EVALUATION OF THE KAZAKH EMISSIONS TRADING SYSTEM'S DEVELOPMENT AND POSSIBLE WAYS FOR ITS IMPROVEMENT

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Author's declaration

No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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Being a major producer of fossil fuels and one of the most energy intensive countries in the world, Kazakhstan emits a significant amount of greenhouse gases. Thereby, in order to reduce the emissions, the country used the Kyoto Protocol's market-based mechanism as a policy tool, and introduced a nationwide Kazakh Emission Trading System. However, due to the newly introduced system, the government and other stakeholders are facing a number of challenges in development process of the system. This research aims to find the main obstacles to the Kazakh ETS development and to explore possible ways for its improvement. This research provides an evaluation of the Kazakh ETS implementation and studies in more detail the country's legislation, its institutional framework, the methodologies for emissions calculation, and interactions of main ETS stakeholders. In addition, the analysis of the experience of the world ETS (16 ETS, EU ETS), and comparative analysis of them with Kazakh ETS have been carried out in the course of this research. The Kazakh scheme's main achievements and drawbacks are identified according to interview results gathered from the representatives of the Kazakh ETS participants. The key achievements include increasing the importance of the emissions reporting and reducing discussion among participants, the basic legislation introduced for the emissions regulation and emissions trading scheme. The main problems were defined as inconsistencies in legislation, the imbalance between the country's growing economy and the emissions reduction targets, and finally the lack of high-qualified experts with experience in ETS. The concluding part provides brief recommendations for further Kazakh ETS development, showing needs for the legislation revising, needs for negotiated linkage of Kazakh ETS with other carbon markets, and providing more educational programs based on international experience.

Keywords: Emissions Trading System, greenhouse gas emissions, Kazakh ETS, EU ETS

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List of Abbreviations

AAUs	Assigned Amount Units
CAREC	Regional Environmental Centre for Central Asia
CCER	China Certified Emission Reduction
CCGT	Combined Cycle Gas Turbine
CCS	Carbon capture and storage
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CMP	Meeting of the Parties
COP	Conference of the Parties
EBDR	European Bank on Reconstruction and Development
EEA-EFTA	European Economic Area-European Free Trade Association
EIT	Economies in Transition
ERUs	Emissions Reduction Units
EU	European Union
EU ETS	European Union Emissions Trading System
GHG	Greenhouse Gas
ICAP	International Carbon Action Partnership
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
JISC	Joint Implementation Supervisory Committee
Kazakh ETS	Kazakh Emissions Trading System
KazSRIEC	Kazakh Research Scientific Institute on Ecology and Climate
KCCMP	Kazakhstan Climate Change Mitigation Program
KETS	Korean Emissions Trading System
MEP	Ministry of Environmental Protection
MRV	Monitoring, reporting and verification
NAP	National Allocation Plan
NZ ETS	New Zealand Emissions Trading System
PETER	Preparedness for Emissions Trading in the EBRD Region
RGGI	Regional Greenhouse Gas Initiative
RMUs	Removal Units
SARs	Subjects of Administrative Regulation
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WMO	World Meteorological Organization

Introduction

Climate change has been recognized in certain countries as a global environmental issue caused by human activity with the expansion of the "greenhouse effect" (IPCC, 2007). Different negotiations and institutions were developed with the common goal to prevent this issue. The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and the United Nations Environment Program in 1988 with the mandate to provide the world community with the most up-to date and comprehensive scientific, technical and socio-economic information about climate change. The IPCC has played a major role in motivating governments to adopt and implement policies in responding to climate change. The *United Nations Framework Convention on Climate Change* (UNFCCC) and the *Kyoto Protocol* has been adopted in order to limit global average temperature increases and to cooperatively cope with the impacts resulting from climate change. In addition, the reduction or prevention of the greenhouse gas (GHG) emissions was intended as the main way to address the climate change issue. The Kyoto Protocol's Parties started to implement numerous climate change mitigation policies and programs, targeting to achieve different percentages of greenhouse gas reduction by different years compared to the 1990 basic level established by the Kyoto Protocol. The *Kyoto Protocol* is an international agreement linked to the UNFCCC, which commits its Parties by setting internationally binding emission reduction targets. The Kyoto Protocol has developed flexible market mechanisms based on the trade of emissions permits, which has facilitated the creation of the Emission Trading System (ETS).

ETS is a system for trading greenhouse gas emission allowances. The system works on the 'cap and trade' principle. The companies captured by the scheme are

given allowances to release a certain quantity of emissions. The system also allows the companies to trade their allowances, providing them with an incentive to reduce their emissions. The annual number of permits is shrunk by the government, which would result in further emission reduction. In addition, ETS works as a major driver of investments in clean technologies. The largest system is the European Union ETS (EU ETS), which has been working for ten years and already has some achievements in emission reduction, (4,5 % of emissions reduction in 2014 in comparison with 2013) (*http://europa.eu/rapid/press-release_IP-15-4987_en.htm*). However, the success of the scheme is still under discussion. Nevertheless, there are also national schemes in Switzerland, New Zealand, Kazakhstan, South Korea, as well as regional schemes in North America (California, RGGI), Canada (Quebec), China (seven provinces), and in two cities in Japan.

Problem definition

Unlike the other countries that have national emissions trading schemes, Kazakhstan is a major producer of fossil fuels and one of the most energy intensive countries in the world (32 place in the world by its total energy consumption) (EIA, 2012), and a reason for this is its power production process, which relies mostly on coal (Kazenergy, 2014). The country's GHG emissions have climbed to 81 percent over the past ten years (IETA and EDF, 2013), largely due to a highly energy-intensive economy. Tackling the climate change issue on the global level, Kazakhstan ratified the Kyoto Protocol and introduced a new law that enhances the country's ability to participate in carbon markets. On 11 December 2012, Kazakhstan's government approved a law which would develop a nationwide cap-and-trade system - the *Kazakh Emission Trading System (Kazakh ETS)*. According to *Carbon Limits and Point Carbon* (2013) the Kazakh ETS is planned to operate similarly to the

European Union Emission Trading System but despite the fact that the Kazakh ETS entered its pilot phase of operation in 2013, the scheme is still a 'work in progress'. Due to the newly introduced system, and according to the results of the Kazakh ETS's pilot year, different challenges have been faced by the government and other stakeholders. The legislation still has to be improved. The businesses (enterprises) obligated to reduce their emissions under the system still have troubles in comprehending and using the system's mechanisms due to a lack of experience. In addition, the current condition of the technology used in Kazakhstan is of crucial concern to the government, since most of the installations are old and need large investments for its improvement. All of these factors create obstacles for the development of ETS in Kazakhstan.

Aim and research questions

The thesis aims to find the main obstacles to the Kazakh ETS development and to explore possible ways for its improvement. Since the system's progress mainly depends on accurate policy implementation, the research focuses on the analysis of the experience of other ETS (16 ETS, including EU ETS), their allocation systems, structure and policy. In addition, this thesis studies Kazakh ETS, the country's legislation, its institutional framework, the methodologies for emissions calculation, and interactions of main ETS stakeholders. In addition, the study compares the main conditions of Kazakh ETS with EU ETS. The possible obstacles and drivers of the Kazakh ETS development are analyzed and discussed according to interview results gathered from the participants of the Kazakh ETS, which in turn shows the role and the positions of all participants - the main authorizes bodies, operator of the ETS, verification companies and major emitters involved.

According to the UNFCCC inventory the emissions are dominated by the power and heat sector, with about 44 percent of the total in Kazakhstan. Therefore, this thesis looks into the country's energy sector and its role in the emission reduction.

The thesis examines two main questions:

RQ 1: How does the relevant policy network conceptualize the opportunities and barriers to emission reduction in the ETS in Kazakhstan?

RQ 2: What are the ways to improve and develop the Kazakh ETS?

Methodology

Multiple methods will be used in the research:

1) *Literature review*. First the analysis of climate change consequences based on the IPCC reports was carried out. For defining the key world actions addressing climate change, the conditions and requirements of world agreements negotiated between the countries such as UNFCCC and Kyoto Protocol was studied. The ICAP reports and publications related to the current conditions and structure of world emissions trading systems were analyzed. For disclosing EU ETS structure, the related reports, publications and guidelines of the European Commission were studied. IPCC's and UNFCCC's reports and publications, the United Nations Climate Change Conferences' outcomes also used. Next the analysis of the Kazakhstan's ETS related legislation, including the Environmental Code, legislative acts related to emissions reporting, monitoring and verification, national methodologies for emissions calculation and IPCC guidelines were provided in this Thesis.

2) *Interviews*. Different types of interview (by email, phone and personally) were carried out with the main actors from all parts of the system, including representatives of the government, private companies, consulting

companies, verifiers and international organizations involved in Kazakh ETS. Most of the interviews were formal with a list of prepared questions mainly about the challenges in the emission trading systems development process, identifying its pilot year's achievements and future prospects.

Outline of the study

The thesis has *four* chapters. *Chapter 1* presents an overview of the policy background and different institutions related to addressing the climate change issue. The international institutions are discussed in this chapter. The Chapter also provides information about the Kyoto Protocol's rules and conditions, and it outlines the flexible mechanisms for trading. *Chapter 2* discusses the existing trading systems in different countries around the world, its recent development and pathways, based on the legislation's analysis and annual reports.

Chapter 3 outlines Kazakhstan's obligations and targets for GHG emission reduction under the Kyoto Protocol and the Kazakh ETS structure and specifics. The chapter represents in more detail the country's legislation, methodologies for emissions calculation, institutions responsibilities and the interactions of main stakeholders. The chapter also provides in short the analysis of data on the current conditions of the country's energy sector and its technologies.

Chapter 4 presents the achievements of the Kazakh ETS and challenges to development, based on the analysis of the interview results. The chapter provides the positions of all participants and their willingness. It also analyzes the role of certain factors that are important for ETS development in Kazakhstan and suggestion to improve Kazakh ETS.

Ultimately, this thesis will add to the overall understanding of the current Kazakh ETS development conditions. Notably, this thesis examines different

components of the system with the aim to identify the incentives for carbon reduction in Kazakhstan. This in turn would help to improve the Kazakh national ETS with a focus on factors which affect its development. The results of the research are expected to provide input for further development of the system in Kazakhstan.

Chapter 1: Climate change and Kyoto Protocol

It is accepted in certain States that climate is changing due to human activities. Therefore, the severity of climate change would depend on the further actions of humanity on emission reduction and climate adaptation (IPCC, 2007). If we look at the history of climate change strengthening, the start of the industrial revolution (about 1750) had a crucial effect on the climate with a warming influence. In addition, it is known that the global climate also has its natural changes in temperatures over the centuries. However, scientists are suggesting that climate is becoming hotter on average, and more variable. According to scientific studies of the Intergovernmental Panel on Climate Change (IPCC), this variability is being attributed to increased levels of carbon dioxide in the planet. The IPCC scientists argue that in the past 650,000 years Earth's atmosphere has never had so much carbon dioxide in its atmosphere as it does today, and the carbon dioxide levels are still continuing to rise.

The Chapter aims to give an overview on climate change as a global issue, the policies and institutions created around the world and conventions negotiated to address this problem. The Chapter also discloses the rules and conditions of the Kyoto Protocol, which particularly focuses on the flexible mechanisms developed for climate change mitigation purposes.

1.1. Climate change

According to the United Nations Framework Convention on Climate Change's (UNFCCC) definition of "climate change", it is "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (UNFCCC, 2007). Therefore, the Convention takes

into account two issues: climate change is caused by human activity and climate variability is caused naturally.

The problem of climate change has an important value, since the consequences of this problem could be irreversible. The changes in climate mainly cause higher temperatures. According to scientific research, from the industrial revolution the rate of temperature rise has risen by 0.89°C (IPCC, 2007). Changes in precipitation also have been observed by IPCC scientists, and they argue that the changing of rainfall, which is already happening today in different parts of the world, is another consequence of climate change. Rainfall has increased in the mid-latitudes of the northern hemisphere since the beginning of the 20th century. There are also changes between seasons in different regions. For instance, the summer rainfall in the United Kingdom is decreasing on average, while winter rainfall is increasing. Also evidence shows that heavy rainfall events have become more intensive, especially over North America (www.epa.gov). Changes are occurring in the seasons, which can be demonstrated in that spring in some places starts earlier and autumns later. This in turn changes the behavior of species, for instance butterflies appearing earlier in the year and birds shifting their migration patterns (IPCC, 2007)

Other important changes are in the sea levels. The rate of sea-level rise has increased in recent decades, which is caused mostly by the melting of sea ice and glaciers, where melting in turn is caused by high atmospheric temperatures. According to IPCC's analysis of historical measures since 1900, sea levels have risen by about 19 cm globally, on average. Glaciers all over the world - in the Alps, Rockies, Andes, Himalayas, Africa and Alaska - are melting with increased rates of shrinkage. Arctic sea-ice has been declining since the late 1970s, reducing by about 4%, or 0.6 million square kilometers every ten years. Antarctic sea-ice has increased,

at a rate of about 1.5% every ten years. The Greenland and Antarctic ice sheets, which between them store the majority of the world's fresh water, are both shrinking at an accelerating rate (IPCC, 2007)

1.2. Climate change cooperation

In order to tackle the potential problems caused by changing climate, the world's different nations started cooperating to make a joint effort to reduce emissions and adapt to climate change. Different institutions were formed and negotiations related to the climate change problem made. All of these acts are leading to the formation of a climate change regime, which takes years for its development. The first step was taken by the World Meteorological Organization (WMO), which convened the First World Climate Conference in 1979. The attendance of the Conference were by scientists from a wide range of disciplines, such as physics, meteorology, climatology, oceanography, chemistry, atmospheric chemistry and others. The conference organized four working groups to look into climate data, identify the climate topics, and research climate variability and change. The Conference led to the creation of the *Intergovernmental Panel on Climate Change (IPCC)* by WMO and UNEP in 1988. Today IPCC is a leading international body for the assessment of climate change. It provides a scientific view on the current state of knowledge in climate change and its potential impacts, producing reports which have been agreed by leading climate scientists and the consensus of participating governments.

