

## **As an EU candidate country Turkey's industrialization and Carbon dioxide emissions**

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### **Abstract**

Industrialization is Turkey's chosen instrument for economic development. The import-substitution development strategy followed up to 1980 was designed to make the country an independent producer of manufactured goods. One of the potential negative side of industrialization in Turkey would be significant increase in CO<sub>2</sub> emissions. This is indeed a major concern, especially given the recent focus in the region on energy-intensive industries and construction which are not particularly friendly environmentally. Carefully balanced industrial planning can allow manufacturing and increase without significantly contributing to accelerated growth in CO<sub>2</sub> emissions. The main objective of the paper is to investigate how to allocate industrial sources to effectively meet targets of environmental protection in the EU and its candidate member Turkey.

*Keywords:* The EU; Turkey; CO<sub>2</sub> Emission s; Environmental economics; Low Carbon Economy

### **1.Introduction**

Renewable energy, nowadays also used as alternative energy, is the new phenomenon on the way for sustainable development and for an environmentally integrated energy policy. It is also the most probable way for the European Union countries to meet their Kyoto targets when producing energy. Recently, energy awareness has made great strides in the EU and Turkey. Therefore, economics theory suggests that policies which use price incentives to attain pollution targets are generally superior to regulatory controls in terms of the costs of meeting the desired standard.

In terms of the enhanced greenhouse effect, the most important greenhouse gas-GHG- is carbon dioxide, and the major source of emissions of this gas is the burning of fossil fuels such as oil, gas, and coal.

The EU 2020 strategy has already made out of clean energy a top political priority against carbon dioxide emissions .According to this strategy it is time to invest more in renewable energy such as solar power, wind, hydrogen etc. The dilemma of energy supply and global warming represent serious challenges for the EU.

Therefore, Turkey, should lead on a range of policies, from the reduction of fossil energy use to the promotion of decentralized energy production, especially through low carbon energy and renewable energy sources.

As the World Bank's World Development Report 2010 argues, "Economic growth alone is unlikely to be fast or equitable enough to counter threats from climate change, particularly if it remains carbon intensive and accelerates global warming. So climate policy cannot be framed as a choice between growth and climate change. In fact, climate-smart policies are those that enhance development, reduce vulnerability, and finance the transition to low-carbon growth paths." (World Bank, 2009)

Environmental issues do not only have financial consequences, but from part of a company's legal and moral obligations towards the broader environment in which it functions as a corporate citizen.(Havenga:2009:194) In this respect, building products and system solutions based on renewable raw materials can make an essential contribution to the environmental problems.

The remainder of the paper is structured as follows; after the introduction in Section 2 Turkey's industrialization and low carbon economy is discussed. Section 3 discusses future of the EU and CO<sub>2</sub> emissions. Section 4, draws attention to the importance of energy policy in Turkey's accession to the EU. Final section is conclusion.

## **2. Global Coordinates of Turkey's Industrialization and Low Carbon Economy**

Having not completed her industrialization process yet, Turkey is neither a wealthy nor a rich country. Meanwhile, industrialization is Turkey's chosen instrument for economic development. Turkey can be classified as an energy dependent country and in order to meet industrial take off it must benefit from renewable energy sources.

IEA's 2009 report projects that world CO<sub>2</sub> emissions will rise from 29.0 billion metric tons in 2006 to 33.1 billion metric tons in 2015 and 40.4 billion metric tons in 2030, which accounts 39 % of increase, as shown in Fig.1.

