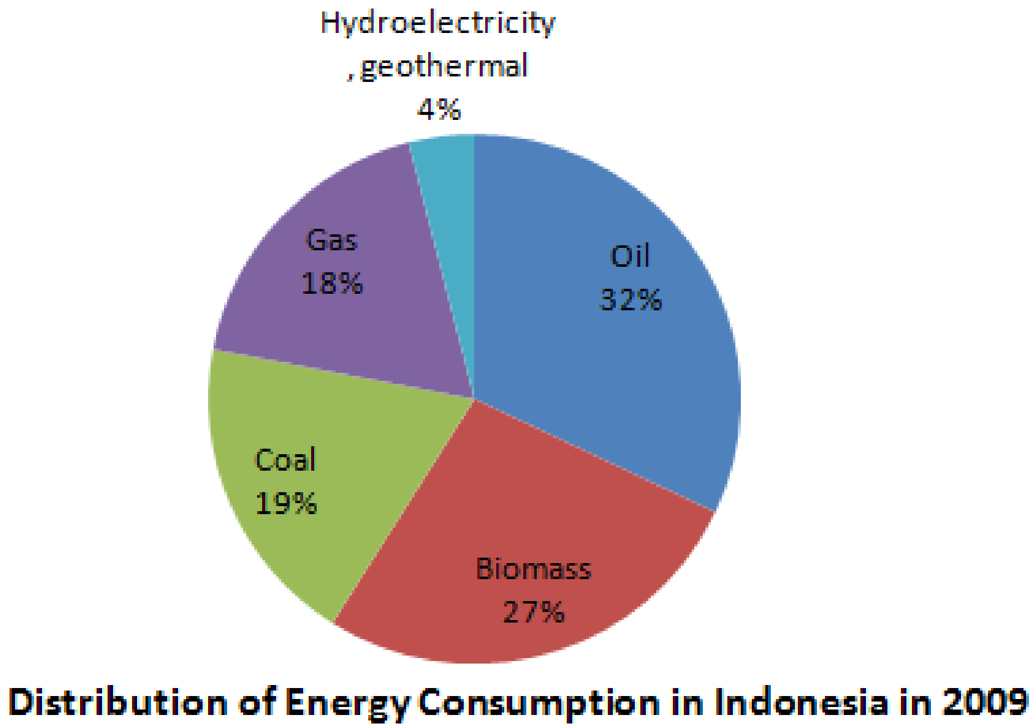


Figure12. *INDONESIA: Energy mix*

Source: *(http://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. One can be sure that it is mostly a question of tradition renewables – peats, charcoal – and th**ey** pollute a lot. One may find a close link between GDP and emissions also in countries in Asia with a most advanced economy. See Figure 13 for South Korea.

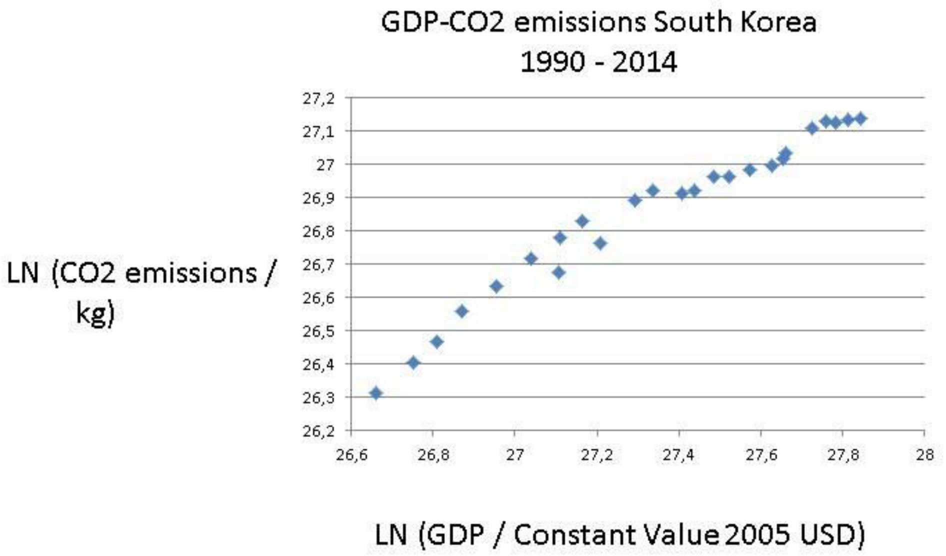


Figure13. *SOUTH KOREA: LN (CO2 / Kg and LN (GDP / Constant Value 2005 USD) (y = 0,65x + 9,19; R^2 = 0,96)*

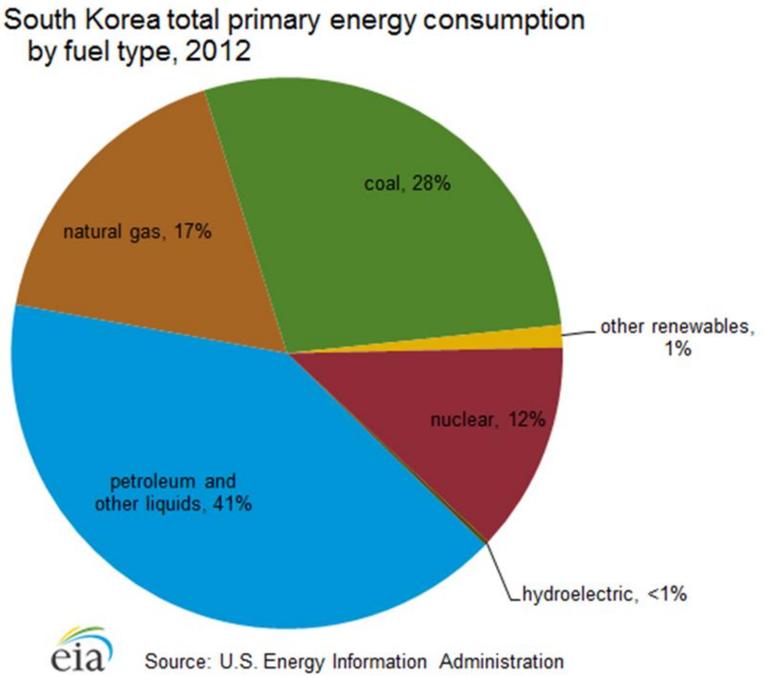


Figure14.

Lacking much hydro power, South Korea has turned to fossil fuels for energy purposes, almost up to 90 per cent (Figure 14). It differs from China only in the reliance upon nuclear power, where the country is a world leader in plant constructions. Reducing its hefty GHG emissions, South Korea will have to rely more upon renewable energy sources, as well as reducing coal and oil for imported gas or LNGs.

Among the above countries that are giant polluters in terms of CO2, China and South Korea uses mainly fossil fuels for energy consumption, whereas India also employs renewables and hydro power, lacking in the other two countries**.** South Asia, East Asia and South East Asia play a most critical role in the COP21 implementation process. They are responsible for almost 50 per cent of the CO2 emissions. And they plan to increase their energy consumption enormously in the next decades. They hope for carbon neutral energy sources, replacing solids and fossil fuels like oil and gas, turning to solar and atomic power. The investment needs are truly immense and based upon a quite aggressive growth argument, bypassing the idea of a sustainable economy (Sachs, 2015). However, it is certain that these goals are not in conformity with COP21.

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).

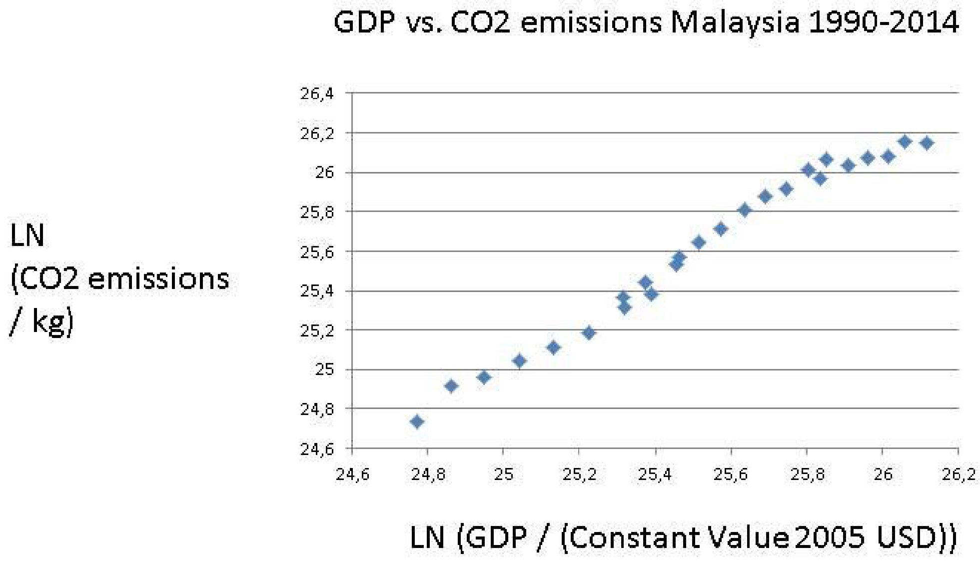


Figure15. *Malaysia (y = 1,13x; R² = 0,98)*

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.

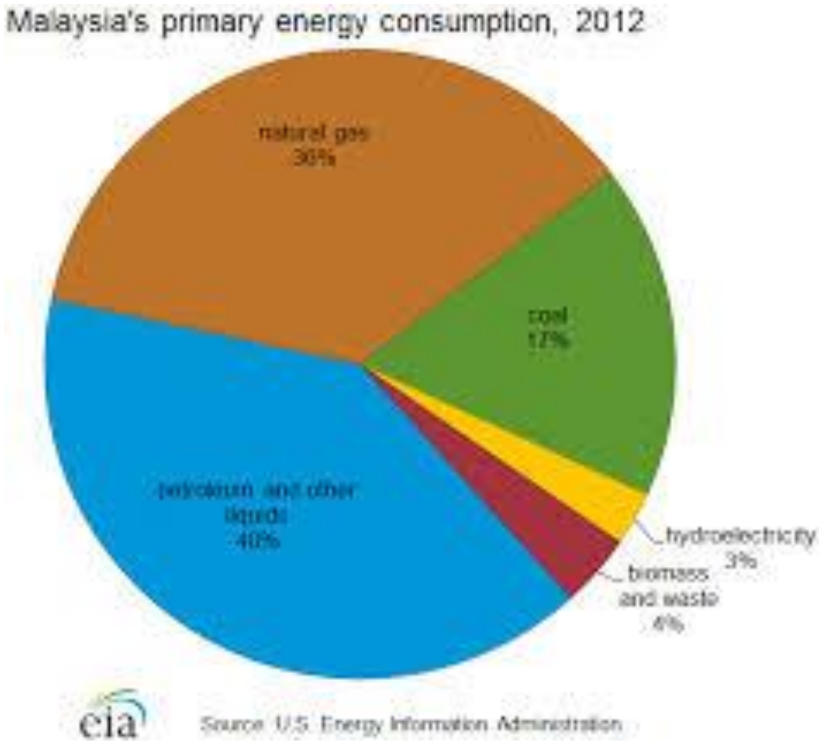


Figure16.