After the Second World Climate Conference and the First Session of the Intergovernmental Negotiating committee, the main international environmental treaty, namely ***United Nations Framework Convention on Climate Change*** (UNFCCC) was signed at the Rio Earth Summit in 1992. According to

Article 2 of the Convention, the objective of this treaty is to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". The Convention does not have any binding limits on greenhouse gas emissions. Instead, it provides a framework for negotiating specific international treaties (called "protocols") that may set binding limits on the emission of greenhouse gases.

1.3. Kyoto Protocol

To achieve the stabilization of greenhouse gas concentration at a safe level and after two years of negotiations, the Convention parties adopted the Protocol in Kyoto, Japan, in 1997. ***The Kyoto Protocol*** is an international agreement linked to the UNFCC, which commits its Parties by setting internationally binding emission reduction targets. Recognizing that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of industrial activity, the Protocol takes into account the principle of "common but differentiated responsibilities" and places a heavier burden on developed nations. The parties have targets on the reduction of greenhouse gas emissions under the Protocol, which they must meet in accordance with the appropriate timeline and using their own national measures. The Kyoto Protocol entered into force only in 2005 and today it has 192 Parties. The Protocol has two Commitment periods, and the first lasted from 2008 to 2012. The second period has already started and is planned to end by 2020.

The protocol sets the targets for emission reduction in each period, whereas the baseline year for these targets is 1990. Countries that are included in Annex B of the Kyoto Protocol are bound by these targets. According to the Kyoto Protocol, each

Annex B country has its own quantified emission limitation or reduction commitment.

The Kyoto Protocol has its principal concepts, which facilitate the GHG emissions reduction and climate change mitigation procedures. The most important and distinctive thing of the Protocol is its concept binding commitments for the Annex I Parties to reduce emissions of greenhouse gases. In addition, it requires them to prepare policies and measures for the reduction of emissions, and use all mechanisms available to achieve reduction. The Protocol established an adaptation fund in order to minimize the climate change's impact in developing countries. The emissions accounting, its reporting and review are also provided in order to ensure the integrity of the Protocol. Moreover, a Compliance Committee was established to compel compliance with the commitments under the Protocol.

1.4. Flexible mechanisms

In order to support the parties to meet their targets the Protocol offers three ***flexible mechanisms*** such as Emissions Trading System (ETS), Joint Implementation (JI) and Clean Development Mechanism (CDM). The mechanisms fall into two categories: international emission trading and project-based mechanisms.

The International Emissions Trading is a market-based mechanism in which a cap has been set on countries' emissions included in Annex B of the Protocol. Producing and releasing GHG emissions requires permits, which are allocated to emitters in the form of an emissions allowance. The emissions are introduced as units which are equivalent to one tonne of CO_2. Therefore, emission reductions or removals are used as a new commodity. According to Article 17 of the Kyoto Protocol, the Emissions trading mechanism allows the Parties to sell their emissions permits that were not "used" to emitters within the same country or go in other countries that are

over their permits. The emission trading systems or schemes could be established at different levels including national and regional, and may be used as climate policy tools. Under the trading systems, governments set emission reduction obligations for their country's entities.

The Clean Development Mechanism (CDM), defined in Article 12 of the Protocol, is a project-based mechanism, which allows the implementation of an emission-reduction project in developing countries. In CDM projects certified emission reduction (CER) credits can be used, each is equivalent to one tonne of CO_2, and can be counted towards meeting Kyoto targets. The CDM has two main purposes. First, the mechanism provides the Kyoto-participating countries to meet their commitments by purchasing relatively inexpensive carbon offsets. Namely, the Parties of the Protocol can invest in emissions reduction in developing countries, which is less expensive than reducing emissions in developed countries. The second purpose of the CDM is to stimulate non-Kyoto countries to develop sustainably by technology transfer. For instance, a CDM project might involve a rural electrification project using solar panels or the installation of more energy-efficient boilers.

There are additional functions of the CDM projects, and one of them is that the CDM is the main source of income for the UNFCCC Adaptation Fund. This fund was established to "finance concrete adaptation projects and programmes in developing country Parties to the Kyoto Protocol that are particularly vulnerable to the adverse effects of climate change" (www.unfccc.int). The share of revenue amounts to 2 percent of certified emission reductions (CERs) issued for a CDM project activity. Therefore, the benefits of the CDM projects are investing in climate change mitigation projects in developing countries, transferring modern technologies and

increasing economic activities of developing countries by creating additional workplaces.

Joint Implementation is a project-based mechanism defined in Article 6 of the Kyoto Protocol. This mechanism allows the Kyoto Protocol participating country included in Annex B to earn emission reduction units (ERUs) from another Annex B Party's emission-reduction or emission removal project, each equivalent to one tonne of CO2. The recipient country cannot credit these units. In practice, JI projects are mostly carried out in countries with economies in transition (EIT) since there are more opportunities for cutting emissions at a low cost. Some examples of JI projects involve replacing a coal-fired power plant with a more efficient combined heat and power plant; production of bio-diesel derived from sunflower and rape crops to substitute for petroleum diesel; or the installation of combined cycle gas turbine (CCGT) replacing electricity generated by using less efficient technology and other projects (UNFCCC).

For the JI projects, the ERUs come from the host country and are known as Assigned Amount Units (AAUs). Each Annex I party has a destined amount of AAUs, calculated on the basis of its 1990 GHG emission levels. It should be mentioned that ERUs may only be issued for a crediting period which started after the beginning of the first commitment period, i.e. from 2008.

According to the JI Guidelines, there are eligibility requirements, which have to be met by the Parties. After the host Party meets all of those eligibility requirements to transfer and/or acquire ERUs, it verifies emission reductions from a JI project. Upon such verification, the host Party may issue the appropriate quantity of ERUs. However, if a host Party meets only a limited set of eligibility requirements, the verification of emission reductions has to be done through the verification

procedure under the Joint Implementation Supervisory Committee (JISC). During this procedure, accredited by the JISC an independent entity has to determine whether the relevant requirements have been met before the host Party can issue and transfer ERUs.

Conclusion

The world communities have already taken the first steps towards the climate change problem's solution. The major institution, IPCC with scientists working from all over the world is researching the possible ways, while the UNFCCC's and the Kyoto Protocol's rules are stimulating the countries to reduce emissions. Besides, one of the most effective methods for emissions reduction today are the market-based mechanisms, which stimulate the countries to build modern technologies in order to reduce emissions and help to solve the problem of global warming. Today the carbon trading mechanisms are widely used as a political tool in many countries. Among them the largest trading system is developed in the European Union (EU ETS). Many national schemes are also developed and working over the world. In addition, new nation-wide trading systems, one is in South Korea, which started only from 2015 and the second, Kazakhstan, which has already started its first Phase of the Scheme. However, the process of building the ETS requires considerable efforts, which takes years of preparation and development. Kazakhstan's ETS is not an exception and can be considered "a work in process". Thus the next Chapter focuses on the disclosure of the world ETS in force, the systems' structure and policies related to the ETS.

Chapter 2: The Kyoto Parties and the world's ETS

The Kyoto Protocol is the world's first greenhouse gas emissions reduction treaty which was accepted by many countries around the world. The Protocol introduces market-based mechanisms, which are carbon reduction instruments widely used by states. This chapter outlines the Kyoto parties who took emission reduction obligations and non-Kyoto parties, and also overviews the existing emission trading systems developed in different countries around the world, their ETS structure, rules and pathways.

2.1. Kyoto and non-Kyoto Parties

The Kyoto Protocol started in 2008 with its first commitment period, which ended in 2012, and started its second period from 2013 planning at the end of 2020. During the first commitment period, the European Community (15 states) and 37 industrialized countries ratified the Protocol and committed to reduce their emissions in average by 5 percent against 1990 levels (Figure 2.1a). Four main greenhouse gases, including carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulphur hexafluoride (SF6), and two groups of gases, hydrofliorocarbons (HFCs) and perfluorocarbons (PFCs) are GHG determined for reduction targets in the Protocol. As a result of the first commitment period, according to the data, submitted by Parties to the Kyoto Protocol by 2014, the total greenhouse gas emissions were 22.6 percent lower than the base year of 1990 (UNNFCC, 2007b). However, not all major emitters have been involved in this action for emissions reduction. As we can see from Figure 2.1b below, the biggest emitters such as China, the USA and India, whose combined greenhouse gas emissions accounted for more than half of the total emissions in 2013 (UNFCCC, 2007b), did not ratify the first phase of the Kyoto Protocol. The main reason for the Chinese and Indian cases is that these countries are developing

countries, while the Kyoto Protocol requires binding the developed countries to reduce their emissions under its Annex B. According to the ratification status of the Kyoto Protocol, the USA did not commit to any emissions reduction (http://unfccc.int/).

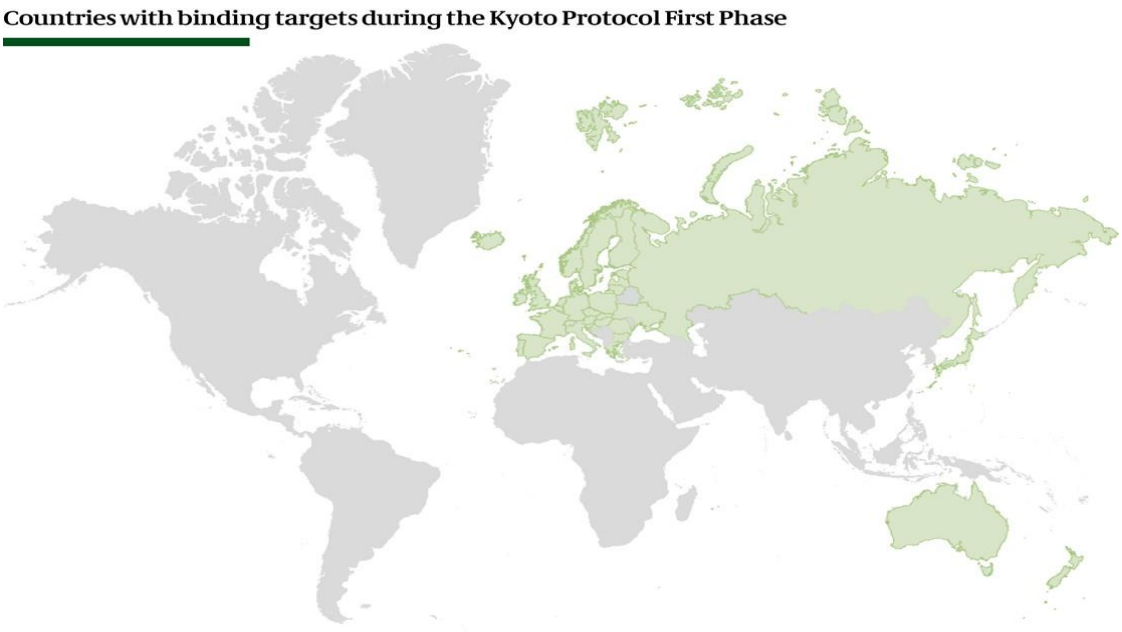


Figure 2.1a: *Countries with binding targets during the Kyoto Protocol First Phase*
Source: www.unfccc.int

