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THE COP21 FRAMEWOK: MOST CHALLENGING OBJECTIVES IN THE 21rst CENTURY

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ABSTRACT

Today, it is no exaggeration to say that the global warming process is the most lethal threat to mankind today. Global warming is now proceeding at an almost constant pace: the concentration of CO2 in the atmosphere keeps increasing: 399.6 (Jan 2015), 402.52 (Jan 2016) and 404.21 (March 2016) as well as 408 (April 2016). The COP21 idea is that this increase follows the anthropogenic GHG. Only the social sciences can analyse how the governments of the countries of the world may coordinate to decrease the CO2 emissions, before the methane emissions start augmenting, which would be fatal for mankind. The standard energy projections for 21rst century outline immense increases, but energy consumption results in GHG (greenhouse gases) emissions. This is the global contradiction between energy and emissions, stemming from the omnipresent demand for economic development or economic growth. The UNFCCC Parties will have to struggle with a huge set of implementation issues over the next decades, but failure is in no way to be excluded. When COP21 is said to promise completely carbon neutral energy for the world, then the implementation perspective is long in time indeed, or the entire century. However calamitous and profoundly sad the destruction of the Syrian nation may be, it cannot be compared when the full effects from global warming, if unstoppable or unhindered by implementation failure.

Keywords: Policy sciences, implementation, greenhouse gases (GHG), CO2 emissions, energy – emissions links, GDP - energy consumption links, decarbonisation, country energy pattern, Sachs, Wildavsky, UNFCCC, country predicaments.

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INTRODUCTION

The COP framework includes three major objectives:

- Short-run: halting the increase in GHC:s in all countries;
- Medium-term: decreasing the COP:s by 40% until 2030;
- Long-run: making the economies carbon free.

Decarbonisation is the theme of COP21, focussing upon the CO2:s in the GHG:s. Can the governments of different countries implement these goals through national policy-making in collaboration with business? This question will be dominating international governance in the 21rst century, and it involves the relationships between emissions, energy consumption and economic development.

Speaking generally, the global warming process is already going on and proceeds seemingly unstoppably, involving *inter alia* larger climate swings, deforestation, desertification, ocean acidification and rising sea levels. One does not really know whether it is an irreversible transformation of Planet Earth, or where it could be stopped: + 1, 5, +2, + 2, 7, +4, +6, or would end in a global catastrophe.

It is now argued that the global increase in GHG has stalled and that the dire link between GDP growth and CO2 emission increase has been undone. Yet, halting the growth of emissions will not be enough, as the level of yearly emissions stay at an enormous size. What is crucial is the undoing of the close link between energy consumption and GHG emissions. The emissions result *primarily* from energy use, especially the burning of fossil fuels or bio or waste materials, and only *secondarily* from economic activities or development. Economic growth that uses carbon neutral energy would reduce global warming. But this is a utopian goal for the entire global economy.

According to economist J. Sachs, decarbonisation will be hard to come by, especially for countries with little hydro or nuclear power. When the requirements of sustainable development collide with conventional economic growth, something has to give. It is not likely that decarbonisation will trump economic development, at least not enough to avoid the + 2,7 scenario. He states: "Economic development, social inclusion, and environmental sustainability are the three tenets underpinning the forthcoming post-2015 development agenda, a once in a generation opportunity to put mankind on the path to a sustainable growth model.**"** But consider standard energy projections below, which entirely reject Sachs' wishful thinking.

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THE CRUCIAL LINKS: GHC, CO2, Energy and GDP

Greenhouse gases (GHG) contribute to the so-called greenhouse effect, which boils down to continuous overall warming of the Planet Earth. Atmospheric gases trap electromagnetic radiation from the sun that would otherwise have been reflected back out into space. These greenhouse gases include: methane, nitrous oxide, carbon dioxide, hydro fluorocarbons (HFCs), per fluorocarbons (PFCs), and sulphur hexafluoride (SF6). But these gases make up only a small fraction of the gases of the atmosphere. Figure 1 and 2 focuses upon the CO2:s that make up some 80% of the GHG:s.

Figure 1. CO_2 emissions by sector

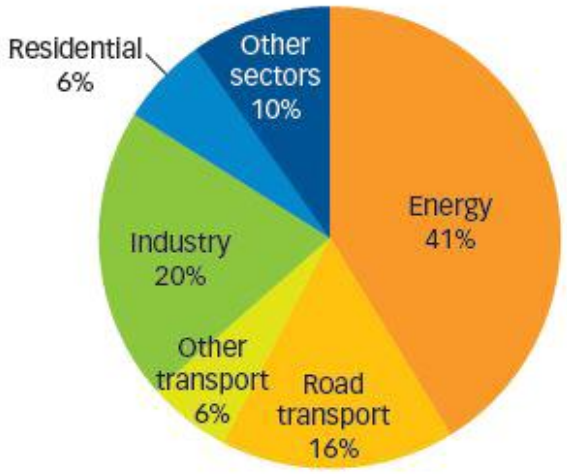
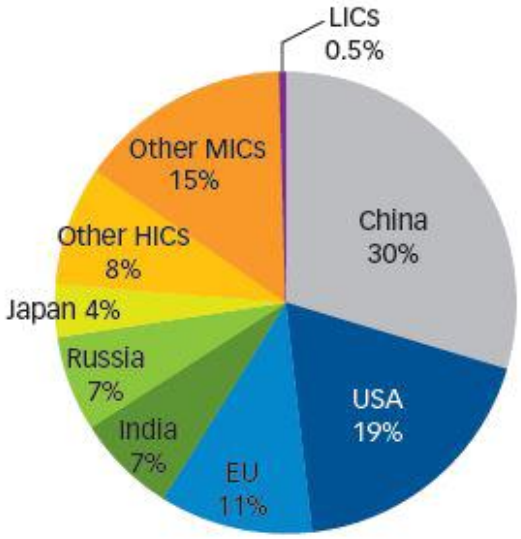


Figure 2. Energy-related CO_2 emissions by country



Notes: Energy-related CO2 emissions are CO2 emissions from the energy sector at the point of combustion. Other Transport includes international marine and aviation bunkers, domestic aviation and navigation, rail and pipeline transport; Other Sectors include commercial/public services, agriculture/forestry, fishing, energy industries other than electricity and heat generation, and other emissions not specified elsewhere; Energy = fuels consumed for electricity and heat generation, as defined in the opening paragraph. HIC, MIC, and LIC refer to high-, middle-, and low-income countries.

Source: IEA 2012a.

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In the first rounds of implementation of COP21, it is logical to focus on the CO2 emissions, but methane emissions may become a big headache later on.

Globally speaking, more than 80 per cent of the energy consumed daily is derived from the burning of fossil fuels. How fast can this be changed and what could be the economic costs of decarbonisation? Countries can attempt to meet their obligations in the COP21 Agreement by decarbonisation, lower economic growth or more energy efficiency. New technology and innovations will be crucial, not only in small scale endeavours but used massively. We wish to find out below is how countries vary in terms of their energy consumption.

Fighting the global warming trend involves reflecting upon several policy measures, as with the COP21 conference in Paris, including:

- Slowing population growth
- Changing agricultural production modes
- Water recycling and waste treatment
- Ocean protection against waste and warming (acidification)
- Changes in energy consumption: “decarbonisation”
- Stopping deforestation and protecting rain forests
- Re-forestation and carbon capture as well as carbon sucking.

Although energy is far from the only source of greenhouse gases, it is the single largest one. Energy use crops up in all forms of activities most often with an economic element: industry, transportation – land, sea, air, housing and commerce as well as food production and agriculture. The implementation of the COP Agreement can only succeed if coal is significantly reduced in electricity production and petroleum decreased in transportation. However, the stylised projections point to an altogether different world in 20-30 years (Figures 3).

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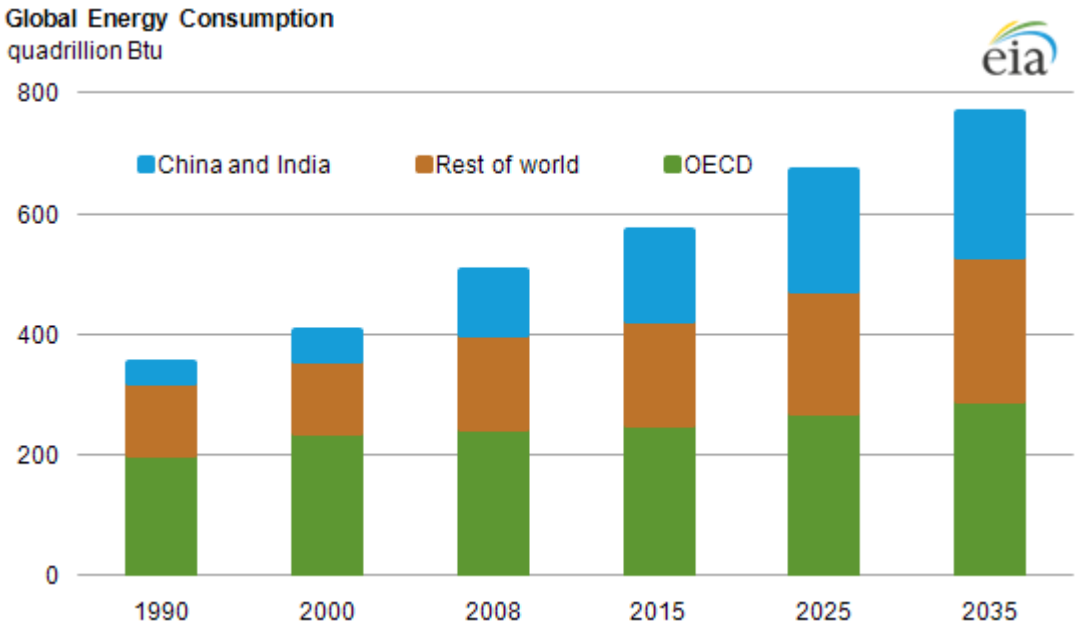
FIGURE 3. Energy projections for China and India



Source: http://www.eia.gov/todayinenergy/detail.cfm?id=3130

The predictions found with all energy companies and agencies will when true undo the implementability of COP21. The main implications are that the use of coal in electricity generation must be reduced and coal power stations, if not closed, be equipped with filters. Moreover, the employment of petroleum products must be decreased in transportations: land, sea and air.

