



Università
Ca' Foscari
Venezia

Master's Degree programme – Second Cycle
(*D.M. 270/2004*)
in International Relations

Final Thesis

—
Ca' Foscari
Dorsoduro 3246
30123 Venezia

The involvement of Mexico towards a Green and Sustainable Economy

The renewable energy potential

Supervisor

Ch. Prof. Stefano Soriani

Co-Supervisor

Ch. Prof. Luis Fernando Beneduzi

Graduand

Chiara Canazza

Matriculation Number 833721

Academic Year

2015 / 2016

Table of contents

Abstract	3
Introduction	12
1. Green Economy as a sustainable model for Latin America	18
1.1. From <i>Our Common Future</i> to <i>The Future We want</i>	18
1.2. The transition through market-based instruments	26
1.3. The green matrix of Latin America	35
1.4. A socially inclusive process: regional definition of Green Economy	48
2. Mexico and its pathway towards a sustainable green growth	53
2.1. The Mexican Renewable Great Potential	53
2.2. The Federal approach to Green Economy	58
2.3. Excursus about current green measures into force	67
2.4. Case study: industrial eco-efficiency in Altamira-Tampico	75
3. Main international stakeholders in the Mexican renewable sector	82
3.1. The international financing community	82
3.2. International agreements for the promotion of the low-carbon transition	88
3.3. The international FDI flow in Mexico	97
4. Challenges for the complete success of the inclusive Green Economy	105
4.1. Political instability	105

4.2. Other barriers to the Mexican attractiveness	111
4.3. The “forgotten” social inclusion	116
4.4. Indigenous environmentalism	123
Conclusions	128
List of main abbreviations and acronyms	131
References	133

Abstract

A partire dalla fine del XX secolo, il termine “Globalizzazione” ha iniziato a prender parte nei maggiori discorsi geopolitici fino ad arrivare ai giorni nostri in cui il termine è ormai parte del vocabolario comune. Globalizzazione può essere intesa come l’insieme di interdipendenze economiche, politiche, sociali, culturali e tecnologiche in continua evoluzione in cui lo Stato risulta essere il tradizionale, ma non esclusivo, attore-chiave. Infatti, in un mondo che assume sempre più la sembianza metaforica di una complessa rete i cui nodi sono collegati da altrettanto complesse relazioni di diversa natura, lo Stato conserva ancora il suo ruolo di attore-chiave, ma è affiancato da altri attori di rilevanza globale come multinazionali e organizzazioni internazionali governative e non. Il mondo appare progressivamente omogeneizzato, ma in realtà è un’omogeneizzazione parziale e di facciata poiché diversità e relazioni gerarchiche di potere continuano ad esistere e il processo di globalizzazione procede a ritmi diversi. Se da una parte si ha beneficiato in termini di liberalizzazione e deregolamentazione, dall’altra si stanno intensificando a ritmi esponenziali gli effetti negativi sull’ambiente e il fenomeno in questione risulta esserne complice: crescita industriale ed intensificazione dei trasporti stanno contribuendo all’innalzamento dei livelli di inquinamento globale e provocando perdita di biodiversità, spesso irrecuperabile.

Consapevoli del fatto che non si può tornar indietro e che la crescente integrazione economica su scala globale è il risultato spontaneo di ciò che viene definito “progresso”, ciò che si sta cercando di favorire è uno sviluppo che sia

sostenibile: la crescita economica deve proseguire in maniera tale da garantire l'integrità e la tutela dell'ambiente naturale così come il benessere umano distribuito equamente sia all'interno della presente generazione sia di generazione in generazione. Tra i vari approcci al concetto di Sviluppo Sostenibile spicca quello conosciuto con il termine di *Green Economy* (o Economia Verde). Tale modello economico è di matrice Occidentale ed ha lo scopo principale di creare efficienti economie non più basate sui combustibili fossili, ma su pratiche e l'utilizzo di risorse naturali che siano ecosostenibili. Numerosi Paesi Occidentali e non, come Danimarca, Germania, Spagna, Israele e Repubblica di Corea, hanno già identificato le loro linee politiche di *Green Economy* e risultati positivi in termini di riduzione e prevenzione di danni ambientali sono stati ottenuti. Elementi caratterizzanti e comuni all'interno del modello di *Green Economy* risultano essere strumenti economici, legislativi e tecnologici. A partire dagli inizi degli anni 2000, l'Organizzazione delle Nazioni Unite (ONU) ha preso particolarmente a cuore tale modello assumendosi l'impegno di diffondere, incoraggiare e facilitare l'adozione di soluzione *green* anche in quei Paesi etichettati come "in via di sviluppo" e "emergenti".

Di qui, scopo della presente tesi è quello di presentare e analizzare l'applicazione del modello di *Green Economy* in America Latina, vasta regione del continente americano in cui, da secoli, la Natura in tutti i suoi aspetti è di estrema rilevanza sociale, culturale ed economica. Per alcuni popoli, la loro sopravvivenza è determinata dalla stessa sopravvivenza del loro habitat naturale, con il quale vivono in perfetta armonia. In particolare, l'attenzione è posta in un determinato Paese

latinoamericano che sta crescendo sempre più come attore economico a livello globale: il Messico.

Di fronte alla crescente consapevolezza di essere partecipi nonché fautori di una preoccupante crisi ecologica mondiale caratterizzata dal continuo degrado degli ecosistemi e da disuguaglianze sociali non solo tra Paesi ma anche all'interno di uno stesso Paese, il primo capitolo si propone di dare una definizione appropriata di Sviluppo Sostenibile e di mettere in evidenza come, a partire dalla fine degli anni 80, la comunità internazionale si è dimostrata sempre più interessata e risoluta a porre un freno a quelle pratiche e scelte politico-economiche "insostenibili" sia per l'ambiente che per l'umanità. Tra i numerosi meeting internazionali, la maggior parte di essi realizzati all'interno della cornice ONU, quello tenutosi a Kyoto nel 1997, e ricordato come COP3 (ossia Terza Conferenza delle parti), è tra i più importanti. Infatti, da tale conferenza ne uscì il primo accordo internazionale contenente misure vincolanti riguardo l'emissione di gas serra. Entrato in vigore nel Febbraio 2005 a seguito della ratifica russa e tuttora in vigore, nell'imporre la riduzione delle emissioni di gas serra, il Protocollo di Kyoto è innovativo poiché, consapevole delle differenze esistenti tra i 192 Paesi parte, applica il "principio di responsabilità comune ma differenziata" secondo cui solo i Paesi appartenenti all'*Annex I* hanno l'obbligo di ridurre le proprie emissioni nocive. Per gli altri Paesi parte dell'accordo, non rientranti in questa lista, l'adozione di misure a tutela dell'ambiente non sono obbligatorie, ma fortemente consigliate. Anche il recente Accordo di Parigi sul clima, frutto della COP21 e firmato ad Aprile 2016, si rifà al medesimo principio di responsabilità comune ma differenziata. Ciò che emerge da

quest'ultimo trattato è la necessità comune di transitare verso economie a basse emissioni di carbonio capaci di garantire una generale crescita economica che sia sostenibile. Il riferimento alla *Green Economy* come valida soluzione alle attuali preoccupazioni ambientali è implicito. La definizione maggiormente diffusa è quella redatta dall'UNEP nel 2008 quando, di fronte alla crisi finanziaria mondiale, l'agenzia ONU per l'ambiente (UNEP) invitò i governi ad adottare un pacchetto di misure economiche e politiche "verdi" quali sussidi, incentivi, ecotasse con lo scopo di agevolare quei settori più virtuosi per l'ambiente come il settore dell'energia rinnovabile. Da fonti pulite ed inesauribili come il vento, il sole, il mare e il calore geotermico può essere ottenuta energia altrettanto pulita ottenendo numerosi benefici che saranno successivamente presentati. Per l'America Latina, la possibilità di ottenere economie nazionali non più dipendenti da combustibili fossili è maggiore rispetto alle possibilità di altre regioni. Inoltre, sfruttando in maniera saggia ed efficiente tali risorse naturali, è possibile attenuare problematiche molto diffuse nella regione come, ad esempio, povertà energetica e disoccupazione. Di qui ne deriva quella che è la definizione regionale di *Green Economy* in cui viene data particolare rilevanza all'aspetto sociale: non deve essere perseguito il benessere economico solo su scala nazionale (tenendo come riferimento il livello del PIL), ma il processo di transizione deve essere il più inclusivo possibile per abbattere gli enormi divari esistenti tra la popolazione.

Con il secondo capitolo ci si focalizza esclusivamente su quello che è l'approccio federale messicano al modello di *Green Economy*. Da decenni l'economia della Federazione Messicana è fortemente legata alla propria

produzione di petrolio e, grazie anche a questo settore, è riuscita a imporsi sempre più nel mercato internazionale. Tuttavia sono sempre più evidenti problematiche come il progressivo esaurimento delle riserve mondiali dell'oro nero e i danni ambientali provocato da questo. Quella messicana è un'economia emergente sulla quale sono poste grandi aspettative future. I potenziali per sviluppare un solido settore dedicato all'energia rinnovabile sono stati portati alla luce a partire dagli inizi del 2000, quando dopo 71 anni in carica, il PRI (Partito Rivoluzionario Istituzionale) lasciò il posto al PAN (Partito Azione Nazionale) il quale introdusse nella sua agenda nazionale sia obiettivi di una progressiva transizione all'energia rinnovabile che di riduzione dell'esistente povertà. Dando maggior spazio all'iniziativa privata e cercando di facilitare l'accesso agli investimenti esteri, si nota come durante la leadership di Felipe Calderón vi sia un chiaro avvicinamento al modello di *Green Economy* nella sua interpretazione regionale. Come emergerà dall'exkursus relativo alle attuali politiche e misure federali circa lo sviluppo di energie rinnovabili, si vedrà come la maggior parte di queste siano attribuibili all'amministrazione PAN. Tuttavia, l'attenzione alla crescita verde è presente anche a partire dal 2012, anno in cui le elezioni videro il ritorno del PRI guidato dall'attuale Presidente in carica, Enrique Peña Nieto, criticato e sempre meno amato dai suoi concittadini. Nonostante molti autori sostengano che l'attuale amministrazione stia continuando a favorire gli idrocarburi, provvedimenti legislativi ed economici volti all'agevolazione del settore rinnovabile sono stati intrapresi attirando l'attenzione di un numero crescente, e vario, di gruppi d'interesse (solitamente definiti con il termine inglese *stakeholders*).

Come sarà spiegato nel terzo capitolo infatti, i grandi potenziali messicani di sviluppare un robusto settore energetico sostenibile sono sostenuti da svariati *stakeholders* sia di rilevanza nazionale che internazionale. Il capitolo si incentra specificatamente su quella che è l'attenzione posta da *stakeholders* internazionali poichè stanno fornendo attualmente la maggior parte del sapere così come dei mezzi tecnologici e finanziari per il decollo del settore in questione. Come emergerà ci sono svariati motivi che bloccano gli *stakeholders* nazionali ad adottare tecnologie rinnovabili, nonostante gli incentivi presenti: scarsa informazione e una scarsa integrazione tra le imprese (per lo più piccole-medie imprese) sono solo due esempi. Tra i maggiori *stakeholders* internazionali si trovano organizzazioni internazionali impegnate a fornire crediti e a cooperare con entità locali per lo sviluppo di progetti pluriennali. "Sustainable Energy Technologies Development for Climate Change" è il progetto avviato dalla Banca Mondiale per introdurre e diffondere l'utilizzo di tecnologie avanzate (le così dette *ACE technologies*) indispensabili alla transizione verde. Questo è solo uno dei numerosi programmi che vedono partecipare l'istituto finanziario internazionale più noto al mondo. Come si avrà modo di leggere, anche l'Unione Europea sta fornendo pratico supporto al Paese Latinoamericano attraverso investendo nella realizzazione di parchi eolici e impianti geotermici laddove i potenziali sono ottimali.

All'interno della comunità internazionale degli Stati, un numero crescente di Governi si sta dimostrando sempre più interessato alla realtà messicana e firmando accordi di cooperazione e sviluppo in ambito di energia pulita. Dalla collaborazione tra governi ne consegue anche un interesse crescente da parte di *stakeholders*

privati i quali, grazie anche ad un maggior grado di apertura alla partecipazione privata in settori come quello energetico un tempo sotto l'esclusivo monopolio federale, decidono di direzionare i loro flussi di investimenti in Messico. Secondo fonti autorevoli, negli ultimi 5 anni, con all'avvio di 44 progetti privati stranieri, 13,372 milioni di dollari sono stati investiti in suolo messicano contribuendo tra l'altro alla generale diminuzione del tasso di disoccupazione vigente all'interno della Federazione.

L'ultimo capitolo infine cercherà di sollevare quelli che sono gli ostacoli al successo del modello di *Green Economy* in Messico. Si partirà da quella che è la situazione politica attuale, dove, come già detto, l'attuale amministrazione guidata da Nieto è fortemente criticata per le sue tendenze autoritarie e per il suo scarso interesse alle questioni sociali di fronte al persistere di forti ineguaglianze e marginalizzazione di gruppi sociali, per lo più quelli che abitano le zone rurali. Tuttavia, la povertà in tutte le sue forme non avvolge solo le zone più remote e incontaminate da simboli della modernità, ma è presente anche nelle maggiori città come Città del Messico, Oaxaca e Monterrey, dove sono visibili quartieri che riversano in situazioni di degrado, dove persiste quella che è definita povertà energetica. Non è solo l'attuale amministrazione ad essere criticata, ma l'intera classe politica contrassegnata da elementi di instabilità e disagio quali corruzione, favoritismi, mancanza di trasparenza e mancanza di inclusione democratica. Tutti questi elementi finiscono per avvolgere l'intero quadro giuridico e istituzionale e persino le forze dell'ordine, incaricate di garantire l'ordine pubblico e la giusta applicazione della legge, sono tra i primi a farsi corrompere contribuendo a

rafforzare lo stretto legame paura-insicurezza che sovrasta sia la popolazione locale sia eventuali investitori stranieri. Il traffico illegale di droga costituisce un'ulteriore barriera in termini di competitività su scala nazionale e internazionale: il persistere dei cartelli di droga e il continuo verificarsi di crimini collegati a questi gruppi criminali, che da anni controllano il mercato mondiale di stupefacenti come cocaina e metamfetamine, rappresentano uno dei maggiori ostacoli nonché una delle maggiori sfide che le autorità non sono mai state capaci e risolte a frenare completamente. C'è inoltre chi critica la validità del modello economico di matrice Occidentale sostenendo che sono pochi i progetti allo sviluppo di energia da fonti rinnovabili destinati alla popolazione locale, specialmente a quei 12 milioni di famiglie che si trovano in una situazione di povertà energetica. La principale accusa è che il settore vada principalmente a beneficiare una cerchia ristretta di *stakeholders* a partire dai grandi colossi multinazionali e che la crescente offerta di energia rinnovabile generata in Messico sia rivolta per lo più all'export. In aggiunta, il modello messicano di *Green Economy* trova di fronte a sé un ulteriore ostacolo rappresentato dall'insieme di numerose comunità indigene che popolano soprattutto la parte meridionale del Paese. Queste comunità si stanno fortemente opponendo alla realizzazione di grandi opere per ottenere energia pulita di cui i beneficiari sono tutt'altri: spesso, i diritti di queste comunità, così come la loro cultura, il loro "vivere bene" in simbiosi con l'ambiente non vengono minimamente considerati alimentando la rabbia locale.

All'interno di questo elaborato verrà anche dedicato spazio alla disciplina e applicazione pratica dell'Ecologia Industriale finalizzata a rendere il più efficiente

possibile l'attività industriale: il concetto di rifiuto è quasi inesistente perché, nell'ottica di un'economia circolare, gli scarti di una determinata attività vengono riutilizzati da un'altra attività creando una solida rete di attività industriali in cui i benefici sono sia economici che ambientali. Nello specifico, verrà presentato il corridoio industriale messicano di Altamira-Tampico come simbolo di eco-efficienza nonostante la maggior parte delle attività siano riconducibili al settore petrolchimico.

Infine, verranno tirate le somme circa l'efficacia o meno del modello di *Green Economy* in Messico con riferimento al settore dell'energia rinnovabile. Ciò che si vuole dimostrare è che le possibilità per ottenere risultati positivi dalla sua applicazione ci sono: rispetto ad altri Paesi Latinoamericani, il Messico è indubbiamente avvantaggiato data la propria posizione geografica e la propria struttura morfologica. La generale diminuzione dei prezzi di mercato di tecnologie relativi all'efficienza e all'energia rinnovabile (soprattutto per l'energia solare) costituiscono un ulteriore input per agire adesso. Più passi sono stati intrapresi, da misure legislative ed economiche all'introduzione di strumenti di mercato, ma ciò che sembra mancare è il vero significato di sostenibilità: infatti, ciò che emerge, è che tale transizione si sta principalmente focalizzando sulla crescita economica generale del Paese, tralasciando la tematica sociale, in particolare l'inclusione sociale.

Introduction

Nowadays Sustainable Development is a recurring thematic which is finding prominent relevance in both national and international scenario. Starting from the Seventies, several international conferences have taken place and numerous policies have been addressed to the topic. Also in the recent 21st session of the Conference of the Parties, the so-called COP21, which took place from November to December 2015 in Paris, the concept of Sustainable Development was immediately faced as deeply related to the main object of the conference: limiting global warming to less than 2 degrees Celsius. The Paris Agreement is the practical result of the UN COP21 and a lot of faith is putted on it as it represents an universal and binding agreement on climate: 196 Countries have attended the conference and ,up to now, 185 countries have signed the agreement and 60 of these have also ratified it. However, in order to become effectively binding, the agreement has to be ratified by minimum 55 Countries, and these ones should represent together at least the 55% of global greenhouse emissions.¹ The text of the agreement emphasizes immediately the close relationship between climate and equitable access to Sustainable Development and also together with eradication of poverty. As the Preamble underlines, good climatic mitigation actions not only lead to environmental results, but also to social and economic results, and so to a range of

¹ In this specific case, the signature of a Country doesn't bind it, but a further step is necessary: the ratification. In this sense, the Paris agreement will enter into force in the international arena only when 55 specific ratifications will be reached.

co-benefits for the entire Planet Earth.² Technological development and transfer play a relevant role because they could reduce gases emissions, provide a better management of natural resources and foster economic growth worldwide, especially in the economies of Developing Countries and the emerging economies, for instance the ones of some Latin American Countries like Brazil and Mexico. At the opening ceremony for the Signature of the Paris Agreement on 22 April 2016, the famous actor Leonardo Di Caprio urged world leaders to leave fossil fuels “*in the ground where they belong*” and to prefer clean and renewable energies.³ Consequently, first of all, a reshape in the industrial sectors seems necessary as, in general, industry is the main consumer of energy.

In order to provide a sustainable economic growth without compromising the integrity of ecosystems, a specific model has recently emerged: the Green Economy model. A first definition of this principle was provided in 2008 by the United Nations Environment Programme (UNEP) in a period affected by a global financial crisis. Since the Green economy is a specific approach to Sustainable Development, it is clear that it pursues the same triple result: long-term economic growth, environmental protection and social inclusion. Latin America could be defined as a “biodiversity superpower” as it host the greatest biological diversity on the planet and, even though the region is characterized by a mosaic of very different communities and morphological features, a lot of countries share the presence of

²UN Framework Convention on Climate Change, *Adoption of the Paris Agreement*, December 21, 2015. Available at: <https://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf> (last visualization: June 23, 2016).

³ Leonardo di Caprio Foundation, *A Landmark Day for Earth*, April 22, 2016. Available on: <http://leonardodicaprio.org/landmark-day-earth/> (last visualization: June 23, 2016).

important natural resources including gas, iron, copper, gold and oil. In addition due to their specific geographical position and due to their geological structure, several Latin American countries have enormous potentials to exploit clean and renewable energy sources by applying the Green Economy model and, consequently, strengthening their socioeconomic situation as well as protecting the environment.

In this scenario, the purpose of my dissertation is to analyze the Green Economy model in Latin America and ,more specifically, in Mexico directing a narrower focus on renewable sources. The aim is to analyze how the country is approaching the model, which results have been obtained and which not, and why it could be not yet affirmed the complete success in its implementation.

Through the consultation of the main treaties agreed in international fora and more official UN documents, the first chapter is intended to define and explain the key concepts of Sustainable Development and Green Economy starting from the 1987 Brundtland Report, which coined the term Sustainable Development, to the UNEP definition of Green Economy provided in 2008 when launching its Green Economy Initiative with the aim to provide worldwide support for the creation and greening of certain sectors. The following year, in April 2009, the Global Green New Deal (GGNW) was the material result of the UNEP commitment to Green Economy: in this report national governments are encouraged to shape new policies and provide green measures in order to obtain a resilient economy with an improved quality of life, while respecting the ecological limits of the Earth. A regional definition of Green Economy, applicable to Latin America, will be provided: being

one of most unequal region in the world in terms of wealth distribution, Green Economy measures have to be also socially inclusive and redistributive in the long and tangled pathway towards Sustainable Development and poverty eradication. It is clear that the good implementation of new policies, starting from clean energy policies, requires also a more complex framework: a democratic decision-making process, grounded and transparent institutions, founding sources, incentive and disincentives and other elements that will be further analyzed.

With the second chapter, the focus moves exclusively to one specific country of Latin American region: Mexico. Fundamental sources of information are represented by legislative measures into force, researches carried out by renowned research centers such as the “International Renewable Energy Agency” and the “Centre for Clean Air Policy”. As the country is acquiring even more relevance in the international arena, the chapter wants to highlight the potentials to develop a strong economy starting from its capacity to generate renewable energy. When in 2012 it hosted the international G20 summit, Mexico affirmed its will to follow the Green Economy model as a way to promote not only economic growth, but also social inclusion and the conservation of its environmental and geographical diversification. As it will emerge, the Federation has already adopted several policies in this way proving really interested on sustainability. Furthermore, a specific case study explains how is effectively possible to improve environmental and production performance, also offering new jobs opportunity, with the implementation of the industrial ecology model. Born in the Nineties, this model could adapt consistently to the Green Economy parameters as they share common

goals including less environmental damages and economic growth. Thanks to the numerous research and analysis studies managed by the academic world, where excels the dedication of the Spanish professor Gemma Cervantes, the example provides at the end of the second chapter is the one of the eco-efficient industrial corridor located between the Mexican cities of Tampico and Altamira.

The third chapter is dedicated to the international commitment in Mexico with regards to green economy activities in which Memorandum of Understanding between governmental bodies as well as official reports released by both international and State-owned credit institutions will be consulted. A strategic role is played by UNEP with its assistance through the Green Economy Initiative. Together with the UN Regional Office for Latin America and the Caribbean (ROLAC), UNEP is supporting investments in the country and motivating the federal government to embark on the green path with adequate policies and partnerships. Due to its comparative advantage in terms of renewable sources availability, the country is attracting even more foreign direct investments (FDIs) by countries such as Denmark, France, Spain, the United States and Israel. As it will be observed, the definition of targeted State regulations and standards, federal programmes as well as numerous public-private partnership agreements have transformed the country into one of the major mainstream markets for renewable energy foreign investments. The international attractiveness that Mexico offers is allowing a consistent economic growth that, if properly managed, could positively stimulate the decrease of existing gaps: first and foremost the sizeable income gap.

The fourth and last chapter is intended to underline some factors that pose obstacles in the true and definitive transition towards a sustainable and inclusive economy through the Green Economy approach. As a matter of fact, there are a range of factors that are preventing the success starting from the socio-political instability. For this purpose, instruments such as public polls and journalistic inquiries result very helpful for obtaining appropriate pieces of information. According to numerous experts, there is a lack of a totally inclusive and transparent process especially with the current government of Enrique Peña Nieto who is criticized for its authoritarian attitudes and his indifference for the marginalized poor communities. In addition, despite the positive signs obtained in terms of growing flow of both public and private investments especially in the clean and renewable sector, much more investments and welfare could be achieved by eradicating some existing problems namely bureaucratic delays, corruption of political leaders and economic stakeholders, drug trafficking and crime-related violence, and the different local oppositions to the realization of any project aimed at building advanced and efficient renewable source plants.

Then, considering the magnitude of the topic dealt together with the heterogeneity of the country into question, without forgetting the presence of different environmental and climatic patterns, societal and political patterns as well as differences in terms of economic diversification, some general conclusions will be drawn confirming the effectiveness in itself that the Green Economy model, if properly applied and managed, could constitute in reaching Sustainable Development.

CHAPTER 1

GREEN ECONOMY AS A SUSTAINABLE MODEL FOR LATIN AMERICA

1.1. From *Our Common Future* to *The Future We want*

A first official definition of Sustainable Development was provided with the publication of a global agenda entitled *Our Common Future* in 1987 during the World Commission on Environment and Development (WCED) in Tokyo. The Commission was previously created in 1983 by the General Assembly of the UN with the main objective to look for an alternative form of development in front of the clear impossibility of an unlimited growth into a resources-limited world. The preparatory works were led by the Norwegian Prime Minister Gro Harlem Brundtland, and for this reason the final document is also known as the Brundtland Report. The report states that Sustainable Development is the “development which meets the needs of the present without compromising the ability of future generations to meet their own needs”⁴. With a pronounced emphasis on the future, the heart of the definition lies in the concept of equity in a double direction as intergenerational and intragenerational equity. Aware of the fact that economic development requires the use of natural resources, a more efficient (and so sustainable) management of these resources is highly recommended not only to worldwide national governments, but to humankind in general as it encompasses a multiple range of actors. Analyzing the report, a wave of optimism results and there

⁴ UN Department of Economic and Social Affairs-Division for Sustainable Development, *Our Common Future*, 1987. Available on: <http://www.un-documents.net/our-common-future.pdf> (last visualization: June 25, 2016).

is confidence in the role of technology. As a matter of fact, according to the document, the proliferation of new 'environmentally sound' technologies applied to pollution, agriculture and energy systems would have favour Sustainable Development.⁵ Nevertheless, with its 22 principles, the Brundtland Report has been defined by some experts as too optimistic and utopian especially when considering the sharp differences between Developed and Developing countries, and disputes emerged due to the subjective and different meaning when outlining the basic needs that should be satisfied.⁶

International cooperation efforts and an increasing number of national legislations on pollution prevention and reduction started being formulated stressing the necessity to act in order to stop the ecological degradation. In June 1992, with thirty thousand people present, the delegates of 172 countries took part to the first United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. The Conference, known also as the "Earth Summit", tried to give more solidity to the concept of Sustainable Development previously defined by the Brundtland Commission. Its definition was revisioned by providing a tripartite structure composed by society, economy and environment. These three interconnected foundations should be harmonized to provide equity and increased national GDP. Compromises to reduce environmental problems and to fight against poverty and social injustice emerged, even though it became more clear the existing gap between countries belonging to the "rich" North and those belonging to the

⁵ Ibid.

