

I - BRIEFING ON THE SCIENCE & POLITICS OF CLIMATE CHANGE

A) Climate change is not a debate any more, although there are no certainties on its pace and intensity

There is a clear relationship between energy consumption and climate change. Climate scientists are very concerned and in ten years their sentiment has changed a lot: now there is a scientific consensus on the idea that climate change is sensitive to small changes in gas concentrations. But we don't know yet what is the gas concentration threshold where the phenomenon gets out of control.

Since the beginning of the 19th century we've a clear increase in temperatures. Recently temperatures are often very much above the mean trend, ¹so there is a high likelihood that we are going to face something we have never faced before.

Not only is the air temperature rising but so is the temperature of the oceans. There have been huge variations around the mean on the short term because of El Niño cycles, and no increased warming since 1996. ²

This is an argument used by climate change detractors, but on longer time period the increase in temperatures is obvious. Soon, we will enter in the hot phase of the El Niño cycle which is going to prove their argument wrong.

Another argument commonly used by anti-climate change lobbyists is that most of temperature increase stems from solar radiation: as there is nothing we can do about it we should continue with business as usual. It is true that they are one of the forces behind global warming, alongside black carbon, stratospheric aerosols and land use. But solar radiance has insignificant impact compared to greenhouse gas emissions.

Most people are not aware of the fact that once we get to a certain stage in warming, around +3C, there will be no going back whatever we do. This temperature would mean serious water rise and flooding of major cities in the world, including London.

Some feedbacks phenomena reinforce global warming, such as the ice albedo feedback. ³

The fat tail debate results from the uncertainty surrounding estimates of the intensity on global warming. While for the 2020-2030 time period there is a consensus that we are likely to see a 1C increase, for the 2090-2099 time period IPCC models do not have a bell shape anymore but flatten into "fat tails", meaning that there is a higher likelihood that we will know more extensive variation of temperatures. ⁴ There is a real possibility that we might head to a +6C, +7C temperature increase. Because of

¹ see [Thomas Holmer Dixon presentation, slide 14](#)

² see [THD presentation, slide 15](#)

³ see [THD presentation, slide 19](#)

⁴ see [THD presentation, slide 28](#)

this possibility - and more and more evidences indicates that we are leading towards a fat tail model - there is a strong case for applying the precautionary policy.

B) Irreversible and enormous consequences: the end of the world as we have known it is practically a given so we should start preparing (resilience) whilst still working to stop catastrophic change

The strong decline in the ice at the poles indicates the beginning of a reconfiguration of atmospheric and ocean circulation.⁵ Such a decline might lead to disappearance of the arctic poles by the next 15 years.

The melting of the poles will lead to conflicts for the control of the resource below the ice. But this is nothing compared to the consequences it will have on the energy balance of the planet. If the polar cell breaks, the jet stream might migrate further north.⁶ The monsoon is already weakening, and we have seen major draughts in East Asia.⁷

Even if we stop emitting more CO₂, one third of the one we already emitted will still be in the atmosphere in 20 years. Temperatures won't decline commensurably. Emissions are irreversible for 1000 years after they have stopped.⁸

There are various consequences to be expected from climate change. It will have an impact on food security. Crop yields are strongly affected by high temperatures, even for a short time exposure. In fifty years from now, it is estimated that most of the globe will be exposed to record-high hot temperatures. Food issue is particularly concerning for densely populated and poor areas, mostly East Asia. China for example needs 450 million tons grains to feed itself, if a seasonal draught happens it will monopolize the whole 200 million tons of grains that are being traded in the world.⁹ Draughts are already occurring in the north of China.¹⁰

This in turn is likely to create social and political unrest as people struggle to access food.

C) The issue mostly revolves around the energy sector

The main issue posed by global warming is energy sources.

