Research in Economics and Management
ISSN 2470-4407 (Print) ISSN 2470-4393 (Online)
Vol. 3, No. 3, 2018
www.scholink.org/ojs/index.php/rem

Original Paper

Coordination Failure and Opportunistic Behavior Results in Climate Chaos

Jan-Erik Lane[1*]

[1] UNIGE, Switzerland

[*] Jan-Erik Lane, UNIGE, Switzerland

Received: June 5, 2018 Accepted: June 25, 2018 Online Published: June 27, 2018

doi:10.22158/rem.v3n3p187 URL: http://dx.doi.org/10.22158/rem.v3n3p187

Abstract

IT IS very much astonishing that no policy or management strategy is forthcoming towards the new theory of climate change. Up to 2030, the living conditions for people will change to the worse, as the social systems face much less degrees of freedom in relation to nature at large in terms of agriculture, potable water, forests, sea level rise, ocean acidification, etc. Climate change will enter a run away stage, from which there is no return—Hawking irreversibility. Natural science cannot explain this defeatism, but major model in the social sciences account for the collective action problematic. Only country resilience remains when coordination fails, but many countries are extremely vulnerable. Millions will die.

Keywords

abrupt climate change theory, COP21 Treaty, Hawking irreversibility, coordination failure, social modeling collective action

1. Introduction

The climate change theory has not only been more and more confirmed. But it has also been given a more radical formulation. The abrupt climate change theory not only shortens the time of arrival of dismal consequences for living organisms but also strengthens the risks and hazards for mankind considerably. There is no policy response from the UNFCCC or the UNCP, or any other responsible political body like G20. Why?

Because we all know the global state coordination will fail in relation to global warming. The COPs are just gaming. The COP21 project is already by passed by real developments in the Arctic, i.e., meltdown and methane release, with no recognition of feedback lopes. Its tempo of the goal of decarbonisation is too slow and open to the flaw of all coordination, namely defection.

To understand why the natural scientists' prediction of abrupt climate change has no impact upon business as usual in states and markets, one must turn to recent advances in the social sciences, especially game theory with asymmetric information.

Before we look at defection, we explain why energy change on a large scale is improbable. The existing situation has tremendous "normative power", declared German political scientist Jellinek.

2. Energy and Its Implications for Mankind

I suggest we analyse energy in a wide sense. The need for energy is obvious—see Figure 1.

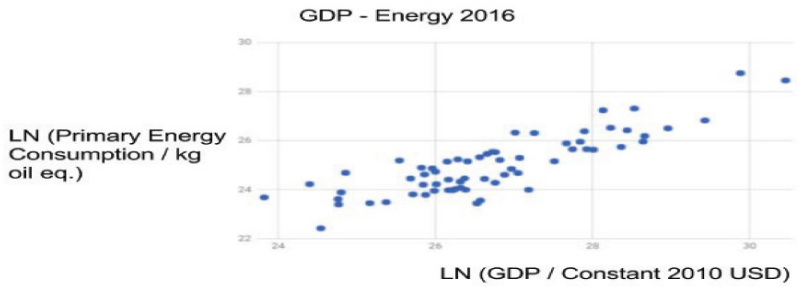


Figure 1. Energy and Affluence Globally

Energy is the capacity to do work. And work is the Adam Smith and J-B Say sources of human welfare. The growth in energy consumption since the industrial revolution and especially after the Second World War has been just immense, especially the supply of fossil fuels. In poor countries, the demand for energy is huge for economic development toward "catch-up", whereas rich countries are heavily dependent of fossil fuels for economic growth. The majority of countries in the COP project are in poverty, as they need more energy. Thus, they can only decarbonise when renewable energy sources become available. This is the redistribution task of C0P21: decarboisation against support for renewable energy by the Super Fund.

The living conditions in the poor countries in Latin America, Africa and Asia as well as the Pacific reflects the low level of energy employed. This basic fact determines life opportunities in a most dramatic fashion. The low access to energy has consequences for the environment and the life situation of people, including health, schooling, work, food and potable water.

For instance, African countries are poor because they have too little energy. Thus, they have much less GHGs than Asia. Yet, they need the COP project of the UNFCCC to renew their energy sources and move from fossil fuels and traditional renewables to solar power. Hydro power depends upon water availability that shrinks with global warming.

African energy deficit is conducive to a dire environment with enormous damages and risks. Consider the following global figures. Figure 2 shows how low energy leads to am unsafe environmental.

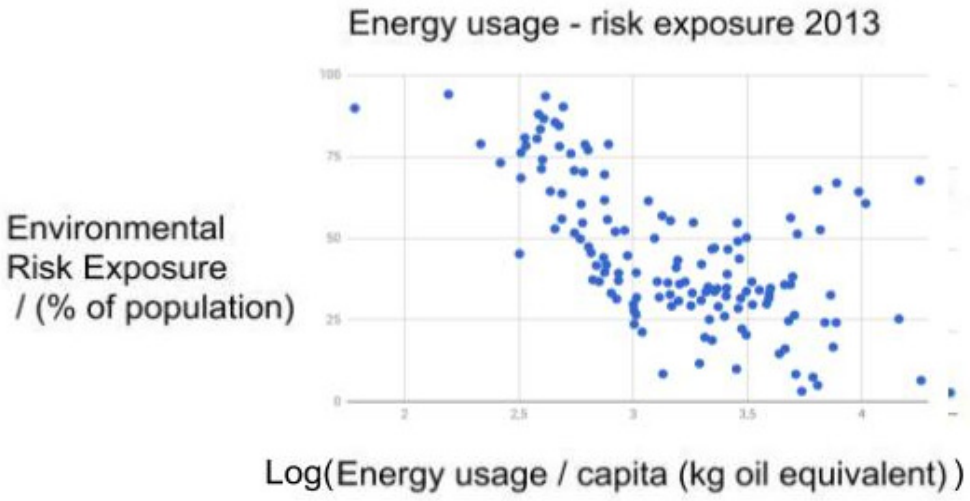


Figure 2. Energy and Environmental Risk Exposure

Source: Environmental Performance Index, Yale University. https://epi.envirocenter.yale

IEA Statistics © OECD/IEA 2014 http://www.iea.org/stats/inde

Low energy use leads to poverty, malnutrition, deceases, lack of potable water, insufficient sanitation, etc. Typical of many Latin American, African and Asian nations is the lack of stable electricity, which hampers everything and reduces environmental viability. Figure 3 has the global picture.

