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Environmental Policies: A Study Focused on the Developing Countries Approach and the Evolution of the WTO Jurisprudence on the Issue

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Introduction

This work is aimed at analysing the international environmental landscape from the point of view of the most important actors in the arena, namely developing countries and the World Trade Organization (WTO). Developing countries are taken into consideration because with their growing rate of fertility, higher incomes and consequent emission of greenhouse gases, are overtaking developed countries in the severity and magnitude of their ecological footprint, i.e. their impact on Earth's ecosystems. At the same time instead, the WTO with its actions is constantly affecting the world environment through trading. In fact, economic activities and agriculture are majorly responsible for the present environmental landscape. What we will analyse in greater detail is the attitude of the WTO towards the increasing effects of climate change and environmental degradation, its jurisprudence and countermeasures. Even if various instruments have been shaped in order to address these issues, they are still characterised by major conflicts, overall in the area of their authority and jurisdiction.

At the same time, with a special focus on countries like China, India and the Russian Federation, we are going to investigate and scrutinise their strategies aimed at addressing the problem of climate change and environmental degradation, focusing in particular on: mitigation and adaptation measures, investments in green energies and in the modernisation of their economies in order to become "greener".

Through this investigation, we are going to understand the effort and commitment actually made by these countries but also the limits of such measures contextualised in the international panorama. Nonetheless, we cannot deny that this is the right path towards an "environmentally-friendly" world, and that such analysis is extremely relevant in our days.

In fact, climate change and environmental safeguard have been recognised as major objectives by the international community and efforts are made both at national and international level in order to address them, as exemplified by the various world conferences and summits that followed through time.

For what concerns this thesis, its aim will be to analyse the current status and future trends of (i) the environmental landscape of our time, (ii) the WTO and its

mechanisms, and finally (iii) the environmental awareness of developing countries with a special focus on China, India and the Russian Federation.

The first chapter is devoted to the analysis of current environmental issues – urbanization, industrialization and global warming - and the strategies of adaptation and mitigation elaborated to address them at national level.

In the second chapter instead, the focus will shift from a national to an international perspective, taking into consideration the WTO approach to such environmental issues and the relative countries' interests: the evolving of the Organization jurisprudence and the mechanisms developed to answer to the increasing demands of greater attention to the environment from the international community.

Finally, the third chapter will tighten its attention on three examples of countries with an increasingly good record on environmental protection, focusing on both measures undertaken by the government and the private sector to ensure relief on their local environment and natural resources, and decrease their impact on the global ecosystem.

Chapter 1

The Role of the Environment at National and International Level

Through history, the environment has always been a crucial resource for the livelihood of human beings. Providing hunting, fishing, animal husbandry, forestry and foraging, populations over time could survive and develop all around the world. Even today, more people than we imagine are dependent on the environment for all these activities, overall in the developing world. Indeed, we can affirm that environmental quality is both affected and the effect of economic development.

This is why many economists have increasingly recognised the existing market failures as one of the fundamental causes of environmental degradation and pollution. Nonetheless, environmental degradation is not yet seriously taken into consideration for policy initiatives, mainly because its effects and costs are not considered in GNI calculations of national income. Therefore, economists are becoming increasingly aware of the importance of including some forms of environmental accounting into policy-making decisions.

However over the past 20 years, in order to introduce some forms of safeguard for the environment, governments, civil society and businesses have increasingly committed themselves to the concept of *sustainable development*, even if still there is a long way to go in order to achieve true positive changes for the environment. Thanks to two global conferences, namely the United Nations Conference on Environment and Development (UNCED) in 1992 and the World Summit on Sustainable Development in 2002, this concept has become an integral part of most debates about environment and development, even if talks about sustainability already started in 1972, with the United Nations Conference on the Human Environment in Stockholm, but at the time it was considered nothing less than a "wishful thinking".

Though there may be some confusion on its definition, sustainable development has become a flexible concept embracing different principles over time, as the one highlighted in the Rio Declaration of 1992. The main ones express a commitment to equity, fairness and to the precautionary principle (i.e. "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation", Rio Declaration on Environment and Development, Principle 15), and lastly to

integration, meaning the effort to understand and act on the wide interconnections that exist among environment, economy and society.

In the end, the Rio Declaration (1992) was one of the most important cornerstones of environmental protection in international law. In fact, it was written in obligatory terms for the states agreeing to it, which had to respect a set of twenty-seven principles negotiated by consensus among them. Moreover, it represented not only the interests of developed countries, but also the ones of developing states, which agreed with the formers on the need to envisage norms of international environmental protection to be respected by everyone.

Through the 1992 Rio Declaration a big step forward has been done for the safeguard of the environment as for the fist time the state management of its own natural resources has been made a matter of common concern for the international community as a whole. Nonetheless, also according to Birnie and Boyle (2002), serious threats to this achievement are posed by the various economic, political and social value judgements in determining what is sustainable, making extremely difficult the review of national legislation by an international court in favour of sustainability. Indeed, there is not a solid legislation on these issues, therefore subjected to the particular views of different states.

As already mentioned before in this chapter, the international community commitment is still not strong enough to address their good intentions towards sustainable development in a practical way. Besides legislation, major problems lies in the fact that developed countries have always understood development as economic growth, and now major developing countries are following their example given the consequent high levels of wealth reached by Western ones. Following this approach, there are major problems to face by both developing and developed countries. In fact, the formers do not realise how quickly natural resources are exhausting and how much they are contributing in this sense with their resource-intensive model of production. The latters instead, have the know-how and wealth to help implementing more sustainable measures and policies in poor countries, but they lack the political leadership and civil engagement to do so. This is why a more effective sustainable development approach must be developed in both developing and developed countries, raising the awareness on how their actual behaviour is dangerous and harmful for the environment and our health.

Furthermore we need to consider that due to these behaviours and growth in both world population and incomes, net global environmental degradation is actually worsening. Its main contributors up to date are developed countries, but also developing ones with their high fertility rates, rising incomes and consequent increase in greenhouse gas emissions are likely to catch up with environmental destruction, unless steps are taken to mitigate their negative consequences.

This condition has contributed to the development of what we can call an "environmental dependence" between developed countries and developing ones. In fact, the latters relies on the formers for the creation of technologies and development of methods to *mitigate* and *adapt* to the existing degradation and climate change, which we will analyse in greater detail in the next sections.

1.1 Mitigation

Climate Change Mitigation refers to the efforts of reducing and preventing emissions of greenhouse gases (UNEP definition) or, as defined by the IPCC as "technological change and substitution that reduce resource inputs and emissions per unit of output". The term mitigation entails different strategies, from changing consumer behaviours to the creation of new sustainable technologies. In this sense, ideas like carbon markets, tax regimes, subsidies for the production of natural carbon sources have been suggested, as we can denote in figure 1 below.

Examples of two mitigation proposals are in the "Stern Review on the Economics of Climate Change" in 2006 and in the "Reducing Emissions from Deforestation and Forest Degradation" (REDD) mechanism, developed during the Copenhagen summit in 2009.

The Stern Review is an economic analysis on global warming and its effects on world economy by the economist Nicholas Stern. When talking about mediation, Stern suggests the establishment of a "global stabilisation target range" (Stern Review on the Economics of Climate Change, 2006) for the greenhouse gases emissions in the atmosphere. Besides, establishing a universal *carbon price* could be a good solution to deal with climate change, along with the adoption of *carbon finance* to hurry developing countries in their objective to protect their forests.

On the other side, the UN-REDD programme is the result of different negotiations between developing countries for the objective of mitigating the effects of climate change through sustainable forests management. Along this project was developed the UN-REDD+, an additional programme discussing "afforestation and reforestation" initiatives too, constituting the "plus". Nonetheless, both programmes did not entail an accord to be signed, and parties limited themselves to "taking note of" this efforts and initiatives.

Figure 1, Technologies and Practices for the Mitigation Sectors

Sector	Key mitigation technologies and practices currently commercially available	Key mitigation technologies and practices projected to be commercialized before 2030
Energy supply	Improved supply and distribution efficiency; fuel-switching from coal to gas; nuclear power; renewable heat and power sources (hydropower, solar, wind, geothermal and bioenergy); combined heat and power; early applications of Carbon Capture and Storage (CCS, e.g. storage of CO_2 removed from natural gas).	CCS for gas, biomass and coal-fired electricity generating facilities; advanced nuclear power; advanced renewable energy, including tidal and wave energy, concentrating solar, and solar photovoltaics (PV).
Transport	More fuel-efficient vehicles; hybrid vehicles; cleaner diesel vehicles; biofuels; shifts from road transport to rail and public transport systems; non-motorized transport (cycling, walking); land use and transport planning.	Second-generation biofuels; higher efficiency aircraft; advanced electric and hybrid vehicles with more powerful and reliable batteries.
Buildings	Efficient lighting and day-lighting; more efficient electrical appliances and heating and cooling devices; improved cooking stoves; improved insulation; passive and active solar design for heating and cooling; alternative refrigeration fluids; recovery and recycle of fluorinated gases.	Integrated design of commercial buildings technologies, such as intelligent meters that provide feedback and control; solar PV integrated in buildings.
Industry	More efficient end-use electrical equipment; heat and power recovery; material recycling and substitution; control of non-CO_2 gas emissions; and a wide array of process-specific technologies.	Advanced energy efficiency; CCS for cement, ammonia, and iron manufacture; inert electrodes for aluminium manufacture.
Agriculture	Improved crop and grazing land management to increase soil carbon storage; restoration of cultivated peaty soils and degraded lands; improved rice cultivation techniques and livestock and manure management to reduce CH_4 emissions; improved nitrogen fertilizer application techniques to reduce N_2O emissions; dedicated energy crops to replace fossil fuel use; improved energy efficiency.	Improvements of crop yields.
Forestry/ forests	Afforestation; reforestation; forest management; reduced deforestation; harvested wood product management; use of forestry products for bioenergy to replace fossil fuel use.	Tree species improvement to increase biomass productivity and carbon sequestration. Improved remote sensing technologies for analysis of vegetation/soil carbon sequestration potential and mapping land-use change.
Waste management	Landfill methane recovery; waste incineration with energy recovery; composting of organic waste; controlled waste-water treatment; recycling and waste minimization.	Biocovers and biofilters to optimize CH_4 oxidation.

Source: IPCC

1.2 Adaptation

Since a significant amount of climate change is now inevitable, what is required is to develop strategies to adapt to it. Adaptation in fact means taking actions in order to prevent, minimise or cope with the damages caused by climate change, or being able to take advantage of the opportunities that may arise. At the same time, it is required to anticipate the adverse effect of climate change and come out with good answers to deal with it. Technically, according to the IPCC definition, adaptation entails the "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities". Potential for adaptation depends on what is called the "adaptive capacity" of a system, meaning the capacity to respond successfully to climate change. This adaptive capacity determines in turn the vulnerability of a system to adapt and cope with the adverse effect of climate change.

By reducing the volume of accumulated degradation through mitigation actions, the latter can even increase the chances that the remaining climate risks can be successfully managed through adaptation.

Adaptation measures can take two forms depending on the actor. Planned, in case of actions undertaken by governments, or autonomous, in the case of actions undertaken by firms or households. Besides, technology can have an important role in all adaptation mechanisms along with other practices, as exemplified in figure 2.

According to Arun Agrawal and Nicolas Perrin we can identify four types of risks due to climate change: across space, over time, across asset classes and across households. Accordingly, five strategies are envisaged.

Mobility pools or avoids risks across space. *Storage* pools or reduces risks experienced over time. *Diversification* reduces risks across assets owned by households of collectives. *Communal pooling* involve both ownership of assets and resource, and *sharing of wealth*, labour or incomes from particular activities across households or mobilisation and use of resources that are held collectively during time of scarcity. In the end, another versatile solution envisaged is *exchange,* as it can substitute for the four types of adaptation plans in order to reduce the risks associated to the entering in the markets across different social groups (Arun Agrawul & Nicolas Perrin, 2008). An example of measures undertaken at international level is the EU 2013 Strategy on adaptation to Climate Change, which has been later reaffirmed in

the COP21 – the UN Climate Change Conference - in December 2015. According to this framework the international community has agreed to maintain global temperature below 2°C with respect to the pre-industrial level. The aim is to avoid most serious, large-scale, irreversible impacts of climate change on the environment and cope with their social, economic and environmental costs.

Figure 2, Examples of Adaptation Practices and Technologies for Different Sectors

Sector	Adaptation technologies and practices
Agriculture	Systematic observation and seasonal forecasting; introduction of drought-resistant crops; crop management; land management; improved water use and availability including rainwater harvesting; leakage reduction; hydroponic farming; building of shelter-belts and wind-breaks to improve resilience of rangelands; monitoring of the number of grazing animals and cut trees; national government programmes to recreate employment options after drought; capacity building of local authorities; assistance to small subsistence farmers to increase crop production; adjustment of planting dates and crop variety (e.g. inclusion of drought-resistant plants such as agave and aloe); accumulation of commodity stocks as economic reserve; spatially separated plots for cropping and grazing to diversify exposures; diversification of income by adding livestock operations.
Coastal zone	Dykes, sea-walls, tidal barriers, detached breakwaters; dune or wetland restoration or creation; beach nourishment; indigenous options such as walls of wood, stone or coconut leaf; mangrove afforestation; early warning and evacuation systems; hazard insurance; practices such as using salt-resistant crops; building codes; improved drainage; desalination systems.
Infrastructure	Urban planning to improve the efficiency of combined heat and power systems and optimize the use of solar energy; minimize paved surfaces and plant trees to moderate the urban heat island effects and reduce the energy required for air conditioning; limit developments on flood plains or potential mud-slide zones; establish appropriate building codes and standards; provide low-income groups with access to property; use physical barriers to protect industrial installations from flooding; climate proofing investments.
Water resources and hydrology	Water transfer; water recycling and conservation (soft technologies to support the preparation of on-line, searchable flood risk maps); water harvesting; increase reservoir capacity; desalination; erection of protection dams against avalanches and increased magnitude of potential debris flows stemming from permafrost thawing; changes in livelihood practices (e.g. by the Inuit), including change of hunt locations, diversification of hunted species; use of Global Positioning Systems (GPS) technology; and encouragement of food sharing.
Tourism	Artificial snow-making; grooming of ski slopes; moving ski areas to higher altitudes and glaciers; use of white plastic sheets as protection against glacier melt; diversification of tourism revenues (e.g. all-year tourism).
Finance	Internalize information on climate risks and help transfer adaptation and risk-reduction incentives to communities and individuals; capital markets and transfer mechanisms alleviating financial constraints to the implementation of adaptation measures, including bank loans (e.g. for purchase of rainwater storage tanks, set-up of crop insurance); creation of local financial pools (as alternative to commercial crop insurance), set-up of revolving credit funds; fostering risk prevention through: implementing and strengthening building standards, planning risk prevention measures and developing best practices, and raising awareness of policyholders and public authorities; adopting forward-looking pricing methods in order to maintain insurability (not yet implemented).
Biodiversity	Supporting implementation of adaptation technologies; modelling movements of species due to climate change and the vulnerability of habitat to sea level rise.
Health	Vector control; vaccination; impregnated bed-nets; health education; greater care with water storage; using appropriate clothing; taking siestas in warm climates; using storm shelters; urban planning to reduce heat island effects; air conditioning; health education; early warning systems; implementation of heat health alert plans including measures such as: opening of designated cooling centres at public locations; information to the public through local media; distribution of bottled water to vulnerable people; operation of a heat information line to answer heat-related questions; availability of emergency medical service vehicles with specially trained staff and medical equipment; disease monitoring and prevention/treatment; access to health services and health alert information.

Source: Based on Adger et al. (2007), UNFCCC (2006), ABI (2004), SBSTA (2007)

According to dominant government and businesses in fact, the solution to enhance sustainable development is continued economic growth made environmentally sensitive, in order to increase global standards of living and break the link between poverty and environmental degradation. Eventually, economic growth is seen as part of the solution in order to develop technologies and strategies that will contribute to a richer, sustainable world. At the same time, this view is embraced also by developing economies like China, Republic of Korea, and India, which are making to develop and grow in a more sustainable way.

Meanwhile, many international organizations have embraced the concept of sustainability for their policies and actions. For example the World Bank, which committed itself to the enhancement of a "sustainable globalization" promoting growth while protecting the environment; the International Monetary Fund (IMF), in favour of a sustainable economic growth; the World Trade Organizations (WTO), committing itself to open borders worldwide and remove barriers to trade. Nonetheless, some critics – as Greenpeace or Corporate Watch - argue that many actors committed to sustainable development are in reality "painting environmentally destructive practices green", in what has been defined as a "greenwash" (Greenpeace, 1997) of businesses, agencies and other actors both at national and international level.