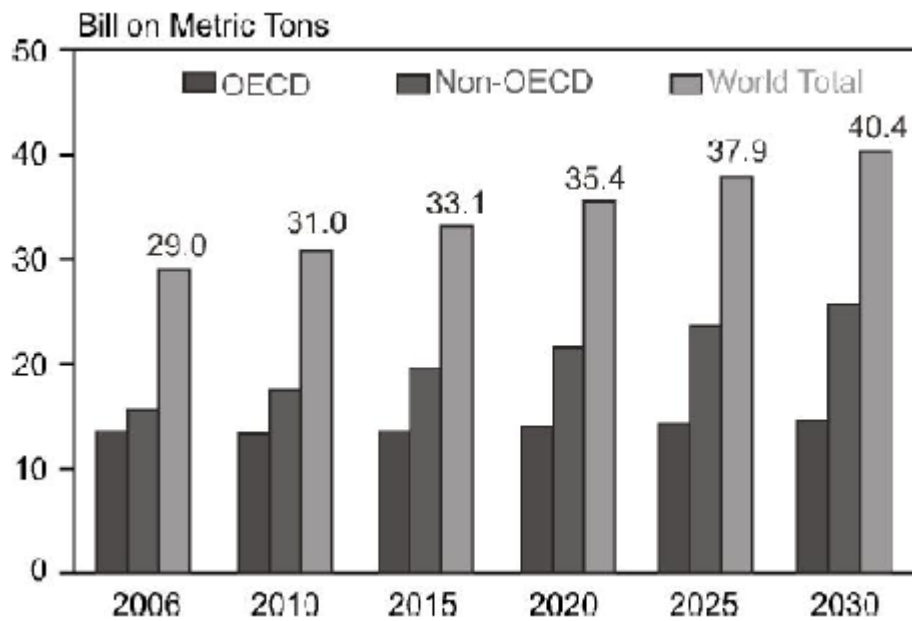


Fig.1:World CO2 Emissions between 2006-2030 period

Source: EIA, World Energy Projections Plus, 2009.

### 2.1 The Environment Policies versus Turkey's Industrialization

The problem of climate change is commonly associated with CO<sub>2</sub> (carbon dioxide) emissions and its accumulation in the atmosphere so that most policy and response options are focused on regulation of its emissions.(IPCC:2011)

Industrialization is Turkey's chosen instrument for economic development. Modernizers have long struggled to build a modern industrial system that would help restore the country's economic power. The country's first factories processed food-stuffs ,such as sugar and flour, and non-durable consumer goods ,such as textiles and footwear. Next came intermediate industrial products ,including iron and steel ,chemicals, cement, and fertilizer .By the end of the 1970s,the country was developing capital goods industries and high-technology products.(Pitman:1988:205) After the 24th January 1980 Decisions, Turkey introduced trade liberalization and extensive policy changes into her economic life and manufactured products replaced agricultural products in Turkey's export composition.

Similar to the international process, environment started to take place in the agenda of Turkish politics in the 1970's. Turkish environmental policies are based on the belief that environmental problems occur due to inadequate per capita income distribution and inefficient use of natural resources hence environmental

policies should not hamper industrialization and economic growth.( Mengi,A and Algan,N :2003:228)

The most of the environmental problems in Turkey are mainly caused by the fact that it has been developing for many decades. In order to tackle underdevelopment, the governments supported rapid industrialization, which in turn paved the way for unregulated urbanization and environmental problems in Turkey. Concentration of the industrial sector in specific cities also resulted in internal migration, which in turn deteriorated the effect of industrialization. The industry on the other hand, perceived environmental regulations as a drawback for economic growth and industrialization.( Baloğlu:2009:165 ) According to Fig.2 below, some developing countries grow rapidly in industrial sector and catch the developed countries in terms of GDP and emissions, including Turkey. Therefore, it is projected that developing countries will overtake total emissions from the developed world by 2020.

