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The Fairtrade Carbon Credits: a fair method to tackle the climate change

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I would like to thank my family and my friends who sustained me during my university studies.
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Introduction

The problem of climate change is becoming more and more severe as the greenhouse gases level in the atmosphere has been increasing since the 20th century mainly because of the human industrial activities. The effects of the concentration of these greenhouse gases have strong impacts on climate, causing significant increases in temperatures which alter the normal functioning of the ecosystem (IPCC, 2014). For the future, according to the forecasts, the scenarios are even worse with more frequent natural disasters, droughts, ocean acidification and higher temperatures, giving some examples.

The main contributors to the global warming are the developed countries which base their economic health on activities that entail a large amount of carbon emissions. But, on the contrary, the countries which are the most affected by the carbon emissions' effects are those who emit less: the developing countries. Hence, these countries do not only have to face already difficult economic situations, but also they have to manage the climate change problem.

Intervening is now a must if irreversible damages for the planet are to be avoided. However, despite the efforts of the international community, currently, no agreements have been really implemented as the economic interests of some countries are the priority. It is thus necessary to involve in this mitigation process the economic sector together with the private companies. Unfortunately, this has not happened, yet.

In this stalemate, where no real effective actions have been taken and where the situation of the developing countries is getting worse, Fairtrade International, one of the main actors in the fair trade movement at global level, together with Gold Standard have started to develop the idea of Fairtrade Carbon Credits (FCCs). These credits aim to contribute to the fight against climate change in a fair and sustainable way. Indeed, contrary to similar initiatives which regard the compliance and the voluntary carbon markets, the credits exchanged in this one involve the small-scale producers in developing countries and ensure a fair reward for the credits sold in addition to a premium to invest in environmental projects.

The thesis, which is divided into six chapters, aims to deepen the Fairtrade Climate Standard and to demonstrate how the FCCs are an effective way to tackle the climate change with a view to sustainable development.

More specifically, the first chapter briefly presents the fair trade movement, the reasons of his birth, the values on which it is based and the main actors at international and Italian level.

The second one focuses on the promoting organization of the FCCs: Fairtrade International, its history, its different programs and strategies.

The third chapter is concerned with the issue of the climate change and explains the causes of global warming, the main contributors, the future trends and the intervention actions that would be necessary to limit the phenomena.

The following chapter, the fourth one, demonstrates through exploiting researches and data how the most serious consequences of climate change hit the developing countries.

The fifth chapter focuses on the Fairtrade Climate Standard, the methodologies used, the reasons why Fairtrade has chosen this method to tackle the climate change and then which are the benefits for the buyers of the credits.

In conclusion, in the last chapter, three different case studies are described. One of them corresponds to the first case of climate project certified under the Fairtrade Climate Standard which is promoted by DHL Deutsche Post Group. The other two are instead projects which are currently under certification process.

1. The fair trade system

1.1 What the fair trade system is and the reasons behind

The fair trade movement is a trading system which has risen in order to do what the conventional trade does not: delivering sustainable live hoods conditions and development opportunities in developing countries. The fair trade system is thus an alternative approach to the normal trade (World Fair Trade Organization and Fairtrade Labelling Organizations, 2009). The goals are to reduce poverty and reform the international trade rules trough equity and fairness. In effect, because of unfair trade conditions, many producers in developing countries were made poor, marginalized and incapable to take control of their lives and jobs. But, if the consumers had been properly informed about the products and what stands behind them, they would have changed their choices contributing to the transformation of the economic systems. For these reasons, since the late eighties, organisations promoting a fair trade started to rise across Europe and North America. Currently, this movement involves more than2 millions of producers and workers across 70 countries (fairtrade-advocacy.org, 2016).

The history of the exact origin of the fair trade movement is not so clear. Someone makes reference to the late 1940s when in America Ten Thousand Villages (called at that time Self Help crafts) started to trade fabrics woven from Puerto Rico and when SERRV, another trade organization, implemented a similar commerce (wfto.com, 2016). Instead, in Europe the first fair trade movements began to arise more or less ten years later when Oxfam GB (Great Britain) began to sell manufactures produced by Chinese refugees and when in Holland the first Alternative Trade Organization (ATO) was founded. Then, again in Holland, in 1969 it was opened the "Third World Shop" in a little village not far from Utrecht.

This approach based on trade was in line with the concept resulted from the second UNCTAD Conference (United Nations Conference on Trade and Development) in 1968: "Trade, not Aid" (fao.org, 2016). Indeed, big amount of money earmarked for the developing countries were useless if the mere development was blocked by unfair trade conditions. For these reasons during the sixties and seventies, an increasing number of Non-Profit Organization started to rise also in the developing countries in order to

cooperate with those in the developed ones. The first was the CORR- the Jute Works (Christian organization for Relief and Rehabilitation) which was founded in Bangladesh in 1971 (Gazzetta Ufficiale dell'Unione Europea, 2009). In this way, a new type of trade was born.

Just two years later, the first fair trade coffee was sold in Netherlands thanks to Fair Trade Original which bought Guatemalan coffee to resell in Europe. Coffee represents one of the main fair trade products as it involved hundreds of thousands of producers (wfto.com, 2016). During the years the range of products has been expanding and now it includes thè, sugar, wine, cocoa, rice and also not food products, like cotton or handicraft products.

In particular, during the eighties the fair trade movement has accelerated. Indeed, the 20th century has been characterized by the presence of two contrasting economic models: the capitalism and the communism. This conflict ended because of the crisis of the last model leading to the spread of the capitalism model around the world, obviously with its pros and cons (Borgonovi, 1997). Indeed, the functioning mechanisms of the capitalism allow countries to achieve higher levels of wealth, more enterprises and stronger incentives for innovations. But, at the same time, it does not develop equally under the social sphere as the richness is not equitably distributed. In particular, this latter is at the expenses of the most vulnerable countries: the developing ones which have never been (and they are so still today) able to react to unfair market conditions imposed by the most industrialized powers. These latter countries, in fact, have created a relationships' system in their favour through exploitation of overabundance productions, conditioning for monocultures' implementation and currency speculative manoeuvres (Borgonovi, 1997).

These economic inefficiencies have thus determined the foundation of even more Not Profit Organisations (NPOs) during the years whose main scope was to cooperate with developing countries in order to improve the life conditions of their inhabitants (Amatucci, 1997).

Some of these NPOs had as goal the achievement of fair economic relations between developed and developing countries. Indeed, they understood how there was an increasing divergence of the economic wealth between the countries. Thus, they started to create alternative forms of trade which were based on a different price purpose: the fairness, and not the profit maximisation. This new type of trade was called "fair trade"

(Amatucci, 1997). Its innovative character was due to the fact that this system was not based on charitable purpose, but on a market system with particular characteristics.

The fair trade consists in fact in an alternative market for the products coming from developing countries of Asia, Africa and Latin America.

The producers or smallholders that want to enter in this market are normally members of cooperatives. In this way they are able to avoid the presence of intermediaries or local speculators and, at the same time, they create a direct economic relationship with developed countries.

The main characteristics of this market are: the price, the durable and direct relationships, the pre-financing and the environment protection (Amatucci, 1997). First of all, as mentioned above, the goal of the fair trade system is to ensure a fair reward to developing countries' producers in order to allow them to live with dignity and to be able to invest a part of the money in development projects. The price is calculated trough transparent methods (more details will be given in the second chapter). Then, the relationship between producers and retailers is direct, without the presence of intermediaries. Indeed, because of them the producers are not able to gain as much as they could because the intermediaries take the majority of the profits. Thus the fair trade NPOs establish direct contacts which are also lasting over time in order to realize efficient and long-term development projects.

The pre-financing consists in the 50% of pre-payment made by the importers on the whole quantity ordered. This allows the producers to have from the beginning the necessary resources for buying the raw material, the seeds and those machineries needed for the future productions. The pre-financing works also as a sort of loan that very often small producers are obliged to ask big landowners who generally operate as usurers.

Another issue to which the NPOs pay attention is the impact on the environment. Indeed, the main goal is the sustainable development which, as defined by the World Commission on Environment and Development in 1987, consists in responding to the present needs, without compromising the ability of future generations to meet theirs (World Commission on Environment and Development, 1987). Operating according to this principle will create a long-term prospective without the maximisation of the today profit. Moreover, through this principle important aspects like the conservation of soils, water resources, energy and biodiversity are taken into consideration.

More specifically, the principles that the fair trade organisations credited to the WFTO (World Fair Trade Organization) have to respects are the following ten (wfto.com, 2013):

The creation of opportunities for economically disadvantaged producers. Indeed, one of the reasons of the fair trade organisations' existence is the reduction of the poverty through the creation of alternative forms of trade. For doing that, it is necessary to empower the producers and the communities to become economically and financially independent.

The transparency and the responsibility with which the fair trade organizations need to operate in order to guarantee fair trade relations with the partners. For this reason the good communication at each level is essential.

The development of fair trade practises from the beginning of the trade till the end. So, every subject in the value chain has to be respected from a social, an economic and an environmental point of view. In addition, for what concerns the buyers, they need to guarantee a pre-payment to the producers or to suppliers if the relationship is not direct, of at least 50%. The interest is equal to zero in the case of handicraft products and not higher than the market interest rate in the case of food products. Moreover, the relationships established have to be lasting and based on solidarity and mutual trust.

The exchange price needs to be the result of a dialogue between the parties in order to guarantee a fair remuneration for producers. In this way, thanks to a socially acceptable compensation, they can still remain in the market. The agreed prices are applied only if the international market prices are lower.

According to the UN Convention on the Rights of Child, the prohibition of any types of child and/or forced labour during the production processes.

The prohibition of any type of discrimination (race, sex, age, nationality...), as well as the necessity of gender equity and the freedom of association. These allow guaranteeing a fair system where everyone is respected.

The obligation to ensure good working conditions and safety work places for the employees. For doing that, the International Labour Standards (ILOs), and the governmental laws if stricter, are taken as a benchmark.

The improvement and the development of the capacities and the skills of producers.

The promotion of the fair trade movement among the consumers in order to make them aware of the methods used by the fair trade organisations.

The working methods have also to be based on eco practises through the use of renewable energy technologies and of low environmental impact materials.

These principles are essential for improve the living conditions of millions of people around the world and it represents an effective method for realizing a real change, making the world a better place for everyone.

Understandably, given these principles, fair trade does not take in consideration just the people, but also global challenges like the climate change, the water shortage and the soil erosion. In this way, the system is really sustainable not only in economic terms, but also from the energy and the environmental point of view.

1.2 The main actors

At the international level, the two main actors are the World Fair Trade Organisation (WFTO) and Fairtrade International (FLO) (Boonman et al., 2010). They represent the two main voluntary and private systems where members can be certified or have the products certified as fair trade. In this way, they can communicate to their stakeholders how they work and what there is behind the products bought.

WFTO

The WFTO was born in response to the necessity of the Alternative Trade Organisations (ATOs) to have a sort of point of reference for their activity. Indeed, since the seventies these organisation were meeting informally and they did not have an official organisation to be part of. For these reasons, year after year and conference after conference thanks to fruitful debates, in 1989 they constituted the International Federation of Alternative Trade (IFAT). IFAT was the original name, substituted in 2008 with World Fair Trade Organisation (WFTO) in order to give a deeper meaning of the activity done through the name. WFTO also represents a network for all the subjects involved in the fair trade value chain, from the producers till the retailers, but of course, they need to be completely in compliance with the ten fair trade principles above

mentioned. Currently, WFTO operates in 70 countries across Europe, Africa, Asia and America counting more than 370 organisation members, being the largest global network for the fair trade organisations (wfto.com, 2016).
This organisation establishes standards for who wants to be certified as fair trade, so it does not correspond to a product label, but to an organisational mark. In order to gain the WFTO mark and logo is necessary to comply with the ten principles explained in paragraph 1.1 and with the Code of Practise set by WFTO (wfto.com, 2016). Obviously, to ensure that these principles are properly respected, a Guarantee System is put into practise and frequent controls are done according to formal procedures and by authorized subjects (Boonman et al., 2010). More specifically, there are three types of controls: the self-assessment by the members, the mutual reviews done by and between the members and the external verification realized by the WFTO inspectors.

Fairtrade International

Instead, the Fairtrade Organisation (FLO) is a fair trade system whose scope is to certify the products traded. Similarly to the WFTO, there are several Standards that have to be respected by the organisations involved and which are set by Fair Trade according to the ten fair trade principles and the WFTO standards (fairtrade.net, 2016) (more information will be given in the Chapter number 2). The players involved are those of the entire supply chain, from the producers, to retailers. The monitoring and the verification of the respects of the Standards is done by FLO-CERT. FLO-Cert is thus the certification body of Fairtrade International, whose scope is to check if the Standards of Fairtrade are correctly implemented.
The main difference between WFTO and Fairtrade International is their activity scopes. WFTO certificates the organisations, controlling if they really meet the necessary requirements. Conversely, the FLO certificates the products, granting a logo for them.
In 2009 the WFTO and the FLO adopted the Charter of Fair Trade that contains the principles which represent guidelines for fair trade organisations (fairtrade-advocacy.org, 2016).

EFTA and FTAO

At the European level, the most important actor is EFTA, the European Fair Trade Association. It was founded in 1987 by some of the larger European fair trade importers and then formally recognized in 1990. It is based in Netherlands and its goals are to support and facilitate the work of its ten European members and also the networking between them, WFTO and Fairtrade International (European-fair-trade-association.org, 2016). In particular, a good result has been reached with the creation of the Fair Trade Advocacy Office (FTAO) in 2004, a legally-independent foundation founded by EFTA, WFTO and Fairtrade International (wfto-europe.org, 2016).

Thanks to the awareness-raising actions of EFTA and FTAO, the fair trade movement has been recognized also at European level by the European bodies (Parliament, Commission, Committee of the Regions) between 2006 and 2010 as these bodies make recommendations to the EU in order to influence the legislations. Especially, a good result was reached in 2006 when the Fair Trade system was recognized through a resolution of the European Parliament and then in 2009 through the Communication on Fair Trade (COM(2009)215 final) in which the importance of fair trade for the realization of a sustainable development has been recognized (Commission of European Communities, 2009). Another important effect has been the "Communication on the new European Consensus in Development" whose aim is to define the European actions to implement the UN Agenda 2030 and its 17 Goals (European Commission, 2016). In this document the Europe recognizes the importance of the fair trade movement for effectively reaching the Agenda's goals. Indeed, what the Europe wants to promote is a responsible and sustainable approach to the economic development guaranteeing a better future for people.

1.3 The fair trade in Italy

During the eighties, the fair trade movement was almost unknown in Italy. Indeed, there were just two shops which were dealing with these products: one in Bressanone and another in Bolzen. (altromercato.it, 2017). Some years later, in 1987, a company

founded by Rudi Dalvai, Heini Grandi and Antonio Vaccaro was born with the name of "Cooperazione Terzo Mondo" (CTM). Since 1998, the name of this organisation is CTM Altromercato. Now CTM Altromercato is one of the most recognized in Italy, counting more than 300 shops (altromercato.it, 2017).

Around ten years later the first movement, the Italian Charter of Fair Trade Principles that defines the common principles of the fair trade organisations was approved. The first version was edited in 1999, but the works continued and in 2005 the second version was published. This Chart is very important because it defines what the fair trade is and which are the goals (fair prices, safe working conditions, abolition of child work, etc.) (equogarantito.org, 2016). Another important step occurred in 2003, when it was established AGICES (Assemblea Generale italiana del commercio equo e solidale), the fair trade Italian Association, which has become the supervisor of the Charter. Indeed, how it is reported by AGICES itself, it was born by the willingness and the necessity of the Italian fair trade organizations to cooperate together.

Currently AGICES is the category association of the Italian fair trade organizations representing a certification body for them and since 2015 its official name is "AGICES - Equo Garantito". In addition, since 2009, the guarantee system of AGICES is certified by ICEA, The Italian Institute for the ethical and environmental certification. The main activities of AGICES – Equo Garantito are four: the promotion of the fair trade in Italy, the monitoring of the fair trade organisations certified by Equo Garantito, the education and training about the fair trade movement and the lobbying and the advocacy activities at all political levels.

The fair trade movement in Italy has been existing for 25 years and nowadays more than 80 organisations that recognized the Chart operate at national level (equogarantito.org, 2016). In fact, since the nineties, the fair trade movement has registered increasing revenues, while during the 2008 economic crisis they were constant (Citterio, 2015).

In 2005 for the first time an Italian Region, the Tuscany, adopted a law about the fair trade. At national level, the first draft on this issue was presented during the legislature 2006-2008, but just on the 3rd March 2016 the law was approved by the Camera. There was a large approbation with 282 votes in its favour and just four against. Despite the good implications that would have resulted from the entry into force, like clear definitions on what the fair trade and the fair price are or the criteria that have to be

respected, the approbation works have been suspended. So, nowadays it does not exist a specific law for the fair trade in Italy (Polara, 2016).

2. Fairtrade International

2.1 The history of Fairtrade

The International Fairtrade system is nowadays the most recognized system in its sector (fairtrade.net, 2016). This system, formed by Fairtrade International and its members, arise after an initiative of the Dutch development Agency Solidariedad branded Max Havelaar that in the late eighties started to sell Fairtrade Mexican coffee in Europe. In the following years, precisely in 1997, Fairtrade International, formally known as Fairtrade Labelling Organization (FLO), was born in Bonn (Germany) as a union of these organizations. In 2002 the company launched its Certification Mark FAIRTRADE in order to increase its visibility and facilitate the cross border trade. Then in 2004 it split into two independent bodies: one has remained FLO, whose purposes are to define standards and to provide producers support, the other one, FLO-CERT is in charge to inspect and to certify the producers. In this way, the system has raised the transparency in its operating system, reflects better the values by which it works and acts as a model for partners. Indeed, the values at the base of the FLO'S mission are trust and cooperation, which allow to promote fairer trade conditions between producers and consumers and to combat the poverty. To boost all that, in 2007 the organization embraced stakeholders' participation making the producers full members in the Fairtrade governance and since 2013 the producer networks have half of the votes at Fairtrade International General Assembly. As a result, a year later the first producer, Marike de Peña, has been elected Chair of the Fairtrade International Board.
Nowadays, the official name of the organization is "Fairtrade International" since when in 2011 FLO was substituted by the current name (fairtrade.net, 2016).

2.2 How Fairtrade works

Before explaining the whole system, it is fundamental to clarify which are the core principles that underpin it: Equity, Fairness, Transparency, Non-discrimination, Mutual

Respect and Justice. All them can be summarize in its mantra "Aid through Trade" (FLO, 2007).

The Fairtrade's system includes Fairtrade International, twenty-five Fairtrade organizations, three producer networks and FLOCERT which is the independent certification body for the whole Fairtrade system (fairtrade.net, 2016).

The Producer Networks are regional associations of certified Fairtrade organizations representing 1.5 million farmers and workers and almost 1,230 organizations in 74 countries through three continents: Africa and Middle East (Fairtrade Africa in Kenya), Asia and Pacific (Network of Asia and Pacific Producers, India) and Latina America and the Caribbean (Coordinadora Latinoamericana y del Caribe de Pequeños Productores y Trabajadores de Comercio Justo, El Salvador). There are also the National Fairtrade Organizations, for example, Fairtrade Italia, which not only promotes this system in its territory, but also license the FAIRTRADE Certification Mark. Similar to them are the Fairtrade Marketing Organizations, except from Mark license activity that is done directly from Fairtrade International (fairtrade.net, 2016).

The Governance of the Fairtrade system is composed of and governed by three bodies: the General Assembly, the Board of Directors and the Chief Executive. The assembly, whose members for one-half are producer's representatives and the rest Fairtrade organization's representatives, meets once a year, elects the Board, takes decisions about the annual financial statements, the membership issues and the new Board directors (fairtrade.net, 2016). The Board counts eleven members: four are nominated by the three producers networks, four by the national Fairtrade organizations and three are independent board members. Through these two institutions, all members and producers participate indirectly to the decision-making process. In addition, there is the Leadership Team that deals with the day-to-day activities.

From an administrative point of view, the headquarter is based in Bonn (Germany) with 70 employees and more than 50 liaison officers around the world. The main tasks of the headquarter are: Setting the Fairtrade Standards that apply not only to all producers, but also to all the entities along the value chain; developing Fairtrade global strategies that aims to tackle emerging and problematic issues as climate change, the food crisis or the global recession; supporting the producers in obtaining the certification and amplify its market (to allow it, the role of the Liaison Officers is fundamental); promoting the trade justice in debates trough Fair Trade Advocacy Office (FTA) in Brussels.

The Fairtrade Products, that respect the Standards, can be easily identified by the FAIRTRADE Mark characterized by the raised arm and its two green and blue colours symbolizing growth and optimism. It was created in 2002 in order to put together under a common symbol all the other marks. It can be found in single ingredient products, as banana, or composite products, as ice-creams, in which at least 20% of the ingredients are from Fairtrade production. To use it, it's necessary a prior written approval that is granted after having put into practise all procedural steps. Since when it has been launched in 2002, the FAIRTRADE Mark has become the most recognised social and development label in the world and it is now trusted by 6 out of 10 consumers (globescan.com, 2011). Just in 2014, Fairtrade Products were sold in more than 125 countries for approximately 6 billion € (fairtrade.net, 2016).
It is important to remark that Fairtrade does not work alone, but in Partnership. This is essential, because the organization, NPOs, cooperatives with which it collaborates have complementary competences in specific areas and territories, but share the same goals.

2.3 Fairtrade Standards

The Fairtrade Standards are strict and continuously reviewed norms that have to be respected by producers and traders in order to receive the Fairtrade certification. Currently, Standards on three hundred products and raw materials exist.
The "Key objectives" of these Standards (fairtrade.net, 2016) aims to ensure that producers receive fair prices that cover the production costs, an additional Premium to be invested in social, economic or environmental projects, and a pre-financing when requested. In fact, certifying products that are socially and economically correct and environmentally responsible ensure producers to have greater control over the trading process facilitating long-term partnership and making their life conditions improved.
In promoting fairer trading conditions, Fairtrade follow a Geographical scope selecting the countries eligible for Fairtrade certification. In choosing them, economic and social indicators, as income per capita and wealth disparity, and the long-term impact of Fairtrade are considered (Fairtrade Int., 2015).

The Standards then are different for small-scale producers and workers, traders and processors. For the first group, not only are forced and child labour and any kind of discriminations (sex, age, religion, political preference) prohibited, but it is essential to ensure the freedom of workers association, regular hiring contracts, a democratic decision-making process, safe working environment and training of workers as well as environmentally friendly agricultural practices. These criteria reflect the ILO's conventions (International Labour Organization) related to Freedom of Association (No. 87), the Right to Organise and Collective Bargaining (No. 98) and the Abolition of Forced and Child Labour (No. 105 and 182) (ilo.org, 2016).

The traders (exporters and importers) have to comply with the requirements to pay the Fairtrade Minimum Price; just in case is higher than the market price, and to correspond the Fairtrade Premium as an additional income used by the producers in development activities (for example in health, environment, economy…). The stipulated contracts have to be binding and transparent in order to begin a durable relationship. Traders have to promote also entrepreneurship and economic development giving pre-financing when required by producers.

The processing firms have specific prescription requirements related to the certifications, the mark usage, the product's packaging as well as for the business practises (like traceability and pre-financing) in order to maintain the Fairtrade Mark credible.

Beyond the whole production chain, Standards have been edited in relation to emerging issues: the latest are climate change and textile production.

The Fairtrade Climate Standards represent a way to help the producers in mitigating the negative effects of climate change through the production of Fairtrade Carbon Credit (FCCs) whose revenues deriving from the selling can be invested in specific climate projects (energy efficiency, renewable energy, reforestation).

The Fairtrade Textile Programme develops criteria concerning the entire supply chain in order to bring better wages and working conditions (like condition of employment and safe and health workplaces) as well as fairer trade, where not only workers, but also the environment is respected. An example of this latter is the Prohibited Materials List, which is composed of two lists: the Red one and the Amber one. The first one prohibits the use of certain materials that could be toxic or hazardous for the human beings or the environment, like the Abamectin or Biric acid. The second contains instead a list of

materials that are not prohibited, yet, but that could become so in the future. Thus, the aim is to discourage their use, like the acepahte or the butachlor (Fairtrade Int., 2014).

The process for setting Standards, as well as the Standards themselves, is made in compliance with two different ISEAL (International Social and Environmental Accreditation and Labelling Alliance) Codes. ISEAL is a non-governmental organisation that defines codes of good practises in standards setting in order to ensure that its members work in ways that ensure respect for people and environment. For what concerns the standard setting, the Code of reference is the "ISEAL Code of Good Practice on Standard Setting", while the Standards refers to the "ISEAL Code of Good Practice for Setting Social and Environmental Standards" (isealalliance.org, 2016). Being part of ISEAL allows Fairtrade to strengthen its credibility, because stakeholders can rely on a check made by an external body (in this case ISEAL).

The consequence of existing Standards setting in this way creates important benefits that are (fairtrade.net, 2016):

- Stable Prices: the presence of Fairtrade Minimum Prices allows the producers to avoid negative effects from the unforeseeable falling of market prices or from unfair market practices covering at the same time the cost of a sustainable production;
- Fairtrade Premium: according to a common decision, this extra-profit is invested in education, healthcare or product quality in order to continue the path towards a sustainable development;
- Partnership: the joint decision-making process and the type of governance adopted permit producers to make their voices heard and consequently to influence prices, premiums and standards;
- Empowerment of farmers and workers: it represents the main goal of Fairtrade which certifies only organizations with a democratic structure and transparent administration.
- Respect of the environment: some Standards focus on the environmentally friendly practises in order to make a sustainable use of the territories and organic production are promoted through a higher Fairtrade Minimum Price.

All these benefits not only regard the producers, but create a sort of win-win relation between the consumers and the traders/companies which, thanks to the presence of Fairtrade and its certification, assure no types of exploitation in the supply chain. Also

the environment takes advantage from these practises because the Fairtrade system supports friendly environmental practises, promoting organic productions in order to defend the environment not merely as a workplace, but also as a place to live healthily. This particular aspect has become central in the new strategies due to the negative effects of climate change.

2.3.1 Standards Setting and Control

In order to reach its goals and make the producers and the traders certified as Fairtrade, Fairtrade International has commissioned the Standards & Pricing (S&P) and the Standards Committee (SC) to develop and revise the Standards, but also the same Board of Director may develop standards through its advisory capacity. They are related to: "Fairtrade Producer and Trader Standards, Fairtrade Product Standards", whose responsible is the Pricing Team, "Fairtrade Minimum Prices and Fairtrade Premiums", developed by the Standard Team (Fairtrade Int., 2016).

The specific procedure that has to be followed is called Standard Operating Procedure (SOP) and require a wide consultation with stakeholders (it happens at each stage), as well as the observance of all requirements of the "ISEAL Code of Good Practises for Setting Social and Environmental Standards" (version 6.0 - December 2014).

The development of a standard may begin after a formal request, called Standard request, when presented by a number of stakeholders. These could be: the Fairtrade International Board, the Standards Committee, a national Fairtrade organization (NFO), a producer network (PN), Fairtrade International staff, or FLOCERT (Fairtrade, 2016). A new Standard may also arise during the routine work planning sessions, as review cycles or complaints' evaluations.

The acceptance of a new standard requests is at the Standards & Pricing's discretion that evaluates if a substantial need for it exists, whether the proposal aligns with Fairtrade objectives and mission and whether a standard covering partially or entirely the same need has already been edited.

If the request is approved, the definition of the project scope and a planning stage begin. The scope is defined considering the stakeholder's needs and the recommendations by

the SC or the Fairtrade International Board and specifies the objectives and the resources needed, while the planning activities define work plans, timelines, budget, responsibilities and performance indicators. Then a Project Assignment (PA) including the above-mentioned details is redacted by S&P and published on the Fairtrade International website in order to receive comments within a timeframe filling the special document, the "project assignment feedback" (Fairtrade Int., 2016), or emailing the indicated email address. Collecting these responses and reflecting on the data collected during the research stage, which focuses on possible overlaps with other standards, alignment and consistency of all standards, S&P writes a "draft" standard or proposal. The draft is necessary for the following phase, the public consultation one. The draft is like a consultation document sent directly to stakeholders and posted on the website with the purpose of receiving feedbacks within 30 (minor project) or 60 days (major project). This phase is repeated more than one time, till the Director of S&P or SC deems that its repetition and data collection are adequate. At this point, a final draft is prepared for obtaining the approval by the Fairtrade Standard Committee. After this phase, the document is edited in English becoming the only valid version in order to ensure clarity. In case of not approval, the decision-making body will provide a sort of guidance explaining where changes and more research are necessary.

The application of the new standard may not be immediate. In this way, producers and traders have enough time to adjust to it. Then, at least every five years the standard is subject to the review cycle where the results are evaluated. Feedbacks, or better complains, can also be made after the approval following the Standard Operating Procedures (SOP).

Thanks to these Standards and its transparent setting system, the consumers have high confidence in the Fairtrade Mark. It is really important to assure them about its truthfulness and for this reason the Fairtrade Assurance Programme is implemented: all Standards are checked at regular intervals by competent personnel. The programme designed observing the requirements of ISEAL's Assurance Code and including the requirements of ISO17065, is composed of a set of rules and the Oversight Committee (OC) that represents all the stakeholders. In addition, there is FLOCERT (accredited against ISO17065 by the German national Accreditation Body DAkkS), the separate and independent certification body that verifies the compliance with Standards through its audits in more than 70 countries. Assurance together with Licensing are seen as

necessary tools to verify and implement the Standards and to realize the Theory of Change, which consists in the transformations of the conventional trade system in order to achieve more fair practises as those developed by Fairtrade (fairtrade.net, 2016).

Specifically, the assurance activity against Fairtrade Standards is made by Assurance Providers. The assurance provider for the producer certification and traders in producing countries is FLOCERT. Instead, in the case of trader certification in consuming countries, the assurance providers are the twenty-two National Fairtrade Organizations, which also includes Fairtrade Italia. For those countries where Fairtrade does not exist, the operator is FLOCERT (Fairtrade Int., 2015). Instead, the licensing activities, which ensure that the Fairtrade Marks is appropriately used, are performed by specific Licensing Bodies. These are National Fairtrade organizations, when present in the country; the National Marketing Organisations; Fairtrade International in the absence of the firsts two entities (Fairtrade Int., 2015). The effectiveness of Assurance Providers and Licensing Bodies are regularly checked by the Oversight Committee.

The Assurance Programme is based on a remediation of non-conformity principle: if non-conformities are found during an audit, the certification is no withdrawn immediately, but it may be suspended. Then a timeframe is given to clients in order to allow them to take corrective actions. If this concession is not properly used, the certification is not more reconfirmed.

After initial audits, there are other three types of them. The Re-certification audits, which is made before the end of each certification cycle and which shall not be longer than three years. The Surveillance audits are made after 15 months from the initial audit or the last re-certification one (when the certification cycle is longer than one year). There are then Unannounced audits.

These audits may last several days, depending on the size of the organization.

Following the specific procedures, the Licensing activity verifies the documents of licensing, if the products and the material used and certified as Fairtrade meet the relevant requirements.

2.3.2 Fairtrade Minimum Prices and Premiums

Because the goal of Fairtrade is to avoid that producers in developing countries are damaged by the market prices fluctuation, it has developed a system based on prices that does not depend on the market forces, allowing in this way an economic sustainability and stability. These prices are called Fairtrade Minimum Prices (FMP) and are determined through a specific procedure in order to allow producers to cover the costs of a sustainable production and to be competitive in the market. For these reasons, the FMP works as a sort of floor price that is applied only when the market price of that particular product is lower than FMP. Each price depends on the type pf product. The list is available on the Fairtrade's web site and it is regularly updated (fairtrade.net, 2016).