From Energy to GDP

As stated above, Sachs has launched a coherent call for the world to move towards *sustainable* development, based on decarbonisation of the energy systems of countries (http://jeffsachs.org/2015/08/sustainable-development-for-humanitys-future/). He has correctly emphasized the close link between economic development or growth and the massive use of fossil fuels as energy sources during the last 20 years, resulting in the enormous expansion of GHG emissions in line with GDP. And he seems inclined to accept a 20% reduction in global output, if it leads to a "sustainable economy", i.e. environmental friendly economic system.

However, given this close links between GDP, energy consumption and emissions, how can the countries of the world achieve decarbonisation without hampering economic development or growth? When viewing the global mass media – CNN, BBC, France24, Bloomberg, CMBC – one gets the impression that the making of the COP21 Agreement has done very little to shake

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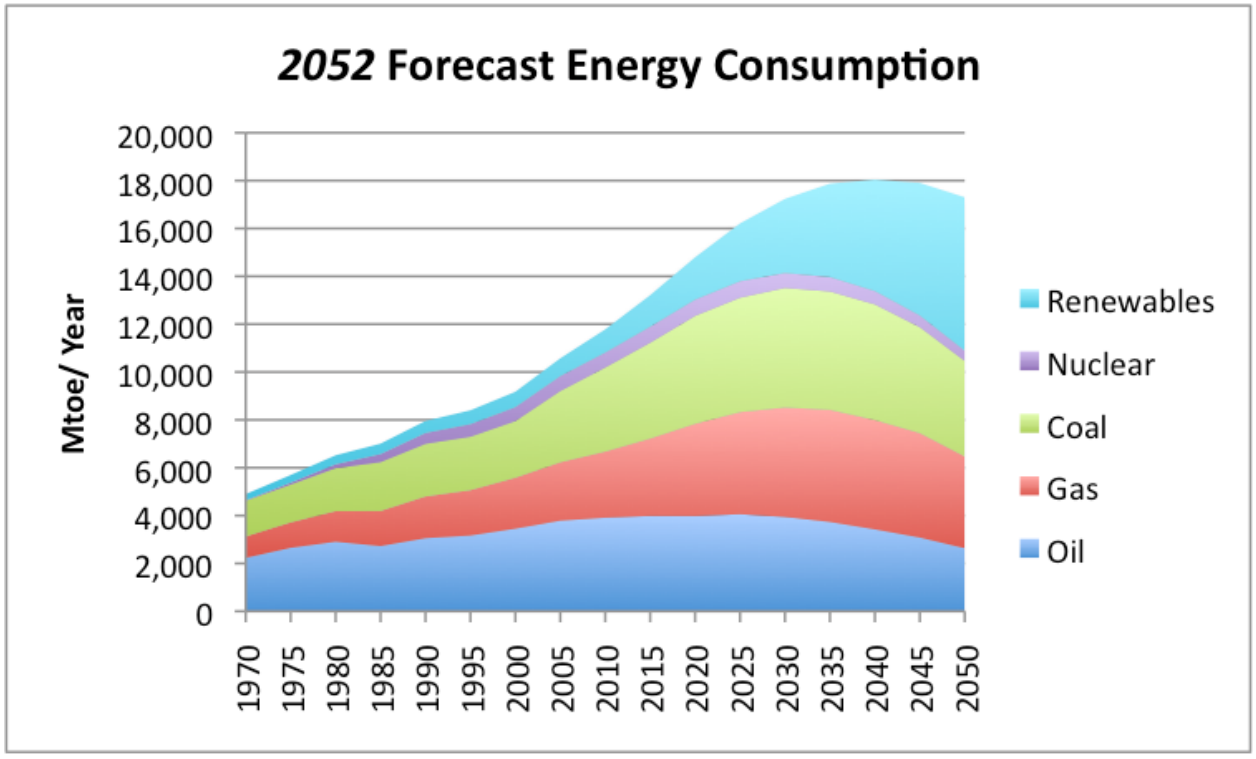
the confidence in global economic growth. Thus, all fear a reduction in growth. The stylised projections about energy in the future speak of a huge demand for additional energy resources in the coming decades (EIA, IEA, BP, ADB, etc.) to support economic development in both advanced and emerging countries. But the implications for GHG:s and CO2:s are not recognized or taken into account.

Let us look shortly at one such prediction for Asia and the rest of the world: energy and emissions (Figure 4). The projections below contradict completely the spirit of the COP21 framework!

Figure 4



Source: BP Energy Outlook 2015.

Now, what is the country link between GDP and GHG emissions? It depends upon the nation in question!

GHC – GDP IN VARIOUS COUNTRIES

The specific country strategies to enhance COP21 will depend upon their energy pattern in usage, Thus, the governments, the IGO:s and NGO:s and other experts on climate change must

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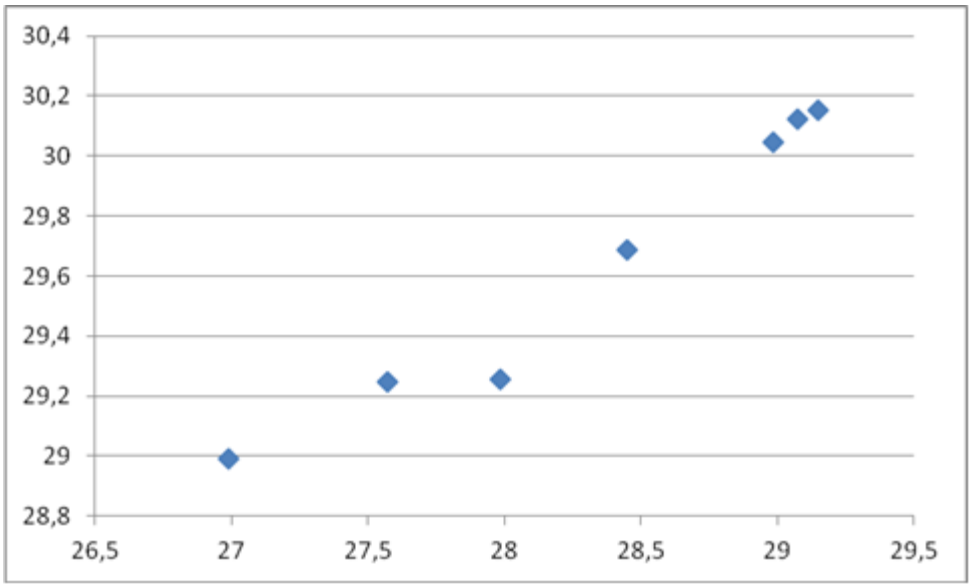
realize that halting or reducing the emission of GHG:s must involve costs. There are simply not enough alternative energy sources or innovations in renewables to draw upon, at the moment. Some countries will ask for special delays, others will call for economic assistance or compensation and some may even decide to promise but later renege. What is involved in this trade-off between reduction of greenhouse gases on the one hand and economic development or growth on the other hand? The closer the link between GDP and emissions is, the more painful or costly will the transition to a reduction of emissions be.

It is up to each country to start implementing COP21. The more reliant upon coal for electricity and petroleum for transportation they are, the more difficult and costly will be the implementation process. This article portrays the basic connections by means of figures on a few key countries.

A FEW GIANTS

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 5).

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



The sharp increase in GHG:s in China reflects not only the immensely rapid industrialization and urbanization of the last 30 years, but also its problematic energy mix (Figure 6).

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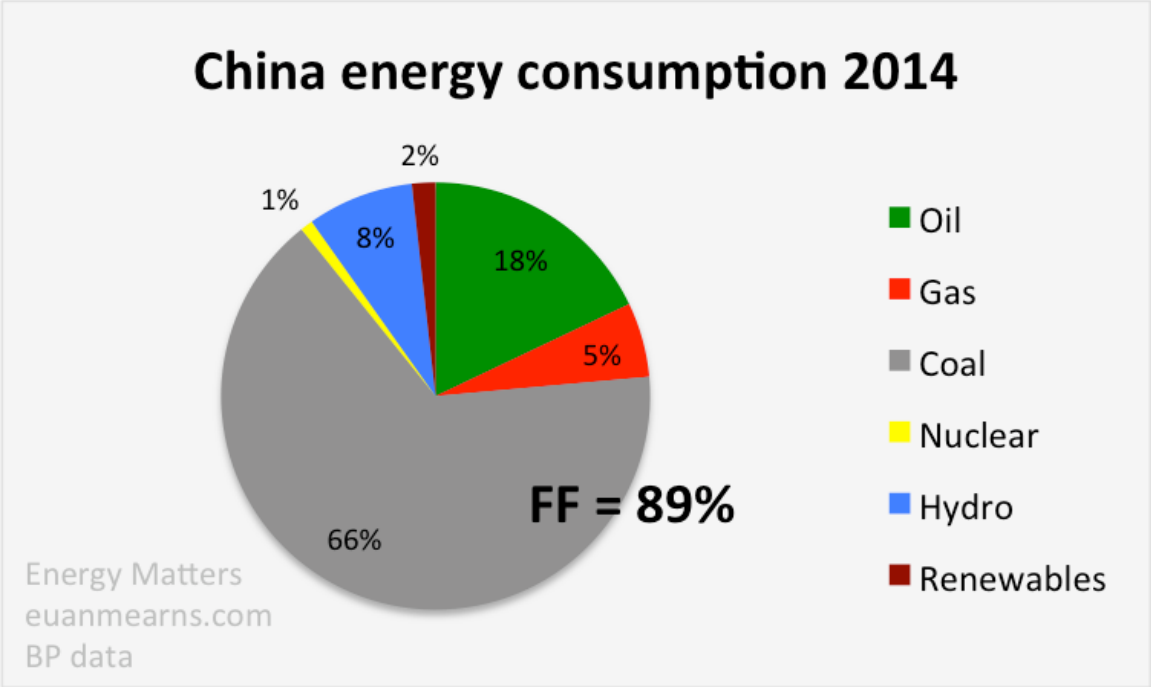
FIGURE 6.



