



EDAM Energy and Climate Change
Climate Action Paper Series 2016/3

Adopting a Carbon Tax in Turkey: Main Considerations

October 2016

Gökşin Bavbek

Research Assistant, EDAM

INTRODUCTION

Carbon emissions are the leading cause of global climate change and they also engender significant additional harms to human health, the environment and the economy. Under the economic nomenclature, these negative effects are referred to as externalities, undesirable costs of an economic activity inflicted on the society that are not paid by the undertakers of that activity. Externality problems can't be solved under the free market mechanism and the utilization of public policy tools are required to address these adversities. At the beginning of the 21st century, carbon emissions can be referred to as the greatest externality that humans are faced with since they are the main culprit of the potentially catastrophic climate change threat. Because of the urgency surrounding climate change, it is only natural that a significant deal of effort has been exerted into designing the appropriate policy tools that can help societies address the issue of carbon emissions. The main question is how the costs of these emissions will be internalized by the actors responsible for emitting them. The policy instruments aimed at internalizing these costs are collectively referred to as carbon pricing mechanisms. Such policies are designed to reflect truer costs of carbon to the emitters through the use of public policy. Applying these tools can help in reducing harmful carbon emissions and shifting the bulk of investments into cleaner options.

The issue of carbon pricing has recently gained increased interest as a result of the global agreement reached with the Paris Summit on 2015. In the conference, the foundation of a new global climate

change regime has been established with nearly universal consensus. This marks a threshold in history as it is the first time that 195 members of the United Nations Framework Convention on Climate Change (UNFCCC) joined to agree to a deal aimed at addressing the threat of climate change with significant mitigation pledges from almost all parties. At the outcome of the conference, it was agreed that the global temperature increases would be held down below the dangerous 2° C limit and best efforts would be made to further limit the increase to 1.5° C. The main tools for realizing this target are the Intended Nationally Determined Contributions (INDC) submitted by the individual states to the UNFCCC before the commencement of the conference. In these documents, countries have been compelled to detail their plans for climate change mitigation and present specific greenhouse gas (GHG) reduction targets for the period between 2020 and 2030.

However, despite these efforts and the submitted national contributions, the current trajectory seems to be pointing towards a warming that will exceed the dangerous 2° C threshold. Recent studies show that accelerated efforts will be necessary in order to limit the increase in temperatures below catastrophic levels. Because of this necessity, it is clear that new policies such as various carbon pricing options will increasingly appear on the global agenda in the years to come.

Utilizing carbon pricing options offer the most cost effective way of mitigating climate change and can be helpful for countries in upholding their mitigation commitments or potentially exceeding them. The two main policy options that are being used as carbon pricing mechanisms are carbon taxation and emissions trading systems (ETS). While the main function of both policy options is the same, the methods that they use in pricing emissions are quite different. A careful examination of these two options and possible solutions is necessary in order to devise the most effective ways of mitigating climate change with minimum harm to a country's economic prospects.

Investigating the possible application of carbon pricing mechanisms is crucial for Turkey which currently

stands at a crossroads regarding its climate change policy. One defining characteristic of the new global climate change landscape is that the former distinction between the developed and developing nations has mostly disappeared. Currently, it is acknowledged that large developing countries share in an important part of the responsibility of combating climate change along with the developed countries. It is accepted that developing countries will need to take considerable action if the threat of climate change is to be contained at relatively safe levels. As a developing country with rapidly rising carbon emissions, it can be expected that in the near future Turkey will come under increased pressure to strongly act against climate change. Moreover, Turkey is a candidate country for accession to the European Union (EU) and it will be expected to conform its climate change policies with those in the EU if the country is to realize its decades long aspiration of becoming a full member of the organization.

On the other hand, the current energy targets of the country involve considerably increasing coal-fired electricity generation capacity in the near future. This policy is mainly aimed at reducing the country's dependence on imported energy sources. Continuing with the current plans would seriously undermine the country's efforts in combating climate change. Therefore, Turkey needs to reevaluate its energy and climate change policies and devise a new policy framework which will align the climate change responsibilities of the country with its developmental needs. Along with other carbon pricing options, a carbon taxation mechanism needs to be considered in this regard. Carbon taxation can potentially play an important role within the country's policy mix in combating climate change. The aim of this paper is to highlight the current carbon tax situation in the world and compare carbon taxation with other carbon pricing options in order to provide a groundwork for future carbon taxation discussions in Turkey.

AN OVERVIEW OF CARBON PRICING

Many types of economic activities such as the burning of fossil fuels for energy generation, industrial processes and agricultural production cause various types of GHG gases to be emitted into the atmosphere. These include gases like carbon dioxide, methane and nitrous oxide among others. The emissions of these gases accumulate in the atmosphere and gradually cause the global temperature levels to increase by trapping heat, thus triggering various other disruptions related to the climate. Changes in temperature and rainfall patterns, rising sea levels and the increased risk of extreme weather events are some of the main effects of climate change that have various adverse impacts on human health, the economy and ecosystems.

However, causing global climate change is not the only adverse effect that can be associated with GHG emissions. These emissions are also associated with local air pollution problems which create severe environmental, social and economic problems at a more regional scale. Perhaps the most significant of these costs is the toll on human health. For example, a report by the Health and Environmental Alliance estimates that air pollution caused by coal plants in Turkey are responsible for 2,876 premature deaths, 4,311 hospital admissions and 637,643 lost working days every year¹.

These significant costs are not internalized by the emitters but inflicted on the society as a whole. Carbon pricing is regarded as the main way by which truer costs for carbon emissions can be reflected to the emitters. Carbon pricing mechanisms are being increasingly utilized throughout the globe. Research undertaken by the World Bank indicates that for the year 2014, around 11% of the total emissions in the world

¹ Health and Environmental Alliance, 'The Unpaid Health Bill, How Coal Plants in Turkey Make Us Sick' (2015), p. 6, accessed from http://env-health.org/IMG/pdf/19052015_hr_coal_report_turkey_final.pdf on 6.2.2016

were subject to a carbon pricing mechanism² and the average price was estimated as 7 US dollars per ton of CO₂³. Although this figure is relatively low, it can be expected to considerably increase in the coming years with several new developments taking place around the world with related to carbon pricing.

Although there are several other methods by which cleaner energy options can be supported and carbon emissions can be reduced, there are certain advantages of using a price based mechanism. Several studies and experience in the market have demonstrated that price based mechanisms are more efficient compared to using regulatory approaches. A primary reason for this is that market based instruments equalize the marginal costs of emission reductions across all emitters. This can be done by either applying an economy-wide carbon tax or an ETS mechanism rather than applying sector specific reduction regulations⁴. Comprehensive carbon pricing measures can exploit the whole range of emission reduction opportunities across an economy. Under such a system, the price of emissions can be reflected upon a variety of sectors thus triggering demand reductions in electricity, transportation fuels and direct fuel usage. A cost effective balance between different emissions can be achieved under carbon pricing since all of the behavioral responses are incentivized up to where the cost of the last ton of carbon emitted equals the emissions price⁵. On the other hand, regulatory policies like mandates for renewable fuel generation and energy efficiency standards are less effective since they focus on a narrower array of emission reduction opportunities. Regulatory policies such as command-and-control approaches and subsidies aimed at promoting clean energy can impose excessive

costs on emitters compared to carbon pricing options and they can be costlier to implement while being less effective⁶. Choosing the most efficient mitigation instruments is crucial given that the task of reducing emissions is a long term effort that will span several decades⁷.

As mentioned, the two main carbon pricing options that are being utilized in the world are carbon taxation and emissions trading systems(ETS). While a carbon tax sets a direct price on carbon emissions by introducing a cost calculated per the amount of carbon emitted, emissions trading set a limit on the quantity of emissions with penalties exacted if the limit is exceeded. The limit can be enforced by allowing the trading of emissions permits each emitter must acquire in order to fulfill its obligation. These tradable permits are typically referred to as allowances and the market for these allowances set the carbon price under an ETS. In short, carbon taxation allows the quantity of the emissions to be determined by the market whereas ETS programs instead allow the price to be determined by the market⁸. Under a tax regime, the price of a unit of emissions is certain and the level of emissions depends on a number of factors such as future technological and economic conditions. Whereas under an ETS, the emissions level from the included activities is certain and the price of the emissions is based on a number of market conditions⁹.