On the other side, most governments cooperate with NGOs and businesses, in order to implement sustainable development, realising how important can be their contribution. In fact representatives and delegates from both actors participate to meetings of many environmental summits. In this way businesses are increasing their investments in sustainable technologies and development, but still their number is limited and this initiative is made only on a voluntary basis. Moreover we should consider the fact that "the majority of the jobs worldwide are provided by small and medium-enterprises for which these concepts are foreign" and that representatives of prominent businesses coming from the BRICS countries are not included in decision-making processes. (Runnalls, 2008)

Eventually, drawing conclusions from the last considerations, we can affirm that the concept of sustainable development is very fluid. There are quite different points of view on the issue and its effectiveness is limited by the actors committed to it. Nonetheless, some argue that this is the only solution left for our world. As financial and fiscal crisis follows and trust in the principles of the Washington Consensus fades, there is a growing faith in the effectiveness and potentialities of sustainable

development as the only way to address the structural problems of our economic, social and environmental spheres.

But at the same time, developing countries argue against this point of view claiming that sustainable development is just a Western ideology aimed at controlling and restricting development aid and international trade at the expenses of less developed countries. Some other radical views, similarly sustains that this concept has been elaborated for the developed world, not considering the massive vulnerability to environmental degradation that poor countries experience and their limited clout (Adams, 2008).

1.3 Challenges at National Level

National governments faces different challenges at domestic level associated with both urbanization and industrial growth. In fact, early stages of urbanization and industrialization usually come along with rising incomes and worsening of environmental conditions. Even if in some cases we note that some types of urban pollution tend first to rise with national income and then fall, as analysed through the environmental Kuznets curve, many others do not follow the same path. At the same time, with industrialization we are facing an increasing trend towards environmental degradation and its worst problems: deforestation, soil erosion, desertification and fuel-wood shortage.

This is why from 1972 the UN Environment Programme (UNEP) publishes an annual "state-of-the-environmental trends" regarding all the aforementioned issues that are analysed hereafter.

1.4 Urbanization Risks

The world is experiencing an unprecedented transition from rural to urban areas since the last century, mostly due to rural-urban migration motivated by job opportunities. Unsurprisingly, right now major trends are taking place in developing countries, like Africa and Asia, which are predicted to move most of their population to urban areas by 2050. If managed in the proper way, urbanization can bring huge benefits for

development and in the organization of communal life. In this sense, it enables economies of scale, networking triggering innovation and consequently makes economic activity more sustainable.

However, higher population density creates negative externalities too. Right now, 40% of world's urban expansion is taking place in slums, creating unsanitary conditions that foster development of diseases and exacerbates disparities. Lack of sanitation and inaccessibility to clean water present severe threats to human health, and even if progresses has been made, still these two factors remain the most important elements affecting urban health. These kinds of problems are particularly severe in areas like in Sub-Saharan Africa and Asia, where almost half of the population lives in slums.

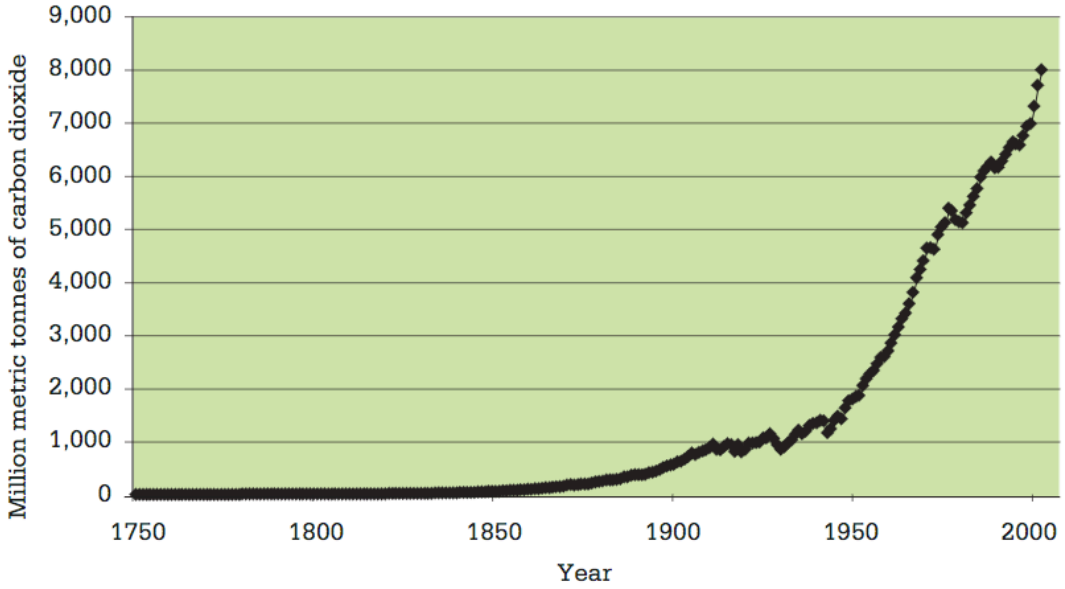
Clearly, postponement of investments in the infrastructure required for sanitation and clean urban waters can lead to much greater costs in the future. For example, foreign-exchange earnings may be threatened by the use of contaminated waters as developed countries health standards may ban the importation of goods produced with them. Another example could be the 2014 Ebola crisis, which showed the vulnerability of urban centres to pandemics and the lack of an effective governance mechanism that could have triggered a quick emergency response.

At the same time pollutants creating risks for human health can exist both inside and outside abitations. Poor home ventilation, smoke of fuels burnt at home to cook and boil water can create severe long-term consequences for health like respiratory infections, which greatly lower individual tolerance to pollutants. Alongside with indoor pollution, threats hide also in the streets, with vehicular emissions causing smog and high levels of airborne; industrial production too is a major problem, whose affects fall not only over the population living around factories, but also beyond borders, traveling by air, water and rains.

1.5 Industrialization Risks

Industrialization is in fact one of the main causes of air pollution and health hazard. Since its onset, the levels of greenhouse gases (GHG) emissions caused by human activities have continuously increased as outlined in figure 3; stoking what has been termed "anthropogenic" GHG emissions.

Figure 3, Global Carbon Dioxide Emissions from Fossil Fuels, 1751-2004



Source: WTO, calculations based on data from http://cdiac.ornl.gov

Among the most common anthropogenic greenhouse gases there are carbon dioxide, ozone, methane, nitrous oxide, which can be found naturally in the atmosphere but that currently have really high concentration, fostering the process of climate change. To date, it is generally agreed that human activities have been a major cause of the acceleration of climate change, also called "anthropogenic forcing" by the International Panel for Climate Change.

Alongside, with industrial production the volumes of waste that contaminate water supplies and land has exponentially increased, creating threat for populations living on the same soil. At the same time, air quality is reduced, creating severe respiratory diseases. For example a case study in Bangkok has shown the presence of high levels of airborne in the air, responsible for the reduction in the average IQ of small children by four or more points. In fact, the negative effects of air pollution are most severe in young children, whom inhale almost twice as many pollutants per unit of body weight as adults do. (Todaro and Smith, 2012)

Moreover, high levels of industrialization entail greater carbon footprints. Indeed, massive greenhouse emissions are generated by industrial production and the

consequent construction of infrastructure needed for transport and increasingly higher levels of urbanization that comes along.

In addition, industrialization can lead to increase in wastes and emissions by altering patterns of consumption. If demand for goods increases, this will lead to an increase in both production of manufactured goods and by-products. The latter, if not regulated, can largely contribute to environmental degradation through its disposal: releasing it into the air, waterways or dumping it on the ground affecting soil, rivers and seas nearby. Nature's role therefore, can become one as a sink for by-products of economic activity. Indeed it can become the resting place for tons of garbage and toxic chemicals, dissipating harmful air and water pollutants, but its absorptive capacity to assimilate potential pollutants is limited, and it is lowering over time.

This phenomenon is caused by the fact that costs of pollutants are borne by someone other than the polluter himself, meaning that the price paid for the consumption of a good is below the social cost associated with it; as a consequence the producer pays only for the private costs of his production that is the direct monetary cost of his manufacturing, without taking responsibilities for the pollutant released into the physical environment during the process.

Action of governments should be aimed at finding a way to incorporate social costs of pollution into the production framework, sharing the pollution burden between consumers and producers, as the gap between private and social cost is actually increasing over time. If this situation persists, with increasing industrialization levels the demand for goods will increase alongside with rapid urbanization and incomes, implying that the costs associated with illness and diseases caused by pollutants will increase faster than population does.

All these factors can exacerbate the potential of natural catastrophes. Extreme weather events like rainfalls, heat waves, droughts, floods, are more likely to happen then ever, as we will later see in chapter three. For this reason, making cities more resilient to these events should become a priority for national governments and the private sector dealing with infrastructures. Besides, the effects are likely to be felt by the poor in greater part, as their settlements tend to be on land at higher risk from extreme weather, so drought and pollution would affect them first and foremost.

The Intergovernmental Panel on Climate Change argues that these kinds of events in food-producing regions are already causing troubles and suggests that the impact of climate change on weather patterns and rainfall – causing floods or droughts – could

cut crop yields by up to 25% (Porter et al., 2014), imposing serious problems on communities living and relying on agriculture.

1.6 Greenhouse Gases and Global Warming

As already mentioned before in this text, among most common greenhouse gases that we can find in the atmosphere there are: carbon dioxide, ozone, methane and nitrous oxide. Carbon dioxide currently account for 77% of greenhouse effect, due to deforestation and burning of fuels, while methane emissions account for 14% and the remaining 9% is composed of nitrous oxide, ozone emissions and others gases coming from industrial productions. Moreover, the fact that many of these gases remain in the atmosphere for very long time means that global warming will remain a major problem for the earth safety for several hundred years. Global warming is already a major issue and it is going to reverberate through time even if emissions will substantially drop or cease today. Given this fact, according to the World Bank, the consequence is that taking into account past and current emissions, a global warming of around 2°C is probably already unavoidable. Thus, what is left is understanding how we can move to react and adapt to climate change, given greenhouse gas levels.

1.7 Joint Action at Governmental and International Level

Governments and international organizations must deal also with other sort of attacks on the environment inflicted by the reckless behaviour of men towards the environment. Examples of man-made environmental catastrophes are the Fukushima power plant disaster and the oil spill in the Gulf of Mexico by the Deepwater Horizon. Men actions account for most of environmental degradation also through overfishing, deforestation and inadequate management of natural resources. It is estimated that deforestation alone accounts for roughly 20% of CO_2 emissions worldwide. (Todaro and Smith, 2012). Moreover, about 60% of rainforest destroyed is destined to agricultural purposes even if the majority of it, almost 90%, is so infertile that farmers will be able to cultivate it only for few years before desertification comes in. In this way, we give up an important mechanism through which the ecosystem regenerates

and absorbs most of the CO_2 produced. Moreover, rain forest destruction is a huge threat to biodiversity, increasing the risk of extinction to many species living in tropical areas. This is way governments in countries rich of rain forests like Brazil, Bolivia, Costa Rica, the Philippines and Ecuador are experiencing pressures from public and private actors in order to develop policies for reduction of deforestation and for rain forest preservation.

Tackling the problem of rain forests destruction is not an easy task. What we need is not just protecting and stop cutting, but a long-term plan that envisages several strategies: access to alternative fuels, sustainable timber schemes, and provision of economic opportunities to poor people dependent on rain forests soil for subsistence, among the most important.

Therefore, it is evident that the world patterns of consumption must change. This does not imply that economies should stop growing to safeguard the environment, but as population and incomes grow along with consumption, the latter must become more knowledge-based and modest in its use of natural resources. Indeed, it has become clear that the world as a whole cannot afford to consume at the levels of the U.S. or other developed countries – where a substantial part of its production is wasteful – but it must develop strategies of responsible consumption.

It is exactly about this point that one of the major debates regarding economic growth is born: will continued economic growth around the world bring ever-greater harm to the world's environment? Or will the increases in wealth and incomes bring solution to ecological problems? Shall economic growth stop at a steady state or continue?

According to some scholars, is not true that economic growth does unavoidable harm to the environment. On the contrary, improvements in environmental standards can be observed once some critical level of income has been reached in a country. This condition is exemplified by the *environmental Kuznets curve*, whose hypothesis puts in relation different indicators of environmental quality and income per capita: in the early stages of economic development environmental degradation increases, but reached a certain level of income – which varies for different indicators – the trend reverses, so that for each level of growth we have an improvement of environmental conditions. This condition implies that the environmental impact indicator is an inverted u-shaped function of income per capita (Stern, 2003). However, this shift does not take place automatically, substituting dirty technologies with cleaner ones; evidences suggest that there might be different cases in which this change takes place.

First, environmental improvements usually take place through policy response: indeed, when countries enjoy greater wealth, citizens demand more attention to non-economic aspects. Secondly, there might be the case in which when a country develop, it cease to produce pollution-intensive goods and start importing them from other poorer countries.

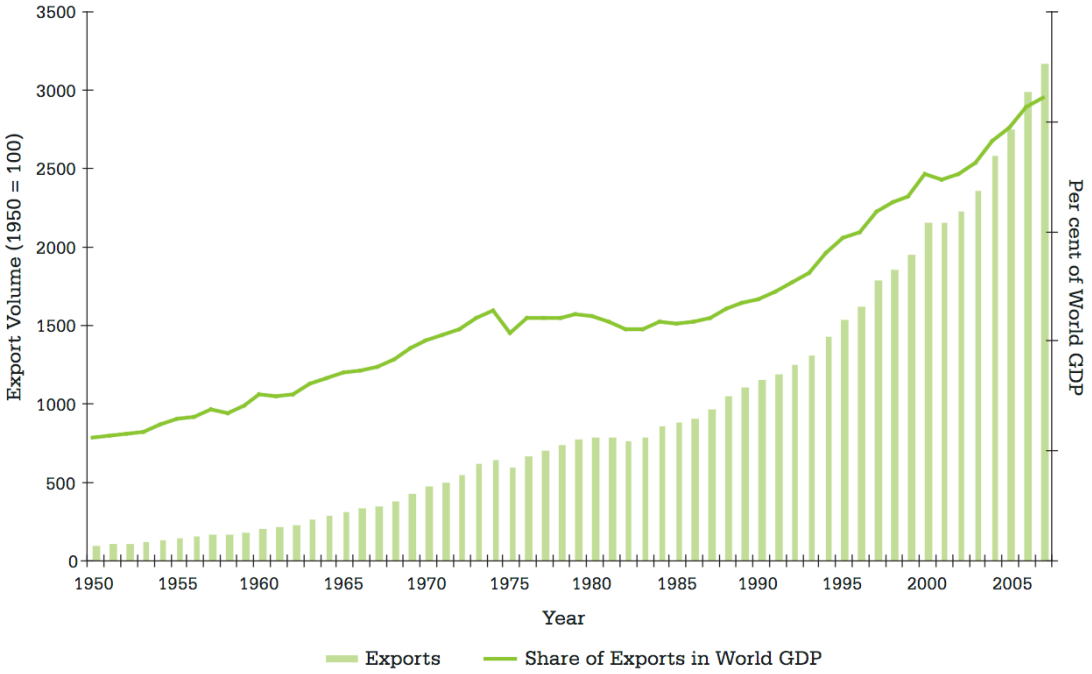
In this case some may argue that present or future development paths could not follow the ones of the past. Developing countries might not be able to find poorer countries from which import pollution-intensive goods and therefore not being able to shift to cleaner technologies and production processes.

A stricter view is proposed by steady state economists, whom sustain the idea of a stable economy – or mildly fluctuating one -, characterised by constant levels of population and consumption of resources and energy. The aim is to reach a "sustainable scale", meaning a situation in which human economy fits within the capacity provided by the planet, that is the level in which marginal costs of growth equal the marginal benefits. At this point we should experience both a fair distribution of wealth, and an efficient allocation of scarce resources, goods and services. Policies that should be enacted according to steady state supporters regard the full internalisation of costs and prices, gradually reset existing fiscal, monetary and trade policy levers and the elaboration of strategies to move away from globalisation towards localisation.

This strand of thought has been strongly engaged in the global debate over the environmental consequences of liberalized trade, at first originated by the foundation of the North American Free Trade Agreement and later fuelled by the creation of the World Trade Organization (WTO).

1.8 Introducing International Trade

Figure 4, Rising Trade Share of Global Output, 1950-2007



Source: WTO (2008b) and Maddison (2001)

One of the main drivers of international trading has been the economic globalisation process, which brought countries – especially developed ones - to sign agreements aimed at regulating how they would engage with each other at both regional and international level.

Indeed, economic globalisation is a process entailing increasing economic interdependence among countries that consequently re-shape their economic structures accordingly, and eliminate national barriers for the movement of goods, services, capital and information. As this liberalisation grew wider, the 20th century international trade called for regulation of international economic relations: this is how the World Trade Organization (WTO) was created, during the Uruguay Round trade negotiations in the years 1986 to 1994.