⁶ Gilbert Rist, *The history of Development: from western origins to faith*. London & New York, Zed Books, 2008, pp. 181-184.

“poor” South of the globe. The need for a stronger cooperation and new international and national strategies was affirmed in the five official documents that resulted from the Summit: the Rio Declaration, the Convention on Climate Change, the Convention on Biodiversity, the Declaration on the Forest and Agenda 21. Together with the 27-articles based Rio Declaration, the latter one is considered by many as the ‘bible of Sustainable Development’ with a lot of recommendations that governments, national and international organizations, NGOs, public and private entities, and citizens should consider. Major public participation as well as major financial commitment by Developed countries are remarked in this no-binding action plan in order to provide a better quality of life in those Developing countries facing huge problems such as financial indebtedness and ecological indebtedness.⁷ Even though, in the text of Agenda 21, Developed countries are depicted as the main ‘unsustainable’ consumers, it is only in 1997 that their responsibility has been really taken into consideration with specific binding measures. The international agreement Kyoto Protocol of 1997 was elaborated in the context of the Conference of the Parties (COP3) with the aim to reduce greenhouse gases (GHGs) by at least 5% below the registered levels of 1990 by 2012.⁸ Based on the principle of common but differentiated responsibilities, the Protocol is mandatory only for the Parties

⁷ The term ‘ecological debt’ was used for the first time in 1991 when some Latin America environmental organizations accused Developed Countries with their capitalist model of having overexploited and progressively destructed the Planet, especially the biological richness that characterized the Latin America region. The term refers to an unequal trade where only Industrialized countries gain, while Developing and Underdeveloped countries suffer social and environmental damages.

⁸ UN Framework Convention on Climate Change, *Kyoto Protocol*, art.3., 1997.

listed in the Annex I: industrialized and wealthy countries belong to Annex I and, once ratified the Protocol, they are obliged to reduce gas emissions, while other countries, parties of the Protocol, without mandatory commitments, are highly recommended to adopt emission-reduction policies especially those with growing economies (and high consumption levels) for instance China, India, Brazil, South Africa and Mexico. Similarly to the Paris Agreement of April 2016, in order to enter into force, the Kyoto Protocol required the ratification of at least 55 Countries responsible for the 55% of the total carbon dioxide emissions in 1990: the so-called prerequisite of the double 55 was reached only in 2005, year in which the Protocol came into force.⁹ However, in November 2012 the Treaty was extended until 2020 in occasion of the Doha Climate Change Conference because the set objectives have not been already achieved. In addition, concerns about the future and validity of the Protocol have emerged because of the withdrawal of a relevant Industrialized country, namely Canada, and also due to the dangerous and increasing GHGs caused by Non-Annex I Parties, with a growing economic weight, such as Brazil, India and China.¹⁰

In front of the ecological crisis humankind and ecosystems are exposed, two different positions have emerged about the environmental policies that governments should adopt in order to get closer to a proper Sustainable Development. The first one is a pessimistic position which states that the actual

⁹ UN Framework Convention on Climate Change, *Kyoto Protocol*, art.25, 1997.

¹⁰ UN Framework Convention on Climate Change, *Status of ratification of the Kyoto Protocol*, available at:

http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php (last visualization: July 4, 2016).

ecological crisis is a structural crisis and the only solution to go beyond is through the radical change implied with the concept of de-growth. This approach criticizes the already developed contemporary consumer society and it asks for a revision and definition of new guiding values and social paradigms. The main exponent of this vision is the French philosopher and economist Serge Latouche: in his fight against consumerism and continuing economic growth as degrading processes, he suggests a specific path composed by eight steps in order to achieve a sustainable world. According to Latouche, applying the “eight-R” (namely Re-evaluate, Reconceptualise, Restructure, Redistribute, Relocalize, Reduce, Re-use, Recycle) a return to the past times at slower rhythm with a regenerated world would be possible.¹¹

The second position applied to the relationship between economic growth and environmental entirety, and completely different, is an optimistic view that strongly believes in the power of technology and market-based forces in countering ecological degradation with an extended economic growth able to enhance the quality of life of poor countries. This approach defends the Western capitalistic model and promote a specific Sustainable Development model named Green Economy.

The term Green Economy entered in the common vocabulary in the 2000s, better to say in 2008 during the multiple global crisis (financial, energy and food crisis) as political leaders and experts from all over the world needed to find new

¹¹ Serge Latouche, *Farewell to Growth*, Cambridge, Bristol, Policy Press, 2009, pp. 35- 47.

policy responses. Even though it was introduced for the first time in a report of the London Environmental Economics Centre in 1989¹², the notion of Green Economy has been championed by the United Nations Environment Programme (UNEP)¹³. As a matter of fact, in 2008, UNEP called on several governments to adopt “green stimulus packages” in order to transform their economies into greener ones, where the term “green” means ecological. Furthermore, the UN environmental authority commissioned the US economist Edward Barbier to elaborate a report entitled “The Global Green New Deal”, published in April 2009, which will be examined in the next section. The report in itself proposes policies, investments and incentives in key sectors with the objective to avoid ecosystems degradation and to solution the financial global recession. However, the report lacks definition about Green Economy, which is provided two years later with the UNEP “Green Economy Report”. In the report, Green Economy *“must not only be efficient, but also fair. Fairness implies recognising global and country level equity dimensions, particularly in assuring a just transition to an economy that is low-carbon, resource efficient, and socially inclusive.”*¹⁴ Through this worldwide accepted working definition it could be understood that Green Economy is a model to achieve Sustainable Development.

¹² David Pearce et al., *Blueprint for Green Economy*, London, Earthscan Publications, 1989.

¹³ The United Nations Environment Programme (UNEP) is the leading global environmental organization born in 1972 when debates about environmental issue was gaining ground internationally also thanks to the publication of the *Limits To Growth* by the Club of Rome in the same year. Since its creation, UNEP performs a wide range of activities to protect the environment (in all its forms) and to favour a sustainable use of natural sources.

¹⁴ UNEP, *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers*, 2011. Available at: www.unep.org/greeneconomy (last visualization: July 5, 2016).

In its resolution 64/236, the General Assembly of United Nations not only reaffirmed the importance of continuing the implementation of Agenda 21 and of Rio Declaration on Environment and Development, but it also announced that in 2012 the United Nations Conference on Sustainable Development (UNCSD) would have taken place in Rio de Janeiro twenty years after the 1992 UNCED Earth Summit: for this last reason, the 2012 Conference is usually called Rio+20.¹⁵ At the meeting, through solidarity, cooperation and a more and better participation,¹⁶ the concept of Sustainable Development was upgraded by focusing on two specific aims: the need to ensure a sustainable institutional framework together with the will to implement the Green Economy paradigm in order to mitigate global threats like poverty, climate change, desertification, loss of biodiversity. All the challenges as well as all the assumed commitments stressed at the Conference have been combined in the final document “The Future We want”. The third part concerns Green Economy making clear that, by adopting green economy policies, national governments should “*respect each country’s national sovereignty over their natural resources taking into account its national circumstances, objectives, responsibilities, priorities and policy space with regard to the three dimensions of sustainable development*”.¹⁷ Recipients of the recommendations of “The Future We want” are not exclusively governments as the main international subjects, but the entire civil society, starting from businesses and industries of every size, regional

¹⁵ United Nations General Assembly, Resolution 64/236, 31 March 2010.

¹⁶ Héctor Sejenovich, “Overcoming poverty through sustainable development”, in: Fabio de Castro, Barbara Hogenboom and Michiel Baud (ed.), *Environmental Governance in Latin America*, London , Palgrave Macmillan, 2016, pp.199-200.

¹⁷ UN Conference on Sustainable Development, *The Future We want*, art.58, 2012.

administrations, local and indigenous communities. In this unique, and at risk, Planet Earth everyone represents a stakeholder: everyone should demand an inclusive and beneficial relationship between humans, and between humans and Earth's ecosystems.

It is noteworthy to mention that at Rio+20, with a view to 2015 as the predetermined year of conclusion of the Eight Millennium Development Goals (MDGs), the UN Open Working Group launch the basis to develop a new agenda with a new set of innovative goals ready to replace the MDGs. The outcome obtained in October 2015 was the international adoption of seventeen new universal Sustainable Development Goals that will be pursued in the following fifteen years, until 2030.¹⁸ In this context, UNEP is convinced that green and innovative fiscal policies and investments are powerful tools that will contribute effectively to the realization of the first goal: end of poverty.¹⁹

¹⁸ Respectively: 1. No Poverty; 2. Zero Hunger; 3. Good Health and Well-being; 4. Quality Education; 5. Gender Equality; 6. Clean Water and Sanitation; 7. Affordable and Clean Energy; 8. Decent Work and Economic Growth; 9. Industry, Innovation and Infrastructure; 10. Reduced inequalities; 11. Sustainable Cities and Communities; 12. Responsible Production and Consumption; 13. Climate Action; 14. Life Below Water; 15. Life on Land; 16. Peace, Justice and Strong Institutions; 17. Partnerships for the Goals.

Available at: www.un.org/sustainabledevelopment/#prettyPhoto (last visualization: July 5, 2016)

¹⁹ UNEP, *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers*, 2011. Available at: www.unep.org/greeneconomy (last visualization: July 5, 2016).

1.2 The transition through market-based instruments

The global and multiple crisis started in 2008 posed significant threats in terms of increasing unemployment, poverty and irreversible loss of biodiversity. A great international effort to find the right ways to exit the worst global crisis since the Great Depression was needed. As the US President F.D. Roosevelt did in the 1930s with his New Deal programme, in the new millennium the example of such a successful initiative was reconsidered. As a matter of fact, in April 2009, UNEP proposed the Global Green New Deal (GGND) as a package of policies and market-based instruments to encourage worldwide governments to transit towards a green economy, and consequently abandoning their brown economy. Adopting the right mix of policies recommended in the GGND, economic recovery could be possible. Sustainability is not put aside because great attention is paid to the current ecological scarcities as well as social inequalities. When the Deal was proposed, great optimism and confidence were placed on it: it was starting to pave the way for the success of Green Economy initiatives supported by UNEP and also by other international entities such as the World Bank. As it emerges from this UN report, hallmark of Green Economy is that the great value of natural capital is constantly remarked and there is an invite to invest in it, without compromising the integrity of ecosystems, but enabling a sustainable economic progress.²⁰

²⁰ “Natural capital” means the set of natural assets which provide natural resource inputs as well as environmental services for economic production. The Organisation for Economic Co-operation and Development (OECD) specifies that natural capital is the compromise of three categories: natural resource stocks (water, renewable energies, etc.), land (agriculture, silviculture, etc.) and ecosystems (forests, wetlands, marine ecosystems, etc.),

One of the main purposes of the recovery programme, and particularly important for the purpose of this script, is to adopt low-carbon strategies expanding clean and renewable energies in order to provide energy efficiency and conservation as well as energy security, especially for the poor. As the document indicates, a lot of importance is given to the energy sector and its reliance on fossil fuels. The sector is responsible for almost two-thirds of GHG emissions and, for this reason, it is drastically contributing to dangerous phenomena such as the rise of temperatures of both ambient and sea temperature, the progressive erosion and impoverishment of soils, desertification, change in rainfall patterns and the rise of sea level.²¹ Questioning what kind of measures could be implemented in order to favour renewable energies (for instance solar power, wind power, geothermal power and marine power), the GGND explains the policies and market-based instruments that governments are recommended to follow. First of all, public subsidies for the use of fossil fuels should be reduced or eliminated because they are environmentally unfriendly. Another possibility to weaken the fossil fuels dependency is through the introduction of ecotaxes and fees making the activities and consumption more onerous and less profitable.²² In this way, the obtained financial savings could be allocated to green energy initiatives, and, thanks to the issue of market-based incentives and fiscal stimulus offered for green energies, a

which are fundamental for the long-term sustainable development.

<http://stats.oecd.org/glossary/detail.asp?ID=1730> (last visualization: July 12, 2016)

²¹ UNEP, *Rethinking the Economic Recovery: A Global Green New Deal*, 2009, pp. 9-10.

Available at: [http://www.sustainable-](http://www.sustainable-innovations.org/GE/UNEP%20%5B2009%5D%20A%20global%20green%20new%20deal.pdf)

[innovations.org/GE/UNEP%20%5B2009%5D%20A%20global%20green%20new%20deal.pdf](http://www.sustainable-innovations.org/GE/UNEP%20%5B2009%5D%20A%20global%20green%20new%20deal.pdf)

(last visualization: July 4, 2016).

²² Ibid.

transition to a cleaner and more sustainable sector could be possible. Government policies should provide not only fiscal incentives, but also a greater injection of public spending in the sector and it should also commit to facilitating the entry of the adequate technologies required. Nevertheless, the public financial commitment is not sufficient and private investments (from credit institutes to private citizens) should be attracted and favoured in this direction. Aware of the fact that the green transition to clean and renewable energy sector implies loss of jobs in the brown economy, it has been affirmed that such loss will recover in the medium-long term providing significant employment opportunities. UNEP states that green economy measures allow a faster and more consistent economic growth than brown economy maintaining and restoring natural capital as well as reducing greenhouse gases emissions.²³ Numerous sceptics raised doubts about the implementation of such green energy policies in developing countries because of their energetic dependency from other countries. It is true that a lot of developing countries are net importers of fossil fuels such as oil and they are the first to suffer from any rise in price, but if they apply the GGND measures they could develop their own energy security by investing in renewable energies: with the right time, the right policies and the right international financial commitment in helping these countries, many developing countries could achieve economic growth, an expansion of employment opportunities and better life quality. In addition, these countries could also promote South-South cooperation and become relevant energy exporters for those

²³ UNEP, *Towards a Green Economy*, 2011, pp.11-12.

developing countries with the inability to provide green measures.²⁴ It has been reported that, in 2010, the exorbitant growth of investments in renewable energy has been conducted by non-OECD countries such as Brazil, India and China whose economies are even more emerging in the global arena.²⁵ Another valid example is represented by Bangladesh experience where, since 1996, it has been started an ambitious and successful programme based on a micro credits scheme with the aim to promote, develop and supply renewable energy to rural households. The project, lead by the local organization “Greemen Shakti”, is obtaining excellent results: in 2012 one million solar home systems have been installed across the Asian country.²⁶ Over 130 countries around the world have policies supporting renewable energies and it has been estimated that around US\$ 250 billion have been invested in 2014: solar PV systems and onshore wind programs result the more attractive.²⁷

Nevertheless, in this successful and encouraging scenario for both developed and developing countries, the GGND as a push strategy for the implementation of green measures considers also other necessities, and always with a specific interest in eradicating poverty and social inequalities. For instance, specific GGND policies are addressed to the current water crisis faced in numerous areas of the world. The aim of these recommended policies is to improve water management together with

²⁴ UNEP, *Towards a Green Economy*, 2011, pp.11-12.

²⁵ UNEP/SEFI, *Global trends in sustainable energy investments 2010: Analysis of Trends and issues in the Financing of Renewable Energy and energy Efficiency*, 2010, p.13.

²⁶ Grameen Shakti, *Grameen Shakti Makes a World Record in Non-Grid Power Generation*. Available at:

http://www.gshakti.org/index.php?option=com_content&view=article&id=190&Itemid=73 (last visualization: July 10, 2016).

²⁷ International Energy Agency (IEA), *Tracking Clean Energy Progress*, 2015, France, p.20.

a more widespread extension of water services. Another GGND target is the one of enhancing the sustainability of transportation systems and favour the access to transport to everyone, especially to the poor. Consequently, the GGND suggests measures starting from lower public transport fares (in order to favour the use of public services and decrease air pollution and congestion on the roads), taxes on fuel and fuel vehicles (in order to encourage the preference for high fuel efficiency, hybrid and alternative-fuel vehicles), tax incentives to auto producers of “eco-cars” with a limited engine-size and/or specific emission standards. These sustainable transport strategies not only are able to contribute to less air pollution, congestion, accident probabilities, but they also favour a major access and employment in the public transport services.²⁸ As for the energetic policies, also these policies are proving successful in several countries with different size of economy: China, India and the United States of America are just some example. Also the Republic of Korea has adopted its 3-years Green New Deal program. In 2009 the Republic decided to invest US\$36 billion in order to create 960,000 new jobs and reduce Korean carbon dependency: among the measures adopted, railroads and mass transit projects have been developed and fuel efficient vehicles and clean fuels have been subsidized.²⁹

The Korean example witnesses how large investments in green recovery programmes favour not only a passage to a low-carbon economy, but also how it creates synergies with other economic sectors and, consequently, diversification of

²⁸ UNEP, *Rethinking the Economic Recovery: A Global Green New Deal*, 2009, pp. 111-117.

²⁹ Ministry of Strategy and Finance of South Korea, *Briefing Note for Foreign Correspondents*, January 19, 2009.

national economy is stimulated. Hence, among the numerous urgencies raised by the GGND, the need to diversify national economies stands out, especially for those countries whose existence is tied to primary production for exportation. The international appeal recommended is the one to improve the primary sector in a sustainable way in order to obtain a better management of natural resources, better production while at the same guaranteeing their export ability. By improving the primary production with the dissemination of new technologies, procedures and knowledge, the financial gains obtained by exports will not stop. What the GGND asks is to re-invest such financial gains in new economic sectors and in educational and training programmes in order to obtain a diversified economy with positives effects in terms of employment, level of income and livelihoods.³⁰ Of course, the question is more complex and every reality should be analyzed alone. Sometimes political and institutional reforms are firstly required as well as the fight against illegal activities and corruption which are blocking any possibility for development. Furthermore, the policies presented in certain developing countries should not be too much ambitious and drastic, but careful and comprehensive keeping in mind the vulnerability of several communities to any change.

When considering the target of its green policies, UNEP does not omit the sharp differences among countries neither the possible obstacles and gaps which could be present everywhere. It is not a chance that the GGND declares itself as a *“comprehensive mix of global economic policies, investments and incentives”* in

³⁰ UNEP, *Rethinking the Economic Recovery: A Global Green New Deal*, 2009, pp. 41-52.

order to “achieve the more immediate goals of stimulating economic growth, creating jobs and reducing the vulnerability of the poor and the long-term aim of sustaining that recovery”.³¹ Despite the numerous challenges, the global recession started in 2008 is conceived as an opportunity to generate a more sustainable world and, according to the report, the first to consider and promote the GGND actions should be the G20 countries.³² These leading countries are invited to invest at least 1 per cent of their own total GDP in the promotion of green national actions to reduce carbon dependency. Furthermore, they have the role to foster international worldwide cooperation and coordination especially in green economic sectors.

Despite the restriction of financial flows caused by the multiple crisis, foreign aid and support should be promoted starting from the G20 in order to reduce the existing gaps with several low-income countries. Financial, technical and institutional assistance is a necessary condition to overcome capital gaps, the absence or inadequacy of Research and Development component, skills and technological gaps as well as the unfamiliarity with some realities such as the possible strong public-private partnership in conducting national green recovery.³³ In 2009, Robert Zoellick, the President of the World Bank from 2007 to 2012, suggested the creation of a vulnerability fund managed by the same international

³¹ UNEP, *Rethinking the Economic Recovery: A Global Green New Deal*, 2009, pp. 8-9.

³² G20 (Group of 20) is an international forum representing the 20 leading national economies in the world. The Group meets regularly with the primary aim to discuss and promote policy issues and the international financial stability. The members are : Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, South Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom and the United States and the European Union.

³³ UNEP, *Rethinking the Economic Recovery: A Global Green New Deal*, 2009, pp. 15-36.

financial institution together with the UN and other regional development banks: in this fund, G20 countries would have deposited 0.7 per cent of their green stimulus packages in order to realize the above-mentioned macro-objective.³⁴ Nevertheless, as engine for the global governance in the financial system and for the application of the GGND, the G20 forum requires the commitment of the entire international community: sub-regional, regional, national and international financial institutions should get involved in green investments, guarantee confidence and transparency in the global credit system in order to stimulate also major private investment flows.

In recent years, different proposals have emerged in relation to the development of innovative financial mechanisms to fund GGND and green economy initiatives in general. The International Financial Facility (IFF) was proposed by the United Kingdom with the scope to raise financial resources from the international capital market and, after that, these capitals would have been allocated to developing countries in the form of long-term issues, which would have been repaid over a maximum of 30 years. Until now, this innovative approach aimed at finance development cooperation has been applied only to public health sector (in the form of vaccination programmes).³⁵

³⁴ Robert B. Zoellick, *A Stimulus Package for the World*, in. The New York Times Online, January 22, 2009. Available at: http://www.nytimes.com/2009/01/23/opinion/23zoellick.html?_r=0 (last visualization: July 4, 2016).

³⁵ Gavi Alliance, *Comunicato Stampa per la Pubblicazione Immediata. L'International Finance Facility for Immunisation emette le prime obbligazioni*, London, November 2006.

Approved in 2008 by the World Bank, two financial sources were proposed for the realization of the GGND: the Clean Technology Fund (CTF) and the Strategic Climate Fund (SCF). These have been conceived as funding providers (through grants, concessional loans and a range of risk mitigation instruments) to middle and low-income countries in their effort to become low-emission and climate resilient countries. Also the United States presented their proposal with the realization of a Global Clean Energy Cooperation Programme with the aim to provide strategic partnerships among countries and among governments and private firms so that to consolidate international investments in efficient and renewable energies.³⁶ Nevertheless the proposed global cooperation has never happened, while bilateral and multilateral cooperation agreements on green energy have been signed. Differently from this last failed project, Green Climate Fund (GCF) is proving extremely successful since its creation in 2010 within the framework of UNFCCC: the fund is playing a relevant role in the transition to the green economy model because it is financing a lot of policies, projects and various activities to reduce greenhouse gas emissions, and so climate changes.³⁷

All these financial mechanisms together with other mechanisms and programmes are important vehicles for the right implementation of green economy measures proposed by UNEP. The international cooperation that has been started should continue and should be strengthened further by involving a major number of actors because it has been demonstrated the high potentials possible as well as

³⁶ UNEP, *Rethinking the Economic Recovery: A Global Green New Deal*, 2009, pp. 76-79.

successful experience already registered around the world by adopting green policies and measures. Multiple benefits could be reached with this balanced economic model dispelling the myth that there is an absolute incompatibility between economic progress and environmental sustainability in which leading indicators are represented by the percentage of: concentration of CO₂ in the atmosphere, energy consumption per capita, share of renewable assets in the power supply, waste recycling and reuse, water stress, R&D investments and training expenditure, fossil fuel taxation, additional income generated, and so forth.

1.3 The Green Matrix of Latin America

Latin America is considered as one of the most heterogeneous region in the world. When describing the region, scholars are used to provide its first macro-division pointing at North America area (with Mexico), Central America area (Costa Rica, Honduras, Nicaragua, Panama, and so on), South America area (Argentina, Brazil, Chile, Colombia, Ecuador and so on) and the Caribbean islands (Cuba Puerto Rico, Dominican Republic, Haiti, Jamaica, Puerto Rico, and so on).³⁸ Despite of this subdivision based mainly on geographical patterns, a multitude of further subdivisions could be realized considering political, economic, linguistic, demographic and cultural factors. Nevertheless, this heterogeneous complex of countries has something in common: a unique biodiversity richness: from the

³⁸ UNEP/DTU, *Carbon Cero America Latina. Una vía para la descarbonización neta de la economía regional para mediados de este siglo*, UN Publications, April 2016, pp. 9-15.

Amazonian rainforests to the Andean highlands, from the Belize barrier reefs to the Ecuadorian mangroves, from the Mexican Chihuahuan Desert to the Argentinean Perito Moreno Glacier. All these natural scenarios are matched with an innumerable quantity of different natural sources, animal and plant species.

Since time immemorial, biological varieties play a determinant role in local human lives. The existence of many local populations (especially indigenous ones) is directly linked to nature because it provides almost everything they need. Not only indigenous communities, but the entire region attributes a great value to natural sources and, as a consequence, good environmental governance is a very salient and important issue for everyone.³⁹ Nevertheless, the respect and conservation of biodiversity have not always been considered. It is generally known that European colonial powers overexploited the region: natural resources and also its population starting from the XV century. With the end of Colonialism mainly during the XIX century, the independent countries of Latin America started developing their economic systems where nature was part of: it is not irrational saying that for these countries nature constituted the entire economic system as supported by primary sector exports. Agriculture and extraction of natural elements (for example gas, iron, copper, and oil), both for domestic and international demand, constituted, and still constitutes, essential part for national economies. In general, natural resources contribute a lot in contemporary economies in terms of GDP, but several threats are

³⁹ Martinez-Alier, Michiel Baud and Héctor Sejenovich, "Origins and perspectives of Latin American Environmentalism" in: Fabio de Castro, Barbara Hogenboom and Michiel Baud (ed.), *Environmental Governance in Latin America*, London, Palgrave Macmillan, 2016, pp.46-51.

emerging. The challenging price reduction in the global market and the associated dependency of Latin American countries to export revenues are among the main concerns. Global warming together with the continuing overexploitation of the region are two other big threats which are causing huge natural and economic losses. According to the experts, a rise in global temperature of 2°C brings to loss of forest cover, impoverishment of the soil, change of coastlines with increased sea levels together with the loss of numerous species. It should also be remember that land, with all its resources, represents the greatest source of life for a great number of people, in particular indigenous communities: not only as mean of subsistence, but also as essential cultural and religious element in their ordinary life. If this trend does not stop, a part of the ecological loss, the estimated economic loss that will be reached in 2050 is around 100 billion dollars.⁴⁰ In addition, the increasing ecological debt faces by Latin American countries is caused also by a the so-called “biopiracy”. This latter term indicates the unfair exploitation of natural resources by those actors who control national and international markets: from national governments, to powerful local businesses and international corporations.⁴¹ By unfair exploitation of natural resources is meant both in ecological and economic terms: both environment that the local communities result damaged.