Almost 70 per cent of the energy consumption comes from the burning of coal with an additional 23 per cent from other fossil fuels. The role of hydro is rising with the Three Gorges Dam. But atomic power is also set to increase in the future. This energy mix makes China very vulnerable to demands for cutting GHG emissions: other energy sources or massive installation of highly improved filters for carbon capture?

It should be pointed out that several small countries have much higher emissions per capita than China. This raises the enormously difficult problematic of fair cuts of emissions. Should the largest polluters per capita cut most or the biggest aggregate polluters? At COP21 this issue was resolved by the creation of a super fund to assist energy transition and environment protection in developing counties, as proposed by economist Stern (2007)

India will certainly appeal to the same problematic, namely per capita or aggregate emissions. The country is even more negative than China to cut GHG emissions, as it is in an earlier stage of industrialization and urbanization. Figure 7 shows the close connection between emissions and GDP for this giant nation.

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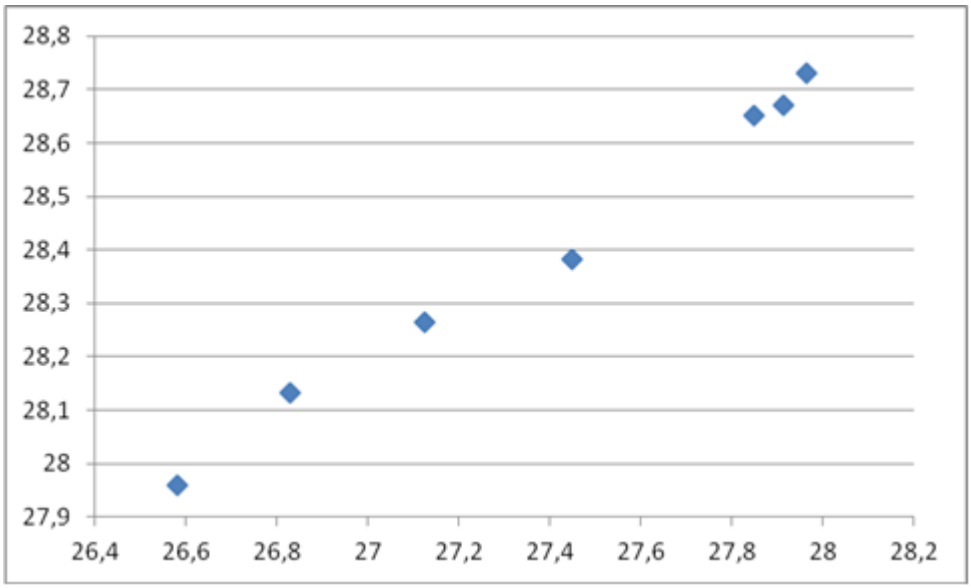
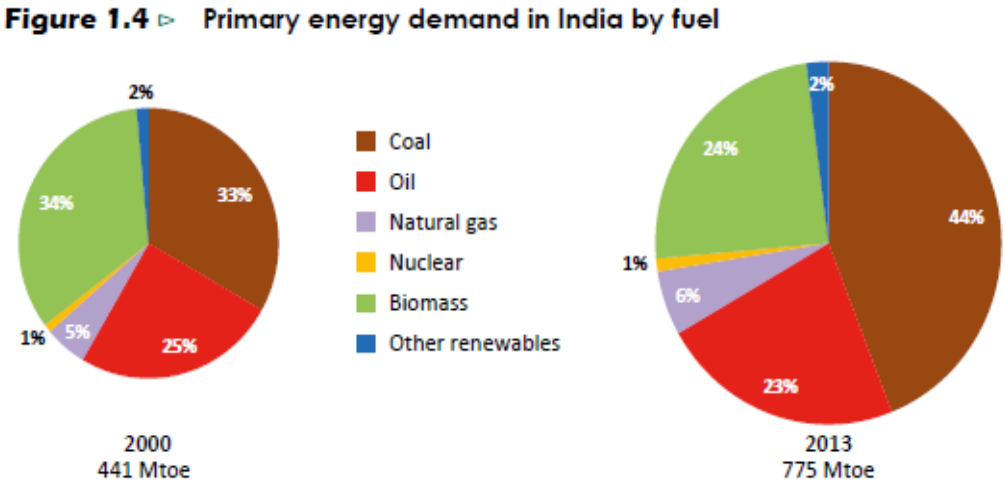
FIGURE 7. INDIA: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



India needs cheap energy for its industries, transportation and heating (Figure 8) 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 smallest numbers for energy per capita, although it produces much energy totally. Figure 8 shows its energy mix where renewables play a bigger role than in China.

FIGURE 8. INDIA'S ENERGY MIX



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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.

How Strong are "Green Signals" in India?

"Green Signals" Jairam Ramesh (2015) is a remarkable book, comprising more official documents than written own analysis. Author Ramesh has published documents from his period as Minister of Environment in the federal government, where we find all sorts of materials: speeches, public letters, administrative decisions, etc. This means that the Reader has to work hard with texts, as the short comments by the Author are rather general in tone. However, this is interesting and highly relevant reading.

J. Ramesh has a long experience with the so-called Great Green Growth Gamble from acting in several roles, academically and politically. Highly relevant for understanding the conditions for ecological policy-making in the largest country in the world very soon ate the materials concerning the following themes;

1) India's coal dependency

2) The immense need for electricity

3) The implementation gap of environmental legislation and decrees

4) The clash between economic growth and environmental protection

6) India' large vulnerability ecologically to global warming and environmental degradation

7) The drying up of rivers for hydro generation and the loss of land to sea level rise.

Interestingly, Ramesh emerged from the growth lobby but turned ecologically friendly when faces with all the demands for *clearances* for ecological interference. No wonder he was controversial as minister, considered both growth advocate and the NO GO man. He is well entrenched in the global discussions concerning climate change policy-making, claiming that India has a major contribution to render in the debate about the necessary *growth-ecology trade off.*

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One may find a close link between GDP and emissions also in countries with an advanced economy. See Figure 9 for South Korea.

FIGURE 9. SOUTH KOREA: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)

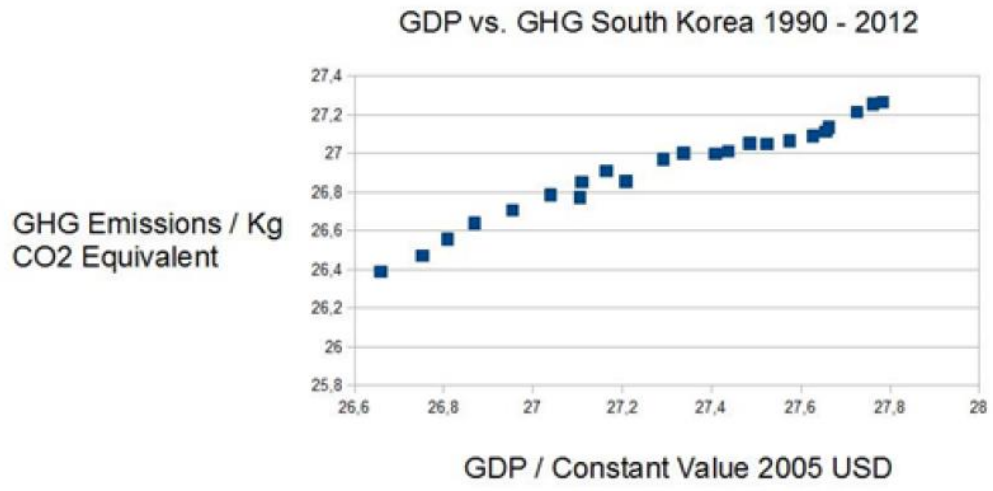
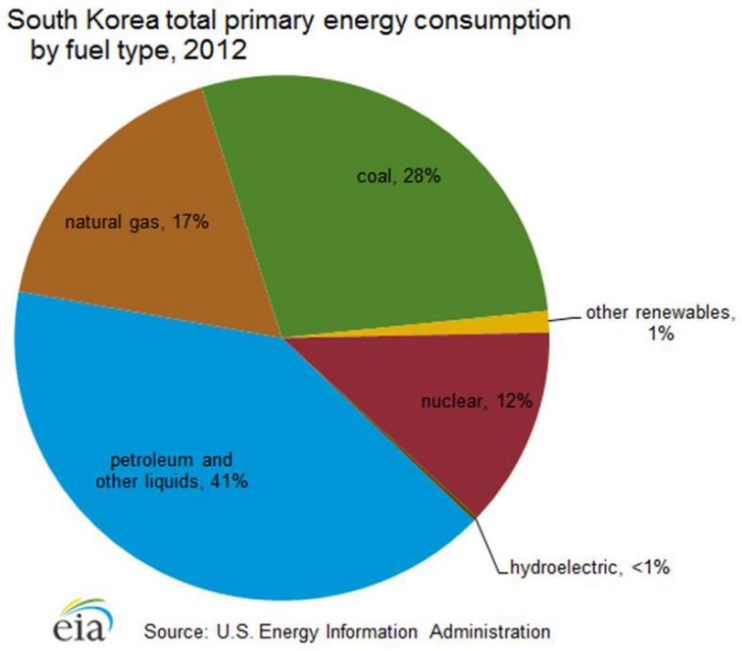


Figure 10.