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

4.2. The Middle East

Countries may rely almost exclusively upon petroleum and gas mainly – see Iran in Figure 17 for instance. 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.

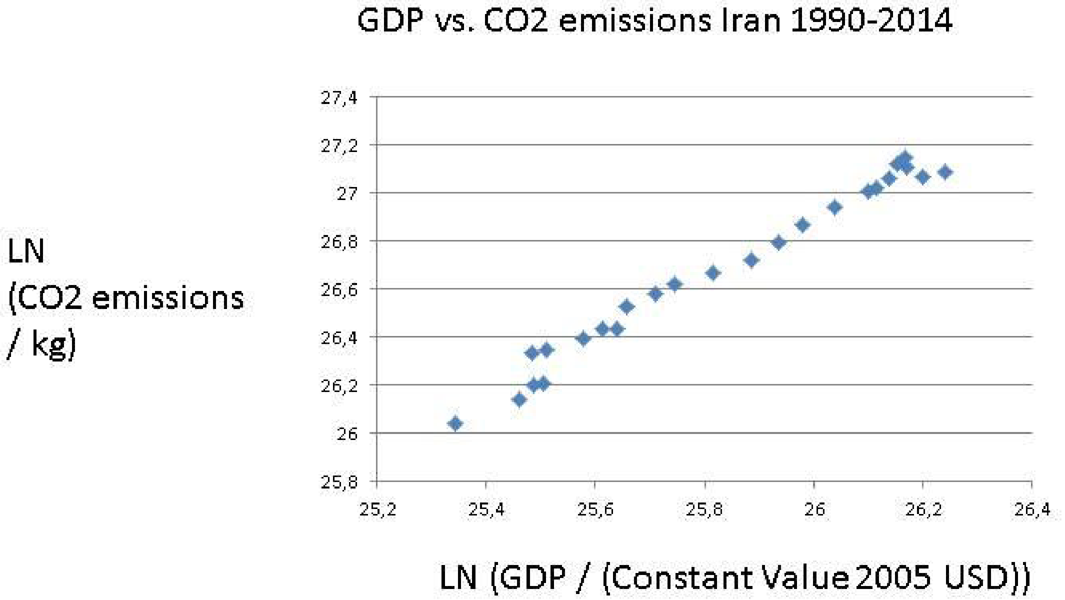


Figure17. *Iran (y = 1,2229x - 4,91; R² = 0,98)*

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.One understands why an emerging economy like Iran wants atomic power. It would allow them *inter alia* to sell their fossil fuels on the market. But the problems for international governance of this energy policy have been most costly in terms of transaction costs. Iran would defend their position with the standard economic growth argument (de Bruyn, 2012; Eriksson, 2013).

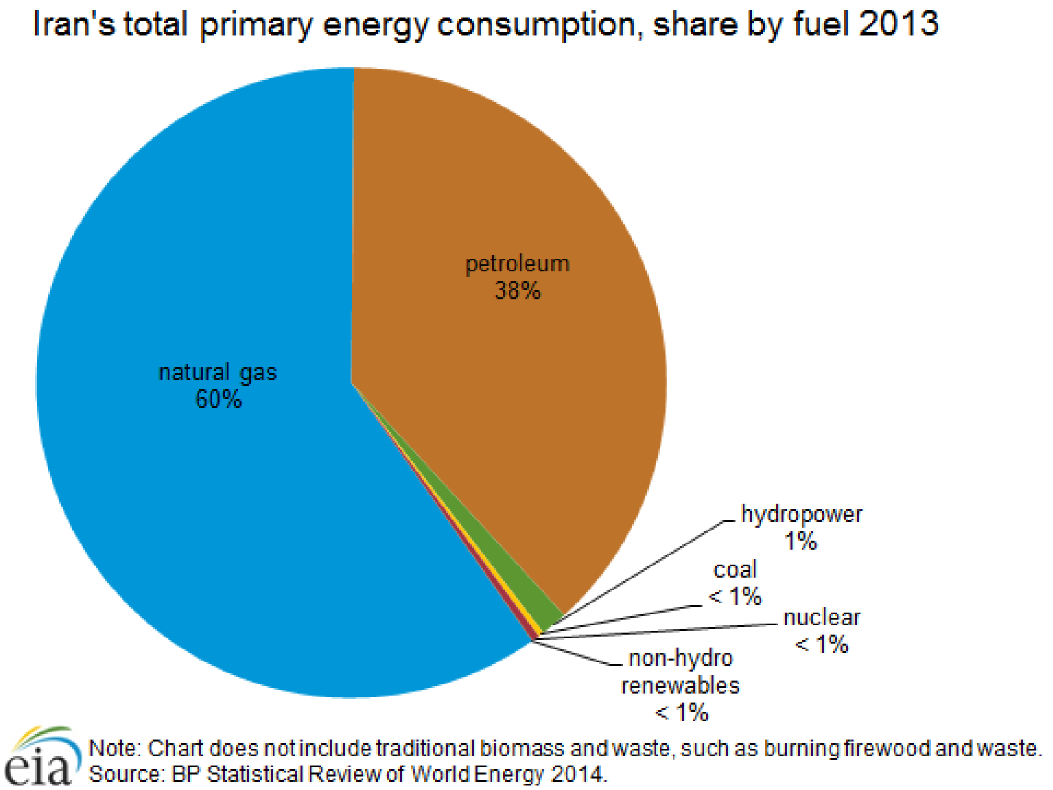


Figure18.

When analysing Iran coming back into the energy markets, one may compare this powerful country with Saudia Arabia in decline. Figure 19 shows its sole reliance upon oil, where it no longer holds a dominant position, neither in the global market or in terms of total future resources. The shale rock revolution has seriously damaged Saudi Arabia's interests, as it is no longer a price setter with the OPEC and the OPEC cannot control supply..

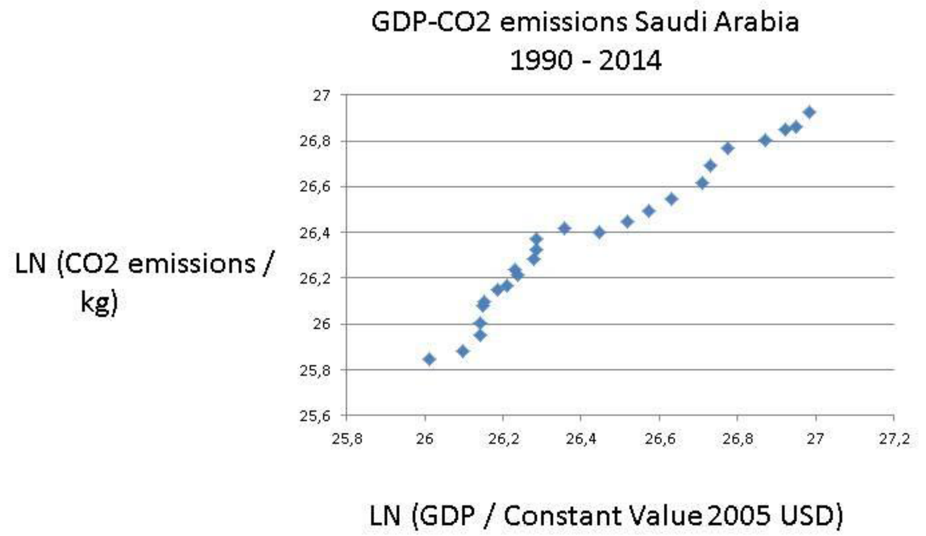


Figure19. *Saudi Arabia (y = 1,03x - 0,77; R^2 = 0,95)*

The overall energy situation for this kingdom has no doubt worsened with the shale oil and gas revolution. With the idea of a HUBBERT peak gone entirely, the Saudis will not get that enormous econmic rent. In stead, they must cut down on luxurey spending and look for alternative energi sources (Figure 20). But how much will the country invest in solar parks or wind power, when oil is stil cheaper and more efficient?

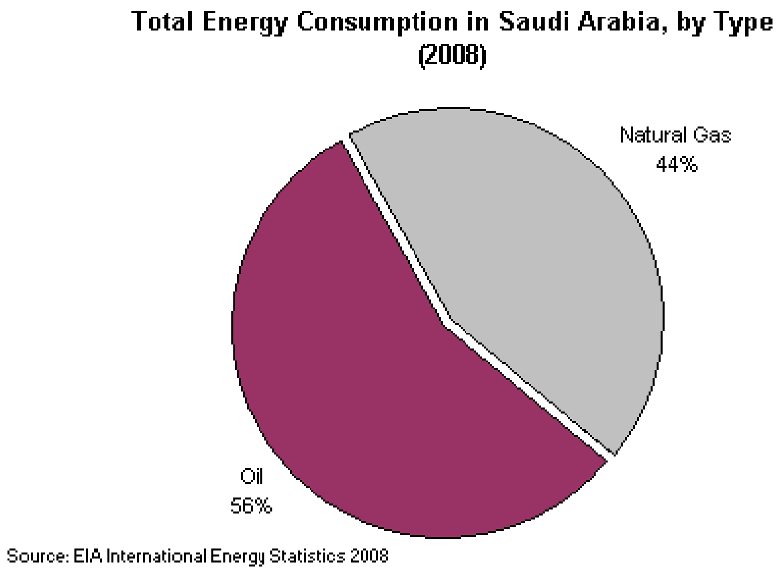


Figure20.