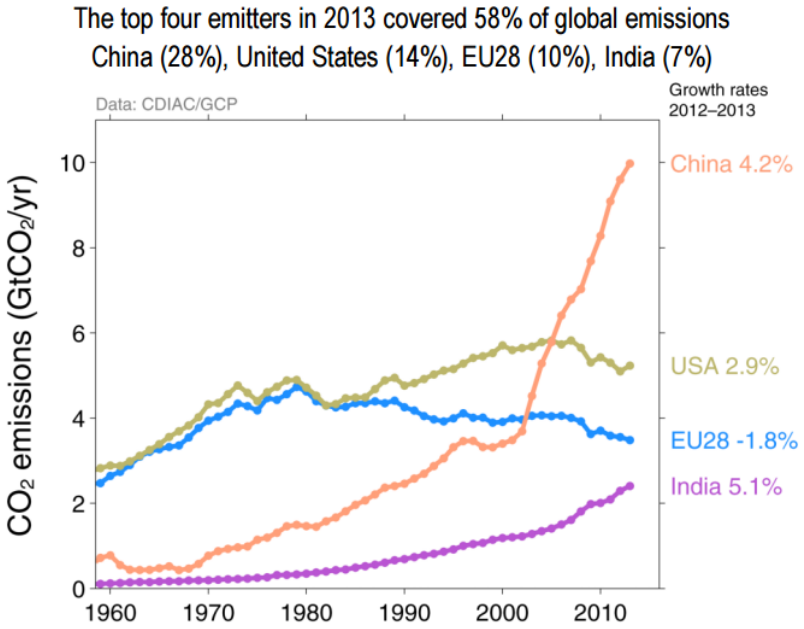
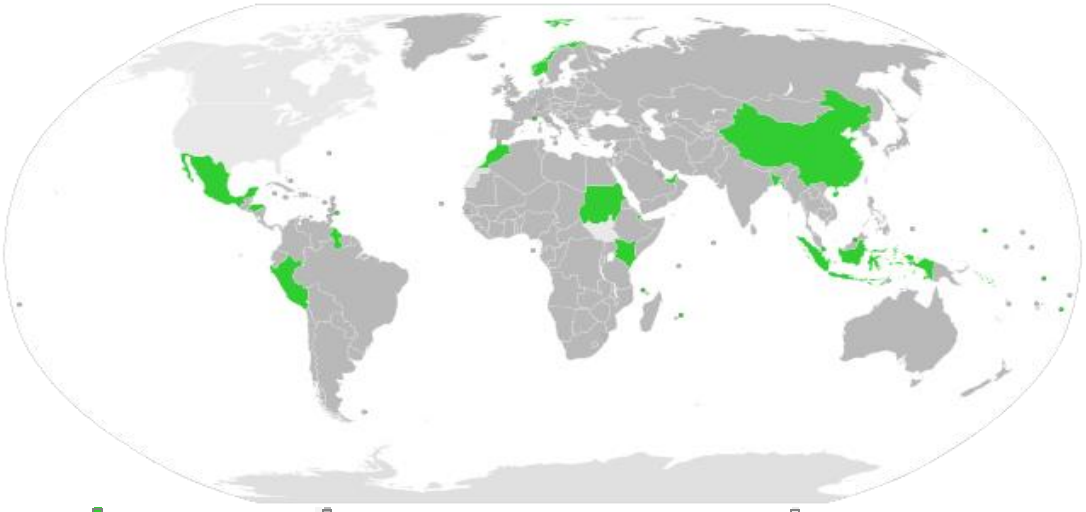


Figure 2.1b: Top 4 greenhouse gas emitters in 2013
Source: Global Carbon Project, 2014

In the end of the first commitment period of the Protocol, the Kyoto parties adopted an amendment to the Protocol in Doha (Qatar) in 2012. This amendment establishes the second commitment period for 2013-2020, which was ratified by 32 countries (www.unfccc.int). However, during the meeting of parties in Doha, Russia, Japan, Canada and New Zealand decided not to sign up to the Kyoto's second commitment period (Figure 2.1c) (http://unfccc.int/). This is probably because of the high emissions reduction targets required by the Protocol.



States that ratified *Kyoto protocol parties that did not ratify* *Non-parties to the Kyoto Protocol*

Figure 2.1: Countries ratified the Doha Amendment to the Kyoto Protocol for the commitment period 2013-2020 Source: www.unfccc.int

Yet, the two biggest emitters, China and the USA, agreed to reduce their emissions in 2014, where the USA president set the goal of reducing the country's emissions to about 26% compared with 2005 levels by 2025, while China with its very fast growing economy, announced to peak its emissions by 2030 (www.whitehouse.gov). This agreement is critical in addressing climate change, since the emissions of both countries account for more than one third of the total world's emissions.

A new global agreement is expected to be adopted during the next Conference of the Parties (COP 21) and the Meeting of the Parties (CMP 11) in December 2015 in Paris, which is planned to be implemented from 2020. This agreement could take the form of a protocol applicable to all Parties. The conference aims to reach a legally binding and global agreement on climate, from all nations of the world (www.unfccc.int).

2.2. Existing ETS in the world

During the first commitment period of the Protocol three market-based approaches with the climate change mitigation purpose were introduced. These market-based mechanisms are becoming increasingly proliferated around the world as an effective instrument for emission reduction. Therefore, emissions trading schemes are widely used by both Kyoto Protocol and non-Kyoto Protocol parties as a key policy tool.

By 2015, the number of emission trading systems had already reached 17 in total, covering 35 countries, 12 provinces or states, and seven cities, including the regional ETS of the European Union, the national ETS of New Zealand, Tokyo, Switzerland, Kazakhstan, Republic of Korea and subnational ETS such as Regional Greenhouse Gas Initiative (RGGI) member states in the US, Californian ETS, Quebec (Canada), Chinese regional ETS in Shenzhen, Shanghai, Beijing, Guangdong, Tianjin, and Chongqing, Hubei (See Figure 2.2) (ICAP, 2015). In addition, ETS implementation scheduled in China and another 14 ETS are under consideration in Brazil, Brazilian cities, Canadian cities, Japan, Chile, Russia, Mexico, Thailand, Turkey, Ukraine and two states of the USA (ICAP, 2015) (See map in Annex 1).

This Chapter looks at all 16 ETS in force and EU ETS separately. Since EU ETS was the first introduced, it was a model for building many other ETS. However,

other countries adapted and changed this model in accordance with their specificities, features of technology processes, policy and other factors. Thereby, the Chapter also compares other world ETS with the EU ETS.

2.2.1. European Union ETS

Starting a decade ago, the first and the largest emission trading system was established in the multi-national European Union (EU ETS), which has been developed through the years of its designing and application. Today the EU ETS covers 28 EU Member States and three European Economic Area-European Free Trade Association (EEA-EFTA) states: Iceland, Liechtenstein and Norway (http://ec.europa.eu/clima/). The European ETS encompasses over 11.500 installations across 30 countries and covers about 40% of total EU emissions. In addition, the European countries adopted new targets of 21% GHG emissions reduction by 2020 and 43% of emissions reduction lower than in 2005 by 2030 (http://ec.europa.eu/clima/).

The EU has designed a number of legislation and institutions, which regulate and control the system. However, since the first "cap and trade" principle was used in the ETS, its development had difficulties in establishing the first carbon market legislation and its implementation. The volume of greenhouse gas emissions emitted by plants, factories and companies covered by the system are limited and set by the authorized body. These emission limits are given as emission allowances to emitters, which can be traded in the case of its surplus (EDF, 2012). Indeed, EU ETS covers sectors such as energy, industrial processes, solvents and other product use, agriculture, waste and aviation. The emissions of carbon dioxide, nitrous oxide and perfluorocarbons were determined to be capped. Before the Kyoto's first commitment period, the EU ETS had its first phase from 2005 to 2007, during which the threshold

for power and heat generation was >20 MW annual thermal capacity per installation and various thresholds for industry. The second Phase was from 2008-2012, where commercial aviation with its established threshold of >10,000 t CO2/year was added to the first phase's sectors. The third phase lasts from 2013 to 2020, and in addition to the second phase, the CCS installations, production of petrochemicals, ammonia, non-ferrous metals, gypsum and aluminum, nitric, adipic and glyoxylic acid with various thresholds have been established. The main legislative, regulating the EU ETS, is the *EU ETS Directive* and the main authorized body is the European Commission. In addition, other related legislative acts were developed and the relevant authorities were created in the Member States for more localized regulation (http://ec.europa.eu/clima/)

According to the EU ETS Directive, the liable entities in European countries are defined at the installation level, with the compliance period which lasts one year. The trading periods for GHG emissions are in accordance with the established phases of the system, which lasted three years in the first phase, five years in the second, and a planned eight years in each of the last two phases. However, the allocation of emissions allowances had different rules in all three phases. For instance, during the first phase about 100% of allocation was given for free to the installation, only some members used auctioning and benchmarking. In the second phase some benchmarking was for free allocation and auctioning reached 3% of total allowances. Furthermore, the number of auctioned allowances rose to 40% of total allowances in 2013, and different allocation rules for energy and manufacturing sectors and for aviation was adopted.

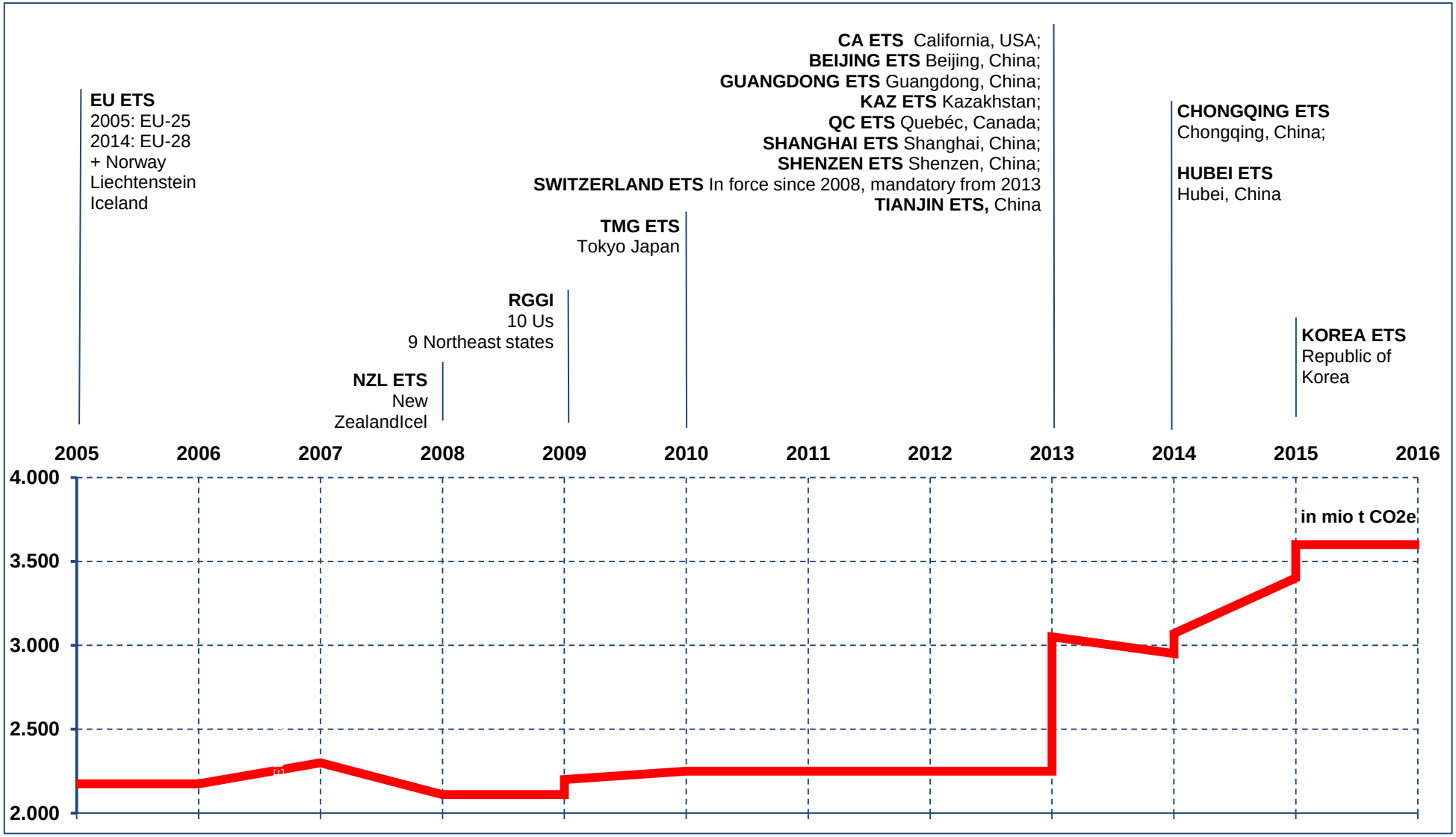


Figure 2.2: The world's ETS in force. Source: ICAP, 2015

The monitoring, reporting and verification (MRV) of GHG emissions are regulated under EU ETS. Thereby, monitoring plan is required for every installation, an annual report on GHG emissions required to be designed based on harmonized electronic templates provided by the European Commission, and also required to be verified by independent accredited organization and submitted each year (European Directive).

Additionally, the EU ETS Directive offers measures for carbon price regulation. For instance, "back-loading" approach was provided to counter the oversupply of allowances, for which the European Commission has planned to put off 900 million allowances by 2019-2020 in order to artificially stimulate the rise in demands. This approach reduces gradually the distribution of auctions during the period. Thus, in the auction volume was reduced by 400 million allowances in 2014, by 300 million in 2015 and planned to be reduced by 200 million in 2016. Another instrument for carbon price stabilization is Market Stability Reserve (MSR), which is scheduled to come into operation in 2021. This would adjust the auction volumes, instead of its direct managing (Environmental Defense Fund, 2012).