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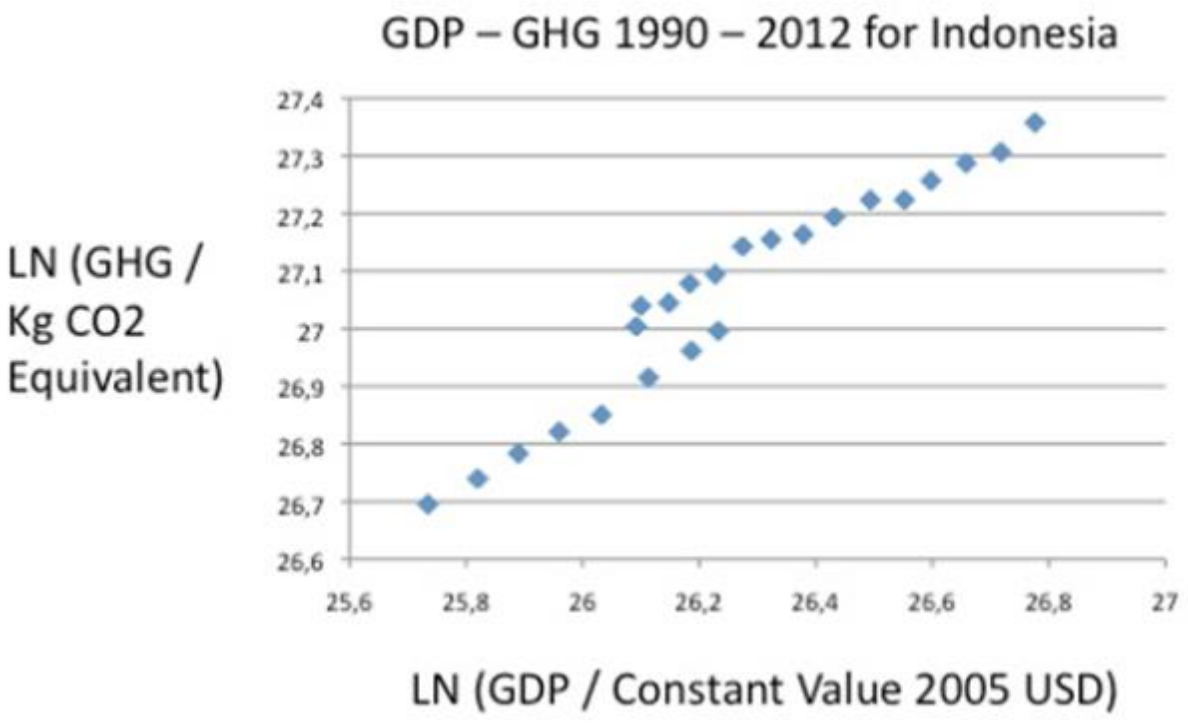
Lacking much hydro power, South Korea has turned to fossil fuels for energy purposes, almost up to 90 per cent (Figure 10). It differs from China only in the reliance upon nuclear power, where the country is a world leader in plant constructions. Reducing its hefty GHG emissions, South Korea will have to rely more upon renewable energy sources, as well as reducing coal and oil for imported gas or LNGs, and build more atomic power stations.

The above three countries are giant polluters in terms of GHGs. China and South Korea uses mainly fossil fuels for energy consumption complemented by nuclear power, whereas India also employs renewables, lacking in the other two, and hydro power, which is much employed also in China.

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

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



Indonesia is a coming giant, both economically and sadly in terms of pollution. Figure 11 reminds of the upward trend for China and India. However, matters are even worse for

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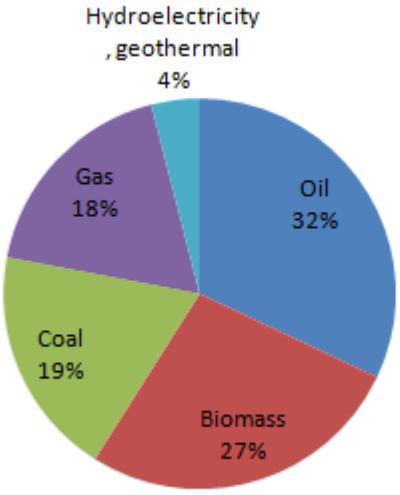
Indonesia, as the burning of the rain forest on Kalimantan augments the GHG emissions very much. Figure 12 presents the energy mix for this huge country in terms of population and territory,

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

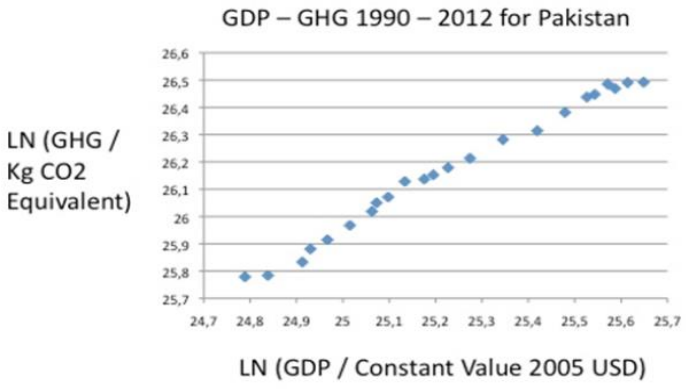


Distribution of Energy Consumption in Indonesia in 2009

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

The same upward trend holds for another major developing country with huge population, namely Pakistan (Figure 13).

FIGURE 13. PAKISTAN: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



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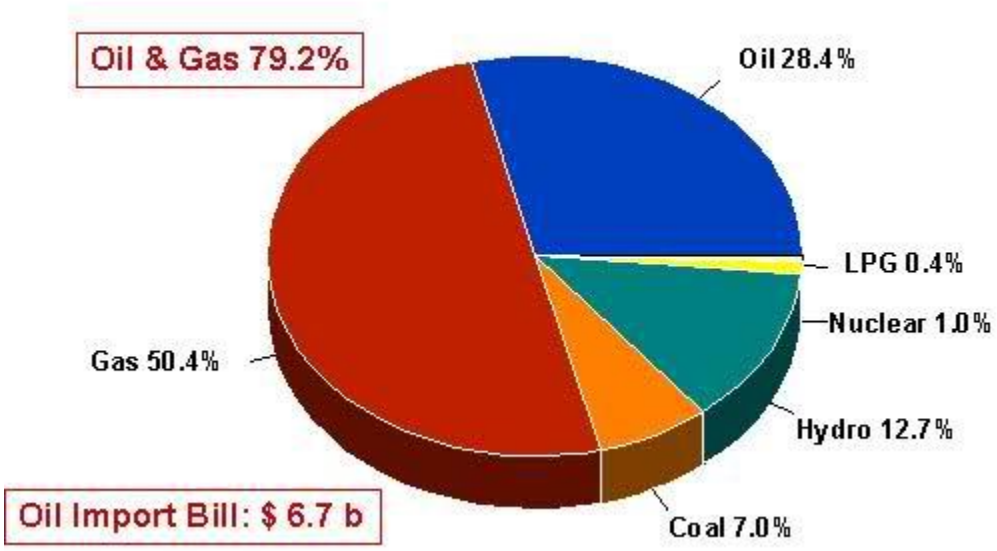
The amount of GHG emissions is high for Pakistan, viewed as aggregate. Pakistan is mainly reliant upon fossil fuels (Figure 14).

FIGURE 14. Pakistan Energy Consumption 2009 (by ShoXee: http://i27.tinypic.com/2h6cyag.jpg)



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

Let us look at the ethanol country *par preference*: Brazil. Figure 14 shows a considerable drop in total emissions, but it is followed by huge increases that tend to flatten out.

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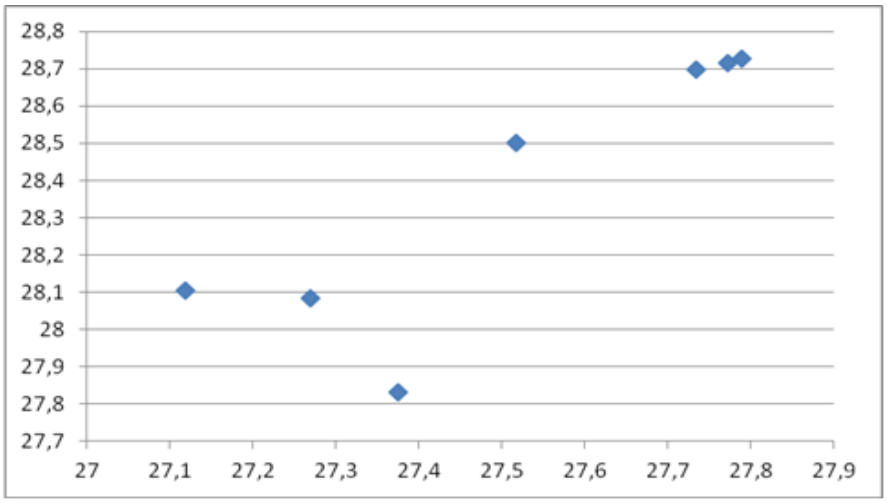
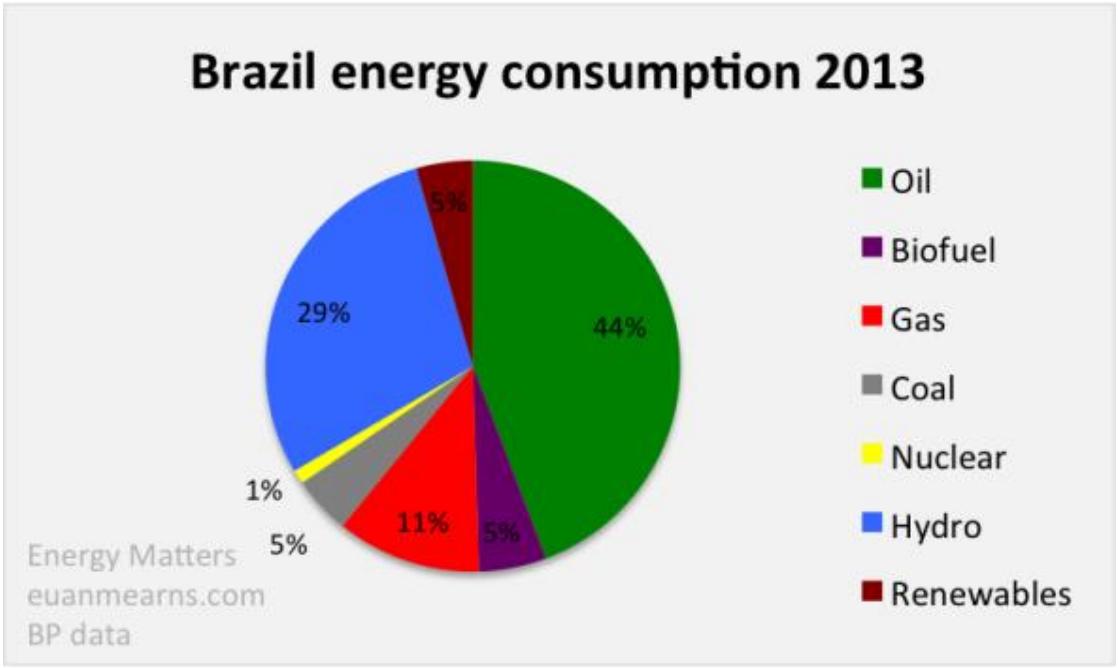
Figure 15. BRAZIL: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



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 16).

