

Rethinking economic growth in the age of ecological constraints.

Fernando Rello¹

I. Summary

The main purpose of this article is to discuss the social meaning of economic growth in the age of ecological constraints. Nowadays, the big size of the global economy in relation of its surrounding ecosystem has transformed natural resources and ecological services into the really scarce goods. The real and actual context of the challenge of economic growth is climate change, and the article explores the relationships between both. It tries to answer the question of why human society has not been able to reduce its emission of carbon dioxide despite the fact that climate change is turning out to be more risky.

II. Economic growth as a panacea

Everybody wants economic growth: politicians to keep social control and power, entrepreneurs to increase their profits and consumers to get the gadgets they try to derive happiness from. Economists and international financial institutions keep saying that our system cannot work without growth and poverty cannot be fought against adequately without it. The whole market economy is growth- dependent.

The American historian J. R. McNeill wrote that “the priority of economic growth is easily the most important idea of the twentieth century”.² According to him, economic growth successfully became a pervasive state religion, displacing communism in their search to become the universal creed of the past century. Economic growth became the indispensable ideology of the modern state almost everywhere. In its name corruption is tolerated, vast social inequalities are accepted, even the lack of liberty is accepted if the material fruits of growth are available to the people, like in China today.

In this essay we will question this idea of economic growth as a panacea. What is economic growth? It is the continuing production of goods and services, using scarce energy and matter and emitting gases and material waste. The social meaning of economic growth has changed since it began, fueled by the Industrial Revolution. At that time there was not a scarcity of natural resources or atmospheric pollution. The world has changed, mainly because of economic growth. Nowadays we are living in the age of ecological constraints.

What do we mean by this? To be living in the age of ecological constraints means that the main obstacle to economic growth is not capital or trained labor -as the theory of growth has been saying since its creation- but the insufficient amount of natural resources and ecological services. Interviewed on China’s future, a former Chinese prime minister said that the main problem China has to face is not the scarcity of capital or financial resources but the scarcity of land, water and energy. We should add the big challenge of climate change to the continuation of our lifestyle. Our world has changed dramatically as the size of global economy in relation to its supporting ecosystem has become too big. In this world, the new

¹ Professor. Faculty of Economics. Universidad Nacional Autónoma de México (relo@unam.mx)

² J.R. McNeill. *Something New under the Sun*. New York, Norton, 2000

and real scarce goods are natural resources and ecological basic services. This is really a new thing under the sun, as McNeill wrote.

III. Climate change and economic growth.

Climate change is the biggest global challenge humanity has had to face in all its history. Disruptions of climatic and natural conditions have caused in the past the disappearance of particular civilizations, like the Maya. But this is the first time all humanity is facing a serious global challenge at the same time. In other words, our economic organization and way of living, is putting our global commons under severe stress and humanity on an unprecedented crisis.

According to the last report of the Intergovernmental Panel on Climate Change (IPCC), without additional efforts to reduce GHG emissions beyond those in place today, emissions growth is expected to persist driven by growth in global population and economic activities. Baseline scenarios, those without additional mitigation, result in global mean surface temperature increases in 2100 from 3.7 °C to 4.8 °C compared to pre-industrial levels.³

These projected temperature increases will have severe negative effects. Take into account that up to now the increase of temperature has been only 0.8 degree, compared to postindustrial levels and that despite this small increase its effects are already noticeable and worrying. The IPCC defines the dangers of future climate change in terms of risks in the following way:

- i) Risk of death, injury or disrupted livelihoods in low lying coastal zones due to storms, coastal flooding and sea-level rise.
- ii) Risk of severe ill-health and disrupted livelihoods for large urban populations due to inland flooding.
- iii) Systemic risks due to extreme weather leading to breakdown of infrastructure networks and critical services as electricity and water supply.
- iv) Risks of mortality due to extreme heat periods.
- v) Risk of food insecurity due to flooding, drought and reduced agricultural productivity, particularly for poorer populations.
- vi) Risks are unevenly distributed and are greater for disadvantaged people and communities.⁴

The IPCC has different scenarios of future climate change. I have selected the already described scenario and not the more optimistic ones for the following reason: despite the Kyoto Protocol and the several COP international meetings to negotiate policies of mitigation of greenhouse gases (GHG), the yearly emanation of gases is not decreasing but increasing. During the period 1970-2000, GHG increased 1.7% per year, whereas a decade later (2010-