The concept of emissions trading goes as far back as 1968 when it was conceived by the Canadian econo-

2 World Bank and Ecofys, 'State and Trends of Carbon Pricing'(2015), p. 23

3 International Energy Agency, 'Energy and Climate Change, World Energy Outlook Special Report'(2015), p. 23

4 Metcalf, Gilbert E., 'A Proposal for a U.S. Carbon Tax Swap, An Equitable Tax Reform to Address Global Climate Change'(2007), p. 9

5 W. H. Parry, Ian, de Mooij, Ruud and Keen, Michael, 'Fiscal Policy to Mitigate Climate Change A Guide for Policymakers'(2012), International Monetary Fund, pp. 10-11

6 Morris, Adele C., 'The Many Benefits of a Carbon Tax'(2013), The Hamilton Project, Brookings Institution, p. 1

7 W. H. Parry, Ian, de Mooij, Ruud and Keen, Michael, 'Fiscal Policy to Mitigate Climate Change A Guide for Policymakers'(2012), International Monetary Fund, p. 11

8 Kaufman, Noah, Obeiter, Michael and Krause, Eleanor, 'Putting a Price on Carbon: Reducing Emissions'(2016), World Resources Institute, p. 5

9 Marron, Donald, Toder, Eric and Austin, Lydia, 'Taxing Carbon: What, Why and How?'(2015), Tax Policy Center, Urban Institute and Brookings Institution, p.2

mist J.H. Dales as a way to control pollution¹⁰. However, the first application of the mechanism was on 1990 as the sulfur dioxide (SO₂) trading program was established with the Clean Air Act Amendments in the US¹¹. The program aimed at reducing acid rains by regulating SO₂ emissions caused by power plants. Many of the previous environmental regulations regarding SO₂ emissions were command-and-control measures such as designated emissions rates and equipment standards. The premise of the new system was that the plants with lower cost opportunities to reduce emissions would reduce their emissions and sell their extra permits to the plants with higher cost emissions reduction opportunities. Therefore, higher cost emission reductions would be avoided and emissions reductions with lower costs would be realized, thus achieving overall emissions reductions in a cost effective manner. This theory was tested under the new system and it proved to be successful. Under the new program, the SO₂ emissions from power plants decreased by 36% between 1990 and 2004 even as the electricity generation from coal power plants significantly increased¹². The costs of the program proved to be much less than the command-and-control alternatives that were previously used and also less than the initial projections for the new emissions trading system¹³. The success of the program helped pave the way for other ETS programs, most significantly the EU-ETS.

Currently, the largest ETS market in the world is the EU ETS which became operational in 2005. Around 45% of all the emissions caused in the EU are covered by the ETS. The system covers a wide range of sec-

10 Çiçek, Hüseyin Güçlü and Çiçek, Serdar 'Karbon Vergisi ile Karbon Ticareti İzinlerinin Karşılaştırılması', (2012), İ.Ü. Siyasal Bilgiler Fakültesi Dergisi No:47, p. 101, accessed from <http://ist-univ.dergipark.gov.tr/download/article-file/5693> on 16.7.2016

11 Metcalf, Gilbert E., 'A Proposal for a U.S. Carbon Tax Swap, An Equitable Tax Reform to Address Global Climate Change' (2007), p. 9

12 Kaufman, Noah, Obeiter, Michael and Krause, Eleanor, 'Putting a Price on Carbon: Reducing Emissions' (2016), World Resources Institute, p. 14

13 Kennedy, Kevin, Obeiter, Michael and Kaufman, Noah, 'Putting a Price on Carbon, A Handbook for US Policymakers' (2015), World Resources Institute, p. 14

tors including CO₂ emissions from power and heat generation and a number of energy intensive industries, N₂O emissions from the production of certain acids and perfluorocarbon (PFC) emissions from aluminum production. More than 11,000 facilities in power generation and manufacturing industries and the operators of flights to and from the EU, Iceland, Liechtenstein and Norway are subject to the policy mechanism¹⁴.

An emissions trading mechanism was also utilized under the Kyoto Protocol which allows countries to trade their allowances in order to fulfill their obligations under the agreement. By emissions trading, countries that exceeded their mitigation targets were able to sell their excess allowances to those countries that have failed to meet their targets. Two instruments that were created under the Kyoto Protocol for this purpose are Joint Implementation and the Clean Development Mechanism. Under the Joint Implementation program, developed countries were able to offset an amount of their mitigation commitments by investing in mitigation efforts in other developed countries and in countries in transition. The Clean Development mechanism, on the other hand, allowed developing country parties to offset an amount of their mitigation commitments by investing in developing countries¹⁵.

Compared to ETS mechanisms, carbon taxation can be regarded as a more direct way to address the externality problem caused by carbon emissions. For a tax to be considered a carbon tax, the amount of the tax needs to be determined by the level of carbon content of the economic activity. Several other types of taxes are generally implemented on fossil fuels but these can't be regarded as carbon taxes unless the amount of the tax is based on carbon content¹⁶. By putting

14 European Union, 'The EU Emissions Trading System (EU ETS)', accessed from http://ec.europa.eu/clima/publications/docs/factsheet_ets_en.pdf on 19.7.2016

15 Escarus Sürdürülebilir Danışmanlık, 'İklimin Finansmanı, Yeşil Tahviller, Karbon Fiyatlandırma' (2016), p. 7

16 Kaufman, Noah, Obeiter, Michael and Krause, Eleanor, 'Putting a Price on Carbon: Reducing Emissions' (2016), World Resources Institute, p. 5

a price per ton of carbon (and carbon equivalent) emitted, carbon taxes can thus create incentives for emitters to shift their production towards less carbon intensive options which can trigger a general response in the economy in the long run¹⁷. Beginning with the 1990's several states have begun to implement carbon taxation mechanism and currently there are 18 countries that have adopted a carbon tax at the national level.

One key challenge in designing a carbon taxation scheme is setting the right amount for the tax. There are several considerations that need to be kept in mind. The views on the correct price for carbon emissions vary greatly from 5 US dollars per ton of CO₂ equivalent to over 100 US dollars per ton. However, the general consensus of the economists is much closer to the low end of this scale¹⁸. A starting point on deciding a price per carbon is the concept of the social cost of carbon per ton. Unfortunately, estimates for the cost of a ton of carbon emissions vary greatly¹⁹. A recent study in the US has concluded that a ton of carbon released in the atmosphere was costing around 37 US dollars per ton for the year 2015²⁰. However, other studies have estimated costs as high as 220 US dollars for the same year²¹. In general, research on the potential for employing a federal carbon tax in the US suggest that a tax rate of around 20 US dollars per ton by 2020 would be an ideal starting point for large emitting countries²².

17 World Bank, 'Background Note: Putting a Price on Carbon with a Tax', accessed from http://www.worldbank.org/content/dam/Worldbank/document/Climate/background-note_carbon-tax.pdf on 8.6.2016

18 Litterman, Bob, 'What Is the Right Price for Carbon Emissions?'(2013), Energy and Environment, p. 38

19 Metcalf, Gilbert E., 'A Proposal for a U.S. Carbon Tax Swap, An Equitable Tax Reform to Address Global Climate Change'(2007), p. 11

20 Stanford News, January 12, 2015, Than, Ker, 'Estimated social cost of climate change not accurate, Stanford scientists say', accessed from <http://news.stanford.edu/2015/01/12/emissions-social-costs-011215/> on 8.7.2016

21 C. Moore, Frances and B. Diaz, Delavane, 'Temperature Impacts on Economic Growth Warrant Stringent Mitigation Policy'(2015), Nature Climate Change, p. 128

22 W. H. Parry, Ian, de Mooij, Ruud and Keen, Michael, 'Fiscal Policy to Mitigate Climate Change A Guide for Policymakers'(2012), International Monetary Fund, pp. 13-14

In contrast to the 11% of all global GHG emissions subject to a carbon pricing mechanism with an average price of 7 US dollars per ton of CO₂, around 13% of global energy related CO₂ emissions received subsidies amounting to 115 US dollars on average per ton of CO₂ for the year 2014²³. These large amounts of subsidies provided for fossil fuels in effect act as a negative carbon tax that threatens to undermine the progress that can be achieved with the utilization of carbon pricing instruments around the world. Therefore, another consideration should be phasing out of this fossil fuel subsidies to enable the full benefits of carbon pricing instruments to be realized. The share of subsidized CO₂ emissions has been falling in the last years. While 14% of all CO₂ emissions were being subsidized on 2012, this share fell to 13% on the year 2014. This decline was caused mostly by the recent reforms in diesel subsidies in India and Indonesia²⁴.