Oil remains critical for transportation (i-e the whole economy). Since the 60s, conventional oil discoveries have declined, while the production kept on increasing. Ultimately production is going to reach a plateau and then decline. Consequently there is going to be critical tension in oil supply when the economy recovers (prices are going to soar together with demand).¹¹

⁵ see THD presentation, slide 20

⁶ see THD presentation, slide 22

⁷ see THD presentation, slide 26

⁸ see THD presentation, slide 23

⁹ see THD presentation, slide 25

¹⁰ see THD presentation, slide 27

¹¹ see THD presentation, slide 30; 32

Natural gas is in a better position in terms of emissions and availability of supplies, it could temporarily fill the gap in supply left by oil scarcity. But even for that, we need intensive investments in LNG which isn't happening.

A key indicator to have in mind when assessing the best options to diversify from conventional oil is the Energy Return on Investment.¹² For US oil production in the thirties the ratio of energy output to input was 100/1, while it is currently of 80/1 for coal and 4/1 for tar sands and 1/1 for ethanol. This implies that we are less and less efficient at producing energy, but given the decline in conventional resource, heavy investments in other sources is not an option.

Despite everything we know, we are now going in the wrong direction to prevent global warming. The CAGR of global fossil fuel emissions is positive. For the 2000-2050 time period, estimates range from 1% to 2.4%. This is probably even going to be an underestimation, given that observation for the 2000-2006 time period was 3.3%.¹³

D) What are the options?

From the most easily done to the least quickly implementable, solutions are: Energy Efficiency, Renewable Energies, Carbon Capture and Nuclear, Atmospheric Carbon Capture, Unconventional Technologies, Geo-engineering, Shifting economics from conventional growth model.¹⁴

We have a decade to transition to non greenhouse gas emitting energies but at the same time to find a way to prevent the poles from melting down.

If everyone is aware of the problem, why society isn't doing something? The key lies into political action, but that is unlikely to happen in a sufficient scale currently. Politicians face too many forces to delay and procrastinate. Some of them are internal to the phenomenon, which suffers from uncertainties, time lags, and non linearity.

On the biodiversity issues, there is no time delays, no uncertainties, yet politicians don't do anything.

Greening initiatives have a very good ROI. There has been a dedicated working group for the G20, but this has not been given much space in discussions.

¹² [see THD presentation, slide 33](#)

¹³ [see THD presentation, slide 35](#)

¹⁴ [see THD presentation, slide 45](#)

II – BRIEFING ON BIODIVERSITY LOSS

A) The destruction of biodiversity is quantifiable and has strong impacts

Biodiversity has different meanings. It can be measured by the Mean Species Abundance. This indicates important loss of biodiversity in The US, the EU, China, India and Latin America. According to the model, in 2000 MSA was 72% while this will fall at 61% in 2050. Natural areas have declined by 7.5M km².¹⁵

Consequence stemming from the loss of biodiversity are (i) loss of economic welfare (the annual loss of natural capital is estimated at \$1.4 to 3 trillions using a discount rate of 4%) and (ii) threats for global development (this will put the poorest population in dire strait) with political consequences (iii).

- (i) Biodiversity can also be defined by the flows of free services delivered by nature, such as food, soil, clean air, and clean water. They are difficult to assess because they are not taken into account by monetary measures such as GDP. There is an implicit trade off between the flows. It is estimated that their loss will represent 7% of GDP in 2050.¹⁶ Nevertheless they are key for the whole system to function. For example the loss of fisheries will threaten 27m jobs, mostly in poor countries where fishing is intensive rather than extensive, as well as loss of revenue and above all increase malnutrition and all the associated problems.¹⁷ The blame for disappearance of fisheries is to lay in subsidies from rich countries.
- (ii) Those services are especially important for the poor, especially those relying on subsistence farming. They cannot afford the irrigation and fertilizers that will be required because of climate change. They represent a quarter of world population. The correlation between underdevelopment and biodiversity loss is particularly striking in countries such as Haiti.¹⁸ It suffers from food scarcity because the land has been made unusable for agricultural purpose, and the lack of access to clean water means most children suffer from chronic diarrhoeas and TB. The message here (for poor governments) is that biodiversity is not solely the concern of rich countries who can afford to care about it because daily survival is not the trade off, but that it is actually a matter of survival for poor countries. They need to realize that destroying ecosystem has life-threatening consequences. Biodiversity is not a superfluous luxury.
- (iii) Loss of biodiversity will, through social distress, lead to political instability.