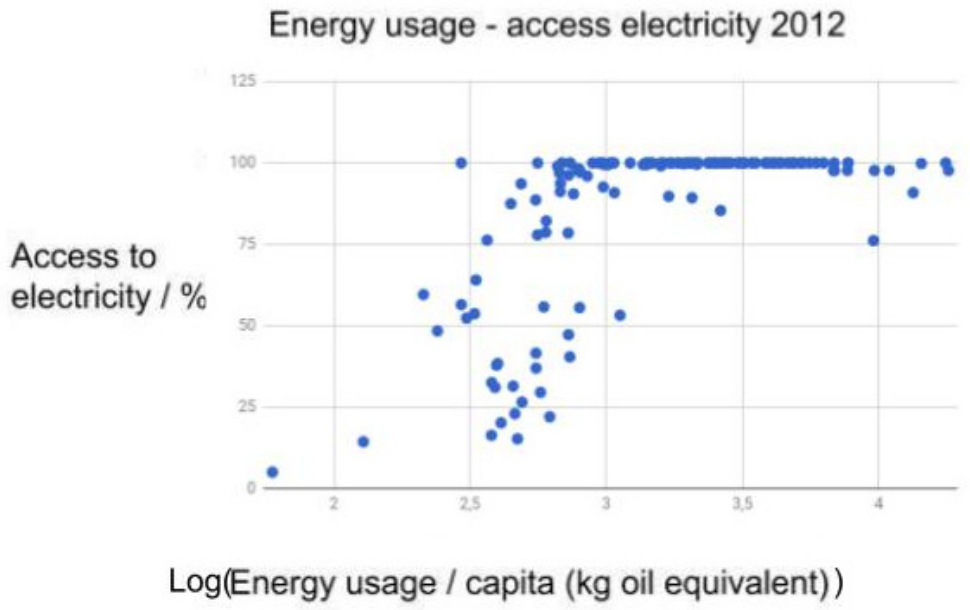


Figure 3. Energy and Electricity Access

Source: Environmental Performance Index, Yale University. https://epi.envirocenter.yale

IEA Statistics © OECD/IEA 2014 http://www.iea.org/stats/inde

The access to safe and stable electricity is crucial for health, schools, food, water, etc. Figure 4 links energy with proper sanitation.

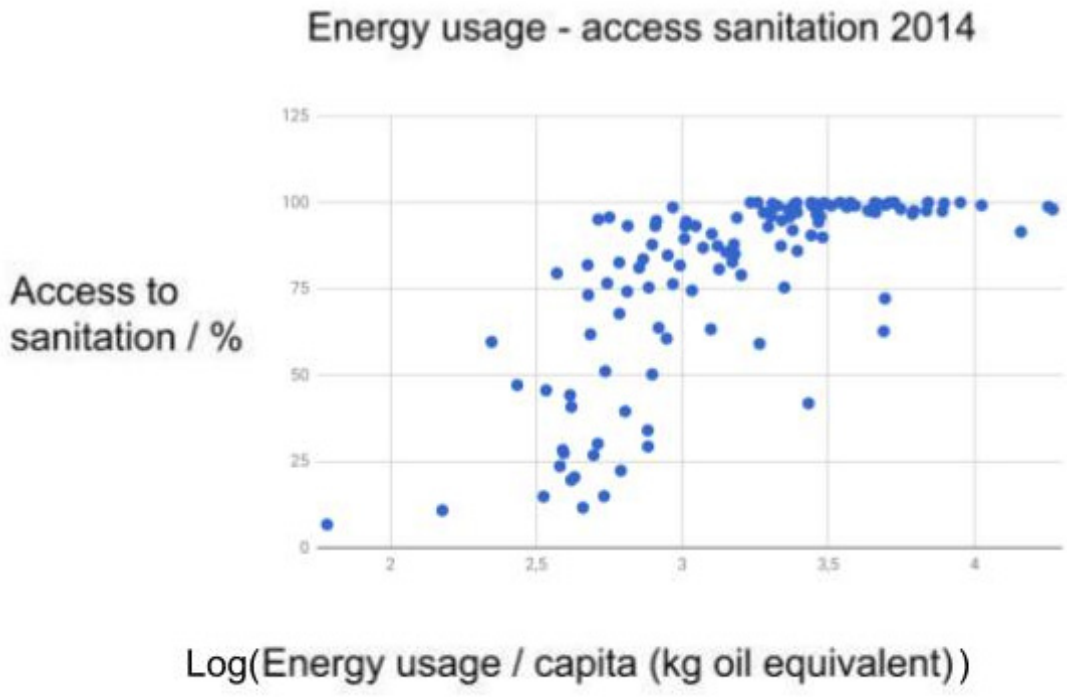


Figure 4. Sanitation and Energy

Source: Environmental Performance Index, Yale University. https://epi.envirocenter.yale

IEA Statistics © OECD/IEA 2014 http://www.iea.org/stats/index

Especially, the rapidly growing African, Latin American and Asian mega-cities lack entirely proper sewage plants. Thus, dirty water is put into the big rivers where other cities downstream take their potable water.

The access to safe and stable electricity is crucial for health, schools, food, water, etc. Figure 4 links energy with proper sanitation.