Saudi Arabia is a high polluter, and it needs to take COP21 very seriously, moving to solar power and nuclear investments. But it will be costly. Actually, all of the super rich Gulf states emit lots of CO2 per capita to maintain thei life style of massive electricity consumption per capita and pharaonic building.Saudi Arabia like other OPEC countries as well as Russia have to develop a management strartegy that takes into account the arrival of huge shale oil and gas deposits over the world and and declining rent from old type oil production and sale.

4.3. Latin America

First, we examine the evidence about emissions in 1990. The countries with lowest total emissions of CO2 were: Paraguay, Uruguay and Bolivia, while the largest emitters included: Mexico, Brazil and Venezuela. In terms of total CO2 emissions, the variation between countries stem from their level of economic development. The only exception is Paraguay, where emissions are higher than Bolivia, although the former is more poor than the latter. Most emissions are to be found in the two economic giants, Brazil and Mexico.

Let us now look at the 1990 emissions per capita. The per capita emissions of CO2 goes up with GDP per capita, but not in a linear fashion. The lowest emissions/capita were to be found in Paraguay, Bolivia and Peru, whereas the highest per capita emissions were to be found in Venezuela, Mexico and Argentina. In 2014, after 24 years of economic development, Latin American coutries have moved up considerably on the GDP scale, reflecting economic advances, especially in some of these countries. However, the missions of CO2 have also moved to the right in Figure 21.

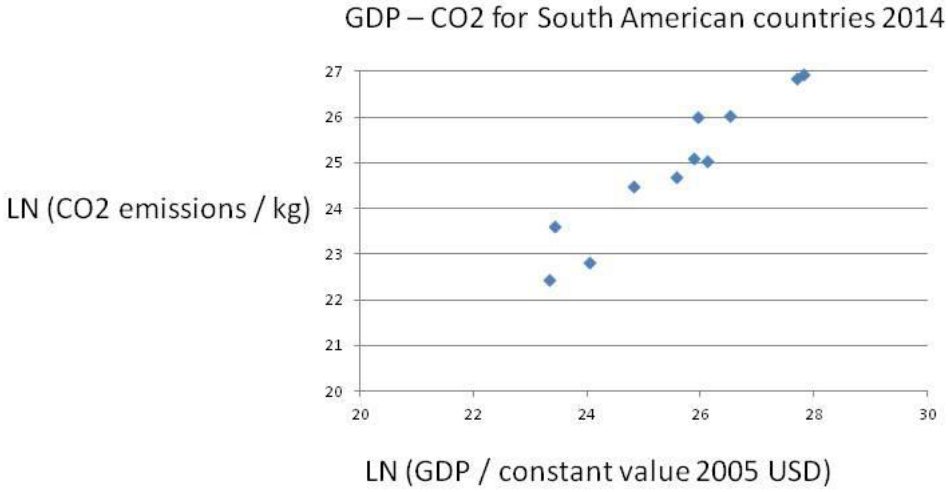


Figure21. *GDP-COP in Latin America 2014 (y = 0,9403x , R² = 0,9136)*

The countries with lowest total emissions of CO2 were: Paraguay, Uruguay and Bolivia, while the largest emitters included Brazil, Mexico and Argentina. We have to look especially at Uruguay, scoring surprisingly low with a fairly advanced economy. The economig progress after 2000 has been conducive to more of CO2 emissions in all countries selected here. Thus, Latin America faces the same growth-emissions problematic as Asia, namely how to secure economic development while *reducing* CO2:s, according to CP21. One must be aware of that total emissions and emissions per capita generate very different country rankings.The countries with lowest per capita emissions of CO2 were Paraguay, Colombia and Bolivia, while the largest emitters included Venezuela, Argentina and Chile in terms of CO2:s per capita. The patterns is a different one, although emissions/capita follows GDP/capita. Argentina just as Venezuela certainly has a CO2 problematic, although it does not rank high on total emissions. Taking population size into account changes the picture, but the 40% reduction goal still obtains whatever emission measue one employs.

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 22 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.

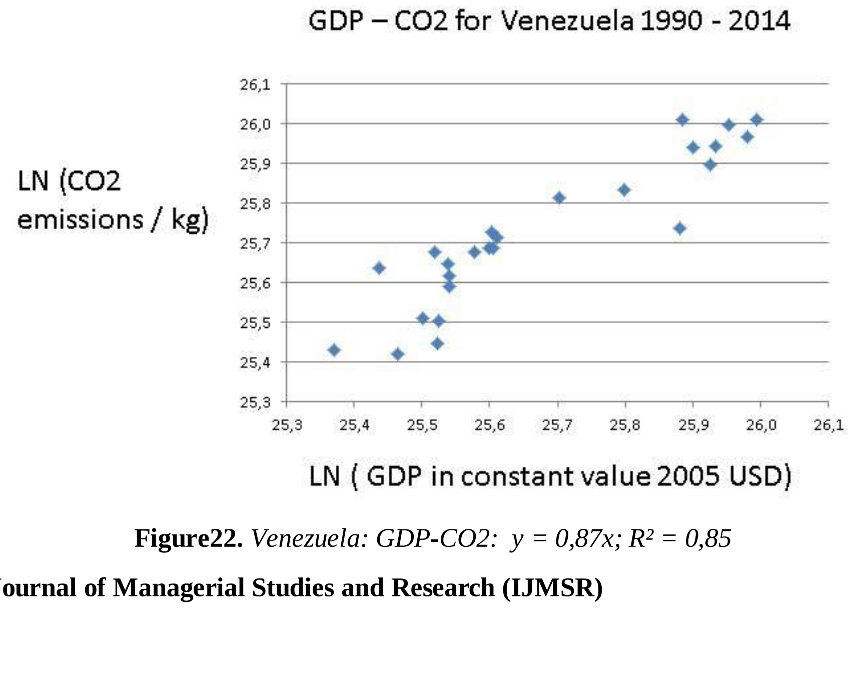


Figure22. *Venezuela: GDP-CO2: y = 0,87x; R² = 0,85*

Although this country has huge hydro power resources, it has much relied upon its oil and gas deposits, burning fossil fuels so that CO2:s go up with the pace of economic growth. Venezuela does use hydro power (Figure 23) line other LA countries like Colombia, Peru and Chile.

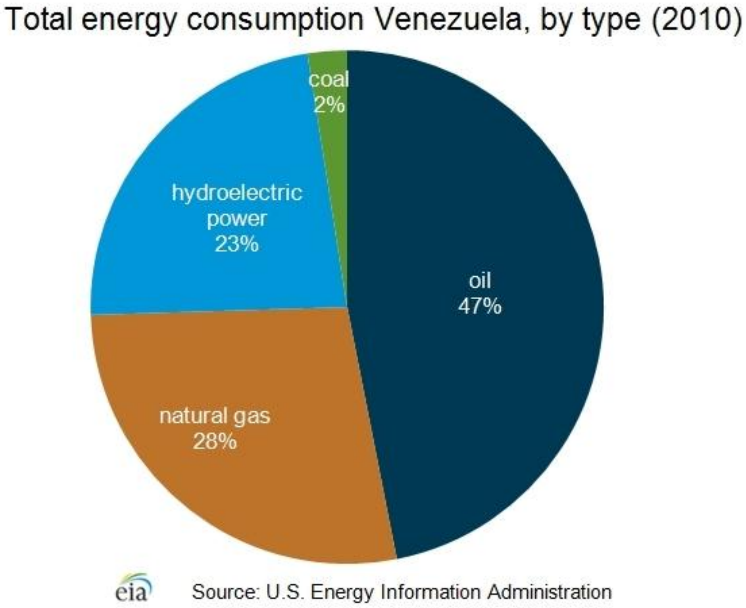


Figure23. *Venezuela: Energy mix*

Yet, 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 enormous electricity chaos, resulting in huge loss of output and work. Evidently, no Venezuelan government has not taken precautionary action, building for instance some sets of back up generators based upon its massive oil and gas reserves.

Brazil has for a long time been in the forefront of environmental concerns. On the one hand, it has paved the way for an alternative to the oil dominance in transportation by developing a domestic biomass industry on large scale. The ethanol is derived from immense sugar plantations and it has reduced oil dependency, especially when international petrol prices have skyrocketed. On the other, there is the constant worry that Brazilian governments are ineffective in protecting the lungs of the Planet Earth, the giant rain forest in the Amazon.

First, we may establish that Brazil produces much CO2:s, and this as a function its economic development (Figure 24).

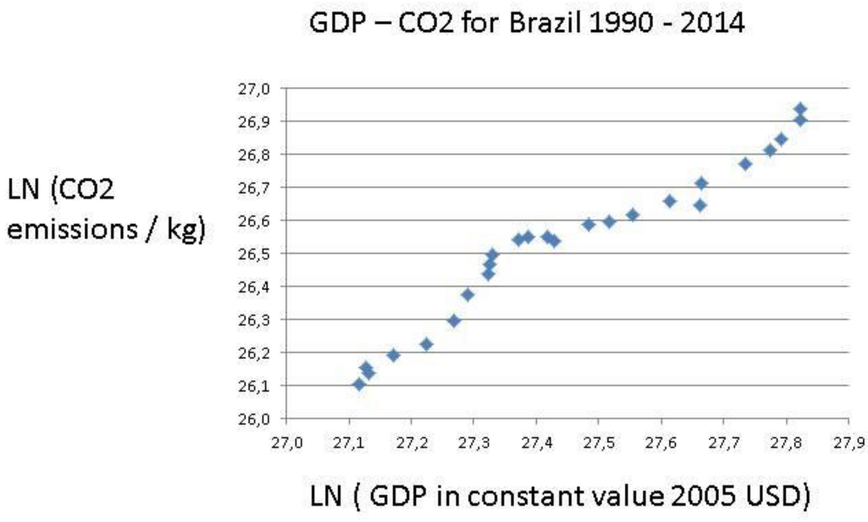


Figure24. *GDP-CO2 in Brazil: y = 1,02x R^2 = 0,95*

The trend in Brazil for CO2:s is like that in for example Argentina: up and up. When the burning of the rain forest is added, then Brazil is one of the largest CO2 emitter in the world. The country may reply that its energy mix and its huge forests and bio-mass plantations decrease CO2:s by consuming carbon (Figure 25).