In addition to the Fairtrade Minimum Price, producers receive also the Fairtrade Premium (FP) that is paid in addition to the FMP. The scope is to give to producers additional and enough economic means to invest in social, environmental, educational and health projects according to shared decisions made by the producers or cooperatives' members. These investments reinforce their production capacity and enable also a socio-economic development for the local community.

The task of developing Fairtrade Minimum Prices (FPM) and Fairtrade Premiums (FP) has to be carried out by the Pricing Team, which is a part of the S&P, following six steps:

1. Submission and assessment of a price request that can be made by Fairtrade International's Producers Services and Relations Unit (PSR) or other units of Fairtrade International, by the Fairtrade producer networks (PN), NFOs, Flo-cert or any other Fairtrade stakeholders when accepted by the Pricing Team;
2. Definition of project scope and planning;
3. Research and consultation processes also with farmers and workers in order to know and calculate the cost of sustainable production considering the costs of labour, of inputs and services, of capital, of exports.
4. Consultation, undertaken by the Pricing Team, whose result is an informative document needed to receive stakeholder's comments (the time frame is normally 30 days);
5. Approval of the proposal by the Head of Pricing or the SC;
6. Implementation and publication on the website.

The Prices are regularly updated by the exchange rates (fairtrade.net, 2016).

2.4 Fairtrade Programmes

Together with the Standards, Fairtrade has been developing five specific Programmes in order to tackle common problems in different countries, but that affect negatively producers and local communities. These Programmes are based on five different challenges.

The first is the Child and Forced Labour Programme (fairtrade.net, 2016) which is set in accordance with the ILO conventions, the United Nations Global Compact (UNGC) as well as the Fairtrade's Child Labour and Forced Labour Guidelines. This program aims to fight the root causes of the child and forced labour problems that affects millions of workers, of whom 168 million are children (as reported by the ILO). For this purpose, producers and processors have to follow the "Fairtrade's Child Labour and Forced Labour Guidelines" during their operations in order to eliminate exploitative labour practises and protect workers and children, their physical and mental health, wellbeing and leisure. In particular the goal is to prevent that children do not have access to education, do not receive proper nutrition or, worst, and are victims of slavery or sexual abuse. In addition to that, Fairtrade collaborates with NGOs and national agencies to expand its range of action, because protecting them means invest in the future of the local communities. In the event producers fail in respecting this ethic, the certification is suspended or withdrawn.

Then there is the "Climate Change Programme" (fairtrade.net, 2016) whose goal is to help vulnerable producers of developing countries to adapt to climate change and to promote sustainable development practises. The Programme aligns with the Fairtrade Climate Standards, which already include environmental practises like the prevention of soil erosion, use of renewable energy or reduction of gas emissions. The programme raises awareness on these themes promoting activities like sharing best practises among producers, assessment of risks and opportunities or exchanging information. The ultimate goal is making the producers able to reduce their environmental impact and gain access to the Carbon Credits Market where the profits deriving from the sold credits can be invested in climate change mitigation projects.

The third, the “Workers’ Rights Programme” (fairtrade.net, 2016), aims to modify the situation of workers who have not got formal contracts, do not gain adequate salaries, do work in unsafe places and cannot be part of labour associations; like in the case of the latter programme, also this is in line with its relative Standards (Standards for Hired Labour) and the ILO’s Conventions. In addition, Fairtrade works in partnership with activist groups and NGOs. As before the empowerment of workers is reached when basic human rights, better life conditions and fairness are guaranteed. Moreover, in 2012 Fairtrade launched the Worker’s Right Strategy, whose purpose is to give to workers the necessary tools to build sort of co-governing labour standards, making them able to negotiate their own work conditions. Another initiative that has been taking place is the Live Wages benchmarks: a sort of minimum salary below which the decent standards of living are not met.

The fourth is the “Gender Programme” (fairtrade.net, 2016) that aspires to eliminate the gap of benefits between men and women promoting gender equality and women’s power and autonomy. Closing this gender gap will increase the percentage of directly involved Fairtrade female smallholders and workers, who are for ow just 25% (fairtrade.net, 2016). This percentage is just about the recognized ones, because even if women are very often highly involved in the production, their work is not fully recognised and rewarded. Their importance is marked also by FAO (the Food and Agriculture Organization of the United Nations) which estimates that closing the gap giving to women more access to resources would reduce by 100-150 million the number of undernourished people and could also increase by between 2.5-4 % the agricultural output in the developing countries (FAO, 2010-11). For tackling this great challenge, Fairtrade are putting into practise an approach consistent with the Fairtrade’s 2016-2020 Strategic Framework and the 2015 Equal Harvest Report that is called "Gender at Work framework" (fairtrade.net, 2016). In addition, Fairtrade Standards is already preventing the gender inequality like the prohibition of gender discrimination, sexual intimidation or abuse as well as rights for maternity and security.

The last, but not the least, is the “Access to Finance Program” (fairtrade.net, 2016) whose purpose is to increase the credit possibilities for producers. These include both the short-term financing, which is essential for having resources and inputs, and the long-term loans whose scopes are investing in quality and productivity. The lack of access to finance depends on the impossibilities to give warranties by the producers or,

at contrary, the inability of paying back the high interests. To overcome these issues, the Fairtrade Approach, based on the Global Producer Finance Unit (GPFU), aims to make reliable the credit profiles of producers in order to have more possibilities of be financed, to generate financial services and to develop projects, whose success helps repaying loans. In addition, the growth of financing chances is a result of the Fairtrade Standards. In particular the "pre-financing" one that obliges the traders to provide short-term capital to producer organisations when required. Otherwise, the certification can be withdrawn if there are not valid reasons for the refuse.

2.5 Fairtrade Producers and Products

The Fairtrade Producers are currently more than 1.65 million farmers and workers distributed across more than 74 countries (fairtrade.org.uk, 2016) between Africa, Asia and Latin America. They mainly work in cooperative structures whose size depends on the number of members and where management, decision making and projects' development are based on democracy principles.

Fairtrade, through its Producer Services and Relations unit, assists producers organising training courses, offering guidelines to access to new markets or to develop trade partnerships, etc. This support is well coordinated across countries by the three Regional heads and the ten Regional coordinators. In addition, there is the Liaison Services and Development Department which further strengths these activities (fairtrade.net, 2016).

To become a certified Fairtrade producer, it is necessary to follow a specific procedure which is available on the website. The procedure includes the standards to which producers have to refer to their products and the changes that have to be done in order to meet the requisites and gaining the Fairtrade's certification. Then, for the certification process intervenes FLOCERT, to which an application form is presented and an application fee is paid. When all documents are approved, the audit phase starts and if positive, the trade can begin.

The main Products offered by the producers are the following. Bananas, which involve more than 1,600 small-scale farmers and 10,100 plantation workers in 123 producer

organizations situated mainly in Latin America. Cocoa, which involves 129 small producer organizations in 20 countries […], representing 179,800 small-scale farmers. Coffee, which was the first product to have become Fairtrade (1988) and which currently, involves 8 million farmers and workers (half of the total) in 30 countries. Cotton, which is produced by more or less 100 million households in 70 countries representing an important source of earnings for West and Central Africa, Central Asia plus India and Pakistan. Flowers, which are the only that do not depend on small holders' production, but that grew up in big estates, in particular in East Africa, involving more than 48,500 workers. Sugar that is produced mainly by 99 Latin-American small-scale farmers counting 62,700 workers (differently from other products, for sugar cane the Premium is not envisaged because of the complicate market price mechanism). Tea, which grows up mainly in large states in Kenya and India. In this case, even if also small producers exist, there are 100 Fairtrade tea producer organisations which represent 240,000 small-scale farmers and 123,400 plantation workers. Composite Products, which are products that derive from the mix of more Fairtrade ingredients (necessary condition for the resulting product to be certified with Fairtrade Mark). Carbon credit, where one credit corresponds to one tonne of carbon dioxide. It is considered as a Fairtrade Product, because it can be sold by those producers, who "make" it thanks to environmental friendly production techniques. In this way the benefit is double: better economic situation of producers, less environment impact.
In addition, there are other type of Fairtrade products: Fresh Fruit, like citrus fruit or sub-tropical fruit, gold, honey which involves 49,000 small-scale producers, juices, rice, spices and herbs, sport balls and wine (fairtrade.net, 2016).

2.6 Fairtrade's Global Strategy, 2016-2020

Because Fairtrade believes that "only by changing trade we can change lives", its new five-year strategy is now called "Changing Trade, Changing Lives 2016-2020" and is inspired by the "Global Goals for Sustainable Development" and the "COP21 Climate Summit" of Paris" (Fairtrade Int., 2016). In reality, Fairtrade has already been working for achieving the new announced goals through its activities, first of all through the

trade. In effect, Fairtrade is trying to change the market and as well as the to improve the living conditions of 1.3 billion of farmers and workers. They are in fact at the centre of the new agendas. In addition, they are involved in planning and implementation activities, because only in this way lasting positive changes can be reached. Moreover, Fairtrade provokes governments and consumers to make these changes faster and, at the same time, looks for and fights against inequalities, which are strictly connected with poverty.

Specifically, the new Fairtrade Strategy is based on 8 out of 17 UN Global Goals for Sustainable Development for ending poverty "in all its forms, everywhere" (globalgoals.org, 2016). The Goals considered are the following. The Goal 2, which aims to end hunger, achieve food security and improved nutrition and promote sustainable agriculture. The Goal 5, which wants to achieve gender equality and empower all women and girls. The Goal 8 which promotes a sustained, inclusive and sustainable economic growth. The Goal 10, which aims to reduce inequality within and between countries. The Goal 12 whose objective is to ensure a sustainable consumption and production. The Goal 13 that promotes immediate actions in order to combat climate change and its impacts. The Goal 16, which promotes a sustainable development, access to justice for all and build effective and the presence of inclusive institutions at all levels. The Goal 17, whose scope is to promote and realize a sustainable development the global partnerships (Fairtrade Int., 2016).

Following the above Goals, the Fairtrade Strategy 2016-2020 is shaped by five goals:

- "Goal 1: Building benefits for smallholders and workers" (Fairtrade Int., 2016). In addition to the Fairtrade Minimum Price and Premium, now the aim is to ensure a living wage to the Producer Organizations increasing the share of production sold on Fairtrade terms. This regards particularly the coffee, cocoa and banana sectors.
- "Goal 2: Deeping impacts through programmes and services" (Fairtrade Int., 2016). Fairtrade will cooperate with other organizations, NGOs, companies and public institutions in order to develop specific programmes on business strengthening, workers' rights, gender equality, children and young people and climate resilience.
- "Goal 3: Building Fairtrade markets" (Fairtrade Int., 2016). Fairtrade Mark is already widely recognized and trusted, and precisely from this point Fairtrade

wants to strengthen the connection producers-consumers. In this way, a market where produces are respected and whose sustainability impact can be measured as well as where consumers know the real cost of products exists.

- "Goal 4: Influencing the government policies" (Fairtrade Int., 2016). In order to achieve the Global Goals, it is necessary that the governments intervene with policies that positively affect farmers and workers. Fairtrade works for defending their voices, influencing policies and practises to ensure constructive results.
- "Goal 5: Building a strong system globally" (Fairtrade Int., 2016). Fairtrade aims to unlock the power following a bottom-up approach in order to develop leadership at all levels. At the same time, it wants to create a global system based on partnership and transparency values. Putting together the two working directions, the result will be a system found on a global-local balance that is fundamental to be strong and long lasting.

3. The Climate Change issue

3.1 The greenhouse effect

Differently from other planets, the Earth has the "right temperature" (Boyle, Ardill, 1989) as a result of the greenhouse effect. It was described as a sort of glass cover by the mathematic Jean Baptiste Fourie, who was the first to study it in 1827 (Boyle, Ardill, 1989). This phenomenon derives from the solar energy that reaches the Earth where two-third is absorbed by the surface and by the atmosphere, and the rest is reflected back to the space. To balance the incoming energy, the Earth has to give back to the space the same amount of it, which is emitted by land and ocean, but emitting back it, this energy is absorbed by the atmosphere and radiated another time back to the Earth. Hence, these actions create a circuit called greenhouse effect (ipcc.ch, 2016) without which the Earth temperature would be 30°C cooler, resulting inhabitable for most of the various life forms that are present today (Griffiths et al., 2009).

Among the gases present in the atmosphere, those which are responsible for this effect are the homonym greenhouse gases that in order of importance are water vapour (H_2O), carbon dioxide (CO_2) and then methane (CH_4), nitrous oxide (N_2O), ozone (O_3) and small quantities of several others. All together they represent just a part of atmosphere gases, as the two principals are nitrogen (78%) and oxygen (21%), which, contrarily to the others, are not responsible for the greenhouse effect (ipcc.ch, 2007).

Obviously, changes in the amount of the gases alter the equilibrium of the greenhouse effect causing climate fluctuations, as already happened in the past. In fact, studying the geological phases, it can be easily reconstructed how over time the Earth's climate has varied because of natural processes like volcanic eruptions or variations in Earth's orbit that provoked ice ages or increasing sea levels (Griffiths et al., 2009).

However, since the 20th century, the increase in Earth's temperature has not been depending entirely on nature: the human influence on global climate is identifiable (IPCC, 1995). Already in 1896, Svante Arrhenius studied the risks of industrial pollution on the greenhouse effect. He affirmed how the rate of carbon emissions of that time could have doubled CO_2, provoking an increase in temperature of 5°C (Boyle, Ardill, 1989). Then, over recent years, the scientists have focused again on the reasons of

climate change and, as it is explained by the IPCC AR4 (2007), they have concluded that taking in consideration the last 100 years, only natural causes are insufficient to justify many of the changes. This is also confirmed by the 2011 United Nation Framework Convention on Climate Change (UNFCCC) that defined the climate change as a "human activity" that alters the composition of the global atmosphere over time (UNFCCC, 2011). Hence, starting from 150 years ago, the presence of human beings has been determinant to lead to the current instable and adverse climate situation.

3.1.1 Main causes of global warming

The main activity that caused these severe environmental changes at local, regional and global levels is mainly related to the burning of fossil fuel, even if also other activities as deforestation and intensive agriculture have their responsibility. These practises produce carbon dioxide (CO_2) that is not potent as other gases in entrapping heat in the atmosphere, but the today emission amounts and its long-term durability (more than one century) are very high (Griffiths et al., 2009). In fact, looking at the CO_2 concentration, until the Industrial Revolution it remained at around 280 parts per million (ppm), but after the Revolution, its level has been starting to rise: in 1950 it was 300ppm (Griffiths et al., 2009), while in 2015, according to the last measure made by NASA, it was about 400ppm (esrl.noaa.gov, 2016).

To have a real scenario, even if the total emissions are constituted by CO_2 for the 90%, it is necessary to take in consideration all the other greenhouse gas emissions (GHGs) that affect negatively the global warming: methane (CH_4), nitrous oxide (N_2O), chlorofluorocarbons (CFCs), and hydrofluorocarbons (HFCs), this latter related to the Fluorinated gases (F-gases). Indeed, if they are converted in CO_2, because of the same effect on climate, they raise the previous CO_2 ppm level to 485ppm for the year 2015 (esrl.noaa.gov, 2016). The result of this combination is represented as CO_2e that is the real value which has to be taken into consideration in studying the climate change (Prinn, 2013). The importance of the gases just mentioned is also confirmed by their

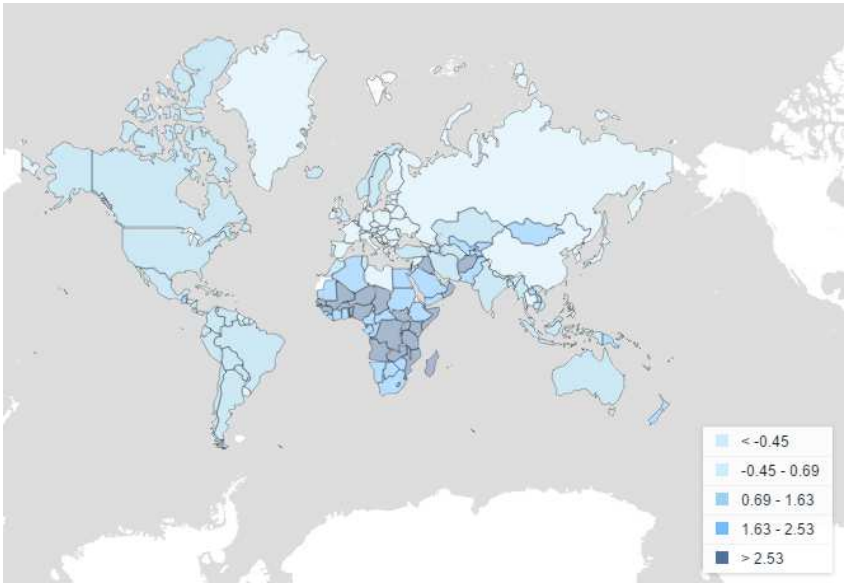
growth since 1750: if CO_2 has increased by 40%, the methane and the nitrous oxide have registered an increment of 150% and 20%, respectively.

Again taking into consideration the period since 1750, almost half of the cumulative anthropogenic CO_2 emissions (CO_2e) has been released during the last 40 years, causing a continuous rising in temperature over the last three decades (IPCC, 2014). The main cause is the CO_2 deriving from the fossil fuel combustion, as since 1970 this activity has tripled mainly because of the economic and population growth (IPCC, 2014).

Starting, therefore, with the economic reasons, it is difficult to think about today civilization without the use of fossil fuels (Yang, 2008) because since the Industrial Revolution they have been an essential determinant of the economic development and they represent the reason of the wealth for millions of people. They are a sort of symbol of modern society and are essential for the functioning of nations, in particular the developed ones, as fossil fuels (coal, natural gas and petroleum) generate electricity, are at the base of transportation systems and are the main elements of several goods (as plastic, ink, liquid).

Also, the population growth represents one of the main drivers. Today, there are more than 7 billion people, but according to the UN World Population Prospect 2015, there will be 9.7 billion of people by 2050 and 11.2 billion by 2100; this sharp increase will be registered especially in less developed regions, Africa and Asia in particular (esa.un.org, 2015, see Fig.3.1). This means that the demand for cheap energy and transportation linked to the use of fossil fuel will maintain its growth trend (Griffiths et al., 2009). In fact, most of the increasing emissions during the last 25 years has occurred in 1990 non-OECED countries, which have almost doubled the total emissions in 2014 rising the proportion from 32% in 1990 to 61% in 2014 (it is necessary to consider that China is responsible for almost half of this new share) (Olivier et al., 2015).

Fig. 3.1 Population growth (annual %) 2015



(Source: worldbank.org, 2015)

Then, there are other contributors to the global warming: land use and deforestation, which have risen by 40% in the last years. (IPCC, 2014). Deforestation activity is particularly relevant for global warming as plants have the ability to store the CO_2: just during the early 2000 the forest stored around 22-26% of human activities CO_2 emissions. Hence, if deforestation would stop and the forest could recover, the emission would be cut by a third, creating positive benefits for the whole world (The Economist, 2015).

In addition, there is the increasing CO_2 itself that creates additional negative feedbacks. For example, it intensifies the water vapour concentration creating a vicious circle, because as water concentration rises some effects happen for the greenhouse effect, which entails more global warming and more water vapour again (ipcc.ch, 2016). Also the increment of fine dust emission caused by smog contributes to the global warming (L. Shanshan et al., 2014).

In conclusion, not only fossil fuel is the responsible, even if it is the main cause.

3.1.2 Main contributors to GHGs emissions

As seen, the humans with their activities are the main contributors to global warming, due to their need of energy. This latter derives mostly from the combustion of fossil fuels and corresponds to almost the 70% of total GHGs emissions, followed then by the industrial processes (7%), agriculture (11%) and others (14%) (IEA, 2015).

As the CO_2 represents the 90% of total GHGs, and the main residual ones, CH_4 and N_2O, derive principally from the agriculture and industrial processes not related to energy, the following data concern just CO_2.

In 2015, the global CO_2 emissions increased by a 0.1% compared to the previous year, reaching the level of 33,508.4 Mt (Megatonne = 10^6 kg) (BP, 2016). This is just a very little increment if compared to the period 1971-2013, when the rising of global total primary energy supply (TPES), which relies on the fossil fuel for more than 80%, made the emissions growing by 150% (IEA, 2015).

Analysing the main *sources* of CO_2 among the TPES, the principal is coal (46%), although it represents just the 29% of the energy supply, because its carbon content per unit of energy released is heavier than the others. Then, there are oil and gas, representing respectively, 33% and 20% of the CO_2 emissions with an energy supply of 31% and 21%. Interesting are the "other" types of energy: nuclear, hydro, solar, wind, etc. whose carbon footprint is very low compared to the other sources: with a supply of 19%, their emissions are only 1% of the total (IEA, 2015).

Looking at the *sectors,* the global CO_2 derives mainly by the Electricity and Heat sector (42%), the Transport sector (23%) and the Industry sector (19%), while the residual is due to residential, services and others like forestry and fishing. The Electricity and heat sector is the major contributor as it is mainly based on coal (72%) (IEA, 2015).

Comparing instead the CO_2 emissions by *countries* in 2015, the results show how China (27.3%), US (16.4%), EU-28 (10.4%) and India (6.6%) were responsible for almost two-third of the total global CO_2 emissions. Other important contributors were Russia (4.4%) and Japan (3.6%) (BP, 2016).

The main reason why China is at the first place in the ranking is due to the strong dependence of its big economy on coal. In 1990, the Chinese emission rate was half of the US's emissions, which at that time was the largest world emitter. But after its entrance in the World Trade Organization (WTO) in 2003, China has begun a fast and

strong industrialisation that has raised the emission rate year after year, overcoming the US rate in 2004 and almost doubling it today (Olivier et al., 2015). On the opposite part of the ranking for total CO_2 emissions, there are the African continent, which accounts for 3.6%, and the little Pacific Islands (BP, 2016), whose emissions derive mainly from forests and methane sources, therefore activities like deforestation, farming and wastewater (Olivier et al., 2015). Hence, not only the amounts, but also the types of activities that contribute to global warming are different in developed and developing countries. And this fact has not to be forgotten.

Absolute values of CO_2 emissions that allow understanding which countries are the biggest emitters can be combined with other types of comparisons, like the CO_2 emissions per capita or on GDP. Obviously, in these last cases many factors, like the size of population or the economic and historical trends, have to be taken in consideration, or the final results can be misleading. For example, comparing the emissions per capita of the biggest emitters, the new ranking does not correspond to the previous one: the first emitter is now the US with 17.63 tCO_2/capita, followed by Russia (10.34 tCO_2/capita), Japan (9.54 tCO_2/capita), EU (6.9 tCO_2/capita), China (6.6 tCO_2) and India (1.69 tCO_2) (BP, 2016). As it can be seen, in the new scenario the major emitters appear to be the developed countries (together with Australia, Canada, Germany…), while other huge contributors as India and China are overshadowed because of the big size of their population. EU compared to China, for instance, emitted in 2015 a little bit more tCO2/capita, but in absolute value China overcame EU almost three times, so in this case it is fundamental remember that China represents the 19% of total world population.

Also in the case of emissions (in kg) per $1000 GDP, there is different resulting scenario: China has 627.92 $kgCO_2$/1000$, Russia 519.16 $kgCO_2$/1000$, India 332.81 $kgCO_2$/1000$, US 321.01 $kgCO_2$/1000$, Japan 282.17 $kgCO_2$/1000, EU 193.72 $kgCO_2$/1000$ (Olivier et al., 2016). Also with this case the comparison of historical trends and among countries are essential as they reflect the structural changes in the economies, the reaction to the crisis, the population growth, the incomes, the amount of investments in low-carbon energy and so on. The importance of these driving factors which stand behind the data needs to be emphasised, as it is the only way to design and implemented efficient policies for reducing the CO_2 emissions.

3.2 The impacts of Climate Change

Because of the industrial processes, the strong use of fossil fuel, deforestation and the other activities explained above, the greenhouse effect functioning is even more endangered, increasing the global warming. Also natural forces and internal variability have contributed to the change, but just minimally (IPCC, 2014).

Over the period 1880-2012, the globally averaged temperature of land and ocean has registered an increased warming of 0.85°C and even if it could just a little variation, the consequences have been very serious (IPCC, 2014). There is no doubt that some benefits could derive from this change: less energy needed to heat closed spaces, new fertile lands, faster-growing crops (Emanuel, 2012) or more difficult transmission of some vector-borne diseases (like animals) in some areas (Rao, 2009). For example, in Russia a warmer climate is increasing the cultivable land. But at the same time, the economic models forecasts a decrease of 15% in wheat production within five years due to the same reason (Nowakowski, 2015). Another consequence was El Niño in the period 1997-1998, which did not only provoke huge damaged, but also generates higher agricultural yields, and therefore revenues, in US (The Economist, 2015).

Unfortunately, the down sides are more and without rapid and effective actions, the situation will be increasingly difficult and some initial benefits can be nullified affecting the whole global system, as it is an "interrelated system" (Kerr, 2000).

The negative *consequences* of the increased level of CO_2e regard first of all the natural system: the atmosphere, the oceans, the cryosphere and the sea level, which in turn provoke extinctions of flora and fauna species, reductions in agricultural outputs and weather-related disasters as hurricanes, floods and droughts (Vidal, 2013).

The Atmosphere temperature has been even warmer in the last decades; in particular the last 30 years have been the warmest during the last eight centuries. On average the total increment has been of 0.78°C comparing the periods 1850-1900 and 2003-2012 (IPCC, 2014).

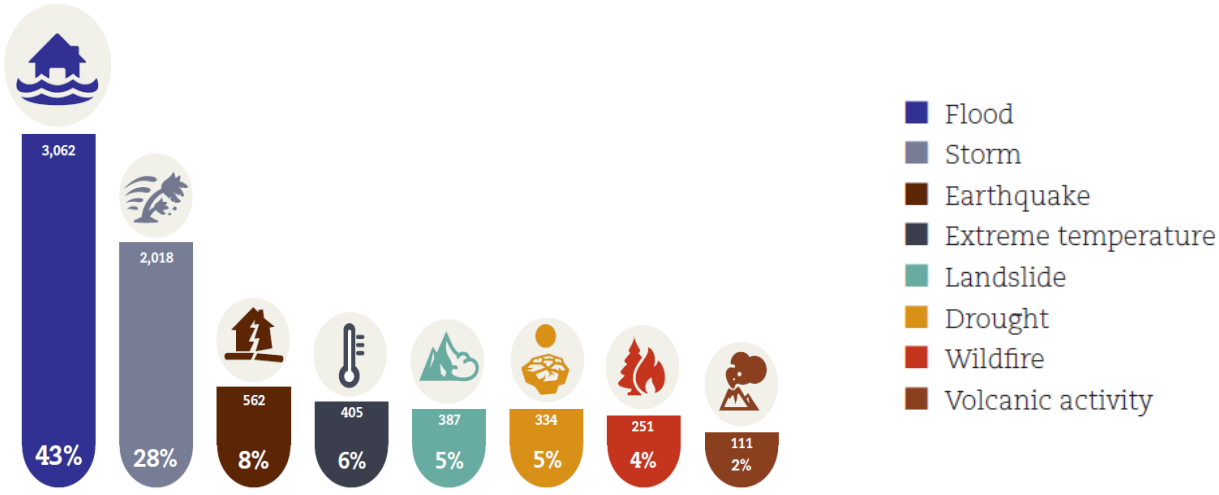
The Oceans have registered increasing temperature, too: near the surface it has been estimated in +0.11°C over the period 1971-2001. Also the salinity has changed: where there is more evaporation it has increased, conversely it has decreased where precipitations have become more frequent. Another consequence has been the increment of 26% in ocean acidification, which seriously impacts on its surface ph.

Measuring the Cryosphere, glaciers in Greenland and Antarctic, it has been discovered that they have been losing mass, even if with different speeds in the Arctic and Antarctic sea ice. The Artic has decreased between 3.5% and 4.1% every decade since 1979; instead the Antarctic has presented regional differences with increments and decrements (IPCC, 2014). This trend of ice melting in the Poles is particularly serious, as there the temperature has been warming more than elsewhere (Wagner and Weitzman, 2015) because of the water vapour concentration: contrary to the humid equatorial regions, in the dry areas there is just a small amount of it, so that a little increment of it or CO_2, as it is happening, has great effects (ipcc.ch, 2007).

The Sea level has always risen uniformly during the last two millennia for a total increment of 0.19 m. However, the mean rates of rise have changed dramatically since the end of 19th century when the usual range of 0.000-0.013 mm a year became 1.5-1.9 mm a year, reaching then the average of 3.2 mm a year since the last decade of 20th century. The main cause has been the melting ices.

Analysing the indirect impacts, as reported by the 2014 IPCC, the quantity and quality of hydrological systems have been altered because of changes in precipitation levels, melting ices and ocean acidifications. Also the weather-related disasters have become more frequent: during the period 2005-2015, the annual average has been 335 disasters, which has been 14% higher compared to the previous ten years and more than double compared to the period 1980-1989. Indeed, taking in consideration the period 1995-2015, the great majority of the natural disasters were floods (43%) and storms (28%), followed by extreme temperature (6%), droughts (5%), while the other disasters linked to earthquake or volcanic activity, registered lower percentages (respectively 5% and 2%) (UNISDR, 2015). See Fig. 3.2.

Fig. 3.2 Percentage of occurrences of natural disasters by disaster type (1995-2015)



(Source: UNISDR, 2015)

These are the reasons why more extreme events like storms, hurricanes or heat waves have been amplified. An example is El Niño, the world's largest phenomena due to climate change (The Economist, 2015). It occurs every few years, causing droughts in humid areas, as western Pacific, and vice versa floods in South America, normally drier places (The Economist, 2015). The mightiest Niño occurred between 1997 and 1998, when it killed 21,000 people and damaged infrastructures around the world for a value of $36 billion (The Economist, 2015).

All these events have impacted in both the life conditions of animal species, which were obliged to migrate or risked the extinction (IPCC, 2014), and the health of human being, as more climate change-related events occur and more are the people affected or killed by them. During the period 1995-2015, more than 4 billion people have been affected, particularly by flood (56%) and drought (26%), and around 600,000 people died mainly because of storms (40%), extreme temperature (27%) and floods (26%) (UNISDR, 2015). Another indirect impact on health has been the air pollution which has grown the rate of deaths for asthmatics and cardiac or pulmonary diseases cases. This problem has resulted from the increment of the ground level ozone, due to pollutant activities like

cars, and factories, and then it has been made worse again by the warming temperatures (IASS, 2016).

Other indirect impacts have been economic ones: changes in productivity for a particular product in one area shifted its price globally, or difficult weather conditions altered the transportation of some raw materials, rising their prices. In particular the weather-related disasters have had major economic impacts in terms of costs: taking in consideration the period 1995-215, more than 70% (around US$1,800 billions) of the economic losses from natural hazard were caused by them, especially the storm has weighted most accounting for the 38% (US$1,011 billion). The countries with the highest absolute losses have been the high-income ones with US$1,151 billion (61% of the total) mainly because of the high value of damaged infrastructures (UNISDR, 2015).

Another repercussion is linked to the migration, both of species and people. This latter is particularly important as it affects the destinations points under the economic, political and social prospective (as income, health, security and land use) (IPCC, 2014).

In conclusion, the climate change does not affect just the temperature, but also involve physical changes in the Earth and its living beings (Lomborg, 2010).

3.2.1 The future trends

Considering the coming years, to know which will be the climate change consequences, it is necessary to have an idea of the future climate change scenario. However, estimating exactly how the temperature will evolve, knowing precisely the amount of pollution that will be emitted is not very easy and the mathematical models cannot forecast the interactions that control the climate or natural processes. An example of unforecastable event happened in 1991, when a volcanic eruption in the Philippines originated a cooling effect that affected the climate for many years because of the gas and dust released (Griffiths et al., 2009). Hence, the projections for the 21st century are based on past anthropogenic emissions together with other variables that affect the GHGs: population growth, economic development, use of energy, climate policies and social attitudes. Using the data developed by IPCC (2014), four main scenarios are

provided: one is a mitigation scenario, two are intermediate scenarios and one is a very high GHGs emissions scenario. (IPCC, 2014). The above observations have been studied considering the whole 21st century, so, a bit less than 100 years. Even if the period is not too long, the occurrence of unexpected events could accelerate some forecasted consequences.