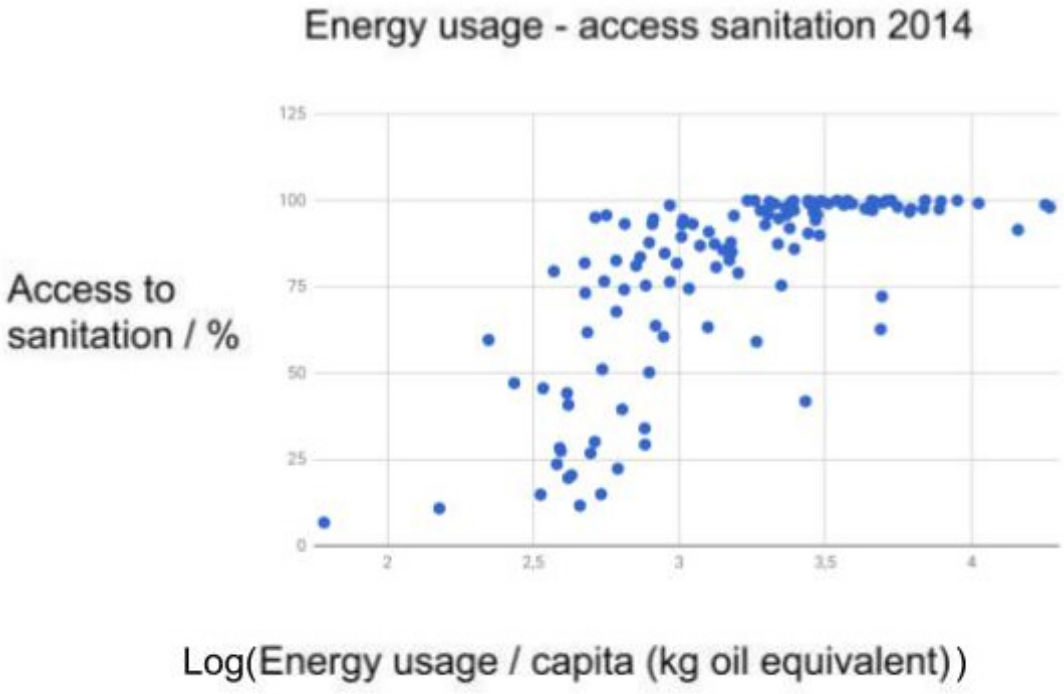


Figure 5. Sanitation and Energy

Source: Environmental Performance Index, Yale University. https://epi.envirocenter.yale
IEA Statistics © OECD/IEA 2014 http://www.iea.org/stats/inde

The necessity of more energy in poor countries for proper sanitation, without which the life of humans is "sale", must be emphasized, especially when global warming diminishes clean water. Air quality too depends upon energy access (Figure 5).

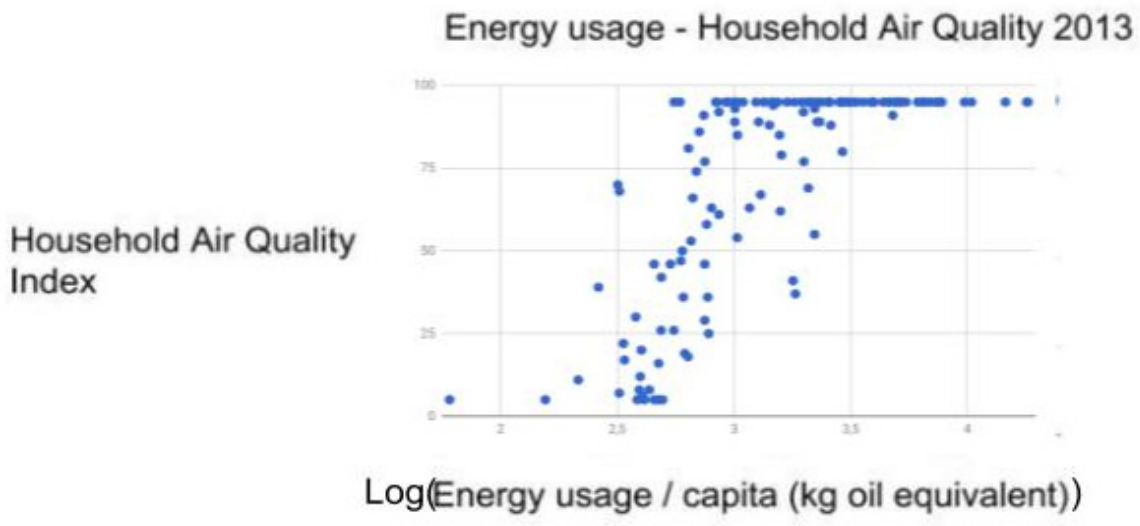


Figure 6. Energy and Air Quality

Source: Environmental Performance Index, Yale University, https://epi.envirocenter.yale
IEA Statistics © OECD/IEA 2014 http://www.iea.org/stats/inde

Typical of many poor nations—Latin America, Africa, Asia—is the lack of predictable access to safe electricity, which hampers work and reduces environmental viability. The access to safe electricity is, it must be emphasized, absolutely central for health, schools, food, potable water, etc. Given the lack of enough energy in poor countries being conducive to the above bad living conditions, one understands the hopes of the poor countries for help with energy transformation leading to better access to just energy!

If, as we believe, energy consumption is behind global warming, the set of poor countries face a most difficult dilemma. On the one hand, they can demand much more energy like fossil fuels, but they then contribute much to climate change, On the other hand, global warming while fabricated by the rich nations and a few very populous poor nations, will have very negative consequences for poor nations. The only way out of this dilemma is that all countries contribute to halting global warming by turning to renewables, especially the set of rich countries.

Thus, energy consumption is closely related to country affluence. The poor countries can only improve living condition by increase energy supply. Their energy demand can only go up, because energy supply is highly skewed to the advantage of the rich countries—see Figure 7.

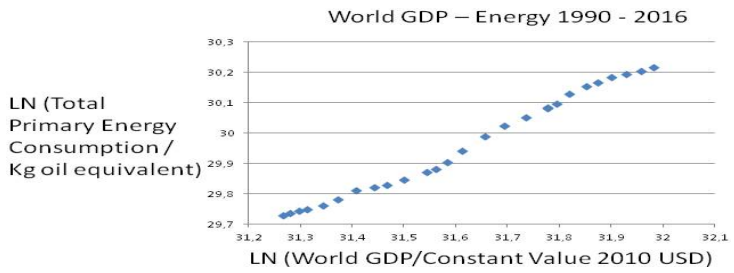


Figure 7. Global Energy Consumption 1990 - 2016

Poor countries need much more energy, but of a new kind. They need assistance to move to modern renewables, as they will give up fossil fuel only if there is compensation by other new energy sources. The enormous demand for more and more of energy comes with a major drawback, namely the GHG emissions. Figure 8 has the picture for the CO2s.