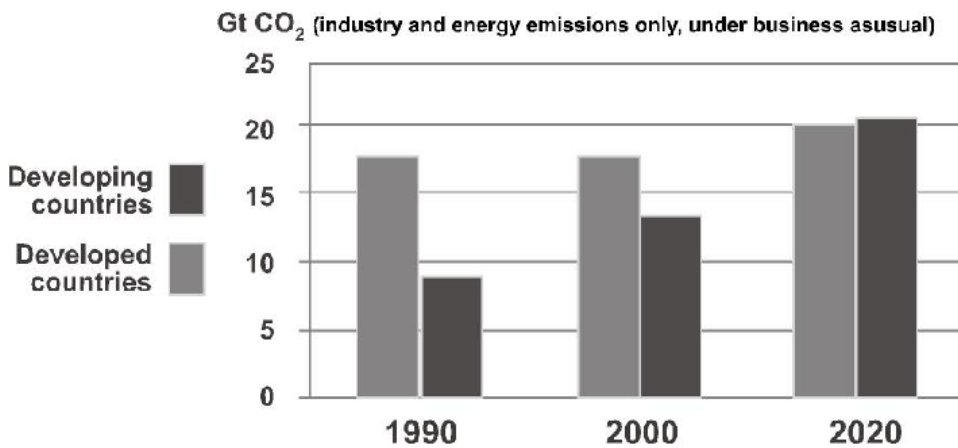


Fig.2 :Projected Greenhouse Gas Emissions in Developed and Developing Countries

Source: EC, European Commission, , 2009.

In Turkey ,over 40 percent of all energy is used by the industrial sector and nearly 35 percent in the residential sector. The rest is split between transportation and commercial services. Industry in Turkey is energy intensive, with the iron and steel manufacturing and cement production sectors by far the largest energy users. Industry accounts for over half of total carbon dioxide emissions, with the residential and transportation sectors contributing roughly one-fifth each. Turkey's high rate of growth in energy-related emissions is expected to continue and even increase, leading to a projected emissions level of almost 210 million tons in 2020. (Atamer,SA and Chandler,W :2002:46) Besides ,industrialization in Turkey,

effective policies in the building sector are of crucial importance, as the housing is responsible for a large amount of greenhouse gases emitted into the atmosphere.

## *2.2 Low Carbon Economy and Turkey*

The new industrial revolution and the transition to low-carbon growth constitute a very attractive path. It is likely to bring two or three decades of innovative and creative growth and large and growing markets for the pioneers. Low-carbon growth, when achieved, will be more energy-secure, cleaner, safer and more bio-diverse than its predecessors. (Stern :2010:8)

Current trends in energy use and energy policies are not sustainable since the world has scarce resources and carbon dioxide (CO<sub>2</sub>) emissions continue to rise in the atmosphere, which in turn accelerate global warming. It has been established that the CO<sub>2</sub> emissions, which are largely traced to energy use, constitute the largest contribution among major green house gases. Energy-related carbon dioxide now accounts for 61–65 % of global greenhouse gas emissions.( IEA: 2008)

In order to identify investment decision in countries with low CO<sub>2</sub> per GDP or with high CO<sub>2</sub> per GDP ratio we consider the median of distribution of the countries' mean of CO<sub>2</sub> intensity. Countries that have mean of CO<sub>2</sub> intensity under the median level are considered low carbon economies while countries that are in the upper tail of distribution (over the median) can be considered high carbon economies. The sample has been split into two subsamples. The former which includes low carbon countries, and the latter including the remaining countries. Low carbon economies is a complex concept because involve a series of long-term policy plans in areas such as transport, energy and climate change. The first subsample, including Austria, Sweden, and Switzerland is made up of the low carbon economies. The second subsample comprising the countries with high CO<sub>2</sub> per GDP: Australia, China, India, S.Korea, Netherlands, Turkey and USA. (EC: 2011)

According to the EC's classification above with high CO<sub>2</sub> ;Turkey's high rate of energy-related carbon emissions growth is expected to accelerate, with emissions climbing from 57 million tons in 2000 to almost 210 million tons in 2020. Carbon intensity in Turkey is higher than the western developed nation average.