Even though the benefits of carbon pricing can seem apparent, it is often hard to implement such policies due to significant political barriers. Public tendencies may be resistant toward any measures that may increase energy consumption prices. For this reason, revenue neutral carbon pricing measures can be regarded as more politically feasible since they would not increase the tax burden on the society.

One other issue that is being put forward by the opponents of carbon pricing is carbon leakage. Carbon leakage refers to the worry that when an individual country prices carbon, high carbon investments may instead flow to other countries with less stringent climate change policies. This would in theory cause a loss of competitiveness for the country that implements the measure while not achieving the desired amount of carbon mitigation when viewed from a global perspective. The main reason for this is that the efforts to price carbon around the world remain fragmented. The coverage and the prices vary greatly

23 International Energy Agency, 'Energy and Climate Change, World Energy Outlook Special Report'(2015), p. 23

24 Ibid, p. 71

between countries that have carbon pricing measures in place. In such an environment, countries are legitimately concerned that pursuing ambitious action may undermine their international competitiveness. Reportedly, carbon leakage hasn't yet occurred at a significant scale, but the risk of it still deter many countries from taking more progressive action in climate change mitigation. It can be expected that the risk of carbon leakage will decline as more countries continue to take concrete action against climate change. Future international cooperation and coordination will be important to address the risks of carbon leakage and create a more favorable environment for global climate change mitigation²⁵.

Despite these problems, carbon pricing instruments continue to be more popular around the world as ways to address the problem of climate change. Lately, more hybrid policy mechanisms are being used in various countries combining elements of both carbon taxation and cap and trade systems to achieve the most efficient results. For example, various European countries that are employing a carbon tax are also employing the EU ETS mechanism in addition to it. In these countries, the sectors that are eligible for emissions trading are generally exempt from carbon taxation²⁶. It can be expected that in the near future, countries will continue to devise new policy mechanisms bringing together different aspects of the carbon taxation and ETS mechanisms in order to benefit from the distinct advantages of each option.

HISTORICAL AND CURRENT STATE OF CARBON TAXATION IN THE WORLD

Even though the idea of carbon taxation was being discussed as early as the 1970's²⁷, carbon taxation measures first began to be utilized in the early 1990's mainly by several Northern European countries. Finland was the first to adopt a carbon tax in 1990²⁸. Since then, several countries have experimented with carbon taxation policies and some have been employing carbon taxation mechanisms over long periods of time. Although the policy mechanism has been widely debated on throughout the decades to follow, it hasn't witnessed more widespread application until the end of the 2000's as the negative effects associated with climate change started to be felt more acutely. It can be assumed that the policy mechanism will gain increased attention and utilization following the Paris Conference as countries will be compelled to adopt new policies and revise their existing policy tools in order to fulfill their commitments made at the conference.

There are currently 18 countries in the world which have adopted a carbon taxation scheme at the national level. These include a wide variety of countries spanning different continents and including both developed and developing nations. The list of countries that are utilizing a carbon tax mechanism include South Africa, Mexico, Japan, France, United Kingdom, Denmark, Finland, Sweden, Norway, Ireland, Iceland, Switzerland, Chile, Portugal, Estonia, Latvia, Slovenia and Poland²⁹. Additionally, Australia had a carbon tax

25 World Bank Group and Ecofys, 'State and Trends of Carbon Pricing'(2015), p. 52

26 Escarus Sürdürülebilir Danışmanlık, 'İklimin Finansmanı, Yeşil Tahviller, Karbon Fiyatlandırma'(2016), p. 8

27 Hayrullahoğlu, Betül, 'Çevresel Sorunlarla Mücadelede Karbon Vergisi', *Ekonomi Bilimleri Dergisi* Cilt 4, No 2, 2012, p. 4

28 Sumner, Jenny, Bird, Lori and Smith, Hillary, 'Carbon Taxes: A Review of Experience and Policy Design Considerations'(2009), National Renewable Energy Laboratory, p. 1

29 World Bank Group and Ecofys, 'Carbon Pricing Watch 2016, An advance brief from the State and Trends of Carbon Pricing 2016 report, to be released late 2016'(2016), p.5

in place between the years 2012 and 2014, which was subsequently repealed³⁰.

There also several applications of carbon taxation at the sub-national level. The most prominent of these are several provincial governments in Canada such as Alberta, British Columbia and Quebec. Additionally, there are a few regional governments in the US that have a carbon tax in place. Boulder, a town of around

100,000 in Colorado, became the first local administration in the US to adopt such a tax on the year 2007³¹. The Bay Area Air Quality Management District which incorporates 9 counties in the San Francisco Bay Area is another example of a local administration in the US that has been applying a carbon tax³².

A general list of countries and local governments that have adopted a carbon tax can be seen at the map below.

Map of Existing Carbon Tax Instruments in the World



Source: World Bank Group and Ecofys, 'Carbon Pricing Watch 2016, An advance brief from the State and Trends of Carbon Pricing 2016 report'

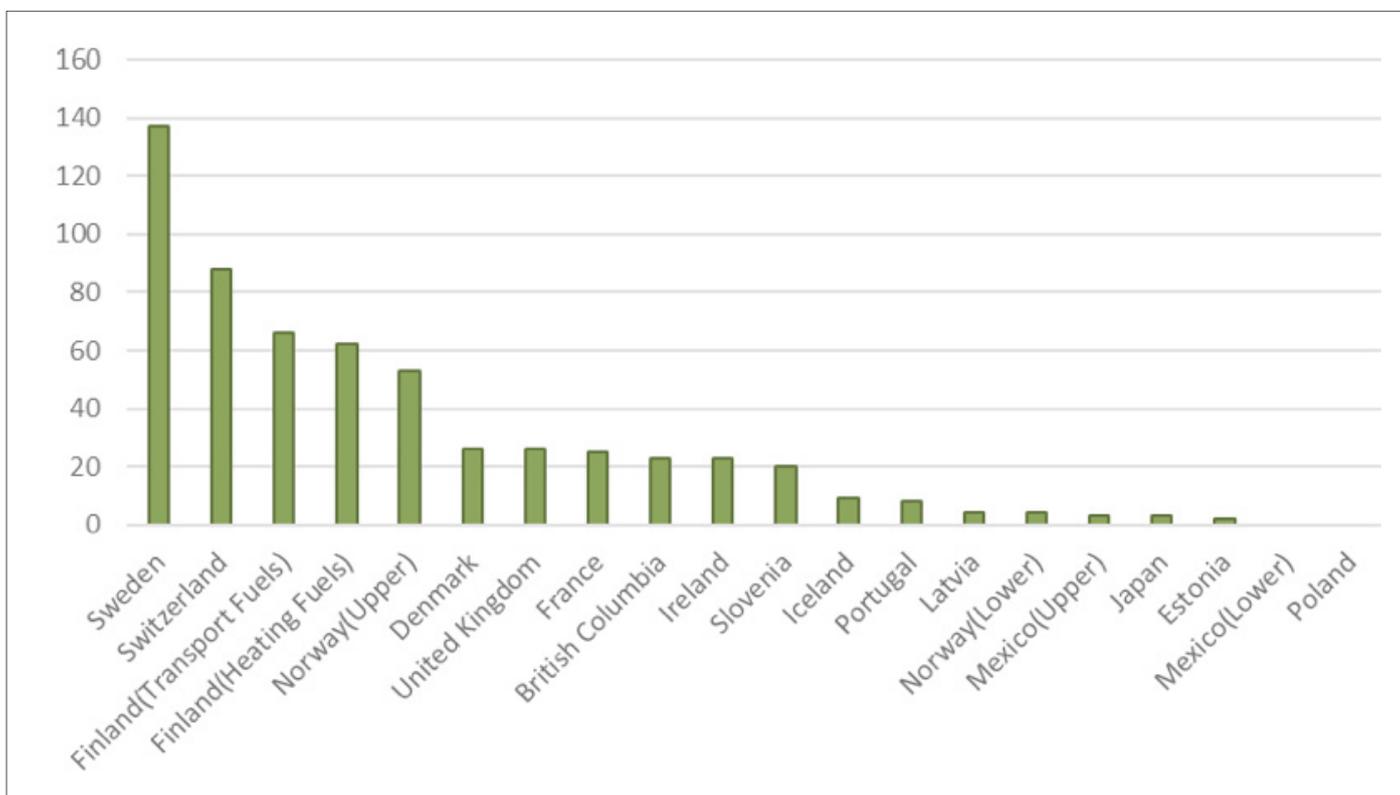
30 The Guardian, 17.8.2016, 'Carbon tax is gone: Repeal bills pass the Senate', accessed from <http://www.theguardian.com.au/story/2423819/carbon-tax-is-gone-repeal-bills-pass-the-senate/?cs=8> on 3.8.2016