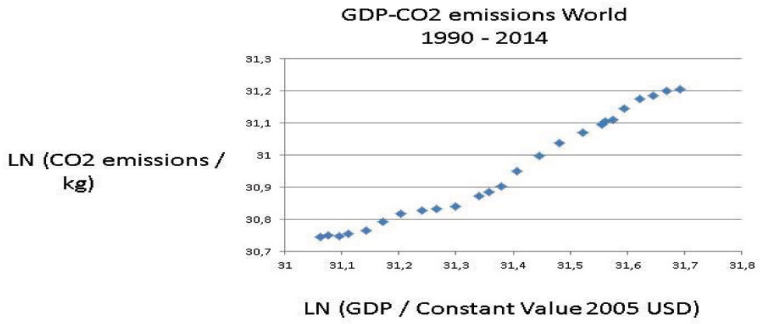


Figure 8. Energy and CO2s 1990-2016

It must be underlined that GHG emissions like CO2s are a function of GDP and population. Only very big poor countries have huge GHG emissions, like India, Brazil and Indonesia. Small poor nations have little GHGs, as they lack energy in great quantity. Yet, poor countries wish to participate in saving the planet from the dangers of climate change on the condition of financial assistance from the COP project and its Super Fund.

In terms of GHGs, rich countries have much higher levels of yearly emissions compared with poor countries, holding population constant. Only when a poor nation is huge, doe it have enormous CO2S. Strict linear relation hold between GDP, energy consumption and GHGs, both on a per capita basis and on an aggregate country level. I will show one more picture (Figure 9).

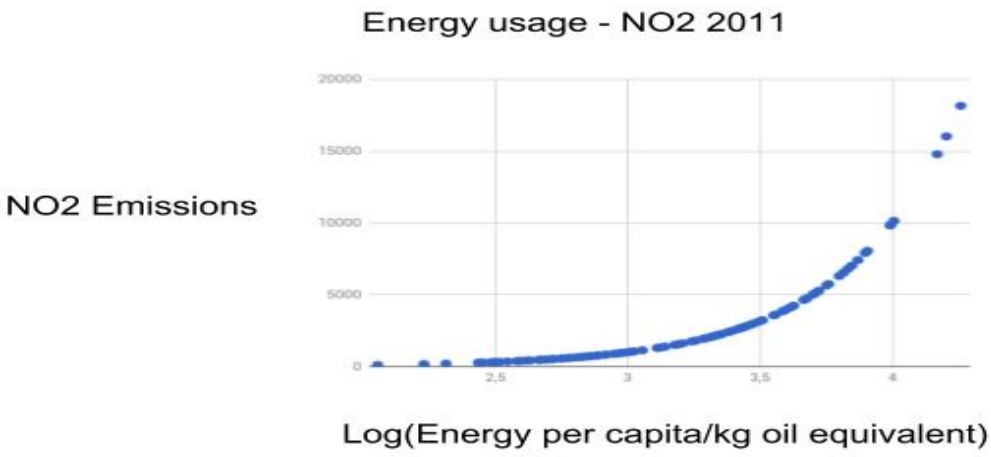


Figure 9. Nitrous Oxide and Energy

Source: Environmental Performance Index, Yale University. https://epi.envirocenter.yale

IEA Statistics © OECD/IEA 2014 http://www.iea.org/stats/inde

While the UNFCCC has mainly concentrated upon the CO2s, the GHGs comprise several gases, on of which is the nitrogen oxide. Production of nitrous oxide stems from microbial activity in soils and in the ocean. Human sources of nitrous oxide are combustion of fossil fuels, biomass burning, industrial production of nitric acid, and fertilizers. Nitrous oxide enhances the greenhouse effect just as carbon

dioxide does by capturing reradiated infrared radiation from the Earth's surface and subsequently warming the troposphere. It stays in the troposphere for about 120 years before moving into the stratosphere where it is conducive to the destruction of stratospheric ozone.

Climate and earth scientists have convinced a large majority of people that climate change occurs today. And the new theory of abrupt climate change entails that huge feedback lopes will change the Earth already within the next one or two decades. It is a matter of Arctic ice meltdown and methane emissions from the permafrost that may bring temperatures much higher than the COP21 Treaty aimed at with uncertain disastrous consequences for both Mother Earth and mankind. Lots of natural science research still remains to be done in order to reduce the large uncertainties about temperature rise and its consequences for a number of vital outcomes for humanity.

3. Decarbonisation and Geo-Engineering

Starting from the nature of Public International Law (PIL), the COP21 Treaty is based on voluntary emissions reductions, involving a COP secretariat with mostly information gathering tasks. The principle of state sovereignty permeates all of PIL. The suggested speed of decarbonisation is slow: the COP21 policies involve *a halt to the increase* in CO2 emissions by 2020, a 30% reduction in CO2s by 2030 (absolutely or relatively?) and more or less total decarbonisation by 2075. But what are the means to these gigantic energy transformation goals? Basically, it is all about managing energy transformation, as the augmentation of GHGs stems from human use of energy resources.

As CO2s have risen too much since the industrial revolution, they must somehow be reduced in total. The COP strategy is to first halt the increase in CO2s and then reduce them, first by 30 per sent and later completely, which is of course utopian. Abrupt climate change makes this strategy obsolete, because it is too slow and ineffective. There are lots of innovative activities, but CO2s keep going up.

The only remedies are: 1) complete and immediate stop of coal and charcoal; 2) massive construction of solar power parks; tests of geo-engineering on a large scale. But these measures are too radical for global coordination and also the G20 nations that are responsible for 70% of total CO2s. Let us see what solar energy revolution would really entail in terms of management tasks for global coordination, assisted by for instance the COP21 Secretariat and the IPCC—see Table 1 with Morocco's giant plats as benchmark.