³ IPCC. Fifth Assessment Report 2014. Group III Mitigation of Climate Change

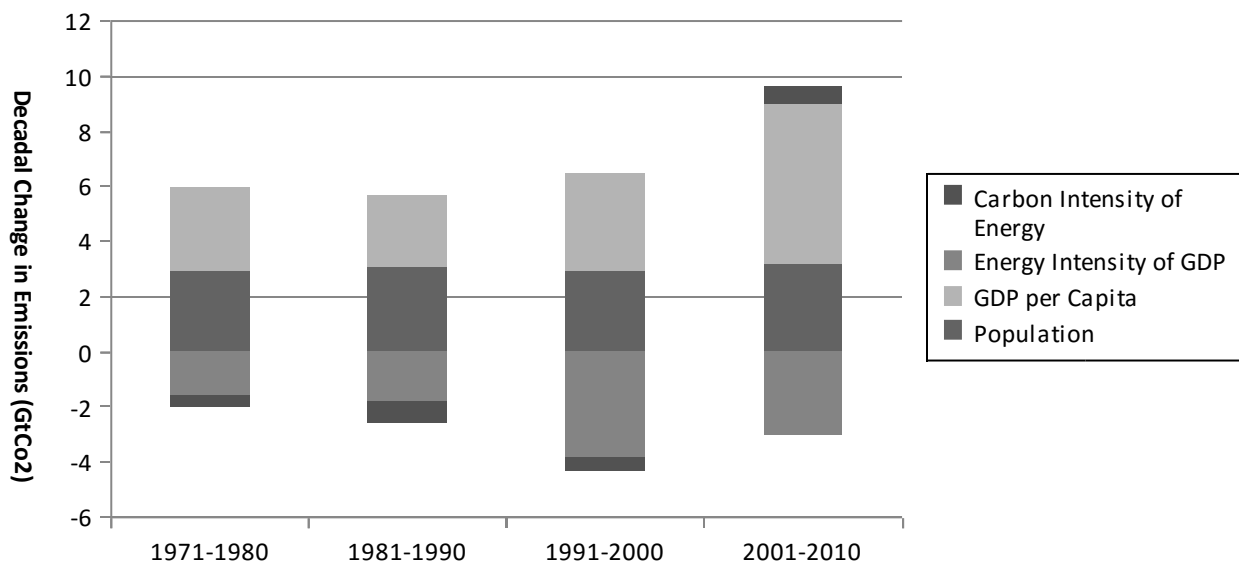
⁴ IPCC. Fifth Assessment Report 2014. Report on Impact, Adaptation and Vulnerability.

2010) GHG augmented at the yearly rate of 2.2%. Mitigation policies and efforts have failed to control emissions. There is no reason to think that mitigation negotiations will be more successful.

The main culprit of this situation is rapid economic growth and the resistance of governments all over the political spectrum to implement policies that really achieve mitigation targets. The main factors behind the augmentation of GHG are the increase of the population and economic growth. Both expand the size of the global economy and the production of GHG and constitute what can be called the scale effect. On the contrary, the technological effect is the positive decrease of GHG resulting from the application of ecological efficient technologies that reduce the emanation of gases per unit of GDP (energy intensity GDP) and per unit of energy generated (carbon intensity of energy).

Graph 1

Decomposition of the Change in Total Global Change CO2 Emissions from Fossil Fuel Combustion



Source: IPCC. Fifth Assessment Report 2014. Group III Mitigation of Climate Change

Graph 1 depicts the evolution and relative importance of these factors. The following conclusions can be drawn from this information: i) The total amount of GHG has increased, particularly in the period 2000-2010; ii) the technological impact was important in the period 1990-2000 but waned in the next decade, showing the limitations of technological advancement in mitigation efforts; iii) economic growth is the main responsible of the increase of GHG and iv) the scale effect surpasses the technological effect. If the scale of the global economy keeps growing as in the past, no technological advancement could counterbalance it in the future.

IV. Inequalities in degrees of economic growth and production of GHG among countries: a barrier to achieve mitigation targets.

In the rest of this short essay, we will try to answer the following two guiding questions: i1) why we have, as a global society, failed to mitigate GHG, when the problem of CC turns out to be more severe and dangerous? ii) Our limitations are due to bad policies or to more

systemic and structural reasons?