FIGURE 16.



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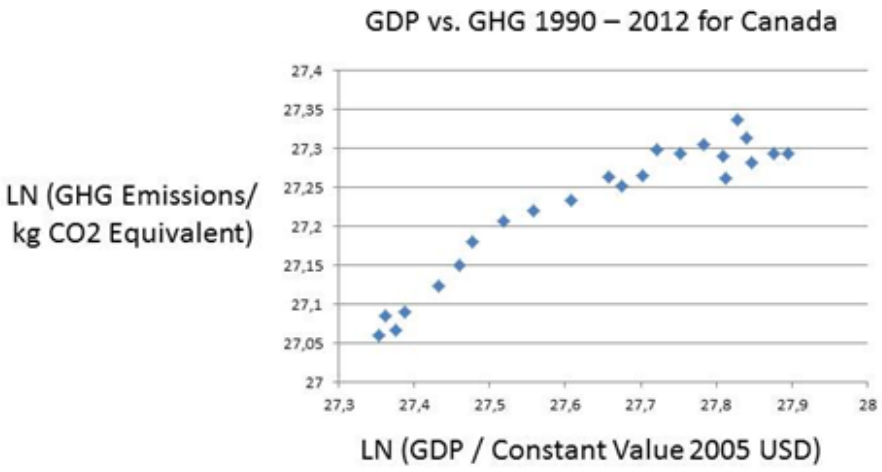
For most countries hold that their emission of GHG:s increases, as well as augments with the GDP. However, there are a few notable exceptions of decreases that are worth mentioning.

DECLINING EMISSIONS

This picture of a very close link between GDP and emission of GHG:s that is to be found with the three giants in Asia does not necessarily hold for all countries. Let us look at a few countries where this link is weaker, starting with Canada that has halted the expansion of GHG:s (Figure 18).

FIGURE 18. CANADA: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



Although Canada is a major emitter of GHG:s as well as one of the world's largest fossil fuel producer – oil sands, it had managed to stem the increase in emissions for the most recent years, i.e. halting the augmentation. Figure 19 may be invoked to explain this, showing a very mixed energy consumption pattern.

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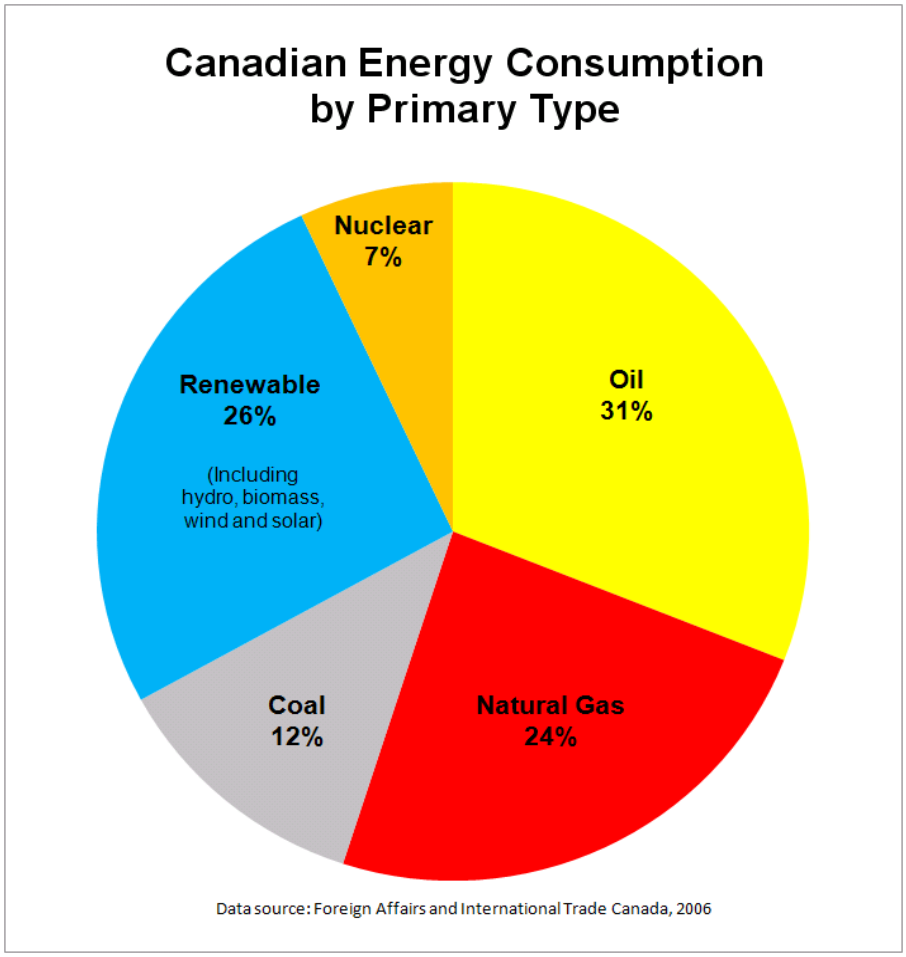
FIGURE 19.



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. We now look at the US (Figure 20).

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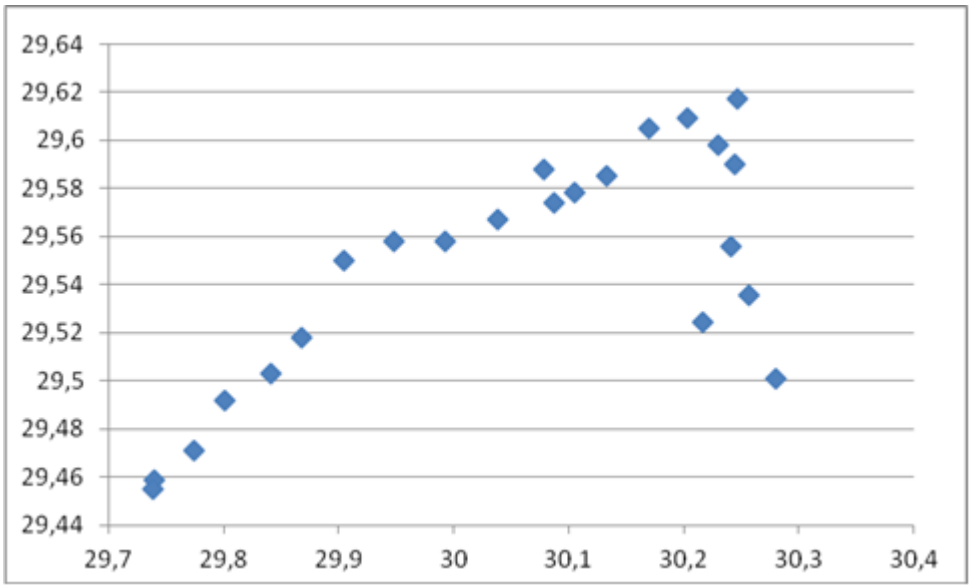
FIGURE 20. USA: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



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 21). Per capita GHG:s is of course extremely high for the USA. As the economy now starts to accelerate, emissions are bound to go up again.

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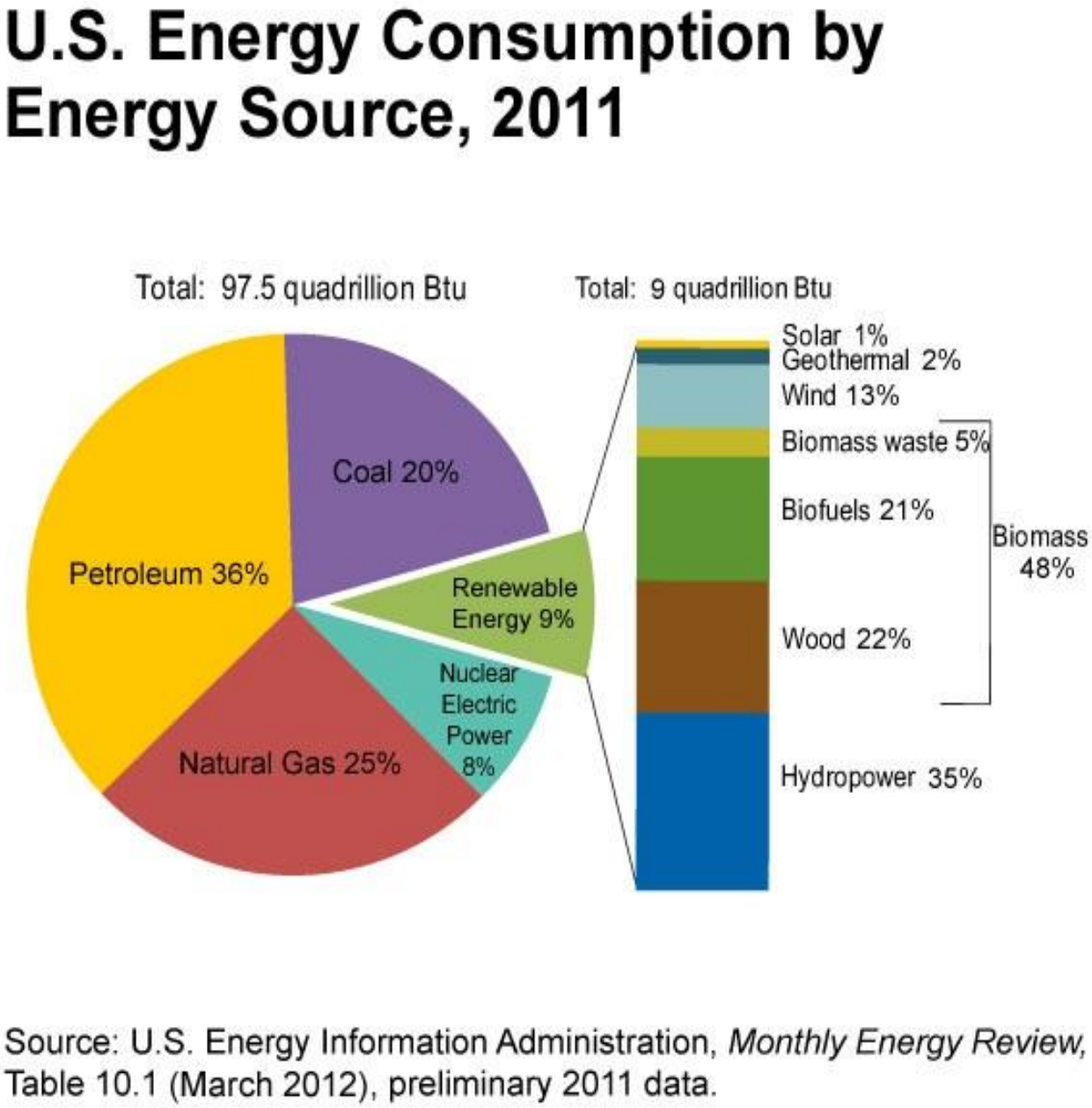
Figure 21.