Furthermore, biodiversity impacts climate change and is impacted by it, notably through the ocean wildlife. We know that phytoplankton can store as much carbon as the rainforest, and that biogenic calcification also helps storing away carbon. We are

¹⁵ see Pavan Sukhdev presentation, slide 4

¹⁶ see PS presentation, slide 8

¹⁷ see PS presentation, slide 10

¹⁸ see PS presentation, slide 11

not sure about the levels of carbon stored, which makes it hard to calculate the cost of not acting to preserve marine biodiversity.

B) No consensus on a financial model yet

Discounting the cost flows resulting from the loss of biodiversity is an ethical choice because it reflects the fact that destruction will impact future generations. But there are many ways to apply this social discount rate. Market commonly uses a 4% flat discount rate, which is based on the hypothesis that there is trade of between wealth and environment. We could use a negative discount rate. Some authors are also discussing the relevance of a growing social discount rate (Elyes Jouini) to reflect cumulative negative impact for future generations.

III – WHY IS IT THAT WE DON'T DO ANYTHING AND HOW SHOULD WE CHANGE THAT AS INVESTORS

A) Politicians have very serious incentive to listen to anti climate change lobbying

The public (i.e. beneficiaries of preventative action) would rather not hear about what is easily seen as a “future problem” and the industries who will suffer lobby as if it is a life or death issue, so politicians don't push for real action so as to keep a chance to get elected. The only possible way is to create popular pressure on the politicians to include climate change on the agenda.

Currently companies that are lobbying against climate change reaction do not face losing their license to operate because politicians know that those companies can threaten to walk away (“carbon seepage”) and take with them thousands of jobs and fiscal revenues. If politicians really decide to stand against those companies, they risk their political career as events in Australia show.

But a shift in public opinion and political engagement can result as a response to a crisis.

Governments need to be made accountable for the issue. For example investors could rate them or design a product that would react to their “carbon guilt”.

B) Investors, not subject to the same ties, need to free themselves from short termism

Investors should push to constitute as broad and diversified a base of knowledge as possible, in order to prevent the whole economy to function upon the same hypothesis which, if proven wrong will undermine everything.

Fund managers should really be evaluating companies on how sustainable they are over 25-50 years and screen companies on long term risks such as climate change since companies that don't do this face losing their social license to operate. But if fund managers do this, they risk alienating clients and underperforming in the short-term. The problem for institutional investors is that they cannot really engage with

companies because they are not really long term investors and their clients who should be long term aren't much better. Investors are primarily evaluated by benchmarking them against short term performance of other short term investors (i.e. relative returns). This leads to higher volatility and higher turn over than really needed over the long term. Not only is there no commercial "cost" for doing this but it is actually a prerequisite for obtaining mandates. Society has gone down the wrong track with its understanding of the role of long-term investors, especially pension funds. Their mandate should reflect their clients' genuine long-term interests, not some simplistic mathematical projections/models. The current crisis – which has raised awareness of the risks associated with sophisticated but fundamentally flawed models – should provide an opportunity for this to be discussed in relation to climate change.

Pension funds should also provide a strong response to counter anti climate change lobbying by the few sectors who benefit in the short-term from inaction. Investors need to challenge managements who are lobbying against measures which would be good if the fund took a portfolio wide and long-term, perspective. There is a clear need for collective mechanisms which are well resourced to increase the weight of this position – this is a big gap today

A first practical lobbying subject would be to engage governments to change the indicators for pension fund reporting so as to include some related to climate change mitigation. This lobbying needs to be done both by finance people and by influential climate scientists. A good start for changing would be those assurance companies now owned by the US government (perhaps AIG). Another target for lobbying should be consultants: they have a lot of power.