2.2.2. Other ETS in force

As was mentioned above, in 2015 another 16 ETS are working effectively around the world. Most of them are designed similarly to the European ETS based on its successful experience.

Regional Greenhouse Gas Initiative (RGGI) is the first greenhouse gas emissions trading system created in the United States, which includes nine eastern states of the US (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont). It started its first phase from 2009 ended in 2011, following with the second control period 2012-2014, the third

from 2015-2017 and fourth for 2018-2020. As with EU ETS, RGGI ETS covers the similar sectors, such as energy, industrial processes, agriculture, waste, but adding also bunker fuels. The RGGI scheme's liable entity was defined at the level of power plant, which in EU ETS was established at the installation level. As with EU ETS, each RGGI member state has its own the regulatory body. All regional emissions allowances are auctioned, which are allocated quarterly and available at maximum 25% per quarterly auction. In addition, the offsets with the qualitative limits are allowed from five offset types. The prices are controlled more strictly than in EU ETS, since RGGI ETS establishes the minimum auction price every year reflecting on inflation rates. As a result more than $1 billion in the regional auction proceeds were invested in energy efficiency programs and greenhouse gas abatement (*www.rggi.org*).

California (USA) initiated its cap-and-trade program in 2012 and its first compliance period started to operate from 2013, which ended in 2014. Today the Californian program covers 85% of the State's total emissions, which include eight types of GHG emissions emitted by such sectors as transportation, electric power, commercial and residential sectors, industry, recycling and waste, and agriculture. The government established the threshold to facilities of >25,000 metric tons or more of CO2 equivalent emissions per year, where the liable entity unlike to EU ETS is the process or operation, emitting more than the established threshold. The allocation system in California depends on sector type and type of utility ownership. In this way, part of the allowances are allocated on behalf of the ratepayers, part are received from auctions. The exception is the industrial sector, which gets free allowances for transition assistance and prevention of leakage. The remainder of the allowances is auctioned. Unlike EU ETS, the government allows using domestic offsets, which

have to be carried out in accordance with established protocols. In addition, as in RGGI, there is a price management in the carbon market, which has its Auction Reserve Floor Price increasing annually by 5% with an inflation rate. As EU ETS, the Californian scheme also requires MRV, precisely annual emissions reporting, implementation of internal audit and verification (California Air Resources Board).

Quebec (Canada) introduced its cap-and-trade system in the same year as California in 2012, which covers 85% of the State's GHG emissions from stationary combustion, transport, industry, agriculture, and waste. The threshold was established at the 25, 000 CO_2 equivalent emissions/year level and the liable entity is defined as any person or business in a sector covered by the system. Unlike EU ETS, in Quebec all allowances are auctioned at most four times per year at an established reserve price, except the sectors which are subject to international competition. In addition, as in California, the government also allows using limited domestic offsets and regulates the prices at auctions, increasing it by 5% each year adding an inflation rate. Since, Quebec and California's ETS were very similar to each other, and in 2014 these ETSs started linking (ICAP, 2015).

Swiss ETS started to operate from 2008, but with a voluntary phase which lasted until 2012. Unlike EU ETS, the followed second phase became mandatory with opts-in voluntarily depending on the industry's size. Thus the first phase (2008-2012) was voluntary, while the second (2013-2020) is mandatory with voluntary opt-in. As EU ETS, the Swiss ETS covers energy, transport, industry, waste and agriculture and limits seven types of GHG emissions. Therefore, the list of industries with its requirements was defined under the system: the industries, which have to participate mandatorily, and the industries, which have a possibility to voluntarily opt-in and opt-out. During the first compliance period all allowances were for free, however in the

second period free allocation is based on industry benchmarks, which is similar to EU ETS. The system does not provide free allowances to the power sector, and plans to reduce free allocation by 30% in 2020. The remainder of the allowances is auctioned. The system also provides qualitative and quantitative limits of credits from CDM and JI projects and from the voluntary phase with defined requirements. Swiss ETS also requires submission of annual emissions monitoring report as in EU ETS. Since there is similarity of Swiss ETS with EU ETS, the linkage of these ETS is under negotiation (ICAP, 2015).

Unlike EU ETS, ***New Zealand*** started its emission trading system (NZ ETS) by entering the forestry sector in 2008 and continued including other sectors such as liquid fossil fuels, stationary energy and industrial process in 2010, waste and synthetic emissions in 2013. NZ ETS opted-out of the Kyoto Protocol, but kept on the Protocol's Certified Emission Reduction units (CERs), Emission Reduction Units (ERUs), and Removal Units (RMUs) in order to account for its emitters' obligations before 2015, after which these units became ineligible. As with Swiss ETS, New Zealand established mandatory ETS with voluntary opt-in. Furthermore, a liable entity was defined as a person, whose activity is under the ETS scope. However, there are no trading phases in NZ ETS, instead of which, annual allocations and surrender obligations are set. The allocation system in NZ ETS is more complicated in comparison with EU ETS. The system provides free allocation partially in accordance with the intensity of activities and sectors. Although the 2012 amendment to NZ ETS allowed the power sector to auction its allowance, no auction has yet taken place. For the second period, only primary CER can be used by participants. In addition, from 2013 forest landowners are given the option to offset deforestation on their land by planting an equivalent forest within the country's territory. Unlike EU ETS, carbon

prices in New Zealand are also regulated with fixing. MRV is also required from the emitters, and presented as requesting of annual reporting and audits. However, the verification is considered only for unique emission factors (MFENZ, 2015).

Six Chinese provinces launched pilot ETS in 2013 and ***one province*** launched it in 2014. The pilot ETS are very similar to each other and have a three year trading period from 2013 to 2015. Unlike EU ETS, all provinces have similar allocation systems providing the allowances based through grandfathering based on 2009-2012 emissions, with benchmarking for new entrances. The exception is Shenzhen, which allocates allowances for free, based on sector-specific carbon intensity benchmarks, which is similar to EU ETS (ECOFYS, 2014). In addition, all provinces allow banking during the pilot year, and allow use of domestic project-based carbon offset credits – China Certified Emission Reduction (CCER). All these trading systems require reporting, monitoring and verification of emissions in a mandatory way. However, the sectors covered by these ETS differ and include production of energy, steel, chemicals, cement and others. Each system has its own regulation, which controls carbon price fluctuations. Some provinces consider linkage within these schemes, but officially there is no linkage to date (ICAP, 2015).

In Japan two cities have launched the emission trading systems. ***Tokyo cap-and-trade program*** was the first mandatory ETS in Japan established in 2010. A year later ***Saitama*** launched its ETS. Both ETS are similar and started to link to each other from 2011. Unlike EU ETS, they cover only CO_2 emissions and have the same sectors included in their ETS. Both have two trading periods, where the second period lasts from 2015 until 2021 in both cities. In addition, unlike EU ETS, Japanese ETS provide allowances in the same order, grandfathering on historical emissions, which is calculated with the given formula. Yet, the allowances for new entrants are

provided based on emissions intensity standards, which are also given by the responsible authority (ICAP, 2015).

The first nation-wide ETS operated in Asia was established in ***the Republic of Korea*** in 2015, which covers one third of the country's total emissions. As with Swiss ETS and NZ ETS, and differing from EU ETS, Korean ETS (KETS) introduced mandatory ETS with voluntary opt-in ETS. KETS covers six types of GHG emissions from sectors such as fuel combustion, transport, fugitive emissions, industrial processes, agriculture and waste. The system established the threshold for companies at more than 125, 000 tCO_2/year, and installation at 25, 000 tCO_2/year. Three trading periods are planned in the following years: phase 1 in 2015-2017 (3 years), phase 2 in 2018-2020 (3 years), and phase 3 in 2021-2025 (five years). The allocation system in Korea is complicated and different from EU ETS. For the first phase all allowances are given for free, based on the average of the base year (2011-2013) without any auctioning, with the exception of three sectors, which are given free allowances following benchmarks based on their previous activity. For other phases the number of free allowances will be limited and will be decreased in further phases. In addition, KETS allows banking and borrowing with some limitations. Domestic credits from external reduction activities, domestic CDM credits, and offsets from emission reduction projects from 16 established subsectors are allowed. KETS Allocation Committee regulates the market stabilization using different measures. As with many other ETS, KETS also requires annual emissions reporting and verification (ICAP, 2015).

Kazakhstan has also launched its national ETS, the development process of which is the subject of this research and will be discussed in the following Chapter in

more detail. Kazakh ETS will be also compared with other world emission trading schemes, including EU ETS.

Chapter 3: The emission trading system in Kazakhstan

Kazakhstan's background

Kazakhstan is located in Central Asia and has the highest rate of economic development (according to the World Bank, the average annual growth rate of real GDP for the last decade was 7.97%) in this region of the Asian continent. The country has significant reserves of natural resources, which is dominated by fossil fuel. Therefore, the sustainable growth of Kazakhstan's economy has a primary focus on the development of its industrial sector. This allows Kazakhstan almost entirely to use its fossil fuel for energy production. According to the statistics of the Energy Information Administration, about 87.5 percent of energy is produced from fossil fuel, while alternative sources of energy account for less than 0.2% (Kazenergy, 2014). An additional characteristic of Kazakhstan's energy sector is that most of the power plants burn local high-ash coal with old and inefficient electric-generated equipment (up to even 80 years old), causing harmful emissions. Another country peculiarity is the lack of gas processing plants and pipes for gas distribution which force it to burn a considerable amount of associated gas in torches (in 100 million m^3 per year). Moreover, Kazakhstan's climate creates a significant demand for heating, heating for seven months of the year. Therefore, energy activity is the main source of anthropogenic emissions in Kazakhstan, where the greenhouse gas (GHG) emissions only in 'energy activity' category accounted for 84.81% of the country's emissions in 2012 (Ministry of Environmental Protection and Water Resources, 2014).

The consequences of climate change in Kazakhstan were identified at the Second National Communication to the Conference of the Parties of the UNFCCC by the Ministry of Environmental Protection. According to the Ministry's report, Kazakhstan's climate became warmer during 1936-2005, and annual temperature

increased by 0.31^{0}C for each decade. The most rapid warming was in the Southern, Northern and Central parts of the country, and the least in the East (Figure 3).

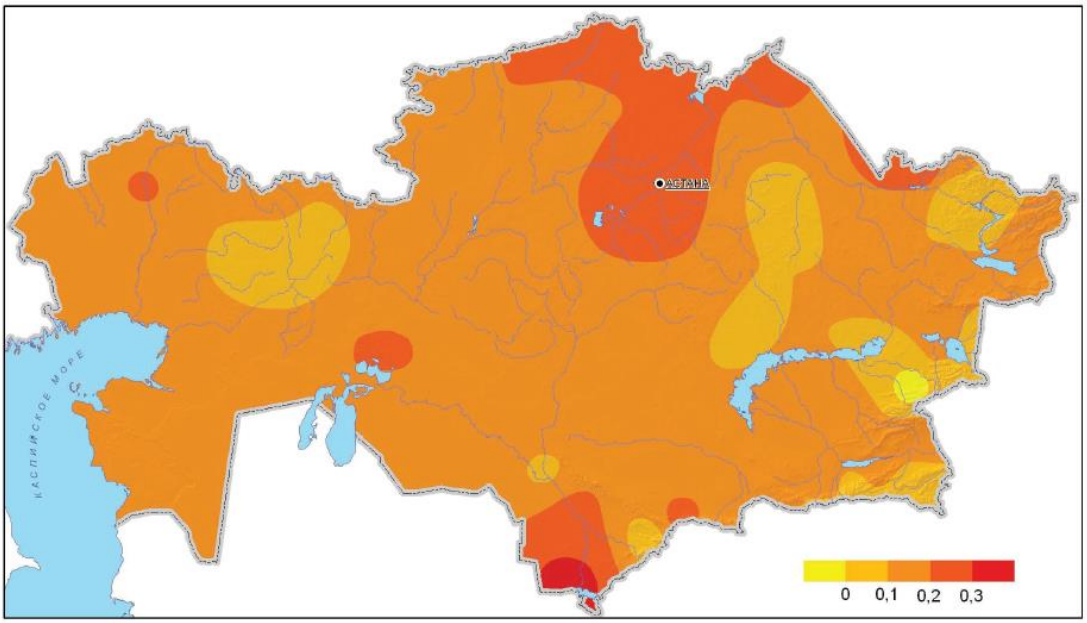


Figure 3: Map on Kazakhstan's temperature increase from 1936 to2005. Source: Ministry of Environmental Protection, 2009

Kazakhstan is making considerable efforts to decrease the environmental impact of the industrial sector by developing different programs, regulations and policies. However, all of these programs are still in the process of development and implementation. One of these plans is the building of the National Emission Trading Scheme (Kazakh ETS) under the Kyoto Protocol, which has already been approved by the Government as a cost-efficient instrument and political tool for greenhouse gas abatement and is in the early stages of implementation.