The US is 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 *shake oil and gas* revolution. Further reduction of GHG:s will meet with firm

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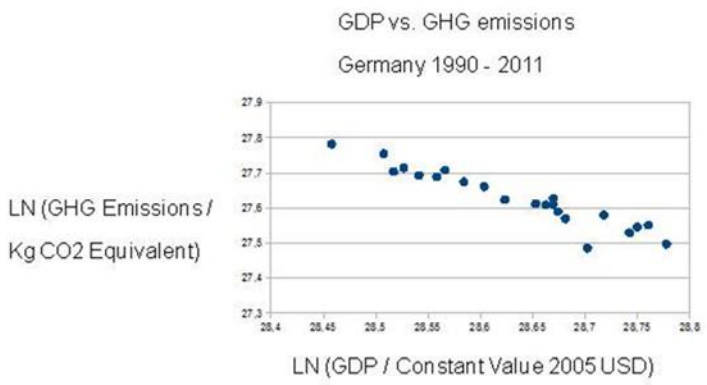
resistance from the Republican House of Congress, which may oppose the COP21 Agreement. The advent of shale oil and gas has changed the entire energy markets, lowering the price of oil most substantially. This implies not only that there will be no Hubbert peak oil for the world, but also that switching to renewable energy source will be expensive, relatively speaking in relation to shale oil and gas.

Another interesting country is the largest EU economy, namely Germany. Figure 22 shows a marked decrease in GHG emissions.

FIGURE 22. GERMANY: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



The German data shows a consistent decreasing trend, which is not to be found with many countries, if at all. How come this German exceptionable policy? Germany needs massive amounts of energy, but it decided to phase out nuclear power. Can really the domestic employment of renewables satisfy this gigantic demand (Figure 23)?

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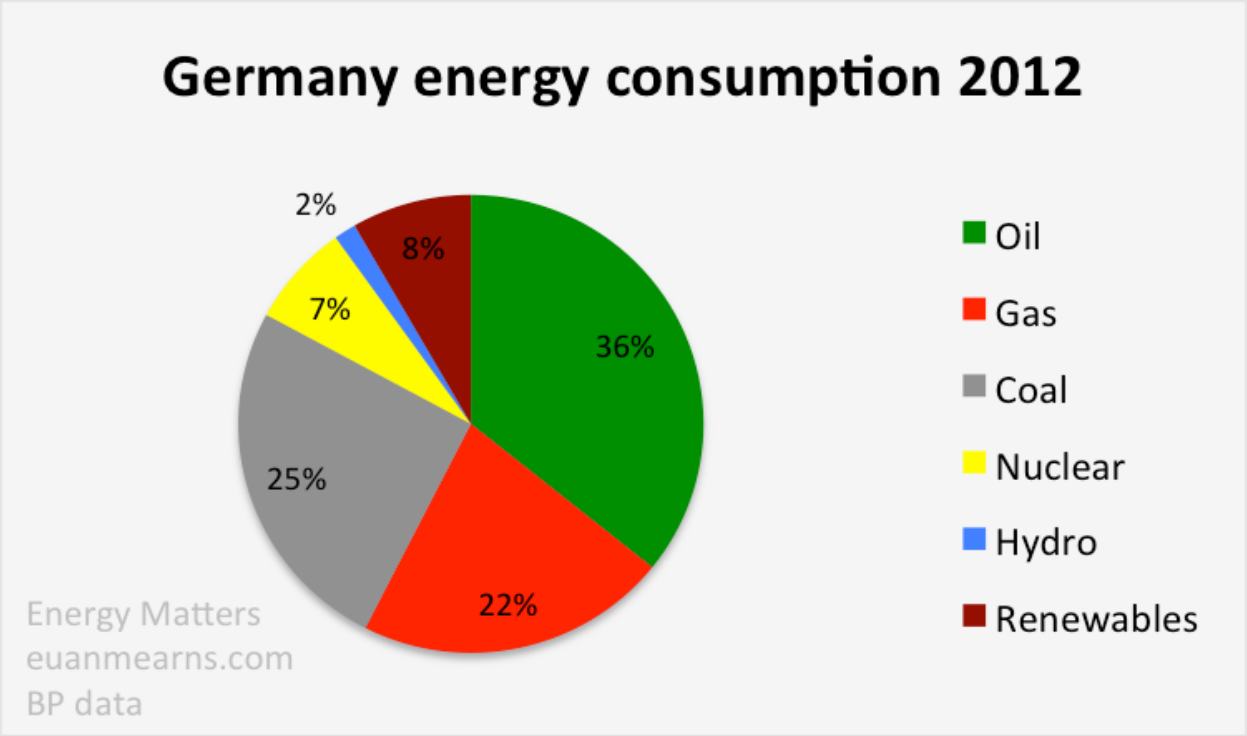
Figure 23.



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.

Japan has a rather similar situation in that it will no longer rely much upon nuclear power. Its emissions have gone done recently, but seem to be on the rise again (Figure 24).

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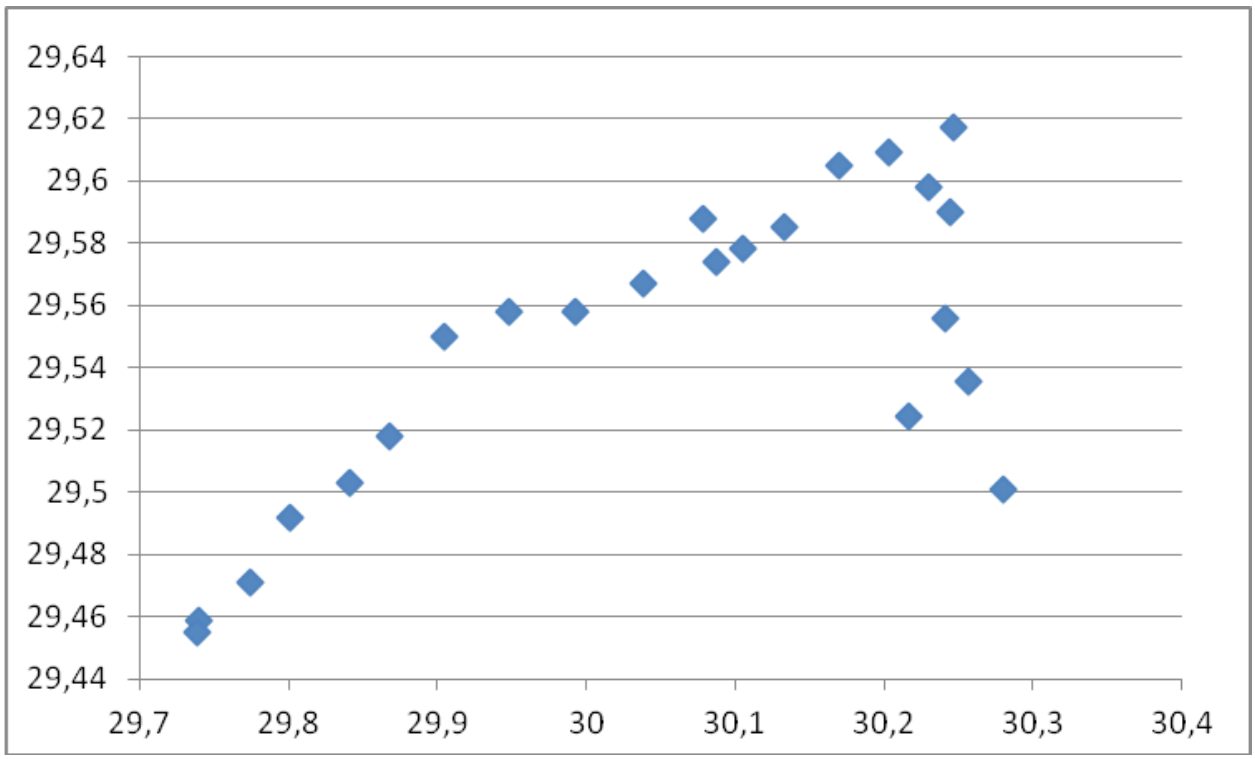
FIGURE 24. JAPAN: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



The decrease in emissions for Japan reflects the country's post-industrial developments. Production sites have been moved out of Japan with heavy investments in other Asian countries as well as the EU and the US. Yet, Japan will still need massive amounts of energy (Figure 25). After the Fukushima disaster, it operates only 3 nuclear power stations.