With the increasing magnitude of international relations, trade liberalization started to pay attention to environmental protection too, as increases in economic growth of countries went hand in hand with global environmental degradation. Time passing by, there is one question to which we are still not able to find an answer: are international trade and environmental protection compatible or in conflict? This issue is still

subject of a hard debate. As discussed above, many scholars opposed liberalization of trade as harmful for the environment since it would bring economic interests before everything else, entailing unsustainable exploitation of limited natural resources. On the other hand, supporters of international trade and liberalization sustain that the latter would trigger the creation of "green-technology" and push countries to specialise in those goods in which they have a comparative advantage with respect to others, leading to growth and development alongside.

Overall, trade liberalization and environmental protection may, but need not, to be in conflict: most of the problem depends on the specific circumstances of the industrial sectors and the economies concerned, plus, the specific environmental policies pursued at national level.

Nonetheless, by now climate change and environmental deterioration has been acknowledged as being common concerns of humankind, according to the Climate Change Convention (1994). In fact, rising greenhouse gas emissions is just one of its effects threatening our environment and to which we must respond. Despite the view that each state must assume responsibility for global environmental deterioration, we need to acknowledge that not all of them have the same burden of responsibility to carry. In fact most of environmental problems to date have been caused by developed countries, with their high levels of greenhouse emissions and unsustainable production processes. This is why we consider the principle of "common but differential responsibility", claiming that developed countries should assume greater responsibility in bearing most of the costs of funding both remediation and adaptation strategies in poor countries, as the latter do not have the means to implement strategies for environmental protection and sustainable production. Despite this view, the debate is still on-going as there are different views on how the costs of global reform should be split among countries, as discussed during the Copenhagen and Cancun Summit respectively in 2009 and 2010. What have been firmly introduced instead are those mechanisms and instruments to incorporate sustainable development within policy-making processes: the Environmental Impact Assessment (EIA) or the Strategic Environmental Assessment (SEA), besides consultation with the public and the integration of environmental considerations in the decision-making procedures are some of the examples.

Nonetheless, two sets of questions yet cannot find an answer in this international panorama. Is the expansion and liberalization of trade responsible for environmental

degradation and climate change? Or do free trade, competition and growing wealth help in developing greater environmental protection? The other set instead inquiries the institutional framework of the international trading system: do the rules of the GATT and the WTO promote or obstruct the safeguard of the environment? Are international environmental agreements consistent with the rules of the WTO? Trying to answer these questions would be too rash, but the purpose of next chapter will be to analyse in greater detail these issues in order to better understand the mechanisms behind them.

Chapter 2

The WTO Instruments to Take On Environmental Issues

The World Trade Organization (WTO) was born on 1 January 1995 as a multilateral trading system. Nonetheless, before its establishment, the General Agreement on Tariffs and Trade (GATT) was in place since 1948 as its predecessor, and it provided the rules of the system for trading among different countries, based on the principles of reciprocity and non-discrimination. The General Agreement evolved over time through a series of negotiations and rounds, the last of which, the Uruguay Round (1986-1994), led to the establishment of the WTO in order to widen the mandate over new areas of interest: trade in services, inventions, creations and designs (intellectual property) (www.wto.org). Nonetheless, even if today we do not hear much talks about the General Agreement, it is still in place as the WTO's umbrella treaty for trade in goods.

The WTO was born as an organization aimed at liberalizing trade, lowering barriers and hosting governments of most trading nations in order to negotiate agreements and settle their disputes. At the same time, all these objectives undoubtedly can collide against environmental stances, and this is why the WTO provided itself with specific tools to deal with these problems.

The WTO allows member states to adapt measures aimed at protecting the environment and human health as long as they do not conflict with WTO rules. Nonetheless, experts are divided on whether environmentally related measures or actions proposed by any WTO member may be compatible with international trade regulations, as the WTO has yet not come out with any clear provision on the issue.

For example, climate change is one of the biggest problems that the international community is facing to date. As it is, climate change is not part of the WTO's action plan and there are any specific rules concerned with it. However, being a challenge that transcend borders and involve the international community as a whole, the WTO plays a significant role under different aspects: first, in developing policies that can affect the environment and its safeguard. Secondly, as measures taken at national level may have an impact on international trade, it must intervene to mitigate and adapt to the consequent effects. Thirdly, it must ensure transparency and fair implementation of the measures and actions taken.

The Technical Barriers to Trade Committee (TBT) is the forum designated to discuss regulations adopted by governments on this issue. The TBT Agreement is the main WTO instrument dealing with environmental regulation and standards (World Bank, 2014). Its aim is to regulate trade and environmental claims, so that the latter do not create impediments to the smooth process of international trade among countries. So far, regulations examined at international level are: fuel economy standard for cars, eco-design requirements for energy-using products, energy efficiency programmes for consumer products and emission limit value for diesel engines (www.wto.org, Activities of the WTO and the challenge of Climate Change).

For what concerns issues regarding the environment, the principle of sustainable development and environmental protection are stated in the preamble of the agreement establishing the WTO, but it does not appear in any legally binding paragraph, or have any specific agreement dealing with it. However, the WTO grants governments the right to protect the environment, and for this purpose was initially created the Committee on Trade and Environment (CTE) – in 1994 at the Ministerial Meeting in Marrakesh -, which has jurisdictions on all areas of the system in order to regulate the relationship between trade and the environment and to make recommendations about changes that might be needed in the stipulated agreements.

In the same way, the GATT has had a Group on Environmental Measures and International Trade since the 1970s, but it was barely known as existent since it was hardly summoned. Conversely, the Committee on Trade and Environment (CTE) has discussed many issues up to now, even if without reaching any clear result as it turned into a forum for discussions rather than an instrument to trigger environmental reform. In fact, even after ten years of work the CTE has not yet made any recommendation for reforms or actions to be taken, and this is why many sustains that in reality it was founded to protect trade interests from environmental stances.

Moreover, a good number of agreements have been subject to formal environmental assessment, required by countries as the United States, Canada and European Community, all WTO members. The assessments are made to prove the economic, environmental, and social impact of trade agreements; consequently, they are more like "predictions" rather than documents stating their actual impact.

Another instrument are the numerous Multilateral Environmental Agreements (MEAs) stipulated among governments to cooperatively address shared environmental problems, 20 of which include provisions that affect trade, maybe

allowing restrictions or prohibiting trading for certain products. Nonetheless, disputes under this type of agreement are often adjudicated very slowly due to the voluntary dispute settlement procedures decided by the parties involved and the non-binding rules that characterise them. Unfortunately, MEAs reflect the poor political power of the responsible national authorities in charge of negotiating these agreements, even if lately under the Doha negotiations WTO members are trying to get over the stalemate; actually, new measures are being discussed to improve or complement existing procedures and cooperation mechanism. For example, cooperation is already in place between WTO and the UNFCC, the latter participating to the meetings of the WTO Committee on Trade and Environment and to the CTE in Special Session, whilst at the same time the WTO Secretariat attends UNFCCC Conference of Parties meetings.

Nonetheless, even in this case, while the WTO Secretariats is free to attend MEA negotiations, MEA Secretariats must seek permission and WTO members have frequently vetoed their attendance as observers in trade negotiations (Eckersley, 2004).

In addition to that, developing countries have been often contrary to the stipulation of MEAs to regulate trading. Indeed, they sustained that such agreements would have had a negative impact on their economies and access to markets, with high costs of compliance that they could not afford. However, this idea is currently not shared by all developing countries, as MEAs can even help them offering financial assistance, technological transfer and other incentives to smooth the process of implementation at national level.

Last but not least, since the beginning of its life the GATT has provided one of the first instruments to deal with environmental concerns: Article XX of the 1947 GATT on “general exemptions” specifies which activities are exempt from GATT rules, in order to give members power to protect human, animal, plant health and safety. Article XX is the only provision in the GATT that explicitly mentions environmental concerns. Besides including protection of national security, morals, and cultural heritage, article XX permits restrictions on matters that are not consistent with the objectives settled in the GATT, of course with due limits, and to the extent that is necessary to ensure such article is not used for disguised restrictions on trade for personal national interests. Eventually, even with the development of new instruments

to face environmental concerns, Article XX of the GATT remains the key-link between trade and the environment within the WTO system.

Indeed, the WTO sustains not to be an environmental agency, and that other agencies better qualified are required to intervene when environmental issues arise, as the Organization would intervene only when environmental policies have a significant impact on trade. This is one of the reasons why many critics sustain that the WTO jurisprudence has not a good record on environmental concerns. Nonetheless, there are records of cases in which the WTO was interrogated when environmental interests of countries were at stake. One of the most important and well-known cases in which the Organization was consulted is the "United States – Import Prohibition of Certain Shrimp and Shrimp Products", a cornerstone of environmental jurisprudence.

2.1 The Shrimp-Turtle Case

The first time in which a Dispute Settlement Mechanism (DSM) ruling supported a breach of international trade rules for the purpose of environmental protection is represented by the case involving the protection of sea turtles involving the US and its trading partners – namely India, Malaysia, Pakistan and Thailand - in the shrimps market. The United States in fact, placed an embargo on the import of shrimp caught without "turtle excluder devices" (TEDs), as fishing was causing an increasing death of sea turtles. Sea turtles became one of the most important cases for the anti-globalisation movement, whose members protested in Seattle dressed up as sea turtles in 1999 and gained high resonance thanks to the media.

Through time, WTO's arbitrational panels ruled several times on the same US law concerning sea turtles: the first ruling found against the US, but not for reasons related to environmental issues. In fact, the panel sustained that environmental rules had to be applied in a fair and non-discriminatory manner and at the same time to be accompanied by good-faith efforts to address the issue multilaterally, but this was not the case for the US. In fact, the latter applied its measures in a discriminatory way on the basis of the country concerned. The United States had negotiated two different agreements with the Caribbean and South East Asian exporters, not taking into consideration the different conditions in which the two exporters found themselves.

Eventually, the American actions were deemed too rigid and discriminatory, plus they were accused of not having made sufficient effort to cooperate with the Asian exporters for a multilateral solution to the problem. The ruling, dated to 1991, found that the US had made no real attempt to negotiate new standards for tuna fishing with the states involved in the dispute, and moreover that the American law treated domestic fishers differently from the ones of other countries.

Later on, in 1998 we have the first WTO panel decision, which indeed supported the concept of sustainable development as a guideline principle, but still ruled against the US' restriction on imports law, based on three findings. First, the law was not designed for the area in which it was applied, as it was intended for application in the Caribbean/western Atlantic region, and was applied to the complainants, all Southern Asian countries, by order not of the US Congress but of the US Court of International Trade. Secondly, the target of the law was inappropriate. The law required that an exporter state's laws make their shrimper behave in a certain way in order to be allowed to export to the US market. But if these countries have laws requiring different sea turtle protection procedures, they may find themselves stuck in the situation in which they must comply with conflicting laws in order to export their shrimps. Thirdly, the US had not made good-faith efforts to solve the issue multilaterally, confronting with the other states involved. Finally, in 2001, another WTO panel ruled in favour of the American law as its application was made more transparent and fairer, aimed at fostering multilateral cooperation among the US and foreign exporters for the real purpose of environmental sustainability rather than protection of the US shrimping industry.

This case is the exemplification of why the WTO, and the GATT before it, often ruled against positions claiming to be in favour of environmental protection, but that in reality were mere attempts of business protection dressed up in environmentalist clothes or cases in which complainant served themselves through inappropriate tools for environmental protection.

2.2 Opposite Stances

Since the 1995 Marrakesh Agreement, which gave life to the WTO, opinions about the role of the Organization towards environmental protection have been conflicting. Different schools of thought developed through time, supporting at various degrees the conduct of the WTO towards the environment and sustainable development. In both cases, they resolutely support some facts in order to validate their ideas, analysing the work of the Organization from different perspectives. We will now go on presenting the two main positions held by critics and experts in the sector, highlighting the main arguments for their stances.

2.2.1 The False Environmental Cry

According to many critics, the WTO has done little to promote an environmental outlook towards existing and future policies and relations. What has been noticed is that there is not enough effort to render the Organization and its rules more environmentally friendly. As an example of that, we can mention the fact that the WTO does not allow trade controls on the basis of how products are processed and the effect of their management on the environment. Besides, the Organization threatens to invalidate trade provisions in some multilateral environmental agreements, as MEAs implementations are conditional to WTO challenges. Some others of the main reasons for their position lie in the following points.

a) Composition of the WTO

The Organization in itself is not responsible for the poor attention given to climate change and environmental protection, but the blame lies with the member countries. In fact, developed countries are responsible for supporting green-policies only partially – sometimes due to pressure from civil society - and when they don't interfere with their own interests. This is why the rules of the system do not change and most of the times particular gains – especially of developed countries – are preferred both over policies for the common good and over the interests of developing countries. As a consequence, trade barriers detrimental to the environment - as for example agricultural, fishery, and road transport subsidies - plus restrictions on trade

in air, water pollution abatement technologies and waste management procedures are not eliminated. These are the reasons why cost of environmental protection is so high, as no action is taken to remove restrictions and as a consequence policies for the environment are not effective.

b) Fail to persuade developing countries

The greatest opposition towards the "greening" of WTO and its rules comes from the developing world. In fact, their representatives are contrary to this approach, as they perceive it as old protectionism concealed in new environmental stances. Moreover, this antagonism from poorest countries is deeply rooted in the distribution of benefits of the WTO agreements, which are strongly perceived as unfairly allocated in the hands of developed countries. Indeed, such "greening" process is perceived as detrimental to developing countries' economic aspirations, and many of them do not want to be "thrown a spoke in the wheels" after all the efforts they have made to reach their high levels of growth and development.

For these reasons developed countries and experts should focus on convincing poor and middle-income countries that a more environmentally-friendly approach will not be hindering their economic successes and aspirations, as all countries will benefit from this shift from a political, economic and environmental point of view.

c) Luck of application of the precautionary principle

The precautionary principle allows preventive measures to avoid harm to the environment or human health even in the absence of scientific evidence (Neaumayer, 2004). For example, if we have a case in which damage to human health or the environment is expected, we can invocate the precautionary principle even when finding evidences of harm is very difficult or impossible to provide due to ignorance about its future consequences.

But the WTO's application of this principle is highly ambiguous and disappointing. In fact, we can find the precautionary approach stated in only one of the Organization's agreements, the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), while all members of the WTO shall have the right to restrict trade affecting the environment or human health on the ground of the precautionary principle whenever they see fit. Moreover, in the SPS Agreements recourse to the principle can be made only provisionally until member states asking

for trade restrictions can show the existence of dangers to health or the environment through scientific risk assessment methods.

2.2.2 The WTO Has a Good Record in Environmental Support

The WTO is not to be blamed for the failure in supporting the "greening" of policies and its rules, mostly because its actions comes from the member countries rather than by the Organization itself. In synthesis, the latter has done much less to hinder environmental protection than its critics believe in the light of the following reasons.

a) There is a good record of WTO environmentally friendly jurisprudence

Even if we did not attend to a "greening" of existing rules and policies, according to Brack and Branczick the former have been increasingly interpreted from an environmental perspective. WTO puts few restrictions to environmental regulation of consumption externalities that can hinder human health or the environment. In fact, countries can even ban a product from domestics market as long as two conditions are met: first, that the damage is not speculative and highly uncertain; secondly, the restriction is applied fairly and without discrimination towards different countries. It is obvious that trade liberalization can lead to increased pollution and degradation if environmental policies and regulations are not in place, but responsibility lies in the hands of policy-makers and their belonging country.

b) Trade-off between environmental protection and country's interests

WTO's legislation and panel decisions on environmental issues are always taken considering the possible flaunting of environmental protection hiding personal interests of the countries involved. WTO's rules in this sense must not be seen as favouring trade over the environment, but as a check on these behaviours and on bad or incomplete legislation. This attitude should be seen as giving an opportunity to make more efficient environmental rules, not as an obstacle to their making. Indeed as in the shrimp-turtle case, the US attitude has been interpreted as unfair and dubious,

since the law was not aimed as fostering environmental sustainability but rather at protecting the US shrimping industry over the foreign exporters.

c) WTO is not an obstacle to Multilateral Environmental Agreements

As already mentioned before, MEAs are one of the instruments in the hands of countries to protect their environment against dangers and destruction. At the moment exist more than 200 Multilateral Environmental Agreements 20 of which include provisions that affect trade, maybe allowing restrictions or prohibition of trading for certain products. Examples of that are the Montreal Protocol, Rotterdam and Basel Convention, Cartagena Protocol and the Kyoto one with different follows-up treaties. The existence of these agreements shows how countries are willing to restrain their trading in favour of environmental protection. Plus, the compatibility between MEAs and WTO is part of the current negotiation agenda in Doha's work, as there is still a long way to go in order to achieve what has been called a "triple win situation" for trade, environment and development: (i) win for the elimination or reduction of tariff and non tariff barriers (NTBs), (ii) win for the improvement of countries production in environmental goods in order to reduce negative externalities and damages to human health, finally, (iii) win for developing countries as they could ultimately address the environmental problems hindering their levels of development.