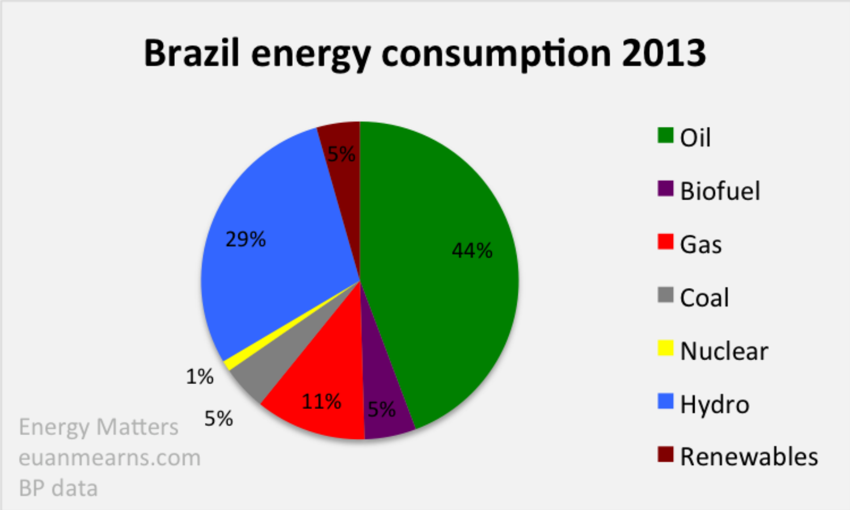


Figure25. *Energy mix of Brazil*

Source: *http://euanmearns.com/brazil-samba-energy/*

Hydroelectric power is massive in Brazil and capacity has grown steadily since 1965. However, hydro production has been down owing to late and light rains. Brazil is one of the few countries in the world where liquid bio-fuel production is significant: ethanol. Gas production in Brazil is significant, but Brazil has very little of coal production. In 2006, the discovery of vast oil resources in the sub-salt strata of the Santos Basin promised petroleum bonanza, but deep water and sub-salt setting has posed technical challenges and high costs. Brazil has 3 nuclear reactors, but nuclear provides merely 1% of primary energy.

One can hardly say that it will easy for Brazil to live up to its COP21 commitments, despite its comparatively low dependence upon fossil fuels. Its large hydro power supply is vulnerable to drought, as rivers could well dry up, like in Venezuela. And then one must add the political difficulties in managing the oil and gas reserves properly in giant enterprise Petrobas. The huge Mato Grosso could be used for renewable energy generation, wind and solar power. Yet the CO2 savings from ethanol production and consumption may have been over stated.

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, burning some of it. For Mexico holds the following situation (Figure 26).

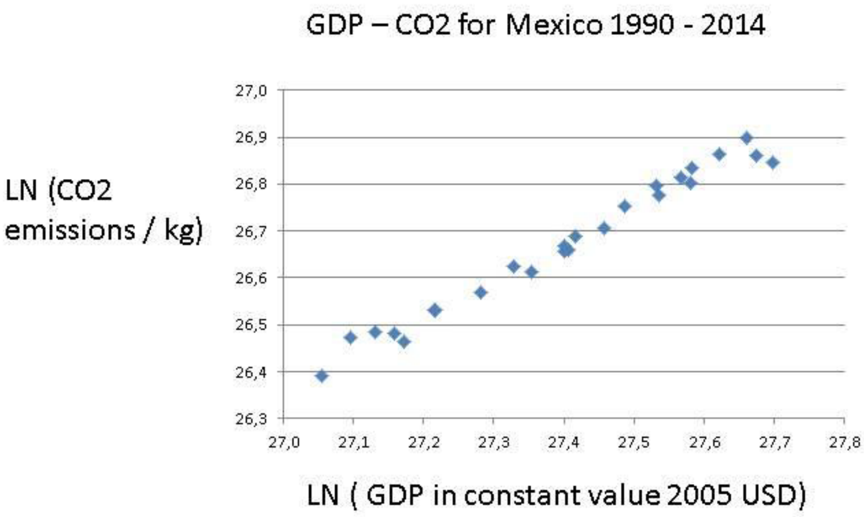


Figure26. *GDP-CO2 in Mexico: $y = 0,77x$; $R^2 = 0,98$*

The close link between economic development and CO2 is discernible 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 inquire into the energy mix of this huge country that is of enormous economic importance to both North and South America (Figure 27).

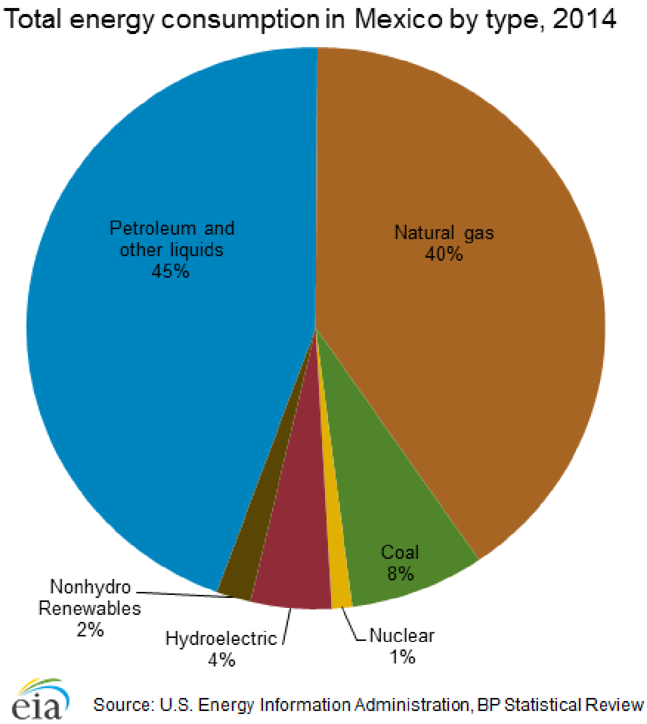


Figure27. *Energy mix for Mexico*

Few countries are so deependent upon fossil fuels as Mexico. 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?

4.4. North America

Although Canada is a major emitter of GHG:s as well as one of the world's largest fossil fuel producer – oil sands, it has managed to stem the increase in emissions for the most recent years, i.e. halting the augmentation, at least for a time (Figure 28). Figure 29 may be invoked to explain this, showing a very mixed energy consumption pattern with lots of different energy sources.

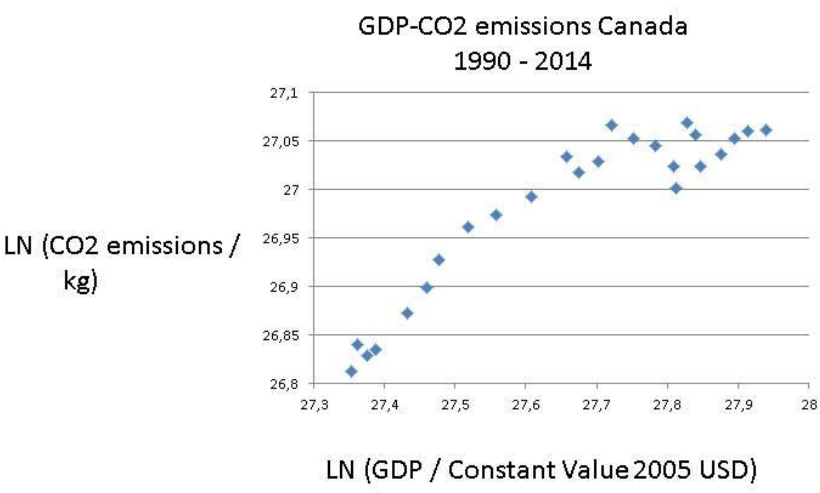


Figure28. *CANADA: LN (CO2 / Kg and LN (GDP / Constant Value 2005 USD) (y = 0,41x + 15,7; R^2 = 0,85)*

Canada has a strong advantage compared with for instance China and India in that it has access to lots of hydro power and natural gas. The burning of coal is as low as 12 per cent, but oil still makes up almost a third of energy consumption. But its emissions still go up with GDP. How to break this dire link?

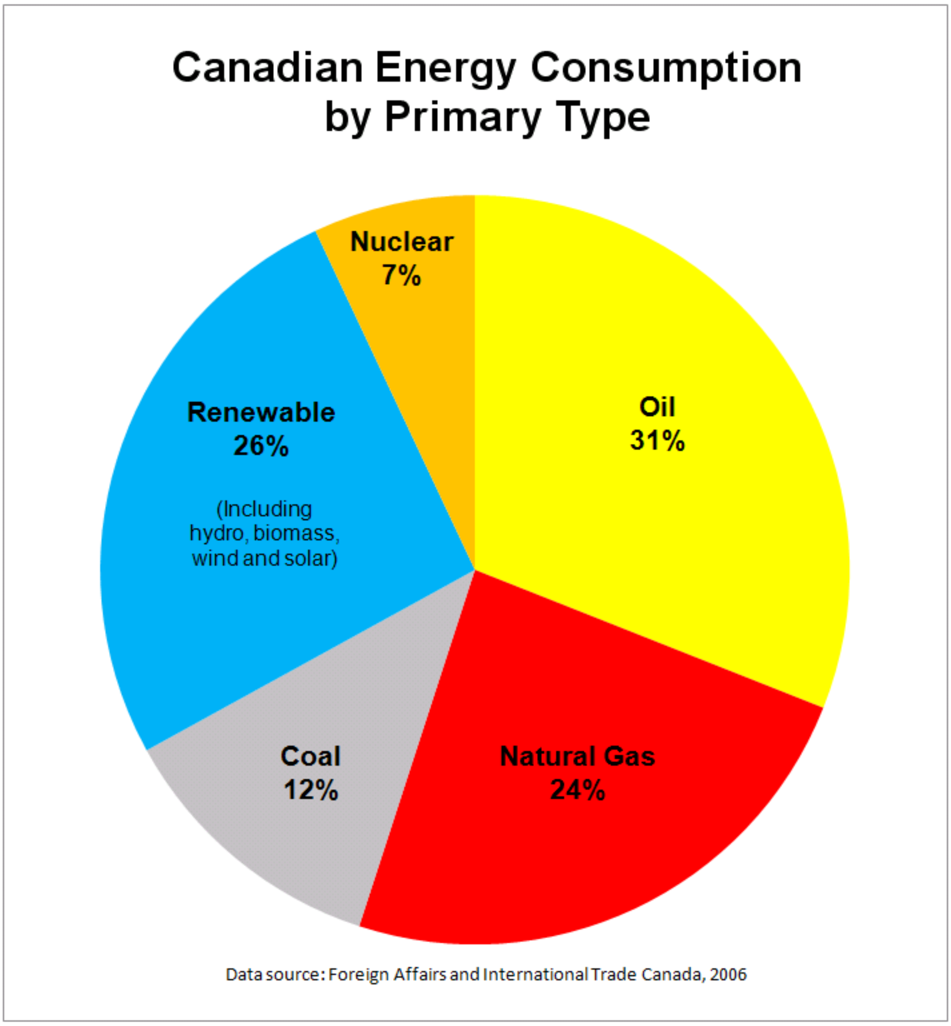


Figure29.