Table 1. Number of Ouarzazate Plants for 40 Percent Reduction of CO2 in Some Giant Countries (Note: Average of 250 - 300 Days of Sunshine Used for All Entries Except Australia, Indonesia, and Mexico, Where 300 - 350 Was Used)

Nation	Co2 reduction pledge/ % of 2005 emissions	Number of gigantic solar plants needed (Ouarzazate)	Gigantic plants needed for 40 % reduction
United States	26 - 28 (Note 1)	2100	3200
China	None (Note 2)	0	3300
EU28	41 - 42	2300	2300
India	None (Note 3)	0	600
Japan	26	460	700
Brazil	43	180	170
Indonesia	29	120	170
Australia	26 - 28	130	190
Russia	None (Note 4)	0	940
World	N/A	N/A	16000

Note. 1) The United States has pulled out of the deal; 2) No absolute target; 3) Pledge is above current level, no reduction; 4) Upper limit dependent on receiving financial support; 5) EU joint pledge of 40 % compared to 1990.

It will of course be argued against such a 40 percent speedy reuction in CO2s that it leads to economic recession. So may it be! But it would reduce future much higher costs. After all, economies adapt and will recover due to all new investments needed in a decarbonised world. Ramesh (2015) emphasizes that India needs much eonomic assistance for decarbonisation—a giant task for global coordination to assist poor nations! Let us look at the American scene in Table 2.

Table 2. Number of Ouarzazate Plants Necessary for 40 Percent Reduction in CO2 (Note: Average of 250 - 300 Days of Sunshine per Year Was Used for Canada, 300 - 350 for the Others)

Nation	Co_2 reduction pledge/ % of 2005 emissions	Number of gigantic solar plants needed (Ouarzazate)	Gigantic plants needed for 40 % reduction
Canada	30	230	300
Mexico	25	120	200
Argentina	none	0	80
Peru	none	0	15
Uruguay	none	0	3

Chile	35	25	30

Some Latin American countries have lots of hydro power, but it may dwindle rapidly due to abrupt climate change. Solar power would be excellent energy for Mexico and Brazil for example.

Table 3 has the data for the African scene with a few key countries, poor or medium income. As they are not in general energy consuming on a grand scale, like Asia, decarbonisation should be feasible with Super Fund support.

Table 3. Number of Ouarzazate Plants Necessary in 2030 for 40 Percent Reduction in CO2 (Note: Average of 300 - 350 Days of Sunshine per year Was Used)

Nation	Co2 reduction pledge/ % of 2005 emissions	Number of gigantic solar plants needed (Ouarzazate)	Gigantic plants needed for 40 % reduction
Algeria	7 - 22 (Note 1)	8	50
Egypt	none (Note 2)	0	80
Senegal	5 - 21	0,3	3
Ivory Coast	28-36 (Note 3)	2	3
Ghana	15 - 45 (Note 3)	1	3
Angola	35 - 50 (Note 3)	6	7
Kenya	30 (Note 3)	3	4
Botswana	17 (Note 3)	1	2
Zambia	25 - 47 (Note 3)	0,7	1
South Africa	None (Note 2)	0	190

Note. 1)The United States has pulled out of the deal; 2) No absolute target; 3) Pledge is above current level, no reduction; 4) Upper limit dependent on receiving financial support.

Table 4 shows the number of huge solar parks necessary for a few Asian countries.

Table 4. Number of Ouarzazate Plants Necessary for 40 Percent Reduction in CO2s (Note: Average of 250 - 300 Days of Sunshine Was Used for Kazakhstan, 300 - 350 Days of Sunshine Per Year for the Others)

Nation	Co2 reduction pledge/ % of 2005 emissions	Number of gigantic solar plants needed (Ouarzazate)	Gigantic plants needed for 40 % reduction
Saudi Arabia	none	0	150
Iran	4 - 12	22	220

Kazakhstan	none	0	100
Turkey	21	60	120
Thailand	20 - 25	50	110
Malaysia	none	0	80
Pakistan	none	0	60
Bangladesh	3,45	2	18

Given the economic advances in Asia, most countries need a lot of solar power parks for decarbonisation. The COP21 management would be able to help. Finally, we come to the European scene.

Table 5. Number of Ouarzazate Plants Necessary for 40 Percent Reduction in CO2s (Note: Average of 250 - 300 Days of Sunshine per Year Was Used)

Nation	Co2 reduction pledge / % of 2005 emissions	Number of gigantic solar plants needed (Ouarzazate)	Gigantic plants needed for 40 % reduction
Germany	49 (Note 1)	550	450
France	37 (Note 2)	210	220
Italy	35 (Note 2)	230	270
Sweden	42 (Note 2)	30	30

Note. 1) The United States has pulled out of the deal; 2) EU joint pledge of 40 % compared to 1990.

4. Energy Plants with Asymmetric Information

The giant polluters have plans for enormous augmentation in energy supply, but they do not say that at the COP reunions (Conka, 2015; Vogler, 2016).

4.1 China

China now enters the First World, as it has long passed its "take-off" point in time around 1980 and has pursued a successful "catch-up" policy for a few decades. Its energy consumption, especially fossil fuels, has skyrocketed with GDP, resulting in the largest CO2 emission globally. Figure 10 has a projection for China.

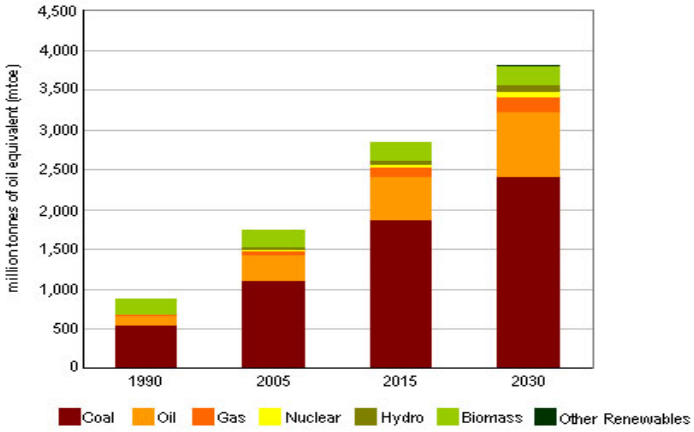


Figure 10. Energy Projection for China

http://www.wrsc.org/attach_image/chinas-projected-energy-growth-fuel

Decarbonisation does not seem highly probable. Much hope was placed at a recent reduction in CO2s, but water shortages forced China to revert to coal in 2017 with attending augmentation of CO2s. China is investing in both renewables and atomic power, but it also plans for large energy increase in the coming decades with lots of energy consuming new projects.