One of the reasons of these limitations has been outlined above: the enormous asymmetries in economic growth and past quantitative emanations of GHG among countries, divides them in international negotiations. The equity issue is simple to define, based on modern science. Global warming is produced by total concentration of GHG in the atmosphere and these gases will stay circulating there for centuries of years warming the earth. Obviously, the countries which started their process of industrialization in the eighteen and nineteen centuries (England, Europe, and USA) have done a great deal more emitting than others. The now less developed countries, including China and India, have produced so far fewer gases and are paying higher costs for present warming and CC because they are more vulnerable due to reasons linked to poverty and geographical locations.

When the USA, in international meetings of the COP urges China, a big polluter nowadays, to reduce its emanations of GHG, the later replies that it is the former that has filled the atmosphere with gases and not China, adding that it has the right to grow economically and pollute to keep its poor population out of poverty. Talks end in a stalemate at this point and further advance is very difficult.

The concept of carbon budget is useful to understand the big climatic challenge we are facing as a global society and the why developed countries find very hard to make more serious mitigation commitments. The carbon budget is the amount of GHG the world could emit in the future and not to surpass the target of 450 parts per million. This maximum concentration of gases would safely limit future temperature increases to 2 degrees and probably avoid the catastrophic effects of CC.

It is estimated that between now and 2050 we could allow 670 billion tons of GHG, if we want to be around a 2 degrees increase. This means 18 billion of gases a year. How to distribute this carbon budget among all countries of the world? This key issue will decide international relations in the future. If this total emission budget were allocated on an equal per capita basis, the budget of the developed countries would be 3 billion tons a year. At today's carbon intensity, the allowable GDP would be a quarter of current GDP.⁵ This growth reduction is politically unacceptable to these countries.

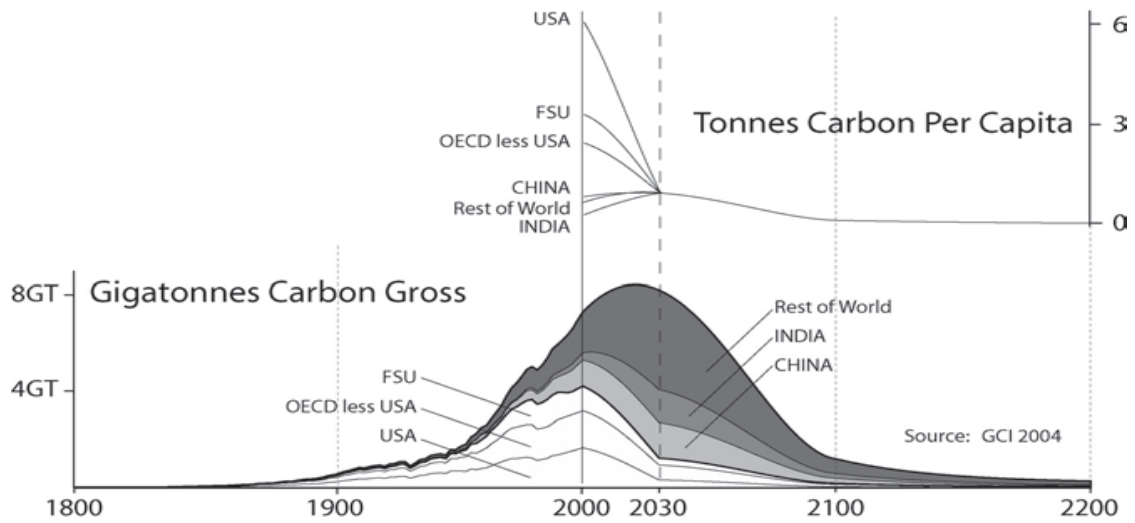
Economic growth is a privilege that implies heavy costs for others. In a tiny planet with a big economy, full of externalities, we could ask who should have the right to grow economically, burning fossil fuels and augmenting the CO₂ concentrations in the atmosphere. "Contraction and Convergence" tries to discuss this difficult question. It is a science-based, global climate-policy framework, proposed to the United Nations since 1990 by the Global Commons Institute (GCI). The goal is to arrive to a negotiable rate of linear convergence to **equal shares per person** globally by an agreed date within the time line of a full-term contraction/concentration global agreement.