This purpose of this chapter is to give an overview of Kazakhstan's obligations and targets under the Kyoto Protocol, process of Kazakh ETS development, system's structure and specifics, the characteristics of the country's current legislation and policies for ETS building. In addition, since the country's energy sector is the main source of GHG emissions, the analysis of data on the

current conditions its energy technologies and potentiality for emission reduction is analyzed.

3.1. Kazakhstan's obligations under the Kyoto Protocol

Kazakhstan ratified the first commitment period of the Kyoto Protocol in on March 26, 2009, 10 years after signing it in 1999 (National Inventory Report, 2012). Being the party to the Kyoto Protocol as Annex B country, Kazakhstan had no obligations to reduce its emissions. However, the country has declared voluntary commitments to reduce its greenhouse gas (GHG) emissions under the Protocol by 15% by 2025 compared to 1990 levels, and to reduce its GHG emissions by 25% by 2050 compared to 1992 levels (www.unfccc.int). At the Conference of the Parties (COP 8) in Doha, Qatar, in 2012, the meeting of the Parties to the Kyoto Protocol (CMP 7) welcomed Kazakhstan's intention to participate as an Annex I party with a commitment inscribed in Annex B to the Kyoto Protocol for the second commitment period and Kazakhstan's efforts to transition its economy towards a green economy (Ministry of Environmental Protection and Water Resources, 2014). However, Kazakhstan has still not ratified the second commitment period of the Kyoto Protocol, since, perhaps, the Protocols has strict requirements to reduce emissions. Nevertheless, the government has already begun efforts on emissions reduction on the national level and started the building of a national emissions trading system – *the Kazakh ETS.*

Consequently, appropriate amendments were included in the Environmental Code of the Republic of Kazakhstan and into other corresponding legislative acts, which enhance the country's ability to participate in the carbon market. The general rules for the emission trading system were defined in this Law on Amendments, in which the requirements for the determination of the system's key elements such as

measurement, allocation, reporting and verification were introduced. The institutions have been created and given the responsibilities for developing the National Emission Trading System.

3.2. The process of Kazakh ETS development

As many of the world Emissions Trading Schemes in force designed their emission trading policy similarly to the first and largest ETS – EU ETS, Kazakhstan was no exception in implementing its experience to Kazakh ETS. This Chapter outlines the process of Kazakh ETS development, its legal basis introduced, methodologies for emissions calculation designed, and institutional framework created and involved into the ETS.

3.2.1. Legal basis for Kazakh ETS

The Environmental Code of the Republic of Kazakhstan, adopted on January 9, 2007, is the main source of environmental law, which is regulating all types of activities related to the environment in Kazakhstan. In July, 2012 in accordance with the established targets of the greenhouse gas emissions reduction, amendments were introduced into the Environmental Code of the Republic of Kazakhstan. Accordingly, the Environmental Code is a main legislative, which describes the basic concepts of the emission trading system, the regulation requirements for greenhouse gas emissions monitoring, inventory and verification. The Environmental Code defines the rights and responsibilities of individuals and the greenhouse gas emissions certification rules. It also provides the requirements for the national allocation plan establishment, the market mechanism conditions for reducing emissions of greenhouse gases (GHG) and the requirements for the trade of carbon units.

In addition, ***secondary legislative acts*** are mostly represented by the Government decrees and Ministerial orders (about 30 legislative acts in total), which also regulate the national emission trading system. Thus, more detailed requirements for the monitoring, reporting and verification of the amount of greenhouse gas emissions are provided in Government decrees and Ministerial orders. As EU ETS, Kazakh ETS is mandatory and requires GHG emissions monitoring, reporting and verification. Thus, the decrees and orders introduce the rules for monitoring and control of the GHG inventory, the rules for maintaining the state registry of GHG emissions sources, the rules for the accreditation of independent organizations providing verification and validation, the rules for trading in GHG emissions and carbon units, the rules for monitoring, accounting and reporting of carbon credits. From these decrees and orders Kazakh ETS participants can get any information about their rights, opportunities and obligations.

The development and approval of the main legislation aimed to create national emissions trading system have been completed with the implementation of the National Allocation Plan (NAP) for the first accounting period. The NAP defines the Major Emitters, the amount of their emission allowances, the amount of reserved emission units for new installations.

The first NAP was introduced for the year 2013, which was the ETS's Pilot year in Kazakhstan. This NAP limits the CO_2 emissions in 2013 from the installations, whose total CO_2 emissions exceed 20, 000 t/CO_2/yr, and determines the amount of 2013's emission allowances based on the basic year of 2010. Like in EU ETS, all allowances for the pilot year were given for free. In addition, on April 21, 2014 the President of Kazakhstan signed the Law on Amendments to the Code of Administrative Offenses, which repealed its Article-243-1 (penalties for the excess of

GHG emission allowances) in order to put it in place from 1 July 2014. Thus, the emissions excess for the Pilot year was not penalized, and the penalties came into force for 2014-2015.

The second National Allocation Plan (NAP2) was approved by the government in the end of 2013. The first phase allocation system is different from EU ETS, and similar to KETS, since the allowances were allocated based on established basic year on the level of the 2011-2012 average amounts of emissions. Unlike EU ETS, for this phase all allowances also were given for free, with the amount of emission allowances defined in view of CO_2 reduction commitments as 0% from the base year in 2014 and 1.5% from the basic year in 2015. NAP2 also defines the amount of reserved emission allowances for new entrants (in priority sectors of the economy). Different from EU ETS, the Kazakh ETS covers only CO_2 emissions. The allocation system in Kazakhstan does not use any auctioning and benchmarking, which are increasing in use of EU ETS. In addition, there are some differences in allowing offsets and credit, since in Kazakh ETS only domestic offsets are allowed, while in EU there are more options for offsets and credit.

Methodologies for the calculation of GHG emissions in Kazakhstan were developed mainly in accordance with the *2006 IPCC Guidelines* for estimating emissions in 2010. However, the national emission factors additionally were introduced in line with these methodologies. The main economic sectors, which are bound to reduce their emissions, were divided into 19 subsections for a more accurate emissions calculation. Thus, 19 methodologies are developed, which are given in Table 3.2.1 below:

Table 3.2.1 Methodologies for calculation of GHG emissions, approved by the Minister of Environmental Protection of the Republic of Kazakhstan

№	Methodologies for calculation of GHG emissions, approved by the Minister of Environmental Protection of the Republic of Kazakhstan
1	Production of mineral substances (production of cement, lime, glass)
2	Chemical industry (production of Ammonia)
3	Enterprises of oil and gas sector
4	Surface mining and processing of coal
5	Mining and processing of coal from underground mines
6	Objects of gas extraction, transportation and storage
7	Objects of oil extraction, transportation and storage
8	Rice growing
9	Thermal power plants and boilers
10	Livestock: enteric fermentation and manure
11	Agricultural soils
12	Solid waste landfills
13	Automobile transportation
14	Aviation (of international and national directions)
15	Railway transportation
16	Water transportation
17	Consumption of hydrofluorocarbons and perfluorocarbons (HFCs, PFCs)
18	Land use and changes in lands and forests
19	Pasture lands

The methods for emissions calculation are provided to estimate the GHG emissions as CO_2, N_2O and CH_4. However, Kazakh ETS covers only CO_2 in the first phase. In general, emissions of each greenhouse gas from any source are calculated by multiplying the source of GHG emissions (for example, fuel consumption) by the corresponding emission factor. Besides, the Guidelines provide three tiers for the emissions calculation depending on the completeness of collecting data needed for the calculation. Therefore, the more information is available and collected about the applied combustion technology at enterprises, the higher the level of assessment can be. In practice, if the emitter has data only on the amount of fuel used, the calculation could be made on Tier 1. In Kazakhstan's methodologies the same approaches are suggested and the tiers differ according to the emission factor. The emissions calculation on Tier 1 requires using the default emission factor of a given GHG by

type of fuel. The example of the emissions calculation on Tier 1 is represented in Figure 3.2.1a.

EQUATION 1

GREENHOUSE GAS EMISSIONS FROM STATIONARY COMBUSTION

$$\text{Emissions}_{GHG,\,fuel} = \text{Fuel Consumption}_{fuel} * \text{Emission Factor}_{GHG,\,fuel}$$

Figure 3.2.1 a: The equation of the greenhouse gas emissions from stationary combustion. Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2.

Where:

Emission $_{GHG,\,fuel}$ = emissions of a given GHG by type of fuel (kg GHG)

Fuel Combustion $_{fuel}$ = amount of fuel combusted (TJ)

Emission Factor $_{GHG,\,fuel}$ = default emission factor of a given GHG by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1.

To find the total emissions of GHG from source category, the emissions sum from all types of fuel as represented in Equation 2:

EQUATION 2

TOTAL EMISSIONS BY GREENHOUSE GAS

$$\text{Emissions}_{GHG} = \sum_{fuel} \text{Emissions}\ GHG, fuel$$

Figure 3.2.1 b: The equation of the greenhouse gas emissions. Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2.

According to Kazakhstan's methodologies on the emissions calculation, the same approach is given for the calculation of emissions on Tier 2, as it was described in the 2006 IPCC Guidelines. Here, under Tier 2, the emission factor is replaced by the country-specific emission factors. The country-specific emission factors have been identified and introduced by the Kazakh Research Scientific Institute of Ecology

and Climate (KazSRIEC). The KazSRIEC used country-specific data to investigate whether the country-specific emission factors are accurate, taking into account characteristics such as carbon contents of the fuels used, the fuel's chemical and physical features, fuel quality and the state of technological development in Kazakhstan. However, the presence of national data is not enough to identify country-specific emission factors for each sector and for each type of fuel. Therefore, the lack of country-specific emission factors necessitates the calculations of emissions on Tier 1.

In reality, emissions depend on the following:

- type of fuel used;
- combustion technology;
- operating conditions;
- control technology;
- quality of maintenance;
- age of the combustion equipment

In the Tier 3 method these factors are taken into account and the equation includes the emission factors which have to be indicated by the operator himself in accordance with the features of its fuel, equipment and technologies. According to Kazakhstan's methodologies the calculation of emissions in a Tier 3 approach is the most preferable as an approach with minimum errors and uncertainties. However, because of the lack of data on the technologies and fuel properties, the Tier 3 method is not required and the equation is not provided in the methodologies.

3.2.2. Institutional framework

The launching of Kazakh ETS needs meticulous approach, which can be faced with well-coordinated and organized institutional framework. In Kazakhstan these tasks are imposed by the Ministry of Environment Protection (MEP) and the Kazakh Research Scientific Institute of Ecology and Climate (KazSRIEC) renamed JSC "Zhasyl Damu", which are the institutions involved in elaborating and performing the design of Kazakh ETS. One of the ways to improve the abilities and functionality of the system is to engage more institutions that specialize in ecological research and involve them in environment protection activities in Kazakhstan. Although MEP with the support of Zhasyl Damu has been elaborating the legal basis for the ETS development, its composing carbon reporting, monitoring and supervision of the system participants' activities, the effective and fully functioning system requires strong analytical and technical support, which could be potentially performed by following institutions: the Center for Energy research at Nazarbayev University, the Kazakh Institute of Oil and Gas and the Economic Research Institute under the Ministry of Economic Development and Trade. One of the main tasks in elaborating the Kazakh ETS and providing effective monitoring and supervision is to obtain precise and representative information about the system participants and their possibilities to fully comply with regulations on emissions reduction (Carbon Limits and Thomson Reuters Point Carbon, 2013).

In the beginning of the ETS development, ***the Ministry of Environmental Protection*** was represented as the main body of the Kazakh ETS that must deliver its responsibilities by performing the tasks in data collection, constructing a complete database of trading allowances, developing the methodology for emissions classification and calculation, providing support for projects concerning emissions

reduction. In this regard, the Low Carbon Development Department was created within the Ministry of Environmental Protection (MEP) of the Republic of Kazakhstan as the primary institution to design and coordinate the Kazakh ETS. In addition, JSC "Zhasyl Damu" has been hired by the MEP for research purposes in the implementation of the legislation and other documentations related to the ETS and GHG emissions reporting. In August 2014, the governmental institutions were reshuffled and a new department was created within the Ministry of Energy for environmental regulations. The MEP was excluded from the government structure and all its authority was transferred to the Ministry of Energy. This reshuffling could retard the ETS development, since the reorganization of authorities needs time.

Zhasyl Damu represents, within the limits of its authority, the interests of the government and performs as a member and working body in the emissions trading system development by participating in the establishment of secondary law, providing direct data collection from operators and overseeing the allocation procedures. The main issue that is on the agenda nowadays is to involve second-tier institutions in the process of institutional framework development without any bottlenecks and coordinate their activities in order to make the system fully complete. The engagement of the Center for Energy research at Nazarbayev University is one of the most envisaging further development and far-reaching achievements that will allow for new scientific innovations such as controlling country balance, modeling the environmental and economic situation, GHG reducing in the energy sector and impacting on environment protection.