In addition ,industrial energy demand is expected to represent about 54 percent of total consumption in 2020, consistent with the rapid industrialization expected over that period. In contrast to most developed and many developing countries, Turkey's industrial energy use is expected to increase as a share of total consumption. Car ownership and distances travelled are expected to rise, as is electricity consumption per dwelling, especially for space heating, water heating, cooking, and other thermal uses. (Atamer, SA and Chandler, W :2002:4-49)

On the other hand, some countries, however, show a clear dynamic: Brazil, China, India and Turkey: these countries show a marked increase in their share of world

production provided by a low production efficiency and high rate of pollution from carbon dioxide. In particular, Brazil and, even more, Turkey, faced with a significant increase in production, seem to have definitely opted for conventional production processes. (Romano:2011:8)

Turkey needs technology transfer and financial support in the access to low carbon economy. Turkey should switch to low-carbon development, employing national efforts and international support. In addition, the government and industry should further strengthen their capacities and cooperate at international and national levels. In this respect, possibilities to participate in the new emissions trading mechanisms should be utilized. ((Baloğlu:2009:205)

Indeed, non-OECD emissions are projected to exceed OECD emissions by 77 % in 2030. However this picture changes dramatically, when countries and regions are ranked according to CO<sub>2</sub> intensity of output, reflecting the greater energy efficiency and less carbon-intensive energy mix of more developed economies in emerging countries, lower energy efficiency and their rising contribution to world GDP growth, has contributed to the moderation in energy efficiency gains observed at the world level in recent years.(OECD:2008:9)

### **3.The Enlargement of the EU and CO<sub>2</sub> emissions**

The ecologic concerns and environmental problems go beyond the state borders, just like money and information. Today's environmental policies are largely devoted to fostering the development and implementation in the EU of renewable energy technologies.

According to an analysis by Jaccard et al. 2003; Soytaş and Sarı, 2009, it has reached consensus worldwide that greenhouse gas (GHG) emissions due to anthropogenic causes are contributing to the ongoing global warming. In fact, the overall economic growth is based on traditional fossil fuels and, particularly, on a return to significant use of coal resulting in increased CO<sub>2</sub> emissions arising from the energy sector.

The enlargement of the EU brought both positive and negative effects on environment. With this process, there is not only some new important assets such as wider and richer range of habitats and land spaces, but also more animal and plant species represents an important challenge for EU environmental policy in the area of capacity building and requirement of additional financing needs in order to support implementation of the *acquis communautaire* by all member and candidate states plays an important role mainly for the countries of Central and Eastern Europe since it helps to accelerate their environmental policies and maintaining good practices.

Concerning the further efforts to decrease the emissions towards low carbon economy, there is an agreement on future targets on CO<sub>2</sub> emissions from cars with

an average emission limit of 130 grams/km to be applied to 65% of new cars in 2012, rising gradually to apply to all cars from 2015. In addition, Parliament and the Council adopted a revised Fuel Quality Directive, which requires a life-cycle GHG emission reduction of 6% for transport fuel by 2020. (EC: 2009:15)

The EU is the third biggest CO<sub>2</sub> emitters in the world, so that it can be assumed that the EU has polluter interests. On the other hand, energy efficiency is very important for the EU due to its dependency on energy imports so that European companies have been working on energy efficient technologies and renewable energies. Hence, international regulations favouring these technologies are for economic interest of these companies since the abatement costs are still moderate within the EU while providing economic gains. There are many advantages of fighting against climate change in Europe and the world. First of all, the air quality improves through the measures to reduce CO<sub>2</sub> and methane concentrations in the atmosphere so this promotes positive effects on human health. Moreover, the measures taken for controlling the climate change improve energy security of Europe. In addition, the introduction of new energy systems leads creating new jobs.

The study of the European Trade Union Confederation indicates that the overall impact of climate change policies on employment will be positive. For example, the Biomass Action Plan is estimated to create 250.000 to 300.000 additional jobs in the EU. In addition, wind energy is developing quickly. Only in Germany, Denmark and Spain, 120.000 people are working in this sector and its potential is expected to increase in the upcoming years. EC, European Commission, Communication on the *"Mid-term Review of Industrial Policy: a Contribution to the EU's Growth and Jobs Strategy"*, COM/2007/374, Brussels. (Baloglu:136) In January 2008, the European Commission put forward the Climate Action and Renewable Energy Package and European Parliament and Council reached an agreement on the package in December 2008. In this respect, the EU is committed reducing its overall emissions to at least 20% below 1990 levels by 2020 as well as increasing the share of renewables in energy use to 20% by 2020.