31 Bhatt, Neha and Ryan, Michael, 'Carbon Energy Tax, Boulder, CO'(2012), Smart Growth America, accessed from <http://www.smartgrowthamerica.org/documents/Boulder-Carbon-Tax.pdf> on 7.7.2016

32 Sumner, Jenny, Bird, Lori and Smith, Hillary, 'Carbon Taxes: A Review of Experience and Policy Design Considerations'(2013), National Renewable Energy Laboratory, p. 5

The specific characteristics of the tax differ greatly between the countries that employ it. Some of the countries employ carbon taxation economy-wide, while others restrict the utilization of the tax to certain sectors. There are also important differences on how the revenues generated by the tax are used across different countries. The amount of the tax differs greatly among countries, with up to 137 US dollars per ton of CO2 equivalent in Sweden to less than 1 US dollars per ton of CO2 equivalent in various countries³³.

Amount (US dollars per ton of CO2e)



Source: World Bank Group and Ecofys, 'Carbon Pricing Watch 2016, An advance brief from the State and Trends of Carbon Pricing 2016 report'

Additionally, many countries in the world have various tax designs in place which can't be classified as carbon taxes but act in very much the same way. For example, Costa Rica has had a 3,5% percentage based taxed that is applied on hydrocarbon sources since the year 1997³⁴. It is also noteworthy to mention India

33 World Bank Group and Ecofys, 'Carbon Pricing Watch 2016, An advance brief from the State and Trends of Carbon Pricing 2016 report, to be released late 2016'(2016), p. 6

34 Marron, Donald, Toder, Eric and Austin, Lydia, 'Taxing Carbon: What, Why and How?'(2015), Tax Policy Center, Urban Institute and Brookings Institution, p. 22

which applies a significant amount of tax on coal³⁵. The 'Clean Environment Cess' as the tax is officially called, was recently doubled, bringing the amount to around 6 US dollars per ton of coal mined or imported to the country.

There are also several countries in which the implementation of a carbon tax is being considered. Canada, Korea and Brazil can be listed among others as countries which may potentially develop national carbon tax mechanisms in the near future³⁶.

China has been trying to set up carbon pricing instruments in the recent years. There are currently seven pilot carbon trading schemes that are operational in the country, effectively making the country the second largest carbon market in the world³⁷. Preparations for a national ETS are also ongoing and the national ETS is expected to come into force by the year 2017³⁸. There are also discussions for a possible carbon tax mechanism to be set up in the country but it currently seems like China will be opting for an ETS system as a means of carbon pricing.

An important point of note is that increasingly developing nations are actively considering the adoption of carbon taxation and carbon pricing mechanisms in general. Countries like Mexico, Chile, China and India are developing countries that have traditionally been averse to pursuing ambitious climate change action. Therefore, what we are observing can be characterized as a new phase in the global struggle against climate change. In the near future, Turkey can also be

expected to follow this trend and take more progressive action with regards to carbon pricing. As will be mentioned in later sections, Turkey is already making preparations to implement its own carbon pricing mechanisms. On the other hand, several new developments have also been happening in some of the largest emitters in the industrialized parts of the world.

DEVELOPMENTS IN THE UNITED STATES

Adoption of a federal carbon tax has recently been a heated topic of discussion in the US. The Obama administration has proposed the adoption of a tax on oil consumption that would be applied as 10 US dollars per barrel to be included in his 2017 fiscal budget plan³⁹. Although it is unclear whether the proposed budget will get past the Congress, the proposal itself is significant since it shows that a serious discussion on carbon taxation is going on in the country. Adoption of a federal carbon tax has also been a topic of discussion in the recent presidential election. A carbon tax was advocated by Bernie Sanders who has been one of the two leading nominees for the Democrat Party for the 2016 presidential elections⁴⁰. It can be expected that the possibility of a federal carbon tax will continue to be on the agenda for the US in the foreseeable future.

There are also several developments that can be expected at the state level. The US Environmental Protection Agency (EPA) has prepared the Clean Power Plan on August, 2015 which aims to significantly reduce the greenhouse gas emissions of the country caused by the electricity generation sector. The plan will be an important instrument in upholding the international

35 Clean Technica, 4.3.2016, 'India Doubles Tax On Coal Again', accessed from <http://cleantechnica.com/2016/03/04/india-doubles-tax-coal/> on 6.6.2016

36 PowerPoint Presentation. 'Overview of Carbon Taxes around the World and Principles and Elements of Carbon Tax Design'(2014), Robertson, C. Williams, Partnership for Market Readiness

37 International Energy Agency, 'Energy and Climate Change, World Energy Outlook Special Report'(2015), p. 23

38 World Bank Group and Ecofys, 'Carbon Pricing Watch 2016, An advance brief from the State and Trends of Carbon Pricing 2016 report, to be released late 2016'(2016), p. 9

39 Bloomberg Politics, 4.2.2016, 'Obama \$10-Per-Barrel Oil Tax Lands With Thud in Congress', accessed from <http://www.bloomberg.com/politics/articles/2016-02-04/obama-to-request-10-per-barrel-oil-tax-for-transportation-needs> on 6.7.2016

40 The Guardian, 7.12.2016, 'Bernie Sanders urges carbon tax and deeper emissions cuts in climate plan', accessed from <https://www.theguardian.com/us-news/2015/dec/07/bernie-sanders-urges-carbon-tax-and-deeper-emissions-cuts-in-climate-plan> on 6.7.2016

mitigation commitments of the country under the Paris Agreement⁴¹. The plan effectively sets a limit on the carbon emissions of the country caused by the electricity generation sector. The target is to reduce the emissions from the sector by 32% by the year 2030 compared to the 2005 levels. Under the plan, emission reduction targets are specified for each state based on their different circumstances and characteristics. The policies that will be used for reaching the targets are left entirely to the choice of each individual state. However, the states are required to submit their plans to the EPA between the years 2016 and 2018. They will then be expected to start cutting their emissions by 2022. If any state refuses to submit its mitigation plans by the deadline, the EPA will be authorized to draft a plan on behalf of that state⁴².

It is expected that carbon taxation measures will be one of the preferred policy options that the US states will pursue with the adoption of the Clean Power Plan⁴³. There are already several ETS programs in the US that are adopted by some of the states. California has an ETS program in place and the Regional Greenhouse Gas Initiative is another such program that encompasses 9 states in the Northeast of US⁴⁴. Moreover, the two US states of Oregon and Washington are also actively considering the implementation of an ETS⁴⁵. It can be expected that other carbon pricing mechanisms will be set up at different states including both carbon taxation and ETS options as the states

41 US Environmental Protection Agency, accessed from <https://www.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants> on 8.6.2016

42 Environmental Protection Agency, accessed from <http://www2.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule.pdf> on 25.1.2016

43 Brookings, 4.5.2016, '9 things you should know about the carbon tax', accessed from http://www.brookings.edu/blogs/brookings-now/posts/2016/05/9-things-you-should-know-about-a-carbon-tax#.Vyt_tifqWO4.twitter on 19.7.2016

44 Center for Climate and Energy Solutions, accessed from <http://www.c2es.org/us-states-regions/key-legislation/california-cap-trade> on 19.7.2016

45 World Bank Group and Ecofys, 'State and Trends of Carbon Pricing'(2015), p. 42

will strive to fulfill their obligations under the Clean Power Plan. Nevertheless, the Clean Power Plan has been recently suspended by the Supreme Court and the prospects for its implementation will not be clear until the final ruling of the court⁴⁶.

DEVELOPMENTS IN THE EUROPEAN UNION

European Union has for long been the pioneer in the global mitigation efforts against climate change. One of the most central policy mechanisms in this has been the EU ETS. However, currently, there are several question marks regarding the future of the policy mechanism. The system is currently facing a significant challenge due to a growing surplus of allowances. The surplus is largely due to the greater than anticipated reduction in emissions since 2008 mainly as a result of the global economic crisis. As a result, the value of the EU ETS was still more than all the other ETS programs in the world in 2014, but was only worth one-fifth of its own level in 2008⁴⁷.