According to the last IPCC report (2014), the future trends could be the following.

For what concerns the temperature, all four scenarios conclude that taking in consideration the years 1986–2005, the mean surface temperature will likely increase between 0.3°C to 0.7°C in the period 2016-2035. This will happen if unexpected events do not occur, like volcanic eruptions or change in solar irradiation. Instead, for the remaining part of the twenty-first century, the scenarios have different results, but on average the total temperature increment might be between 1.8 C° and 4.0C° (IPCC, 2014 table SPM.1). In fact, if interventions are not put into practise, in 20 years 50-60 ppm of CO_2e will be added to the present ones reaching a total concentration of 550ppm. In this eventuality, the probability of staying below an increase in temperature of 3°C by 2100 is less than 50% (IPCC, 2014). So, it is necessary to hold them below 500ppm, in order to have a 50% chance to stay below 2°C. In any case, the increment will not be uniform so that it may be between 2°C and 10°C depending on the region. In terms of emissions reductions, it is necessary to cut them at least of 40% from 50 billion tonnes of 2013, to 35 billion in 2030 and under 20 billion in 2050 (Stern, 2015).

Regarding the Water cycle, there will be not uniform changes: in tropical regions and subtropical dry areas the precipitation will increase due to higher evaporation rates; on the contrary in some mid-latitude wet regions it will decrease. In North America and Europe the number of heavy precipitation will rise.

Relating to the Ocean, they will continue to warm up increasing acidification and height. This latter phenomenon will be caused by the decrease in glacier volume, projected between 15% and 85% depending on the scenario, and will be faster compared to the period 1971-2010. Moreover, it will not be uniform all around the world, even if it will concern more than 95% of the global oceanic area (IPCC, 2014).

3.2.2 The potential future risks

Given the possible future trends, it is now important to delineate which could be the potential future risks.

As Stern explains in his book “Why are we waiting?” (Stern, 2015), in some areas, like the Mediterranean, North Africa, Middle East and US, the summer temperatures will increase affecting the biodiversity of that regions. In addition the risk of losing ecosystems and biodiversity will increase, as well as the occurrence of extreme weather events (IPCC, 2014). According to the "Stern Review" (Stern, 2007), the extinction rate of land species will be of 10% for a 1°C warming, around 15-40% in case of 2°C and 20-50% for 3°C (Stern, 2007). Also the ocean acidification will undermine the variety of marine organisms and plants, which are essential not only for the food chain, but also for the production of calcium carbonate that absorbs CO_2 emissions; marine living beings risk the extinction because of their inability to adapt to the too fast climate changing rate (Emanuel, 2012).

For what concerns the surface and ground water resources, they are projected to diminish, as in the dry regions the droughts will be even more frequent and increasing pollutants will damage the raw water (IPCC, 2014). This problem will affect especially people, globally they are already over 4 billion that have to face severe water scarcity for at least one month a year (Carrington, 2016), particularly in China, India, Central Asia, Africa and Middle East (Smith and Vivekanada, 2007). According to UN Water Organization’s projections, by 2025 1.8 million of people will be affected by water scarcity and will be living in countries or regions with absolute water scarcity and two-third of world population will face stress conditions (un.org, 2016). The water loss problem is also intensified by the even more melting glaciers, which feed many important rivers around the world affecting millions of people. For example, the meltwater from the Himalaya-Hindu Kush region reaches seven of the largest rivers in Asia, while many South American capitals, like Lima, La Paz and Quito, rely on the Andes glaciers (Stern, 2007). Also caused by higher sea levels, but with opposite effects, is the potential risk of flood for fifteen big cities, like Tokyo, Miami and Hong Kong. In the same situation there are more than 200 million people who live in coastal areas, where the current possibilities of storm surges and floods are still very high (Stern, 2007).

Also natural phenomena, as cyclones, hurricanes or heat waves will be more frequent and more intense. For example, El Niño has already had strong consequences because of increasing concentrations of gases in the atmosphere, and forecasts are not positive as stronger Niños and relative weather events are expected again. Even the Indian monsoon rainfall could be reduced, causing more droughts in that area (Stern, 2007).

At this rate, climate change will undermine also the food security, which is defined by the Food and Agricultural Organization (FAO) as a "situation that exists when all people, at all times, have social, physical and economic access to safe, sufficient and nutritious food that are able to meet their dietary and daily needs and food preferences which allow them to have an healthy and active life " (FAO, 2015). Indeed, two contrasting factors are projected: on one side the population is expected to grow and thus also the food demand, while on the other side the food production will become more difficult, as the marine biodiversity, the fisheries and agricultural production (rice, wheat, maize) find difficulties in adapting to the new climate (Rao, 2009). In addition, the agricultural surfaces are diminishing because of increasing sea levels that will reduce the cultivable coastal areas (Smith and Vivekanada, 2007) or because of even more dried land and scarce water resources (IPCC, 2014). The two main consequences are thus the reduction of food quantity and increasing prices of agricultural products. The number of people who will be affected by hunger is likely to increase by 20% by the mid of this century (wfp.org, 2016). Today they are already approximately 800 million (FAO, 2014). From all these projections, it is understandable as the food security will be affected in relation to: its availability and the access to adequate resources and the ability to utilize the food supplies (Schmidhuber and Tubiello, 2008).

Also the human health will be compromised, even if in the last years it has considerably improved, in fact, during the first 15 years of the 21st century, the global average life expectancy has increased by five years (who.int, 2016). The major causes will be: the warmer temperatures that have been increasing ill-heat cases, cardiovascular and respiratory diseases, as well as the vector-borne ones, as diarrhoea and malaria (this latter already kills half-million of people every year and is estimated to increase by 60,000 cases per year) (who.int, 2016); the weather-related natural disasters, which will cause deaths, injuries, physical and mental illnesses; the reduction of agricultural lands and/or its fertility and the increasing food prices, which will increase the annual average of 3.1 million of deaths for undernutrition, in particular for children (+95,000); water

scarcity that will cause further foodborne or waterborne diseases (Caplin, 2015); household and ambient air pollution, will determine respectively 4.3 million and 3.7 million deaths per year (who.int, 2016).

The most severe consequence for humans could even lead to their own extinction, as happened 250 million years ago with dinosaurs and the whole ecosystems. In fact, the mass extinction of these ancient Earth's habitants was due to three simultaneous facts deriving from huge emission of CO_2 in the atmosphere: the global warming, the ocean's acidification and the loss of oxygen from seawater. These great emissions were caused by intense volcanic activities and the burning of fossil fuels as it is happening today (Monbiot, 2015). Indeed, according to a research published in 2013, the current ocean acidification caused by combustion of fossil fuel has reached the fastest rate of the last 300 million years and is now at a level of 30 Gt of CO_2 per years (1 Gt is one billion tonnes), while around 250million years ago during the Permian mass extinction, they were 1 or 2 Gt (Bijma et al., 2013).

The climate changes will also impact the living conditions of some populations that could be forced to migrate to other areas because of the lack of resources or higher exposure to weather events. It has already happened 5,000 years ago from the region that nowadays corresponds to the Sahara Desert (Stern, 2015). According to International Organization for Migration, by 2050 the environmental migrants may become 200 million (iom.int, 2016), as the annual average of displacement caused by weather-related extreme events calculated on the past seven years was 22.5 million, and the trend seems to be increasing (IDMC, 2015). They will move from a rural zone to other rural zones, to urban centres or to other nations. A part from the first scenario, the last two will accelerate the urban poverty, increasing criminality and racisms phenomena (Smith and Vivekanada, 2007). Indeed, conflicts arise easier and faster particularly when great amounts of migrants have different nationality and/or ethnicity, so the integration is more complex, or when the receiving states already suffer from limited available resources (UN, 2009).

Also peace is indirectly affected by climate change. As expressed in 2010 by the U.S. Department of Defense, it can be stated that the climate change issue has relevant effects on geopolitical situations being responsible for environmental degradation, poverty and fragile governments (U.S. Department of Defense, 2010). In fact, even if armed conflicts are not a direct consequence of climate changes, when these combine with poverty,

water and food scarcity and diverse types of tensions, wars will arise for the controlling of resources (Klare, 2015). An example is Sanaa, the Yemeni capital, which become the first capital in the world to be waterless, because its aquifers are drained. This already difficult situation is aggravated by the political instability: first of all it has made difficult to pump hydrocarbons, which are particularly important as representing the 87% of the Yemeni exports and one of the leading economy's sector; and then it has impeded necessary interventions against climate change. As consequences, tribal conflicts, where also the Houthis and Al Qaeda took part, have risen and Yemeni farmers have been forced to abandon their farms because of the dryness. As asserted by Juan Cole, one of the main experts on Middle-East, the solution is the construction of solar-powered desalinisation plants, as already happened in the neighbouring countries, involving all the tribal groups, Houthis included (Cole, 2014). Another recent and severe example is the Syrian civil war. In part the civil rebellion has been caused by the indifference by Bashar al-Assad in front of the extreme droughts occurred during the years 2006-2010, which have turned into desert the 60% of the country land causing very serious economic consequences (Klare, 2015).

Also the economic development is afflicted by climate change. Each consequence explained above has economic repercussions due to decreasing agricultural or farming outputs, increased migration or diseases, political stabilities, etc. All them implicate the reduction of global GDP, estimated in about 2% with an increase of average temperature by 3°C (Farid at al., 2016). For example, US and China, the two main contributors for the GHGs emissions, see the climate change as a threat to their economy (Bussard, 2014). The lacking revenues will not only damage the populations or companies, but also the governments which have fewer means to deal with adaption and mitigation actions. What will make the economic situation worse are the economic losses caused by weather-related disasters that already sum up to an annual average between US$ 250 billion and US$ 300 billion (UNISDR, 2015).

3.3 Intervention actions

Given the above scenarios about the future, the automatic emerging conclusion is that intervening is a *devoir* and what is necessary to do is cutting the CO_2 emissions over the next years and modify the lifestyles. To do that, what is required are fast and effective actions, because the results will be slow to arrive: even if there were a complete cessation of net anthropogenic emission, their consequences would remain for centuries (IPCC, 2014). In fact, some GHGs emissions last for almost 1000 years in the atmosphere; also the increasing sea level will continue for several decades after the corrective actions (Stern, 2015). Hence, because we are already in an extreme serious moment, it is fundamental for saving the Earth to act now, even if the intervention actions will cost much money, because the not-intervention will cost much more.
In addition, looking at the climate change problem from another prospective, it is not just an environment issue, because fighting against the global warming is fundamental to guarantee the economic prosperity and the sustainable development in the long term, as all three are strictly related. Indeed, if climate policies are well connected with other societal plans, there is the possibility to reach co-benefits, strengthening all plans and reducing the poverty.

3.3.1 The role of the international community

As a single global authority does not exist, the whole international community has a fundamental role for obtaining successful results in the fight against climate change. Its main goals should be summarized as follow (UN, 2009). Firstly, the international community has to take bold actions against climate change, implementing adaptations and mitigations actions. Secondly, it has to support the countries in doing that, particularly the developing ones which often lack resources or are frequently hit by climate change-related disasters. Thirdly, the international community has to ensure a sustainable and equitable development of all countries through transfer of financial and technological supports, from the developed countries to the developing ones. In this way

a general and fair development can be realized, that is also able to reduce the great vulnerability of poor countries. Fourthly, future problems related to climate changes have to be anticipated in order to tackle them in the right manner, for example the environmental migrants or the water scarcity. Hence, combating climate change is the main reason why international agreements are being stipulated, but it is not the only, as maintaining the international peace and supporting a sustainable development (Smith and Vivekanada, 2007) is crucial, too. Indeed, if the inability to adapt to climate change interacts with other pressures, what will result are violent conflicts whose cost is much bigger than adaptation's ones. And for implementing efficient development plans, they have to include the climate change issue, or the reached goals will be only temporary.

So, for these reasons the Heads of States have begun to sit periodically in climate conferences and international Conventions in order to conclude and implement common environmental agreements.

The first global action was in 1988 with the establishment of the Intergovernmental Panel on Climate Change (IPCC) by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in order to prepare climate change reports based on scientific, technical and socio-economic information with the main goal of making governments aware of the current climate situation.

Until now five reports have been edited by IPCC (1990, 1995, 2001, 2007, 2013/2014) representing the source of accepted scientific assessment on climate, as they collect analysis, causes, current and future impacts and risks (ipcc.ch, 2016).

Then, in 1992 during the Rio Earth Summit, it was constituted the United Nations Framework Convention on Climate Change (UNFCCC) in order to develop a unique and harmonized global action for dealing with the climate change recognizing the great responsibility of developed countries for that. As stated in the article 2, its main objective is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (UNFCCC, 1992). It came into force in 1994 and since the year after, 1995, the parties of this Convention meet every year at a conference called Conference of the Parties (COPs) that take place each time in a different city. The COP's tasks are to review the national communications on emissions, to evaluate the actions taken by the Parties, to promote and to review the implementation of Conventions (ipcc.ch, 2016).

One of the most important COP was the third one, which took place in Kyoto in 1997 where the Kyoto Protocol was adopted: it was the first binding agreement born to implement the principles of UNFCCC. In fact, according to it, the Parties during the first committed period (2008-2012) had to reduce their greenhouses emission up to the binding level, on average 5% less compared to 1990. If this would not have happened, there had been sanctions as previewed by the Protocol (Stern, 2015).

Particularly important was the tentative to introduce the emission trading systems. Indeed, in order to respect the UNFCCC's clause of "common but differentiated responsibilities", the Kyoto system has divided the countries into three categories: the Annex I countries (the developed ones), the non-Annex I countries (the developing ones) and the Annex B countries (those that have accepted a legally binding commitment). This mechanism has established three flexible methods of carbon trading that could be used to reduce the emissions.

The first is based on the emissions trading and is called International Emissions Trading (IET). Under the IET, the countries are allowed to trade the Assigned Amount Units (AAU's) which correspond to limited allowances of carbon emissions. The second and the third are instead related to the trading of project-based credits, rather than allowances. Specifically, the second mechanism, called Joint Implementation (JI), allows the developed countries to sell to other parties their credits. While the third mechanism is the Clean Developed Mechanism (CDM) and, differently from the second, consists in the trading of credits generated by projects realized in the developing countries. These are called Certified Emissions Reductions (CERs) (Schreiber, 2013).

The main problem related to this agreement was that even if it has been ratified by 192 parties, an important country, the US, who was the first in the ranking for CO2 emission at that time, did not subscribe it (Griffiths et al., 2009). In addition, the emissions targets were defined just for rich countries, as what was considered were only the emissions per capita, so big absolute emitters like China and India that were respectively at third and sixth in the global total emission ranking, were not obliged to sign (globalcarbonatlas.org, 2016). Hence, it has been misleading not comparing all data; in fact it has not prevented what would happen in the near future. Moreover, the specific emission reductions and the sanctions for failing were not defined specifically and at the end the Protocol resulted like an agreement between EU and Japan (Tol, 2014), without meeting the initial expectations. After 12 years, it can be concluded that is has been a

failure. Indeed, the biggest emitters did not take part and only 21 countries met the goal, but they were just small emitters: all their emissions together account for more or less the 1% of the total (Gelis, 2015).

Another important COP, which was considered "our last chance" (Griffiths et al., 2009), was the conference of Copenhagen in 2009. But also in that case, no agreement was stipulated: the Accord was weak because of leadership failure as the politicians were more aware of money and politics instead of the severe forthcoming climate consequences. In fact, the Accord was not binding and did not provide specific emission targets, then even if it proposed short- and long-term financings for developing countries, the short-term financings lacked details and the ng-term ones established a sum of $100 billion a year by 2020 without specifying how and when the money would be allocated (Huq et al., 2010).

Another important COP was the COP21 held in December 2015 in Paris. It had to substitute the Kyoto Protocol whose deadline is fixed for 2020. In that occasion 195 nations agreed on two main goals: avoiding that the world's average temperature would overcome the 2°C comparing to the pre-industrial level and reaching the net zero emission by 2050. Moreover, the little responsibility and the great vulnerability of developing countries have been recognized, so the developed countries have to transfer $100 billion a year already previewed in Kyoto Protocol to the developing ones by 2020 in order to sustain them in their fight against climate change (The Economists, 2015). For some aspect it is similar to the Accord of COP15, but in this case the obligations are extended to both developed and developing countries. In fact, the carbon dioxide emissions of developing countries harm in the same manner as those emitted by the developed ones and if their economic growth is not helped in implementing low-carbon emissions practises, the efforts of US, for example, will become useless (Surowiecki, 2014). In addition China and India promised, respectively, to reduce its emissions of coal plants by 60% by 2020 and to cut the emission intensity of GDP around 34% by 2030 (Kahn, 2015).

In order to come into force in 2020, this new agreements has to be ratified by 55 countries representing at least the 55% of the total global GHGs emissions. For reaching this percentage at least one of the most emitting countries (US, China, Russia and EU) has to accept. The deadline for the signature is April 2017 after which it is possible to join just trough the "accession" (Northrop and Ross, 2016). An up to date of the situation

after eight months, in August 2016, showed that only 22 countries out of 195 have ratified the agreement and between them great emitters like China, US, Brazil and Australia do not appear. So the pathway to implement a real and effective international accord seemed still very long (Chenouard, 2016). But in autumn 2016 there were many signatures like Malawi, Armenia, Zambia, Chile, Republic of Moldova, Kyrgyzstan and on 5th of October the minimum threshold of 55% has been reached. Indeed, 128 Parties out of 197 have ratified the Agreement that entered into force the 4th November. As declared by Patricia Espinosa, the Executive Secretary of the UNFCCC, these dates have a historical importance for the world and for its future (UNFCCC, 2016).

The last COP, the COP22, took place in Marrakech in November 2016. There were great expectations on this COP as the previous COP in Paris has led to good results, so the world hoped for new concrete actions. Instead, the 195 States present at the conference have not concluded anything of concrete in no negotiation chapters. Indeed, only the procedures and the working plan for finalizing the future actions to put into practise the Paris Agreement have been fixed. One of the causes was the influence of Donald Trump and his declarations, which represented an excuse for not moving forward. More specifically, the draft of the roadmap for the nations' future actions will be revised during the next COP, which will be in Bonn. In addition, expect for USA, Germany, Mexico and Canada, no other country has submitted an updated national action plan for cutting the emissions. Also for what concerns the climate financing, nothing has changed. The amount of 100 billion dollars established during the COP21 was not increased (the when ONU estimates the necessity of almost 5,000-7,000 billions of dollar) and also its delivery is not guaranteed. Despite all this, important countries as China, Brazil, UE and India declared their willingness to continue working on this theme (repubblica.it, 2016).

3.3.2 The role of governments and of the private sector

As seen, the climate can be defined as a “global public good” (Kerr, 2000) since the negative effects of the greenhouse gases regard the whole world. Because of this characteristic, it is fundamental that every person, every country, every enterprise and every government makes its own contribution to fight against the climate change, and

this is not a task that can be done alone. Cooperative and complementary international actions not only are more efficient in mitigating the GHG emissions, but also allow knowledge spillovers through the transfer of information and technologies.

As reported by the IPCC (2014), some governments have begun to tackle the problem implementing national or supranational environmental policies and programmes, but as we can see in the reality, it is insufficient. Nevertheless, even if the climate programme is urgent and global, the afflicted subjects who have the knowledge and the capacity to act do not take strong actions, why? The answer is called free riding: subjects do not act and do not share costs, but waiting for the others' efforts. As said before, the climate is a public good and consequently, it is characterized by being non-rival, as anyone can use the good without reducing the utility of the others, and non-exclusive, as no one can be excluded to use it. This creates "a non-cooperative environment" that slow down the initiatives against climate change (John and Rübbelke, 2009) because, even if the countries and people involved are aware of the situation, they prefer leave actions to others, taking benefit from them without bearing cost themselves (Kerr, 2000). Using other terms, the states invoke the "I will, but if you will" argument (Griffiths et al., 2009) to justify their inertia. In addition, the costs of GHGs emissions do not affect directly the main emitters, which, thus, do not have economic incentives for intervening. Hence, this externality cannot be corrected by market, as it fails, but by policies (Stern, 2005).

From this prospective, it is clear that what can really tackle the climate change problem are governments. To make it working at best, it has to assume a pyramid form, where the highest part is the international governance, while the inferior part is the local communities.

As seen in the paragraph 3.3.1, the internationally cooperation has already begun, as the climate change issue has a global character and cannot be tackled with single actions. Unfortunately, there is not a single global common action, yet. And this deadlock situation shows how the role and the will of the national governments are essential to reach common goals. In addition, there is a particularly sensitive issue that exists between developing and developed countries: the first ones do not want to accept the same limitations of developed countries for economic development reasons; while the second ones affirm that a division between industrialized and developing countries has not to be done in this case (Internazionale, 2015).

In an ideal situation, an important step already occurs when States approve new international agreements or conventions, as it means that the problem is recognized and that actions will be put into practises. But then, the government has to set and implement national coordinated plans, which have to effectively involve the local communities. It is necessary to take in account potential vulnerable groups or particular situations, supporting programmes with adequate financial and policy system and revising norms and regulations. The climate change problem could even become an opportunity to reconcile communities and having more peaceful societies, as they are unified against the same enemy and the victory will give them better places to live in (Smith and Vivekanada, 2007).

It is also required to collaborate with the private sector providing them with incentives (subsidies, financing…) for changing pollutant processes or for investing in low-carbon technologies, without merely sanctioning them. Otherwise market failure and disincentives will arise. The companies required to be involved are all, from the small-medium size enterprises till the multinational companies; the same is for sectors: not just transport or energy, but also the financial sector needs to be involved, as changing require investments. Governments have to intervene thus to re-structure the low-carbon energy market in order to make it profitable and attract investments (The Economist, 2015). In fact, if the private investments against global warming are efficiently deployed, the money spent would overcome the governments' investments in terms of amount and time horizons. Hence, if in the past large corporations were blamed to be largely responsible for climate disasters, now they emerge like efficient reformers as they have understood how much the climate change could harm their economic interests. For example, the insurance companies, like Munich Re, have begun to collect data on climate change since the seventies and founded what is now the Corporate Climate Centre (CCI) in order to better set premiums and avoid economic losses (Ball, 2015).

The roles of governments and companies are even more essential also because extremely important are the data on which adaptation and mitigations projects are based. Even if IPCC already provides analysis and information at global and regional level, the reports lack of local specific statistics or situations, as some governments do not collaborate making their studies available to all or exchanging information. This creates a great obstacle in reaching a coordinated international action, as there is not a

true picture of the situation. Therefore, not only States and companies have to become more transparent about their activities, but also international monitoring systems have to be strengthened, like the Global Climate Observing System and the Global Earth Observation System (UN, 2009). This is the only way that creates efficient partnerships between private and public sectors at national or international levels, which may be similar or complemental and which share same goals and resources.

Visible changes, therefore, result from the combination of top-down and bottom-up approaches (Griffiths et al., 2009) which consider at each level the social, political and economic implications. Indeed, behind the human activity that has led to the current situation, there have been economic and policy actions (Uzawa, 2003).

It can be concluded that if any agreement have been implemented by governments the reasons behind are linked to the fear of harming the economic growth through the realization of plans against the climate change or the presence of lobbying pressure from multi-national companies. In fact, even if there are several enterprises, like the Munich Re, that are investing in climate change researches, others, like the major energy corporations, still look for new hydrocarbon reserves despite they should be left in the ground (Chomsky, 2014).

3.3.3 Adaptation and mitigation actions

In order to cope with the climate change problem, efficient solutions, which are integrated, preventive and universal, have to be implemented. In this way, they do not aggravate other existing problems (integrated), they minimize the possibility of creating negative feedbacks (preventive) and they are supported by all nation that is a necessary condition to implement it (universal) (Griffiths et al., 2009).

Hence, the responsibility and the costs of these actions have to be assumed by all nations, as the climate change problem is global, but given the strong vulnerability of developing countries and the great responsibility of developed nations for the GHGs emission, the richer countries should contribute more (Stern, 2005).

In particular, in order to cope with the current situation resulted from climate change and to prevent as much as possible the future negative impacts, two actions are needed:

adaptation and mitigation. Mitigation is essential, but given that its benefits will arrive slowly, adaptation is extremely needed and has to be realized now (Smith, 2007).

As these two actions are complemental, effective actions against climate change have to achieve both adaptation and mitigation (Griffiths et al., 2009) in order to integrate the local impacts of the first with the global ones of the second, and to facilitate the realization of both as the benefits of the mitigation reduce the efforts of adaptation and adaptation has positive repercussions on mitigation actions (Klein and al, 2007). Some examples are the improvement of energy efficiency, the reduction of energy and water consumptions or the development of sustainable forestry and agriculture (IPCC, 2014).

Another analogy is the uncertainty and unclearness that characterizes the context where mitigation and adaptation projects have to be realized, as the information about the future climate changes cannot be the perfectly predicted or are inadequate. The outcomes are thus uncertain, too and the better method for acting is then "act, then learn and then act again" (Manne and Richels, 1992). So, the best approach is creating a flexible framework that just in general defines how and where intervenes.

What differs among the two is how the results come out and how are measured: if mitigation is based on the reduction in GHGs concentration, the adaptation has to be valued under different dimension in various contexts (social, economic, political) (Klein et al, 2007).

Going into details, *adaptation* consists in establishing actions that reduce the vulnerability of countries, and thus also the impacts of climate change. It does not represent a method to reduce the GHGs emissions, but it is in any case fundamental, as contrarily to mitigation action, its impacts are immediately tangible (EU Commission, 2007). The aim is to improve the resilience of a country, defined as the capability to deal with disastrous or sudden events and to adapt to slow changes in socio-economic conditions (Griffiths et al., 2009). It has to involve all sectors with activities like the development of stronger crop varieties, better uses and conservations of water sources, low-carbon practises and sustainable agricultural methods that reduce land erosions and protect biodiversity and ecosystems. If well done, adaptation can reduce the risk and the effects of climate change and can lead to a peace situation that in turns increase the adaptive capacity again (Smith and Vivekanada, 2007).

In term of *mitigating* (or combating), what is necessary to do is to stabilize and then reduce the greenhouses emissions at global level (Griffiths et al., 2009). A good

mitigation strategy has to involve changes in management practises and consumers behaviour in order to make a shift to a low-carbon energy source, more efficient energy save and conservation technologies as well as a strong reduction of deforestation activities. The methods, which the governments can implement at national or regional level, reflect some of the policies through which the negative externalities can be faced: taxes, tradable quotas or regulations (Pigou, 1920). This latter, differently from the other two approaches does not lead to public revenues, so it would be better to use it when and where the market mechanism fails.

The urgency of intervention is confirmed from an economic point of view, as estimated by the International Energy Agency (IEA), the delay will have a monetary cost: for every single dollar does not invested in cleaner technology before 2020, it is necessary to add $4.30 after 2020 to counterbalance the effect of the emissions (IEA, 2011). Hence, delays in mitigation now will extend the period of recovering and will rise the costs for the same action in the future. As is known: time is money.

In addition, reducing the carbon footprints does not mean leading to an economic recession as there is a partial decoupling in the trends: combining data on CO_2 emissions and socio-economic indicators, even if in 2014 the world's population and economy rose by 1% and 3%, the CO_2 emissions has almost stalled as they increase just by 0.5% comparing to 2013 (Olivier, 2015). Hence, the economic development can still rise also trough investments that do not concern intensive-carbon activities.

4. The climate changes in the developing world

4.1 The great vulnerability of developing countries

As the climate change problem and its consequences explained are global, also the causes derive, more or less, from the bad behaviour of all countries because of their environmental policies. In fact, if the developed countries make an exaggerate use of carbon fossils and industrial activities, the developing ones contribute with deforestations and a strong use of fossil fuel (Kerr, 2000). It is true that the contribution of these latter have increased during the last decade, but the responsibility of the current situation cannot be perfectly split among developed and developing countries: although in the last years some emerging economies have developed without a specific regard to environment (as China and India), the industrialized ones have started much before. And, a part from China and India, the rest of developing countries have a carbon emission rate that is much lower than developed countries. For example in 2015 just North America (Canada, US and Mexico) had total CO_2 emissions for almost 6,500 $MtCO_2$, while the whole African continent contributed for 1,000 $MtCO_2$ (BP, 2016).

What makes the situation really astonishing is that, even if the negative externalities deriving from the climate change affect more or less the entire world, ironically those who are greater damaged are again the developing countries, despite their less responsibility. Hence, who emit most are who benefit most, and who emit least are who benefit least (Uzawa, 2003).

The great vulnerability of developing countries to climate changes impacts derive mainly by their fragile environments, their socio-economic structures and their limited means necessary to adapt or to recover (Stern, 2007).

Indeed, vulnerability depends on three factors: *exposure* to climate change impacts, *sensitivity* to them and the *adaptive capacity* to climate changes (Stern, 2007). The developing countries are therefore weak under all the three aspects.

The great *exposure* derives from their geography. Particularly affected by extreme events, like El Niño, peaks of temperature, unexpected droughts and heavy rain periods, are the tropical area, which compared to the temperate one, register a

disproportionately high effects from climate change (Nordhaus, 2006). For example, the agriculture is particularly affected as the cereals productivity will decrease in low latitude countries, Africa and South Asia, and the production of rain-fed agriculture may half by the end of 2020 (UN, 2009). Indeed, if in mid-and-high latitudes (US, Europe, Russia…) little increases in temperature could rise the agricultural output, in tropical regions these effects are negative (Stern, 2005).

The high *sensitivity* to climate changes is instead the result of: their direct dependence on the agriculture and the ecosystem, and of increasing population and food insecurity. Indeed, the developing countries do not have a diversified economy and depend mainly on the primary sector (agriculture) and the exploitation of land, forest and other natural resources (Kerr, 2000). For example, in Sub-Sahara and South-Asia countries, the share of GDP of agricultural sector has a range between 20-60%; instead, in North America or in Europe, it counts just for few percentage points (cia.gov, 2016). Given this economic situation, rural countries do not only have low incomes level, but also are more sensitive to climate changes. Their sustenance depends only on the environment and so, the risks of economic disruptions is much higher given that any loss are not counterbalance by other economic sectors.

Another factor that influences the sensitivity is the growth of population and its consequent urbanisation. As seen before in Figure 3.1, the main population increase will occur in the developing countries and, specifically, more than half expected global growth between 2015 and 2050 will occur in Africa (1.3 billion out of 2.4 billion). Then, the second major contributor, for the same period, is Asia with 0.9 billion (un.org, 2016). For this reason, the people, who will depend on nature resources, will be more, and thus also the individuals expose to the risks of climate change.

What will intensify is also the migration to urban centres, which is seen as a way to escape from rural areas, to find new jobs or to improve own life conditions. As estimated by the World Bank, the urban population in the developing countries will increase more than everywhere and by 2050 it will be more than 5 billion (worldbank.org, 2016). But the cities are almost always unprepared to welcome them, and thus they will expose to other types of problems, like as sanitation or access to clean water. The sensitivity is boosted also by diseases, like malaria and the food insecurity.

The third aspect, the *adaptive capacity*, is influenced by resources, knowledge and infrastructures available to recover from the damages of climate change. The developing

countries, by definition, have lower levels of incomes and this represents a limit to save own financial resources and also for accessing to credits (Stern, 2007). The States themselves have limited means for recovering because of low national incomes and high corruption. Moreover, their economy is not diversified, so if the primary sector is blocked by extreme weather events, their ability to take funds from the citizens is much reduced.