The emitter is defined as an equipment operator who legally owns or lawfully uses the installation in the territory of the Republic of Kazakhstan, the operation of which involves the emission of greenhouse gases (Environmental Code). Unlike in

EU ETS, the emitters, according to the Environmental Code, have different qualification criteria for the emissions reduction. Thus, in Kazakhstan the emitters have been divided into two categories: major emitters, for which the threshold for inclusion to the ETS was established as 20,000 t/CO_2/yr, and Subjects of Administrative Regulation (SARs) – the companies who emit below the estimated 20,000 t/CO_2/yr threshold. SARs are not required to reduce their emissions and do not participate in the ETS. As a result, according to the established National Allocation Plan, 166 companies have been obliged to reduce their emissions under the system. The sectors, such as the power sector; oil, gas and coal production, chemical, mining and metallurgical industries are involved in the emission trading system and are bound for emissions abatement (Table 3.2.2)

Table 3.2.2: Sectors of the economy covered by the Kazakh ETS according to the National Allocation Plan

Sectors of economy	**Number of companies**
Power	60
Oil, gas and coal production	66
Industry	40
Total	**166**

According to the Environmental Code, a major emitter has the right to meet his obligations to reduce GHG emissions by carbon units (quotas), acquired from another major emitter, who has a reserve of fixed quota volume for GHG emissions, and (or) carbon credits, obtained as a result of project implementation in the case of exceeding the volume of quotas for greenhouse gas emissions. If conversely the major emitter has a reserve of quotas for GHG emissions, compared with the NAP fixed quota volume and the commitments to reduce GHG emissions, the emitter can sell its extra units to other emitters. However, if the quotas reserve in comparison

with the fixed volume results from reduced production, it cannot be the subject of trade.

An independent accredited organization is needed for the surveillance over the accuracy of emissions monitoring, reporting on greenhouse gas inventory in accordance with the criteria, approved by the authorized body and techniques (Article 94-11 of the Environmental Code). Consequently, in order to get the emission allowances, all Major Emitters have to provide the documents verified and confirmed by independent accredited organizations (Verifiers). The accreditation of verification companies has been conducted by the MEP before it's restructuring, however today this authority to accredit is given to the Ministry of Energy's Climate Change Department in accordance with the appropriate law. During the Pilot year only four verification companies were working in Kazakhstan, three of which were foreign. Nowadays, the number of national verification companies is increasing significantly, which is caused by a large number of incoming foreign specialists (required for getting the accreditation). Verifiers bear the responsibility for the accuracy of the GHG reporting data of their customers (Emitters). Thus, they are required to thoroughly check the condition of equipment, technologies used by installation, the accuracy of emissions calculation and other materials related to the GHG emissions data.

In Kazakhstan Major emitters are allowed to get consultations on the projects related to emissions reduction from the licensed ***consulting companies.*** These consulting companies which provide consulting services in the field of environmental protection have to be licensed by the Committee on Environmental Regulations in accordance with the appropriate law. For the GHG reporting the consulting companies provide the services on emission calculation, design the installation

passport, develop plan and program for greenhouse gas emissions reducing for the Emitters (customers), and other documents required from the Emitter to submit to the authorized body. The consulting companies also provide support in the verification process mostly in explanation of emissions calculation.

International organizations also take a considerable role in the development process of Kazakhstan's ETS. One of the international organizations participating in the Kazakh ETS is the *United States Agency for International Development (USAID)* with its designed Kazakhstan Climate Change Mitigation Program (KCCMP). This program aims to help the country achieve long-term sustained reductions in GHG intensity. It supports Kazakhstan's government and business community in the ETS policy implementation and GHG emissions reduction at the national and at the corporate level. Moreover, the Program offers specialized training to help build highly qualified professionals in climate and energy in Kazakhstan.

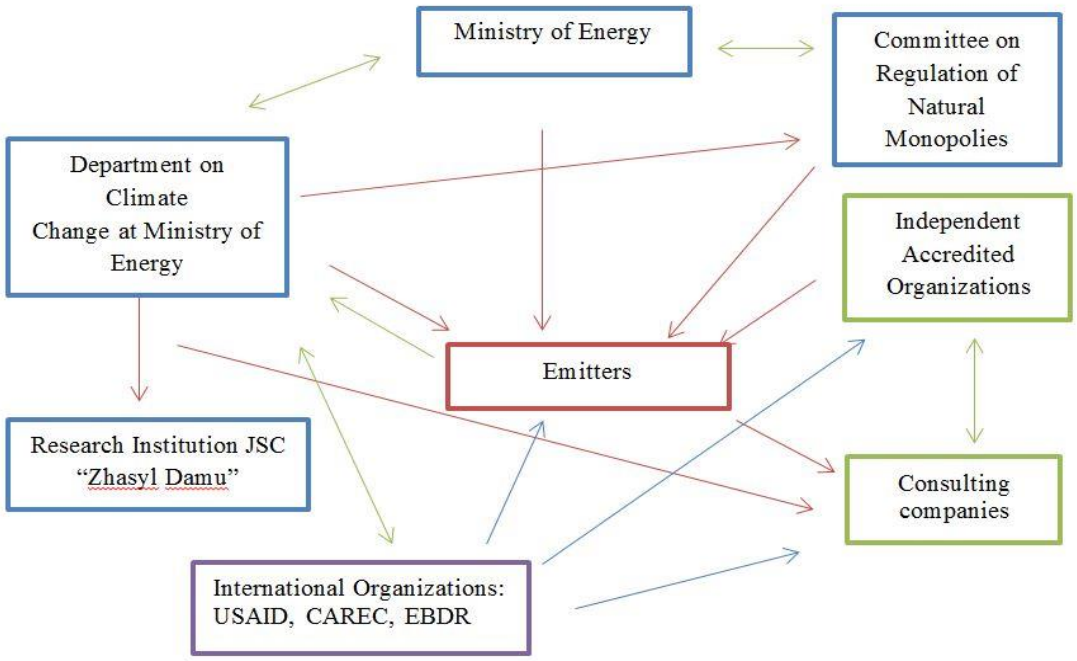
The Regional Environmental Centre for Central Asia (CAREC) promotes multi-sector cooperation in addressing environmental problems in Central Asia at the local, national and regional levels. The Center has designed a Climate Change and Sustainable Energy program, which contributes to the reduction of greenhouse gas emissions in Central Asia including Kazakhstan. The program assists in the implementation of the Kyoto protocol and enhances energy efficiency in Central Asia. CAREC aims to establish an inter-regional dialogue in Central Asia, and to attract advanced knowledge, best international practices and technologies to Central Asia including Kazakhstan.

3.2.3. Interactions of participants

The interaction of the Kazakh ETS participants is crucial in the development and subsistence of the system on the whole. The interaction completely depends on

the responsibilities of each ETS participant, including the government, Independent Accredited Organizations, Major Emitters and others. However, the successful development and implementation of the Kazakh ETS also relies on the character and intensity of the participants' interaction. The interactions could have a collaborative, obligatory or voluntary character depending on the participants' obligations and aims (See Figure 4).

As we can see in Figure 3.2.3, ***the Department of Climate Change at Ministry of Energy*** interacts with all ETS participants and has mostly an obligatory character of interaction, except the international organizations, with which the Department of Climate Change collaborates in developing the ETS.



Character of the Kazakh ETS participants' interactions	
→	obligatory
↔	collaborative
→	voluntary

Figure 3.2.3: Interactions of the Kazakh ETS participants. Source: designed in accordance with the Environmental Code and the aims of the participants from their official websites. (Author's own analysis)

According to the Kazakhstan's legislation the Department of Climate Change is a main ETS regulating body and controls ETS participants such as Major Emitters, Verification Companies, and the Consulting companies (licensed by the government), providing them accreditations, permits and license, controlling and regulating the participants' activities, penalizing them in accordance with the appropriate law.

In addition, this Department hires JSC "Zhasyl Damu" for the research purposes and support in designing legislation and policies related to the Kazakh ETS development. For an additional support and for experience exchange purposes the Department cooperates with International Organizations, such as United States Agency for International Development (USAID), United Nations Development Program in Kazakhstan (UNDP), the Regional Environmental Centre for Central Asia (CAREC), European Bank on Reconstruction and Development (EBDR) and others. The Department on Climate Change also cooperates with other departments of the Ministry of Energy for the accurate designing of the ETS related legislation.

The Major Emitters of GHG emissions have mostly obligatory interactions with other ETS participants, since the Emitters are regulated and controlled by different authorized bodies including the Ministry of Energy, Department on Climate Change, Committee on Regulation of Natural Monopolies and Independent Accredited Organizations. According to the Environmental Code the Major Emitters has to submit the required documentation to the Department on Climate Change in order to get the emission allowances and for the annual emissions reporting. However, the Emitters also cooperate with the representatives of the Department on Climate Change for explaining questions related to the documentation or the legislation requirements. For the verification purposes, required by the Environmental Code, the Emitters hire Independent Accredited Organizations. This interaction is

obligatory, since it is required by the Law, where the Independent Accredited Organizations have to verify the veracity of the GHG emissions amount and causing these emissions operations of the Emitters. In addition, the Emitters are allowed to hire the Consulting companies for the services of designing the GHG reporting documentation, which not obligatory. This interaction of the Emitters with the consulting companies has more collaborative character, which helps the Emitters in carbon monitoring and reporting process.

International Organizations in Kazakhstan have only collaborative interactions with other ETS participants. International Organizations provide training courses, design programs for emissions reduction for businesses (Major Emitters), Consulting and Verification Companies and the Government. International organizations also support the ETS participants by sharing with their experience on the ETS and providing emission reduction projects. For example, USAID has developed the Kazakhstan Climate Change Mitigation Program (KCCMP) for the long-term sustained reductions in greenhouse gas emissions. EBDR has designed the Preparedness for Emissions Trading in the EBRD Region - PETER project for Kazakhstan for understanding the costs and benefits of ETS, the cap-and-trade options, and increase preparedness of the country for linking with external carbon markets.

The Ministry of Energy is the main body in the regulation of Kazakhstan's energy sector. The Ministry is responsible for the development of the fuel and energy complex in order to ensure a high level of competitiveness, national and energy security, to ensure the growing needs for energy economy, and for the development of scientific and technological potential, aimed at their efficient use. The Ministry regulates the activities of the energy production companies including the annual

amount of energy production. Therefore, the Ministry has obligatory interactions with the Major Emitters by controlling and requiring them energy efficient and energy safe activities. The Ministry of Energy works in collaboration with the Committee on Regulation of Natural Monopolies, which also regulates the activity of the energy producers, particularly regulating the tariffs for the energy supply. It has to be added, that almost all energy suppliers in Kazakhstan are monopolists, since single energy company supplies energy to one region of the country.

3.4. The Kazakh ETS Phases

As a first step of the Emission Trading System's development, the country had its *Pilot year* in 2013. This year was decisive for the Government's decision on the further improvement and development of the Kazakh ETS. The basic year of the Pilot phase was 2010, for which the GHG emission reports were not verified. According to the NAP, the Pilot year was not bound for emission reductions, since this was the first year of ETS in Kazakhstan. From this year, according to the Environmental Code, the Major Emitters started to get emission allowances and submit verified reports on GHG emissions inventory. However, as reports in 2010 (basic year for the Pilot phase) were submitted without a verification process, the quality varied. Therefore, the Major Emitters allowed requesting additional allocations from the government. In response, the Government distributed additional allowances.

Kazakhstan's ETS covers about 77% of the country's total carbon dioxide emissions. The next Phase (Phase II) was established for 2014-2015 period. During the Pilot year the emissions for 2011-2012 were verified, and the average amount of 2011-2012 years was established as a basic number for the Phase II reduction. In comparison with the Pilot year, in this phase the enterprises fully complied with the

Government requirements on the GHG reporting: more than 90% of the country reports were submitted to the authorized body on time (Ministry of Environmental Protection).

Kazakh ETS started working from 2014, when the first carbon trades took place through "*Caspy" Commodity Exchange* at the price of EUR 1.98. The trades of 2013 allowances were conducted at prices of EUR 0.04-4.00 (http://comex.kz/en/). In total, 20 enterprises completed 54 sales or purchases. However, the government still put in a great deal of effort into the improvement of the ETS by pressing on with amendments to the legislation and regulations. The country has already announced on the willingness to continue working on Kazakh ETS and create the third NAP after 2015.

Conclusion

Kazakhstan's growing economy and its energy activity make the country one of the major emitters of GHG emissions. Therefore, the country's government makes considerable efforts to decrease the environmental impact. One of the ways chosen for emissions regulation tool is the development of National Emission Trading Scheme. For the development of the Kazakhs ETS, the appropriate amendments were included in the Environmental Code of the Republic of Kazakhstan and into other corresponding legislative acts, the emissions calculation methodologies have been developed and approved by the government. In addition, the coordinated institutional framework has been created for the regulation of the ETS participants. For the development of the Kazakh ETS the pilot year has been established for 2010, which has resulted in the 20 enterprises completed 54 sales or purchases. Accordingly, this could have meant that the Kazakh ETS started working.

In comparison with EU ETS, Kazakh ETS is different in most cases. As EU ETS, Kazakh ETS is mandatory, covers the same sectors, and both require MRV. However, only CO_2 is capped in Kazakhstan, while EU ETS covers three GHG emissions. The thresholds are also different in two ETS varying from sectors and trading phases. The allocation systems are different, since Kazakhstan does not use any auctioning and benchmarking.