Nonetheless, MEAs and their relation with the WTO are a delicate argument that we will explore in more detail in the next section.

2.3 WTO and MEAs Relation

As mentioned before, there exist more than two hundred Multilateral Environmental Agreements (MEAs), twenty of which, being the most recent and significant, deal with global environmental problems. Nevertheless, MEAs and international environmental law generally provide a more fragmented form of governance that lacks the coherence, stretch, financial backing and organizational structure of WTO (Eckersley, 2004). Moreover, even if some of these treaties, like the UN Framework Convention on Climate Change (UNFCCC) have achieved near-universal membership, and as trade restrictions become more and more popular in

policymaking, concerns are rising about the fact that they may eventually come into conflict with WTO rules. In fact, most MEAs typically work on an *ad hoc*, issue-by-issue basis pushing for cooperation and usually avoiding punitive sanctions and recourse to courts; while if sanctions are approved, they may always be questioned by WTO rules.

So how should environmental conflicts be managed given this scenario?

Up to date it is striking that trade rules are given more weight with respect to environmental stances: when environmental disputes are brought before the WTO, trade restrictive environmental measures must show both to be compatible with WTO rules, and if they are, that this is the least trade restrictive measure possible. As we can imagine, there is no right of members to MEAs to challenge trade rules for being inconsistent with environmental norms stated in their agreements. In the same way, there are no punitive sanctions that they can levy under MEAs, so in case of non-compliance, the only means left are diplomacy and cooperation.

Moreover, there is no expectation that WTO agreements and actions demonstrate to be consistent and respectful of the principles and norms enshrined in MEAs, or that they are the least environmentally damaging option.

Along with the expansion in scope of trading agreements are spreading worries about the growing of potential restrictions in MEAs scope, capable of reducing their effectiveness and reach, and making them more vulnerable to WTO challenges. As a consequence disputes are rising about the real concern of the WTO and trade policies for the environment, as what seems to count is only the effect of environmental policies on trade, rather than the contrary.

On the other hand, WTO supporters argue that environmental concerns are exaggerated, and that WTO jurisprudence is actually moving towards a more environmentally friendly approach, as exemplified in the *Shrimp-Turtle* case.

Nonetheless, even if MEAs measures must show compliance with WTO rules, numerous agreements rely on trade restrictions to achieve their environmental goal. Even if their reach and success is limited, one of the outstanding example of this practice is the 1987 Montreal Protocol, which imposed restrictive measures on both parties and non-parties to the agreements regarding trade in ozone depleting substances and products related to it.

Another example is the 1997 Kyoto Protocol, which includes trade restrictions as option rather than compulsory measure, but it succeeded in making parties trading

under carbon trading schemes to exclude trade in carbon credits with other non-member countries.

Moreover, besides specific or optional trade obligation, there are other measures that MEAs can undertake, ranging from import and export bans, labelling requirements, fiscal instruments like border tax or incentives to domestic green industries, which are all potential subjects to challenge by WTO rules.

Yet up to date, no WTO member has challenged a MEA in the WTO's dispute settlement mechanism. However, as the number of environmental treaties with trade restrictions is growing, a potential conflict over the application of MEA restrictions cannot be ruled out. For example, one of the potential areas of conflict between WTO and MEAs is exactly climate change. With the use of climate regulations to restrict trade in carbon-intensive goods, overlaps between trade and international policies aimed at reducing carbon emissions are unavoidable, even if yet the international climate regime does not include explicit trade measures.

2.4 The WTO and the Committee on Trade and Environment (CTE)

The relation between the WTO and MEAs remained uncertain and unfavourable along with the one between trade and the environment until the 1994 Marrakech Agreement where the Committee for Trade and Environment (CTE) was founded. Its purpose was to promote sustainable development and make recommendations in order to foster the relation between trade liberalization and environmental protection. Moreover, its duty was to examine the relation between the trading system and MEAs and the one between the latter and the dispute settlement procedures.

Nonetheless, as already mentioned, the CTE did not issue any recommendation for any modification of the WTO rules, as many thought WTO rules were already favourable to environmental concerns. The CTE work continued without any great novelty until the Doha Conference, when it was given mandate to negotiate on "the relationship between existing WTO rules and specific trade obligations set out in Multilateral Environmental Agreements" (paragraph 31, Doha Ministerial Declaration), but of course this should have not added or restricted the rights and obligations of WTO members. Moreover, the Doha Agreement granted the CTE the

power to be involved in both cases in which conflicts between parties and non-parties to MEAs would arise and in cases of disagreements on nonspecific obligations. However, negotiations eventually resulted in a stalemate between a minority of WTO members who sustains the exemption of MEAs from WTO challenges and those in opposition of any further step towards environmental compromise.

Nonetheless, it should be also recognised that the CTE increased the level of environmental consciousness of developing countries: they improved the sensitivity of trade towards the environment and integrated environmental negotiations in their delegations. Eventually, this increasing awareness of the CTE's importance will bring countries together in order to elaborate a solution to this stalemate, giving the right importance to environmental interests and protection even through new instruments besides the ones already in play.

2.5 Time for New Solutions

Besides the challenges posed by the WTO jurisprudence and the limited power of the mechanisms for environmental protection, another problem is posed by developing countries attitude towards the introduction of environmental norms. Indeed, as already mentioned, they sustain that this would weaken their comparative advantage and market opportunities, reducing economic potentialities for growing; an idea that unfortunately the US and EU are actually not proving wrong, making poor effort to change developing countries mentality.

In this panorama, different agents have proposed a number of options for reform. Some sustains the amendment of Article XX of the GATT on "general exceptions" in order to give more power to MEAs; others, like Switzerland, have proposed the division of responsibility between WTO and MEA in terms of competences, based on the principles of no hierarchy, mutual supportiveness and deference (Eckersley, 2004). Some others instead, not trusting any of these reforms, suggest the idea of creating a World Environmental Organization (WEO) or Global Environmental Organization (GEO) as a counterbalance to the WTO powers. In fact, this new Organization could substitute the work of the United Nations Environment Programme (UNEP) as it lacks the status, means and organization to set off against

the WTO; in addition, it would consolidate a programme for environmental policy and technology research, absorbing the other existing environmental agencies under one umbrella, strengthening its institutional support to MEAs. Furthermore, the GEO would collaborate with other organizations like the ILO to form a system of checks and balances against the WTO actions and measures. Such organization would formulate and enforce policies that internalize environmental externalities in order to ensure that all economic decisions and actions taken at global level would reflect global social costs and benefits.

However, this is a hardly viable solution. Creating a new Organization would need the support of a large number of states, most of which are first of all part of the WTO and, up do date, cannot even agree on the "greening" of WTO rules and actions. On the other hand, this proposal could help promoting awareness on the importance of the present "stalemate" that we are living, sensitising countries about the urgency of a change that ultimately would lead to a more practicable reform from within.

Eventually, WTO jurisdiction has gradually come to accept that trade-restricting measures under Article XX are justifiable for environmental reasons, as exemplified by the *Shrimp-Turtle* case. Still, the relation between trade and environment remains a complex one, with several points of disagreement.

First, the WTO approach to environmental policy; some sustains the Organization is not sufficiently concerned with environmental issues and should recognise its formal environmental responsibilities.

Secondly, WTO interpretation of existing jurisprudence; critiques are moved at its interpretation of the precautionary principle, as it is often not applied or not considered, it is seen as a highly ambiguous and disappointing behaviour.

Thirdly, questions are raised about integration between MEAs and the WTO. There is a growing debate on the issue especially because the former is considerably extending its use of trade-restricting measures that still remain exposed to challenges by WTO rules.

Finally, climate change is pushing towards the integration of trade measures to tackle global warming. According to some scholars, this can be achieved through border tax adjustments, special treatment of goods and services with lower impact on the environment, and subsidies for renewable energies, among others. Ultimately, it is almost impossible to escape from the forthcoming merging of climate policy and international trade measures.

Chapter 3

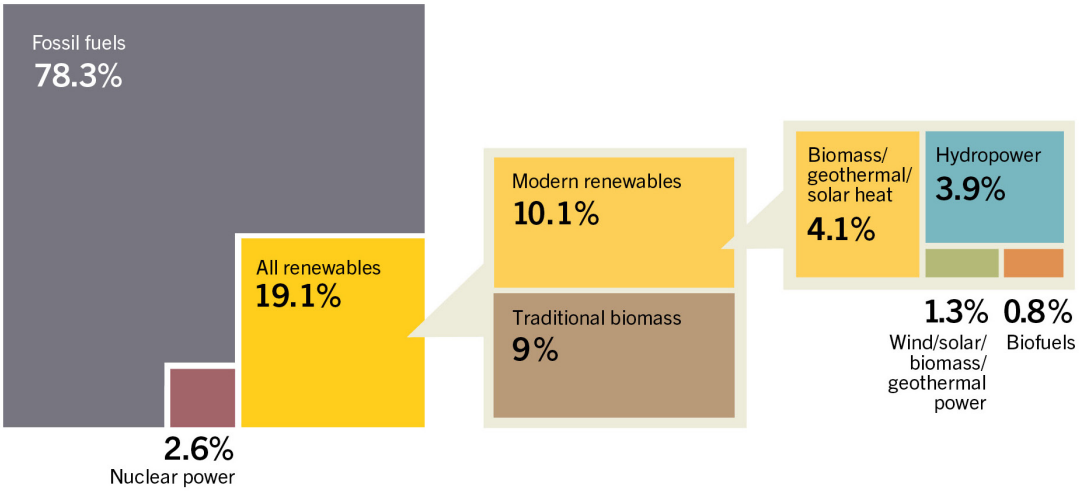
Moving towards Environmental Protection

Until very recently, the relationship between environmental protection and developing countries has always been controversial. Due to their scepticism towards the environmental measures developed by the international community, cooperation between countries aimed at developing a common response to environmental degradation has been delayed for a long time. Indeed, as mentioned in the last chapter, the instruments created to address this issue are poorly effective and much work is still needed to develop a proper international solution.

Nonetheless, even if a comprehensive and global strategy has not been developed yet, many developing countries have started to address the problem of environmental degradation and climate change at national level. In fact, many of them have experienced a shift in the industrial structure of environmental goods and services, from traditional "end of pipe" activities to the adoption of cleaner technologies that reduce pollution at the source.

Furthermore, many developing countries as for example China, India, Republic of Korea and others, have turned in leading producers of clean energy sectors like solar and wind energy. Indeed, countries like Brazil, India, China, South Africa, Republic of Korea and others, have emerged as part of the top exporters of renewable energy products in latest years. This is the reason why in recent years the contribution by renewable energies in the global final energy consumption has steadily increased (Figure 1).

Figure 1, Estimated Renewable Energy Share of Global Final Energy Consumption, 2013



Source: Renewables 2015 Global Status Report (REN21)

This turn at national level brought many developing countries to reconsider the role of Multilateral Environmental Agreements (MEAs), whose number has been growing alongside with the commitment of the latter in the protection of the environment and management of climate change. Among the most important ones, we can mention the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Montreal protocol, Basel Convention, Kyoto Protocol, Convention on Biological Diversity, Cartagena Protocol, the Stockholm and Rotterdam Conventions. Besides developed countries, also developing ones have been taking part to these Agreements. Countries like the BRICS (i.e. Brazil, Russia, India, China and South Africa) are part of all of them with the exception of Russia, which did not ratify the Cartagena Protocol.

Nonetheless, this achievement is not just the result of serious commitment to the cause by such countries; others factors join the game when we face environmental pollution and degradation, overall when the impact of pollution is more severe in such countries than others. In fact, developed countries have the resources and technology to address these issues, while developing countries have not. For the latters, fighting environmental pollution and degradation may undermine their economic growth and competitiveness, especially if they depend on natural resources. At a certain point in time countries must make a choice between two different paths: foster economic growth and their standards of living, overall through cheap production processes, or try to ensure a certain degree of environmental protection. In most of the cases,

choosing economic growth over environmental concerns will mean over-consumption, waste, inefficiency and fuel pollution.

3.1 The Costs of Environmental Degradation in Developing Countries

What is interesting to analyse is the estimated cost of such environmental damages in developing countries. Even if the data used to investigate this aspect are few and not fully available, we rely on the analysis done by some institutions like the Central Bank and the Asian Development Bank (ADB) - which analysed countries like China, India, Philippines, Indonesia, Pakistan and Thailand – to highlight the most severe consequences of environmental degradation.

a) Degraded water

Excessive groundwater extraction, pollution from human waste and industry, poor infrastructure, and dam building are among the factors contributing to degradation of the regions fresh water sources (Zhank and Crooks, 2012).

The impact of this problem in countries like Asia is significant: almost 70% of Asian water is used for agriculture, and this means that water shortages threaten food security and the incomes of rural farmers, while contaminated waters reduces labour productivity and may cause health problems.

Therefore, without good management of pollution and industrial water usage, availability for human consumption may continue to fall, and conflict over access to water may rise within states, overall in countries like the People's Republic of China (PRC).

b) Deforestation and land degradation

They are both the result of the unsustainable use of natural resources: intensive farming, urbanization, demand for timber and palm oil among the most important causes, within which there is also the poor management and regulation of these resources due to corruption. Such practices are inevitably leading to a drop in soil productivity, which in some cases may even lead to food insecurity. The latter, is a major problem in countries like Asia, where access to good food not only ensures labour, well-being and hence economic growth and development, but also factors like

political stability. About this issue, the Food and Agriculture Organization (FAO) estimates that in two-thirds of ASEAN nations (excluding Singapore) 40% of land is suffering severe degradation due to human activities in these areas. Moreover, according to the ADB studies, annual productivity losses due to deforestation and land degradation has been around 7% just during the 1990s, and if we add health and productivity losses it increases to 10% of GDP.

c) Air Pollution

This is a primary source of illness and death in urban and rural areas of Asia, undermining both productivity and income, such that a recent study estimated that in 2005 the annual welfare loss associated with air pollution in the PRC amounted to US$ 151 billion (2010dollars) (Matus et al. 2011). Besides welfare loss, indoor air pollution impairs educational opportunities and most importantly the prospects for poor families to emerge from poverty.

In addition, air pollution is worsened primarily by the increase in urban population and consequent urbanization. In Asia for example, a growing middle class is causing a huge increase in vehicles ownership, which are going to escalate in numbers from 120 to 413 vehicles present on Chinese streets, and the same is going to happen in India. As we have already seen from many pictures shown on newspaper and documentaries, air pollution – both indoor and outdoor – is causing the creation of brown clouds over Asian skies, affecting crop production, health and global climate in general through transboundaries effects.

In very poor countries air pollution is mainly due to the use of natural fuels - like biomass and coal - for cooking and heating, which are responsible for causing a variety of illness including damages to lungs and cancer. Indeed, Chinese share of global fossil fuel emissions will be 34% by 2030, while for Asia as a whole 51.9%. Moreover, given the very high level of exposure to such substances, especially particulate matter and carbon monoxide, the WHO estimated that over 1 million deaths in countries like China and India are directly attributable to indoor air pollution each year (WHO, 2009).

d) Climate Change

Asia is one of the regions estimated to most likely suffer from extensive climate change damages in the future. Examples of that are the estimates reported by the

Intergovernmental Panel on Climate Change (IPCC) in 2007, which stated that yields of important crops will decline in parts of Asia by 2.5% to 10% by 2020s, and that the intensity of extreme weather events is going to escalate in the proximate future. One of the major responsible for climate change of course is China, which according to the International Energy Agency (IEA) will have to worry about a huge share of mitigation burden necessary to restrict global warming to 2°C. In fact, Asia is both highly vulnerable to climate change and it also plays a crucial role in controlling it.