Moreover, the EU declared that it is ready to commit 30% reduction of GHG emissions under a new global climate change agreement when other developed countries make comparable efforts. The overall EU effort appears approximately adequate to meet Kyoto obligation, which is to reduce emissions collectively 8% comparing to 1990 levels in 2008-2012 commitment period. However, the EU has to more comprehensive actions in order to meet new stated commitments. (Baloglu:2009:139)

The EU has an essential role to bridge domestic and international dimensions of environmental policy. On the one hand, the EU establishes its own common environmental policy while taking into consideration social, economic, political and ecological differences of the Member States. On the other hand, the EU has been one of the most enthusiastic parties to various international environmental agreements, particularly in the issue of climate change. In this respect, the EU has

unique supranational responsibilities, which are inherited from the European Community to the European Union. Regarding the environmental policy, the EC has shared competence so that the EU institutions do not act separately from the Member States. Therefore, it plays a bridging role between its member states and broader international Community. (Kramer,L; 2004:58)

Since 2005, the EU has its own internal industry carbon emissions trading scheme, and thus, at the time being, it is not obvious that there will be trade in emission permits across countries participating and non-participating in EU's trading scheme. We assume that in a Kyoto follow-up agreement after 2012, the EU does not deny its member states the right to meet their obligations by permits purchased from other countries participating in the agreement. (Eyckmans and Hagem:2009:4)

As the main driver of Kyoto regime, the EU claims that, for a realistic action, concerning the national circumstances, developed countries should have about 30% collective reduction by 2020. Moreover, the EU claims that "advanced developing countries" should have commitments to set their own binding emission targets and should limit the rise of GHG emissions in 2020 by 15% to 30% below "business as usual" projections. The EU claims that the collective emissions reduction by developed countries must be shared out fairly in a way that ensures each country to make a comparable effort. Therefore, the EU asks the distribution of the overall targets on the basis of responsibility of each country for emissions and its capability to reduce them emissions. (EC,2009:23)

#### **4. The Importance of Energy Policy in Turkey's Accession to the EU & Kyoto Protocol**

The accession negotiations of Turkey to the EU were launched on October 3, 2005 following the adoption of the Negotiation Framework by the Council of the EU. The launch of negotiations initiated a new stage between the EU and Turkey. During the negotiations, Turkey is expected to adapt to the EU Acquis by harmonizing its rules and procedures with those of the EU. In addition to this complex structure, Turkey faces considerable financial challenge to harmonize, implement and enforce the EU environment Acquis. "Turkey EU Integrated Environmental Compliance Strategy: 2007-2023" provides a roadmap for harmonization with the EU Environment legislation from 2007 to 2023. Accordingly it is estimated that the cost for compliance with the EU Environment Acquis amounts €14.8 billion to industry and €50 billion to the state. (Baloğlu:2009:181 )

The energy–environment–income nexus poses important challenges to Turkish policy makers, considering the high economic growth rate and high CO<sub>2</sub> growth rate this emerging market experiences as a candidate member to the EU. (Soytas, Sari, 2007:6) Turkey signed the Kyoto protocol on February 17,2009. Therefore to reach the level envisaged in the protocol the status of the main indicators affecting CO<sub>2</sub> emissions should be reviewed and strategic plans must be made within the



context of the compliance with the protocol. Moreover, Turkey is obliged to fulfil the liabilities of CO<sub>2</sub> emissions as a candidate country of the EU. (Alp and Sözen:2011:1678)

Concerning the climate change, the major and foremost demand of the EU was ratification of the Kyoto Protocol by Turkish Government. Screening Report of the European Commission for Turkey in 2008 draw attention to the risk that Turkey might have faced a 'Kyoto criteria' for the opening of negotiations on environment chapter. Finally, Turkey became a party to the Kyoto Protocol in August 2009, but as a late comer Turkey does not have any emission reduction commitment in the first phase of 2008-2012. Turkey's ratification of the Kyoto Protocol is considered as an opportunity to strengthen integration of policies for environmental management and sustainable development into other sectoral development practices. (Dimas: 2009 :2)