Nevertheless, Kazakh ETS is planning to link with other carbon markets in the future. Therefore, Kazakh government has still developing ETS, and working on legislation improvement and on creating new programs supporting the ETS implementation. The next chapter identifies more details on barriers and achievements of the current Kazakh ETS, discusses its future opportunities and plans based on analysis of interview results.

Chapter 4: Achievements of Kazakh ETS and challenges to its development

In the previous chapters the overview of Kazakh ETS with its institutional framework was conducted based on its main legislation. However, this analysis does not disclose the real internal conditions of the ETS in Kazakhstan. Thus, for deeper analysis of Kazakh ETS, the field research was done in this country, which includes interviewing the main ETS participants. Thereby, this Chapter defines the current achievements of Kazakh ETS and the challenges the participant encountered during the system's implementation. In addition, the Chapter presents the participants' opinions on the future of ETS in Kazakhstan and the possibility of its linkage to other world carbon markets.

4.1. Interviewing Kazakh ETS participants

The study of Kazakh ETS is based on interviews and its analysis gathers thoughts and opinions from the participants of Kazakh ETS including energy industry experts, policy makers, international organizations and other ETS key stakeholders.

A number of questions for the interview were formulated for each participant separately, in accordance with their responsibilities regarding the ETS. The questions were mostly focused on the effectiveness of the ETS implementation, its usefulness for emissions reduction, options on the legislation improvement and the problems the participants had in meeting the ETS requirements. The outline of the interview questions are represented in Annex 2.

During the field research, one personal interview with the Deputy Director of JSC "Zhasyl Damu" - Sergei Tsoy was held. As mentioned before, JSC "Zhasyl Damu" is the main institution involved in elaborating and performing the design of

Kazakh ETS together with MEP. In the first steps of Kazakh ETS development, Sergei Tsoy was the General Director of this institution. Thereby, Tsoy is one of those who greatly contributed to the ETS design and establishment in Kazakhstan and still continues to put efforts in developing and improving the system.

Another interview was held with Robyn Camp, the Deputy Chief of Party of KCCMP, USAID, which is an international organization. As mentioned before, KCCMP – is the Kazakhstan Climate Change Mitigation Program, which was designed by USAID, to help Kazakhstan achieve reductions in GHG emissions, to support the Kazakh government in implementing ETS policies and provide trainings to help build climate and energy professionals in Kazakhstan.

The mail and Skype communication with other representatives of Kazakh ETS participants, such as verification company experts, energy production company experts and consulting company experts also took place. Their answers with the given interview questions can be found in Annex 3.

4.2. Achievements of Kazakh ETS

Three years after the ETS implementation have revealed numerous strong and weak sides of the trading system. The achievements of Kazakh ETS establishment could be examined from the current facts on the policy application by the country's major emitters. Obviously, the scheme is still in the beginning of its development in comparison to ETS, which has been working for a decade. Thus, it is difficult to identify whether the country's emissions have already reduced due to this trading scheme or not.

Since the first phase of Kazakh ETS is still lasting, the question about the achievement of the ETS was based on the effectiveness of the Pilot year. According

to the interviewee answers, in general, the pilot year results in Kazakhstan were positive. This was demonstrated by Mr. Tsoy's. He claims that since the NAP was introduced and the first trades already conducted, Kazakh ETS implementation has succeeded. In the opinion of Mr. Tsoy, at least, the better understanding of the scheme's requirements, more accurate monitoring and reporting of GHG emissions by enterprises were achieved with the system. In addition, another important achievement of the ETS is the formed verification system. As well as many key institutions of the ETS, the verification pool in Kazakhstan has been established successfully. The representative of Verification Company has the same opinion. She argues that the pilot year gave hope on the ETS can work. The main achievement of the ETS pilot year, she thinks, is that they learned how to defend their position based on the international trading system and on international methodologies, to do accurate GHG emissions inventory and verification of emissions reduction in order to trade.

Indeed, according to the previous Chapters, a number of legislative acts have been designed and introduced for emissions regulation and the ETS development. The main responsibilities were given to the institutional framework created for ETS regulation. During the Pilot year the emission trading system already had its requirements. However, the timescale for preparation of accurate legislation, preparation of the key institutions and especially, preparation of the enterprises was too short. Thus, there are still numerous problems related to Kazakh ETS, which will be discussed in the following sector.

4.3. Challenges and problems of Kazakh ETS

As in many other world ETS, including the largest EU ETS, Kazakh ETS has its drawbacks and challenges in the first steps for the system's implementation and development. According to the interviewee's answers, the problems were in the pilot year of the ETS and still take place in Phase 1. However, the problems are normal to find in the first steps of ETS implementation, especially legislation and regulations. Naturally, the enterprises try to comply with the scheme that leads to changes in legislation. In this way, Kazakhstan is not an exception, and a number of changes still need to be made in legislation for Kazakh ETS effective operation. As to the question what improvements in Kazakh legislation are needed, Ms. Camp advised "to clarify some of the definitions, better articulate some of the details, and to correct some inconsistencies between the various regulations, orders and legislation that govern the ETS".

More details about the problems and challenges the government and business communities meet were suggested by Mr. Tsoy during the interview. He outlines the first problem as the disagreement of major emitters with the emission trading scheme in Kazakhstan. Especially, the energy sector is still dissatisfied with the ETS, as it is based on old installations and built on coal generation. Another problem that needs to be outlined is the accuracy of emissions reporting. The introduction of new legislation required enterprises to switch from the country's method of emissions calculation to a sectorial method, which requires the calculation of the enterprises own emissions factor. In this case, the government representative claims that mistakes were made by verifiers, which did not allow calculating of the emissions factor. However, the representative of the Verification Company argues that the current main problem of Kazakh ETS is the drawback in the legislative basis, especially in the methodologies

for emissions calculation, which was done by the government. Another problem is that enterprises do not understand the importance of verification of emissions inventory reports. Most enterprises perceive verification as a formal process to do and do not accept the transition calculation from the country's level to the enterprise level or Tier 3. This happens because usually the transition of emissions calculation results in the increasing emissions amount. In addition, the representative of the Verification Company believes that Kazakh ETS legislation is very different from other world ETS and suggests adapting it to EU ETS Directives.

From the emitter's standpoint, the main problem occurs in the national allocation plan. The interviewee from the Energy Production Company claims that the emissions reduction required by the NAP does not consider the possibilities of enterprises reducing the emissions and introducing reliable emissions reduction programs. The problem to get the allowances shortages has different causes. One of them for the energy sector is the requirements of the Committee on Regulation of Natural Monopolies. In this way, as mentioned before, the Committee on Regulation of Natural Monopolies regulates the activity of the energy producers, regulating the tariffs for energy supply. Being a monopolist almost all energy suppliers in Kazakhstan are under the regulation of this Committee. The requirements of the Committee often contradict with the ETS. The ETS allows the enterprises to use domestic offsets, while the Law on Natural Monopolies prohibits providing any services and carrying out activities which are not related to spheres of natural monopoly regulations, and also prohibits including the costs into the tariffs. Therefore, all energy suppliers, being the subjects of the Natural Monopoly regulations, cannot use the offsets in order to meet the ETS requirements. Therefore,

the suggestion could be the differentiating the emissions reduction requirements in accordance with the enterprises real possibilities to reduce their emissions.

During the interview, other problems related to ETS were defined by the representative of the Consulting Company. The problem is that Kazakh ETS does not consider the current fast developing process of the industrial sector in the country. The interviewee claims that the established Kazakh ETS with its emissions reduction requirements even retards the country's economic growth. The emissions reduction will require changing the technologies in industrial sector, which is not feasible without big investments, especially for the energy sector's old installations. In addition, the interviewee claims that the government does not support the enterprises, because there are still no programs, methodologies or mechanisms to reduce the emissions directly. As a representative of the Consulting Company, who provides consultancy in the emissions calculation for enterprises, the interviewee also found numerous mistakes in the introduced methodologies for emissions calculation and approved by the government. Therefore, the further development of Kazakh ETS needs to be improved and consider the current economic growth of the country.

4.4. Future of Kazakh ETS

According to the current development of Kazakh ETS, there are different opinions on ETS future pathways. As mentioned above, officially the government has already announced the introduction of the next NAP for emission trading scheme in Kazakhstan by 2016. However, there is still no information about the following trading period's conditions and timescale. The interviews, conducted during the field research, disclose the opinions of the ETS participants on the future of the ETS in Kazakhstan with additional questions on their suggestion on improving the current scheme.

The Deputy Director of the main operator of Kazakh ETS, JCS "Zhasyl Damu", stated that the ETS in Kazakhstan will definitely continue operating. Moreover, the new amendments to the Environmental Code are already under the government consideration. Thus, the changes in the trading scheme in Kazakhstan are expected. One of the suggestions is using benchmarks in the next trading period. At some points, benchmarking simplifies the ETS, since it allows using carbon content per unit of product, without historical emissions factors. However, there is still a question on what benchmarks the government would introduce, since the European benchmarks are not relevant to Kazakhstan's technologies. However, perhaps, not all enterprises would accept the benchmarking approach, especially the energy sector, which has very old technologies and could not stand benchmarking standards. Regarding this issue, Mr. Tsoy suggested introducing individual coefficients for technologies, which exist only in Kazakhstan, for instance, for aluminum production and metal production technologies. He argues that Kazakhstan can introduce new trends to the world by developing differentiated coefficients. But this is still a question of the coefficients accuracy and reliability. For further development of the ETS, Kazakhstan needs to entrance into the international trading community and to receive the financing for international projects. Mr. Tsoy argues that the main process of the significant emissions reduction would start with international trading. Thus, Kazakhstan already negotiates the linkage of its system with other world ETS. However, this is a complicated process, since the Kazakh System is different from many other world ETS. The possible linkage may with Korean ETS, since it is new and could still change and adapt the scheme's structure with Kazakh ETS. "In general, linkage means the synchronization of registries work process. So, to conduct the international transactions, we do need to have the software which calculates this

emission commodity" (Mr. Tsoy). Kazakh ETS, perhaps, would not link with EU ETS from the economic perspective of the European countries. The linkage of Kazakh ETS with its low carbon prices could result in the European prices reduction for GHG emissions. Ms. Camp hopes that Kazakh ETS will be able to link to other carbon markets and supposes that it would link to Chinese provinces ETS or the Korean ETS, from the economic and political perspectives.

Regarding the suggestions for Kazakh ETS improvement, the representative of the Verification Company believes that further development of the ETS in Kazakhstan directly depends on legislative improvement, on well-controlled emissions reduction, on using measures to stimulate enterprises for energy efficiency, on using more strict penalties and on the working quality of trading exchange.

Conclusion

According to the analysis of interviews, the main achievement after three years of Kazakh ETS is that the legislation has been designed and established, the institutional framework created, and the emitters' understanding of their obligations and options to reduce and trade their emissions. The interviewees' answers demonstrate that the Pilot year succeeded, since trades have already been conducted and more accurate monitoring and reporting of GHG emissions was represented by enterprises. However, numerous problems were encountered during the Pilot year and still exist in the first phase of the ETS. The main problems mentioned are the disagreement of major emitters with the emission trading scheme, incorrect methodologies for emissions calculation and weak legislation were defined. However, most interviewees agree that the existence of these problems are part of the normal process for the first steps of the ETS implementation and believe that the ETS would not stop working. Indeed, Kazakh ETS needs improvement in its legislation. The use

of benchmarks, linking with other carbon markets and the entrance of Kazakh ETS into the international trading community were suggested for the further development of the ETS in Kazakhstan.

Findings and Conclusions

The Kyoto protocol provides for market-based mechanisms for emissions reduction systems, which have been widely adopted and used by the Kyoto and non-Kyoto parties and are even growing in use as an effective instrument for emission reduction. This study outlined all the ETS in comparison to the first and the largest, the European Union ETS, based on their legislation structure, allocation system, MRV, covered emissions and sectors, supporting programs, measures for carbon price regulation and possible linkage of carbon markets. The analysis of the world's emission trading schemes demonstrates that the ETS differ from each other and only a few ETS's are identical. The differences in the ETSs affect the trades that can be executed between the various systems hampering a multinational adoption. These linkages are crucial to the effective implementation of emission reduction targets. However, the differences in the ETS structure prevent the schemes' linkage. Yet, we already have two examples of ETS linkage, the first was Quebec and Californian, and the second was two Japanese cities. The Swiss ETS, being very similar to EU ETS, is still negotiating the possible linkage with it. Seven Chinese provinces also put effort into being linked to each other.

Being one of the emitters and in order to abate greenhouse gas emissions, Kazakhstan also started the establishment of its nation-wide ETS. The study of Kazakh ETS was made in comparison with EU ETS. However, the literature review on the legal and institutional framework in Kazakhstan indicated that the structure of Kazakh ETS differs from the European scheme in the emissions coverage, methodologies for emissions calculation, established threshold for emitters and approaches for allowances allocation. For deeper analysis of the main achievements and drawbacks of Kazakh ETS interviewing of some key participants was done.