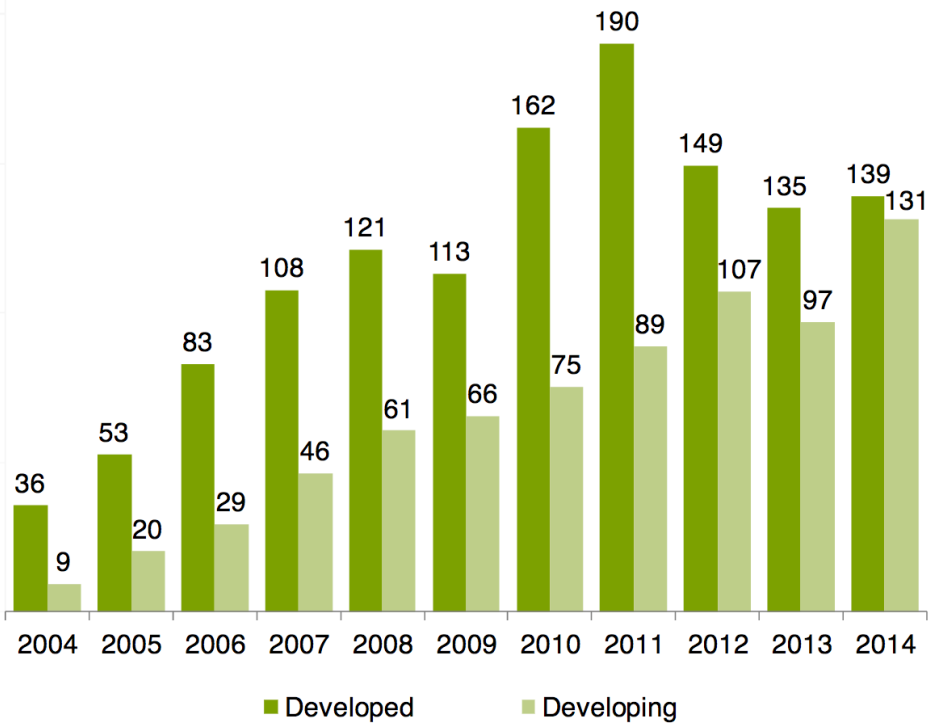
Indeed, developing countries today are under great pressure to limit and mitigate their contribution to environmental degradation thanks to the influence of international funding agencies, international and national NGOs, governments of developed countries and overall pushes from within by civil society.

Even though many of these developing countries complain about pressures received by OECD nations, as they perceive these measures would harm their economies and development levels, there seems not to be another alternative for them. Even if some experts sustains that poor countries should be left following the same path of developed ones with their own industrial revolution experience, this cannot be the right solution due to intrinsic differences existing at present time. To explain this concept, there are some facts that must be highlighted. Firstly, the flow of environmental damage per year during industrialization of developing countries is larger than the one experienced by developed ones due to "compacted" time periods in which environmental degradation has been accumulating. Secondly, the shocks that often hit the economies are much more severe with respect to the ones experienced by developed countries at their industrialization stage; and lastly, environmental management and strategies of mitigation are already taking place somehow and somewhere, so that even if some governments may oppose to it, this phenomenon is inevitable. Indeed, this trend suggests that a more efficient environmental policy regime will emerge in developing countries in shorter time and better managed than in developed countries one hundred years ago while experiencing industrialization.

Nonetheless, there are some success stories that are worth mentioning as examples of good initiatives and dedication to the cause of environmental awareness and protection. In fact, countries like Russia, India and China with the help of investment banks as the Asian Development Bank (ADB) or the World Bank – or the support from the WTO accession – have become advocates in favour of a green economy and

sustainable development. Indeed, even if there is still a long way to go in order to effectively implement their strategic framework for environmental protection and efficiently change their political, institutional and fiscal frameworks, it is still worth analysing their transition from a country merely focused on economic growth to one concerned with sustainable development. In order to do so, we will focus on three main areas of interest: climate change, technological advancement and investments in renewable energy.

Figure 2, Global New Investment in Renewable Energy: Developed vs. Developing, 2004-14 ($BN)



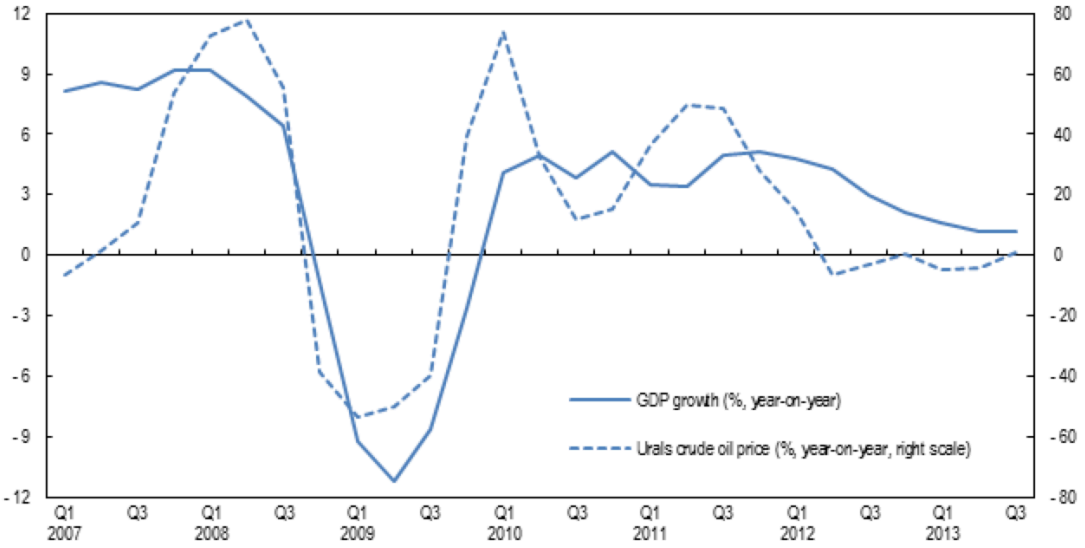
Source: Bloomberg New Energy Finance, UNEP.

3.2 The Environmental Challenge of the Russian Federation

Being one of the largest countries in the world, with 142 million population, and 9 time zones, Russia is also one of the richest countries in the world for oil, gas, and minerals, which are the main drivers of its economic growth (Figure 3). Nonetheless, due to the legacy of the Soviet Union era, its industries and production processes are obsolete and characterised by high-energy inefficiency. As a consequence, environmental quality is very low in about 15% of Russian territory, with air pollution reducing GDP by 4-12% due to an average $14 billion annual cost, and lowering life expectancy by about four years in the cities. To crown it all, Russia is planning to

triple its share of coal in the fuel mix - as exports markets prefer the use of oil and natural gas – increasing it to between 150 million and 290 million tons of coal per year by 2020 (World Bank, 2014). Indeed, Russian economy is one of the greatest consumers of energy and carbon fuel in the world, placing as the fourth largest emitter of greenhouse gas in the world.

Figure 3, Economic Dependence of the Russian Federation on Natural Resources



Source: OECD, Rosstat and Datastream

Only recently, after eighteen years of negotiations, the World Trade Organization invited Russia to join the Organization, and in 2012 the latter ratified the agreement, officially taking part to the trading system. Among the various benefits coming from this accession, trade liberalization presented a huge opportunity for the Federation to undertake environmental improvements. Indeed, supporters of Russian WTO accession sustains that this represents the best opportunity to overcome environmental and human health consequences of industrial pollution, plus improving antidumping practices, a major problem for the country. It is true that at the beginning emissions will increase due to the scale effect (i.e. more output produced, more pollution emitted) and the economy will shift towards more polluting industries, but according to the World Bank Group (2014), direct emission pricing or indirect emission pricing through energy efficiency standards would cause price-responsive technology adjustment in production and consumption through fuel switching or energy saving technologies. Besides, trade liberalization will foster innovation and use of energy efficient technologies as well as greater chance to address the problems of mitigation of climate change impacts.

Earlier in time, Russia already showed some commitment to the problem of climate change: it ratified the Kyoto Protocol in 2004 and started to pursue a policy of greenhouse gas emission reduction with a targeted decline of 25% by 2020. However, it refused to renew its commitment to the Protocol in 2011 and also to the Copenhagen accords. Moreover, in Russia the consciousness of the importance of environmental problems and related policies is much lower than in developed countries, and sometimes even in various developing ones. This is mainly due to the lack of environmental priorities in the Russian economic strategy, along with a weak environmental management and monitoring systems and a low level of environmental awareness throughout civil society.

3.2.1 Russian Climate Change Measures

Climate change effects in Russia have been more severe then everywhere else. Overall the temperature increase was 1.29°C compared to the global one of 0.74°C; an average increase in air temperature of 0.43°C between 1976 and 2012, twice as higher than similar indicators for global temperatures; an increase in the number of floods, droughts, melting and disappearing glaciers, mudslides, heat waves, rising sea levels, coastal flooding and the dramatic spread of diseases through insects. Russia acknowledged the importance of climate change and the need to combat environmental degradation since the very beginning of the United Nations Framework Convention on Climate Change (UNFCCC). In accordance to it, Russia developed the Climate Doctrine of the Russian Federation and publishes regularly updates on national actions and measures to mitigate and adapt to climate change, in accordance to article 4 of the UNFCCC. Moreover, in the "Principles of the State policy in the area of environmental development of the Russian Federation for the period up to the year 2030" it ensure the pursuing of "[…] socio-economic goals for environmentally oriented economic growth, preservation of the environment, biodiversity and natural resources to meet the needs of present and future generations, […] strengthening of the rule of law in the area of environmental protection and environmental safety" (Article 7 of the Principles of the State Policy).
Other measures have been undertaken by the Russian Federations over time, and they are the following.

- "Program on Environmental Protection 2012-20", to foster sustainable development in the country, protect biological diversity, hydrometeorology and environmental monitoring and improve environmental safety throughout the Russian Federation.
- "Energy Saving and Energy Efficiency Improvement until 2020" program, in which it is targeted a first reduction of 40% in energy intensity, that will later increase in the future, and measures for primary energy savings.
- Decree on the Reduction of GHG Emissions of 2013, which target a reduction to 75% emissions of 1990 levels by 2020, even if big business considers the goal difficult to achieve.
- Federal law on "Energy Conservation and Energy Efficiency" adopted in 2011, aimed at reducing the intensity of electricity, heat, water and gas consumption in order to meet the 2020 objectives. According to this law energy-intensive companies are required to have certified energy management systems and managers in order to monitor and eventually reduce energy and other resources consumption.

Moreover, in 2015 Russia submitted its "Intended Nationally Determined Contribution" (INDC) proposing to reduce emissions of net greenhouse gases by 25% to 30% below 1990 levels by 2030. However, with due calculations and after accounting for forestry –being Russia the largest forest nation in the world, the Climate Action Tracker rated this results as "inadequate", on the basis that the Russian Federation did not provide any further information on which accounting rules it has used, nor the potential magnitude of their impact on the emissions level in 2030(Climate Action Tracker, 2015). Besides, Russia adopted the "Decree on the Main Directions of State Policy in Improving Energy Efficiency of the Electric Power Industry Based on Renewable Energy Sources" for a 2.5% renewable electricity production and consumption target within 2015, and a plan for the production of electricity from hydropower of 4.5% in 2020, which has been reduced to 2.5% as a more feasible target.

Moreover, a system of economic incentives for environmental protection has been developed and included in the Federal Law. Such system comprises: support for entrepreneurs aimed at implementing measures for environmental protection, like environmental liability insurance; tax breaks for the undertaking of different measures aimed at defending the environment– always in compliance with Russian Federation

laws - like: best available techniques (BAT), nonconventional types of energy, recycling wastes, and others. All these measures have been adopted in order to make carbon reporting much less "painful" for Russian companies when they have to. In fact, according to the Carbon Disclosure Project's 2013 Global 500 Climate Change Report, six out of ten Russian companies surveyed either declined to participate to the report or did not respond at all.

In addition, new standards for certifications and eco-labelling have been introduced. Russian companies recently introduced international corporate-management and environmental-efficiency standards. Nonetheless, in 2008 Russia ranked 50 for the ISO 14000 certificates issued (i.e. these family of standards providing tools for companies and organizations to help them manage their environmental responsibilities). In fact, compared with other countries Russia lags behind with only 267 certificates issued compared to other BRICS countries; India ranks 12th with 2,640 certificates and Brazil 15th with 1,872 certificates (World Bank Group, 2014).

Eventually, the main problem in Russia is that policy on adaptation to climate change formally exists, but they are not implemented in the right way. We can report many programmes, projects and initiatives to reduce and prevent climate change effects, but there is no comprehensive and systematic policy framework to take care of them as there is still poor awareness at state and business level about the urgency of taking proper remedies to climate change.

3.2.2 Green Technologies

As mentioned before in this chapter, Russian factories and technologies are mostly still dated back to the Soviet era, so that technological progress has become one of the main objectives of the local government. The Russian Federation employs three times more energy than EOCD countries and Japan because of its factories backwardness, high temperatures in the country and a very high level of demand and consumption, as some of the main reasons. Consequently, the energy saving potential for the country is estimated at over 45% of current energy consumption. Russia needs an urgent upgrade to its obsolete and energy inefficient infrastructures. Nonetheless, the level of development of green technologies lags behind many other developing countries: Russian "green" patents share is less than 1% with respect to the rest of the world and

its spending in R&D is very low. Among the major problems in this field are low investments in clean technologies and innovations, and a deep problem of underdevelopment in Russian innovative and entrepreneurial culture, which led to a low demand for renewable energies from both businesses and citizens. Nonetheless, in recent years a campaign to promote development of clean technologies has been launched, increasing the demand and investments in solar energy, energy conservation and the development of electric vehicles.

Many countries such as China, Brazil, Turkey and others have been already making big steps towards the development of renewable technologies, and Russia is trying to keep up with these measures through the adoption of the 2009 decree to increase the share of renewable energies in the country up to 4,5% by 2020, even if in the present situation it won't be easy to reach this target, due to the financial cost of modernizing facilities, ambiguity and gaps in the legal framework.

Another important issue in the Russian Federation is compliance with environmental requirements, which is highly problematic for different reasons. First of all, there are too many and poorly organised regulations: there are over 4.000 federal-level regulatory legal documents, quite difficult to follow as part of them contravenes one another (World Bank, 2014). Moreover, as already mentioned, production processes and factories remained stuck at the time of the Soviet era, with very high levels of emissions. Legislation envisaged some permits for emissions as long as the enterprise shows commitment to environmental protection measures, but usually the monitoring system is not much effective. Plus, compliance with the rules, unless mandatory, is a huge struggle. Indeed, voluntary industrial compliance is almost impossible to find and sometimes, if existing, is hard even to enforce such measures. In addition to that, the Russian pollution charge system is full of flaws as targeting too many pollutants, thus monitoring and sanctioning becomes too difficult; as a consequence, the number of charges for pollution is very low.

Eventually, the Russian Federation is trying to contain the problem with alternative measures like the adoption of best available techniques (BAT), described by the Federal Law as "based on the latest scientific and technological achievements, aiming at reducing the adverse impact on the environment and having an established timeframe for practical application in view of economic and social factors" along as "technologies which include nonconventional energy sources use of secondary

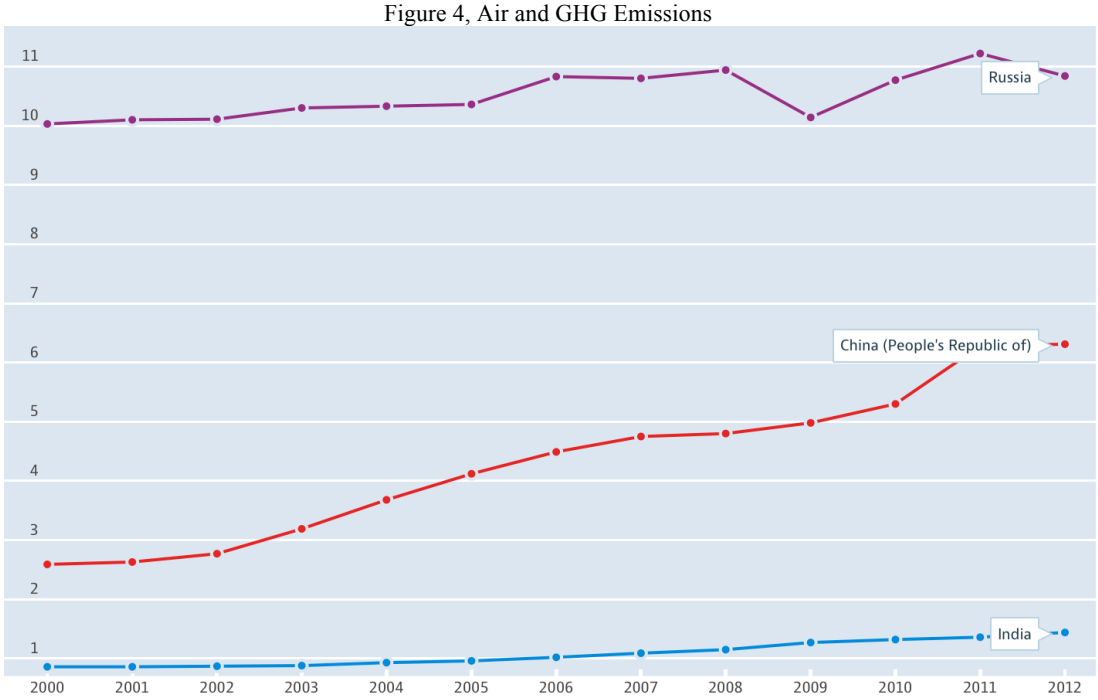
resources and waste recycling, as well as other efficient environmental protection methods"(Bobylev and Perelet, 2013).