Graph 2 depicts this hypothetical situation with convergence by 2030. USA and OECD countries would diminish their total and per head gas emanations 1) improving energy

⁵ Calculations made by T. Jackson (2009).

intensity of GDP and carbon intensity of energy and ii) decreasing rates of economic growth. China, India and the rest of less developed countries would be permitted to raise their total gas emanations until convergence year (2030 in this exercise). From 2030 onwards, per head GHG emanations would be the same in all countries with a declining tendency over time. The source of this graph is the Global Commons Institute (<http://www.gci.org.uk>).

Graph 2
Contraction & Convergence



This example shows regionally negotiated rates of C&C. This example is for a 450ppmv Contraction Budget, Converging by 2030.

This type of methodology addresses the issue of growth and emanations asymmetries but in reality what is proposing is a redistribution of wealth and income through redistributing the future rights to grow and pollute. Since they imply a redistribution of wealth and power, are difficult to accept for developed and powerful countries.

V. Another possible explanation of why is so difficult to adopt effective mitigation policies, are the political difficulties faced by less developed countries in rapid process of economic expansion, if they would decide to curtail emissions slowing their rate of economic growth. Let us take the case of China as a significant example.

China is now the most populated country in the world and the second biggest economy with the highest rate of annual economic growth. China has become the most important polluter of our atmospheric global commons (graph 3) because to fuel its enormous and fast growing economy it has to use energy, particularly electricity, produced inefficiently (graph 4) and using basically coal, a very contaminating source of energy.

Graph 3



Graph 4



China burns half of the world's annual supplies of carbon to produce electricity. At its present pace of growth, its cumulative emissions from energy between 1990 and 2050 will amount to some of 500 billion tons -roughly the same as those in the whole world from the beginning of the industrial revolution to 1970.⁶ This energy consumption growth will have a very high impact on global concentrations of GHG and climate change. Its negative consequences for the entire world will be very significant.

This is so because of the big scale of the Chinese economy. China's total Ecological Footprint was 2.9 billion global hectares (gha) in 2008, and is a result of its total population and per head footprint. Although China's per head Ecological Footprint of 2.1 gha is just 80% of the global average of 2.7 gha, China's total Ecological Footprint is the largest in the world in view of its large population size. In comparison, the per head Ecological Footprint of the USA is 7.2 gha, ranking it 6th in the world; but its relatively small population gives the USA a total Ecological Footprint of 2.2 billion gha, lower than that of China.

Economic growth has produced very serious and dangerous effects in China itself; there is severe atmospheric pollution and illness associated with it, pervasive water contamination, desertification and loss of arable land and multiplication of cancer near polluted industrial areas.⁷ Environmental depredation poses a serious threat to China's economic growth, costing the country roughly 9% of its gross national income, according to the World Bank.

Environmental damage has a great political cost for the ruling Communist Party, expressed in growing social unrest. Demonstrations have proliferated questioning the government legitimacy and authority.

When western countries press accuses China to be the bigger polluter in the world and press it to cut emanations of GHG, Chinese Government fights back pointing out that 1) China is not responsible for the accumulation of GHG. The west is. 2) China is no special case: it is following the pattern developed countries adopted in their economic evolution: grow first and clean up later and 3) China has begun to clean up and is investing a lot of resources to this task.

These arguments are correct but this does not prevent that China's future expansion will have a tremendous negative environmental and social impact because China is a special case due to 1) the enormous relative size of Chinese economy and 2) to the fact that its growth is occurring when CC problem is very acute and dangerous and the scale of the world economy is already very big in relation to the supportive ecosystem.

The present neoliberal era of the world economy has favored the expansion of China's and world's emission of GHG, permitting the opening up of national borders to commerce and international capital flows. Multinational corporations, once located in EUA, have immigrated to China to take advantage of cheap labor and loose environmental laws. China has become the workshop of the world, where the developed countries go to buy the goods they need, but also has become the dirty chimney of the world. Thanks to the liberalization and the expansion of the world markets, output produced with relatively clean energy in USA and Europe, is now manufactured in China cheaply but with a lot more contamination. According

⁶ The Economist. The East is Grey. China and the Environment. August 10th, 2013

⁷ Internal pollution in China is not dealt with in this article. Interested readers could find a good review of this subject in Economy, E. *The River Runs Back: The Environmental Challenge to China's Future*.

to one study, between 2002 to 2008, 48 per cent of China's total emissions were related to producing goods for export.⁸

Could China reduce significantly its generation of GHG in the future? It is unlikely because the following reasons:

1) Economic growth, the cause of the problem, remains by far its most important priority. The ruling Communist Party needs economic growth to legitimize its political power questioned by the environmental discontent and the social malaise due to the lack of civil liberties.

ii) The central government, which is more aware of the environmental problem, has a limited capacity to control local authorities, who are more preoccupied with local economic growth.

iii) The Chinese Government has announced that it plans to transfer rural population to urban centers massively in the short run. This switch from rural to urban life would double energy use and carbon emissions per person.