In this context, it seems necessary to find the right set of solutions in order to overcome these problems. Latin America has enormous potentials to develop

⁴⁰UNEP/DTU, *Carbon Cero America Latina*, UN Publications, April 2016, pp. 2-3.

⁴¹Joan Martinez-Alier, Michiel Baud and Héctor Sejenovich, “Origins and perspectives of Latin American Environmentalism” in: Fabio de Castro, Barbara Hogenboom and Michiel Baud (ed.), *Environmental Governance in Latin America*, London , Palgrave Macmillan, 2016, pp.46-51.

strong and more independent economies without compromising its biological richness. In addition, by undertaking a virtuous and sustainable path, the obtained benefits will involve environment, economies and health.

The main advantage that the region possess is its energy matrix. Latin America owned the cleanest energy matrix in the world because it presents a large availability of natural resources which could be addressed in the production of clean and renewable energies.⁴² Hydroelectric and biomass energies are two “traditional” renewable possibilities already known and quite developed in the region, especially Brazil. The green matrix of the energetic sector does not exhaust in these two possibilities. As a matter of fact, depending on morphologic and climatic characteristics, there is a wide range of potentials for the development of low-carbon emissions economies. The main sources of solar energies are represented by the North-West part of Mexico, the North-East part of Brazil, the South part of Peru and the desert of Atacama in the North of Chile. These two last areas represent the largest concentration of solar radiation in the world (275 W/m²) and, consequently, they would be able to satisfy a large percentage of energetic demand in the neighbouring areas, starting from the industrial demand.⁴³ Another great possibility consists in the availability of geothermal sources in countries such as Mexico (which is currently the main producer in the region), Chile, Costa Rica, Colombia and Guatemala. Also wind resources are abundant with high capacities of energetic production. Among the countries with such possibility to develop and use clean

⁴² UNEP/ DTU, *Carbon Cero America Latina*, UN Publications, April 2016, pp. 3-8.

⁴³ UNEP/ DTU, *Carbon Cero America Latina*, UN Publications, April 2016, pp. 10 -13.

wind power there are: Brazil, Venezuela, Mexico, Argentina (in the Austral Patagonia), Colombia (in the desert of Guajira).⁴⁴ Another last example of natural resource that could be employed in the sustainable production on clean and renewable energy is represented by the sea. As a matter of fact, Chile and other countries overlooking the Pacific Ocean could exploit tidal energy generated by tides and waves. While all the above-mentioned clean energy sources could already count on several concrete projects around the region, this last one possibility is not yet well-defined and developed, and experts and researchers are still studying and developing it. One of the main obstacle in the real use of tidal energy is the exorbitant costs associated with the development and functioning of specific technologies.⁴⁵

With an increasing number of benefits that could be obtained, a lot of Latin American countries have already started, or are launching, several projects and policies supporting a gradual transition to renewable and clean energies. It is noteworthy to report that Costa Rica is currently the most virtuous country in the world in the use of renewable energies: in 2013, the 88,2% of the electricity produced in the country was obtained through renewable sources.⁴⁶ A similar situation is experienced also by Paraguay, Uruguay, Nicaragua and Brazil. Together with many other Latin American countries, through the adoption of national and regional energy plan, they want to demonstrate that decarbonisation is possible.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ UNFCCC, *Costa Rica generará el 93% de su electricidad con renovables*, January 16, 2015. Available at: <http://newsroom.unfccc.int/es/energ%C3%ADa-limpia/costa-rica-generara-el-93-de-su-electricidad-con-renovables/> (last visualization: July 12,)

Even though the region is responsible only for the 10% of global CO₂ emissions, an efficient process of decarbonisation should be pursued because, as the Latin American Energy Organization (OLADE) documents, the commitment to CO₂ intensive resources such as oil and coal is too high in too many countries (Venezuela, Mexico, Brazil, Colombia are still the main producer and exporters of oil).⁴⁷

Substantial gains in terms of environment, economy and improved livelihoods are obtained with the application of renewable energies in the electricity sectors. Given the increasing rates of urbanization and industrial expansion in many areas of Latin America, the demand of electricity increases as a consequence. How is possible to sustain this demand? The answer lies in renewable sources. Developing and investing in this clean market is possible to satisfy the request. In addition, it has been noted that the costs for the installation of renewable energy systems are decreasing since the related-market is more and more widespread. This represents the opportunity for the abandonment of polluting and scarce resources as well as the opportunity for more distributed electricity networks. For instance, it has been registered that the costs for the implementation of industrial photovoltaic (PV) systems has fallen from US\$8 per W in 2007 to US\$3 per W in 2013.⁴⁸ Brazil and Chile are moving in this direction with the adoption of specific policies with the aim

⁴⁷ OLADE, *Energy Economic Information System. Energy Statistics*, 2015. Available at: http://biblioteca.olade.org/iah/fulltext/Bjnbr/v32_2/hm000540.pdf (last visualization: July 11, 2016).

⁴⁸ UNEP/DTU, *Carbon Cero America Latina*, UN Publications, April 2016, pp. 18-19

to install PV systems in residential, industrial and commercial areas.⁴⁹ With extend networks of clean electricity systems, environmental and health benefits are both obtained: not only a reduction of CO₂ emissions, but also a decrease in the number of health problems related to the inhalation of dangerous substances caused by obsolete heating and cooking systems spread in numerous rural and urban areas (these systems still rely on the combustion of oil, wood and coal).

Whether there are concrete opportunities to decarbonise electricity production, there are also concrete opportunities to decarbonise the transport sector including every sort of motorized vehicle: buses, trains, private cars, trucks and also vessels. As already said, Latin America is experiencing a increasing rate of urbanization and this also implies a growth in the rate of motorization. Currently, the region holds the primacy of the highest level of urbanization and motorization: studies show that every year the motorization rate raises of 4,5%.⁵⁰ In many parts of the region, vehicles are obsolete with low standards in terms of efficiency and emissions. Cities such as Ciudad del Mexico, Bogotá, Sao Paulo and Santiago are undertaking ambitious projects to promote the use of public transport services as well as the use of electric vehicles. Also in this case, the transition to sustainable transport vehicles means benefits in terms of air quality, health quality and energy security. As far as public transport is concerned, public-private investments have been directed to 62 projects for the realization of the so-called system of “Autobuses de Tránsito Rápido” (ATR): the system provides a faster, safer, more comfortable, and relatively

⁴⁹ Ibid.

⁵⁰ UNEP/DTU, *Carbon Cero America Latina*, UN Publications, April 2016, pp. 30-31.

cheap kind of public transport. Even though the urban buses involved are not electric ones, but powered with fossil fuels, they result much more efficient than before because of the implementation of advanced mechanical technologies. In addition, the system is economically more convenient and its implementation (with the adjustment of existing infrastructure) is not so expensive as other complementary systems such as metro or railway systems.⁵¹ Positive results have been already achieved with a major number of people preferring public bus instead of cars as well as a reduction of urban emissions. Nevertheless, some governmental authorities are orienting towards the electrification of their ATR systems.

More people in Latin America, especially those living in urban areas, are opting for the purchase of electric cars not only because the incentives offers by national policies, but also because the market price is decreasing: the development of new technologies are transforming electric and hybrid vehicles into more efficient and simpler ones. Recently, the Californian automotive and energy storage company Tesla has announced that, thanks to technological improvements, the price of its vehicles will decrease of around 50% by 2017.⁵² Generally speaking, it seems that the transition to electric and hybrid vehicles involves savings and benefits for almost everyone.

⁵¹ UNEP/DTU, *Carbon Cero America Latina*, UN Publications, April 2016, pp. 30-33.

⁵² Daniel Sparks, *Tesla Motors Inc.'s Model 3 Ambitions May Be More Realistic Than You Think*, June 28, 2015. Article on www.themotleyfool.com available at: <http://www.fool.com/investing/general/2015/06/28/tesla-motors-incs-model-3-ambitions-more-realistic.aspx> (last visualization: July 14, 2016).

In order to promote the advantages that could be obtained by a decarbonised economy based on renewable energies, what is necessary is a clear political determination. Recalling the package of green measures identified by the GGND, national authorities are invited to cooperate with the most influential economic sectors in order to favour the transition to a more sustainable economy. Even though there are a lot of green projects started by different Latin American countries, a lot of obstacles should be removed and more knowledge should be disseminated. Too many countries still have fossil fuel subsidies. There are also governments that are not paying the adequate attention to the issue with adequate policies, investments and fiscal incentives.

Table 1 shows the different national commitments in the adoption of national policies as well as what kind of fiscal incentives they are currently implementing. All the mentioned measures correspond to the same measures contemplated by the green economy strategies. As a consequence, the green economy model appears as a suitable model for many Latin American countries.

Table 1. Current Energy Policies in Latin America ⁵³

	National Policy								Fiscal Incentives							
	Renewable Energy Target	Renewable Energy Law / Strategy	Solar Heating Law / Programme	Solar Power Law / Programme	Wind Power Law / Programme	Geothermal Law / Programme	Biomass Law / Programme	Biofuels Law / Programme	VAT Exemption	Fuel Tax Exemption	Income Tax Exemption	Import / Export Fiscal Benefit	National Exemption of Local Taxes	Carbon Tax	Accelerated Depreciation	Other Fiscal Benefits
Argentina	■	■			■			■	■	■	■	■	■		■	■
Belize	■	■														
Bolivia	■								■			■	■			
Brazil	■				■			■		■		■	■			■
Chile	■	■	■	■		■	■		■	■	■	■		■		■
Colombia	■	■							■	■	■	■			■	
Costa Rica	■					■	■			■	■	■			■	
Ecuador	■					■	■			■	■	■				
El Salvador	■			■						■	■	■				
Guatemala	■						■		■		■	■				■
Guyana	■										■	■				
Honduras	■	■								■	■	■				■
Mexico	■		■			■	■				■	■	■	■	■	■
Nicaragua	■					■	■		■		■	■	■			■
Panama	■		■	■	■		■		■	■	■	■			■	■
Paraguay	■								■		■	■				
Peru	■	■		■		■		■	■						■	■
Suriname	■															
Uruguay	■	■	■				■	■	■	■	■					■
Venezuela	■	○							■	■						■
TOTAL (Active)	19	11	4	4	2	6	8	11	9	6	10	12	5	2	5	12

■ Active; ■ Expired, superseded or inactive; ■ Subnational level; ○ Under development

⁵³ Source Table 1: IRENA, *Renewable Energy In Latin America 2015: an Overview of Policies*, June 2015.

These countries should stress the importance of such a green transition because benefits are major than disadvantages. With good policies and commensurate investments, the economy is supposed to grow and new job opportunities are present. For instance, the sector of renewable energy is much more intensive in terms of labour force than the highly motor-powered thermoelectric sector. Also with a partial and gradual transformation of transport systems, economy growth is a consequence as well as a new demand for specific jobs such as engineers, economists, logistics experts and a wide range of operators to integrate in different tasks. It emerges that investments in training and educational programmes are fundamental in order to satisfy these requests. Currently, despite public and private commitments, at international level the Inter-American Development Bank (IDB) is providing multiple forms of action through its Energy Innovation Centre including financial loans, training and capacity-building programs in order to strengthen the renewable energy sector in the region and the correlated economic development.⁵⁴

The region is conscious of the great opportunity presented by its renewable energy matrix and it is making progress in this direction. Numerous countries have already promulgated relevant about the efficient use of energy and about incentives for the use of alternatives sources of energy.⁵⁵ Well-designed policies are obtaining

⁵⁴Inter-American Development Bank (IADB), *Energy Innovation Center*. Available at: <http://www.iadb.org/en/topics/energy/energy-innovation-center/programs,9232.html> (last visualization: July 11, 2016).

⁵⁵ Just to mention some practical examples:

- *Ley de Promoción del Uso Eficiente de la Energía* in Peru (Law n°27345, 5/9/2000)
- *Ley 697 de 2001* in Colombia for the rational and efficient use of energy and other non-conventional energy)

encouraging signs especially in terms of investments in the sector and as a consequence the market is growing. With more than US\$ 40 billion between 2006 and 2012, Brazil is the regional country that has attracted more investments in renewable energy (mainly for wind energy). Positive signs are coming also from other countries such as Chile (US\$7.5 billion) , Nicaragua (US\$ 1.3 billion), Panama (US\$ 1.2 billion).⁵⁶

Observing the table below (Table 2), it could be noticed that all the Latin American countries⁵⁷ possess the opportunity to exploit (in a sustainable manner) at least one source of renewable and clean energy source. The green matrix is the element that unites such a heterogeneous region and numerous advantages , as already said, could be reached.

- *Lei 10.438/2002* in Brazil for the promotion of renewable energies through the so-called PROINFA regulatory framework.

⁵⁶ The reported data have to be intended as the monetary quantity of investments attracted in renewable sources in the period from 2006 to 2012. The data have been taken by:

IADB, *Study on the Development of the Renewable Energy Market in Latin America and the Caribbean*, November 2014. Available at:

<https://publications.iadb.org/bitstream/handle/11319/6711/Study-on-the-Development-of-the-Renewable-Energy-Market-in-Latin-America-and-the-Caribbean.pdf> (last visualization: July 12, 2016).

⁵⁷ The list refers only to the countries that are members of IDB. Cuba, French Guiana and other Caribbean islands are excluded as they are not States Parties.

Table 2. The Renewable Green Matrix of IDB Member Countries

Country	Hydro Potential	Wind Potential	Solar Potential	Geothermal potential
Argentina	High	High	High	High
Bahamas	Unknown	Medium	High	Unknown
Barbados	Low	High	High	Unknown
Belize	Medium	High	High	Unknown
Bolivia	High	High	High	High
Brazil	High	High	High	Medium
Chile	High	High	High	High
Colombia	High	High	High	High
Costa Rica	High	High	High	High
Dominican Republic	High	Medium	High	Unknown
Ecuador	High	Unknown	High	High
El Salvador	High	High	High	High
Guatemala	High	High	High	High
Guyana	High	Medium	High	Unknown
Haiti	High	High	High	Unknown
Honduras	High	High	High	High
Jamaica	Low	Medium	High	High
Mexico	High	High	High	High

Nicaragua	High	High	High	High
Panama	High	High	High	Unknown
Paraguay	High	High	High	Unknown
Peru	High	High	High	
Suriname	High	Low	High	Unknown
Trinidad and Tobago	Low	Low		Unknown
Uruguay	High	High	High	Unknown
Venezuela	High	High	High	Low

58

1.4 A socially inclusive process: the regional definition of Green Economy

According to the Latin American Economic System (SELA, from the original name in Spanish), green economy ,as the globally dominant environmental model, represent a valid opportunity in contributing to improve quality growth while reducing poverty and substantial income inequalities.⁵⁹ If properly managed, natural capital as a complex is able to provide satisfiers for everyone. The national “green growth” agendas have to pay more appropriate attention to social issues and equity

⁵⁸ Source Table2: Inter-Development Bank, *Study on the Development of the Renewable Energy Market in Latin America and the Caribbean*, November 2014.

⁵⁹ SELA (from Spanish *Sistema Económico Latinoamericano y del Caribe*) is a regional organization born in 1975 with the objectives to favour social development and economic cooperation among its member countries (28).

concerns: both those already existing and the ones that could arise by implementing the required measures to greening economies.

In this context, SELA has provided a proper definition of green economy suitable for the region: the model “must necessarily be redistributive” and the green measures adopted have to guarantee “inclusive growth and development”.⁶⁰ The emphasis puts by the regional organization is on social inclusion and redistribution, especially for the most vulnerable groups such as indigenous groups, remote rural communities but also women. All these actors are traditionally meeting high barriers to make progress in the economic scale. Consequently, it is believed that sustainable development would be reached with the redistributive green economy mechanism in which there is a fair interaction of actors and factors of production.⁶¹

In order to move towards the redistributive model, SELA invites each country (from political leaders to national agencies) to act by implementing inclusive policies and programmes as well as promoting debates. A comprehensive legal and institutional framework is needed and the development of innovative projects requires innovative financial sources.⁶² The redistributive approach needs to become concrete through the adoption of the already mentioned measures in the ten leading sectors detected by UNEP and that SELA agrees with.⁶³ By assuming the cost

⁶⁰ SELA, *The vision of the green economy in the Latin America and the Caribbean*, XXXVIII Regular Meeting of the Latin American Council, Caracas, October 2012, p. 19.

⁶¹ SELA, *The vision of the green economy in the Latin America and the Caribbean*, XXXVIII Regular Meeting of the Latin American Council, Caracas, October 2012, pp. 19-21.

⁶² SELA, *The vision of the green economy in the Latin America and the Caribbean*, XXXVIII Regular Meeting of the Latin American Council, Caracas, October 2012, pp. 3-6.

⁶³ Starting from the energy sector, the other nine are: agriculture, buildings, fishery, forestry, industry, tourism, transport, waste and water.

of transition to the green model, the State must ensure social equity namely the equality of opportunities to achieve full development.

Despite the positive signals that are coming from more Latin American countries showing a significant development in term of industry, infrastructures, financial system while preserving the environment, Latin America is still today home to the largest inequality gap in the world. Alicia Bárcena, Executive Secretary of Economic Commission for Latin America and the Caribbean (ECLA), states that *“in 2014 the richest 10% of people in Latin America had amassed 71% of the region’s wealth. If this trend continues in just six years’ time the richest 1% in the region will have accumulated more wealth than the remaining 99%.”*⁶⁴ The polarized society that characterized the region is due to systematic disparities in income, possession of resources and power. Elite groups (starting from political classes, but also influential landowners, business-leaders and capitalists) are preventing the formation of an egalitarian society into a sustainable framework. As large part of these elites is only interested in making profits, they do not respect so often other social actors and the precious biodiversity in which they are immersed. As a consequence, with their negligence, they are the first responsible of the continuing socio-environmental tensions that emerge over the meaning of nature, development and participation.

At the end of the Eighties the neoliberal model was introduced in the region. The so-called Washington Consensus had the aim to put an end to the “lost decade”

⁶⁴ Alicia Bárcena, “Latin America is the world's most unequal region. Here's how to fix it”, January 25, 2016. Article on www.cepal.org available at: <http://www.cepal.org/en/articles/2016-latin-america-worlds-most-unequal-region-heres-how-fix-it> (last visualization: July 8, 2016).

consisting in the economic recession and the huge financial indebtedness that generally characterized the decade in question: it consisted in a set of neoliberal economic policies such as trade liberalization, more rigorous fiscal discipline and privatization and deregulation.⁶⁵ Despite the proclaimed purpose to provide participatory democracy, especially in authoritarian countries with the exception of Cuba, few progresses were obtained in the social sphere. The unfulfilled promises for participatory policies caused further tensions where people claimed the inclusion of their social rights as well as the recognition of existing ecological limits into national political agendas.⁶⁶

A turning point began with the new millennium with the so-called “pink tide”: the election of several progressive governments in countries including Brazil, Venezuela, Paraguay, Chile and Argentina, saw an increased attention for the social and environmental issues.⁶⁷ The national agendas of numerous countries started orienting towards stability and long-term sustainable economic growth through the promotion of efficient and participatory policies.⁶⁸ In order to face the triple-challenge of democracy and citizenship, improvement of quality of life together with ecological integrity, participatory environmental governance has become an

⁶⁵ Gian Luca Gardini, *L'America Latina nel XXI secolo. Nazioni, regionalismo e globalizzazione*. Roma, Carocci Editore, 2009, pp. 69-70.

⁶⁶ Fabio de Castro, Barbara Hogenboom and Michiel Baud, “Introduction: environment and society in contemporary Latin America”, in: Fabio de Castro, Barbara Hogenboom and Michiel Baud (ed.), *Environmental Governance in Latin America*, London , pp. 14-15.

⁶⁷ The term “pink tide” reveals the ideological trend characterized by a progressive and moderate rhetoric and led by social democratic governments (also identified as Post-Neoliberal governments). The use of the adjective “pink” wants to differentiate from the previous “red” leftist governments.

⁶⁸ Gian Luca Gardini, *L'America Latina nel XXI secolo. Nazioni, regionalismo e globalizzazione*. Roma, Carocci Editore, 2009, pp. 13-21.

element of great relevance in the entire region.⁶⁹ Even though environmental governance appears as a complex set of different (and often contrasting) demands, goals, perceptions of nature and priorities, the progressive governments have started developing their “green growth” agenda getting closer to the green economy model with the assumption that natural resources as a common wealth represent a powerful tool to solve social injustice. The shift has seen also a major involvement of private corporations, both national and transnational, which have favoured also the adoption of new technologies. Together, state authorities and corporate sector, have imposed a series of stronger conditions for the exploitation of natural resources, especially those no-renewable and those emission-intensive, as well as incentives for investments and use of other natural resources such as clean and renewable ones. Nevertheless, the gain generated from fiscal policies (for instance taxes and royalties) have not been always redistributed among citizens as promised. Some commentators believe that the promised empowerment of local and marginalized communities have not happened as pledged due to the dangerous coalition created between governments and corporation: their political and economic interests have often prevailed over large-scale community interests fuelling social discontent.⁷⁰ Furthermore, several criticisms are linked to the conservative political trend common and part of the history of many Latin American countries in which patrimonialism as form of governance prevailed. Social discontent together with serious cases of corruption and financial scandals are now

⁶⁹ Fabio de Castro, Barbara Hogenboom and Michiel Baud, “Introduction: environment and society in contemporary Latin America”, in: Fabio de Castro, Barbara Hogenboom and Michiel Baud (ed.), *Environmental Governance in Latin America*, pp. 14-21.

⁷⁰ Ibid.

threatening the pink tide with the possible return of right-wing coalitions as already occurred in Argentina (with the election of Mauricio Macri in December 2015).

CHAPTER 2

MEXICO AND ITS PATHWAY TOWARDS A SUSTAINABLE GREEN

GROWTH

2.1. The Mexican Renewable Great Potential

Behind China, Brazil, Russia and India, Mexico is the fifth largest emerging market and the fifteenth largest in the world by looking at the nominal GDP. At the end of the Nineties, surpassed the crisis of 1994 and with the spreading of Globalization, the Federal Republic of Mexico saw the necessity to give a renewed impetus to its economy in order to compete on a global scale. A significant contribution in the economic growth has been made by the Mexican oil industry. As a matter of fact, the country ,together with Brazil and Venezuela, owns the biggest oil reserves in the region located mainly in the Gulf of Mexico. Even though private participation was formally allowed in 1997, the public state-owned company PEMEX (*Pertróleos Mexicanos*) retains the monopoly of exploration, production and refining capacity. It is currently the seventh biggest oil company in the world.⁷¹ It

⁷¹ Gibrán S. Alemán-Nava et al., "Renewable energy research progress in Mexico: a review.", in: *Renewable and Sustainable Energy Review vol.32*, Elsevier Ltd.,2014, pp. 140-153.

has been registered that Mexican reserves are progressively reducing (due to the fact that crude oil is a non-renewable resource), but the country continues to maintain its primacy in Latin America with an average of around 3 million barrels per day of which around 1,300 million are exported.⁷²

It is evident that the federal economy is still too tied to oil extraction ,production and consumption as well as to the related carbon-intensive sectors causing ecological disasters such as air and water pollution and the loss of biodiversity. Even though Mexico is not among the countries with the largest ecological footprint, looking at its very ecological footprint of around 2.9 global hectares per person, it results that the country is currently in a bio capacity deficit situation with an estimated -1,6 global hectares per capita.⁷³ When calculating the ecological footprint, that is an indicator of the impact of human activities in relation to the Earth capacity to regenerate its ecosystems, it is obvious that the emissions caused by fossil fuels have a bearing on the final result obtained.

Nevertheless, Mexico has a great advantage: a consistent supply of natural and clean resources which could be applied to reduce such a fossil fuel dependency. It should be recalled that the with the term renewable energy sources it is meant all the natural resources able to produce electric and/or thermal energy and, more

⁷² Ibid.

⁷³ *Ecological wealth of Nations*. Available at: http://www.footprintnetwork.org/ecological_footprint_nations/ (last visualization: July 21, 2016).

relevant, able to regenerate at the same rate they are consumed.⁷⁴ Compared to fossil sources of energy, these are inexhaustible and do not produce any harmful emissions. The witnessed abundance of clean and renewable energy sources in the country could realize an “energetic revolution” and get closer to the desired sustainable development because not only economic growth could be stimulated, but also environmental improvement as well as reduction of the existing energy poverty. Among the different primary renewable energy sources, Mexico stands out for its natural installed capacity for the generation on solar energy, wind energy and geothermal energy. Installed capacity is expressed in Gigawatts (GW) or Megawatts (MW) and it indicates how much electricity could be generated at optimal geoclimatic conditions with the implementation of proper technological systems (from specific components to hardware). This section wants to focus on the three above-mentioned alternative sources, and therefore differing from the two “traditional” ones (and generally already quite known) that Mexico has already developed namely hydroelectric and biomass energy sources.