In order to transform to the low-carbon economy, there is a need for an overall mental landscape transformation. Since climate policies are related to the various policy areas, such as energy, economy, industry, agriculture and tourism, various measures and reforms in this respect have the capacity of changing the overall outlook of the country. Actually, these measures are, in nature, necessary attempts for a strong, respectable and low-carbon Turkey, in way to the EU accession. The main precondition to achieve this is the active participation of Turkey in post-2012 global climate regime by providing reliable data, information and strategies to place the country in the right list in accordance to its national capacity and responsibilities. Meanwhile, the EU sets ambitious emission reduction targets accompanied with integrated climate and energy policy. In this respect, Turkey is pressured by the EU and the international community to take commitments in the post-2012 climate regime. (Baloğlu:2009:5-211)

Turkey, on the other hand would have a more challenging negotiations regarding the environment chapter. Turkey has more and severe environmental problems compared to Poland and all other enlargement countries, thus will have to make more investments to implement EU Directives.

Compatibility with EU energy policy will also trigger a new phase concerning environmental issues in Turkey. Adoption of EU *acquis* of environmentally related energy measures will bring in benefits for life quality and for economy to Turkey. (Tuncay:2005:80) In 2008, the Accession Partnership Document for Turkey was published. It listed the short term and medium-term priority lists containing the need for transposition, implementation and enforcement of the *Acquis* related to the framework legislation concerning the environment chapter as well as international environmental conventions that the EU is a party. In this respect, it has drawn attention to the fact that Turkey should ratify the Kyoto Protocol, during the EU accession process, since accessing countries are obliged to be a party to all international agreements that the EU takes part. Moreover, it emphasized the importance of integration of environmental requirements into other sectoral policies. (ABGS:2008) In sum; we therefore take a long term perspective and

explore particular areas in which the EU and Turkey could cooperate during the long interim negotiating period. We find that there are a number of areas where closer cooperation would be appropriate, with the exact form of this cooperation varying from one area to another. It ranges from 'virtual membership' to ad hoc cooperation.(Derviř:1:2004)

## 5.Conclusion

Industry in Turkey is energy intensive, with the iron and steel manufacturing and cement production sectors by far the largest energy users.As an problem touching upon all aspects of our life ,what Turkey can't do is keep being dependent on fossil fuels from other countries for her energy needs.

Although there is a growing alternative market for climate friendly, renewable energy technologies, there are still many barriers. In this regard, in the short term changes in individual behaviors can be a clear solution to Turkey's energy problems. For example :We can launch a campaign in high schools/Universities to encourage students to become habituated to simple energy gestures such as using energy-efficient bulbs or switching the light while leaving a room. These small steps may contribute to a better management of energy and subsequently better protection of the environment .Investment in the R&D sector is one of the most important instruments for supporting the development of low-carbon economy on a local level both in the EU and Turkey. Tax system should be reformed in a way it encourages/bussinessmen- citizens to invest in the energy efficiency in order to development of low-carbon economy. To meet energy needs and addressing environmental concerns, there is no better philosophy than "think global ,act regional".

As already shown in Balođlu 2009 study ;as in other developing countries, Turkey felt a trade-off between clean environment and economic-industrial development. Nevertheless, as an OECD member and an accessing country to the EU, Turkey should take an active role in ongoing post-2012 climate negotiations and set strategies in order to limit its rapidly growing emissions in line with sustainable development goals.

Finally, Turkey with weak regulatory powers seek to overcome the lack of competence in the field of energy by developing European or international/Balkans cooperation projects. The only solution for developing sustainable energy projects against carbon dioxide emissions is to grasp financial opportunities offered by the EU and national level.