VI. A more structural explanation of why global society has not been able to reduce the generation of GHG, is that market economies find very hard to slow down their pace of economic growth without destabilizing their economies and the society itself.

Would capitalism function well without continuous economic expansion? This is a difficult and challenging question. Political economy and orthodox economic theory would say no. This is why economic growth is considered a must by economists and politicians. This is also a reason why this type of question is very rarely asked.

If capitalism needs continuous expansion, the scale of the economy will grow without limit. The market economy mechanism is a feedback loop in which each element contributes to the growth of the next. This idea is depicted in diagram 1. We begin with the sphere of capital accumulation-investment-production which creates income and effective demand (accumulative effects between loops are denoted by the sign +). Consumption of high carbon goods follows but it does not produce inner satisfaction only a superficial and temporary relieve. This dissatisfaction, something which economic theory cannot explain, is a current issue in modern psychology and oriental disciplines.

8 N. Klein. *This Changes Everything. Capitalism vs. the Climate*. Simon and Schuster, 2014, p. 80

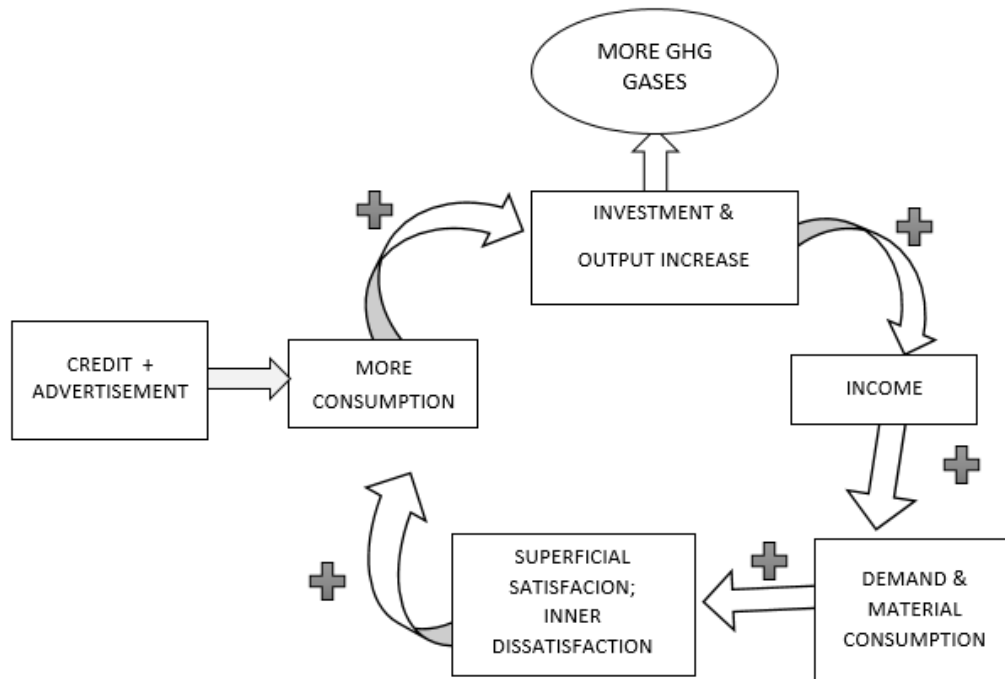


DIAGRAM 1. MARKET ECONOMY FEED BACK LOOP. THERE IS NO INTERNAL BREAK THAT COUNTER-BALANCE THE TENDENCY TO GROW.

The answer to dissatisfaction is more material consumption which is enhanced by consumption credit and advertising, traditional ways of fostering more demand of goods. The last step in the loop and the first of the next round is more investment, material production and emissions of GHG. The capitalist system lacks an inner mechanism to decelerate or stop growth, except for economic crisis which can only temporary slowdown growth. Only an external intervention would be capable of performing this task.