As far as solar energy is concerned, the potential of the country to develop this kind of energy is one highest in the world because of its geographical position: the country is located in the so called “solar belt” in which there are the highest of solar radiation in the world. More specifically, it is the north-west part of Mexico in the federal entities of Baja California, Baja California Sur, Sonora and Chihuahua which present the highest level reaching up to 6.1 KW/m² per day. In this sense,

⁷⁴ *Energie rinnovabili e non rinnovabili*. Available at: http://www.energiesensibili.it/it/energie_rinnovabili_e_non_rinnovabili/ (last visualization: July 21, 2016).

with solar energy is intended the 100% renewable and clean energy source obtained by radiation of the sun onto Earth. According to the technological systems applied to convert solar radiation into energy, there are three kinds of solar energy obtained. The first one is photovoltaic energy which is captured through panels, photovoltaic modules or conductors with a primarily component in silicon. The second type is the high concentration solar energy captured through big parabolic panels or arrangements of mirrors which concentrate solar radiation to be consequently transformed into electricity. Solar thermal energy is the third and last type of energy that could be originated by the sun and is obtained through solar thermal collectors which absorb and storage the heat.⁷⁵

Another opportunity for Mexico consists in its wind power capacity. As a matter of fact, the main federal entities with the most favourable wind conditions are Oaxaca, Baja California, Yucatan and all the coastal area along the Gulf of Mexico. It has been estimated that the country has the potential to generate around 40,000 MW of wind energy, while currently only the 3% of this installed capacity is being exploited.⁷⁶ As for solar energy, also wind energy is 100% renewable and clean and it consists in transforming the power of wind into electric or mechanical energy usually through wind turbines (or aerogenerators) grouped into a wind-farm. Wind-farms could be located both in the mainland and in the midst of the sea and, as mills, they have big wind blades whose rotation generates energy. Differently from solar energy installations, which are available in different

⁷⁵ Ministry of Economy, *Pro México. Trade and Investment*, August 2013, pp. 6-16.

⁷⁶ Ministry of Economy, *Pro México. Trade and Investment*, August 2013, pp. 15-16.

size according to the quantity of electric energy they generate (from residential to industrial use), the realization of a wind-farm, even though it is composed by few wind turbines, requires large territorial areas in which wind is constant. For this reason, a lot of experts are stressing the potential represented by the sea for the installation on wind-farms.⁷⁷

The United Mexican States own a third advantage in relation to renewable energy sources: the geothermal potential. With its geothermal potential of 40,000 MW, Mexico constitutes one of the major country worldwide with such an installed capacity. The reason why Mexico has this geothermal advantage is because of the multitude of volcanoes present in the country. The Transvolcanic Belt (better known as Sierra Nevada) crosses the central-south of Mexico and ,together with the peninsula of Baja California, creates a fertile ground for geothermic energy. Among the most relevant geographical locations with the highest geothermal capacity there are the volcanos Cerro Prieto and Las Tres Virgen in the peninsula of Baja California, the volcano of Los Azufres in Michoacan and the volcano in Veracruz.⁷⁸

Geothermal energy is the energy taken from the core of the Earth in the form of heat. It is generated through inner nuclear reactions and it is calculated that falling by 100 meter, the temperature of the Earth rises by 3°C. In volcanic areas the temperature is higher accelerating the process and the speed of the energy flow to

⁷⁷ *Energia Eolica*. Available at: <http://www.ecoage.it/eolico-introduzione.htm> (last visualization: July 19, 2016).

⁷⁸ Gibrán S. Alemán-Nava et al., "Renewable energy research progress in Mexico: a review.", in: *Renewable and Sustainable Energy Review vol.32*, Elsevier Ltd.,2014, pp. 140-153.

the surface.⁷⁹ Once it has been extracted, the heat is implemented for the production of electricity or for local district heating networks. Despite the high costs associated with the exploration and generation of geothermal energy, Mexico is currently the fourth largest country in the world engaged in such 100% renewable and clean energy source.⁸⁰

In this respect, it is clear that Mexico has an important availability of low CO₂-emissions energy sources. Nevertheless, despite the numerous projects already launched in all the three different kinds of alternative sources, their potential has not yet been fully investigated and used. As it will further analyzed, in recent years the Mexican government is promoting several measures including specific laws for a major commitment to renewable energy sources and encouraging signs are also coming from the greater private participation allowed.

2.2. The Federal approach to Green Economy

On 1st December 2006, Felipe Calderón Hinojosa won the election becoming the 56th President of Mexico.⁸¹ As political candidate of the centre-right party *Partido Acción Nacional* (PAN), he defeated the opposition party *Partido*

⁷⁹ *Energia Geotermica*. Available at: <http://www.ecoage.it/geotermia.htm> (last visualization: July 19, 2016).

⁸⁰ SELA, *The vision of the green economy in the Latin America and the Caribbean*, XXXVIII Regular Meeting of the Latin American Council, Caracas, October 2012, pp.32-33.

⁸¹ In the federal republic of Mexico (officially *Estados Unidos Mexicanos*), the Head of State is also Head of government as foreseen by the Constitution. Once elected, the President remains in office six years with no possibility of re-election.

Revolucionario Institucional (PRI) headed by Andrés Manuel López Obrador. As a consequence, the pink tide that was involving a lot of Latin American countries in those years did not affect Mexico. Immediately, into his political national agenda, he gave peculiar attention to social issues (continuing the social assistance programme *Oportunidades* of his predecessor Vicente Fox to reduce national poverty), but also to sustainable development starting from climate change concerns.⁸² In front of the continuing loss of biodiversity and the persisting high rate of poverty in the country, Calderón shared the conviction that green economy is the key to ensure the present and the future of both humankind and the Earth. Even though the country is not inserted in the list of Annex I countries of the Kyoto Protocol, Calderón affirmed that the economy of the country was too much sustained by fossil fuel production and that new alternatives and solutions should have been explored and applied in order to guarantee a general equilibrium and economic growth. With the clear support of the Environment Ministry SEMARNAT, and also of the Secretariat of Energy SENER, numerous steps have been progressed in order to integrate the green economy model through the refined definition of policies and institutional frameworks.⁸³ In his efforts to move towards a green economy, the main boosted areas have been water management, transport efficiency, sustainable agriculture and, above all, renewable energies.⁸⁴ Aware of the natural richness of the country with reference to the abundance of natural

⁸² Gian Luca Gardini, *L'America Latina nel XXI secolo. Nazioni, regionalismo e globalizzazione*. Roma, Carocci Editore, 2009, pp. 49-55.

⁸³ OECD, "Mexico: better policies for inclusive development.", in: "Better Policies" Series, OECD Publications, September 2012, 53-58.

⁸⁴ Ibid.

renewable sources, Calderón developed a real energy reform elaborating green stimulus measures for instance pricing emissions and governmental subsidies. Despite of offering green stimulus measures through specific sectoral policies and laws which will be presented in the next section, another trump card, as part of the green economy model, was played: the necessity to establish and maintain strong alliances between the public and private spheres, between the business community as well as between different governments in order to accelerate the sustainable green growth.⁸⁵

By allowing a greater private participation in terms of investments, the market of renewable energy has become even more attractive both for Mexican and international investors. During his six-years mandate, Calderón has well integrated in his agenda the Green New Deal obtaining positive results in terms of economic growth and also in terms of GHG emissions. Such a dedication by the country was awarded in 2011 by UNEP. As a matter of fact, the President received the official recognition of “Champion of the Earth” in New York city at the Natural History Museum: he was awarded for the implementation of policies in favour of environmental and climatic protection as well as for his devotion to the green economic approach.⁸⁶ One of the main practical example of the success obtained by Mexico is the *Law for the use of renewable energy and finance of the energy*

⁸⁵ Ibid.

⁸⁶ Notimex, “Calderón recibe premio Campeones de la Tierra”. In: *El Economista Online*, May 11, 2011. Available at: <http://eleconomista.com.mx/sociedad/2011/05/11/calderon-recibe-premio-campeones-tierra> (last visualization: July 22, 2016).

transition (LAERFTE) in 2008 which led to the outline of additional multi-year programmes with specific clean energy goals and efficiency strategies.⁸⁷

The Mexican push was subject to a strong acceleration in 2012, the last year of the mandate of Calderón. The ambitious long-term goals of CO₂ emission reductions pointed out with the *General law on climate change* in April of the same year had significant resonance at global level, especially for the countries with the strongest economies and with major weight in terms of unhealthy environmental emissions. In order to demonstrate its relevance in promoting a green growth , Mexico did not leave out the opportunity to host the annual G20 Summit: from the 18th to the 19th June 2012, the representatives of the twenty major economies in the world met at the Los Cabos Convention Centre in the city of San José del Cabo in the region of Baja California del Sur. The Summit preceding Rio+20 was attended not only by Heads of government and/or Heads of state, but also by international organizations including the UN, the WB, the OECD, the FAO and also by the B20, namely the main business leaders of the countries into question.⁸⁸ In fact, some months before Calderón welcomed the business community to gather in the coastal city of Puerto Vallarta to discuss and formulate recommendations to submit subsequently at Los Cabos. These recommendations were reclaimed by the Mexican President at the beginning of the Summit and then included in the final leaders Declaration.

⁸⁷ Centre for Clean Air Policy, *Case Study: Mexico's Renewable Energy Program*, January 2012, pp. 15-16.

⁸⁸ B20 stands for Business 20. As an international coalition of business leaders and business organizations, the B20 represents the private sector with its experience in economic governance.

Mexico outlined five priorities that should be globally addressed through cooperative efforts: economic stabilization and structural reforms as foundations for growth and employment; strengthening the financial system and fostering financial inclusion to promote economic growth; improving the international financial architecture in an interconnected world; enhancing food security and addressing commodity price volatility; promoting sustainable development, green growth and the fight against climate change.⁸⁹ The last priority talks about “long-term prosperity through inclusive green growth in the contest of sustainable development” emphasizing the necessity to adopt measures and actions in order to obtain climate-friendly economies.⁹⁰ As he said in a preparatory seminar of the Summit :

“There is a terrible climate change problem. This is not just an issue regarding environmental issues. This is an issue that relates to the viability of our civilization’s whole model as we look ahead to the end of this century. In addition, if you want to see it from a pragmatic point of view, this is also an economic issue. It is an issue of pesos and cents. This is to say, what we do today to avoid the consequences of climate change, even if it is expensive, will be much cheaper than what we will have to do in the future to pay the cost of adapting to the consequences of climate change. This is what we have to do. And there are ways of

⁸⁹ G20, *G20 Leaders Declaration*, 19 June 2016, pp. 2-12.

⁹⁰ *Ibid.*

doing it. There are ways to generate growth linked to combating global warming.”⁹¹

This part of speech together with the official text of the final G20 Leaders declaration of Los Cabos outlines the Mexican promotion and devotion to the green economy model as a modern and competitive model. The implementation of national and international policies, the strengthening of technological and institutional capacities, the essential role played by the private sector, the reduction of inefficient fossil fuel subsidies as well as the avoidance of nationalistic and protectionist tendencies are characteristic features that could be easily identify by reading these documents.⁹² According to some experts the green impetus addressed by Calderon during his administration and the consolidated international market position obtained with the G20 Presidency have highly contributed to reduce national rates of inflation and public debt. Consequently, it has been witnessed a general improvement of infrastructures and medical attention, a reduction in the rate of school-drop out and in the rate of people with insufficient energy supply.⁹³

After twelve years of leadership by the PAN, on the 1st December 2012 the PRI candidate Enrique Peña Nieto seized the power. As his predecessor, Nieto affirmed the importance of a strong environmental policy oriented towards an inclusive

⁹¹ *The Current Challenges for Global Economic Growth*. Available at: <http://www.g20.utoronto.ca/2012/2012-111213-calderon-en.html> (last visualization: July 22, 2016)

⁹² G20, *G20 Leaders Declaration*, 19 June 2016, pp. 2-12.

⁹³ World Economic Forum, *Foro Económico Mundial sobre América Latina. Transformación regional en un nuevo contexto global*, Geneve, World Economic Forum publications, 2012, pp. 15-18.

green growth without compromising the unique natural heritage of Mexicans. Among his lines of actions, he publicly announced the will to transform the existing industrial metabolism into a more efficient and even more based on renewable sources.⁹⁴ In 2013, the state monopoly on the management of electricity and fossil fuel formally ended: an amendment changed the 1917 Constitution in which it was established the direct state control of all underground resources. In addition, the need to adopt new advanced clean technologies has become real in January 2014 with the entry into force of the Carbon Tax applied for the use of different fossil fuels. While Calderón privileged wind and solar energy sources when outlining new programmes, Nieto has also boosted the geothermal potential of the country as the Geothermal Law witnesses.⁹⁵

Aware of the fact that an inclusive sustainability is an indispensable factor for the welfare of the country, Nieto has developed virtuous programmes to extend energy access such as the *Bandera Blanca* project (with the goal to electrifying rural communities with solar energy systems) and the similar *Isolated Communities Electrification* project (with the aim to provide solar home systems and mini wind turbine to rural households).⁹⁶

Nevertheless, as it will be said in more detail in the last chapter, the current administration of Nieto is subject to numerous critiques. According to some

⁹⁴ International Renewable Energy Agency, *Renewable Energy Policy Brief: Mexico*, IRENA Publications, June 2015, pp. 3-4.

⁹⁵ International Renewable Energy Agency, *Renewable Energy Policy Brief: Mexico*, IRENA Publications, June 2015, pp. 5-7.

⁹⁶ Ibid.

commentators, the long timeframes for the final approval at the end of 2015 of the *Ley the Transición Energética* (Law of Energy Transition) is the visible signal of the low interest by the present administration in renewable energies. It seems that the ongoing energetic reform is favouring hydrocarbons with their competitive prices on the market rather than renewable sector.⁹⁷ In any case, the Law has been approved and, pursuing the same goal of major participation of renewable sources in electric generation, has taken the place of the former LAERFTE. With the introduction of the clean energy certificates system (into force starting from 2018), incentives and higher profits are guaranteed to electricity generation firms as well as to the wide range of consumers, while reducing hazardous emissions.⁹⁸ While Mexican authorities expect to attract even more private investments (around US\$ 62.5 billion in the next two years) and to generate increased fiscal revenues to be further invested for the public welfare, there is already good news: in 2015 the country attracted US\$ 4 billion in the renewable sector (especially in the solar and wind sources) with an overall growth of 105% compared with the previous year.⁹⁹

On 22nd April 2016, Mexico, better to say the Minister of the Environment Rafael Pacchiano Alaman, signed the Paris Agreement on climate change which is expected to enter globally into force in 2020. By signing the Agreement, Mexico was also the first among developing countries to present and submit on voluntary basis

⁹⁷ Francisco Muciño, "Senado aprueba en comisiones Ley de Transición Energética", in: *Forbes Mexico online*, November 30, 2015. Available at: <http://www.forbes.com.mx/senado-aprueba-en-comisiones-ley-de-transicion-energetica/#gs.=agrOF8> (last visualization: July 24, 2016).

⁹⁸ Ibid.

⁹⁹ Frankfurt School-UNEP Centre, *Global Trends in Renewable Energy Investment 2016*, Frankfurt, Frankfurt School of Finance & Management, 2016, pp. 22-23.

its *Intended Nationally Determined Contributions* (INDCs).¹⁰⁰ INDCs represent the national mitigation and GHG reduction commitments every member State decides to include into the Paris Agreement taking into account its national situation, necessities and capabilities. All the climate actions indicate in national INDCs have the same long-term objectives: put an end to the alarming increase in the global average temperature and achieve a zero emission level in the second half of the current century.¹⁰¹ In this context, the INDC of Mexico refers to GHG emissions and also to SLCPs (namely short-lived climate pollutants) as the guilty parties of global warming. In summary, the Nieto administration has reaffirmed at international level the ambitious emission target of the 2012 national “General Law on Climate Change”: the 50% reduction of GHG emissions by 2050. Nevertheless, to reach this goal a second medium-term target has been added in the Mexican INDCs: the 25% reduction of GHG and SLCP emissions by 2030.¹⁰² The “fair and ambitious”¹⁰³ INDC of Mexico is composed by two elements: mitigation and adaptation. The mitigation section refers to the measures directed to moderate the national emission levels as well as to stop deforestation by achieving the 0% rate of deforestation by 2030. On the other hand, adaptation actions have a further insight on Mexican communities, especially the most vulnerable to any climate change: strategic infrastructures,

¹⁰⁰ UNFCC Newsroom, *Mexico Submits its Climate Action Plan ahead of 2015 Paris Agreement*, March 28, 2016. Available at: <http://newsroom.unfccc.int/unfccc-newsroom/mexico-submits-its-climate-action-plan-ahead-of-2015-paris-agreement/> (last visualization: August 29, 2016).

¹⁰¹ *What is an INDC?* Available at: <http://www.wri.org/indc-definition> (last visualization: August 29, 2016).

¹⁰² Gobierno de la República de México, *Intended Nationally Determined Contribution*, April 22, 2016, pp.1-8.

¹⁰³ *Ibid.*

warning systems, increased adaptive capacity as well as increased public and gender participatory processes are the principal areas of actions established.¹⁰⁴ All the actions officially presented by the country do not forget of the possible economic losses implied: for this reason an inclusive green growth is reiterated. In this sense an adaptation of each productive systems is required in order to guarantee the conservation and restoration of ecosystems, economic productivity and the national competitiveness.¹⁰⁵

2.3 Excursus about current green measures into force

With the aim to respect the constitutional right to adequate environment for everybody (art.4, para.5), the Federal Republic has historically managed all natural resources to guarantee “equable distribution” and “balanced development of the country” (art.27, para.3).¹⁰⁶ Nevertheless, as time went, it was acknowledge the necessity to include private participation in the management of public natural resources, especially for energetic purposes since electricity consumption increased and still increases. According to OECD, electricity generation is going to double between 2009 and 2050 and consequently, in order to sustain such a growth, several

¹⁰⁴ Ibid.

¹⁰⁵ Ibid.

¹⁰⁶ The political Constitution of the Mexican United States, 1917. See articles 4 and 27.

measures have been taken emphasizing the validity of renewable and clean sources.¹⁰⁷

This section wants to provide a chronological excursus of the green measures and policy actions adopted by Mexican authorities in order to transit towards a more sustainable economic approach and, for this reason, tackling issues such as poverty, employment and environment. Undoubtedly, some of these measures could be assimilated into the green stimulus package presented by the international community when invoking the green economy model.

Accelerated Depreciation for Environmental Investment, 2005: with the amendment of the Federal Law for Income Tax, it has been established a new fiscal regime favouring renewable energy technologies. Investors, in particular businesses, who acquires machineries and equipment for the generation of power through renewable sources could deduct up to 100% of the total investment in just a single year. The condition is that the renewable energy project has to remain in operation at least 5 years.¹⁰⁸ In the same year, SENER (the Secretariat of Energy) and CFE (the Federal Electricity Commission, undisputed leader in the generation, distribution and market of electric power) directed the project for the construction of “La Venta II” wind farm in

¹⁰⁷ OECD, “Mexico: better policies for inclusive development.”, in: “Better Policies” Series, September, OECD Publications, 2012, p.60.

¹⁰⁸ Centre for Clean Air Policy, *Case Study: Mexico’s Renewable Energy Program*, January 2012, pp. 11-12.

the region of Oaxaca. Thanks also the financial involvement of the World Bank, the two entities heavily committed in the construction, insurance and training of requested personnel: with its 98 wind turbines is one of the biggest wind farm in the entire Latin America today.¹⁰⁹

Resolution on grid connections for small scale solar generators, 2006: with the resolution 176/2006 the Government authorized and favoured the installation of small scale solar generators for residential use (up to 10 KW) and for commercial use (up to 30KW) establishing financial benefits. This is an important step forward because it is the first strategic plan regarding self-supply methods.¹¹⁰ In addition, 3 years later major incentives have been introduced regarding home photovoltaic systems: who heat water through solar technologies obtain a 20% reduction on water consumption charges.¹¹¹

Law for the Development of Renewable Energy and Energy Transition Financing (LAFARTE), 2008: promulgated during the Calderón administration, the law into question established specific standards, guidelines as well fiscal incentives for the use and production of renewable energy power. The descended Special Programme fixed specific energy goals namely: i) a better degree of information and dissemination; increasing the installed capacity of renewable energy sources; iii) increasing renewable energy generation; iv)

¹⁰⁹ Centre for Clean Air Policy, *Case Study: Mexico's Renewable Energy Program*, January 2012, p. 9.

¹¹⁰ *Policies and measures: Renewable energies*. Available at: <https://www.iea.org/policiesandmeasures/renewableenergy/> (last visualization: July 26, 2016).

¹¹¹ Ibid.

provide electricity to 2,500 grid-off communities.¹¹² Furthermore, two funds have been created by the law in order to finance related initiatives: every year, from 2009 to 2012, around US\$ 160,000 have been directed into the funds.¹¹³ A specific method has also been introduced: the net metering scheme. This innovative regulatory regime allows customers, both residential and commercial, with their own solar or wind power systems to feed electricity back into the grid the electricity they do not consume. This method has the benefit not only because clean energy is generated and saved, but also to because users could get lower electricity tariffs for the remaining electricity to be consume.¹¹⁴ In 2011 the law was modified by adding an important new goal: reduce the dependency on fossil fuel in the total power generation of 65% by 2024, 60% by 2035 and 50% by 2050. It was also established the need to provide more transparency in order to obtain more confidence by citizens: for this reason the SENER was obliged to provide reliable data on the Mexican renewable sector collected in a National Renewable Energy Inventory.¹¹⁵

General Law of Climate Change, 2012: this law is conceived as the first comprehensive climate change law enacted by an emerging country as Mexico. As already mentioned, even though the country is not considered as

¹¹² Centre for Clean Air Policy, *Case Study: Mexico's Renewable Energy Program*, January 2012, pp. 15-16.

¹¹³ *Ibid.*

¹¹⁴ Ministry of Economy, *Pro México. Trade and Investment*, August 2013, pp. 27-30.

¹¹⁵ *Policies and measures: Renewable energies*. Available at: <https://www.iea.org/policiesandmeasures/renewableenergy/> (last visualization: July 26, 2016).

one of the largest CO₂ emissions, with this law it aspires to reduce its emissions by 30% by 2020 and by 50% by 2050 with respect to the registered levels of 2000. In order to reach this objective, a second target has been added: the electricity generation of at least 35% from non-fossil fuels by 2024.¹¹⁶ Mitigation and efficiency programmes have been developed in this context as it is represented by the Federal programme *Sustitución de Equipos Electrodomésticos para el Ahorro de Energía*: financial subsidies are granted to the households substituting old electric appliances (of 10 or more years old) namely refrigerators and air conditioning equipments.¹¹⁷ Another interesting programme launched by the national credit institute Infonavit is the *Hipoteca Verde* according to which it is possible to obtain a determined expansion of credit (in relation to monthly wage) whether eco-technologies from PV systems to water regulating taps are installed in households: the additional credit obtained will be return to the institute as savings thanks to eco-technologies are progressively obtained.¹¹⁸ For example, adhering to this latter facultative programme, Infonavit affirms that with a monthly wage of US\$ 2,300, people could obtained up to US\$ 4,400 of additional loan and the monthly saving obtained is around US\$100.¹¹⁹

¹¹⁶ Ibid.

¹¹⁷ OECD, "Mexico: better policies for inclusive development.", in: "Better Policies" Series, September, OECD Publications, 2012, p.60.

¹¹⁸ Ibid.

¹¹⁹ *Hipoteca Verde*. Available at: http://portal.infonavit.org.mx/wps/wcm/connect/infonavit/trabajadores/saber+para+decidir/cuido_mi_casa/hipoteca+verde (last visualization: July, 27, 2016).

Carbon Tax, 2013 (into force since 2014): together with the tax on pesticides, the carbon tax represent an efficient economic measure to transit towards clean energy production and consumption while creating awareness of GHG emissions. The tax is applied both on sale and exports of fossil fuels. Taxes varies in accordance to the type of fossil fuel namely in accordance with the quantity of CO₂ provoked: liquefied petroleum gas (producing 0,458 kgC/l) has a tax of 6,60 US cents/l; diesel (producing 0,772 kgC/l) has a tax of 12,59 US cents/l; carbon mineral or anthracite is the most polluting (0,825 kgC/l) and has a tax of 27,54 \$/ton.¹²⁰

Secondary Laws, 2013: the Constitutional Reform at the end of 2013 marked a turning point for the country. As a matter of fact, with the amendment of Article 27, private investments in oil and power sectors are allowed putting an end to the longstanding federal monopoly. Generation, commercialization, exploration, extraction and competition by the private sector are now enabled.¹²¹ According to some experts, the inclusion of the private initiative in the energy sector will bring benefits: major confidence in the country attracting so a major quantity of FDI in different-in-size projects; large-scale investments in advanced technologies as well as research especially in the renewable energy sector whose costs are globally decreasing; creation of new employment opportunities (estimated at 500,000 in for

¹²⁰ SEMARNAT, *Carbon tax in Mexico*, SEMARNT Publications, May 2014.

¹²¹ International Renewable Energy Agency, *Renewable Energy Policy Brief: Mexico*, IRENA Publications, June 2015, pp. 3-4.

years); the growth of the national GDP (estimated at +1.7% per year).¹²² The crowning achievement of the energy reform has been the adoption of secondary legislation through a package of 21 secondary laws with the aim to strengthen and determine the attractiveness of energy sources, more specifically create a good mix of renewable energy schemes. In line with this dissertation, among the 21 laws, it is noteworthy to consider two of them: the new Electricity Law and the Geothermal Law.