The situation is so severe also because there are poor governance and public services. The essential preventive measures for reducing the impacts of climate changes are not even planned by the public institutions. As a consequence, there are not education programmes for increasing awareness on the climate change effects, there are not actions that prevent diseases, water and food scarcity, and adequate infrastructure to facilitate the adaptation and mitigation programmes are not taken into account (Stern, 2007).

Summing up this scenario, the developing countries not only are the most damaged by climate disasters because of their great exposure and sensibility, but also their ability to recover is even more undermined due to socio-economic and political instabilities that impede the realization of adaptation and recovery plans, so they face a sort of "double penalty" (Drabo, Mbaye, 2011). A clear example is the Yemeni case explained above.

4.2 Why is the impact on developing countries stronger?

The impacts of climate change are particularly severe in the developing countries because almost the 80% of damages are registered in low- latitude countries (Mendelsohn, 2010). The reasons are linked to the weather events, which are stronger in these areas, and to the close relation between the livelihood and the economic activities with the environment.

The more visible impacts derive from natural disasters and extreme events. According to the Global Climate Risk Index 2016 (CRI), which takes in consideration the death toll, the number of deaths, the total losses in term of million $ and GDP and the number of events, in the period 1995-2014 nine out of ten most affected countries by weather

disasters were developing countries and the first three in the ranking have been Honduras, Myanmar and Haiti (Kreft et al., 2016). In fact, 43% of weather-related disaster between 1995 and 2015 occurred in lower-middle and low-income countries (respectively 30% and 13%) with more than 2,700 disasters causing almost 357,000 deaths (59% of the total deaths for natural disasters). Also in terms of GDP, the losses caused by these disasters are high for the poorer countries: 1.3% and 5% for respectively lower-middle and low-income countries, while 0.2% and 1.1% for high and upper-middle-income countries (UNISDR, 2015).

Then, there is the increasing danger for the health, which regards mainly, again, the developing countries. The reasons are the following. First of all, the food scarcity, that already affects around 800 million people of which 98% are in developing countries (FAO, 2015), will increase if by 2050 the food production does not double (worldbank.org, 2016). The statistic forecasts that the world population will become 9 billion by the mid of this century and the highest growth rate will exhibit in developing countries, increasing again the high level of malnutrition (FAO, 2012). The situation is particularly severe for children as 25 more millions of them will suffer the hungry by 2050 because of climate change (Goldenberg, 2009). Then, the increasing temperatures make more favourable the diseases' spread, for example malaria will put into risk between 260 and 320 million more people by 2080 (ucl.ac.uk, 2009). Also the problem of the lack of water availability is expected to become worse: by 2050 the people that will face the water stress problem will increase by 2.3 billion, particularly in areas like North, Central and South Africa (oecd.org, 2016). Hence, one out of four people will leave in countries where there will be shortages of fresh water (un.org, 2016). In addition, the worsening health will depend on the lack of access to basic sanitation that for the mid-21st century will involve still 1.4 billion people (oecd.org, 2016). Completing the picture, there is a strong lack of health care facilities, medicines and infrastructures that makes impossible tackling efficiently the situation.

The health is also affected by the reduction of the agricultural output in these areas because of the new environmental conditions. For what concerns the temperatures, the International Monetary Fund (IMF) estimates that, if the Earth becomes 2°C warmer, there will be more land areas where extreme heat will verify. More specifically, the increment will be of: 30% in the Middle East and North Africa; 30– 40 % in Latin America and Caribbean; 45% in Sub-Saharan countries. Again, the most affected

countries are the developing ones, as in Europe and Central Asia the percentage decreases to 10-15% (Farid, 2015). This situation impact thus on the economy, mainly based on the first sector. Mendelsohn predicts a reduction of the agricultural income of 60% by 2100 (Mendelsohn, 2010). An example derives from one of the most traded commodity around the world and produced in developing world: coffee, which involves more or less 100 million people who economically depend on it. World Coffee Research has estimated that by 2050 because of rising temperature the suitable land for growing coffee could reduce by 50% and, at the same time, the plants will become more susceptible to disease (Nowakowski, 2015).

In addition, the output growth is affected by natural disasters, which will be reduced by 9% that is relevant compared to the 1% of developed ones (Noy, 2008).

Again, from a lower economic growth, the level of poverty will increase and, as consequence, will affect the human health, child mortality, water and food scarcity.

In order to manage the future economic risks deriving from climate events, the poorest people are putting into practises some measures that appear a good solution, but that in the long-term could push them into a poverty trap (Stern, 2007). These measures are related to the risk-management and the risk-cope. The first one is based on the choice of crops that are less vulnerable to the climate, avoiding thus more profitable inputs that are riskier. But doing so, they reduce the returns, impeding to reduce the poverty level (Dercon and Christiaensen, 2007). The second one employs the selling of assets, like animals or lands, or involves the reduction of consumption levels. These behaviours will intact both the future development and wealth, like paying education for the children or receiving additional returns, and the health (Stern, 2007). To avoid these extreme measures, the governments should provide a sort of insurance for the farmers, in order to protect them from any loss, but that does not happen.

When these difficult economic conditions together with the high level of poverty meet the adverse impacts of climate changes, one important consequence is the migration, which is seen as a way to cope with climate change, even if in reality it represent a failure to adapt to it (Drabo and Mbaye, 2011). It occurs especially in the developing countries as confirmed by the International Displacement Monitoring Center (IDMC) which calculated that during the period 2008-2014 the 91% (179 million people) of global displacement occurred in or from developing countries and a similar situation occurred also in 2014 with 17.4 million, so more than the 90% again.

Also the migration causes negative impacts, like the tensions in the receiving countries that could switch into conflicts (Adger and Barnett, 2007) or simply between the co-nationals who will compete in the use of still limited existing resources. They can be defined ad *consequences of consequences* (Smith and Vivekanada, 2007) that make them facing a double problem: climate change and conflicts The example that can be considered the first case of conflict caused in part from climate change is the war in Darfur (Sudan), which was triggered by an ecological crisis (Ban Ki-Moon, 2007).

There are also several other indirect consequences for developing countries which contribute to obstacle their development. For instance, one is linked to children education when schools are destroyed or not more utilizable, or families cannot more afford paying school due to the difficult economic conditions or the deteriorate health of children who cannot go to school. Another example is the increasing gender inequalities: the usual female activities like collection of water or fuel and agricultural works become more time-consuming. Moreover, when husbands migrate they need to take care of all entire family, so there are no more possibilities to participate in educational or emancipation programs (Stern, 2007).

The great importance of climate change for developing countries has been recognized also by the UN that in the "Millennium Development Goals Report 2015" affirmed how these changes together with environmental degradation have compromised the ability to reach the set objectives undermining, in particular, the developing countries (un.org, 2015). For these reasons in the 2030 New Agenda for Sustainable Development one goal is completely dedicated to climate: Goal 13-Climate action (undp.org, 2016).

4.3 Specific regional impacts: Asia, Africa and Latin America

This paragraph aims to summarize the specific climate change current and future impacts in the developing countries, making a more detailed overview for Asia, Africa and Latin America (Data from IPCC AR5, 2014 and unfccc.int, 2016).

4.3.1 Asia

In Asia, the climate change has mainly impacted on the temperatures, which have increased more or less across the entire continent. This has affected the precipitation trends, worsening both the monsoons and the drought periods. These events, together with an increased population, a bad water resources management and melting glaciers, have worsened the water scarcity problem. The increased temperatures have also changed the plants' growth cycles and the distribution of the organisms, in particular, the vegetation. Climate changes have also influenced the food productivity that has decreased in some areas, like in Jordan because of 30% less rainfalls, and has increased in others, like in China. For what concerns the disasters caused by weather and climate reasons, Asia has registered the highest number and has suffered the second highest economic loss (around 27%). Also the negative impacts on the health have been observed. They are mainly related to increased temperature, water- and vector-borne diseases, floods and storms because of contamination in the drinking water and mosquito proliferation.

For the future, the forecasts depend on the scenario considered. In general, by the end of this century the temperatures will increase between 3°C and 6°C, in the worst case scenario, or between 2°C and 3°C in the less severe scenario, with some differences across the regions. The precipitations (just in higher latitudes), as well as the cyclones and monsoons, will increase in frequency and intensity. Also other climate-related events will follow the same trend, like sea level, storms and typhoons, affecting around two-third of cities that exceed 1 million of habitants. The water availability will change differently across the regions, as it depends on seasons and river basins: in the tropical, northern and temperate areas the rainfalls are expected to rise, contrary to the central and west parts. But in all areas, the water stress will become worse, mainly because the increased population, which need it not just for the personal consumption, but also for agricultural and industrial activities. All that will make one billion people suffering from the lack of freshwater by 2050. Biological changes, both in land and in oceans, will be continuously subjected to changes: the dimensions and the types of forests as well the distribution, the size and the quantity of marine fishes. Even in the case of food production there will be mixed changes, with increase production in some areas, like north and east Kazakhstan, and decrease in other like in the Indo-Gangetic region.

As it is common among developing countries, all these changes will have adverse repercussions on human health and economic growth. The first issue will be related to: an increased aging population that will be more sensitive to higher temperatures; virus spreads, like malaria o diarrhoea; and less seafood safety. The second will happen because Asia, even if it is registering a rapid urbanization, is mainly an agrarian society: around 52% of people live in rural areas and 80% of them work in the agricultural sector. Hence, as climate changes will make a net reduction in crop yields (increase of 20% in East and South Asia, a decrease of 30% in Central and South Asia), consequently the economic revenues will reduce, too.

4.3.2 Africa

Africa is the most vulnerable continent to climate change. Starting from the temperatures, they have risen half Celsius degree during the last 100 years in more or less all Africa, so in general, all the minimum and maximum seasonal temperatures have increased. One of the consequences has been a decline in rainfalls in western and eastern part of Sahel region, as well as in North Africa, and, on the contrary, an increment in eastern and southern Africa. Then, as in Asia, also the extreme climate events, like floods and droughts, have become stronger and more frequent over the past 30-60 years. A sever fact has been the expansion of the desert and a contraction of the land vegetation. The water ecosystem has undergone changes in the thermal dynamics, nutrients and temperatures, having effects on the species and fisheries production. Also the ocean ecosystems have registered changes, from the ocean acidification and migration of birth species, till the warming of the Canary current.

The climate changes, together with the economic crises and the population increment, have made difficult the ability to reach the Millennium Goals (as poverty, food security…). For example, the rise of food prices was responsible for 30,000-50,000 more unnourished children in Sahel area and the economic activities could not improve too much the poverty situation as mainly based on the agricultural sector and fishing. The health has been affected also by the climate changing conditions that have expanded the areas of the vector-borne diseases like malaria, and the food- and water-borne diseases.

Cholera, for instance, increased both in terms of cases and duration because of more rainfalls, like the epidemic occurred between 2008-2009 in Zimbabwe.

The future projections are the following. The temperature will continue its growing trend and it will increase earlier in tropics and West areas. Also the precipitation trend will be similar to the last years, with a decrease in the mean annual precipitation in the North and South and an increase mean in East and Central Africa (expect for the Sahel).

The ecosystems seen before that have already experienced changes will be altered: the sea surface temperature and ocean acidification will rise, while the water availability will decrease affecting between 90 and 220 million people by 2020, in particular in southern and northern Africa. This latter will be caused not only by climate drivers, but also by agricultural use and population growth. For example, in Northern Africa by 2050, the socioeconomic factors will account for the 78% for this problem.

As the climate conditions change, also the agricultural productivity will be affected and in general the yield will decrease. By 2050, the estimated reductions of major cereals will vary between a 18% of southern Africa, till 22% in Sahel area; also high-value crops as tea, coffee and cocoa will decrease causing severe damages on revenues from exports. While, for some products, as penults, bananas and cassava, the trend will show increments or decrements depending on the areas. Evidently, the animal conditions will be affected, too. The main cause are water scarcity, reduced availability of crops for feeding animals and increase of plant diseases, like the black leaf streak of bananas or Striga hermonthica for cereals. Adverse consequences will also regard the fisheries, which is an important determinant for the food security representing around 30% of the total animal protein eaten. The most affected countries will be Angola, Mauritania, Senegal and Democratic Republic of Congo where in addition the jobs related to this activity will half.

This latter situation is an example on how difficult it is to improve the food security because of climate changes. Indeed by 2050, the fisheries productions would have to increase by 500% to meet the new demand. Other factors are the decreased crop productivity, the increased world food prices and the even more difficult climate conditions. This food scarcity is one of the causes of health vulnerability together with water scarcity, sanitations and diseases. The diverse diseases will spread out of the common borders as they will meet the perfect conditions due to the alteration of

climate. In East Africa the malaria cases will increases (around 5-7%), as well as cholera in West Arica and sub-regions, the leishmaniosis epidemics in Sub-Sahara area.

4.3.3 Latin America

Also Central America (CA) and South America (SA) have suffered from the consequences of climate change, the increasing rainfalls and warming temperature, the melting glaciers and extreme events, such as the 613 occurred during the first 13 years of 21st century. The situation is then exacerbated by the growing industrialization and land use, as well as the presence of the Amazonian forest, the world's biggest tropical one, where little changes have great effects on all adjacent regions.

Also in this case, the first changes have involved the temperatures, which have recorded an increment both in CA and SA since 1970, expecting for the Chile coast. A particular situation is found in the Andes, where the temperature has risen by 0.1°C per decades. The rainfalls have instead detected different trends with increments in the southeast part of SA and decrement in CA. During the second half of the 20th century the changing precipitations have modified the normal runoffs of some rivers and basins and again there are different trends between areas and periods. For example in central Chile the rainfalls decreased during the period 1935 and 1976, but then started to increase. Obviously, these events have modified the hydrological state: the streamflow of La Plata River, the Patos Lagoon and Laguna Mar Chiquita have risen after the middle of the last century, opposite situation for the Amazon River and several Andean rivers, which did not show regular trends. What altered the normal streamflow have also been the melting tropical glaciers that started in 1950 and have become even more rapid. In the beginning, this event increased greater the water quantity, but after having reached a peak, the runoff decreased. Hence, the changes in river flows have depended on both the rainfalls and melting glaciers.

The alterations on the ocean ecosystem, due to ocean acidification and warming, have modified the ocean productivity, the habitats and have forced some species to migrate.

In relation to the food production, the increment of rainfalls and the average temperatures have brought some benefits like in south-eastern South America where

the suitable land areas have expanded and have brought to an increment of maize and soybean crops (between 9% and 58%), but also to negative trends for wheat, maize and soy in Brazil and Paraguay.

Indirectly, the health has been affected by all these changes that have increased the frequency of mortality, disabilities and diseases. Increasing cases of malaria, for example, have been registered during the last 50 years and its transmission has started to occur also in higher altitudes, another example is the dengue fever, which has increased by 45% in Rio de Janeiro areas. There are then other diseases as yellow fever and cholera whose increasing occurrence is due to pollution, warming ocean, malnutrition and extreme events like El Niño.

According to the IPCCC, by 2100 the future projections will be as follows. About the temperatures, in CA the increment will be between 1.6°C and 4°C, instead in SA the range will be 1.7°C and 6.7°C. Different types of scenarios will occur in the case of rainfalls: in CA the range is -22 and +7%, instead in SA in some areas the reduction could reach -22% in others a growth of 25%. Hence, in the environment there will be replacements of tropical forest by semi-arid or arid vegetation or expansions of cultivated lands.

The hydrogeological scenario is not well defined for the future, but in general, there will be a reduction in runoff of around 20% in CA due to more evaporation, less precipitations and the even more melted glaciers, which are expected to completely disappear in 20-50 years. This pattern will have adverse consequence on water availability for domestic use and the economic activities.

The costal system will record more flooding in urban coastal areas and coasts in the east side due to increase sea levels, and beach erosions in the South Brazil and some parts of Pacific Coast. In addition, the ocean ecosystem will be affected by the changing in temperatures: some species of coral reef in both CA and SA are likely to disappear within 100 years; mangroves are expected to decrease and 40% of its species to extinct mainly because higher water levels; fisheries will decrease with severe consequences son economic activities and food security. For this last point, linked to food production, there are diverse projections for the future, as the changed temperatures make the cultivation more or less able to adapt depending on the area: for example some crops like soybean, maize, rise, Arabica coffee and sugarcane can increase in term of production in South Brazil or some areas of Pampas, while in Chile, CA and West

Argentina there is the opposite effect for other cultivations. Especially, in CA the wheat and rice yields are likely to reduce by 10%. These changes in productivity will impact on the food security of humans and livestock: human malnutrition will be accentuated, particularly in that area where it already exists (for instance, in Guatemala almost one-third of its population already face food insecurity), and livestock will have faced harder conditions and their productivity is expected to decline.

As in the other cases studied above, also in this case the health will be continually negatively affected. What is related to climate change are the respiratory and cardiovascular diseases, as well as the usual vector-and water-borne diseases.

4.4 Adaptation and mitigation actions in developing countries

The adaptation and mitigation actions have to be re-arranged for developing countries, whose situation is very critical as their development is closely related to nature and to an increasing use of fossil fuel and combustion activities. In fact, since the first emerging problems linked to the global warming, these two elements have characterized their inability to tackle the climate change problems as, on one side the adverse consequences on nature have been having direct impacts on their health, economic activities, etc., and on the other side the main source of energy derive from carbon combustion. Hence, many in developing world argue that they are already hit hard by climate change consequences and being forced by International agreements to make substantial cuts in emission results inequitable: firstly because this slows down their growth, secondly because they cannot count on technologies and studies that allow them to switch to low-carbon tools without having additional negative economic repercussions (Stern, 2015). In addition the energy is mainly used in important infrastructures like schools and hospitals, or for other activities that are at the base of development (transportation, electricity…) In spite of this, intervention is essential as by 2030, climate change will be one of the main drivers of global poverty if not adequately tackled (worldbank.org, 2016).

For these reasons, the UNFCCC declared that North countries must cover a key role in fighting the climate change compared to the South ones: in fact there are “common but

differentiated responsibilities" among them (UNFCCC, 1992). This means that both rich and poor countries have to reduce their emissions, but the commitment of the developed contribute must be higher, not only because of their responsibility for the current situation, but also because they have to support the developing countries in the realization of their climate actions providing technology transfer and financial assistance especially where high immediate costs are needed. As said by the Heather Colerman of Oxfam America, if this does not happen, other developing countries will be the new China, and having again some of them is what it has to be avoided for our planet (Surowiecki, 2014).

Moreover, for the developing countries, the adaptation and mitigations actions should be integrated with measures for sustainable development and poverty reductions trough actions like: improvement of governance, empowerment of communities, availability of reliable information, increasing the resilience of infrastructures and livelihoods. (OECD, 2016). In fact, improving the development level, like having better infrastructures, investments in education and health system, diversification of economic activities, will make easier the implementation of adaptation measures, and, conversely, the benefits of adaptation actions will facilitate the development under different perspectives (Farid, 2016). If the actions are thus implemented in this manner, especially the mitigations measures represent cost-effective opportunities that facilitate the creation of co-benefits (worldbank.org, 2016). For example, extending the use of solar household in rural countries where there is not electricity allows improving the livelihoods and preventing the use of fossil fuel for it.

5. The Fairtrade strategy: the Fairtrade Carbon Credits

5.1 Fairtrade's climate change approach

Thanks to the ethical values at the base of its operating system, Fairtrade International has created a value chain where, through the Fairtrade Premium and the Fairtrade Minimum Price, the producers obtain benefits that in the conventional world trading system would not. Particularly in the last years, given the current climate change problem, Fairtrade International has decided to amplify the technical and financial support normally offered to its producers, in order to ameliorate their ability to cope with the climate change issue. In fact, according to the analysis, who are suffering more from the global warming are the developing countries, and thus also the Fairtrade producers. Indeed, their socio-economic and geography characteristics make them facing extra challenges for their development.

The work plan against the climate change that Fairtrade is developing has the scope to realize adaptation and mitigation activities. At the same time Fairtrade wants to strengthen its system, like the financial stability, the good management and the use of sustainable development and environmental practises, which also work as pre-conditions for the mentioned scope. More specifically, the plan concerns a new collection of standards related to climate change, support for the adaptation and a producer-driven advocacy (fairtrade.net, 2016). Hence, the result is a solution that is like a mix of technical and financial aids.

Particularly important is the Fairtrade Climate Standard, which is perfectly aligned with the Fairtrade's Global Strategy 2016-2020 and which aims to tackle the problem of climate change. To do that, specific rules are set for the smallholders or rural communities in order to give them the opportunity to access to the carbon market, where they can sell the Fairtrade Carbon Credits (FCCs). Thanks to this market, the producers are motivated to reduce their carbon footprint gaining extra profits to invest again in the environmental projects.

In addition to the Standards, Fairtrade sustains the adaptation process of the producers through activities like the opportunity-and-risk analysis, the dissemination of information and efficient practises or the implementation of projects that have tangible

results on the territories, like reforestations or awareness campaigns. Adapting is very important and creates a sort of virtuous circle as, thanks to it, the producers and communities become more resilient and able to increase both adaptation and mitigation activities.

Another important role played by Fairtrade is the participation at international conferences in order to bring the voices of developing countries during the international climate change negotiations as they are the most affected and the most vulnerable. In this occasion Fairtrade has the role to explain how the type and the size of support they needed is different and larger, and that the international community has to be aware of that. In addition, Fairtrade presents itself as a part of the solution showing the result data obtained from the activities that have been realizing. The first UN conference on climate change where Fairtrade was present was the COP16 in Cancun (Mexico). It participated also the following year, in Durban (South Africa) at COP17 during which it had the possibility to intervene explaining how the Fairtrade system helps the development and the empowerment of producers, how it already supports the fight against climate change and how much important is the financial aids given by richer countries to improve the effort of Fairtrade against the global warming. In that occasion, Fairtrade installed also an exhibition booth where it gave the possibilities to better know how the system works, it organized a cocktail meeting where the Fairtrade Africa's Chairman Adam Tampuri and the Indian producer Tommy Matthews made important speeches, and during the Round Table it discussed with the European delegates about how Europe can give its own contribution (fairclimatedeal.net, 2016). One year later, Fairtrade participated again at the UN conference, this time at COP18 in Doha (Qatar). There, Fairtrade outlined the importance of agriculture for the small-scale Fairtrade producers and how it should remain a priority in establishing the working plan. Furthermore Fairtrade recalled the necessary economic support from the Green Climate Fund for realizing efficient interventions without impacting on the fragile economic situation of developing countries. Fairtrade took part also in the last conference, the COP21 in Paris (France), where it intervened in two meetings: "Partnerships to improve agricultural resilience and productivity in a changing climate" and "Towards a more holistic and fairer carbon approach". During these two circumstances, it presented the Fairtrade Carbon Credits projects, as a way to sustain

even more the efforts of the small-producers in fighting the climate change, and the first projects realized by producers related to the new Climate Change Standard.
The Climate Standard and the correlate initiative are very important as they reach two goals simultaneously: overcoming poverty and tackling the climate change. As also Stern believes, failing one means failing also the other (Stern, 2015). In particular, as the majority of climate change consequences hit the developing countries, the realizations of projects that do not consider the climate change are not efficient. At the same time, implementing international actions against climate change that do not have a special regard for the South would address the problem only partially (Stern, 2015). Indeed, it is not necessary to choose between the economic growth or fight against the climate change. Better, if they are linked together there could be benefits on both sides reaching also different goals.

5.1.1 Fairtrade Carbon Credits

The Fairtrade Carbon Credits (FCCs) are tonnes of CO_2 that are prevented from being released in the atmosphere and that are then sold to companies in accordance with the Fairtrade Standards. In this way, the companies can compensate their too high emissions buying the credits and the producers, which are smallholders and rural communities, can improve their financial resources from the selling.
Indeed, once the Fairtrade Carbon Credits are generated, they can be exchanged in the carbon market and sold at the Fairtrade Minimum Price (when the market prices are lower than this) guaranteeing that all the production costs have been covered. In addition, like for the other Fairtrade products, it is also paid the Fairtrade Premium, which has to be invested in new projects against the climate change, like the crop diversification or bushes that protect plantations as established by the Climate Standard. In this way, the producers do not only receive benefits from the money gained, but also from the implementation of projects that generate the credits, as they become more resilient and stronger and acquire more knowledge about climate change.
The advantages are not limited just to the producers, but extend also to the other businesses. Indeed, buying the FCCs they make credible and effective actions against the climate change and at the same time they take part in climate justice. Besides buying

credits, the buyers, which purchases annually more than 1,000 carbon credits, have to realize a carbon reduction plan as well. This measure allow thus the creation of partnerships where both the parties make efforts for tackling the global warming problem, or otherwise the net result would be zero and effective CO_2 reductions would not be realized in the long term. In particular, this companies' commitment with Fairtrade reflect two facts: firstly the will of answer with concrete actions to the increasing demand of consumer for reducing their carbon footprint, as explained by Martin Hill the chief executive of Fairtrade International; secondly, as said by Marion Verles the chief executive of Gold Standard, the assurance offered by the Fairtrade system that the companies' investments in the climate change fight will benefit directly who is suffering most (qualityfoodawards.com, 2016).

The types of the projects that can be realized for the production of FCCs have to concern one of these areas: the energy efficiency, like the wind energy, solar electricity or biogas heating; the renewable energy, like energy saving lamps or water filtration system; and the afforestation/reforestation, like the planting trees or regeneration of ex-forested areas. The duration of these projects depends on the types of activities: for the first two type of project it is estimated between 7 and 10 years, while for the last between 30 and 40 years. For all of them, the annual average of credits generated is approximately 25,000 (where one credit corresponds to one tonne CO_2e) (Fairtrade, 2015).

5.1.2 The FFCs Minimum Prices and Premiums

As happens for the other Fairtrade products, also for the FCCs the Minimum Price calculation follows specific rules and it is used when the market price is lower than it in order to guarantee a minimum fair price that covers the costs and assures an economic margin. In addition to that, it has to be paid also the Fairtrade Premium.

Both, the Price and the Premium change according to the type of project that has generated the credits. As state by the "Fairtrade Minimum Price and Premium" table (Fairtrade, 2016), the prices applied worldwide to every CO_2 tonne (tCO_2e) not-produced are: 8.20€ for the energy efficiency projects, 8.10€ for the renewable energy

projects and 13.00€ for the afforestation/reforestation projects. Respectively, the Fairtrade Premium is 1.00€ for the firsts two and 1.50€ for the last.

Table 5.1: Fairtrade Minimum Price and Premium for Fairtrade Carbon Credits

Fairtrade Minimum Price and Premium for Fairtrade Carbon Credits		
	Fairtrade Minimum Price	Fairtrade Minimum Premium
Energy efficiency projects	8.20€	1.00€
Renewable energy projects	8.10€	1.00€
Afforestation/Reforestation projects	13.00€	1.50€

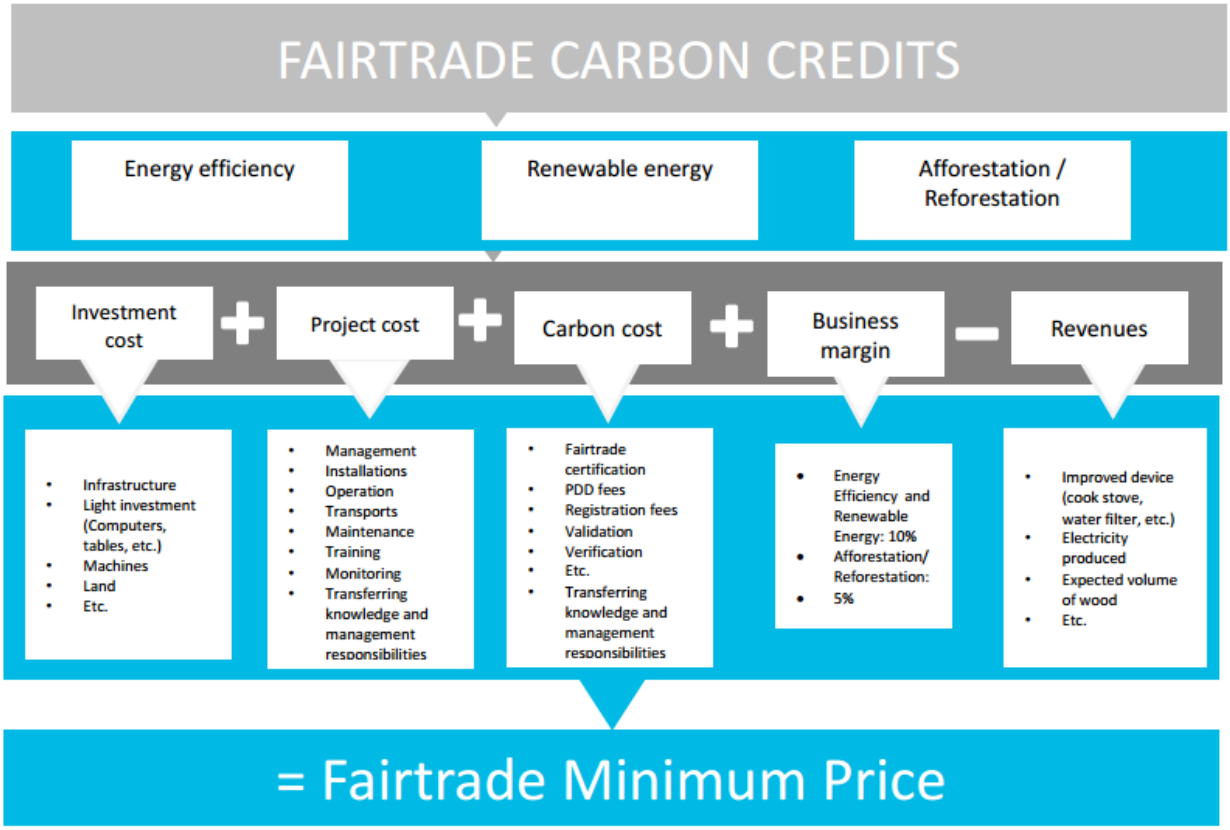
(Source: Fairtrade, 2016)

The calculation of the Prices and Premium follows a specific procedure that take into accounts costs, revenues and the net margins.

Starting from the costs, they are the following: the Investments costs, which derive from the building constructions, the machineries, the working tools and in general everything needed to realize the projects; the Project costs which are necessary for realizing activities like the management ones, the operations, the transportations, the distribution; and, the Carbon costs which arise from the implementation of FCCs projects, like carbon accounting, consultations, verifications, monitoring. All them together determine the Total costs, which derive from an average of the all types of costs and which change according with the type of projects realized among the three. Then it is calculated the Business margin that is equal to the 10% for energy projects and to 5% for the others. This percentage is added to the costs in order to guarantee a margin over them. The third element calculated is the further potential revenues that may derive from the projects, like revenues from the sale of energy production or forests products.

Utilizing these data, the FCC Minimum Price is quantified as showed in the graphic.

Fig. 5.1: Fairtrade Carbon credits



(Source: Fairtrade Carbon Credits price methodology, 2015)

As the table shows, the Price is the result of the difference between the sum of all Average Costs and the Business margin with the additional revenues. The result is then divided by the average quantity of credits that are expected to be generated by that specific project.

The formula is then the following:

$$\text{Fairtrade Minimum Price} = \frac{[(\text{Average Costs} + \text{Business margin}) - \text{Revenues}]}{\text{Number of credits}}$$

Hence, the pricing is based on the costs of the project.

There are other existing methods to calculate the carbon credit prices, but they do not guarantee the same sustainability of the projects, neither ensure that the money go directly to the most vulnerable communities nor require mandatory carbon emission reduction to buyers. Indeed, the pricing method based on market dynamics follows the

supply and demand rule, being effective in term of competitions, as it leads to cost reduction and even more efficiency for continuing to survive. But, at the same time, there could be a race to the bottom, the prices can be set under the average cost, the best projects could fail because of higher costs and the fundamental goals like food and water safety or education systems could be reduced or eliminated in order to avoid some expenses. Hence, the objective to reduce the environmental impact of economic activities making a sustainable development is not realized.