For the short term, this surplus puts the orderly functioning of the carbon market at risk while for the long term it can potentially hamper the ability of the EU ETS to reduce future emissions in a cost effective manner. To address the problem, the European Commission has opted to postpone the auctioning of some of the allowances as an immediate action, while also launching discussions on structural reforms that can provide a sustainable solution for the long term⁴⁸.

In 2014, as a short term measure, the EU decided

46 Forbes, 18.2.2016, 'The Supreme Court Suspends Obama's Clean Power Plan: Changing The Law On Staying Put', accessed from <http://www.forbes.com/sites/uhenergy/2016/02/18/the-supreme-court-suspends-obamas-clean-power-plan-changing-the-law-on-staying-put/#4bf9fe86f0a7> on 20.7.2016

47 International Energy Agency, 'Energy and Climate Change, World Energy Outlook Special Report'(2015), p. 23

48 European Union, 'The EU Emissions Trading System (EU ETS)', accessed from http://ec.europa.eu/clima/publications/docs/factsheet_ets_en.pdf on 19.7.2016

to temporarily postpone the auctioning of 900 million allowances from the period of 2014-2016 to the period 2019-2020 in a process referred to as backloading. In 2015, the establishment of the Market Stability Reserve was agreed upon as a long term measure to address the problems faced by the EU ETS. The new system is designed to remove allowances from the market when supply is much higher than demand and injecting allowances when the situation is reversed. Unallocated allowances will also be reserved under this new system which will become operational on 2019⁴⁹. Other changes that were agreed upon include increasing the annual cap reduction from 1,74% to 2,2%, adopting better targeted rules for the free allocation of allowances and establishing funds using the allowances with the aim to promote low-carbon innovation and modernization of the energy sector in the lower income member states⁵⁰.

Currently, there is no indication that we will be seeing a EU-wide carbon tax mechanism in the near future. However, as we have seen, several countries inside the EU are employing carbon taxation at a national level to capture those emissions that can't be priced under the EU ETS. An argument in favor of applying carbon taxes in European countries is that such taxes can potentially help in solving the fiscal deficit problems faced by many EU member states with relatively less damage to the economy. It is argued that carbon taxation would have a less detrimental effect on the economy compared to other tax options. Therefore, carbon taxation can potentially be viewed as a useful fiscal policy tool for the European countries along with its role in combating climate change⁵¹.

49 World Bank Group and Ecofys, 'State and Trends of Carbon Pricing'(2015), pp. 44-45

50 Ibid.

51 Vivid Economics, 'Carbon taxation and fiscal consolidation: the potential of carbon pricing to reduce Europe's fiscal deficits'(2012), report prepared for the European Climate Foundation and Green Budget Europe, p. 2

THE EXPECTED IMPACT OF THE PARIS CONFERENCE

The 21st session of the Conference of Parties(COP) took place between 30 November and 11 December 2015 in Paris, France. The goal of the conference was to establish a post-Kyoto global climate change regime. Ever since the expiration of the first commitment period of the Kyoto Protocol on 2012, the negotiations in the international climate change conferences aimed at reaching a new global climate change agreement that would ideally include all the countries in the world. The efforts at the previous conferences culminated in the adoption of the Paris Conference. Although the new regime still has various uncertain elements that will need to be resolved in future negotiations, the outcome of the conference signaled a historic moment with nearly all the parties to the UNFCCC taking on mitigation commitments.

In the Paris Agreement, it was agreed to hold the increase in global temperatures below 2° C, with further efforts to limit the increase to 1,5° C. The main instruments that are used to enforce this target are the mitigation commitments submitted to the UNFCCC in the form of INDC's. These documents outline each countries' climate change mitigation plans and set specific mitigation targets for the period between 2020 and 2030⁵².

However, despite the progress achieved in the Paris Conference, the current trajectory points to an increase in temperature levels that will exceed the 2° C limit. Recent research undertaken by the Intergovernmental Panel on Climate Change (IPCC) demonstrates that the increase in global temperatures have already reached 0.85° C by the year 2012⁵³. Moreover, it is estimated that 65% of the carbon budget on the

52 United Nations Framework Convention on Climate Change, accessed from <https://unfccc.int/resource/docs/2015/cop21/eng/109.pdf> on 9.6.2016

53 Intergovernmental Panel on Climate Change, 'Climate Change 2014 Synthesis Report Summary for Policymakers'(2014), p. 2

course to limit the temperature increase to 2° C has already been exhausted between the years 1870 and 2011⁵⁴. Therefore, it can be said that the window of opportunity is currently quite narrow and urgent action is required to prevent catastrophic climate change. According to the estimations made by the Climate Action Tracker, the aggregation of all the INDC's submitted to the UNFCCC have only managed to put the world on a course to limit the temperature increases to 2.7° C by the year 2100, even if it is assumed that all the pledges made in the documents will be fulfilled⁵⁵. Because of this urgency, it can be assumed that several countries may feel compelled to revise their INDC's in the coming years. It can be expected that new and revised carbon pricing policies will play a central role in the new period following the Paris Agreement as part of a broader policy mix. Carbon prices can potentially be set to achieve the mitigation goals set in the INDC's 'using fuel use projections, carbon emissions factors, estimates of changes in future fuel prices from carbon pricing, and fuel price elasticity assumptions'⁵⁶. An ideal way to promote international cooperation in the climate change mitigation effort could be agreeing upon a CO₂ price floor among willing countries which could be pursued alongside the INDC process. Such an agreement would create a degree of protection against competitiveness concerns and fuel smuggling across borders. According to experience, such an approach involving tax floors is easier to agree upon compared to agreeing over specific tax rates⁵⁷.

The importance of carbon pricing is mentioned in the Paris Agreement, recognizing 'the important role of providing incentives for emission reduction activities,

54 Intergovernmental Panel on Climate Change Climate Change 2014 Synthesis Report

55 Gütschow, Johannes, Jeffery, Louise, Alexander, Ryan, Hare, Bill, Schaefer, Michiel, Rocha, Marcia, Höhne, Niklas, Fekete, Hanna, van Breevoort, Pieter and Blok, Kornelis, 'INDC's lower projected warming to 2.7°C: significant progress but still above 2°C'(2015), p. 2

56 International Monetary Fund, 'After Paris: Fiscal, Macroeconomic, and Financial Implications of Climate Change'(2016), pp. 18-19

57 Ibid, pp. 26-27

including tools such as domestic policies and carbon pricing⁵⁸. Carbon pricing was a frequently mentioned policy tool in the countries' national plans submitted to the UNFCCC as more than 90 countries included a mention of carbon pricing in their INDC's⁵⁹. Other countries also shared their progress in their market readiness plans supported by the Partnership for Market Readiness(PMR). For example, Chile has reported on its operationalization of its carbon tax, China on its pilot ETS programs and Turkey on setting its GHG reporting and verification infrastructure⁶⁰.

Another important factor that may make the adoption of a carbon tax easier in the near future is the ongoing case of low fossil fuel prices. In a recent op-ed, Kemal Derviş and Karim Foda argue that with a carbon tax that fluctuates asymmetrically with the price of oil, 'policymakers could use the market to help propel their economies away from dependence on fossil fuels, redistributing producer surplus from oil producers to the treasuries of importing countries, without placing too large or sudden a burden on consumers'. According to the authors, the key ensuring political feasibility for this strategy would be to launch it while the oil prices remain very low⁶¹.

COMPARING THE ETS AND CARBON TAX OPTIONS

Carbon taxation and ETS are the two main types of carbon pricing mechanisms that are being utilized in the world. Although the main premise of both methods is the same, there are also some key distinctions

58 United Nations Framework Convention on Climate Change, accessed from <https://unfccc.int/resource/docs/2015/cop21/eng/109.pdf> on 9.6.2016

59 The World Bank, accessed from <http://www.worldbank.org/en/news/feature/2016/05/09/leaders-meet-in-lima-to-discuss-next-steps-on-carbon-pricing> on 20.7.2016

60 Ibid.

61 Brookings, 16.2.2016, 'Time for a carbon tax', Derviş, Kemal and Foda, Karim, Accessed from <https://www.brookings.edu/opinions/time-for-a-carbon-tax/> on 19.7.2016

that separate the two policies. Both ETS and carbon taxation methods offer increased efficiency compared to regulatory approaches by achieving emissions reduction at minimal cost. Carbon taxation achieves this by setting a price for emissions and allowing the quantity to be determined by the market while ETS programs set a maximum quantity for carbon emissions and allow the price to be determined by the market⁶². As a result of this key difference, various advantages and disadvantages of the two options become evident on a number of key policy issues.