The first one pursues the same objectives of electricity generation declared by the General Law of Climate Change and remarks specific energy capacity targets to reach by 2018: 13030MW in hydropower; 1018MW in geothermal power; 8922MW in wind power; 784 MW in bioenergy; 627MW in solar energy.¹²³ In addition, the law specifies that power generation and commercialization are liberalized, while transmission and distribution are still prerogative of CFE public enterprise. Nevertheless, public-private associations are possible for the activities carried out by CFE including installation, maintaining, financing and network expansions. Space is also given to the governmental commitment to electrify rural and peri-urban areas through renewable sources.¹²⁴

The Geothermal Law regulates the process of geothermic development outlining three different phases that should be authorized by SENER: admission, exploration and use. The main target, together with the regulation, is to foster one of the

¹²² Eduardo Carbajal, “Los beneficios de la reforma energetica”, in: *El Economista Online*, August 18, 2013. Available at: <http://eleconomista.com.mx/mercados-estadisticas/2013/08/18/beneficios-reforma-energetica> (last visualization: July 26, 2016).

¹²³ International Renewable Energy Agency, *Renewable Energy Policy Brief: Mexico*, IRENA publications, June 2015, pp. 3-4.

¹²⁴ *Ibid.*

biggest renewable potential of the country.¹²⁵ In the transitional articles of the law, reference is made to “Round Zero” as the first stage led by CFE for the development of new geothermal projects. Concrete results have already or almost been achieved through the realization of geothermal plants in the peninsula of Baja California, Jalisco and Michoacan. “Round One” has taken place in 2015 with the participation of both national and international businesses which have obtained 30-year concessions by CFE for exploration and exploitation of determined geothermal areas.¹²⁶

Energy Transition Law, 2015: after long periods for its approval, the Energy Transition Law has been approved in December 2015 substituting the previous LAERFTE. In front of the increasing demand for electricity supply and in front of the fact that in 2013 electricity obtained by the renewable matrix accounted 16%, Mexican authorities added in the law a new intermediary target: the electricity produced by renewable sources has to reach 35% of the total generation by 2024.¹²⁷ With a peculiar focus on industrial sector as one of the main actors involved in the climate contamination, the law establishes mechanisms and institutions as well as funds with the goal to maintain competitiveness and mitigate the emission of harmful substances that are causing ecological disasters. For instance, the law contemplates the establishment of the National Institute of Electricity and Clean

¹²⁵ Ibid.

¹²⁶ International Renewable Energy Agency, *Renewable Energy Policy Brief: Mexico*, IRENA publications, June 2015, pp. 3-6.

¹²⁷ ¿Qué es la ley de Transición Energética? Available at: http://www.milenio.com/politica/Ley_de_Transicion_Energetica-energia_limpia_mexico-reforma_energetica_0_638936262.html (last visualization: July 27, 2016).

(officially created in 2016 and it operates as research centre) and the Advisory Council for Energy Transition (defined as a commission of consult and citizens participation, but not yet in action) as well as 2 funds namely the Fund for Energy Sustainability (operative) and the Fund for Renewable Energies (not yet operative).¹²⁸ Nevertheless, within the new measures the Clean Energy Certificate system stands out (into force from January 2018): one certificate (CEL, *Certificado de Energía Limpia*) is issued by CFE to electricity generation plants for every KWh produced by renewable sources. The certificate could be consequently sold (at a prices based on demand and supply) to other power producers less virtuous, but obliged to buy these certificates. Every year the Government determines a minimum percentage of total energy that should be produced by renewable sources and the power producers/generators who do not conform to the obligation are sanctioned with fines up to around US\$ 278,000/MWh. The obligation is addressed to everyone involved in the electricity industry in general.¹²⁹ Consequently, the issuing and sale of these certificates provide economic gains for virtuous firms generating energy from renewable sources and allow the country to reach its renewable energy targets improving the quality of ecosystems.

2.4. Case study: industrial eco-efficiency in Tampico-Altamira

This section wants to focus on the industrial sector in general because it is conceived as the main engine for the economic growth of Mexico as well as the

¹²⁸ Ibid.

¹²⁹ Ibid.

main energy user. Consequently, a great majority of the total emissions of CO₂ and other hazardous emissions are generated by industry.

The scientific discipline of “Industrial Ecology”(IE) found its origins and first application in the Nineties, while in Mexico it started been applied at the end of the same decade with an increasing attention by the academic world, especially by some leading Universities such as the *Universidad Autónoma Metropolitana* of Mexico City. Even though the first ones to formulate the principle of IE were the scholars Frosch and Gallopoulos in the scientific review *Scientific American*, the most widespread definition is attributed to Lowe who defines EI as “*a broad, holistic framework for guiding the transformation of the industrial system to a sustainable basis. Human activities are managed on a sustainable basis by: seeking the essential integration of human systems into natural systems; minimizing energy and materials usage; minimizing the ecological impact of human activity to levels natural systems can sustain*”.¹³⁰ EI encompasses the system of Circular Economy because it contemplates the transition from a linear model to a closed-loop model in which waste and pollution tend to zero as industrial processes are conceived as cyclical flows. With a redefinition of productive methods on ecological basis, a metaphor with natural ecosystems is offered.

The circular economy model , and therefore EI, could be considered as part of the green economy model because through production systems that are cleaner and more efficient, they both aim to reduce environmental impacts and to obtain economic competitiveness as well as provide a major degree of job security. Some

¹³⁰ Ernest Lowe, *Eco-industrial Park Handbook for Asian Developing Countries*, Hidden Valley Lake, Indigo Development, 2001, pp. 4-5.

countries such as China, Japan and Canada have already adopted national policies regulating circular economy activities.¹³¹ In addition, also EI puts a considerable emphasis on science, technology and industrial culture as constituent elements of the so-called Ecological Modernisation process.¹³²

IE finds its concrete application in realities such as Eco-industrial Parks (EIPs) and Industrial Symbiosis. Generally speaking, an EIP is composed by a certain number of firms of different size that collaborate among themselves and with the local community in which they are inserted. They share resources (for instance information, water, electricity, infrastructures and natural habitat) in the most efficient way possible obtaining better performances regarding economy (profits), environment (no degradation) and society (equal management of resources between firms and local community).¹³³ An EIP characterizes itself from other models of EI is that the businesses are all located in a determined common property.

On the other side, industrial symbiosis is another practical model to implement the principles of EI. Also in this case resources are shared among different-in-size businesses inside the industrial symbiosis network and the by-product of a business becomes an important resource to one or more businesses. The Industrial symbiosis distinguishes from EIP because of the geographical

¹³¹ Gemma Cervantes et al., *La ecología industrial en México*, Mexico City, Universidad Autónoma Metropolitana - División de Ciencias Sociales y Humanidades, 2013, pp.19-25.

¹³² For more details about Ecological Modernisation as a set of approaches see: Stefano Soriani, *Il Rapporto tra Economia e Ambiente nella Prospettiva della Modernizzazione Ecologica*.

¹³³ Andrea Cecchin, *L'approccio Eco-industriale per una gestione sostenibile dei sistemi produttivi territoriali*, 2014, pp. 3-4.

extension: it is not confined by a limited common property, but businesses are in contact due to the only geographical proximity (it usually includes two or more neighbouring cities).¹³⁴

The most famous example of industrial symbiosis is the one in the small city of Kalundborg, but also Mexico offers curious instances of both EIPs and industrial symbiosis. According to a research carried out by Alles Group Oncor International (one of the leading independent real estate service provider in the country) there are around 300 experiences of industrial efficiency.¹³⁵ The industrial symbiosis that is taken place in the so-called industrial corridor of Altamira-Tampico is a good case study in the implementation of IE principles.¹³⁶

The majority of the businesses have settled in the Eighties, but it was in 1997 that the World Business Council for Sustainable Development (WBCSD) launched the by-product synergy programme counting immediately on the resilient support of the *Asociación de Industriales del Sur de Tamaulipas* (AISTAC). An initial group of 21 companies applied the eco-efficient model in which the interexchange of by-products and residues were performed trying to close the industrial cycles involved. Since then, even more companies (more than 30) have joined the eco-industrial network creating 64 practical synergies. It must be said that the great majority of these businesses belong to the petrochemical sector and for this reason undisputed

¹³⁴ Ibid.

¹³⁵ *Parques industriales en Mexico*, available at: <http://revistas.bancomext.gob.mx/rce/maqazines/122/6/RCE6.pdf> (last visualization: August 1, 2016).

¹³⁶ The corridor is located in the eastern Federal entity of Tamaulipas in the seafont of the Gulf of Mexico and it includes the cities of Tampico, Altamira and México.

icon of contamination and ecological degradation.¹³⁷ Nevertheless, with the basic assumption that for several businesses is quite improbable to quit this sector due to their specific productions, environmental benefits could be obtained through the by-product synergies as well as through the application of advanced technological innovations such as the installation of systems for the recovery and recycle of water, CO₂ and hydrochloric acid.¹³⁸

Here, some successful synergies identified and put in place¹³⁹:

- Shoe soles manufactured with PVC residuals and carbon black
- Plastic pallets manufactured with polyethylene residuals
- Fuel for indoor use obtained by butadiene residuals
- Cement obtained by mineral slag
- Waterproof membranes for external use and building materials manufactured with polymer residuals

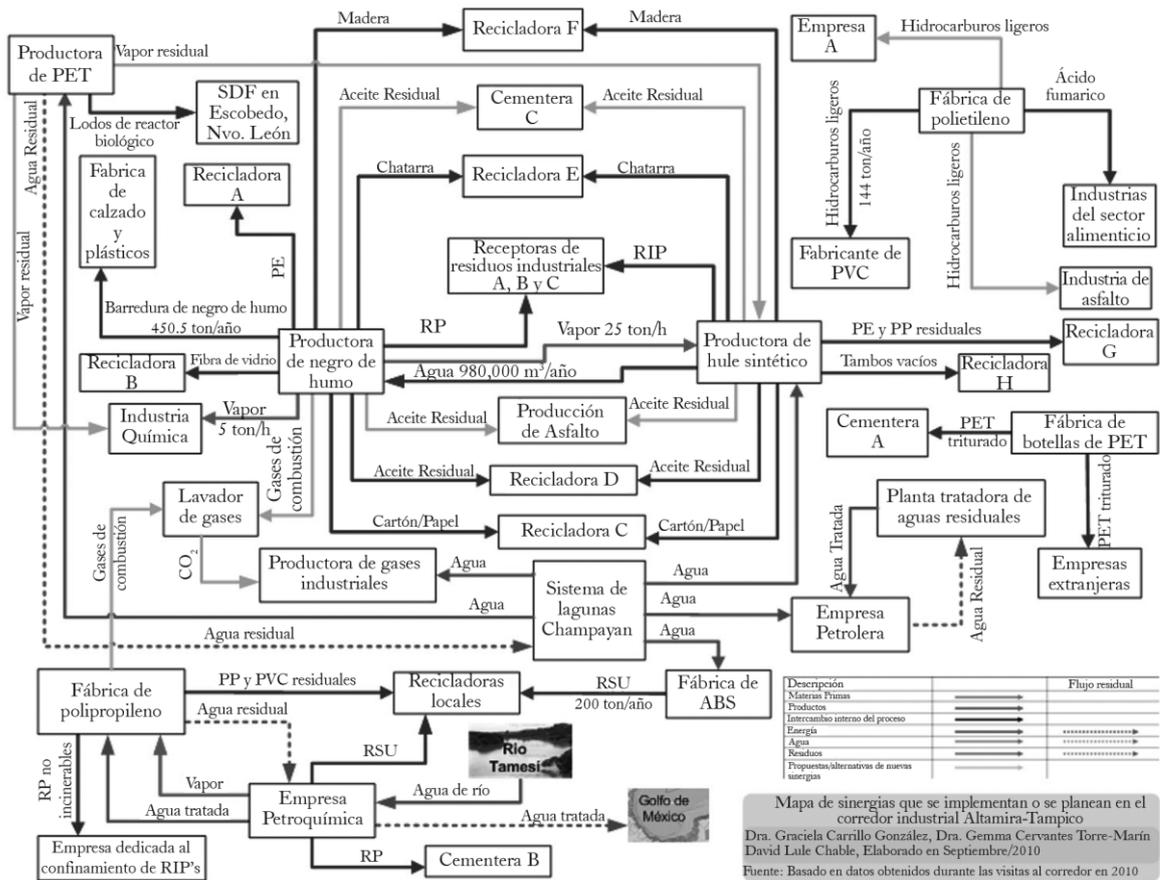
It could be said that this programme, started at the end of Nineties mainly for economic reasons, has applied the key principles of EI generating cost savings and increased revenues for the companies involved. These latter ones have progressively changed their image because they manifest their commitment to environment upgrading despite they are part of an industrial sector conceived as enemy of ecosystems. Even though they do not rely on renewable energy, a green inclusive growth seems possible. In addition, despite of offering different job

¹³⁷ In the industrial corridor there are National leading companies in the production of: synthetic rubber, thermoplastic resins, white and black pigments ,PVC, PET, PTA, PP.

¹³⁸ Gemma Cervantes et al., *La ecología industrial en México*, Mexico City, Universidad Autónoma Metropolitana - División de Ciencias Sociales y Humanidades, 2013, pp.176-179.

¹³⁹ Ibid.

Diagram 2: Synergies identified in 2011.¹⁴²



¹⁴² Gemma Cervantes et al., *La ecología industrial en México*, Mexico City, Universidad Autónoma Metropolitana - División de Ciencias Sociales y Humanidades, 2013, p.194.

CHAPTER 3

MAIN INTERNATIONAL STAKEHOLDERS IN THE MEXICAN RENEWABLE SECTOR

3.1 The international financing community

Nowadays, Mexico is among the major emerging economies investing record sums into the macro sector of renewable energy and, as already said, with a noteworthy commitment of local authorities starting from the Federal Government. As the leading US data company *Bloomberg New Energy Finance* has recently informed, in 2015 the country resulted the second developing economy behind South Africa with the highest financial commitment to renewables: with an amount of US\$ 4 billion, the Latin American country observed a growth of 105% in terms of investments compared to 2004.¹⁴³ At national level, not only political leaders are proving their interest in clean power through the implementation of advanced laws and regulatory plans as well as market-based instruments that are part of the green economy model. As a matter of fact, a wide range of national entities are proving even more committed investing money and strengths: from local private firms, to national agencies to national credit institutions. For instance, *Nacional Financiera*, the development bank promoting overall development including the overall

¹⁴³ Frankfurt School-UNEP, *Global Trends in Renewable Energy Investment 2016*, 2016, pp. 12-14.

modernization of industry, has issued five-year bonds with a total value of US\$ 500 million with the aim to realize nine wind farm projects across the country.¹⁴⁴

Nevertheless, the presence of international stakeholders of every sort and with different-in-size contributions are revealing essential in such a transition towards a greener image of the country. In this sense, the UN, the Global Environment Facility (GEF) and the WB are considered the major contributors in Mexico because they are promoting and providing high financing volumes and technical assistance in order to implement a more inclusive and sustainable low-emission growth.

As the principal worldwide advocate of the green economy approach, UNEP has launched in 2008 as a set of three initiatives that Mexico immediately welcomed. The *Green Economy Initiative* considers the following three targets: drafting a complete report about Green Economy with appropriate definitions (*de facto* realized in 2011¹⁴⁵); providing advisory service for the “greening” of certain sectors including the spread of energy efficient technologies and the sustainable management of natural sources; involving an increasing number of stakeholders such as interrelated UN partners, researchers, scholars, non-governmental organizations and businesses.¹⁴⁶ Even though UNEP has not provide direct financial investments to Mexico, its role as advisor has been, and is still, essential because,

¹⁴⁴ Frankfurt School-UNEP, *Global Trends in Renewable Energy Investment 2016*, 2016, p.43.

¹⁴⁵ In 2011, UNEP officially presented “Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication.”

¹⁴⁶ *Green Economy Initiative*. Available at: <http://www.unsceb.org/content/green-economy-initiative-gei> (last visualization: August 5, 2016).

after having established a resistant partnership with the country though the signature of a Memorandum of Understanding (MoU), it has developed the *Mexican Green Economy Scoping Study* (GESS) with the aim to provide good policy samples, favour dialogue with the different stakeholders involved and push the country to become the regional key for South-South cooperation.¹⁴⁷ The partnership with UNEP has recently extended to other UN agencies such as UNCTAD, UNIDO, UNDP and UNITAR: the country could count not only on their expertise and advisory service, but also on a comprehensive package of technological assistance as well as capacity building services. This enlarged partnership is defined *Partnership for Action on Green Economy* (PAGE) and Mexico is a *PAGE Exchange* country with its promising initiatives, policies and practical projects started.¹⁴⁸ Thanks also to the pressures exerted by UNEP and UNDP, Mexico has obtained increasing sums by the GEF fund and virtuous programmes have been launched such as the “Plan of action for removing barriers to the full-scale commercial implementation of wind power” extended in the entire federal territory (with a concessional loan of US\$ 35.24 million) and the “Small grid-connected photovoltaic systems” extended in the north part of the country (with a concessional loan of US\$ 5.9 million).¹⁴⁹

High participation for the enhancement of the country is represented by the WB which is sustaining numerous projects starting from the “Sustainable Energy Technologies Development for Climate Change” project aimed to enhance the

¹⁴⁷ UNEP, *Green Economy Advisory services: Mexico*, 2012, pp.1-2.

¹⁴⁸ Ibid.

¹⁴⁹ Instituto de Investigación Electricas, *Full-Scale Project Concept Paper: Plan of Action for the Large-Scale and Sustainable Implementation of Renewable Energy in Mexico*, 2002, pp. 5-15.

institutional capacity of ACE technologies institutions in Mexico and promote the commercialization of such technologies.¹⁵⁰ ACE technologies include the technologies involved in three specific sectors namely architecture, construction and engineering. Data about the concessional loan provided by the WB are not yet available as the project has recently begun and it will last until 2019. With a specific dedication to solar and wind energy sources, the most famous international financial institution wants to scale up the renewable potential of the country. In collaboration with the GEF as well as with the Government, the WB is supporting with more than US\$ 25 million the development of *La Venta III* which is the first Independent Power Producer (IPP) wind farm located in the south-west of the country.¹⁵¹ This is just one case of financial collaboration between the WB and the GEF. As a matter of fact, in 2000 a successful four-year-programme was launched for the dissemination of clean energy in the agricultural sector. For the “RE for Agriculture” programme, US\$31 million were provided making possible the installation of 1200 PV systems and 55 wind water pump turbines in Mexican rural areas.¹⁵²

These are not the only ones international financial institutions committed with Mexico. Among the several multilateral development banks that are providing

¹⁵⁰ *Mexico Sustainable Energy Technologies Development for Climate Change Project*. Available at: <http://www.worldbank.org/projects/P145618/?lang=en&tab=overview> (last visualization: August 6, 2016).

¹⁵¹ Indira Masullo, “Lessons from Mexico: Mobilizing Investment in Wind Power” in: *World Resources Institute*, June 2014. Available at: <http://www.wri.org/blog/2014/06/lessons-mexico-mobilizing-investment-wind-power> (last visualization: August 6, 2016).

¹⁵² US Department of Energy, *Mexico Renewable Energy Program and Bilateral/Trilateral Energy Cooperation. Agreements relating to Renewable Energy*, March 2006, pp.12-13.

concessional loans, credit lines as well as partial risk guarantees to both public and private stakeholders, there are the Inter-American Development Bank (IDB) and the European Investment Bank (EIB) that should be mentioned. The first one is still providing financing for the development of renewable energy systems and for the development of the needed infrastructure to exploit and spread these low-carbon sources. Aware of the fact that initial high transition costs and the frequent high interest rates required by local credit institutions could represent a major barrier to clean energy investments, the IDB has delivered financial sources to be allocated in specific areas. The financial role of the IDB regards the material realization of projects, but also the supply of policy advice, research methods, technical assistance and training to public and private clients. For instance, in 2014 the IDB awarded the country for its commitment to renewable by partially financing advisory services with the presence of international experts of geothermal energy. This group evaluated and selected the geothermal possibilities in specific areas of the country and developed the projects.¹⁵³ In addition, Mexico was the first Latin American country to welcome the issuance of the IDB green bonds generating a total amount of US\$ 125 million to be invest in the renewable energy market.¹⁵⁴

Finally, the international financial institution of the European Union, named EIB, is financially supporting several projects for the Mexican transition towards a clean and efficient energy mix together with other projects related to the reduction

¹⁵³ IDB, *IDB to support energy efficiency financing through the issuance of Green Bonds in Mexico*, May 19, 2015. Available at: <http://www.iadb.org/en/news/news-releases/2015-05-19/energy-efficiency-in-mexico,11161.html> (last visualization: August 8, 2016).

¹⁵⁴ Ibid.

of CO₂ in general. When choosing which project the Bank could sustain, the main standard required is that the project should be able to contribute to the economic growth of the Federation. Until 2014, the European Union bank into question has financed selected Mexican SMEs and Mid-caps (respectively small-medium-sized enterprises and middle-capitalization enterprise) with a total amount of US\$ 167 million in order to foster their growth while being more energy efficient.¹⁵⁵ Furthermore, also the EIB ,as the IBD, has taken part to the financing of *La Venta III* wind farm project granting a loan of around US\$ 87 million.¹⁵⁶ In addition, with an equal share of US\$ 20 million, Mexico and the EU have recently started the first joint geothermal research project (the *GEMex* project): researchers are called to investigate and develop innovative techniques in order to extract the heat from the Earth in an easier way possible and, consequently, obtain a cost-effective and more affordable clean energy power. The project, launched this year, will last three years and the expected collaboration will also concern the full respect of environmental standards as well as the social acceptance of the technological methods applied.¹⁵⁷

¹⁵⁵ EIB, *EIB financing Latin America*, Fact Sheet August 2014, pp.1-2.

¹⁵⁶ *Ibid.*

¹⁵⁷ *Policy: Mexico*. Available at: <http://ec.europa.eu/research/iscp/index.cfm?pg=mexico> (last visualization: August 12, 2016).

3.2 International agreements for the promotion of the low-carbon transition

Not only international financing mechanisms are offering a great support to Mexico for its sustainable growth, but there are also several countries of every continent involved in this pathway. In this section the most relevant worldwide partners are considered. The signing of specific governmental and ministerial agreements show themselves interested in the Mexican reality also because they could obtain benefits starting from commercial ones.

Among the European countries determined to cooperate with the Latin American country there is the Federal Republic of Germany. With a long term consolidated renewable energy sector and an increasing domestic demand for energy, German authorities are even more interested in the solar and wind energy mix of Mexico. In April 2016, the respective Energy Ministers Sigmar Gabriel and Pedro Joaquín Coldwell signed a joint declaration with the intent to shape the German-Mexican energy partnership strengthening the dialogue on issues such as funding mechanisms and the needed reforms for renewable electricity markets.¹⁵⁸ Two months later the practical result was the signature of a MoU in which it has been disposed a close relationship between the governmental bank systems for the funding of PV projects as well as advisory services. The banks involved, which are acting on behalf of the two federal governments, are Bancomext and, on the other

¹⁵⁸ *Joint Declaration of Intent on the Energy Partnership between the Government of the United Mexican States and the Government of the Federal Republic of Germany, Berlin, April 12, 2016, pp.1-6.*

side, KfW (*Kreditanstalt für Wiederaufbau*) and GIZ (*Gesellschaft für Internationale Zusammenarbeit*).¹⁵⁹ While KfW is issuing two loans of about US\$ 90 million each one to Bancomext for the development of wind power, biomass and solar power units, GIZ seems more devoted to clean solar energy as it is witnessed by the German credit agreed to cover the investment cost for the installation of 25,000 solar panels in an equal amount of households: the credit into question has been distributed in the form of subsidies in order to boost renewable energy private investments.¹⁶⁰ Similarly to this latter project, KfW is actively contributing for the realization of “*EcoCasa*” programme: in front of the growing Mexican population and the connected growing demand for housing, the programme is concretely building energy-efficient private residential buildings for low and middle-income groups. According to KfW experts, in seven years, around 27,000 sustainable residential units will be built.¹⁶¹ The energy agreement between the two countries is the signal of common perspective and goals about the green future of both parties. Also the Germany of Angela Merkel has started an energy policy reform setting the target of 35% of electricity produced by clean sources by 2020. Nevertheless, despite the share need for a more sustainable world, Germany is highly interested in the Mexican renewable energy sector because, as an even-more emerging economy, it represent an unique opportunity for German investors as well as an incredible market for the import of clean energy supply and technologies from the American country.

¹⁵⁹ *Germany in Mexico dual year*, Mexico City, June 6, 2016, pp. 3-5.

¹⁶⁰ *Mexico*. Available at: <https://www.giz.de/en/worldwide/306.html> (last visualization: August 13, 2016).

¹⁶¹ KfW Development Bank, *Project Information*, September 2014, pp.1-2.

With its long lasting experience and domain expertise in clean energy technologies and energy efficiency, the Kingdom of Denmark is facilitating the Mexican ability to implement the right green economy measures and programmes in order to better manage its renewable potentials. The Scandinavian country is currently the world leader in wind power: it is not a case that in 2015 around 42% of the total national electricity consumption was generated by wind turbines, the majority of them located in the Western part.¹⁶² Such a leadership consolidated since the beginning of the Eighties has pushed the Danish government to promote wind energy (and all the related benefits) not only at home, but also abroad. Cooperation on climate and energy between Mexico and Denmark could be traced back to the beginning of this millennium when they signed the first MoU. Nevertheless, it was since 2011 that SEMARNAT and the Danish Energy Agency (DAE) started really cooperating on renewable energy sources outlining emissions baselines and models for carbon reduction keeping in mind the different energy matrix and resources available.¹⁶³ In addition, Denmark allocated around US\$ 182 million under the framework of its financing mechanism for climate change funding (the *Danish Climate Envelope*).¹⁶⁴ A new bilateral agreement for the implementation of climate change mitigation and energy programme has been concluded in 2014: the European country has committed more than US\$ 6.8 million in this three-year programme to sustain the Mexican transition. The programme activities include

¹⁶² *Wind Energy*. Available at: (last visualization: <http://energinet.dk/EN/EI/Nyheder/Sider/Dansk-vindstroem-slaar-igen-rekord-42-procent.aspx> August 15, 2016).