Could capitalism generate a new engine of growth not based in the production of carbon-intensive goods but of low-carbon services? The idea of a new engine of growth comes from Ecological Economics. 'In effect, a new growth engine is needed, based on non-polluting energy sources and selling non-material services, not polluting products' (R. Ayres, 2008). Its key concept is the production and sale of dematerialized 'services', rather than material 'products'. We must admit that it is not clear if a market economy could be dynamic enough to provide jobs and wealth on this basis. A system like this has not ever existed.

At this point, we quote T. Jackson at length: "whatever the new economy looks like, low-carbon economic activities that employ people in ways that contribute meaningfully to human flourishing have to be the basis for it. That much is clear. In fact, the seeds for such an economy may already exist in local or community-based social enterprises: community energy projects, local farmers' markets, slow food cooperatives, sports clubs, libraries, community health and fitness centers, local repair and maintenance services, craft workshops, writing centers, water sports, community music and drama, local training and

skills. And yes, maybe even yoga (or martial arts or meditation), hairdressing and gardening” (T. Jackson, 2009)

Three types of external interventions could keep moving the market economy within its ecological limits:

- i) An increase in the rate of saving at the expense of consumption and a decision to invest much more on ecological purposes.
- ii) The replacement of high-carbon goods with low-carbon services to fuel the engine of growth.
- iii) Changes in the consumption pattern, a result of a more conscious way of living.

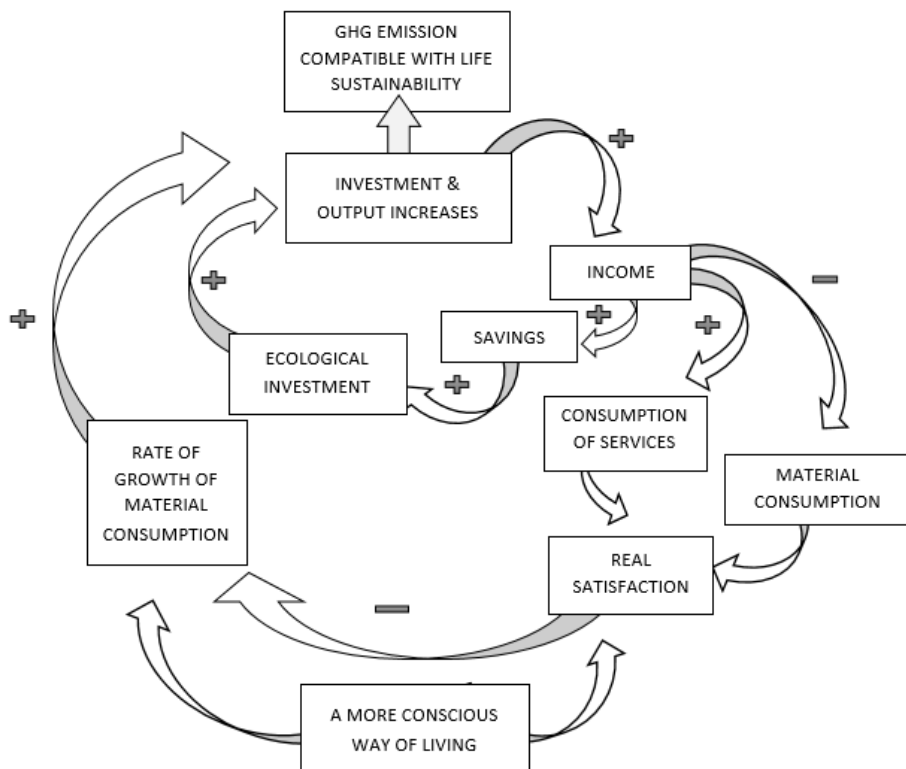


DIAGRAM 2. MARKET ECONOMY FEED BACK LOOP MODIFIED BY PUBLIC INTERVENTION AND CHANGE IN LIFE CONCIUSNESS.

Diagram 2 depicts the same feed-back loop but with external interventions. The first one is an increased rate of savings in the economy by means of a right economic policy at the expense of consumption of high-carbon goods. Total savings -public and private- are directed at clean technology and non-fossil energy research, ecological investment, conservation of our natural capital and to adaptions to negative effects of CC. More specifically, there could be three types of investment in this transitional stage of the economy:

- Investments that enhance resource efficiency and lead to resource cost savings (such as energy efficiency, waste reduction, recycling);
- Investments that substitute conventional technologies with clean or low-carbon technologies (such as renewable energy);
- Investments in ecosystem enhancement (climate adaptation, afforestation, wetland renew and so on). T. Jackson, 2009.