Revenue Distribution

One key difference between the two systems is on revenue distribution. Under a carbon tax, the costs to the firms are higher as the tax revenues are collected by the government. On the other hand, the costs of the firms are lower under an ETS mechanism. Carbon tax revenues can be integrated into a state fiscal policy due to their relative predictability whereas the inherent price volatility of ETS programs preclude them from being regarded as reliable revenue sources⁶³. As witnessed in the case of the EU ETS, carbon trading programs can potentially be plagued by a high degree of price fluctuation whereas the revenue projections under a carbon tax system would be more reliable.

On the issue of revenue distribution, there is also the question of equity. An argument raised against ETS mechanisms is that it is not equitable to reward large emitters by allowing them to raise funds by reducing their emissions, because that is in essence rewarding them for their previous years of polluting the environment. The adherents of the argument maintain that a carbon taxation system would be more equitable where the collected funds could in principle be used

for the benefit of the society⁶⁴.

Price Predictability

One important advantage that carbon taxes have over ETS programs is the predictability of price. The price of carbon can significantly fluctuate under ETS programs, making investment decisions harder for firms and increasing risks. On the other hand, the price of carbon is fixed in carbon tax systems even though it may be adjusted over the years. The predictability in the price of carbon lends predictability to energy prices thus encouraging investments in low-carbon energy sources in contrast to a carbon market where the price may change drastically in a relatively short amount of time. Price volatility thus undermines a systems cost effectiveness by creating large differences in abatement costs at different points in time. Many of the emission reduction technologies have high upfront costs, exacerbating the problem of price instability⁶⁵.

It must be noted that there are ways to increase price stability and predictability under ETS mechanisms such as employing price floors and ceilings. However, employing such measures run the risk of overcomplicating the system and incurring additional costs. The EU ETS is currently under transformation to adopt such measures to address price volatility. It won't be before many years that we will be able to observe whether the changes in the policy mechanism will yield the desired outcomes.

Overall Effect on Emissions

Although both carbon taxes and ETS programs can have positive impacts on emission reductions, the predictability of the two systems overall effect on emissions is not the same. By setting an overall limit on emissions, ETS programs can have a more certain

62 Kaufman, Noah, Obeiter, Michael and Krause, Eleanor, 'Putting a Price on Carbon: Reducing Emissions'(2016), World Resources Institute, p. 5

63 Carbon Tax Center, accessed from <http://www.carbontax.org/cap-and-trade-problems/> on 20.7.2016

64 Mankiw, N. Gregory, 'Smart Taxes: An Open Invitation to Join the Pigou Club', *Eastern Economic Journal*, 2009, 35, pp. 18-19

65 International Monetary Fund, 'After Paris: Fiscal, Macroeconomic, and Financial Implications of Climate Change'(2016), p. 18

effect on emissions. On the other hand, since there is no emissions limit set by a carbon tax, the effects of a carbon tax on overall emissions reductions will be less certain⁶⁶. Therefore, it can be argued that for the single purpose of achieving a specified level of reduction in emissions, ETS programs can be more effective.

Transparency

Carbon taxes are generally considered more transparent and understandable compared to ETS programs. This feature makes carbon taxes more likely to draw public support as ETS programs can be more difficult to understand and gather support from the perspective of the general public⁶⁷. The determination and the application of the tax amount is clear while the pricing and costs under an ETS program are harder to understand⁶⁸. Additionally, as policymakers include more flexible design elements to address the price volatility problem inherent in ETS programs, such schemes may increase in complexity and transparency⁶⁹.

Difficulty in Implementation

All of the countries in the world have existing taxation systems in place and a carbon tax can easily be built upon the existing tax infrastructure without need for extensive changes in the legislative and regulatory framework. On the other hand, the implementation of ETS systems can be more complex as it would require the setting up of new administrative structures

66 Goulder, Lawrence H. and Schein, Andrew R., 'Carbon Taxes versus Cap and Trade: A Critical Review'(2013), *Climate Change Economics*, Volume 4, No 3, p. 14

67 Carbon Tax Center, accessed from <http://www.carbontax.org/cap-and-trade-problems/> on 20.7.2016

68 Çiçek, Hüseyin Güçlü and Çiçek, Serdar 'Karbon Vergisi ile Karbon Ticareti İzinlerinin Karşılaştırılması', (2012), *İ.Ü. Siyasal Bilgiler Fakültesi Dergisi* No:47, p. 111, accessed from <http://ist-univ.dergipark.gov.tr/download/article-file/5693> on 16.7.2016

69 Ramseur, Jonathan L. and Parker, Larry 'Carbon Tax and Greenhouse Gas Control: Options and Considerations for Congress'(2009), *Congressional Research Service*, p. 16

for the allocation of allowances⁷⁰. Carbon taxes can be implemented more easily and quickly compared to ETS programs. Taxes on fuel can be the easiest to administer since it would only require changes in the amount of the tax reflecting the carbon content of the fuel source⁷¹. This distinction can be especially important for developing countries which may lack the necessary administrative capacity to enforce new regulations and carbon trading⁷².

Manipulability

A potential shortcoming of ETS programs is that they can be prone to manipulation by special interest groups, especially by the financial industry. On the other hand, a carbon tax would create little incentive or opportunity for rent seeking or cheating⁷³. According to Nordhaus, 'A price approach gives less room for corruption because it does not create artificial scarcities, monopolies, or rents. There are no permits transferred to countries or leaders of countries, so they cannot be sold abroad for wine or guns'⁷⁴.

Adjustability

Under a carbon tax system, the amount of the tax would need to be regularly adjusted according to the changing economic conditions over the years. A carbon tax can easily be adjusted over a timeframe if it is found to be too low or too high to deliver the desired results. However, an ETS program is more difficult to

70 Frank, Charles, 'Pricing Carbon: A Carbon Tax or Cap-And-Trade?'(2014), *Brookings Institution*, accessed from <http://www.brookings.edu/blogs/planetpolicy/posts/2014/08/12-pricing-carbon-frank> on 4.6.2016

71 Congress of the United States, Congressional Budget Office, 'Policy Options for Reducing CO2 Emissions'(2008), pp. 12-13

72 International Monetary Fund, 'After Paris: Fiscal, Macroeconomic, and Financial Implications of Climate Change'(2016), pp. 15-16

73 Green, Kenneth P., Hayward, Stephen F. and Hassett, Kevin A., 'Climate Change: Caps vs. Taxes'(2007), *American Enterprise Institute for Public Policy Research*, pp. 5-6

74 Nordhaus, William D., 'Life After Kyoto: Alternative Approaches to Global Warming Policies'(2005), accessed from http://www.econ.yale.edu/~nordhaus/kyoto_long_2005.pdf on 3.8.2016

adjust because permits reflect a significant monetary value. Because of this, permit traders can be greatly affected by sudden changes in the permit prices caused by government intervention. Therefore, carbon tax programs offer a greater degree of adjustability compared to ETS programs⁷⁵.

Applicability across Sectors

ETS programs can be more easily implemented on large emitters such as large industrial facilities and large energy generators. However, carbon trading can't be easily applied on smaller emitters such as those in

the automobile transportation and residential heating/cooling sectors. For those sectors, a carbon tax is the preferred way to promote GHG emissions reductions⁷⁶.

Applicability across Countries

One advantage that carbon taxes have over ETS programs is that in theory they can be more easily replicated across borders. That is because the price metric embodied in a carbon tax is much more universal in nature compared to the quantity reduction metric used under ETS programs⁷⁷.