¹⁶³ DAE, *The joint Danish-Mexican cooperation on climate and energy*, 2015, p.2.

¹⁶⁴ *Ibid.*

also the transfer of Danish know-how and renewable energy technologies to both private and public actors in the Latin American country and experts have been appointed to carry out training and evaluation activities.¹⁶⁵ As the Mexican president Nieto has recently reaffirmed during his state visit in Denmark, Mexico is more sustainable, productive and competitive thanks to its energy policy reforms with the introduction of instruments and incentives favouring the use of renewable sources.¹⁶⁶ He added that *“in particular, Mexico would like to enjoy this proximity in order to boost the real potential in the bilateral relation in two determined areas: trade and investment and clean energy generation.”*¹⁶⁷ The energy partnership is an important key-element as, over the last years, export opportunities are increased for both countries and Denmark results the main Nordic countries with the major amount of investments in Mexico.

Diplomatic relation with Japan started in the last quarter of the Nineteenth century when, in 1888, a first “Treaty of Friendship, Commerce and Navigation” was signed by the two governments. Nevertheless, it was starting from the Fifties of the following century that trans-Pacific diplomatic relations saw a rise especially because of the commercial opportunities they presented. Nowadays, for the Japanese growing-in-size and diversified economy, Mexico is still attractive with its big domestic market and also a key export platform in order to trade with other

¹⁶⁵ DAE, Mexico: *Official Cooperation Agreement Signed in Mexico*, July 9, 2014. Available at: (last visualization: <http://www.ens.dk/en/info/news-danish-energy-agency/official-cooperation-agreement-signed-mexico> (last visualization: August 15, 2016).

¹⁶⁶ Francisco Resendiz, “Promueve Peña a Mexico en Dinamarca”, in: *El Universal*, April 14, 2016.

¹⁶⁷ Ibid.

world players such as North America, Europe and other Latin American countries.¹⁶⁸

The well-established friendly and close relationship regards not only the economic sphere, but also the political and cultural ones: a particular interest in the Latin American country is given due to the presence of around 20,000 *Nikkei* (Japanese) definitively migrated there at different times.¹⁶⁹ Cooperation in terms of energy is not new among the two parties as the East Asian country has no significant reserves of fossil fuel in its territory and, consequently, for decades, imports from the Mexican PEMEX have revealed necessary to satisfy its energy needs. With the rising climatic concerns and the progressive degradation of worldwide ecosystems, Japan (Annex I country of the Kyoto protocol) is developing its renewable energy sector: due to its geographical position and geological conformation, it is adopting technologies for the production of electricity mainly from hydroelectric, geothermal and photovoltaic systems.¹⁷⁰ Despite its domestic renewable energy goal of 20% in the total electricity output by 2020, the current Prime Minister Shinzō Abe is also helping Mexico in its own renewable energy goal through the Japanese state-owned JBIC (the Japan Bank for International Cooperation). As part of its “Activities for Environmental Sustainability”, JBIC has put in place a credit line of US\$ 50 million to BANCOMEXT to finance Mexican renewable energy and efficient energy projects.¹⁷¹ In addition, in 2014, JBIC signed a MoU with NAFIN with the aim to exchange

¹⁶⁸ Mexico is considered a key export platform because of its numerous Free Trade Agreements signed with the above mentioned regions.

¹⁶⁹ Margaret Myers and Mikio Kuwayama, “A new phase in Japan-Latin America and the Carribean relations”, in: *Japan-Latin America Report*, February 2016, pp.11-13.

¹⁷⁰ Ibid.

¹⁷¹ *Credit Line for BANCOMEXT under GREEN Operations*. Available at: <https://www.jbic.go.jp/en/information/press/press-2014/0728-26301> (last visualization: August 21, 2016).

information and views on the environmental behaviour of local SMEs in general.¹⁷²

Cooperation agreements in the sector bring benefits not only to the Mexican side with expected reduction of GHG emissions, but also for the Asiatic side: major Japanese exports of machinery and equipment as well as the possibility to secure the import of natural resources.

As far as the American continent is concerned, it should be paid attention to the relationship between Mexico and the United States of America: Such a relationship is firstly favoured by the geographical proximity: the border the two countries share is around 2,000 kilometres long from East to West. A good and strong relationship is equally important for both countries starting from their homeland security, trade and economy. Since the second half of the Twenty century several cooperation agreements have been signed on different topics including the management of the common border, migration, illegal drug trafficking and related crimes. The persistence of a close trade relationship is, according to numerous scholars, the most important tie between the two countries: in fact, Mexico is the third exporter to the USA (after Canada and Brazil) and, at the same time, it is the first importer from the big power.¹⁷³ Such trade relationship is regulated by the famous NAFTA (*North American Free Trade Agreement*) signed in 1994 and joined also by Canada: the goal of the trilateral agreement is to remove any barrier to trade and investments in the three countries involved and, consequently, produce

¹⁷² JBIC, *JBIC's Activities for Environmental Sustainability. Supporting your global challenges*, 2014, p.5.

¹⁷³ USAID, *Mexico. County profile*, December 2009, pp-1-2.

economic benefits in terms of increased GDP.¹⁷⁴ Nevertheless, cooperation on environment and natural sources is not absent between the US and Mexico. In 1998, the two federal governments proposed a first *US-Mexico Bilateral Energy Cooperation Agreement* with a specific focus on renewable energy sources: the agreement was intended to stimulate the overall benefits of no-fossil fuel realities as well as joint research, personnel qualification and the use of clean energy sources by both public and private sectors.¹⁷⁵ Long time has been required for its implementation that happened *de facto* in 2007 with the inclusion of Canada and it is renewed every five years: as it could be read in the official text of this MoU, no international financial contributions are considered, but every country is paying its own incurred costs.¹⁷⁶ A renewed effort into the issue was put in 2009 when Felipe Calderon and Barack Obama signed the *US-Mexican Bilateral Framework on Clean Energy and Climate Change*: what it has been affirmed is the need for training, but also for sustainable and more efficient infrastructure as well as green energy technologies.¹⁷⁷ In their commitment to mitigate climate change, the US is proving also much more interested in the Mexican renewable development and the major US financial commitment for such a development is embodied by the *United States Agency for International Development* (USAID). The governmental agency is

¹⁷⁴ *North American Free Trade Agreement*. Available at:

http://www.naftanow.org/about/default_en.asp (last visualization: August 22, 2016).

¹⁷⁵ *Memorandum of Understanding among the Department of Energy of the United States of America and the Department of Natural Resources of Canada and the Ministry of Energy of the United Mexican States for Cooperation in Energy Science and Technology*, British Columbia, July 23, 2007.

¹⁷⁶ *Ibid.*

¹⁷⁷ White House, *US-Mexico Announce Bilateral Framework on Clean Energy and Climate Change*, Washington DC, April 16, 2009.

engaged in assisting Mexican projects that conserve ecosystems, promote clean energy sources and reduce CO₂ emissions: the assistance provided shifts from technical assistance and training to financial assistance through the issue of grants and loans.¹⁷⁸ USAID operates with the main objective to help low and middle income countries to achieve self-sustaining socio-economic development, but it wants also to keep vital the geopolitical and economic interests that the US has with countries such as Mexico. Since 2010 over US\$ 50 million have been provided to the Mexican Government for the realization of low emission strategies, policies and programmes. For instance, together with other stakeholders, USAID is sponsoring programmes such as: “Clean-tech Challenge Mexico” (as an annual green business-plan competition for selected local businesses); “Mexico Low-Emissions Development Program” (as a programme with a wide range of activities including the creation and improvement of systems for monitoring, reporting and verification of overall emissions coming from all economic sectors); “Water/Wastewater Utility Greenhouse Gas Reduction and Energy Management Program” (as a programme with the aim to facilitate the identification and implementation of cost effective renewable energies technologies in municipal areas).¹⁷⁹ As Donald McCubbin, USAID environmental officer appointed in the Latin American country, has recently stated, the majority of USAID investments are directed to small communities and small companies with great potentials and, with a particular preference in the wind and solar renewable sector, he remarks that “*the financing of new technologies and*

¹⁷⁸ USAID. Available at: <https://www.usaid.gov/> (last visualization: August 22, 2016).

¹⁷⁹ USAID, *USAID in Mexico: Program Overview*, April 2014.

working with the government to implement national reforms is demonstrating a proven formula for success that can be replicated by others in Mexico.”¹⁸⁰

Few months ago (at the end of June) the three NAFTA leaders met in Ottawa in order to discuss the importance of free trade and regional cooperation. In front of the concerning data about climate change underlined at COP21, they decided to foster a sustainable regional integration by committing to an even more carbon-free economy and society: accelerated transmission of cross-border projects, the promotion of common energy efficiency standards, universal energy access as well as the adoption of common green measures. Tax credits for clean sources, carbon tax and the removal of hazardous fossil fuel subsidies are the main proposals emerged at the Canadian summit.¹⁸¹ In this sense, “*Los tres amigos*” (commonly used to refer to the three political authorities namely Barack Obama, Justin Trudeau and Enrique Peña Nieto) have publicly signed a “North American Climate, Clean Energy and Environment Partnership” with the ambition to produce the 50% of energy by renewable sources by 2025.¹⁸² Nevertheless, this optimistic form of trilateral cooperation is truly endangered by the possible US presidential election of the Republican candidate Donald Trump who prefers protectionist measures and he has recently announced his will to remove US from the NAFTA as well as from other multilateral agreements with other worldwide countries.

¹⁸⁰ Ibid.

¹⁸¹ White House, *Leaders’ Statement on a North American Climate, Clean Energy, and Environment Partnership*, Washington DC, June 29, 2016.

¹⁸² Ibid.

3.3 The international FDI flow in Mexico

A great part of the increasing development of the renewable sector in Mexico is attributed to the foreign interest in the country. Foreign Direct Investments are defined as financial investments made by an investor (individual or, more often, companies) from one country into another nation: by purchasing a local company or specific tangible assets, the foreign investor exercises a commensurate control. As UNCTAD has recently reported, Mexico is the tenth largest FDI recipient proving one of the most open economies especially among the emerging ones.¹⁸³ Currently, after a year of scarce international interest in terms of investments (that is to say the year 2014), the inflow is growing again particularly in aerospace and automotive sectors. Other leading sectors, which have contributed to the FDI inflow of US\$ 21.5 billion registered in 2015, are: electronics, finance, banking, tourism and ,of course, energy. On the other side, agriculture and fishing are experiencing a relative decline of FDI flows.¹⁸⁴ As far as renewable energy sources are concerned, Mexico is attracting significant sums by private foreign investors (intended both individuals and businesses of different size and type): as witnessed by the “Renewable energy country attractiveness index”, developed by the worldwide professional service network EY (previously known as Ernst & Young), the Latin American country has made considerable progress thanks mainly to political and economy reforms

¹⁸³ Santander Trade Portal, *Mexico: Foreign Investment*, August 2016. Available at: <https://en.portal.santandertrade.com/establish-overseas/mexico/foreign-investment> (last visualization: August 25, 2016).

¹⁸⁴ Ibid.

reaching the seventh position in this global index and declaring itself a mainstream market for these kind of no-carbon resources.¹⁸⁵

Starting from the basic assumption that private foreign investors (as well as private domestic investors) are driven first of all by the profit motive, and they invest in the most attractive projects in the most attractive countries, a key factor allowing the recorded high level of attractiveness of Mexico lies in the recent opening of its power market to the private sector competition. Nevertheless, there are other relevant elements that foreign investors are considering when deciding to invest in the green sector of Mexico starting from the positive environmental and health impacts obtained. The FDI inflow to the sector into question is a sustainable inflow and, in addition, the foreign investor is depicted as a good exemplar investor respectful of the environment. Another reason why Mexico is experiencing much more interest in the clean energy field is also due to the fluctuating trend of fossil fuel prices together with the progressive exhaustion of these non-renewable resources.¹⁸⁶ Furthermore, there are a remarkable number of foreign stakeholders who are addressing their investment source in Mexico because of the social return expected: NGOs such as Greenpeace and WWF are mainly acting in order to provide a long-lasting clean energy access to the numerous underserved Mexican communities, without caring too much about the financial return expected by their initial investment.¹⁸⁷

¹⁸⁵ EY, "RECAI. Renewable energy country attractiveness index", in: *Issue 47*, May 2016, p.10.

¹⁸⁶ ECLAC, *Foreign Direct Investment in Latin America and the Caribbean*, 2015, pp. 35-43.

¹⁸⁷ *Ibid.*

Trying to investigate which country address FDI in the Mexican renewable energy sector, it emerges that the major FDI bidders come from the following top five countries: Spain, the USA, Denmark, Germany, Israel.¹⁸⁸ Authoritative sources have recently communicated that in the period 2010-2015 “Mexico’s renewable energy industry received 44 FDI projects that added up US\$ 13,372 million.”¹⁸⁹ These projects have contributed not only in the national economy and green transition, but they have also provided new jobs position for local people and, consequently, highly contributed to the positive trends of the national unemployment rate: in June 2016, the rate fell to 3.9%, the lowest in the last 10 years according to the Mexican agency *Instituto Nacional de Estadística y Geografía*.¹⁹⁰ This appealing attractiveness have also motivated domestic companies to diversify their businesses by taking part in small-scale project for clean energy technology manufacturing and sales.

Among the above-mentioned countries, Spain is the one with the strongest presence in terms of FDI especially in the wind and PV solar market. The two main factors that are pushing Spanish companies to invest in the solar and wind market in Mexico is its excellent geographical position and the record low prices for the generation of power: US\$45/MWh for the solar power and US\$55/MWh for the

¹⁸⁸ Ministry of Economy, *Pro México. Trade and Investment*, August 2013, p.18.

¹⁸⁹ Ministry of Economy, *Pro México. Renewable Energy Industry*, 2015, p. 7.

¹⁹⁰ *Mexico Unemployment Rate 1994-2016*. Available at: <http://www.tradingeconomics.com/mexico/unemployment-rate> (last visualization: August 26, 2016).

wind power.¹⁹¹ The leading Spanish companies which are working hard for the development of projects, engineering, installation and maintenance of renewable energy solutions are *Gamesa*, *Iberdrola Group* and *Acciona Group*. While the latter one has realized four wind farms in the region of Oaxaca able to generate 556MWh with a total investment of around US\$1,200 million, the *Iberdrola Group* has supply several Mexican wind farms with its advanced wind turbines (reaching an installed capacity of 500 MWh) and has invested around US\$ 5 billion (between 2014 and 2016) for the realization of renewable energy projects including solar power plants in Baja California, Altamira and Tamaulipas.¹⁹² It is noteworthy to remember that, once ended his mandate, the former President Felipe Calderón entered the Group as member of the Council. Also the famous Spanish oil and gas company *Repsol S.A.* has recently started collaborating on renewable sources (more precisely on biofuels) with the Mexican industrial group *Kuo*: they have created a bioenergy joint venture named *Kuosol* with the ambitious aim to investigate and develop sustainable energy by non-edible vegetables such as the jatropha plant (a flowering plant very common in the country).¹⁹³

Even though it is considered the absolute top investor in Mexico, the USA, better to say US foreign investors, are behind the Spanish competitors. Nevertheless, partnership between US and Mexican companies is increasing due to the increasing demand for energy in the first one, but also due to the competitive

¹⁹¹ EY, "RECAI. Renewable energy country attractiveness index", in: *Issue 47*, May 2016, p.18-19.

¹⁹² Ministry of Economy, *Pro México. Renewable Energy Industry*, 2015, p. 10-16.

¹⁹³ Ministry of Economy, *Pro México. Energías renovables*, 2015, p.2.

Mexican costs starting from the lower labour cost. Geographical proximity is another key element of the attractiveness of Mexican market. In addition, Mexico welcomes US FDI inflows because, together with Germany and Japan, the USA possesses most patents on climate change mitigation technologies: for this reason they are vital actors for the production and distribution of these sustainable tools.¹⁹⁴ The principal US company that is operating in the Mexican solar market is *SunPower Corporation*, leader in the design and manufacturing of solar technologies such as solar panels, roof tiles and photovoltaic cells. In Mexico since 2011, the corporation is competing with other energy companies in order to boost solar energy supply in the whole country especially in Yucatan and Guanajuato. The reliability of the products together with the expertise and on-going innovation of transnational companies like *SunPower* have transformed Mexico into the largest PV modules manufacturer in the Latin American region with positive effects in the economy thanks to export earnings.¹⁹⁵ Although rather far to be put in practice, the Californian company *Alion Energy* has expressed its will to expand in Mexico with its robotic solar panel installation: the value proposition of the company is the real possibility to make solar electricity cheaper, and consequently more accessible, because labour costs are reduced of nearly 75% due to the fact that no more than one or two operators are required to assist the robot for the installation.¹⁹⁶ The low cost for these PV panels are also because of the few components required for the

¹⁹⁴ ECLAC, *Foreign Direct Investment in Latin America and the Caribbean*, 2015, pp. 112-114.

¹⁹⁵ Ministry of Economy, *Pro México. Energías renovables*, 2015, p.2.

¹⁹⁶ Sara Warden, "Interview of the Week: Mark Kingsley, President & CEO of Alion Energy", in: *Mexico Energy Forum*, February 19, 2016. Available at: <http://www.renewableenergymexico.com/interview-of-the-week-mark-kingsley-president-ceo-of-alion-energy/> (last visualization: August 26, 2016).

final installation: no metal frame, no clips or bolts are necessary, just a railing system.¹⁹⁷ An increasing number of US private companies is also directing investments for the development of forthcoming geothermal projects as they have the necessary expertise in the engineering, management and drilling services for this kind of clean source. A similar trend in the Mexican geothermal sector is being experienced also by several Icelandic private firms which have gained considerable experience because of their homeland geothermal absolute advantage.¹⁹⁸

With green industry manufacturing costs lower than the global average (approximately 11,5% less), the presence of FDI flows in Mexico is even more diversifying that is to say that foreign investors from different countries are even more attracted by the Mexican renewable energy industry. It should be noticed that all this is possible thanks to the presence of over 30 bilateral Agreement for the Promotion and Reciprocal Protection of Investments between national governments as well as over 40 agreements to avoid double taxation.¹⁹⁹ Also the Italian renewable energy multinational corporation *Enel Green Power* has recently launched three solar projects in the centre and north of Mexico by investing around US\$ 1 billion: the Italian utility is generating renewable energy that will not be exported, but that will supply local communities for at least 15 years.²⁰⁰ As a matter of fact, by signing a private purchase agreement with CFE, *Enel Green Power* has obtained the right to provide renewable energy contracts for 15 years and to issue

¹⁹⁷ Ibid.

¹⁹⁸ ECLAC, *Foreign Direct Investment in Latin America and the Caribbean*, 2015, pp. 112-114.

¹⁹⁹ Ministry of Economy, *Pro México. Energías renovables*, 2015, p.2.

²⁰⁰ Ibid.

green certificates for 20 years. Once realized all three projects, the Italian experts of the multinational corporation believe that around 1.021.400 tons of CO₂ will be saved per year.²⁰¹

As far as industrial symbiosis is concerned, the *Mexican Association of Industrial Parks* (AMPIP) has started the strategic promotion for the implementation of sustainable practices among the 250 industrial parks it represents. Besides the already mentioned fiscal incentives as part of the green stimulus package promoted at a national level, the association is taking proper actions in order to safeguard the environment, but also to attract the attention of international investors. With the launch of two specific initiatives namely the "Green Industrial Park Recognition" and the "Recognition of Sustainable Industrial Park", AMPIP is currently fostering the fulfilment of given criteria including high quality infrastructure standards, the adoption of energy-savings solutions as well as the meet of specific water and environmental parameters.²⁰² The most virtuous industrial parks (representing a broad range of different businesses) are awarded with official recognition and excellence certification becoming an interest motive in the decision-making process of both private and public foreign stakeholders.²⁰³

²⁰¹ Enel Green Power, *Comunicato Stampa: Enel Green Power conferma la sua leadership nelle rinnovabili in Messico a seguito del successo ottenuto in una gara pubblica*, April 30, 2016, pp. 1-2.

²⁰² *Industrial Parks in Mexico: Sustainability*. Available at: <http://ampip.org.mx/en/industrial-parks/> (last visualization: August 29, 2016).

²⁰³ Ibid.

The following map shows the main foreign renewable energy companies located in Mexico.²⁰⁴



²⁰⁴ Source: Ministry of Economy-Pro México Trade and Investment.

CHAPTER 4

CHALLENGES FOR THE COMPLETE SUCCES OF INCLUSIVE GREEN

ECONOMY

4.1 Political instability

Starting from the basic assumption that the declared intention to move towards a more sustainable and inclusive economy is demanding, not easy and neither immediate, it could be generally said that some positive results that the country is experiencing are also due to its green commitment and enhanced cooperation with the broad spectrum of stakeholders previously considered. The lower inflation rate, the decreased unemployment rate together with the greater efforts made by the nation in terms of medical care and infrastructural services are practical evidences.²⁰⁵ Nevertheless, there are a lot of eradicated problems that are lessening the Mexican sustainable growth and, more specifically, preventing a huge number of people from believing and investing in promising sectors including the renewable one.

It could be said that the main barrier to the complete success of the Green Economy model is the current, maybe better to say typical, political instability of the country. Rampant corruption is an intrinsic feature of the Federation and it has affected essential elements such as political legitimacy, macroeconomic efficiency,

²⁰⁵ *Mexico Data*. Available at: <http://data.worldbank.org/country/mexico> (last visualization: September 4, 2016).

ruling class legacy, transparent process in the administrative practices and so on. According to *Transparency International*, the global non-governmental coalition against corruption born at the beginning of the Nineties with its headquarter in Berlin, Mexico is the most corrupted country among the OECD members and among the top ten corrupted Latin American countries (Venezuela results as the most corrupted).²⁰⁶ Looking at the *Corruption Perceptions Index* (CPI) of 2015, developed by the NGO and with the task of ranking 167 countries on the basis of how corrupt the public service is perceived, Mexico ranks 95th: the first position is occupied by Denmark and it means that no corruption is perceived ,while the most corrupted countries are found by going downwards the list. North Korea and Somalia occupy the lowest position.²⁰⁷ Even though, from a comparative analysis of the CPI over the last years, it emerges that the country is rising the ranking (in 2011 it ranked 100th), the rise is very slow and corruption is a persistent reality starting from the political and institutional environment.²⁰⁸

In particular, the current PRI administration leaded by Nieto is criticized for being highly corrupted and for its continuous favouritisms to other political and economic predatory elites constituting the hierarchical Mexican society in which there are predetermined power relations. The reputation of the Federal President is tarnished by several corruption scandals including the exclusivity granted to the company *Grupo Higa* in over 80 public work contracts: the construction company is

²⁰⁶ *Corruption Perceptions Index 2015*. Available at: <http://www.transparency.org/cpi2015> (last visualization: September 1, 2016).

²⁰⁷ *Ibid.*

²⁰⁸ *Ibid.*

owned by a close friend of the President and, consequently, general indignation has emerged for the existing conflict of interests. There are also doubts about the validity of his electoral results of 2012.²⁰⁹ The authoritarian attitudes, the patronage networks installed, the lack of space for political competition and the ongoing manipulation and corruption of national media (obliged to keep unfortunate truths under wraps such as the sudden mass kidnapping of 43 Mexican students) are decreasing even more the public support to the ruling party. Through public surveys and interviews, it also emerges that confidence in the current administration is eroded by the poorly performing reform agenda much-flaunted during the 2012 election campaign. Dissatisfaction with the PRI direction has reached historical levels: roughly 72% of Mexicans do not feel represented and they criticized the indifference to the huge inequality gaps and broken promises concerning social and educational reforms.²¹⁰ Nonetheless, aware of this situation, the President is trying to regain both domestic and international trust through effective provisions aimed at restoring a sense of security as the recent *General Law on Transparency* and the anti-corruption reform witness. On one hand, the *General Law* wants to guarantee the right to public information through the direct access by citizens to data of public institutions and Federal bodies, while on the other hand, the anti-corruption reform

²⁰⁹ Nick Mirroff, William Booth, "Mexico's presidential election tainted by claims of vote-buying", in: *The Washington Post*, July 4, 2012. Available at: https://www.washingtonpost.com/world/mexicos-presidential-election-tainted-by-claims-of-vote-buying/2012/07/04/gJQAHqTzNW_story.html (last visualization: September 4, 2016).

²¹⁰ Danielle Cuddington, Richard Wike, "Declining Ratings for Mexico's Peña Nieto", in: *Pew Research Center*, August 27, 2015. Available at: <http://www.pewglobal.org/2015/08/27/declining-ratings-for-mexicos-pena-nieto/> (last visualization: September 4, 2016).

has the aim to fight and discourage corruption through the creation of an entity (called *Comisión Nacional Anticorrupción*) able to act widespread.²¹¹ Also in this case people are not showing enthusiastic due to the bureaucratic delays in the implementation of the declared measures and because these appears in contradiction to the living political attitudes.²¹²

The recorded political instability is not only confined to the highest floors in the federal system. It is exactly also its specific federal structure that influences such long-lasting situation. As a matter of fact, as previously reported, Mexico is composed by 31 Federal States and a Federal District with their own constitution and, consequently, they are quite free and sovereign. In the Mexican case, this political and administrative decentralisation contributes to the overall insecurity and not-fully exploited attractiveness of the country. Furthermore, there is also a second level in the internal political organization of the *Estados Unidos Mexicanos* as every State has a fixed number of municipalities. 2,438 is the total number of these municipalities and they vary in size. Some are very big including two or more cities: for instance, Baja California is the State with the most extensive municipalities.²¹³ The problem into question is not the federal system in itself, but how it is managed and how the different subdivisions are integrated: there is a poorly-managed coordination and agreement between all the federal entities and some are really abandoned to themselves in which neither fundamental public

²¹¹ Wilson Center, *Mexico: the fight against corruption. (A review of ongoing reforms to promote transparency and curtail corruption)*, Wilson Center Publications, June 2015, pp. 11-17.