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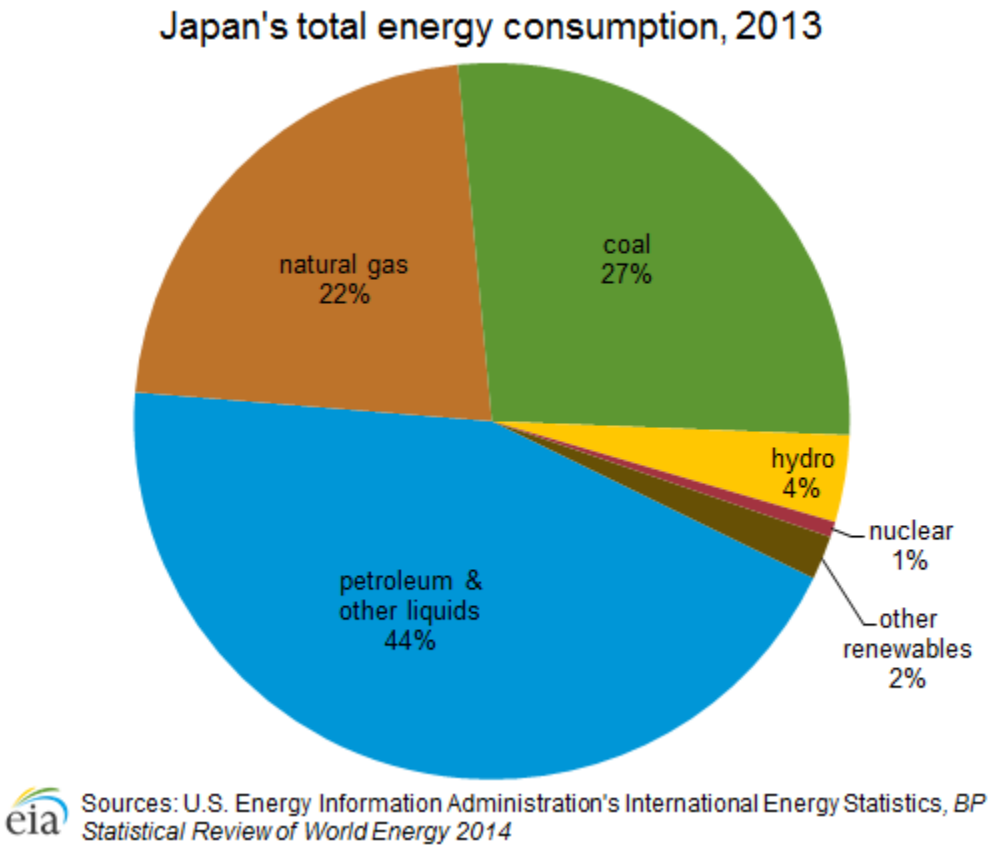
FIGURE 25.



As Figure 25 shows, Japan is very dependent upon fossil fuels for generating electricity and transportation, especially when nuclear power is no longer a major option with one nuclear power plant operating now in Japan.

"GREEN STATES": GHC - GDP

Some countries applaud themselves for a positive energy policy, i.e. a policy that leads to decreases in emissions. But is it really true? Look first at Singapore in Figure 26.

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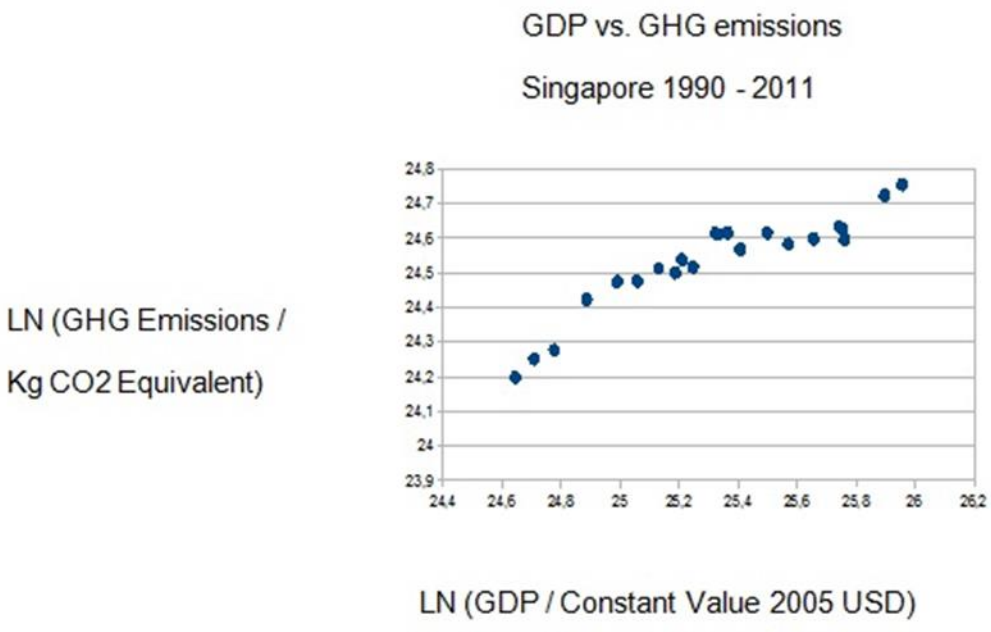
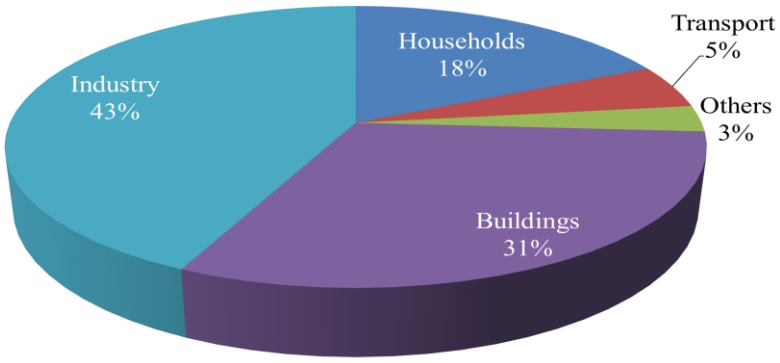
FIGURE 26. SINGAPORE: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



Despite its official statements about being a *GREEN* city, emissions have been going up steadily in Singapore. The GHG:s are very high if related to per capita. Its energy mix is almost only oil (67%) and gas (32%), imported from abroad (Figure 27). Singapore needs lots of electricity to bolster its advanced life style (air conditioning, total waste water cleaning, etc).

FIGURE 27.



Source: Electricity Consumption in Singapore (National Environmental Agency, 2014

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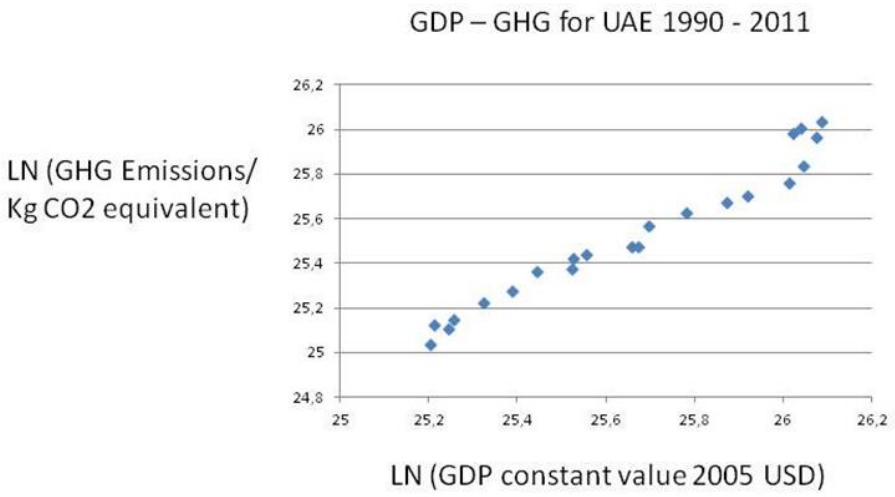
Why would this island state need too much energy, resulting in such an amount of emission of GHG:s? Reply: the need for fossil fuels to generate electricity and make transportation possible**.** Singapore has a hot climate and handles that with a complete use of air conditioners all over the place. It is also a huge hub for shipping and air travel. It is impossible to generate so much electricity without emissions when using fossils fuels. Singapore has a large oil refinery.

Consider now another "GREEN" state, the United Arab Emirates (Figure 28).

FIGURE 28. UNITES ARAB EMIRATES: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)



The UAE have increased their emission of GHG sharply in relation the positive economic development of these emirates. They rely upon the fossil fuels of Abu Dhabi with immense oil resources. Like other Gulf States, the UAE boosts with building entirely GREEN sites, with energy from solar power and almost no waste. But it is based upon their enormous consumption of electricity generated out of burning oil and gas (Figure 29). The Gulf countries use lots of

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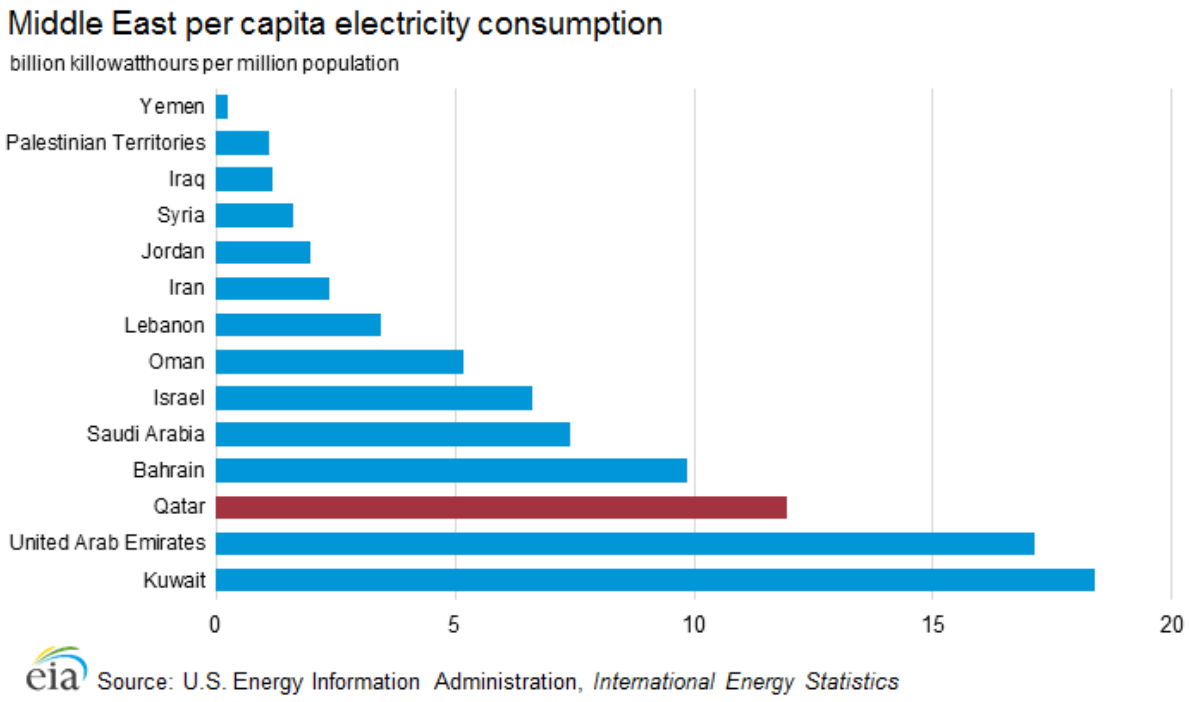
petrol, gas and electricity to uphold a stunningly high standard of living, which also results in extremely high levels of emissions per capita.