Carbon Taxation	Emissions Trading System
Can provide a cost effective way of carbon mitigation	Can provide a cost effective way of carbon mitigation
Can generate revenues	Can generate revenues
Price is set, quantity is determined by the market	Quantity is set, price is determined by the market
Price needs to be administratively changed over time to adjust to evolving conditions	Price automatically adjusts itself to changing conditions
Provides more price predictability for the future, encouraging investments	Future prices less certain, thus can undermine potential investments
Overall effect on emissions less certain	Overall effect on emissions more certain
Easier to administer and enforce	Harder to administer
Can be easily implemented on several sectors	Harder to implement on the transportation and heating-cooling sectors

75 Green, Kenneth P., Hayward, Stephen F. and Hassett, Kevin A., 'Climate Change: Caps vs. Taxes' (2007), American Enterprise Institute for Public Policy Research, p. 6

76 Frank, Charles, 'Pricing Carbon: A Carbon Tax or Cap-And-Trade?' (2014), Brookings Institution, accessed from <http://www.brookings.edu/blogs/planetpolicy/posts/2014/08/12-pricing-carbon-frank> on 4.6.2016

77 Carbon Tax Center, accessed from <http://www.carbontax.org/cap-and-trade-problems/> on 20.7.2016

CURRENT SITUATION AND LATEST DEVELOPMENTS IN THE TURKISH MARKET

As a developing country with rapidly rising GHG emissions, Turkey has a considerable responsibility in combating climate change. Although, the share of the country's emissions is still relatively small compared to the total global emissions, the rate of increase of the country's emissions in the recent decades has been alarming. According to the data provided by the Turkish Statistical Institute, the country's total emissions amounted to around 467,6 million tons of carbon equivalent for the year 2014, up from 207,6 million tons in 1990⁷⁸. This marks a rapid increase of around 125% in the order of 24 years.

The processes of rapid industrialization and urbanization the country is going through are set to continue in the near future. Therefore, it can be expected that the energy demand of the country will continue to increase in the following decades, necessitating an important amount of investments into the energy sector. Because of this, the policy choices the government makes today are crucial in determining the emissions trajectory of the country for years to come.

Turkey has been a party to the UNFCCC since the year 2004 and has ratified the Kyoto Protocol in 2009. Despite this, Turkey didn't take on any mitigation commitments under the first and second commitment periods of the protocol. During the Kyoto Protocol's timeframe, the only commitment of the country was to monitor its emissions from all sources. The country's first National Plan on Climate Change was published in 2011 by the Ministry of Environment and Urbanization but the document didn't specify any mitigation targets⁷⁹. The Paris Agreement marks the

78 Turkish Statistical Institute, accessed from http://www.tuik.gov.tr/PreTablo.do?alt_id=1019 on 22.7.2016

79 Gevrek, Z. Eylem and Uyduranoğlu, Ayşe, 'Public preferences for carbon tax attributes', *Ecological Economics* 118 (2015), p. 186

first time that Turkey has undertaken a GHG reduction commitment.

In its INDC submitted to the UNFCCC, Turkey has pledged to reduce its GHG emissions by 21% by the year 2030, compared to its business-as-usual scenario. However, due to the high carbon growth trajectory in the official scenario, the pledge mostly fails to provide a meaningful mitigation commitment. The business-as-usual scenario foresees a nearly 150% increase in the country's emissions between the years 2015 and 2030. With the mitigation commitment, Turkey effectively promises to raise its emission levels to 929 million tons of CO₂ equivalent by the year 2030 compared to 467,6 in 2014⁸⁰. This pledge falls decidedly short compared to many of the pledges made by developing country parties to the UNFCCC. According to the Climate Action Tracker which assessed the ambition of the submitted INDC's, Turkey's INDC was inadequate and not in line with the 2° C target agreed upon in the agreement⁸¹.

Climate change mitigation is also one of the priorities of the coordinated environmental policy pursued by the EU. The implementation of a more comprehensive and ambitious GHG mitigation policy would help Turkey demonstrate that it is willing to fulfill its obligations for membership to the organization⁸². Turkey will be expected to align its climate change and energy policies with those in the EU if the country is willing to pursue its decades long goal of joining the organization as a full member.

Additional policies will probably not be required to fulfill the current commitment of the country outlined in its INDC. However, as the global climate change landscape shifts and more countries around

80 The Republic of Turkey, Intended Nationally Determined Contribution, accessed from http://www4.unfccc.int/submissions/INDC/Published%20Documents/Turkey/1/The_INDC_of_TURKEY_v.15.19.30.pdf on 5.6.2016

81 Climate Action Tracker, accessed from <http://climateactiontracker.org/countries/turkey> on 22.7.2016

82 Gevrek, Z. Eylem and Uyduranoğlu, Ayşe, 'Public preferences for carbon tax attributes', *Ecological Economics* 118 (2015), p. 187

the globe continue to take meaningful action against climate change, Turkey will be compelled to undertake more ambitious action. A new type of energy economy is emerging in the world as low carbon technologies are being rapidly developed creating significant opportunities for economic development and employment. If Turkey insists on relying on high carbon sources for fueling its economy, it would run the risk of missing this technological evolution and the opportunities that come with it. As a country with a rapidly growing energy demand, Turkey has to design an effective climate change policy that will align the developmental needs of the country with its international responsibilities in the struggle against climate change. The employment of carbon pricing options can potentially play a central role in this effort.

Turkey has little actual experience in employing market based climate policy tools. So far, the country has engaged in the voluntary carbon market which is not regulated under any official legislation⁸³. On the other hand, Turkey has been making significant efforts for preparing for the implementation of carbon pricing mechanisms in the country. It can be expected that following the activation of the Paris Agreement, the monitoring of GHG emissions will be of critical importance. Turkey has been working on the monitoring and verification of GHG emissions in collaboration with the Partnership for Market Readiness(PMR) program operating under the World Bank since the year 2011⁸⁴. A preliminary assessment for a pilot carbon market program in Turkey is going on within the scope of the project. The electricity generation sector, refineries and cement manufacturing sectors are targeted for the pilot carbon trading program. Reportedly, preparations for setting up a GHG monitoring, review and verification system in 18 power plants, 1 refinery and 5 cement factories has been going on in 2015 as part of the project. Furthermore, the preparations are going on for the launching of a report regard-

ing carbon pricing options that will be presented to the Coordination Board on Climate Change⁸⁵.

There have also been recent developments in terms of using taxation as a pricing strategy to reduce GHG emissions. Additionally, in the draft of the 'National Energy Efficiency Action Plan' prepared by the Ministry of Energy and Natural Resources, there was mention of a possible climate change levy that would be applied on the electricity and natural gas consumption of industrial and commercial customers⁸⁶. Moreover, there has also been recent developments in the transportation sector. The Turkish Finance Ministry announced a plan in 2013 for restructuring vehicle taxes based on the pollution generated by the vehicles instead of determining the amount based on engine size and age⁸⁷.

Electricity generation constitutes one of the foremost causes of carbon emissions in the country. In the recent years, Turkey has been pursuing an energy policy based on substantially increasing coal-fired electricity generation. Coal-fired generation capacity in the country has rapidly increased in the last decade up to 14.8 GW in 2014 from 6.8 GW in 1990⁸⁸. The increase in the utilization of coal is expected to continue in the foreseeable future as a result of several policies designed to promote electricity generation based on domestic lignite sources. In 2014, 133 of the total 467.6 million tons of CO₂ equivalent emissions released in the country was caused by coal combustion. 76 million tons of this figure was caused from power plants fueled with coal energy⁸⁹.

85 Escarus Sürdürülebilir Danışmanlık, 'İklimin Finansmanı, Yeşil Tahviller, Karbon Fiyatlandırma'(2016), p. 10

86 'Draft of Turkey Energy Efficiency Action Plan', accessed from http://www.eie.gov.tr/duyurular_haberler/document/UEVEP_TASLAK.pdf on 22.7.2016

87 Gevrek, Z. Eylem and Uyduranoğlu, Ayşe, 'Public preferences for carbon tax attributes', *Ecological Economics* 118 (2015), p. 187

88 Turkish Electricity Transmission Company, accessed from <http://www.teias.gov.tr/> on 25.7.2016

89 Algedik, Önder, 'Kömür ve İklim Değişikliği-2016'(2016), p. 4, accessed from <http://www.onderalgedik.com/wp-content/uploads/2016/06/Komur-2016.pdf> on 23.7.2016

83 Gevrek, Z. Eylem and Uyduranoğlu, Ayşe, 'Public preferences for carbon tax attributes', *Ecological Economics* 118 (2015) , p. 186

84 Ministry of Environment and Urbanization, accessed from <https://www.csb.gov.tr/db/iklim/editordosya/file/PMR.pdf> on 23.7.2016

There is currently an extensive amount of subsidies provided for coal energy in Turkey. According to a study undertaken in 2015, the total amount of subsidies provided for the coal industry amounted to 730 billion US dollars for the year 2013. It is also added that this figure only includes the quantifiable types of subsidies and leaves out more qualitative subsidies such as investment guarantees and the subsidies provided under the Regional Incentive Scheme. Therefore, it can be expected for the actual amount of subsidies to be significantly higher than the estimate⁹⁰.