As seen, the price varies between the types of the projects. Several are the elements that determine the price. First of all, there are different impacts that the projects have to the communities: more is the value they deliver and more the cost of credit is. The variation depends also on the size of the project as the smallest ones normally are more expensive: the carbon credits production is lower, so covering all the costs requires higher sale prices. Another factor is the location. The costs rise also when a country does not have those infrastructures or resources that facilitate the project implementations, or when the countries are facing politic or economic instabilities. The prices vary also in accordance to the offer size of those particular types of credits, for example the solar credits. A further element is the willingness of the companies to pay for that particular type of credit. In fact, the buyers often decide to buy the credits from those producers whose activities align with the buyers' CSR (Corporate Social Responsibility). Another trend that is observed in the carbon credits markets is that lower prices are set for older credits. This market force is in reality no sense, as the goal to avoid the release of new carbon emissions is realized independently on when. It is realized in any case. In fact, the importance is not when the carbon credits have been generated, but how. (Gold Standard, 2016).

According to International Energy Agency (IEA), in 2014 the average price was around \$7 per tonne of CO_2 (IEA, 2015) that converted using the 2014 average exchange rate \$/€ becomes 5.26€ (cambi.bancaditalia.it, 2016). The average price is thus much lower than the floor price set by Fairtrade. This data demonstrates how the lack of a Minimum price would undermine the affordability and the attractiveness of the Fairtrade producers for realizing the projects. Indeed, as seen, the resulted prices from the Fairtrade calculation take in considerations all the costs and are presumably higher than the Minimum defined, while the average market price does not.

5.1.3 The FCCs calculation methodologies

The calculation of the Carbon Credits follows some detailed methodologies defined by Gold Standard, the Clean Development Mechanism (CDM) and the Verified Emission Reductions (VER). Their application depends on the types of projects. The following chart gives a clear idea about it.

Table 5.2: Fairtrade Carbon Credits - Approved carbon calculation methodologies

Fairtrade Carbon Credits - Approved carbon calculation methodologies		
Renewable Energy - Energy Efficiency	CDM AMS II.G Energy efficiency measures related to thermal applications of non-renewable biomass (version n.6)	Biomass fired cook stoves or dryers or ovens characterized by higher energy efficiency
Renewable Energy - Energy Efficiency	Gold Standard - Practices and Technologies to Displace Decentralized Thermal Energy Consumption (version 2011)	More efficient biomass or fossil fuel cook stoves, dryers, ovens, space and water heaters, solar cookers, heat retention cookers , safe water supply bio-digesters and treatment technologies which provide water boiling, and thermal insulation in cold environment
Renewable Energy - Energy Efficiency	The Gold Standard Suppressed demand and small- scale Methodology for the use of energy in processing of agricultural products (version 2013)	Photovoltaic panels or wind power plant as an alternative source of energy for providing electricity to biodiesel generators or mills
Renewable Energy - Energy Efficiency	Small scale methodology based on VER: Ecologically	Substitution of fossil fuel heating devices with biomass efficient

	fuel switch to biomass in order to reduce the energy requirement	heaters
Renewable Energy	AMS-I.C Small-scale methodology: production of thermal energy with or without electricity	Solar cook stoves or biomass/ biogas energy production devices
Renewable Energy	CDM AMS I.E Switch from non-renewable biomass by the user for thermal applications	Biogas stove or solar cookers or drinking water treatment technologies which use renewable energy sources
Renewable Energy	CDM AMS III.R Methane recovery at household/small farm level in agricultural activities (version n. 2)	Biogas production in order to avoid naturally emitted methane
Afforestation/ Reforestation	Large and Small scale Gold Standard: Afforestation and Reforestation requirements (version 2013)	Reforestation, improvements in forest management or natural regenerations
Afforestation/ Reforestation	CDM AR-AMS0007 A/R Small-scale methodology: Reforestation and Afforestation project activities which are implemented on lands or wetlands (version n.3.0)	Reforestation and agroforestry projects developed on degraded land

(Source: Fairtrade Int., 2015)

For what concern the "Renewable Energy and Energy Efficiency" projects, there are four types of methodologies: the Clean Development Mechanism (CDM) – Accelerator Mass Spectrometry (AMS) II.G, two Gold Standard methodologies and a Verified Emission Reduction (VER) methodology. The first method in the list is used for the projects that

involve “energy efficiency measures in thermal applications of non-renewable biomass”. The activity concerns the introduction of more efficient devices in term of non-renewable biomass energy (for example the consumption of cook stoves or ovens or dryers). The calculation is done through the AMS method which counts the radiocarbon atoms (cdm.unfccc.int, 2016).

The equations are presented in the following tables. Instead, Annex A provides the detailed meaning of the acronyms used in the formulas. The explanation of their meaning is presented separately in order to facilitate the reading of this Chapter.

Table 5.3: Energy efficiency measures related to thermal applications of non-renewable biomass (version n.6)

CDM AMS II.G: Energy efficiency measures related to thermal applications of non-renewable biomass (version n.6)	
Emission reductions -general formula	$\mathrm{ER}_y = \sum_i ER_{y,i}$
ER – household cook stoves	$ER_{y,i} = \sum_{a=1}^{a=y} B_{y,savings,i,a} \times f_{NRB,y} \times N_{y,i,a} \times \frac{\mu y, i}{365} \times NCV_{biomass} \times EF_{projected\_fossilfuel} - LE_y$
ER – ovens and dryers	$ER_{y,i} = \sum_{a=1}^{a=y} B_{y,savings,i,a} \times LE_y \times N_{y,i} \times f_{NRB,y} \times \frac{\mu y, i}{365} \times EF_{biomass}$

(Source: cdm.unfccc.int, 2016)

The Gold Standard method is applied for “Technologies and Practises to Displace Decentralized Thermal Energy Consumption”. Examples of technologies are improved stoves, ovens, water heaters or dryers that consume less biomass or fossil fuel energy. Examples of practises are instead activities that allow a shift to renewable energy technologies. The calculations take in consideration the Baseline Scenario, the Project Scenario and Additional Baseline and Project Scenarios. The Baseline Scenario corresponds to the normal average fuel consumption of the population to which the project refers. The Project Scenario is instead the level of fuel consumption once the

project has been adopted. The Emission Reduction (ER) is then the result of the difference between the first and the second scenario. It has to be subtracted also the "Leakage". This term refers to those activities that increase the carbon emissions because of the project implementation, for example the reuse of inefficient technologies because displaced by the project. During the time, from this initial situation, Additional scenarios can be added when the end users average level of consumption does not correspond to the Baseline Scenario or when new technologies or practises are introduced in the project, modifying in this way its reference Scenario (Gold Standard, 2011).

The equations that calculate the projects' GHG reduction in one year (y) are the followings:

Table 5.4: Practices and Technologies to Displace Decentralized Thermal Energy Consumption

Gold Standard: Practices and Technologies to Displace Decentralized Thermal Energy Consumption (version 2011)	
Same Baseline emissions scenario	$BE_{b,y} = B_{b,y} \times ((EF_{b,fuel,CO2} \times f_{NRB,y}) + EF_{b,fuel,nonCO2}) \times NCV_{b,fuel}$
Project emissions	$PE_{b,y} = B_{b,y} \times ((EF_{b,fuel,CO2} \times f_{NRB,y}) + EF_{b,fuel,nonCO2}) \times NCV_{b,fuel}$
The overall GHG reductions	$ER_y = \sum BE_{b,y} - \sum PE_{p,y} - \sum LE_{p,y}$

(Source: Gold Standard, 2011)

Also the third method refers to a Gold Standard calculation mechanism. It is called "Methodology for energy use for the processing of agricultural products" and involves activities as the installation of solar/photovoltaics panels wind power plants, mills, etc. which reduce the use of fossil fuel in the agricultural outputs' processes (Gold Standard, 2013).

Table 5.5: Methodology for the use of energy in processing of agricultural products

Gold Standard: Suppressed demand and small- scale Methodology for the use of energy in processing of agricultural products (version 2013)	
Baseline emissions scenarios	$BE_y = BE_{heat,y} + BE_{power,y}$
Project emissions	$\mathbf{PE_y} = PE_{power,y} + PE_{PP,k,y} + PE_{heat,y} + PE_{CH4,y} + PE_{MeOH,y} + PE_{CC,y}$
Emission Reductions	$ER_y = BE_y - PE_y - LE_y$

(Source: Gold Standard, 2013)

The fourth method is instead the "Ecologically sound fuel switch to biomass with reduced energy requirement" which derives from a small scale methodology of Verified Emission Reduction. It regards projects that substitute the fossil fuel heating devices with heaters based on renewable energy (Gold Standard, 2016).

Table 5.6: Ecologically fuel switch to biomass in order to reduce the energy requirement

VER Small scale methodology: Ecologically fuel switch to biomass in order to reduce the energy requirement	
Baseline emissions	$BE_Y = Q_y \times EF_{BSL}$ Where: $EF_{BSL} = (FC_{BSL} \times NCV \times EF_{CO2y})/Q_{BLS}$
Project emissions	$PE_Y = FC_Y \times NCV \times EF_{CO2}$
Emission reductions	$ER_y = BE_y - PE_y - LE_y$

(Source: Gold Standard, 2016)

For what concerns just the "Renewable Energy" projects, there are three additional calculation methods: the AMS-I.C, the CDM AMS I.E and the CDM AMS III.R.

The first, called "Thermal energy production with or without electricity", is based on the AMS-I.C Small-scale methodology. Hence, it involves projects whose energy supply

derives from the thermal energy instead of the fossil fuel. Examples are the solar thermal devices or the biomass/biogas energy productions (UNFCCC, 2016).

Table 5.7: Production of thermal energy with or without electricity

AMS-I.C: Small-scale methodology: production of thermal energy with or without electricity	
Baseline emissions for electricity production	$BE_{captelec,y} = \left(\frac{EG_{captelec,PJ,y}}{\eta_{BL,captive\ plant}}\right) \times EF_{BL,FF,CO2}$
Baseline emission for heat production	$BE_{thermal,Co2,y} = \left(\frac{EG_{thermal,y}}{\eta_{BL,thermal}}\right) \times EF_{FF,CO2}$
Baseline emissions for electricity and heat production	$BE_{cogen/trigen,CO2,y} = \left[\left(\frac{EG_{PJ,electrical,y} \times 3.6 + EG_{PJ,thermal,y}}{\eta_{BL,cogen/trigen}}\right)\right] \times EF_{FF,CO2}$
Project emissions	$PE_y = PE_{FF,y} + PE_{Ec,y} + PE_{cultivation,y} + PE_{Geo,y} + PE_{ref,y}$ Where: $PE_{Geo,y} = PE_{FF,y} + PE_{s,y}$
Emission reductions	$ER_y = BE_y - PE_y - LE_y$

(Source: UNFCCC, 2016)

The second methodology is again a Small-scale one. It regards a "Switch from non-renewable biomass for thermal applications by the user" and it is applied in projects that develop renewable energy-based technics and devices like biogas stoves and solar cookers. (UNFCCC, 2016).

Table 5.8: Switch from non-renewable biomass by the user for thermal applications

CDM AMS I.E: Switch from non-renewable biomass by the user for thermal applications	
Baseline emissions	$BE_y = f_{NRB,y} \times EF_{projected\_fossil\_fuel} \times B_y \times NCV_{biomass}$
Project emissions from cultivation of biomass	$PE_{BC,y} = PE_{SM,y} + PE_{BB,y} + PE_{Ec,y} + PE_{TR,y}$
Emissions reductions	$ER_y = BE_y - PE_y - LE_y$

(Source: UNFCCC, 2016)

The last methodology for the calculation of carbon credits from "Renewable energy" activities is the CDM AMS III.R called "Methane recovery in agricultural activities at household/small farm level". This type of projects aims to avoid that agricultural activities release methane into the atmosphere (UNFCCC, 2016). In this case, the ER is not determinate just by a subtraction, but by the comparison between two subtractions in order to take the lowest value. The first is like the other type of ER calculation, while the second has as first member the quantity of the Methane Destroyed or captured in the year (y) by the project (UNFCCC, 2016).
The equations are the followings:

Table 5.9: Methane recovery at household/small farm level in agricultural activities

CDM AMS III.R: Methane recovery at household/small farm level in agricultural activities (version n. 2)	
Baseline emissions	$BE_y = D_{CH4} \times GWP_{CH4} \times UF_b \times \sum_{j,LT} MCF_j \times N_{LT,y} \times B_{0,LT} \times MS\%_{Bl,j} \times VS_{LT,y}$
Project activity emissions	$PE_y = PE_{PL,y} + PE_{power,y} + PE_{transp,y} + PE_{flare,y} + PE_{storage,y}$

Emission reductions	$ER_{y,ex\ post} = min[(BE_{y,ex\ post} - PE_{y,ex\ post}), (MD_y - PE_{power,y,ex\ post})]$ Where: $MD_y = BG_{burnt,y} \times D_{CH4} \times FE \times w_{CH4,y} \times GWP_{CH4}$

(Source: UNFCCC, 2016)

The next to calculation methodologies refer to the third type of projects promoted by Fairtrade: the Afforestation/Reforestation ones. One method is used for both Small and Large scale projects which develop activities like reforestation, regeneration and forest management. The equations applied refer to "Gold Standard Afforestation and Reforestation requirements" of the Version 9 (august 2013) and are partially different from those used for the other types of projects. For understanding this type of calculation, it is necessary to understand what the Modelling Units (MU) and the CO_2-carbon fixation are. The MUs represent distinct planting areas where the project is developed and where the carbon stocks are calculated, while the CO_2-carbon fixation is the conversion process made by living organism that transform the carbon dioxide in organic compounds. The CO_2-certificates, refers to just one MU, so it is necessary then to sum all the CO_2-certificates of all the MUs of the project (Gold Standard, 2013). The equations are the followings:

Table 5.10: Reforestation and Afforestation requirements

Large and Small scale Gold Standard: Reforestation and Afforestation requirements (version 2013)	
CO_2-certificates	CO2-certificates: $(CO_{2_{Fixation}} - Baseline - Leakage - Other\ Emissions) * Eligible\ planting\ area$
Total CO_2-certificates per Project area per year (y)	$CO2\_certificates_{Project\ area,t} = \sum_{MU=1}^{MUs} \sum_{t=1}^{CP} CO2_{certificates\ MU,t}$

(Source: Gold Standard, 2016)

The second methodology used for Afforestation/Reforestation small-scale projects refers to the project activities implemented both on lands and wetlands. In this case, the calculation methodology is based on three data: the Baseline and the Actual net GHG removals by sink, and the Leakage emissions (UNFCCC, 2016).

5.11: Small-scale methodology: Reforestation and Afforestation project activities which are implemented on lands and wetlands

Small-scale methodology: Small-scale methodology: Reforestation and Afforestation project activities which are implemented on lands and wetlands (version n. 3.0)	
Baseline net GHG removals by sinks	$\Delta C_{BSL,t} = \Delta C_{TREE\_BSL,t} + \Delta C_{LI\_BSL,t} + \Delta C_{SHRUB\_BSL,t} + \Delta C_{DW\_BSL,t}$
Actual net GHG removals by sinks	$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t}$
Leakage emissions	$LK_t = LK_{AGRIC,t}$
Net anthropogenic GHG removals by sinks	$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL.t} - \Delta C_{BSL,t} - LK_t$

(Source: UNFCCC, 2016)

5.2 The Fairtrade Climate Standard

The Fairtrade Climate Standard is a protocol of environmental practises defined by Fairtrade whose scope is to define a framework of requirements for gaining access to investment opportunities against the climate change. Some examples are the projects related to renewable energy, the reduction of CO_2 emissions, new agricultural practises, reforestations or minimization of energy waste.

The Standard addresses to all the subjects of the Fairtrade value chain: from the FCCs producers, to traders that exchange the carbon credits, to buyers and to project facilitators who help the realization of projects.

The principles that characterize this Standard are the following. First of all, the "Democracy and Transparency" as the producers of the FCCs are directly involved in the management of the project. Then, the payment of a Fairtrade Minimum Price and the Fairtrade Premium that allow sellers to be fairly economically rewarded from their investments and efforts in the adaptation and mitigations actions, and to be motivated and financially supported to continue. The promotion of a "Capacity Building" that improves progressively with the implementation of the projects. The respect of the "Environment and Labour conditions" and thus all the core principle of Fairtrade. Finally the "End buyer emissions reductions" as the carbon credits have to implement a carbon emission reduction plan to be able to buy the credits (fairtrade.net, 2016).

Given these principles, the Standard allows the achievement of two complemental results: the adaptation and the mitigation. The first one makes the producers and the rural communities more resilient to climate change, while the second onemakes them better in term of carbon footprint.

As seen before, they trigger benefits to both the producers of credits and buyers. Indeed, the producers can invest additional revenues to be invested, while the buyers make credible and effective actions against the climate change. Hence, both parties actively act against the global warming.

In conclusion, it is important to underline how the Climate Change Standard is designated in the respect of the core values of Fairtrade: a governance based on transparency and democracy, the respect of human rights and of the environment, the empowerment of women and the payment of fair prices. In fact, the goal of this Standard is to boost even more a sustainable development making a further step towards the realization of the Theory of Change, but with the priority of climate change.

5.2.1 Fairtrade and the Gold Standard Foundation

This plan of action is developed in synergy with an international organization specialised in climate and development projects: the Gold Standard, whose certification in this regard accompanies the Fairtrade Standard.

The Gold Standard Foundation, based in Geneva (Switzerland), was born in 2003 thanks to an initiative promoted by World Wildlife Foundation and other NGOs in order to create a specific organism that could be the reference point for the project developed under the UN's Clean Development Mechanism (CDM). The organization now involves more than 80 organizations and more than 1.000 projects around the world (goldstandard.org, 2016).

The Gold Standard's main activities are to define standards and to certificate their respect for assuring that the money and the efforts invested in environmental projects have lasting results and that the live conditions of the poorest are improved. Indeed, its mission is the promotion of sustainable development together with the reduction of CO_2 emissions in such a way as to protect the environment and to make the managers more responsible and aware of this current issue. Moreover, as Gold Standard is specialised in climate security, this organisation works as certificatory for both the voluntary carbon offset projects and the Clean Development Mechanism projects. For the first types of projects, the credits are called Gold Standard Verified Emission Reductions (GS VERs), while for the second ones are defined GS Certified Emission Reductions, as they are part of the CDM (GS CERs).

The specific goals of Gold Standards thus encompass several fronts, but they are linked one each other and concern the reduction of greenhouse gas emissions and deforestation, the improvement of health and livelihoods of the world's poor as well as the food and water security and the support to a sustainable development (goldstandard.org, 2016).

The way the organization operates is inclusive of and collaborative with the local communities, has a transparent governance, applies rigorously its standards and promotes new and innovate programs as a pioneer. Indeed, the projects have to conform to the Millennium Development Goal set by UN.

After the implementation, the Organization continually monitors, verifies and reports all the progresses and also analyses the feedbacks or comments that could derive from the stakeholders involved. These opinions, which are a direct result of the transparency principle, are really important as they derive from a different prospective and can represent a starting point for improvements.

In the specific case of the FCCs, Fairtrade and Gold Standard announced a partnership in December 2012 in order to combine the forces and expertise for putting together the climate finance and the support of the small-scale farmers (Howard at al., 2015).

5.3 The features of Fairtrade Climate Standard

The Fairtrade Climate Standard has been developed on the basis of five distinguishing features: the General requirements, the Social and Business Development, the Labour Conditions, the Environmental Development and the Trade.
For each of them, it has been defined a specific scope, the requirements and a guidance in order to clarify which are the pre-set objectives and the rules to respect, and who are required to comply with them and how.
For what concerns the requirements, there are the Core ones, which consist in the basic Fairtrade principles, and the Development ones, which regard the improvements necessary to make by the subjects involved over time and that are evaluated by a score. The time necessary to reach a complete compliance with these requirements can be longer or shorter depending on the type of them. For this reason it has been defined also a time frame expressed in years that defined the periods within which adapt, as after the audit activity starts. During this latter, the Climate Standard is considered respected if there is a total observance of the Core requirements and if the agreed minimum score for the Development ones has been reached in time.
Obviously, there are requirements that do not refer to all the operators involved, as they have different roles and activities to carry out. These subjects are the Producers organizations, the Project facilitators, the Traders and the End buyers.
The Producer organizations are those which produce FCCs trough the implementation of carbon emissions reduction projects based on energy efficiency, or renewable energy or afforestation/reforestation activities. The producers can be: certified Fairtrade producers which start developing carbon projects in compliance with Gold Standard requirements; organizations or producers that are developing a Gold Standard project and decide to access to the Fairtrade carbon credits market; operators without any of

these two certifications, but that want to obtain them in order to produce the FCCs. The two conditions that make the last-mentioned eligible are: being situated in one of the countries of the Fairtrade geographical scope and being a small-scale producer of carbon credit. This latter is defined as who faces difficulties in term of market access, or resources and technology availability, does not overcome 15 megawatts in the realization of energy projects, and realizes at least half of the reforestation project by own work or the member's family work.

The Project facilitators do not produce any FCCs, but give an important support to producers for doing that trough the transfer of competences and knowledge. Generally, they are external bodies like NPOs, companies or consultants that are disposed to give their contribution helping the development and the realization of the projects.

Contracts between producers and facilitators are stipulated when producers need to outsource the realization of activities related to the requirements. This occurs when the producer does not have enough skills and knowledge to do that alone, and so it nominates an external entity that has the necessary competences. The relationship is well defined by a contract that has to follow the prerequisite set by the Standard. Specifically, the contract has to be written and has to specify the duration, which parties deals with which activities, the recompense for facilitators and how the profit from the FCCs sale will be shared, when and how the knowledge and competences will be transferred, and further relationship details.

The Traders are operators that buy and then sell FCCs paying the Fairtrade Minimum Price and the Fairtrade Premium to producers. They can be traders that belong to the Fairtrade supply chain or to a Gold Standard's projects, so they are already certified, or they can be a new certified trader. Also the project facilitators and end buyer can act also as trader and in this case they are certified as such.

The End buyers are business actors that buy the FCCs in order to compensate those emissions that are not able to eliminate despite the implementation of carbon reduction emission projects. The engagement in this type of projects are an essential prerequisite for accessing to the FCCs market or, at contrary, there would be a mere trade of carbon credits without a true wish for fighting the climate change. They can be buyers which already buy Fairtrade products and that want to act concretely against the climate change, boosting, at the same time, their commitment in the fair and sustainable development financing (indirectly) the environmental projects of Fairtrade producers.

They can also be external buyers that share the same motivations of the certified Fairtrade buyers and that want to reduce their carbon footprint, supporting also the people who are the most affected by the climate change issue.
The Climate Standard, as occurs with the other Standards, is defined in accordance to the ISEAL Code and to the international standards and conventions, like ILO. Moreover, if national legislations require higher climate standard, this latter becomes the benchmarks (Fairtrade Int., 2015).

5.3.1 The General Requirements

The General Requirements correspond to those requisites that make reliable the Fairtrade products and marks. They are the Certification and the Right to trade, the Carbon accounting and the Use of Fairtrade trademark.
The Certification and Right to trade section defines who can trade the FCCs and the auditing controls to which are subject the traders. The acceptance of announced or unannounced audits, during which all the necessary documents have to be shown, is since the beginning a core requirement that applies for the producers, the facilitators and the traders. Also the presence of a Fairtrade officer, who deals with the certification issue, is a core requirement for all three since the beginning. The only exception is done for the producers: if they do not have immediately an internal officer, they have a period of time of three years to nominate one, who can be the individual producer or an employee. In the meanwhile, the role is played by the facilitator.
As regards to traders, their activity involves just the purchase of FCCs from certified Fairtrade producer organizations and it can be started only when the relevant permission is issued and a contract with Fairtrade is concluded. It may happen that the certification of the buyer or the producer is suspended or revoked: in the first case new Fairtrade contracts can be signed later, in the second the transaction cannot be done.
The Carbon accounting represents one of the most important sections of the Standard as it defines the amount of carbon credits produced. The methodologies used, which could vary on the basis of the project type, are those of the Clean Development Mechanism or

of the Gold Standard that are approved by Fairtrade. For a producer, resulting as "registered" is a core requirement that allows it to be subjected to carbon accounting procedures.
The Use of the trademark, relative to this Standard, works as a sort of advertisement for good environmental practises. Its use starts for both the producers and the traders after a consent released by Fairtrade (Fairtrade, 2015).

5.3.2 Social and Business Development

This section aims to define how the producer organizations have to work in order to be transparent and democratic and how they have to operate in order to ensure that the benefits reach directly the members. The requirements concern the Organizational development, the FCCs project management and the Climate Change Adaptation.
Beginning with the Organizational development, this refers just to producers' organizations, which, from its very definition, have to be a group of more producers that assumes the form of an association or of a small producers-or-community based organization. This core requirement specifies that the decision making processes and the representative elections have to be transparent and democratic and how a feedback system relative to the Social and Business Development issues has to be created. Other core requirements for the producers' organizations, which are necessary since the beginning, are the opening of a bank account (if not possible, the opening will be made by the facilitator) and the prohibition of any types of discriminations inside the organization. Also the presence of a policy for the women empowerment is a core requirement, but in this case the time for the compliance is three years. Same timeframe is established for the Development requirement of incrementing the involvement of the producers through the sharing of the ongoing results, through training courses or explanatory meetings.
The Fairtrade Carbon Credits project management concerns the governance of the projects. Regarding the producer organizations, within three years they have to nominate one or more project managers who assume the responsibility for the

realization of the projects and for all its administrative issues. In case of a necessary support from the facilitator, this latter has to develop the management capacities of the project manager in order to decrease its contribution progressively. Obviously, the projects can be implemented after having received the necessary permits and authorization in order to be in compliance with the legislation. Then, a periodic check of the laws is needed. Other Core requirements, which add to those just explained, establish the realization of specific market analysis of the projects at the beginning and then at regular intervals. They have to concern: risks and opportunities in term of business and environment; the impact on the environment in order to avoid and mitigate potential negative consequences (as loss of biodiversity, soil erosion…); the respect of local people, human rights and the cultural values of the areas; and, the forecast of possibilities that the project could undermine the food securities of its members or of the communities. Always for the producer organizations, it is required to obtain the "Free, Prior and Informed Consent" (FPIC) before the realization for the project in order to assess the impacts on the nearby communities which are not part of the project (like noise or pollution). This "Consent" is freely released by the communities (Free) before the start of the project (Prior) and after being "informed" on all its essential details. In addition to these procedures which aim to protect who and what gravitates around the project, there are also the grievance mechanisms with which the producer organization is informed about negative feedback. They are very important because they trigger corrective actions, allow to continually improve and to obtain the best results from the project implementation.

For the facilitators, instead, the "project management" requirements establish that they have to be at least one year experienced in the field of management, carbon monitoring and finance, and within one year from the beginning of the project, they have also to train the producer organizations and transfer to them the necessary knowledge and skills, complying with the plan elaborated that provides also a success indicator to evaluate this procedure. This competencies transfer from the facilitator to responsible of the producer organization has to occur gradually over a three-years period.

For what concerns the Climate change adaptation requirements, their scope is to invest the money gained from the sale of the FCCs in efficient adaptation activities, in order to reduce the great vulnerability of the disadvantaged communities. Again the producer organization has the main role because it has to organize meetings where the problem of

climate change is explained, from the causes and the consequences, till the mitigation actions. In addition, in one year time, the organization representatives shall have acquired the necessary competences for developing a “risk and opportunity assessment” relative to local climate conditions that is essential for understanding which the best measures to take are. During the same period, taking in consideration the previous assessment, also an adaptation plan has to be developed, where the duration, the objectives, the budget and the responsibilities are specified. Its main goal is to prevent future potential risks, saving thus money and avoiding further damages. Obviously, all the decisions related to the just described actions have to be the result of a democratic process that involves all the members. It could happen that the Fairtrade Premium is invested in activities that are not related to climate: this is possible when there is great urgency in another field.

Concluding the Climate change adaptation section, there are two important long term Development requirements. One establishes the realization of activities against climate change (minimum one) within a period of three years that benefits the most vulnerable groups, like the migrants or women, the other is based on a longer period, six years, and affirms the necessity to show, discuss and explain the results and the experience gained from the implementation of the projects.

5.3.3 The Labour Conditions

The Labour Conditions requirements define the good and minimum conditions to applicate to workers employed who produce the FCCs, in order to respect them and to give them a fair reward. These requirements refer to the ILO Labour Conventions, which already have inspired the Fairtrade Labour Standards. These are the Freedom from discrimination and from forced or compulsory labour, the Child labour and protection, the Freedom of association and collective bargaining, the Condition of employment and the Occupational health and safety.

The Freedom from discrimination is based on the number 111 ILO Convention which, at article number 1, defines the discrimination as any type of distinctions based on the sex, religion, age, gender, nationality, race, colour and, in general, all what is not based on

merit (ilo.org, 2016). These types of discriminations are not allowed, as well as any types of mental or physical punishment and intimidating or abusive behaviours.

The Freedom is also from the forced or compulsory labour, as well as the human trafficking and the sexual exploitation. These Core requirements reflect the C29 and C105 ILO Convention, which define what the forced labour is and declare its abolition, respectively (ilo.org, 2016).

The Child labour and protection Core requirements are based on the ILO Conventions number 182 and 138. The first describe what is meant for Worst Form of Child Labour, defined as the work that harms the heath, the safety and the moral of the children, like child soldiers, prostitution, illicit activities... (ilo.org, 2016). While the other establishes that the Minimum Age for working corresponds to the age of the conclusion of the compulsory school and in any case not before being 15 years old, unless the local legislation does not define an higher age (ilo.org, 2016). Below 15 years, the children can just help their parents if member of the producer organization, but without affecting in some ways the school activities. To carry out tasks that could be particularly dangerous, the minimum age shifts to 18 years. Additionally to not employ children, the members have to realize some procedures that prevent the child labour.

The Freedom of association and collective bargaining section derives from the following ILO Conventions: the Freedom of Association and Protection of the Right to Organize (n.87), the Right to Organize and Collective Bargaining (n.98) and the Workers' Representatives (Recommendation n.143). Their scope is to give to worker the choice of joining or not a worker organization, of having a workers' representative and of negotiating collectively the contracts (ilo.org, 2016). The Climate Standard shares the same ILO worker rights and over a period of three years encourages the worker member to found a worker organization if there is none, if the existing ones are managed by the governments or if the unions are not allowed.

The Wages Core requirements concern the producer organizations and establish what follows. The salaries have to be set in accordance with the Collective Bargaining Agreements or with the legal minimum wages if higher, and the payment has to be regular. Particular it is the case of quotas or piecework where the rate has to be fair and accepted also by the workers. Along these Core requirements, there are the Development ones which explain that, within three years, the producer organizations have to: implement a system that recognizes the maternity leave, the social securities

and other benefits; make written contracts for all the workers where the binding conditions are specified; deliver these contracts to all workers; give the same benefits to different workers intended like migrants, locals, permanent or temporary; implement salaries that increase year after year. Six years are instead the timeframe to conform the subcontracts of seasonal or migrants to the labour Standards.

The 155 ILO Convention on the Occupational Safety and Health, which defines how prevent the accidents and injuries in the workplace (ilo.org, 2016), has inspired the homonym Core requirements. These claim that: the workplace (like the machineries, the processes…) had to be safe; the people in particular circumstances (like people with diseases or disabled) cannot make hazardous work, and those who make it have to receive the personal protective equipment (PPE); the workers have to be trained and equipped in order to be able to make the first aid; and there have to be toilets, water and washing sites. Over a period of three years, other two Core requirements have to be satisfied. First of all, the realization of training courses for workers who carry out hazardous work, as they have to receive all the relevant information about the risks and how to manage potential inconvenient. Secondly, instructions on safety, hygiene and recommended behaviours have to be clearly displayed in an understandable way. In the same period also the Development requirement which disposed the nomination of a health and safety representative for the workers have to be satisfied.