However, all these complications in the development and adoption of renewable technologies are due to a basic difficulty in "greening" the same industries that should adopt them. There are several barriers to the achievement of such goal, namely: existence of mainly resource-based industries, implying large amounts of emissions and waste; low level of awareness about the opportunities offered by eco-oriented policies and their benefits; lack of an efficient regulatory framework, spread corruption and long bureaucracy.

3.2.3 Investments in Renewable Energies

The Fifth National Communication of the Russian Federation to the United Nations Framework Convention on Climate Change (UNFCC) revealed that the energy sector accounts for nearly 82% of Russian anthropogenic greenhouse gas emissions, assuring to itself the leading role in reducing the country's impact on climate change (Figure 4).

Figure 4, Air and GHG Emissions



Source: OECD

Given the new renewable energy revolution spreading in all developed and developing countries, Russia must keep up with them in order to not be left out.

In the post-war Soviet period, the country already managed to build 7.000 hydro-generating factories and the first tidal electric plant ever. Nonetheless, in 2015 renewable energy accounts for less than 1% of the country generation capacity, excluding hydro, which would led Russia to overstep even developed countries like France and the UK shifting to 17% of generating capacity. Moreover, what must be taken into account is that almost 10% of Russian citizens still do not have access to electricity, making the country facing a huge gap to narrow.

However, Russia recognises the need to invest and develop renewable energies, and this is why a series of decrees and resolutions have been implemented. Examples of that are the "Energy Strategy to 2030" for a 4.5% of all electricity produced and consumed to be generated through renewable resources, and the resolution no.1-r "On the Main Areas of Government Policy to Raise the Energy Efficiency of Electric Power from Renewable Energy Sources for the Period to 2020". Nonetheless, this latter resolution is not mandatory in its objectives, and this is why the target of 1.5% raise by 2010 has not been met, and many believe that the whole target for 2020 will not be achieved at all, except for 0.3-0.4 gigawatts of renewables contribution in the total energy capacity.

Moreover, the availability of vast quantities of fossil fuels and nuclear power present barriers to the advancement of the energy sector, along with subsidies for fossils and low costs for gas. Subsidies exist also in the electricity sector, although they are gradually being reduced with reforms that regard the gas market too.

In addition to that, the Russian Federation adopted a regulatory framework to support renewable energies development. At the beginning, it consisted only of a premium added to the wholesale market price of electricity, but now it evolved in a capacity-based scheme with an Electricity Premium Scheme stating that "the price of electricity produced by qualified renewable energy installations shall be determined by adding to the equilibrium price of the wholesale market a premium, which shall be fixed in accordance with the procedure established by the Government of the Russian Federation" (Article 32, paragraph 2 of the Federal Electricity Law).

In conclusion, Russia is the third largest emitter of CO_2 after USA and EU, and this is why measures to reduce pollution and environmental degradation are to be made priorities for the country. Overall, the Federation is now starting to adopt instruments

needed to meet national environmental objectives, but there is a long way to go yet, as such policies need to be strengthen in order to renew the national production processes, which are already changing after the WTO accession. The recently adopted Climate Doctrine shows the commitment to a modernization agenda in the most important sectors of the economy, namely industry, transport and housing, and to the effort of mitigating the already existing consequences of climate change. Moreover, the plan tries to foster investments for innovations, new technologies and the employment of energies with a lower footprint on the environment. In fact, the Federation main problems lie in its employment and consumption of energy, mostly due to inefficient factories and equipment. In addition, there are practical difficulties in the implementation of state policies and its monitoring at national level, due to a lack of coordination, reliable data and monitoring that the country must quickly face in order to achieve its targets.

3.3 The Chinese Case

As we know China holds the absolute record in population, emission of greenhouse gases and as the world's biggest manufacturer, for this reasons it is under global scrutiny for its social and environmental practices since a long time now.

The country has a huge weight in terms of energy for several reasons: it remains by far the world's largest producer and consumer of coal, it deploys more renewable power generation capacity than any other country and within 2030 it will outdo the USA and EU as the biggest consumer of oil and for having the largest gas market in the world.

For all these reasons and more, China has recently transformed into a leading country in the adoption of resource-efficient and sustainable model of growth. The main push for this change comes from the Chinese national leaders, which are increasingly giving importance to the domestic environmental protests – that are worsened by the difficult central-local relations - and the fears about energy and resource security.

Fifteen years ago, when the Chinese government prepared the 10th Five-Year Plan (2001-2005), it was criticised for the fact that environmental protection was just a conditional objective to economic growth and development, that the Ministry of

Environmental Protection was just a façade and the environmental agenda was too weak.

However, under the Premier Wen Jiabao, the administration made many steps forward: during the Sixth National Conference on Environmental Protection in 2006 the Premier announced that the government would have increased its dedication and care towards environmental protection, following three new policy directions aimed at making "three shifts":

1. Shift towards an approach which pays equal attention to environmental protection and economic growth;
2. Shift towards policies that undertake environmental considerations before making economic decisions, and not vice versa.
3. Shift towards an approach that serves itself with legal, economic, technical and administrative means to address environmental issues rather than just administrative ones.

The effects of this commitment showed up right away. Starting from the last two administrations that succeeded in China, new laws, regulations taxes and policies were introduced in order to implement a greener growth model. From a low 3% in 2005, by now half of China's energy use is subject to mandatory efficient standards and improvements in efficiency alongside large-scale deployment of wind, solar, hydro and nuclear power (World Energy Outlook, 2015). Even though there are many barriers and complications to the achievement of such target, the central government is trying to keep up with the environmental measures to be implemented also using the "iron hand". For example, when the former Chinese Premier Wen Jiabao realized that the country was not reaching the targets set in the 11th Five Years Plan he asked local officials to use more forceful methods in order to meet the national energy intensity target of 20%. This was the proof of the commitment of national authorities to the environmental policies undertaken, and eventually this attitude led to the achievement of many positive outcomes for China.

Nonetheless, environmental targets have still a lower weight with respect to other objectives like growth rate, fiscal income, and foreign direct investments. Local officials are bound to achieve some environmental targets during their mandate, as the Mayor, Party Secretary and the leaders of the bureaus would not pass the end-of-year check eventually. For this reason, they all try to meet some environmental standards during their mandate, but such policy is often not efficient for the environment.

Moreover, even if according to China Daily (2013) the total government spending on environmental protection in 2011 was 419 billion RMB, meaning the 0.9% of GDP, this is still not enough to tackle the problem of environmental degradation, as in order to do so it has been estimated that around 2-4% of GDP is what is needed to be devoted to the cause. As national authorities acknowledge this situation, further 200 billion RMB for clean-up projects and 350 billion RMB for more than 13.300 projects to control emissions and reduce PM2.5 between 2011 and 2020 have been implemented (World Bank Group, 2014). Right now, according to latest data available, China is investing about CNY 5 trillion (US $817 billion) in environmental protection, through government, financial institutions and enterprises commitment. Such steps forward in environmental protection officially make The People's Republic of China on of the most committed countries to the cause of safeguarding the environment and containing climate change.

In addition, financial institutions work the same way as local authorities. Since 1995, China's central bank required them to prioritise environmental safeguard when choosing which projects to fund. Nonetheless, data from the Chinese Ministry of Environmental Protection showed that only 12% of these institutions carried out this task, while 18% of them did not show any proof of the adoption of such policy. This is why in the 10th Five-Year Plan (2001-2005) the environmental performance of the country was unsatisfactory, as 9 out of 20 targets in the environmental plan were not met, becoming the only sector program to have fully failed.

Later on the situation got better in the 11th Five-Year Plan, with 11 out of 13 environmental targets met due to a change in the approach to growth and development by the government. In fact, the country was long criticised on its heavy focus on economic growth at any cost and no concern on the environment.

Among the most important measures adopted, we can mention: the creation of the Ministry of Environmental Protection (MEP), a cabinet-level institution; the establishment of six MEP's regional supervision centres with the aim to monitor environmental performances of the local governments; the amendments of existing laws and the release of new guidelines and regulations; integration of the climate change agenda in the list of priorities of all relevant departments.

3.3.1 Chinese Climate Change Countermeasures

The People's Republic of China is undoubtedly the world's largest emitter of greenhouse gases (GHG) with a share of 24.2% of carbon dioxide (CO_2) emissions and occupying the first place for the highest contribution in fuel combustion, overtaking even the United States.

Without any change in the present situation, the IPCC suggests that global GHG emissions will continue to increase alongside with the world's average temperature; global energy-related CO_2 emissions will increase by 1,6% between 2006 and 2030, while the rate of increase for the US will be 0,1% and for the PRC 3,1%, meaning nearly twice the global average and 30 times the US average (Zhang Q., Crooks R., 2012).

The seriousness of the impact of climate change on the country can be understood through the expected future trends that have been elaborated by the IPCC. First, temperature will increase by between 1.3°C and 6.0°C until 2100, slightly more than in the rest of the world. Secondly, annual precipitation will increase by between 2% to 17% in 2100 with significant differences between regions. Thirdly, the frequency of extreme weather events will be higher, with droughts that will have an estimated cost of $8 billion; floods already inflicting an estimated economic loss of CNY 142.2 billion. Since the frequency of floods and droughts will increase, this will lead to a further decrease in water security – already a huge problem for the PRC -, highly reducing water availability for the citizens. Finally, over the next 50 years it is estimated that the rate of extinction of certain species in the PRC will be around 7%-13%, and in some cases even 60%. Besides, agricultural productivity is expected to decline, along with the increase in temperatures – changes in cropping patterns and crop yields are probable too - and the negative effects of urbanization.

Given the severity of this panorama, different types of actions have been undertaken by the central government.

First, the National Leading Group on Climate Change (NLGCC) has been established in 2007, with the purpose of developing strategies aimed at creating solutions for climate change through the national and international cooperation.

Secondly, the "[the People's Republic of] China's Nationally Appropriate Mitigation Actions (NAMAs) under the Copenhagen Accord" is a document in which the government has made four main commitments for climate change.

1. The conservation of energies and improvement of its efficiency while trying to reduce CO_2 emissions per unit of GDP by 40%-45% through 2020 from the 2005 level.
2. Increase in the contribution of non-fossil fuels in the primary energy consumption to about 15% by 2020 (about 50% increase with respect to the current situation), along with the development of renewable and nuclear energy.
3. The country will further increase its forest area and reserves by 2020.
4. China commits itself to the development of a green, low-carbon and circular economy, and to the fostering of the research and development sector (R&D) for the acquisition and modernization of climate-friendly technologies.

The International Energy Agency (IEA) has stated that if these policies will be carried on, the PRC would bring about 1 gigaton (Gt) reduction in CO_2 emissions only by 2020, meaning the 25% of global emissions reduction needed to stabilize the world atmospheric concentration of CO_2. With the same purpose, China joined the international community of the UN Framework Convention on Climate Change (UNFCCC) in order to develop a new treaty setting GHG mitigation targets from 2020 on, applicable to every country.

Reducing the PRC emissions of GHG by 40%-45% is a quite ambitious plan that is now favoured by the decreasing GDP growth rate of the country. In fact, this challenge was seen as particularly difficult if the country would have continued to experience such high rate of growth as in the past; however, right now the trend of growth is going down while the probability of success of GHG abatement is increasing. Nonetheless, even if an average 7% of growth is reached – compared to the 10% of last 3 decades -, the PRC has still a long way to go in order to be really successful in cutting down emissions: first, it will have to improve the level of the industry sector; secondly, the tertiary sector must grow along with domestic consumption; lastly, China must become a service economy like all developed countries.

Proofs of such commitment are the laws promulgated in recent years, namely the Law on Promotion of Cleaner Production (2002), the Renewable Energy Law (2005) and the Circular Economy Promotion Law (2009). Moreover, the Ministry of Environmental Protection has issues the “Comprehensive Directory for

Environmental Protection" in which are specified the conditions of admittance for resource-based industries that have very high levels of emissions or consumption.

3.3.2 Technological Investments and the Economy Restructuration

Another major objective of the People's Republic of China (PRC) is the restructuring of the whole economy, one of the main concerns of the 11th Five-Year Plan. As China became the world's second largest economy since 2010, its growth came at the expenses of environmental protection. Economic development has been based on what was described as a "high growth, high pollution" economy that makes it very difficult to decouple pollutant emissions from economic growth (World Bank, 2010b). Indeed, the latter came at the expenses of high resource consumption, environmental pollution and ecologic destruction. In fact, during the 1980s, the primary sector accounted for 28% of GDP, the secondary 48% and tertiary only for 24%. In order to achieve sustainable development and stop inflicting major damages through climate change, in thirty years time the Chinese structure of the economy has been reversed: the primary sector declined to 11% of the GDP, while the secondary increased to 47% and the tertiary expanded up to 43%. However, right now the country is experiencing a major problem of stall in growth percentage, leading to an imbalance in the economy that seems to unload over the tertiary sector which is actually declining.

For what concerns the technological advancement instead, there is much that can be done for environmental emission levels through the transfer of existing technology. Nonetheless, there are several issues to be addressed by local authorities in order to make this process start. First, intellectual property protection and rights should be ensured for imported technologies. Secondly, China has a very low return on investments that keeps back foreign capitals from the country, and lastly, the PRC often prefer local home-grown technology to imported one which often delay technological modernisation and environmental safeguards. Furthermore, technological transfer in both the mining sector and the one of coal could address many of the environmental problems faced by the country. Nonetheless, China experience strong competition for a limited amount of capital to be invested, for this reason besides the social benefits coming from such adoption there should be also an

economic one; a feature in common with every developing country, which makes technological transfer more complicated.

3.3.3 Investments in Green Energies

The 12th Five-Year Plan is making further steps forward sustainable growth: a moderation in GDP growth objectives and better resource use efficiency like water and energy, with the objective of sourcing 20% of primary energy from renewable ones by 2020.

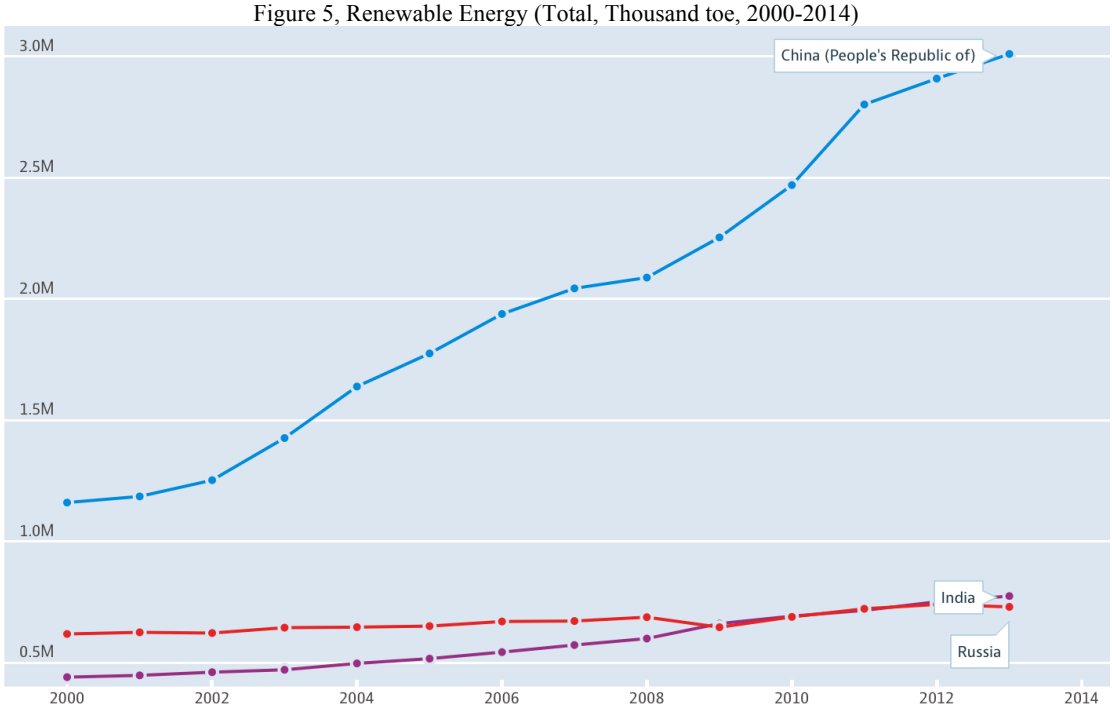
However, energy efficiency is still a huge problem in China due to its great reliance on coal. In 1990s, coal accounted for the 76% of total energy consumed, and it is expected to cover 67% of total energy demand in the year 2020. Even though the proportion of energy coming from renewable sources increased from 5,1% to 8,9%, it is still not enough to be a sufficient improvement in the energy sector. Indeed, the latter will continue to be one of the major challenges for the country, being a main determinant of atmospheric environment quality. Nonetheless, as mentioned before, the PRC is increasing its investments in non-fossil fuels, namely renewables and nuclear energies.