Canada has not yet like the US managed to turn this link downwards. The collapse of the oil price should make Canada invest more in water and modern renewables or atomic power, but uncertainty prevals about the future of the oil sands, viz. more of that?

4.5. African Continent

Looking at the African continent from the COP21 perspective, two things must be emphasized. Firstly, some countries still lean on traditional renewables reflecting low economic development. Second, the population predictions for the continent are extremely high meaning that it will need colossal amounts of energy in this century. New renewables cannot deliver all of that at the same time as decarbonisation is to proceed. We display the connection between GDP and CO2:s around 1990 for a selection of African nations.

When we look at the same factors in 2014, the link has been strengthened considerably. The chief finding is that African nations, although not generally polluting heavily with CO2:s like Asia, face the same problematic as countries on the other continents. They must reduce CO2:s while maintaining economic development. What this dilemma entails appears clearly when a few African nations are explored below according to the theoretical framework above.

When countries are heavily dependent upon fossil fuels, it may actually not be coal that is the largest source, but oil and gas. To verify this, we go to the north of Africa, the Maghreb.

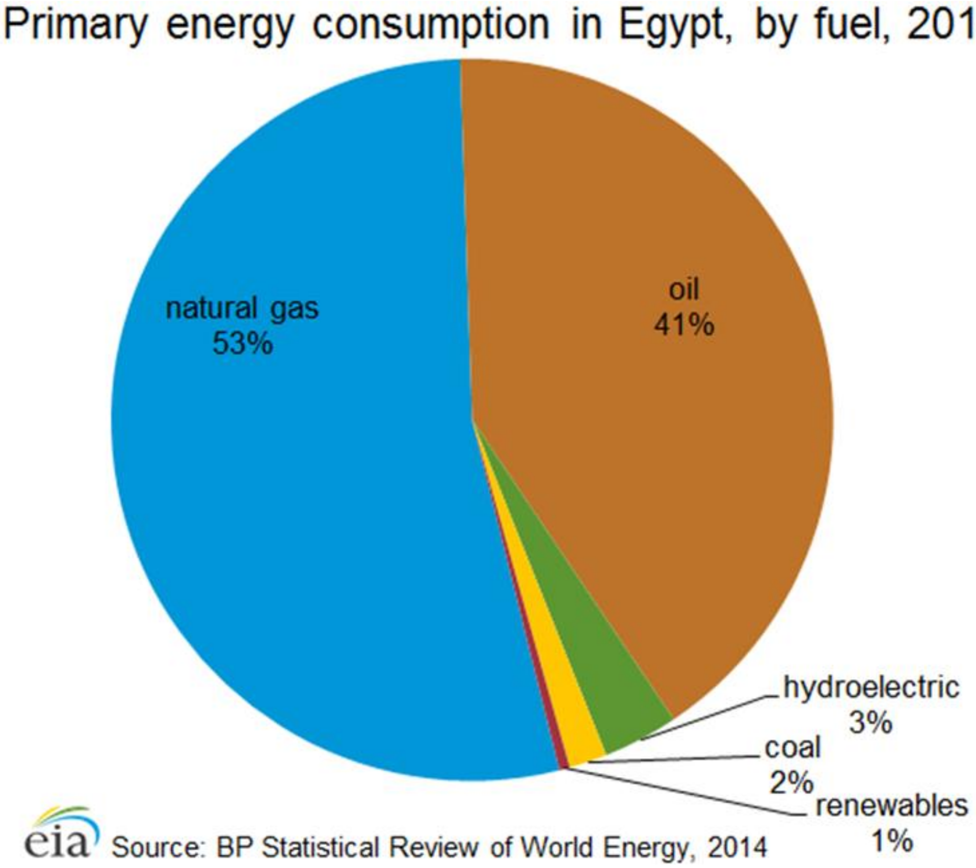


Figure30. *Egypt: Energy mix*

Egypt with its giant population has not been able to employ hydro power as much as one would be inclined to presume. The Nile Valley countries find it very difficult to reach an agreement about how to use and divide these enormous water masses. As for the RSA, CO2 increases follow the GDP. 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?

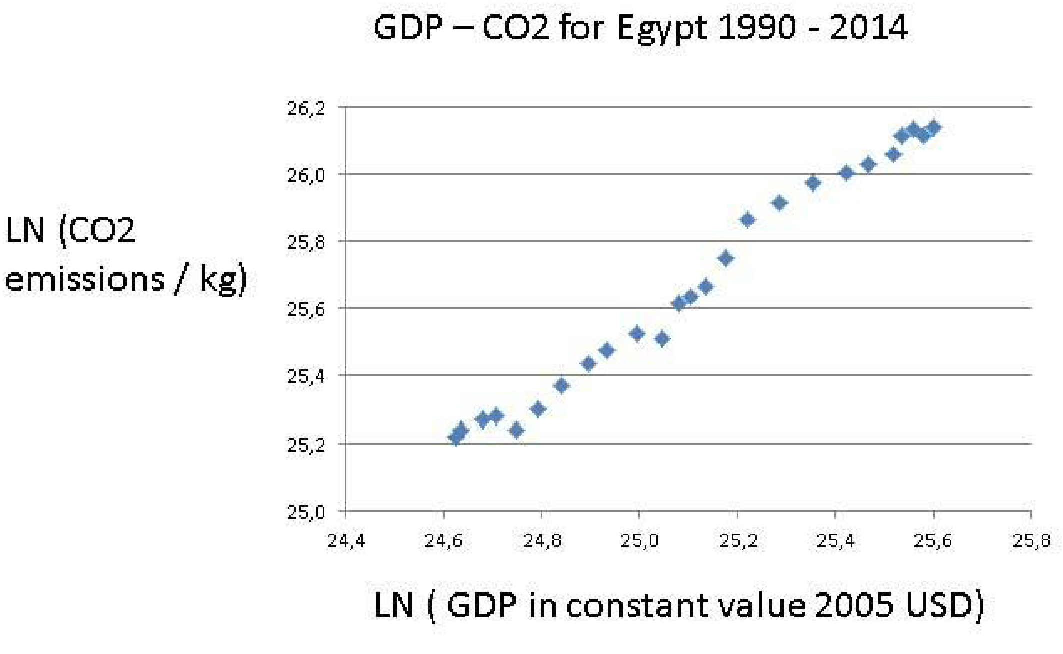


Figure31. *GDP-GO2 for Egypt*

One of the promising nations in Africa is Ghana, housing both democracy and positive economic development. Figure 32 shows its GDP-CO2 picture for the last two decades, when things have gone well and peacefully.

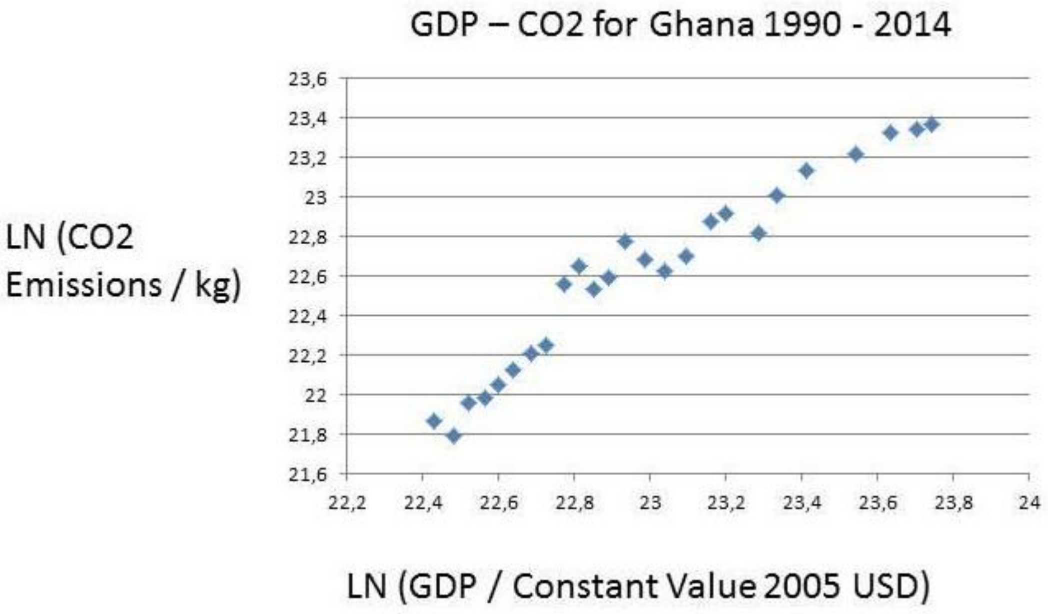


Figure32. *Ghana: GDP-CO2: y = 1,17x, R^2 = 0,94*

There is a very strong connection between GDP and CO2 emissions in Ghana. One would like to examine its energy mix in order to understand this. Figure 33 present the energy consumption pattern in Ghana.