5.3.4 The Environmental Development

This section of requirements aims to guarantee that the realization of the projects does not impact negatively on the environment, but at contrary they have to protect it. These requirements are numerous and they may vary between the type of the project (afforestation/reforestation or energy based). They are related to the Pest management, the soil and water, the Waste, the Genetically Modified Crop and the Biodiversity.

The Pest management is addressed only to the afforestation/reforestation producers and is composed of a series of Core and Development requirements whose intent is to limit to the minimum necessary the use of pesticides and to promote a conscious and careful use of the least toxic of them. First of all, the mentioned producers cannot use

any of the pesticides present in the Fairtrade International prohibited material list, unless derogation is granted by the certification body. In this latter contingency, the use has to be minimal, real needed and just temporary. It is also necessary to write a list of those used and to update it at least every three years. In any case, the pesticides have to be applied beyond not less than ten meters from the human activities, like offices or houses. Moreover, always since the beginning, those workers who handle the chemicals and pesticides have to be trained and informed about the risks, the containers have to show detailed labels and the storage of these latter has to make in safety way to avoid risks as children's contacts, reuse of containers, thefts.

In addition to these Core requirements, there are the Development ones which establish that within three years from the project implementation all pesticides and other hazardous chemicals have to be labelled and the hazardous wastes eliminated. In addition, their storages or potential contaminated equipment cleaned and the members have to be trained and informed about the use and the risks of these materials and about the strategies for weed prevention without the use of herbicides. Within a longer period, six year, also other members have to be trained and well equipped, in order to be able to tackle accidents or spills deriving from these chemicals, and training course on the use of fertilizers have been organized.

The second part is composed just by Development requirements which refer to two vital elements: soil and water. Again, the producers concerned are only those who develop afforestation/reforestation projects. Over a period of three years, the producers have to identify areas already damaged by soil erosion or at this risk and have to provide trainings to recover the first case situations and prevent the seconds. Within the same period also a list of the water sources shall be made in order to know the trees irrigations sources. Obviously, in any case the projects must not in some ways harm these sources, so a continuous dialogue between the producer organizations and the local authorities have to be established for monitoring the situation and for intervening where necessary. Also the organization of training courses for the producers result needed, so they can learn to estimate how much is the water average consumption demand, how measure the real consumption, and how to recycle it and how to optimize its use. Furthermore, in six years, it is envisaged that a waste water management preparation is given to the producers to avoid that the water quality and the health are negatively affected. Some examples of measure are the installation of water filtration

systems, periodic water analysis or explanations of the waste water risks and preventive actions.

The Waste requirements define how to manage waste through the reuse, the recycle or its reduction. In this case the Core requirement is just one and establishes that within one year there must not be any trace of hazardous waste in the producers' project areas. The rest are Development requirements whose application period is three years. First of all, the members have to acquire all the information and the competences that make them able to effectively reuse and recycle the waste. In addition, areas for the storage of the hazardous waste have to be designates. The burning of this material is done only if allowed by the local legislation and always in conformity with the safety rules.

The regulations for the Genetically Modified (GM) Crops have been developed because their use is not beneficial for the health and the environment in the long-term. As stated by FAO, from the food and health point of views, the GM products could be toxic and allergenic, instead for what concerns the environment there GM would lead to a loss of biodiversity, negative effects on the other organisms or the evolution of pest resistance (fao.org, 2016). For these reasons, the afforestation/reforestation producers are not allowed to use the GM crops, but at contrary have to develop practises which avoid that these crops contaminate their productions.

This latter section is closely related to the Biodiversity one, which orders to not negatively affect the protected or conservation areas that belong to or are outside the projects. Moreover, over a period of three years it is necessary to raise awareness among the producers for avoiding the collection and the hunt of rare species, as well as the introduction of invasive species. Three years more is instead the timeframe for the realization of buffer zones around the watershed recharge and the conservation areas, where any types of pesticides or other chemical products are applied, and also for reporting any types of activities that benefit the biodiversity.

5.3.5 The Trade

This last section deals with the buying and selling of the FCCs that is managed just by the Authorized Carbon Credits Supplier. The traders can buy the Credits directly by the

producers' organizations or from the project facilitators. This latter case occurs when facilitators sell the credits after having bought them from the producers or when they sell them on producers' behalf when they do not have the sufficient competences to do that. The trader can be also the end buyer when it buys directly from the producers. The specific requirements concern the Contracts, the Sourcing, the Traceability, the Access to finance and upfront payments, the Price and the Fairtrade Premium, the Timely payment and the End buyer engagement.

Thanks to the requirements of the Contract section, Fairtrade wants to ensure that partnerships are based on the mutually respect and on the transparency and that all the conditions written in the mandatory contracts (like volume, terms of payments or amount of Fairtrade Premium) are followed. Then, in three years, a long-term commitment between the seller and the buyers has to exist. If producers' organizations are not able to supply the forecasted and agreed volume of credits, the contract cannot be nullified by the buyer unless he pays a sanction or unless the underperformance is caused by unjustifiable delays of producer who not even inform the buyer on that.

The Sourcing requirements are useful as they force the producers to schedule their operations, so they can know which their production trends are. In this ways potential delays can be anticipated and communicate to producers.

The Traceability is done through documents that attest it, like the sale or purchase invoices.

The Core requirements of the Access to finance section represent one of the most important benefits that derive from the Fairtrade Standard. The subjects in charge of making the finance resource available are the producer organizations and the traders. These latter, in addition, have to pay in advance when requested by the producers.

As generally set with the Fairtrade Minimum Price, also for the FCCs Price the same rule applies. The Minimum Price is paid to producers (without any type of discounts), unless the market price for non-Fairtrade carbon credits is higher. Deductions can be made just by the project facilitators who act on behalf of the producer organizations, as they are a sort of fees for their activities. In any case, the deductions on Price received are made in accordance with the contract, while the rest is entirely transferred to producers as well as the Fairtrade Premium, which must never be compromised. The buyers have also to pay a fee for Fairtrade activities realized in this operating sector. The fee corresponds to the 3.5% of the Minimum Price (goldstandard.org, 2016).

The payment for both Price and Premium in favour of producers has to be done by the traders within a period of 30 days after having received the FCCs. The same terms work for project facilitators, but in this case the 30 days start after paid from the trader.
The End buyer engagement requirements establish that these subjects have to sign with the national Fairtrade organization (NFO) or with Fairtrade International (when the first is not present in the country) an agreement for the purchase of credits and a contract that allows to communicate this procedures for promotional purposes. One year later, they have to calculate and report the own carbon emissions and present an emission reduction plan. After three years, a third part will verify the carbon emissions reported and then there will be the possibility to buy the FCCs, if there is enough supply. Again three years later, the buyers have to reduce as much as possible the number of subjects in the supply chain in order to have contacts as direct as possible with producers.

5.4 Why the Carbon Credits for reducing the carbon emissions?

Three methods are normally used to reduce the carbon emissions. These are the regulations, the carbon taxes (or subsidies) and the tradable quotas (also known as cap-and-trade schemes) (Stern, 2015). Obviously each one has pro and cons.

The regulation
The regulation is one of the most used methods to tackle the climate change (Tol, 2014). Essentially, it defines specific standards for products, infrastructures and technologies and it works like a sort of one-size-fits-all solution. This methodology has a different cost for each business because of their ability to meet the standards changes in relation to the type of activity done. So, it could result more costly than the market-based approaches for some companies. However, this methodology has the advantage of the clarity that is very important in uncertain circumstances like the real world. Indeed, the businesses know how to behave in order to meet the standards and the governments are sure that everyone will conform to the new climate regulations.

Taxes and Subsidies

The other two instruments, taxes (or subsidies) and tradable permits, are market-based. The main advantage in using these instruments is that the regulator forecasts or defines only how much the reduction has to be, not how. So every subject can choose the best option that fits with its activities. In this way, the cost-effectiveness is guaranteed (Tol, 2014). In addition, putting a price on carbon emissions allows transforming the carbon emission external costs, as pollutions or climate extreme events, in a source of income. The main difference between taxes/subsidies and the tradable allowance is that for the firsts the price for extra emissions are set in advance, while the total carbon emissions reduction is not (but it can be forecasted) (carbonpricingleadership.org, 2016).

More specifically, the tax corresponds to a given price for carbon units emitted and it represents a cost for the companies. In order to avoid it, businesses are incentivised to reduce their emissions up to the point where the marginal cost matches the tax. In reality, it is very difficult for the companies knowing the exact point where these two elements are equal. Indeed, estimations of the future are necessary, but it is quite impossible to know when and how innovative technologies will be introduced in the market and how the marginal costs will be affected by them (Stern, 2015).

It is also important to consider that even if taxes are applied, it does not mean that there will be changes in behaviours and technologies, as many companies and people will continue to use and operate as always. Regulations instead require investments in new tools and changes in behaviours that at the beginning are inevitably more expensive. But these new behaviours and technologies are durable, so this deadweight loss is just initial (Tol, 2014).

An alternative to taxes can be subsidies. Differently from the first, they are not seen as a penalty, but as a sort of reward for each carbon units not emitted. The two solutions have the same effect in the emissions, as they are reduced, but the distributional effect is different. Indeed, in the case of taxes, the money flows from emitting companies to States, so the average production cost increases and the money available to invest in the company's activities decreases. In the case of subsidies, there is the opposite situation: the businesses have more money and their average production costs decrease (Tol, 2014).

Carbon Credits

The trading system is based on tradable quotas. It also called the cap-and-trade scheme as the total number of allowances issued corresponds to maximum level of emissions reachable (cap) and these allowances can be exchanged (trade) for a given price. This methodology is thus quantity-based, so the total emissions will remain below the cap, and market-based as a market for the allowances will create.

The idea of a carbon market was idealised by Michael Grubb in 1989 who recognised how much it was difficult reaching international agreements to tackle the climate change. Analysing the regulation developed by the US to manage the acid rain problem, he understood how copying the same methodology would have had positive effects. Indeed, creating a global carbon market, the polluters would have been provided with carbon emission allowances that could be exchanged for a given price. This would have incentivised businesses to reduce their carbon footprints and to sell those not-used in exchange for a sum of money (Newell and Paterson, 2010). Indeed, emitting less than how much allowed, they can sell their permits, having an additional source of income. The efficient businesses will reduce their emissions until the marginal cost of the reduction meets the permit price. Buyers will purchase credits up to the point where the purchasing cost equal the extra emission ones.

The trading system fits in particular with those subjects that find very expensive reducing their emissions, so they prefer paying another agents for whom is cheaper doing so. At the end the net impact is equal to zero, as the reduction of one is compensated by the emissions of the other. Indeed, the companies or governments compensate their emissions buying, and thus financing, the emissions reductions in other countries (Howard et al., 2015).

The importance of Carbon pricing has been underlined also by the article 137 of the Paris Agreements which explains how this tool works as an incentive for reducing the emissions (cop21.gouv.fr, 2015).

The trading system has other four important and positive consequences: the investments on research and development, new plants and technologies; the following dissemination of results; the competition; and the cost-effectiveness. The first one, the investments, is made in order to be more competitive as credits' producers. The second

one, the results' dissemination, is in part inevitably and in part can be realized through transfers of skills and technologies (Kerr, 2000).The third one, the competition, exists because the companies benchmark against their competitors and try to imitate what they do in order to be efficient identifying and reproducing the practises (Hoffman and Woody, 2008). The fourth one, the cost-effectiveness, allows reaching, under perfect market conditions, environmental goals at the lowest costs (Kerr, 2000).

Comparing this method with the previous, the "level" of emissions is known, while the price's trend is not. This latter depends in fact on the market forces: the supply and the demand. Unfortunately, this market cannot be left completely free to adjust autonomously, but it needs some interventions for avoiding crisis. For example, in the European Union Emissions Trading System it happened that the supply was so large compared to the demand that the prices crashed. The introduction of a floor price is thus a good solution that leads to a positive result: the flexibility of the market and a (minimum) price as a tax (Stern, 2015).

The allowance allocation can be based on output or on grandfathering method. The main difference between the two is that the first methodology takes in consideration the current data (or of the previous year), while the second depends just on historical data. Over time, the grandfathering is perceived as unfair because it does not adapt to new market situations, in particular regarding the new firms. In reality, this does not happen. Indeed, an entering firm does not bear regulation costs as the market is already regulated. In addition, it will enter just if it has competences and technologies to be profitable (Kerr, 2000). Hence, the best method to use between the two is a combination of them.

The place where the emission trading scheme works is the carbon market. There are two types of carbon markets: the compliance schemes and the voluntary programs. The firsts, the compliance market, are regulated by supra-national, national or sub-national bodies and contribute to meet the Kyoto Protocol requirements, while the seconds do not as they are not formally recognised. The credits originated are respectively called Certified Emission Reductions (CERs) and Voluntary Emission Reductions (VERs).

The compliance carbon markets were born after the introduction of the Kyoto Protocol which defined three flexible mechanisms that can be used to achieve the target of the correlate Convention. These are the Emission Trading, the Clean Development Mechanism and the Joint Implementation (Gold Standard, 2016). The emission trading

consists of transferring allocations from an industrialised country (defined in the Annex 1) to another. The Clean Development Mechanism (CDM) regards the emission reductions in developing countries whose credits, called CERs, can be sold. The third typology, the Joint Implementation, consists in investments made by and realized in industrialised countries in emission reductions' projects. An important example of compliance carbon market is the EU Emission Trading System (ETS). It was developed in order to reach the goals of the Kyoto Protocol as it would be implemented if the Protocol would have not been implemented. Nowadays, it is the largest GHGs carbon market in the world involving 31 countries (all 28 EU countries plus Iceland, Liechtenstein and Norway) (ec.europa.eu, 2016).

The voluntary carbon markets are instead born voluntarily by emitters that want to reduce their carbon emission buying carbon credits. Hence, they are the result of the motivation of businesses and corporations which need more flexibility to grow and to meet climate change goals. In general, the credit in this market are generally called Verified Emission Reductions (VER) and works in parallel with the other market taking as a benchmark the CDM developed by the UN. The principal voluntary carbon standard are the Verified Carbon Standard (VCS) launched in 2006 by private companies and the Gold Standard (GS) of same year with a focus on the social and environmental development effects of the projects. Part of this category is nowadays also the Fairtrade Carbon Credits (Howard et al., 2015).

The two types of market (the compliance and the voluntary) are similar and connected. It often happens that projects that are not able to be registered under the first may end up on the voluntary market where the requirements are lower. This happens in particular for the CDM when the projects that are not able to gain the CDM certification try to be approved by the voluntary market (Newell and Paterson, 2010).

Two important differences between the two markets are: the specificity of the projects, which is much higher in the voluntary market, and the presence of a secondary market for the CERs (Certified Emission Reductions) and not for the VERs (Verified Emission Reductions). In particular, the first aspect is attractive for the businesses that decide to invest in the carbon emissions reductions. Indeed, they can well know how the projects they are investing in are developing. So, these investments become part of their strategies and marketing actions (Newell, Paterson, 2010).

Also the profiles of emitters in the two markets are different. While in the compliance one there are bigger and more-energy-intensive businesses, in the second they are smaller. This stands to reasons that the transaction costs are much lower, so this market is particularly suitable and attractive for those projects that are too small
for affording the compliance one. Including the process that defines how and how much a project has cut carbon emissions is a bit different. Indeed, in the voluntary market there is not a centralised supranational body that verifies, but there are standards set out by the founders that create a sense of government for this issue. Examples are the Gold Standard or The Climate Community and Biodiversity (CCB) standards (Newell and Paterson, 2010).

Comparing data of the compliance markets and the voluntary markets what results is that the second ones are much smaller. Indeed, analysing the latest available data, those of 2015 as the year 2016 it is just finished, the value of the total ETSs (Emission Trading Systems) was €30,64 billion (worldbank.org, 2016), of which the value of just the voluntary carbon market was €250,56 million (Hamrick, 2016). The different size influences inevitably the prices of credits, but it is not the only. It depends also on type of seller. Indeed, if the average price of traders, which do not become owner of the credits, is €0.90/tonne, the prices of retailers, which buy and then resell, is €3.33/tonne (Hamrick, 2016). In order to cope with these market dynamics that could become underproductive, some initiatives that introduce the idea of a price floor has risen. The two main initiatives have been the World Bank's Pilot Auction Facility for Methane and Climate Change Mitigation (PAF) and the Fairtrade Climate Standard (Hamrick, 2016).

Focusing the attention on the voluntary carbon markets, in 2015 the volume of carbon transactions in this market increased by 10%. However, the total market value has decreased for 7% (from €268,580 million to €243,351 million) because of the fall of the carbon prices: the average price fell from €3.43/tonne for 2014 to €2.97/tonne with a reduction of the 14%. In addition, the range has been very large: from €0.09/tonne (the lowest value transaction) to €40.38/tonne (the highest value transaction). This drop has been caused in part because of the presence of big suppliers, normally retailers, that trading large volumes are able to offer lower prices. The smaller ones cannot afford these lower margins, so their ability to compete is weaker (the bigger suppliers are those who trade more than 1MtCO_2e for

an average price of €2,61/tonne, while the smaller organization are those who sell less than 50.000 tonnes for an average price of €6,76/tonne) (Hamrick, 2016).
The following table gives a brief summary about the three methodologies for the carbon emissions reduction.

Table 5.12: The three methodologies' characteristics

	How much is the reduction	**Price**	**How to reduce**
Tax/subsidies	Forecastable	Defined	Not defined
Direct regulation	Not defined	Not defined	Defined
Permits	Defined	Not defined	Not defined

5.4.1 The choice of Fairtrade

The FCCs are based on a sort of complementary approach that exploits the advantages of the above-explained methodologies. Indeed, as all three have pros and cons, the best approach should be complementary.
For what concern the regulations, the Climate Standards work like them as they push the subjects to change some behaviours or technologies in order to adapt to the climate requirements. Even if these adaptations could be expensive for some subjects, they are durable over time and they facilitate the fight against the climate change, besides higher FCCs productions. Moreover, these Standards ensure the projects' quality. Each project is in fact designed, assessed and realized in order to reach the maximum benefits from the investment, without compromising a sustainable development or climate goals. The Standards also guarantee the transparent governance, as well as the respect of the environment and the communities in the projects' implementation.

Instead, as regards the market-based methods, Fairtrade can use just a part of all the relative methodologies. Indeed, not being a governmental body, Fairtrade cannot introduce taxes or subsides neither can takes part in a compliance carbon market. For these reasons, the Fairtrade approach is mainly based on a trading system that involves a voluntary carbon market and uses the Fairtrade Minimum Price and Premium respectively like a sort of floor price and a subsidy. More specifically, the Fairtrade trading system is based on the Fairtrade Carbon Credits which are exchanged in its specific voluntary market in conformity with the Climate Standards that, as seen, work like regulations. In this market, in addition to these Standards, there are the Minimum Price and the Premium. The Minimum Price does not only reflect the Fairtrade policy used for all the other Fairtrade products, but also avoids market failures. For example, in 2007 in the European Union Emissions Trading System the price of the carbon credits crashed, making unaffordable for the producers continuing to operate in this market (ec.europa.eu, 2016). Moreover, this floor price attracts the developing countries' producers to take part of this market because, as Stern sustained, they are willing to invest in climate change actions if there are valued and sure returns on investments (Stern, 2015). Instead, the Fairtrade Premium has to be interpreted as a sort of subsidy: the carbon credits' producers receive an additional amount of money for their carbon credits' productions that can be reinvested, so the final effect is like that of a subsidy.

Thus, Fairtrade implements a market-based approach where the developing countries' producers are direct involved and where the cons of the market are overcome with corrective actions (as Fairtrade Minimum Price). This allows tackling the climate change guaranteeing a sustainable development (Schreiber, 2013). In addition, this system allows reducing poverty in a different way compared to the flow of aids that normally arrive from developed countries. Indeed they are driven by moralistic and charitable sentiments because the poverty is seen as a stand-alone problem. Instead it can be efficiently and better tackle trough controlled market mechanism, as Fairtrade is doing. The Fairtrade project is particularly suitable for the rural communities for two main reasons. First of all, normally they do not have the necessary competences and skills to realize projects whose carbon credits can be exchange in the carbon market. So, the presence of the Facilitators can help producers to become independent over the time to do that. In addition, the carbon market has been facing difficulties because of the fall

in the carbon credits price, where the rural communities' projects would not enable to survive.

The market where the FCCs are exchanged is part of the voluntary carbon market.

The role assumed by these types of market is very important because the existence of the voluntary markets influences and shapes the complementary ones despite the governments look badly to firsts. In their opinion these markets "steal" businesses initiatives from the compliance markets which require big efforts to be sustained. Despite that, the voluntary markets remain still positive as they fill the gap attracting those projects that are not able to meet the high requirements for being part of the other type of markets. Indeed, the bureaucratic costs are lower and more flexible for immediate actions. In addition, in the voluntary market contest, there is the possibility to experiment and, why not, to be more innovative, as the space left for the parties' initiatives and suggestions is greater.

So, it can be concluded that it more useful seeing these two different markets are complementary and not as competitors, because the existence of both is crucial in this moment (Newell, Paterson, 2010).

Indeed, as reported by the Climate Care's annual report the climate situation is so grave that worry too much about the reasons for the businesses in choosing which types of markets is counterproductive (Smith, 2007).

It is important to outline how Fairtrade, differently from many actors that operate in carbon markets, implements its carbon trading system in order to reduce also the problem of poverty. This is very important as it avoids what is called "carbon colonialism". It consists of a sort of new colonialism based on the carbon credits' trade which again will negatively hit the developing economies (O'Brien et al., 2010). Indeed, FCCs face the climate change problem not just merely under the climate point of view, but also take in consideration the ethics and the human security, especially of the developing countries. Actually, Fairtrade sees this problem as an additional opportunity to involve the developing countries who can become protagonist in this climate battle. They not only are respected and protected by the "carbon colonialism" risks, but also they can gain new possibility to emancipate.

A problem that could arise from the carbon markets is called carbon leakage. It consists in the relocation of the business productions to countries that have weaker climate and/or environment regulations (Stern, 2015). In reality, as some studies show, the

decision about the production location mainly depends on the local workforce skills and cost, the political stability, types of infrastructures available and the strictness of regulations. The environmental regulation is not particularly determinant (Kerr, 2000). In addition, this is limited to some sectors which are emissions and trading intensive (worldbank.org, 2015).

In summary, the FCCs are based on four pillars. First of all, they make the producers able to play a bigger part. Indeed, the producer play an active role in the realization of the climate projects, their competences and skills are improved and they can decide also when and to whom sell the credits. Secondly, a transparent pricing is guaranteed and the floor price fairly reflects the costs necessary for the realization of the projects and avoids market failure. Thirdly, also the opportunity to adapt is always guaranteed thanks to the payment of the Premium that will invest in further adaptation projects. Fourthly, the a priori commitment of the companies to the reduction of their carbon emissions and the ethical values of Fairtrade assure that the reduction is credible without any type of carbon colonialism (Fairtrade Int., 2015).

5.4.2 The benefits for the FCCs' buyers

The FCCs system does not only have positive effects on credits' producers, but also on carbon credits' buyers. The awareness about these benefits has just been growing for the last years as the introduction of carbon credits has changed the way the businesses looked at the actions and the international agreements against the climate change. From a threat, the climate change has become an opportunity for making money. Indeed, during the late nineteens, when the first international meetings on climate change started to be made, businesses founded lobbying organizations to defend their interests. These bodies, like the Global Climate Coalition (GCC) and the Climate Council, were in charge to represent oil extraction companies, car and steel producers, and in general all those businesses that would be economically damaged by a forced international reduction in the use of fossil fuel. Not only they sustained that the climate change was not happening and that in any case the cause was not the use of fossil fuel, but also they made the politicians aware of the risk deriving from these types of decisions that would

cause an economic recession and a consequent loss of the political office for the promoters. In particular, the more influent and potential lobbies were set up in the countries that were the highest emitters, like USA. For example, the three big associations, the Western Fuels Association, the Edison Electric Institute and the National Coal Association of the USA financed an advertising campaign for $500,000 to show the global warming as something theoretical, not based on facts. The lobbies also argued that the actions of just few countries would have been insufficient and if regulations would have been introducing, the companies would have moved to other countries where there were not emissions levels to respect. In this way, the global situation would not have changed at the end and the countries would have lost jobs facing negative economic consequences.

Businesses started then to look at the climate change effects independently without being influenced by the bigger companies' opinions. The climate change was really a problem with negative consequences on the Earth. In addition, the introduction of new technologies, which could mitigate the problem or provide alternative and renewable energy supplies, began to be seen as an opportunity to integrate in the business strategy. It was really an opportunity because it represented the occasion to innovate the existing products, to gain the first mover advantage, to improve the own Corporate Social Responsibility (CSR) and to minimize the business risk from the introduction of climate change policies. Only when the climate change was seen in this latter way, as a risk and not more as a threat, the companies started to convert their opinions (Newell and Paterson, 2010). Moreover, if the companies would improve their environmental practises, the overall costs of the economic performances would decrease (Schaltegger and Synnestvedt, 2002).

In addition, taking in consideration the climate change issue, the development of an adequate strategy allows businesses to improve their CSR. This is a good opportunity for the companies, which can gain from this good publicity, new customers, higher employee attractiveness and new investors. Also the fidelity of the old costumers increases, in particular if the pressure for reducing the carbon footprint does not come from regulations, but from the stakeholders (costumers, shareholders, NPOs, staff).

Briefly, taking part of a carbon market is advantageous for many reasons. But why a company should choose Fairtrade for tackling the climate change? Because the companies could make a tangible contribution in the fight against this issue and in the

promotion of a sustainable development. All this is possible for two reasons: first of all because Fairtrade is the most recognized fair trade certification in the world and this ensure that operating inside this system have positive repercussions on the developing countries; secondly because Fairtrade co-works with Gold Standard which is the most recognized label in the Voluntary Carbon Market for its quality standards.

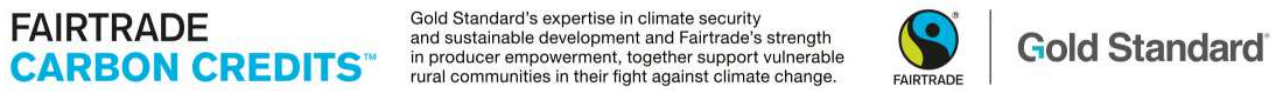
Hence, taking part of the projects of these two organizations ensures that the money spent for the credits will be invested in new environmental projects. In addition, these projects will be based on the sustainability of the project itself and the involvement of the local communities.

Of course, entering in the Fairtrade Carbon Market is an opportunity for the companies also for gaining an "eco-label" that affects positively the credibility of companies. This is one of the reasons why the voluntary environment and social labels have been increasing in the last years. Indeed, very often the innovation or the good practises are not known by consumers, so gaining a label allows to inform consumers (Castka and Corbett, 2014). A research made by the Carbon Trust has showed how the consumers are aware of the carbon footprint of the products they buy. Indeed, the 45% of shoppers would change their shopping habits and would stop buying the favourite brands if the companies not make efforts in decreasing their carbon emissions. At contrary, 56% of shoppers would become more loyal to their brands if climate actions are taken (Morrison, 2011). This increasing awareness of the shoppers about the behaviour of the businesses is another reason why the interest in emissions reductions is rising. As said before, being environmental-friendly is part of the CSR and the marketing actions. These eco-labels are the result of the growing form of "soft law" that show how the power is shifting form the governments to different types of institution networks. Hence, at the base there could be a marketing strategy, but there are also the consciousness and sensitivity for the topic as the negative effects of the climate change affect also their country and in for some aspects also their activities.

It can be concluded that a "win-win" situation will arise for both the buyers and the producers of the carbon credits. The buyers will have a better reputation in term of environmental behaviour becoming an example for the others and the buyers will improve their life's quality.

In the case of the FCCs, the label is the represented in Figure 5.2:

Fig. 5.2: Fairtrade Carbon Credits logo



(Source: atmosfair.de, 2016)

From a practical point of view, to enter into this system and to be allowed to purchase the FCCs, a company has to contact the closer Fairtrade agency, calculate the carbon footprints with a carbon expert, develop a concrete plan for reducing the carbon emission, buy then the credits for compensating the unavoidable emissions and then communicate the strategy to the stakeholders (Fairtrade, 2016).

6. Case studies

6.1 A project already certified: the “Save80” Project of DHL

Almost one year after the launch of the FCCs (December 2015), in January 2017, Fairtrade announced that the first climate project has gained the Fairtrade Carbon Credit certification. This project is the “Save80” project which has been developed in Lesotho thanks to the logistic company DHL Deutsche Post Group and which aims to provide families with new and more efficient wood-cook stoves in order to reduce the deforestation and the carbon emissions (fairtrade.net, 2017).
After this first case of certification, Fairtrade has opened the possibility to gain the certification also to any small-scale organizations located in the geographic scope area defined by Fairtrade (see paragraph 2.3). Some examples are two reforestation projects in Peru and an energy efficiency project in Ethiopia which involves the delivery of cook-stoves to coffee communities (fairtrade.net, 2017).

6.1.1 Deutsche Post DHL Group and the GoGreen Program

Deutsche Post DHL Group is the first company at international level in the logistic sector. The Group is the result of the acquisition made by the German company Deutsche Post of the American DHL. Indeed, Deutsche Post, the main German courier founded in 1989 and privatized in 1996, began to diversify the investments around the end of nighties acquiring a little at a time DHL (dpdhl.com, 2017). The total control arrived in 2002. DHL was instead born in the USA as an initiative of Adrian Dalsey, Larry Hillblom and Robert Lynn (the first letter of their surnames gave the name to the company) in order to provide transport services between California and Hawaii. Year after year the range of services as well as the operating areas became even larger becoming a global company (dpdhl.com, 2017). Thanks to the acquisition of Deutsche Post, nowadays the Group, whose headquarter is in Bonn (Germany), is the largest company in the world in its

sector. It provides not only postal services, but also worldwide shipments across more than 220 countries involving almost 500,000 employees (dpdhl.com, 2017).

In carrying out its activities, Deutsche Post DHL Group does not just focus on the enhancement of the quality and types of services provided, it is also deeply committed to its Corporate Social Responsibility. Indeed, the company has been developing three programs following the philosophy "Living Responsibility". The idea is based on the willingness of realizing social and environmental initiatives together with local or international organizations (for example UNICEF). More specifically, these initiatives are called "GoHelp", which sustains areas and communities hit by natural disasters, "GoTeach", which promotes educational activities in developing countries and poor areas, and "GoGreen, which focuses on the environmental protection (dhllive.com, 2017). In particular, this latter is very important as one of the projects developed under this area fits with the Fairtrade Carbon Credit strategy. Indeed, the "GoGreen" climate protection programme consists of a portfolio of carbon emissions free services. To do that, the company implements low-carbon practises (like the use of alternative fuels and energy sources) and, at the same time, purchases carbon credits in order to have a total environmental impact equals to zero. Indeed, buying credits is the only way for offsetting the DHL's carbon emissions as it is impossible to provide a transport service free from any carbon emission (dpdhl.com, 2017).

The reasons why the Group is interested in this activity results from the fact that almost the 15% of the GHGs emissions are due to the transport sector, of which DHL is the main actor at international level (IPCC, 2014).

At the same time, the company is interested in increasing its social responsibility and it wants to sell services that promote the sustainable economic development around the world, contributes to the fight against the climate change and allows to strength its own corporate social responsibility (dpdhl.com, 2017).