²¹² Ibid.

²¹³ Ibid.

services are provided. In addition, corruption makes its way also there, especially in the most isolated areas where people are more vulnerable and political authorities are involved in businesses not so honest without really overcoming local concerns and without considering the validity and benefits of the numerous projects and programmes available (for instance renewable energy projects).

It is clear that corruption is endemic and it should be said that it does not spare even those who are theoretically appointed to guarantee law enforcement and, more in general, security. In fact, the police apparatus is very often protagonist of events linked to criminal gangs as well as episodes in which crimes remain unsolved, unreported and not fairly punished. No public trust, but fear in police is very often the outcome. What emerges from the numerous episodes of misuse of power by Mexican police and its involvement in criminal networks (through the dangerous disclosures of journalists and victims) is that a great part of policemen are not suitably professionalized through appropriate training, education and skills and their conduct is not appropriately monitored by legislative and civil authorities.²¹⁴ Furthermore, also in this case, the scarce cooperation among the different divisions of the federal apparatus increases the current enormous insecurity generally experienced.

Together with a wide set of problems that will be further detailed, the political and institutional instability of the country has a negative impact on both

²¹⁴ Paul Imison, "Mexico's efforts to tackle police corruption keep failing", in: *Vice News*, March 21, 2016. Available at: <https://news.vice.com/article/mexicos-efforts-to-tackle-police-corruption-are-failing> (last visualization: September 5, 2016).

economy and society and their possibilities to advance. In particular, corruption has also a significant economic cost that damages the public budget and affects the increased public debt. The Mexican Institute for Competitiveness has recently claimed that *“each year corruption costs the country between 2% and 10% of its GDP (between US\$ 53 billion and US\$ 130 billion), reduces investment by 5%, and eliminates around 480,000 jobs from small- and medium-sized businesses.”*²¹⁵ The vagueness by local institutions and the related need for a mentality change are visible also in relation to environmental concerns: it results very difficult to define and enforce effectively environmental laws. Furthermore, very often the integrity of ecosystems is sacrificed in order to favour projects with harmful effects in the medium and long-term and a lot of these projects obtain the contracts and concessions officially required because, again, corruption and conflicts of interest are involved as well as big gains are planned. As a consequence, the environmental degradation is left aside and common activities such as deforestation, intensive farms of export products as avocado and sugar cane, extraction of oil and mining continue to occur.²¹⁶ As it will be said, not only such a situation leads to weaken the overall Mexican governance, but it highly contributes to the persistence of a vicious cycle between crime and insecurity that affects a large portion of population, especially those who are socially marginalized.

²¹⁵ Duncan Wood, “Fighting corruption in Mexico”, in: *Foreign Affairs*, June 22, 2016.

²¹⁶ Wilson Center, *Mexico: the fight against corruption. (A review of ongoing reforms to promote transparency and curtail corruption)*, Wilson Center Publications, June 2015, pp. 16-22.

4.2 Other barriers to the Mexican attractiveness

It has been confirmed that the general lack of confidence in the police and juridical system, or more in general in law enforcement, has a direct link with another major concern of the Latin American country: criminality. As a matter of fact, as citizens do not trust on institutions, they usually do not consider the necessity to report any kind of crimes they assist or they are aware of. This trend is typical of the Southern part of the Federation because it results less densely inhabited, with no big metropolises and industrial clusters as in the Northern part, with different climatic conditions that makes the area more isolated and, consequently, a fertile ground for the spread of illegal activities. Another area ,where high criminality rate is recorded, is the Mexican-USA border.²¹⁷ Not only these citizens do not feel encouraged and motivated to denounce the situation, but they get also involved in criminal activities such as homicides, kidnapping, robberies, carjacking, gender violence, guns battles, human trafficking and drug trafficking. This increases the general insecurity felt by another portion of citizens who fear to become victims or get involved as well as by the international actors who fell incapable and, for instance, investors (but also workers and tourists) prefer to project their interests in safer countries.²¹⁸

²¹⁷ Santander Trade Portal, *Mexico: Foreign Investment*, August 2016. Available at: <https://en.portal.santandertrade.com/establish-overseas/mexico/foreign-investment> (last visualization: August 25, 2016).

²¹⁸ Christopher Woody, "Mexico's president appears to be fudging numbers about the biggest threat to the country", in: *Business Insider UK*, September 27, 2015. Available at: <http://uk.businessinsider.com/mexico-crime-rates-2015-9?r=US&IR=T> (last visualization: September 6, 2016).

Among all the above-mentioned criminal activities that are highly contributing to slowing down the development of Mexico, drug cartels represent the main concern. A drug cartel indicates the complex systems of drug trafficking criminal organizations, in which the management, production and marketing of drugs such as cocaine, marijuana and amphetamines take place. Starting from the Eighties, the Mexican cartels grew in size and entered the transnational network of drug smuggling.²¹⁹ Despite the numerous governmental efforts to tackle the problem, drug cartels are still a reality in Mexico and, according to analysts, there are at least seven main drug cartels that control the federal profitable market and that often conflict between themselves. The Sinaloa cartel is the largest one not only in the country, but in the whole Western hemisphere.²²⁰ It is above all the large profits obtained that makes drug trafficking attractive, especially for the poorest. Homicides, kidnappings and extortions are the main tools used by the Mexican narcomafia: according to the 2015 report “Drug violence in Mexico”, over 138,000 people have been murdered by drug cartels between 2006-2013.²²¹ What makes even more difficult to contrast it is that these organized groups are also militarized and own huge stocks of weapons. In addition, it has been proven the existing network between drug cartels and public institutions, in particular the police apparatus. It is not a coincidence that the origin of drug cartels in Mexico is

²¹⁹ Ibid.

²²⁰ Department of Political Science and International Relations, *Drug violence in Mexico. Data and analysis through 2014*, University of San Diego, April 2015, pp. 2-5.

²²¹ Department of Political Science and International Relations, *Drug violence in Mexico. Data and analysis through 2014*, University of San Diego, April 2015, pp. 40-45.

assigned to a former federal police officer.²²² The corruption and involvement of several policemen have the consequence to let drug criminals unpunished and free to continue their activities. Numerous accusations of human rights abuses are levelled against these complicit authorities. Despite the ongoing “War on drugs”, started in 2006 with the Calderón administration, with a major active involvement of federal troop to end drug violence, few lasting results have been obtained: murders and the prison evasion of criminals are part of the daily routine.

While on one hand there are those who criticized the over-dependency on foreign credits and investments (especially from the USA), on the other one there are those who point at the persistence of regulatory obstacles which prevent an adequate and beneficiary FDI penetration. As far this last critique is concerned, it has been argued that the current regulatory framework needs to be revisioned not only to favour international stakeholders, but also the local ones. This discourse is especially important for SMEs which currently find most difficulties: what is strongly required is the creation or improvement of integration networks among SMEs at local level. High distribution and logistic costs (often due to infrastructural deficiencies) obstruct economic activities.²²³ Also dissemination of information among economic activities should be improved in order to favour both cooperation and competition. The high interest rates applied to SMEs by the Mexican bank system as well as the non-ease of access to finance constitute further barriers to

²²² Ibid.

²²³ PwC, *Mexico: investment and business opportunities*, Ciudad de Mexico, PwC Publications, October 2014, pp. 35-41.

investment opportunities.²²⁴ Furthermore, there are some monopolies with a negative impact on the country level of attractiveness and on the level of market prices for consumers: for instance, despite the recent reform letting illusory private and foreign participation, both electricity and telecommunications services are leaded almost totally by the two public utilities (CFE and *Telemex* respectively).²²⁵

With regards to the energy sector, and thus renewable energy, some critical considerations should be done. It has been demonstrated that the Green Economy model is finding application into the Latin American country and that some positive results have been already achieved. Nevertheless, the Mexican energy matrix still relies on fossil fuels and hydrocarbons. Even though they have been drastically reduced, fuel subsidies still exists in the country, especially for gasoline and diesel.²²⁶ As a consequence, the opening to the renewable sector is slowed down. The R&D sector in relation to renewable sources is underdeveloped and the spread of green innovations on local markets is quite slow. It is true that the transition costs required in the different renewable energy projects are rather high (due also to the inadequacy of existing grids), but it is likewise true that there is scarce information about the use and benefits of renewable energy sources.²²⁷ What is need is more detailed and widespread information to increase public awareness and to favour the dissemination of new renewable energy businesses. According to statistics, in Mexico there are still few employers in the sector, despite the great potentials that

²²⁴ Ibid.

²²⁵ Ibid.

²²⁶ Ibid.

²²⁷ Instituto de Investigación Electricas, *Division de energías alternas e informática gerencia de energías no convencionales*, February 2012, pp. 17-18.

the country presents to develop clean activities. Such a low employment in the sector is due to the general lack of trained and adaptable workforce.²²⁸ More attention and devotion by local and public authorities in affordable training courses and programmes would mean an increased availability of suitable workforce, more job opportunities, more productivity, more attractiveness and, of course, more respect for the environment.²²⁹

Gemma Cervantes, the high-profile scholar of IE, thinks that EI is not yet properly managed in Mexico: the Federation as well as the main affected stakeholders should insist on the importance of efficiency and recycle of by-products. The scholar affirms that side by side with an increased awareness among entrepreneurship class favoured by Federal States and industry associations, a *Bolsa de Subproductos* should be created in Mexico: it consists in a information system among different companies with the final aim to foment the optimization, recycling and reuse of resources. It is usually known also as *Mercado de Subproductos* as it works as a virtual market where, through a web platform, companies insert their demand and supply advertisements of the residues and by-products they have or they are looking for.²³⁰ This efficient system has been already developed in some countries around the world such as in Canada, Costa Rica, Ecuador, Spain, Belgium and France. The system could create synergies at different level: local, regional,

²²⁸ Ibid.

²²⁹ Ibid.

²³⁰ Gemma Cervantes et al., *La ecología industrial en México*, Mexico City, Universidad Autónoma Metropolitana - División de Ciencias Sociales y Humanidades, 2013, p. 78.

national and also transnational as it is witnessed by the *Borsi* between Colombia, Costa Rica and Ecuador.²³¹

4.3 The “forgotten” social inclusion

As it has been reported in the first chapter of this dissertation, the shared definition of Green Economy among numerous Latin American countries (Mexico included) is that of a specific economic model with the peculiar aim to guarantee social inclusion and redistribution favouring the economic progress of the most vulnerable people.²³² For this reason, national green growth agendas have been called to include social and equity concerns. Mexico immediately welcomed the SELA definition of Green Economy and it declared inclined to adopt inclusive policies for a long-term prosperity and as the core part of its sustainable pathway.²³³

Some years after the presumed implementation of redistributive green policies in the country, a first set of consideration could be traced. The reference question is: are the current green measures leading to an inclusive sustainable development characterized by a general equilibrium and equity in terms of opportunities? It could be immediately answered that even though the national economy is rather stabilized, growing in size and affirming as a relevant global

²³¹ Ibid.

²³² SELA, *The vision of the green economy in the Latin America and the Caribbean*, XXXVIII Regular Meeting of the Latin American Council, Caracas, October 2012, pp. 19-21.

player, social concerns inside its geographical borders still persist. The increased GDP that the country is experiencing is not a matter of general and widespread welfare.²³⁴ Disparity, marginalization, unemployment, lack of social service provision are part of the same coin. Although it has been recorded a general decrease of extreme poverty and a slight decrease of the GINI coefficient, Mexico is the OECD country with the highest poverty and inequality rate. According to official statistics, around 53.3 million people live in poverty on a total population of 123.8 million.²³⁵ In this context, living in poverty means people with the lack of at least one of the fundamental social protection service and a salary lower than the minimum welfare threshold.²³⁶ More specifically, *Coneval*, the public agency that generates objective data about the socio-political situation in Mexico, differentiates two kinds of poverty which are currently affecting the Federation. As a matter of fact, the agency states that rural poverty consists in living with no more than US\$ 85 per month, while urban poverty means living with no more than US\$ 158 per month (the average monthly wage is around US\$ 450/560).²³⁷ From a geographical perspective, the Southern Mexican States are those with the highest concentration of poverty (Oaxaca, Guerrero and Chiapas lead the list), while the Northern Federal States are those more developed, even though metropolis such as Mexico City,

²³⁴ Mina Kleiche-Dray, Roland Waast, "Indigenous knowledge in Mexico: between Environmentalism and rural development" in: Fabio de Castro, Barbara Hogenboom and - Michiel Baud (ed.), *Environmental Governance in Latin America*, London , Palgrave Macmillan, 2016, pp. 87-92.

²³⁵ Coneval, *Pobreza urbana y de las zonas metropolitanas en México*, Coneval Publications, 2013, pp.20-21.

²³⁶ Ibid.

²³⁷ Coneval, *Pobreza urbana y de las zonas metropolitanas en México*, Coneval Publications, 2013, pp.28-30.

Puebla and Tijuana have their visible pockets of deprivation and social exclusion.²³⁸

Among the numerous considerations that could be developed, it could be underlined how poverty is reflected in the lack or inadequate provision of energy services, healthcare, education and employment.

One of the principal element that marked the huge inequality gap is the existing educational system: it is rather outdated and it does not offer equal opportunities to Mexicans. What is needed is a structural reform stressing the importance of education and motivating (but also allowing) parents to let their children go to school. School drop-out, especially at high school, is very frequent in the country as teenagers often prefer temporary jobs to mitigate their economic condition or because they prefer to earn money through the numerous illegal activities already mentioned. Alarming is the fact that there are nearly 7 million minors who do not attend primary school.²³⁹ A structural reform in the education system should better focus on youth capacity enabling them an easier and more egalitarian access to school as well as to the national labour market. Hence the need for a more adequate, coherent and homogeneous employment policy: despite the existence of specific laws, people face discrimination in the world of work and not everyone have the possibility to migrate to other countries such as the USA or Canada. Discrimination at work is mainly reflected in the level of income: there are countless instances of workers being paid less than other colleagues because of their geographic location (in some remote rural areas people are paid less for the

²³⁸ Coneval, *Pobreza urbana y de las zonas metropolitanas en México*, Coneval Publications, 2013, pp. 31-33.

²³⁹ Ibid.

same tasks performed in other areas), their ethnic origins (Mexican indigenous people are those facing the highest income discrimination) and gender-bias (women are not equally paid and they do not have the same job opportunities as men especially due to the persistence of cultural and social stereotypes).²⁴⁰ In addition, a further relevant complaint comes from Mexican graduates: they criticized the fact that being graduated is not synonym of better wage. An increasing number of graduates have to decide whether accept unemployment or lower wages despite their high qualification. These lower wages are also determined by a poor local demand for professions such as engineers or economists.²⁴¹ As José Luis de la Cruz, director at the *Instituto para el Desarrollo Industrial y el Crecimiento Económico* of Monterrey, said *“highly trained personnel is not required. Labour intensive processes are increasingly demanded rather than quality.”*²⁴² What emerges is that, generally speaking, Mexico has problem in giving space to certain professions which might expand the socioeconomic opportunities of the country and may find their appropriate way in the green growth model. As already reported, one of the main barrier that the Green Economy model is currently facing, in relation to the renewable energy sector, is exactly the lack of the required qualified and trained figures: it would not be too much hazardous saying that maybe there is already an initial number of suitable figures, but due to socioeconomic causes these young people are impeded.

²⁴⁰ Ibid.

²⁴¹ Ivonne Vergas, “Sueldos, poco competitivos en México”, in: CNN-Expansión, March 31, 2014. Available at: <http://expansion.mx/mi-carrera/2014/03/28/salario-profesional-promedio-en-13-mil> (last visualization: September 11, 2016).

²⁴² Ibid.

Inequalities are reflected also in the energy access and its adequacy. Combating poverty and social inequalities means also universal access to adequate energy sources. In Mexico, as in many other Latin American countries, energy poverty is still a concerning reality. Energy poverty indicates the absence of access to adequate and reliable energy sources which are needed by people in order to satisfy their basic needs such as food, domestic heating and lighting.²⁴³ According to a survey recently realized by INEGI, there are over 12 million households facing energy poverty mainly relying on wood and kerosene, which have adverse effects on human health and environment.²⁴⁴ Better analyzing, 2.7 million households of them are without access to electricity grid.²⁴⁵ The absence of electricity service is linked to the poverty status of a lot of people, but also due to geographic isolation of numerous rural areas which seem forgotten by federal institutions.

As far as the Mexican renewable energy projects are concerned, in the context of the Mexican inclusive Green Economy, it should be said that until now the inclusiveness has not been really put in practice neither by competent federal authorities nor by local and international stakeholders. It is true that a multitude of projects and programmes have been launched for the development and local use of energy obtained by clean and sustainable sources, but the majority of these projects are focus on large-scale realities and the use of this kind of energy is addressed to large companies (starting from multinationals) which have already a

²⁴³ *Energy poverty*. Available at: <http://www.iccgov.org/en/hot-topics/energy-poverty/> (last visualization: September 11, 2016).

²⁴⁴ CEPAL, *Pobreza energetica en America Latina*, UN Publications, March 2014, pp. 17-18.

²⁴⁵ *Ibid.*

strong economic basis. In addition, it has been noticed that numerous renewable energy projects (as part of specific federal/international programmes) have been delayed, even halted or abandoned, due to bureaucratic delays or due to the lack of the additional funds required for the complete realization, operation and management of renewable plants. Several years could occur also for the feasibility evaluation as well as for the issue of permits and interconnection agreements.²⁴⁶

The incentives and subsidies available for the implementation of renewable energy technologies as solar panels are not obtaining the enormous success expected because people are not well informed about the existence and virtues of these instruments nor about renewable energy in general. Furthermore, a lot of people are prevented from accessing to these opportunities: financial institutions are not used to provide micro-credit to people interested in adopting renewable energy solution (for both domestic and commercial/industrial purposes), especially in rural areas.²⁴⁷ In accordance with *Encuesta Intercensal 2015*, the INEGI set of surveys covering socio-demographic issues, there are nearly 160 thousand households in Mexico that have solar panels in their roofs.²⁴⁸ It is equally important to say that the social inclusion and social justice promoted by the Federal green approach are not even visible in relation with employment: green employments, although rather few in comparison to the estimated opportunities, do not always

²⁴⁶ Jennifer J. Ronk, Bradford S. Gentry, *International Investment Agreements and Investments in Renewable Energy*, Yale School of Forestry & Environmental Studies, January 2010, pp. 50-51.

²⁴⁷ Ibid.

²⁴⁸ *Encuesta Intercensal 2015*. Available at: <http://www.inegi.org.mx/est/contenidos/Proyectos/encuestas/hogares/especiales/ei2015/> (last visualization: September 12, 2016).

correspond to decent jobs and what is required is better working conditions, longer contracts, higher wages and higher female participation.²⁴⁹

In conclusion, what clearly emerges from the bulk of above-mentioned evidence is that the Green Economy model is not really working as an inclusive and redistributive approach as publicly stated. Social inequalities still persist and are severe and visible not only between cities and rural villages, but also within the same urban area. More attention and devotion are needed by federal authorities and the totality of stakeholders in order to reduce the existing gaps. Energy poverty should be effectively decreased through an easier and preferential access to energy grid and renewable energy tools should be their first choice taking advantage of the overall significant decline in average market prices for technologies such as those linked to solar energy. Until now, it appears that the positive results obtained by the green growth have benefited only a restricted group. More should be practically done, starting from a reduction of electricity tariffs which result still rather high. The promotion of renewable energy sources has to be accompanied also by a strong emphasis on the need to reduce energy waste in the major consumption sectors and higher income groups because benefits would have multiple directions: environmental, societal and economic. What is even more essential is that, in order to be really inclusive and sustainable, green economy measures need to be followed

²⁴⁹ Mariaoliva Gonzalez, "The Green Economy: a wasted opportunity?" in: *Friedrich Ebert Stiftung Sustainability*, Berlin, FES-Publikationen, June 2016, pp. 6-7.

by appropriate social and labour market policies in order to achieve a comprehensive framework.²⁵⁰

4.4 Indigenous environmentalism

Another challenge that the Green Economy model is called to face is represented by local oppositions, especially indigenous rural communities. Mexico could be defined as a multicultural country in the sense that ,despite the foreign presence, Mexican population is really heterogeneous and composed by 56 different ethnic groups. Among these ethnic groups stand out those who identify themselves as indigenous groups, those who claim their European roots and those who feel tied to Asiatic or Afro-American culture.²⁵¹ Even though the majority of the total population identifies itself as *mestiza*, namely the combination between European and indigenous roots, the belonging to pure indigenous ethnic groups is very felt by nearly 15.7 million people scattered throughout 62 indigenous villages and speaking their own linguistic variety.²⁵² The Federal States hosting the highest number of indigenous residents are: Campeche, Chiapas, Oaxaca , Quintana Roo and Yucatán (all in the South).²⁵³ These groups face a lower social development than the national level characterized by higher infant mortality rate, lower literacy rate, lower access to health care. Nevertheless, their daily life is closely connected

²⁵⁰ ILO/GLU, *Green New Deal and the question of environmental and social justice*, Berlin, Global Labour University Publications, 2015, pp. 10-11.

²⁵¹ Gian Carlo Delgado Ramos et al., *Buena vida, buen vivir: imaginarios alternativos para el bien común de la humanidad*, Mexico City, UNAM, 2014, pp. 185-188.

²⁵² Ibid.

²⁵³ Ibid.

to their lands and, generally speaking, they believe in a special relationship with nature. Hence their claim for the right to respect their heritage and their environment.

A great number of indigenous communities is currently hindering the realization of projects of Green Economy and the reasons are more than one. The first criticism is about the effects that the Green Economy model produces. As a matter of fact, what is criticized is that the approach is too tied to technology and economy causing the commodification of Nature: every natural assets has a monetary value and through the purchase it becomes a private good preventing people (indigenous people in this context) to continue using these common assets. The marketization and capitalization of Nature as Western models are what they fear and condemn: natural assets and natural services have a value in use that not correspond to the allocated economic value.²⁵⁴ The resulting individualism clashes with the way of life usually qualified as pre-modern and opposed to progress and development.²⁵⁵ In addition, there is a different perception among the involved actors regarding the meaning of environmental degradation in which the indigenous environmental activities are considered sustainable at a local level, but not so much at a regional and global level. This means that there is a realm of ways in which the relationship environmental-society could be observed and live: there is

²⁵⁴ E. Bignante, F. Celata, A. Vanolo, *Geografie dello sviluppo. Una prospettiva critica e globale*, Torino, UTET, 2010, p.105.

²⁵⁵ CEDMA, *El buen vivir frente a los paradigmas del progreso y desarrollo*. Available at: <http://www.cemda.org.mx/el-buen-vivir-frente-a-los-paradigmas-del-progreso-y-desarrollo/> (last visualization: September 13, 2016).

not the right or wrong way, it depends on the actors involved, their interests, the scale of reference.²⁵⁶

For indigenous people, especially those communities living in the Southern forests, the development of Green Economy measures partially impedes the functions of their ecosystem: production, regulation, culture and support to their lives, in harmony with Nature and respectful of its biophysical limits. The so-called “*Buen Vivir*” is integral part of their way of life and is distanced from the conditionality and protectionism implied in the Western approach to sustainability.²⁵⁷ With its origins in the Quechua communities of the Peruvian and Ecuadorean Andes, this social philosophy translates the concept of sustainable development as a synonym of “living well” (*estar bien*) and not “living better” (*estar mejor*). As a consequence, they do not comply with the concept of development based on economic indicators because source of disparities, but they seek an equilibrium that covers their basic needs through the social and ecological cooperation.²⁵⁸

In the name of their “living well” and their rights, Mexican indigenous groups are indistinctly opposing environmentally harmful activities: from oil-extraction and mining projects to clean energy megaprojects, mainly headed by multinationals. For instance, a current conflict exists in the Isthmus of Tehuantepec hosting tropical

²⁵⁶ E. Bignante, F. Celata, A. Vanolo, *Geografie dello sviluppo. Una prospettiva critica e globale*, Torino, UTET, 2010, pp. 72-73.

²⁵⁷ Similar movements and discourses, criticizing the duo “development-economic growth”, are spread also elsewhere: for instance, in Europe with the *Degrowth* discourse and in India with the *Ecological Swaraj* movement.

²⁵⁸ Gian Carlo Delgado Ramos et al., *Buena vida, buen vivir: imaginarios alternativos para el bien común de la humanidad*, Mexico City, UNAM, 2014, pp. 185-187.

jungles and forests together with a huge variety of biodiversity. More specifically, the conflict is taking place in the Federal State of Oaxaca (with its 220 km, the isthmus includes the States Oaxaca and Veracruz) where, thanks to the recent opening to private participation in the Mexican energy sector, wind energy investors are willing to exploit the wind power potential of the area, but lived by indigenous people. Not only they affirm the social and environmental bad impacts that these megaprojects imply, but they also claim their indigenous rights and the integrity of their common lands.²⁵⁹ As a matter of fact, they accuse that these projects are developing without their consent and they mention that:

“the Constitution recognizes and guarantees the right of the indigenous people to self-determination and, consequently, to autonomy, including: [...] V To conserve and improve the indigenous peoples' habitat and preserve the integrity of their land in the terms of this Constitution.”²⁶⁰

A lot of indigenous spokesperson appeal the concept of “Environmental Justice” meant as the assignment of power, to the inhabitants of a determined area, to affect the choices regarding the environment in which they live. “Environmental Justice” refers also to a fair and equitable compensation of environmental benefits.²⁶¹ Energy projects developers are the first to be accused, but also political authorities because they let the first ones expropriate and use natural assets in a

²⁵⁹ David Barkin, Blanca Lemus, “Local solutions for Environmental Justice”, in: Fabio de Castro, Barbara Hogenboom and Michiel Baud (ed.), *Environmental Governance in Latin America*, London , Palgrave Macmillan, 2016, pp. 263-264.