4.2 India

In Indian energy policies, it is emphasized that developmental goals take precedence over climate change considerations. Thus, all Indian households must have access to electricity and only sustained rapid economic growth can reduce poverty. India has a "take-off" economy that delivers affluence for the first time since independence. But it is based on fossil fuels. India looks into other sources of energy, as long as socio-economic development is not hindered. Figure 11 shows the main features of future planning.

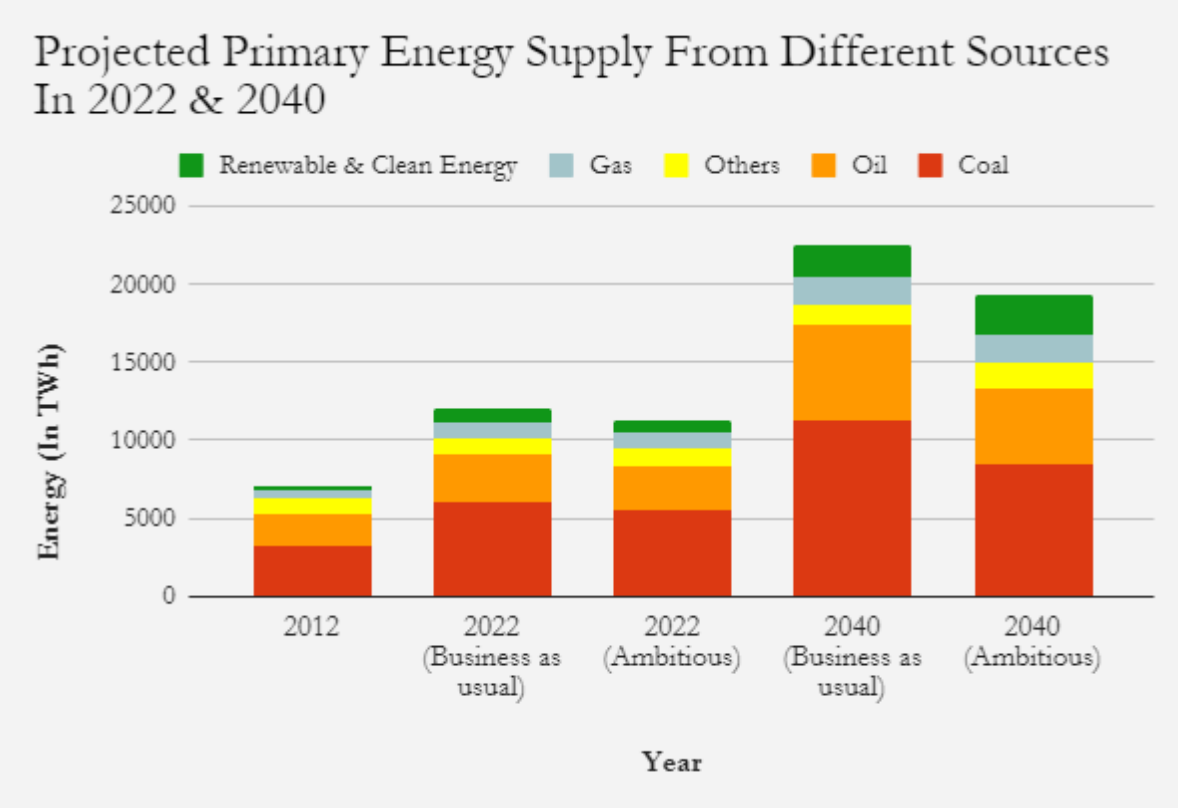


Figure 11. India's Energy Future

Source:

https://scroll.in/article/843981/indias-new-energy-policy-draft-projects-coal-fired-capacity-will-double-by-2040-is-that-feasible

India has rapidly become a major CO2 emitter due to its high growth rates since 1990. It uses lots of coal, stone or wood. Charcoal is bad for households and results in forest destruction. India tries to broaden its energy supply to modern renewables, like solar, wind and hydro power. Yet, it will remain stuck with fossil fuels for decades. It needs assistance from the COP21 project, especially for solar power parks. Building more dams is very risky, as global warming reduces water assets. Figure 11 indicates the India cannot meet its COP21 promises, as Ramesh (2015) underlines.

4.3 Brazil

Brazil is a "catch-up" with its "take-off" point long ago in the 20th century. Compared with India, but it never really succeeds to close the gap to North America, tumbling now and then into dictatorship or recession. Figure 10 shows its stylised energy plans—are they in agreement with COP21 hopes of decarbonisaton?