## References

ABGS, 2008. The Republic of Turkey, Secretariat General for EU Affairs, , "Accession Partnership with the Republic of Turkey", 2008.

Alp,İ and Sözen, A ,2011. Efficiency Assessment of Turkey's Carbonization Index, Energy Sources Part A 33:1678-1691.

Atamer, SA Chandler, W ,2002. Climate change mitigation in developing countries Brazil, China, India, Mexico, South Africa, and Turkey, Pew Center on Global Climate Change.

Baloğlu ,H. ,2009. Sustainable Development and Climate Change Policies: Situation of Turkey as an Accessing Country to the EU, Unpublished PhD thesis ,University of Vienne.

Derviş , K et al ,2004. The European Transformation Of Modern Turkey, Report ;Centre For European Policy Studies Brussels and Economics And Foreign Policy Forum Istanbul.

Dimas,S., 2009. Europe's Contribution to a Low Carbon Economy, available at:<http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/09/21&format=DOC>.

EC, European Commission, “2008 Environment Policy Review”, 2009, Brussels,

EC, European Commission, “EU Action Against Global Climate Change. Leading Global Action to 2020 and Beyond”, Brussels, 2009.

EC, European Commission, “EU Action Against Global Climate Change. Leading Global Action to 2020 and Beyond”, Brussels, 2009.

Eyckmans, J Hagem , C. ,2009. The European Union’s Potential for Strategic Emissions Trading through Minimal Permit Sale Contracts, Cesifo Working Paper No. 2809.

Havenga, MK Esser ,I., 2009. Directors Environmental Responsibilities in South African Law,1st International Conference on Governance, fraud, ethics &social responsibility,June11-14 2009,Edirne/Turkey.

IEA, International Energy Agency, “World Energy Outlook 2008”, Paris, 2008.

IEA, World Energy Projections Plus, 2009

IPCC, Intergovernmental Panel for Climate Change, Third Assessment Report, Climate Change 2001,Impacts, Adaptation and Vulnerability, Geneva, 2001.

Jaccard, M. K., Nyboer, J., Bataille, C., et al., 2003. Modeling the cost of climate policy: distinguishing between alternative cost definitions and long run cost dynamics. The Energy Journal, 24(1), 49 - 73.

Kramer,L 2004 . “The Roots of Divergence: A European Perspective”, in N. Vig and M. G. Faure (eds),*Green Giants? Environmental Policies of the United States and the European Union*, Massachusetts Institute of Technology, 2004 : 53-73.

Mengi,A and Algan,N ,2003. “Küresellesme ve Yerellesme Çağında Bölgesel Sürdürülebilir Gelişme:AB ve Türkiye Örneği”, Siyasal Kitabevi, Ankara, 2003, p 228. See also Keles, Rusen and Can Hamamcı,Çevrebilim, Ankara: Imge Kitabevi, 1997, p.250.

OECD, Organization for Economic Co-Operation and Development, “Environmental Outlook to 2030”, Paris, 2008.

Pitman,M ,1988. Turkey a country study, Library of Congress Cataloguing in-Publication Data,Washington DC.

Sustainable Energy News, Newsletter for INFORSE International Network for Sustainable Energy, No. 48,March 2005.

Romano,AA ,2011 .The Investments in Renewable Energy Sources: Do Low Carbon Economies Better Invest In Green Technologies? International Journal of Energy Economics and Policy Vol. 1, No. 4, 2011, pp. 107-115.

Soytas, U., Sarı, R., 2009. Energy consumption, economic growth, and carbon emissions: challenges faced by an EU candidate member. Ecological Economics, 68, 1667 - 1675.

Stern, N. ,2010. *China's growth, China's cities, and the new global low-carbon industrial revolution*, Policy Paper, Grantham Research Institute on Climate Change and the Environment, LSE, November.

Tuncay, U, 2005. The EU Energy Policy And The Importance Of Energy In Turkey's Accession To The EU, Unp.Master Thesis,M.Ü-EU Ins..

World Bank 2009: *World Development Report 2010*, World Bank, Washington DC.