In 2008, the Group set a target that never before another company made: 30% reduction of carbon emissions in 2020 with respect to 2007. Indeed, as the quantity of services sold has been increasing, the amount of carbon emissions should remain stable (as showed in the figure). This is possible through a better combination of routes and the transport systems and the purchase of carbon credits. In 2015 the efficiency level was already +25%, so the path toward the final goal has been correctly realized (cr-report2015.dpdhl.com, 2015).

As explained before, in order to offset the emissions, the company finances different projects around the world from which it can buy credits. A part of them is also generated by the "Save80" project which has been realized in Lesotho and has just gained Fairtrade Carbon Credit certification. The realization of this project is very important for Deutsche Post DHL Group as it means that their efforts are well planned and leads to concrete results in terms of reducing the carbon emissions. These effects do not only benefit directly the communities involved, but also make the DHL's costumers aware of making a real contribution to protecting the environment buying these services. In addition, these carbon emissions free services can be part also of customers' actions against the climate change. Indeed, the customers who buy these types of services will receive a sort of certificate from DHL: the DHL GoGreen logo (Fig.6.1). In this way, being part of this initiative can have positive impacts also on their environmental responsibility for their transportation and logistics activities. This is a good chance to improve also their market position.

Fig. 6.1: GoGreen logo

(Source: dpdhl.com, 2017)

The selling of climate neutral services, which were related to only parcels, began in 2005. Since then, the portfolio of services has been expanding and includes now express shipments and mail deliveries across more than 50 countries. The company provides customers also with detailed carbon reports in order to give them information about the amount of emissions for their services. The customers have the possibility to buy GoGreen services that are carbon neutral (cr-report2015.dpdhl.com, 2015). They can also calculate online the emissions of the services they ask for. This is possible thanks to

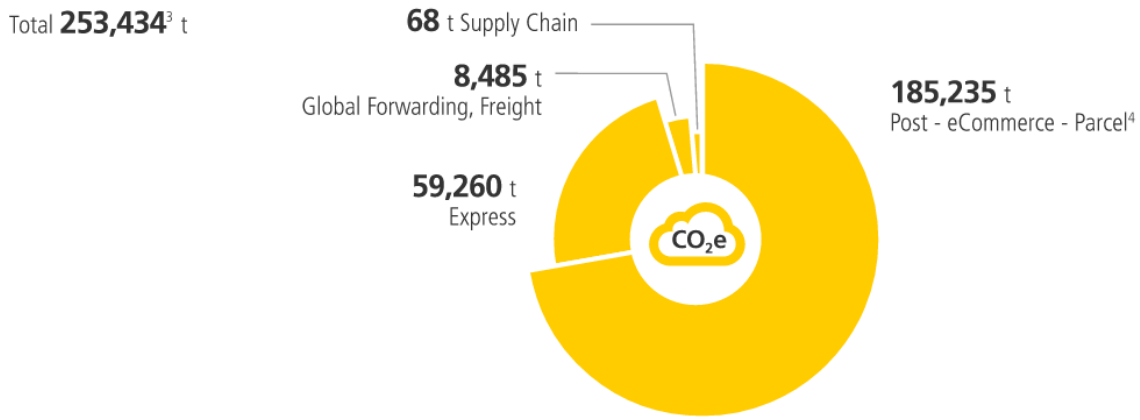
the Carbon Dashboard which regards the Express, Air, Oceans and Road Freight. They can also decide which type of sending scenario they prefer in order to minimize the environmental impact.

Who verifies since 2011 the reliability of all the emissions calculations is the Swiss Société Générale de Surveillance (SA SGS) (dpdhl.com, 2017).

Just in 2015, the total climate neutral shipment overcame 2 billion, avoiding more than 250,000 tonnes of carbon emissions (dpdhl.com, 2017).

As reported in the Figure 6.2, the majority of the climate neutral services regard the division "Post-eCommerce-Parcel" followed by the "Express" and others.

Fig. 6.2: Share of climate neutral services



(Source: cr-report2015.dpdhl.com, 2015).

6.1.2 The "Save 80" stoves project

The "Save80" project, which has been realizing in Lesotho, is the first one that has been certified by Fairtrade as it fulfils the Fairtrade Climate Standard. This project was recognized before by the United Nation's Clean Development Mechanism (CDM), which monitors the development of the project and the calculation mechanism, and it is registered by the UNFCCC since 2012. The project is also certified by Gold Standard, the organisation that collaborates with Fairtrade and that is in charge of checking the sustainability of the project and if the local population is correctly involved in it (dpdhl.com, 2013).

The founder of the project, which is also the buyer of the carbon credits, is Deutsche Post DHL Group. Besides the Group, also Atmosfair and Solar Lights contribute to the development of the project. Indeed, Deutsche Post DHL only finances the project and buys the Carbon Credits generated. Instead, Solar Lights, which is a Lesothian NPO, represents the local partner for the Group. This organization acts as a facilitator in the project, as it is required and described by the Fairtrade Climate Standard. More specifically, it has to deal with the monitoring and training activities by the beneficiaries. While Atmosfair is a German company: one of the most important carbon emissions offsetting company at international level and that already works together with other companies for realizing similar projects (for example, Cisco or Bayer) (atmosfair.de, 2017). In this case, it is in charge of monitoring the databases of the households and of calculating the credits generated. Thus, it deals with the administrative activities in order to ensure that the project achieves the certifications (CDM, Gold Standard and Fairtrade) (atmosfair.de, 2017).

Lesotho

Lesotho, whose capital city is Maseru, is a state-enclave situated in the Republic of South Africa. It extends for 30,000 square kilometres and the territory is mainly mountainous. Since 1868 this territory was a British protectorate, then in 1966 it achieved the independence and it is now a parliamentary monarchy.

The population corresponds to more than 2 million of people who are unequally distributed across the country. Indeed, most of the citizens live in the rural areas of the western plateau and of the Orange Valley.
The currency is Loti, the major languages are Sesotho and English and the main professed religion is Christianity (bbc.com, 2016).
The economic situation is quite difficult: the GDP per capita is a little bit more than 1000$, hence it corresponds to a low-income country (167°/195° World Bank rank) (databank.worldbank.org, 2015); the unemployment rate is almost the 30%; and more than half of the population lives below the poverty line (worldbank.org, 2017).
The main sector is the agriculture, whose production is mostly based on corn, wheat and potatoes, is not able to satisfy the national demand. Indeed, only the 11% of the land is arable. At contrary, the sheep and cattle farming is quite well developed and in part export-oriented. The secondary sector depends instead on the extraction activity as Lesotho is rich in diamond mines and other metals.
The already difficult economic situation is aggravated by the climate change environmental consequences. Not only the range between minimum and maximum temperatures has become larger, but also since the beginning of the 90s the forest has been reducing also because of the strong use of wood and the bad environmental practises of cooking on open fires. These practises produce a large amount of biomass through the combustions and need big amount of woods that cause deforestation, crop failures and less arable land (europarl.europa.eu, 2011). Nowadays, the total forest lost corresponds to more than 60% in 25 years and if there are no interventions to tackle the situation, in less than 20 year there could be a complete deforestation (fairtrade.net, 2017).
What makes this situation worst are the absence of long-term governmental adaptation plans and the lack of financial and technological resources (unfccc.int, 2016).

The “Save80” stoves project is the first of this typology in Lesotho and aims to provide with new and more efficient stoves 10,000 families benefiting almost 45,000 people of the following districts: Berea, Maseru, Leribe, Mohale’s Hoek, Mafeteng and Butha-Buthe. Indeed, the goal of the project is to cut the carbon emissions and to reduce the use of wood, and consequently, the deforestation (fairtrade.net, 2017) as the biomass is

the main source of energy for the domestic activates and for small producers (unfccc.int, 2016).

Clearly, these new firewood stoves, which need less wood to work, are designed according to the local needs and practises. The set of stoves delivered is in fact composed of stoves, pans and a special box for keeping the food warm (Fig. 6.3). The stoves consume 80% less of firewood: just 250 g of wood is necessary to boil 6 litres of water, generating very little smoke and ash (cdm.unfccc.int, 2017). This percentage of stoves' efficiency has given the name to the project, which is called "Save80 stoves". Obviously, thanks to these new appliances, several advantages are generated. First of all, the beneficiaries buy less wood having in this ways also economic advantages, then the carbon emissions produced are less and the deforestation problem is efficiently handled as well as its negative consequences, like the land erosion and the air pollution (artmosfair.de, 2017). Moreover, the positive effects of these projects do not only regard the environment, but also the people's quality of life. The families' members save much time to collect the wood and the risk of diseases due to the air pollution of the stoves decreases. The project addresses in particular to the women as they have direct relationships with nature and they are the first and the most affected by the climate change effects. Indeed, they deal with the food production and gathering, little cultivations for the family sustenance and the collection of wood. Given this situation, the measures have to primarily reduce their vulnerability and their daily works (unfccc.int, 2015).

Fig. 6.2: New cook-stoves delivered

(Source: dhllive.com, 2017)

The first steps of the project were taken in 2010, when the first demonstrations of the function of these new stoves were showed in the villages. As reported by the responsible of the "Save80" project Guido Sattler, at the beginning people were surprised and sceptical about these new instruments: the wood needed was much less than the normality (dpdhl.com, 2017).

Then, the project started with the distribution of the new 10,000 cook stoves that took place between 2011 and 2013. The delivery of the new efficient wood-burning stoves was done through a regional distribution network which included every house in the territory. This was possible thanks to the cooperation with the local partner Solar Lights. It is important to note that the stoves were manufactured in Germany and then shipped to Lesotho. Once in the territory, the stoves were assembled in the workshop by the local population. In this way, new jobs and income opportunities were created (dpdhl.com, 2017).

Since 2012, thus shortly after the beginning of the distribution, the Group has been using the carbon credits generated and calculated using the CDM formulas, as they were certified by Gold Standard. Then, in 2016 the "Save80" project achieved the Fairtrade Climate Standard certification.

The families involved in the project are only those that have been classified before as eligible. Indeed, they are just the households which used wood for cooking and no other type of energy like fuel or electricity. Once the beneficiaries were identified by Solar Lights, they had to sign an agreement and to give some data (the contact details and the custom code of the stoves) in order to create then a database. This was necessary in order to monitor the number of stoves delivered and calculate the credits generated. The database is then managed by Atmosfair, which continues to cooperate with Solar Lights in order to inform the local partner with any necessary interventions to make. The agreement is important also because the beneficiaries ensure to give the credits generated only to Atmosfair and to collaborate with Solar Lights. In fact, even if the new stoves are property of the households, their purchase was subsidized by the project as beneficiaries would not have afforded the expenditure. Then, in order to guarantee the continuity of the project over time, a little workshop for the repair and the maintenance of the appliances has been made available and, in addition, Solar Lights, the local

partner, has become the point of references for the users, providing them with the necessary support (atmosfair.de, 2017)

The project planned period is ten years and the goal is to avoid almost 20,000 tonnes of CO_2 annually. Indeed, each appliance provided contributes to CO_2 saving between 2 and 2.5 tonnes per year (atmosfair.de, 2017).

The calculation of the credits follows the AMS II.G called "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass" (formulas at table 5.1). Indeed, the type of the project is part of the "Energy Efficiency Improvement projects". The credits generated by the project are recognised as "VER Gold Standard" (Voluntary Emissions Reduction) and since 2016 they are also certified by Fairtrade (dpdhl.com, 2017). More specifically, the Fairtrade Carbon Credits certified in 2016 were a little bit more than 10,000 which corresponding to the half of the total credits generated by the project in the year. For the next years, the goal is to increase the share of the credits certified (atmosfair.de, 2017).

As defined in the Fairtrade Climate Standard, Fairtrade monitors the development of the project assuring that it meets the necessary requirements in order to realize the goal of the project and their social value.

6.2 Projects under certification process: "Alto Huayabamba" and "Biocorredor Martin Sagrado REDD+" projects

For now just one project has gained the Fairtrade Carbon Credit certification, but as mentioned before, there are other projects that are currently under the certification process. Two of them are the "Alto Huayabamba" and "Biocorredor Martin Sagrado REDD+" projects which have been developed in the San Martin Region in Peru thanks to the Fairtrade cooperative ACOPAGRO. Part of the carbon credits generated by the projects have already reached the VCS (Voluntary Carbon Standard) certification, but now they have been verified in order to become FCCs.

6.2.1 The ACOPAGRO cooperative

The two above mentioned important projects that are currently under certification process involve the ACOPAGRO cooperative. ACOPAGRO is a Peruvian organization of small cacao producers situated in the Huallaga Central Valley, San Martin Region. It was founded in June 1997 as a result of a United Nations initiative made in collaboration with the Peruvian State in order to fight the coca cultivations and consequently the drug-traffic, the black market and the terrorism. So, the aim of project was to replace this cultivation with the cocoa one and to improve in a sustainable manner the life quality of its members.

At the beginning, even if the strong incentives made by the UN, the development of this project started slowly because the cocoa market was not wide and profitable as the other one. For these reasons, the State and the UN supported more the cocoa producers, helping them also with the market research.

As the cocoa market started to increase, mainly thanks to the exportations, more and more farmers decided to leave the coca production and to convert it into a legal economy.

The values on which the cooperative has been created are the solidarity and the trust. Indeed, the over 2,000 members of today (they were just 27 in 1997) work together across the four Provinces of San Martin Region in order to make the cooperative leader on cocoa commercialization at international level. They already export to Italy, France, Swiss, Holland and Unites States, making the San Martin Region responsible for the 40% of the total Peruvian cocoa production. This result has been reached thanks to the accreditation inside the fair trade system. Indeed, in 2005, after the participation to the Biofach, the German fair of the organic products where the idea of a fair trade was developing, ACOPAGRO decided to enter into the fair trade network joining Fairtrade. Thanks to this new sale channel, where the market is wider and the products are paid more (because of the Fairtrade philosophy), the revenues have increased. In particular, the Fairtrade Premium has given them the possibility to make continue developments that every year focus on a particular aspect chosen by the President like quality, productivity or economic education of the members, to give some examples (acopagro.com, 2017).

6.2.2 The climate change effects

After 11 years of activity, the cooperative started to notice the negative effects of the climate change on the cocoa production which were accentuated by the high deforestation rate of the 1980s. Indeed, the cocoa production was at risk as the cocoa plants need approximately 40% shade for having high yields and, at the same time, the shade protects the fields from strong rains and droughts. Taking in consideration the harvest, even if the cocoa can be picked during all year round, the two main harvest seasons are from June to September (campaña grande) and in November (campaña chica). But last year for example, in February 2016, it did not rain enough. On the contrary, the month after abundant rainfalls took place accompanied in May by under average temperatures (normally 27°-39°, but in May 2016 20°). Obviously, these changes affected the production previsions. For instance, last year the forecast was about 5,000 tonnes of cocoa, but the harvest was just about 4,400 tonnes. This underproduction had negative impacts not just on the producers' incomes, but also on the buyers, like the Italian main buyer ICAM, which made plans, too.
Hence, because of the climate change effects, which have modified the climate conditions of the area, realizing agroforestry and afforestation projects allow to protect the cocoa cultivations and to give more stability to the production rate (purproject.com, 2016).

6.2.3 "Alto Huayabamba" and "Biocorredor Martin Sagrado REDD+" projects

Given the above worrying situation, ACOPAGRO needed to act urgently, not only for economic reasons, but also for the environmental safety. In addition, being ACOPAGRO part of Fairtrade, which, as seen, does not focus only on the social value of the trade, but also on the environmental issue, the cooperative took in consideration the idea of the carbon credits.

More specifically, since 2008 ACOPAGRO has been developing the "Alto Huayabamba" project together with the French organization PUR Project. PUR Project is a social business founded by the French Tristan Lecomte with the scope of supporting communities and cooperatives in developing countries for realizing environmental projects (purproject.com, 2016). In this specific case, it acts as facilitator of the project, as it is required by the Fairtrade Climate Standard. Indeed, PUR Project helps to implement all the necessary operations and to organize and to realize all the different activities in order to preserve and regenerate the surrounding environment and ecosystem. It works in forty projects assisting, therefore, companies and organizations worldwide in their interventions linked to the forest, biodiversity and climate issues (purproject.com, 2016).

As said before, the "Alto Huayabamba" project was born to promote the ecosystem protection and revitalization in order to mitigate and reduce the negative effects of the climate change. The project is developed in San Martin Region, in Peru, and it involves 1,800 producers of the Peruvian cooperative and 4 million of people who live in the area.

In mid-2014, the project obtained the VCS (Voluntary Carbon Standard) certification with 50,000 credits generated (purproject.com, 2016).

This project represents "the own grain of sand against the climate change" with 2 million of trees planted, as the Pamela Esquivel Rios the commercial manager of ACOPAGRO says. Indeed, "Alto Huayabamba" aims to regenerate the soil and the water quality, to preserve the biodiversity and promote the reforestation of areas spoiled. For 2016 the plan consisted of 6,000 new trees to plant.

The importance of the project is not limited just to the benefit for the cocoa plants. Indeed, after the afforestation phase, there is the forest management one which allows having an additional source of income for the farmers thanks to the selling of the timber.

In addition, since 2010 the cooperative has to manage the "Biocorredor Martin Sagrado REDD+" project in San Martin Sagrado reserve that corresponds to a complementary action of the "Alto Huayabamba" project. This project aims to combine the reforestation of the spoiled area and the reduction of the GHGs emissions in the area near the Huayabamba River which involves eighteen communities and almost 300,000 hectares of the Amazonian forest. Indeed, this project is part of the UN-REDD initiative which was

born in 2008 in order to reduce the Emissions from Deforestation and Forest Degradation (un-redd.org, 2016).

Similarly to the previous case, also this project is developed by the French organization PUR Project together with the "Amazonia Viva Foundation" which is constituted by two Peruvian cooperatives (ORO VERDE and ACOPAGRO) and four local associations (APAHUI, APROBOC, APAP, APAPMASAR). This Foundation works as the local point of reference for PUR Project and is in charge of coordinating the activities, maintaining the relationships with the subjects involved, managing the funds, collecting data and giving feedbacks.

The estimated length project period is 50 years and the estimated tCO_2e credits will increase over time (from about 11,000 in 2011 up to more than 400,000 in 2050) reaching a total of almost 8,800,000 at the end in 2050 (Pur Project, 2012).

These two projects aligns with the Fairtrade Carbon Credits initiative and calls for a sharing of the tasks: PUR Project focuses mainly on the administrative activities (as selling of the Carbon Credits, technical assistance and information to the members), while the farmers are responsible for the cultivations after having received both theoretical and practical trainings. However, both of them have not obtained the Fairtrade Carbon Credit certification, yet. They are under this process.

Conclusion

The study allows identifying how the climate change effects are becoming stronger day after day. This fact occurs in particular in the areas of South America, Asia and Africa.
As demonstrated by the data analysed in Chapter 3 and 4, if concrete actions will not betaken soon, the consequences for our planet are irreversible, first of all for the areas just mentioned.
To deal effectively with this problem, intervention plans are necessary from both the developed countries, which are the most contributors to the climate change, and the developing countries, which need to implement mitigation and adaptation actions.
In this study various methodologies that can be used have been presented in order to involve the private sector in this process. They concern the introduction of taxes or subsidies, environmental national laws or the creation of carbon markets.
In particular, this latter allows connecting the developed and developing countries by creating new types of trade agreements, in which the goods exchanged are carbon credits. However, these markets may determine the risk of the creation of the so-called "carbon colonialism": a way for the Norther countries to cheaply offset own emissions in the developing countries. Indeed, this type of market does not have a capillary structure that reaches those who are most affected like the rural communities and the small-scale producers.
In the light of this risk, in December 2015 at COP 21, Fairtrade International together with Gold Standard launched the Fairtrade Climate Standard that regulates the creation, the calculation methods and trade of Fairtrade Carbon Credits (FCCs). Unlike the other carbon credits available in different markets, the management of these credits is in line with the values of the fair trade movement. Hence, a minimum price that covers production costs and a premium to be invested in further environmental projects are always guaranteed. In addition, what is very important is the involvement of the small-scale producers and the most vulnerable subjects of developing countries. Not only they will benefit from this trade, but first of all they will be obliged to strength themselves reducing their climate vulnerability in order to be eligible for producing the credits. The Standard does not regulate only the production side, but also establishes criteria for the traders, the project facilitators and also the buyers. In fact, these latter have to submit an

internal emission reduction plan in order to be eligible for the FCCs purchase. Only in this way, the final result is not only a simple trade, otherwise there would not be a real emissions' reduction, but a mere exchange.

The thesis has also deepened into the reasons why a company should buy the FCCs. The companies pay more and more attention to their social and environmental responsibility. This occurs because the consumers use this fact as a selection criterion while shopping. Hence, the FCCs represent a way to strengthen the own social and environmental commitment and, at the same time, they guarantee an effective contributions against the effects of climate change in the developing countries. The relationship that will be established is therefore defined as a win-win situation. An example is the"Save80" project developed in Lesotho and just certified.

Obviously, the FCCs are not sufficient to solve the problem of climate change, because as it has been explained the intervention of the whole international community is essential. However, these types of credits are a further step towards the goals of the reduction of the climate change problem and of the promotion of the sustainable and fair development.

Annex A – Meaning of the acronyms of Chapter 5's formulas

As anticipated in Chapter 5, Annex A provides the meaning of the acronyms used in the formulas. In this way, the reader can easily read the mentioned Chapter and can find all the relevant information apart.

In this Annex, there are all the table which concern the FCCs calculation methodologies. The tables follow the same order in which they are presented in Chapter 5.

The acronyms used more than once in the formulas are explained just one time.

Table 5.3: Energy efficiency measures related to thermal applications of non-renewable biomass (version n.6)

CDM AMS II.G: Energy efficiency measures related to thermal applications of non-renewable biomass (version n.6)	
Emission reductions -general formula	$\mathrm{ER}_y = \sum_i ER_{y,i}$
ER – household cook stoves	$ER_{y,i} = \sum_{a=1}^{a=y} B_{y,savings,i,a} \times f_{NRB,y} \times N_{y,i,a} \times \frac{\mu y, i}{365} \times NCV_{biomass} \times EF_{projected\_fossilfuel} - LE_y$
ER – ovens and dryers	$ER_{y,i} = \sum_{a=1}^{a=y} B_{y,savings,i,a} \times LE_y \times N_{y,i} \times f_{NRB,y} \times \frac{\mu y, i}{365} \times EF_{biomass}$

(Source: cdm.unfccc.int, 2016)

Where:

$B_{y,savings,i,a}$= Quantity of wood not used for the device *i*, whose age is *a*, in the year *y*

$EF_{biomass}$ = Emission factor related to biomass

$EF_{projected\_fossilfuel}$= Emission factor related to fossil fuel that is projected to be used in substitution of woody biomass

$ER_{y,i}$ = Emission reductions in year *y* in terms of tCO_2e thanks to the project device *i*

LE_y =Leakage emissions during the year y

$N_{y,i,a}$ = Total number of device i whise age is a at work during the year y

$NCV_{biomass}$ = Net calorific value of woody biomass which is not renewable and which has been substituted

$f_{NRB,y}$= Fraction of non-renewable biomass not used in the year y

$\frac{\mu y,i}{365}$ = number of days when the device I is used during the year y

$ER\ y$ = Emission reductions in year *y* in terms of t CO_2e

$ER\ y,i,j$ = Emission reductions in year *y* in terms of tCO_2e thanks to the project device *i* and the batch j

Table 5.4: Practices and Technologies to Displace Decentralized Thermal Energy Consumption

Gold Standard: Practices and Technologies to Displace Decentralized Thermal Energy Consumption (version 2011)	
Same Baseline emissions scenario	$BE_{b,y} = B_{b,y} \times ((EF_{b,fuel,CO2} \times f_{NRB,y}) + EF_{b,fuel,nonCO2}) \times NCV_{b,fuel}$
Project emissions	$PE_{b,y} = B_{b,y} \times ((EF_{b,fuel,CO2} \times f_{NRB,y}) + EF_{b,fuel,nonCO2}) \times NCV_{b,fuel}$
The overall GHG reductions	$ER_y = \sum BE_{b,y} - \sum PE_{p,y} - \sum LE_{p,y}$

(Source: Gold Standard, 2011)

Where:

$BE_{b,y}$ = t CO_2e's emissions of baseline scenario *b* of the year y

$BE_{b,y}$ =Baseline emissions in year y for baseline scenario b (t CO_2e/yr)

$B_{b,y}$ = Fuel consumed during the year y in the baseline scenario b

$EF_{b,fuel,CO2}$ = Factor of CO_2 emission related to the fuel which is substituted or reduced.

$EF_{b,fuel,nonCO2}$ = Factor of non- CO_2 emission related to the fuel which is substituted or reduced

ER_y = Emission reduction in year y for total project activity (tCO2e/yr)

$LE_{p,y}$ =Leakage in year y for project scenario p (tCO2e/yr)

$NCV_{b,fuel}$ = Net calorific value of the fuel which is substituted or reduced

$PE_{b,y}$ = Emissions during year y for project scenario p calculated in t CO_2e

$PE_{p,y}$ =Project emissions in year y for project scenario p (t CO_2e/yr)

$f_{NRB,y}$ = Non-renewable biomass which has been consumed during the year y the scenario took in consideration

Table 5.5: Methodology for the use of energy in processing of agricultural products

Gold Standard: Suppressed demand and small- scale Methodology for the use of energy in processing of agricultural products (version 2013)	
Baseline emissions scenarios	$BE_y = BE_{heat,y} + BE_{power,y}$
Project emissions	$\mathbf{PE_y} = PE_{power,y} + PE_{PP,k,y} + PE_{heat,y} + PE_{CH4,y} + PE_{MeOH,y} + PE_{CC,y}$
Emission Reductions	$ER_y = BE_y - PE_y - LE_y$

(Source: Gold Standard, 2013)

Where:

$BE_{heat,y}$ =Baseline emissions used for the thermal processing of the agricultural products (tCO_2/year)

$BE_{power,y}$ =Baseline emissions during the year y used for renewable power in the year y (tCO_2/year)

BE_y=Baseline emissions during the year y (CO_2/year)

$PE_{heat,y}$ =Project emissions during year y derived from thermal processing of agricultural products (tCO_2/year)

$PE_{CH4,y}$ =Where it is applicable, project emissions during year y of CH4 from solid waste and/or waste water in the (tCO_2)

$PE_{MeOH,y}$ = Emissions during the year y from fossil fuel carbon in methanol which is used in the transesterification process (tCO_2e)

$PE_{PP,k,y}$ = Emissions during the year y from biodiesel production generated by the use of seeds type k in year y (tCO_2e)

$PE_{power,y}$ = Project emissions during year y derived from mechanical treatment (tCO_2/year)

PE_y = Project emissions during year y (tCO_2/year)

$PE_{CC,y}$ = Emissions during the year y from cultivation of crops used for oilseeds (tCO_2e)

Table 5.6: Ecologically fuel switch to biomass in order to reduce the energy requirement

VER Small scale methodology: Ecologically fuel switch to biomass in order to reduce the energy requirement	
Baseline emissions	$BE_Y = Q_y \times EF_{BSL}$ Where: $EF_{BSL} = (FC_{BSL} \times NCV \times EF_{CO2})/Q_{BLS}$
Project emissions	$PE_Y = FC_Y \times NCV \times EF_{CO2}$
Emission reductions	$ER_y = BE_y - PE_y - LE_y$

(Source: Gold Standard, 2016)

Where:

Q_y=Net output during the year y in the project activity considered

EF_{BSL}= Emission factor related to the baseline situation (tCO_2/unit of output)

EF_{CO2} =CO_2 emission factor related to fossil fuel (tCO_2/TJ)2

FC_{BSL} = Total amount of fossil fuel consumed in baseline situation for captive energy generation

FC_Y = Amount of fossil fuel consumed in the project activity during the year y for captive energy generation

Q_{BLS} =Net output generated related to the baseline situation during a period of time where the total fuel consumption has been taken.