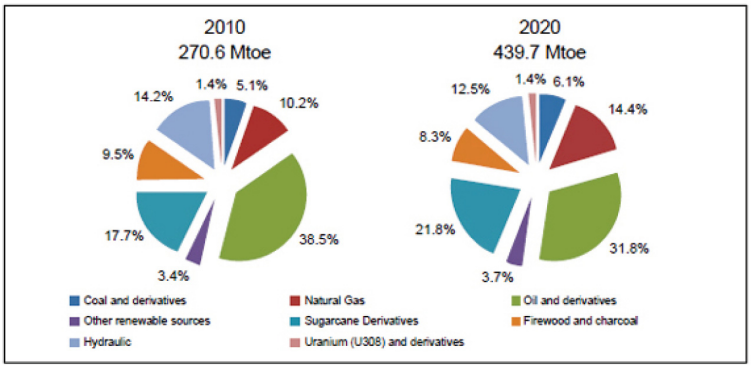


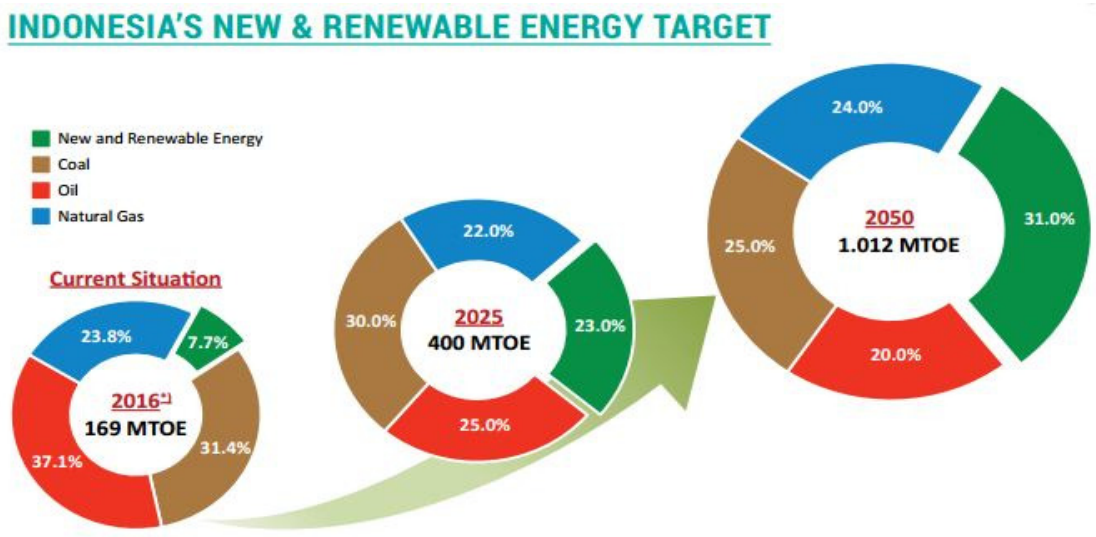
Figure 12. Energy Plans in Brazil

Source: http://www.scielo.br/scielo.php?pid=S0103-40142012000100017&script=sci_arttext&tlng=en

Brazil has already a diversified supply of energy. However, since the country plans to almost double its energy supply, its dependence upon fossil fuel will grow, also upon coal. It dreams about building many more dams in the Amazons, but future water shortages due to climate change may make these plans unrealistic. The country needs COP21 assistance to turn to solar power massively, in order to eliminate first and foremost coal and charcoal. The rain forest is part of Brazil's emission picture where burning and logging reduce its carbon uptake.

4.4 Indonesia

Indonesia is like India a "taker-off" country, enjoying rapid economic growth with attending augmentation in energy consumption. The outcome is that this giant nation has quickly become a major GHG emitter. What make the situation worse is the burning down of the rain forest in parts of Indoneasia.



	2016	2025	2050
NRE Mix	7.7 %	23%	31%
Energy Supply	169 MTOE	400 MTOE	1.012 MTOE
Generation Capacity	59 GW (NRE 8 GW)	136 GW (NRE > 45 GW)	443 GW (NRE > 167 GW)
Electricity/Capita	956 kWh	2.500 kWh	7.000 kWh
Electrification Rate	91%	~100%	~100%

Figure 13. Energy Future for Indonesia

Such a phenomenal augmentation of energy is out of line with the aim of global decarbonisation.

5. Social Science Modeling Coordination Failure

The most influential social scientist ever, Max Weber from Freiburg and Heidelberg, stated in a famous passage the following about means and ends in human behavior:

"Any thoughtful reflection on the last elements of meaningful human activity is first of all bound to the categories of 'ends' and 'means'" (Weber, 1922).

This model of mean-end rationality recurs in Weber's theory of public administration. Actually, Weber regarded the Western civilization as basically founded upon means-end rationality, or technical calculation, in both state (the bureaucracy) and market (the modern corporation). Now, we must ask: Can the global governance project COP21 deliver outcomes in manner that fits Weber's notion of means-end rationality? The main theories in public administration as well as in management entail that accomplishing the decarbonisation goals globally will run into difficulties.

5.1 Bounded Rationality

Herbert Simon developed his bounded rationality theory by emphasizing the cognitive limitations of men and women. He devoted much of his scholarship to criticize the relevance of the neo-classical decision-making model in economics to private management and public administration (Simon, 1996). In government agencies and big firms, decisions could not meet all the requirements of full or

completely comprehensive rationality. Instead, decision-making just "muddles through", as C. Lindblom (1959) argued, following H. Simon. Not all means were known, not all their probabilities could be stated, and not all goals were taken into account—bounded rationality, i.e., incomplete marginal decision-making.

5.2 Implementation Hiatus

Wildavsky took up marginalism or incrementalism, applying it first to budget-making and then to policy implementation in general. When the national government decides about policies, how can regional or local governments implement these? Due to cognitive limitations and the rapidly changing situation, regional and local governments may reject the means and ends of the national government, and try other implementation strategy themselves (Pressman & Wildavsky, 1973, 1984). Policy identity could be entirely lost due to space and time. The same warning—*Wildavsky's hiatus*—applies to the implementation of the COP21 Treaty goals I, II and III: unintended and dysfunctional outcomes, goals displacement and unrecognized results. There may even in relation the COP21 Treaty be a risk for implementation disaster—what Olsen and March (1976) call the "garbage can decision process". So many players, so much noise, too large confusion about ends and means!

5.3 Rational Foolishness

Game theory rests upon the assumption of full rationality in behavior, meaning complete information and transitive preferences, but means-end rationality is far from guaranteed. In 1950, Albert Tucker invented a game showing how individually rational actors can end up with the worst outcome for both collectively—the Prisoner's Dilemma (PD) game, already anticipated by Hobbes in Leviathan (1651). The COP21 Treaty introduces a so-called common pool regime in Elinor Ostrom's (1990) theory saying that voluntary cooperation by those concerned by externalities can solve the free rider problematic. The COP21 is an extremely large CPR, instructed to protect a common pool with free access. Ostrom was too optimistic that CPRs that they can handle the PD gaming, as defection is always an alternative (Dutta, 1998).