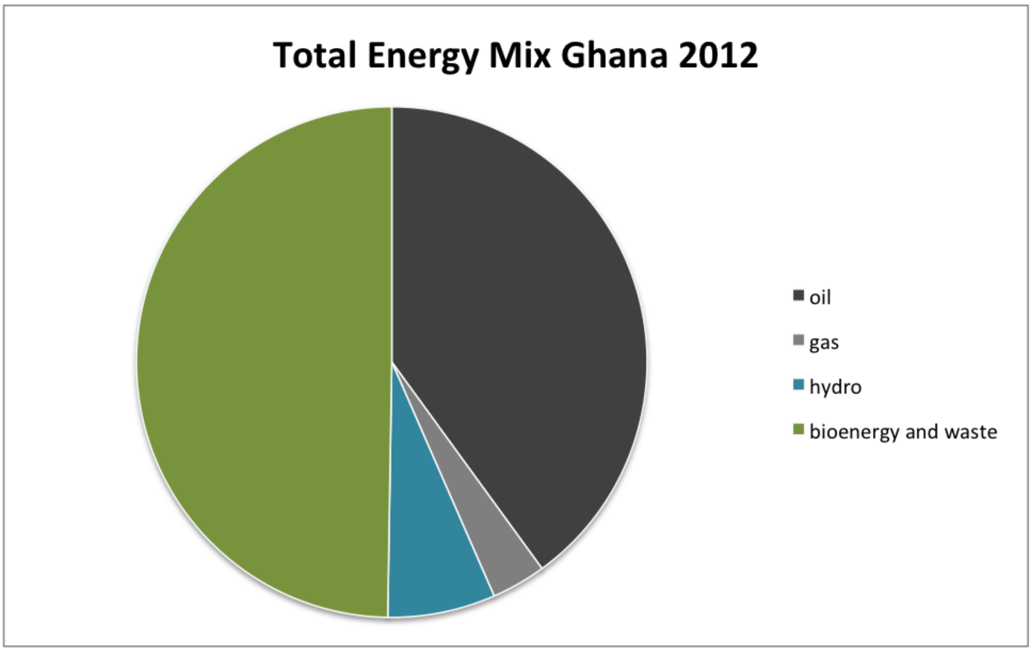


Figure33.

Source: *http://climateanswers.info/2015/10/ghana-climate-and-energy-statistics/*

Ghana needs both electricity in its many villages and petrol for transportation. Figure 34 shows that oil is used abundantly, but there is also much hydro power. Yet, 50 per cent of the power comes from bioenergy and waste, which is classified as old renewables. These kinds of *traditional* renewables are to be found in almost all sub-saharan Africa countries. And they create large CO2 emissions, which is why there is this close link between GDP and CO2:s here.

Look now at Kenya, the economically leading country in East Africa, in Figure 34.

Figure34. *Kenya: y = 1,08x, R^2 = 0,95*

As a matter of fact, Kenya:s curve for GDP and CO2:s resembles that of Ghana, both countries experiencing economic progress. The basic energy resources are also the same: renewables, hydro and petroleum – see Figure 35.

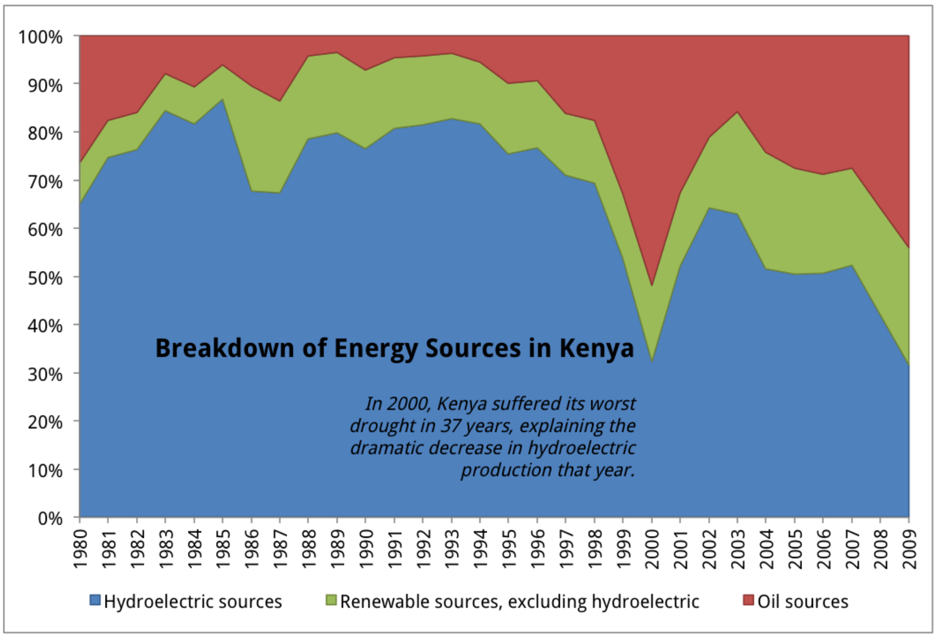


Figure35. *Kenya: energy mix*

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

These renewables are not all carbon neutral, meaning hey include 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, Niger, Nigeria, Kongo, Angola and East African states, but the trend in Figure 34 does not suit or fit COP21. Hydro power has been launched as a solutio for several African countries to comply with COP21, perhaps helped mainly by China, building dams in Ethopia and Sudan for instance. Some say that more than 300 hydro power stations are to be constructed in the next decade in Africa, Latin America, and Asia, but it is wishful thinking to some extent.

Algeria ia a major exporter of natural gas and oil, Thus, we expect that it relies mainly on fossil fuels, like Mexico and the Gulf States. Figure 36 verifies this expectation.

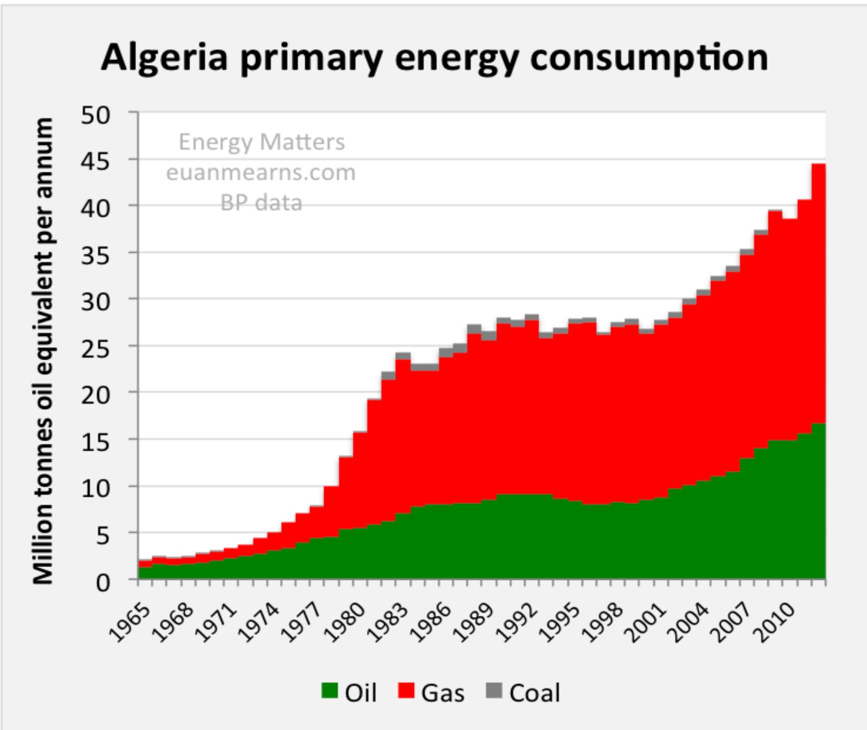


Figure36.

Source: *http://euanmearns.com/post-peak-algeria/*

Although Algeria may trust in the availability of future fossil fuels resources, it still faces the demand for a 40% reduction of its CO2 emissions. They have thus farfollowed the economic progress.

One would naturally suggest solar energy as a viable alternative to the heavy dependence upon fossil fuels in Algeria, given its immense Saharan territory. Yet, also Algeria has been plagued by the attacks of terrorists or looters. Giant solar parks would be easily knocked out. Giant Nigeria has an energy mix typical of a poor African country, despite having the biggest economy on the African continent, with some 50% in agriculture, despite being a oil and gas exporter, like Angola– see Figure 37.

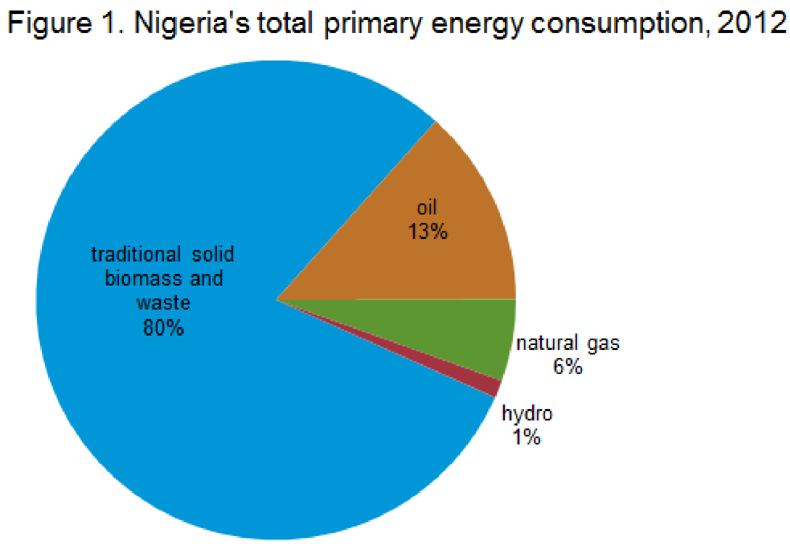


Figure37. *Nigeria*

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.

The COP21 framework outlines the three main goals for the 21rst century in order to keep Planet Earth habitable. Thus, these 3 objectives are now accepted as desirable, but scholars now question whether they are feasible, at least without massive costs or economic decline and global depression (Sachs, 2015). A few countries are almost completely dependent upon coal. How will they implement the COP21 goals? Look at South Africa. Emissions are high, because South Africa uses a lot of coal to generate electricity. Decarbonisation will be difficult and costly. The reliance upon coal in this largest economy in Africa is stunning.

The RSA has a modern economy running on mainly coal (Figure 38). In transportation, it uses petroleum mainly. This makes the RSA a major polluting nation. It wants to spread electricity to all shanti-towns, but with what energy source?