Table 5.7: Production of thermal energy with or without electricity

AMS-I.C: Small-scale methodology: production of thermal energy with or without electricity	
Baseline emissions for electricity production	$BE_{captelec,y} = \left(\frac{EG_{captelec,PJ,y}}{\eta_{BL,captive\ plant}}\right) \times EF_{BL,FF,CO2}$
Baseline emission for heat production	$BE_{thermal,Co2,y} = \left(\frac{EG_{thermal,y}}{\eta_{BL,thermal}}\right) \times EF_{FF,CO2}$
Baseline emissions for electricity and heat production	$BE_{cogen/trigen,CO2,y} = \left[\left(\frac{EG_{PJ,electrical,y} \times 3.6 + EG_{PJ,thermal,y}}{\eta_{BL,cogen/trigen}}\right)\right] \times EF_{FF,CO2}$
Project emissions	$PE_y = PE_{FF,y} + PE_{Ec,y} + PE_{cultivation,y} + PE_{Geo,y} + PE_{ref,y}$ Where: $PE_{Geo,y} = PE_{FF,y} + PE_{s,y}$
Emission reductions	$ER_y = BE_y - PE_y - LE_y$

(Source: UNFCCC, 2016)

Where:

$\eta_{BL,captive\ plant}$ =The efficiency of the plant related to the use of fossil fuel which would have been used without the project's activity

$\eta_{BL,cogen/trigen}$ = Total annual average efficiency related to the cogeneration/ trigeneration plant because of the use of fossil fuel

$\eta_{BL,thermal}$ =The plant's efficiency derived from the use of fossil fuel which would have been used without of the project activity

$BE_{captelec,y}$ = The baseline emissions in year y related to the electricity displaced during the project activity (tCO_2)

$BE_{cogen/trigen,CO2,y=}$ Baseline emissions in year y related to electricity and thermal energy displaced during the project activity (tCO_2)

$BE_{thermal,Co2,y}$ = The baseline emissions in year y derived from steam/heat displaced during the project activity

$EF_{BL,FF,CO2}$= The CO_2 emission factor related to the fossil fuel which would have been used in baseline plant

$EF_{FF,CO2}$ = CO_2 emission factor related to the fossil fuel which would have been used in a baseline cogeneration plant

$EG_{PJ,electrical,y}$ = Amount of electricity supplied in year y because of the project activity (GWh)

$EG_{PJ,thermal,y}$ =Net quantity of thermal energy which has been supplied in year y by the project activity (TJ)

$EG_{captelec,PJ,y}$ =The amount of electricity in year y related to the project activity (MWh)

$EG_{thermal,y}$ =The net quantity of steam/heat in year y supplied by the project's activity

$PE_{Ec,y}$ = Project emissions in year y derived from electricity consumption (tCO_2)

$PE_{FF,y}$ = Project emissions in year y derived from fossil fuel consumption (tCO_2)

$PE_{Geo,y}$ = Project emissions in year y derived from a geothermal project activity (tCO_2)

$PE_{cultivation,y}$ = Project emissions in year y derived from cultivation of biomass in a specific plantation (tCO_2)

$PE_{ref,y}$ = Project emissions in year y derived from use of refrigerant in the project activity (tCO_2)

PE_y = Project emissions in year y derived from the project activity (tCO_2)

3.6= This number corresponds to the conversion factor (TJ/GWh)

Table 5.8: Switch from non-renewable biomass by the user for thermal applications

CDM AMS I.E: Switch from non-renewable biomass by the user for thermal applications	
Baseline emissions	$BE_y = f_{NRB,y} \times EF_{projected\_fossil\_fuel} \times B_y \times NCV_{biomass}$
Project emissions from cultivation of biomass	$PE_{BC,y} = PE_{SM,y} + PE_{BB,y} + PE_{Ec,y} + PE_{TR,y} + PE_{SOC,y}$
Emissions reductions	$ER_y = BE_y - PE_y - LE_y$

(Source: UNFCCC, 2016)

Where:

B_y = Quantity of woody biomass which has to be substitute or displace in tonnes

$PE_{BB,y}$= Emissions which result during the year y from clearance or burning of biomass (tCO_2e)

$NCV_{biomass}$ = Net calorific value related to the non-renewable woody biomass which has to be substitute

$PE_{BC,y}$ = Emissions resulting in during the year y which derive from cultivation of biomass in the dedicated plantation (tCO_2e)

$PE_{Ec,y}$= Emissions which result during the year y from energy consumption (tCO_2e)

$PE_{SM,y}$= Emissions which result during the year y from soil management (tCO_2e)

$PE_{SOC,y}$ = Emissions which result during the year y from loss of soil organic carbon (tCO_2e)

$PE_{TR,y}$= Emissions which result during the year y from transport of biomass (tCO_2e)

Table 5.9: Methane recovery at household/small farm level in agricultural activities

CDM AMS III.R: Methane recovery at household/small farm level in agricultural activities (version n. 2)	
Baseline emissions	$BE_y = D_{CH4} \times GWP_{CH4} \times UF_b \times \sum_{j,LT} MCF_j \times N_{LT,y} \times B_{0,LT} \times MS\%_{Bl,j} \times VS_{LT,y}$
Project activity emissions	$PE_y = PE_{PL,y} + PE_{power,y} + PE_{transp,y} + PE_{flare,y} + PE_{storage,y}$
Emission reductions	$ER_{y,ex\ post} = min[(BE_{y,ex\ post} - PE_{y,ex\ post}), (MD_y - PE_{power,y,ex\ post})]$ Where: $MD_y = BG_{burnt,y} \times D_{CH4} \times FE \times w_{CH4,y} \times GWP_{CH4}$

(Source: UNFCCC, 2016)

Where:

$B_{0,LT}$= Maximum methane producing potential related to the volatile solid which is generated for animal type LT (m3 CH4/kg dm)

$ER_{y,ex\ post}$ = Emission reductions made by the project activity

GWP_{CH4}= Global Warming Potential (GWP) of CH4 which is applicable to the crediting period (t CO2e/t CH4)

MCF_j= Annual methane conversion factor (MCF). This is related to the baseline animal manure management system which correspond to the letter j

MD_y= Methane destroyed and captured or that is used in the project activity during the year y (tCO_2e)

$MS\%_{Bl,j}$ = Fraction of manure which id handled in system during the year y

$N_{LT,y}$= Annual average number during the year y of animals' type LT

$PE_{PL,y}$= Emissions derived from physical leakage during the year y of biogas (tCO_2e)

$PE_{flare,y}$= Emissions derived from combustion or flaring of the biogas stream during the year y (tCO_2e)

$PE_{power,y,ex\ post}$ = Emissions derived from the use of electricity or fossil fuel for the operation related to the installation of facilities during the year y based on monitored values (tCO_2e)

$PE_{power,y}$= Emissions derived from the use of fossil fuel or electricity for the operation of the facilities installed during the year y (tCO_2e)

$PE_{storage,y}$= Emissions derived from the manure's storage (tCO_2e)

$PE_{transp,y}$= Emissions derived from incremental transportation occurred during the year y (tCO_2e)

$PE_{y,ex\ post}$ = Project emissions which has been calculated using the ex post monitored values UF_b= Model correction factor used for the model uncertainties (0.94)

$VS_{LT,y}$ = Amount of volatile solid production during a single day and related to the type of animal LT (kg VS/head/d)

FE = Flare efficiency during the year y (it corresponds to a fraction)

values for year y (tCO_2e)

$BG_{burnt,y}$= Biogas combusted or flared during the year y (m3)

D_{CH4} = CH4's density (0.00067 t/m3 at 1 atm pressure and a room temperature of 20 ºC)

Table 5.10: Reforestation and Afforestation requirements

Large and Small scale Gold Standard: Reforestation and Afforestation requirements (version 2013)	
CO_2-certificates	CO2-certificates: $(CO_{2_{Fixation}} - Baseline - Leakage - Other\ Emissions) * Eligible\ planting\ area$
Total CO_2-certificates per Project area per year (y)	$\text{CO2\_certificates}_{Project\ area,t} = \sum_{MU=1}^{MUs} \sum_{t=1}^{CP} CO2_{certificates\ MU,t}$

(Source: Gold Standard, 2016)

Where:

CP= year when the crediting period will end

Mus= Mus of the project area (Modeling Unit)

t= years related to the crediting period

$CO2_{certificates\ MU,t}$ = CO_2-certificates of a MU during the specific year t

5.11: Small-scale methodology: Reforestation and Afforestation project activities which are implemented on lands and wetlands

Small-scale methodology: Small-scale methodology: Reforestation and Afforestation project activities which are implemented on lands and wetlands (version n. 3.0)	
Baseline net GHG removals by sinks	$\Delta C_{BSL,t} = \Delta C_{TREE\_BSL,t} + \Delta C_{LI\_BSL,t} + \Delta C_{SHRUB\_BSL,t} + \Delta C_{DW\_BSL,t}$
Actual net GHG removals by sinks	$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t}$
Leakage emissions	$LK_t = LK_{AGRIC,t}$
Net anthropogenic GHG removals by sinks	$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL.t} - \Delta C_{BSL,t} - LK_t$

(Source: UNFCCC, 2016)

Where:

$\Delta C_{ACTUAL.t}$ =Actual net GHG which has been removed by sinks during the year t

$\Delta C_{AR-CDM,t}$ = Net anthropogenic GHG which has been removed by sinks during the year t

$\Delta C_{BSL,t}$ = Baseline net GHG which has been removed by sinks during the year t

$GHG_{E,t}$ =Increase of the non-CO_2 GHG emissions inside the project boundary which derive from the implementation of the A/R CDM project activity during year t

$LK_{AGRIC,t}$ =Leakage derived from to the displacement of the agricultural activities during the year t

LK_t =GHG emissions during the year t derived from the leakage

$\Delta C_{BSL,t}$ = Baseline net GHG which has been removed by sinks during the year t

$\Delta C_{DW\_BSL,t}$ =Change in the carbon stock related to the baseline dead-wood biomass during the year y inside the project boundary

$\Delta C_{LI\_BSL,t}$ = Change in carbon stock related to the baseline litter biomass during the year y inside the project boundary

$\Delta C_{P,t}$ =Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; t CO_2-e

$\Delta C_{SHRUB\_BSL,t}$ =Change in carbon stock related to the baseline shrub biomass during the year y inside the project boundary

$\Delta C_{TREE\_BSL,t}$ = Change in carbon stock related to the baseline tree biomass during the year y inside the project boundary

Bibliography

ACOPAGRO (2016), http://acopagro.com.pe/ , (15/12/2016)

Altromercato (2017), http://www.altromercato.it/it_it/ , (17/01/2017)

Amatucci F. (1997), *Il commercio equo e solidale*, ETASLIBRI, Milano

Astmosfair (2016), https://www.atmosfair.de/en/, (10/12/2016)

Ball J. (2015), *Who Will Pay for Climate Change?,* available at https://newrepublic.com/article/123212/who-will-pay-climate-change

Ban Ki-Moon (2007), *A Climate Culprit in Darfur*, The Washington Post, (16/01/2007)

Banca D'Italia Eurosistema (2016), http://cambi.bancaditalia.it/ , (15/10/2016)

Barnett, J. and Adger, W. N. (2007), *Climate change, human security and violent conflict,* Political Geography, Volume 26, Issue 6, 639–655

BBC (2016), http://www.bbc.com/ , (10/11/2016)

Bijma J., Pörtner H. O., Yesson C. and Rogers A.D. (2013), *Corrigendum to "Climate change and the oceans – What does the future hold?*, Marine Pollution Bulletin, Volume 74, Issue 2, 495–505

Boonman M., Huisman W., Sarrucco-Fedorovtsjev and E., Sarrucco T. (2010), *A Success story for Producers and Consumers,* https://european-fair-trade-association.org

Borgonovi E. (1997), *Le ragioni dello sviluppo del Commercio equo e solidale*, in Il commercio equo e solidale (edited by Amatucci), 37-40, ETASLIBRI, Milano

Boyle S. and Ardill J. (1989), *Il pianeta che cambia*, Frassinelli, Milano

BP (2016), *Statistical Review of World Energy*, 1-2, http://www.bp.com

Bussard S. (2014*), Aria nuova per il clima*, Internazionale, n°1070, 17

Central Intelligence Agency, CIA (2016) https://www.cia.gov/ (10/09/2016)

Caplin S. (2015), *Acqua. Fino all'ultima goccia,* Internazionale n°1120, 40-46

Carbon Pricing Leader Coalition (2016), https://www.carbonpricingleadership.org/

Carrington (2016), *Four billion people face severe water scarcity, new research finds*, The Guardian, (12/02/2016)

Castka P. and Corbett C. J. (2014), *Governance of Eco-Labels: Expert Opinion and Media Coverage*, Journal of Business Ethics, Volume 135, Issue 2, 309–326

Chenouard M. (2016), *COP21: huit mois après, les gros pollueurs trainent toujour les pieds*, available at http://www.lavoixdunord.fr/france-monde/cop21-huit-mois-apres-les-gros-pollueurs-trainent-ia0b0n3687471

Chomsky N. (2014), Il *triste crepuscolo della civiltà umana*, Internazionale, n°1068, 34

Citterio E., (2015), *Le nuove frontiere del «fair trade». Commercio equo e solidale, la rivoluzione «domestica»*, L'Avvenire, (22/05/2015)

Clean Development Mechanism, CDM (2016), https://cdm.unfccc.int/, (20/12/2016)

Cole J. (2014), *Why Is Yemen So Violent? Because It Is So Poor and Thirsty, Poverty doesn't cause terrorism, but poor countries face special problems in dealing with it*, The Nation, (8/11/2014)

Commission of European Communities (2009), *Contributing to Sustainable Development: The role of Fair Trade and nongovernmental trade-related sustainability assurance schemes,* Communication from the Commission to the Council, the European Parliament and the European Economic and Social Committee, 1-19

COP21 (2015), www.cop21.gouv.fr/

Dercon S. and Christiaensen L. (2007), *Consumption risk, technology adoption and poverty traps: evidence from Ethiopia*, Policy Research Working Paper, No. 4257, World Bank, Washington DC, 1-41

Deutsche Post DHL Group (2015), *Corporate Social Responsibility Report*, available at http://cr-report2015.dpdhl.com/

Deutsche Post DHL Group (2017), http://www.dhl.com/en.html, (01/02/2017)

DHL Living Responsibility (2017), https://www.dhllive.com/, (18/01/2017)

Drabo A. and Mbaye L. M. (2011), *Climate Change, Natural Disasters and Migration: An Empirical Analysis in Developing Countries,* IZA Discussion Paper No. 5927, 1-32

Earth System Research Laboratory (2016), https://esrl.noaa.gov/, (10/09/2016)

Emanuel K. (2012), *What we know about climate change*, The MIT Press, Cambridge, Massachusetts

Equo Garantito (2016), http://www.equogarantito.org/, (13/09/2016)

Esa, UN Department of Social and Economic Affairs (2015), *World Population Prospects,* available at https://esa.un.org/unpd/wpp/Publications/Files/WPP2015_DataBooklet.pdf

European Commission (2016), *Proposal for a new European Consensus on Development Our World, our Dignity, our Future*, Communication from the Commission to the Council, the European Parliament and the European Economic and Social Committee, 1-27

European Commission Climate Action (2016), http://ec.europa.eu/clima/policies (12/10/2016)

European Fair Trade Organization (2016), https://european-fair-trade-association.org, (15/09/2016)

European Parliament (2016), http://www.europarl.europa.eu/, (10/09/2016)

Fair climate deal (2016), http://www.fairclimatedeal.net, (24/08/2016)

Fair Trade Advocacy Office (2016), http://www.fairtrade-advocacy.org/, (25/08/2016)

Fair Climate Deal (2016), http://www.fairclimatedeal.net, (30/08/2016)

Fairtrade Foundation (2016), http://fairtrade.org.uk/, (25/08/2016)

Fairtrade International (2009), *A charter of fair trade principles*, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/about_us/documents/Fair_Trade_Charter.pdf

Fairtrade International (2009) *Fairtrade International Requirements for Assurance Providers*, Version 1.1, available at

https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/ASSU_ReqAssuranceProviders_v1.1.pdf

Fairtrade International (2009) *Fairtrade International Requirements for Licensing Bodies,* Version 1.0, available at

https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/ASSU_RequirementsLicensingBodies_v1.0.pdf

Fairtrade International (2014) *Fairtrade Prohibited Materials List*, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/2014-05-15_EN_Prohibited_Materials_List.pdf

Fairtrade International (2015) SOP Development of Fairtrade Minimum Price and Premium, available at
https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/2015-01-27_SOP_Development_of_Fairtrade_Minimum_Prices_and_Premiums.pdf

Fairtrade International (2015), Fairtrade Geographical Scope Policy of Producer Certification, available at
https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/Geographical_Scope_Policy_EN.pdf

Fairtrade International (2015) *Fairtrade Assurance Code Public System report,* available at
https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/ASSU-Assurance_Code_System_Report_Template_Fairtrade_International.pdf

Fairtrade International (2015) *Fairtrade International Oversight Procedure*, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/ASSU_OversightProcedure_v1.0.pdf

Fairtrade International (2015) *2015 Fairtrade Monitoring and Impact Report*, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/resources/2015-Monitoring_and_Impact_Report_web.pdf

Fairtrade International (2015) *Fairtrade Assurance Public System Report*, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/ASSU-Assurance_Code_System_Report_Template_Fairtrade_International.pdf

Fairtrade International (2015) Fairtrade Carbon Credits -Approved carbon calculation methodologies, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/FCC_approved_carbon_methodologies.pdf

Fairtrade International (2015) *Fairtrade Carbon Credits price methodology*, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/FCC_price_methodology.pdf

Fairtrade International (2015) Fairtrade Geographical Scope Policy of Producer Certification, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/Geographical_Scope_Policy_EN.pdf

Fairtrade International (2015) Fairtrade Minimum Prices and Premium for Fairtrade Carbon Credits, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/2015-10-01_EN_Standard-and-price-announcement.pdf

Fairtrade International (2015) Growing stronger together Fairtrade's partnership strategy (2011-2015), 1-6, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/about_us/documents/2011-Fairtrade_Partnership_Strategy.pdf

Fairtrade International (2015), Fairtrade Monitoring and Impact Report, Scope and Benefits of Fairtrade, Seventh edition 2015, 1-173, available at

https://www.fairtrade.net/fileadmin/user_upload/content/2009/resources/2015-Monitoring_and_Impact_Report_web.pdf

Fairtrade International (2016) *Changing Trade, Changing Lives 2016-2020*, 1-20, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/about_fairtrade/documents/2016-Fairtrade-Global-Strategy-web.pdf

Fairtrade International (2016) *Development of Fairtrade Standards*, 1-14, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/SOP_Development_Fairtrade_Standards.pdf

Fairtrade International (2016) *Changing Trade, Changing Lives 2016-2020*, 1-20, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/about_fairtrade/documents/2016-Fairtrade-Global-Strategy-web.pdf

Fairtrade.net (2016), https://www.fairtrade.net/, (12/12/2016)

FAO (2014) *The State of Food Insecurity in the World 2014, Strengthening the enabling environment for food security and nutrition*, Rome, 1-57, available at http://www.fao.org/3/a-i4030e.pdf

FAO (2016), http://www.fao.org, (15/10/2016)

FAO, Food and Agriculture organization of United Nations (2010-2011) *The State of Food and Agriculture report*, 1-60, available at http://www.fao.org/docrep/013/i2050e/i2050e.pdf

FAO, Food and Agriculture organization of United Nations (2012) *World Agriculture Towards 2030/2050: The 2012 revision*, 1-4, available at http://www.fao.org/fileadmin/user_upload/esag/docs/AT2050_revision_summary.pdf

FAO, IFAD and WFP (2015) *The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress*, Rome, 1-62, available at http://www.fao.org/3/a-i4646e.pdf

Farid M., Keen M., Papaioannou M., Parry I., Pattillo C., Ter-Martirosyan A. and other IMF Staff (2016) *After Paris: Fiscal, Macroeconomic, and Financial Implications of Climate Change,* 1-46, http://www.imf.org/external/pubs/ft/sdn/2016/sdn1601.pdf

FLO, Fairtrade Labelling Organizations International (2007), *Constitution of the Association*, 1-20, available at https://www.fairtrade.net/fileadmin/user_upload/content/2009/about_us/documents/151014-Constitution-Fairtrade-International-EN.pdf

Gazzetta Ufficiale dell'Unione Europea (2009), *Parere del Comitato economico e sociale europeo sul tema Prodotti alimentari del commercio equo e solidale: autoregolamentazione o legislazione? (parere d'iniziativa)*, 1-6, available at http://eur-lex.europa.eu/legal-content/IT/TXT/PDF/?uri=CELEX:52009IE1461&from=IT

Gelis S. (2015) *Kyoto Protocol, 10 years later: Did deal to combat greenhouse emissions work and what of its future?*, The National Post, (14/02/2016)

Global Carbon Atlas (2016) http://www.globalcarbonatlas.org/en/content/welcome-carbon-atlas

Global Goals (2016) http://www.globalgoals.org, (14/10/2016)

GlobeScan (2011), *Shopping Choices Can Make a Positive Difference to Farmers and Workers in Developing Countries: Global Poll*, available at http://www.globescan.com/news-and-analysis/press-releases/press-releases-2011/94-press-releases-2011/145-high-trust-and-global-recognition-makes-fairtrade-an-enabler-of-ethical-consumer-choice.html

Gold Standard (2011) Revision to "Technologies and Practices to displace decentralized thermal energy consumption" methodology", 1-67, available at http://www.goldstandard.org/sites/default/files/documents/gs_tpddtec_meth_110411.pdf

Gold Standard (2013) *Afforestation/Reforestation (A/R) Requirements*, 1-48, available at http://www.goldstandard.org/sites/default/files/ar-requirements_v0-9.pdf

Gold Standard (2013) *The Gold Standard Suppressed Demand Small-scale Methodology for Energy Use for the Processing of Agricultural Products*, 1-17, available at http://www.goldstandard.org/sites/default/files/documents/gs-agricultural-product-processing-2013.pdf

Gold Standard (2016) *Ecologically Sound Fuel Switch to Biomass with Reduced Energy Requirement*,1-8, available at http://www.goldstandard.org/sites/default/files/gs_methodology_switch_to_biomass_fuel.pdf

Gold Standard (2016) *Gold Standard Supply Report Q1 2016, Better information for better decision-making*, 1-14, available at http://www.goldstandard.org/sites/default/files/documents/tgs_supply_report.pdf

Gold Standard (2016) *Gold Standard Supply Report Q2 2016, Better information for better decision-making*, 1-12, available at http://www.goldstandard.org/sites/default/files/documents/gs_supply_report_q2_2016.pdf

Goldenberg (2009) *By 2050, 25m more children will go hungry as climate change leads to food crisis*, The Guardian, (30/10/2009)

Griffiths J., Rao M., Adshead F. and Thorpe A. (2009) *The health practitioner's guide to climate change: diagnosis and cure*, (edited by Griffiths J. et al.), Earthscan, London

Hamrick K. (2016) *Raising Ambition, State of the Voluntary Carbon Markets 2016*, 1-58, available at http://www.forest-trends.org/documents/files/doc_5242.pdf

Hoffman A. J. and Woody JG. . (2008) *Climate Change: What's Your Business Strategy?*, Harward Business Press, Boston, 1-14

Howard R. J., Tallontire A. M., Stringer L. C. and Marchant R. A. (2015) *Which "fairness", for whom, and why? An empirical analysis of plural notions of fairness in Fairtrade Carbon*

Projects, using Q methodology, Environmental Science & Policy, Volume 56, 100–109, February 2016

Howard, Tallontire, Stringer and Marchant (2015) *Unravelling the Notion of "Fair Carbon": Key Challenges for Standards Development*, World Development, Volume 70, 343–356, June 2015

Huq S., Chandani A. and Anderson S. (2010) *COP 15 - Review and analysis*, available at http://www.iied.org/cop-15-review-analysis

IEA, International Energy Agency (2011) The world is locking itself into an unsustainable energy future which would have far-reaching consequences, IEA warns in its latest World Energy Outlook, available at https://www.iea.org/newsroomandevents/pressreleases/2011/november/the-world-is-locking-itself-into-an-unsustainable-energy-future.html

IEA, International Energy Agency (2015) *Energy and climate change, World Energy Outlook Special Report*, 1-200, available at https://www.iea.org/publications/freepublications/publication/WEO2015SpecialReportonEnergyandClimateChange.pdf

IEA, International Energy Agency (2015) Key trends in CO2 emissions, Excerpt from: CO2 emissions from fuel combustion, 1-152, available at https://www.iea.org/publications/freepublications/publication/CO2EmissionsFromFuelCombustionHighlights2015.pdf

ILO, International Labour Organization (2016) http://www.ilo.org (10/10/2016)

Institute for Advance and Sustainability studies, IASS (2016) http://www.iass-potsdam.de/en (29/08/2016)

Institute for Global Health, UCL (2016) https://www.ucl.ac.uk/igh/ (30/08/2016)

International Displacement Monitoring Centre, IDMC (*2015) Global Estimates 2015, People displaced by disasters*, 1-109, available at

http://www.internal-displacement.org/assets/library/Media/201507-globalEstimates-2015/20150713-global-estimates-2015-en-v1.pdf

International Organization for Migration (2016) https://www.iom.int (05/10/2016)

Internazionale (2015) *Tutte le domande sulla conferenza di Parigi*, n°1130, 54-55

IPCC (2014) *Africa. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,* Niang, I., O.C. Ruppel, M.A. Abdrabo, A. Essel, C. Lennard, J. Padgham, and P. Urquhart, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1199-1265.

IPCC (2014) *Asia. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,* Hijioka, Y., E. Lin, J.J. Pereira, R.T. Corlett, X. Cui, G.E. Insarov, R.D. Lasco, E. Lindgren, and A. Surjan, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1327-1370

IPCC (2014) *Central and South America. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Magrin, G.O., J.A. Marengo, J.-P. Boulanger, M.S. Buckeridge, E. Castellanos, G. Poveda, F.R. Scarano, and S. Vicuña, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1499-1566

IPCC (2014) *Climate Change 2014 Synthesis Report Summary for Policymakers,* Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.), IPCC, Geneva, Switzerland, 1-32

IPCC (2014) *Summary for Policymakers*, In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B.

Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. 1-32

IPCC (2016) http://www.ipcc.ch (14/12/2016)

ISEAL Allliance (2016) http://www.isealalliance.org (10/09/2016)

John K. D. and Rübbelke D. (2009) *Benefits of Environmental Policy: Conference Volume of the 6th Chemnitz Symposium 'Europe and Environment'*, Routledge

Kahn (2016) *No More Free Riders? Lessons from the Paris Climate Change Mitigation Treaty,* available at http://greeneconomics.blogspot.it/2015/12/no-more-free-riders-lessons-from-paris.html

Kerr S. (2000) *Global Emissions Trading, Key Issues for Industrialized Countries, New Horizons in Environmental Economics*, Cheltenham UK, Edward Elgar

Klare M. (2015) *La pace passa per il clima*, Internazionale, n°1130, p. 59-60

Klein, R.J.T., S. Huq, F. Denton, T.E. Downing, R.G. Richels, J.B. Robinson and F.L. Toth (2007) *Inter-relationships between adaptation and mitigation. Climate Change 2007: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK, 1-34

Kreft S., Eckstein D., Dorsch L. and Fischer L. (2016) G*lobal climate risk index 2016,* 1-32, available at https://germanwatch.org/en/download/13503.pdf

Lomborg (2010) *Smart Solutions to Climate Change, Comparing Costs and Benefits*, Cambridge University Press

Manne A. S.and Richels R. G. (1992) *Buying Greenhouse Insurance: The Economic Costs of CO2 Emission Limits*, MIT Press, Cambridge, Massachusetts

Mendelsohn R. (2010) *Climate Change and Economic Growth,* available at http://siteresources.worldbank.org/EXTPREMNET/Resources/489960-1338997241035/Growth_Commission_Vol4_Globalization_Growth_Ch12_Climate_Change_Economic_Growth.pdf

Monbiot G. (2015) How fossil fuel burning nearly wiped out life on Earth – 250m years ago, The Guardian, (27/05/2015)

Morrison H. (2011) *Low carbon products in demand despite challenging economic climate*, The Guardian, (01/07/2011)

Newell P. and Paterson M. (2010) *Climate Capitalism, Global Warming and the Transformation of the Global Economy*, Cambridge, Cambridge University Press

Nordhaus D. W. (2006) *Geography and macroeconomics: New data and new findings*, PNAS, Yale University, 1-8

Northrop E. and Ross K. (2016) *After COP21: What Needs to Happen for the Paris Agreement to Take Effect?*, available at http://www.wri.org/blog/2016/01/after-cop21-what-needs-happen-paris-agreement-take-effect

Nowakowski K. (2015) *A climate for Coffee*, National Geographic, vol.228 n°3

Nowakowski K. (2015) *Wheat in New Climate*, National Geographic, vol. 227 n°5

Noy I. (2009) *The macroeconomic consequences of disasters*, Journal of Development Economics, 1-11

O'Brien K., St. Clair A. L. and Kristoffersen B. (2010) *Climate Change, Ethics and Human Security*, Cambridge Press University

Olivier J. G. J., Janssens-Maenhout G., Muntean M. and Peters J. A.H.W. (2015) *Trends in Global CO2 Emissions, 2015 Report*, 1-80, available at http://edgar.jrc.ec.europa.eu/news_docs/jrc-2015-trends-in-global-co2-emissions-2015-report-98184.pdf

Organisation for Economic Co-operation and Developmen, OECD (2016) https://www.oecd.org/, (07/11/2016)

Pigou A. (1920) *The welfare of economics*, London: Macmillan and Co.

Polara G. (2016) *Equo e garantito, il Senato si muova*, available at http://www.radioarticolo1.it/articoli/2016/11/03/7896/equo-e-garantito-il-senato-si-muova

Prinn R. (2013) *400 ppm CO2? Add Other GHGs, and It's Equivalent to 478 ppm*, available at http://oceans.mit.edu/news/featured-stories/5-questions-mits-ron-prinn-400-ppm-threshold

Pur Project (2012) *Biocorredor Martin Sagrado Redd+ Project*, 1-202, available at https://s3.amazonaws.com/CCBA/Projects/Biocarridor_Martin_Sagrado_REDD%2B_project/PDD+REDD+Biocorredor+Martin+Sagrado+CCBA+-+V4.0+(1).pdf

Pur Project (2016) http://www.purprojet.com, (08/12/2016)

Quality food awards (2015) http://qualityfoodawards.com/ (02/08/2016)

Rao P. K. (2009) *The Economics of Global Climatic*, Routledge

Repubblica (2016) *Clima, Cop 22: entro il 2018 regolamento per attuare gli accordi di Parigi,* (19/12/2016)

Schaltegger S. and Synnestvedt T. (2002) *The link between 'green' and economic success: environmental management as the crucial trigger between environmental and economic performance* Journal of Environmental Management, Volume 65, Issue 4, 339-346,

Schmidhuber J. and Tubiello F. (2008) *Global Food Security under Climate Change",* Proceedings of the National Academy of Sciences, vol. 104 no. 50, 19703–19708

Schreiber D. (2013) *The Voluntary Carbon Market and Business Innovation for Sustainable Development*, University of Pennsylvania, 1-73

Shanshan L., Lei Z., Zui C. and Liangmei Z. (2014) *Che aria tira a pechino,* L'internazionale n°1046, 50-52

Smith K. (2007) *The Carbon Neutral Myth: Offset Indulgences for your Climate Sins, Amsterdam, Carbon Trade Watch*, 1-80, available at http://www.carbontradewatch.org/pubs/carbon_neutral_myth.pdf

Smith D. and Vivekananda J. (2007) *A climate of conflict, The links between climate change, peace and war*, 1-48, available at http://reliefweb.int/sites/reliefweb.int/files/resources/16A12BCAEAD0E411852573AE007570A3-International%20Alert_Climate%20of%20Conflict_07.pdf

Stern N. (2007) *Stern Review: The Economics of Climate Change*, Cambridge University Press

Stern N. (2015) *Why Are We Waiting? The Logic, Urgency, and Promise of Tackling Climate Change*, The MIT Press, Cambridge, Massachusetts

Surowiecki J. (2014 October) *Climate trades*, The New Yorker, (13/10/2014)

The Economist (2015) *Bringing up baby,* 59-60, (22/08/2015)

The Economist (2015) *Clear thinking needed,* 13 (28/11/2015)

The Economist (2015) *Disaster foretold,* 55-56 (07/11/2015)

The Economist (2015) *Hope for trees, Green light, Hopelessness and determination,* 17-18, 86-87, (19/12/2015)

The Economist (2015) *It's getting hotter,* 55-56, (03/10/2015)

The Economist (2015) *Raise the green lanterns*, 50, (05/12/2015)

The Economist (2016) *In the red,* 66, (28/05/2016)

Tol R. (2014) *Climate Economics: Economic Analysis of Climate, Climate Change and Climate Policy*, Edward Elgar, Cheltenham

U.S. Department of Defense (2010 February) *Quadrennial Defense Review Report*, 1-128, available at http://www.comw.org/qdr/fulltext/1002QDR2010.pdf

UNFCCC (2011) *Fact sheet: Climate change science*, 1-7, available at https://unfccc.int/files/press/backgrounders/application/pdf/press_factsh_science.pdf

UNFCCC (2016) http://unfccc.int/2860.php (27/12/2016)

UNISDR, United Nations Office for Disaster Risk Reduction (2015) *Making Development Sustainable: The Future of Disaster Risk Management. Global Assessment Report on Disaster Risk Reduction*, Geneva, Switzerland, 1-136, available at http://www.preventionweb.net/english/hyogo/gar/2015/en/gar-pdf/GAR2015_EN.pdf

UNISDR, United Nations Office for Disaster Risk Reduction (2015) *The human cost of weather related disasters* 1995-2015, 1-30, available at https://www.unisdr.org/2015/docs/climatechange/COP21_WeatherDisastersReport_2015_FINAL.pdf

United Nation Development Programme, UNDP (2016) http://www.undp.org/ (04/12/2016)

United Nations, UN (2009) *Climate change and its possible security implications*, 1-29, available at http://www.unhcr.org/protection/environment/543e73f69/climate-change-its-possible-security-implications-report-secretary-general.html?query=climate%20change

United Nations, UN (2016) http://www.un.org (06/11/2016)

UN-REDD Program (2016) http://www.un-redd.org/ (08/09/2016)

Uzawa H. (2003) *Economic Theory and Global Warming*, Cambridge University Press

Vidal D., (2013) *Riscaldamento globale*, Internazionale, n°1028, 50-51

Wagner G., Weitzman M. L. (2016) *Climate shock: the economic consequences of a hotter planet*, Princeton University Press

World Bank (2016) http://www.worldbank.org/ and http://data.worldbank.org/ (06/12/2016)

World Commission on Environment and Development (1987*) Our Common Future, The Brundtland Report*, Oxford University Press, Oxford, 1-300, available at http://www.un-documents.net/our-common-future.pdf

World Fair Trade Organization (2016), http://wfto.com/ (07/11/2016)

World Fair Trade Organization and Fairtrade Labelling Organizations (2009), *A Charter of Fair Trade Principles*, 1-12, available at http://www.wfto.com/sites/default/files/Charter-of-Fair-Trade-Principles-Final%20%28EN%29.PDF

World Fair Trade Organization- Europe (2016), http://wfto-europe.org/ (17/10/2016)

World Food Program, WFP (2016) wfp.org (10/09/2016)

World Health Organization, WHO (2016) http://www.who.int (12/11/2016)

Yang Z. (2008) *Strategic Bargaining and Cooperation in Greenhouse Gas Mitigations: An Integrated Assessment Modeling Approach*, The MIT Press, Cambridge, Massachusetts