Coming back to the research aim and stated questions, the overall conclusion is that Kazakh ETS has succeeded at some points. The positive results in the Pilot year of Kazakh ETS is the establishment of the basic legislation, the creation of the main institutional framework, and the emitter's better operation on emissions reporting and monitoring and the first trades done. However, according to the interview results, Kazakh ETS had difficulties in the first years of its establishments and the challenges with its further development still exist. Three main problems were identified during the analysis of interviewee answers, which include the inconsistencies in legislation and in methodologies for emissions calculation, the imbalance between the country's growing economy and the emissions reduction targets, and finally the lack of high-qualified experts with experience in ETS.

Regarding the problems of inconsistencies in legislation and in methodologies for emissions calculation, there are still difficulties with accurate emissions calculation on Tier 3.Thus the methodologies for emissions calculation need to be revised and guidelines for enterprise-specific emissions factors should be introduced. The legislation should provide more flexible mechanisms, especially for the energy sector. Thereby, in order to resolve the problem of legal contradiction, which makes the energy enterprises unable to use domestic offsets, the laws should be revised considering all opportunities to reduce emissions. In addition, for the ETS's better working with its aim to reduce emissions, linkage with other carbon markets should be negotiated.

Regarding the problem of imbalance between the country's growing economy and emissions reduction targets, a suggestion to review the allocation system and introduce new allowances based on benchmarks, as in EU ETS, is already under consideration by the government. In addition, the benchmarks should include the

current conditions of the country's technologies and emissions factors should be differentiated for different sectors. Regarding the problem of high-qualified experts with an experience in ETS shortage, the educational programs based on international experience should be designed and introduced by the government. The educational programs should include all ETS participants.

Ultimately, there are three principal recommendations. The government should put more efforts into improving the legislation basis, educating the ETS experts and negotiating Kazakh ETS linkage with other world carbon markets (particularly South Korea). The new legislation should consider all current problems and future potential of the country.

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Regional Greenhouse Gas Initiative (RGGI) official website URL: http://www.rggi.org/

United States Environmental Protection Agency official website URL: http://www.epa.gov

California Air Resources Board official website URL: http://www.arb.ca.gov/

JSC “Zhasyl Damu” official website URL: http://zhasyldamu.kz/en/

“Caspy” Commodity Exchange official website URL: http://comex.kz/en/

The Regional Environmental Centre for Central Asia (CAREC) URL: http://www.carecnet.org/

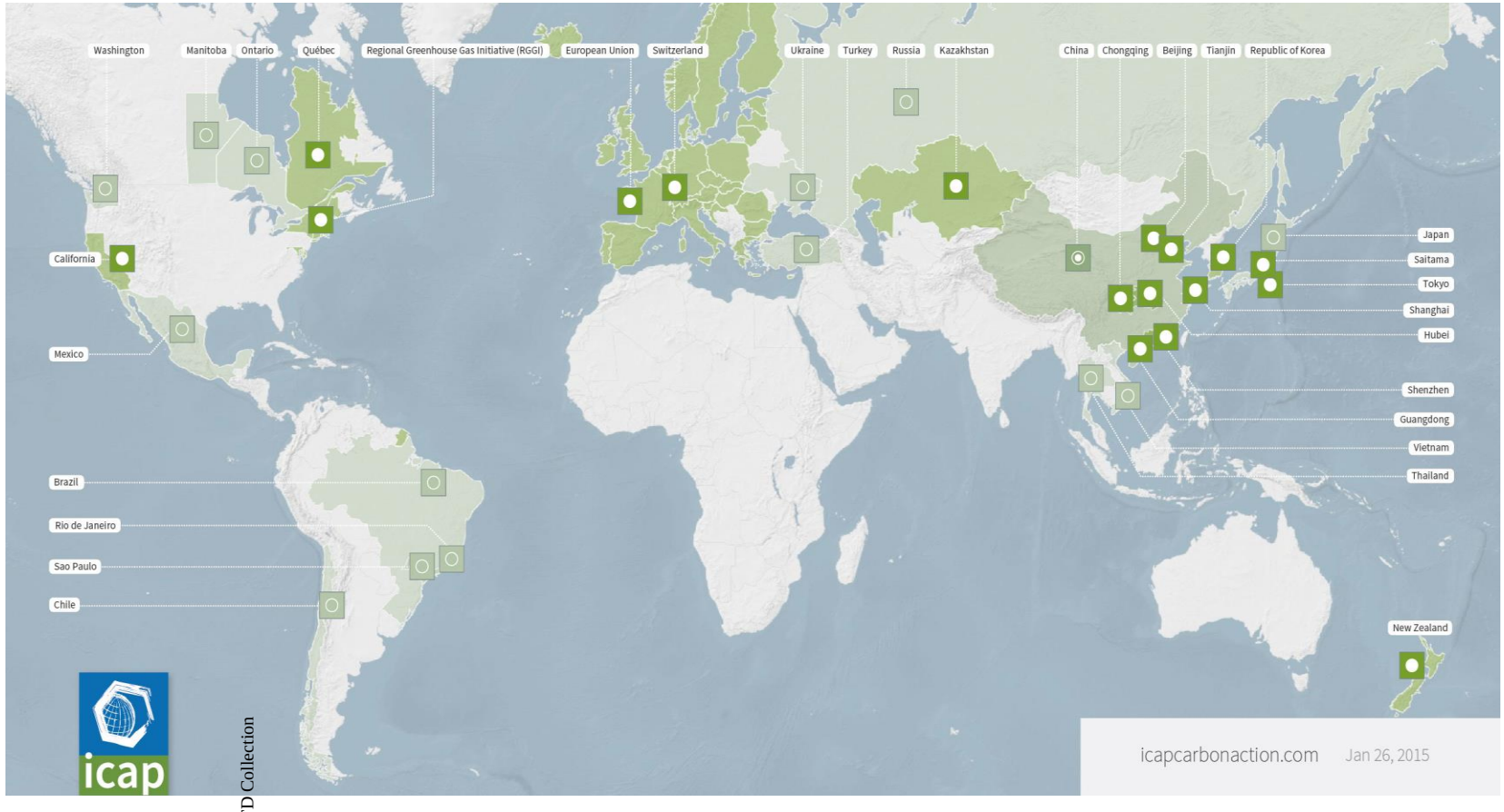
Preparedness for Emissions Trading in the EBRD Region - PETER project URL: http://www.ebrdpeter.info/

KCCMP: Kazakhstan Climate Change Mitigation Program URL: http://www.kazccmp.org/

Ministry of Energy of the Republic of Kazakhstan official website URL: http://www.energo.gov.kz

Ministry of Environmental Protection of the Republic of Kazakhstan official website URL:http://www.ecogov.kz

Annex 1 Map of the World Emissions Trading Systems Source: ICAP, 2015



Annex 2 Approximate interview questions

Questions for the energy production company

1. Do you consider the emission trading system useful for climate change mitigation?
2. Do you consider the emission trading system useful for emission reduction (for your company, for country)?
3. Has the ETS's pilot year influenced your decisions with regards to emission reduction?
4. Do you have any problems to meet the requirements of the law related to the ETS? If yes, what are they?
5. Do you have any problems with GHG emission reporting? If yes, what are they?
6. Do you have any problems interacting with other participants of the ETS: the government (ministry of environment protection, ministry of energy), verifiers?
7. Do you use the services of any consulting companies? If yes, did you have any problems working with them?
8. Who is responsible for emission reporting and for the development of the emission reduction plans in your company?
9. Does your company have a policy to encourage the workers to contribute to emissions reduction?
10. Is your company considering participating in the carbon market? If yes, have you bought or sold allowances, or do you plan to do so?
11. Do the given free emission allowances match your company's needs? If not, do you have a strategy in place? How do you plan to meet this demand?
12. Do you need any additional support from the government? If yes, what kind of support? Do you feel you have received enough information to understand your obligations?
13. Do you think that the legislation is well structured and easy to follow?
14. How can legislation be amended in order to achieve its goals?
15. In your opinion what is the future of ETS in Kazakhstan?

Questions for the government representatives

1. Do you consider the emission trading system useful for climate change mitigation in Kazakhstan?
2. Can you tell us about the history of designing the scheme? Have you drawn experience from other schemes? If yes, what are the countries? How do you use this experience?
3. Do you have any consultancy from the foreign specialists? What kind of consultancy?
4. What do you think are the main factors that influence the development of the ETS in Kazakhstan?
5. What problems do you have with the implementation of the policy?
6. Do you think that the policy needs to be improved? If yes, how would you improve the policy?
7. How do you encourage the emitters to participate in the system? What measures do you use to enforce emitters to participate in the scheme?
8. Do you provide consultations or education programs for the participants?
9. Do you have problems with the companies regarding emission reporting?

10. The energy sector is regulated by the government, including the tariff regulation and the amount of energy produced. How do you support the energy sector? Do you have any additional programs for them?

11. What happens when publically owned companies do not have enough allowances or the money to purchase on the market? Do you envision support programs for them? If so, what would then motivate them to reduce emissions?

12. What achievements of the ETS implementation could you highlight?

13. Are you going to introduce other policies for the emission reduction goals? If yes, what kind of policies?

14. How effective do you think the pilot year was? What lessons were learned and what do you think is the way forward?

15. What are your further plans for ETS development?

Questions for Verification Company

1. Do you consider the emission trading system useful for climate change mitigation in Kazakhstan?

2. Has your company had any experience before providing the verification services in Kazakh ETS?

3. Do you have any consultancy from the foreign specialists? If yes, what kind of consultancy?

4. What do you think are the main factors that influence the development of the ETS in Kazakhstan?

5. Do you have any problems meeting the requirements of the law related to the ETS? If yes, what are they?

6. Do you have problems with the companies regarding the verification of emission reporting and other documents related to ETS? If yes, what kind of problems is most common?

7. Do you have any problems interacting with other participants of the ETS: the government (ministry of environment protection)?

8. What achievements of the ETS implementation could you highlight?

9. How effective do you think the pilot year was? What lessons were learned and what do you think is the way forward?

10. Do you think that the policy needs to be improved? If yes, how would you improve the policy?

11. In your opinion what is the future of ETS in Kazakhstan?

Questions for Research Institution (Zhasyl Damu)

1. Do you consider the emission trading system useful for climate change mitigation in Kazakhstan?

2. Have you been participating in designing the ETS scheme? If yes, can you tell us about the history of designing the scheme? Have you drawn experience from other schemes? If yes, what are the countries? How do you use this experience?

3. Do you have any consultancy from the foreign specialists? What kind of consultancy?

4. What do you think are the main factors that influence the development of the ETS in Kazakhstan?

5. What problems do you see the government has with the implementation of the policy?

6. Do you think that the policy needs to be improved? If yes, how would you improve the policy?

7. How do you think the government should encourage the emitters to participate in the system? Which measures should they use to enforce emitters to participate in the scheme?

8. Do you provide consultations or education programs for the participants?

9. Do you have problems with the companies regarding emission reporting?

10. What happens when publically owned companies do not have enough allowances or the money to purchase on the market? Does the government envision support programs for them? If so, what would then motivate them to reduce emissions?

11. What achievements of the ETS implementation could you highlight?

12. How effective do you think the pilot year was? What lessons were learned and what do you think is the way forward?

13. What are your further plans for ETS development?

Questions for Consulting Company

1. Do you consider the emission trading system useful for climate change mitigation in Kazakhstan?

2. Has your company had any experience in providing consulting services before?

3. Do you have any consultancy from the foreign specialists? What kind of consultancy?

4. Do you have any problems meeting the requirements of the law related to the ETS? If yes, what are they?

5. Do you have any problems providing consultancy to companies in GHG emission reporting? If yes, what are they?

6. Do you have any problems interacting with other participants of the ETS: the government (ministry of environment protection), verifiers?

7. Do you need any additional support from the government? If yes, what kind of support? Do you feel you have received enough information to understand your obligations?

8. Do you think that the legislation is well structured and easy to follow?

9. How can legislation be amended in order to achieve its goals?

10. In your opinion what is the future of ETS in Kazakhstan?

Questions for International Organization (USAID, CAREC)

1. Do you consider the emission trading system useful for climate change mitigation in Kazakhstan?

2. Do you provide any consultancy to the Government and other stakeholders?

3. Do you have any problems providing consultancy to companies in GHG emission reporting? If yes, what are they?

4. Do you have an experience in other ETS? If, yes could you make a comparison with the ETS in Kazakhstan?

5. Do you think that the legislation is well structured and easy to follow?

6. How can legislation be amended in order to achieve its goals?

7. In your opinion what is the future of ETS in Kazakhstan?

Annex 3 List of Interviewees

Interviewees

Tsoy Sergei Klementievich - Deputy Director of JSC "Zhasyl Damu"
Robyn Camp - Deputy Chief of Party of KCCMP, USAID
Ovchinnikova Nadejda Borisovna - Chief of the Environmental Services Department at LLP "Kazakh Ecological Group"
Director of the consulting company on environmental services
Ecologist of energy company