The threat to this global CPR is reneging, which one big partner already has done. Turkey may follow suit and perhaps also Australia. The relevant model of the management of the COP21 Treaty is the N-person PD game, which offers numerous possibilities for *defection*: goal displacement, insufficient means, information cheating, lack of funding, internal political instability, global super power clash, etc. To overcome reneging, there must be a system of *selective incentives*, sponsored by the Super Fund.

5.4 Utopian Strategy

World star economist J. Sachs preaches this message (Sachs, 2015), but it is only ethics. Economics is, as Carlyle said, a "dismal science", analysing the IS and not the OUGHT. And the Malthusian predicament is with us with a vengeance in the form of the energy-emissions conundrums. For Africa, it could result in extreme drought, famine, deforestation, desertification, water shortages, etc. With the policy changes in Washington, DC, the entire COP21 framework is up in the air. I do not believe that the US will contribute to the much needed Super Fun.

Insisting upon the positive nature of economics, "positive" referring to the understanding and prediction of the IS, one cannot but realize that sustainable development theory deals with the OUGHT. The gulf between normative utopia and harsh reality forces one to look for how adherents of sustainable economics get from realities to vision. Take the example of Sachs, stating about SDG (*Sustainable Development Goals*):

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

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

Market-based strategies (such as carbon taxation) can help to simplify the policy challenge by steering private decisions in the right direction, but politics, planning, and complex decision making by many stakeholders will be unavoidable.

Source: www.thelancet.com Vol 379 June 9, 2012, p. 2010.

Of course, but what is the likelihood that a carbon tax can be put in place (where, how much) as well as how large is the probability that planning works? Only wishful thinking!

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

The SDGs will therefore need the unprecedented
mobilisation of global knowledge operating across many
sectors and regions. Governments, international institutions,
private business, academia, and civil society will
need to work together to identify the critical pathways to
success, in ways that combine technical expertise and
democratic representation. Global problem-solving networks
for sustainable development—in energy, food,
urbanisation, climate resilience, and other sectors—
will therefore become crucial new institutions in the
years ahead.

Source: www.thelancet.com Vol 379 June 9, 2012

Nothing is durable in economic life. A couple of years ago, there was a fear for a global Hubbert peak,

but now there are huge amounts of shale oil and gas. If fusion power becomes available soon, the energy-emission conundrum will disappear.

5.4 Reneging

In ocean games, the risk of coordination failure is omnipresent. The COP21 Treaty is a common pool regime, vulnerable to the n-1 problem (I can cheat on the others) and the 1/n problem (why do anything for others?). Governments can easily renege upon global coordination, as the US has already done. How could such a giant policy be managed for such a long time without any control mechanisms?

6. Conclusion

Governments pay lip service to the threat of human extinction. It is business as usual among the Great Powers, in the Middle East and South China Sea, in markets and financial institutions. This is not what climate and earth scientists would predict, but it is in accordance with social science theories of collective action.

Given the evidence about abrupt climate change, the Left in the world has only one task, namely halt global warming. In the left wing new daily journal Social Europe, not one single article so far has raised the urgency of anti-climate policy-making in global coordination. No time for utopian experiments, as time is tight (Stern, 2007, 2015).

References

Solar power sources

CO2 Emission Reduction With Solar. (n.d.). Retrieved from http://www.solarmango.com/in/tools/solar-carbon-emission-reduction

EDGAR. (n.d.). *European Commission, Joint Research Centre (JRC)/PBL Netherlands Environmental Assessment Agency*.

Emission Database for Global Atmospheric Research (EDGAR), release version 4.3.2. (2016). Retrieved from http://edgar.jrc.ec.europe.eu

Paris. (2015). *Tracking country climate pledges*. Carbon Brief. Retrieved from https://www.carbonbrief.org/paris-2015-tracking-country-climate-pledges

GDP sources

OECD National Accounts data files. (n.d.).

World Bank national accounts data. (n.d.). http://www.data.worldbank.org

GHG and energy sources:

BP Energy Outlook 2016. (n.d.).

British Petroleum Statistical Review of World Energy. (2016).

Energy Information Administration. (n.d.). Washington, DC.

Environmental Performance Index. (2014). Yale University. https://epi.envirocenter.yale

EU Emissions Database for Global Research EDGAR. (n.d.). Retrieved from

http://edgar.jrc.ec.europa.eu/

EU Joint Research Centre Emission Database for Global Atmospheric Research. (n.d.). Retrieved from http://edgar.jrc.ec.europa.eu/overview.php

International Energy Agency. (n.d.). Paris.

UN Framework Convention on Climate Change. (n.d.). http://unfccc.int/ghg_data/ghg_data_unfccc/time_series_annex_i/items/3814.php

World Bank Data Indicators. (n.d.). Retrieved from http://www.data.worldbank.org

World Resources Institute CAIT Climate Data Explorer. (n.d.). Retrieved form http://www.cait.wri.org

Literature

Conka, K. (2015). *Un Unfinished Foundation*. The United Nations and Global Environmental Governance, Oxford: OUP. https://doi.org/10.1093/acprof:oso/9780190232856.001.0001

Growth and Democracy in India. (2015). Oxford: Oxford University Press.

Ramesh, J. (2015). *Green Signals: Ecology*. https://doi.org/10.1093/acprof:oso/9780199457526.001.0001

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

Sachs, J. D. (2015). *The Age of Sustainable Development*. New York: Columbia University Press. https://doi.org/10.7312/sach17314

Stern, N. (2007). *The Economics of Climate Change*. Oxford: OUP. https://doi.org/10.1017/CBO9780511817434

Stern, N. (2015). *What are we waiting for*? Cambridge, MA: MIT Press.

Vogler, J. (2016). *Climate Change in World Politics*. Basingstoke: Macmillan Palgrave. https://doi.org/10.1057/9781137273413