For what concerns renewables, most of the effort is put on the production of hydroelectric energy, as the PRC is the first producer in the world. Nonetheless, this production must increase rapidly within 2020 if China wants to meet the objectives of reducing CO_2 emissions to its targeted level, an objective that can be impeded by the fact that this type of energy is subject to the influence of climate change and extreme weather events as much as wind and solar energies, defined as "intermittent" sources. Nonetheless both have received increasing investments, like the Golden Sun Demonstration Program launched in China to foster the development of solar energy. In 2014 both China and Japan has experienced an unprecedented solar boom with $74.9 billion investment, almost half of the global total, increasing Chinese investments in the market up to 45% on the previous year. In total, China invested up to $83.3 billion in renewable energy investments in 2014, overstepping both the US and Europe.

Direct consequences of these huge investments can be observed in the cities starting from local stores and enterprises. For example, IKEA in 2012 committed to the

installation of solar photovoltaic panels in IKEA-owned buildings in China, in order to meet 10-15% of the power usage of the stores and 100% of the power needs for IKEA's Shanghai Distribution Center in China. (RE100 China Analysis, 2015) In order to do so, rooftop installations have been made on half of IKEA's stores in China, with yearly electric energy production of 1.6 million kWh.

Figure 5, Renewable Energy (Total, Thousand toe, 2000-2014)



Source: OECD, Extended World Energy Balances

3.3.4 A Special Case: Environmental Courts in China

A peculiarity of the People's Republic of China and its judicial system is the existence of specific environmental courts – eleven have been established so far – for the resolution of disputes that have specific environmental interests. While the number of these disputes increased exponentially over time since 1980s – from 100.000 to 700.000 in 2005 - the government took the decision to establish specific courts aimed at dealing with such matters. Nonetheless, only a very small percentage of all environmental disputes have been brought to court up to now, since all of them are resolved by administrative means rather than litigation of court proceeding. However, the number is expected to increase, as the economic consequences of these disputes are becoming heavier and more complex.

Yet, the judiciary system must be updated in order to function in the proper way and deliver the right solutions. Most important problems at this level regards the (i) lack of trained judges in environmental law, (ii) difficulties in the implementation of remedies ordered by the court as the losing parties refuses to do that or the local governments are not prone to help, (iii) the lack of a regulatory framework for court actions. Eventually, an effective legal system for environmental protection will be essential to properly administrate environmental interests, something that is still to be fully addressed by the judicial system.

3.4 India's Clean Energy Agenda

India has the second largest population worldwide, and is ready to overtake China in 2030. Besides, India is one of the most polluted countries in the world, with air pollution causing 8 million deaths every year and cities, like Delhi, holding the record as the world's most polluted city with a 300% rise in respiratory illnesses. As it was not enough, the country reported about 2.000 heat-related deaths in the summer of 2015; according to the Minister of Science and Technology and Earth Sciences the blame is on climate change, which if not contained will bring major problems to the agricultural sector due to rising temperatures. Moreover, the number of droughts in India is increasing alongside with the sea levels, leading to floods and heavy rainfalls that are growing in their intensity, time after time.

Plus, as we know India experienced a substantial and sustained economic growth over the last decades, placing huge pressure on its energy resources, of which 80% of its oil is imported, representing a great threat to its energy security.

Due to its climate vulnerabilities, politicians and business leaders are realising that they will soon have to walk their way out of the carbon-intense growth path currently experiencing, abandoning the motto of "emit now and pay later" adopted during the Copenhagen Summit in 2009. In this regard, India is trying to take care of its recent increase in emissions by 65% in the last 10 years, 41% of which are due to the industrial sector. This country is in fact the fourth largest producer and second biggest consumer of coal worldwide, experiencing a huge problem with its deposits: most of

them are trapped under the Indian forest land, meaning that extracting this energy results in further emissions and vast deforestation.

Nonetheless, India is trying to clean up its reputation and invert the path of environmental degradation through different policies and strategies adopted both at governmental and business level. Let's now explore them in further detail.

3.4.1 Climate Change in India

India is one brilliant example of economic growth among developing countries that are paving their way out of extensive poverty. Nonetheless, such growth came at huge environmental expenses, with physical degradation of the environment, scarcity of natural resources and pollution. Such consequences, are even threating their objective of eliminating poverty, as the areas that are most experiencing environmental problems are the poorest ones. However, Indian rapid growth has triggered people awareness on climate change and they are now demanding sound management of natural resources and protection of biodiversity. This is why environmental sustainability became one of the objectives of the current 12th Five Year Plan for India. Efforts to address the problem of climate change has been already made during the 11th Five Year Plan, when the government prepared regulations for the protection of the coastal zone regarding hazardous wastes, river conservation and hunting. Moreover, it was elaborated a New National Environment Policy (2006) regarding resource management and environmental pollution in which among the major objectives set for the country were: (i) conservation of critical environmental resources, (ii) efficiency in environmental resource use, (iii) environmental governance in the management of resources - meaning a transparent, rational and accountable good governance by the state – (vi) integration of environmental concerns for socio-economic development, (v) actions to reduce land degradations, (vi) conservation of forests and wildlife granting biodiversity, (vii) sustainable conservation of resources and (viii) policies for – air, water, noise, soil - pollution abatement.

Besides, the National Environment Policy, being one of the most comprehensive instruments in India to tackle climate change, has been the basic framework for the development of a National Biodiversity Action Plan (NBAP) with the objective of

assessing the vulnerability and adaptation strategies to climate change, and other targets as the prevention of pollution, the strengthening of policy, legislative and administrative measures for biodiversity conservation an management.

In addition, among the most important actions undertaken by the Indian Government there is the National Action Plan on Climate Change (NAPCC) of 2008, in which are outlined the existing and future policies addressing mitigation and adaptation strategies. This plan delineates eight "national missions" as following:

- *National Solar Mission*, aimed at promoting the employment and development of solar energy for power generation in order to ultimately make solar competitive with fossil-based energy.
- *National Mission for Enhanced Energy Efficiency,* in order to decrease energy consumption, overall for industries, through energy incentives and certificates.
- *National Mission on Sustainable Habitat,* promoting energy efficiency at the heart of urban planning and waste management, creating incentives for the use of public transportation.
- *National Water Mission,* as water availability is projected to decrease with climate change, the plan sets a target of a 20% improvement in water use efficiency.
- *National Mission for Sustaining the Himalayan Ecosystem,* regarding biodiversity, forests, glaciers and other resources in the region.
- *National Mission for a "Green India",* meaning an action of afforestation of 6 million hectares of degraded land, in order to expand forests from 23% to 33% of the territory.
- *National Mission for Sustainable Agriculture,* with the aim to foster agricultural resilience to climate change.
- *National Mission on Strategic Knowledge for Climate Change,* in order to collect and spread knowledge about the phenomenon of climate change, also through the establishment of a Climate Science Research Fund and fostering private sector investments in adaptation and mitigation strategies.

However, criticisms have been raised as implementation has not proceeded at the expected pace, while some others think the document only as a "wish-list" with good purposes rather than a strategic plan really aimed at tackling current problems. This is why later in time the Indian Planning Commission has suggested a re-elaboration of

the text, focusing on the current priorities for the country. Yet, actual expenditure on adaptation and climate change related actions has been increasing, from 1.7% in 2006-7 to 2.6% in 2009-2010, and they are expected to intensify over time. Adaptation however is still a relatively new field of work, in which India must put more effort in order to efficiently address the problem of climate change, as the current investments in the field are not sufficient for the strategies to be properly effective.

3.4.2 Sustainable Technological Advancement

The main areas of interest for the application of new technologies in India are its urban and rural areas, for the creation of climate-smart villages and cities. Example of this practice is the project run by an international NGO and the Consultative Group for International Agriculture Research programme on climate change, agriculture and food security (CCAFS) aimed at creating 1.000 climate-smart villages in six different Indian states. This project employed solar energy for the creation of pumps to irrigate land, the introduction of laser-guided land levelling for the fields and new technologies for sewing and farming. Its aim is to substitute diesel-powered irrigation pumps and other fossil-based technologies in order to decrease emissions and ensure a more sustainable way of farming without overexploiting land and water.

As already mentioned, others projects have been elaborated for the urban areas of India, in which the population is expected to grow by 300 million more within the next couple of decades according to the United Nations report. Besides, by 2030 it is expected that 68 cities will have more than one million inhabitants each, and six megacities with more than ten million each, a dramatic booming in urban population. This is why the Indian Government and the private sector are exploring new sustainable solutions to face such scenario. The company Siemens has started to invest in sustainable power for cities through different projects: combined cycle power plants for urban power supply and energy infrastructure, of which one has been built in Vadodara, one of the largest cities of India; low-loss power supply through high-voltage, direct current transmission (HVDC), a technology suitable for transmission of energy over long distances, currently built to connect the city of

Mundra with the industrial regions near New Delhi; new types of wind turbines for wind energy plants sold in different Indian cities.

Besides India is collaborating with the UK for a Sustainable Energy Technologies Network, in order to move to a low-carbon energy supply. This plan envisages a collaborative research activity between the UK and India to build an interdisciplinary, multinational, energy research centre (The Midlands Energy Consortium). Lastly, the Government of India launched the Smart Cities Mission, one of the major urban development programs that focus on Indian growth and its consequent challenges and opportunities. The objective is to improve the quality of life through different initiatives: technological advancement, institutional reforms, and involvement of citizens. One hundred Indian cities are participating to this challenge, and the project took over other countries with similar sustainable objectives.

3.4.3 Renewable Energy Investments

As mentioned before, India is one of the world's biggest consumers of coal, used to generate more than half of the country's electricity. However, the country started to recognise the importance of developing this sector and to acknowledge its potentialities for cutting down greenhouse gas emissions, as a viable and efficient solution to taxes on carbon – a method implemented through a $4 tax per metric ton on coal -. Up to date the share of renewables in the energy mix amounts to less than 9%, but India committed to a cut of 25% of emissions by 2020, and this share is planned to increase over time. To this purpose, hydro, solar and nuclear energy capacity must increase up to 90GW production, meaning a 20% in the total energy mix, which will further increase over time according to the ambitious Indian plan for the investments in renewables: indeed, the renewable market in India is estimated to account for a $10.51 billion opportunity, and generate business prospects worth $160 billion in the next five years.

In favour of this outlook there is the declining cost of power generation in favour of solar energy production. The cost of solar power has declined from 30cents per unit to about 9cents in the last few years, turning solar energy a viable solution for the country and the government itself, which has planned an investment of around $100 billion in this sector, and expects foreign investors to be attracted by this cheap

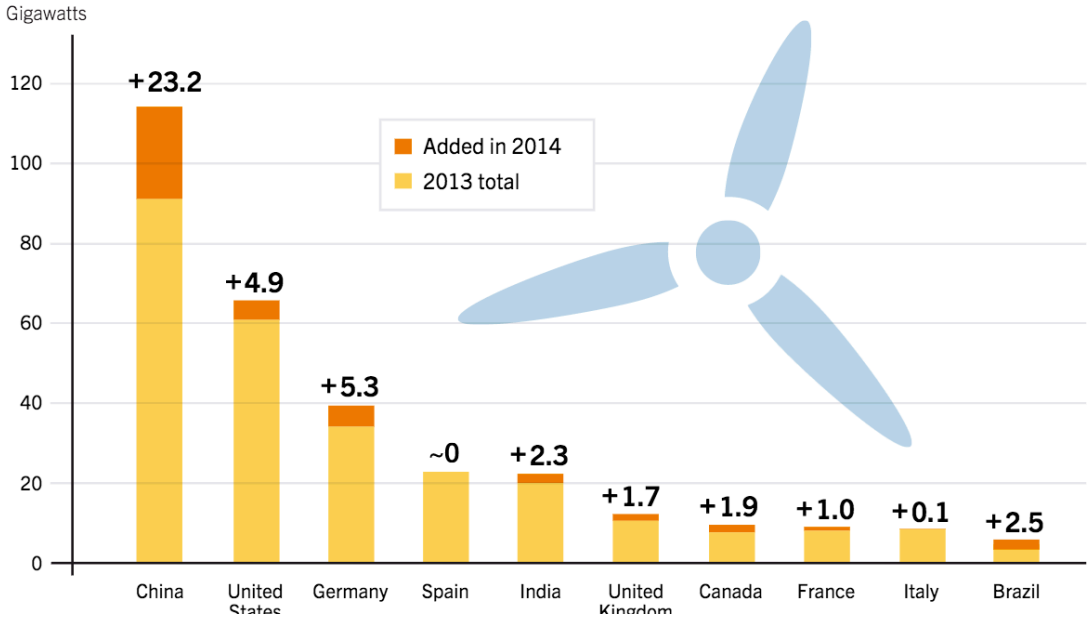
market. Besides, in order to encourage the employment of renewable energies it is used the "accelerated depreciation" strategy, allowing investors in green energy and technologies to depreciate the value of their plant equipment at a faster rate than usually allowed, thus reducing their stated income for the purposes of income taxation.

Moreover, it is worth noting that major contribution to the renewables is coming from wind power, accounting to 70% of its capacity. Due to India's commitment in the wind field, it placed in the top 10 of the countries with the highest wind power capacity (Figure 6), which is projected to increase thanks to the new installations starting to operate in these last years.

For this reason a Centre for Wind Energy Technology has been set up in order give technical support to the Ministry of New and Renewable Energy (MNRE) in its programmes for the implementation and adoption of renewable energies. This Ministry is the first and only of his kind, as it deals only with matters relating to new and renewable energies.

Besides, the MNRE is indeed working to implement programmes involving the adoption of renewables in rural areas for lighting, cooking and motive power, plus incentivising its use for urban, industrial and commercial applications. Most of these programmes are implemented through the State Renewable Energy Development Agencies, which in order to do so mobilises actors at all levels, from local agencies to non-governmental institutions (NGOs) and village level organizations. To finance these renewable energy projects, India came out with perhaps one of the only institutions in the world dedicated to finance exclusively projects regarding renewables and energy efficiency, meaning the Indian Renewable Energy Development Agency (IREDA).

Figure 6, Wind Power Capacity and Additions, Top 10 countries, 2014



Source: Renewables 2015, Global Status Report, REN 21

3.4.4 Indian Environmental Supreme Court

Starting from the1980s, Indian Supreme Court has developed a body of "green constitutional law" to safeguard citizens from environmental degradation. From then, India's Constitution guaranteed a right to healthy environment, clean air and water and obliges the State and its agencies to enforce environmental laws whenever necessary. Through time the country recognised environmental law as a specialised area of law requiring a separate system of adjudication, and the Supreme Court finally called for the constitution of such environmental-specific court. As a consequence, the latter established the National Environmental Tribunal with an Act in 1995, and another one in 1997 for the creation of the national Environmental Appellate Authority (NEAA) concerning administrative decisions in case of environmental impact assessment; nonetheless, both have never been implemented, remaining only on paper. Somehow, the Supreme Court was expecting this failure and called for the involvement of experts in judicial cases concerning the environment, creating experts committee to have scientific backing, summoned at the discretion of the Court. Besides, to overcome this stalemate, a solution has been envisaged in the Public interest Litigation (PIL), which at first was established as a mechanism to which any member of the public could address against the violation of his legal or constitutional

rights. However, with time the PIL has increasingly concerned itself with environmental issues, thus currently allowing every citizen to approach the Court in cases of environmental harms and violations of his rights to an healthy environment. Eventually, it turned into the "right hand" of the Supreme Court of India with the objective of dealing with environmental disputes.

Conclusions

From this analysis can be drawn three points that enclose the main features of the international environmental landscape of current times.

First, environmental safeguard and climate change are contemporary problems that are still not addressed with due commitment. Starting from developed and developing countries, which are still reluctant to undertake proper measures for the environment as they are afraid this could undermine their economic power and position overall in the international trading arena. What is not taken into consideration is that the trading and climate change debate is actually taking place in the context of the current financial and economic crisis that almost all countries are experiencing, making the elaboration of proper solutions even more challenging and necessary due to the increasing trend in trade protectionism. At the same time international actors don't have the proper instruments to address the problem of environmental protection by themselves, plus are doomed to collide against organizations as the WTO - and the GATT before it -which are still poorly concerned about environmental interests.