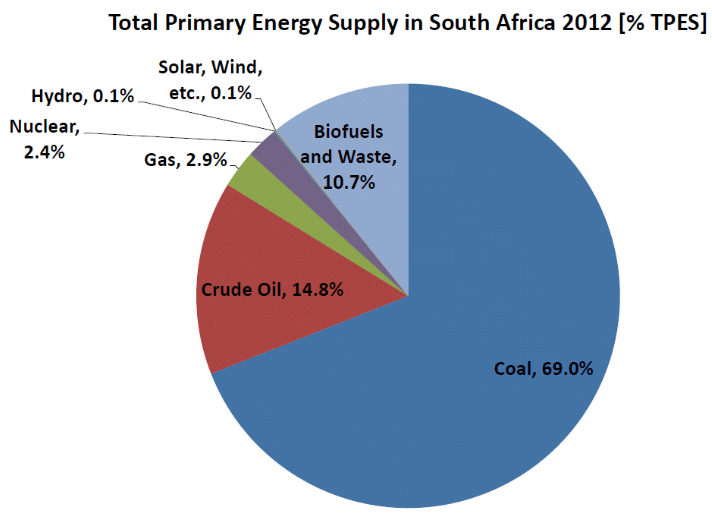


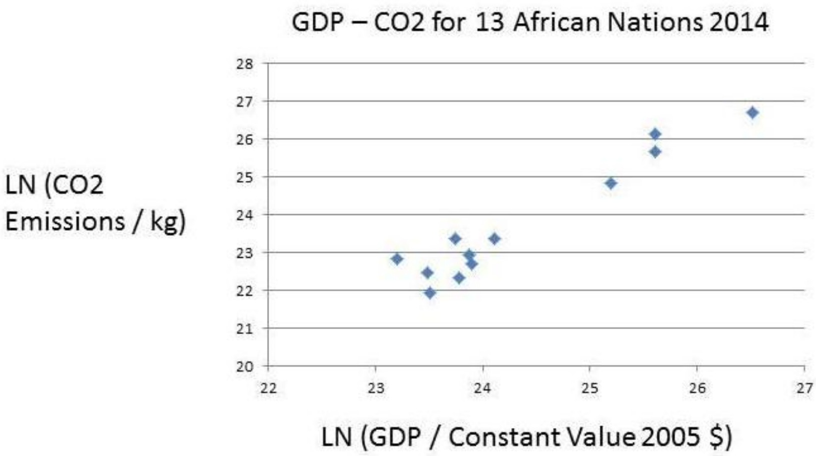
Figure38. *Energy consumption in RSA*

Does the RSA have the resources and motivation to cut the coal consumption radically and move to solar energy for instance? Or could the RSA renege – the always available option in collective action endeavours.

The African continent is so heavily dependent upon solids that implementing the COP21 objectives will prove exceedingly problematic, especially without support from the super fund. Some nations rely almost exclusively upon oil and gas or coal, whereas others depend upon wood, charcoal and dung. Hydro power is exploited, but will water suffice for instance in the Nile Delta that several countries share? Atomic power is completely lacking. The solar power plant is the only way out in order to reduce solids and oil and gas. Modern renewables must replace traditional ewnewables, like in South Asia.

The African continent harbors two kinds of societies or economies. On the one hand there are emerging economies in the North and the South. On the other hand, there are poor countries in the stomach of Africa, many of which have been plagued by political instability and death from domestic violence.

The finding is that African nations face the same problematic as countries on the other continents. They must reduce CO2:s while maintaining economic development. What this dilemma entails appears clearly when a few African nations are explored above according to the theoretical framework above. In Africa, the GDP-GHG link is all upward sloping (Figure 39).



5. Countries with Type II GDP - CO2 Missions

There is much talk about a peak for CO2 growth. Globally, it seems that CO2;s have stagnated, but t is too early to talk about a decrease. However, a set of very few countries have trodden the path of dlining CO2 emissions. Recently, the level of GHG emission has been reduced significantly in the US. It reflects no doubt the economic crisis that began 2007, but the US remains the second largest polluter in the world, reflecting that it cannot draw upon a mixed bag of energies (Figure 40). Per capita GHG:s is of course very high for the USA. As the economy now starts to accelerate, emissions are bound to go up again.

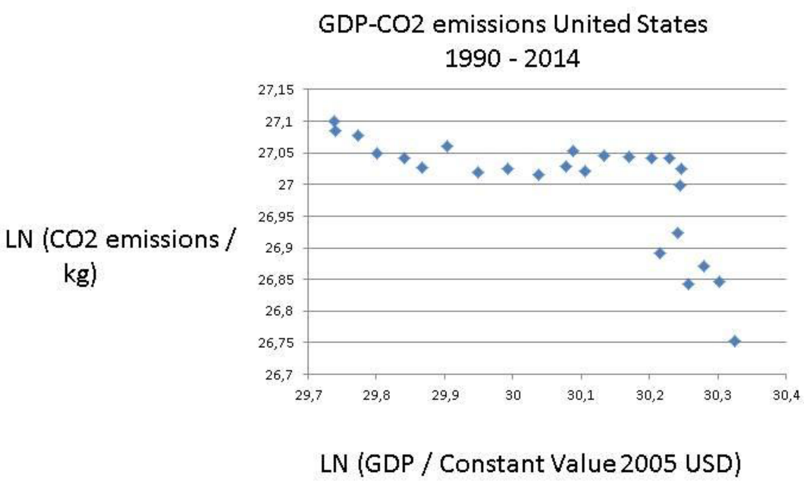


Figure40. *USA: LN (CO2 / Kg and LN (GDP / Constant Value 2005 USD) (y = -0,32x + 36,7; R² = 0,49)*

Recently, the level of GHG emission has been reduced significantly in the US. It reflects no doubt the economic crisis that began 2007, but the US remains the second largest polluter in the world, reflecting that it cannot draw upon a mixed bag of energies (Figure 41). Per capita GHG:s is of course very high for the USA. As the economy now starts to accelerate, emissions are bound to go up again, especially as solar and wind power has its limitations compared with shale oil and gas.

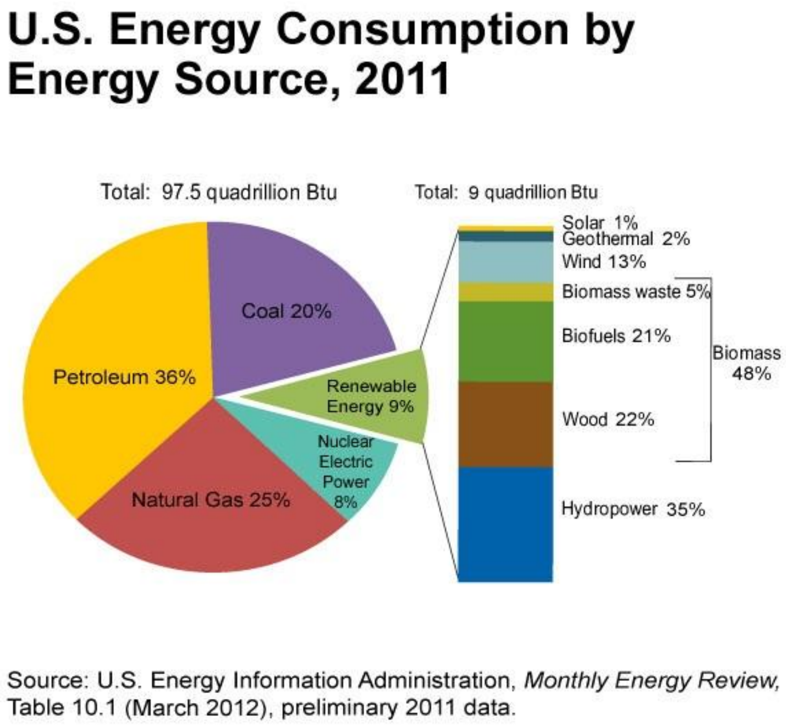


Figure41.

It must be emphasized that The US remains heavily dependent upon fossil fuels, or some 89 per cent comes there from. What is changing is the more and more of energy is produced within the US and no longer imported from outside – the *shale oil and gas* revolution. Further reduction of GHG: s will meet with firm resistance from the Republican House of Congress, which may oppose the COP21 Agreement. The advent of shale oil and gas has changed the entire energy markets, lowering the price of oil most substantially. This implies not only that there will be no *Hubbert peak oi*l for the world, but also that switching to renewable energy source will be extremely expensive, relatively speaking.

Another interesting country is the largest EU economy, namely Germany. Figure 31 shows a marked as well as remarcable decrease in GHG emissions – *Energiwende*.

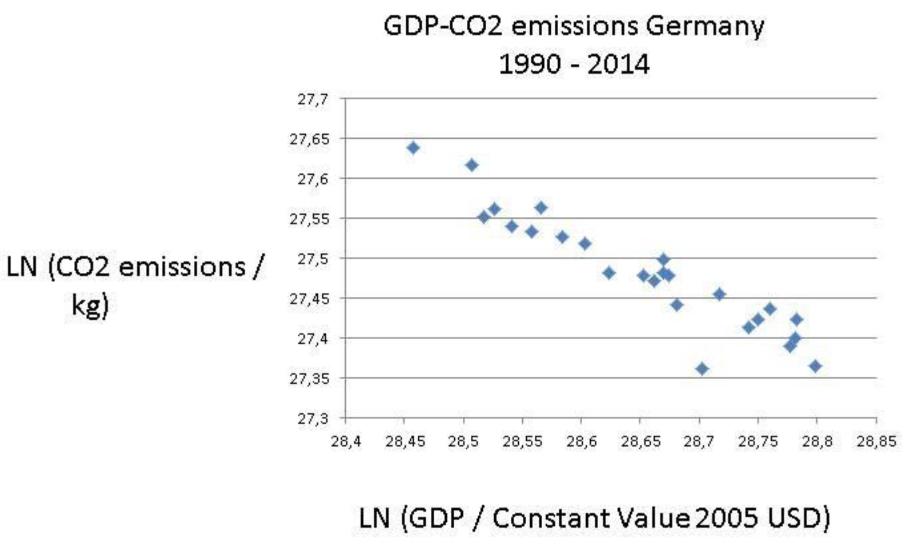


Figure42. *GERMANY: LN (CO2 / Kg and LN (GDP / Constant Value 2005 USD) (y = -0,69x + 47,3; R^2 = 0,88)*

The German data shows a consistent decreasing trend, which is not to be found with many countries, if at all. How come this German exceptionalism? Germany needs massive amounts of energy, but it decided to phase out nuclear power. Can really the domestic employment of modern renewables satisfy this gigantic demand (Figure 43)?