FIGURE 29.



HARD CASES FOR COP21

a) HIGH COAL DEPENDENCY

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. A few countries are almost completely dependent upon coal. How will they implement the COP21 goals? Look at South Africa.

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FIGURE 30. SOUTH AFRICA: LN (GHG / Kg CO2 eq and LN (GDP / Constant Value 2005 USD)

Emissions are high, because South Africa uses a lot of coal to generate electricity (Figure 30). Decarbonisation will be difficult and costly.

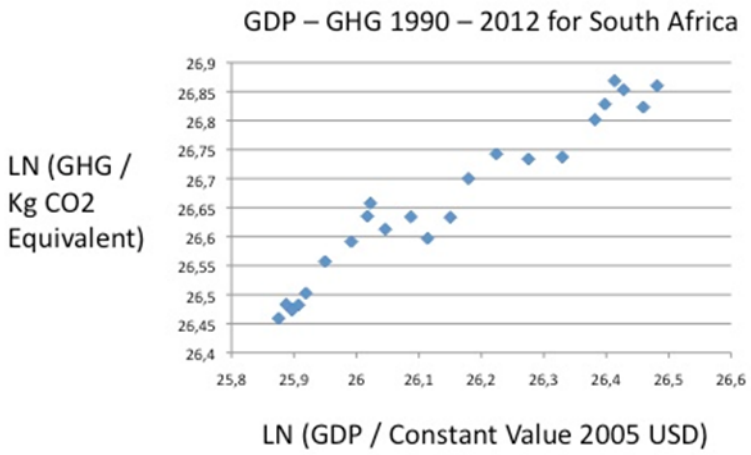

Figure 31 shows the coal dependency of the RSA.

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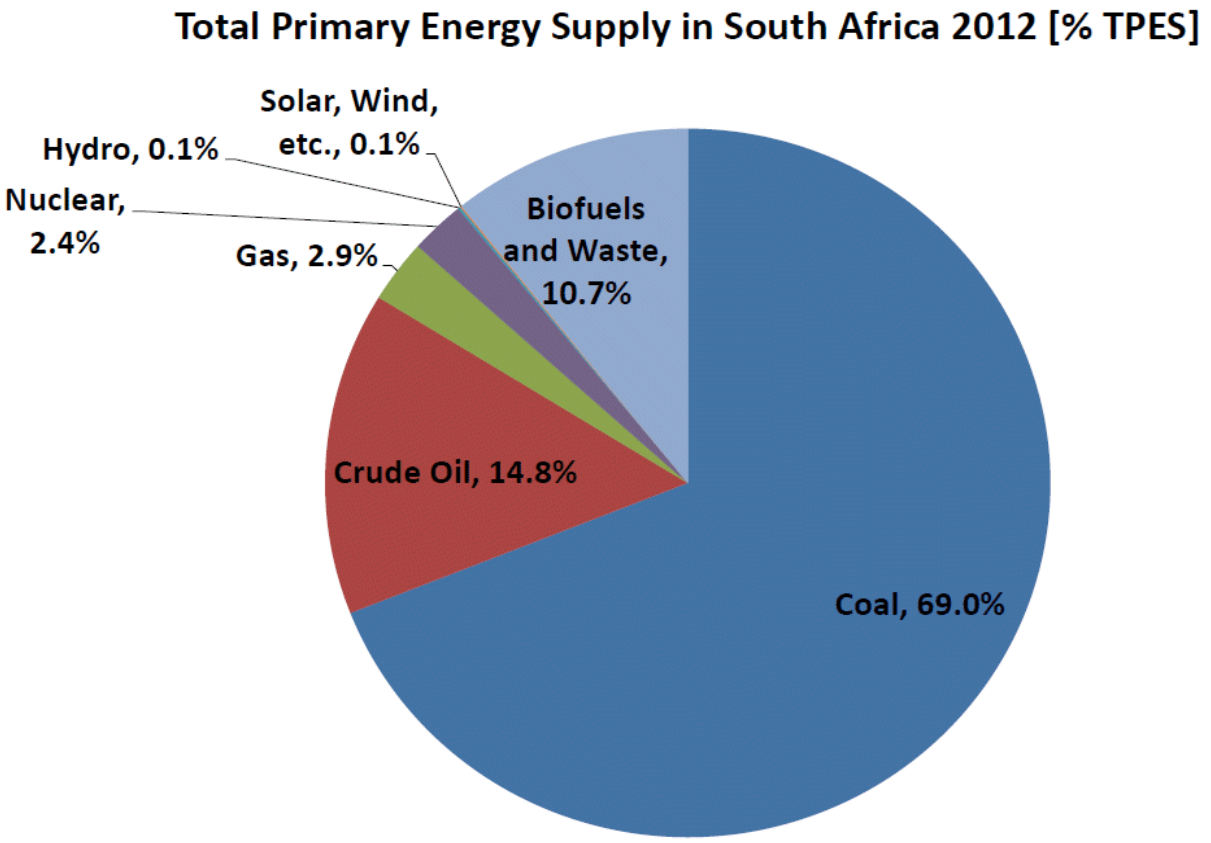
FIGURE 31. Energy consumption in RSA

The reliance upon coal in this largest economy in Africa is stunning.



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?!

b) Fossil fuel dependency: the Philippines

A populous nation with severe environmental problems, the Philippines rely heavily on fossil fuels up to 80%. To combat poverty and natural disaster, they need economic development. But how to procure the energy needed (Figure 32), while also respecting the COP21 goal of 40% decrease of CO2:s?

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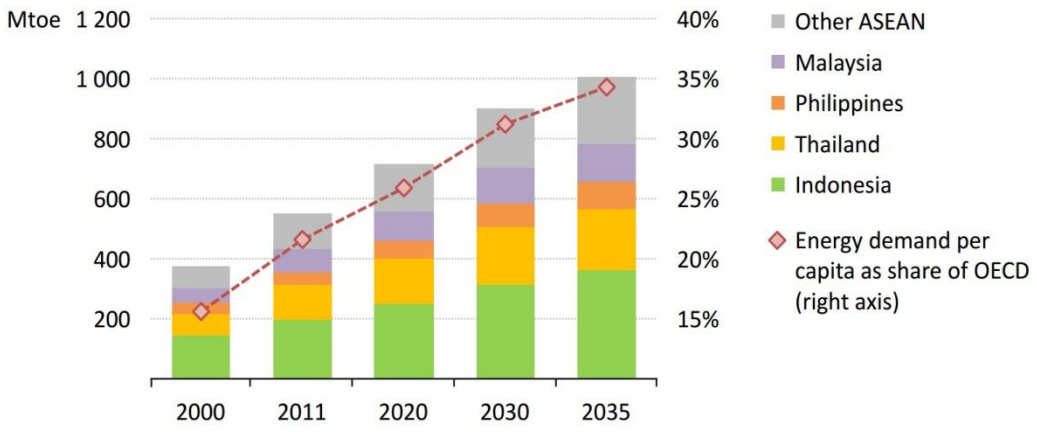
FIGURE 32. Energy demand in the ASEAN



https://www.iea.org/newsroomandevents/graphics/

This miracle – increasing energy and decreasing CO2 emissions – is only feasible by massive Western support for renewables in this large nation – the Stern approach.

CONCLUSION

The global warming process is a most lethal trend for mankind everywhere. It brings with it several dismal social consequences, like:

- Violent changes in climate
- Sea level rise and inundation: loss of land
- Ocean acidification: less fish and food
- Desertification and persistent droughts: less food and no water to drink to humans and animals.
- Deforestation: more global warming
- Increasing pressure on the environment
- Augmenting poverty among peasants and poor people.

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Halting this global warming process is the major policy task for global governance in the 21rst century, because the survival of the human race in an agreeable environment is more important than egoistic state interests in the political conflicts that dominate world politics: the Middle East, South China Sea and the emergence of *rogue* countries as well as terrorism. As the late American policy analyst, Aaron Wildavsky, emphasized, namely that policy implementation is hard and may result in policy failures. The world opinion, governments and the business community have yet to realize the enormous tasks and responsibilities that they have committed their countries to in the COP21 Agreements and what its entails for domestic policies.

The theory of policy implementation of Wildavsky entails that implementation success is less likely than implementation failure, especially with a highly decentralised framework, like COP21. The consequences of COP21 failure could be disastrous for the social systems of mankind and ecology systems everywhere.

A major implementation failure of the UN and the governments of the world would make global warming a nightmare for mankind. Temperatures would sooner than later rise to level where ordinary people could not work outside in the free. People would be bound to the air conditioner: home, work and car. But air conditioners affect climate change negatively and lead to a *circulus vitiosus*. Already now, people in South Asia and South East Asia rely all the time upon the air conditioner, if they so can. How to earn a living, if temperatures become inhuman? Poverty, food scarcity, unemployment and social conflicts as well as political interstate ones must increase. And there will be fresh water shortages besides all the electricity break offs.

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