²⁶⁰ *Constitución Política de los Estados Unidos Mexicanos*, February 5, 1917, Article 2.

²⁶¹ E. Bignante, F. Celata, A. Vanolo, *Geografie dello sviluppo. Una prospettiva critica e globale*, Torino, UTET, 2010, pp. 112-113.

not integrated way. Hence, the rising number of socio-environmental conflicts that are taking place in Mexico are fuelled by the unfulfilled promises of inclusive policies and the lack of any regulation that determines the *real* value of these lands which are currently paid far less to landowners.²⁶² Concerning is also the fact that these local protests are often stopped with violence contributing to the macro instability of the country.

²⁶² Centre for Clean Air Policy, *Case Study: Mexico's Renewable Energy Program*, January 2012, pp. 18-19.

Conclusions

With its relative low CO₂ emission level on global scale Mexico has no international urgent obligation to reduce its emissions and ,for this reason, it is not included in the Annex I of the Kyoto protocol. Nevertheless, as it has been reported throughout this dissertation, the Latin American country has taken more steps to break free from its fossil fuel dependency by adopting sustainable solutions. At the beginning of the 2000s, the PAN administration welcomed the UN proposal of a Green New Deal showing interest in giving more value to its inexhaustible and clean natural sources as the sun, the wind and the heat of the Earth. The adoption of the Green Economy model as a typically Western product entails the adoption of market-based instruments in which sustainability seems to be proportional to the magnitude of the national economy. What has emerged from this reading is that Mexico is following this trend with the formulation of virtuous economic policies. These policies are advanced and instruments such as the recent Carbon Tax should be considered exemplar also by highly polluting countries. Also the forthcoming issuing of Clean Energy Certificates appears as a promising system in the renewable energy transition of the country.

The push on renewable energy has been thought by political-institutional authorities as a way to foster a sustainable and inclusive economic growth without compromising the immense biodiversity richness that Mexico hosts. Even though the environmental integrity in all its forms is quite respected, the concept of sustainability counts on two further element: the social and economic features. As it

has clearly emerged, the economic aspect is the linchpin the Western model above presented and positive economic results have been achieved by its adoption: the Federal economy is even more growing and competing in the international arena and FDI inflows in sectors such as the renewable one are increasing. These economic results are good, but not optimal as numerous barriers still persist and prevent Mexico to achieve an economic welfare in line with the other members of the OECD club. It has been proved that the development of legislative measures is often only quite an illusion because there is no effective law enforceability especially in the smallest realities such as municipalities. Corruption, conflicts of interests and criminality are the main problems that could hit everyone irrespective of status and age. A structural and widespread reform is needed in order to drastically reduce the intensity of these issues: the reform has firstly to focus on political elites and public security forces which are among the most important actors responsible for the Federal stability.

The main concern that could be raised is that the Mexican Green Economy approach to Sustainable Development is mainly favouring the economic aspect while overlooking the social element. As a matter of fact the inclusive and redistributive features have not yet been put in practice and huge inequality gap still distinguish the country with the major number of Spanish speaking inhabitants. Social inequalities are visible both in rural areas and urban areas: these latter ones are getting even more crowded as living in lost and remote areas is even more demanding. Nevertheless, problems are not fully left behind, but they shift location and become more visible. The city, as symbolic matrix of modernity and welfare,

appears poorly sustainable: social exclusion, unemployment, no equal access to the wide range of public services, irrational energy consumption and so forth. Among the numerous renewable energy projects developed in the framework of Green Economy, few have been addressed to face the existing energy poverty. Local private investors are investing in the renewable sector exploiting also the current decreased prices in some technologies such as the solar ones, but there is still a long way to go in which uncertainty and priority to foreign large companies are present. Hence the whole apparatus of local SMEs (as SMEs are the most common industrial reality in the country) should gain a stronger position in order to obtain the needed trust and the needed conditions (such as easier access credit condition or reduced rates) to implement advanced and environmentally-friendly systems or to adopt efficient solutions as witnessed by the EI system.

“Eradicate poverty through an Inclusive Green Economy”: this was a slogan promoted in the regional definition of the model. As emerges from this reading, an inclusive Green Economy has not been achieved in Mexico and society needs much more attention to meet the essential needs of present and future generations. If properly planned, the Western model could deliver optimal results with tripartite benefits among environment, society and economy. In order to be a more sustainable model, what is need is a more comprehensive and inclusive framework where economic and legislative tools, aimed at reducing environmental degradation, are combined with effective and immediate social policies. The renewable energy potential of Mexico is the starting line towards a promising sustainable growth and it should be managed in the possible way.

List of main abbreviations and acronyms

CFE Comisión Federal de Electricidad

CO₂ carbon dioxide

COP Conference of the Parties

ECLAC Economic Commission for Latin America and the Caribbean

EIP Eco-Industrial Park

FDI Foreign Direct Investment

G20 Group of 20

GCF Green Climate Fund

GDP Gross Domestic Product

GEF Global Environment Facility

GGND Global Green New Deal

GGNW Global Green New Deal

GHG Greenhouse Gas

GW Gigawatt

IDB Inter-American Development Bank

IE Industrial Ecology

INDCs Intended Nationally Determined Contributions

LAERFTE Ley para Aprovechamiento de Energías Renovables y el Financiamiento de la Transición Energética

MoU Memorandum of Understanding

MW Megawatt

NAFTA North American Free Trade Agreement

OECD Organisation for Economic Co-operation and Development

OLADE Organización Latino Americana de Energia

PAN Partido Acción Nacional

PEMEX Pertróleos Mexicanos

PRI Partido Revolucionario Institucional

PV photovoltaic

RE Renewable Energy

ROLAC Regional Office for Latin America and the Caribbean

SELA Sistema Economico Latino Americano y del Caribe

SENER Secretaría de Energía

SME small and medium-sized enterprises

UN United Nations

UNCED World Commission on Environment and Development

UNCSD United Nations Conference on Sustainable Development

UNDP United Nations Development Programme

UNEP United Nations Environment Programme

UNFCCC United Nations Framework Convention on Climate Change

USAID United States Agency for International Development

WB World Bank

References

Bibliography

- Alemán Gibrán S. et al., “Renewable energy research progress in Mexico: a review.”, in: *Renewable and Sustainable Energy Review vol.32*, Elsevier Ltd.,2014.
- Barkin David, Lemus Blanca, “Local solutions for Environmental Justice”, in: Fabio de Castro, Barbara Hogenboom and Michiel Baud (ed.), *Environmental Governance in Latin America*, London , Palgrave Macmillan, 2016.
- Bignante E., Celata F., Vanolo A., *Geografie dello sviluppo. Una prospettiva critica e globale*, Torino, UTET, 2010.
- Cecchin Andrea, *L’approcio Eco-industriale per una gestione sostenibile dei sistemi produttivi territoriali*, 2014.
- Centre for Clean Air Policy, *Case Study: Mexico’s Renewable Energy Program*, January 2012.
- CEPAL, *Pobreza energetica en America Latina*, UN Publications, March 2014.
- Cervantes Gemma et al., *La ecología industrial en México*, Mexico City, Universidad Autónoma Metropolitana - División de Ciencias Sociales y Humanidades, 2013.
- Coneval, *Pobreza urbana y de las zonas metropolitanas en México*, Coneval Publications, 2013.

- *Constitución Política de los Estados Unidos Mexicanos*, February 5, 1917.
- DAE, *The joint Danish-Mexican cooperation on climate and energy*, 2015.
- de Castro Fabio, Barbara Hogenboom and Michiel Baud (ed.), *Environmental Governance in Latin America*, London, Palgrave Macmillan UK, 2016.
- de Castro Fabio, Barbara Hogenboom and Michiel Baud, "Introduction: environment and society in contemporary Latin America", in: Fabio de Castro, Barbara Hogenboom and Michiel Baud (ed.), *Environmental Governance in Latin America*, London , pp. 1-25.
- Delgado Ramos Gian Carlo et al., *Buena vida, buen vivir: imaginarios alternativos para el bien común de la humanidad*, Mexico City, UNAM, 2014.
- Department of Political Science and International Relations, *Drug violence in Mexico. Data and analysis through 2014*, University of San Diego, April 2015.
- ECLAC, *Foreign Direct Investment in Latin America and the Caribbean*, ECLAC Publications 2015.
- EIB, *EIB financing Latin America*, Fact Sheet August 2014.
- Enel Green Power, Comunicato Stampa: Enel Green Power conferma la sua leadership nelle rinnovabili in Messico a seguito del successo ottenuto in una gara pubblica, April 30, 2016.
- EY, "RECAI. Renewable energy country attractiveness index", in: *Issue 47*, May 2016.
- Frankfurt School-UNEP Centre, *Global Trends in Renewable Energy Investment 2016*, Frankfurt, Frankfurt School of Finance & Management, 2016.
- G20, *G20 Leaders Declaration*, June 19, 2016.
- Gavi Alliance, *Comunicato Stampa per la Pubblicazione Immediata. L'International Finance Facility for Immunisation emette le prime obbligazioni*, London, November 2006.
- Gardini Gian Luca, *L'America Latina nel XXI secolo. Nazioni, regionalismo e globalizzazione*. Roma, Carocci Editore, 2009.
- *Germany in Mexico dual year*, Mexico City, June 6, 2016.

- Gonzalez Mariaoliva, “The Green Economy: a wasted opportunity?” in: *Friedrich Ebert Stiftung Sustainability*, Berlin, FES-Publikationen, June 2016.
- ILO/GLU, *Green New Deal and the question of environmental and social justice*, Berlin, Global Labour University Publications, 2015.
- Instituto de Investigación Electricas, *Division de energías alternas e informática gerencia de energías no convencionales*, February 2012.
- Instituto de Investigación Electricas, *Full-Scale Project Concept Paper: Plan of Action for the Large-Scale and Sustainable Implementation of Renewable Energy in Mexico*, 2002.
- International Energy Agency, *Tracking Clean Energy Progress*, 2015.
- International Renewable Energy Agency, *Renewable Energy Policy Brief: Mexico*, IRENA Publications, June 2015.
- J. Ronk, S. Gentry Bradford, *International Investment Agreements and Investments in Renewable Energy*, Yale School of Forestry & Environmental Studies, January 2010.
- JBIC, *JBIC’s Activities for Environmental Sustainability. Supporting your global challenges*, 2014.
- *Joint Declaration of Intent on the Energy Partnership between the Government of the United Mexican States and the Government of the Federal Republic of Germany*, Berlin, April 12, 2016.
- KfW Development Bank, *Project Information*, September 2014.
- Kleiche-Dray Mina, Waast Roland, “Indigenous knowledge in Mexico: between Environmentalism and rural development” in: Fabio de Castro, Barbara Hogenboom and -Michiel Baud (ed.), *Environmental Governance in Latin America*, London , Palgrave Macmillan, 2016.
- Latouche S., *Farewell to Growth*, Cambridge, Policy Press, 2009.
- Lowe Ernest, *Eco-industrial Park Handbook for Asian Developing Countries*, Hidden Valley Lake, Indigo Development, 2001.

- Martinez-Alier, J. et al., "Origins and perspectives of Latin American Environmentalism" in: Fabio de Castro, Barbara Hogenboom and Michiel Baud (ed.), *Environmental Governance in Latin America*, pp.29-57.
- *Memorandum of Understanding among the Department of Energy of the United States of America and the Department of Natural Resources of Canada and the Ministry of Energy of the United Mexican States for Cooperation in Energy Science and Technology*, British Columbia, July 23, 2007.
- Ministry of Economy, *Pro México. Energías renovables*, 2015.
- Ministry of Economy, *Pro México. Renewable Energy Industry*, 2015.
- Ministry of Economy, *Pro México. Trade and Investment*, August 2013.
- Ministry of Strategy and Finance of South Korea, *Briefing Note for Foreign Correspondents*, January 19, 2009.
- Myers Margaret, Kuwayama Mikio, "A new phase in Japan-Latin America and the Caribbean relations", in: *Japan-Latin America Report*, February 2016.
- OECD, "Mexico: better policies for inclusive development.", in: *"Better Policies" Series*, OECD Publications, September 2012.
- PwC, *Mexico: investment and business opportunities*, Ciudad de Mexico, PwC Publications, October 2014.
- Resendiz Pearce Francisco, "Promueve Peña a Mexico en Dinamarca", in: *El Universal*, April 14, 2016. D. et al., *Blueprint for Green Economy*, London, Earthscan Publications, 1989.
- Rist, G., *The history of Development: from western origins to faith*. London & New York, Zed Books, 2008.
- SELA, *The vision of the green economy in the Latin America and the Caribbean*, XXXVIII Regular Meeting of the Latin American Council, Caracas, October 2012.
- Sejenovich, H., "Overcoming poverty through sustainable development", in: Fabio de Castro, Barbara Hogenboom and Michiel Baud (ed.), *Environmental Governance in Latin America*, pp.186-202.

- SEMARNAT, *Carbon tax in Mexico*, SEMARNT Publications, May 2014.
- Soriani Stefano, *Il Rapporto tra Economia e Ambiente nella Prospettiva della Modernizzazione Ecologica*.
- The political Constitution of the Mexican United States.
- UN Conference on Sustainable Development, *The Future We want*, 2012.
- United Nations General Assembly, Resolution 64/236, 31 March 2010.
- UNEP, *Green Economy Advisory services: Mexico*, UN Publications, 2012.
- UNEP/DTU, *Carbon Cero America Latina. Una vía para la descarbonización neta de la economía regional para mediados de este siglo*, UN Publications, April 2016.
- UNEP/SEFI, *Global trends in sustainable energy investments 2010: Analysis of Trends and issues in the Financing of Renewable Energy and energy Efficiency*, UN Publications, 2010.
- UN Framework Convention on Climate Change, *Kyoto Protocol*, 1997.
- US Department of Energy, *Mexico Renewable Energy Program and Bilateral/Trilateral Energy Cooperation. Agreements relating to Renewable Energy*, March 2006.
- USAID, *Mexico. County profile*, USAID Publications, December 2009.
- USAID, *USAID in Mexico: Program Overview*, USAID Publications, April 2014.
- White House, *Leaders' Statement on a North American Climate, Clean Energy, and Environment Partnership*, Washington DC, June 29, 2016.
- White House, *US-Mexico Announce Bilateral Framework on Clean Energy and Climate Change*, Washington DC, April 16, 2009.
- Wilson Center, *Mexico: the fight against corruption. (A review of ongoing reforms to promote transparency and curtail corruption)*, Wilson Center Publications, June 2015.
- Wood Duncan, "Fighting corruption in Mexico", in: *Foreign Affairs*, June 22, 2016.

- World Economic Forum, *Foro Económico Mundial sobre América Latina. Transformación regional en un nuevo contexto global*, Ginebra, World Economic Forum publications, 2012.

Sitography

- Bárcena Alicia, "Latin America is the world's most unequal region. Here's how to fix it", January 25, 2016. Article on www.cepal.org available at: <http://www.cepal.org/en/articles/2016-latin-america-worlds-most-unequal-region-heres-how-fix-it> (last visualization: July 8, 2016).
- Carbajal Eduardo, "Los beneficios de la reforma energética", in: *El Economista Online*, August 18, 2013. Available at: <http://eleconomista.com.mx/mercados-estadisticas/2013/08/18/beneficios-reforma-energetica> (last visualization: July 26, 2016).
- CEDMA, *El buen vivir frente a los paradigmas del progreso y desarrollo*. Available at: <http://www.cemda.org.mx/el-buen-vivir-frente-a-los-paradigmas-del-progreso-y-desarrollo/> (last visualization: September 13, 2016).
- *Corruption Perceptions Index 2015*. Available at: <http://www.transparency.org/cpi2015> (last visualization: September 1, 2016).
- *Credit Line for BANCOMEXT under GREEN Operations*. Available at: <https://www.jbic.go.jp/en/information/press/press-2014/0728-26301> (last visualization: August 21, 2016).
- Danielle Cuddington, Richard Wike, "Declining Ratings for Mexico's Peña Nieto", in: *Pew Research Center*, August 27, 2015. Available at: <http://www.pewglobal.org/2015/08/27/declining-ratings-for-mexicos-pena-nieto/> (last visualization: September 4, 2016).
- DAE, Mexico: *Official Cooperation Agreement Signed in Mexico*, July 9, 2014. Available at: (last visualization: <http://www.ens.dk/en/info/news-danish->

- [energy-agency/official-cooperation-agreement-signed-mexico](#) (last visualization: August 15, 2016).
- *Ecological wealth of Nations*, Available at: [http://www.footprintnetwork.org/ecological footprint nations/](http://www.footprintnetwork.org/ecological_footprint_nations/) (last visualization: July 21, 2016).
 - *Encuesta Intercensal 2015*. Available at: <http://www.inegi.org.mx/est/contenidos/Proyectos/encuestas/hogares/espaciales/ei2015/> (last visualization: September 12, 2016).
 - *Energia Eolica*. Available at: <http://www.ecoage.it/eolico-introduzione.htm> (last visualization: July 19, 2016).
 - *Energia Geotermica*. Available at: <http://www.ecoage.it/geotermia.htm> (last visualization: July 19, 2016).
 - *Energie rinnovabili e non rinnovabili*. Available at: [http://www.energiesensibili.it/it/energie rinnovabili e non rinnovabili/](http://www.energiesensibili.it/it/energie_rinnovabili_e_non_rinnovabili/) (last visualization: July 21, 2016).
 - *Energy poverty*. Available at: <http://www.iccgov.org/en/hot-topics/energy-poverty/> (last visualization: September 11, 2016).
 - *Grameen Shakti, Grameen Shakti Makes a World Record in Non-Grid Power Generation*. Available at: http://www.gshakti.org/index.php?option=com_content&view=article&id=190&Itemid=73 (last visualization: July 10, 2016).
 - *Hipoteca Verde*. Available at: http://portal.infonavit.org.mx/wps/wcm/connect/infonavit/trabajadores/saber+para+decidir/cuido_mi_casa/hipoteca+verde (last visualization: July, 27, 2016).
 - IADB, *Energy Innovation Center*. Available at: <http://www.iadb.org/en/topics/energy/energy-innovation-center/programs,9232.html> (last visualization: July 11, 2016).
 - IADB, *Study on the Development of the Renewable Energy Market in Latin America and the Caribbean*, November 2014. Available at:

- <https://publications.iadb.org/bitstream/handle/11319/6711/Study-on-the-Development-of-the-Renewable-Energy-Market-in-Latin-America-and-the-Caribbean.pdf> (last visualization: July 12, 2016).
- IDB, *IDB to support energy efficiency financing through the issuance of Green Bonds in Mexico*, May 19, 2015. Available at: <http://www.iadb.org/en/news/news-releases/2015-05-19/energy-efficiency-in-mexico,11161.html> (last visualization: August 8, 2016).
 - Imison Paul, “Mexico's efforts to tackle police corruption keep failing”, in: *Vice News*, March 21, 2016. Available at: <https://news.vice.com/article/mexicos-efforts-to-tackle-police-corruption-are-failing> (last visualization: September 5, 2016).
 - Industrial Parks in Mexico: Sustainability. Available at: <http://ampip.org.mx/en/industrial-parks/> (last visualization: August 29, 2016).
 - Leonardo di Caprio Foundation, *A Landmark Day for Earth*, April 22, 2016. Available at: <http://leonardodicaprio.org/landmark-day-earth/> (last visualization: June 23, 2016).
 - Masullo Indira , “Lessons from Mexico: Mobilizing Investment in Wind Power” in: *World Resources Institute*, June 2014. Available at: <http://www.wri.org/blog/2014/06/lessons-mexico-mobilizing-investment-wind-power> (last visualization: August 6, 2016).
 - *Mexico*. Available at: <https://www.giz.de/en/worldwide/306.html> (last visualization: August 13, 2016).
 - *Mexico Data*. Available at: <http://data.worldbank.org/country/mexico> (last visualization: September 4, 2016).
 - *Mexico Sustainable Energy Technologies Development for Climate Change Project*. Available at: <http://www.worldbank.org/projects/P145618/?lang=en&tab=overview> (last visualization: August 6, 2016).

- *Mexico Unemployment Rate 1994-2016*. Available at:
<http://www.tradingeconomics.com/mexico/unemployment-rate> (last visualization: August 26, 2016).
- Miroff Nick, Booth William, "Mexico's presidential election tainted by claims of vote-buying", in: *The Washington Post*, July 4, 2012. Available at:
https://www.washingtonpost.com/world/mexicos-presidential-election-tainted-by-claims-of-vote-buying/2012/07/04/gJQAHqTzNW_story.html (last visualization: September 4, 2016).
- Muciño Francisco, "Senado aprueba en comisiones Ley de Transición Energética", in: *Forbes Mexico online*, November 30, 2015. Available at:
<http://www.forbes.com.mx/senado-aprueba-en-comisiones-ley-de-transicion-energetica/#gs.=agrOF8> (last visualization: July 24, 2016).
- *North American Free Trade Agreement*. Available at:
http://www.naftanow.org/about/default_en.asp (last visualization: August 22, 2016).
- Notimex, "Calderón recibe premio Campeones de la Tierra". In: *El Economista Online*, May 11, 2011. Available at:
<http://eleconomista.com.mx/sociedad/2011/05/11/calderon-recibe-premio-campeones-tierra> (last visualization: July 22, 2016).
- OLADE, *Energy Economic Information System. Energy Statistics*, 2015. Available at:
http://biblioteca.olade.org/iah/fulltext/Bjnbr/v32_2/hm000540.pdf (last visualization: July 11, 2016).
- *Organisation for Economic Co-operation and Development*, available at:
<http://www.oecd.org/> (last visualization: July 29, 2016).
- *Parques industriales en Mexico*, available at:
<http://revistas.bancomext.gob.mx/rce/magazines/122/6/RCE6.pdf> (last visualization: August 1, 2016).

- *Policies and measures: Renewable energies*. Available at: <https://www.iea.org/policiesandmeasures/renewableenergy/> (last visualization: July 26, 2016).
- *Policy: Mexico*. Available at: <http://ec.europa.eu/research/iscp/index.cfm?pg=mexico> (last visualization: August 12, 2016).
- *¿Qué es la ley de Transición Energética?* Available at: http://www.milenio.com/politica/Ley_de_Transicion_Energetica-energia_limpia_mexico-reforma_energetica_0_638936262.html (last visualization: July 27, 2016).
- Santander Trade Portal, *Mexico: Foreign Investment*, August 2016. Available at: <https://en.portal.santandertrade.com/establish-overseas/mexico/foreign-investment> (last visualization: August 25, 2016).
- Sparks, D., Daniel Sparks, *Tesla Motors Inc.'s Model 3 Ambitions May Be More Realistic Than You Think*, June 28, 2015. Article on www.themotleyfool.com available at: <http://www.fool.com/investing/general/2015/06/28/tesla-motors-incs-model-3-ambitions-more-realistic.aspx> (last visualization: July 14, 2016).
- *The Current Challenges for Global Economic Growth*. Available at: <http://www.g20.utoronto.ca/2012/2012-111213-calderon-en.html> (last visualization: July 22, 2016).
- *Green Economy Initiative*. Available at: <http://www.unsceb.org/content/green-economy-initiative-gei> (last visualization: August 5, 2016).
- UN Department of Economic and Social Affairs-Division for Sustainable Development, *Our Common Future*, 1987. Available at: <http://www.un-documents.net/our-common-future.pdf> (last visualization: June 25, 2016).
- UNEP, *Rethinking the Economic Recovery: A Global Green New Deal*, 2009. Available at: <http://www.sustainable->

- innovations.org/GE/UNEP%20%5B2009%5D%20A%20global%20green%20energy%20deal.pdf (last visualization: July 4, 2016).
- UNEP, *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers*, 2011. Available at: www.unep.org/greeneconomy (last visualization: July 5, 2016).
 - UNFCCC, *Costa Rica generará el 93% de su electricidad con renovables*, January 16, 2015. Available at: <http://newsroom.unfccc.int/es/energ%C3%ADa-limpia/costa-rica-generara-el-93-de-su-electricidad-con-renovables/> (last visualization: July 12,)
 - UNFCCC, *Adoption of the Paris Agreement*, December 21, 2015, available at: <https://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf> (last visualization: June 23, 2016).
 - UN Framework Convention on Climate Change, *Status of ratification of the Kyoto Protocol*, available at: http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php (last visualization: July 4, 2016).
 - UN Sustainable Development Goals. Available at: www.un.org/sustainabledevelopment/#prettyPhoto (last visualization: July 1, 2016).
 - USAID. Available at: <https://www.usaid.gov/> (last visualization: August 22, 2016).
 - Vergas Ivonne, “Sueldos, poco competitivos en México”, in: CNN-Expansión, March 31, 2014. Available at: <http://expansion.mx/mi-carrera/2014/03/28/salario-profesional-promedio-en-13-mil> (last visualization: September 11, 2016).
 - Warden Sara, “Interview of the Week: Mark Kingsley, President & CEO of Alion Energy”, in: *Mexico Energy Forum*, February 19, 2016. Available at: <http://www.renewableenergymexico.com/interview-of-the-week-mark-kingsley-president-ceo-of-alion-energy/> (last visualization: August 26, 2016).

- *Wind Energy*. Available at: (last visualization: <http://energinet.dk/EN/EI/Nyheder/Sider/Dansk-vindstroem-slaar-igen-rekord-42-procent.aspx> August 15, 2016).
- Woody Christopher , “Mexico's president appears to be fudging numbers about the biggest threat to the country”, in: *Business Insider UK*, September 27, 2015. Available at: <http://uk.businessinsider.com/mexico-crime-rates-2015-9?r=US&IR=T> (last visualization: September 6, 2016).
- Zoellick, R.B., *A Stimulus Package for the World* , in: The New York Times Online, January 22, 2009. Available at: <http://www.nytimes.com/2009/01/23/opinion/23zoellick.html? r=0> (last visualization: July 4, 2016).