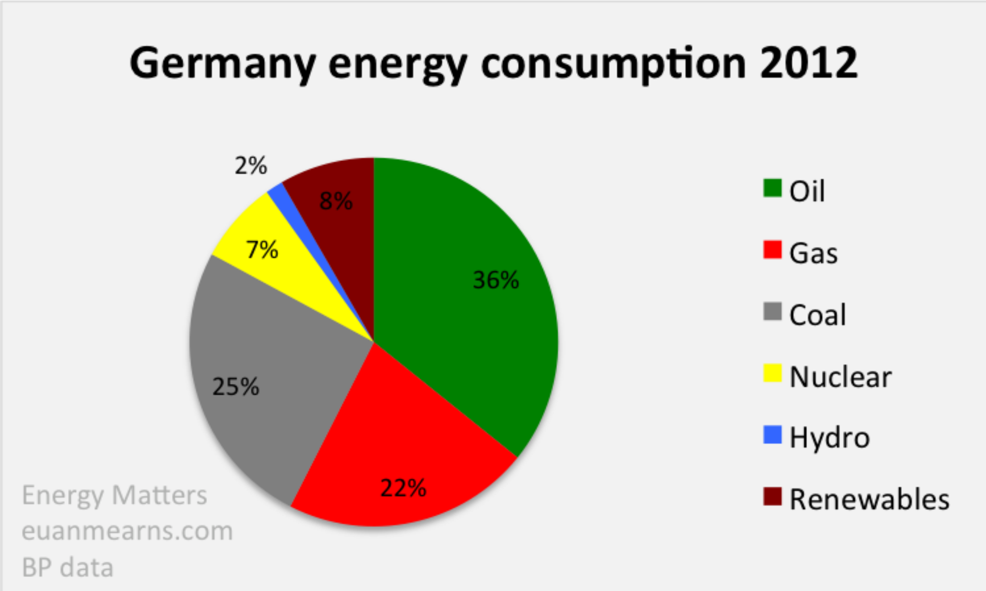


Figure43.

It is true that nuclear power and renewables has made it possible for Germany to decrease its GHG:s, but the country is still dependent upon fossil fuels, especially coal and oil. What will happen with the nuclear power stations are phased out in 2022 is that most likely the GHG emissions will start going up again. To replace nuclear power with solar and wind power will be difficult to say the least. Already, Germany uses more coal from Columbia and gas from Russia. The question of coal is very politicised in the Republic, but many do not realise that burning waste or bio-mass is not much of an improvement.

Finaly, let us do France with its glbally speaking nuclear uniqueness, which though seems to be on the retreat in several ways, also in construction abroad where South Korea is more aggressively successful.

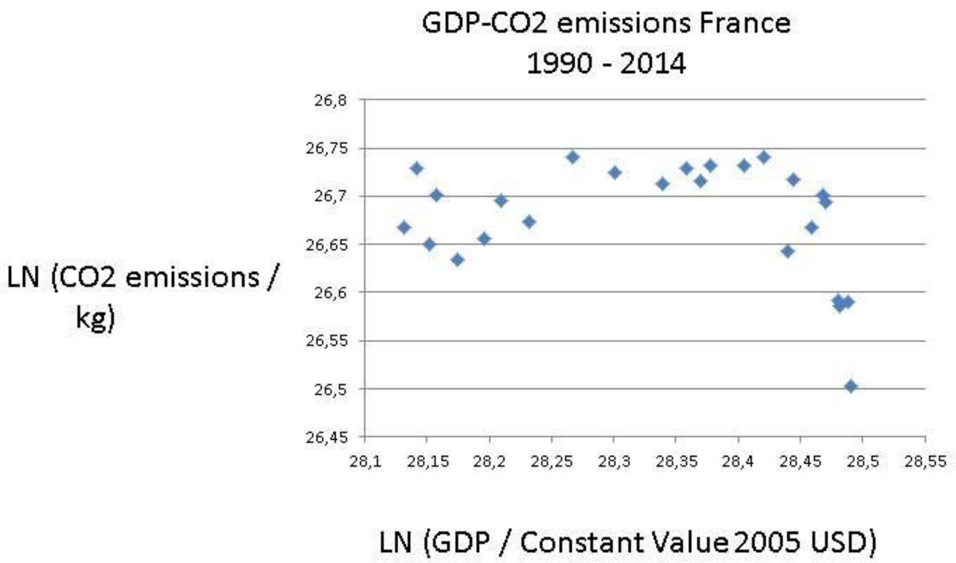


Figure44. *France ($y = -0{,}13x + 30{,}4$; $R^2 = 0{,}08$)*

Nuclear power reduces greenhouse gases but creates another form of pollution, namley radioactive waste. The environmental movement fights both, but this may be too much in the short-run. Perhaps the greenhouse gases are the worst, because they cannot be contolled or burried for thousands of years? France opts for both decarbonsation and denuclearisaton. Possible?

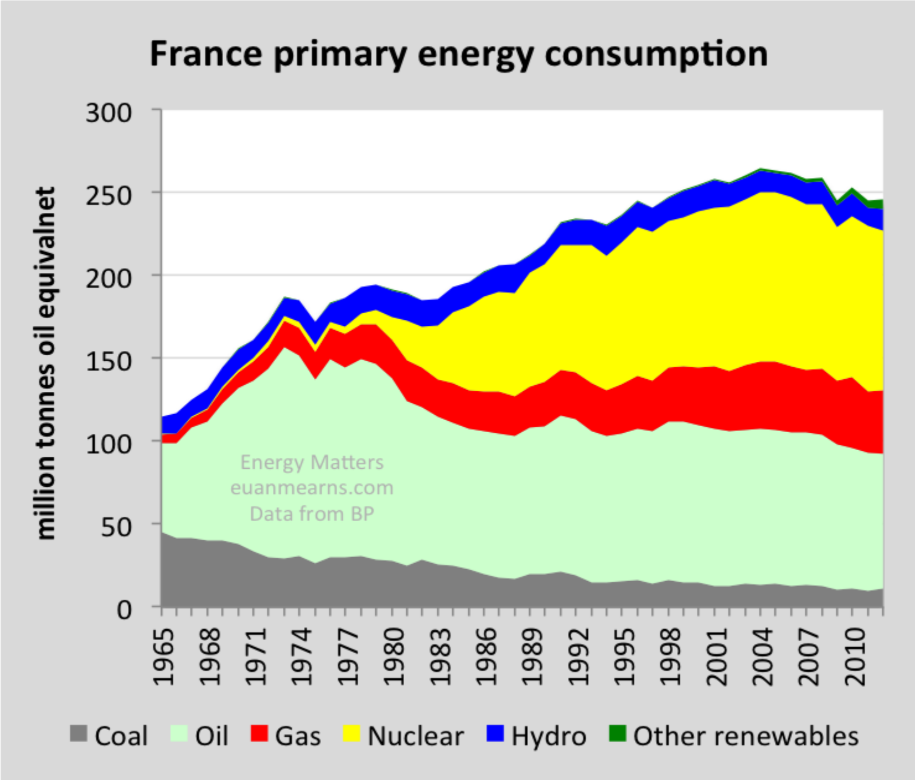


Figure44.

One may also mention Sweden as an example of successul turn around of the fundamental GDP – CO2 link. However, strangely enough it also cuts down on nuclear power, betting on mainly wind, solar and bio-mass.

Yet a few swallows do not create a summer. Most countries in the world have NOT begun their COP21 project. And their starting-points are hardly favourable.

6. Conclusions

The findings above seem to support the skeptical theory of policy implementaton. Politicians and environmentalists act as if theory 1 were true. But one may predict that theory 2 is going to be true of COP21. In the country findings above, we have four sets of countries from the COP21 perspetive, namely radil decardonisation (D), namely:

(a) those with TYPE I: an increasing or stalling link between GDP and CO2:s

(b) those with TYPE II: a declining link between GDP and CO2.

© those almost totally reliant upon fossiel fuels or lignite/carcoal

(c) those drawing much upon hydro plants and nuclear power.

Often (a) and © coincide, which is doubly negative for the COP21 process.

Perhaps the nations in the sets (b) and (d) may accomplish COP21, perhaps only though! Stern (2007) underlined that global warming is the greates externality in economic history, but it is noy likely to be managed by means of voluntary coordination/cooperation in a gigantic commön pool club (Ostrom, 1990). There must be systematic planning, international control, global oversight, continuous evaluation and massive international funding.

References and Sources

Energy Information Administration (EIA) 2015 Annual Energy Outlook (http://www.eia.gov/ forecasts /aeo/index.cfm)

World Bank national accounts data - data.worldbank.org)

OECD National Accounts data files

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

International Energy Agency (IEA) (2015) World Energy Outlook (http://www.iea.org/bookshop/700-World_Energy_Outlook_2015)

BP Energy Outlook 2015

United Nations Population Division: World Population Prospects, United Nations Statistical Division.

Population and Vital Statistics Report (various years), Census reports and other statistical publications from national statistical offices

Eurostat: Demographic Statistics

Secretariat of the Pacific Community: Statistics and Demography Program,

U.S.Census Bureau: International Database.

GDP:

World Bank national accounts data - data.worldbank.org

OECD National Accounts data files

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.

International Energy Agency. Paris.

Energy Information Administration. Washington, DC.

LITERATURE

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

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

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

de Bruyn, S.M. (2012) Economic Growth and the Environment: An Empirical Analysis. Berlin: Springer.

Eriksson, C. (2013) Economic Growth and the Environment: An Introduction to the Theory. Oxford: OUP.

Knight, F. (1921) Risk, Uncertainty and Profit. New York: Houghton Mifflin.

Mazmanian, D.A. and P. A. Sabatier (1989) Implementation and Public Policy Paperback. Lanham, MD: UPA.

Minzberg, H. et al (1998) Strategy Safary. New York: Pearson.

Ostrom, E. (1990) Governing Common Pools. Cambridge: Cambridge U.P.

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

Ramesh, J. (2015) Green Signals. Oxford: OUP.

Sabatier, P.A. (1998) "The advocacy coalition framework: revisions and relevance for Europe," in Journal of European Public Policy. Volume 5, Issue 1: pages 98-130.

Sabatier P.A. (1993), Policy Change and learning : An Advocacy Coalition Approach, Boulder, CO, Westview

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

Sachs, J. (2015) "Sustainable economies" (http://jeffsachs.org/2015/08/sustainable-development-for-humanitys-future/).

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

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

Wildavsky, A. (1979, 1987) Speaking Truth to Power. Piscataway: Transaction Publishers.