In fact, the second point is that the environmental jurisprudence needs to be better developed and taken in consideration by national and international agents, namely national courts and the WTO. As we analysed in the second chapter, the reach and influence of instruments like the Committee on Technical Barriers to Trade (TBT), Multilateral Environmental Agreements (MEAs) and Article XX of the GATT is very limited. The dialogue on these mechanisms is constantly open, and new answers are trying to be elaborated in order to eventually reach a solution for the protection of environmental interests. Besides, taking into consideration developing countries concerns and bring them into the wider range of environmental voices characterising the WTO negotiations, is likely to provide the basis for the resolution of the conflict between MEAs and the World Trade Organization.

Thirdly, we cannot deny the commitment to environmental protection of some of the most polluting developing countries, namely China, Russia and India.

During the last decades the three of them have made big step forwards, increasing environmental awareness and efficiently undertaking measures against degradation. Huge investments have been made in the field of renewable energies and environmental protection, making these countries appear in the top rankings of the countries with better environmental records in such fields.

Nonetheless, an higher effort is required to fully address the problems of climate change and environmental degradation, enduring the work of modernisation of the economic, political and legal structures of each country.

Abstract

Il cambiamento climatico e la tutela ambientale sono diventati argomenti portanti del dibattito internazionale moderno: la loro estrema importanza e attualità è, infatti, ormai riconosciuta anche dalle menti più scettiche.

Ciò nonostante, per quanto la loro rilevanza sia aumentata nel tempo, il dibattito risulta ancora particolarmente acerbo e caratterizzato da conflitti e visioni differenti che rallentano l'elaborazione di una risposta comune a questi problemi.

La tutela ambientale è ancora discontinuamente presa in considerazione per l'elaborazione delle politiche nazionali ed internazionali, dimenticando così che le nostre azioni hanno un costo sociale nascosto, il quale, secondo un crescente numero di economisti, ha portato agli attuali fallimenti di mercato. Tuttavia, negli ultimi venti anni si è assistito alla diffusione del concetto di sviluppo sostenibile, che ha condotto numerosi paesi ad un'evoluzione nelle loro "coscienze ambientali": conferenze importanti come quella di Stoccolma (1972), Rio (1992), il World Summit (2002), la Conferenza di Parigi sui cambiamenti climatici COP21 (2015), sono frutto di un progresso nella consapevolezza dell'impatto delle nostre azioni sull'ecosistema in cui viviamo. Politiche come quella della mitigazione e dell'adattamento al cambiamento climatico sono state elaborate da un numero considerevole di paesi sviluppati ed in via di sviluppo, con la consapevolezza che gli attuali livelli di consumo ed emissioni non sono più sostenibili.

Inoltre, in questo elaborato si andranno ad individuare le sfide più impegnative che i singoli paesi dovranno fronteggiare a livello locale, per tutelare il proprio ambiente e risorse, partendo dai rischi di urbanizzazione, industrializzazione e riscaldamento climatico, per arrivare all'impatto dei loro scambi commerciali con l'esterno.

Oggigiorno, il commercio internazionale è oggetto di molteplici dispute a livello mondiale, giacché lega la maggior parte dei paesi esistenti al mondo e ci spinge ad una politica di consumo e produzione che non è più sostenibile per il nostro pianeta. Ecco perché assistiamo a pressioni, sia a livello nazionale che internazionale, su organismi come l' Organizzazione Mondiale del Commercio (WTO) per la regolamentazione degli scambi commerciali e la tutela degli interessi ambientali. In questo senso, il dibattito sulla conciliazione della liberalizzazione degli scambi e la protezione dell'ambiente ha dato vita a discussioni protrattesi fino ai giorni nostri, con lo sviluppo di punti di vista diametralmente opposte. Oggetto di questa tesi è anche

un'analisi su come, tramite l'organismo principe per la regolamentazione degli scambi commerciali, la WTO, la tutela dell'ambiente ed i relativi interessi dei paesi membri vengano disciplinati e tutelati. Dalla data della sua fondazione nel 1995, l'Organizzazione Mondiale del Commercio ha favorito la formazione di diversi strumenti per risolvere, o quantomeno affrontare, le dispute internazionali che hanno per oggetto interessi ambientali: partendo dall'Articolo XX del suo predecessore, l'Accordo Generale sulle Tariffe ed il Commercio (GATT), l'accordo sugli ostacoli tecnici agli scambi (TBT) per arrivare ai vari accordi multilaterali ambientali (MEA), di cui oggi ne contiamo più di duecento.

Ciò nonostante, le relazioni tra la WTO ed i MEA sono molto controverse. Infatti, anche se alcuni accordi multilaterali, come la Convenzione Quadro sui Cambiamenti Climatici delle Nazioni Unite (UNFCCC), possono contare su un'adesione quasi mondiale, crescenti sono le preoccupazioni su come questi possano prima o poi entrare in conflitto con le regole della WTO. Ad oggi, è evidente che gli interessi commerciali dei paesi ricevano più attenzione e peso rispetto alle dinamiche ambientali; ma ben presto, dato l'aumento del degrado ambientale e della consapevolezza della comunità internazionale, non potremo più evitare di trovare una soluzione a questi conflitti.

Pe queste ragioni, nonostante la vacillante regolamentazione a livello internazionale, molti paesi hanno già iniziato ad avviare programmi per salvaguardare le loro risorse naturali e limitare il loro impatto ambientale. Al di là delle principali economie mondiali quali gli Stati Uniti, Germania, Francia ed Italia, altri casi brillanti di impegno ecosostenibile sono la Russia, la Cina e l'India, le cui politiche verranno analizzate nel corso di questo elaborato, focalizzando l'attenzione su tre aspetti fondamentali cui si sono principalmente rivolti i loro sforzi: il cambiamento climatico, lo sviluppo tecnologico e gli investimenti nelle energie rinnovabili.

Per quanto concerne la Russia, a causa dell'eredità lasciata dell'Unione Sovietica, le sue industrie e i processi di produzione sono ancora obsoleti e caratterizzati da un'alta inefficienza energetica. A causa di ciò, la qualità ambientale del paese è tra le più basse al mondo, con un'alta dipendenza da risorse naturali quali carbone e petrolio. Negli ultimi anni però, la Russia ha intrapreso la strada del cambiamento anche grazie al suo ingresso all'interno dell'Organizzazione Mondiale del Commercio (WTO), le cui stime prevedono grandi opportunità per diminuire sostanzialmente gli effetti negativi sull'ambiente e sulla salute umana dell'inquinamento industriale prodotto nel

paese. A livello nazionale invece, la Russia ha iniziato a tracciare un programma di investimenti e politiche sostenibili che ha avviato il paese verso la giusta trasformazione. Per quanto riguarda il cambiamento climatico, diversi programmi sono stati adottati nel breve termine per arginare l'impatto ambientale di questo fenomeno e proteggere l'ecosistema. I temi principali affrontati sono stati la protezione ambientale e il monitoraggio delle risorse naturali, il potenziamento dell'efficienza energetica e la riduzione delle emissioni di gas serra. Inoltre, è stato elaborato un sistema di incentivi economici per favorire la protezione ambientale che prevede diverse misure, tra le quali supporti finanziari per la classe imprenditoriale del paese ed agevolazioni fiscali di diversa natura.

Per quanto concerne invece lo sviluppo e gli investimenti nelle tecnologie "green", la posizione della Federazione Russa è molto complicata. Con un sistema industriale e di produzione obsoleti, la Russia impiega tre volte più energia rispetto ai paesi OECD ed il Giappone. E' stato stimato che il potenziale risparmio di energia nel caso di modernizzazione industriale sia del 45% dell'odierno consumo, ma nonostante questa consapevolezza sono pochi i passi avanti già fatti. Ciò che limita il progresso è una legislazione mal organizzata e spesso contraddittoria, con sistemi di controllo poco rigidi e facilmente eludibili. Gli sforzi attuali della Federazione si stanno concentrando su misure come l'adozione di un sistema di "migliori tecniche disponibili" (BAT), finalizzate alla riduzione del degrado ambientale e per l'adozione di tecnologie che implichino un maggior livello di efficienza e riciclo di energia.

La situazione è invece migliore per gli investimenti nelle energie rinnovabili, con la costruzione di 7.000 centrali idroelettriche e il primo impianto che sfrutta l'energia delle maree: l'energia idroelettrica conta infatti per il 17% della produzione nazionale di energia. La Russia inoltre con la sua "Strategia Energetica per il 2030" ha stabilito che il 4.5% di tutta l'elettricità del paese dovrà essere generata da fonti rinnovabili entro la data stabilita. Per quanto questi passi avanti si susseguano a velocità modesta, la Federazione Russa sta effettivamente investendo nel processo di modernizzazione e eco-sostenibilità, facendo i conti con i vari limiti ed impedimenti che ne intralciano il progresso.

Un altro paese che sta seriamente facendo i conti con i suoi limiti e con la sua stessa grandezza è la Repubblica Popolare Cinese. Destinata a superare in consumi e popolazione sia gli Stati Uniti che l'Europa entro il 2030, la Cina ha attualmente gli occhi del mondo puntati addosso, accusata di essere arrivata a livelli di inquinamento

ed impatto ambientale insostenibili. Consapevole del suo ruolo, la Cina ha intrapreso grandi iniziative per la sostenibilità negli ultimi Piani Quinquennali ed anche nel privato.

A favore del contenimento e della riduzione del cambiamento climatico è stato fondato un organo specifico per lo sviluppo di strategie atte a trovare soluzioni a questo fenomeno, ovvero il National Leading Group on Climate Change (NLGCC). Insieme ad esso sono state sviluppate misure per la conservazione dell'energia e il miglioramento del suo impiego efficiente, cercando di ridurre le emissioni di CO_2 di circa il 40-45% entro il 2020. Inoltre, altre iniziative prevedono l'impiego di energie rinnovabili per il 15% nel consumo di energia primaria, l'incremento della superficie delle foreste cinesi e l'impegno a sviluppare nel tempo un'economia "green" e circolare, con un basso impatto ambientale ed a favore dell'acquisizione di tecnologie sostenibili.

Per quanto riguarda quest'ultimo punto, la Cina sta affrontando diverse difficoltà nel cercare di assorbire nuove tecnologie con l'obiettivo di ristrutturare la sua economia ed espandere il settore terziario. Grandi passi avanti sono stati fatti per far sì che il settore predominante non fosse più quello primario, tanto che negli ultimi anni da una percentuale del 28% esso si è ridimensionato all'11% del PIL nazionale, mentre il terziario si è espanso dal 24% fino al 43% del PIL.

Nel frattempo, il dodicesimo Piano Quinquennale cinese prevede la crescita del contributo delle rinnovabili fino al 20% entro il 2020, e la conseguente diminuzione dell'utilizzo del carbone come fonte di energia, attualmente la più utilizzata nel paese. Il futuro delle rinnovabili sembrerebbe quindi luminoso in Cina, che si ritrova ad essere il primo produttore di energia idroelettrica al mondo ed un importante investitore nella produzione dell'energia solare. Nel 2014 la Repubblica cinese ha investito $74.9 miliardi, quasi la metà degli investimenti mondiali nel settore dell'energia solare, e ben $83.3 miliardi nelle energie rinnovabili, superando sia l'Europa che gli Stati Uniti.

Infine l'India, che negli ultimi anni ha dato il via allo sviluppo di politiche sostenibili, soprattutto in seguito agli alti livelli di crescita registrati nell'ultimo decennio, che hanno contribuito ad incrementare le pressioni sulle sue risorse energetiche – soprattutto carbone - e le emissioni del 65% rispetto ai livelli del 1990. Nel dodicesimo Piano Quinquennale indiano sono così state elaborate politiche per la conservazione e gestione delle risorse naturali, l'integrazione degli interessi

ambientali nello sviluppo socio-economico del paese, la tutela delle biodiversità e nuove politiche per la riduzione dell'inquinamento dell'aria, dell'acqua e del suolo. Inoltre, uno dei piani più importanti intrapresi dal paese è stato il Piano Nazionale sul Cambiamento Climatico del 2008, con otto obiettivi primari tra cui i più stringenti sono: l'efficienza energetica, la tutela dell'acqua, lo sviluppo e la resistenza dell'agricoltura al cambiamento climatico, e la missione per rendere più *green* il paese. Per quanto questo piano sia molto ambizioso, il governo sta lavorando per raggiungere almeno una parte di tali obiettivi senza disperdere energie per cercare di attuarli tutti e rischiare di fallire nei suoi intenti.

Lo sviluppo tecnologico è un altro punto cardine per la sostenibilità del paese, ed il governo indiano si sta adoperando sia a livello urbano che rurale. Diversi programmi sono stati attuati per la creazione di città intelligenti, come il progetto *India Smart Cities Challenge* che coinvolge all'incirca cento città indiane per promuovere ed incoraggiare lo sviluppo ed il consumo sostenibile. Al di fuori delle città invece, compagnie come la Siemens si stanno adoperando da anni con diverse iniziative, tra cui la costruzione di stabilimenti per la produzione di energia a ciclo combinato, la realizzazione di una rete di trasmissione elettrica che colleghi città ad elevate distanze, ed il rifornimento di centrali eoliche con nuovi e più moderni tipi di turbine.

Infine, per quanto concerne gli investimenti nelle energie rinnovabili, l'India si sta muovendo per incrementare il suo share, che al momento ammonterebbe al 9% del PIL nazionale. Ciò nonostante, nuovi investimenti sono stati fatti nel settore dell'energia solare, nucleare ed idroelettrico, mentre il settore delle rinnovabili si prospetta di offrire laute opportunità di profitto stimate intorno ai $160 miliardi nei prossimi anni. In aggiunta, il settore delle rinnovabili in India è in forte crescita, tanto da portare alla creazione di un ministero esclusivamente dedicato alle energie rinnovabili – unico nel suo genere al mondo – che si propone di diffondere l'utilizzo di questo tipo di energia nelle aree rurali del paese.

In conclusione, tutti e tre i paesi citati, negli ultimi decenni hanno compiuto grandi progressi nel campo della sostenibilità e della protezione ambientale. Secondo il decimo rapporto delle Nazioni Unite per l'ambiente (UNEP), i paesi in via di sviluppo hanno raggiunto e superato la quota d'investimenti nelle energie rinnovabili rispetto ai paesi sviluppati, una differenza che nel 2015 ammonta a $130 miliardi per questi ultimi, rispetto a $156 miliardi degli altri, con Cina e Giappone a ricoprire un ruolo da leader. L'espansione verso questi nuovi mercati emergenti è anche dovuta alla

diminuzione dei costi di produzione dell'energia "verde" – soprattutto per l'eolico onshore e il solare fotovoltaico -, diventata ormai competitiva rispetto alle fonti tradizionali a seguito del progresso tecnologico e dei nuovi investimenti nei paesi in via di sviluppo, soprattutto l'India. L'International Energy Agency (IEA) ha stimato nel suo *Renewable Energy Term Market Report 2013* che nel 2018 l'energia rinnovabile coprirà un quarto della produzione di elettricità mondiale e un decimo del fabbisogno di calore. Già oggi, le rinnovabili sono la seconda fonte di energia più impiegata dopo il carbone, e questo trend non accenna ad arrestarsi neanche nelle previsioni meno rosee per il futuro. Inoltre, secondo la IEA il 60% dell'aumento nella domanda di energie rinnovabili nei prossimi anni deriverà proprio dai paesi non OECD, tra cui spiccano Cina ed India, paesi che si annoverano tra i maggiori richiedenti di energia "verde" a livello mondiale.

In sintesi, i dati che stiamo raccogliendo sono rassicuranti per un futuro più sostenibile: le rinnovabili stanno coprendo una percentuale sempre più elevata nel consumo totale di energia ed un altrettanto crescente porzione della produzione di elettricità. In aggiunta, per quanto si stia vivendo un periodo di recessione economica, il settore del rinnovabile sembra non esserne affetto: dai primi anni 2000, gli investimenti nella *green economy* non fanno altro che aumentare costantemente.

Visto l'esempio di questi paesi, possiamo affermare che nel tempo sia ormai maturata la consapevolezza che l'eco-compatibilità della moderna economia mondiale non inibisca la creazione di ricchezza ma, al contrario, offra significative opportunità di investimento, di crescita ed occupazione. Ciò nonostante, gli sforzi intrapresi devono continuare per far sì che questa transizione sia efficace nel tempo e si consolidi nella realizzazione di un'economia verde, con un'azione coerente di parte di tutti gli attori a livello nazionale ed internazionale. Tale transizione non si tradurrà solamente in una crescita economica dei paesi che la realizzano, ma anche nell'eliminazione della povertà che ancora caratterizza alcuni paesi fortemente dipendenti dallo sfruttamento di risorse naturali. Il passaggio verso una *green economy,* infatti, implica reinvestire nel capitale naturale invece di sfruttarlo, per la creazione di un'economia cosciente delle proprie risorse e potenzialità ed in grado di lasciare alle generazioni future un pianeta sano e produttivo, capace di generare ricchezza per tutti.

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