More recently, other changes have been made regarding the coal energy policies of the country. On June 2016, several changes were made in the Electricity Market Law, which is the main legislative document regulating the electricity market in the country⁹¹. Among other things, the changes in the law allows for employing purchasing guarantees for electricity generated by domestic coal sources and makes it possible to divide fields of large coal reserves between different investors⁹². The main motivation behind these was to decrease the dependence of the country on imported energy sources. Another recent policy change aimed at this goal was the application of a new tax on imported coal sources. On August 2016, the tax was passed in the Official Gazette imposing a levy on imported coal used in electricity generation in the amount of 15 US dollars per ton to support domestic coal production⁹³.

Research undertaken by the Institute for Energy Economics and Financial Analysis (IEEFA) estimates that a purchasing guarantee applied at 8 USD cents per

90 Acar, Sevil, Kitson, Lucy and Bridle, Richard, 'Subsidies to Coal and Renewable Energy in Turkey' (2015), p.10

91 Official Gazette, accessed from <http://www.resmigazete.gov.tr/eskiler/2016/06/20160617-1.htm> on 26.7.2016

92 Anatolian Agency, 11.7.2016, 'Yerli üretim teşvikleri yatırımcıyı çekiyor', accessed from <http://aa.com.tr/tr/ekonomi/yerli-uretim-tesvikleri-yatirimciyi-cekiyor/605538> on 3.8.2016

93 Reuters, 5.8.2016, 'Turkey imposes import tax on thermal coal for power generation', accessed from <http://in.reuters.com/article/turkey-coal-imports-idINL8N1AM473> on 7.8.2016

kWh for lignite powered power plants would amount to 1.1 billion USD dollars per year⁹⁴. This would bring additional financial burdens on the society and in effect act as a kind of negative carbon tax along with the other existing subsidies provided for coal sources.

Increased utilization of the domestic lignite resources in Turkey is especially problematic in terms of causing carbon emissions because of their low calorific value in comparison to other types of coal. The bulk of the domestic coal reserves in the country consist of lignite reserves which have a considerably lower thermal quality compared to hard coal. Lignite can be considered as one of the dirtiest types of fossil fuels used for electricity generation. The lifecycle CO₂ emissions intensity of lignite is estimated around 1,054 tons of CO₂e/GWh in comparison to 888 for hard coal, 733 for oil and 499 for natural gas⁹⁵.

The impact of coal based electricity generation on the country's emission stock is substantial. Increased utilization of coal energy threatens to undermine the country's efforts against climate change and exacerbates several local environmental problems faced by the country. Therefore, reducing the employment of coal energy should be one of the central purposes of any future carbon pricing instrument that will be introduced in the country for a meaningful GHG mitigation to be achieved.

In addition to the current preparations for setting up a carbon trading system, a carbon tax should also be considered as an alternative or a complementary policy tool in diverting the current policy environment in the country towards a more climate friendly path. It can be expected that the employment of a

94 Yenigün Dilek, Pelin and Schlissel, David, 'Turkey at a Crossroads: Invest in the Old Energy Economy or the New?' (2016), Institute for Energy Economics and Financial Analysis, p. 20

95 World Nuclear Association, 'Comparison of Lifecycle Greenhouse Gas Emissions of Various Electricity Generation Sources' (2011), p. 6, accessed from http://www.world-nuclear.org/uploadedFiles/org/WNA/Publications/Working_Group_Reports/comparison_of_lifecycle.pdf on 19.7.2016

carbon tax would have substantial implications for the country's energy dependence on imported sources. One challenge would be to balance the climate change goals of the country with its targets concerning energy security. Due to the high carbon content of domestic lignite sources, it can be expected that a tax applied based on carbon content would favor imported coal sources against domestic lignite sources in the country's electricity generation mix. Such a tax would also favor imported natural gas against all types of coal thus putting the energy security of the country at risk. However, the main beneficiaries from such a tax would be low carbon energy sources such as wind, solar and nuclear energy that emit nearly zero carbon emissions. The potential for renewable energy sources in the country is substantial and a carbon tax could help realize more of this potential. The further promotion of renewable energy sources in the country would also serve to increase the share of local energy sources in the power generation mix. Moreover, many argue that the current subsidy system provided for renewable energy sources is overly complex and sometimes inefficient. The employment of an economy-wide carbon tax can potentially make some of the existing regulations concerning renewable energy obsolete by providing a more cost effective way of subsidizing low carbon energy sources.

An extensive amount of research hasn't been made on the potential effects of a carbon tax mechanism in the country. One obvious area that a carbon tax can be expected to have a positive impact is reducing the country's carbon emissions. In a recent study undertaken by the WWF-Turkey and Istanbul Policy Center, the prospects for a carbon tax in Turkey was investigated. In the study, it was estimated that with the application of a carbon tax equal to 1,2% of the country's total GDP, the country's total emissions could be reduced by 40% compared to the official plans by the year 2030. This estimation is made with the assumption that the revenues collected by the tax would be used in subsidizing renewable energy sources with the establishment of a 'Renewable Energy Invest-

ment Fund'⁹⁶.

If Turkey decides the adoption of a carbon tax, the specifics on the design on the instrument will be key. One important decision in designing a carbon tax is how to use the revenues that will be generated. In this regard, there are several options. One option could be to design a revenue neutral tax, offsetting the additional charges levied by the tax by reducing existing taxes applied on energy. Such an approach would protect the society against additional tax burdens but also would make it impossible for the revenues to be used in new programs that could potentially promote low carbon growth. Another issue that will need to be addressed when designing a carbon tax will be how to offset the potential negative effects of the tax on low income households and vulnerable sectors. A carbon tax can potentially increase the energy costs, increasing the burden on vulnerable segments in the economy. Special provisions may need to be devised in order to protect the low-income households and such sectors from being negatively affected by the new tax.

A recent study undertaken on the adoption of a potential carbon tax in Turkey reveals important insights on the preferences of the Turkish public regarding carbon taxation. According to the study, the Turkish public favors a carbon tax that would be progressive in character, in that higher income citizens would be compelled to pay more compared to the lower income citizens. Another preference for the tax favored by the public is that the tax revenues should be earmarked either for income distribution or for promoting environmental policies. The study concludes that for Turkey, 'the adoption of an appropriate carbon tax is a viable option and deserves full consideration in addressing climate change'⁹⁷. Taking the public opinion into consideration before designing the tax would be a

96 Yeldan, Erinç, Voyvoda, Ebru, Özgür Berke, Mustafa, Şahin, Ümit and Gacal, Funda, 'Low Carbon Development Pathways and Priorities for Turkey, Climate-Friendly Development in Turkey: A Macro Level Evaluation', WWF-Turkey and Istanbul Policy Center, p.54

97 Gevrek, Z. Eylem and Uyduranoğlu, Ayşe, 'Public preferences for carbon tax attributes', Ecological Economics 118 (2015), pp. 191-195

deciding factor on the success of the policy instrument and its social acceptability.

Subsidies to high carbon sources in the country is another issue that will need to be addressed before the adoption of a carbon tax. Providing large amounts of subsidies for high carbon energy sources while also administering a carbon tax would defeat the purpose of the tax and offset any potential benefits. Therefore, the application of a carbon tax should be accompanied by a fossil fuel subsidy reform that would at least substantially reduce the amount of subsidies provided for high carbon fossil fuel sources in the country such as lignite.

In this new stage of the climate change struggle, it is clear that Turkey needs to significantly reform its energy and climate change policies with a more climate friendly approach. Climate change mitigation in the country needs to be realized by devising policies that would bring minimum harm to the country's developmental prospects. As evidenced by its application in many different parts of the world, carbon pricing can offer a cost effective way of reducing an economy's carbon emissions. Thus, the application of a carbon trading market or a carbon tax should be on the agenda for Turkey in the following years. Each option has various advantages and disadvantages and perhaps a hybrid system bringing different aspects from both policy choices can create the most effective outcomes. Whether Turkey decides to pursue a carbon trading market, a carbon tax or a hybrid of the two, it will be important to investigate the successful case studies in the world in order to implement the best policy practices and adopt them to the specific conditions in the Turkish market.



EDAM Energy and Climate Change
Climate Action Paper Series 2016/3

October 2016

Adopting a Carbon Tax in Turkey: Main Considerations

Gökşin Bavbek
Research Assistant, EDAM