The transition from a high-carbon goods economy to a low-carbon services one, would be a second type of intervention. Services are labor-intensive and the issue of labor productivity enhancement (substitution of labor for capital) is not important because the service offered is labor itself. So, the growth of the service sector would create more jobs than the growth of industry. An unresolved question is whether the services sector, complemented with the production of low-carbon goods, could offer a sufficient base to keep moving the market economy.⁹

Finally, a third change to ease the transition to a low-carbon economy would be a radical shift in the pattern of demand: an increased consumption of low-carbon services and goods and a diminished demand of high-carbon goods and services. The underlying reason of this shift is a more conscious way of living, in which happiness is no longer based on the accumulation of high-carbon goods as a source of well-being. The rationale for this change is twofold: 1) an acceptance of the dangers of CC and a willingness to change personal behavior to avoid or diminish this hazard and 2) an understanding that to accumulate goods does not bring out real inner happiness.

These changes are not unlikely. In fact when people are asked about the sources of happiness, their answers do not place the possession of goods or money in the first places. The main sources of happiness are familiar well-being -by far the most important- health and a nice place to live.

Buddhist economic approaches question the direct and simple relationship, assumed by orthodox economic theory, between material consumption and utility or welfare. (Zadek, 1993). They explain that the main root of suffering or dissatisfaction is attachment to desire and desire in a consumer society is want of carbon-intensive material goods. "Buddhism predicts an eternal gap between (1) object-attachment desires and wants and (2) actual fulfillment of satisfaction received from biophysical reality. If the belief in potential satisfaction from worldly phenomena dominates, socioeconomic systems form a treadmill that never delivers the anticipated results". (Daniels, 2010).

The way out from the consumer-trap in where the market economy has placed us, is to question our attachment to desire of material goods and stop looking for satisfaction only in the external world. This is the essence of a new and more conscious way of living, a possible path to cut the risks of climate change and to live a more fulfilled life.

VII. Conclusion.

The idea of economic growth as a panacea for all problems still prevails in orthodox economic discipline and policy-making, despite the fact that all evidence indicates that continuing economic expansion will put global society out of its ecological limits and produce severe risks of ecological and social disturbances. The reasons of our failure to limit our yearly emissions of GHG are structural (capitalism needs expansion to preserve itself), social (inequalities in the distribution of wealth, income and emissions of GHG) as well as political (political systems need economic growth to get stability).

⁹ T. Jackson (2008) and H. Daly (2014) have explored the idea of an ecological macroeconomics, a new economic discipline in which the interactions of macroeconomic variables are worked out always keeping in mind the ecological limits of human society.

The market economy cannot by itself slow down economic growth because it lacks an endogenous mechanism to do so. We need external interventions to keep the global economy within its ecological limits. This is a complex problem that needs to be approached in ways that take into account this complexity. No single physical or social discipline is capable to offer single solutions. Trans-disciplinary approaches are needed. Policy-making, till now reduced to limited economic approaches, must go out and look for broader and fresher views and ideas. A real solution will not come out only from public policy-making; it must encompass the participation of society and changes in the direction of a more conscious and participatory way of living.

References

R. Ayres (2008). 'Sustainability economics: Where do we stand'? *Ecological Economics* 67, 281–310.

H. Daly, 2014. *From Uneconomic Growth to a Steady-State Economy*. Advances in Ecological Economics Series. Edward Elgar, Cheltenham, UK & Northampton, USA.

Peter L. Daniels., 2010. "Climate change, economics and Buddhism". *Ecological Economics* 69 (2010) 952-961.

The Economist. The East is Grey. China and the Environment. August 10th, 2013

E. Economy. *The River Runs Back: The Environmental Challenge to China's Future*. Council on Foreign Relations Books, Cornell University, 2010.

IPCC. Fifth Assessment Report 2014. Group III Mitigation of Climate Change

IPCC. Fifth Assessment Report 2014. Report on Impact, Adaptation and Vulnerability.

N. Klein, 2014. *This Changes Everything. Capitalism vs. the Climate*. Simon and Schuster.

T. Jackson, 2009. *Prosperity without growth. Economics for a Finite Planet*, Earth scan, London

J.R. McNeill. *Something New under the Sun*. New York, Norton, 2000

S. Zedekiah, 1993. "The practice of Buddhist economics: another view. *The American Journal of Economics and Sociology* 52 (4), 433-446.